

# Safedock®

## Manual



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**SAFEDOCK®**  
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## CONFIGURATION SUMMARY

The manual includes chapters/appendices with descriptions for available product options as follows:

- **General Options** - common to most gates/sites.
- **More Options** - specific to gates/sites.

**Note:** Some information may not be relevant to a specific gate/site. You can also check with project or site management for options included in the specific configuration for a gate/site.

The table is a guide to some of the product options available. The configuration summary column can be used as a reference guide to find option information relevant for a specific gate/site.

Product Options	Configuration Summary
<b>General Options</b>	
Operator Panel	Softkey <b>Note:</b> For 30-key Operator Panel information see Manual version 1.5 or earlier.
Safedock Display Type	T1 -42. T2 -18, or -24. T3 -9 or -15. <b>Note:</b> For other type information see Manual version 1.8 or earlier.
Closing Rate Distance	<b>No digital countdown</b> (closing rate bar only) from 15 m (as default) or <b>Digital countdown</b> (including closing rate bar) from 15, 20 (as default), 30 metres or 40 feet.
Stand Configuration	Yes or No
Stand Printout Configuration Utility	Yes or No
<b>More Options</b>	
Battery backup (UPS)	Yes or No
Communication	Yes or No
Camera	Yes or No
Dock Viewer	Yes or No
54 Key Extension	Yes or No
MEWTocol protocol	Yes or No
Bridge Dual Safe	Yes or No
Loader Update	Yes or No
OP Softkey Setup	Yes or No
Adjacency Rules (GOS)	Yes or No
Operation & Maintenance Modes/Operator Panel Key Switches	Yes or No
Other	Yes or No

## WARRANTY

### Project Warranty

The Contractor (Safegate Group or subsidiary Company) hereby warrants that there shall be no significant failure or substantial reduction in performance in the following product or system, the performance criteria for which are as contained within the Project Contract.  
This Warranty shall commence on a specific date, and end on a specific date according to the Project Contract.

The Contractor warrants to the Principal (Customer, agent or sub-contractor) that all work performed and all goods supplied by the Contractor under the above mentioned Project Contract will be:

- at least of the quality and to the standard required by the Contract; and
- of good workmanship and new and of merchantable quality; and
- fit for the purpose or purposes for which they are required.

All materials and workmanship are guaranteed against defect and malfunction for a period of twelve 12 months from the date of successful completion of a Site Acceptance Test (SAT) or of a period of eighteen 18 months from the date of shipment, whichever occurs first according to the Project Contract.

Project Managers  
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### Product/System Warranty

Safegate Group guarantees that the performance of the Safegate Group product/system, when sold by Safegate Group or its licensed representatives, meets the requirements of and is in compliance with standards:

- ICAO: Annex 14 Volume I Paragraphs 5.3.16, 5.3.19 for use in CAT I, II, III.
- FAA: L-852C/K AC150/5345-46C.
- IEC 61827.
- NATO: STANAG 3316.
- STAC.

**Note:** For more information, contact Safegate for compliance with other standards.

Any defect in design, material or workmanship, which may occur during proper and normal use over a period covered by the warranty stipulated in the contract, will be replaced by Safegate Group free of charge, excluding works.

Operational failure resulting from improper installation, damage due to user/operator error, airport maintenance equipment are not considered a result of proper use and is beyond the scope of the warranty.

Any 3rd party products installed or integrated with functionality in a Safegate system without prior consent or support from Safegate causes the warranty to become invalid, as the design specifications can longer be guaranteed.

The above constitutes the limits of Safegate Group liabilities concerning the Safegate Group products/systems.

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## HISTORY

Version	Date	Description
1.0	January 2008	First Release (Single type option)
1.1	July 2008	Projects (All type options)
1.2	January 2009	Projects (All type options)
1.3	May 2009	General update
1.4	October 2009	Feature update
1.5	January 2010	Feature update
1.6	June 2010	Feature update
1.7	November 2010	Minor update
1.8	April 2011	General update
1.9	June 2011	T2 T3 LED update
1.10	April 2012	Drawings update

## ORIGINAL DOCUMENTS

The following is a list of original documents used to create this manual.

File Name	Description
SDK_INTRODUCTION	*
1_SDK_SYSTEM_DESCRIPTION	*
2_SDK_INSTALLATION	*
2A_SDK_IN_Quick_Guide	*
2B_SDK_IN_Config_Commission	*
2C_SDK_IN_Communication	
2D_SDK_IN_Camera	
3_SDK_OPERATION	*
3A_SDK_OP_Pilots_Guidelines	
3B_SDK_OP_Features	
3C_SDK_OP_AdjacencyRules	
3D_SDK_OP_OM_modes	
3E_SDK_OP_Ramp	
3F_SDK_OP_Guidelines	
3G_SDK_OP_ICD_Example_PBB	*
4_SDK_MAINTENANCE	*
4A_SDK_MA_StandConfig	
4B_SDK_MA_StandPrint	
4C_SDK_MA_DockViewer	
4D_SDK_MA_54KeyExtension	
4E_SDK_MA_MEWTocol	
4F_SDK_MA_BridgeDualSafe	
4G_SDK_MA_LoaderUpdate	
4H_SDK_MA_OPSoftkeySetup	
5_SDK_DRAWINGS	CHAPTER 5. DRAWINGS list
Various drawings - see Chapter 5.	Standard Drawings examples.

**Note:** This page is to be updated with every authorised change to the manual.

An asterisk \* denotes chapter/section information changed since previous release.

## INTRODUCTION

This manual has been compiled to give the reader an understanding of installation, operation and maintenance (IOM) procedures of the Safedock® Advanced Visual Docking Guidance System (A-VDGS), with a focus on safety and efficiency.

The manual includes chapters/appendices with contents for quick access to information as follows:

### Introduction

Information about configuration options, warranty, copyright, version history, original documents used to create this manual, a general contents list for quick access to information. Contents are also included at the beginning of each of the main chapters for quick access to information. Safety Information including Laser Safety Information, abbreviations, and a glossary of terms,  
**Note:** *It is important to read the General and Laser Safety Information.*

### Chapter 1 – System Description

A system overview of the constituent system parts with a detailed technical description. A description of system architecture and the components involved.

### Chapter 2 – Installation

Guidance to system installation engineers with references to software programming instructions, calibration procedures and cross references to the Maintenance chapter.

**Note:** *Appendix documents may be included with this chapter, options if required.*

### Chapter 3 – Operation

A description of procedures used for system operation and itemized docking.

**Note:** *Appendix documents are included with this chapter, options if required.*

For example, a User Guide Appendix (with instructions to pilots) gives an explanation of signs and signals in a Safedock system. A Safedock Features Appendix provides information about the optional operational features in the system.

### Chapter 4 – Maintenance

A system designed to minimize maintenance downtime. The maintenance of equipment is described at assembly level only. For example, if a fault is traced to a defective circuit board, the complete circuit board is replaced. No provision is made in this manual for repair at component level. The chapter also includes high-level maintenance procedures and fault diagnosis information.

**Note:** *Appendix documents are included with this chapter, options if required.*

### Chapter 5 – Drawings

This chapter contains drawings and parts lists.

**Note:** *Check with project or site management for Safedock options included in the specific configuration for a gate/site. Specific information (non-standard) may require Addendum documents.*

## SAFETY INFORMATION

Safedock® Advanced Visual Docking Guidance System is an aircraft parking aid for airport and aircraft safety and efficiency. The design is according to strict airport industry standards for the safety of, and use by authorised airport personnel.

**Note:** The appendix document, Chapter 3 Operation – Appendix A, Pilots Guidelines must be distributed to all airlines using the system.

### Airport Operations, Maintenance and other Authorised Personnel

This information is a summary of the safety requirements on operation and maintenance personnel based on general electrical and laser safety precautions.

**Note:** It is very important for authorised personnel to study this section before any operation or maintenance work on the system is commenced.

Safedock® should only be used by airport operations and maintenance personnel who have been properly trained in the use of the system. Safegate takes no responsibility for incorrect use of the system. All warnings contained in the text of this manual must be strictly observed.

Airport operations and maintenance personnel are strongly advised to observe the following symbols and safety advisories.

Symbol	Safety Advisory
	Safedock® Docking Guidance System contains electrical circuits and laser emitting devices, which may be hazardous to operators and maintenance personnel, if proper safety precautions are not observed. Only properly trained personnel should open enclosures or attempt to perform maintenance on these devices. Personnel are cautioned to read and thoroughly understand this manual before attempting to service this device.
	Safedock® Guidance Docking System contains 100 - 230 VAC electrical circuits that may be hazardous to operators or maintenance personnel if proper safety procedures are not observed. Remove power before attempting to service this device. Power may be turned off at the main disconnect circuit breaker inside the Display cabinet or at the breaker panel supplying AC power to the unit. <b>CAUTION: SOME SYSTEMS ARE SUPPLIED WITH A REMOTE UPS, WHICH MAY CONTINUE TO SUPPLY POWER TO THE SYSTEM, EVEN WHEN THE BREAKER AT THE SUPPLY PANEL IS SWITCHED OFF. BE SURE TO REMOVE ALL POWER, BEFORE SERVICING THIS EQUIPMENT.</b>
	A chassis ground connection is provided inside the cabinet. Be sure to follow all applicable codes in making chassis ground connections.

Symbol	Safety Advisory
 <b>CLASS 1 LASER</b> Complies with 21 CFR 1040.10 - 11 & IEC 60825-1	<p><b>Laser Safety Information</b></p> <p>Safedock® Docking Guidance System is a Class 1 laser product, which means that it is safe under foreseeable conditions of operation, including the use of optical instruments for intra beam viewing.</p> <p>The lower compartment of the Display unit contains a Laser Range Finder, which is a Class 1M laser product. A Class 1M laser product is safe under foreseeable conditions of operation, but may be hazardous, if the user employs optical instruments within the beam, e.g. binoculars or telescope.</p>
	<p><b>Invisible Laser Radiation</b></p> <p>The laser output from this system is within Class 1 limits (USA FDA 21 CFR 1040.10 – 11 and IEC 60825-1, Edition 1.2, 2001-08) as long as the range finder is installed and operated as specified by Safegate. If operated in any other fashion than described, the range finder is capable of emitting radiation up to Class 1M limits.</p>
	<p><b>Eye Safety</b></p> <ol style="list-style-type: none"><li>1. Safegate accepts no liability for the misuse of its equipment or for the consequences of this misuse.</li><li>2. Safegate recommends that eye safety procedures be followed in accordance with ANSI Z136.1 – 1993 or IEC 60825-1 during maintenance.</li><li>3. The laser beam exiting the window of the Safedock enclosure is within Class 1 limit for eye safety, when the product is operated as specified by Safegate.</li><li>4. To provide eye safety the user is advised to treat this laser unit as a Class 1 M laser product. Class 1 M denotes lasers or laser systems that can produce a hazard if viewed through light collecting optics such as binoculars. For the laser the following values apply:<ul style="list-style-type: none"><li>• Pulse width ~ 10 ns</li><li>• Wavelength 905 nm</li></ul></li><li>5. If the laser by any reason should be switched on and used outside the docking system, safety procedures may include, but are not necessarily limited to the following:<ul style="list-style-type: none"><li>• Do not stare into the laser beam.</li><li>• Do not view the beam with binoculars or other devices that collect light.</li><li>• Do not point the laser at people.</li></ul></li></ol> <p><b>CAUTION:</b> DO NOT POINT THE LASER RANGE FINDER AT THE SUN.</p>

## ABBREVIATIONS

Abbreviation	Description
AC	Alternate Current
ACC	Apron Control Centre
ALB	Aircraft Loading Bridge
ATA	Actual Time of Arrival
ATD	Actual Time of Departure
A-VDGS	Advanced Visual Docking Guidance System
CL	Centre Line
COTS	Commercial Off-the-shelf Items
CPU	Central Processing Unit
CR	Communication Room
CU	Control Unit of Docking System
DC	Direct Current
DGS	Docking Guidance System
ESD	Electrostatic Discharge
ETA	Estimated Time Of Arrival
ETD	Estimated Time Of Departure
FAT	Factory Acceptance Test
FIDS	Flight Information and Display System
GMS	Gate Management System
GOS	Gate Operating System
HMI	Human Machine Interface
I/O	Input/ Output
ICD	Interface Control Document
IOM	Installation Operation Maintenance
ISO	International Standardisation Organisation
IT	Information Technology
LCC	Life Cycle Cost
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LRU	Line Replaceable Unit
MDT	Mean Down Time
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
NTP	Network Time Protocol
OP	Operator Panel unit
PBB	Passenger Boarding Bridge
PCB	Printed Circuit Board
PD	Pilots Display unit
P/N	Part-number
QCP	Quality Control Plan

<b>Abbreviation</b>	<b>Description</b>
RAM	Random Access Memory
RH	Relative Humidity
RVR	Runway Visual Range
SAT	Site Acceptance Test
SBU	Safety Back-up
SMGCS	Surface Movement Guidance & Control System
S/N	Serial Number
SQL	Structured Query Language
STA	Scheduled Time of Arrival
STD	Scheduled Time of Departure
TCP/IP	Transmission Control Protocol/Internet Protocol
U/S	Unserviceable/ Out of Service
UPS	Uninterruptible Power Supply

## GLOSSARY OF TERMS

<b>Term</b>	<b>Description</b>
Active state	The A-VDGS is scanning the stand area for an approaching aircraft.
Alphanumeric display/ Text display	The upper portion of the LED display. It is used as a text display capable of displaying two lines of alphanumeric characters, or one line of double height characters.
A-VDGS Maintenance software	A software system run on a PC connected to the A-VDGS. It is used to install/update software on the A-VDGS and to perform calibration and configuration of the A-VDGS. The same as 'Stand Configuration Utility'.
Azimuth display	The middle portion of the LED display. It is used to indicate the lateral position of the aircraft relative to the centreline. It is also used to give a red indication (stop bar) to indicate stop or error.
Block-Off transaction/ Chock-Off transaction	A message sent from GOS to FIDS when an aircraft is detected to leave a stand. The message can be used for billing purposes.
Block-On transaction/ Chocks-On transaction	A message sent from GOS to FIDS when an aircraft has reached the stop position. The message can be used for billing purposes.
Calibration control	A procedure performed at the start of each docking procedure. It verifies that the system is in operation condition.
Capturing/ Capture Mode	The A-VDGS is scanning the stand area for an approaching aircraft.
Chocks-On	The action of placing the chocks onto the wheels of the aircraft after it has reached the stop position.
Closing rate display	The lower portion of the LED display. It is used to indicate the distance remaining to the stop position for the approaching aircraft.
Control Unit	The processing centre for the A-VDGS system. It is mounted in the same cabinet as the display unit.
Docking Guidance System	A system providing visual information to the pilot about an aircraft's position relative the centreline and stop position. It acts as an aid for the pilot to manoeuvre the aircraft to the correct parking position.

Term	Description
Docking log/A-VDGS log	Each A-VDGS will retain a detailed log of the last docking procedure. This docking log can be uploaded using the Maintenance PC, or be automatically uploaded to a GOS concentrator.
Docking procedure	The procedure by which a A-VDGS leads an incoming aircraft to the predefined stop position. It consists of aircraft selection by operator, system self-test and a calibration control, Capture, Tracking and Identification.
Laser Range Finder/ LRF	A measuring device using laser pulses to measure the distance to an object.
Laser Scanning Unit/ Laser Unit	A device made up of a Laser Range Finder and two mirrors mounted on stepper motors. The device uses the two mirrors to direct the laser pulses from the LRF in two dimensions, resulting in a three-dimensional scan of the stand area.
LED Display Unit	The A-VDGS system uses a display consisting several 8x8 dot 'light emitting diode' boards to display text, azimuth and closing rate information to the pilots.
Maintenance PC	A PC used to run the A-VDGS maintenance software. It can be a portable PC connected locally to an A-VDGS, or a stationary PC connected to the units through GOS.
Operators Panel/ Operators Control Panel	The operator panel is the primary source for operator input to the A-VDGS system. It consists of an LCD display for status information and function keys for operator input.
Scheduled Docking	A pre-planned incoming flight, consisting of Aircraft type, flight number, stand and scheduled/estimated/actual time of arrival. GOS can use this information to initiate the docking procedure at the appropriate stand. The Scheduled docking will be presented at the A-VDGS, for approval of the marshal.
Short log	Each A-VDGS keeps a brief record of the last 100 docking procedures. This short log can be uploaded using the Maintenance PC for later review using the GateConfigPrint.exe program.
Stand configuration file	A complete configuration for an A-VDGS system can be stored on disk in a stand configuration file (.GTE). This file can be used to review and print the stand configuration using the GateConfigPrint.exe program. The file can also be used to restore the configuration for a in case of a hardware breakdown.
Stand Setup/ Stand configuration	The process of configuring a stand for operation. This process includes defining the centreline to use and selecting the aircraft types to allow and defining their stop positions.
Tracking/ Tracking Mode	The A-VDGS has found an incoming aircraft, and is in the process of leading it to the predefined stop position.
Walk test	A test procedure used to verify the operation of an A-VDGS system.

**CHAPTER 1**  
**SYSTEM DESCRIPTION**  
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## 1. EQUIPMENT AND SYSTEM DESCRIPTION

### 1.1 GENERAL

#### 1.1.1 Brief System Architecture

The figure A-VDGS SYSTEM OVERVIEW is an overview of the Safedock Advanced Visual Docking Guidance System (A-VDGS). The following section is a brief description of the A-VDGS and its sub units.

- (a) The A-VDGS main unit consists of a real time LED Display Unit, a Control Unit and a Laser Scanning Unit, all these housed in the same cabinet.
- (b) The system also includes an Operators Panel, comprising an LCD display screen and an Emergency stop push-button, or optionally a 'Clear Gate' button. The Operators Panel is mounted at Apron level.
- (c) The Laser Scanning Unit is based on 3D- measuring technology to effect a safe docking procedure, when an aircraft approaches a terminal stand. The Laser Range Finder (LRF) transmits distance data from the approaching or departing aircraft to the Control Unit for processing.
- (d) The Control Unit transmits processed data results for presentation on the Display Unit, the Operators Panel and to the Advanced Visual Docking Guidance System Central Computer, GOS.

#### 1.1.2 Design Objectives

Important design factors are:

- (a) Commonality of components to reduce customer stock of essential spares.
- (b) Analysis for successful long-term operation.
- (c) Knowledge of aircraft characteristics and the recognition of the unique factors in any airport requirement, responding in a highly cost effective technology.
- (d) Human-Machine-Interfaces of the SAFEDOCK system has been designed in co-operation with customers and end-users, and has been developed from the experience of systems, previously delivered, with the objective to achieve a high degree of safety, guidance readability and operational efficiency.

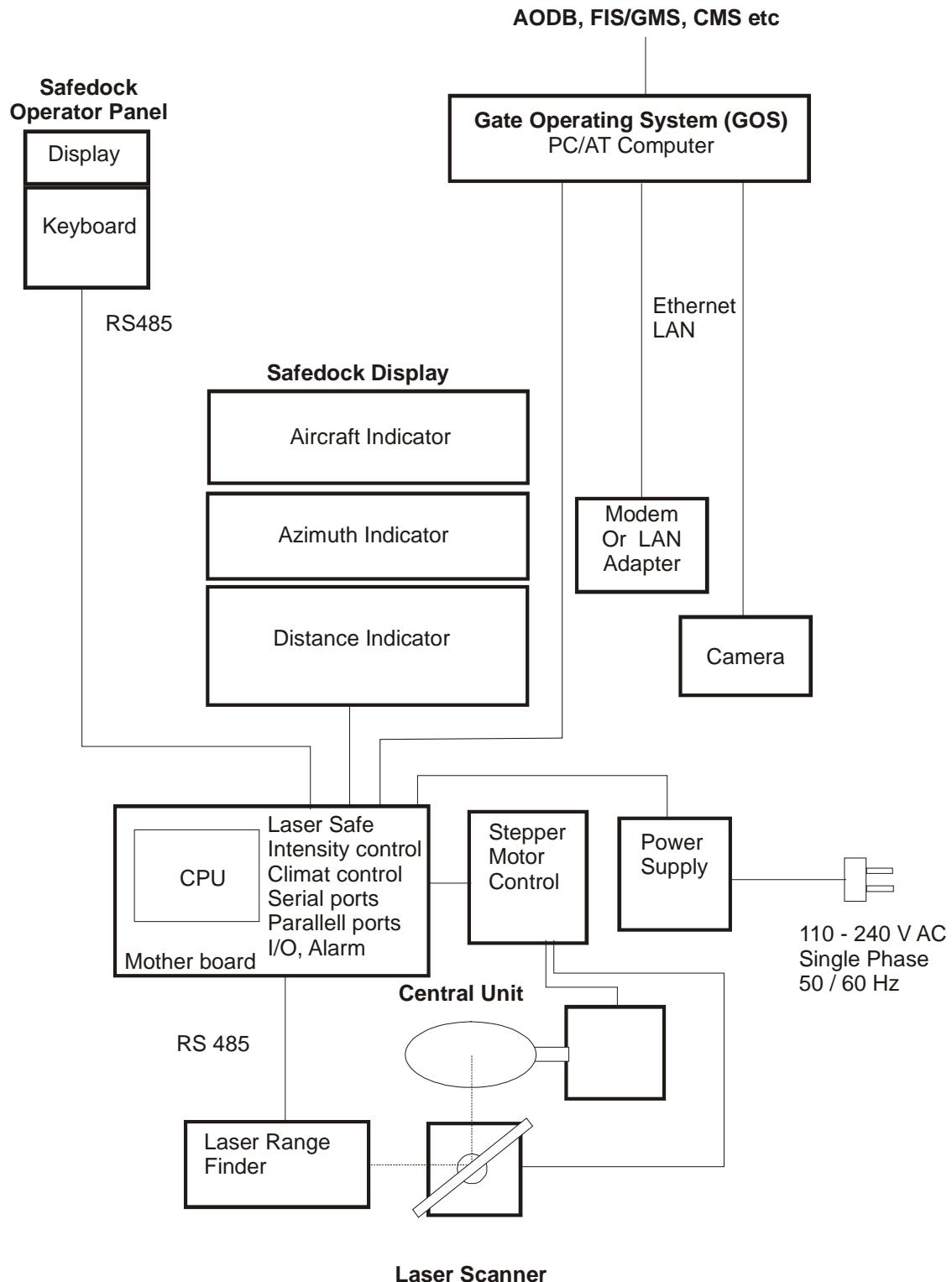


FIGURE 1.1 - A-VDGS SYSTEM OVERVIEW

1.2 A-VDGS SYSTEM SUB-UNITS

1.2.1 Display Unit

1.2.1.1 General

The Display Unit incorporates three different indicators for alphanumeric, azimuth and closing rate information, clearly visible from both pilot positions in the aircraft cockpit.

The Display comprises a set of LED (light emitting diode) indicators, yellow and red indicator boards, each housing a processor board connected in series to the Control Unit.

The upper rows are used for alphanumeric information, the next row for azimuth information and the lower section for closing rate information.

1.2.1.2 Alphanumeric Information

The alphanumeric display, shown in yellow, will present information such as abbreviations for Aircraft type, Airport code and Flight number. Special guiding text information is also displayed to the pilot during the docking phase.

1.2.1.3 Azimuth Guidance Indicators

The azimuth guidance indicator, often displayed as red arrows, gives information on how to steer the aircraft. A yellow vertical arrow shows the actual position of the aircraft in relation to the Centre-Line.

1.2.1.4 Closing Rate Indicator

The closing rate indicator, shown in yellow, comprises 24 - 62 horizontal elements, building a vertical column, the centre-line symbol. Each element represents 0.3 – 0.6 metres.

1.2.1.5 Legibility of Displayed Information

The displayed information is readable in direct sunlight, reflections and back-light.

This is achieved through the use of:

- (a) Automatic adjustment of LED light intensity.
- (b) Use of dark coloured LED-boards.

1.2.2 Control Unit

The Control Unit, located with, or inside, the Display Unit, comprises a motherboard with a microprocessor unit, and two stepper motor drive boards. It continuously monitors and controls the operation of the docking guidance system.

The Control Unit is designed for real time processing of measured distances, handling of communication lines, stepper motors, temperature control, display's light intensity control and safety control of the Laser Range Finder.

Software and parameters are stored in non-volatile memory.

Communication to a Central Computer System (Gate Operating System/GOS) is by means of a balanced current loop Modem or optionally an Ethernet LAN adapter.

1.2.3 Laser Scanning Unit

1.2.3.1 General

The Laser Scanning Unit comprises the following sub-units:

- (a) Laser Range Finder.
- (b) Vertical Scanning Mirror and stepper motor.
- (c) Horizontal Scanning Mirror and stepper motor.

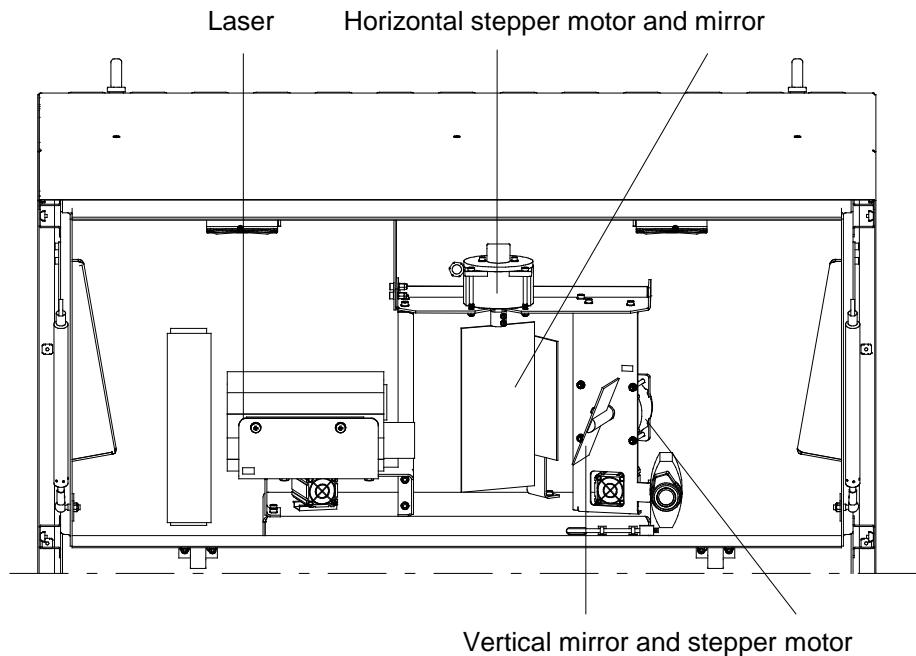


FIGURE 1.2 - SAFEDOCK T1 LASER SCANNING UNIT

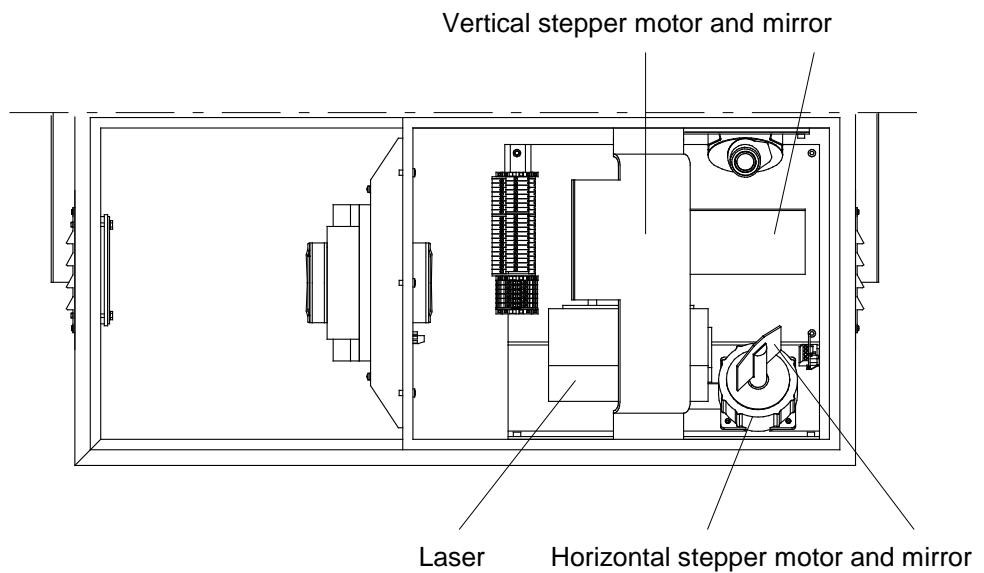


FIGURE 1.3 - SAFEDOCK T2/3 LASER SCANNING UNIT

The Laser Scanning Unit is housed in the lower part of the Display Unit Cabinet. The unit, based on 3D-technology, consists of a Laser Range Finder, comprising both a transmit and a receiving lens. The unit also incorporates a fixed mirror used with the calibration procedure to facilitate an accurate setting of the Docking Guidance System.

**WARNING: Invisible Laser Radiation**

The laser output from this system is within Class 1 limits (USA FDA 21 CFR 1040.10 – 11 and IEC 60825-1, Edition 1.2, 2001-08) as long as the range finder is installed and operated as specified by Safegate. If operated in any other fashion than described, the range finder is capable of emitting radiation up to Class 1M limits.

#### 1.2.3.2 Functional Description

When a docking process has been started, the Laser Range Finder transmits infrared pulses, scanning both vertically and horizontally via a stepper motor controlled mirror system, to detect an approaching aircraft.

The distance to the aircraft is determined by the elapsed time, taken for the infra red pulse to be transmitted and received by the Range Finder. The Control Unit, which handles the positioning of the scanning mirrors, uses the distance values, obtained from the Laser, to determine the location of the aircraft, in relation to its required stop position.

#### 1.2.3.3 Laser Scanning Area

During capturing mode the scanning area is 10 degrees in a vertical plane, subject to change. When an aircraft has been captured, the laser will follow the aircraft in a scanning area according to the Safedock type in following figures.

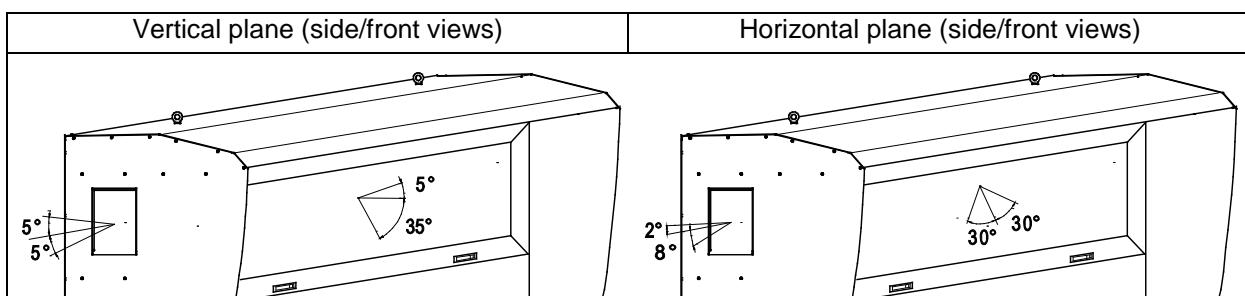


FIGURE 1.4 - SAFEDOCK T1 LASER SCANNING AREA

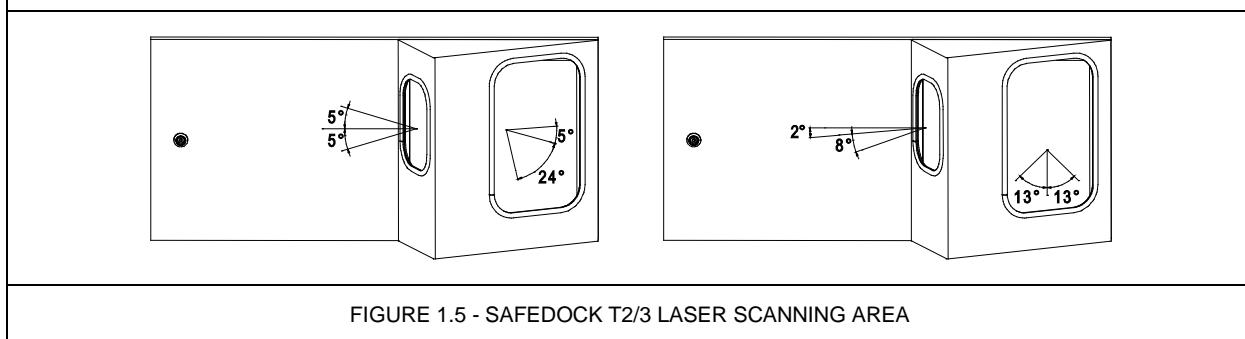


FIGURE 1.5 - SAFEDOCK T2/3 LASER SCANNING AREA

**1.2.3.4 Mirrors and Stepper Motors**

This part of the system comprises a vertical and a horizontal mirror assembly, each controlled by a stepper motor. See Figure 1.2.

**1.2.4 Power Unit**

Required power supply: 115/230VAC  $\pm 10\%$ , 50/60Hz

The Power Unit generates DC (24V in T1, 21V in T2/3) to the Control Unit, the Display Unit, the Laser Scanning Unit, and to the Operator Panel. The system has an over-voltage protector and a power line transient filter.

**1.2.5 Battery Backup Unit (Option)**

Optionally a battery unit can be installed to back up power line failures for at least one minute. Lead-acid batteries are used, and the maximum capacity is 7.2 Ah (T1) or 2.3 Ah (T2/3). The battery unit has a built-in charger and also a 30VDC auxiliary output, max 1 A, often used to power up external LAN equipment, such as an Ethernet Hub or Switch.

**1.2.6 Temperature Control System**

The laser system in the lower part of the A-VDGS cabinet includes a thermostatically operated climate control system, comprising a ventilated double wall and de-icing/anti-condensation heater.

Optionally the Display Unit also has a heater to prevent moisture on the window during cold weather.

## 1.2.7 Operator Panel

### 1.2.7.1 General

The Operator Panel, figure below, is used to control the docking guidance system from a location close to the Aircraft Loading Bridge.

The Operator Panel, controlled by an embedded microprocessor unit, is connected to the Control Unit by a RS485 communication line. Power, 21 VDC, is supplied from the A-VDGS main unit.

The interface to the Aircraft Loading Bridge is via the Operator Panel printed circuit board, having the input/output ports for that purpose.

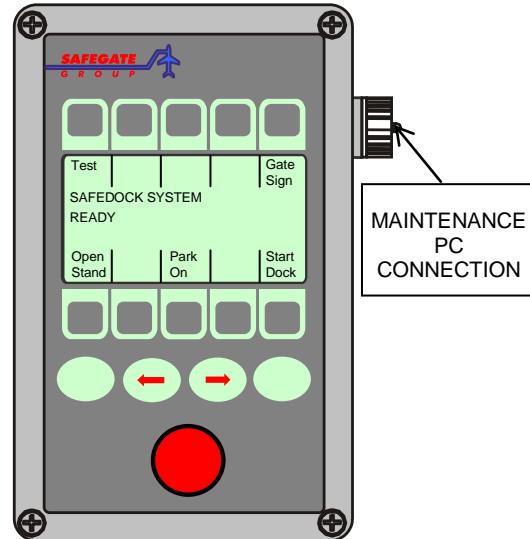


FIGURE 1.6 - OPERATOR PANEL (SOFTKEY)

### 1.2.7.2 Physical Description

The Control Panel consists of a keyboard with 14 push buttons (4 fixed function keys and 10 context sensitive keys), and a liquid crystal display (LCD). The LCD indicates systems modes of operation, lead text for the context sensitive keys, and gives also diagnostic/error information. The operator control panel display is backlit.

### 1.2.7.3 Service Outlets

At the right side of the Control Panel a connector for a PC serial port, RS485, is installed. This can be used with a Maintenance PC for the local configuration and calibration of each individual A-VDGS.

Optionally, an outlet can be provided for the connection of a remote Operator Panel.

### 1.2.7.4 Emergency Stop Button or 'Clear Gate' Button

The Operator Panel has an Emergency Stop push-button that is connected to the A-VDGS Control Unit by a separate line. Optionally a 'Clear Gate' button can be installed instead of the Emergency Stop button.

### 1.2.7.5 Other Pilot Messages

Input ports, 16 in total, are also used for activating messages to the Pilot, after docking has been completed. Such messages are: CHOCKS ON/OFF; PCA ON/OFF; 400Hz ON/OFF etc.

## 1.3 OPERATION

### 1.3.1 The Docking Process

This is a brief description of the Safedock operation. For more information, see Chapter 3 Operation.

- (a) The individual A-VDGS is operated from the OP-panel at Apron level or from the GOS/Central Computer System. From GOS all connected systems can be individually controlled and monitored.
- (b) In the A-VDGS a number of aircraft types are defined by a set of parameters such as the nose profile etc. At start of docking an aircraft type is assigned by the operator. During the docking procedure the corresponding parameters of

the actual aircraft are measured by the laser equipment. Captured data are compared to the safety profile of the assigned aircraft. If the safety margins are not correct, the message ID FAIL will be displayed to the Pilot and the docking process will be aborted.

- (c) The system operates in three modes (see below):
- (i) Calibration check
  - (ii) Capturing
  - (iii) Tracking

### 1.3.2

#### Calibration Check

The docking process starts when an aircraft type is selected from the Operator Panel or, optionally, from GOS and connected external systems. While idling, a calibration check is done once per 30 minutes, if the required/optional hardware is added to the system. This will reduce start up time to approximately 7 seconds.

The system automatically tests, if the previous calibration check was successful, before the system changes over to Capturing Mode. If not successful, the calibration check will be repeated, and the type of error that might occur will be shown in the LCD window of the Operator Panel and on the LED Display. For more information, see Chapter 4 Maintenance.

Calibration Check is performed according to the sequence as in the figure.

**Note:** The Laser Range Finder (LRF) transmits distance data from the approaching or departing aircraft to the Safedock Control Unit (CU) for processing.

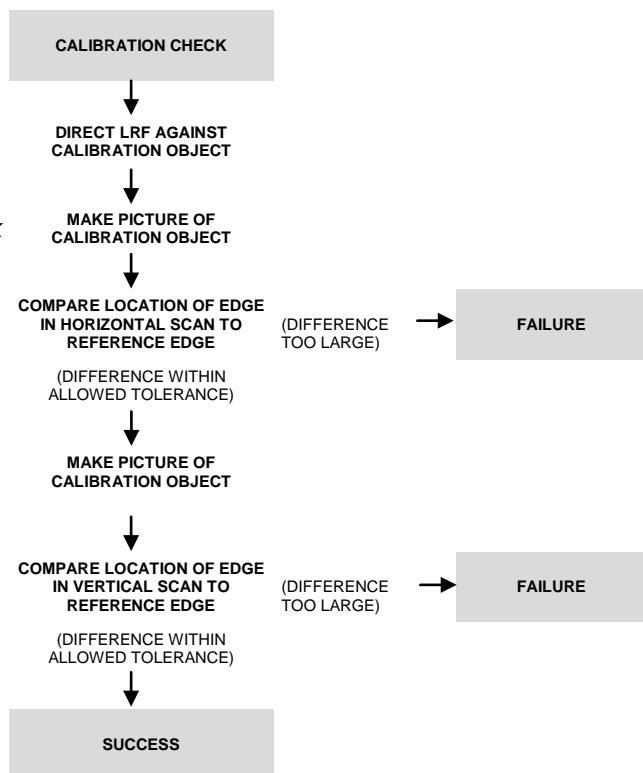


FIGURE 1.7 - CALIBRATION CHECK SEQUENCE

### 1.3.3

#### Capturing

After successful calibration check, the system is automatically switched over to the capturing mode for distance data collection. In this mode the laser is scanning the pre-defined docking area to detect an approaching aircraft and also to check the area for other objects.

### 1.3.4 Tracking

When an aircraft is detected and its approximate position is confirmed, the system switches to tracking mode.

The Safedock system checks the graphical profile of the approaching aircraft and compares it to the corresponding parameters of the selected aircraft. If there is no mismatch between these parameters, the docking process will continue by measuring the aircraft nose position. As many aircraft have similar profiles, all types cannot be discriminated. However a safety margin is checked from measurements of the approaching aircraft's geometry. If the safety margin is too small, the display will show **STOP ID FAIL**, and the docking procedure will be automatically interrupted.

The A-VDGS measures the position of the aircraft in relation to aircraft Stand centre-line and the defined stop position for the particular aircraft type. During the tracking process the relative position of the aircraft is displayed on the Display unit, clearly visible from the whole cockpit area.

If the communication link with the Display unit is malfunctioning, the display will revert to a default setting, which means that red patterns are turned on, and yellow patterns are turned off, thus signalling a **STOP** message.

### 1.3.5 Safety with the docking procedure

Safedock safety with the docking procedure is based on the approaching aircraft type as identified according to the type selected at start-of-docking. An acceptable physical safety margin between airport stand area equipment such as the Passenger Boarding Bridge (PBB) and the aircraft is also fundamental in a Safedock docking procedure. For more information see PBB interlock.

#### 1.3.5.1 Risk factors and Safedock solutions

1. Operator error: if the wrong aircraft type is selected or the operator does not observe the wrong aircraft type is approaching the stand.
- Safedock aircraft identification and verification monitors the incoming aircraft type and displays information if there is an error, for example **STOP ID FAIL**.
2. Pilot(s) error: the pilots do not observe the wrong aircraft type on the docking system display.
  - Safedock aircraft identification and verification monitors the incoming aircraft type and displays information if there is an error, for example **STOP ID FAIL**.
3. The docking system must detect or analyse the risk involved, when the approaching aircraft type does not correspond to the type selected at start-of-docking, immediately instruct the pilots with a message to stop, the docking procedure and wait for manual assistance.
  - Safedock aircraft identification and verification monitors the incoming aircraft type and displays information if there is an error, for example **STOP ID FAIL**.
4. Obstruction in the apron area for example PBB out of position or positioned for an incorrect aircraft type.
  - Safedock auto calibration monitors the stand area and displays information if there is an obstruction, for example **STOP ID FAIL**.
5. Fuel/water/sewage pits/foreign objects debris (FOD).
  - Safedock with a GOS camera option can visually monitor the stand area however aircraft docking procedures are also to be monitored by airport ground personnel on the apron.

#### 1.3.5.2 Aircraft Safety Check

Aircraft Safety Check is based on differences in aircraft geometrical characteristics, for identification and verification in profiles, such as:

- nose height, location of engines

### 1.3.5.3 Performance

From a test run at Copenhagen International Airport with 200 docking events, the following results were verified:

- Accuracy for engine position:  $\pm 1,1$  m (confidence of 99,7 %)
- Accuracy of the nose height measurement:  $\pm 0,5$  m

Limiting factors are:

- reflectivity of the aircraft surface
- speed of the aircraft
- aircraft turning
- low visibility
- ground level variations

### 1.3.5.4 Discrimination Criteria

#### Nose Height

The measured nose height must be within the tolerance limits  $\pm 0,5$  m of the nose height of the selected aircraft type.

#### Nose-to-engine distance

The measured nose-to-engine distance must be within the tolerance limits – 1 m to +3m from the nose-to-engine distance of the selected aircraft type.

Otherwise the system will show STOP/ID FAIL when the aircraft is closer than 12 metre to the stop position.

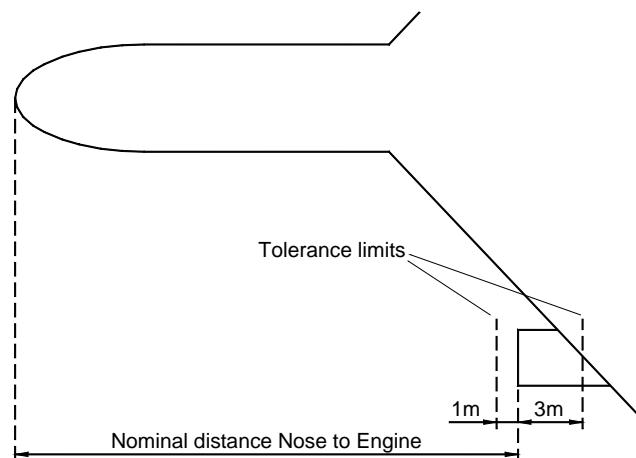


FIGURE 1.8 – DISCRIMINATION CRITERIA

### 1.3.5.5 Docking Other Aircraft Types (than the type selected)

If another aircraft type than the selected type is accepted by the Safedock docking system into the stand, it is stopped with the nose at the same position where the selected type is to stop (alternatively ID FAIL is shown, if the previous nose criteria is not met). The safety margin in this case (the Safety Margin Other Aircraft or A/C) is calculated as shown.

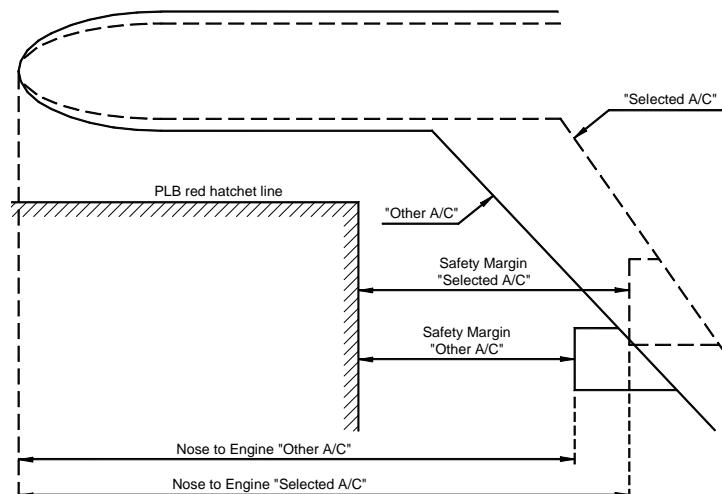


FIGURE 1.9 – DOCKING CALCULATION

*Safety Margin Other A/C (worst case) =*

*Safety Margin Selected A/C – Tolerance – Measuring accuracy*

### Example

Safety Margin                    3 metre (set by airport architects)

Tolerance                        1 metre (a constant)

Measuring accuracy            1.1 metre (a constant)

### Conclusion

The safety margin is therefore be 0.9 m or greater, depending on the layout of stopping positions where the basic safety margin is 3 m (to a fixed obstacle) or greater for all aircraft, stopped at the correct stop position.

#### 1.3.5.6 Practical Aspects

If another aircraft type than the type selected is accepted (discrimination criteria is not met) into the stand it is a risk to the normal parking position and stop position accuracy.

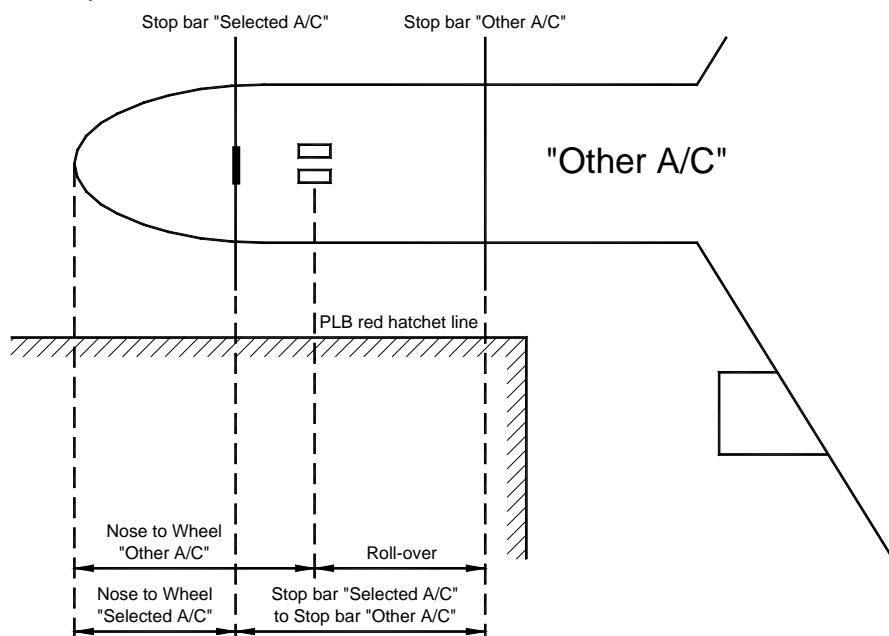


FIGURE 1.10 – PRACTICAL ASPECTS

The deviation, "roll-over", from the normal stopping position is calculated as follows:

$$\text{Roll-over} = (\text{Stopbar Other A/C-to-Stopbar Selected A/C}) + (\text{Nose-to-wheel Selected A/C}) - (\text{Nose-to-wheel Other A/C})$$

The calculation illustrates the result from a docking procedure, where the aircraft discrimination criteria does not result in a STOP/ID FAIL message, as the geometrical deviation was too small to be detected.

## 2. INTERFACES TO OTHER SYSTEMS

### 2.1 GENERAL

The diagram below exhibits the general A-VDGS interfaces to external systems.  
These might be:

- (a) GOS and related systems, such as FIDS/GMS and Central Maintenance Systems
- (b) Maintenance PC
- (c) GBMS (optional, an external maintenance system)
- (d) AGL (optional)
- (e) Passenger Loading Bridge/PBB (optional)

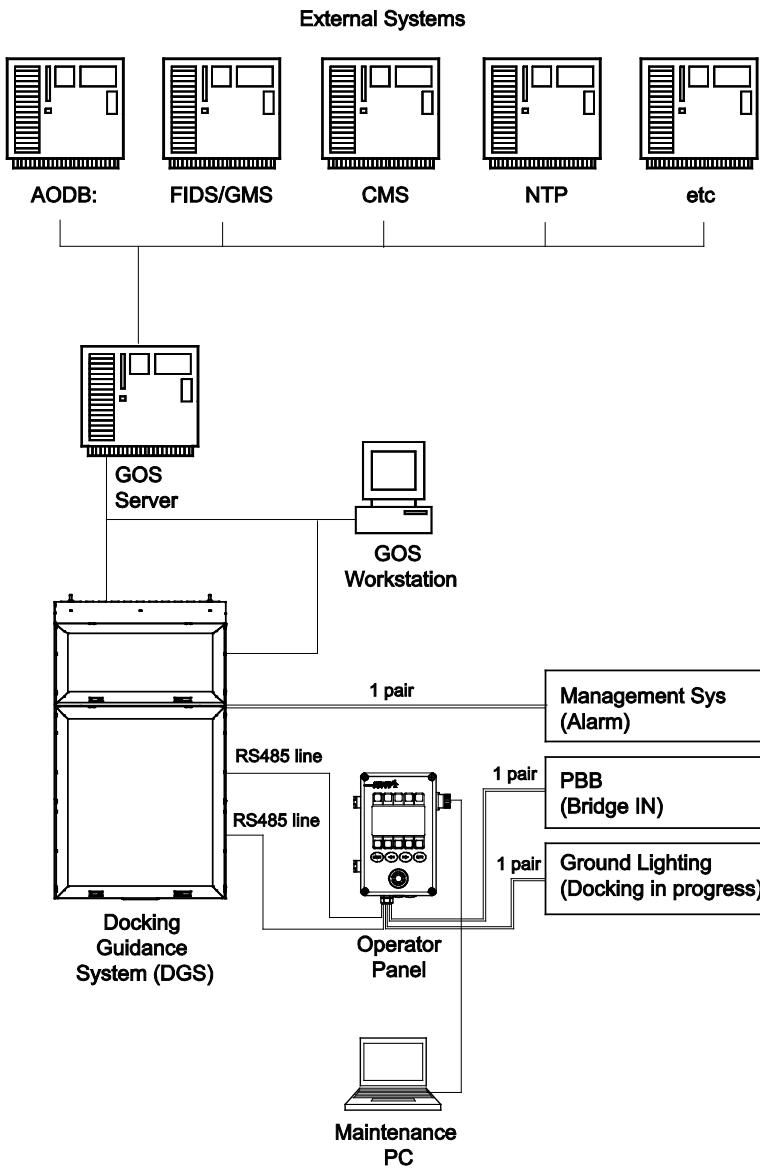


FIGURE 1.11 - INTERFACE STRUCTURE

## 2.2 SYSTEM AVAILABILITY/LINE REPLACEABLE UNITS

### 2.2.1 General

The Drawing List contains all Line Replaceable Units/LRU used in the SAFEDOCK system. For more information, see Chapter 5 Drawings.

#### 2.2.1.1 Availability & Reliability General Definitions

The availability of a product depends on the following factors of a Line Replaceable Unit:

MTBF Mean Time Between Failures

MTTR Mean Time To Repair

MLDT Mean Waiting Time for Recourses

MDT Mean Down Time (MTTR + MLDT)

### 2.2.2 Reliability of Reparability of Line Replaceable Units

The calculated MTBF and MTTR figures are according to the table below. Units are in hours.

The table includes selected key components from Safedock® Docking Guidance Systems.

**Note:** Information is subject to change. For more information, see [www.safegate.com](http://www.safegate.com) or contact Safegate.

Line Replaceable Unit	P/N	QTY	MTBF	MTTR
Control Unit Board	590 125	1	120 000	0.7
Motor Control Board	590 130	2	120 000	0.4
LED Board, incl. controller Y	590 550	7-24	400 000*	0.4
LED Board, incl. controller R	590 551	1-2	400 000*	0.4
LED Board, incl. controller G	590 548	1-2	400 000*	0.4
Laser Range Finder	590114	1	120 000	0.4
Stepper Motor	590131	2	150 000	0.4
Power Supply	2938604	1	120 000	0.4
Operator Panel Board (Softkey)	590 495-000-01	1	80 000	0.4
Operator Panel Board (30-key)	590 419	1	80 000	0.4

**\*Note:** A certain degree of redundancy has been given in these figures.

## 2.2.3

### Reliability Calculation

For a typical Safedock System the below total MTBF\_Safedock figure is calculated, **not considering** the fact that the system has a built-in temperature control system and that the system operation duty-cycle is only some 10 %.

$$1/\text{MTBF\_Safedock} = 1/\text{MTBF\_Cu} + 1/\text{MTBF\_Cpu} + 2/\text{MTBF\_Mcb} + 9/\text{MTBF\_Led} + 1/\text{MTBF\_Laser} + 2/\text{MTBF\_Motor} + 1/\text{MTBF\_Power} + 1/\text{MTBF\_OPanel}$$

Values according to the table above give  $\text{MTBF\_Safedock} = 9\ 600$  hours.

This value does not correspond to the statistical value, found during a four year period of time. So, if we consider the following facts, a less conservative MTBF figure is being calculated.

1. The Laser Range Finder is only switched on during 10% of time. A factor 10 is used for the calculation.
2. Figures for the Operator Panel are calculated according to MIL-HDBK-27F. Only a few operations per hour are made. A factor of 4 will be used for the calculation.
3. The system will be available for docking even if one LED display board has failed, unless it is one of the two azimuth guidance boards. This will increase operational reliability with a factor of 4.5.
4. The Safedock system is temperature controlled, which will increase reliability with a factor 1.5

$$1.5/\text{MTBF\_Safedock} = 1/\text{MTBF\_Cu} + 1/\text{MTBF\_Cpu} + 2/\text{MTBF\_Mcb} + 2/\text{MTBF\_Led} + 0.1/\text{MTBF\_Laser} + 2/\text{MTBF\_Motor} + 1/\text{MTBF\_Power} + 0.25/\text{MTBF\_OPanel}$$

Using this formula, **considering operating temperature and duty cycle**, the calculated MTBF figure for the Safedock system would be **24 800 hours**.

## 2.2.4

### Operational Availability

Suppose that continuous operation is 24 hours a day, and Mean Down Time, MDT, is 6 hours. Then, according to the formula  $A_0 = \text{MTBF}/(\text{MTBF}+\text{MDT})$ , operational availability would be > 99.98%.

### 3. TECHNICAL DATA

#### 3.1 PERFORMANCE

Stop position accuracy	0.1 m
Stop position distance	2 - 65 m (T1), 8 – 50 m (T2), 8 – 50 m (T3)

**Note:** This depends on configuration.

Azimuth accuracy	0.2°
Azimuth distance	up to 110 m, depending on configuration
Display type	High intensity LED
Display visibility angle	Approximately 170° (T1), 48° (T2/3)
Display visibility distance	Approximately 160 m (T1/2), 80 m (T3)

**Note:** This depends on configuration, display number of characters.

Display number of characters	Up to 168 (T1), 24 (T2), 16 (T3)
------------------------------	----------------------------------

**Note:** This depends on configuration, LEDs.

LED configuration (typical module totals)	42 (T1), 18, 24 (T2), 9, 15 (T3)
---	----------------------------------

Maximum separation - two centre lines	30° (T1), 13° (T2/3)
---------------------------------------	----------------------

#### 3.2 A-VDGS UNITS' DIMENSIONS AND WEIGHTS

##### 3.2.1 A-VDGS Main Unit

###### T1 Main Unit

Dimensions, (built-in sun cover)	1887 x 1087 x 724 mm (H x W x D)
----------------------------------	----------------------------------

**Note:** Height x Width x Depth.

Weight	140-150 kg (308-331 lbs)
--------	--------------------------

**Note:** This depends on configuration.

Mounting rails/clamps upper-lower distances 1449 mm

###### T2 Main Unit

Dimensions, (without sun cover)	1520 x 900 x 422 mm (H x W x D)
---------------------------------	---------------------------------

Dimensions, (with sun cover attached)	1547 x 958 x 650 mm (H x W x D)
---------------------------------------	---------------------------------

Weight (depending on configuration)	100-110 kg (220-243 lbs)
-------------------------------------	--------------------------

Mounting rails/clamps upper-lower distances 1046 mm

###### T3 Main Unit

Dimensions, (without sun cover)	1370x 600 x 422 mm (H x W x D)
---------------------------------	--------------------------------

Dimensions, (with sun cover attached)	1396 x 656 x 650 mm (H x W x D)
---------------------------------------	---------------------------------

Weight (depending on configuration)	90-100 kg (198-220 lbs)
-------------------------------------	-------------------------

Mounting rails/clamps upper-lower distances 896 mm

##### 3.2.2 Operator Panel

Dimensions	260 x 160 x 90 mm (H x W x D)
------------	-------------------------------

Weight	2 kg / 4.4 lbs
--------	----------------

**Note:** For more information, for example Safedock types with other or more specific hardware configuration options, see Chapter 5 Drawings.

3.3	SUB UNIT CHARACTERISTICS	
3.3.1	<b>Power Unit</b>	
	Power Requirements	100-115/100-230 VAC, +10%, 50/60Hz, depending on geographical location.
	Power consumption	1000 W (T1), 400 W (T2/3), maximum
3.3.2	<b>Control Unit</b>	
	Microprocessor ETX CPU module	
	Alarm system interface	Relay contact, potential free
	Power Requirements	24 V (T1), 20 V (T2/3) DC +20%, -50%.
3.3.3	<b>Laser Scanning System</b>	
	Laser Type:	GaAs semiconductor
	Wave Length:	0.9 ± 0.1 μm
	Beam Width:	Approximately 30 mm in diameter
	Beam Divergence:	5 mrad maximum (full angle of circular beam)
	Laser Class:	Class 1
	Serial Interface:	RS485, 19200 Baud
3.3.4	<b>Operator Panel (OP softkey)</b>	
	Micro controller:	Rabbit 2000
	LCD Display	240 x128 pixel; subdivided into 2 lines of 5 soft-keys and 3 lines of 20 characters for text; backlit.
	Serial Interface	RS485 (to Safedock Main Unit)
	Keyboard	14 keys (10 soft keys + 4 fixed function)
	PBB Interface	24 VDC, Opto coupled Input
	AGL Interface (lead-in light)	Relay contact, potential free
3.3.5	<b>Conduit entry points (cable glands, nuts, holes)</b>	
	Safedock (power supply/control) glands:	diameter is 9-13 mm.
	Safedock (OP communication) nut:	diameter is 9-13 mm.
	Safedock communication (option such as GOS):	diameter is 4-8 mm.
	Operator Panel (Safedock communication) nut:	diameter is 8-13 mm.
	Operator Panel (option such as PBB) extra holes:	diameter is 20.5 mm.
	For more information, see chapter 2. Installation or 5. Drawings.	
3.4	<b>ENVIRONMENTAL LIMITS</b>	
3.4.1	<b>Dust and Water Protection</b>	
	Protection against dust and water meets ICAO requirements of IP 54 (IEC 6 052 9).	
	Safedock Display Unit	IP 65 (T1), IP54 (T2/3)
	Laser Unit:	IP 65 (T1), IP54 (T2/3)
	Operator Panel (Option/softkey):	IP 65
	<i>Note: IP classification may differ in certain market regions. Safedock Display Unit Type T1 with a fan option is IP 54.</i>	
3.4.1.1	<b>IP classification</b>	
	Classification of degree of protection provided by enclosure according to IEC 529, IPXX. The IEC (International Electrotechnical Committee) is the world's leading	

organization that prepares and publishes International Standards for all electrical, electronic and related technologies. The IEC designation consists of the letters IP (ingress protection) followed by two numerals. The first characteristic numeral indicates the degree of protection provided by the enclosure with respect to persons and solid foreign objects entering the enclosure. The second characteristic numeral indicates the degree of protection provided by the enclosure with respect to the harmful ingress of water.

#### 3.4.2 Installation environment

The SAFEDOCK System is intended to be installed outside, and at an altitude not exceeding 2000m above sea level.

#### 3.4.3 Temperature and Humidity Limits

Safedock withstands relatively extreme temperature and humid atmosphere without any adverse effects (corrosion or change of characteristics due to the absorption of humidity).

**Operational** -25°C to +50°C

**Relative humidity** from 10 to 100%

**Note:** *The unit is equipped with internal heating and scanning window-defrosting elements to ensure proper cold weather operation. Safedock can also be equipped with an internal cooling device (option) to ensure proper warm weather operation.*

#### 3.4.4 Storage

It is recommended that units are kept in the shipping box and in a dry covered storage area until installed for operation.

#### 3.4.5 Wind Load

The SAFEDOCK System is designed to resist damage in wind speed up to 44 m/s (no active operation).

#### 3.4.6 Snow Load

The SAFEDOCK System is designed for a snow load up to 1000 N/m<sup>2</sup>.

#### 3.4.7 Brightness

Environmental brightness range from direct sunshine down to an average luminance of at least 10 lux with a uniformity ratio (average to minimum) of not more than 4 to 1 measured at 2 m height.

#### 3.4.8 Vibration

The SAFEDOCK system is tested according to IEC 68-2-64 to meet a level of satisfactory function at acceleration of 0.1G within the frequency range 10 - 100Hz.

#### 3.4.9 Acoustic Sound and Noise

The SAFEDOCK system is tested to meet a sound level not exceeding 45 dBA, relative a sound reference pressure of  $2 \times 10^{-5}$  Pa.

**Note:** *This information may be subject to change for T1 with a Supercooler option.*

#### 3.4.10 Pollution Limits

Tested to pollution degree 2 (IEC 664)

#### 3.4.11 Installation Over-voltage Limits

Tested to Category II (IEC 664)

**3.5 ELECTROMAGNETIC COMPATIBILITY**

**3.5.1 General**

The SAFEDOCK system is tested to fulfil all relevant requirements for EMI/EMC immunity as stated by FCC part 15 (47 CFR Part 15).

Also, the SAFEDOCK system is tested to fulfil all relevant requirements for EMC immunity as stated by EMC Directive 89/336/EEC and standards as below:

**3.5.2 Generic Standards**

EN 50081-1:1992 Generic Emission Standard; Part 1: Residential, Commercial & Light Industry Environment

EN 50082-2:1995 Generic Immunity Standard Part 2: Industrial Environment

**3.5.3 Basic Standards**

ENV 50140 EMC - Basic Immunity Standard Radiated RF electromagnetic fields immunity test

ENV 50204 EMC - Basic Immunity Standard Radiated RF electromagnetic fields immunity test (pulse modulated)

EN 61000-4-4 EMC, Part 4: Testing & measurement techniques.

Sect 4: Transient immunity test

EN 61000-4-2 EMC, Part 4: Testing & measurement techniques.

Sect 2: Electrostatic discharge immunity test.

**3.5.4 Product Family Standards**

EN 55022 Limits and methods of measurement of radio interference characteristics of information technology equipment.

EN 55024 Immunity requirements for information technology and communications equipment. Only parts as Surges, Voltage Dips and Voltage Interruptions is tested.

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**INSTALLATION**  
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**WARNING! Invisible Laser Radiation**

The laser output from this system is within Class 1 limits (USA FDA 21 CFR 1040.10 – 11 and IEC 60825-1, Edition 1.2, 2001-08) as long as the range finder is installed and operated as specified by Safegate.

If operated in any other fashion than described, the range finder is capable of emitting radiation up to Class 1M limits.

Class 1 M denotes lasers or laser systems that can produce a hazard if viewed through light collecting optics such as binoculars.

## 1. SCOPE

### 1.1 GENERAL

This document applies to a system using a display unit with a viewing angle of 23 degrees.

Installation of the Docking Guidance System is performed in three phases and often by three different personnel categories.

1. Mechanical installation
2. Electrical installation
3. System configuration

**Note:** This document is focused on the mechanical and electrical installations with system configuration, for example software set-up procedures briefly described with references to other sections or chapters in the manual.

### 1.2 INSTALLATION SCHEDULE

The schedule presented in the table below should be used with the appropriate installation drawings.

Item	Task
1	Attach the support fixture to the wall or mast
2	Mount the Docking Guidance Unit on the support fixture
3	Install the Operators Panel
4	Mount the calibration plate
5	Install interconnecting cables
6	Connect a PC, with the Safedock Configuration Utility program, SDCONFIG, to the OP-Panel and perform the following: <ul style="list-style-type: none"><li>- Calibrate the A-VGDS and define a centre-line</li><li>- Set operating parameters</li><li>- Configure the Stand</li></ul>
7	Carry out a functional check of the system

**Note:** It is recommended to paint permanent or temporary centreline(s) and stop-position(s) on the apron before an A-VGDS installation, to aid proper alignment, calibration and configuration.

### 1.3 REQUIRED TOOLS AND EQUIPMENT

Tools and equipment needed for the installation are according to the table below.

Hand Tools	Equipment
Screwdrivers, standard sizes	Lap top PC computer, with SD CONFIG software
Pliers: regular, needle nose and diagonal	Multi-meter (U, I, R)
Adjustable end wrenches	Portable lift for 1 to 2 people: <ul style="list-style-type: none"><li>- Lifting height for standard installation: minimum 6 m (17 feet)</li></ul>
Wire strippers	<ul style="list-style-type: none"><li>- Lift capacity: 150 kg/300 lbs.</li></ul>
Level	<ul style="list-style-type: none"><li>- Lifting height for standard installation: 10 m (33 feet)</li></ul>
Tape measure, > 10 m	

## 2. INSTALLATION CONSIDERATIONS

### 2.1 MOUNTING HEIGHT

Minimum mounting height, recommended, is 4.0 metres. This figure depends on the following factors:

- Maximum vehicle height on the service road
- Maximum nose height of the aircraft to be docked to the particular stand

Maximum mounting height, recommended, is 8.0 metres. This figure depends on the following factors:

- Minimum nose height of the aircraft to be docked to the particular stand

**Note:** The minimum distance to the stop position for a particular aircraft, depends on the maximum downward viewing angle allowed. For more information see 2.2 Stop Position.

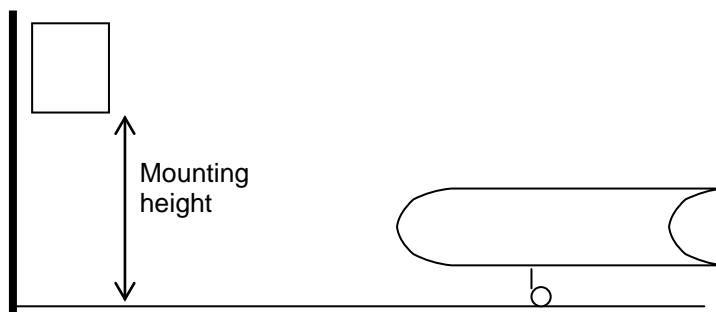


FIGURE 2.1 MOUNTING HEIGHT

**Note:** An A-VDGS overlooking a PBB or walkway may have operational constraints, which require an adjusted mounting height and/or re-positioning of aircraft stop-positions to create an obstacle free scanning area.

### 2.2 STOP POSITION

The longest recommended stop position is 65.0 metres (T1) or 50 metres (T2/3). Within this distance the lateral accuracy is  $\pm 0.2$  metre. If the clip distance is 100 metres, 23 metres of tracking on the centreline are available for aircraft verification.

The shortest recommended stop position is 2.0 metres (T1) or 8 metres (T2/3), but the angle to the aircraft nose shall never be more than 24 degrees, according to the picture below.

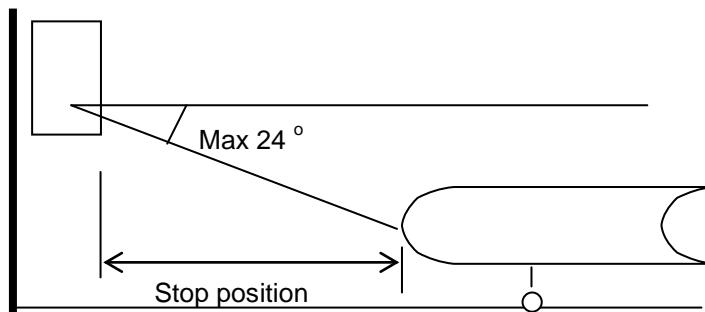


FIGURE 2.2 STOP POSITION

**Note:** A stop position must be less than a 24 degree angle from the laser scanning unit to the aircraft nose. A high mounting height may limit the shortest allowed stop position. The shortest recommended stop position may be as close as twice the difference between the mounting height and the aircraft nose height, but never shorter than 2.0 metres (T1) or 8 metres (T2/3).

For nose-distances that are set at the edge or outside the recommended range, it is important to always review each A-VDGS position individually for correct operation.

## 2.3 CENTRE LINES

The SAFEDOCK system can handle up to three centre lines, convergent or parallel. For an accurate guidance the centrelines must be placed within the laser's aircraft scanning range of the system, which is  $\pm 26$  degrees. The limits for centreline position are defined according to the picture below. The display reading sector is  $\pm 55$  degrees.

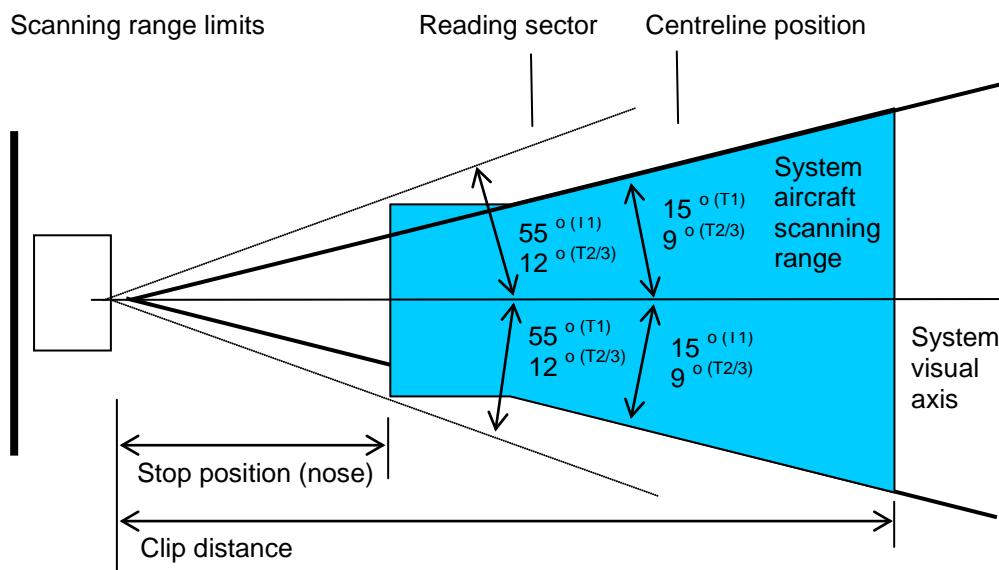


FIGURE 2.3 CENTRE LINES

**Note:** Aircraft stop-positions must be within the scanning range. It is recommended that the display is in view for both pilot and co-pilot to allow docking from both positions.

## 2.4 AIRCRAFT SAFETY CHECK

For systems using the 'Aircraft Safety Check' feature, the engine of the aircraft must be within a  $\pm 30^\circ$  view area of the system. The aircraft must have been aligned to the centreline for at least 4 seconds, when more than 12 metres remain to the stop position. Failure to obtain this condition will lead to an ID-FAIL situation.

View area

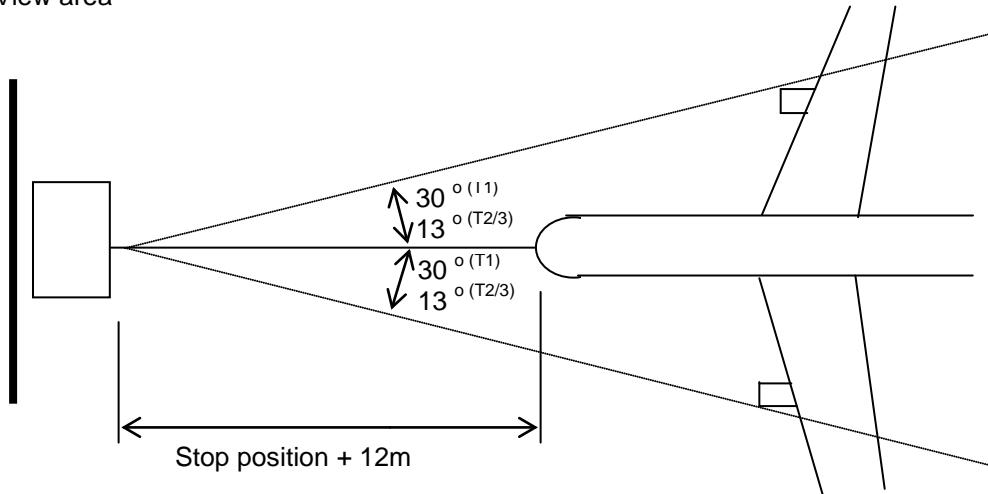


FIGURE 2.4 AIRCRAFT SAFETY CHECK

## 2.5 TRACKING

After Safedock successfully locates an approaching aircraft within the clip distance (for more information, see Chapter 2 Appendix B), tracking with azimuth guidance starts. Safedock can give azimuth guidance to a fuel truck, but it will eventually end with an ID fail. Therefore, azimuth guidance begins when the Safedock acquires a lock onto an object (possibly but not necessarily an aircraft).

Identification (or verification) is the next part of the process with success depending on the circumstances. Identification (or verification), an independent process from azimuth guidance, then matches the incoming aircraft to the data of the selected aircraft.

It is recommended to consider where aircraft tracking is to start based on the following:

1. Distances to the countdown area, to stop position(s) and the Safedock unit.
2. Tracking an area without other airfield traffic or obstruction, such as an airfield taxiway or service road.
3. An unobstructed frontal view of the approaching aircraft from the Safedock unit (laser scanning view).
4. Set a value from a range based on average aircraft speeds, such as 50-95 m (T1) or 50-80 m (T2/3).

For more information, see Configuration and Commissioning Guidelines, Clip distance.

**Note:** Safedock is capable of tracking an approaching aircraft from a distance of 110 m. However in most cases, the distance depends on site configuration, such as the approach to gate.

## 2.6 CURVED CENTRELINES

For a curved centreline, the angle between the optical axis of the system and the approaching aircraft may not exceed 20 degrees.

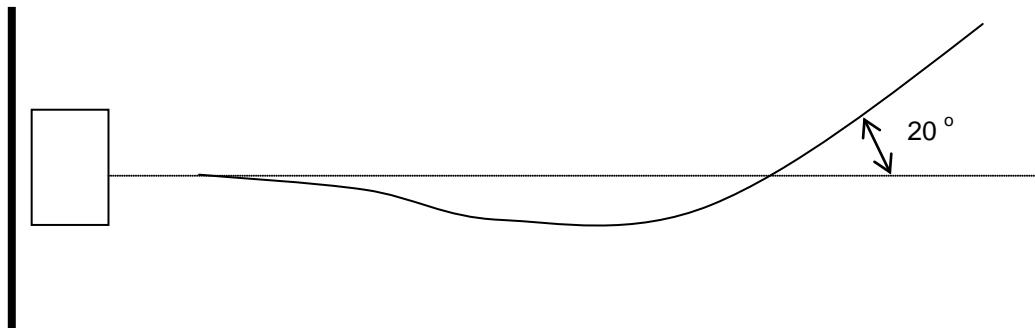


FIGURE 2.5 CURVED CENTRELINES

## 2.7 FREE SPACE ON THE APRON

Foreign obstacles might disturb the docking process. Therefore a specified area between the Docking system and the approaching aircraft must be cleared, before docking is started.

During docking the system is tracking the aircraft nose and the vertical scan is  $\pm 5$  degrees. The level of this scanning sector depends on laser height, aircraft position and aircraft size.

For example, high vehicles on a service road must not enter this sector, after the Docking system has been started.

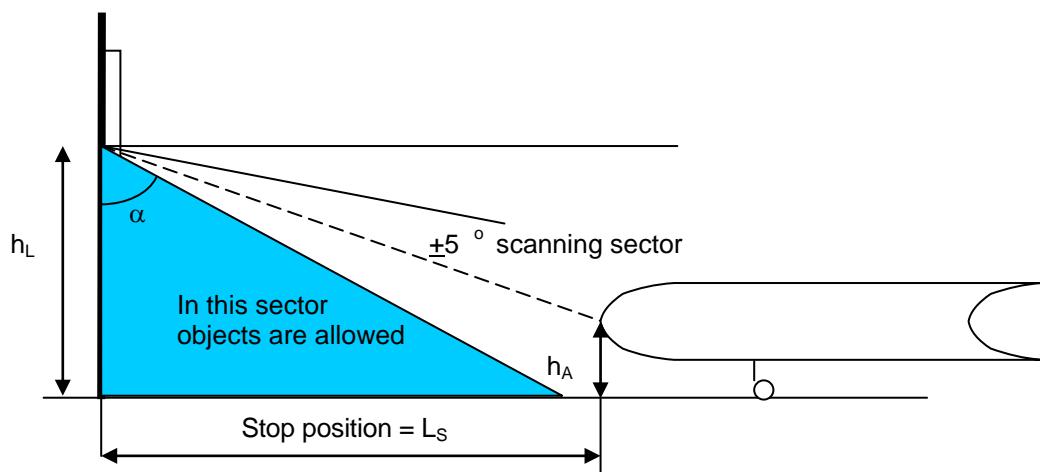


FIGURE 2.6 FREE SPACE ON APRON

From the illustration above the angle  $\alpha$  is calculated as:

$$\alpha = \text{arctg } L_S / (h_L - h_A) - 5$$

This is the maximum angle for a sector where foreign objects are allowed.

## 2.8 VIEWING RANGE

### 2.8.1 General

Safedock must have an unobstructed view of the aircraft nose throughout the docking procedure. For additional features, such as id-verification, to work properly, the viewing range must be extended to cover the particular needs of the feature.

Safedock supports sideways clipping on both sides of the centreline. Using this feature, the system can be instructed to ignore objects beyond the side clipping limits, such as the passenger boarding bridge. However, the side clipping should never be used to reduce the view of the system below what is specified in the sections below.

### 2.8.2 Without ID-verification

A system without id-verification will only need an unobstructed view to the nose of the aircraft to operate properly. Thus, the sideways clipping limits can be set as close to the centreline as defined by the width of the widest aircraft intended for docking at the stand. The minimum clipping angle to each side of the centreline is found by finding a line from the Safedock system to a point half the aircraft width from the centreline at the stop position (nose) for the aircraft.

Stand area, top view:

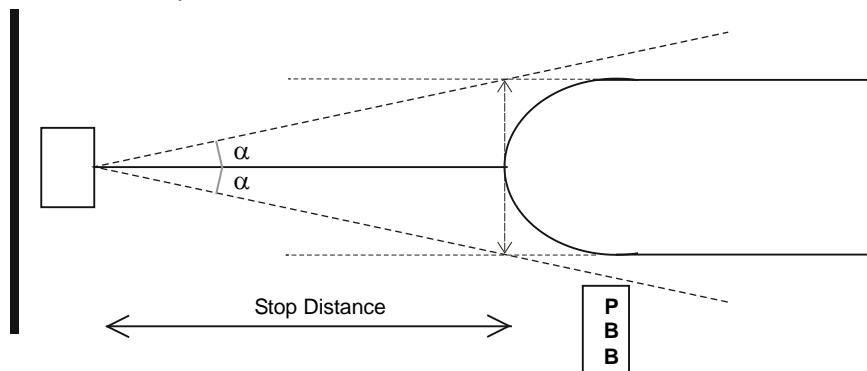


FIGURE 2.7 VIEWING RANGE WITHOUT ID

The minimum viewing range is defined by finding the aircraft that needs the widest view according to:

$$\alpha = \text{ArcTan}(\text{aircraftWidth}/2) / \text{aircraftNosePos}$$

**Example:** A B777-200 with stop position (nose) 30m from the Safedock

$$\text{aircraftWidth} = 6.2\text{m}$$

$$\text{aircraftNosePos} = 30.0\text{m}$$

$$\alpha = \text{ArcTan}(3.1 / 30.0) = 5.9^\circ$$

The minimum viewing range without id-verification is  $5.9^\circ$  to either side of the centreline.

**Note:** A system using a centreline that is not perpendicular to the mounting of the Safedock will require a wider viewing range as the entire nose of the aircraft must be fully visible throughout the docking procedure.

### 2.8.3 With ID-verification

A Safedock system that uses the extended ID-verification feature needs a larger viewing range, as it must be able to find the location of the aircraft engine. Safedock

will always prefer the away-from-bridge side engine in the verification procedure, unless this engine is found to be beyond the side clip limit. If the engine is found to be beyond the side clip, Safedock will attempt to find the engine on the other side.

Thus, one side (normally the bridge side) can use the same limit as for the above case. The view on the side selected for engine measurement, must be extended to allow the system a clear view of the engine.

Stand area, top view:

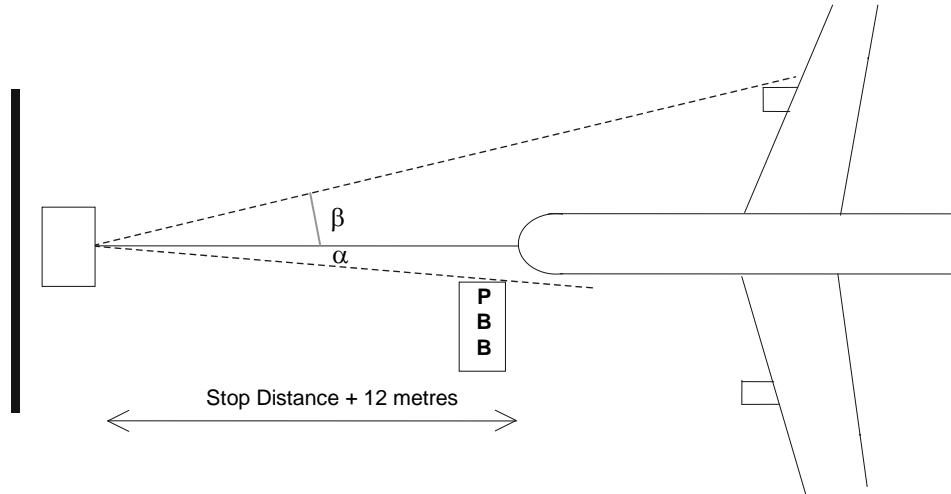


FIGURE 2.8 VIEWING RANGE WITH ID

The minimum viewing range that allows engine measurement is defined by finding the aircraft that needs the widest view according to:

$$\beta = \text{ArcTan}(\text{engineToCentre} / (\text{aircraftNosePos} + 12 + \text{engineToNose}))$$

**Example:** A B777-200 with stop position (nose) 30m from the Safedock

$$\text{aircraftNosePos} = 30.0\text{m}$$

$$\text{engineToCenter} = 9.7\text{m}$$

$$\text{engineToNose} = 20.3\text{m}$$

$$\beta = \text{ArcTan}(9.7 / (30.0 + 12.0 + 20.3)) = 8.8^\circ$$

The minimum viewing range with id-verification is  $8.8^\circ$  away from bridge and  $5.9^\circ$  towards the bridge.

### 3. MECHANICAL INSTALLATION

#### 3.1 INTRODUCTION

This section provides the installation engineers with instructions on how to install the SAFEDOCK Docking Guidance System. Each installation is unique due to location, sighting and mounting of the equipment as well as local engineering practices.

Every installation should refer to a set of drawings for the proposed site. To install the system safely and efficiently the drawings are to be used with the information in this manual. The installation must be carried out in accordance with NEC (if applicable) and other local electrical codes.

#### 3.2 INSTALLATION PROCEDURE

##### 3.2.1 General

The way in which the docking guidance unit is installed varies from airport to airport. For example, the Docking Guidance main unit may be mounted on the wall of the terminal building, or on a mast, situated away from the terminal building.

When installed, the Docking Guidance unit is usually mounted from 5.5 to 7 metres (18 to 23 feet, related to bottom edge of the display unit) above ground. The actual mounting height depends on local conditions and the type of aircraft, which will be docked to the terminal gate, e.g. wide-bodied or narrow-bodied aircraft. The Docking Guidance Unit, where possible, should be mounted such as it is centred over the aircraft stand centreline.

All A-VDGS units mounted to the terminal-wall at the same approximate height should use a sightline on the building, for example x-metres above ground, as the grading can vary from gate-to-gate. This is for aesthetic purposes only and at this stage, there is the flexibility to do so.

**CAUTION: WHEN DETERMINING THE MOUNTING HEIGHT, THE POSSIBLE PRESENCE OF HIGH VEHICLES ON THE SERVICE ROAD IN FRONT OF THE DOCKING SYSTEM SHALL BE TAKEN INTO CONSIDERATION. SEE SECTION 2.3 ABOVE.**

Clamp fasteners (5 ½" or 139.7 mm diameter) for attaching and mounting the Docking Guidance unit to a support fixture, are included in the installation package. A support fixture, for example a 5 ½" or 139.7 mm diameter pole, is not supplied as standard as local requirements differ. Furthermore, fasteners and fixtures must often be furnished locally, since local building codes and engineering practices vary.

The figure below shows the Safedock display unit rear view examples and the mounting hardware for a typical support fixture for mounting the unit.

**Note:** For more information, for example Safedock types with other/more specific configuration options, see Chapter 2 Installation - Appendix A or Chapter 5 Drawings.

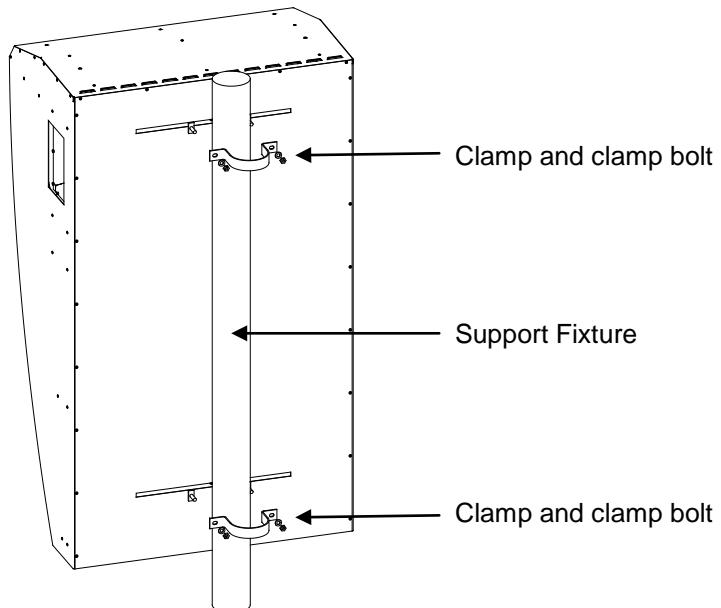


FIGURE 2.9 SAFEDOCK T1 INSTALLATION MATERIAL

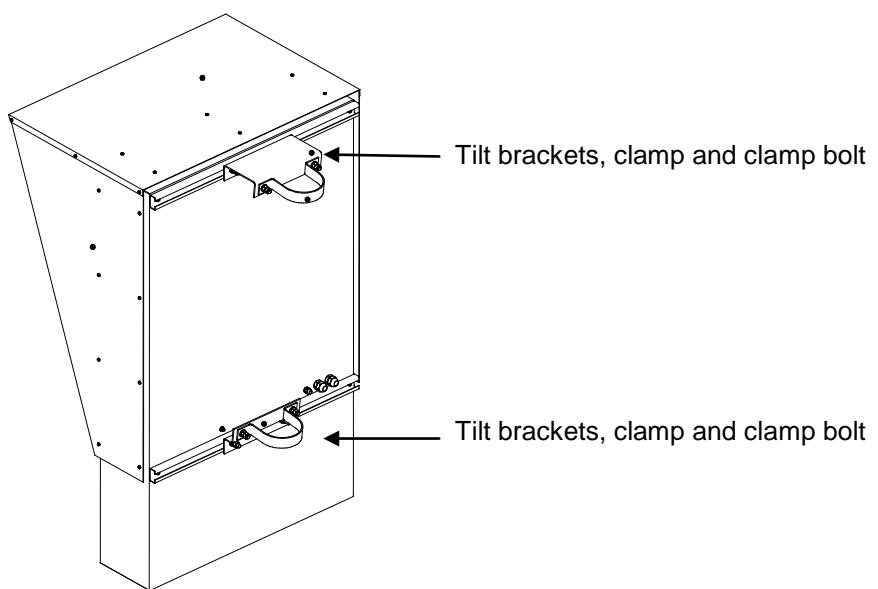


FIGURE 2.10 SAFEDOCK T2/3 INSTALLATION MATERIAL

### 3.2.2

### Height Calculation

The A-VDGS installation height depends on the actual situation at each stand:

- The A-VDGS laser view toward aircraft must be unobstructed. Possible obstructions may include a PBB or vehicles on a service road.
- The aircraft at the stop position must be visible in vertical range of the A-VDGS laser view. The aircraft types (mix) to be used and the range of stop positions (to nose) affect the mounting height.
- Comfortable pilot views of the A-VDGS throughout the docking must be considered.

If no acceptable mounting height at the desired position can be used, an alternative location for the A-VDGS may be necessary, for example a free standing pole.

**Note:** It is important to always check with the Project Manager for the location, height and alignment requirements, for each A-VDGS installation.

The following variables may be used as a guideline for height calculation:

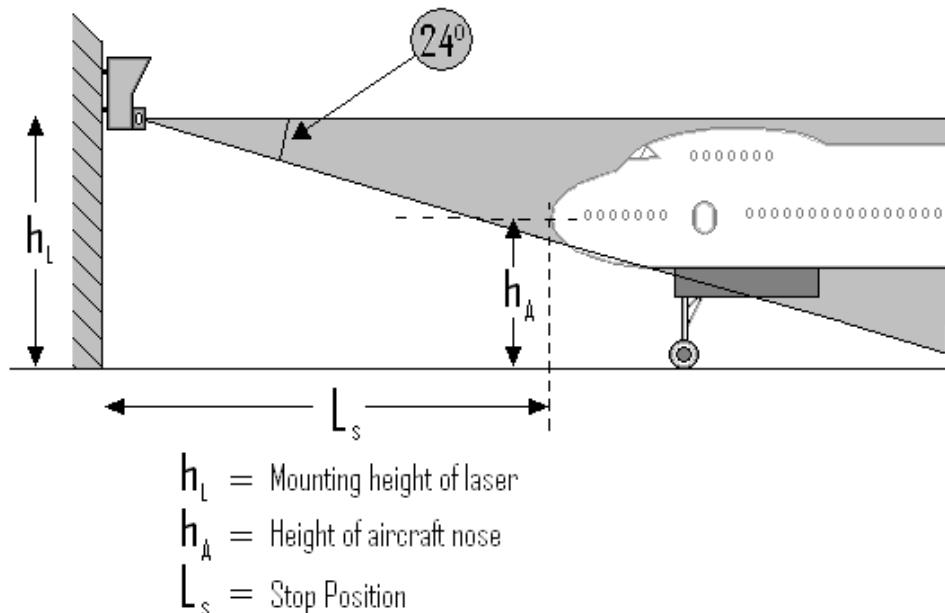


FIGURE 2.11 HEIGHT CALCULATION

General recommendations:

- Mounting height of laser from 4 to 8 metres.
- Height of aircraft nose(s) are less than the height of laser.
- Stop position(s) from 2 to 65 metres (t1) or 8 to 50 metres (T2/3).

### 3.2.3

#### Offset Calculation

The A-VDGS installation can also be installed according to an offset calculation, depending on the actual situation at each stand.

**Note:** It is important to fulfil requirements, as described previously in sections 2.3 and 2.4, for an offset installation calculation as described in the following table.

The A-VDGS angle of alignment (perpendicular or other) must also be carefully considered in relation to the centreline, for example for system aircraft identification on approach to the stand.

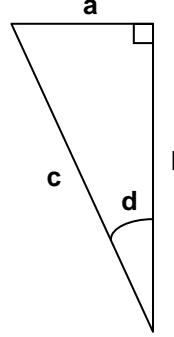
Offset Calculation	
<p>The following calculation is for an offset installation:</p> <p><b>a = b/6, not &gt; 5 m</b></p> <p>The following are variables used in the calculation:</p> <p><b>a</b> - Maximum offset mounting distance</p> <p><b>b</b> - Closest stop position with <b>reference to aircraft nose</b> (distance from A-VDGS to aircraft nose at stop), <b>b</b> is also the extension of the centre line.</p> <p><b>c</b> - Straight line between aircraft nose and A-VDGS, centre of A-VDGS view.</p> <p><b>d</b> - 10 degrees is the maximum angle between centre line and A-VDGS centre of view.</p>	

FIGURE 2.12  
OFFSET CALCULATION

### 3.2.4

#### Support Fixture

A support fixture is required for the A-VDGS unit to be attached to with clamps, for example a steel pipe Ø139.7 mm or 5 ½" in diameter. Clamps are supplied for these dimensions. Make sure the support fixture is positioned according to recommendations, for example up to 3 parallel or convergent centrelines at:  
± 15 degrees, minimum 2 metres to maximum 65 metres (T1) or  
± 9 degrees, minimum 8 metres to maximum 50 metres (T2/3)  
from the aircraft nose stop position, at an angle of maximum 24 degrees from the unit to aircraft nose stop position.

The support fixture shall be checked as described below.

- Using a level, check that the support fixture is vertical.
- Tighten all fasteners that hold the support fixture in place, for example to the wall or mast.

### 3.2.4.1 Maximum allowable deflection in mounting

The table below is a guideline to deflection when mounting on a support fixture.

Deflection Guideline			
Distance from display to stopping position (m)	Max. allowable angle		
	A (degrees)	For practical reasons B (degrees)	For safety reasons* B (degrees)
10	0,8	0,6	(2,8)
20	0,5	0,3	(1,4)
30	0,4	0,2	(0,9)
40	0,3	0,1	(0,7)
50	0,3	0,1	(0,6)
60	0,2	0,1	(0,5)

**Note:** \* Results in an azimuth measurement error of 0.5 m. Only allowed during extreme conditions, such as during maximum wind gusts.

### 3.2.4.2 Docking Guidance Unit

- (a) Check with the Project Manager for the exact height and alignment for every installation, as stand requirements may differ. For example, verify alignment if mounted off-centre at more than a 2 degree angle to the centre line or if more than one centreline.
- (b) Attach appropriate lifting straps to the unit at suitable positions.  
For T1, make sure there is a near/vertical load on each lifting eye, to prevent possible damage (due to horizontal load) to the unit, as follows:
  - Place a board, such as approximately 873x45x120 mm or 34"x2"x6" (LxWxD), not supplied, between the lifting straps/just above the lifting eyes, to uphold the vertical load.

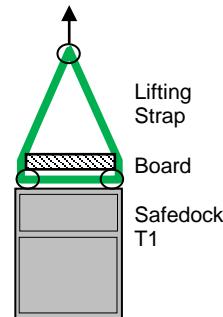


FIGURE 2.14 T1 LIFT EXAMPLE

For T2/3, use a lifting strap with load support from underneath:

- Place a lifting strap around the sides/bottom of the unit.
- Attach the sunshade sides as temporary lifting strap holding plates to the unit (side brackets/upper) to secure the lifting strap in place.
- **Note:** *Do not install the entire T2/3 sunshade until after the unit is fastened to the support fixture, to avoid lift damage.*



FIGURE 2.15 T2/3 LIFT EXAMPLE

- (c) Lift the unit into position using a crane.
- (d) Position 2 clamp bolts in each rail, so that they are on opposite sides of the centre bolt hole in rail.
- (e) Fasten the unit to the support fixture with the **clamps**. The clamps (supplied) are for a steel pipe Ø139.7 mm or 5 ½" in diameter.

**Note:** *Tilt brackets (supplied for T2/3) are required if the pilot display is in direct sunlight at sunrise/sunset.*

- (f) Using a level, check that the sides of the unit are vertical.
- (g) **Conduit** cable entry points (power and control wiring).
- (h) Assemble the **sunshade** and attach it to the unit using the M5 x 20 stainless steel screws and lock washers.

**Note:** *Install the T2/3 sunshade after the unit is fastened to the support fixture, to avoid damage when lifting.*

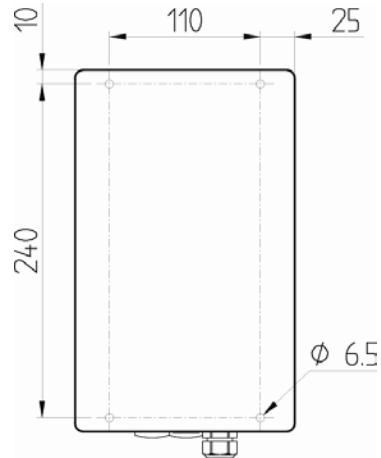
### 3.2.4.3 Operator Panel (OP)

The OP is enclosed in a standard aluminium box and can be installed as follows:

- Mount on flat surfaces or posts using standard mounting equipment and fasteners.
- The OP can also be mounted on a pulpit, as the display provides a 6 o'clock view.

**Note:** Mount at normal shoulder height for best display readability.

The figure below shows the positions of the mounting holes, located on the rear of the operator panel. Conduit cable entry points (Dead man or Emergency Stop button) are located on the bottom of the OP.



**Note:** Measurements are in mm.

FIGURE 2.16 OPERATOR PANEL MOUNTING HOLES

### 3.2.5

#### Calibration Check (Auto Calibration)

A Safedock must be configured with two reference points, one for horizontal and one for vertical calibration. The system checks the calibration automatically for each docking or at regular intervals, according to the references and system settings. If fixed equipment at the aircraft stand, for example a fixed PBB section, cannot be used to obtain reference points, a calibration plate can be installed to obtain reference points.

##### 3.2.5.1

##### Reference Points

Reference points to fixed equipment may be used for a calibration check, for more information, see Chapter 4 Maintenance - Appendix A, Stand Configuration.

##### 3.2.5.2

##### Reference Points using a Plate

A calibration plate can be installed to obtain reference points.

A calibration plate can be mounted within the forward or side scanning areas. The table below lists the scanning angles of the Docking Guidance Unit for the forward and side scanning areas.

Scanning Area	Vertical Scanning Angle	Horizontal Scanning Angle
Forward area	+15°; -35° (T1) or -24° (T2/3) + means upward	+30°; -30° (T1) or +13°; -13°
Side area	+ 5°; - 5 °	2°; +8° (forward)

The calibration plate must also be mounted at least 3 metres from the docking guidance unit, and there should not be any objects behind it for at least two metres.

The calibration plate must be of at least 10 steps size in a calibration picture for good performance. The minimum distance for the calibration plate is 3m from the Safedock. The maximum distance for the calibration plate is 30m.

Recommended minimum dimensions of a calibration plate:

Distance	Size
3-10m	0.3m
10-20m	0.4m
20-25m	0.5m
25-30m	0.6m

The calibration plate must be located within the Safedock system's field of vision.

The field of vision is:

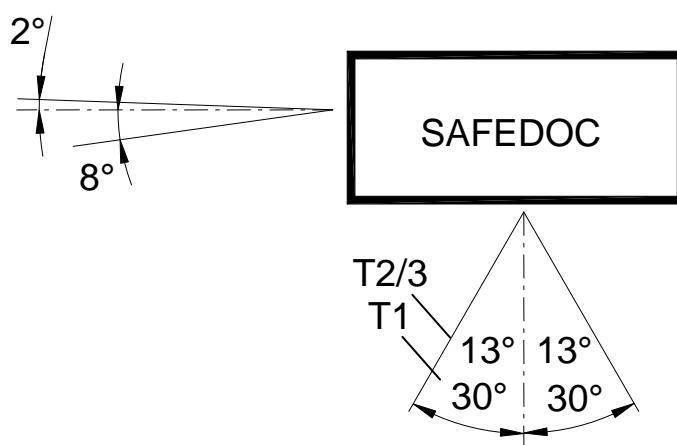


FIGURE 2.17 CALIBRATION CHECK

## 4. ELECTRICAL INSTALLATION

### 4.1 GENERAL

Cables for powering and operating the Docking Guidance System must be run between the various sub-units of the system. Figure 3 gives an overview on how the different sub-units are to be connected.

For more information, see Chapter 2 Installation - Appendix A.

It is also recommended to use UPS to avoid any power-down in the last few seconds of a docking which is a critical time.

A power budget, for UPS sizing requirements, should include typical idle current/KVA requirement and the maximum during docking.

The figure below gives an overview on how the different sub-units are to be connected.

**Note:** GOS is optional system that may not exist at your airport.

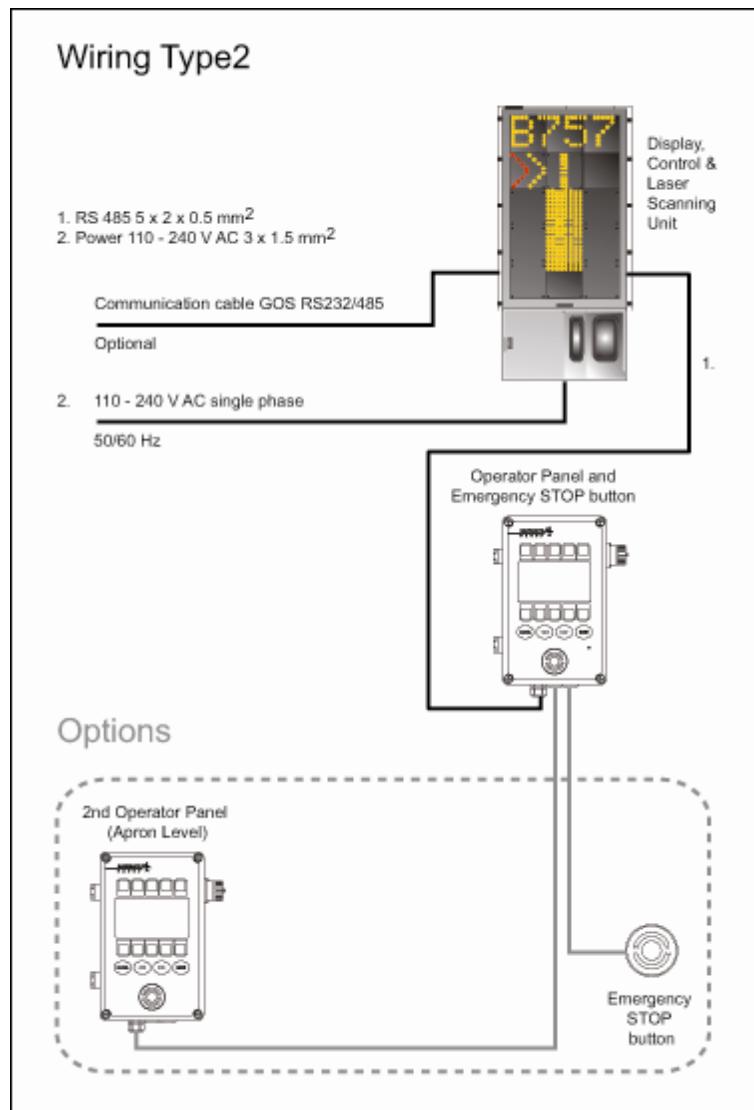


FIGURE 2.18 SAFEDOCK SYSTEM INTERCONNECTION CABLES

#### 4.2 EARTHING THE A-VDGS HOUSING

It is supposed that the support fixture, used for mounting the A-VDGS unit, is connected to construction ground/earth for the current drain from lighting induced voltage surges. Alternatively a copper cable, minimum 25 mm<sup>2</sup>, connected to earth, must be available.

The A-VDGS main unit shall be connected to earth (the earth connection point is delivered by a third party), using an 'earth bonding strap' with a conductor area of 25 mm<sup>2</sup>, which shall be connected to the weld bolt on the rear of the A-VDGS housing.

#### 4.3 A-VDGS CONNECTION TO MAINS

The mains supply should be routed from its conduit entry point via the routing channel to the pole circuit breaker (mains disconnect device). Route it away from other conductors and components. A cable, 3 x 1.5 mm<sup>2</sup>, shall be used. It shall be connected to the A-VDGS unit according to 4.5.4 Cable Connection to A-VDGS Main Unit or see 5. Drawings. The protect earth (PE) wire shall be connected to chassis directly, as it enters the cabinet, to the yellow/green terminal. The cable inside the cabinet shall be as short as possible.

The PE/cable gland hole is located at the rear/lower area, in the Safedock unit, as in the figure.

**Note:** If the PE hole is not used, it is important to seal it using the rubber plug/bolt supplied in the OP package.



FIGURE 2.19 PE EXAMPLE

#### 4.3.1 Main Switch Specification

A main switch that has the specifications listed below shall be installed near the docking guidance unit and shall be easily accessed by service personnel.

- Minimum Voltage Rating: 240 VAC.
- Minimum Amperage Rating: 10 A.
- Disconnects all phases and neutral simultaneously.
- Marked/labelled as the main switch for the docking guidance system.

#### 4.4 CONNECTION OF GOS COMMUNICATION LINE (OPTION)

##### 4.4.1 Communication Cable

When a LAN is not available, normally the communication with the central Gate Operating System/GOS is carried out using a two-pair current loop line. The cable could be CAT 5 UTP (unshielded twisted pair 4x2x0.5mm) for distances less than 1400 metre. In noisy environments the cable should be shielded, which would reduce maximum length to 1000 metre.

##### 4.4.2 Cable Connection to A-VDGS Modem

The cable shall be connected to the terminals in the A-VDGS main unit according to 4.5.4 Cable Connection to A-VDGS Main Unit or see 5. Drawings.

The shield shall be connected directly to the chassis, where it enters the housing. If an UTP cable is used, a separate shield shall be added and used around the cable inside the cabinet. It shall be connected to the chassis at the cable entry and close to the modem terminals.

## 4.5 CONNECTIONS OF THE OPERATOR PANEL

### 4.5.1 General

The following signals, associated with the Operator Panel, are to be connected to the Docking Guidance Main Unit:

- 24 VDC power.
- Operator Panel COM line to main A-VDGS unit.
- Emergency Stop line.
- Dead-man-switch line (option).
- Maintenance COM line to main unit.

**Note:** It is recommended that the support fixture, used for mounting the Operator Panel, be connected to construction ground/earth for the current drain from lightning induced voltage surges. Alternatively a copper cable, minimum 25 mm<sup>2</sup>, connected to earth, should be available. The screws used for fastening the Operator panels to the support fixture shall give the electrical connection to earth.

### 4.5.2 Cable requirements, solutions and glands

For the connection of the Operator Panel, a shielded twisted-pair (STP) cable, 6 x 2 x 0.5 mm<sup>2</sup> or 20 AWG, shall be used, thus with 2 spare pairs. The cable area is needed especially for the power supply. The cable should have a braided shield for obtaining optimal noise immunity.

**Note:** Check with the Project Manager for any field-wiring diagrams that may override these instructions and/or include any additional work.

#### Cable solutions

Cabling may depend on local supply or alternative requirements. It is recommended to discuss alternative cable category requirements with Safegate as communication problems may arise in the field. Communication is dependent on the quality/category of the cable used. A general guideline is to use a cable with a length as short as possible (less than 100m) and with at least 2 spare wires, for example if any I/O points are connected into the A-VDGS Operator Panel, as in A-VDGS/PBB interlocks.

#### Cable glands

The OP unit includes three Ø20.5 mm holes, one with a cable gland for Safedock connection and two plugged holes for other connection options, if required.

The Safedock unit includes two Ø20.5 mm holes with cable glands, one for OP connection and one for power. There is also one Ø12.5 mm hole with a cable gland, for communication to other external systems for example GOS.

In summary, Safedock to OP connection is designed with pre-drilled Ø20.5 mm holes with cable glands in each respective unit, for a cable between 8 mm and 13 mm in diameter.

### 4.5.3 Cable Connection to OP Panel, Emergency and Chocks Button

The cable shall be connected to terminals in the Operator Panel depending on which type of panel is used.

**Note:** It is important to connect all shields to the Operator Panel housing. The shield wire must be as short as possible. Alternatively EMC type cable glands shall be used for connecting cable shields directly to the chassis.

The line/pair for the Chocks On button shall be installed according to sites specific drawings.

Drawings may also include an additional Emergency Stop button, which shall be installed in series with button circuitry inside the Operator Panel.

Cables to the external Emergency or Chocks buttons shall also be shielded. The shield shall be connected to the Operator Panel housing.

#### 4.5.4

#### Cable Connection to A-VDGS Main Unit

The cable from the Operator Panel shall be connected to terminals in the A-VDGS Main Unit according to the drawing, examples in figures on the following pages.

**Note:** It is important to connect the shields directly to the chassis, where it enters the A-VDGS housing - or to a ground terminal. Alternatively EMC type cable glands shall be used for connecting cable shields directly to the chassis.

#### Cable Connection Examples

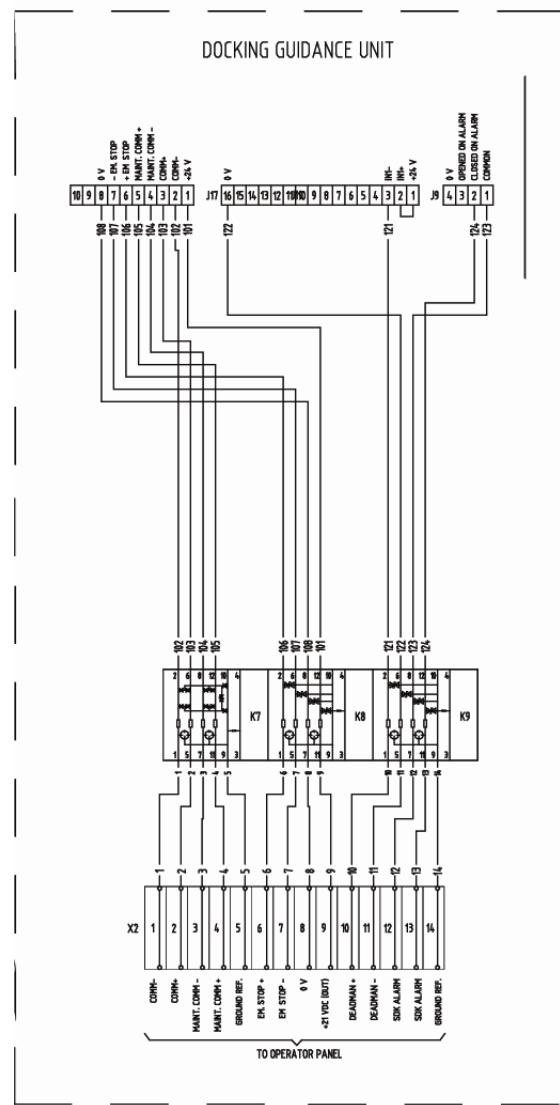


FIGURE 2.20 SAFEDOCK T1 OPERATOR PANEL OPTIONS

**Note:** For more information, see the following figure SAFEDOCK T2/3 OPERATOR PANEL (SOFTKEY).

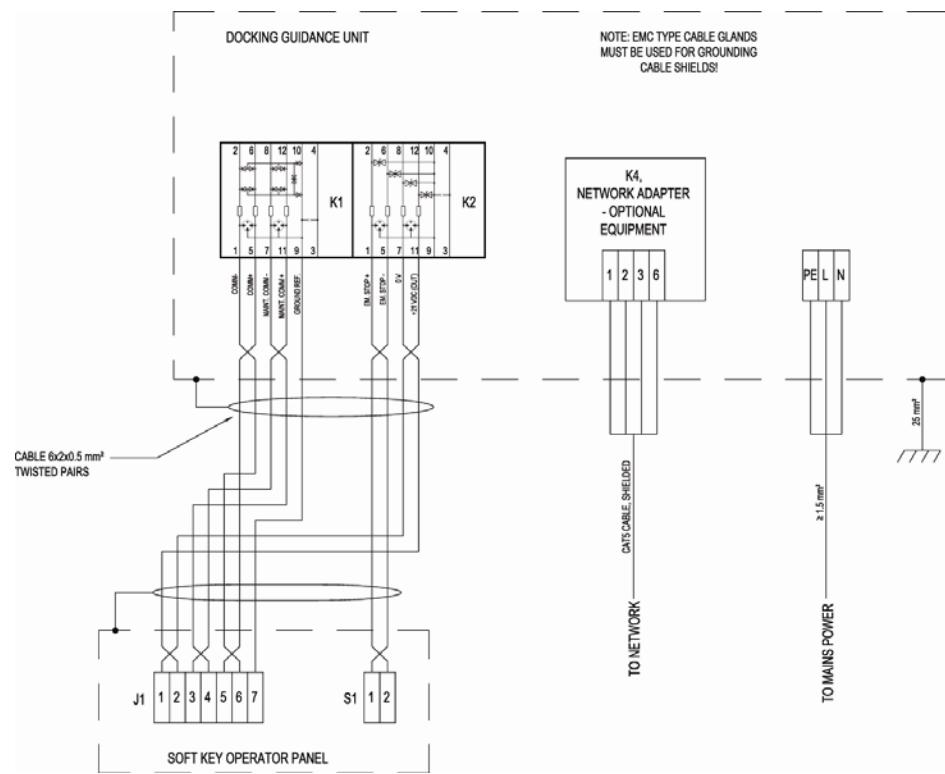


FIGURE 2.21 SAFEDOCK T2/3 OPERATOR PANEL (SOFTKEY)

## 4.6 OTHER CONNECTION (OPTIONS)

### 4.6.1 PBB Interlock/Chock On button examples

The OP can be connected to a Passenger Boarding Bridge (PBB) for interlock functionality, for example if the PBB is in a safe position/parked away from aircraft approach to gate area (PBB in or up) then a docking procedure can be started using the OP. Otherwise, if the PBB is not in a safe position (out or down) it is a damage risk obstruction and a docking cannot be started. It is recommended to use shielded twisted pair cabling ( $2 \times 2 \times 0.5 \text{ mm}^2$ ) for the connection, 2 dry contacts (potential free contacts) with the shield connected to the OP housing.

**Note:** Dry contact (potential free) refers to a contact of a relay (switch) which does not make or break a current. Usually some other relay or device has the job of starting or stopping the current.

PBB Interlock connection, Chock On button	OP Image example
<p><b>PBB Interlock</b> A 24 V signal is required for PBB interlock functionality at OP Input: J8/3 (24 V) and J8/4 (0 V) dry contacts (potential free contacts). If the PBB does not send a 24 V signal, an alternative connection can be made between the PBB and OP as follows:</p> <ol style="list-style-type: none"> <li>1. Connect PBB to OP Input: J8/18</li> <li>2. Connect OP Input: J8/17 to J8/3</li> <li>3. Connect OP Input: J8/4 to PBB.</li> </ol> <p><b>External Chock On button</b> For Chock On functionality at OP Input: Connect J8/5 (to 24 V) and J8/6 via a button (to 0 V).</p>	

FIGURE 2.22 PBB INTERLOCK, CHOCK-ON OPERATOR PANEL (SOFTKEY)

### 4.6.2 Aircraft code signalling

Safedock can send data as binary codes to other equipment, for example a PBB in preparation for a docking procedure with a specific aircraft type.

- Connect from the OP J9/1-12 to the other equipment.

For example, the signal stays active/on from the time the docking is started until finished, Docking OK. If 1/2 and 7/8 are closed = code number 9.

**Note:** For more information, see Maintenance Appendix 4A Stand Configuration Utility or Chapter 5. Drawings.

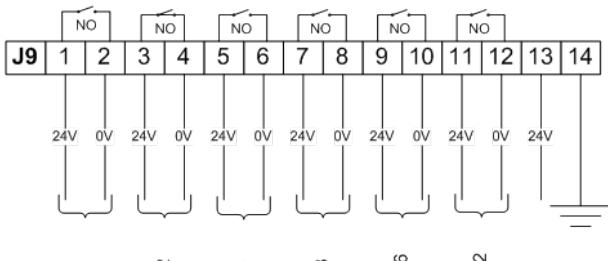


FIGURE 2.23 AIRCRAFT CODE SIGNALLING OPERATOR PANEL (SOFTKEY)

#### 4.6.3 PBB interface

Safedock can be equipped with a serial interface modem using Siemens protocol 3964R.

**Note:** For more information, see the following figures or Chapter 5. Drawings.

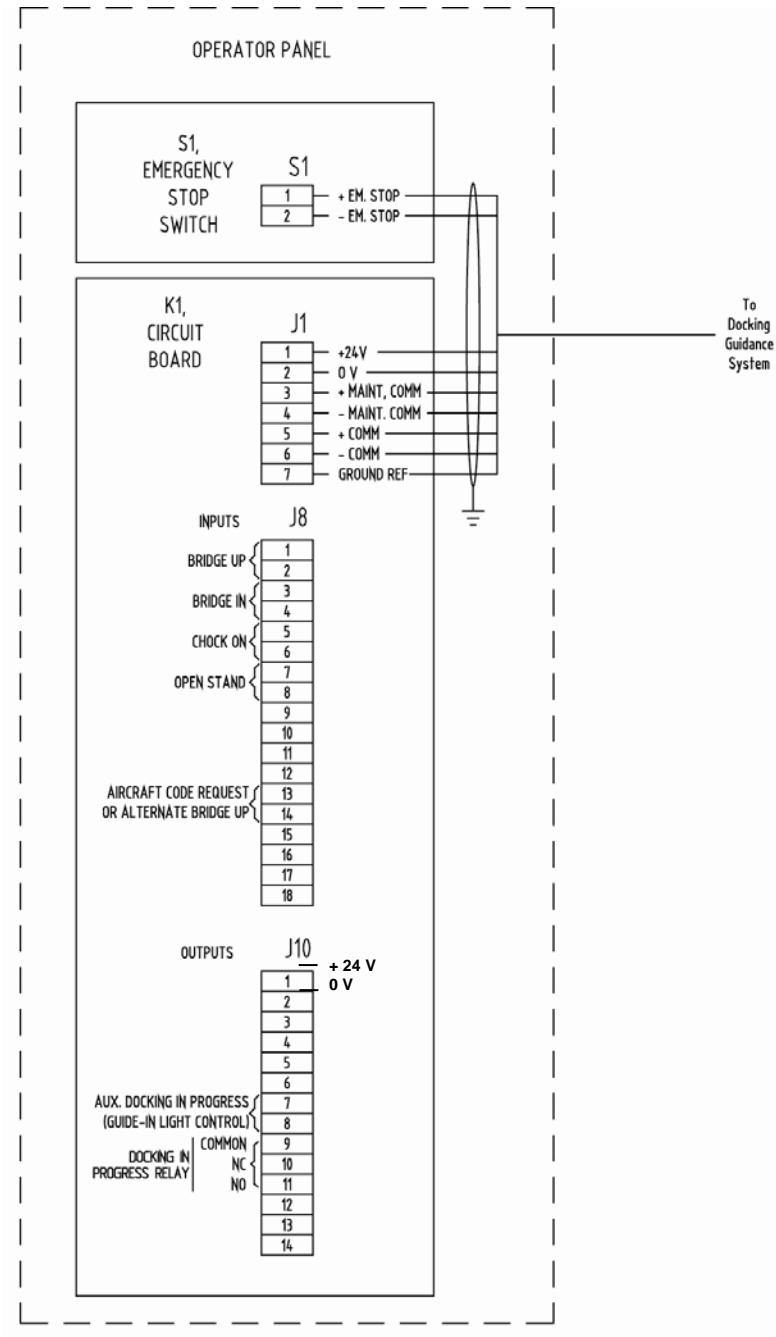


FIGURE 2.24 CONNECTION OPTIONS  
OPERATOR PANEL (SOFTKEY)

## 5. SAFEDOCK SET-UP INSTRUCTIONS

### 5.1 GENERAL

After the Docking Guidance Unit, Operators Panel(s) and calibration plate have been installed, the system must be set-up to meet the demands or characteristics of the particular Stand.

The set-up procedure includes: defining the centre line, setting sighting and calibration points, removing interference echoes, loading operation parameters and setting up the Operator Panel for selectable aircraft types.

The set-up procedure at each stand is carried out using the Safedock Configuration Utility Program. The Configuration Print-Out Utility program is used to document each Stand set-up. A copy per installed Stand shall be stored for the customer's approval during commissioning. The file shall also be maintained throughout the system life cycle.

For configuration and commissioning guidelines, see Chapter 2 Appendix B.

For an in-depth description of these software utilities, see Chapter 4 MAINTENANCE and Appendices.

### 5.2 SET-UP PHASES

The Docking Guidance System is set up by the following procedures, described in Chapter 4 Maintenance - Appendix A.

- Defining a Centreline
- Verifying a centreline definition
- Setting Calibration check points
- Configuration (setting aircraft types and their stop positions and so on)
- Removing Echoes from Fixed Object
- Storing Stand Configuration Files

For carrying out these procedures please refer to the description of the Stand Configuration Utility Program, section 6.

## 6. FUNCTIONAL CHECK

### 6.1 GENERAL

Testing the Docking Guidance System, after the installation has been completed, is done using the 'walk test' procedure. For more information, see Chapter 3 OPERATION.



## CHAPTER 2 INSTALLATION - APPENDIX A

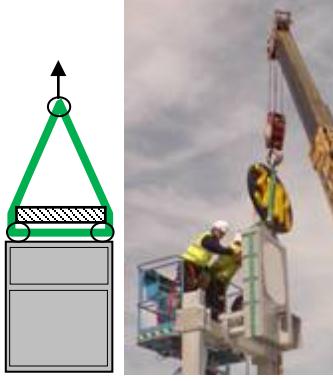
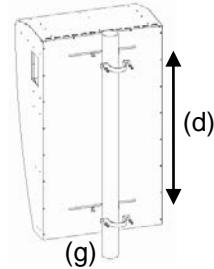
### ENGINEERS AND CONTRACTORS QUICK GUIDE

#### MOUNTING UNITS AND WIRING

##### 1. QUICK GUIDE FOR CABINET UNITS

This information is for engineers and/or contractors to use as a reference during installation of a stand-alone Safedock Advanced- Visual Docking Guidance System unit (A-VDGS) and a soft key Operator Panel (OP). It is recommended to make notes, such as colours/numbers used when wiring in step 4.

**Note:** Installation may be subject to any site specific aspects. For more information, see site documentation such as field wiring diagrams or manual chapters, 2. Installation or 5. Drawings.

<b>1.1</b>	<b>CHECK THE SUPPORT FIXTURE</b>
<p>A support fixture is required for the A-VDGS unit to be attached to with clamps, for example a steel pipe Ø139.7 mm or 5 ½" in diameter. Clamps are supplied for these dimensions. Make sure the support fixture is positioned according to centreline(s) recommendations, for example up to 3 parallel or convergent centrelines at ± 15 degrees (T1) or ± 9 degrees (T2/3), 2 - 65 metres (T1 min/max) or 8 - 50 metres (T2/3 min/max) from the aircraft nose stop position, at an angle of maximum 24 degrees from the unit to aircraft nose stop position.</p> <ul style="list-style-type: none"> <li>(a) Using a level, check that the support fixture is vertical.</li> <li>(b) Tighten all fasteners that hold the support fixture in place, for example to the wall or mast.</li> </ul>	
<b>1.2</b>	<b>INSTALL THE A-VDGS UNIT</b>
<ul style="list-style-type: none"> <li>(a) Check with the Project Manager for the exact height and alignment for every installation, as stand requirements may differ. For example, verify alignment if mounted off-centre at more than a 2 degree angle to the centre line or if more than one centreline.</li> <li>(b) Attach appropriate lifting straps to the unit at suitable positions. For <b>T1</b>, make sure there is a near/vertical load on each lifting eye, to prevent possible damage (due to horizontal load) to the unit. Place a board (such as 45x120mm/2"x6") between the lifting straps/just above the lifting eyes, to uphold the vertical load. For <b>T2/3</b>, use a lifting strap with load support from underneath. Place a lifting strap around the sides/bottom of the unit. Attach lifting strap holding plates (kit/supplied) to the unit (side brackets/upper) to secure the lifting strap in place. <b>Note:</b> Do not install the T2/3 sunshade until after the unit is fastened to the support fixture, to avoid lift damage.</li> </ul>	
<ul style="list-style-type: none"> <li>(c) Lift the unit into position using a crane.</li> <li>(d) Position 2 clamp bolts in each rail, so that they are on opposite sides of the centre bolt hole in rail.</li> <li>(e) Fasten the unit to the support fixture with the <b>clamps</b>. The clamps (supplied) are for a steel pipe Ø 139.7 mm or 5 ½".</li> </ul> <p><b>Note:</b> T2/3 only: Tilt brackets (supplied) are required if the pilot display is in direct sunlight at sunrise/sunset.</p> <ul style="list-style-type: none"> <li>(f) Using a level, check that the sides of the unit are vertical.</li> <li>(g) <b>Conduit</b> cable glands 9-13 mm (power/OP) 4-8 mm (options).</li> <li>(h) T2/3: Assemble the <b>sunshade</b> and attach to the unit using M5x20 stainless steel screws and lock washers.</li> </ul> <p><b>Note:</b> Install the T2/3 sunshade after the unit is fastened to the support fixture, to avoid damage when lifting.</p>	 <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <span>T1</span> <span>T2/3</span> </div> <p><b>FIGURE 2A.1 LIFT EXAMPLES</b></p>  <p><b>Note:</b> Mounting rails/clamps upper-lower distances: T1 - 1449 mm see (d), T2 - 1046 mm, T3 - 896 mm.</p> <p><b>FIGURE 2A.2 - T1 UNIT REAR</b></p>

### 1.3

#### INSTALL THE OP UNIT

- (a) Use standard mounting equipment and fasteners to mount on flat surfaces or posts. Alternatively, mount on a pulpit, as the display provides a 6 o'clock view. Mount at normal shoulder height for best display readability.
- (b) Mounting hole positions are on the rear of the OP.
- (c) Conduit cable gland 8-13 mm (Dead man or Emergency Stop button) located at the bottom with extra Ø 20.5 mm holes, if required (options).

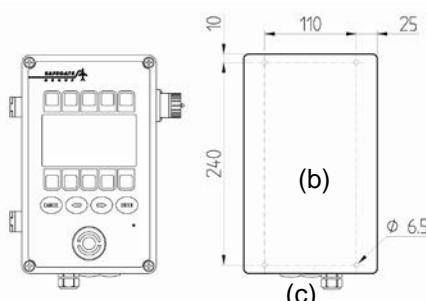


FIGURE 2A.3 – OP SOFTKEY VIEWS

**Note:** Measurements are in mm.

### 1.4

#### TERMINATE WIRING IN UNITS: OP TO A-VDGS

It is recommended to use shielded twisted-pair (STP) cable, for example 6x2x0.5mm<sup>2</sup> or 20 AWG.

**Note:** Check with the Project Manager for any field-wiring diagrams that may override these instructions and/or include any additional work. If the Protect Earth (PE) hole located at the rear/lower area of the Safedock unit is not used, seal it using the rubber plug/bolt supplied in the OP package.

(a) **OP unit:** Terminate J1 and S1.

(b) **Wires:** Write colour/number.

(c) **A-VDGS unit:** Terminate K7, 8-X2 (T1) or K1, 2 (T2/3).

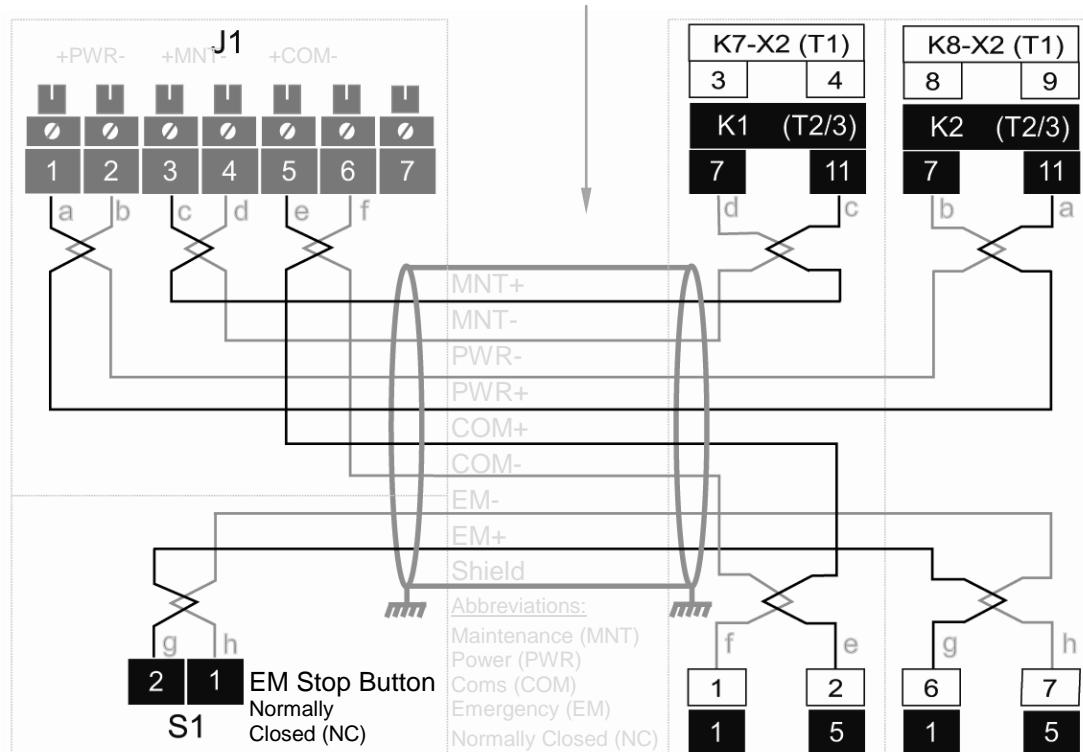


FIGURE 2A.4 – OP TO A-VDGS WIRING

#### Commercial Coding Guidelines for AC Wiring

Service  
115v/240v 60Hz  
Common  
Ground

US  
Black  
White  
Green

Europe  
Brown  
Blue  
Green/Yellow

UK  
Brown  
Blue  
Green/Yellow

**Note:** If notes are made on this page, please forward a copy to site management for safe keeping.

## 2. QUICK GUIDE FOR T1 SPLIT UNITS (OPTION)

This information is for engineers and/or contractors to use as a reference during installation of an Advanced Visual Docking Guidance System (A-VDGS), Safedock Type 1 (T1 Split) with separate units. Units include: display unit, a laser unit, a gate sign (option) and a soft key Operator Panel (OP).

**Note:** Installation may be subject to any site specific aspects. For more information, see site documentation such as field wiring diagrams or manual chapters, 2. Installation or 5. Drawings.

### 2.1 CHECK THE SUPPORT FIXTURE

A support fixture is required for the A-VDGS unit(s) to be attached to with clamps, for example a steel pipe Ø139.7 mm or 5 ½" in diameter. Clamps are supplied for these dimensions. Make sure the support fixture is positioned according to centreline(s) recommendations, for example up to 3 parallel or convergent centrelines at ± 15 degrees, 2 - 65 metres (min/max) from the aircraft nose stop position, at an angle of maximum 24 degrees from the unit to aircraft nose stop position.

- Using a level, check that the support fixture is vertical.
- Tighten all fasteners that hold the support fixture in place, for example to the wall or mast.

### 2.2 INSTALL THE UNITS

- Check with the Project Manager for the exact height and alignment for every A-VDGS installation, as each stand may have different requirements. For example, verify the alignment if mounted off-centre at more than a 2 degree angle to the centre line(s).
- Attach appropriate lifting straps to the **display unit** at suitable positions, for more information see 1.2.
- Lift the unit into position (the upper section of the support fixture) using a crane.
- Position 2 clamp bolts in each rail, so that they are on opposite sides of the centre bolt hole in rail.
- Fasten the unit to the **support fixture with clamps**. The clamps (supplied) are for a steel pipe Ø139.7 mm or 5 ½" in diameter. Using a level, check that the sides of the unit are vertical.
- Attach appropriate lifting straps to the **sign unit**, for more information see section 1.2.
- Lift the unit into position (the middle section of the support fixture) using a crane.
- Position 2 clamp bolts in each rail, so that they are on opposite sides of the centre bolt hole in rail.
- Fasten the unit to the **support fixture** with clamps (approximately 150 mm below the pilots display).  
**Note:** The sign is to be moved up closer to the display in a later step for sign connection.
- Attach appropriate lifting straps to the **laser unit**.
- Lift the unit into position (the lower section of the support fixture) using a crane.
- Position 2 clamp bolts in each rail, so that they are on opposite sides of the centre bolt hole in rail.
- Fasten the unit to the **support fixture** (just below the sign) with the clamps.

**Side view example (T1 Split units)**

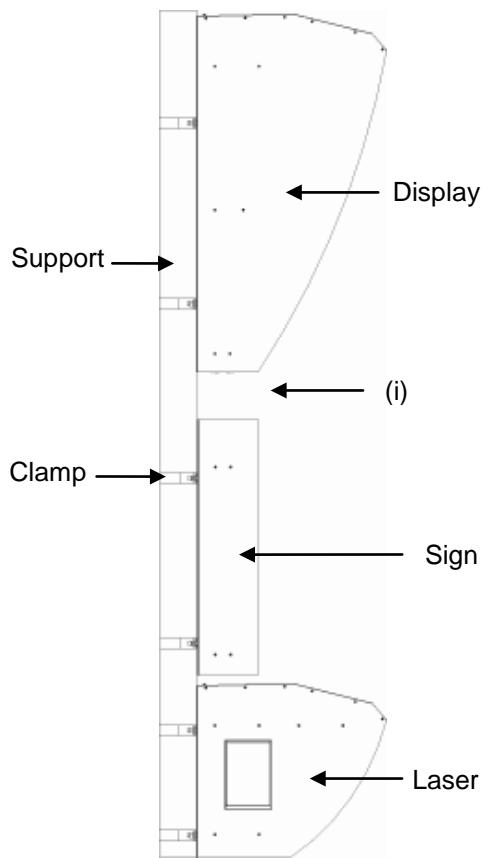
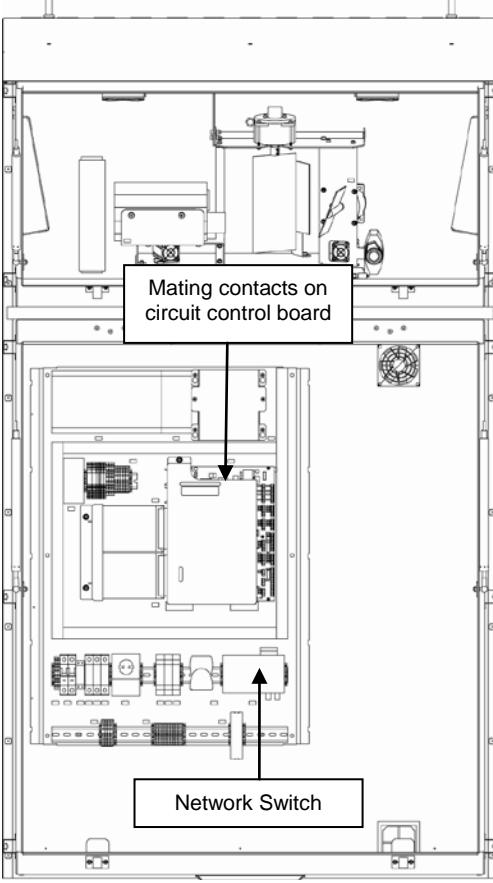
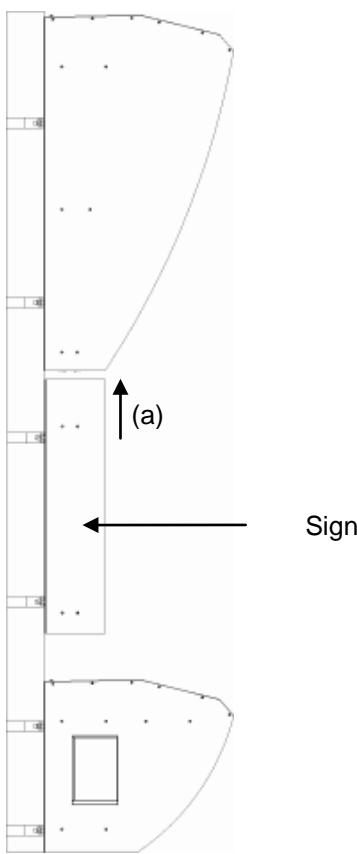
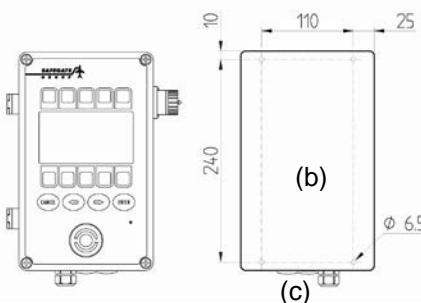


FIGURE 2A.5 – T1 SPLIT SIDE VIEW  
SIGN DOWN

<p><b>2.3 CONNECT THE LASER UNIT TO THE DISPLAY UNIT</b></p> <p>(a) Carefully lift the laser unit's external cables up behind the sign unit to the bottom of the display unit.</p> <p>(b) Feed the loose ends of the cables through the appropriate conduit cable glands/holes in the display unit bottom, 9-13 mm (power/OP) 4-8 mm (options).</p> <p>(c) Attach the flange/cover plate to the bottom of the display unit.</p> <p>(d) Attach the cable glands of the other 2 cables to the display.</p> <p>(e) Open the display door.</p> <p>(f) Attach the cables with green contacts to the control circuit board.</p> <p>(g) Connect the network cable to one of the available ports on the network switch.</p> <p>(h) Connect the remaining cables to the appropriate terminal contacts in accordance with the wire numbers on each cable. For more information, see 1.4 Terminate wiring in units: OP to A-VDGS on page 2 or 5. Drawings, T1 Split for connection.</p> <p>(i) Remove the covers of the appropriate cable ducts and position the cabling in the ducts. Then replace the covers.</p>	<p>Front view example (T1 Display unit)</p> 
<p><b>2.4 CONNECT THE DISPLAY UNIT TO POWER, OP, NETWORK</b></p> <p>(a) Route the cables through the appropriate size cable glands located in the flange/cover plate on the bottom of the display.</p> <p>(b) See 5. Drawings, T1 Split for connecting the power and operator panel cables in the display unit.</p> <p>(c) Connect the network cable to the transient filter located below the network switch.</p> <p>(d) Tighten the cable glands.</p> <p>(e) Re-check everything is connected properly.</p>	<p>FIGURE 2A.6 – T1 COMPONENTS</p>

<h2>2.5 CONNECT THE SIGN</h2> <ul style="list-style-type: none"> <li>(a) Reposition the gate sign so that it is closer to the bottom of the display unit.</li> <li>(b) Open the door to the gate sign.</li> <li>(c) Run the power cable for the gate sign through the cable gland in the bottom of the sign.</li> <li>(d) Connect the cable to the terminal contact located just above the cable gland.</li> </ul> <p><b>Note:</b> The power to the lamps is controlled by an adjustable light sensor relay. It may be necessary to adjust the relay at dawn or dusk to have the sign light up at the appropriate time.</p>	
<h2>2.6 INSTALL THE OP UNIT</h2> <ul style="list-style-type: none"> <li>(a) Use standard mounting equipment and fasteners to mount on flat surfaces or posts. Alternatively, mount on a pulpit, as the display provides a 6 o'clock view. Mount at normal shoulder height for best display readability.</li> <li>(b) Mounting hole positions are on the rear of the OP.</li> <li>(c) Conduit cable gland 8-13 mm (Dead man or Emergency Stop button) located at the bottom with extra Ø 20.5 mm holes, if required (options).</li> </ul>	
<h2>2.7 POWER ON THE DISPLAY AND SIGN UNITS</h2> <ul style="list-style-type: none"> <li>(a) Turn on the main power switches in the display and sign units.</li> <li>(b) Close the doors to the display and sign units.</li> <li>(c) Check the display, sign and OP units turn on.</li> </ul> <p><b>Note:</b> For more information, see Chapter 2 Installation - Appendix B, Configuration and Commissioning Guidelines.</p>	



**CHAPTER 2 INSTALLATION - APPENDIX B**  
**OPERATIONS AND MAINTENANCE PERSONNEL**  
**CONFIGURATION AND COMMISSIONING GUIDELINES**

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1.2	PREPARE THE MAINTENANCE LAPTOP .....	3
1.3	CONNECT THE MAINTENANCE LAPTOP TO THE OP .....	3
1.4	START SAFEDOCK MAINTENANCE SYSTEM (SDCONFIG SOFTWARE) ..	4
1.5	SET DATE AND TIME .....	5
1.6	SET THE CLIP DISTANCE.....	5
1.7	SET CENTRELINE, AUTO CALIBRATION, CONFIGURE A-VDGS/OP .....	6
1.8	WALK TEST THE SYSTEM.....	11
1.9	ADD/CHANGE AIRCRAFT TYPES PARAMETERS/STOP POSITIONS.....	13
1.10	DOWNLOAD LOG OR SHORT LOG.....	13
<b>2.</b>	<b>TROUBLESHOOTING .....</b>	<b>14</b>

## **1. GUIDELINES**

This information is for airport Operations and Maintenance personnel to use as a reference for configuration and/or commissioning of a Safedock, Advanced Visual Docking Guidance System (A-VDGS), via an Operator Panel (OP) and a maintenance laptop, at a stand with a single centreline. Text and image references may not depict the actual system being configured and commissioned.

**Note:** This document also includes a Troubleshooting section if an error should occur during system configuration and commissioning.

## 1.1 PREPARE THE STAND FOR AIRCRAFT STOP POSITIONS

Aircraft stop positions are specific to each stand due to a number of different variables, for example aircraft type, Passenger Boarding Bridge (PBB) type and centreline length.

It is recommended for airport personnel to prepare each stand for A-VDGS configuration and commissioning works with stop distance/aircraft type information from design drawings or actual aircraft dockings at the stand.

- (a) Enter stand/gate, stop distance, aircraft type information in the table below for future reference.

**Stand/Gate Name/Number:**

**Note:** If notes are made on this page, please forward a copy to site management for safe keeping.

- (b) Make sure ground markings are painted along the centre line for the aircraft type stop positions to be used at the specific stand.
  - (c) This information is to be made available for Safegate and/or other airport personnel before commissioning or changing configuration settings in an A-VDGS.

## 1.2 PREPARE THE MAINTENANCE LAPTOP

The following are required for a local connection to an A-VDGS via an OP (supplied by Safegate, if requested):

- **Maintenance Laptop** – a portable computer.
- **Configuration Software** – Safedock Maintenance System (SDCONFIG).
- **Communication Cable** – a cable with an OP service outlet connector.
- **Interface Converter** – USB to RS-232-485 adaptor, if required.

(a) Make sure Safedock **SdConfig** configuration software is installed on the laptop, supplied on the software CD.

**Note:** If a Maintenance Laptop is supplied by Safegate, software is pre-installed.

(b) Make sure the laptop battery is fully charged before use in the field (airside).

## 1.3 CONNECT THE MAINTENANCE LAPTOP TO THE OP

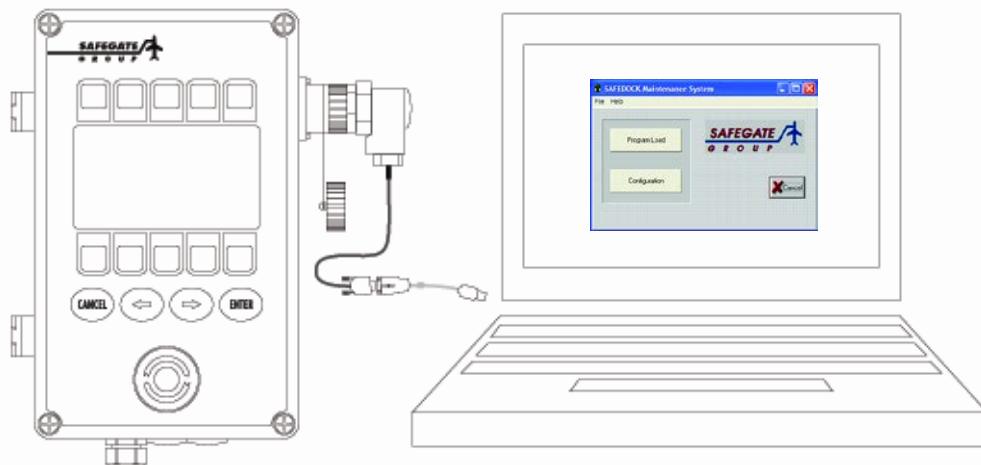


FIGURE 2B.1 – LAPTOP TO OP CONNECTION

- Connect the communication cable to the OP service outlet.
- Connect the cable to the laptop, via the interface converter USB adaptor, if required.

## 1.4

### START SAFEDOCK MAINTENANCE SYSTEM (SDCONFIG SOFTWARE)

- (a) From Windows, double click on the **SdConfig** icon or go to **Start/All Programs/SdConfig**.
- (b) From the **SAFEDOCK Maintenance System** menu, click **Configuration**.
- (c) For a local connection (Laptop – A-VDGS), select:
  - **Local** radio button
  - **COMX** - select a COM number **X** (available laptop port) for communication.

**Note:** If other devices are installed on the laptop, the COM number **X** may vary.

- **Baud rate 9600** radio button.

Alternatively, for a remote connection (to an A-VDGS via a GOS Server) select:

- **Remote** radio button
- **IP Address** and enter an IP address.  
**Note:** If Server 1 IP and Server 2 IP addresses to GOS servers are entered, SdConfig automatically selects the active server.
- **Stand No.** and enter a stand name/number corresponding to the Safedock to be configured.

- (d) Click **Connect**.

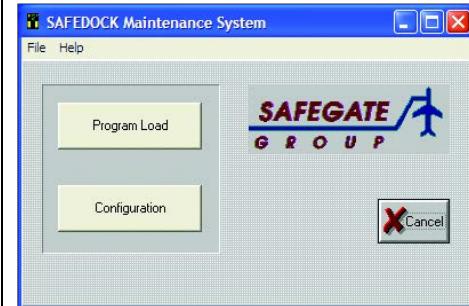


FIGURE 2B.2 – SDCONFIG START

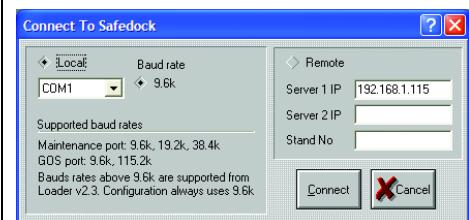


FIGURE 2B.3 – CONNECT TO PD

A **SAFEDOCK Configuration** window appears.

#### SAFEDOCK Status

- Make sure that the small dot in the upper left corner flashes between black and white to show communication is being established.  
If not see (c), select another local COM port.

**Note:** Some buttons are disabled/appear shaded grey.

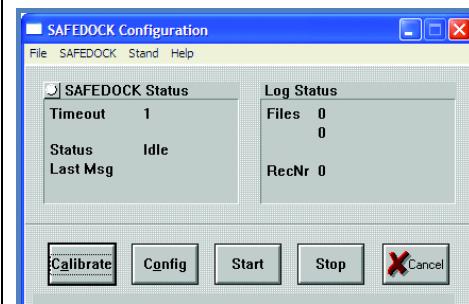


FIGURE 2B.4 – CONFIGURATION

## 1.5 SET DATE AND TIME

Set the date and time in the A-VDGS to the same settings as in the Maintenance Laptop or other connected computer.

**Note:** Make sure the date and time settings in the computer are correct (accurate for local time).

- (a) Click **SAFEDOCK** in the menu bar.
- (b) Click **Set Date and Time**.  
**SDConfig** software automatically sets the date and time in the A-VDGS to the settings in the computer.

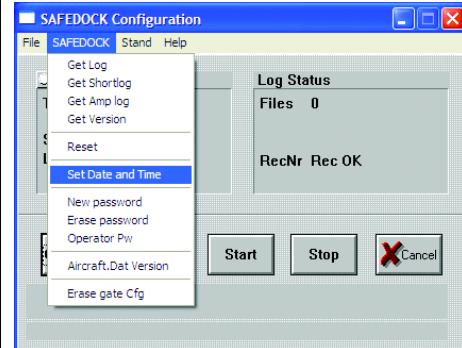


FIGURE 2B.5 – SET DATE TIME

## 1.6 SET THE CLIP DISTANCE

The clip distance is a setting from where the A-VDGS starts aircraft identification (capture) on approach to a stand, based on an obstruction free view on the centreline.

- (a) From **SAFEDOCK Configuration**, click **Config**.  
The A-VDGS configuration download starts immediately. This process may take up to a minute. When the communication flashes black and white, approximately once per second, the download is complete.
- (b) From **SAFEDOCK Setup**, click **Parameters**.
- (c) From **Setup Parameters**, go to **Clip dist**.
- (d) Enter the clip distance for stand requirements, click **OK**.
- (e) From **SAFEDOCK Setup**, click **Send**.
- (f) Click **Save** to save the updated configuration file to a folder, **OK**.
- (g) Enter the password, **!safedock!** (standard password unless changed), **OK**.
- (h) Click **Cancel** to close the window.

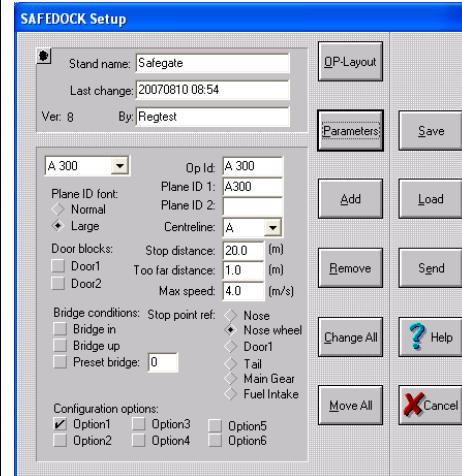


FIGURE 2B.6 – SETUP

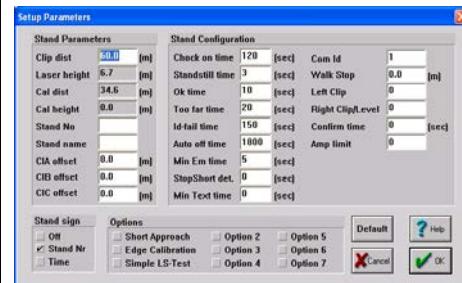


FIGURE 2B.7 – PARAMS

## 1.7 SET CENTRELINE, AUTO CALIBRATION, CONFIGURE A-VDGS/OP

This step includes instructions for:

- Set a centreline
- Set an auto calibration point
- Configure A-VDGS and OP

**Note:** The order of the instructions in this step is based on theory. Another order may be used during configuration and commissioning, depending on engineer preferences or site requirements.

### • Set a centreline

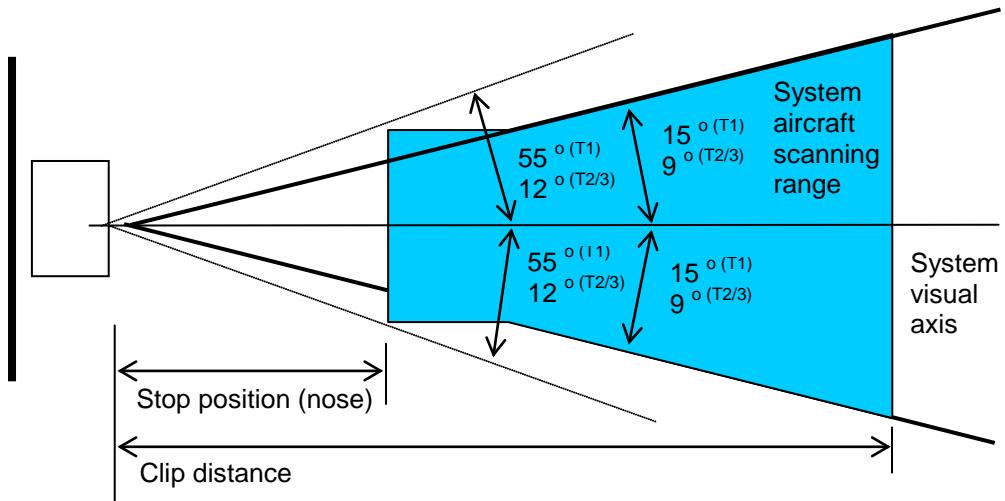


FIGURE 2B.8 – SET A CENTRELINE

The system can manage up to three centrelines, convergent or parallel. For an accurate guidance the centreline(s) must be placed within the laser's aircraft scanning range of the system,  $\pm 15$  degrees (T1) or  $\pm 9$  degrees (T2/3). The limits for centreline position are defined as shown. The display reading sector is  $\pm 55$  degrees (T1) or  $\pm 12$  degrees (T2/3).

**Note:** The aircraft stop-positions supported for all centrelines must be for a pilot/co-pilot position within the scanning range, as shown. Painted centrelines may extend outside of this area and cause confusion. For more information, see Chapter 2. Installation.

- (a) From **SAFEDOCK Configuration**, click **Config**.
- (b) Click **New** to send new offset values to the A-VDGS, and start a new picture scan to verify the sighting point.

A calibration view Distance mode example.

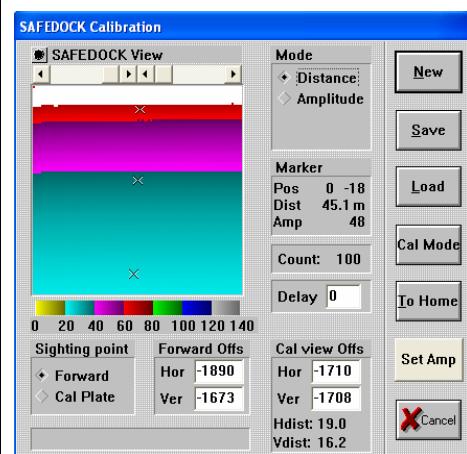


FIGURE 2B.9 – CALIBRATION

- Enter a confirmation code, **!safedock!** (standard password unless changed).

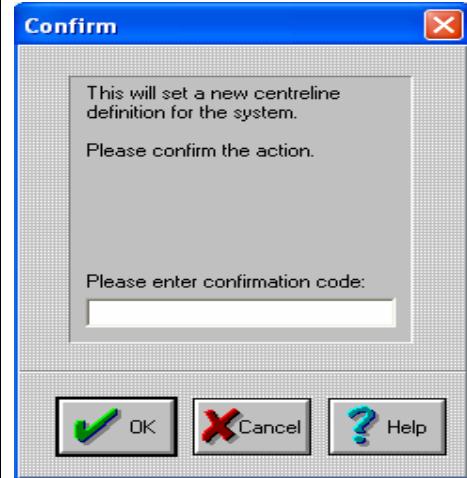


FIGURE 2B.10 – CONFIRM

- Click **OK**.

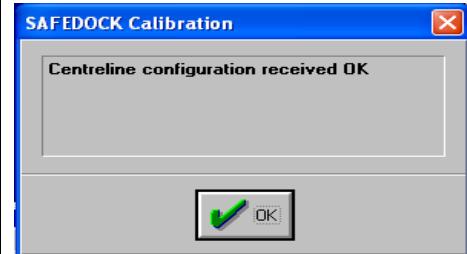


FIGURE 2B.11 – OK

A calibration view Amplitude mode example.

- For an alternative calibration view scan, click **Amplitude**.
- You can also click **Cal Mode** to set variables, for example centreline points, select a centreline and manage multiple centrelines or a single centreline.
- Left/Right clip adjustment:**

Above the Safedock View window there are two horizontal scrollbars. By dragging the scrollbars, the system can be instructed to ignore fixed objects at the left and/or right edges of the laser scanning unit's field of view, when it attempts to detect an approaching aircraft. The area the system ignores is then greyed-out in the window. The left/right clip area is configured individually per centreline.

If required, click **New** to send the new configuration to the system and start a new picture scan to verify, enter password, **OK**.

**Note:** If there are no fixed objects at a gate to be ignored, then both sides should be set to the centre (disabled).

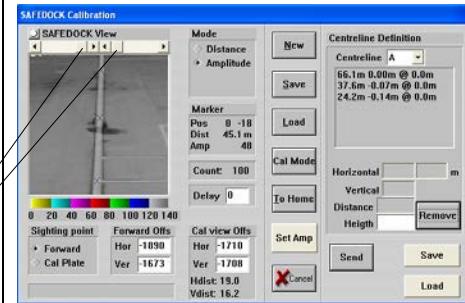


FIGURE 2B.12 – AMPLITUDE

- Select **Save** (Safedock view) to save a copy of the current (scanned) picture for later review or save a centreline configuration file.

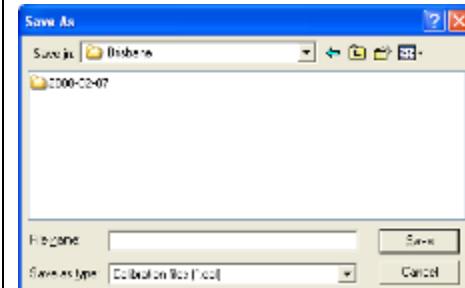


FIGURE 2B.13 – SAVE

- You can also select **Load** (Safedock view) to load a previously saved (scanned) picture or to load a centreline configuration file.

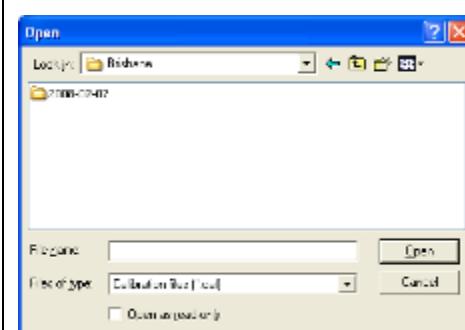


FIGURE 2B.14 – LOAD

- Set auto calibration**

Calibration check points verify correct system operation at the start of every docking. There are two methods: Edge calibration or Point calibration (Non Edge). Edge calibration is recommended as it includes a set of calibration control points, however Point calibration is used as an alternative.

A calibration plate must also be mounted or other fixed points may be used, if located at least three metres from the Safedock unit and with no objects behind it for at least two metres, for more information see the manual Installation or Maintenance chapters.

**Note:** For Safedock version 3.0 or later, use SdConfig to select the calibration mode (parameters).

### Edge calibration

Configure an A-VDGS using edge calibration.

(a) From **SAFEDOCK Configuration**, click **Calibrate**.

(b) Select **Cal Plate** in the lower left and click **New**.

The laser takes a new picture through the side using calibration view offsets and counts to 100. A view appears on which the calibration edge or point, for example on a fixed bridge, may be set. It may be necessary to adjust the offsets so that the system can acquire a calibration picture through the side window.

(c) From the **SAFEDOCK Calibration** view, left click to find the calibration object, the plate or another defined object.

**Note:** A new centre for the calibration picture is set, whenever the calibration picture is left-clicked in **Cal Point** mode.

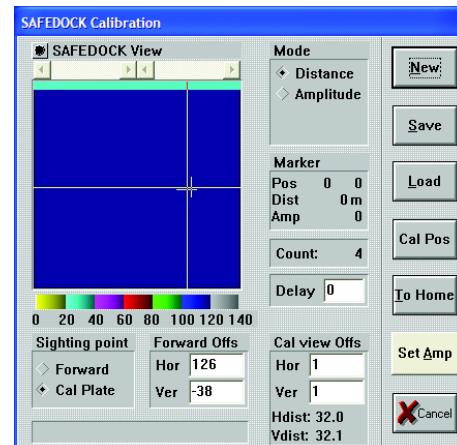


FIGURE 2B.15 – EDGE

- (d) When the object is found in the picture, run a **distance check** by setting the crosshair in the middle of the calibration object and right click a few times. Check the distance value under the cursor. **Note:** Distance values should be consistent to the object distance.
- (e) Make sure the calibration object edges have at least 1 metre clearance to other nearby objects.
- (f) Click **Cal Pos**.
- (g) A horizontal calibration edge is required (the edge found during a horizontal scan). Place the crosshair on the intended calibration object, close to the edge, and left click. A horizontal line is marked across the picture, with a small notch where the edge is expected.
- (h) A vertical calibration edge is required (the edge found during a vertical scan). Place the crosshair on the intended calibration object, close to the edge, and left click. A vertical line is marked across the picture, with a small notch where the edge is expected.
- (i) Click **Cal Pos** to confirm both edge selections. The new calibration edge parameters are downloaded to the Safedock. The **Hdist** and **Vdist** fields now have distance values.  
**Note:** Distance values must not diverge more than  $\pm 0.1$  metre from the distance checked above.
- (j) The horizontal and vertical positions of calibration edges must always be visible within the same scanned picture, **Note:** The edges do not necessarily need to be on the same object.
- Verify the calibration setup by starting docking a few of times, and observe the result of the calibration test. Check **Hedge** and **Vedge** parameters on the bottom row of the SAFEDOCK Configuration view. Each value should not exceed 2. If one of these values exceeds 4, **AUTO CAL ERROR** appears and the calibration set-up procedure must be repeated.

### Point calibration (non-edge)

This method is equivalent to Edge calibration except for horizontal and vertical calibration edge selection. This method does not require the calibration checkpoints to be located close to the edge of the defined calibration object.

Configure an A-VDGS to a new auto self calibration point.

- From **SAFEDOCK Configuration**, click **Calibrate**.
- Select **Cal Plate** in the lower left corner and click **New**.  
The laser now takes a new picture through the side calibration window and counts to 100.  
A fixed structure view appears representing where the existing calibration point, for example on a fixed bridge.
- After the new picture is taken, the system is ready to set a new calibration point, click **Cal Pos**.
- Click twice on the fixed object in the picture and then click **Cal Pos** again.
- Enter the password **!safedock!** (standard password unless changed) and click **Ok**. A new auto calibration point is set.
- Click **Cancel** to close all windows and exit the program.

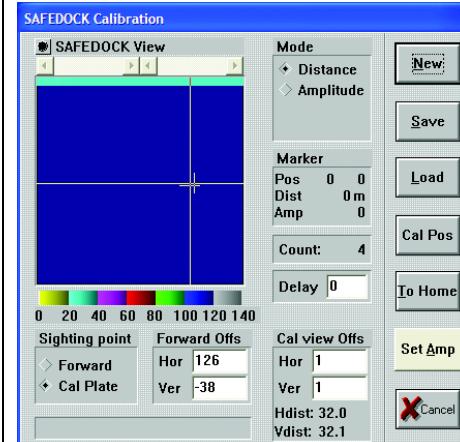


FIGURE 2B.16 - POINT

### • Configure A-VDGS and the OP

#### A-VDGS and the stand

Configure to a configuration file from a similar stand or a completely new configuration.

- Similar stand:* Connect to another OP, if required.
- From **SAFEDOCK Configuration**, click **Config**.
- Click **Save** to save the configuration file.
- Exit and disconnect from the OP.
- New stand:* Connect to the OP at the new stand.
- From **SAFEDOCK Configuration**, click **Config**.
- Click **Load** and browse to the folder with saved configuration file, if required.
- Select a GTE file to be used, for example LHR 508 for stand 508, and click **Open**, if required.

#### OP and aircraft types

Configure the OP for aircraft types. Use a configuration file from a similar stand or create a new file.

- Click **Open** file button in the upper left corner and browse to a folder with the saved configuration file.
- Select the CFG file to be used and then click **Open**, **Ok**.
- Click **Send**.
- Click **Save**, **Yes** to overwrite or enter a file name, **Ok**.
- Enter the password **!safedock!** (standard password unless changed) and click **Ok**.  
For more information, see Chapter 4. Maintenance.  
The system notifies receipt of the correct configuration.
- Click **Cancel** to close the windows, exit the program.
- Start walk tests for the aircraft type(s)/stop position(s).

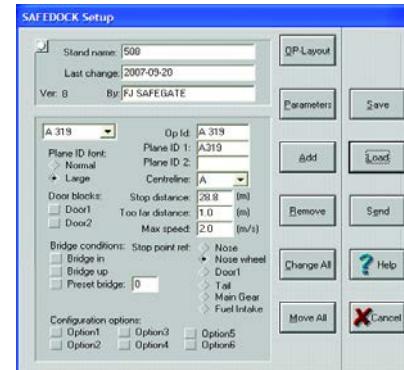


FIGURE 2B.17 – SIMILAR OR NEW

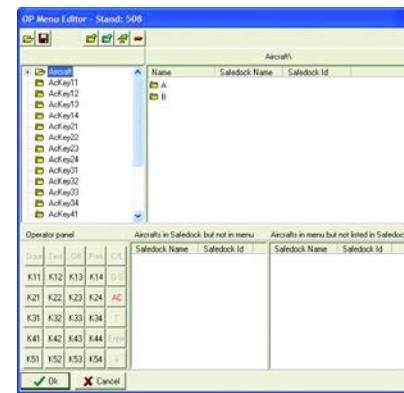


FIGURE 2B.18 – OP MENU EDITOR

## 1.8 WALK TEST THE SYSTEM

After entering or changing parameters such as aircraft types or stop positions in the A-VDGS, always carry out a physical walk test to ensure correct system operation.

- (a) From the OP main menu, select **Test**, enter a password, if required, and press **ENTER**.
- (b) Select **Walk Test**.
- (c) If the configuration has been updated for individual aircraft types, the system displays the aircraft type(s) that require a walk test before the A-VDGS can dock them. Each time the **Walk Test** function is selected the next aircraft type requiring a walk test is displayed, until a successful walk test is completed for all the aircraft types in the configuration.
- (d) Press the **ENTER** key to start a walk test for the suggested aircraft type.

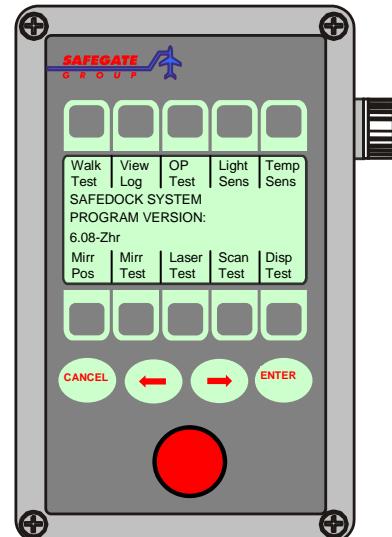


FIGURE 2B.19 – OP

- (e) Select an aircraft type as instructed from the aircraft selection menu, for example **B 747**. The selected aircraft type determines the stop position for walk test.
- (f) Go to the start position, making sure to walk out:
  - parallel to the centreline, well aside of the capture area ( $\pm 5^\circ$  from centreline) to avoid an early capture
  - at least 20 metres out, from an assumed stop position.
- (g) From the start position on the centreline, walk normally towards the system, on and following the centreline. The system activates azimuth guidance and closing rate display, as soon as the person is seen by the system.
- (h) Follow the guidance information that appears on the Pilots Display (PD), verifying a close match to the centreline.
- (i) On approach to the stop position, about 4 metres out, start to take small and slow steps until **STOP OK** appears.  
Verify that the actual stop position matches the desired stop position (always nose wheel position during walk test) for the selected aircraft type.  
**Note:** If the stop position is not satisfactory, adjust accordingly. For more information, see step 9. Change aircraft types and stop positions.
- (j) After a successful walk test the system automatically stops the test functionality and returns to normal operation without further user input.  
**Note:** Messages such as **SLOW** or **TOO FAR** are not available during walk test. As a walk test is looking for a person (a much smaller object than an aircraft) the system cannot reliably be used in adverse weather conditions such as rain or snow. It is recommended to fine tune the system, if problems arise, with measurements from actual aircraft dockings.

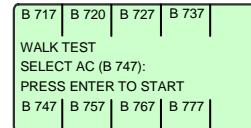


FIGURE 2B.20 – OP WALK TEST

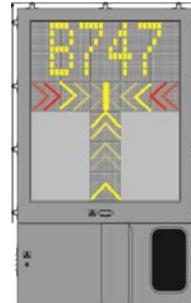


FIGURE 2B.21 – T2-18 CAPTURE

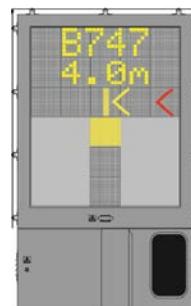


FIGURE 2B.22 – T2-18 AZIMUTH

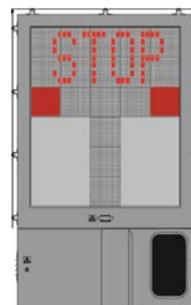


FIGURE 2B.23 – T2-18 STOP

## 1.9 ADD/CHANGE AIRCRAFT TYPES PARAMETERS/STOP POSITIONS

- Change existing stop positions for aircraft types, if required.
- From **SAFEDOCK Configuration**, click **Config**.
  - Select **Add** and enter aircraft type parameters, or select the aircraft type to change from the drop down list, (to the left of **Op Id:** )
  - Go to a parameter, such as **Stop distance** and enter a value, such as distance in metres. **Note:** A lower value brings the stop position closer to the A-VDGS.
  - Click **Send** and enter the password, **!safedock!** (standard password unless changed) and click **Ok**.
  - Click **Cancel** to close all windows and exit the program.
  - Start a walk test for this aircraft type parameter/stop position.

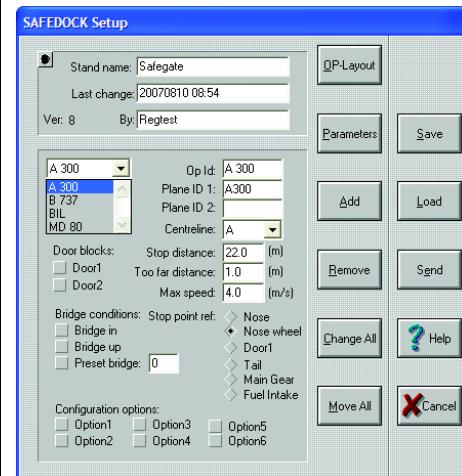


FIGURE 2B.24 – CHANGE AIRCRAFT SETUP

## 1.10 DOWNLOAD LOG OR SHORT LOG

Download a log file from the A-VDGS for reference or troubleshooting, if required.

- Go to the **SAFEDOCK** menu and select **Get Log**. A **Log Status** appears on the right side of the window. When **RecNr** stops counting, the log file is downloaded.

**Note:** Downloaded log files are saved to **C:\Program Files\Safegate\A-VDGS Software Tools\Log** for a standard installation.

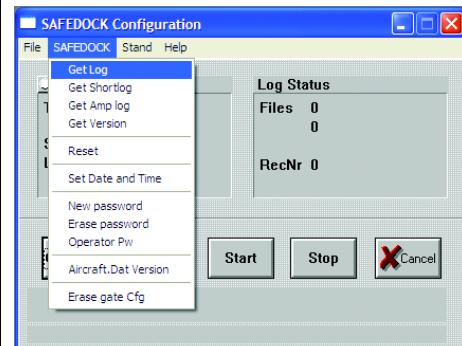


FIGURE 2B.25 – DOWNLOAD LOG

Download a short log file from the A-VDGS, for reference or troubleshooting, if required.

- Go to the **SAFEDOCK** menu and select **Get Shortlog**.
- Select where to save the file, enter a name for the file and click **Save**.

A **Log Status** appears on the right side of the window. When **RecNr** stops counting, the log file is downloaded.

**Note:** Downloaded log files are saved as in step (b).

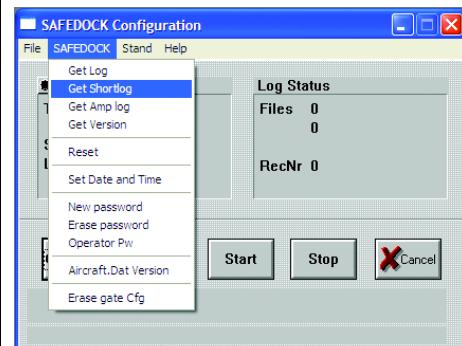


FIGURE 2B.26 – DOWNLOAD SHORTLOG

## 2. TROUBLESHOOTING

All A-VDGS units complete a factory acceptance test (FAT) before shipping however some error messages may appear during configuration and commissioning due to unforeseen reasons.

If a malfunction occurs within an A-VDGS, error numbers appear on the Pilots Display (PD) and their equivalent error messages appear on the Operator Panel (OP) display. Some error messages may appear in abbreviated form on the PD, depending on the A-VDGS type and/or size of PD installed at the stand. Faults can be diagnosed and rectified from error messages.

It is important to evaluate an error in a logical order, for example:

1. An airport operations event (see Chapter 3 Operations - Appendix F, for Guidelines or Chapter 4 Maintenance - Appendix B, for A-VDGS log files).
2. Routine maintenance (see Chapter 4 Maintenance for Planned or Corrective Maintenance).
3. Cabling fault (see Chapter 4. Maintenance or Chapter 5. Drawings).
4. A configuration problem (see Chapter 2 Installation - Appendix B, Configuration/Commissioning).
5. Component fault (see Errors below and/or Chapter 4 Maintenance, for spare part replacement).
6. Support (see Chapter 4 Maintenance, for Support information).

**Note:** Some error messages appear for 10 seconds and then disappear from the display. The operator may then attempt a new or continue a docking procedure. The error is saved in the event log.

For more information, (how to rectify the system after errors) see 4. Maintenance.

PD – OP messages, symptom	Possible cause	Action to rectify
<b>ERROR 1 – LASER ERROR</b>		
The Control Unit fails to receive any distance data from the laser range finder. The docking is aborted.	The cable between the control unit and the laser-scanning unit is open circuited.	Check the connections and make sure they are properly fastened. If the cable is broken, replace it.
	The Laser Range Finder is malfunctioning.	Replace the Laser Range Finder.
	The Control Unit is malfunctioning.	Replace the Control Unit.
<b>ERROR 2 – MIRROR ERROR</b>		
<b>During Start of Docking:</b> The horizontal or vertical stepper motor cannot find its home position or, one of the stepper motors is overrunning its stop position.	No 21 VDC supply to the Motor Control Boards.	Replace the power supply.
<b>During Docking:</b> The Control Unit fails to detect any stepper motor motion during a docking procedure.	The appropriate Motor Control Board is malfunctioning.	Replace the Motor Control Board.
	The stepper motor is malfunctioning.	Replace the stepper motor.

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
The docking is aborted.	The cable continuity between the control unit and the laser scanning unit is open circuit.	Replace the cable.
	The Control Unit is malfunctioning.	Replace the Control Unit.
<b>ERROR 3 – AUTOCAL ERROR</b>		
The auto-calibration has failed when starting a docking procedure.  The system prevents a docking procedure from starting.	Dirty laser compartment windows or the calibration point or plate may have been moved or damaged.	Check and clean laser windows if necessary. Put the calibration plate in correct position or if needed replace it. If necessary, recalibrate the system to the calibration point or plate.
	A mirror, within the laser-scanning unit, is broken.	Replace the mirror.
	The stepper motor is malfunctioning.	Replace the stepper motor.
	A motor control board is malfunctioning.	Replace the motor control board.
	The laser range finder is malfunctioning.	Replace the laser range finder.
	The Control Unit is malfunctioning.	Replace the Control Unit.
<b>ERROR 4 – NOT CALIBRATED</b>		
The system has been 'powered up' but no calibration data is found.  The docking procedure is prevented from starting.	The system has not been calibrated.	Perform a system calibration.
	The Control Unit is malfunctioning.	Replace the Control Unit.

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 5 – NO PROFILE</b>		
A docking procedure has been attempted for an aircraft type not defined (stored) in the system. The system prevents a docking procedure from starting.	The system is not loaded with the aircraft type parameters.	Load the aircraft type parameters into the system.
	The Control Unit is malfunctioning.	Replace the Control Unit.
<b>ERROR 6 – NOT IN USE</b>		
Not currently in use.		
<b>ERROR 7 – NOT IN USE</b>		
Not currently in use.		
<b>ERROR 8 – CONFIG ERROR</b>		
Incorrect or missing Stop reference for aircraft type selected.	Aircraft type not configured for docking at this stand.	Download correct configuration, including the aircraft type, for the stand.
<b>ERROR 9 – DOOR BLOCKED</b>		
A docking procedure has been attempted to either door 1 or door 2, which has been blocked by the stand configuration.  The docking procedure is prevented from starting.  <i>Note: It is not applicable for the OP to show DOOR NOT ALLOWED in Hong Kong.</i>	Selected door not available or not allowed to be used.	Start a docking procedure for the other door.
	An attempt has been made to dock an aircraft type with only one door, to the door 2 position.	
<b>ERROR 10 – DISPLAY ERROR</b>		
Messages transferred to display do not appear.	The PD is partly or completely malfunctioning.	Replace the faulty display board/boards.
	The Control Unit is malfunctioning.	Replace the I/O board (Mother Board).

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 11 – RESTARTED</b>		
Control Unit has restarted. The event will be viewable in the error log.	Control Unit has been out of service of inexplicable reason.	Check the event log.
		Check the power supply to the system.
<b>ERROR 12 STOP/ID FAILED – ID-FAILED</b>		
The aircraft is less than 12 metres from the stop position and its identity has not been verified by the system.  The docking is aborted.	Incorrect aircraft type selected on the docking system.	Press 'OFF' to abort the docking and select the correct aircraft type to initiate a new docking procedure.
	The laser scanning unit field of view is impaired.	Clean the mirrors and windows of the scanning unit.
	The laser scanning unit field of view is blocked by an object.	Move the object out of view (the docking area at the stand).
<b>ERROR 13 STOP/TOO FAST – DOCKING TOO FAST</b>		
The aircraft is approaching the stand at a speed that may overrun the stop position. It is recommended to slow down immediately.	Aircraft approach speed too fast for docking.	Slow down.
		From the <b>SAFEDOCK Maintenance</b> program, check the <b>Max speed</b> : setting for the aircraft type.
<b>ERROR 14 STOP/BR IN – BRIDGE NOT IN</b>		
The bridge is not in and may obstruct the aircraft approach.	Incorrect Passenger Boarding Bridge position for aircraft type.  PBB is not fully retracted.	Correct the passenger boarding bridge position.
<b>ERROR 15 – NOT IN USE</b>		
Not currently in use.		

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 16 – PARAMETER ERROR</b>		
The docking procedure is prevented from starting.	Incorrect parameters entered in the <b>SAFEDOCK Maintenance</b> program. Requested parameter of Laser position is not available.	Check the event log. Add the requested parameter to the system using the <b>SAFEDOCK Maintenance</b> program.
<b>ERROR 17 STOP/SBU – SBU STOP</b>		
The aircraft has been correctly identified, but the system loses tracking less than 2 metres from the stop position.  The docking is aborted.  A Safety Back Up (SBU) indicates the docking procedure must be completed by a manual back-up activity.  <i>Note: STOP/SBU appears for approx. 10 seconds.</i>	The laser scanning unit field of view is impaired.  The aircraft has moved outside the tracking scope of the laser unit.	Another error message will follow the SBU message after approximately 10 seconds, indicating the actual reason for the interruption.  The docking procedure has to be completed by a manual safety back-up activity.
<b>ERROR 18 – OPERATOR PANEL ERROR</b>		
The OP is out of order.	Communication from/to OP-panel is malfunctioning.	Check communication cable.
	Control panel board is malfunctioning.	Exchange the Control panel board.
<b>ERROR 19 – EM-STOP CIRCUIT ERROR</b>		
The emergency stop circuit test has failed when starting a docking procedure.  The system prevents a docking procedure from starting.	The emergency stop circuit is shorted to ground.	Check the emergency stop circuit.
	The Control Unit is malfunctioning.	Replace the Control Unit.
<b>ERROR 20 – NOT IN USE</b>		
Not currently in use.		

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 21 WAIT &gt; GATE &gt; BLOCK – GATE BLOCKED</b>		
The normal view of the laser-scanning unit is impaired by an obstruction in the aircraft docking area.  The docking procedure re-commences automatically as soon as the obstruction is cleared from the docking area.  <i>Note: The PD cycles the messages WAIT, GATE and BLOCK until the docking area is cleared or the docking is aborted.</i>	The docking area is obstructed.	Clear the docking area.
<b>ERROR 22 – CL ERROR</b>		
Invalid or missing centreline (CL) for the aircraft type selected.	The centreline is invalid or undefined.	Define the centreline.
	The aircraft configuration selects an incorrect centreline.	Change the aircraft configuration to use an existing centreline.
<b>ERROR 23 WAIT &gt; VIEW &gt; BLOCK – VIEW BLOCKED</b>		
The system is unable to see through the forward window. The docking procedure will abort.  <i>Note: The PD cycles the messages WAIT, VIEW, BLOCK.</i>	Dirty window/mirrors.	Clean the window/mirrors.
	The check area is obstructed by a reflecting or low-visibility object.	Remove the obstruction.  For more information, see Chapter 4 Maintenance - App A, Section 7.5 c CONFIGURATION OF STAND PARAMETERS
	The Laser Range Finder is malfunctioning.	Replace the Laser Range Finder.
<b>ERROR 24 WAIT &gt; APRN &gt; BLKD – APRON BLOCKED</b>		
An enhanced view of the laser-scanning unit is impaired by an obstruction in the docking (apron scan) area.  The docking procedure re-commences automatically as soon as the obstruction is cleared from the docking area.  <i>Note: The PD cycles the messages WAIT, APRN and BLKD until the apron area is cleared or the docking is aborted.</i>	<b>Note:</b> This error is only possible, if the optional function APRON SCAN is installed.  The docking (apron area) is obstructed.	Clear the docking (apron) area.

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 25 – WALKTST REQUIRED</b>		
A walk test is required by the system. <b>Note:</b> If this error does not clear or reappears even after a walk test for a specific aircraft type, it is recommended to restart the system.	The configuration for the stand has been modified since the last walk test procedure was performed. Software changes or errors in the system may require a complete system restart.	Perform a walk test procedure to verify the current configuration at the stand. If this error does not clear after a walk test(s), restart the system (open the PD, switch <b>F1</b> down/off and up/on).
<b>ERROR 26 – TEMP ERROR</b>		
The system has a temperature fault.	The temperature in the system is higher than the operational range.	Check cooling fan. Check temperature sensors.
	The temperature in the system is lower than the operational range	Check heaters. Check temperature sensors.
<b>ERROR 27 – LASER SAFE ERROR</b>		
The system has a laser safety error. <b>Note:</b> A class 1 laser is used in the system. It is eye-safe, even if this error occurs.	The timer circuit that shuts off the laser in case of no horizontal or vertical mirror movement is not within set limits.	From the OP, use the Test feature to check the Laser Safe circuitry. The Laser Safe circuitry, CU Mother Board or Stepper Motor Encoder may need to be repaired or replaced.
<b>Note:</b> For more information, see Chapter 4. Maintenance.		

**CHAPTER 2 INSTALLATION - APPENDIX C**  
**COMMUNICATION (OPTIONS)**  
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## 1.

### CONFIGURATION OF ETHERNET CONVERTER (OPTION/TIBBO)

#### 1.1

##### GENERAL

Each converter must be uniquely configured for its Safedock (IP Address, Subnet mask etc.). To configure the Ethernet converter, the program DS Manager must be used. A LAN connection must also be available between PC and the converter, preferably an Ethernet Cross-over cable is used between PC and the converter.

#### 1.2

##### DS MANAGER SOFTWARE INSTALLATION

To install DS Manager

- (i) Run Setup.exe from the <Tibbo setup directory> and follow on-screen instructions.
- (ii) Accept default directory for the installation
- (iii) When asked to select Components to be installed, select 'Device Server Manager' and 'Help Files'.
- (iv) Accept default Program Group Name

#### 1.3

##### CONFIGURATION OF THE ETHERNET CONVERTER

###### 1.3.1

###### General

Make sure the PC is connected to the converter with a cross-over cable, and that the PC has a valid IP Address.

Start the software DS Manager from Windows start menu. Below menu will appear on screen.

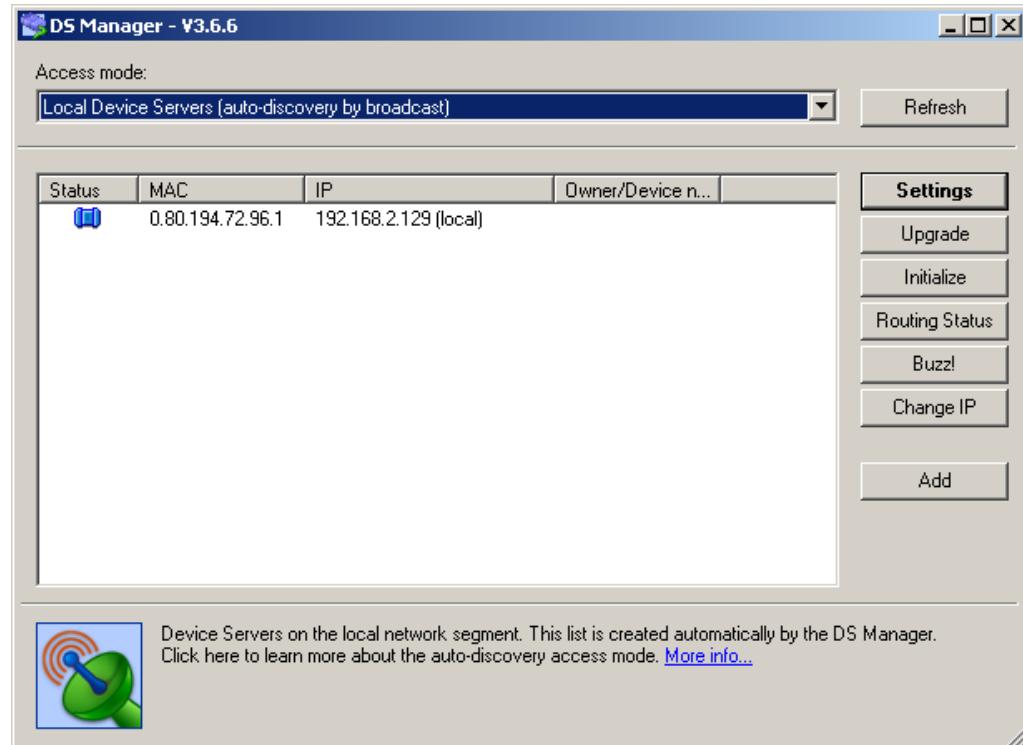


FIGURE 2C.1 – DS MANAGER

The DS Manager has three fundamental modes of operation, called access modes, that defines how it connects to the converter. Desired access mode is selected from the Access mode drop down-box, located at the top of the main window.

Available access modes are:

- Local Device Servers (auto-discovery by broadcast)

In this mode the DS Manager automatically finds all local device servers (converters connected to the same network segment as the PC) and displays them in the device list. Remote Device Servers located behind one or several routers cannot be auto-discovered. The Device list is updated each time the Refresh button is pressed, only devices that have actually responded to the refresh appear in the list.

- Device Servers from the Address Book

In this mode the list of available Device Servers- called "the address book"- is created manually by the User and the DS Manager does not attempt to locate Device Servers automatically. The Device list displays all entries from the address book at all times, even if corresponding Device Servers are not online. Since local Device Servers can easily be accessed using the auto-discovery mode the primary use of the address book mode is to access Device Servers located on different network segments than the PC. See below how to add an entry to the address book.

- Device Servers attached to the COM port

This option is not used.

To add an entry to the address book:

- Select access mode 'Local Device Servers from the Address Book'
- Press the Add button and the following dialog will appear

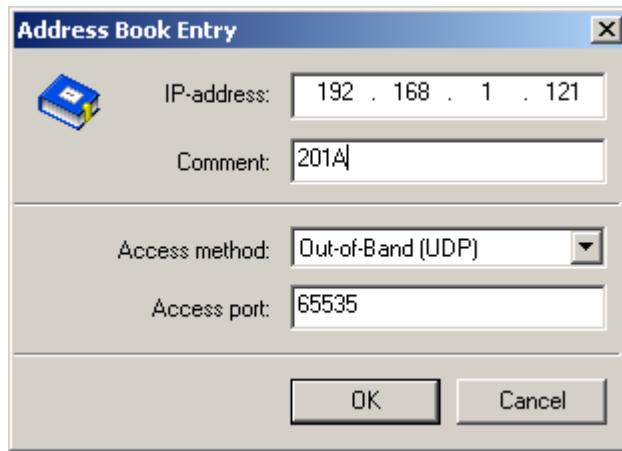


FIGURE 2C.2 – ADDRESS BOOK ENTRY

- Configure the following:
  - IP-address
  - Comment: Type in the stand name
  - Use Out-of-Band (UDP) access method.
  - Use access port 65535
  - Press OK to save the entry

**Note:** Network traffic from/to port 65535 must be allowed through the network.

### 1.3.2

### Settings - Configuring Installation Parameters for TCP or UDP

Perform the following to configure the converter:

- (a) Select desired access mode (TCP or UDP) from the Access mode drop down box, located at the top of the main window. Available devices will now appear in the device list window.
- (b) Select a device to configure from the list and press the Settings button for a dialog to appear.
- (c) Enter required settings information in the tabs for Network (site specific), Connection, Serial port and Outbound as in the figures on the following pages.

**Note:** Site specific information is required for some fields. There is also an **All** tab which is not edited.

For example, the Network tab requires site specific information, as in the figures on the following pages, for the following fields:

- **Owner name** - site specific information.
- **Device name** - site specific information.
- **MAC-address** - see figure on the following page but with a site specific last digit.
- **Gateway IP-address** - site specific information.
- **Subnet mask** - site specific information.

For other fields, enter information as in the figures on the following pages.

- (d) Select the Network Settings tab.
- (e) To install general configuration settings press the Load button and browse to the file DS202.ds (located in the DS Manager Setup directory).
- (f) Set Owner name <sup>1</sup> (for example an Airport code such as ARN for Stockholm Arlanda International Airport), Device name (for example stand/gate name/number such as B25) IP address, Subnet mask, Gateway address and MAC address <sup>2</sup>. For more information, see the following note.
- (g) Enter information as in the following figures, contact the site IT department or network administrator for site specific information.
- (h) Press OK to save the configuration. The device will now reboot itself.

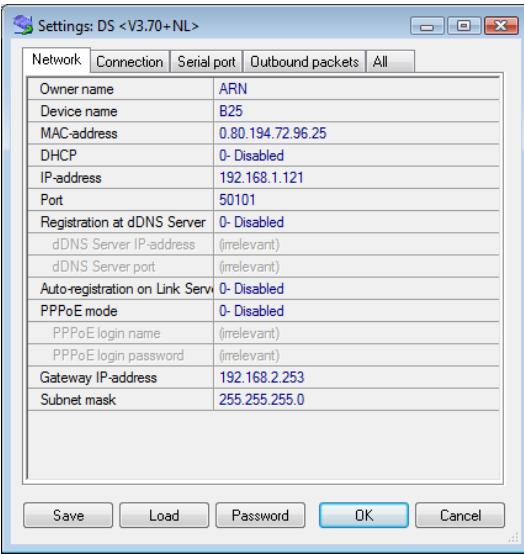
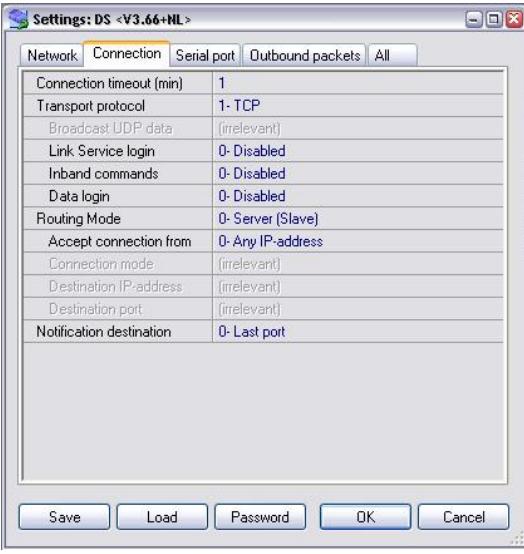
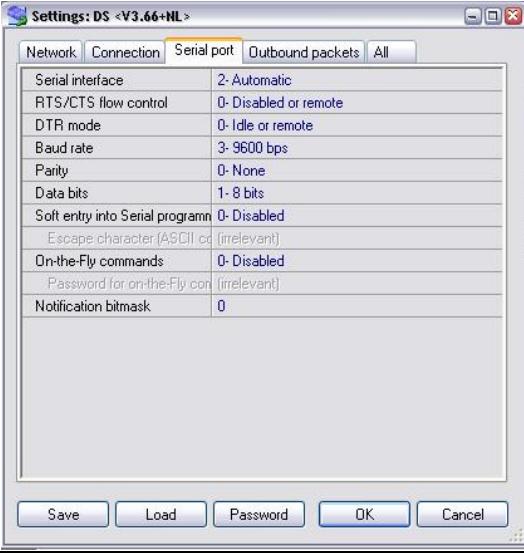
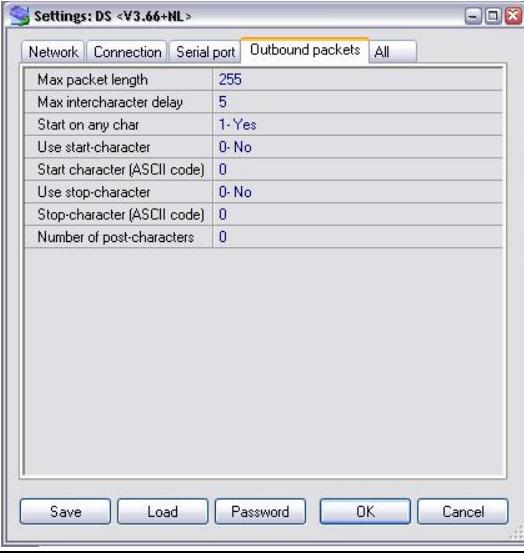
**Note:**

<sup>1</sup>Owner name and device name can broadcast Tibbo information, for example the stand name/number can be seen from the GOS servers using DS Manager in the Control Panel. It is also easier to verify communication with each Safedock. If Broadcast is not allowed on a network, an address book entry is an alternative solution to see Tibbo information.

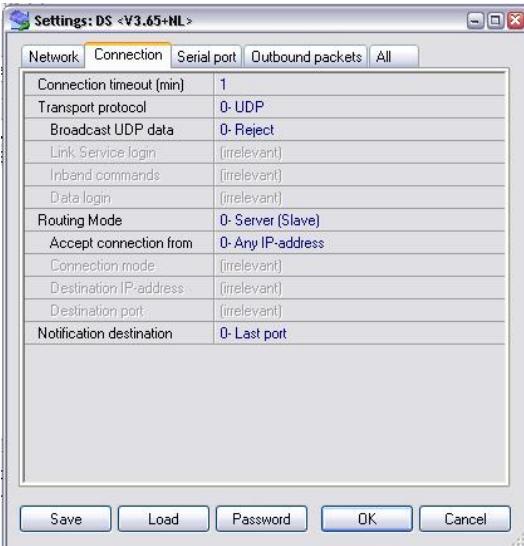
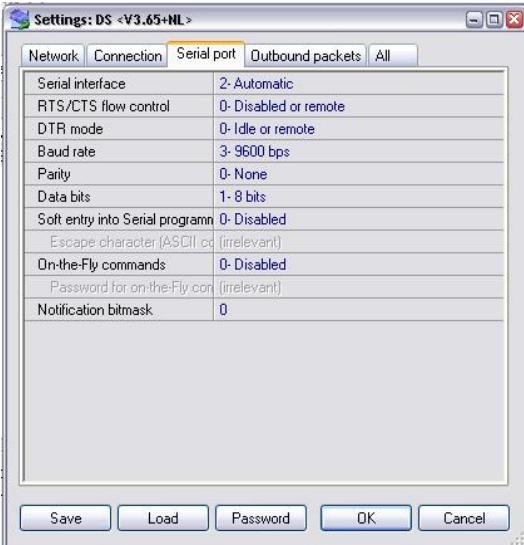
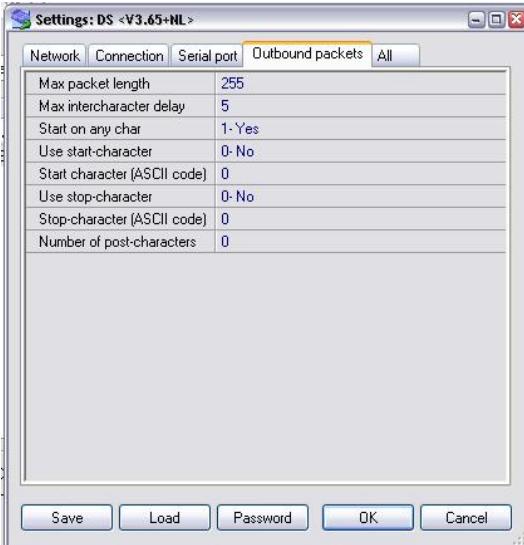
<sup>2</sup> Each DS202 unit has a unique MAC-Address configured when distributed by Tibbo. However, the MAC-Address is not globally registered, which means that if a DS202 unit is installed in a global network such as an airport's LAN, there is a 'small' possibility that another network device exists with the same MAC-Address. To avoid getting a conflict on the LAN, globally Safegate registered MAC-Addresses shall be used on each site. The MAC-Address range that Safegate has for GOS/A-VDGS Ethernet devices is: 0.80.194.72.96.00-255.

The five first numbers will be the same for each DS202 (0.80.194.72.96.). The last number shall be the same as the COM ID set in the Safedock (1 to 223). 93 and 94 shall never be used.

### 1.3.2.1 TCP information

Network tab (Site specific example)	Connection tab (Enter information)
	
FIGURE 2C.3 – TIBBO SETTINGS TCP NETWORK	FIGURE 2C.4 – TIBBO SETTINGS TCP CONNECTION
Serial port tab (Enter information)	Outbound packets tab (Enter information)
	
FIGURE 2C.5 – TIBBO SETTINGS TCP SERIAL	FIGURE 2C.6 – TIBBO SETTINGS TCP OUTBOUND

### 1.3.2.2 UDP information

Network tab (Site specific example)	Connection tab (Enter information)
	
FIGURE 2C.7 – TIBBO SETTINGS UDP NETWORK	FIGURE 2C.8 – TIBBO SETTINGS UDP CONNECTION
Serial port tab (Enter information)	Outbound packets tab (Enter information)
	
FIGURE 2C.9 – TIBBO SETTINGS UDP SERIAL	FIGURE 2C.10 – TIBBO SETTINGS UDP OUTBOUND

### 1.3.3 Firmware Update

Any converter delivered by Safegate will already have the correct firmware installed. Therefore firmware upgrade shall not be done unless stated by Safegate.

Current firmware version in the device can be found in the caption property of the Settings dialog (opened when pressing the Settings button).

The internal firmware of the converter can be upgraded as follows:

- (a) Connect the PC and the converter on the same network segment.
- (b) Select the Local Device Servers (auto-discovery by broadcast) access mode.
- (c) From the DS Manager's main window select (single-click) the DS you want to upgrade in the device list and click Upgrade button. Upgrading the Device Server dialog will appear.
- (d) Browse to a file you want to upload into the DS and click OK. Be sure to select correct firmware file.

The upgrade will start automatically. After the upgrade is finished the DS Manager will reboot the DS. The DS Manager will also make sure that the DS starts running with the newly loaded firmware and let you know if the DS enters the [error mode](#), which means that its settings must be [initialized](#):

Internal settings of the DS can be initialized by selecting the device from the device list and click the Initialize button. The device must now be reconfigured according to previous section.

- 2. CONFIGURATION OF ETHERNET CONVERTER (OPTION/RITEX LD-30)**
- 2.1 GENERAL**
- Each net controller must be uniquely configured for each Safedock (IP Address must be unique for each Safedock). To configure the Ethernet converter, the program NCSetup.exe must be used.
- 2.2 NCSETUP SOFTWARE INSTALLATION**
- Before installing any software on PC, connect COM1 on PC to CH-2 (serial port) on controller.
- Before the NCSetup software can be used it must be installed on the PC. The software drivers for NCSetup can be found on the GOS software CD-ROM (D:\Gosbackup\Server\Netconverter, where 'D' is the CD-ROM device).
- To install NCSetup:**
- (i) Start the program setup.exe and follow screen instructions.
  - (ii) Accept default directory for the installation
  - (iii) Accept default Program Group Name
- 2.3 CONFIGURING THE ETHERNET CONVERTER**
- (a) From windows start menu select Programs and NCsetup. Start Ncssetup.exe.

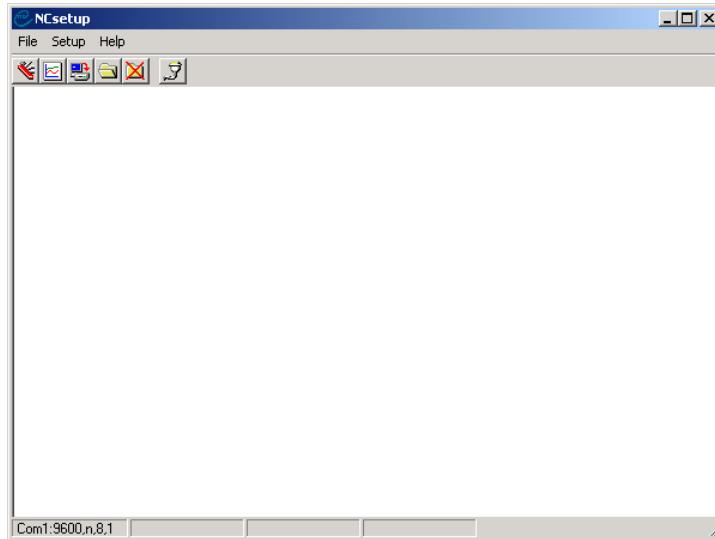


FIGURE 2C.11 – NC SETUP

- (b) Select 'File' and 'Options' from the menu

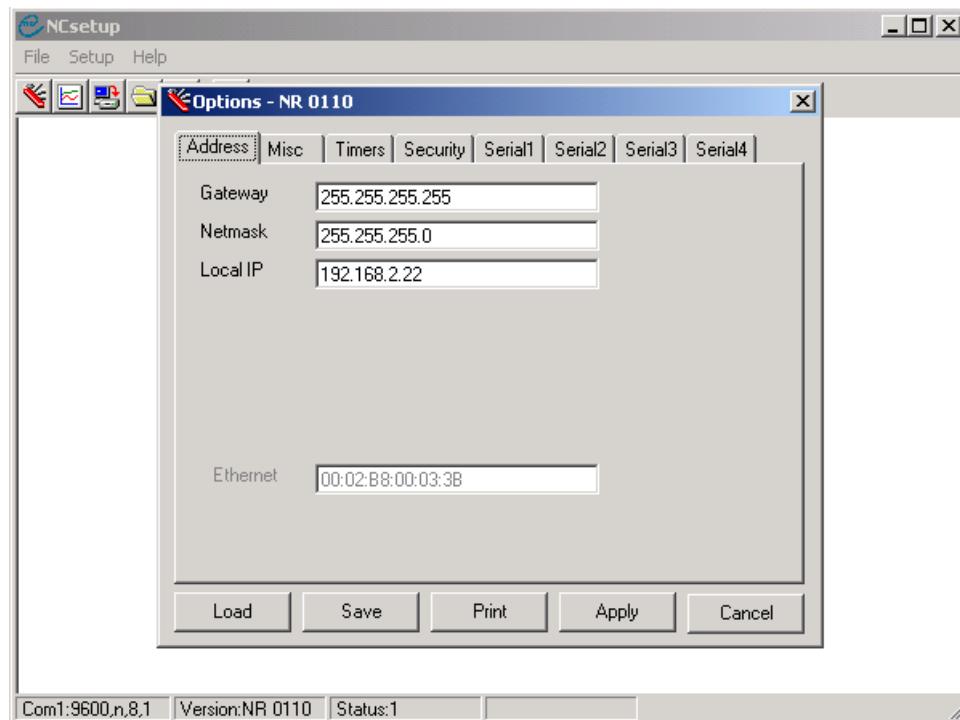


FIGURE 2C.12 – NC SETUP OPTIONS

The following configuration shall be done for each menu tab:

- (c) Address tab:
- (i) Gateway IP-address: 255.255.255.255
  - (ii) Netmask IP-address: .....
  - (iii) Local IP-address: .....
  - (iv) Ethernet address: xx:xx:xx:xx:xx:xx. This is the Ethernet converters unique MAC address, and set by the manufacturer. This is not to be changed.
- (d) Misc tab:
- (v) Trace: 1
  - (i) Option: UDP
- (e) Menu Timers:
- (i) Connect timeout: 5
  - (ii) Activity Timeout: 0
- (f) Security tab:
- (i) Accept default.
- (g) Serial1 tab:
- (i) Serial-1: 9600
  - (iv) Format: 8/7 Databits
  - (v) Protocol: None

- (vi) Receiver Timeout: 10
- (vii) Stop char: 00
- (viii) Local TCP port: 50101
- (ix) Remote TCP port: not used
- (x) Remote IP: not used

- (h) Serial2 tab:
  - (i) Serial-2: 9600
  - (ii) Format: 8/7 Databits
  - (iii) Protocol: None
  - (iv) Receiver Timeout: 10
  - (v) Stop char: 00
  - (vi) Local TCP port: 50102
  - (vii) Remote TCP port: not used
  - (viii) Remote IP: not used

Serial3 and 4 tab - ignore

### 3. CONFIGURATION OF MODEM - LINE SPLITTER (OPTION/RITEX LD-1)

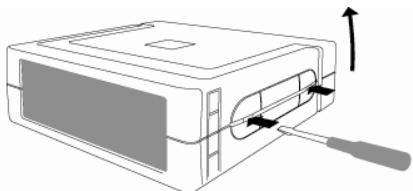
- The RiTex LD-1 is installed in the Safedock main unit.  
3.1 MODEM – LINE SPLITTER RITEX LD1 SETTINGS

It can be adapted for different applications with jumpers on the LD-1 card.

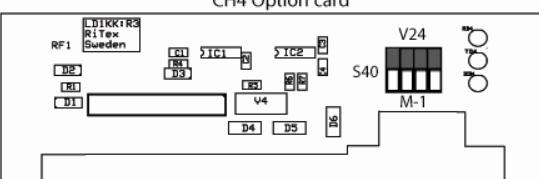
**Modem – Line Splitter Ritex LD1 Settings**

**WARNING: DISCONNECT THE POWER SUPPLY BEFORE OPENING THE BOX.**

1. Open the box.



2. Set the CH4 (S40) jumpers from factory default (M1) to V24 (RS232) interface.



	MS	MM	Data flow direction
S50	↔	↔	Port 1 can communicate with ports 2, 3 and 4(option). communication between port2, 3 and 4 is not possible. . (e.g. Master-Slave protocol)
S51	↔	↔	All ports can communicate with each other (e.g. Token-Passing,- MultiMaster protocol)
S52	↔	↔	

	M-1	V.24	Interface
CH1 Port 1 (S10)	↔	↔	M-1 Interface
CH2 Port 2 (S20)	↔	↔	V.24/RS232 Interface
CH3 Port 3 (S30)	↔	↔	M-1 Interface
CH4 Port 4 (S40) option	↔	↔	V.24/RS232 Interface

3. Close the box.

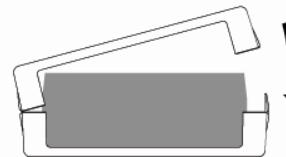


FIGURE 2C.13 – MODEM RITEX LD1

### 3.2 CABLE CONNECTION TO SAFEDOCK MODEM

The cable is connected to, Safedock main unit, terminals as in the diagram below.

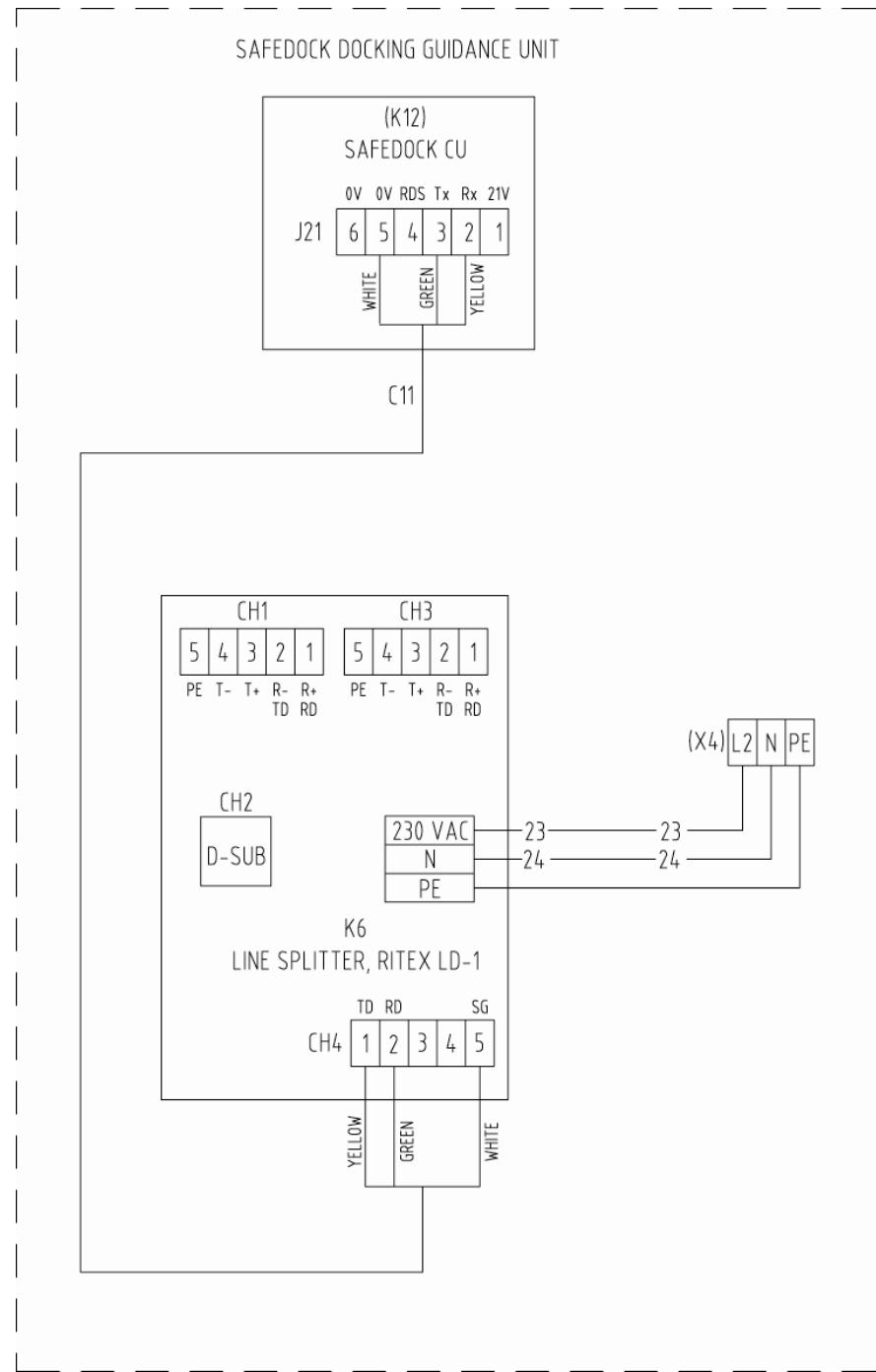


FIGURE 2C.14 – CONNECTION SAFEDOCK MODEM

For more information, see 5. Drawings or [www.ritex.se](http://www.ritex.se) for Data Sheets/Line Splitters/LD-1.

**Note:** Ritex product documents are available in English for downloading.

**CHAPTER 2 INSTALLATION - APPENDIX D**  
**CONFIGURATION OF CAMERA (OPTIONS)**  
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## 1. CONFIGURATION OF CAMERA (OPTION/AXIS 211)

### 1.1 GENERAL

Each camera must be configured uniquely to its Safedock (IP Address, Subnet mask etc.). Two programs are required to configure the camera: **Axis IP\_Installer** and a web browser, it is recommended to use **Internet Explorer**.

A LAN connection must also be available between the PC and the camera, it is recommended to use an Ethernet Cross-over cable is used between PC and the camera.

### 1.2 AXIS IPUTILITY

The software to configure the 211/211A camera does not need to be installed. It can be run from the directory: *Software/Common/Axis/IpUtility.exe*.

### 1.3 CONFIGURATION OF THE CAMERA

#### 1.3.1 Locate the camera

- (a) Start the **IPUtility.exe**, the software is provided with the camera from Axis Communication AB.
- (b) Right-click on the camera name to configure and select “**Set IP Address...**”
- (c) Enter IP-address and press “**Set IP**”.

**Note:** Make sure the PC is connected to the camera with a cross-over cable, and the PC has a valid IP Address.

#### 1.3.2 Set an IP Address in Camera for the first time

The camera must be configured with a valid IP Address, to access the camera using the web interface.

- (a) Restart the camera by switching the power off and on again.
- (b) From Windows, start the **Axis Utility** software. A menu appears on screen and the program tries to access the camera.

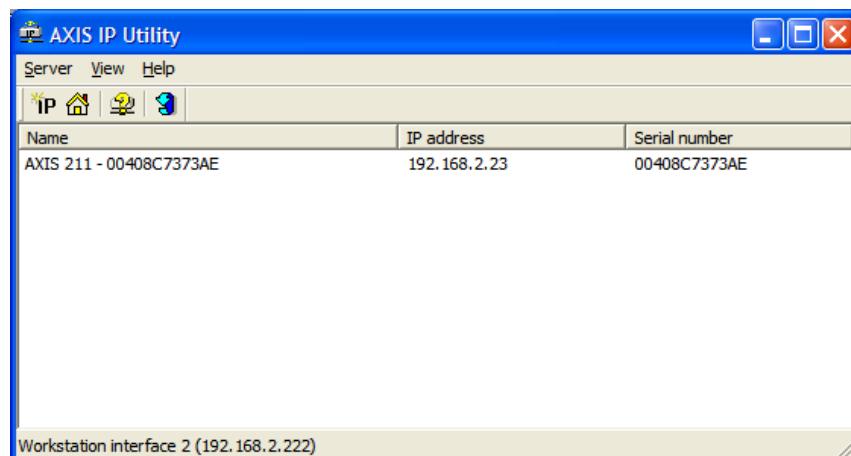


FIGURE 2D.1 – AXIS IP UTILITY

- (c) Right-click on the camera name to configure and select “**Set IP Address...**”.
- (d) Enter the desired IP Address in the field and press the **Set IP** button to store the address in the camera.
- (e) Wait for the operation to finish.

**Note:** If unsuccessful, it may be necessary to reset the camera to factory default settings.

- 1.3.2.1      Reset to factory default settings, if required
- Switch off the camera by disconnecting the power.
  - Press and hold the Reset Button (located under the camera to the right above the status indicators). While holding the Reset Button, reconnect the power supply cable.
  - When the Status Indicator is lit permanently, release the Reset Button. The unit restarts automatically, after approximately 5 seconds.
  - Wait for camera unit to appear in window.
    - Set an IP Address the camera, as described previously.
    - Configure the camera by accessing the camera web interface, as described in the following section.

1.3.3      **Configure the camera**

**Note:** It is important to click **SAVE** on each page before moving on to next step.

- Connect to the camera by:
  - Starting the web browser, enter the camera IP Address to access and the default start page opens. Click **Administration Tools** to access the camera configuration page.
  - Alternatively, it is possible to connect to the camera by double-clicking on the camera name in the IPUtility.exe.
- At first time use, a set password prompt is shown for user **root**.
- Enter the password, **manager**, confirm the password and save.
- Click **Setup** to the upper right in the browser.
- Enter the password for user, **root**, and click **OK**.
- Click **Date & Time**, in Basic Configuration.
- Set the time-zone and weather, automatically adjust for daylight saving and save changes.
- Select **Synchronize with NTP Server** and click **No server specified**.
- Enter the NTP server address to the address field in NTP Configuration, as in the configuration document for the GOS Server, and click **Save**.

Live View | Setup | Help

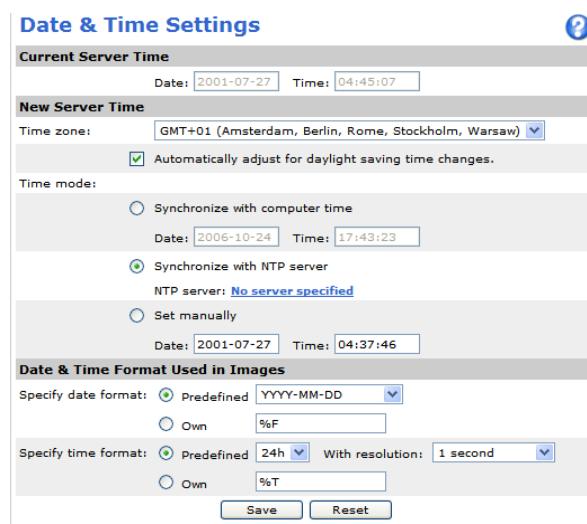


FIGURE 2D.2 – DATE & TIME SETTINGS

- (j) Click **Video & Image** and set the following:  
Resolution: **320 x 240**  
Compression: **30**  
Maximum frame rate: Limited to **5** fps per viewer.  
Click **Save** to save changes.

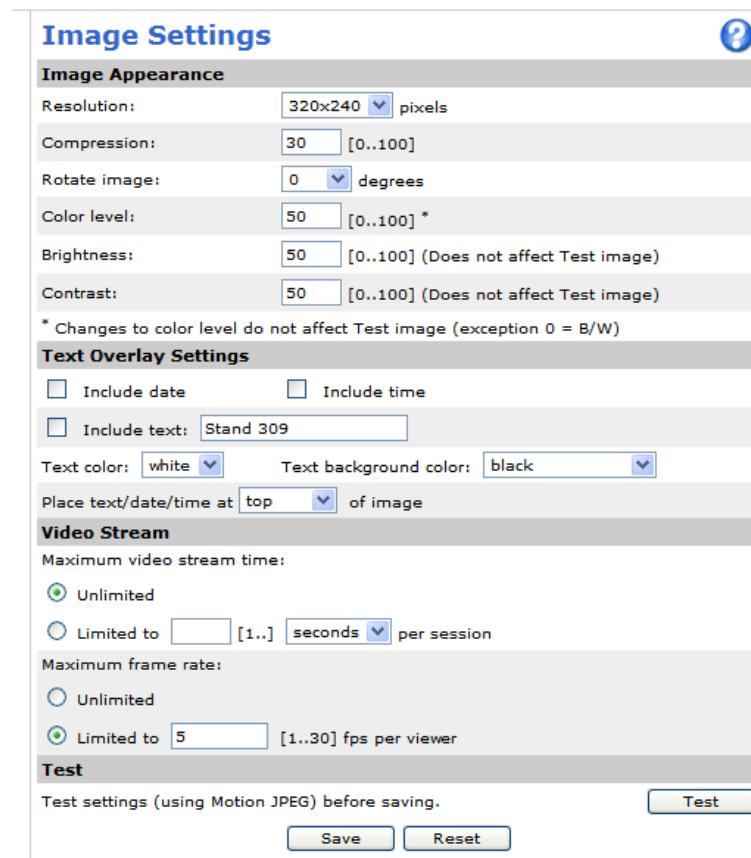


FIGURE 2D.3 – IMAGE SETTINGS

- (k) Click **Event Configuration**, **Event Servers** and then **Add TCP...**  
Enter/set the following:  
Name: **GOS Loop Controller**.  
Network address: Enter the GOS Loop Controller (IP or hostname) address.  
Port: Enter the port number as in the Safedock.GosLoopController.exe.config file (default 10900).  
Click **OK**.

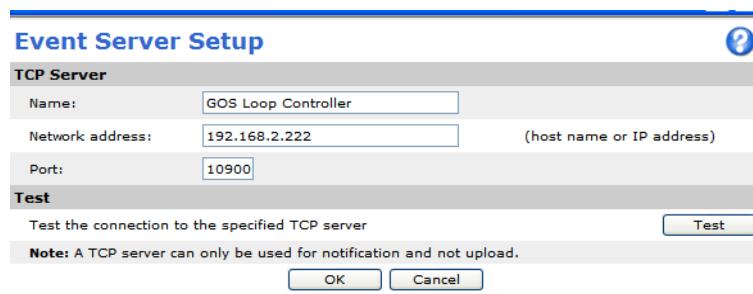


FIGURE 2D.4 – EVENT SERVER SETUP

- (I) Click **Event Types, Add triggered...**  
Enter/set the following:  
Name: **Park event.**  
Triggered by... Select **Input ports** and for Input 1 select **Change**.  
Check the Send TCP notification to checkbox and select **GOS Loop Controller** (the newly configured TCP server).  
Message: Enter [GosName]#t (where [GosName] is the name of the gate as defined in gos.ini)  
Click **OK**.

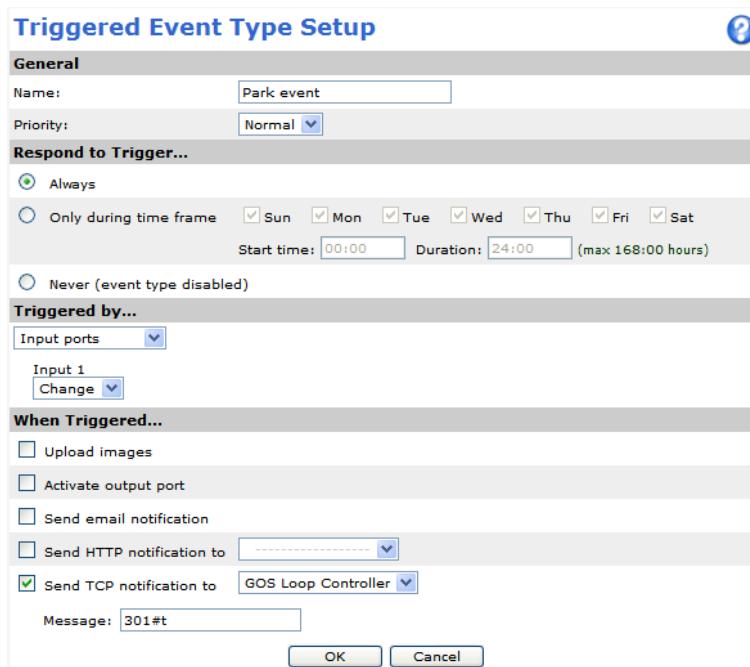


FIGURE 2D.5 – TRIGGERED EVENT TYPE SETUP

#### 1.3.4

#### Adjust the Focus

Direct the camera towards a distant object and bring the camera into focus by turning the outer Focal Length and the inner Focus ring. Tighten the thumbscrew.

## 1.4 FIREWALL SETTINGS

The GOS Loop Controller is installed as a service and listens for incoming connections. A program needs to be authorized by the firewall in order to be allowed to do this (normally Windows asks the user for this, but not for services).

If a Windows Firewall is in use:

- (a) Open the Control panel.
- (b) Click Windows Firewall.
- (c) Open the Exceptions tab.
- (d) Click Add Program.
- (e) Click Browse.
- (f) Choose the Safedock.GosLoopController.exe file in the loop controllers folder (default C:\Gos\LoopController).
- (g) Click OK.

As an alternative you can make exceptions for the ports that are used. The following ports are used for incoming connection:

- AxisEventTcpPort (from the Loop Controllers settings, default 10900).
- GosPortNumber (from the Loop Controllers settings and Gos.ini, default 10950).

There are also outgoing ports for ping and HTTP requests.

## 2. CONFIGURATION OF CAMERA (OPTION/AXIS 2120)

### 2.1 GENERAL

Each camera must be configured uniquely to its Safedock (IP Address, Subnet mask etc.). Two programs are required to configure the camera: **Axis IP\_Installer** and a web browser, it is recommended to use **Internet Explorer**.

A LAN connection must also be available between the PC and the camera, it is recommended to use an Ethernet Cross-over cable is used between PC and the camera.

### 2.2 AXIS IP INSTALLER INSTALLATION

To install Axis IP Installer:

- (a) Run **Setup\_IPInstaller.exe** from the <Camera setup directory> and follow the instructions.
- (b) Accept the default destination directory for the installation.
- (c) Accept the default Program Group Name.

### 2.3 CONFIGURATION OF THE CAMERA

#### 2.3.1 General

Camera configuration includes two steps:

1. Set an initial IP Address using the Axis IP Installer software.
2. Set configuration parameters using a web browser.

**Note:** Make sure the PC is connected to the camera with a cross-over cable, and the PC has a valid IP Address.

### 2.3.2

#### Set an IP Address in Camera for the first time

The camera must be configured with a valid IP Address, to access the camera using the web interface.

- (a) Restart the camera by switching the power off and on again
- (b) From Windows, start the software **Axis IP Installer**. A menu appears on screen and the program tries to access the camera.

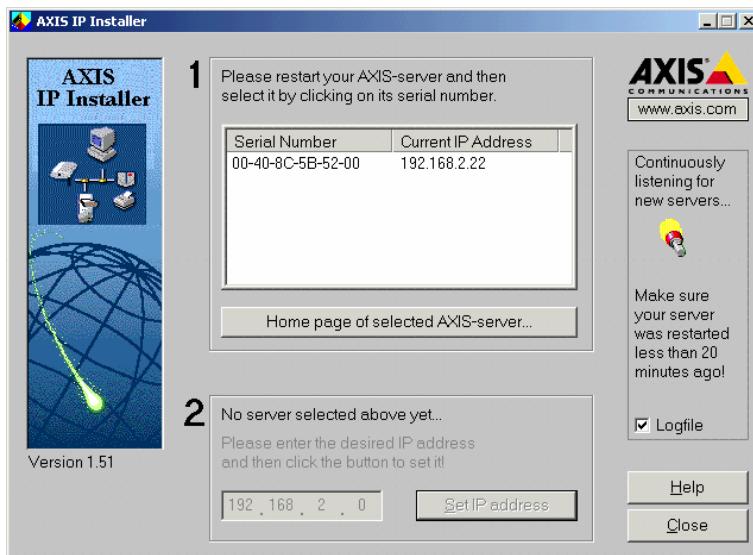


FIGURE 2D.6 – AXIS IP INSTALLER

- (c) Select the camera by clicking on its serial number in the window.
- (d) Enter an IP Address in the address field and click the **SET IP ADDRESS** button to store the address in the camera.
- (e) Wait for the operation to finish.

**Note:** If unsuccessful, it may be necessary to reset the camera to factory default settings.

#### 2.3.2.1

##### Reset to factory default settings, if required

- (a) Switch off the camera by disconnecting the power.
- (b) Press and hold the Reset Button (located under the camera to the right above the status indicators). While continuing to hold the Reset Button, reconnect the power supply cable.
- (c) When the Status Indicator is lit permanently, release the Reset Button. The unit restarts automatically, after approximately 5 seconds.
- (d) Wait for camera unit to appear in window.
  - Set an IP Address the camera, as described previously.
  - Configure the camera by accessing the camera's web interface, as described in the following section.

### 2.3.3

#### Set Configuration Parameters using a Web Interface

- (a) Connect to the camera by starting the Web browser, enter the camera IP Address to access and the default start page opens. Click **Administration Tools** to access the camera configuration page.
- (b) In the left section of the page click **Network** and the following appears:

#### Network - TCP/IP

The screenshot displays the 'Network - TCP/IP' configuration interface. It includes four main sections: 'Set IP Address Automatically' (Protocol dropdown set to 'Bootp', 'Enable Bootp' checkbox checked, 'Enable DHCP' checkbox unchecked), 'Set IP Address Manually' (IP Address: 192.168.2.22, Subnet Mask: 255.255.255.0, Default Router: 192.168.2.1, Host Name: 201A), 'DNS' (Domain Name: axis.se, Primary DNS Server: blank, Secondary DNS Server: blank), and 'Miscellaneous' (Select Media: Auto-negotiate, Max Bandwidth: 1.0 Mbit/s, HTTP Port Number: 80). A 'Save' button is located at the bottom of the form.

FIGURE 2D.7 – NETWORK – TCP IP

### (c)

Enter/set the following parameters:

- Protocol: Check **Enable Bootp**, uncheck DHCP.
- IP Address: Enter site information.
- Subnet Mask: Enter site information.
- Default Router: Enter site information (Gateway).
- Host Name: Enter site information (stand name).
- Max Bandwidth: 1 Mbit/s.
- Accept default values for other parameters.

### (d)

Click **Save** to store the configuration in the camera.

### 2.3.4

#### Adjust the Focus

Direct the camera towards a distant object and bring the camera into focus by turning the outer Focal Length and the inner Focus ring. Tighten the thumbscrew.



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**OPERATION**  
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## 1. INTRODUCTION

### 1.1 GENERAL

This document is describing the general operation of the SAFEDOCK Docking and Guidance System. Illustrations are given for a generic system or a variation on this, which means that they may deviate slightly from the system actually delivered. However, the project relevant display pictures (Option) are presented in Chapter 3 Operation - Appendix A, Pilots Guidelines. Special features (Options) for delivery with the system are described in Chapter 3 Operation - Appendix B, Safedock Features.

### 1.2 SYSTEM OVERVIEW

The Safegate Docking Guidance System, SAFEDOCK, is designed to provide fast and safe guidance during the aircraft's approach into the stand area.

The SAFEDOCK system is based on laser scanning and distance measuring technology, and it tracks the lateral and longitudinal position of the aircraft. This 3-dimensional technique ensures that the pilot is provided with the correct stop indication for the aircraft.

All necessary information, such as azimuth guidance, distance to stop, aircraft type, door in use etc is shown on an alphanumeric LED display that is clearly visible for both pilots.

Each individual SAFEDOCK system is controlled from the local Operator Panel (Soft key) or from GOS (Option), the Central Gate Operating System. From GOS all connected SAFEDOCK systems can be individually controlled and monitored.

GOS is also the gateway to the airports database system, FIS, which optionally provides information on scheduled and active flights.

### 1.3 OPERATIONAL STATES

The SAFEDOCK system has four operational states and also a maintenance mode:

- (a) Ready (the system is idling, waiting for a command; Stand can be cleared).
- (b) Scheduled (an initiate-docking command has been received from GOS, if applicable).
- (c) Prepared (an initiate-docking command has been received from GOS and the Stand has been cleared, if applicable).
- (d) Active (docking has been started).
  - (i) Calibration check
  - (ii) Capturing aircraft
  - (iii) Tracking aircraft
  - (iv) Aircraft check
- (e) Parked (the docking procedure has been completed)

During the maintenance mode, the following functions can be performed:

- (a) Program Load
- (b) Stand Configuration and Calibration
- (c) Dump of SAFEDOCK configuration data
- (d) Dump of SAFEDOCK docking log

## 2. OPERATING DETAILS

### 2.1 THE DOCKING PROCEDURE

The following section is a step-by-step description of a docking routine, how it is started, performed and completed. Some figure examples are given below with different SAFEDOCK display variations illustrated. The project variations for delivery (Options) are described in Chapter 3 Operation - Appendix A, Pilots Guidelines and Chapter 3 Operation - Appendix B, Safedock Features.

- (a) The docking procedure can be activated from any one of the following three options:
  - (i) SAFEDOCK Operator selecting the Aircraft Type to be docked from the Operators Panel.
  - (ii) Remote selection of Aircraft Type from the GOS system. Such a command must be confirmed (Option) at the SAFEDOCK Operator Panel. (Please refer to Volume 2, the GOS Manual, if applicable.)
  - (iii) Automatic selection of Stand and Aircraft Type, via GOS, based on FIS flight information available to GOS by means of a database interface. Such a command must be confirmed (Option) at the SAFEDOCK Operator Panel. (Please refer to Volume 2, the GOS Manual, if applicable).
- (b) At start of docking an Aircraft Type is assigned. A profile for the selected aircraft has previously been set up using parameters such as nose outline, height and optionally engine position. During the docking procedure the laser equipment measures the corresponding parameters of the actual aircraft. The captured data are compared to a safety profile of the assigned aircraft. If the safety margin, related to the aircraft type concerned, is too small, the display will show STOP/ID FAIL.
- (c) Before a docking procedure is activated, the operator must confirm his action by pressing a four-digit password, if this authorization feature has been included in the SAFEDOCK configuration. When the password is confirmed the system is activated.
- (d) Before the docking can be commenced, a self-test is carried out by the SAFEDOCK system. The correct position of a test object and the distance measuring accuracy is checked. A failed test would indicate ERR 3 on the LED Display. The apron area is also checked for foreign objects. If such are found, the system will show a WAIT message.
- (e) The AIRCRAFT TYPE is then shown on the LED Display unit and on the Operator Panel LCD screen. SAFEDOCK standard is that floating arrows on the azimuth and closing rate display indicates that the system is ready for docking. The laser-scanning unit is now activated. In bad weather conditions, the downgrade mode shows AIRCRAFT TYPE and SLOW and the floating arrows are disabled. This is a message to the pilot to take extra care. The "closing rate" bar will light up, as is normal, when the aircraft is detected by the system.
- (f) When the laser-scanning unit is activated, the Operator Panel LCD screen will show the Aircraft Type and status ACTIVE. The system is now trying to capture an approaching aircraft.
- (g) The closing rate LEDs will be activated when the aircraft is caught by the laser, usually > 50 metres (Option/30 metres) before the stop position. The yellow arrow in the azimuth display (see figure), will indicate the lateral position of the aircraft with respect to the centreline, and a red flashing arrow will indicate the direction to steer. The Operator Panel LCD screen will now show TRACKING.

- (h) During the approach the aircraft type assigned will be verified by the SAFEDOCK system. When the aircraft type has been verified, the LCD screen on the Operator Panel will show IDENTIFIED.
- (i) If the aircraft speed exceeds the configured maximum value within a configured zone, the message SLOW will be displayed to the pilot. The feature can be enabled in a zone, configurable between 30 and 2 metres before the stop position. Maximum allowed speed can be configured proportional to distance to stop position. Software configuration options are further described in Chapter 3 Operation - Appendix B.
- (j) When the aircraft is within a specified distance (could be 16 or 12 metres) to its corresponding stop position; the closing rate LED indicators will start to extinguish.
- (k) If aircraft type verification is not established within 12 metres from the stop position, the display unit will indicate (Option/WAIT) STOP/ID FAIL.
- (l) When the stop position is reached, the alphanumeric display will show STOP, with a red stop symbol. All closing rate LED indicators will extinguish.
- (m) When no movement of the aircraft has been detected by the system within a configurable period of time, the alphanumeric LED display will change from STOP to OK – or TOO FAR, if the roll distance is larger than the configured value. This will also be indicated on the Operator Panel LCD
- (n) After a configurable period of time, status will change to PARKED which is displayed on the Operator Panel LCD display.

## 2.2

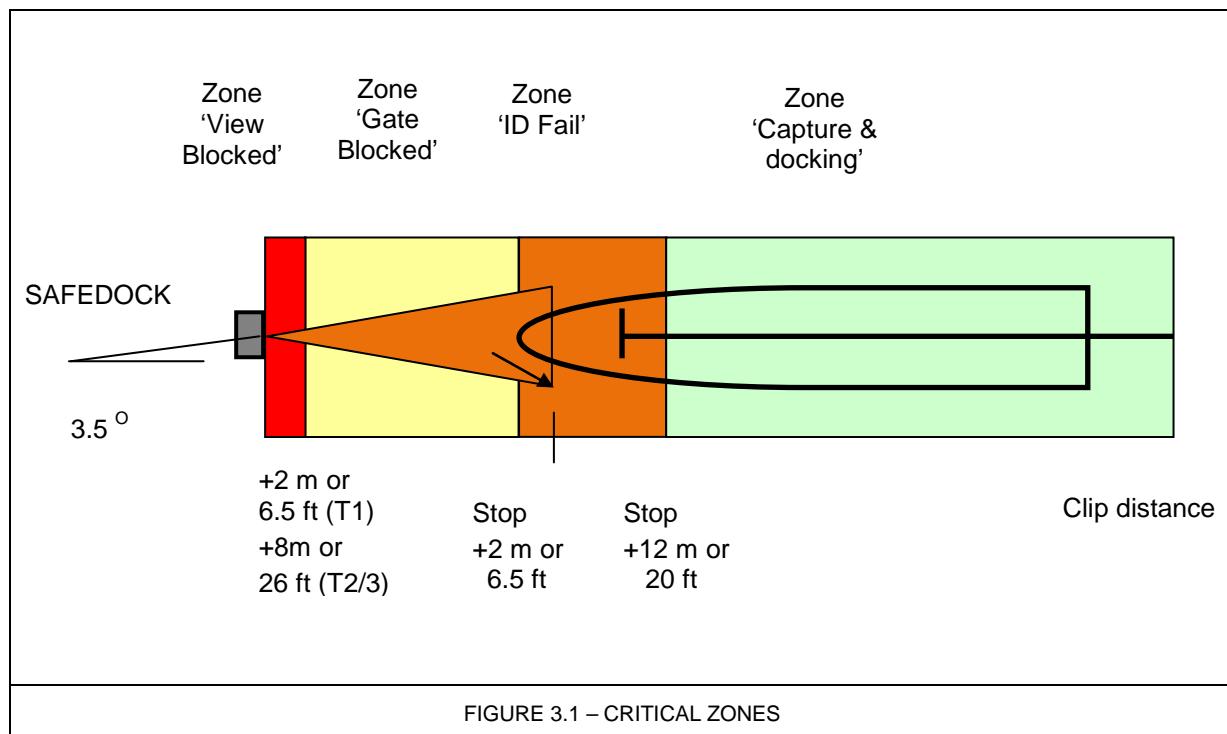
### ABNORMAL CONDITIONS

If an object is blocking the view from the SAFEDOCK laser-scanning unit toward the stop position of the selected aircraft type, the system will be unable to perform the docking procedure. When an object is detected between the laser scanning unit and the stop position (Option/>10 seconds), the system will halt the docking procedure and display a GATE BLOCK warning and a WAIT message. When the blocking object is removed, the docking procedure will be resumed.

When objects are detected close to the A-VDGS system and its laser window the system will halt the docking procedure and display a VIEW BLOCK warning and WAIT message. When the disturbing objects are removed, for example by cleaning the laser window, or when the aircraft is found approaching, the docking procedure will be resumed.

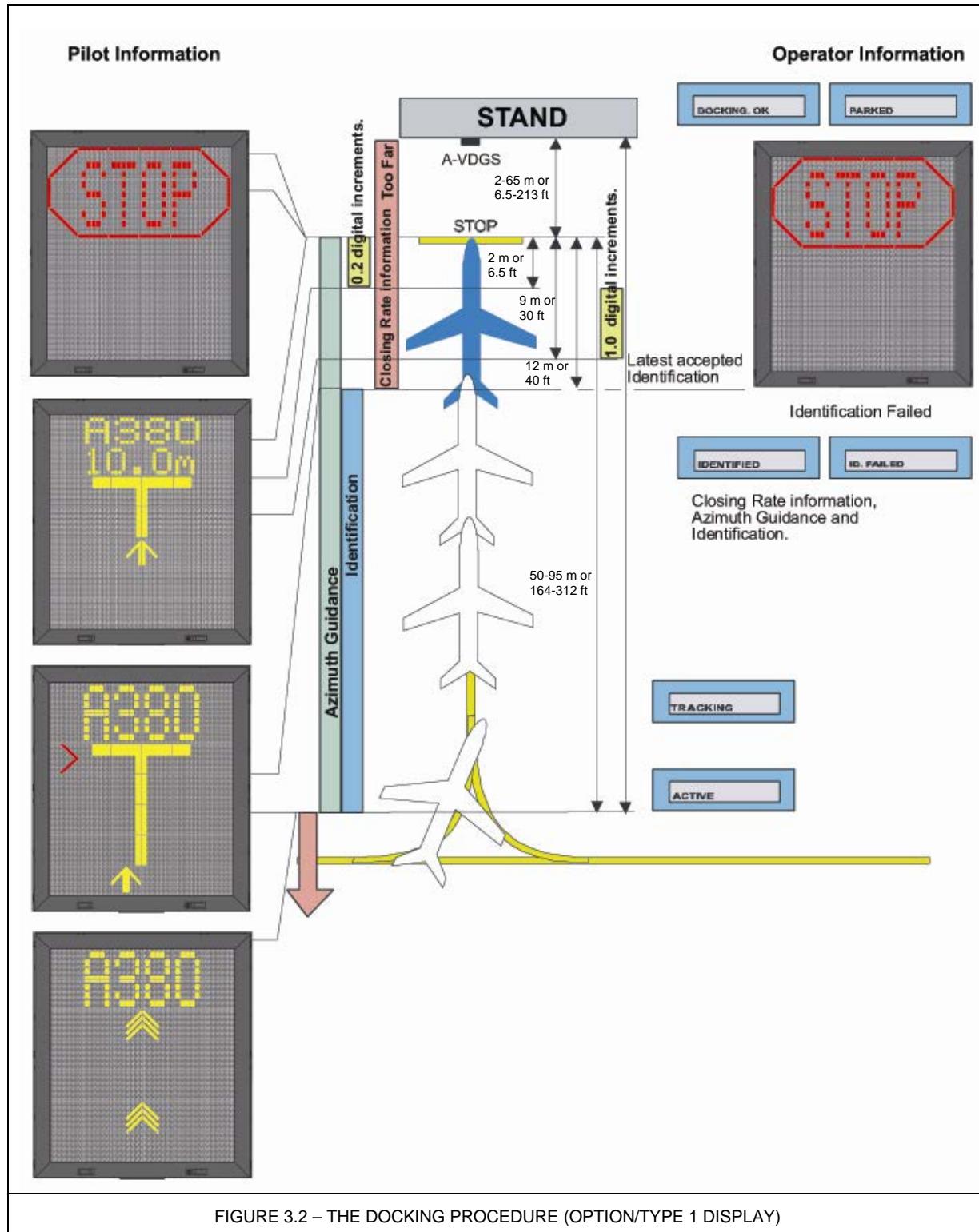
If an unrecoverable error occurs during a docking procedure, a SBU (Safety Back Up) condition exists. In this case an alternate method to guide aircraft to the stop position must be used, as the docking procedure cannot be completed. SBU stop conditions are:

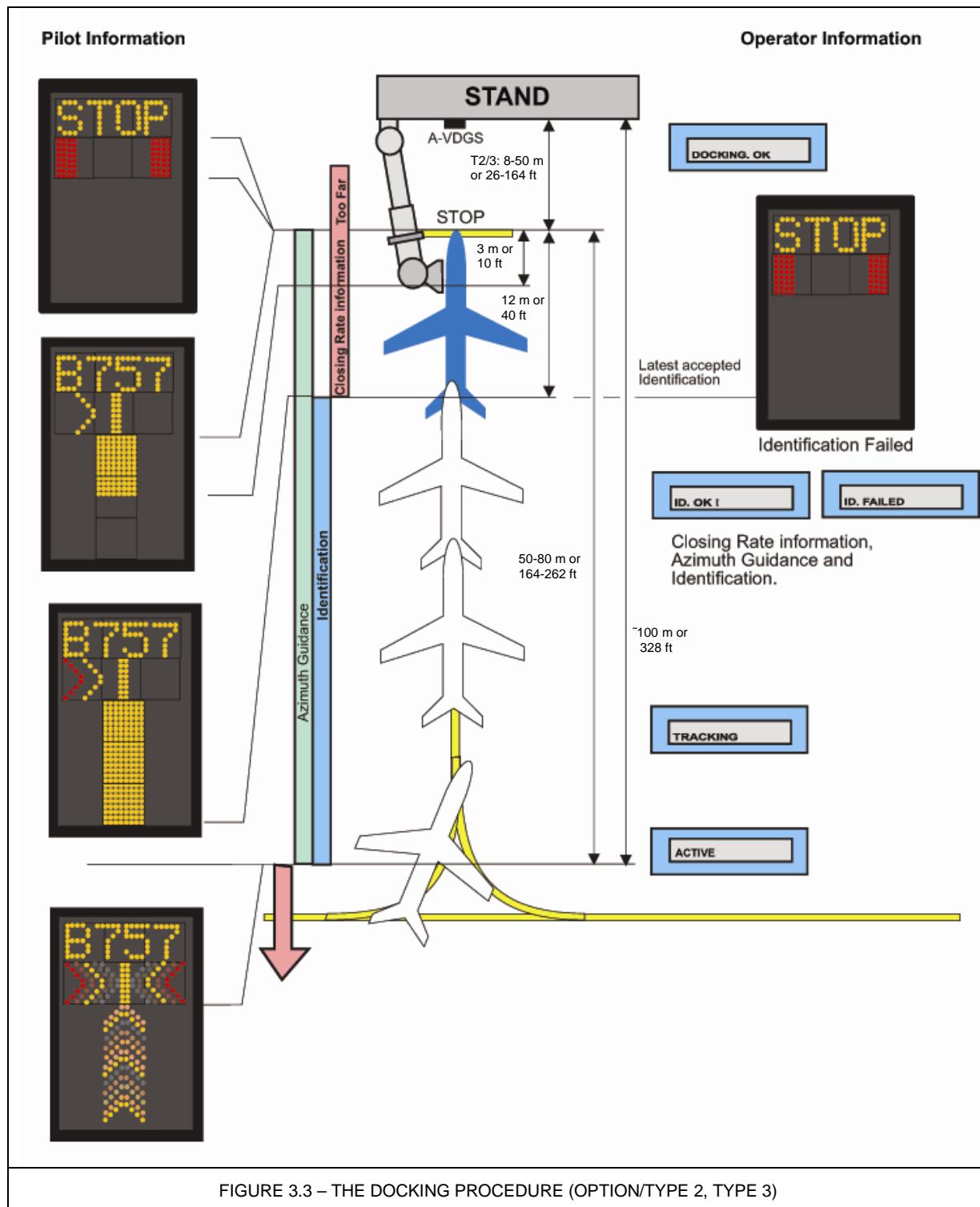
- (a) A hardware failure
- (b) Aircraft more than 3.5° off centreline and less than 2m to the stop position.
- (c) View from Laser scanning unit to aircraft blocked with less than 2m to the stop position.

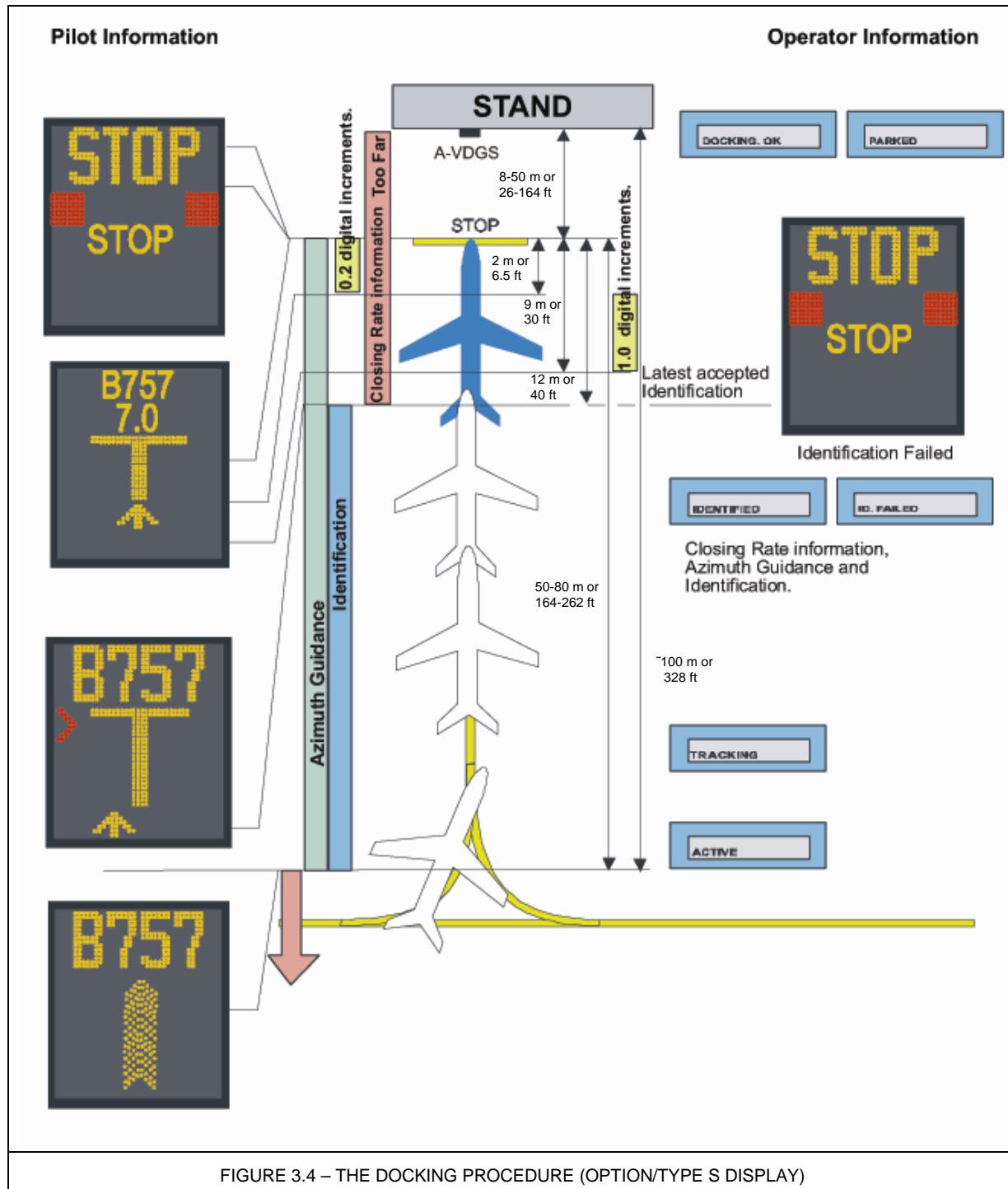


(Option)

**Note:** The SBU event can occur after the pilot has got the STOP message, but the aircraft is still rolling. In this case a manual Park On command must be done in order to complete the docking sequence with a **Blocks On** message to GOS and external systems.





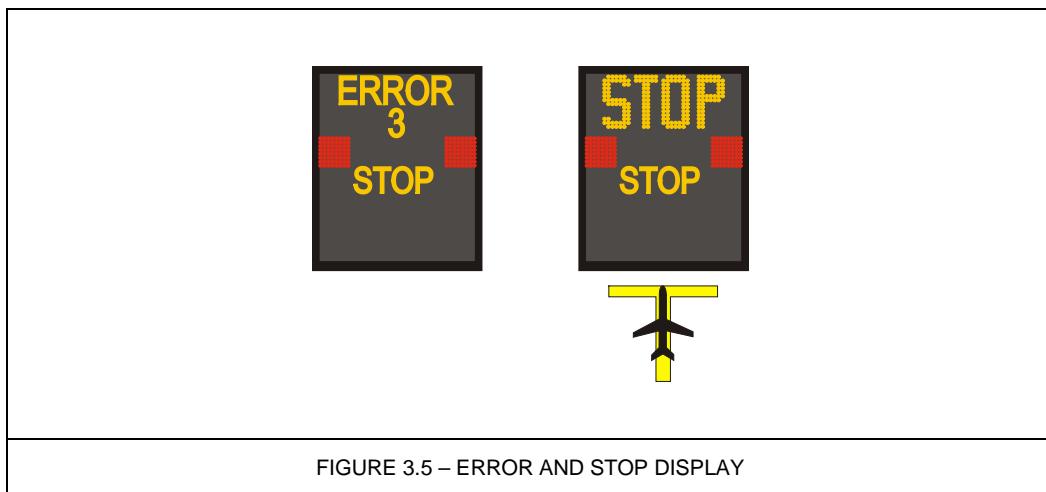


## 2.3 DOCKING SAFETY FEATURES

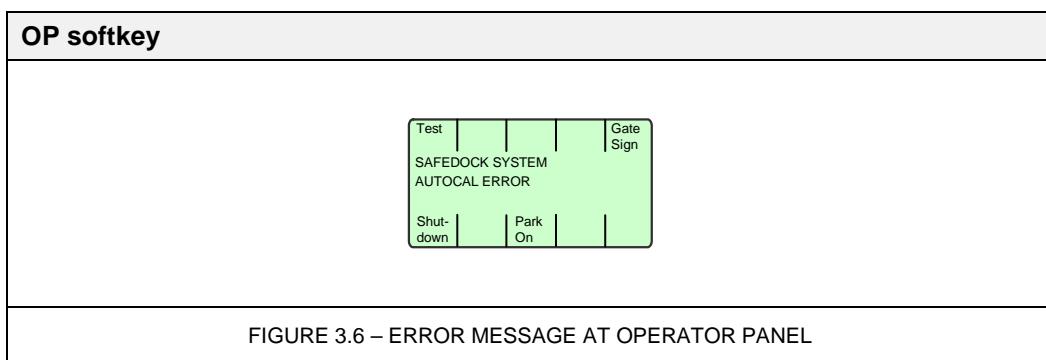
### 2.3.1 Test Functions Before Docking

Errors and their rectification are described in chapter 3, MAINTENANCE, of this manual.

- (a) When the SAFEDOCK System is started, a built-in error detection program checks the system for correct operation.
- (b) If an error should occur within the system, at initial start-up, the alphanumeric indicator of the display unit will show ERROR and the azimuth display will show a red stop symbol. The type of the system error will be shown on the Operator Panel LCD screen as well. The SAFEDOCK cannot be activated, if the system is not fully functional.



- (c) If a fault occurs, after the system has been activated, and an aircraft is approaching the terminal stand, the alphanumeric display will show STOP and the azimuth LED indicators will show a red stop symbol.
- (d) A detailed list of error messages and their appropriate rectification procedures are included in Chapter 4, Maintenance.
- (e) The figure below is an example of an error displayed on the Operator Panel LCD screen.

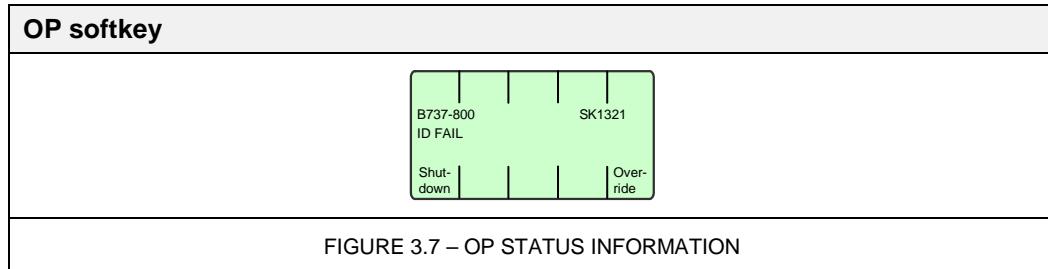


### 2.3.2

#### Aircraft Profile Check

During the docking procedure the nose profile of the approaching aircraft is roughly checked with the nose of the aircraft, selected at start-of-docking.

- (a) If the aircraft nose profile has not been verified within 12 metres of the stop position, the LED Display unit will show STOP/ID FAIL.
- (b) The figure below illustrates the message ID FAILED on the Operator Panel LCD screen.



### 2.3.3

#### Continuous Test Procedure

The system undertakes a continuous test procedure, even when the system is in the idle mode.

If an error occurs during the continuous test procedure, the error will be registered in the Error Log, and a LED will start to flash on the Operator Panel. To deactivate the LED a user must view the Error Log from the Operator Panel (TEST mode) to confirm the message.

The following automatic tests are implemented in Safedock.

- (a) Automatic calibration test
  - (Is done only if the Safedock Control Unit is equipped with the Stepper Motor Monitor hardware)
- (b) Automatic display test

#### 2.3.3.1

##### Automatic Auto Calibration Test

The system will automatically perform auto calibration test at regular time intervals (every thirty minutes). Before the docking system gets activated, the system will check if the latest auto calibration test was successful or not. If successful test, the system will start-up without performing a new test, thus, reducing start-up time. If unsuccessful test, a new auto calibration test will be performed before the system is activated. If the system doesn't pass the test it will not be activated, and an error message will be displayed on the operator panel, display unit and GOS, if connected.

#### 2.3.3.2

##### Automatic Display Test –(Standard T1, Option T2/3)

The system will automatically perform display test at regular time intervals (every thirty minutes). Each time the test takes place; a new LED board will be tested. During test the board will flash for a very short while. The status of each board will be stored in memory. Before the docking system gets activated or docking is started, the system will check if there are any faulty boards. If no faulty boards exist, the system can start up. Otherwise an error message will be displayed on the operator panel, the display unit and GOS, if connected.

If a fault is found in the LED matrix controller, this will be reported as a major fault, and results in a Display Error at start of docking.

### 2.3.4

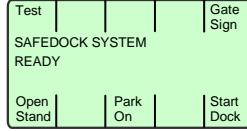
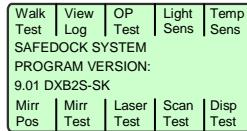
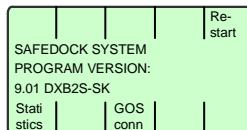
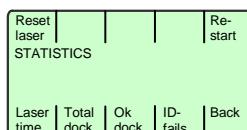
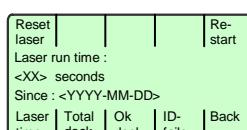
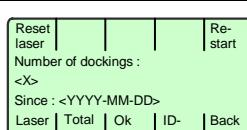
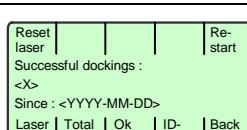
#### Indication of Power Failure

In the case of a power failure, the display unit will turn black and the docking procedure will be interrupted.

## 2.4 SAFEDOCK STATISTICS

Safedock (software version 9.01 or later) includes some basic statistics, for example events such as the number of dockings or ID fail messages and more. Statistics are viewed using the OP softkey.

### 2.4.1 View Safedock Statistics

1. From the OP, select <b>Test</b> .		FIGURE 3.8 – OP TEST
2. Press the right arrow for the next Test menu page.		FIGURE 3.9 – OP TEST MENU
3. Select Statistics.		FIGURE 3.10 – OP STATISTICS
4. From the <b>Statistics</b> menu, press a softkey to view statistics:		FIGURE 3.11 – OP STATISTICS
<ul style="list-style-type: none"> <li>Select <b>Laser time</b> for run time in seconds.</li> </ul>		FIGURE 3.12 – OP LASER TIME
<ul style="list-style-type: none"> <li>Select <b>Total dock.</b> for the number of dockings.</li> </ul>		FIGURE 3.13 – OP TOTAL DOCKINGS
<ul style="list-style-type: none"> <li>Select <b>Ok dock.</b> for the number of successful dockings.</li> </ul>		FIGURE 3.14 – OP SUCCESSFUL DOCKINGS

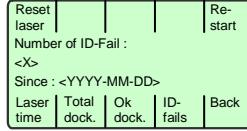
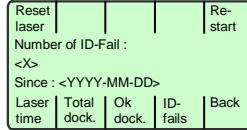
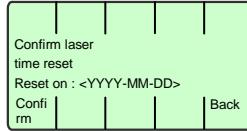
<ul style="list-style-type: none"><li>Select <b>Id fails</b> for the number of aircraft identification problems.</li></ul>	 <p>Reset laser Number of ID-Fail : &lt;X&gt; Since : &lt;YYYY-MM-DD&gt; Laser time   Total dock.   Ok dock.   ID-fails   Back</p>
<p><b>Note:</b> This operation is to be performed whenever a laser unit is replaced.</p> <ul style="list-style-type: none"><li>Select <b>Reset laser</b> and then <b>Confirm</b> to reset the laser time.</li></ul>	 <p>Reset laser Number of ID-Fail : &lt;X&gt; Since : &lt;YYYY-MM-DD&gt; Laser time   Total dock.   Ok dock.   ID-fails   Back</p>  <p>Confirm laser time reset Reset on : &lt;YYYY-MM-DD&gt; Confir   Back</p>

FIGURE 3.15 – OP ID FAIL EVENTS

FIGURE 3.16 – OP RESET LASER

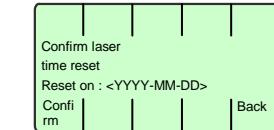


FIGURE 3.17 – OP CONFIRM

- 2.5 GOS CONNECTIVITY STATUS  
Safedock can display GOS connectivity status.
- 2.5.1 View GOS connectivity status and activity

- From the Test menu, press the right arrow.
- Select **GOS conn.**

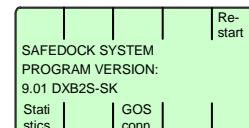


FIGURE 3.18 – OP GOS CONNECTIVITY

GOS status is shown with an ID number <X> and activity information, the text **NONE** (for no activity) or an animation (to show GOS activity) appears.

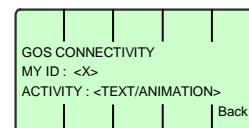


FIGURE 3.19 – OP GOS CONNECTIVITY STATUS

If no data is yet received from GOS, **ACTIVITY: NONE** appears:

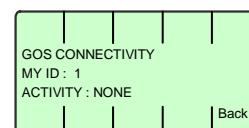


FIGURE 3.20 – OP GOS CONNECTIVITY NO ACTIVITY

If GOS communication data is received, an animation cycle repeats with symbols appears (to show there is activity):

/ then - then \ then | (appear repeatedly) or until **Back** is selected.

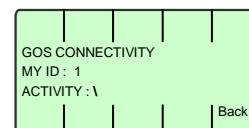


FIGURE 3.21 – OP GOS CONNECTIVITY ACTIVITY

When Safedock receives communication data from GOS but the address is incorrect, for example the ID is configured to another GOS ID, **OTHER** is the (incorrect) address of the data received from GOS.

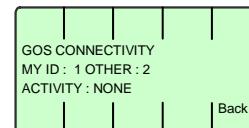


FIGURE 3.22 – OP GOS CONNECTIVITY ADDRESS

### 3. TECHNICAL DESCRIPTION

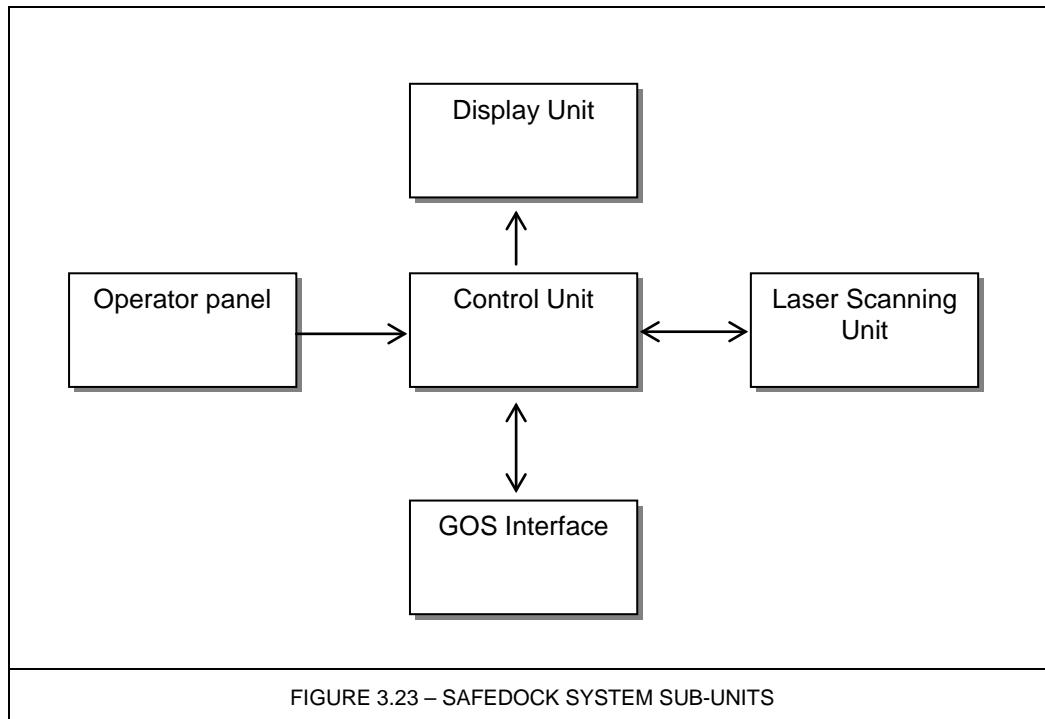
#### 3.1 GENERAL

The SAFEDOCK system uses a scanning laser range finder to measure the location of an approaching aircraft. Information of the aircraft position relative to the pre-selected stop position is presented by means of a display to both pilots.

#### 3.2 SYSTEM UNITS

The SAFEDOCK system consists of five major system units:

- (a) Control Unit.
- (b) Laser Scanning Unit.
- (c) Operator Panel.
- (d) Display Unit.
- (e) GOS Interface.



#### 3.2.1 Control Unit

The Control Unit is the processing heart of the SAFEDOCK system. It will accept user input commands from the SAFEDOCK Operator Panel or via the GOS Interface.

Alphanumeric information and aircraft position data are presented on the Display unit. It is also responsible for positioning of the mirrors in the Laser Scanning Unit and processing of the distance data provided by the Laser Scanning Unit. The Control Unit maintains a database of information about the aircraft types configured for docking by the system and their stop positions.

#### 3.2.2 Laser Scanning Unit

The Laser Scanning Unit comprises a Laser Range Finder and two mirrors mounted on the shafts of stepper motors.

The Laser Range Finder uses laser pulses to measure the distance to any object the laser beam is directed toward. The stepper motor mounted mirrors are used to direct

the laser beam in the horizontal and vertical plane, respectively. This design gives the system the ability to make a 3-dimensional scan of the stand area.

### 3.2.3 Operator Panel (OP softkey)

The Operator Panel is the primary source of user input to the system. It comprises a 14 key keyboard and a LCD display.

The keyboard is divided into 10 menu selection keys and 4 special function keys. The menu selection keys are also used for numeric input, such as user verification of commands. The display is used to give the operator visual feedback of the systems operation.

### 3.2.4 Display Unit

The Display unit is constructed using a set of Light Emitting Diode matrices. The Display is divided into two parts.

The top part is used as an alphanumeric display capable of displaying one or two lines of text. The lower part of the display is used to indicate the aircraft's position relative to the centreline and the stop position during a docking procedure.

### 3.2.5 GOS Interface (Option)

The GOS Interface is the optional link between the SAFEDOCK system and a central control and monitoring system, GOS. It is also used as a gateway to other external systems and to receive information about scheduled arrivals and departures from FIS.

The information can be used to display information such as flight number, estimated time, next/previous port-of-call and time remaining to departure on the Display. It is also used to present the information about a scheduled arrival on the Operator Panel for easy activation of the docking procedure.

The SAFEDOCK system uses the GOS Interface to report Block-on/off times to the central control system for statistics and billing purposes. All SAFEDOCK events and errors will also be sent to the central system, where they will be stored in a log file.

## 3.3 PERFORMANCE CHARACTERISTICS

### 3.3.1 Scanning area

Safedock (Options)	Type 1	Type 2/3
Horizontal range during capturing mode:	$\pm 5^\circ$	$\pm 5^\circ$
Horizontal range during docking:	$\pm 30^\circ$	$\pm 13^\circ$
The vertical scanning range is relative to the SAFEDOCK system horizon.		
Vertical scanning range above the horizon:	$\pm 15^\circ$	$+5^\circ$
Vertical scanning range under the horizon:	$-35^\circ$	$-24^\circ$

### 3.3.2 Guidance Performance

Azimuth Accuracy:	$\pm 0.2^\circ$
Stop Position Accuracy:	$\pm 0.1$ m

### 3.3.3 Display Unit

Visibility/Readability CAT3A:	160m (T1/2) 80m (T3)
Display Type:	Alphanumeric, LED

## 3.4 ELECTRICAL SUPPLY

The SAFEDOCK system is power supplied from the 115/230VAC mains, using an internal power supply unit to generate the 24 VDC for T1 units and 20 VDC required for T2/3 units.

## 3.5 OPERATION

### 3.5.1 Main Function

This section is a brief description of the SAFEDOCK system. A detailed description of the operating procedures is found in the section 'Operational Procedures'.

- (a) In the SAFEDOCK a number of aircraft types are defined by a set of parameters such as nose , height and optionally aircraft geometry. At start of docking the operator assigns an aircraft. During a docking procedure the laser equipment measures the corresponding parameters of the actual aircraft.
- (b) The individual SAFEDOCK system is operated from the OP-panel at Apron level or from the GOS. From GOS all connected systems can be individually controlled and monitored.
- (c) The system operates in three modes (see below) during the docking process:
  - (i) Calibration control
  - (ii) Capturing
  - (iii) Tracking

### 3.5.2 Calibration Check

The docking procedure starts when an aircraft type is selected from the OP-panel or from the GOS/FIS. If the previous automatic auto calibration test was not successful, then the system automatically makes a new calibration check which must be successful, before the system changes over into Capturing Mode. If this test were not successful, the type of error would be shown in the LCD window (for further information, see Chapter 4. Maintenance).

### 3.5.3 Capturing

After successful calibration control, the system is automatically switched over to the capturing mode for distance data collection. In this mode the laser is scanning the pre-defined docking area to detect an approaching aircraft.

### 3.5.4 Tracking

When an aircraft is detected, and its approximate position is confirmed, the system switches to tracking mode.

The SAFEDOCK system will check the nose height and optionally the outline of the approaching aircraft and compare it to the corresponding parameters of the selected aircraft. If there is no mismatch between these parameters, the docking process will continue by measuring the aircraft nose position. As many aircraft have similar profiles, all types cannot be discriminated. However a safety margin is always checked from measurements of the approaching aircraft's geometry, if this option has been included.

If the safety margin is too small, the display will show STOP ID FAIL, and the docking procedure will be automatically interrupted.

The SAFEDOCK system measures the position of the aircraft in relation to aircraft stand centreline and the defined stop position for the particular aircraft type. During the tracking process the relative position of the aircraft is displayed on the Display unit, clearly visible for both pilots from the aircraft cockpit.

If the communication link with the Display unit is malfunctioning, the display will revert to a default setting, which means that all red areas are turned on, and yellow areas are turned off.

## 4. SOFTWARE PROGRAMMES

### 4.1 DEVELOPMENT ENVIRONMENT

Software development has been done using C++ compiler on a Microsoft Windows 98 PC platform.

### 4.2 SOFTWARE ITEMS

Software items and the actual versions being used are apparent from the Software Configuration List. How to handle and install these items is described in Chapter 4. Maintenance.

The following software items are related to the SAFEDOCK system:

- (a) LOADER.EXE  
is the resident program loader of the SAFEDOCK/A-VDGS System.
- (b) SAFEDOCK.EXE  
This software item controls the SAFEDOCK System, i.e. laser measuring equipment, pilot display, operator panel and interfaces to external systems. The configuration item for Narita would be called Sd504Nar.EXE (504 is a version number) after compilation and delivery. This name is changed to SAFEDOCK.EXE at program load time, as the Loader of SAFEDOCK/A-VDGS will start a file with that name.
- (c) AIRCRAFT.DAT  
is a file containing information about each aircraft type or subtype; Nose height, stop position, distance nose to door and between doors, profiles used for identification check etc.
- (d) PROFILES  
is a set of files, two for each aircraft type, containing data for the vertical and horizontal profiles.
- (e) The Operating System is the Safegate Real Time Kernel (RTK).
- (f) SDCONFIG.EXE  
is the Maintenance Software package for SAFEDOCK/A-VDGS. The software is executed on the GOS system for making Program Load, Parameter Load, Calibration and Stand Configuration etc. It can also be used locally on a Maintenance PC, connected to the Operator Panel's service outlet.
- (g) STANDCONFIGPRINT.EXE  
This utility program is used on the GOS system (or the Maintenance PC) for making a hard copy of the Stand configuration done for each SAFEDOCK system installed. It is also used for the printout of a SAFEDOCK 'short log'.

### 4.3 SOFTWARE FUNCTIONS

This section is a brief description of functions performed by software.

- (a) Acquisition of data from:
  - (i) Laser Range Finder
  - (ii) Stepper Motor Position
  - (iii) Operator Control Panel (commands)
  - (iv) A-VDGS Central Computer (commands)
- (b) Output data to:
  - (i) Laser Scanning Unit (scanner positions)
  - (ii) Display Unit (guidance information)
  - (iii) Operator Control Panel (status information)
  - (iv) A-VDGS Central Computer (status information)
- (c) Menu-driven man-machine interface
- (d) Real time calculation and presentation of parameters such as:

- (i) Aircraft type verification
- (ii) Tracking positioning
- (iii) Closing Rate data
- (iv) Azimuth Guidance data
- (e) Calibration Control function
- (f) Storage of data
  - (i) Aircraft parameters
  - (ii) Stand parameters
  - (iii) Log files etc

#### 4.4 SOFTWARE FLOWCHART

The software state diagram on next page illustrates the docking process from state READY to state PARKED.

The different states are described in the following table.

State	Description
IN OPERATION	The system is available for normal operation
READY	The system is idling and awaiting a command.
MAINTENANCE	The system is taken out of operation for maintenance purpose.
SCHEDULED	A docking procedure has been initiated by GOS and the system is awaiting confirmation by the local operator.
PREPARED	A docking procedure has been initiated by GOS and the operator has cleared the stand. The system is awaiting activation.
ABORT SCHEDULED	The local operator has aborted the docking, suggested by GOS
DOCKING	A docking procedure has been started
DOCKING	A system self test is performed. This test includes verification of configured parameters, aircraft profile and data. It also includes an extensive test of the system hardware and a calibration control
TESTING	An error has been encountered during system self test.
ERROR	The system is active and scanning the stand area for an approaching aircraft.
ACTIVE	An aircraft has been detected approaching the stand area.
DOCKING	The system is tracking an incoming aircraft. The aircraft is continuously compared to a set of stored parameters, attempting to verify the type of the incoming aircraft.
TRACKING	The system is tracking an incoming aircraft. The aircraft type has been verified within specified limits.
ID VERIFIED	An operator has aborted the docking procedure.
ABORT DOCKING	The aircraft is closer than 12m to the stop position, and has not been identified.
ID FAILED	A non-recoverable error has occurred during the docking due to one of the following causes: <ul style="list-style-type: none"> <li>• Aircraft too far off centreline close to the stop position.</li> <li>• System failure.</li> <li>• Hardware failure (possible but as a last resort).</li> </ul>
SBU STOP	The aircraft is parked at the stop position. The system will continually scan for departure of the aircraft.
PARKED	The emergency stop function has been activated. The system is unavailable for further operation until the emergency stop function is deactivated. The system will revert to the ready state upon release of the emergency stop button. Optionally, the system can be configured to resume the last docking procedure upon release of emergency stop button.
EMERGENCY STOP	

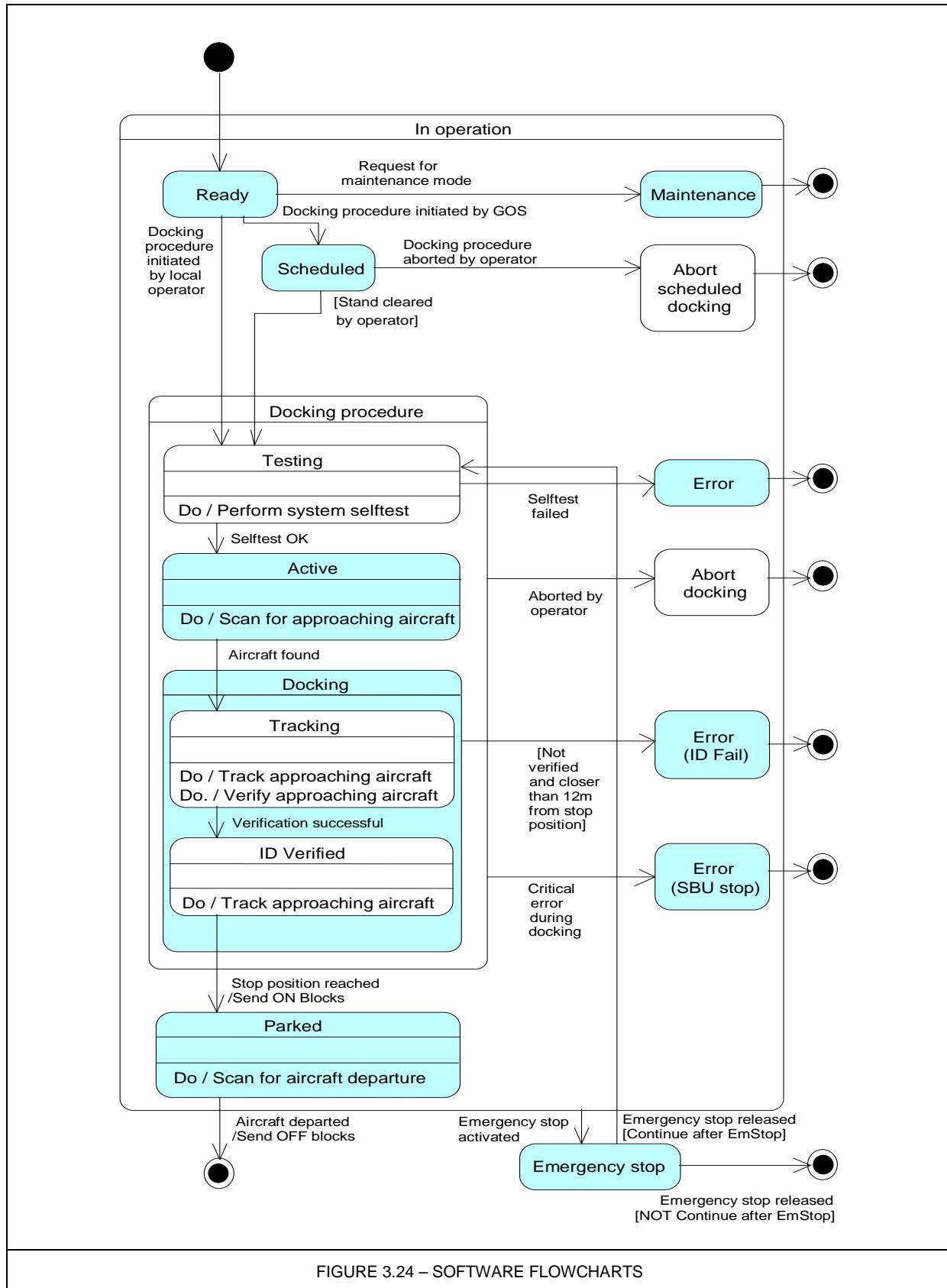


FIGURE 3.24 – SOFTWARE FLOWCHARTS

## 5. SAFETY PROCEDURES

### 5.1 CHECK OF ACCESS RIGHTS

For security reasons most of the commands from SAFEDOCK are requiring a password, if so configured.

#### WARNING!

**PASSWORD INFORMATION SHALL ONLY BE GIVEN TO AUTHORISED PERSONNEL. NEVER KEEP CODES IN WRITING THAT COULD BE ASSOCIATED WITH THE SAFEDOCK SYSTEM.**

### 5.2 ABNORMAL DISPLAY AND GUIDANCE

#### WARNING!

**THE SAFEDOCK SYSTEM HAS A BUILT-IN ERROR DETECTION PROGRAM TO INFORM ABOUT IMPENDING DANGERS DURING THE DOCKING PROCEDURE.**

For more information, see Chapter 3 Operation – Appendix A, Pilots Guidelines.

### 5.3 DISCREPANCIES FROM THE DESCRIBED DOCKING ROUTINE

#### WARNING!

**IF THE DISPLAY UNIT OR THE OPERATORS CONTROL PANEL LCD INDICATES ANYTHING OTHER THAN WHAT IS DESCRIBED IN THE DOCKING ROUTINE, THE OPERATOR MUST ACTIVATE THE EMERGENCY STOP PUSH-BUTTON TO PREVENT DAMAGE TO THE AIRCRAFT, GROUND EQUIPMENT OR INJURY TO PERSONNEL.**

**REASONS FOR SPURIOUS INDICATIONS ON EITHER DISPLAY MUST BE RECTIFIED BEFORE THE DOCKING PROCEDURE CAN RE-COMMENCE.**

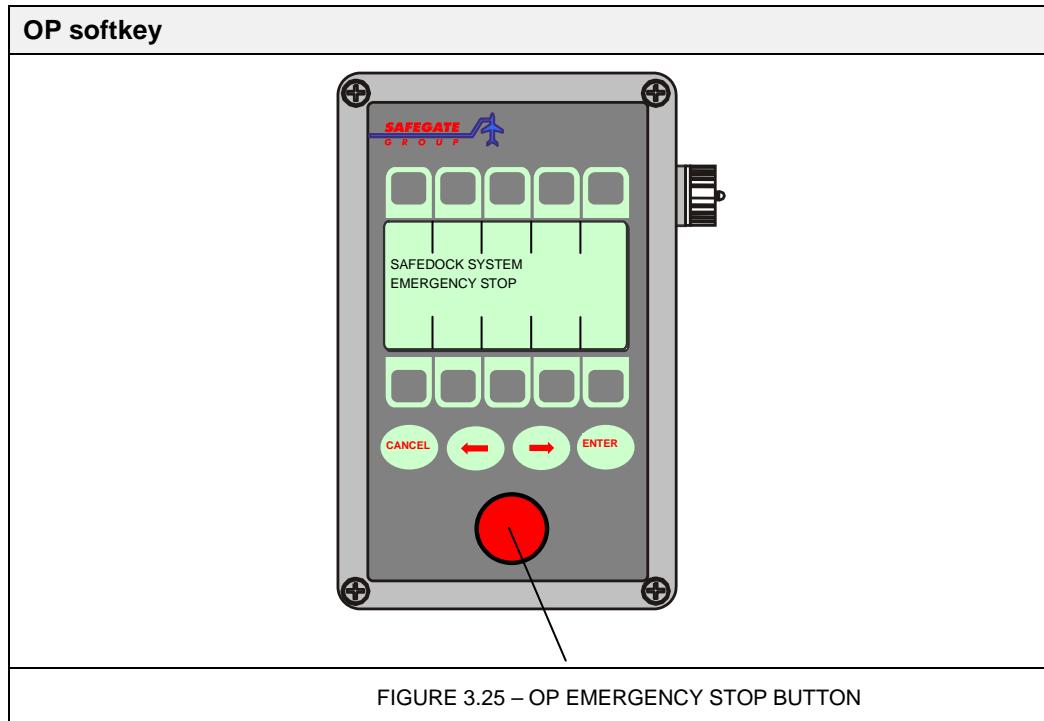
### 5.4 ITEMS TO BE CHECKED DURING THE DOCKING PROCEDURE

The following should be checked during the docking procedure:

- (a) When the Aircraft Type is shown on the Operator Panel LCD screen and on the alphanumeric display unit, the SAFEDOCK system is ready for docking. Ensure that the Aircraft Type displayed really is the same type as the approaching one.
- (b) When the aircraft turns from the taxiway onto the terminal stand centre-line, ensure the LCD screen on the Operator Panel changes from ACTIVE to TRACKING, and further to IDENTIFIED, when the aircraft approaches the terminal gate. Ensure also the azimuth display indicates the lateral position and the closing rate LED indicators are activated.
- (c) When the aircraft is approaching the stop position, ensure the closing rate LED indicators are gradually turned off from the bottom.
- (d) When the aircraft has reached the stop position, ensure the LCD screen indicates DOCKING OK, the display unit shows STOP with the RED stop bar activated.

## 5.5 MANUAL EMERGENCY STOP

When an emergency stop push-button is operated, the Operator's Control Panel LCD screen will show EMERGENCY STOP and the alphanumeric display will indicate STOP.



## 6. OPERATING PROCEDURES

The following description covers both the local control procedures of SAFEDOCK and the optional operation of SAFEDOCK on commands from GOS.

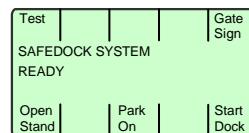
For security reasons some SAFEDOCK systems are configured with a password feature for the authorisation of commands. For more information, see Chapter 3 Operation - Appendix B, Safedock Features.

### 6.1 LOCAL OPERATION

Basic docking procedures are described in this section.

#### 6.1.1 A-VDGS Control Commands

When the Docking system is ready to operate, the LCD indicator at the Operator Panel will display: SAFEDOCK SYSTEM plus a status message. At this state a start-of-docking command may be issued.



**Note:** T2/3 start menu.

FIGURE 3.26 – OP T2 T3 START

- (a) A docking procedure is initiated by pressing the Start dock key on the Operator Panel.



**Note:** T1 start menu,  
press **Cancel** for  
SAFEDOCK SYSTEM  
READY menu.

FIGURE 3.27 – OP T1 START

- (b) The operator will be presented with a series of menus that can be used to select the exact aircraft type desired. By selecting a button that has a sub-menu, that sub-menu will be activated:

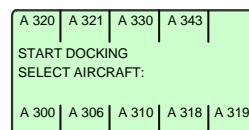


FIGURE 3.28 – OP SELECT AIRCRAFT

- (c) Once a sub-menu that contain actual aircraft types is presented, the operator can activate a docking procedure by selecting the desired aircraft type; a password is requested, if configured (option):

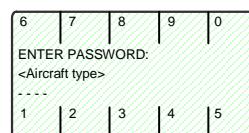


FIGURE 3.29 – OP ENTER PASSWORD (OPTION)

- (d) A self-test precedes the activation of the docking process.

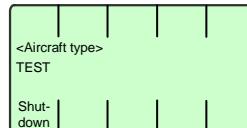


FIGURE 3.30 – OP SELF TEST

If test is OK, SAFEDOCK status will turn to ACTIVE, and the Operator Panel will display accordingly:

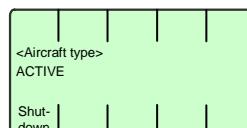


FIGURE 3.31 – OP ACTIVE

- (e) It shall be ensured that the aircraft type also is indicated on the alphanumeric LED display unit.  
(f) The docking process will now start. The process is described in 'The Docking Procedure to Parked state' below.

## 6.1.2 The Docking Procedure to Parked state

### 6.1.2.1 The Regular Docking Process

The following section is a description of a regular docking process.

- (a) The Laser has caught an object and locked on it, tracking it.



FIGURE 3.32 – OP TRACKING

- (b) The system verifies the identity of the approaching aircraft.

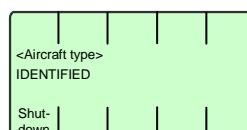


FIGURE 3.33 – OP IDENTIFIED

- (c) This message will appear, if the aircraft runs too fast

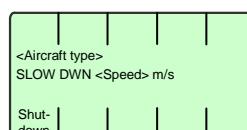


FIGURE 3.34 – OP SLOW

- (d) Docking is completed, when the following message is displayed.



FIGURE 3.35 – OP DOCKING OK

- (e) This message will appear, if the aircraft rolls too far past the stop position.

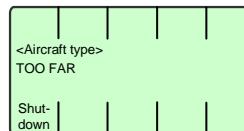


FIGURE 3.36 – OP TOO FAR

- (f) After a configurable period of time SAFEDOCK status will change to PARKED.

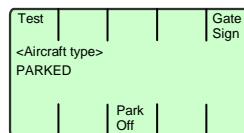


FIGURE 3.37 – OP PARKED

- (g) A Blocks-On transaction is sent to FIS.

**Note:** At any time the docking procedure can be aborted by pressing the OFF key on the Operator Panel.

#### 6.1.2.2

Abnormal docking condition

A number of abnormal events that affects the docking procedure can occur.

The following events only affect the pilot information, the docking is allowed to continue:

- (a) Downgrade
- (b) Gate blocked
- (c) View blocked

These events halt the docking procedure, but it can be resumed:

- ID Fail

These events abort the docking procedure:

- SBU stop

#### 6.1.2.3

Downgrade

If the Safedock system detects that the visibility is reduced due to adverse weather condition, such as snow/rain/fog, the system will report a downgrade condition. The docking procedure is allowed to continue, but the pilot's display is set into a non-inviting state, to give caution to the pilot.

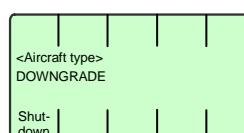


FIGURE 3.38 – OP DOWNGRADE

#### 6.1.2.4 Gate Blocked

If an object is found to be blocking the view from the Safedock towards the aircraft, and closer than the stop position, it is reported as a Gate Blocked condition and the pilot display enters a wait state, alternating WAIT / GATE / BLOCK.

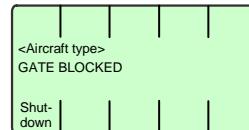


FIGURE 3.39 – OP GATE BLOCKED

The docking procedure will resume as soon as the blocking object is removed.

#### 6.1.2.5 View Blocked

If the system detects too many echoes from very close range, it will be reported as a View Blocked condition, and the pilot display will enter a Wait state.

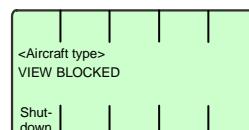


FIGURE 3.40 – OP VIEW BLOCKED

This condition can be caused by small amounts of dirt on the window/mirrors, and it is quite possible that the system will still be able to see the aircraft, once it appears at the stand area. As soon as the system detects the presence of the aircraft, the docking procedure will resume as per normal.

#### 6.1.2.6 ID Fail

If the system fails to verify the aircraft type before 12m from the stop position, the docking procedure will be halted with an ID-fail message.

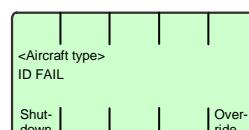


FIGURE 3.41 – OP ID FAIL

The operator may override this condition by pressing the Override key, to resume the docking procedure without any further verification attempts. ID-override should only be used when the operator is certain that the aircraft type selected matches the actual aircraft.

#### 6.1.2.7 SBU Stop

If the Safedock system encounters an unrecoverable error during the docking procedure, such as a hardware failure, the docking procedure will immediately be aborted with an SBU condition.

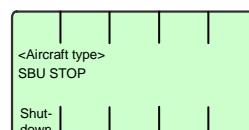


FIGURE 3.42 – OP SBU STOP

#### 6.1.2.8 Chocks On Display

After the docking has been completed and chocks have been put under the aircraft wheels, the message CHOCK ON may be displayed to the pilot by pressing the appropriate button (if configured) on the Operator Panel. Optionally a separate button may be placed somewhere at apron level.

#### 6.1.2.9 Display of Chocks On, 400 Hz and PCA (Option)

The message CHOCK ON can be displayed for the pilot, by pressing a button, to show that chocks have been placed under the aircraft wheels.

Also signals from 400 Hz and PCA devices can generate messages, indicating a connection and disconnection. Display time constants used are according to Chapter 3 Operation - Appendix A.

#### 6.1.2.10 Park On Command

If a docking procedure cannot automatically come to a 'parked' state, the Marshal can manually set this. (It is required for enabling the following park-off procedure.)

The sequence is started with SAFEDOCK in the quiescent state:

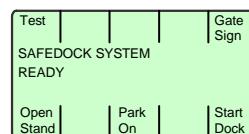


FIGURE 3.43 – OP READY

- (a) A Park on operation is initiated by pressing the Park On key



FIGURE 3.44 – OP PARK ON SELECT TYPE

- (b) The operator will be presented with a series of menus that can be used to select the exact aircraft type desired. By selecting a button that has a sub-menu, that sub-menu will be activated:

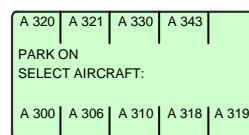


FIGURE 3.45 – OP PARK ON SELECT AIRCRAFT

- (c) Once a sub-menu that contains actual aircraft types is presented, the operator can activate the park on procedure by selecting the desired aircraft type.
- (d) The park on operation requires an operation-level password.

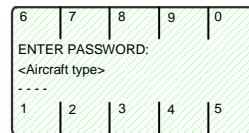


FIGURE 3.46 – OP ENTER PASSWORD

- (e) SAFEDOCK, will go to the 'parked' state, which is displayed as follows:

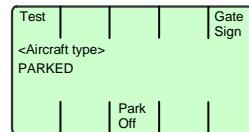


FIGURE 3.47 – OP PARKED

- (f) With this manual Park On command a Blocks-On transaction will not be sent to the FIS, as Flight No. is not available, and cannot be manually input.

### 6.1.3 Commands at departure

#### 6.1.3.1 Park Off Command

When an aircraft has departed, a Park Off command may be given by the Marshal, if the SAFEDOCK system by any reason did not detect the departure of the aircraft automatically and came to a READY state.

It is presumed that an aircraft is parked at the stand, and the SAFEDOCK Operator panel displays:

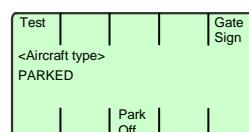


FIGURE 3.48 – OP PARKED

- (a) When pushing the key PARK OFF, the Operator Panel will display the following:

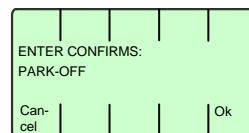


FIGURE 3.49 – OP PARK OFF

- (b) This operation requires an operation-level password.

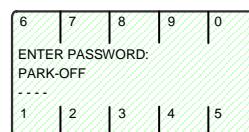


FIGURE 3.50 – OP ENTER PASSWORD

- (c) SAFEDOCK will go to the READY state, which is displayed at the Operator Panel.

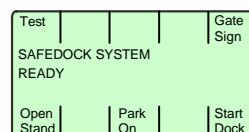


FIGURE 3.51 – OP READY

- (d) At this moment a Blocks-Off transaction will be sent to the FIS, if a departing flight for the particular Stand was scheduled and inserted to GOS database.

#### 6.1.3.2 Departure state (Option)

A Safedock can be configured to extend the park off detection sequence with an additional state, "Departure". If this state is enabled, the Safedock system will change to the departure state when the aircraft has moved away from its stop position.

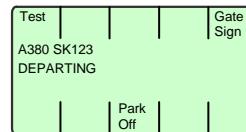


FIGURE 3.52 – OP DEPARTING

It will then perform scans until no aircraft is detected. When the gate is clear, the system will enter the READY state.

## 6.2 START OF DOCKING FROM GOS (OPTION)

Basic docking procedures are complimented with GOS. All basic docking commands can be controlled remotely via GOS or locally, if required.

### 6.2.1 Start of docking with interlocking stands

#### 6.2.1.1 Start of docking

A docking procedure can be preceded by a check for one or more interlocking adjacent stands. If this option is enabled, the following steps will take place.

- (a) Any steps performed before the docking normally starts will be performed as before.
- (b) When the docking is about to start, the system will ask for confirmation from GOS. If the system receives a confirmation the docking will start normally. The following message will be shown, when the request is sent to GOS.

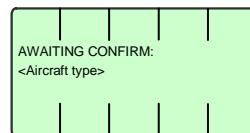


FIGURE 3.53 – OP AWAITING CONFIRM

- (c) If there are any interlocking adjacent stands, the docking will be halted, and the information about the first interlocking stand will be shown as illustrated below. This blockade cannot be overridden.

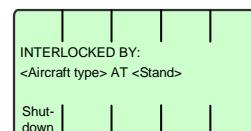


FIGURE 3.54 – OP INTERLOCKED BY

- (d) If GOS is unable to verify the state of one or more stands, the first two stands will be shown as illustrated below. This block can be overridden by pressing the Ok key.

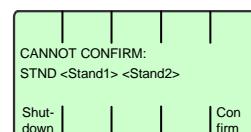


FIGURE 3.55 – OP CANNOT CONFIRM STND

- (e) If the system is unable to contact GOS for confirmation, a message is shown as illustrated below. The docking can be initiated, without GOS confirmation, by pressing the Ok key.

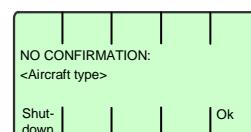


FIGURE 3.56 – OP NO CONFIRMATION

## 6.2.2 Start of Docking FROM GOS with activation

### 6.2.2.1 Preparing a docking

A docking procedure is prepared by sending the aircraft information to Safedock, and to have the Safedock operator confirm that the stand is ready to accept an aircraft.

- (a) If the Safedock operator confirms the stands readiness before the aircraft information is available:
- (i) When the Safedock operator confirms the stands readiness by pressing the 'Open stand' button, the following message will be displayed on the Operator Panel:

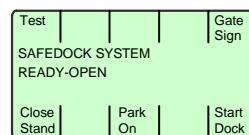


FIGURE 3.57 – OP READY-OPEN

*Note: A system set in the Ready-Open state automatically returns to a Ready state after 30 minutes.*

- (ii) When the scheduled flight information is made available for the Safedock system the following information will be displayed:

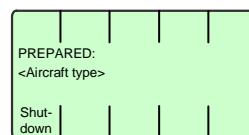


FIGURE 3.58 – OP PREPARED

- (iii) The system is now awaiting activation of the docking procedure. The only operation available to the local operator at this time is to abort the prepared flight. The activation command must come from the GOS system.
- (b) If the aircraft information is made available before the Safedock operator confirms the stands readiness:
- (i) When the scheduled flight information is made available for the Safedock system the following information will be displayed:

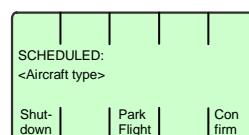


FIGURE 3.59 – OP SCHEDULED

- (ii) Select Park Flight for the following menus:

FIGURE 3.60 – OP PARK FLIGHT

- (iii) When the Safedock operator confirms the stands readiness by pressing the Ok button, the following message will be displayed on the Operator Panel:

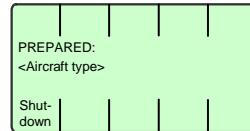


FIGURE 3.61 – OP PREPARED

- (iv) The system is now awaiting activation of the docking procedure. The only operation available to the local operator at this time is to abort the prepared flight. The activation command must come from the GOS system.

#### 6.2.2.2 Docking Abort Command

The Safedock operator may abort the scheduled/prepared docking, when he understands that the approaching aircraft is not according to the type assigned.

- (a) The Abort docking command is initiated by pressing the Shutdown key. The operation requires an operation-level password.

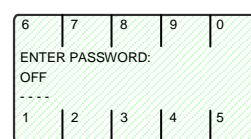


FIGURE 3.62 – OP ENTER PASSWORD

- (b) Entering a correct password will bring the system to READY status

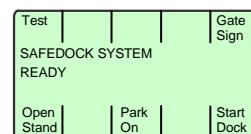


FIGURE 3.63 – OP READY

- (c) Now a new docking process can be started according to item ‘Local Start Of Docking’.

#### 6.2.2.3 Activate Docking Command

It is presumed that GOS has issued a ‘scheduled’ command and the Safedock operator has confirmed the stands readiness:

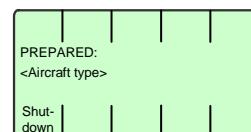


FIGURE 3.64 – OP PREPARED

- (a) The docking of the prepared flight is confirmed by an Activate command sent from the GOS system.

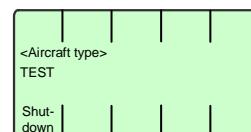


FIGURE 3.65 – OP SELF TEST

- (b) If test is OK, SAFEDOCK status will turn to 'active', and the Operator Panel will display accordingly:

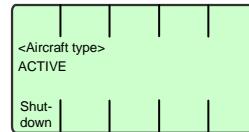


FIGURE 3.66 – OP ACTIVE

- (c) The docking process will now start. The process is described in item 'The Docking Procedure to Parked state' below.  
(d) Ensure that the Aircraft Type is indicated on the alphanumeric LED display unit.

### 6.3 START OF DOCKING FROM FIDS (OPTION)

Basic docking procedures are complimented with both GOS and FIDS. All dockings can be managed and controlled based on information from FIDS as well as basic docking commands controlled remotely via GOS or locally, if required.

**Note:** <Flight> indicated in the windows below, will be displayed at SAFEDOCK only if available from FIS, and if docking is not started locally.

#### 6.3.1 The Schedule Command

Normally scheduled flights are inserted into the GOS database by FIS. At a time prior to arrival a ‘scheduled’ command will be issued to SAFEDOCK from GOS.

- (a) When GOS has initiated docking for a scheduled flight, the following message will be displayed on the Operator Panel:

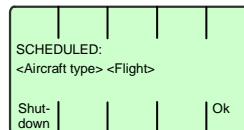


FIGURE 3.67 – OP SCHEDULED BY GOS

- (b) The operator now has two options: to abort or confirm the docking process.

##### 6.3.1.1 Docking Confirm Command

It is presumed that GOS has issued a ‘schedule’ command:

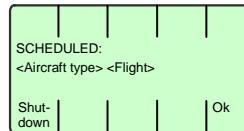


FIGURE 3.68 – OP SCHEDULED BY GOS

- (a) The docking of the scheduled flight is confirmed by the Marshal pressing the Ok key. This operation requires an operation-level password, (if configured, option).

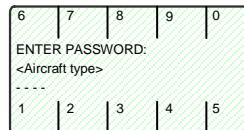


FIGURE 3.69 – OP ENTER PASSWORD (OPTION)

- (b) A correct password will start a docking.

#### 6.3.2 Automatic docking

Normally scheduled flights are inserted into the GOS database by FIS. At a configured time prior to arrival, the docking procedure starts automatically.

#### 6.3.3 Docking Abort Command

The docking may be aborted by the Marshal, when it is understood that the approaching aircraft is not according to the type assigned.

- (a) The Abort docking command is done by pressing the Shutdown key. The operation requires an operation-level password, (if configured, option).

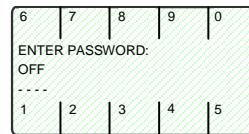


FIGURE 3.70 – OP ENTER PASSWORD (OPTION)

- (b) Entering a correct password will bring the system to READY status

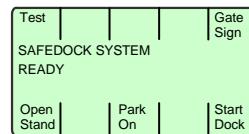


FIGURE 3.71 – OP READY

- (c) Now a new docking process can be started according to item ‘Local Start Of Docking’ above.

#### 6.3.4 Docking Confirm Command

It is presumed that GOS has issued a ‘schedule’ command:

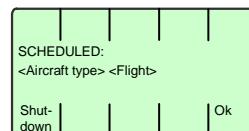


FIGURE 3.72 – OP SCHEDULED BY GOS

- (a) The docking of the scheduled flight is confirmed by the Marshal pressing the Ok key. This operation requires an operation-level password, (if configured, option).

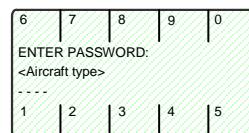


FIGURE 3.73 – OP ENTER PASSWORD (OPTION)

- (b) A correct password will start a docking.  
(c) After a successful docking, SAFEDOCK status will change to PARKED and a Blocks-On transaction is sent to FIS.

## 6.4 TOW-IN GUIDANCE

### 6.4.1 General

As the Safedock system relies on a measurement of the nose position of the aircraft to determine the aircraft position in relation to the centreline, the presence of a tow-in truck in front of the aircraft can affect the docking procedure, especially for smaller aircraft. To allow tow-in guidance of smaller aircraft a Safedock system can be configured to use a unique variant of the aircraft type, that will reduce the dependency of the lower portion of the aircraft, thus allowing for the presence of a tow-in truck.

### 6.4.2 Tow-in versions of aircraft types

Only aircraft with a nose height lower than 2.5m require special handling to allow tow-in guidance. For these aircraft types, a special version of the aircraft is available, with a ‘-TOW’ suffix to the aircraft name, I.E. B737-TOW is the tow-in guidance version of the B737 aircraft family.

**Note:** As the system is limited to only using the upper portion of the aircraft during tow-in docking, the stop position accuracy is slightly reduced for these operations.

**CHAPTER 3 OPERATION - APPENDIX A**  
**PILOTS GUIDELINES - SAFEDOCK TYPE 1, 2, 3 (OPTIONS)**  
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**Note:** This page is blank for convenient double-sided printing.

## 1. INTRODUCTION

### 1.1 SAFEDOCK

The Safedock Advanced-Visual Docking Guidance System (A-VDGS) provides both pilots with guidance for manoeuvring the aircraft into the gate to the correct centreline and stop-position under all operational conditions. A Safedock includes a built-in computer integrated to a low-intensity infrared laser that scans the gate area for the approaching aircraft. Safedock locks onto the aircraft to determine nose, engine, and wing positions to guide it to its park position. During the docking, Safedock also performs a safety check for a positive match of the inbound aircraft type, docking is interrupted if there is a mismatch.

Airport operations requirements include an optimum use of existing airport space, management of an ever changing mix of aircraft in airline fleets as well as safety and efficiency.

### 1.2 DOCUMENTATION

This document has been compiled to give the reader a quick understanding of operation procedures, with a focus on safety and efficiency. It is also an overview of the Pilots Display messages that may appear on the most common Safedock Types (T1, T2, T3), installed at numerous airports around the world.

The distances are provided in metric (metres) and imperial (feet) values, where 1 metre = 3.3 feet approximately and 1 foot = 0.3 metre approximately.

**Note:** *It is recommended to print this information as a double-sided document or as a booklet, to show texts to the left (even page) and images to the right (odd page).*

For more detailed information, see the Safedock Manual or [www.safegate.com](http://www.safegate.com).

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### History

Version	Date	Description
1.0	January 2008	First Release (Single type option)
1.1	July 2008	All type options
1.2	January 2009	Type options compared
1.3	May 2009	General update
1.4	September 2009	Feature update
1.5	January 2010	Feature update
1.6	June 2010	Feature update
1.7	November 2010	Minor update
1.8	April 2011	Minor update
1.9	June 2011	T2, T3 LED update
1.10	April 2012	Drawings update

**Note:** *This page is to be updated with every authorised change to the document.*

## 2. SAFETY INFORMATION

Safedock Advanced-Visual Docking Guidance System is an aircraft parking aid for airport and aircraft safety and efficiency. The design is according to strict airport industry standards for the safety of, and use by authorised airport personnel.

### 2.1 GENERAL WARNING

The Safedock has a built-in error detection program to inform the aircraft pilot of impending dangers during the docking procedure.



**WARNING!** IF A PILOT IS UNSURE OF THE INFORMATION BEING SHOWN ON THE SAFEDOCK DISPLAY UNIT, HE MUST IMMEDIATE STOP THE AIRCRAFT AND OBTAIN FURTHER INFORMATION FOR CLEARANCE.

### 2.2 ITEMS TO CHECK BEFORE ENTERING THE STAND AREA



**WARNING!** A PILOT SHALL NOT ENTER THE STAND AREA, UNLESS THE DOCKING SYSTEM FIRST IS SHOWING THE VERTICAL RUNNING ARROWS. THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THESE ARROWS HAVE BEEN SUPERSEDED BY THE CLOSING RATE BAR.



**WARNING!** A PILOT SHALL NOT ENTER THE STAND AREA, UNLESS THE AIRCRAFT TYPE DISPLAYED IS EQUAL TO THE APPROACHING AIRCRAFT. THE CORRECTNESS OF OTHER INFORMATION, SUCH AS 'DOOR 2', SHALL ALSO BE CHECKED.

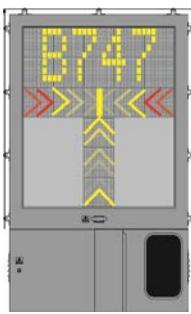
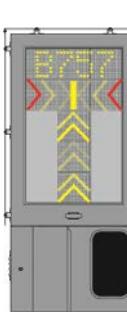
### 2.3 THE SBU MESSAGE

The message STOP SBU means that docking has been interrupted and has to be resumed only by manual guidance. DO NOT TRY TO RESUME DOCKING WITHOUT MANUAL GUIDANCE.

**Note:** This information for Pilots must be distributed to all airlines using the systems.

### 3. SAFEDOCK TYPES

A Safedock system includes display types as options:  
T1-XX, T2-XX, T3-XX (T - types), XX – (number of LEDs).

Pilots Display (PD)	Type 1-42	Type 2-18	Type 3-9
A single cabinet housing a number of units: display (including LEDs), a laser scanner, control and power units.  The unit is mounted 4-8 metres above ground and provides multiple functionality, for example clear pilot instructions, accurate aircraft identification and tracking, as well as quick and easy access to this low maintenance unit.			
FIGURE T1-42, T2-18, T3-9 CAPTURE			

#### 3.1 FUNCTIONS AND OPTIONS

Each display type also includes functions with more options available for specific site requirements.

Functions and Options		
START-OF-DOCKING	DOCKING COMPLETED	SBU-STOP
CAPTURE	Overshoot	TOO FAST
TRACKING	STOP SHORT	EMERGENCY STOP
CLOSING RATE	WAIT	CHOCKS ON
ALIGNED TO CENTRE	AIRCRAFT VERIFICATION FAILURE	ERROR
SLOW	GATE BLOCKED	SYSTEM BREAKDOWN
AZIMUTH GUIDANCE*	VIEW BLOCKED	POWER FAILURE
STOP POSITION REACHED		
<b>Note:</b> The symbol * indicates available options.		

**Note:** This document includes options for the distance counts available for display types, in metres and feet. Each option is a specific distance count and not intended as a conversion between metres and feet.

#### 4. SAFEDOCK PROCEDURES

**Note:** The following functions and/or options are available for Safedock types (Pilots Displays). Safedock types with other configurations may exist at some airports and may therefore differ from the images used in this document. All display images in this document are subject to modification by Safegate Group/Thorn Airfield Lighting. The descriptions that follow correspond to the respective image examples on the opposite/next page.

##### 4.1 START-OF-DOCKING

The system is started by pressing one of the aircraft type buttons on the Operator Panel. When the button has been pressed, WAIT will be displayed.

---

##### 4.2 CAPTURE

The floating arrows indicate that the system is activated and in capture mode, searching for an approaching aircraft.

It shall be checked that the correct aircraft type is displayed. The lead-in line shall be followed.  
**THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THE ARROWS HAVE BEEN SUPERSEDED BY THE CLOSING RATE BAR.**

---

##### 4.3 TRACKING

When the aircraft has been caught by the laser, the floating arrow is replaced by the yellow centre line indicator.

A flashing red arrow indicates the direction to turn.

The vertical yellow arrow shows position in relation to the centre line. This indicator gives correct position and azimuth guidance.

---

##### 4.4 CLOSING RATE

The closing rate is the final countdown from a specific distance to the stop position. A yellow vertical closing rate bar/centre line indicator appears with or without a digital countdown, depending on the configuration.

The closing rate bar represents the distance from stop, it consists of a number of rows representing for example 0.3 m or 0.6 m per row, depending on the configuration requirements. Each row turns off as the aircraft approaches stop (reducing the length of the bar, bottom upwards) and as the last row turns off, less than the interval for one row remains until **STOP** appears.

A digital countdown (option) shows the distance to stop numerically, for example starting from 9, 12 (40 feet), 15, 20 or 30 m, depending on the configuration requirements.

The digital countdown also uses different decrements during the closing rate process.

- Metric digital count example
  - Starting with 1 metre decrements from 20 m down to 3 m followed by 0.2 metre decrements from 3.0 down to 0.2 m and then followed by STOP.
- Imperial digital count example
  - Starting with 4 feet decrements from 40 ft down to 12 ft followed by 1 foot decrements from 8 ft down to 1 ft and then followed by STOP.

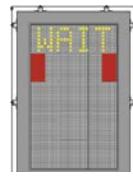
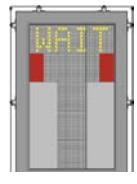
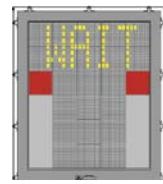
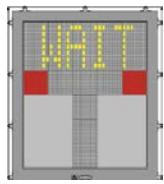
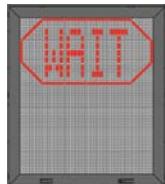
The pictures illustrate aircraft in the closing rate distance from stop position, slightly left of the centre line. The red arrow indicates the direction to steer.

**Note:** Some pictures are units with centre line symbol countdown only - no digital count (NDC).

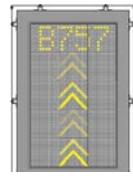
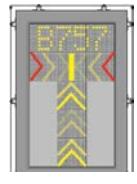
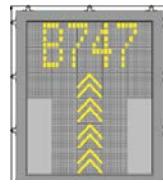
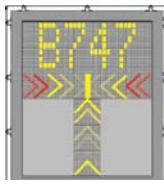
T1-42		T2-18	T2-24		T3-9	T3-15
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**Note:** Pilots Display figure/image examples are subject to modification by SAFEGATE.

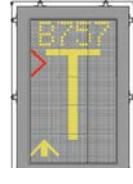
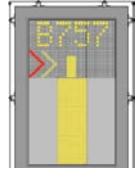
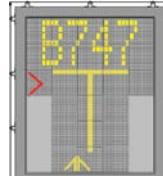
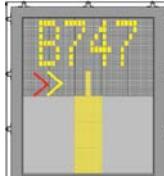
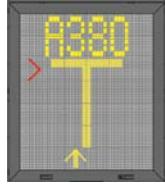
#### 4.1 START-OF-DOCKING



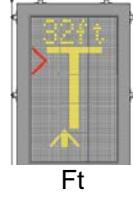
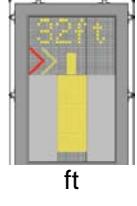
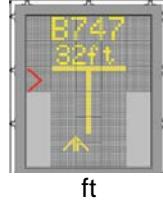
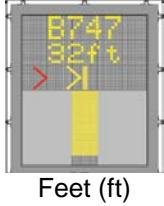
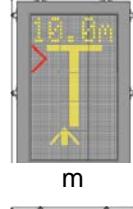
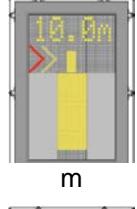
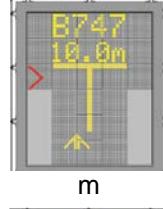
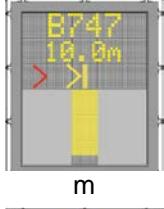
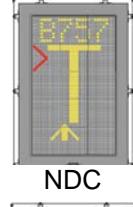
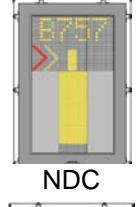
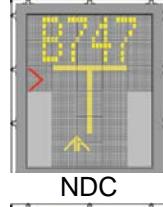
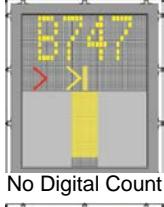
#### 4.2 CAPTURE



#### 4.3 TRACKING



#### 4.4 CLOSING RATE (OPTION)



#### 4.5 ALIGNED TO CENTRE (OPTION)

The aircraft is at the displayed distance from the stop position. The absence of any direction arrow indicates an aircraft on the centre line.

---

#### 4.6 SLOW (DECREASE SPEED)

Safedock is configured with a slow down active zone (optional distances set from the stop position, standard 6-24 metres) according to an acceptable docking speed (optional max allowed speed, standard 2 m/s).

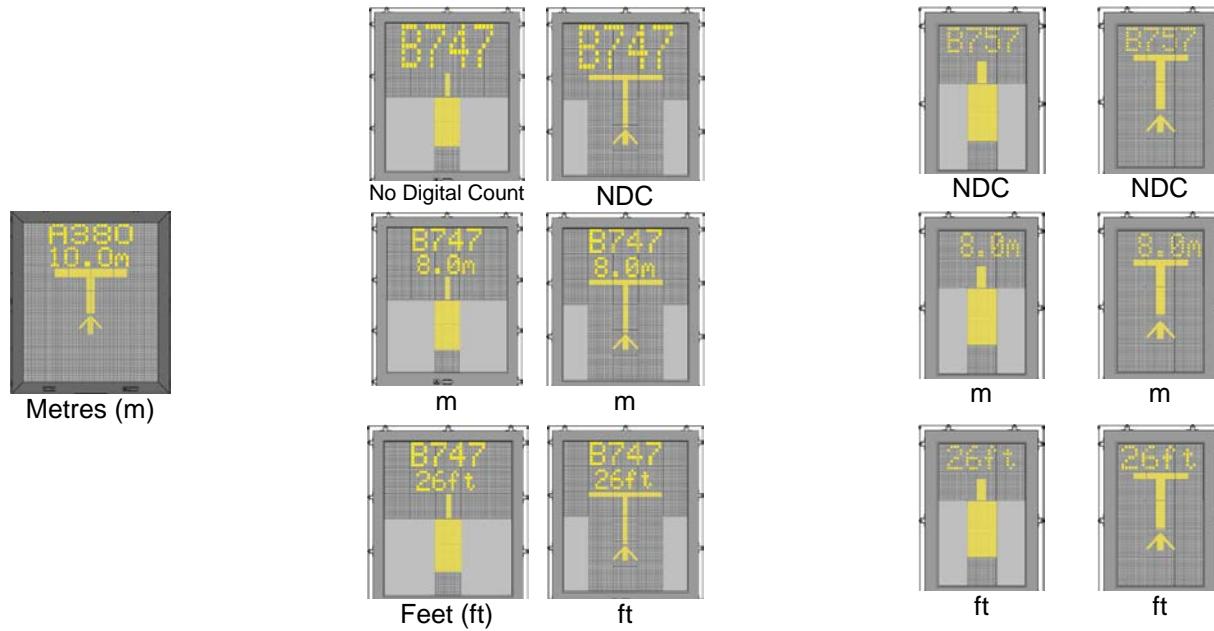
**Note:** When 2 m/s is rounded down to a single digit, it is approximately 7 km/h, 4 mph or 3 knots.

If the aircraft is approaching faster than the accepted speed, the system will show SLOW as a warning to the pilots.

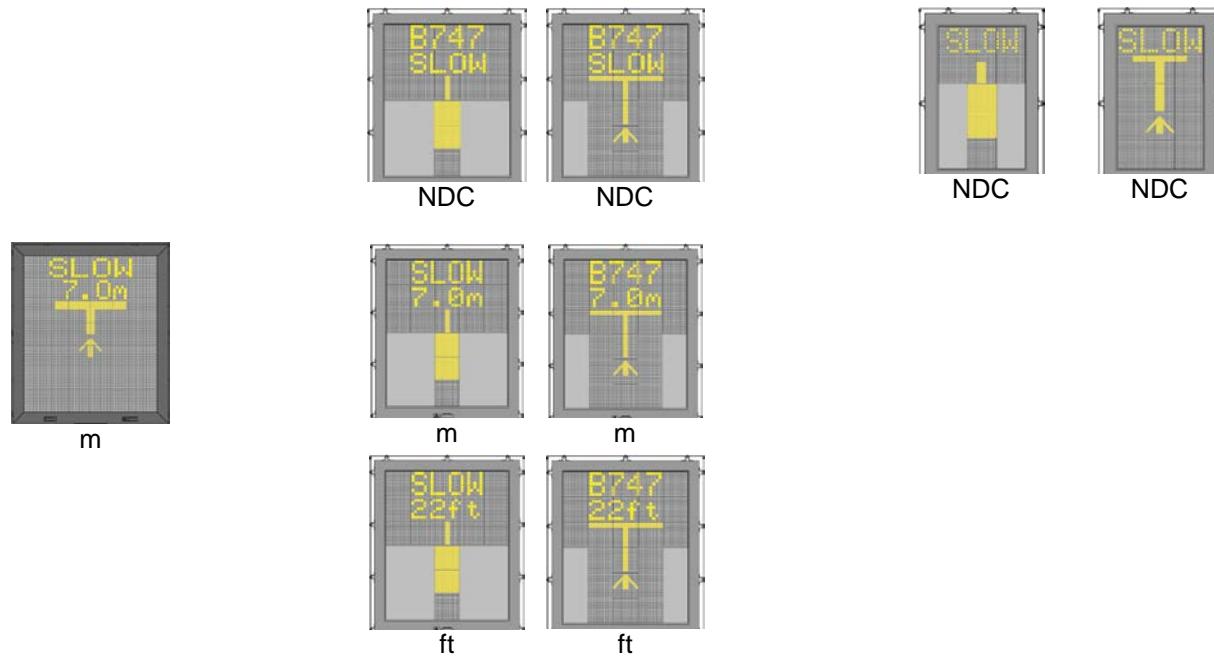
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T1-42		T2-18	T2S-24		T3-9	T3-15
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4.5 ALIGNED TO CENTRE (OPTION)



4.6 SLOW (DECREASE SPEED)



#### 4.7 AZIMUTH GUIDANCE (OPTION)

The aircraft is at the displayed distance from the stop-position. The yellow arrow indicates an aircraft to the right of the centre line, and the red flashing arrow indicates the direction to turn.

---

#### 4.8 STOP POSITION REACHED

When the correct stop-position is reached, the display will show STOP with a red border or with red lights.

---

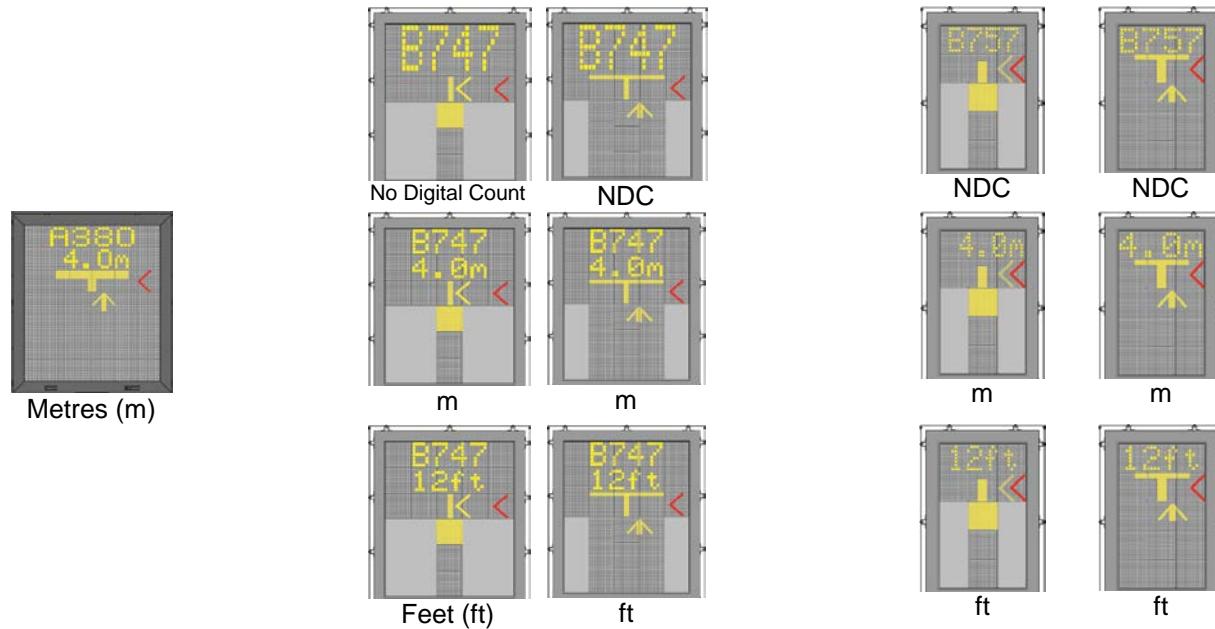
#### 4.9 DOCKING COMPLETED

When the aircraft has parked, OK will be displayed.

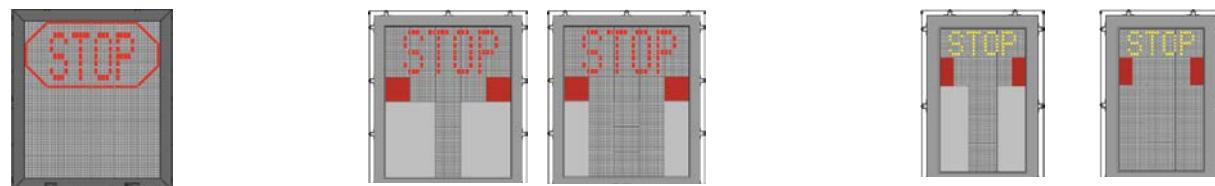
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T1-42		T2-18	T2S-24		T3-9	T3-15
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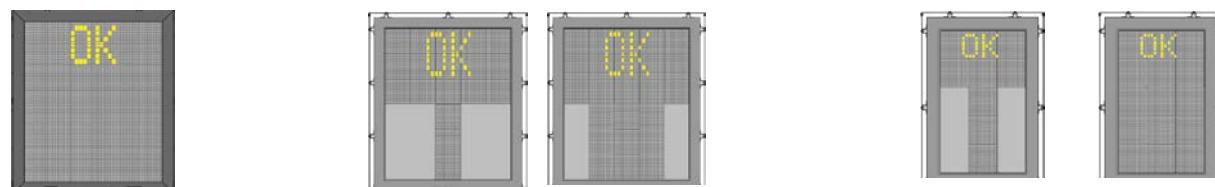
4.7 AZIMUTH GUIDANCE (OPTION)



4.8 STOP POSITION REACHED



4.9 DOCKING COMPLETED



#### 4.10           OVERSHOOT

If the aircraft has overshot the stop-position, TOO FAR will be displayed.

---

#### 4.11           STOP SHORT

If the aircraft is found standing still but has not reached the intended stop position, the message STOP OK will be shown after a pre-configured time.

---

#### 4.12           WAIT

If some object is blocking the view toward the approaching aircraft or the detected aircraft is lost during docking close to STOP, the display will show WAIT.

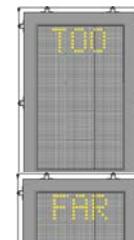
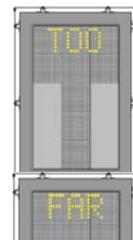
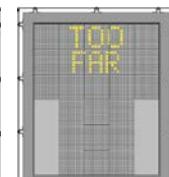
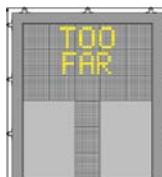
The docking will continue as soon as the blocking object has disappeared or the system detects the aircraft again.

**THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THE "WAIT" MESSAGE has BEEN SUPERSEDED BY THE CLOSING RATE BAR.**

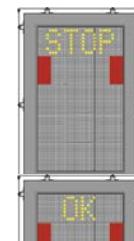
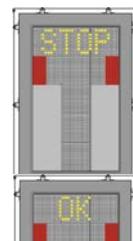
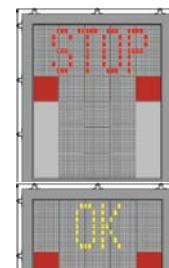
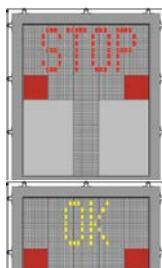
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T1-42		T2-18	T2S-24		T3-9	T3-15
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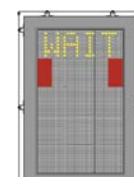
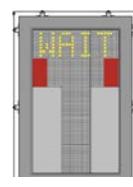
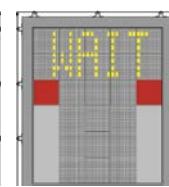
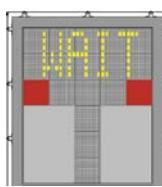
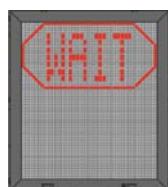
4.10      OVERSHOOT



4.11      STOP SHORT



4.12      WAIT



#### 4.13 SLOW (IN ABNORMAL SITUATIONS)

This display can be shown for two reasons:

##### A) BAD WEATHER CONDITION

During heavy fog, rain or snow, the visibility for the docking system can be reduced.

When the system is activated and in capture mode, the display will disable the floating arrows and display SLOW and the Aircraft Type.

As soon as the system detects the approaching aircraft, the vertical closing rate bar will appear.

If the system has been configured in this mode to make a shortened ID verification (check of engine position excluded), the Aircraft symbol will blink to give attention.

##### B) AIRCRAFT LOST DURING DOCKING

If the aircraft is lost during docking far out from the bridge or PBB area, the display will show SLOW.

As soon as the system detects the approaching aircraft, the vertical closing rate bar will re-appear.

**THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THE CLOSING RATE BAR IS SHOWN.**

---

#### 4.14 AIRCRAFT VERIFICATION FAILURE

During entry into the Stand, the aircraft geometry is being checked.

**T1:** If, for any reason, aircraft verification is not made 12 metres before the stop-position, the display will first show WAIT and make a second verification check. If this fails STOP and ID FAIL will be displayed.

**T2, T3:** If, for any reason, aircraft verification is not made according to the distance option or 12 metres or 40 feet before the stop-position, the display will first show WAIT and make a second verification check. If this fails STOP and ID FAIL will be displayed. The text will be alternating on the upper two rows of the display.

**THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE WITHOUT MANUAL GUIDANCE,  
UNLESS THE WAIT MESSAGE HAS BEEN SUPERSEDED BY THE CLOSING RATE BAR.**

---

#### 4.15 GATE BLOCKED

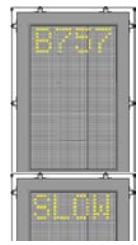
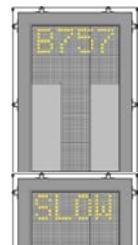
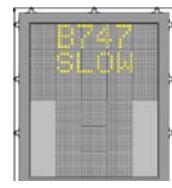
If an object is found blocking the approach to gate/apron view from the Safedock to the planned stop position for the aircraft, the docking procedure will be halted with a WAIT and GATE BLOCK message.

The docking procedure will resume as soon as the blocking object has been removed.

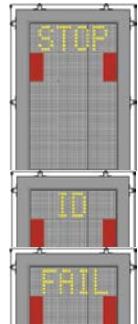
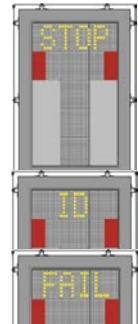
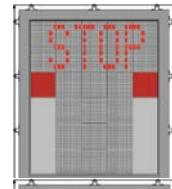
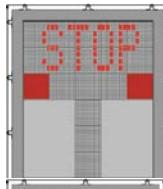
**THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE WITHOUT MANUAL GUIDANCE,  
UNLESS THE WAIT MESSAGE HAS BEEN SUPERSEDED BY THE CLOSING RATE BAR.**

T1-42		T2-18	T2-24		T3-9	T3-15
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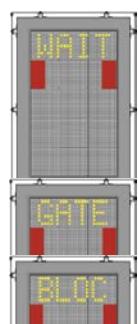
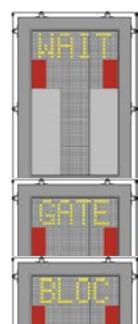
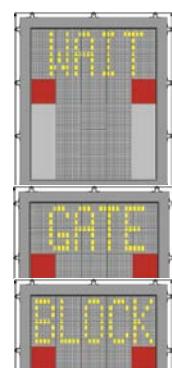
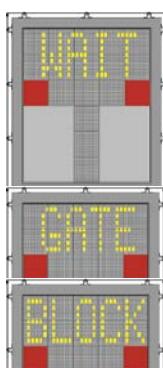
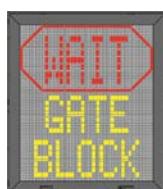
4.13 SLOW (IN ABNORMAL SITUATIONS)



4.14 AIRCRAFT VERIFICATION FAILURE



4.15 GATE BLOCKED



#### 4.16 VIEW BLOCKED

If the view towards the approaching aircraft is hindered, for example internally in the unit or the laser lens or on the laser window by dirt, or another obstacle in the closest view area, the Safedock will report a View blocked condition. Once the system is able to see the aircraft through the hinder, the message will be replaced with a closing rate display.

**THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE WITHOUT MANUAL GUIDANCE,  
UNLESS THE WAIT MESSAGE HAS BEEN SUPERSEDED BY THE CLOSING RATE BAR.**

---

#### 4.17 SBU STOP

Any unrecoverable error during the docking procedure will generate an SBU (safety back-up) condition. The display will show the text STOP SBU.

A MANUAL BACKUP PROCEDURE MUST BE USED FOR DOCKING GUIDANCE.

---

#### 4.18 TOO FAST

If the aircraft approaches with a speed higher than the docking system can handle, the message STOP TOO FAST will be displayed.

The docking system must be re-started or the docking procedure completed by manual guidance.

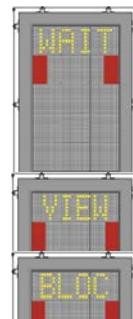
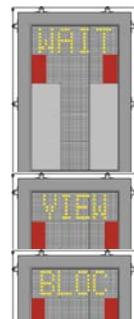
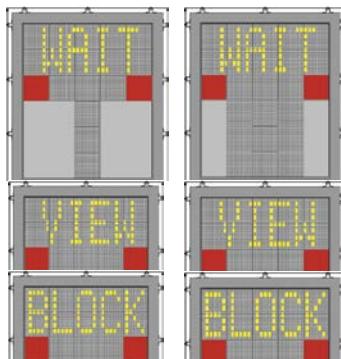
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#### 4.19 EMERGENCY STOP

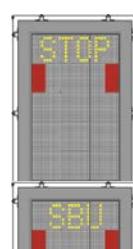
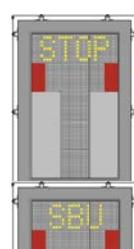
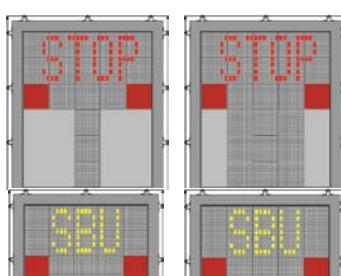
When the Emergency Stop button is pressed, STOP is displayed.

T1-42	T2-13	T2-18	T2S-24	T2S-27	T3-9	T3-15
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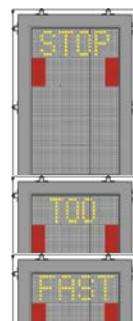
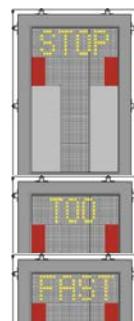
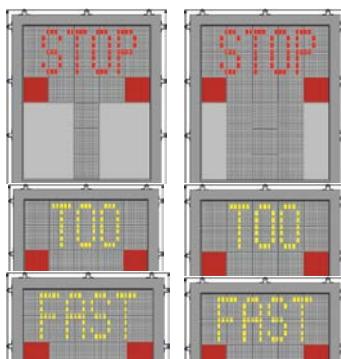
4.16 VIEW BLOCKED



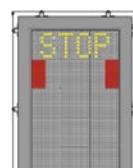
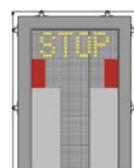
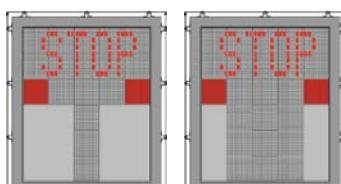
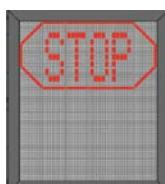
4.17 SBU-STOP



4.18 TOO FAST



4.19 EMERGENCY STOP



#### 4.20 CHOCKS ON (OPTION)

CHOCK ON will be displayed, when the ground staff has put the chocks in front of the nose wheel and pressed the “Chocks On” button on the Operator Panel.

---

#### 4.21 ERROR

If a system error occurs, the message ERROR is displayed with an error code. The code is used for maintenance purposes and explained elsewhere.

---

#### 4.22 SYSTEM BREAKDOWN

In case of a severe system failure, the display will go black. A manual backup procedure must be used for docking guidance.

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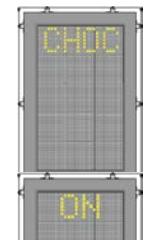
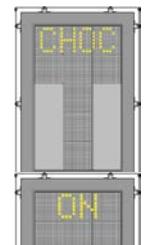
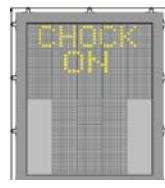
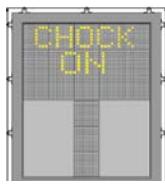
#### 4.23 POWER FAILURE

In case of a power failure, the display will be completely black. A manual backup procedure must be used for docking guidance.

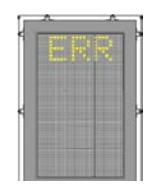
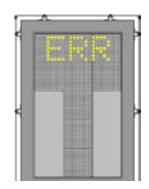
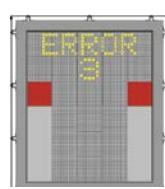
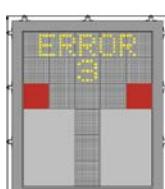
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T1-42		T2-18	T2S-24		T3-9	T3-15
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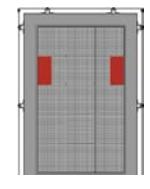
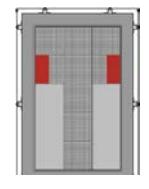
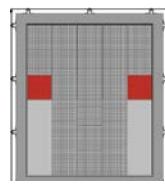
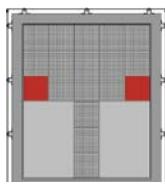
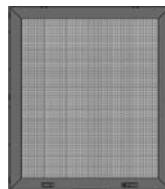
4.20 CHOCKS ON (OPTION)



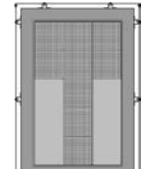
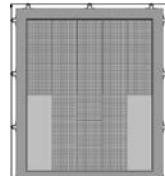
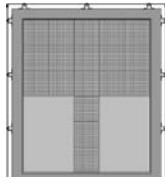
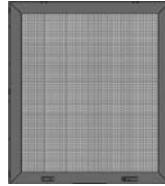
4.21 ERROR



4.22 SYSTEM BREAKDOWN



4.23 POWER FAILURE



**Note:** This page is blank for convenient double-sided printing.

**CHAPTER 3 OPERATION - APPENDIX B**  
**SAFEDOCK FEATURES (OPTIONS)**  
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## 1. SAFEDOCK OPTIONS

This appendix is a summary of all optional operational features, available with the Safedock Docking Guidance System. In sections describing a feature, it is usually stated that the Docking system 'is equipped' or 'is configured' in a particular way. However not all these statements may be relevant for a particular customer system. They are merely options and/or alternatives.

A Safedock system normally includes only the features, which are specified for a particular customer's requirements. This appendix covers all features and options that may be delivered in a system, and is a subset of Chapter 3 Operation.

For more information, contact site or project management, Safegate or see [www.safegate.com](http://www.safegate.com).

**Note:** Some of the features in this section are alternatives, one of which may exclude the other. Sections describing excluding alternatives have a suffix (A), (B), (C) etc. after the header text.

## 2. SCOPE

### 2.1 GENERAL

This document is a detailed description of functional variations of the SAFEDOCK system. The features described are related to the following categories:

- (a) Data Entry
- (b) Displayed Information during Docking
- (c) Centreline
- (d) Safety procedures
- (e) Interaction with Optional or External Equipment
- (f) Test Procedures

## 3. DATA ENTRY

### 3.1 GENERAL

To control the docking system, the following options for manual data entry are available:

- (a) User Passwords
- (b) The 'Open Stand' command

### 3.2 PASSWORD ENTRY

#### 3.2.1 General

The SAFEDOCK system can be equipped to use password protection for operator and/or maintenance (remote) operations.

How to create users and passwords is described in 4. Maintenance.

SAFEDOCK/A-VDGS system would require a four digit Password at the following commands:

- (a) Local Start of Docking (by assigning an aircraft type)
- (b) Local Park ON or Park OFF (creating Blocks On and Blocks Off transactions)
- (c) Confirmation of a Scheduled Flight Start-of-docking Command from GOS
- (d) Aircraft Loading Bridge Lock Override (if installed)
- (e) Diagnostic Test Procedure (requires a maintenance operator password; will be described elsewhere)

Activities that do not require a password are:

- (a) Emergency Stop
- (b) Chocks On message to pilot

### 3.2.2

#### Operator password

The system can be configured with operator level password protection, the SAFEDOCK system will require all operator interactions except shutdown and emergency stop to be confirmed using a four-digit confirmation code. The confirmation codes are configurable per SAFEDOCK system. Password configuration is described in Chapter 4 Maintenance - Appendix A.

An option for operator password is to only require passwords for the maintenance menu (the TEST button on the Operator Panel), while allowing the operator to perform other operations without entering a password.

### 3.2.3

#### Maintenance Password

The system can be configured with maintenance level password protection. The SAFEDOCK system will require all maintenance interactions using the 'Stand Configuration Utility' to be confirmed using a password. The password is configurable per SAFEDOCK system. This feature requires that the Stand Configuration Utility Software is configured to use the remote password system, as the password is stored and verified on the SAFEDOCK system. Password configuration is described in Chapter 4 Maintenance - Appendix A.

### 3.3

#### THE 'OPEN STAND' COMMAND

The 'Open Stand' command is issued by a local operator to acknowledge that the Stand area is empty and ready to accept an aircraft. This command can be used to accept a scheduled docking, initiated by a GOS/GMS system, or to set the Stand status to 'free open', allowing remote start of a docking procedure from a GOS system. The 'Open Stand' command can be assigned to a button on the operator panel, or to an external button.

A system set in the Ready-Open state automatically returns to a Ready state after 30 minutes.

## 4.

### POWER UP SCAN

#### 4.1

##### GENERAL

Safedock cannot recognize the type of aircraft parked in front of the system at power-up. Instead, a unique aircraft type (named 'Unknown') can be added to the system configuration. At system power-up, if the system finds an object in front of itself, it will enter the 'Parked' state, using this unique aircraft type.

#### 4.2

##### FUNCTION DESCRIPTION

Upon start-up, Safedock checks for an object that matches the parameters of a unique aircraft type. If an object is found, the system enters parked state, with this unique aircraft type.

If an object is found, the system proceeds with its regular park off detection procedure. Once the object is gone, the system reverts to a 'Ready' state.

The parked state and the unique aircraft type are reported to the GOS system, if present.

The parked state can be reported to external systems connected to GOS, such as FIS/GMS, but no specific aircraft type information will be available.

#### 4.3

##### THE UNIQUE AIRCRAFT TYPE

It is not possible to use the 'Unknown' aircraft type in docking any operations. Any attempt to start a docking procedure with this aircraft type results in an error condition.

## 5. PARK OFF SCAN

### 5.1 GENERAL

Once every minute (unless changed by a connected GOS system) the system will perform a park off scan.

### 5.2 FUNCTION DESCRIPTION

During the park off scan, the system will try to match the currently parked aircraft's profile with the aircraft in front of the system. If the system doesn't see any aircraft it will perform a park off operation. Note that parking vehicles, such as a truck, might cause the system to believe the aircraft is still present.

## 6. EARLY DOWNGRADE WARNING (OPTION)

The Safedock system can, upon request from GOS, perform a check for low visibility conditions and report the results to GOS. This feature can be configured to ignore fog outside a certain distance (metres) from the system.

- Using SdConfig software, click **Configuration, Config, Parameters** to enter the distance in the **Left Clip** parameter.

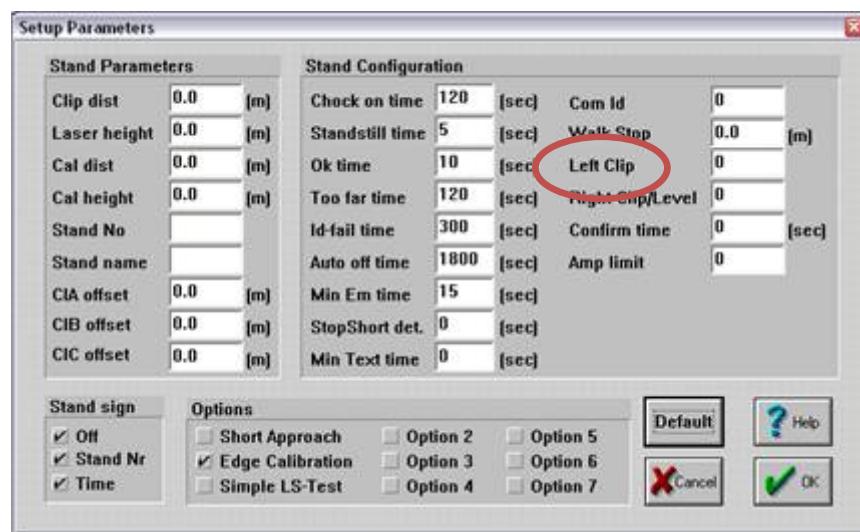


FIGURE 3B.1 EARLY DOWNGRADE WARNING

If a low visibility condition is detected the status is reported for one hour after which the system clears the status flag, unless a new request has been made by GOS before one hour has passed.

## 7. DISPLAYED INFORMATION DURING DOCKING

### 7.1 GENERAL

Displayed information during the docking procedure is related to variants of the following functions:

- (a) Slow
- (b) Digital Closing Rate
- (c) Chocks On
- (d) Chocks Off
- (e) Stand sign
- (f) PCA/400Hz status \*

## 7.2 SLOW

### 7.2.1 General

The SAFEDOCK system is configured to display a warning, when an aircraft is approaching the stop position at a high speed.

Maximum allowed speeds decrease as the distance to stop reduces as follows:

- For distance greater than distance stop + 20m, maximum speed is fixed at 4 m/s.
- For distance stop + 20m to stop + 10m, maximum speed is fixed at 3 m/s.
- For distance stop +10m to stop + 3m, the maximum allowed speed is configurable with set value per aircraft type (X m/s), where the value for X can be set up to 3 m/s maximum, but never higher.

Whenever the speed of the approaching aircraft is found to exceed the speed limit within the distance window, a SLOW message is displayed.

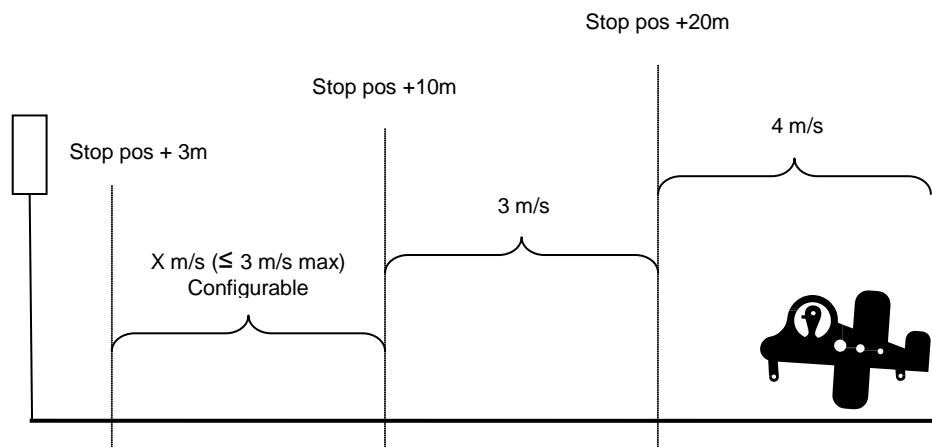


FIGURE 3B.2 SLOW SPEEDS

Slow speed conversion table			
Metres/second	Kilometres/hour	Miles/hour	Knots
4 m/s	14 km/h*	8 mph*	7 knots*
3 m/s	10 km/h*	6 mph*	5 knots*
2 m/s	7 km/h*	4 mph*	3 knots*

**Note:** \*An asterix denotes an approximate value which is rounded down to a single digit, to be within possible maximum speed limits where necessary or set.

## 7.3 DIGITAL CLOSING RATE (OPTION)

The SAFEDOCK system can be equipped/ configured to display the distance remaining to the stop position using a digital distance display.

The digital distance display is only active for the last part of the docking procedure. On a two-line text display, the aircraft type will be displayed on the top line and the distance to stop on the bottom line. On a single-line display, the aircraft type will be replaced by the distance-to-stop information. The distance to stop display is available from 9m, 12m, 20m (digital countdown/default) or 40feet.

- 7.4      **CHOCK ON (OPTION)**  
The SAFEDOCK system can be equipped/configured to use the display to give a 'CHOCK ON' message to the pilot, when the chocks have been placed on the wheels. The message can be activated either from the SAFEDOCK operator panel, or from an external switch mounted at apron level. The message will remain on the display for a configurable period of time (default: 2 minutes).
- 7.5      **CHOCK OFF (OPTION)**  
The SAFEDOCK system can be equipped/configured to use the display to give a 'CHOCK OFF' message to the pilot, when the chocks have been removed from the wheels.  
The 'chock off' message uses the same activation method as the 'chock on' message. The two messages will alternate on pressing the dedicated button. The duration of the message is as for the 'chock on' message.
- 7.6      **STAND SIGN**  
The display of the SAFEDOCK system can be utilised as a general-purpose Stand Sign display between docking procedures.  
The information that can be displayed includes Stand ID, current time and alternating time/Stand id or 'Stand', Stand No. and Current Time.
- 7.7      **PCA/400HZ STATUS**  
The SAFEDOCK system can be equipped to use the display to give a 'PCA ON/OFF' message to the pilot, when the external pre-conditioned air supply is connected or disconnected. The SAFEDOCK system is also equipped to display a '400Hz ON/OFF' message to the pilot, when the external 400Hz power supply is connected/disconnected.  
The messages will remain on the display for a configurable period of time (default: 2 minutes).

## **8. UNINTERRUPTABLE POWER SUPPLY**

- 8.1      **GENERAL**  
The Safedock system can be equipped with a specifically designed UPS. This UPS enables the system to operate even during loss of main power.
- 8.2      **SYSTEM BEHAVIOUR WHEN RUNNING ON UPS POWER**  
The system will behave according to the following table once the main power is lost

<b>Time since loss of main power (minutes)</b>	<b>Behaviour</b>
< 20	Normal operation
> 20	No new dockings allowed. Any active docking is allowed to continue.
> 30	Any active docking is aborted. System shutdown

- 8.3      **MESSAGES DISPLAYED BY THE UPS**  
If a docking is initiated during the 20-30 minute window after main power failure the following message will be displayed: "Dockings blocked by UPS"  
When the system is about to shutdown the message "UPS Shutting down..." will be displayed on the operator panel.

## **9. CENTRELINE**

### **9.1 MULTIPLE CENTRELINES**

The SAFEDOCK system is configured to use multiple centrelines. Up to three centrelines per system can be defined and used. The centrelines need not be parallel. The centreline to be used is determined individually per aircraft type. This configuration is described in Chapter 4 Maintenance - Appendix A.

### **9.2 CURVED CENTRELINES**

The SAFEDOCK system is configured to use also curved centrelines. Up to three centrelines per system can be defined and used. The centreline to be used is determined individually per aircraft type. This configuration is described in Chapter 4 Maintenance - Appendix A.

## **10. ENHANCED SAFETY CHECK**

### **10.1 GENERAL**

The SAFEDOCK system includes the Aircraft Safety Check feature, which is a further enhancement of its safety performance. Aircraft geometry is analysed by means of a true 3D measuring technique, thus bringing safety risk to a minimum.

When a particular aircraft type has been assigned with the start-of-docking command, and another type of aircraft is really approaching the Stand, there is a risk for a collision with fixed ground equipment, the passenger boarding bridge or the terminal building. However, several mistakes have been made before such an accident would occur: The correct type of aircraft has not been assigned by the operator - and - the pilot has not discovered that an incorrect aircraft type is displayed on the docking system - and - aircraft geometry differs in a negative and dangerous way.

### **10.2 AIRCRAFT SAFETY CHECK**

By the Aircraft Safety Check feature the approaching aircraft's geometry is analysed and compared to parameters of the aircraft type that was assigned with the start-of-docking command.

If aircraft geometry has not been verified within 12 metres from the stop position (of the assigned aircraft), the LED Display unit will show STOP/ID FAIL.

As the requirements for letting the aircraft into the Stand are more restricted by a SAFEDOCK system using this feature, the STOP/ID FAIL message may be shown also if the aircraft is approaching diagonally or too fast.

### **10.3 EXTENDED ID FAIL LIMIT**

Each aircraft can individually be configured to use an extended ID Fail limit of a total of 22 metres to the stop position. This option is more thoroughly described in Chapter 4 Maintenance - Appendix A, Stand Configuration Utility.

## 11. INTERACTION WITH EXTERNAL EQUIPMENT

### 11.1 GENERAL

The following operational features are available as options:

- (a) Dead Man's Grip
- (b) Bridge In/Up Check
- (c) Pre-positioning of bridge
- (d) Adjacent Stand Interlock
- (e) Fire Warning
- (f) Alarm Signal
- (g) Docking in progress Signal
- (h) Push-Back Data Transmission
- (i) Command from bridge
- (j) SIGMA control
- (k) Simplex clock

### 11.2 DEAD MAN'S GRIP

The SAFEDOCK system can be equipped to use a 'dead man' grip function.

The 'dead man' grip forces the operator of the SAFEDOCK system to keep a switch depressed throughout the docking process, when the aircraft is present. If the 'dead man' switch is deactivated at any time during the docking procedure, and the aircraft is present, the docking will be aborted, displaying STOP to the pilot, as if the operator had activated the 'OFF' key. Once the aircraft has reached the stop position, the operator can release the 'dead man' switch without affecting the operation of the system. If the 'dead man' grip is released before the aircraft appears at the stand, Safedock will display WAIT until the 'dead man' grip is pressed again.

### 11.3 BRIDGE IN/UP CHECK

#### 11.3.1 General

The SAFEDOCK system can be configured to require confirmation from the bridge about the positioning of the bridge, before a docking procedure is allowed to commence. If the bridge is found to be in the incorrect position, a message BR IN will be displayed to the operator. The confirmation can be enabled per aircraft type at the Stand. To enable the 'bridge in/up' feature, the desired confirmation (bridge in and/or bridge up) for each aircraft type in the Stand configuration shall be marked.

#### 11.3.2 Second Bridge

The SAFEDOCK system can be equipped to require 'bridge in' confirmation from a second bridge. This will require confirmation for both bridges, before a docking procedure is allowed to commence. The second bridge will use the same configuration settings as the first bridge.

#### 11.3.3 Dual Safe Position bridge

If the program version includes support for Dual Safe Position Bridges, option 5 (set per aircraft type) is used to specify which of the two possible bridge positions shall be used. To use this feature, select Bridge up only for aircraft types using the primary bridge position, and both bridge up and option 5 for aircraft using the alternate bridge position. If selected, the primary position uses OP-Input no. 2, and the alternative position uses OP-Input no. 7.

**Note:** It is very important that the correctness of this configuration is verified as an erroneous configuration can result in a hazardous situation, possibly leading to physical damage to both persons and airport equipment.

#### 11.3.4      **Override**

The SAFEDOCK system can be equipped with an override function for the bridge conditions. This override function will allow the operator to commence a docking procedure, despite that the bridges report 'out-of-position'.

#### 11.4            **AIRCRAFT CODE SIGNALLING TO BRIDGE**

##### 11.4.1          **General**

The SAFEDOCK system can be equipped to send information about the aircraft selected for the current docking procedure to be passed to the control system of the passenger boarding bridge/PBB. The information presented to the PBB consists of a 6-bit (maximum) code, individually configurable per aircraft type and Stand. The information is available on digital outputs at the Operator Panel.

This feature cannot be used with the WATCH DOOR warning.

##### 11.4.2          **Signalling**

Signalling is performed as follows:

- (a)     The operator selects aircraft type from the SAFEDOCK Operator Panel or from the central Gate Operating System/GOS, whereupon an aircraft code is automatically output. \*
- (b)     As soon as SAFEDOCK is reset to FREE CLOSED (SYSTEM READY) or to the MAINTENANCE state, the aircraft code will be reset, cleared.

**\*Note:** To control the output port an 'Aircraft Request/Reset' signal from the external system (PBB) can be added to the SAFEDOCK system.

*This handshake signal cannot be used with the feature 'Adjacent Stand Interlock'.*

##### 11.4.3          **Hardware Connection**

All signals between the two systems are by means of potential free contacts. A set of opto-couplers are added to the SAFEDOCK Operator Panel to provide the signals needed.

The signals from SAFEDOCK to PBB are:

<b>Aircraft selected (code)</b>	Maximum six potential free, normally open, opto-couplers. These outputs can be configured per aircraft type. For example: one of these outputs can be configured to close to indicate the type/category of aircraft to be docked.
---------------------------------	---

The signal from PBB to SAFEDOCK is:

<b>Aircraft Request/Reset</b>	A potential free, normally open, contact (request data). This signal shall close (24 VDC) to reset/clear the 'aircraft selected' signals.
-------------------------------	---

#### 11.4.4          **Configuration**

The SAFEDOCK system shall be configured to use the 'aircraft type/category selected' signals for each aircraft type used in the system.

The correct aircraft code must be set up for each aircraft type.

#### 11.5            **ADJACENT STAND INTERLOCK**

##### 11.5.1          **General**

The SAFEDOCK system can be equipped with a blocking scheme, whereby two adjacent SAFEDOCK systems will lock each other out, allowing only one of the systems to be active at a time, including having a parked aircraft. This feature is normally used, only where two centrelines are located too close to each other to allow them both to be used at the same time.

- 11.5.2      Override**  
The SAFEDOCK system can be equipped with an override function for the adjacent Stand interlock. This override function will allow the operator to commence a docking procedure despite the status of the adjacent Stand.
- 11.6      FIRE WARNING**  
The SAFEDOCK system can be equipped to use either a locally input signal, or a signal from a remote system, received through GOS, as a 'fire warning' signal. The 'fire warning' signal is used to abort any pending docking procedure and to display a warning message at the Stand. The 'fire warning' signal is given the highest operating priority, overriding all other operations, including emergency stop. The SAFEDOCK system must be in operation. 'Fire Warning' will have no effect during 'program load'.
- 11.7      ALARM SIGNAL**  
The SAFEDOCK system can be equipped with a potential free alarm output for connection to an external alarm system. The alarm output will be activated on any error detected by the SAFEDOCK system. Alternatively, a GOS system can be used to collect error messages from the SAFEDOCK systems and forward them to a central alarm handling system.
- 11.8      DOCKING IN PROGRESS SIGNAL**  
The SAFEDOCK operator panel is equipped with a potential free output used to indicate that a docking procedure is in progress. A 'docking in progress' signal can be used by external systems that may need to know when a docking procedure is activated.  
(a)      A light control system can use the 'docking in progress' signal to automatically activate the lead-in lights at the Stand when a docking procedure is activated.  
(b)      The bridge control system can use the 'docking in progress' signal to inhibit any outward movement of the bridge during a docking procedure.
- 11.9      PUSHBACK DATA TRANSMISSION**
- 11.9.1      General**  
The SAFEDOCK system can be equipped with a feature to track an aircraft during the pushback procedure. The distance information gathered during pushback is forwarded to a ground radar system (via GOS), allowing the radar system to start tracking the aircraft, where it would normally be unable to, due to radar shadow in the proximity of the terminal building.
- 11.9.2      Manual Activation**  
The bridge operator can start the pushback procedure manually by activating the 'park on/off' button.
- 11.9.3      Automatic Activation**  
The bridge and 400Hz supply systems is connected to the SAFEDOCK system, allowing the SAFEDOCK system to automatically start the pushback procedure when it detects that the bridge is retracted and the 400Hz supply is disconnected.
- 11.10      CONTROL FROM BOARDING BRIDGE(A)**
- 11.10.1      General**  
The SAFEDOCK system can be configured to accept start of docking commands from the passenger boarding bridge control system. In this configuration, the PBB's control system will operate as an extension of the SAFEDOCK operator panel, allowing the PBB to initiate the docking procedure when the PBB operator activates the pre-positioning of the PBB. Currently, two different communication protocols are available: Melsec and Siemens 3964R.

- 11.10.2 **Melsec (A)**  
The Melsec protocol is used by PBB's based on Mitsubishi PLC system, such as Maritime hydraulics.
- 11.10.3 **Siemens 3964R (B)**  
The Siemens 3964R protocol is used by PBB's based on Siemens PLC system, such as FMT.
- 11.11 **SIGMA CONTROL (B)**  
The SAFEDOCK system can be configured to communicate on a SIGMA network. In this configuration, status of the SAFEDOCK will be reported onto the SIGMA network and docking procedures can be initiated from a SIGMA control station.
- 11.12 **SIMPLEX CLOCK (C) (OPTION)**  
A SAFEDOCK system can be equipped to use the 'simplex protocol' for time synchronisation. Using this configuration, the SAFEDOCK periodically synchronises its internal clock to that of the clock master available on the simplex network.

## **12. TEST PROCEDURES**

- 12.1 **GENERAL**  
The following test procedure options are available:  
(a) Calibration check  
(b) Access to test functions  
(c) Walk test
- 12.2 **CALIBRATION CHECK**
- 12.2.1 **General**  
This is a standard feature. A calibration check is performed latest at the start of each docking procedure. The method used to check the calibration is one of the following alternatives, and is determined by SAFEDOCK configuration:  
(a) Distance check  
(b) Edge check
- 12.2.2 **Distance check**  
When using the distance check, the laser beam will be directed toward a predefined, solid calibration object. A laser scan of the object must find the object at the correct distance for the calibration control to be successful.
- 12.2.3 **Edge check**  
When using the edge check, the calibration object must contain both a vertical and horizontal edge. During calibration control, both the vertical and horizontal edges must be located at the correct position and distance for the calibration control to be successful.
- 12.3 **ACCESS TO TEST FUNCTIONS**  
The SAFEDOCK system is equipped with a set of test functions that can be activated from the operator panel. Access to these test functions can be blocked by an external key-switch, requiring the maintenance personnel to use a key to unlock the test functions. Access to these test functions requires a maintenance level password.
- 12.4 **WALK TEST**  
The 'walk test' procedure is used to perform a system test of the SAFEDOCK system. It can also be used to verify the configured centreline. The stop position for 'walk test' will be the nose wheel position for the selected aircraft type. As usual the calibration check must have been completed successfully, before the walk test procedure can start.

## CHAPTER 3 OPERATION - APPENDIX C

### STAND ADJACENCY RULES (OPTION)

#### GATE OPERATING SYSTEM (GOS)

## 1.

### SAFEDOCK

The Safedock Advanced Visual Docking Guidance System A-VDGS provides both pilots with guidance for manoeuvring the aircraft into the gate to the correct centreline and stop-position under all operational conditions. A Safedock includes a built-in computer integrated to a low-intensity infrared laser that scans the gate area for the approaching aircraft. Safedock locks onto the aircraft to determine nose, engine, and wing positions to guide it to its park position. During the docking, Safedock also performs a safety check for a positive match of the inbound aircraft type, docking is interrupted if there is a mismatch.

Airport operations requirements include an optimum use of existing airport space, management of an ever changing mix of aircraft in airline fleets as well as safety and efficiency. Such factors impose a need for gate adjacency rules to assure consistent terminal operations whilst avoiding damage risks.

## 2.

### STAND ADJACENCY RULES

Standalone Safedock operations can be enhanced with a Safegate Gate Operating System (GOS) to further improve safety and efficiency.

Safedock units connected in a GOS network with adjacent gate status provide:

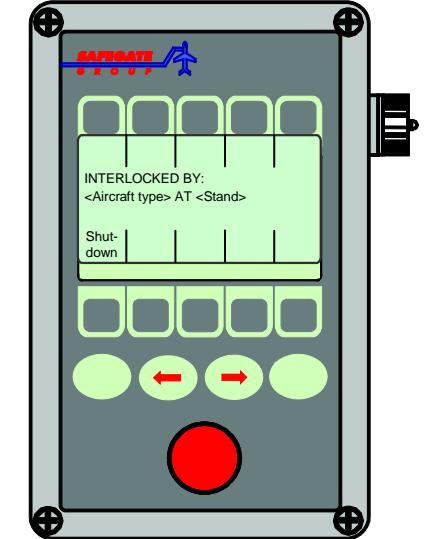
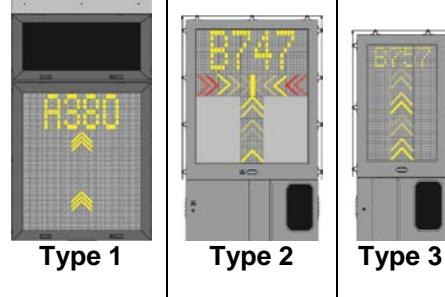
- Overall status for connected gates.
- Information based upon aircraft already parked or actively scheduled and awaiting to be parked at adjacent gates.
- An awareness of specific aircraft types parked at each gate compared to adjacent gates.
- Adjacent gate information and rules determine if each Safedock can park a selected aircraft type at the target gate.
- Rules/decisions for Safedock operation.

## 3.

### GOS

GOS manages gate adjacency rules with an Interlock function.

GOS Interlock function	Image examples									
<p><b>(a) Gate layout outline</b></p> <p>The example is for aircraft types allowed to park at a gate:</p> <table border="1"><thead><tr><th>Stand</th><th>Left</th><th>Right</th></tr></thead><tbody><tr><td>Aircraft type</td><td>Any</td><td>Narrow bodied</td></tr><tr><td>Aircraft type</td><td>None (Blocked)</td><td>Wide bodied</td></tr></tbody></table> <p>If a wide bodied aircraft is docked to the right and airport personnel request to start a docking to the left for any aircraft, GOS generates an adjacency conflict and messages block the request in workstation and operator panel views.</p>	Stand	Left	Right	Aircraft type	Any	Narrow bodied	Aircraft type	None (Blocked)	Wide bodied	 <p>FIGURE 3C.1 - GATE LAYOUT</p>
Stand	Left	Right								
Aircraft type	Any	Narrow bodied								
Aircraft type	None (Blocked)	Wide bodied								

<p><b>(b) GOS workstation view</b></p>	<p>A docking request is started when airport personnel select an aircraft type, either from a GOS workstation or locally from an operator panel. The GOS system then performs an interlock evaluation for the aircraft type, the status of adjacent stands and decides if a docking is to be allowed or not (<b>Blocked</b>). The interlock evaluation is based on a series of blocking rules, which are configured for each stand in a system file, GOS.INI. As a docking request is started, all the rules for the stand are evaluated, and the request is allowed or denied accordingly. If GOS is unavailable as a docking request starts, Safedock asks the local operator for a manual confirmation to start the docking procedure. If no rules are specified for the selected stand, the docking is always allowed.</p>
<p><b>(c) Operator Panel (OP) display</b></p> <p>Airport personnel can start an aircraft docking locally at the gate, from an OP, or from a GOS workstation.</p> <p>When an aircraft docking is started, the selected aircraft type detail is provided for GOS. GOS checks adjacent gate status for aircraft parked or actively awaiting to be parked and any adjacency rules imposed on the selected aircraft type.</p> <p>If the rules do not allow for an aircraft type to dock, the docking request is denied and an information message appears, for example in GOS: <b>Blocked</b> with stand and aircraft information and in the OP display:</p> <p><b>INTERLOCKED BY:</b> <b>&lt;Aircraft type&gt; AT &lt;Stand&gt;.</b></p>	 <p>FIGURE 3C.2 - GOS WS VIEW</p>  <p>FIGURE 3C.3 - OP INTERLOCKED</p>
<p><b>(d) Safedock pilot display</b></p> <p>GOS automatically identifies any blocked gate situations for pilots prior to arrival at the gate.</p> <p><b>Note:</b> If an aircraft arrives at a gate and a Safedock is not showing any pilot instructions, such as the rolling-arrows to guide the aircraft to the gate, the aircraft may need to be re-routed to another gate due to a last minute resolve by airport personnel.</p>	 <p>FIGURE 3C.4 - SAFEDOCK PILOTS DISPLAYS</p>

## CHAPTER 3 OPERATION, APPENDIX D

### OPERATION AND MAINTENANCE MODES (OPTION)

#### OPERATOR PANEL - KEY SWITCHES

##### 1. OPERATION AND MAINTENANCE MODES

The DGS system can be equipped with operation and maintenance mode options, if required. Modes are set via key switches built into the Operator Panel (OP).

###### 1.1 OPERATION MODES

The DGS system operation modes include:

- **REMOTE** – Aircraft related commands are only allowed from GOS. The test menu on a local OP is blocked. The OP does not allow any aircraft related commands, such as park on and start docking.
- **OFF** – Both OP and GOS commands are blocked.
- **LOCAL** – Aircraft related commands are only allowed from the local operator panel. All incoming GOS commands are ignored.

*Note: The operation mode status appears in the OP and is reported to GOS.*

###### 1.2 MAINTENANCE MODE

The DGS system includes a normal or a special maintenance mode:

- **NORMAL** – The system is not in maintenance mode.
- **MAINT.** – The system is in maintenance mode, but remains fully functional for local operations. Only maintenance status is reported to the GOS system.

*Note: Maintenance mode status appears in the OP.*

###### 1.3 SET AN OPERATION OR MAINTENANCE MODE

##### Set an operation or maintenance mode

From the OP, use a key to set a mode.

- (a) For operation modes, use the right key:  
**REMOTE** – turn left.  
**OFF** – vertical position.  
**LOCAL** – turn right.
- (b) For maintenance modes, use the left key:  
**NORMAL** – vertical position.  
**MAINT.** – turn right.

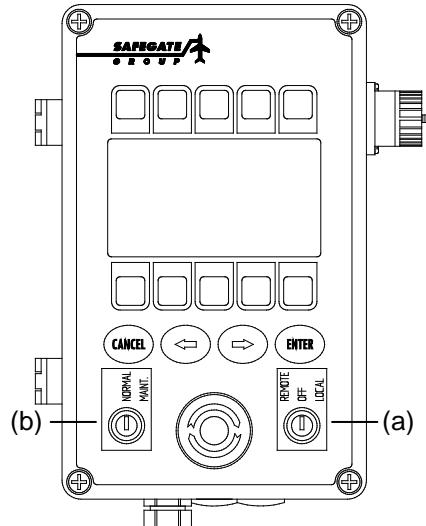


FIGURE 3D OPERATOR PANEL OM MODES



## CHAPTER 3 OPERATION - APPENDIX E

### OPERATION MODE RAMP (OPTION)

#### OPERATOR PANEL - CLOSE/OPEN RAMP

##### 1. OPERATION MODE RAMP

The A-VDGS system can be equipped with an operation mode option for a ramp, if required. Modes are set via the Operator Panel (OP).

###### 1.1 OPERATOR PANEL (OP) RAMP FUNCTION

The ramp function is set to open as default with settings:

- **Close ramp** – displays the RAMP CLOSED message on the main display.
- **Open ramp** – removes the RAMP CLOSED message.

**Note:** Ramp status appears in the OP when the ramp is closed. This function operates locally only; no status is signalled to GOS.

###### 1.2 SET AN OPERATION MODE FOR A RAMP

##### Set an operation mode a ramp

From the OP, the mode is set to open as default.

(a) Select **Close ramp** to deactivate the ramp function.

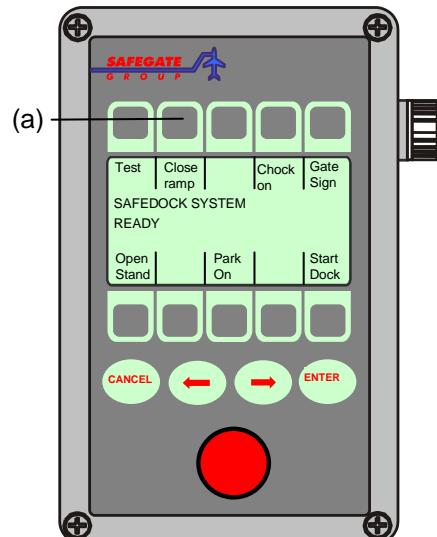


FIGURE 3E.1 CLOSE RAMP

- (b) Select **Ok** to confirm. **RAMP CLOSED** appears.

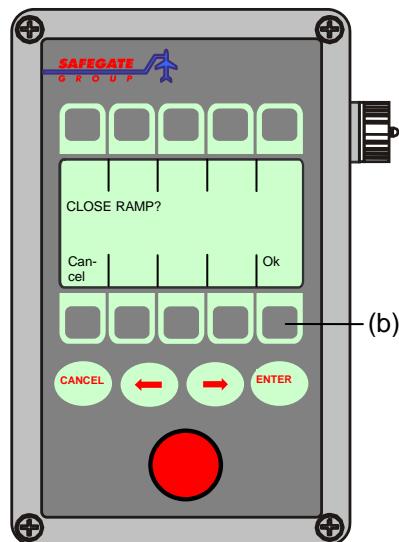


FIGURE 3E.2 CLOSE RAMP?

- If a ramp is closed, select **Open ramp** to activate the function and open the ramp.

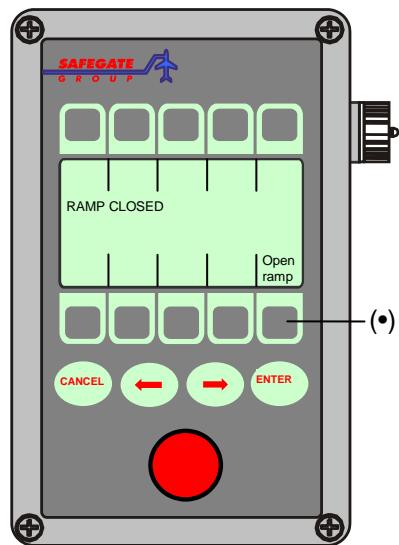


FIGURE 3E.3 RAMP CLOSED

**CHAPTER 3 OPERATION - APPENDIX F**  
**AIRPORT OPERATIONS GUIDELINES**  
**OPERATORS/GROUND PERSONNEL**

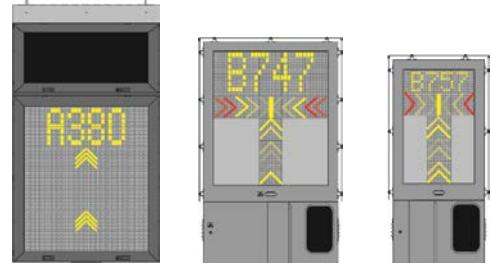
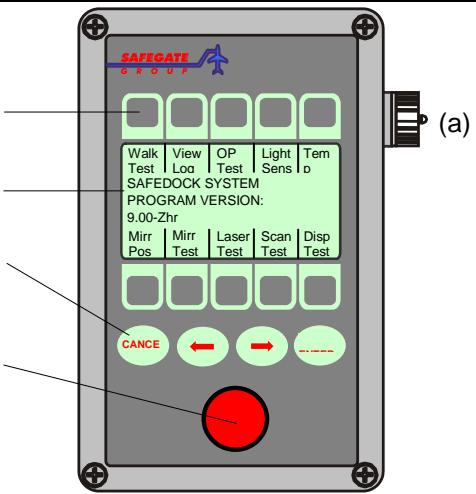
Section	Description	Page No.
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<b>2.</b>	<b>SAFETY PROCEDURES .....</b>	<b>3</b>
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2.3	ITEMS TO BE CHECKED DURING THE DOCKING PROCEDURE .....	3
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## 1. INTRODUCTION

The Safedock A-VDGS provides both pilots with guidance for manoeuvring the aircraft into the gate to the correct centreline and stop-position under all operational conditions. A Safedock includes a built-in computer integrated to a low-intensity infrared laser that scans the gate area for the approaching aircraft. Safedock locks onto the aircraft to determine nose, engine, and wing positions to guide it to its park position. During the docking, Safedock also performs a safety check for a positive match of the inbound aircraft type, docking is interrupted if there is a mismatch.

Airport operations requirements include an optimum use of existing airport space, management of an ever changing mix of aircraft in airline fleets as well as safety and efficiency. Such factors impose a need for gate adjacency rules to assure consistent terminal operations whilst avoiding damage risks.

### 1.1 SAFEDOCK A-VDGS UNITS

Pilots Display (PD)	Type 1-42	Type 2-18	Type 3-9
<p>A single cabinet housing a number of units: display (including LEDs), a laser scanner, control and power units.</p> <p>The unit is mounted 4-8 metres above ground and provides multiple functionality, for example clear pilot instructions, accurate aircraft identification and tracking, as well as quick and easy access to this low maintenance unit.</p>			
FIGURE - SAFEDOCK PILOTS DISPLAYS			
<b>Operator Panel (OP)</b>			
<p>An OP is used to control the Safedock A-VDGS from the apron or a PBB, as well as configuration, operation and maintenance procedures. OP software is designed for intuitive use with minimal key presses. It is controlled by an embedded microprocessor unit and is connected to the A-VDGS control unit by a RS485 communication line. Power, 21 VDC, is supplied from the PD unit.</p> <p>The OP control panel consists of a keyboard with 14 push buttons (4 fixed function keys and 10 context sensitive "soft" keys), and a liquid crystal display (LCD) which is backlit. The LCD indicates systems modes of operation, lead text for the softkeys, and gives also diagnostic/error information. There is also a connector for a PC serial port, RS485 to use with a Maintenance PC for the local configuration and calibration of each individual A-VDGS.</p>			
<p>The OP has the following:</p> <ul style="list-style-type: none"> <li>(a) <b>Service outlet</b> for maintenance PC communication.</li> <li>(b) <b>Softkeys</b> for menu navigation and variable options.</li> <li>(c) <b>LCD display</b> for softkey identification and text feedback from selections.</li> <li>(d) <b>CANCEL</b>, navigation arrows and <b>ENTER</b> keys.</li> <li>(e) <b>Emergency STOP button</b> When the push-button is operated, the OP shows <b>EMERGENCY STOP</b> and the alphanumeric Pilots Display (PD) shows <b>STOP</b>. The button is connected to the A-VDGS control unit in the PD by a separate line.</li> </ul>			
FIGURE - OPERATOR PANEL SOFTKEY			

## 2. SAFETY PROCEDURES

### 2.1 CHECK OF ACCESS RIGHTS

For security reasons, Safedock commands can be password restricted, if required.

**WARNING! PASSWORD INFORMATION SHALL ONLY BE GIVEN TO AUTHORIZED PERSONNEL. IT IS ADVISED TO NEVER KEEP CODES IN WRITING THAT COULD BE ASSOCIATED WITH THE SYSTEM.**

### 2.2 DISCREPANCIES FROM THE DESCRIBED DOCKING ROUTINE

**WARNING! IF THE PILOTS DISPLAY UNIT OR THE OPERATOR PANEL INDICATES ANYTHING OTHER THAN WHAT IS DESCRIBED IN THE DOCKING ROUTINE, THE OPERATOR MUST ACTIVATE THE EMERGENCY STOP PUSH-BUTTON TO PREVENT DAMAGE TO THE AIRCRAFT, GROUND EQUIPMENT OR INJURY TO PERSONNEL.**

**REASONS FOR SPURIOUS INDICATIONS ON EITHER DISPLAY MUST BE RECTIFIED BEFORE THE DOCKING PROCEDURE CAN RE-COMMENCE.**

### 2.3 ITEMS TO BE CHECKED DURING THE DOCKING PROCEDURE

The following should be checked during the docking procedure:

- (a) When the Aircraft Type is shown on the Operator Panel and the Pilots Display unit, the A-VDGS is ready for docking.
- (b) Ensure that the Aircraft Type displayed is the same as the actual Aircraft Type which is approaching the stand.
- (c) When the aircraft turns from the taxiway onto the terminal stand centreline, ensure the Operator Panel display feedback changes from **ACTIVE** to **TRACKING**, and then to **IDENTIFIED** as the aircraft approaches the gate.
- (d) Ensure the Pilots Display indicates the azimuth lateral position and the closing rate LED indicators are activated.
- (e) As the aircraft is approaching the stop position, ensure the closing rate LED indicators are gradually turned off from the bottom.
- (f) When the aircraft has reached the stop position, ensure the Operator Panel shows **DOCKING OK**, the Pilots Display unit shows **STOP** (in red).

### 2.4 GENERAL WARNING

The A-VDGS has a built-in error detection program to inform the aircraft pilot of impending dangers during the docking procedure.

*Note: For more information, see Chapter 3 Operation – Appendix A, Pilots Guidelines.*

**IF THE PILOT IS UNSURE OF THE INFORMATION, BEING SHOWN ON THE A-VDGS DISPLAY UNIT, HE MUST IMMEDIATE STOP THE AIRCRAFT AND OBTAIN FURTHER INFORMATION FOR CLEARANCE.**

**GROUND OPERATORS SHALL PRESS THE EMERGENCY-STOP SWITCH IF FOR ANY REASON THERE IS A NEED TO INFORM THE PILOT TO STOP THE AIRCRAFT.**

### 2.5 ITEMS TO CHECK BEFORE ENTERING THE STAND AREA

The A-VDGS has a built-in error detection program to inform the aircraft pilot of impending dangers from large objects within the docking area during the docking procedure.

**WARNING! THE PILOT SHALL NOT ENTER THE GATE AREA, UNLESS THE DOCKING SYSTEM IS SHOWING THE VERTICAL RUNNING ARROWS. THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE CAB, UNLESS THESE ARROWS HAVE BEEN REPLACED BY THE CLOSING RATE BAR.**

**ADDITIONALLY, THE PILOT SHALL NOT ENTER THE STAND AREA UNLESS THE AIRCRAFT TYPE AND ANY OTHER DISPLAYED INFORMATION IS CORRECT FOR THE AIRCRAFT THEY ARE DOCKING.**

**2.6 THE SBU MESSAGE**

The message STOP SBU means that docking has been interrupted and has to be resumed by manual guidance. DO NOT RESUME DOCKING UNDER A-VDGS - GUIDANCE.

**2.7 ERRORS OR MALFUNCTIONS**

If for any reason the SAFEDOCK docking guidance system fails or reports an error, please take note of any details that may have caused the problem and report the error and supporting details to the appropriate maintenance personnel.

**2.8 CHECKS BY GROUND PERSONNEL FOR AIRCRAFT DOCKING**

Below are some general checks that the head marshaller or ground crew should perform as a part of the aircraft docking procedure when using the docking guidance system.

1. Gate/Docking area cleared of obstacles prior to aircraft arrival.
2. Docking system view is not obstructed by vehicles or other equipment.
3. Passenger boarding bridge is safely parked away from the approaching aircraft.
4. Selected aircraft and subtype shown on docking system pilot display and Operator's Panel display are correct for the arriving aircraft. If not, abort the current aircraft selection and re-activate for the proper aircraft type.
5. Be ready to press the Emergency-STOP switch/button should an unsafe condition arise during the aircraft docking.

**2.9 AIRCRAFT DOCKING OVERVIEW**

The following are overviews of the docking routine, indicating how it is performed after selection of the aircraft type. The examples show a selected aircraft with a Type1 and Type 2/3 displays (which show similar information).

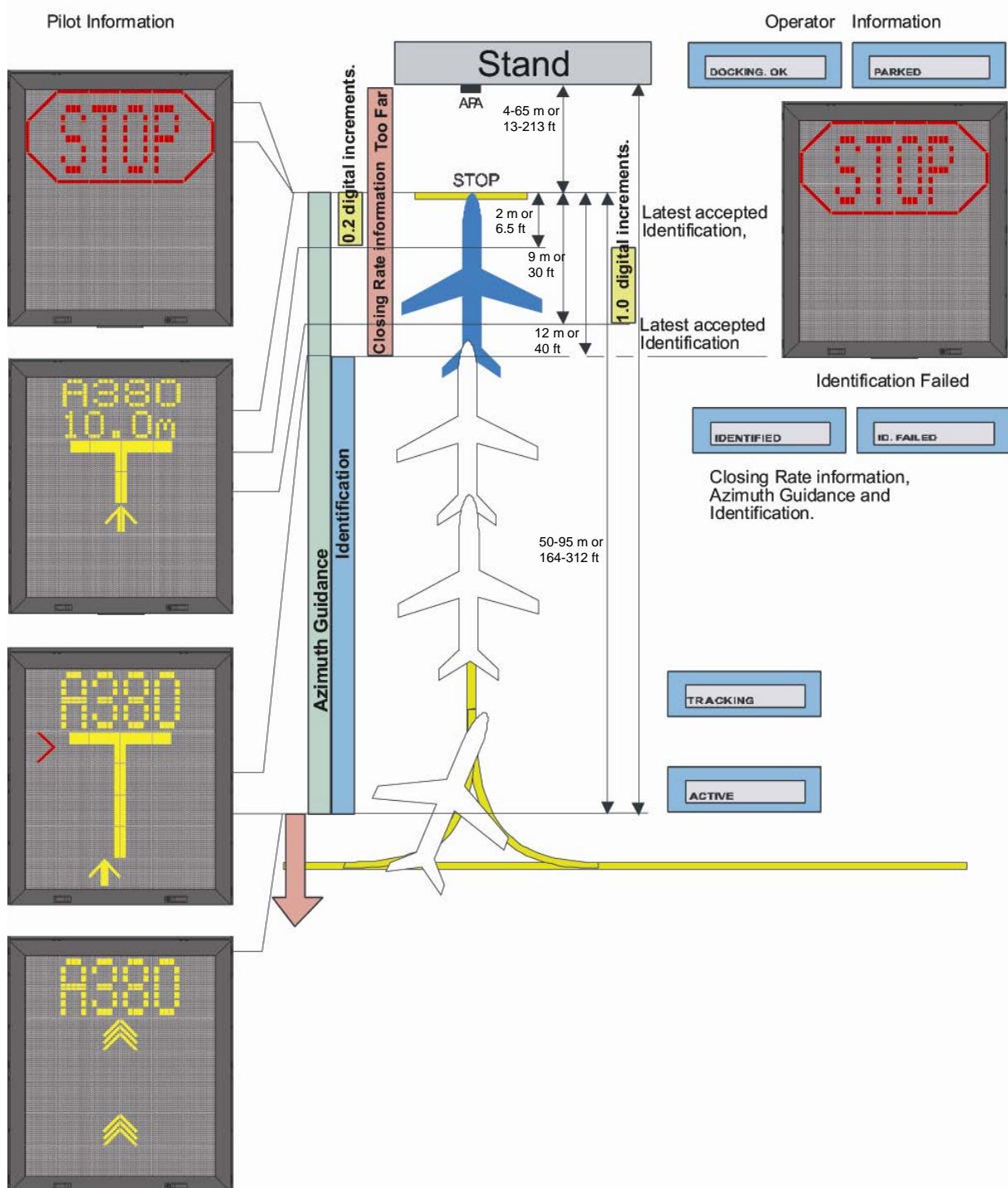
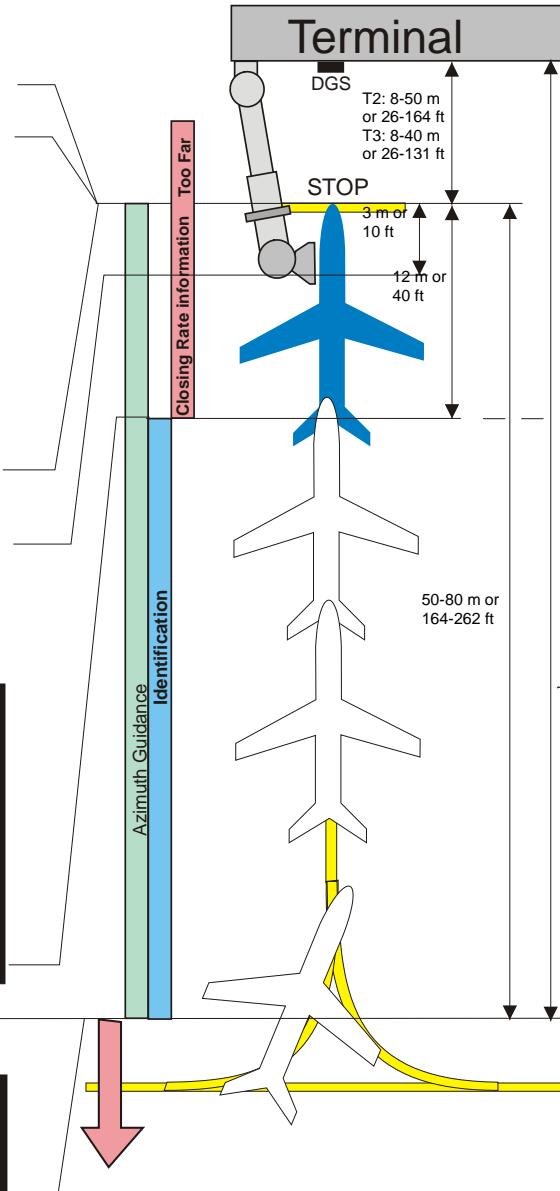
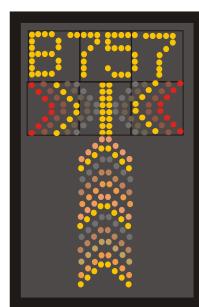
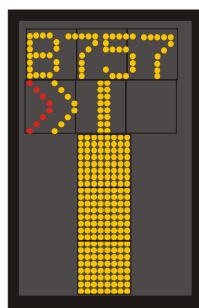
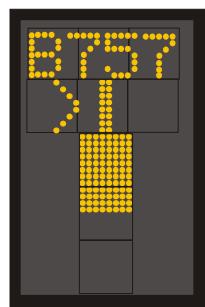
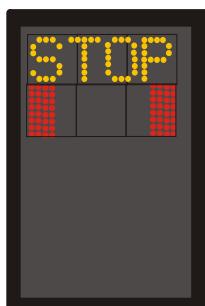
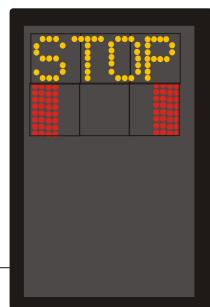


FIGURE - THE DOCKING PROCEDURE (OPTION/TYPE 1 DISPLAY)

Pilot Information.



Operator's Information.



Closing Rate information,  
Azimuth Guidance and  
Identification.



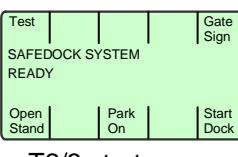
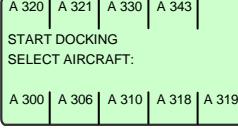
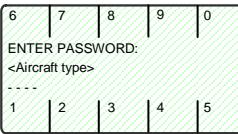
FIGURE - THE DOCKING PROCEDURE (OPTION/TYPE 2, TYPE 3)

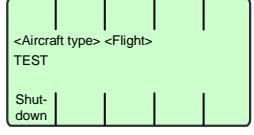
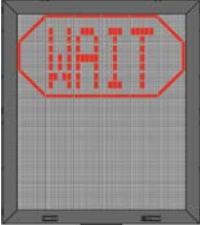
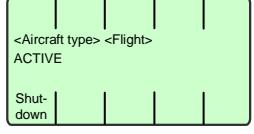
### 3. AIRCRAFT DOCKING PROCEDURE

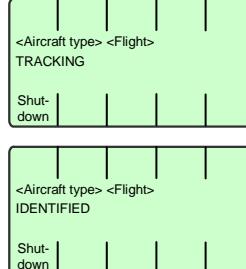
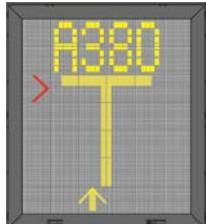
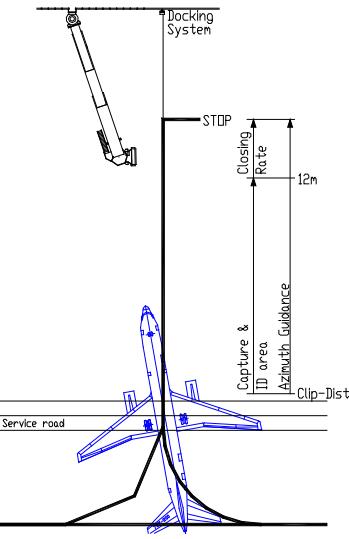
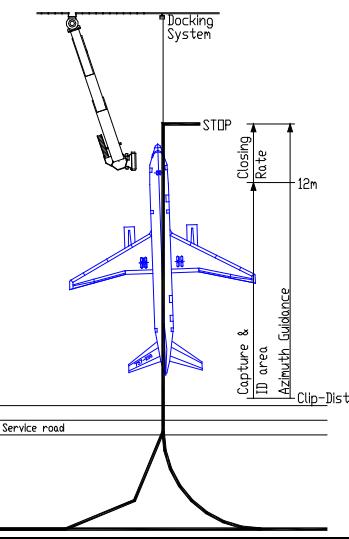
The following section is a more detailed step-by-step approach to the docking routine indicating the procedure and events from start to completion, using a Type 1 pilots display (PD) and an Operator Panel (OP) with softkeys in examples.

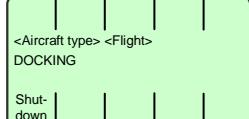
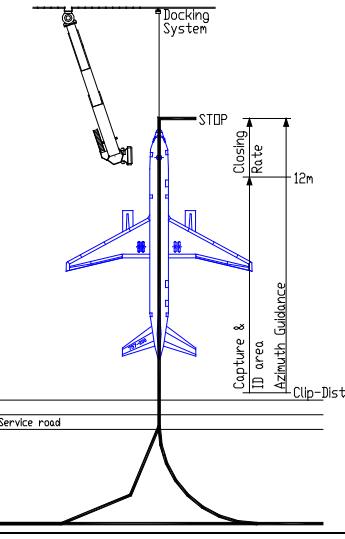
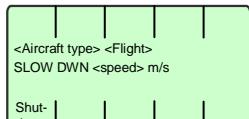
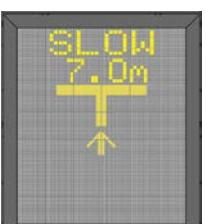
**Note:** The activation of the aircraft docking should be done prior to the aircraft arriving at the gate. Otherwise, the docking may fail due to the SAFEDOCK docking guidance system not having enough time to perform its self-test, capture, and verify the aircraft prior to it reaching the final countdown in metres prior to its assigned stop-position.

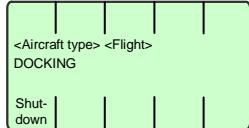
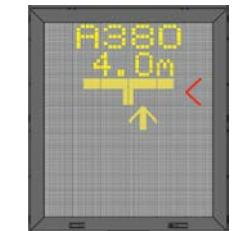
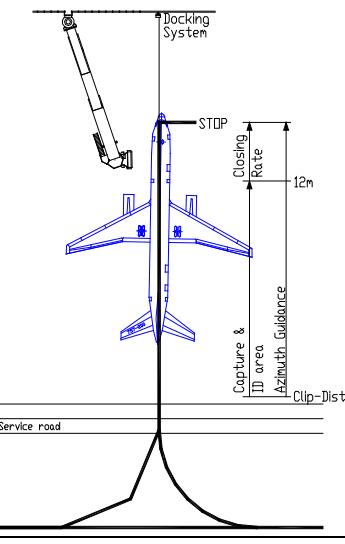
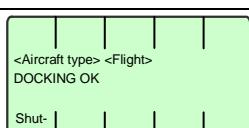
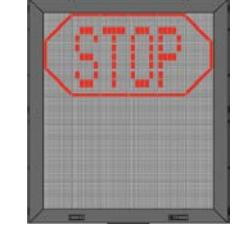
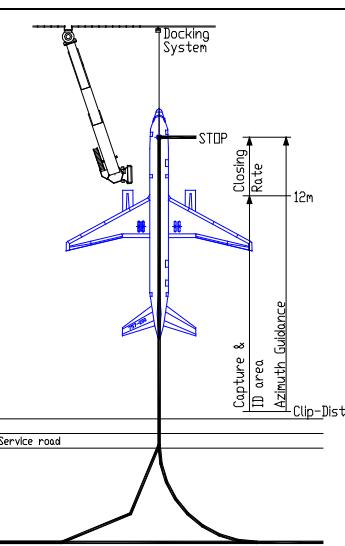
The section includes the Safedock Type 1 Pilots Display option in image examples, for other Type option image examples see Chapter 3. Operation, Appendix A Pilots Guidelines.

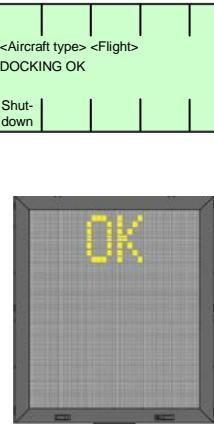
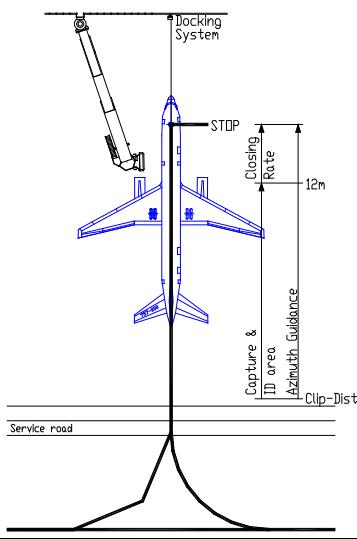
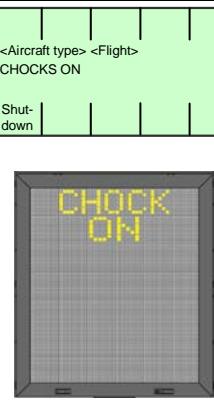
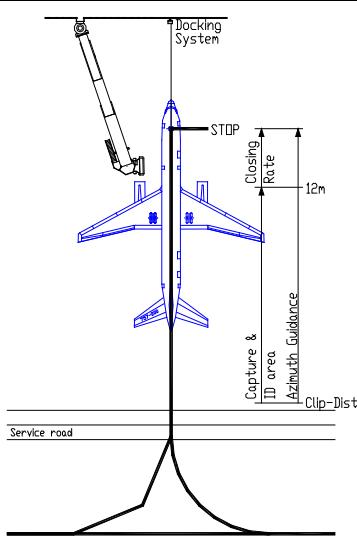
Instruction	Unit	Comments/Position
3.1 AIRCRAFT DOCKING ACTIVATION	<p>Aircraft docking activation is performed at the OP as follows:</p> <p>(a) For T2/3, press <b>Start Dock</b>.</p> <p>(b) For all PDs, determine aircraft for docking:</p> <ul style="list-style-type: none"> <li>Press the desired aircraft type key.</li> <li>Press an exact sub-type key, if required.</li> </ul>	 <p>T1 start menu (direct to aircraft options)</p>  <p>T2/3 start menu</p>  <p>Aircraft selection menu showing options like A320, A321, A330, A343, A300, A306, A310, A318, A319.</p> <p>Gate area: Empty (<i>aircraft is on the ground en route to gate</i>)</p> <p><b>Note:</b> Make sure the correct sub-type is selected when they are available for an aircraft button. For example, pressing the B767 key may list B767-200, B767-300, and B767-400 (press arrows for all listed sub-types).</p>
3.2 OPERATOR PASSWORD (OPTIONAL)	<p>OP: If operator passwords are enabled, enter the 4-digit password to continue aircraft docking activation (note the 0-9 digits on the switch cover).</p>	 <p>ENTER PASSWORD: &lt;Aircraft type&gt; ----- 1 2 3 4 5</p> <p>Gate area: Empty (<i>aircraft is on the ground still en route to gate</i>).</p>

Instruction	Unit	Comments/Position
<p><b>3.3 SELF-TEST</b></p> <p>After selecting the aircraft for docking, a self-test and calibration point check is carried out by the SAFEDOCK to confirm docking accuracy.</p> <p><b>Note:</b> <i>Failing the self-test will result in an error code displayed in text format on the OP and an “ERR x” on the main display. Failing the calibration point check will result in an “AUTOCAL ERROR” or “ERR 3”.</i></p> <p>OP shows: <b>TEST</b> PD shows: <b>WAIT</b> (with RED border/bars)</p>	 	<p>Gate area: Empty (<i>aircraft is on the ground still en route to gate</i>).</p>
<p><b>3.4 CAPTURE (AWAITING AIRCRAFT)</b></p> <p>The floating arrows indicate that the system is activated and in capture mode, searching an approaching aircraft.</p> <p>Check the correct aircraft type is displayed on the PD. The lead-in line is to be followed.</p> <p>THE PILOT MUST NOT PROCEED BEYOND ANY BRIDGE, UNLESS THE ARROWS HAVE BEEN SUPERSEDED BY THE CLOSING RATE BAR.</p> <p>OP shows: <b>ACTIVE</b> - “capture” mode. PD shows: Aircraft Type and floating arrows until aircraft is “captured”.</p>	 	<p>Gate area: Empty (aircraft is on the ground still en route to gate).</p> <p><b>Note:</b> <i>If the A-VDGS is still in “capture” mode when aircraft nose reaches the Passenger Boarding Bridge cab, press the Emergency-STOP button immediately.</i></p>

Instruction	Unit	Comments/Position
3.5 TRACKING	<p>The floating arrows are replaced by a yellow centre line indicator and floating arrow to indicate that the system has captured the aircraft and is actively tracking it. At this time, the system verifies the selected aircraft.</p> <ul style="list-style-type: none"> <li>- A flashing red and/or yellow arrow indicates the direction to turn for azimuth guidance.</li> <li>- The yellow arrow indicates the aircraft position in relation to the centreline.</li> <li>-The centreline "distance-to-go" indicator changes from floating arrows to all LEDs on/lit. This decreases as the aircraft nears its configured stop-position.</li> </ul> <p>OP shows: <b>TRACKING</b>, and <b>IDENTIFIED</b>. PD shows: Aircraft captured-left of centreline.</p>	  
3.6 CLOSING RATE	<p>Digital countdown begins when the aircraft is XX metres (or feet) from its stop position. When the aircraft is within the last 12 metres, the distance-to-go closing rate indicator decreases by about one LED-row per 0.5 m (1.6 ft) of movement.</p> <p>OP shows: <b>DOCKING</b> PD shows: Aircraft 16m (or 32 ft) from its stop position, slightly left of the centreline.</p>	  

Instruction	Unit	Comments/Position
<p><b>3.7 ALIGNED TO CENTRE</b></p> <p>The RED direction arrow(s) disappear, indicating the aircraft is on centre.</p> <p><b>OP shows: DOCKING</b></p> <p><b>PD shows:</b> Aircraft 10 metres (or 33 ft) from its stop position and on-centre.</p>	 <p>&lt;Aircraft type&gt; &lt;Flight&gt; DOCKING</p> <p>Shut-down</p>  <p>A380 10.00</p>	 <p>Docking System</p> <p>STOP</p> <p>Closing Rate</p> <p>12m</p> <p>Capture &amp; ID area</p> <p>Arbuth Guidance</p> <p>Clip-Dist</p> <p>Service road</p>
<p><b>3.8 SLOW (DECREASE SPEED)</b></p> <p>Safedock is configured with a slow down active zone (optional distances set from the stop position, standard 6-24 metres) according to an acceptable docking speed (optional max allowed speed, standard 2 m/s).</p> <p>If the aircraft is approaching faster than the accepted speed, the system will show <b>SLOW</b> as a warning to the pilot.</p> <p><b>OP shows: SLOW DWN &lt;Speed&gt; m/s</b></p> <p><b>PD shows: SLOW</b></p>	 <p>&lt;Aircraft type&gt; &lt;Flight&gt; SLOW DWN &lt;speed&gt; m/s</p> <p>Shut-down</p>  <p>SLOW 7.00</p>	<p>Aircraft continues approach into gate.</p>

Instruction	Unit	Comments/Position
<p><b>3.9 AZIMUTH GUIDANCE</b></p> <p>Centreline guidance continues to the stop-position.  <b>OP shows:</b> DOCKING  <b>PD shows:</b> Aircraft 4 metres (12 ft) from its stop position, slightly right of the centreline.</p>	 	
<p><b>3.10 STOP-POSITION REACHED</b></p> <p>When the aircraft reaches the stop-position, the display will show STOP and red lights will be lit.  <b>OP shows:</b> DOCKING OK  <b>PD shows:</b> STOP (with RED border/bars)</p>	 	

Instruction	Unit	Comments/Position
3.11 DOCKING COMPLETED	<p>After the aircraft has stopped all motion, the OK message will be displayed.</p> <p>OP shows: <b>PARKED</b>.</p> <p>PD shows: <b>OK</b>.</p> 	
3.12 STATUS INFO TO PILOT (OPTION)	<p>If the A-VDGS is provided with optional support of "Chocks On", "GPU On" (for Ground Power Unit or 400Hz), "PCA On" (for PC-Air) or other status messages, they will be displayed to the pilot upon OP key selection or actual sensed conditions (if connected) after the aircraft reaches the stop-position and is parked. The "Chocks On" status is provided via button press on the OP or a separate button. Status messages will be displayed one after the other and continue until a programmed timeout expires.</p> <p>OP shows: <b>CHOCKS ON</b>.</p> <p>PD shows: <b>CHOCK ON</b>.</p> 	
For more information, see Chapter 3 Operation.		

#### 4. ABNORMAL CONDITIONS

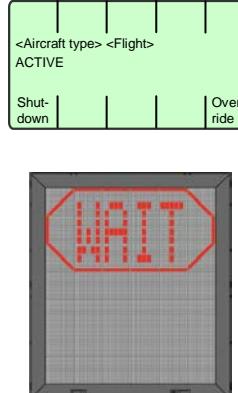
If an object is blocking the view from the SAFEDOCK laser-scanning unit toward the stop position of the selected aircraft type, the system will be unable to perform the docking procedure. When an object is detected between the laser scanning unit and the stop position for at least ten seconds, the system will halt the docking procedure and display a GATE BLOCK warning message. When the blocking object is removed, the docking procedure will be resumed.

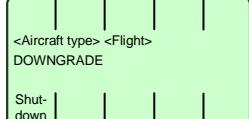
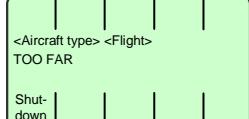
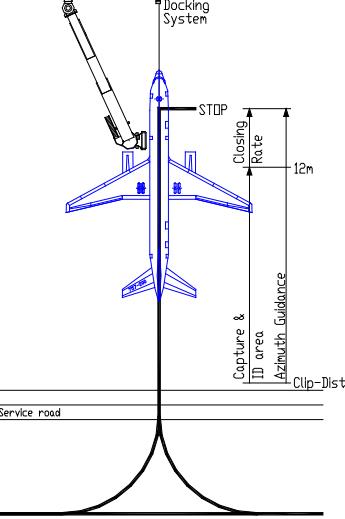
If an unrecoverable error occurs during a docking procedure, a SBU (Safety Back Up) condition exists. In this case an alternate method to guide aircraft to the stop position must be used, as the docking procedure cannot be completed. SBU stop conditions are:

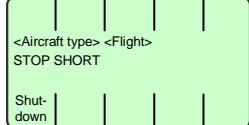
- (a) Aircraft more than 3.5 degrees off centreline and less than 2m to the stop position.
- (b) View from Laser scanning unit to aircraft blocked with less than 2m to the stop position.
- (c) A hardware failure (possible but as a last resort).

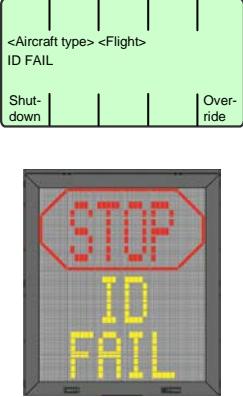
**WARNING! AN OBJECT MUST NEVER BE PLACED IN FRONT OF THE SAFEDOCK UNIT AND CLOSER THAN 1.5 METRES TO THE LASER WINDOW. SUCH AN OBJECT WOULD VIOLATE PROPER DOCKING PERFORMANCE!**

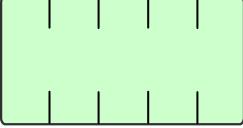
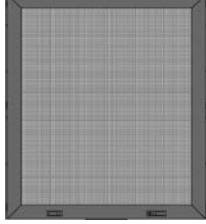
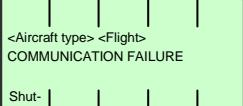
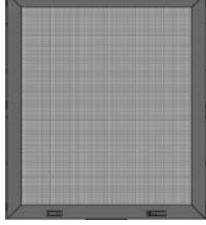
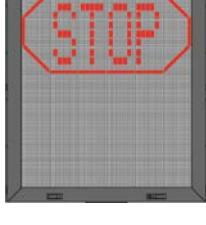
Other non-typical conditions that may occur are as follows:

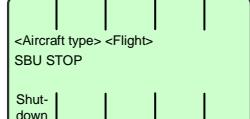
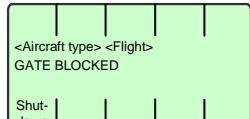
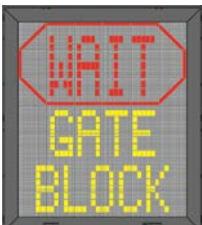
Instruction	Unit	Comments/Position
4.1 WAIT	<p>If the detected aircraft is lost during docking, before 12 metres to <b>STOP</b>, the display shows <b>WAIT</b>. The docking continues as soon as the system detects the aircraft again.</p> <p>During penetration into the stand, the aircraft geometry is checked. If, for any reason, aircraft verification is not made 12 metres before the stop-position, the PD shows <b>STOP</b> and <b>WAIT</b>.</p> <p>OP shows: <b>ACTIVE</b>.</p> <p>PD shows: <b>WAIT</b> (with RED border/ bars).</p>	 <p>Aircraft stops and waits as directed by the Pilots Display (PD).  <b>Note:</b> This may only be a system event and not a fault. The system requires time for safety checks, apron sweeps, aircraft capture and id checks before the closing rate to stop position.  Examples of events are the aircraft was selected too late, an incorrect aircraft type was selected, an incorrect aircraft was on approach to the wrong gate or there was a temporary obstruction (such as a service vehicle).</p>

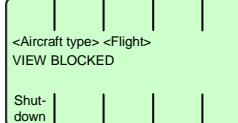
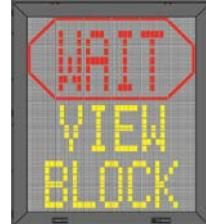
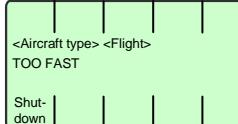
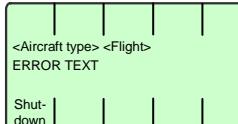
Instruction	Unit	Comments/Position
4.2 BAD WEATHER CONDITIONS		
<p>During heavy fog, rain or snow, the visibility for the docking system can be reduced.</p> <p>When the system is activated and in capture mode, the PD disables the floating arrows and shows SLOW and the Aircraft Type.</p> <p>As soon as the system detects the approaching aircraft, the vertical closing-rate bar appears.</p> <p>If the system has been configured in this mode, to make a shortened ID verification (check of engine position excluded), the Aircraft symbol blinks to give attention.</p> <p><b>Note:</b> <i>THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THE CLOSING-RATE BAR IS SHOWN. Failing this, the ground operator must press the Emergency-STOP button to abort the docking.</i></p> <p>OP shows: <b>DOWNGRADE</b>.</p> <p>PD shows: Selected aircraft type followed by <b>SLOW</b>.</p>	 	Aircraft proceeds into the gate area at a reduced speed as directed by the PD.
4.3 OVERSHOOT		
<p>If the aircraft overshoots the stop-position, the PD displays <b>STOP</b> (with RED border/bars) followed by "TOO FAR" after the aircraft comes to a complete stop.</p> <p>OP shows: <b>TOO FAR</b>.</p> <p>PD shows: <b>STOP</b> (with RED/Stop bars) followed by <b>TOO FAR</b>.</p>	 	

Instruction	Unit	Comments/Position
<p>4.4 STOP SHORT (OPTION)</p> <p>If the aircraft is found standing still but has not reached the intended stop position, the message STOP OK will be shown after a while.</p> <p>OP shows: <b>STOP SHORT</b>.</p> <p>PD shows: <b>STOP OK</b> (with RED/border-bars).</p>	 	

Instruction	Unit	Comments/Position
4.5 FAILED AIRCRAFT VERIFICATION		
<p>After capture of the aircraft, its geometry is checked against a stored profile. If, for any reason, aircraft verification is not confirmed 12 metres before the stop-position, the display will show STOP followed by ID FAIL.</p> <p><b>Note:</b> Dockings can be resumed without verification however it is important to follow the information below.</p> <p>Alternatively, the aircraft shall be marshalled-in or towed-in to the gate.</p> <p>OP shows: <b>ID FAIL</b></p> <p>PD shows: <b>STOP</b> (with red border/bars) followed by <b>ID FAIL</b> (in yellow).</p>		<p>Aircraft stops and waits as directed by the PD.</p> <p><b>Note:</b> This may be a system event or a fault, see Event or Fault diagnosis information below.</p>
<p><b>Override</b></p> <p>The override function is designed to resolve an aircraft verification problem during an active docking procedure.</p> <p><b>WARNING! THE OVERRIDE FUNCTION GIVES THE OPERATOR RESPONSIBILITY FOR AIRCRAFT VERIFICATION, AS A TEMPORARY SOLUTION TO AN EVENT/FAULT RECOGNISED BY THE SYSTEM.</b></p> <p><b>WHEN USING OVERRIDE, THESE INSTRUCTIONS MUST BE FOLLOWED:</b></p> <ul style="list-style-type: none"> <li>• Make sure the stand area is clear of any obstructions such as vehicles, PBB or other objects which may obstruct the aircraft, including wings or engines.</li> <li>• Check for the correct stop position (ground markings).</li> <li>• Observe the aircraft docking.</li> <li>• Make sure pilots approach at a cautious speed.</li> <li>• Be prepared to push the Operator Panel Emergency STOP button, if required or unsure. If the Emergency STOP button is pushed, arrange for the aircraft to be marshalled-in or towed-in to the gate.</li> <li>• After a docking is complete, always diagnose/resolve an ID FAIL message as soon as possible.</li> </ul>	<p><b>Event or Fault diagnosis</b></p> <p>The system requires time for safety checks, apron sweeps, aircraft capture and id checks before the closing rate to stop position appears on the PD.</p> <p>Examples of events are</p> <ul style="list-style-type: none"> <li>• the aircraft was selected too late,</li> <li>• an incorrect aircraft type was selected,</li> <li>• an incorrect aircraft was on approach to the wrong gate or</li> <li>• there was a temporary obstruction (such as a service vehicle).</li> </ul> <p>Frequent events may also be due to configuration or hardware problems.</p> <ul style="list-style-type: none"> <li>• Check log files as soon as possible after an ID FAIL to interpret the cause of the message.</li> <li>• Resolve the cause of an ID FAIL message (event or fault) before future aircraft docking.</li> </ul>	<p>Diagnosis/resolution of an event/fault improves:</p> <ul style="list-style-type: none"> <li>• operational efficiency (future docking procedures)</li> <li>• safety (understand/avoid potential risks)</li> <li>• maintenance (pro-active troubleshooting).</li> </ul> <p>For more information, see</p> <ul style="list-style-type: none"> <li>• the Maintenance, Troubleshooting or Configuration sections</li> <li>• the Safedock Manual</li> <li>• <a href="http://www.safegate.com">www.safegate.com</a> or contact support.</li> </ul>

Instruction	Unit	Comments/Position
4.6 POWER FAILURE	<p>In the case of a power failure, the display becomes completely black.</p> <p><b>Note:</b> A manual backup procedure must be used for docking guidance.</p> <p>OP shows: black. PD shows: blank.</p>  	Aircraft stops and waits as directed by Airport Authorities.
4.7 SYSTEM FAILURE	<p>In case of a severe system failure, the display will go black (T1), except for a red stop indicator (T2/3).</p> <p><b>Note:</b> A manual backup procedure must be used for docking guidance.</p> <p>OP shows: <b>Communication failure</b>. PD shows: black (T1) or <b>STOP</b> (with RED bars T2/3).</p>  	Aircraft stops and waits as directed by Airport Authorities.
4.8 EMERGENCY STOP	<p>When an OP Emergency Stop button is activated. The display shows STOP (with red border/bars).</p> <p>OP shows: <b>EMERGENCY STOP</b>. PD shows: <b>STOP</b> (with RED border/bars).</p> <p><b>Note:</b> Additional emergency stop buttons (other than an OP) may be connected to the system.</p>  	Aircraft stops and waits as directed by Airport Authorities.

Instruction	Unit	Comments/Position
<p><b>4.9 SBU STOP</b></p> <p>Any unrecoverable error during the docking procedure generates a safety backup (SBU) condition. The display shows the text <b>STOP SBU</b>. A manual backup procedure must be used for docking guidance.</p> <p>OP shows: <b>SBU STOP</b>.</p> <p>PD shows: <b>STOP</b> (with RED border/bars) <b>SBU</b>.</p>	 	<p>Aircraft stops and waits as directed by the PD.</p>
<p><b>4.10 GATE BLOCKED</b></p> <p>If an object is found to be blocking the view from the A-VDGS towards the aircraft, and closer than the stop position, (&gt;2m from the unit to stop position) it is reported as a blocking object and the PD enters a "Wait" state.</p> <p><b>THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE WITHOUT MANUAL GUIDANCE, UNLESS THE WAIT MESSAGE HAS BEEN SUPERSEDED BY THE CLOSING RATE BAR.</b></p> <p>If the blocking object remains for more than 10 seconds, it is reported as a Gate Blocked condition.</p> <p>OP shows: <b>GATE BLOCKED</b>.</p> <p>PD shows: <b>WAIT GATE BLOCK</b> (with RED border/bars, T1) or <b>GATE BLOCK</b> (with RED bars, T2/3).</p>	 	<p>Aircraft stops and waits as directed by the PD.</p>

Instruction	Unit	Comments/Position
4.11 VIEW BLOCKED	<p>If the view towards the approaching aircraft is hindered, for example by dirt on the PD window (&lt;2m to the laser), the A-VDGS reports a “View blocked” condition. Once the system is able to see the aircraft through the dirt, the message is replaced with a closing rate display.</p> <p><b>THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE WITHOUT MANUAL GUIDANCE, UNLESS THE WAIT MESSAGE HAS BEEN SUPERSEDED BY THE CLOSING RATE BAR.</b></p> <p><b>OP shows: VIEW BLOCKED.</b>  <b>PD shows: WAIT VIEW BLOCK</b> (with RED border, T1) or  <b>VIEW BLOCK</b> (with RED bars, T2/3).</p>	 
4.12 TOO FAST	<p>If the aircraft approaches with a speed higher than the docking system can manage, the message <b>STOP TOO FAST</b> appears and the A-VDGS docking is terminated.</p> <p><b>WARNING! THE DOCKING PROCEDURE MUST BE COMPLETED WITH A MANUAL GUIDANCE PROCEDURE.</b></p> <p><b>OP shows: TOO FAST.</b>  <b>PD shows: STOP TOO FAST</b> (with RED border/bars).</p>	 
4.13 ERROR	<p>Any error that occurs during the docking operation generates an error message in the Operator Panel and an error code in the Pilots Display. If it occurs during docking, the RED/Stop bars will also light-up (generally an SBU-Stop in such cases).</p> <p><b>OP shows: ERROR TEXT</b> (Text = information)  <b>PD shows: ERR X</b> (X = error code)</p>	 

For more information, see the Safedock Manual Chapter 4. Maintenance.



**OPERATION: APPENDIX G**  
**ICD EXAMPLE - PBB (OPTION)**  
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## 1. SCOPE

### 1.1 GENERAL

The objective of an Interface Control Document (ICD) is to describe the interface used between a Safedock and for example, a Passenger Boarding Bridge (PBB) using a subset of the 3964R protocol, which is used to send Safedock statuses to a PBB.

This Interface Specification is an example of a description of requirements and the detailed design of an interface identified as Safedock A-VGDS and a Passenger Boarding Bridge (PBB) System.

### 1.2 SYSTEM OVERVIEW

Safedock is used to detect and lead arriving aircraft to the correct stop position. Safedock also detects the departure of the aircraft.

## 2. COMMUNICATION PROTOCOL

### 2.1 GENERAL

Messages are exchanged by the Safedock system, having a master function, reading and writing registers of the PBB controller. This system uses the protocol 3964R for the communication.

The WRITE command, sent by Safedock, will be performed as an A telegram with the data block address.

The READ command, sent by Safedock, will be performed as an E telegram with the data block address, and the PLC will respond with sending the contents of the Command Register/Data Block.

The physical interface at Safedock is according to RS-232 as a standard. Short haul modems must be used to connect the Safedock units RS-232 port to the PBBs serial port. Alternatively RS-232-to-RS-422 converters (insulated line) may be used.

### 2.2 PROTOCOL SPECIFICATION

Communication is asynchronous with a bit rate of 9600 Baud.

Error Parity is even, and one stop bit is used.

### 2.3 IO AREAS

The protocol implementation supports two I/O areas; using base addresses 20 and 30. This means that the commands 20, 21, and 22 can be exchanged with 30, 31 and 32. This document uses base address 20 in all examples

### 3. MESSAGE FORMAT

#### 3.1 GENERAL

Messages are exchanged by the Safedock system, having a master function, reading and writing registers of the PBB controller. This system uses the protocol 3964R for the communication.

#### 3.2 DATA TYPES

The following data types are used in the data fields:

INT16 - A 16 bit (2 bytes) binary value, in the range -32768 - +32767.  
Stored with high byte first.

UINT16 - A 16 bit (2 bytes) binary value, in the range 0 - +65535. Stored with high byte first.

### 4. SAFEDOCK STATUS

#### 4.1 MESSAGE FORMAT

The following table specifies the status register of the Safedock A-VDGS. On a status change the contents of this register will be sent to the corresponding register in the PBB controller.

Write A-VDGS status to Data Block: DB 21 DW 0 (Status Register)

Byte pos	Field name	Data type	Description
1-2	Stand	UINT16	Stand ID
3-4	Reserved		
5-6	Aircraft	UINT16	Aircraft ID.
7-8	Reserved		
9-10	Centerline	UINT16	Centerline ID, 1-3.
11-12	Length	INT16	Length from laser to aircraft nose. Unit of measure: cm.
13-14	Height	INT16	Height from ground to aircraft nose. Unit of measure: cm.
15-16	Offset	INT16	Offset from centerline. A positive value indicates aircraft closer to bridge than the centerline. Unit of measure: cm.
17-18	Reserved		
19-20	Reserved		

#### 4.2 MEASUREMENT DATA DEFINITIONS

The following table details the resolution and expected accuracy for the data item above:

Data item	Resolution	Accuracy	Note
Length	cm	±20cm	
Height	cm	±50cm	
Offset	cm	±20cm	

#### 4.3 AIRCRAFT CODES

Aircraft type is indicated using the codes configured for each aircraft type on Safedock. If no code is configured, the default value is according to the document 'AvailableDgsAircrafts.xls'.

## 5. PBB STATUS

### 5.1 MESSAGE FORMAT

The following table specifies the status register of the PBB. Safedock will periodically read this information.

Read PBB status to Data Block: DB 22 DW 0 (PBB Status Register)

Byte pos	Field name	Data type	Description
1-2	Stand	UINT16	Stand ID
3-4	Status	UINT16	Current state of PBB system.
5-6	Aircraft	UINT16	ID of aircraft being served by the PBB
7-8	Error type	UINT16	Error code. Only valid if status = Error
9-10	Finger 1 status	UINT16	Status of bridge finger 1
11-12	Finger 2 status	UINT16	Status of bridge finger 2
13-14	Finger 3 status	UINT16	Status of bridge finger 3
15-16	Finger 4 status	UINT16	Status of bridge finger 4

### 5.2 AIRCRAFT CODES

Aircraft type is indicated using the codes configured for each aircraft type on the PBB. If no code is configured, the default value is according to the document 'AvailableDgsAircrafts.xls'.

### 5.3 PBB STATUS CODES

PBB status is reported using the following codes:

PBB status code	Description
1 – EmStop	Emergency stop activated.
2 – Error	An error condition exists. The particular error will be indicated in the error code field.
3 – Ready	PBB is ready to be operated.
4 – In use	The PBB is in use, connected to an aircraft

### 5.4 PBB ERROR CODES

PBB error is reported using the following codes:

PBB error code	Description
TBD	

## 5.5 PBB FINGER STATUS

Status for individual fingers of the PBB is reported using the following codes:

PBB finger status code	Description
0	Not available. Reported for fingers not fitted onto the PBB.
1	Parked. The finger is parked in a safe position
2	In use. The finger is not in a safe position, and not yet connected to the aircraft, moving to/from the aircraft.
3	Connected. The finger is in use and connected to an aircraft.

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**MAINTENANCE**  
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## 1. INTRODUCTION

### 1.1 SCOPE

This document is a description of the maintenance of an individual SAFEDOCK Docking Guidance System, being a part of the parking system at an airport. In this perspective the main tool for Stand Set-up and SAFEDOCK configuration is a Lap Top computer, which can be connected to each docking system at the apron.

The description includes:

- (a) Stand Set-up Procedures
- (b) Corrective Maintenance
- (c) Preventive Maintenance
- (d) A Fault Finding Guide

When SAFEDOCK units are integrated with a Central Computer System (the Gate Operating System/GOS), any Maintenance GOS Workstation on the LAN can be used as a configuration tool.

This integrated system, its topology and centralized functionality is described in Volume II of the GOS Manual.

## 2. SAFEDOCK SET-UP

### 2.1 GENERAL

The Docking Guidance System has to be set up and configured at mainly the following events:

- (a) After initial installation at a Stand (configuration and calibration)
- (b) After certain corrective activities/maintenance (recalibration)
- (c) After the system by some reason has been forced out of its position (recalibration)
- (d) When a centreline is changed or added (calibration)
- (e) When a new aircraft type is added (configuration)
- (f) When a STOP position is changed (configuration)

### 2.2 SET-UP PROCEDURES

The Docking Guidance System is set up by the following procedures.

- (a) Defining Centrelines
- (b) Verifying a centreline definition
- (c) Setting Calibration check points
- (d) Configuration (setting aircraft types and their stop positions and so on)
- (e) Removing Echoes from Fixed Object
- (f) Storing Stand Configuration Files
- (g) Set-up validation, the WalkTest

For carrying out these procedures, please refer to the description of the Stand Configuration Utility Program, appendix A.

The Stand Print-Out Utility, described in appendix B can be used to verify the set up parameters per Stand.

### 3. PLANNED MAINTENANCE

#### 3.1 GENERAL

The SAFEDOCK system has been specifically designed to minimise maintenance downtime. The following maintenance schedules detail the maintenance requirements on a weekly, monthly, six monthly and twelve monthly basis. The system does not require any further scheduled maintenance, as proving operations is always done automatically prior to any start-of-docking procedure.

Before commencing maintenance the following precautions must be considered:

**CAUTION: PROTECTION AGAINST ELECTROSTATIC DISCHARGE**

The transfer of static electricity causes ESD damage when electronic components are handled. It's essential to protect components from electrostatic discharge to avoid damage and extra costs in connections with service and production. Therefore

- (a) All ESD- sensitive materials must be stored in ESD- safe area.
- (b) All ESD- sensitive components must be stored in protective packages.
- (c) Apply a conductive band around your wrist and connect it to ground before touching any electronic component.

**WARNING! ISOLATE THE POWER SUPPLY PRIOR TO UNDERTAKING ANY MAINTENANCE ACTIVITY!**

**IF A BATTERY BACKUP IS INSTALLED, ALSO THE 21-VOLT DC CURRENT TO THE ELECTRONICS HAS TO BE SWITCHED OFF!**

#### 3.2 MAINTENANCE SCHEDULE

Planned or preventive maintenance per time interval is carried out according to the maintenance task lists below. Time intervals are:

- (a) Per week.
- (b) Per month.
- (c) Per six months.
- (d) Per year.

#### 3.3 WEEKLY CHECK

##### 3.3.1 Laser Unit Windows

- (a) Inspect the Laser Scanning Unit cabinet front/side windows and Operator Panel for cleanliness.
- (b) Clean as required with mild soap and water and a soft rag.

#### 3.4 MONTHLY CHECK

##### 3.4.1 Display Unit Front Glass

- (a) Inspect the display unit front glass cover and Operator Panel for cleanliness.
- (b) Clean as required with mild soap and water and a soft rag.

#### 3.5 SIX MONTHLY CHECK

##### 3.5.1 Laser Scanning Unit door

- (a) Examine the Laser Scanning Unit door seal for signs of perishing and security of attachment.

- (b) Renew carefully the seal if required. Use a sharp knife and clean with alcohol after removal. Adapt a new rubber gasket, closed cell type (EPDM-SBR), size 15 x 5 mm, available from Safegate.

### 3.5.2 Laser Scanning Unit Mirrors

- (a) Examine the Laser Scanning Unit calibration and scanning mirrors for signs of dust, or damage.  
(b) Renew mirror if required.  
(c) Clean the laser lenses and mirrors with a camera lens cleaning wipe and alcohol.

### 3.5.3 Operator Panel Emergency Stop Buttons and keys

- (a) Check the correct function of all Emergency Stop buttons. Ensure that the pilots display indicates STOP when the Emergency stop button is pressed.  
(b) For stands with multiple emergency stop buttons, the above test shall be performed individually for each button.  
(c) For adjacent system that share common emergency stop buttons, ensure that both systems pilots display indicates STOP when the Emergency stop button is pressed.  
(d) Check there are no visible signs of wear on the OP cover (film) and check all keys react with a normal press. For example, press all keys: softkeys (option/function), scroll left/right, CANCEL and ENTER.

**Note:** Press the **Back** softkey before confirming any option/function selection.

### 3.5.4 Temperature Sensor

- Check the function of the Temperature Sensor, using the OP's TEST utility.

## 3.6 ANNUAL CHECK

### 3.6.1 Display/Laser Unit

- (a) Vacuum clean the inside of the display unit.  
(b) Check fans in the system to make sure they are running properly. Every five year the fans shall be exchanged. Refer to purchase information below.  
(c) If a Battery Backup unit is equipped, the batteries must be exchanged every five year. Contact Safegate or see the Spare Parts list.

## 4. CORRECTIVE MAINTENANCE

### 4.1 GENERAL

The Docking Guidance Equipment has a built-in diagnostic test program that is activated prior to any start-of-docking command. Errors are reported with a code, identifying the kind of fault. Corrective maintenance of the SAFEDOCK system is carried out on the basis of these reports.

### 4.2 FAULT FINDING AND RECTIFICATION

Possible causes of each error and the recommended actions to be taken are presented in TROUBLESHOOTING.

During rectification the procedures described in REPLACEMENT OF MALFUNCTIONING UNITS shall be followed.

### 4.3 TEST EQUIPMENT

The test equipment used for the set-up of the SAFEDOCK system is the Server of the A-VDGS Central Computer System, provided the connection to GOS is established. The software SDCONFIG.EXE shall be used for this purpose.

An alternative is to use any Laptop PC, which shall be connected to the service outlet of the Operator Panel. Note that the service outlet is an RS-485 port, which means that an interface converter must be used, when connecting to the RS-232 COM port of the Lap Top computer.

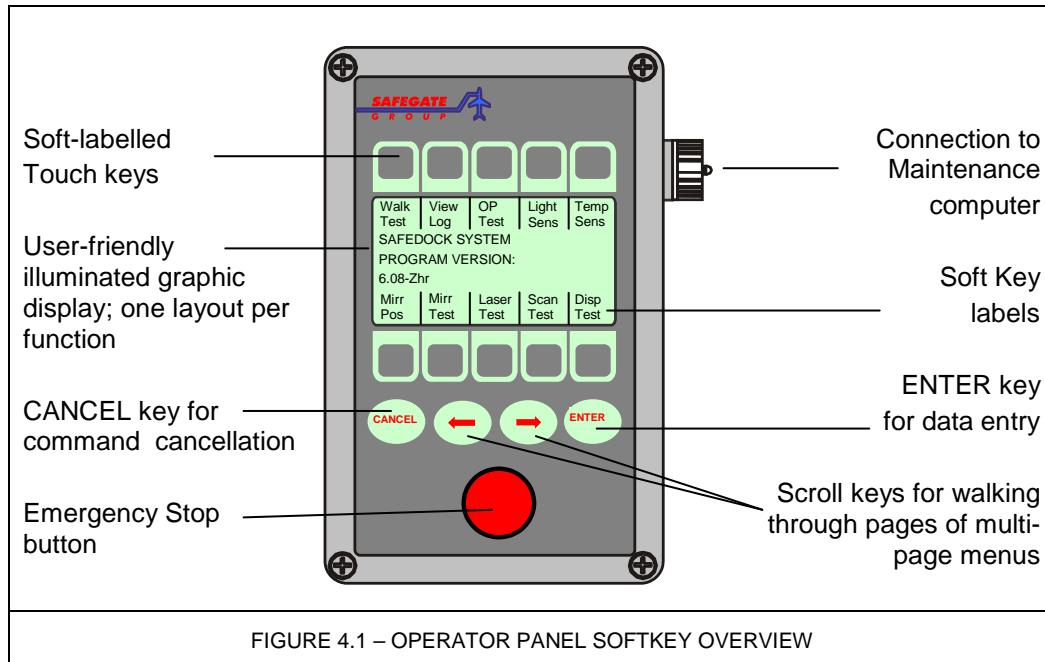
Optionally a Lap Top computer can also be connected to a 10BaseT/RJ-45 outlet in the Docking system's Display unit. This option also gives the Computer access to the central Configuration database.

#### 4.4

#### DIAGNOSTIC TEST FUNCTIONS (OP SOFT KEY)

The Safedock is equipped with a set of test/diagnostics functions. To access these functions from the Operator Panel main menu, select Test, enter a password (if configured) and press ENTER.

A menu containing all available test functions will then be presented. Pressing the soft-key associated with the desired test function activates the test function. The arrow keys can be used to switch between menu pages. Pressing the CANCEL key will bring the system back to normal operation.



The available test and set-up functions are according to the following sections.

##### 4.4.1

##### View Log

This function is used to display data about the latest docking procedures.

Data from the last 400 docking procedures and/or errors are stored on non-volatile memory, and are available for later review. The View Log function includes separate views of docking events and errors.

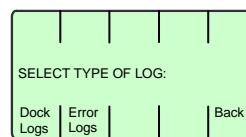
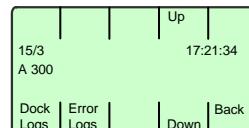


FIGURE 4.2 – VIEW LOG

(a) Docking Log View

This function is used to display data about the latest docking procedures.

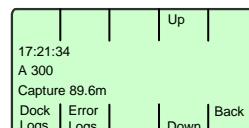
- (i) The date/time and aircraft, for the latest logged docking will be displayed as below:



Date/time for  
the docking  
Aircraft type

FIGURE 4.3 – DATE TIME TYPE

- (ii) The Dock Logs and Error Logs buttons can be used to switch between docking and error event viewers. The Up and Down keys can be used to select among the stored entries. The Back key can be used to get back to the test function menu.
- (iii) To view the data saved for the selected docking, press the ENTER key.



Time for the event  
Aircraft type  
Event

FIGURE 4.4 – TIME TYPE EVENT

- (iv) Use the DOWN key to look through the events, saved for this docking. Data saved are: aircraft type, date/time, error during docking, speed at the last slow message, capture distance, ID-verified distance, stop distance, and roll after stop.
- (v) The UP key will provide a jump back to the header of the selected docking.
- (vi) By pressing the CANCEL button, the test is aborted.

(b) Error Log View

- (i) This function is used to display a list of the errors detected. The error log is viewed in the same way as the docking log. Refer to the above section.
- (ii) A list with the error message and date/time for the last 400 errors and/or docking procedures is available. A typical event could be:

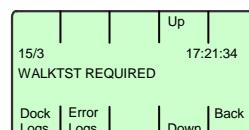


FIGURE 4.5 – ERRORS

#### 4.4.2 Mirror Test

- (a) This function is used to test the home positions for the mirrors.

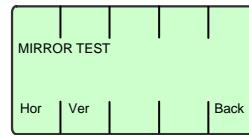


FIGURE 4.6 – MIRROR TEST

- (b) Use the Hor and Ver buttons to select between the mirrors (horizontal and vertical). A message will display the result of the test.



FIGURE 4.7 – MIRROR TEST VERTICAL\_HORIZONTAL

#### 4.4.3 Laser Test

- (a) This function is used to test for range data from the LRF and mirror motion detection.

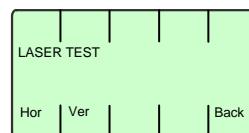


FIGURE 4.8 – LASER TEST

- (b) Use the Hor and Ver buttons to select between the mirrors (horizontal and vertical) and make a test with the selected mirror. A message will display the result of the test.

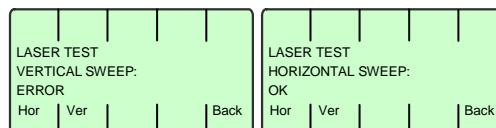


FIGURE 4.9 – LASER TEST VERTICAL\_HORIZONTAL

#### 4.4.4 LED Display Test

There are three available tests for the operator panel, Board, Address and Line test. Each test has a soft key associated to it:

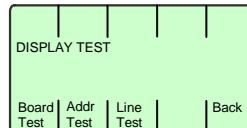


FIGURE 4.10 – DISPLAY TEST

##### (a) Board Test

This is an automatic test. Each LED board will be tested one by one, and the result will be displayed at the Operator Panel. If any LED board is found to be faulty, its address will be displayed after the test is performed:

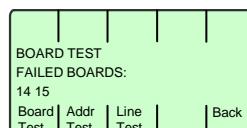


FIGURE 4.11 – BOARD TEST

##### (b) Addr Test

In address test, a unique character is displayed on each of the display boards. Thus the addressing of the boards can be checked:

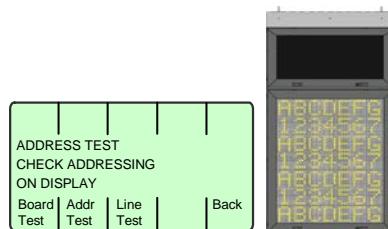


FIGURE 4.12 – ADDRESS TEST

##### (c) Line Test

The line test is used to light up all the LED's on the display boards, one line at a time. This allows for visual inspection of the individual LED's.

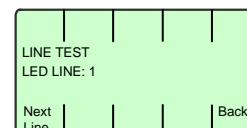


FIGURE 4.13 – LINE TEST

Use the Next Line button to advance to the next LED pattern.

#### 4.4.5 Laser Scan Test

This test is used to check the Mono Stable Multi Vibrator circuit's ability to switch off the laser. The circuits activate the laser on horizontal and vertical mirror movements.

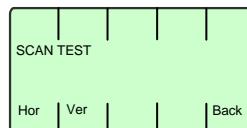


FIGURE 4.14 – LASER SCAN TEST

- (a) Press the Hor or Ver keys to start a test using that mirror. A message will display the result of the test.

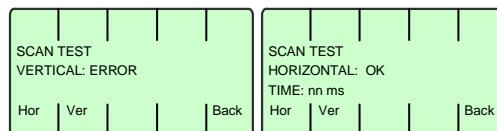


FIGURE 4.15 – LASER SCAN TEST VERTICAL\_HORIZONTAL

- (b) nn shall be in the range 100 – 600 ms.

#### 4.4.6 Mirror Position Detector Test

This function is used to test the Stepper Motor Control Board. If the board is functioning properly and the mirrors are in correct position, 'OK' will be displayed. Otherwise 'ERROR' or 'NOT AVAILABLE' (not installed) will be displayed.

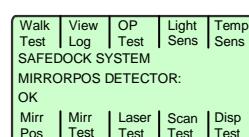


FIGURE 4.16 – MIRROR POSITION DETECTOR TEST

#### 4.4.7 Operator Panel Test

Tests for the inputs/outputs on the Operator Panel can be performed. Use the Input or Output key to select the test to perform.

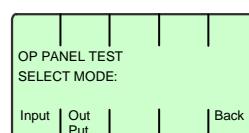


FIGURE 4.17 – OPERATOR PANEL TEST

- (a) Input test

This test can be used to test the operation of the digital inputs on the operator panel board.

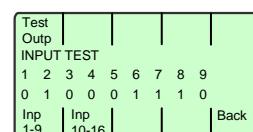


FIGURE 4.18 – INPUT TEST

The operator panel board has 16 digital inputs. The input test will show the current state of each input. Use the 'Inp 1-9' and 'Inp 10-16' to switch between displayed inputs.

- (c) Output test

The output test can be used to test the operation of the digital outputs on the operator panel.

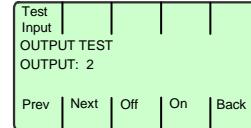


FIGURE 4.19 – OUTPUT TEST

Use the Prev/Next keys to move between the 10 available digital outputs. Use the On/Off keys to toggle the state of the selected output.

**Note:** Disconnect any device using the outputs before testing to avoid generating false signal to the external device.

#### 4.4.8 Restart

The restart function can be used to terminate the Safedock program and return control to the Program Loader.



FIGURE 4.20 – RESTART

Press OK to confirm the restart operation, press Cancel to resume normal operation.

If no program loader device is connected, the Safedock program will automatically resume operation within a few seconds.

#### 4.4.9 OP setup and test functions menu

The OP includes a setup and test functions menu for adjusting settings in the OP.

The menu is accessed as the unit or system is powered on by simultaneously pressing and holding the OP **Cancel** button until the menu appears.

The OP is restarted in the unit as follows:

1. Open the OP front panel.
2. Remove the J1 connector.
3. Press and hold the **CANCEL** button.
4. Insert the J1 connector.

Alternatively, the Safedock system including OP can be powered off/on using the main switch in the display unit. This would require two people, one to turn off/on the display unit and one to press and hold the OP unit.

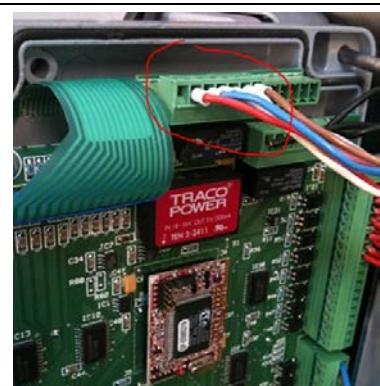


FIGURE 4.21 – OP J1 CONNECTOR

5. Release the **CANCEL** button when the firmware version and the two soft key menus appear.

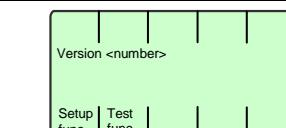


FIGURE 4.22 – OP SETUP/TEST FUNCTIONS

#### 4.4.10 OP contrast intensity adjustment

1. Restart the OP to access the setup and test functions menu.
2. Release the **CANCEL** button when the firmware version and two soft key menus appear.
3. Press **Setup func.**

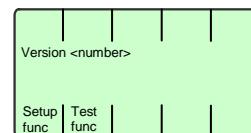


FIGURE 4.23 – OP SETUP/TEST FUNCTIONS

4. Press the **LCD contr** button.

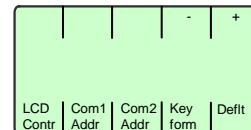


FIGURE 4.24 – OP LCD CONTRAST

5. Adjust the contrast using the + or - buttons (upper right).
6. Press **CANCEL** (twice) to exit.

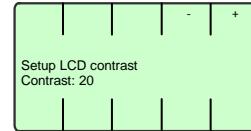


FIGURE 4.25 – OP LCD CONTRAST SETTING

7. Press **YES** to save changes.
8. Press **ENTER** to exit the setting menu and return to normal operation.

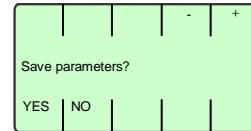


FIGURE 4.26 – OP SAVE PARAMETERS

#### 4.4.11

#### Walk Test

Walk test is a system wide test function that exercises all the major features of the SAFEDOCK system. It is used to verify the operation of the system, and shall be performed, whenever a modification to the system has been made.

In walk test, an entire docking procedure is performed, docking a person walking in along the centreline in place of an aircraft. When Walk Test is activated, a stop position must be chosen by selecting one of the configured aircraft types. The stop position for walk test will be the nose wheel position for the selected aircraft type. In this way, walk test can be used both to verify the operation of the system, and the configured stop positions for each aircraft type. For more information, see Chapter 3 Operation - Appendix B.

The procedure for performing a walk test is:

- (a) Enter system TEST functions and select WALK TEST.  
If the configuration has been updated for individual aircraft types, the system will suggest an aircraft type to be tested. WalkTest for the suggested aircraft type can be started by pressing the ENTER key.

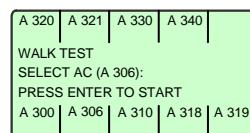


FIGURE 4.27 – WALK TEST

At every entrance to the WALK TEST function the system will continue to suggest aircraft types until all updated aircraft types have been tested successfully.

The test of any aircraft type's stop position can be done as follows:

- (b) Select an aircraft type using the aircraft selection menu. The selected aircraft type will determine the stop position for walk test.
- (c) Walk to the start position for 'walk test', which should be at least 20 metres from the stop position along the centreline. Walk from a position well aside of the capture area ( $\pm 5^\circ$  from centreline) to avoid an early capture.
- (d) Walk toward the system, following the centreline. The system will activate azimuth guidance and closing rate display, as soon as the person is seen by the system.
- (e) Follow the guidance information provided by the system, verifying that it closely matches the centreline.
- (f) When STOP is given, verify that the stop position matches the desired stop position (nose wheel position) for the selected aircraft type.
- (g) After a successful walk test the system will automatically terminate the test functions and return to normal operation without further user input.

**Note:** No **SLOW** or **TOO FAR** messages are available during walk test. As walk test is looking for a person, a much smaller object than an aircraft, it cannot reliably be used in adverse weather conditions such as rain or snow.

#### 4.4.12 Temperature sensor Test

This test function is used to check the temperature of the laser unit. The display shows the measured temperature, according to the format below:

Walk Test	View Log	OP Test	Light Sens	Temp Sens
SAFEDOCK SYSTEM				
TEMPERATURE:				
L nn				
Mirr Pos	Mirr Test	Laser Test	Scan Test	Disp Test

FIGURE 4.28 – TEMPERATURE

Where 'nn' is the temperature, in degrees Celsius.

#### 4.4.13 Test of Light Sensor

This test function is used to check the function of the light sensor that controls the intensity of the Safedock display.

Walk Test	View Log	OP Test	Light Sens	Temp Sens
SAFEDOCK SYSTEM				
LIGHT SENSOR:				
nn - kk				
Mirr Pos	Mirr Test	Laser Test	Scan Test	Disp Test

FIGURE 4.29 – LIGHT SENSOR TEST

Where 'kk' is the light intensity measured, and 'nn' is the control parameter used.  
(3 < nn < 99; 0 < kk < 52000).

## 5. TROUBLESHOOTING

All A-VDGS units complete a factory acceptance test (FAT) before shipping however some error messages may appear during configuration and commissioning due to unforeseen reasons.

If a malfunction occurs within an A-VDGS, error numbers appear on the Pilots Display (PD) and their equivalent error messages appear on the Operator Panel (OP) display. Some error messages may appear in abbreviated form on the PD, depending on the A-VDGS type and/or size of PD installed at the stand. Faults can be diagnosed and rectified from error messages.

### 5.1 FAULT EVALUATION

It is important to evaluate an error in a logical order, for example:

1. **An airport operations event** - see Chapter 3. OPERATIONS Appendix F for Guidelines or Chapter 4. MAINTENANCE Appendix B. for A-VDGS log files).
2. **Routine maintenance** - see PLANNED or CORRECTIVE sections in this chapter.
3. **Cabling fault** - see Chapter 2. INSTALLATION Appendix A Quick Guide or Chapter 5. DRAWINGS.
4. **A configuration problem** - see Chapter 2. INSTALLATION Appendix B. for Configuration and Commissioning.
5. **Component fault** - see ERRORS, REPLACEMENT sections in this chapter.
6. **Support** - see SUPPORT information in this chapter.

**Note:** Some error messages appear for 10 seconds and then disappear from the display. The operator may then attempt a new or continue a docking procedure. The error is saved in the event log.

## 5.2 ERRORS

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 1 – LASER ERROR</b>		
The Control Unit fails to receive any distance data from the laser range finder. The docking is aborted.	The cable between the control unit and the laser-scanning unit is open circuited.	Check the connections and make sure they are properly fastened. If the cable is broken, replace it.
	The Laser Range Finder is malfunctioning.	Replace the Laser Range Finder.
	The Control Unit is malfunctioning.	Replace the Control Unit.
<b>ERROR 2 – MIRROR ERROR</b>		
<b>During Start of Docking:</b> The horizontal or vertical stepper motor cannot find its home position or, one of the stepper motors is overrunning its stop position.	No 21 VDC supply to the Motor Control Boards.	Replace the power supply.
<b>During Docking:</b> The Control Unit fails to detect any stepper motor motion during a docking procedure.  The docking is aborted.	The appropriate Motor Control Board is malfunctioning.	Replace the Motor Control Board.
	The stepper motor is malfunctioning.	Replace the stepper motor.
	The cable continuity between the control unit and the laser scanning unit is open circuit.	Replace the cable.
	The Control Unit is malfunctioning.	Replace the Control Unit.
<b>ERROR 3 – AUTOCAL ERROR</b>		
The auto-calibration has failed when starting a docking procedure. The system prevents a docking procedure from starting.	Dirty laser compartment windows or the calibration point or plate may have been moved or damaged.	Check and clean laser windows if necessary. Put the calibration plate in correct position or if needed replace it. If necessary, recalibrate the system to the calibration point or plate.

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
	A mirror, within the laser-scanning unit, is broken.	Replace the mirror.
	The stepper motor is malfunctioning.	Replace the stepper motor.
	A motor control board is malfunctioning.	Replace the motor control board.
	The laser range finder is malfunctioning.	Replace the laser range finder.
	The Control Unit is malfunctioning.	Replace the Control Unit.
<b>ERROR 4 – NOT CALIBRATED</b>		
The system has been 'powered up' but no calibration data is found. The docking procedure is prevented from starting.	The system has not been calibrated.	Perform a system calibration.
	The Control Unit is malfunctioning.	Replace the Control Unit.

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 5 – NO PROFILE</b>		
A docking procedure has been attempted for an aircraft type not defined (stored) in the system. The system prevents a docking procedure from starting.	The system is not loaded with the aircraft type parameters.	Load the aircraft type parameters into the system.
	The Control Unit is malfunctioning.	Replace the Control Unit.
<b>ERROR 6 –</b>		
Not currently in use.		
<b>ERROR 7 –</b>		
Not currently in use.		
<b>ERROR 8 – CONFIG ERROR</b>		
Incorrect or missing Stop reference for aircraft type selected.	Aircraft type not configured for docking at this stand.	Download correct configuration, including the aircraft type, for the stand.
<b>ERROR 9 – DOOR BLOCKED</b>		
A docking procedure has been attempted to either door 1 or door 2, which has been blocked by the stand configuration.  The docking procedure is prevented from starting.  <i>Note: It is not applicable for the OP to show DOOR NOT ALLOWED in Hong Kong.</i>	Selected door not available or not allowed to be used.	Start a docking procedure for the other door.
	An attempt has been made to dock an aircraft type with only one door, to the door 2 position.	
<b>ERROR 10 – DISPLAY ERROR</b>		
Messages transferred to display do not appear.	The PD is partly or completely malfunctioning.	Replace the faulty display board/boards.
	The Control Unit is malfunctioning.	Replace the I/O board (Mother Board).

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 11 – RESTARTED</b>		
Control Unit has restarted. The event will be viewable in the error log.	Control Unit has been out of service of inexplicable reason.	Check the event log.
		Check the power supply to the system.
<b>ERROR 12 STOP/ID FAILED – ID-FAILED</b>		
The aircraft is less than 12 metres from the stop position and its identity has not been verified by the system.  The docking is aborted.	Incorrect aircraft type selected on the docking system.	Press 'OFF' to abort the docking and select the correct aircraft type to initiate a new docking procedure.
	The laser scanning unit field of view is impaired.	Clean the mirrors and windows of the scanning unit.
	The laser scanning unit field of view is blocked by an object.	Move the object out of view (the docking area at the stand).
<b>ERROR 13 STOP/TOO FAST – DOCKING TOO FAST</b>		
The aircraft is approaching the stand at a speed that may overrun the stop position. It is recommended to slow down immediately.	Aircraft approach speed too fast for docking.	Slow down.
		From the <b>SAFEDOCK Maintenance</b> program, check the <b>Max speed</b> : setting for the aircraft type.
<b>ERROR 14 STOP/BR IN – BRIDGE NOT IN</b>		
The bridge is not in and may obstruct the aircraft approach.	Incorrect Passenger Boarding Bridge position for aircraft type.  PBB is not fully retracted.	Correct the passenger boarding bridge position.
<b>ERROR 15 –</b>		
Not currently in use.		

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 16 – PARAMETER ERROR</b>		
The docking procedure is prevented from starting.	Incorrect parameters entered in the <b>SAFEDOCK Maintenance</b> program. Requested parameter of Laser position is not available.	Check the event log. Add the requested parameter to the system using the <b>SAFEDOCK Maintenance</b> program.
<b>ERROR 17 STOP/SBU – SBU STOP</b>		
The aircraft has been correctly identified, but the system loses tracking less than 2 metres from the stop position.  The docking is aborted.  A Safety Back Up (SBU) indicates the docking procedure must be completed by a manual back-up activity.  <i>Note: STOP/SBU appears for approx. 10 seconds.</i>	The laser scanning unit field of view is impaired.  The aircraft has moved outside the tracking scope of the laser unit.	Another error message will follow the SBU message after approximately 10 seconds, indicating the actual reason for the interruption.  The docking procedure has to be completed by a manual safety back-up activity.
<b>ERROR 18 – OPERATOR PANEL ERROR</b>		
The OP is out of order.	Communication from/to OP-panel is malfunctioning.	Check communication cable.
	Control panel board is malfunctioning.	Exchange the Control panel board.
<b>ERROR 19 – EM-STOP CIRCUIT ERROR</b>		
The emergency stop circuit test has failed when starting a docking procedure.  The system prevents a docking procedure from starting.	The emergency stop circuit is shorted to ground.	Check the emergency stop circuit.
	The Control Unit is malfunctioning.	Replace the Control Unit.
<b>ERROR 20 –</b>		
Not currently in use.		

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 21 WAIT &gt; GATE &gt; BLOCK – GATE BLOCKED</b>		
<p>The normal view of the laser-scanning unit is impaired by an obstruction in the aircraft docking area.</p> <p>The docking procedure re-commences automatically as soon as the obstruction is cleared from the docking area.</p> <p><b>Note:</b> The PD cycles the messages <b>WAIT</b>, <b>GATE</b> and <b>BLOCK</b> until the docking area is cleared or the docking is aborted.</p>	<p>The docking area is obstructed.</p>	<p>Clear the docking area.</p>
<b>ERROR 22 – CL ERROR</b>		
<p>Invalid or missing centreline (CL) for the aircraft type selected.</p>	<p>The centreline is invalid or undefined.</p>	<p>Define the centreline.</p>
	<p>The aircraft configuration selects an incorrect centreline.</p>	<p>Change the aircraft configuration to use an existing centreline.</p>
<b>ERROR 23 WAIT &gt; VIEW &gt; BLOCK – VIEW BLOCKED</b>		
<p>The system is unable to see through the forward window. The docking procedure will abort.</p> <p><b>Note:</b> The PD cycles the messages <b>WAIT</b>, <b>VIEW</b>, <b>BLOCK</b>.</p>	<p>Dirty window/mirrors.</p>	<p>Clean the window/mirrors.</p>
	<p>The check area is obstructed by a reflecting or low-visibility object.</p>	<p>Remove the obstruction. For more information, see Chapter 4, App. A, Section 7.5 c CONFIGURATION OF STAND PARAMETERS</p>
	<p>The Laser Range Finder is malfunctioning.</p>	<p>Replace the Laser Range Finder.</p>
<b>ERROR 24 WAIT &gt; APRN &gt; BLKD – APRON BLOCKED</b>		
<p>An enhanced view of the laser-scanning unit is impaired by an obstruction in the docking (apron scan) area.</p> <p>The docking procedure re-commences automatically as soon as the obstruction is cleared from the docking area.</p> <p><b>Note:</b> The PD cycles the messages <b>WAIT</b>, <b>APRN</b> and <b>BLKD</b> until the apron area is cleared or the docking is aborted.</p>	<p><b>Note:</b> This error is only possible, if the optional function APRON SCAN is installed.</p> <p>The docking (apron area) is obstructed.</p>	<p>Clear the docking (apron) area.</p>

<i>PD – OP messages, symptom</i>	<i>Possible cause</i>	<i>Action to rectify</i>
<b>ERROR 25 – WALKTST REQUIRED</b>		
A walk test is required by the system. <b>Note:</b> If this error does not clear or reappears even after a walk test for a specific aircraft type, it is recommended to restart the system.	The configuration for the stand has been modified since the last walk test procedure was performed. Software changes or errors in the system may require a complete system restart.	Perform a walk test procedure to verify the current configuration at the stand. If this error does not clear after a walk test(s), restart the system (open the PD, switch <b>F1</b> down/off and up/on).
<b>ERROR 26 – TEMP ERROR</b>		
The system has a temperature fault.	The temperature in the system is higher than the operational range.	Check cooling fan. Check temperature sensors.
	The temperature in the system is lower than the operational range	Check heaters. Check temperature sensors.
<b>ERROR 27 – LASER SAFE ERROR</b>		
The system has a laser safety error. <b>Note:</b> A class 1 laser is used in the system. It is eye-safe, even if this error occurs.	The timer circuit that shuts off the laser in case of no horizontal or vertical mirror movement is not within set limits.	From the OP, use the Test feature to check the Laser Safe circuitry. The Laser Safe circuitry, CU Mother Board or Stepper Motor Encoder may need to be repaired or replaced.
<b>Note:</b> For more information, see Chapter 4. Maintenance.		

## 6. REPLACEMENT OF MALFUNCTIONING UNITS

### 6.1 GENERAL

This chapter describes the disassembly, inspection and the assembly of SAFEDOCK units. The following figures show the different types of SAFEDOCK units.

**WARNING:** TO PREVENT ELECTRIC SHOCK, ISOLATE THE POWER SUPPLY PRIOR TO UNDERTAKING ANY MAINTENANCE WORK WITHIN THE UNIT.

IF A BATTERY BACKUP IS INSTALLED, ALSO THE 21-VOLT DC CURRENT TO THE ELECTRONICS HAS TO BE SWITCHED OFF!

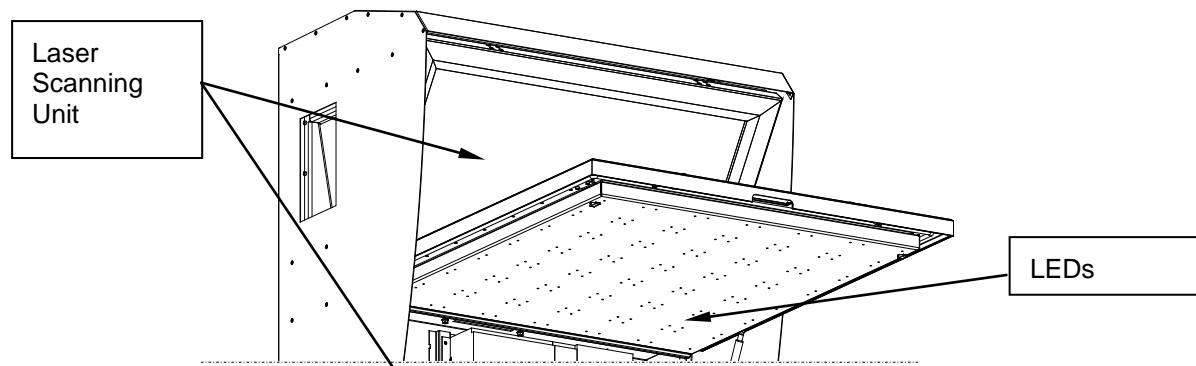


FIGURE 4.1 OVERVIEW SAFEDOCK UNIT TYPE 1 LASER UNIT

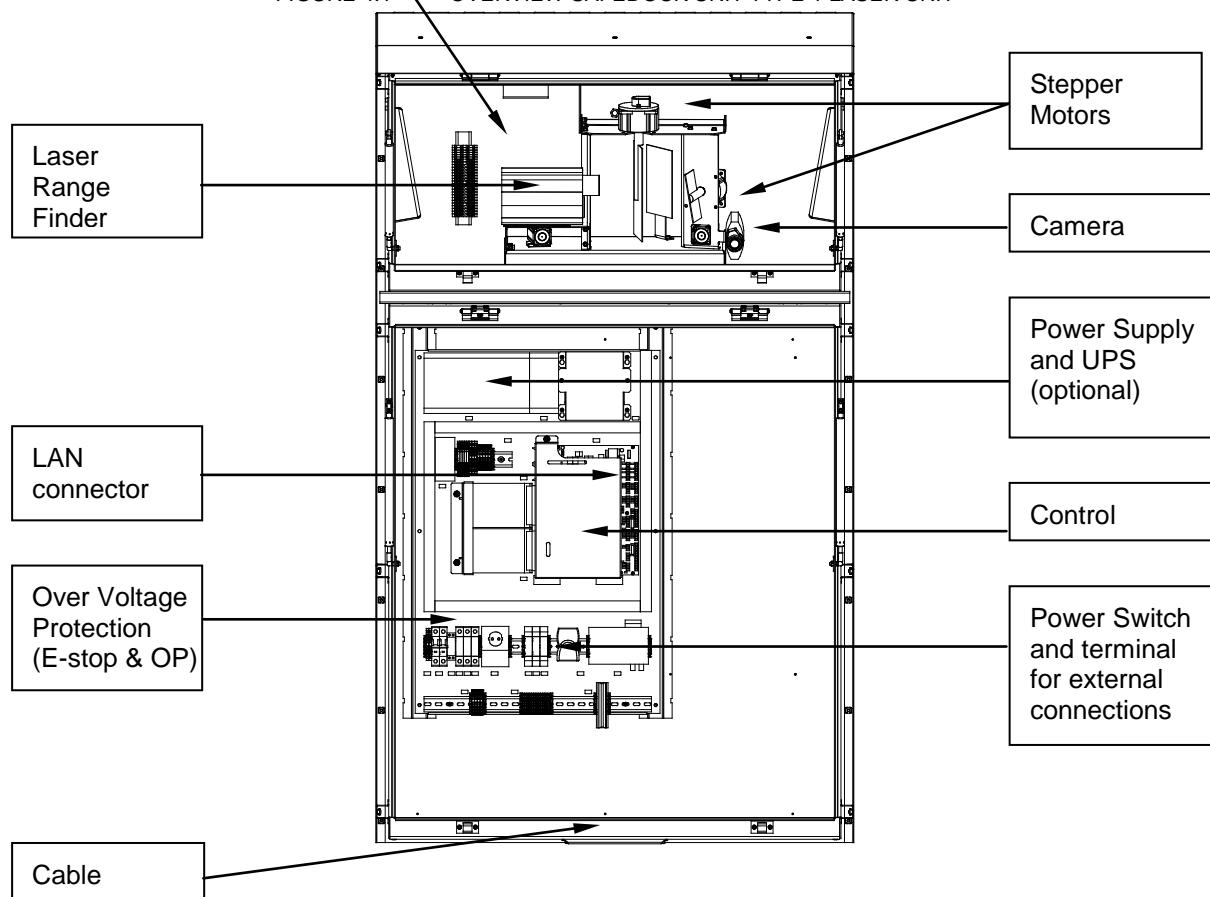


FIGURE 4.30 – OVERVIEW SAFEDOCK UNIT TYPE 1 OPEN

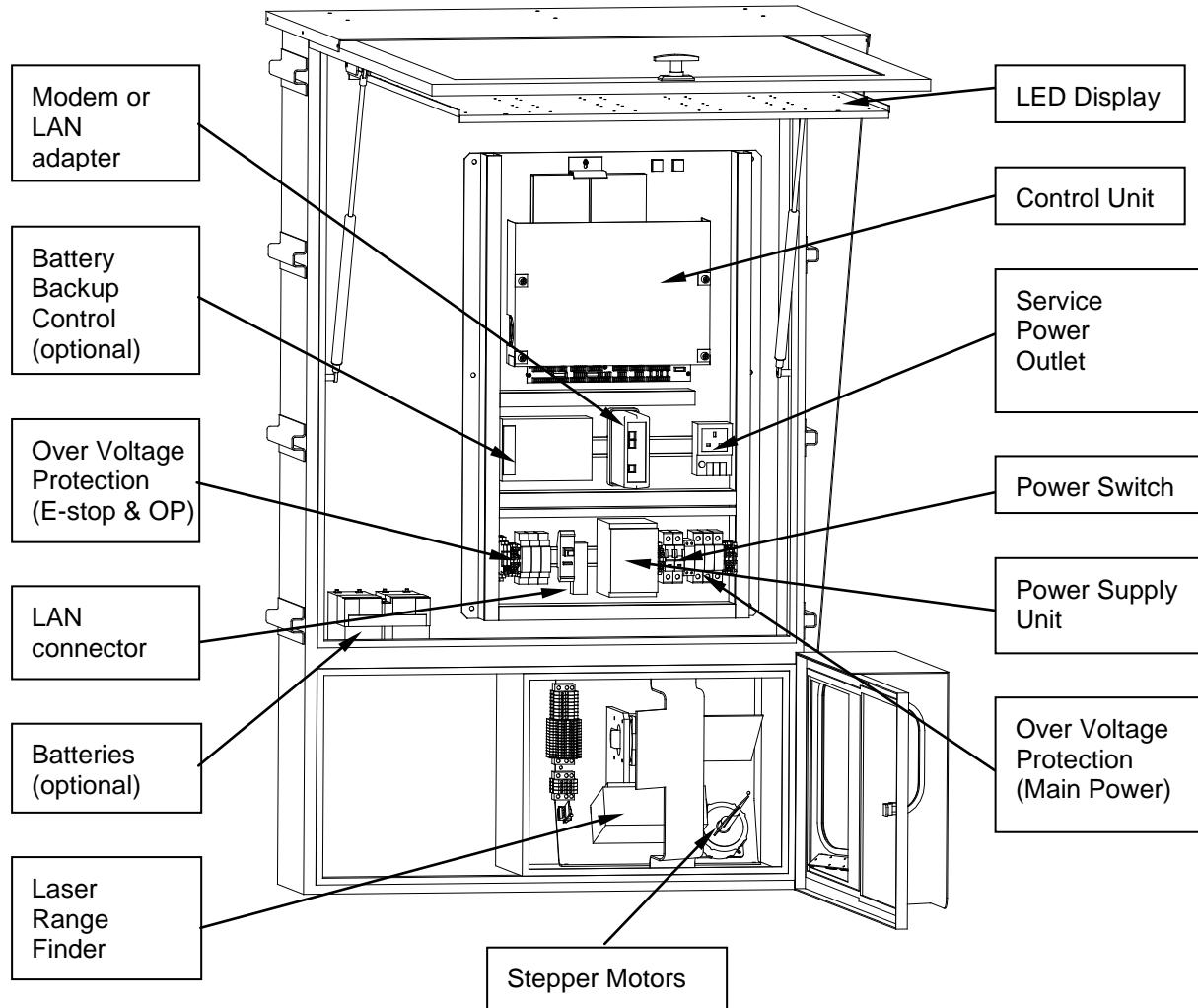


FIGURE 4.31 – OVERVIEW SAFEDOCK UNIT TYPE 2

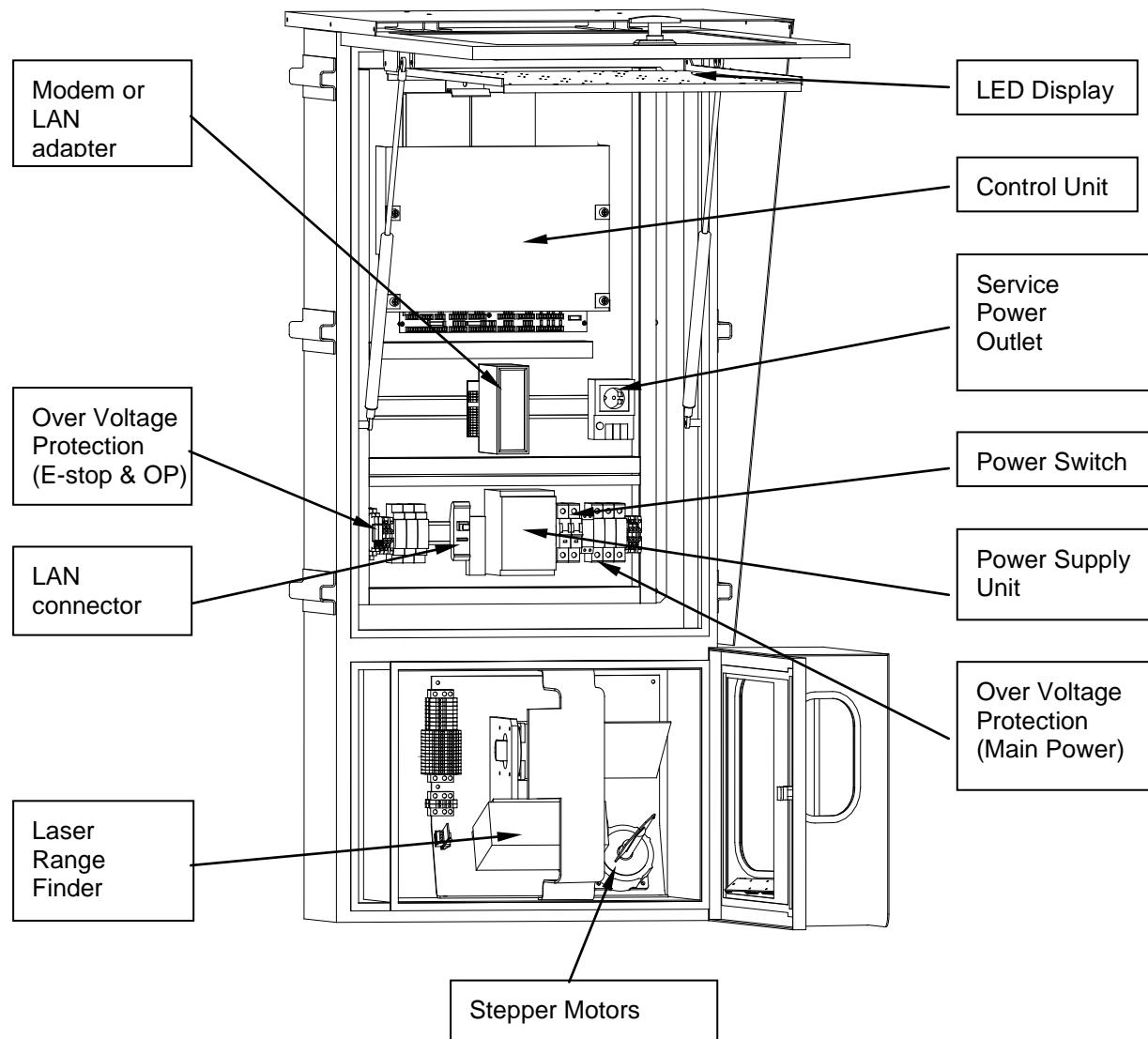


FIGURE 4.32 – OVERVIEW SAFEDOCK UNIT TYPE 3

## 6.2 RENEWAL OF STEPPER MOTOR

### 6.2.1 Motor Disassembly

The figure below illustrates the positions of the two stepper motors of the Laser Scanning Unit.

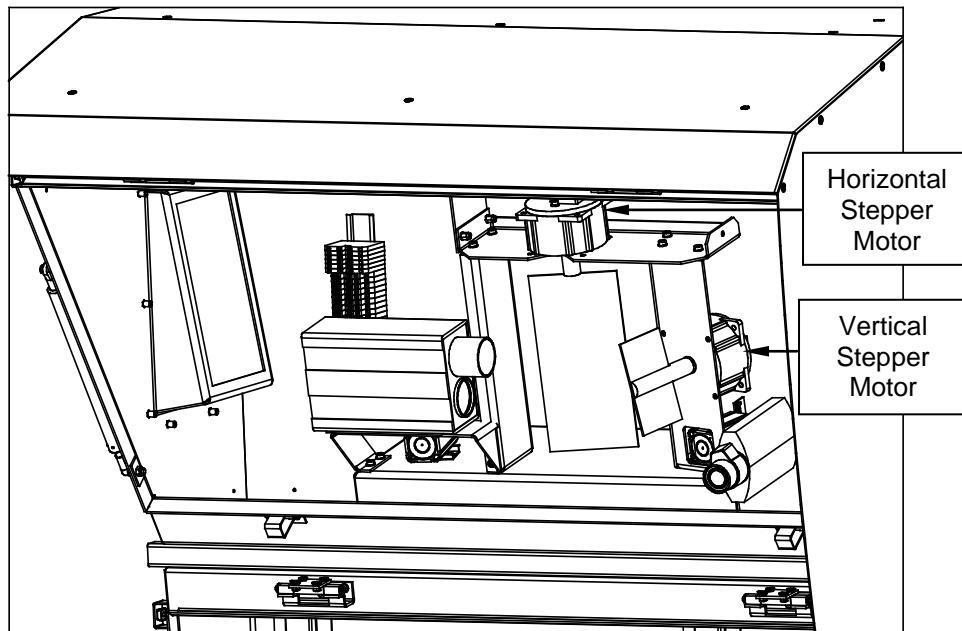


FIGURE 4.33 – SAFEDOCK T1 STEPPER MOTORS OF LASER SCANNING UNIT

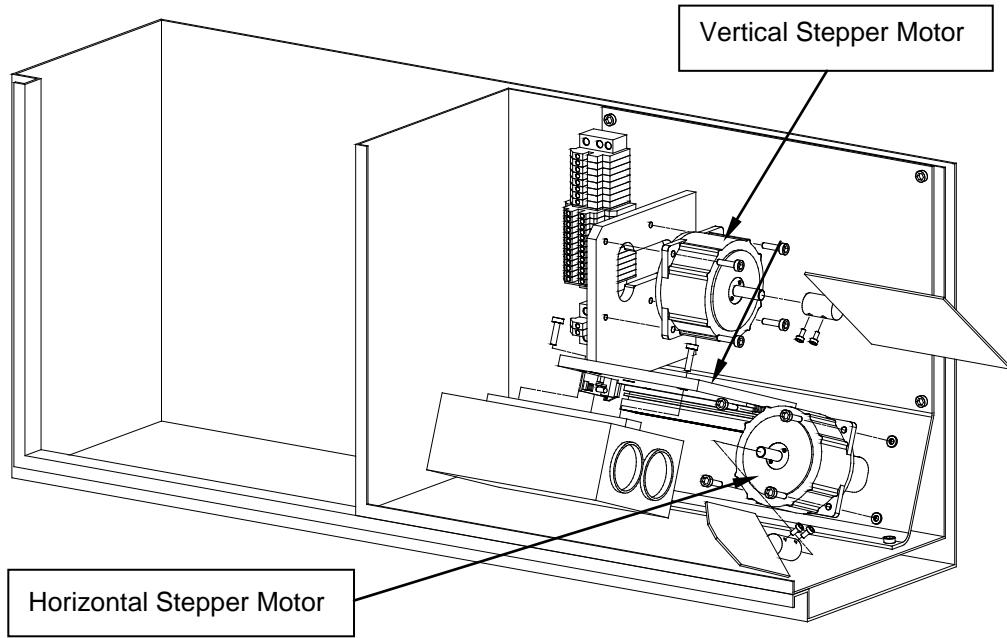


FIGURE 4.34 – SAFEDOCK T 2/3 STEPPER MOTORS OF LASER SCANNING UNIT

- (a) Switch OFF the main power switch.
- (b) To gain entry to the Laser Scanning Unit, undo the cabinet lock and open the hinged door.
- (c) Turn off the power in the system
- (d) Loosen the two 3-mm socket head screws, on the axle adapter, which secures the scanning mirror ((smaller) to the motor drive shaft (stem).
- (e) Carefully withdraw the scanning mirror, complete with axle adapter, from the motor drive shaft. Place the scanning mirror in a suitable place to avoid damage.
- (f) Unscrew the four 4-mm socket head screws, which secure the stepper motor to the motor bracket.
- (g) Carefully remove the stepper motor from the bracket.
- (h) Disconnect the stepper motor electrical leads (13 cables) at the terminal block (strip) situated in the laser unit cabinet. Disconnect the cable connector to the motor position sensor located on the back of the stepper motor.

## 6.2.2

### Inspection

- (a) Inspect the scanning mirror assembly for signs of damage. Renew if required.
- (b) Inspect the Laser Range Finder lenses for cleanliness. Clean as required.
- (c) Inspect the two scanning mirrors, and the calibration mirror, for cleanliness. Clean as required.
- (d) Inspect the Laser Scanning Unit cabinet, front and side windows for cleanliness. Clean as required.
- (e) Ensure the Laser Scanning Unit cabinet is free of all extraneous material.

**Note:** The items covered in step b to d inclusive must be free of grease, dirt and moisture. Only anti-static cleaning materials should be used.

The cables from the stepper motor are colour coded for connection.

The checklist in the table below can be used as a guideline:

Stepper motor wiring, numbering and colour codes				
Cable No.	Terminal No. on connector: Strip 1      Strip 2		Cable colour codes	Check ✓ for correct connection
<b>Cables from the Stepper Motor</b>				
1	59	72	BROWN	<input type="checkbox"/>
2	60	73	BROWN/WHITE	<input type="checkbox"/>
3	61	74	RED	<input type="checkbox"/>
4	62	75	RED/WHITE	<input type="checkbox"/>
5	63	76	ORANGE	<input type="checkbox"/>
6	64	77	ORANGE/WHITE	<input type="checkbox"/>
7	65	78	YELLOW	<input type="checkbox"/>
8	66	79	YELLOW/WHITE	<input type="checkbox"/>
<b>Cables from the Black Box behind the Stepper Motor</b>				
9	67	80	BROWN	<input type="checkbox"/>
10	68	81	YELLOW	<input type="checkbox"/>
11	69	82	GREEN	<input type="checkbox"/>
12	70	83	GREY	<input type="checkbox"/>
13	71	84	WHITE	<input type="checkbox"/>

#### 6.2.3

##### Assembly

- (a) Connect the stepper motor electrical connections to the terminal block (make sure to follow the colour codes).
- (b) Connect the connector to the motor position sensor.
- (c) Fit the new stepper motor to the bracket and secure in position with the four socket head screws.
- (d) Switch on mains/system power, observe the stem on the stepper motor. It rotates for a few seconds and stop. Once the stem stops rotating, turn mains/system power off again.
- (e) Install the mirror on the stem of the motor, such that the clear side of the mirror faces the laser unit. The mirror shall be installed at an angle of 45 degrees not necessarily aligning the mounting screws with the bevel on the stem.
- (f) Secure the axle adapter to the motor drive shaft, by tightening the two socket head cap screws.
- (g) Close the cabinet door and secure using the lock.
- (h) Switch ON the mains/system power.
- (i) The system must be set up again: defining and verifying the centrelines, setting calibration check points and making a new backup of the Stand configuration file. Please refer to appendix A.

#### 6.2.4

##### Testing

- (a) Verify the centreline definition according to appendix A.
- (b) If the centreline definition points are not correct, the system must be set up again. This means: defining and verifying the centrelines, setting calibration check points and making a new backup of the Stand configuration file. Please refer to appendix A.
- (c) Perform a Walk Test procedure.

## 6.3 RENEWAL OF CALIBRATION MIRROR

### 6.3.1 Mirror Disassembly

The calibration mirror is mounted on a bracket, situated above the laser range finding unit, see the figure below.

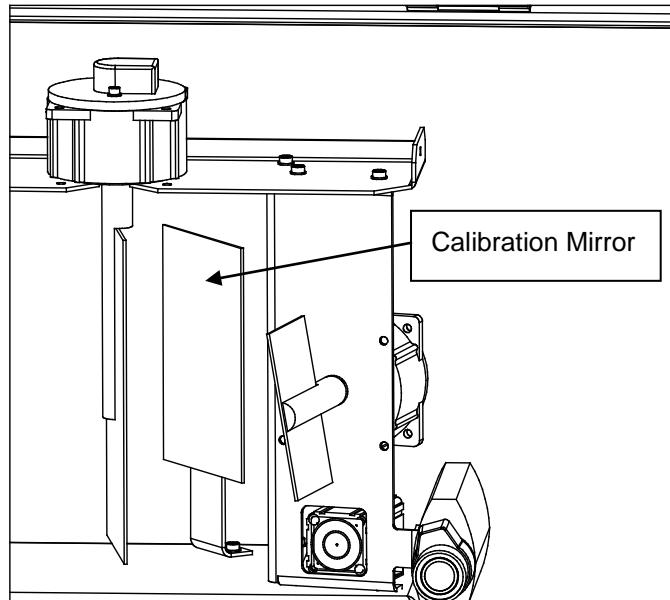


FIGURE 4.35 – SAFEDOCK T1 CALIBRATION MIRROR

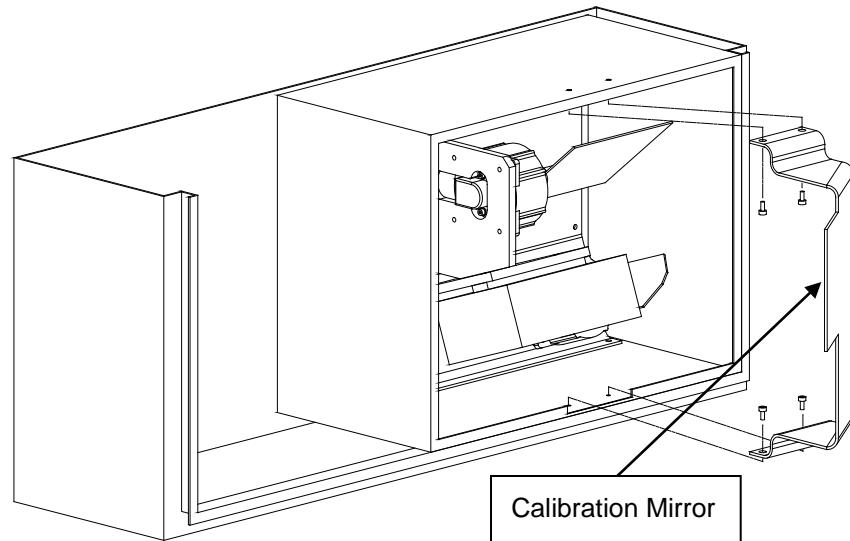


FIGURE 4.36 – SAFEDOCK T2/3 CALIBRATION MIRROR

- (a) Switch power OFF and isolate the power supply unit.
- (b) To gain entry to the laser-scanning unit, undo the cabinet lock, and open the hinged door.
- (c) Loosen the four 5-mm socket head screws, which secure the calibration mirror bracket.
- (d) Remove the bracket from the Laser Scanning Unit.
- (e) Carefully remove the calibration mirror from the bracket using a sharp knife or chisel. If needed, heat the backside to dissolve the tape on the back of the mirror.
- (f) Remove the remaining tape from the bracket.

**Note:** If the calibration mirror is being renewed because it has been broken, ensure no mirror fragments are left in the cabinet. Any mirror fragments left in the cabinet could affect the operation of the Laser Scanning Unit.

#### 6.3.2

##### Inspection

Carry out an internal inspection of the Laser Scanning Unit assembly as detailed in 5.2.2, item (b) to (e) inclusive.

#### 6.3.3

##### Assembly

**CAUTION: EACH MIRROR ASSEMBLY IS MADE OF FRAGILE MATERIAL.  
EXERCISE EXTREME CARE IN LOCATING THE MIRROR ASSEMBLY TO AVOID  
DAMAGE OR BREAKAGE**

- (a) Carefully position the calibration mirror on its mounting and secure in position using the 3M mounting tape.
- (b) Ensure the mirror is free of fingerprints, grease, dust and moisture.
- (c) Close the cabinet door and secure using the lock.

#### 6.3.4

##### Testing

- (a) Switch power ON.
- (b) Verify the centreline definition according to appendix A.
- (c) If the centreline definition points are not correct, the system must be set up again. This means: defining and verifying the centrelines, setting calibration check points and making a new backup of the Stand configuration file. Please refer to appendix A.
- (d) Perform a Walk Test procedure.

## 6.4 RENEWAL OF SCANNING MIRROR

### 6.4.1 Mirror Disassembly

The figure below illustrates the assembly of the two mirrors for horizontal and vertical scanning direction.

The small mirror is used for the horizontal scan.

The large mirror is used for the vertical scan.

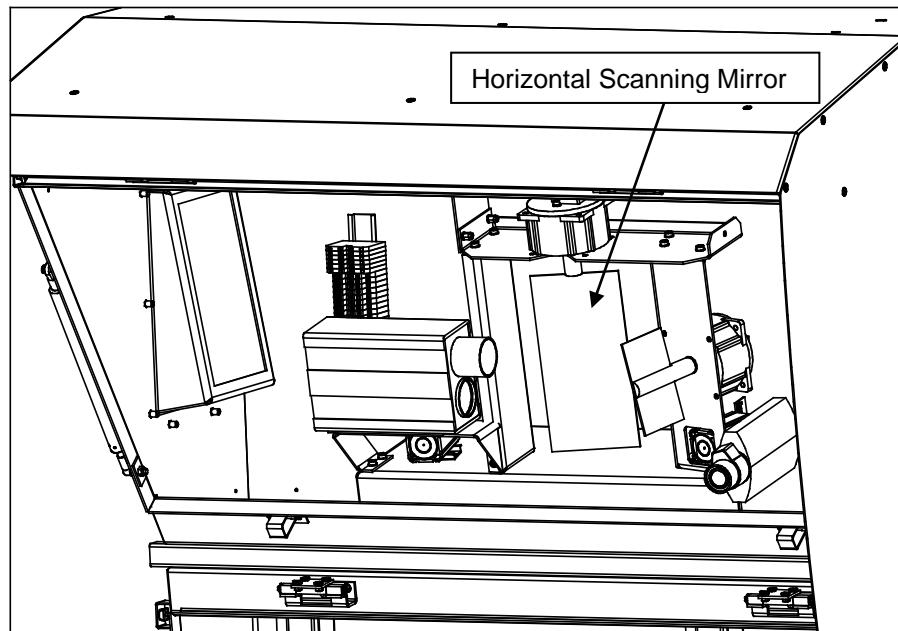


FIGURE 4.37 – SAFEDOCK T1 SCANNING MIRRORS

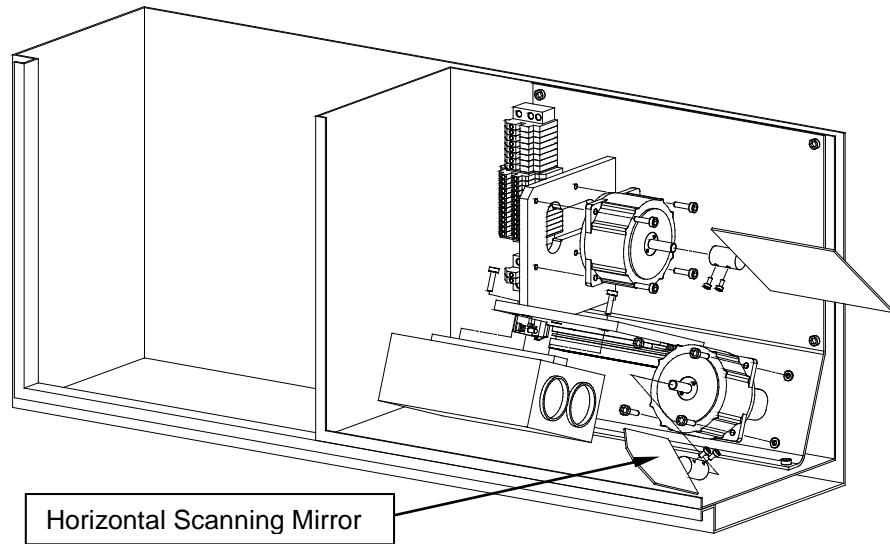


FIGURE 4.38 – SAFEDOCK T 2/3 SCANNING MIRRORS

- (a) Switch power OFF and isolate the power supply unit.
- (b) To gain entry to the Laser Scanning Unit, undo the cabinet lock, and open the hinged door.
- (c) Loosen the two 3-mm socket head screws on the axle adapter, which secure the scanning mirror to the motor drive shaft.
- (d) Carefully withdraw the scanning mirror, complete with axle adapter, from the motor drive shaft.

**Note:** If the scanning mirror is being renewed because it has broken, ensure no mirror fragments are left in the cabinet. Any mirror fragments left in the cabinet could affect the operation of the laser scanning system.

#### 6.4.2

##### Inspection

Carry out an internal inspection of the Laser Scanning Unit assembly as detailed in sub-section 5.2.2, items (b) to (e) inclusive.

#### 6.4.3

##### Assembly

**CAUTION: EACH MIRROR ASSEMBLY IS MADE OF FRAGILE MATERIAL.  
EXERCISE EXTREME CARE IN LOCATING THE MIRROR ASSEMBLY TO AVOID  
DAMAGE OR BREAKAGE.**

- (a) Carefully locate the new scanning mirror, complete with axle adapter, on the motor drive shaft.
- (b) Secure the axle adapter to the motor drive shaft, by tightening the two socket head cap screws.

#### 6.4.4

##### Testing

- (a) Reconnect the power supply to the Laser Scanning Unit and switch ON.
- (b) Verify the centreline definition according to appendix A
- (c) If the centreline definition points are not correct, the system must be set up again. This means: defining and verifying the centrelines, setting calibration check points and making a new backup of the Stand configuration file. Please refer to appendix A
- (d) Perform a Walk Test procedure

## 6.5 RENEWAL OF LASER RANGE FINDER

### 6.5.1 Range Finder Disassembly

The figure below illustrates the position of the Laser Range Finder.

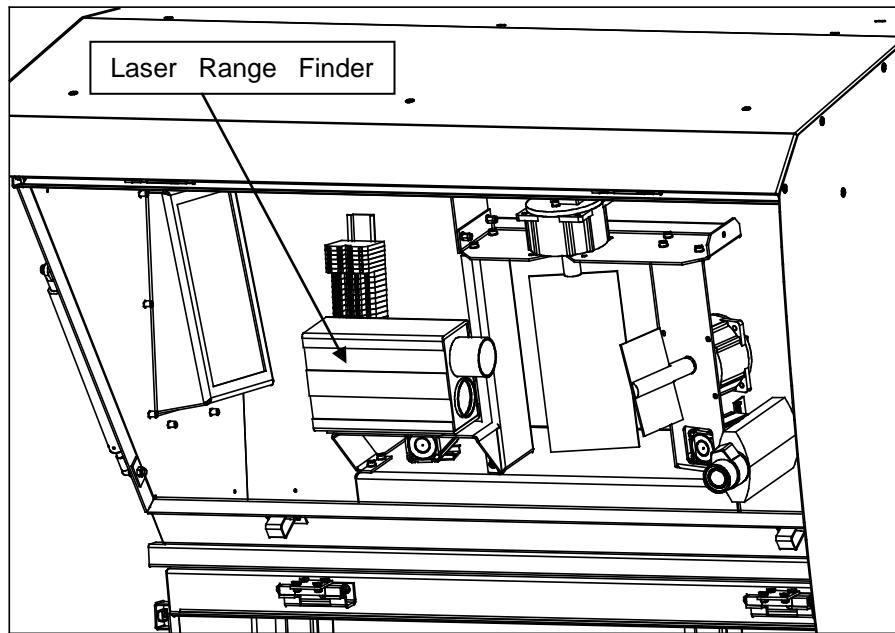


FIGURE 4.39 – SAFEDOCK T1 LASER RANGE FINDER

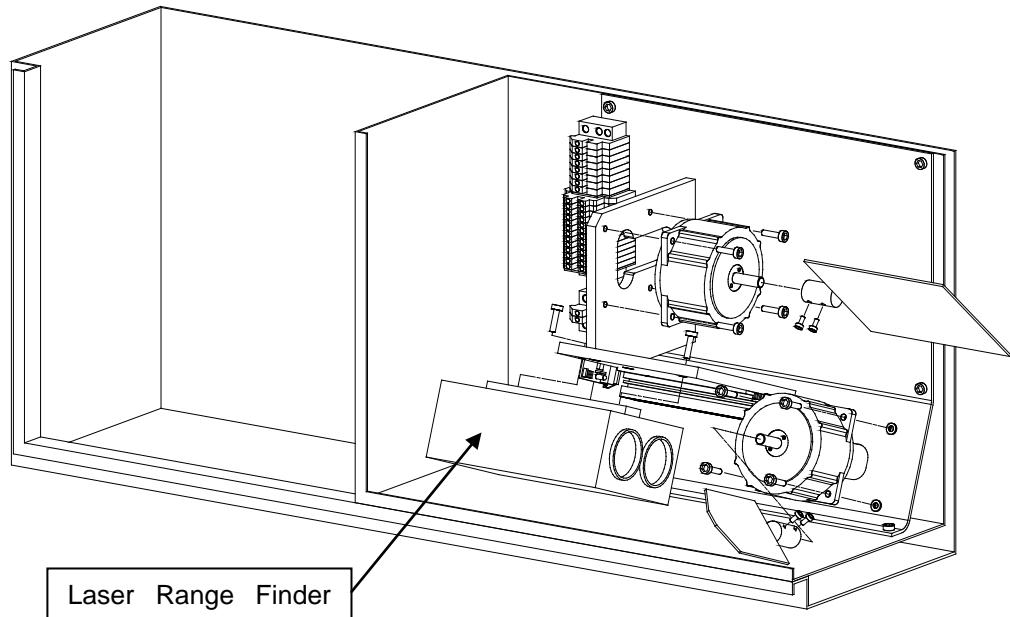


FIGURE 4.40 – SAFEDOCK T2/3 LASER RANGE FINDER

- (a) Switch OFF and isolate the power supply.
  - (b) To gain entry to the Laser Scanning Unit, undo the cabinet lock and open the hinged door.
  - (c) Disconnect the Laser Range Finder electrically by pulling out the green connector from the terminal block.
  - (d) Remove the two socket head cap screws, which secure the Laser Range Finder to the bracket.
  - (e) Lift the Laser Range Finder clear of the bracket.
- 6.5.2 Inspection**
- (a) Carry out an internal inspection of the Laser Scanning Unit assembly as detailed in sub-section 5.2.2, items (b) to (e) inclusive.
- 6.5.3 Assembly**
- (b) Locate the new Laser Range Finder and secure to the bracket with the two socket head cap screws.
  - (c) Connect the Laser Range Finder's electrical leads to the terminal block.
  - (d) Close the cabinet door and secure using the locks.
- 6.5.4 Testing**
- (a) Reconnect the power supply to the Laser Scanning Unit and switch ON.
  - (b) Verify the centreline definition according to appendix A
  - (c) If the centreline definition points are not correct, the system must be set up again. This means: defining and verifying the centrelines, setting calibration check points and making a new backup of the Stand configuration file. Please refer to appendix A.
  - (d) Perform a Walk Test procedure.

#### 6.5.5 Reset Laser statistics

**Note:** This operation is to be performed whenever a laser unit is replaced.

- (a) From the OP, select **Test**.

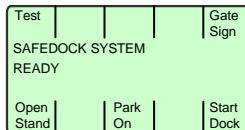


FIGURE 4.41 – OP TEST

- (b) From the Test menu, press the right arrow for the next page and select **Statistics**.

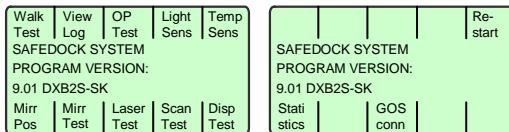


FIGURE 4.42 – OP STATS

- (c) From the Statistics menu, select **Reset laser** and then **Confirm** to reset the laser time.

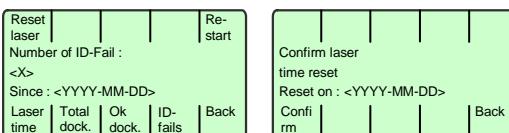


FIGURE 4.43 – OP RESET LASER

## 6.5.6

### Laser safe test

A LASER SAFE ERROR may be caused by one of the following components: stepper motor, stepper motor card, laser or CU card. The following steps may help to diagnose which of the components is at fault:

- (a) Move one of the mirrors gently by hand. When moving it the LED named LASER SAFE TEST should light up as an indication of that the stepper motor sensor is detecting a movement. There should be some resistance when moving the mirror by hand. If not, the Stepper motor control board is possibly broken. Swap the 2 stepper motor control boards to check if the problem moves to the other stepper motor.
- (b) If the LED does not light up, then there is a problem with the cable between the stepper motor and the CU board, or the stepper motor itself.

## 6.6

### RENEWAL OF CONTROL UNIT

#### 6.6.1

#### Preparations Before Maintenance

**Note:** Stand set-up parameters, such as configuration data, calibration values and aircraft data, are stored in a non-VOLATILE memory of the control unit.

A DISK COPY OF THE STAND SET-UP PARAMETERS SHALL PREVIOUSLY HAVE BEEN MADE AT THE SAFEDOCK INSTALLATION/SET-UP PHASE AT EACH STAND.

THIS PROCEDURE HAS BEEN DONE FOR FACILITATING THE EXCHANGE OF THE CONTROL UNIT IN CASE OF AN ERROR, AND FOR MAKING RESTORATION OF SOFTWARE AND SET-UP PARAMETERS EASIER AFTER THE EXCHANGE OF HARDWARE.

THE APPLICABLE STAND SET-UP FILE SHALL BE LOADED INTO THE MAINTENANCE PC ACCORDING TO SECTION 6 OF APPENDIX A.

#### 6.6.2

#### Dumping Stand Set-Up Parameters from the Control Unit

If the Stand parameter back-up file is not available, the procedure described in Appendix A, can be carried out to secure the Stand set-up parameters, if possible.

- (a) Connect the Maintenance PC, loaded with the SAFEDOCK Maintenance software, called SDCONFIG.EXE, to the connector at the right side of the Operator Panel.
- (b) Dumping the CU memory contents to the PC will be done automatically, as soon communication between the CU and the PC is established. To make a disk copy, use the function SAVE in the SAFEDOCK Stand Configuration Dialogue Box. The current configuration will be saved onto disk in the maintenance PC.

If a faulty Control Unit does not allow you to dump its memory contents, the set-up and calibration procedure has to be done manually again as described in the section SAFEDOCK SETUP PROCEDURE of Appendix A.

### 6.6.3 Control Unit Disassembly

The figure below illustrates the position of the SAFEDOCK Control Unit/CU.

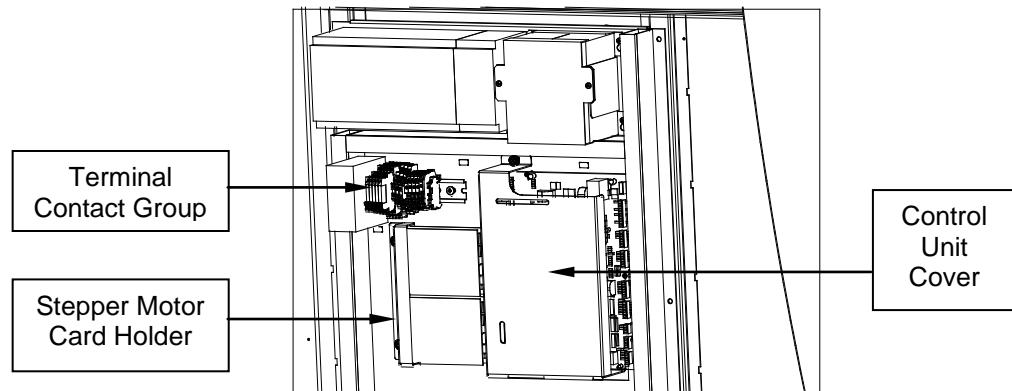


FIGURE 4.44 – SAFEDOCK T1 CONTROL UNIT

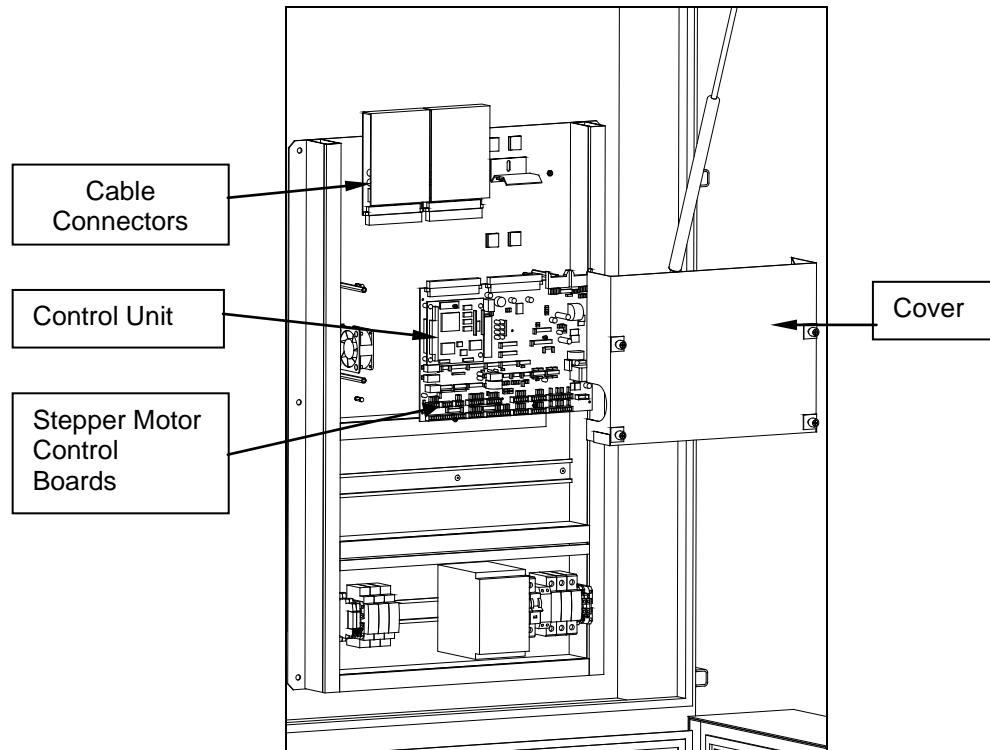
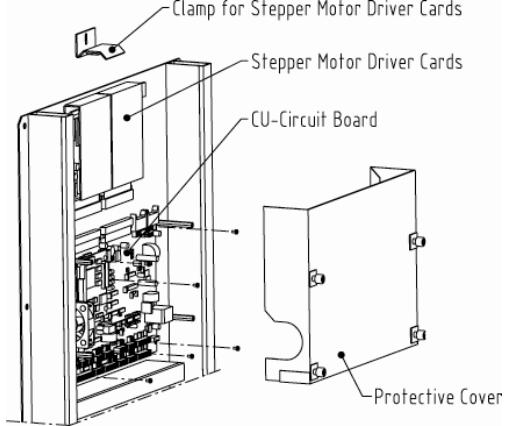


FIGURE 4.45 – SAFEDOCK T2/3 CONTROL UNIT

6.6.4 Renewal of Control Unit/Carrier Board	
This information is a basic step by step guide for authorized personnel to replace a Control Unit (CU) Carrier Board.	
<b>Safedock T1/2/3</b> (system design from Spring 2008) - CU circuit includes a docking board (connections) and a carrier board (CPU).	
<b>Before you start</b>	
<ul style="list-style-type: none"> <li>If possible, use the Safedock Maintenance program (SDCONFIG) to save aircraft and centre line configuration files.</li> </ul> <p><b>Note:</b> For more information, see the Maintenance chapter in the manual.</p> <p><b>WARNING: DANGER OF ELECTRIC SHOCK!</b></p> <ul style="list-style-type: none"> <li>ISOLATE THE POWER SUPPLY PRIOR TO UNDERTAKING ANY MAINTENANCE!</li> <li>IF A BATTERY BACKUP IS INSTALLED, THE DC CURRENT TO ELECTRONICS MUST ALSO BE SWITCHED OFF.</li> </ul> <p><b>Note:</b> Standard tools are required such as screwdrivers and Allen keys.</p>	 <p>Clamp for Stepper Motor Driver Cards Stepper Motor Driver Cards CU-Circuit Board Protective Cover</p> <p>Part Identification for Disassembly</p>
<p><b>Removal</b></p> <p><b>Carrier board (SG590524-000)</b></p> <ol style="list-style-type: none"> <li>Open the Safedock Pilot Display cabinet and set the Safedock power switch to <b>OFF</b>.</li> <li>Locate the protective cover for the CU-circuit board assembly and remove it.</li> <li>Remove the carrier board.</li> <li>Return the (old) CU-circuit boards to Safegate.</li> </ol> <p><b>Renewal</b></p> <ol style="list-style-type: none"> <li>Position the Carrier Board-CPU assembly over the mating contacts and stand offs on the docking board and press until contacts are seated and locking tabs on the stand-offs click into place.</li> <li>Re-install the protective cover.</li> <li>Power up the system and install and configure the software for the Safedock system, if required.</li> </ol> <p><b>Note:</b> The new CU-circuit board requires version 8 or higher to run properly.</p>	
<p><b>Testing</b></p> <ul style="list-style-type: none"> <li>Verify the system starts up correctly: Operator Panel contact is re-established and the Emergency stop function is operational.</li> <li>If it was possible to save aircraft and centre line configuration files using the Safedock Maintenance program (SDCONFIG) then these files can be loaded to the system once again. If not, a new configuration is required according to the manual.</li> <li>Walk test the system.</li> </ul>	<p>FIGURE 4.46 – CU PARTS</p>

## 6.6.5 Renewal of Control Unit/Docking Board

This information is a basic step by step guide for authorized personnel to replace a Control Unit (CU) Docking Board.

**Safedock T1/2/3** (system design from Spring 2008) - CU circuit includes a docking board (connections) and a carrier board (CPU).

### Before you start

- If possible, use the Safedock Maintenance program (SDCONFIG) to save aircraft and centre line configuration files.

**Note:** For more information, see the Maintenance chapter in the manual.

**WARNING: DANGER OF ELECTRIC SHOCK!**

- ISOLATE THE POWER SUPPLY PRIOR TO UNDERTAKING ANY MAINTENANCE!
- IF A BATTERY BACKUP IS INSTALLED, THE DC CURRENT TO ELECTRONICS MUST ALSO BE SWITCHED OFF.

**Note:** Standard tools are required such as screwdrivers and Allen keys.

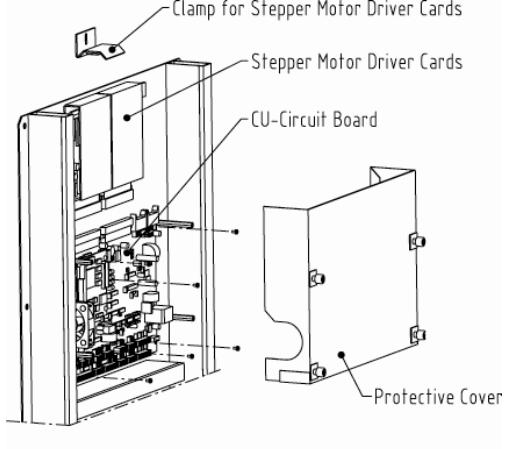
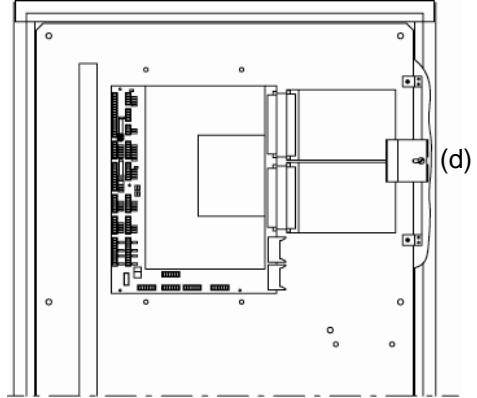
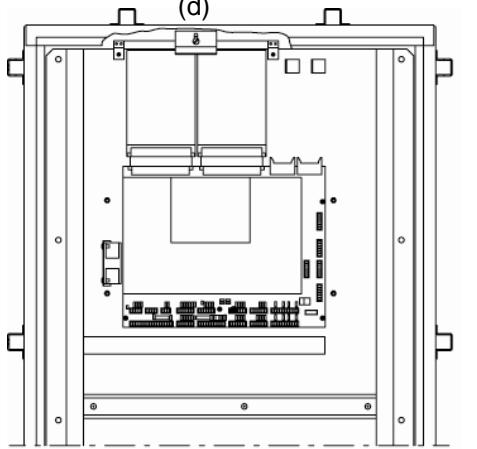
Removal	Image examples
<p><b>Docking board (SG590562-000)</b></p> <p>(a) Open the Safedock Pilot Display cabinet and set the Safedock power switch to <b>OFF</b>.</p> <p>(b) Locate the protective cover for the CU-circuit board assembly and remove it.</p> <p>(c) Disconnect all wiring from the docking board.</p> <p>(d) Undo the clamp fasteners holding the stepper motor driver cards in place. Remove the stepper motor driver cards by pulling them away from the CU-circuit board.</p> <p>(e) Remove the carrier board.</p> <p>(f) Remove the docking board by removing the six fasteners holding it in place on the stand-offs. <b>Note:</b> Be careful not to loosen the stand-offs, as it can be difficult to re-tighten them without loosening the mounting plate.</p> <p>(g) Return the (old) board to Safegate.</p>	 <p>Clamp for Stepper Motor Driver Cards Stepper Motor Driver Cards CU-Circuit Board Protective Cover</p> <p>Part Identification for Disassembly</p>

FIGURE 4.47 – CU PARTS

Renewal	Image examples
<p>(a) Fasten the new docking board in place on the stand-offs.</p> <p>(b) Position the Carrier Board-CPU assembly over the mating contacts and stand offs on the docking board and press until contacts are seated and locking tabs on the stand-offs click into place.</p> <p>(c) Re-install the stepper motor driver cards.</p> <p>(d) Position the extension assembly on the edge of the mounting plate so it is centred to the stepper motor driver cards, and then tighten the set screws on the extension plate.</p> <p>(e) If the stepper motor driver cards are mounted horizontally, use the clamp and screw supplied with the spare part to fasten the clamp.</p>	 <p>Placement of New Parts, Systems with Horizontally Mounted Stepper Motor Driver Cards</p>
<p>If the stepper motor driver cards are mounted vertically, attach and fasten the original clamp.</p> <p><b>Note:</b> If an extension assembly exists in the system, it must be re-used with the clamp.</p> <p>(f) Re-connect all wiring.</p> <p>(g) Re-install the protective cover.</p> <p>(h) Set the Safedock power switch set to <b>ON</b></p> <p>(i) Power up the system and install and configure the software for the Safedock system, if required.</p> <p><b>Note:</b> The new CU-circuit board requires version 8 or higher to run properly.</p>	 <p>Placement of New Parts, Systems with Vertically Mounted Stepper Motor Driver Cards</p>
Testing	
<ul style="list-style-type: none"> <li>• Verify the system starts up correctly: Operator Panel contact is re-established and the Emergency stop function is operational.</li> <li>• If it was possible to save aircraft and centre line configuration files using the Safedock Maintenance program (SDCONFIG) then these files can be loaded to the system once again. If not, a new configuration is required according to the manual.</li> <li>• Walk test the system.</li> </ul>	

## 6.6.6 Renewal of Control Unit with a CU Board Upgrade Kit

This information is a basic step by step guide for authorized personnel to replace a Control Unit (CU) circuit board.

**Safedock T1/2/3** (system design from Spring 2008) - CU circuit includes a docking board (connections) and a carrier board (CPU).

**Safedock T2/3** (SG590125-000/older system design to Spring 2008) - CU-circuit single board (connection and CPU). **Note:** This design is now obsolete.

- CU Board Upgrade Kit (SG590399-001-01) includes:
  - A docking board and a carrier board.
  - Extension plate, clamp and screw for some systems, if required.

**Note:** The CU Board Upgrade Kit requires software version 8.0 or higher.

### Before you start

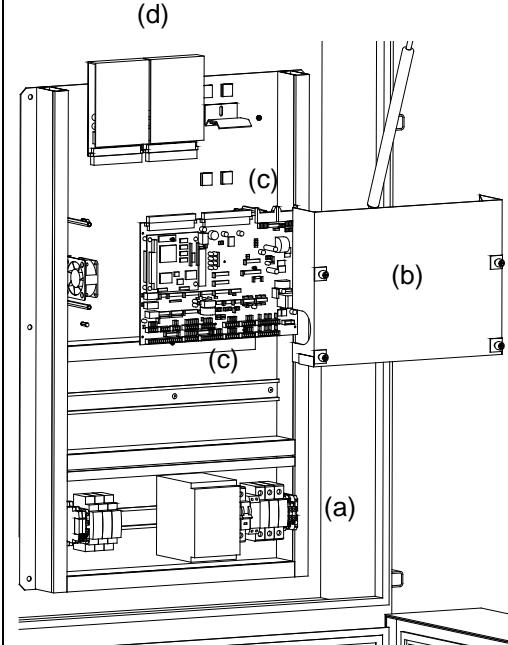
- If possible, use the Safedock Maintenance program (SDCONFIG) to save aircraft and centre line configuration files.

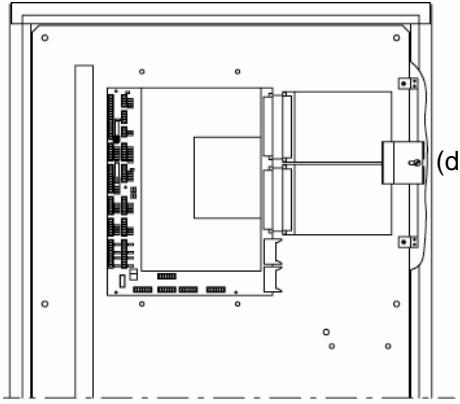
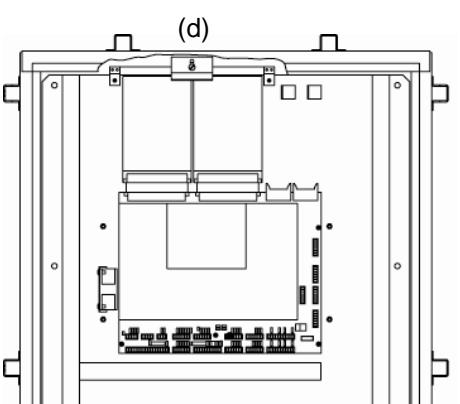
**Note:** For more information, see the Maintenance chapter in the manual.

**WARNING: DANGER OF ELECTRIC SHOCK!**

- ISOLATE THE POWER SUPPLY PRIOR TO UNDERTAKING ANY MAINTENANCE!
- IF A BATTERY BACKUP IS INSTALLED, THE DC CURRENT TO ELECTRONICS MUST ALSO BE SWITCHED OFF.

**Note:** Standard tools are required such as screwdrivers and Allen keys.

Removal	Image examples
<p><b>CU-circuit board (SG590125-000)</b></p> <p>(a) Open the Safedock Pilot Display cabinet and set the Safedock power switch to <b>OFF</b>.</p> <p>(b) Locate the protective cover for the CU-circuit board assembly and remove it.</p> <p>(c) Disconnect all wiring from the CU-circuit board.</p> <p>(d) Undo the clamp fasteners holding the stepper motor driver cards in place.</p> <p><b>Note:</b> If a welded stud is used as the clamp fastener, carefully twist the stud to break it off.</p> <p>(e) Remove the stepper motor driver cards by pulling them upwards from the CU-circuit board.</p> <p>(f) Remove the CU-circuit board by removing the six fasteners holding it in place on the stand-offs.</p> <p><b>Note:</b> Be careful not to loosen the stand-offs, as it can be difficult to re-tighten them without loosening the mounting plate.</p> <p>(g) Return the (old) board to Safegate.</p>	 <p>FIGURE 4.50 – CU REMOVAL</p>

Renewal	Image examples
<p><b>CU Board Upgrade Kit (SG590399-001-01)</b></p> <p>(a) Fasten the new docking board in place on the stand-offs.</p> <p>(b) Position the Carrier Board-CPU assembly over the mating contacts and stand offs on the docking board and press until contacts are seated and locking tabs on the stand-offs click into place.</p> <p>(c) Re-install the stepper motor driver cards.</p> <p>(d) Position the extension assembly on the edge of the mounting plate so it is centred to the stepper motor driver cards, and then tighten the set screws on the extension plate.</p> <p>(e) If the stepper motor driver cards are mounted horizontally, use the clamp and screw supplied with the spare part to fasten the clamp.</p>	
<p>If the stepper motor driver cards are mounted vertically, attach and fasten the original clamp.</p> <p><b>Note:</b> If an extension assembly exists in the system, it must be re-used with the clamp.</p> <p>(f) Re-connect all wiring.</p> <p>(g) Re-install the protective cover.</p> <p>(h) Set the Safedock power switch set to <b>ON</b></p> <p>(i) Power up the system and install and configure the software for the Safedock system, if required.</p>	
<p><b>Note:</b> The new CU-circuit board requires version 8 or higher to run properly.</p>	<p>FIGURE 4.51 – CU PLACEMENT HORIZONTAL</p>
<p><b>Testing</b></p> <ul style="list-style-type: none"> <li>• Verify the system starts up correctly: Operator Panel contact is re-established and the Emergency stop function is operational.</li> <li>• If it was possible to save aircraft and centre line configuration files using the Safedock Maintenance program (SDCONFIG) then these files can be loaded to the system once again. If not, a new configuration is required according to the manual.</li> <li>• Walk test the system.</li> </ul>	<p>FIGURE 4.52 – CU PLACEMENT VERTICAL</p>

## 6.7 RENEWAL OF POWER SUPPLY

### 6.7.1 Power Supply Disassembly

The figure below illustrates the position of the SAFEDOCK power supply.

**WARNING: DANGER OF ELECTRIC SHOCK! ISOLATE THE POWER SUPPLY PRIOR TO UNDERTAKING ANY MAINTENANCE!**

IF A BATTERY BACKUP IS INSTALLED, ALSO THE 21 VOLT DC CURRENT TO THE ELECTRONICS HAS TO BE SWITCHED OFF!

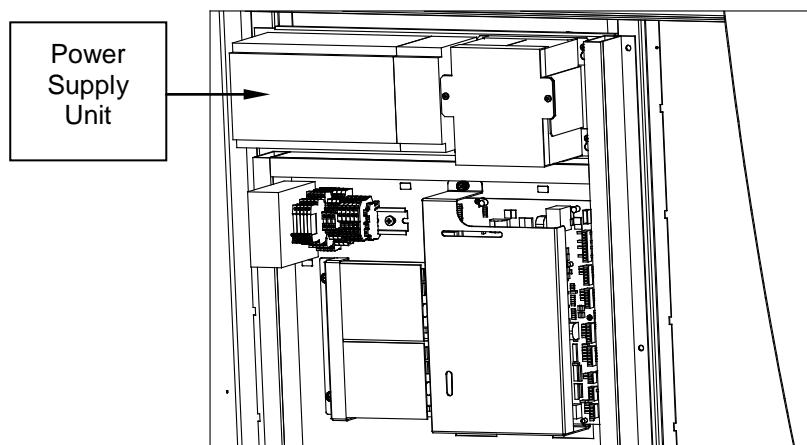


FIGURE 4.53 – SAFEDOCK T1 POWER SUPPLY

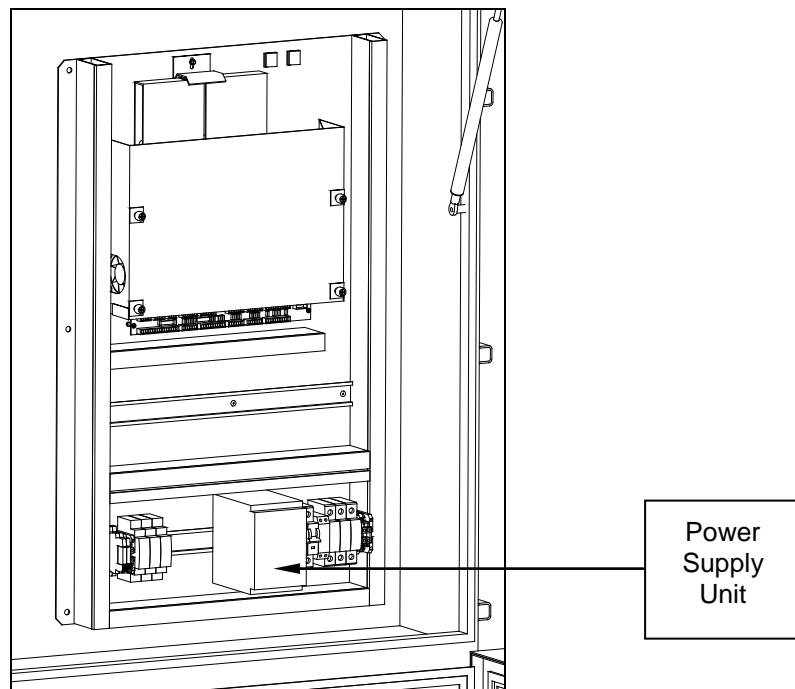
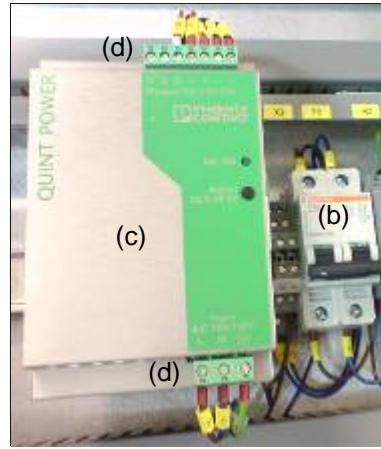
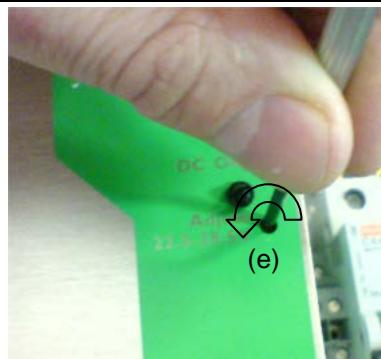


FIGURE 4.54 – SAFEDOCK T2/3 POWER SUPPLY

6.7.2 Renewal of Power Supply Unit	
This information is a basic step by step guide for authorised personnel to replace a power supply unit. <b>Note:</b> For more information, see Chapter 4. Maintenance.	
<b>Before you start</b>	
<b>WARNING: DANGER OF ELECTRIC SHOCK!</b>	
<ul style="list-style-type: none"><li>• ISOLATE THE POWER SUPPLY PRIOR TO UNDERTAKING ANY MAINTENANCE!</li><li>• IF A BATTERY BACKUP IS INSTALLED, THE 21 VOLT DC CURRENT TO ELECTRONICS MUST ALSO BE SWITCHED OFF.</li></ul>	
<b>Note:</b> Tools required are a standard flat blade screwdriver and an electrical flat blade screwdriver.	
<b>Removal</b>	 <p>(a) Open the Safedock Pilot Display cabinet and locate the lower DIN rail. (b) Locate the Safedock power switch and set to <b>OFF</b>. (c) Locate the power supply unit. (d) Disconnect primary and secondary cables from the unit. (e) Use a standard flat blade screwdriver to release the spring latch under the unit.</p>
<b>Renewal</b>	 <p>(a) Locate the lower DIN rail in the Safedock Pilot Display cabinet. (b) Carefully place the new power supply unit into position. (c) Apply gradual pressure until the spring latch catches on the DIN rail. (d) Connect primary and secondary cables to the power unit. (e) On the front of the Power Supply unit, remove the plug cover for voltage adjustment. Carefully turn the adjustment screw counter clockwise until it clicks. Put the plug back in place. (f) Set the Safedock power switch set to <b>ON</b>.</p>
<b>Testing</b>	<ul style="list-style-type: none"><li>• With the power supply <b>ON</b>, measure 115/230VAC (primary side) and 21 VDC ±1 (secondary side).</li><li>• Verify the system starts up correctly: Operator Panel contact is re-established and the Emergency stop function is operational.</li></ul> <p><b>Note:</b> For more information, see 3. Operation.</p>

## 6.8 RENEWAL OF MOTOR CONTROL BOARD

### 6.8.1 Control Board Disassembly

The figure below illustrates the position of the two motor control boards, connected directly to the Control Unit.

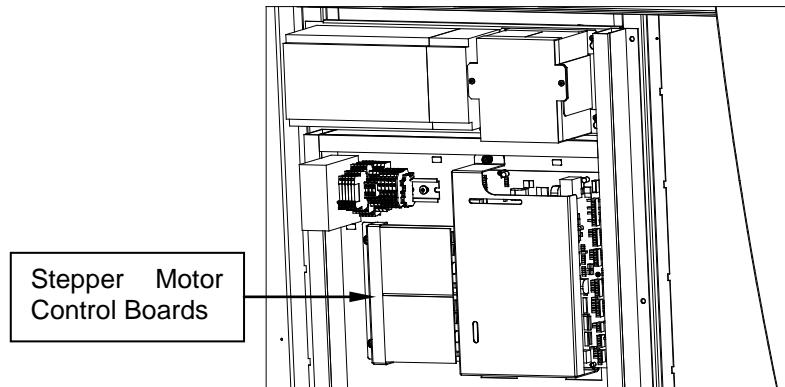


FIGURE 4.57 – T1 STEPPER MOTOR CONTROL BOARDS

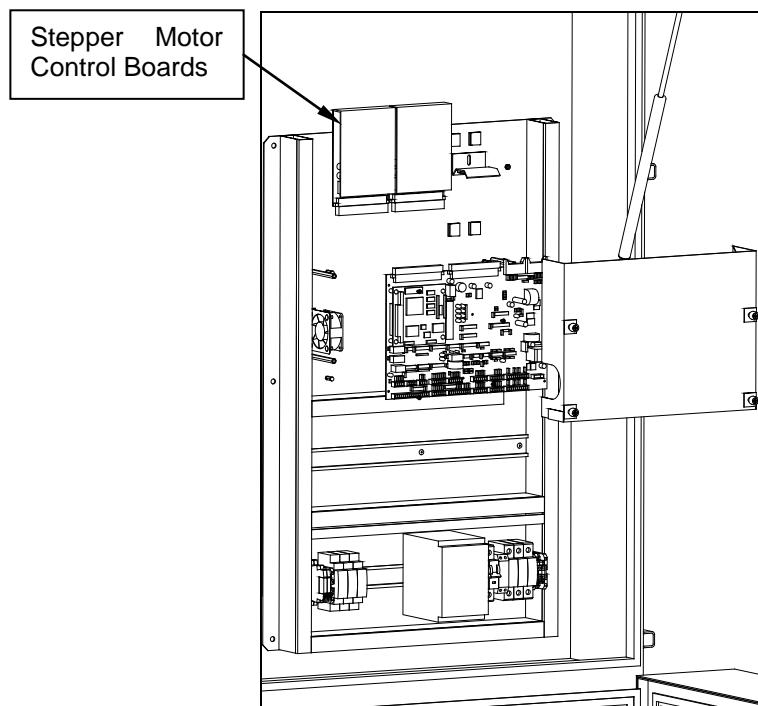


FIGURE 4.58 – T2/3 STEPPER MOTOR CONTROL BOARDS

**WARNING!** DANGER OF ELECTRIC SHOCK. THE ELECTRICAL CONNECTIONS MAY BE LIVE. DO NOT PLACE ANY TOOL INSIDE THE CONTROL RACK.

- (a) Switch power OFF and isolate the power supply unit.
- (b) To gain access to the motor control boards, undo the four self-retaining screws, on top of the cover plate, which secures the protective cover plate.
- (c) Withdraw the motor control board. The two motor boards are equivalent.

#### 6.8.2 Assembly

- (a) Ensure the DIP switch positions, located on the control boards, and are set correctly. The switch settings have to correspond with the setting of the removed control board.
- (b) Carefully insert and locate the motor control board. Tighten the screw.
- (c) Fit and secure the protective cover plate, using the four self-retaining screws.

#### 6.8.3 Testing

- (a) Switch ON power to the system.
- (b) Start a docking procedure. The system will perform a calibration control and a self-test.
- (c) If the system fails during the calibration control test, undertake a new calibration procedure, according to appendix A.

## 6.9 RENEWAL OF LED MODULE

### 6.9.1 LED Module Disassembly

The figure below illustrates the LED matrix boards' connection to the mounting plate.

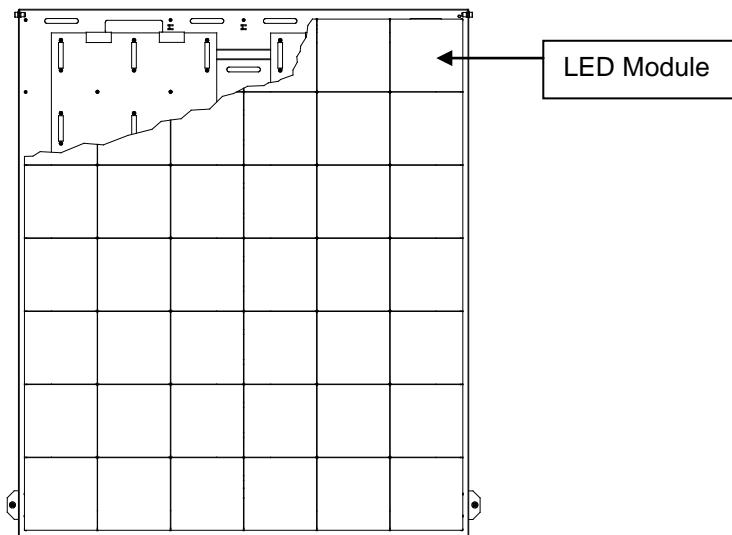


FIGURE 4.59 – SAFEDOCK T1 LED MODULE

**Note:** The front glass is hinged at the top of the display unit.

- (a) To gain access to the inside of the display unit, undo and lift the front glass of the cabinet.
- (b) Switch OFF and isolate the power supply.
- (c) Undo the two lock devices on the outer end of the front glass and let down the plate with the LED modules on.
- (d) Release the holders and screw that are securing the defective LED module, and disconnect the ribbon cable from the rear of the LED module.

### 6.9.2 Inspection

- (a) Inspect the front glass for cleanliness. Clean as required.
- (b) Inspect the cabinet for extraneous material. Clean as required.

### 6.9.3 Assembly

- (a) Check the new module for correct colour and switch settings. The switch setting has to correspond to the setting of the removed LED module.
- (b) Connect the ribbon cable to the rear of the new LED module. Secure in position, using the holders.
- (c) Carefully close the front glass and secure.

### 6.9.4 Testing

- (a) Switch power ON.
- (b) Run the display test from the Operator Panel to verify the function of the new board as follows. Push the test button and scroll until the Display Test appears on the OP panel display, and confirm with ENTER. The display shows now the alphabet with one letter on each module. Check if the right letter is displayed on the modules.

## 6.10 RENEWAL OF OPERATOR PANEL FILM (SOFTKEY)

6.10.1 Renewal of Operator Panel Film (Softkey)	
This information is a basic step by step guide for authorized personnel to replace an old type, a damaged or worn film on the front cover, with a new one.	
<b>Before you start</b>	
<b>WARNING: DANGER OF ELECTRIC SHOCK!</b>	
<ul style="list-style-type: none"><li>• ISOLATE THE POWER SUPPLY PRIOR TO UNDERTAKING ANY MAINTENANCE!</li><li>• IF A BATTERY BACKUP IS INSTALLED, THE 21 VOLT DC CURRENT TO ELECTRONICS MUST ALSO BE SWITCHED OFF.</li></ul> <p><b>Note:</b> Tools required are No. 1, 2 Phillips and flat blade screwdrivers, a knife, white spirits and a cleaning cloth.</p>	
<b>Removal</b>	
(a) <b>Safedock Pilot Display cabinet:</b> Locate the power switch on the lower DIN rail and set to <b>OFF</b> . (b) <b>Operator Panel:</b> Unscrew the cover and open it.	
<p style="text-align: center;">FIGURE 4.60 –OP FILM</p>	
(c) Disconnect the film cable and maintenance cable connectors from the circuit board inside the OP. (d) Disconnect the Emergency Button and cabling from the inside of the cover as follows: <ul style="list-style-type: none"><li>• Unscrew the terminal screw.</li><li>• Release the terminal clamp.</li><li>• Pull the Emergency Button away from the cover.</li></ul> <p><b>Note:</b> Keep the Emergency Button and terminal screw in a safe place until the film is replaced.</p>	
<p style="text-align: center;">FIGURE 4.61 – OP FILM CONNECTION</p>	

- (e) On the OP front, use a knife to lift up a film corner.
- (f) Carefully start to cut at the film (bottom layer) adhesive whilst simultaneously pulling the film away.  
**Note:** *The film is layered, be careful not to split the layers when cutting/pulling away. When approximately half of the film is released from the surface, it may be possible to pull the remainder of the film away, without cutting.*
- (g) During removal of the film, pull the film cable out through the upper hole in the cover. Clean the exposed front cover metal surface thoroughly with white spirits on a cleaning cloth until all remaining adhesive is removed.



FIGURE 4.62 – OP FILM REMOVAL

#### Renewal

- (a) Remove all protective coverings from the new film to expose the adhesive surface.
- (b) Carefully feed the film cable through the exposed upper hole in the front cover.
- (c) Carefully place the upper area of the film according to the contours for the film on the cover surface.
- (d) Slowly even out from the top of the film downwards, making sure no air bubbles exist. Continue until the entire film is in place at the bottom.
- (e) Wipe over the film surface with a dry clean cloth.  
**Note:** *If the new film does not have a pre-cut Emergency Button hole, locate the approximate centre of the hole by pressing on the film, or use the old film as a template to find it. Make neat incisions (horizontal, vertical and diagonal) with a knife from the centre of the hole to the contour to create sections to cut away. Carefully cut away the sections to expose the hole.*
- (f) Place the Emergency Button in position.
- (g) Whilst holding the Emergency Button in position, open the front cover and clamp the Emergency Button terminal in the place on the inside. Fasten the terminal with the screw.
- (h) Connect the film and Maintenance connectors to the circuit board on the inside of the cover.
- (i) Close the cover and secure the screws.
- (j) **Safedock Pilot Display cabinet:** Locate the lower DIN rail and set the power switch set to **ON**.



FIGURE 4.63 – OP FILM RENEWED

#### Testing

- Verify the system starts up correctly: Operator Panel contact is re-established and the Emergency Button stop function is operational.

**Note:** For more information, see 3. Operation.

## 7. SUPPORT

Our experienced engineers are available for support and service at all times, 24 hour/7 days a week. They are part of a dynamic organization making sure the entire Safegate Group is committed to minimal disturbance for airport operations.

Safegate Support	
<p>Safegate knows that our equipment is used in one of the busiest industries in the world, where down-time costs money and creates delays for airlines and their passengers. As one of the world's leading suppliers of airport systems, Safegate is committed to ensuring that our customers are able to get the most out of your equipment, regardless of the location or the time of day. For this reason, Safegate has established the Safegate Support service.</p> <p>Safegate Support is a unique service provided by Safegate to our customers, free of charge during the warranty period or as a service contract. Any time of day, any day of the year, a Safegate engineer is on standby to answer questions and assist with any problems that may arise. Qualified technical assistance is just a phone call or an e-mail away, 24-7 worldwide.</p> <p>✉ <a href="mailto:support@safegate.com">support@safegate.com</a> ☎ +46 40 699 1740</p>	

### 7.1 SAFEGATE WEBSITE

The Safegate Website, [www.safegate.com](http://www.safegate.com), offers information regarding our airport solutions, products, company, news, links, downloads, references, contacts and more.

**Note:** There is also a **Client/Partner login** area for the latest information and updates, if available.

## 7.2 RE-CYCLING

### 7.2.1 Local Authority Re-cycling

The disposal of Safegate products is to be made at an applicable collection point for the recycling of electrical and electronic equipment. The correct disposal of equipment prevents any potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling. The recycling of materials helps to conserve natural resources. For more detailed information about recycling of products, contact your local authority city office.

### 7.2.2 Safegate Re-cycling

Safegate is fully committed to environmentally-conscious manufacturing with strict monitoring of our own processes as well as supplier components and sub-contractor operations. Safegate offers a re-cycling program for our products to all customers worldwide, whether or not the products were sold within the EU.

Safegate products and/or specific electrical and electronic component parts which are fully removed/separated from any customer equipment and returned will be accepted for our recycling program.

All items returned must be clearly labelled as follows:

- **For ROHS/WEEE Re-cycling**
- Sender contact information (Name, Business Address, Phone number).
- Main Unit Serial Number.

Safegate will continue to monitor and update according for any future requirements for EU directives as and when EU member states implement new regulations and or amendments. It is our aim to maintain our compliance plan and assist our customers.

**Note:** For more information, see [www.safegate.com](http://www.safegate.com), or contact Safegate Support via email at [support@safegate.com](mailto:support@safegate.com) or phone +46 40 699 1740.

### 7.2.3 Packaging

All packaging shipped with products should be properly marked for recycling per GB 18455-2001 Packaging recycling Mark. Responsible and sustainable recovery of packaging products is therefore of paramount importance, and with the right actions, it contributes to a sustainable environment based on a best effort basis.

All packaging and boxes are to be re-cycled according to local authority regulations.

- **Cardboard** - Used cardboard packaging is to be flattened for delivery to a local authority re-cycling site and onward delivery to, for example, a paper mill for re-cycling/reuse as a new product.
- **Plywood box** - Used plywood boxes are to be flattened for delivery to a local authority re-cycling site and onward delivery to, for example, a materials recovery facility (MRF) where the box is to be grinded down, while the steel is separated from the Plywood, using an electromagnet. The steel is then sent to a steel mill where it is melted down and reused as a new product. Plywood spillage is burned in a controlled environment, for example a combined heat power plant where the extracted energy is reused in the municipality's energy system with high efficiency, such as in the electricity network.

**Note:** If plywood is burned in an uncontrolled environment, the amount of CO<sub>2</sub> released is the same as the amount of CO<sub>2</sub> from the atmosphere through photosynthesis. Wood is a source of bio-energy, in contrast to fossil fuel, and does not contribute to global warming. The concentration of the restricted substances in the waste gas from Plywood is also below the limit.

Nefab Packaging Sweden AB has an Environmental/ Management System certified according to ISO 14001. For more information see [www.nefab.com](http://www.nefab.com).

## 7.3 SPARE PARTS

The following is a list of spare parts for Safedock® Advanced Visual Docking Guidance Systems (2011).

**Note:** Information is subject to change. For more information, see [www.safegate.com](http://www.safegate.com) or contact Safegate for assistance with ordering spare parts.

Spare Part Item	Item no.	Old Part Number
<b>Laser Cabinet</b>		
Laser Riegl, s/w version 4.3B (T2, T3)	12176	590114
Laser Riegl D, T1	12217	590602
Stepper Motor	12185	590130
Mirror Horizontal with Shaft	12179	590120
Mirror Vert incl shaft.	12177	590118
Mirror T1 Horizontal w.Shaft	15278	590251-284
Mirror T1 Vertical w.Shaft	15279	590251-286
Mirror Calibration	12178	590119
Mirror T1 Calibration	15280	590251-288
Stepper Motor Board	12186	590131 149-429
Circulation Fan 119mm 24VDC(T2, T3)	13640	(4314/4314U)
Filter Fan 20m³/h (T1)	12378	
Temperature Sensor	12187	590137
Cooling Fan for Laser Assembly	14362	SG590405-000-01
<b>Display Cabinet</b>		
Stepper Motor Monitor	12203	590541
CU-Replacement Kit. (Replaces 590125) <sup>1</sup>	14359	590399
Carrier Board with CPU&CF	12200	590524
Docking Board (Base Plate)	12210	590562
Compact Flash (SG boot SW)	12218	590604
Disk on Chip	12183	590126
Power Supply	12375	2938604
Battery power backup	14326	NGA51206D5HS0SA
UPS Battery Backup Control	12198	590513
Network colour camera	12119	211
Power Supply Camera	12376	2938756
Network Switch - media convert	14399	SG590614-001-01
Relay fan/heating	12377	2961105
Cat 6 Transient Filter	15240	2881007
Terminal Server RS232, 10-24V	12202	590539
<b>Display</b>		
LED Board Red 23 degrees	12206	590549
LED Board Yellow 23 degrees	12207	590550
LED Board Red/Yellow 23 degree	12208	590551
LED Board Yellow/Red 23 degree	12209	590555
LED Board T1 Yellow/Red	12213	590570
Led Fixture Board T1	12214	590573
Ribbon cable		state SDK type
Light sensor	12190	590148
Hydraulic gas strut 300N, SDK 2	12120	4510
Hydraulic gas strut for SDK 3	0	4538
<b>OP-Panel</b>		
Operator Panel Board Soft Key	13686	590495-000-01

<sup>1</sup> State current SW running on DGS when ordering Upgrade Kit. Replaces 590125.

<b>Spare Part Item</b>	<b>Item no.</b>	<b>Old Part Number</b>
Operator Panel Film	12181	590124
Operator Panel Film ver. 2.0 (6 LED)	12194	590426
Operator Panel Soft Key Film	12123	8484
Emergency Stop Button	14423	XB4BS542
<b>Complete Operator's Panel</b>		
Operator Panel Soft Key	12195	590495
Operator Panel, 30 Key	12180	590121
<b>Overvoltage protector</b>		
VAL-MS 230 ST for 210V-230V	12368	2798844
PT 5-HF-5DC-ST for RS485	12372	2838762
PT 4x1-24DC-ST for 24V	12371	2838322
VAL-MS 230 - BE	12369	2817741
PT2x2-BE Base Unit for RS485	12373	2839208
PT4x1-BE Base Unit for 24V	12374	2839363
Circuit Breaker (fuse)	12367	2112252
<b>Special equipment</b>		
Super Cooler	14128	AA06024230010
Super Cooler T1	14129	AA10024230010
Centreline Reflector (4 pcs)	12201	590533
<b>Communication Modems</b>		
USB Maintenance Interface	12197	590507
<b>Software Feature Options</b>		
Dock Viewer	1	
SdConfig - DGS Maintenance SW <sup>2</sup>	1	
Aircraft.DAT Update (NB: No test req.)	per system	
Configuration + Regression Test <sup>3</sup>	1	
Safedock SW Upgrade <sup>4</sup>	per system/version	
Digital Count down	per system	
Aircraft Verification	per system	
Multiple convergent Centreline	per system	
Adjacent stand interlock (requires GOS)	per system	
<b>Service &amp; Support</b>		
Log file Analysis	per file	
Phone/e-mail support	per hour	

SW upgrades include a CD/or memory stick with the updated SW version and updated standard manual in English.  
All SW upgrades assume installation and commissioning by others.

**Note:** Exchange price is for purchase of a renovated/repaired part/article at a reduced price. The exchange price conditions are the faulty part/article is not more than 6 years old and it is returned to Safegate Group.

<sup>2</sup> Aircraft.dat is not included.

<sup>3</sup> This item is always required when a new Safedock program is ordered.(N/A for Aircraft.dat).

<sup>4</sup> Price per system per SW platform version (Sd8.xx -> Sd9.xx).



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**STAND CONFIGURATION UTILITY**  
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## 1. SCOPE

This description is a part of the Safedock System Maintenance Manual, and describes the procedures of how to configure and calibrate a docking system during installation and also how to load new software versions to the SAFEDOCK system's control unit.

The software package, called Safedock Configuration System, SDCONFIG.EXE, executed on Windows 2000 or later platforms, is used for the configuration purposes, either on a local PC computer directly connected to a Safedock system, or remotely on one of the computers that are parts of a Central Docking and Guidance System.

The first sections of this manual are a detailed description of the Configuration Software and its man-machine-interfaces. The later sections of the manual contain procedure instructions on how to set up and update the Safedock System, i.e. loading parameters, defining a centre line and calibrating the system.

## 2. STAND CONFIGURATION UTILITY SET-UP

### 2.1 GENERAL

#### 2.1.1 Installation Details

Note that if TCP/IP communication will be used, Windows' Network Support must be installed, on the PC computer that is used for the Safedock Configuration System, SDCONFIG.EXE.

Aircraft Parameters and Aircraft profiles are stored in the file AIRCRAFT.DAT and the directory PROFILES. The DLL files BWCC32.DLL and OPMENUEDITOR.DLL is used internally by the application. SDConfig.INI is a configuration file for SDConfig.exe. If SDConfig.INI does not exist, the application will create a default file. These five files shall be in the same directory as SDCONFIG.EXE for making the configuration of Safedock work.

### 2.2 UTILITY CONFIGURATION

#### 2.2.1 General

The utility software SDCONFIG.EXE uses the SDConfig.INI file for custom settings. The below settings are available.

#### 2.2.2 SDConfig Settings

Below is an example of SDConfig.INI.

##### [Setup]

Metric=YES

RemotePassword=YES

ForceSave=YES

COLOR=YES

##### [Confirm]

Code!=SAFEDOCK!

##### [CONFIG]

MODE=LOCAL

COMMPORT=COM1

OVERRIDE\_COMM\_PORT=COM1

CONNECT\_PORT=4500

TCP\_PORT=4503

BAUDRATE=9600

ADDRESS1=127.0.0.1

ADDRESS2=192.168.2.30

#### Description of settings:

**Metric = YES:** All distance values are displayed in meter. If Metric is set to 'NO', the distance values are displayed in feet/inches. Default is 'YES'

**RemotePassword = YES:** Maintenance password is stored at 'Safedock' (Requires special 'Safedock' version). Default is 'NO'

**ForceSave = YES:** User is required to save the configuration file on the PC before downloading it to 'Safedock'. Default is 'NO'.

**COLOR = YES:** When this option is set to 'YES' the calibration picture will be displayed using a colour representation of the distance values. Default is 'NO'

**Code = !SAFEDOCK!**: If RemotePassword is set to 'NO', this will be the maintenance password

**OVERRIDE\_COMM\_PORT = COM1**: On some system, scanning for available ports is a time consuming process. To allow a faster connection phase it is possible to specify which port to use. Doing this will cause SD Config not to scan for available ports and it will not be possible to select another port without first exiting SD Config and removing this setting. The format of the port is always "COM" + a number, such as COM1, COM5 and COM11.

**CONNECT\_PORT = 4500**: TCP/IP Port number used internally by SDConfig when connecting to a 'Safedock' system remotely (through GOS). This port number must match the port number configured in the GOS system.

**TCP\_PORT = 4503**: TCP/IP Port number that GOS uses when responding to 'SDConfig'.

SDConfig uses the following parameters internally. Thus, the user should never change these settings.

**MODE = LOCAL**

**COMMPORT = COM1**

**BAUDRATE = 9600**

**ADDRESS1=127.0.0.1**

**ADDRESS2=192.168.2.30**

### 3. USER CATEGORIES AND ACTIVITIES

#### 3.1 SAFEDOCK USERS

The SAFEDOCK system may be installed with an optional authorisation check feature. The description in the sections below is relevant only when this option is installed.

Before updating Safedock software and configuration parameters, it is necessary to confirm particular commands by assigning a password, which could be unique for each Safedock system, presumed that each individual system has been given a unique password.

Access to Safedock Operation, Configuration and Program Load is gained by three categories of operators, using different passwords:

- (a) SUPERVISOR (One secret password only)
- (b) MAINTenance Operator (One password per Safedock system)
- (c) Safedock Operators (Several passwords per Safedock system)

We presume that the operator of the Stand Configuration Software already has logged on to the Operating System i.e. Windows NT. Refer to the software installation chapter in the GOS Manual.

#### 3.2 SUPERVISOR'S ADMINISTRATION OF PASSWORD

##### 3.2.1 General

If the MAINToperator has forgotten his password, the supervisor has to set the default password.

With a SECRET password, only known by the Supervisor and the manufacturer, the Supervisor can erase the MAINT password and set the DEFAULT password, which is "SAFEDOCK!".

After that the MAINT operator shall set a new MAINT password.

##### 3.2.2 Erasing Maintenance Password

When the Safegate Configuration System is running, the supervisor can select from the main menu the function "Erase password". The below figure illustrates the window for this function, which gives the necessary instructions to the user.



FIGURE 4A.1 CONFIRMATION DIALOG BOX

### 3.3 MAINTENANCE OPERATOR ACTIVITIES

#### 3.3.1 General

The Maintenance Operator has the following responsibilities, which can be performed after having entered the correct password:

- (a) Password Administration for Safedock Operator Control and Maintenance/Test functions
- (b) Program Load of Safedock
- (c) Calibration of Safedock
- (d) Configuration of Safedock

Maintenance activities shall be carried out in the order pointed out above.

#### 3.3.2 Safedock Password Administration

Before the main operation of a Safedock system can start, a Safedock Operator's password shall be set by the MAINT operator. At the following commands the Safedock system will require a password.

- (a) Start of Docking (assigning an aircraft type)
- (e) Park ON or Park OFF (creating Chocks On and Chocks Off transactions)
- (f) Confirmation of a Scheduled Flight Command from the central system
- (g) Test Procedure (local maintenance)
- (h) Aircraft Loading Bridge Override

Activities not demanding password are:

- (a) Shut Down
- (b) Emergency Stop

Passwords are set by selecting the "Operator pw" (password) function from the Configuration System main menu.

A password can be one or several numbers of 4 numeric characters. The Safedock system has a maintenance (local test) mode besides the normal operation mode. One or both of these modes can be associated with the password.

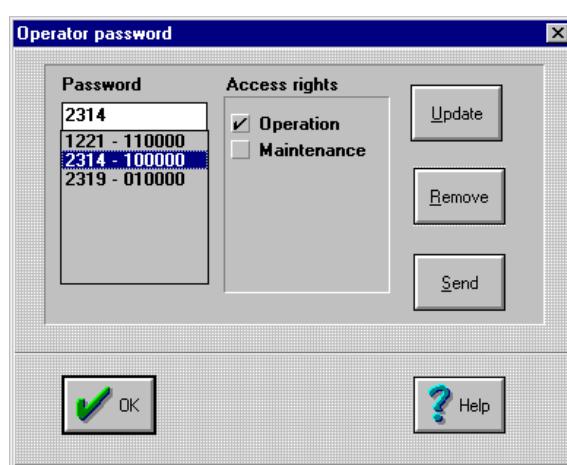


FIGURE 4A.2 OPERATOR PASSWORD DIALOG BOX

When the maintenance operator clicks the “Send” button, the “Confirm” dialog will appear, and he/she has to confirm the operation, using the MAINT password, before data could be sent down to the Safedock system.

### 3.3.3

#### Maintenance Password Administration

Before data can be loaded to Safedock from any of the above functions, the MAINT operator has to enter the MAINT password. Initially this password has the default value “!SAFE GATE!”, which is set by the supervisor. First of all the default password shall be changed to a new MAINT password, known by maintenance staff only. This is done from the Configuration System main menu, by selecting the “New password” function. The password shall have maximum 10 alphanumeric characters.

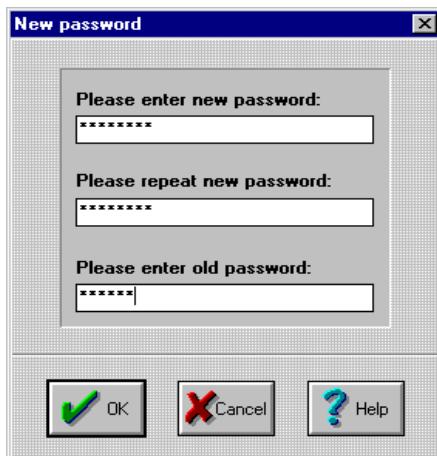


FIGURE 4A.3 MAINTENANCE PASSWORD DIALOG BOX

### 3.3.4

The password is required for the activities mentioned in the below sections.

#### Program Load to Safedock

The following sequence is performed:

- Shut-down of present application program (requires MAINT password)
- Load Program File to Safedock

### 3.3.5

#### Calibration of Safedock

The following sequence is performed:

- Up-Line Dump of present Configuration Data
- Change of Calibration Data
- Down-Line Load (requires MAINT password)

### 3.3.6

#### Configuration of Safedock

The following sequence is performed:

- Configuration Up-Line Dump
- Change Configuration Data
- Down-Line Load (requires MAINT password)

## 4. CONNECTING TO SAFEDOCK

### 4.1 GENERAL

The Safedock Configuration System is initiated from the START Menu of Windows' Desktop. It is called "SDCONFIG". The following window will appear, when starting the program:

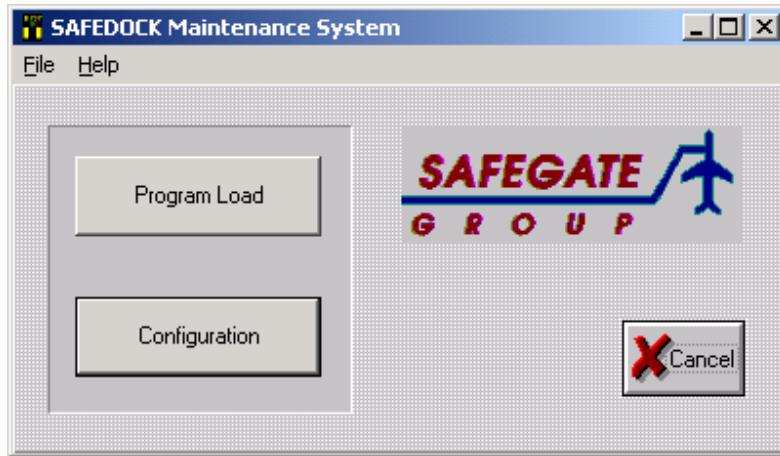


FIGURE 4A.4 SAFEDOCK MAINTENANCE SYSTEM SCREEN

The Configuration System has two main functions:

- (a) Safedock Program Load
- (b) Safedock Configuration

After one of these functions has been selected, it is necessary to make the appropriate connection to a Safedock system. See the next section for details on how to do this,

### 4.2 CONNECTION DIALOG

There are three ways to connect to a Safedock system:

- (a) Via the maintenance port on the operator panel
- (b) Through a network via a GOS server.
- (c) Via a special-made serial cable directly into the GOS port of the Safedock main board.

Option (a) requires a RS232-RS485 converter and is always available as long as an operator panel is accessible. Option (b) requires a working Ethernet and a running GOS server. Option (c) is only used on test systems and in-house testing due to the distance limitation imposed by the high baud rate.

Option (a) and (c) both have connection speed limitations, according to the following table. The remote (network) connection in reality communicates with 9.6k baud, but uses the Ethernet as a transport layer.

This table only applies to the program loader; the configuration function always uses 9.6k baud.

Port	Loader v2.1 or earlier	Loader v2.3 or later
Maintenance	9.6k baud	38.4k, 19.2k and 9.6k baud
J21	9.6k baud	115.2k and 9.6k baud

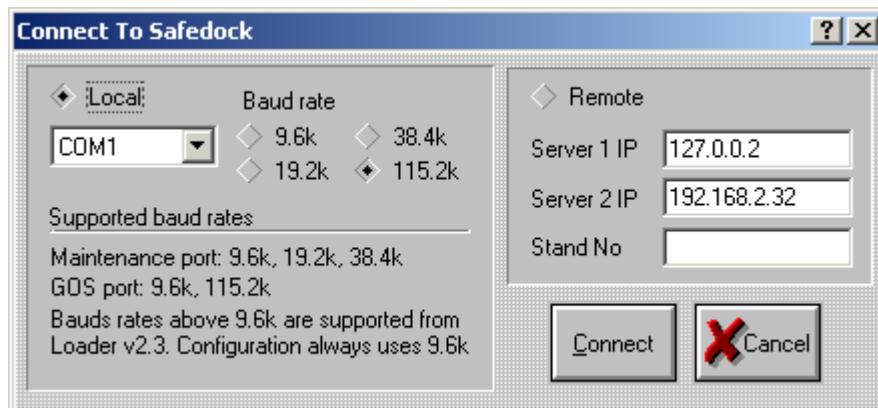


FIGURE 4A.5 CONNECTION DIALOG BOX - PROGRAM LOADER

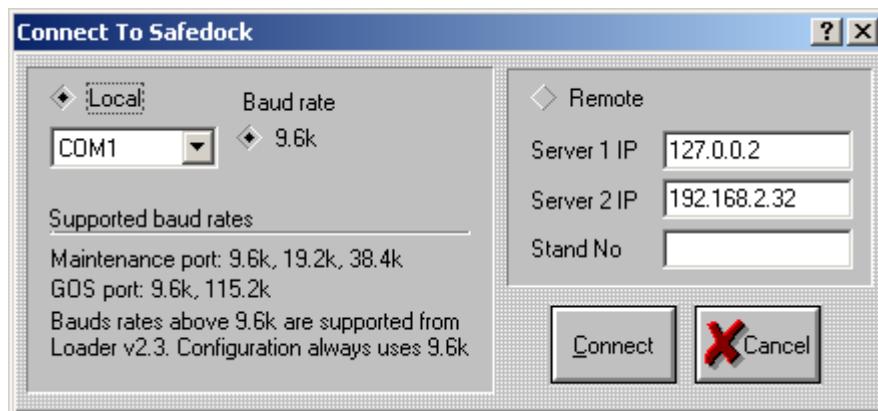


FIGURE 4A.6 CONNECTION DIALOG BOX - CONFIGURATION

#### 4.3 LOCAL CONNECTION

Local connection is the kind of connection that is mainly used during installation/maintenance of a Safedock system. To connect to a Safedock system via a local connection, follow these steps:

- Select the *Local* option.
- Select the port which the Safedock system is connected to. . The dropdown box used to select the port to use is disabled when the port to use has been specified in the sdconfig.ini file (See information about setting OVERRIDE\_COMM\_PORT above)

- (c) Select the connection speed, or accept the default of 9.6k if you're connecting using the configuration function.

Click the *Connect* button. The program function, *Program Loader* or *Configuration* is now opened and ready to use if the selected port is in communication with the Safedock system.

#### 4.4

#### REMOTE CONNECTION

Connecting remotely to a Safedock system is very similar to a local connection, with the difference that you now need to specify one or two network addresses (depending on the number of available GOS servers). Follow these steps to connect to a remote system:

- (a) Select the *Remote* option
- (b) Enter the IP address of the GOS server. If redundant servers are used both addresses can be entered and SD Config will automatically connect to the active server.
- (c) Click the *Connect* button. The program function, *Program Loader* or *Configuration* is now opened and ready to use if the selected port is in communication with the Safedock system.

## 5. SAFEDOCK PROGRAM LOAD

### 5.1 SAFEDOCK PROGRAM LOADER DIALOG

#### 5.1.1 General

The SAFEDOCK Program Loader is used for loading new software versions down line to a Safedock system. The user window of this program is shown below, and illustrates the two management systems, of SAFEDOCK and the Maintenance system itself (the PC).

NOTE: Loader version 2.0 and newer will only activate if the emergency stop button is activated. In order to be able to establish a connection between SdConfig and the Loader, the emergency stop button of the Safedock system should be activated.

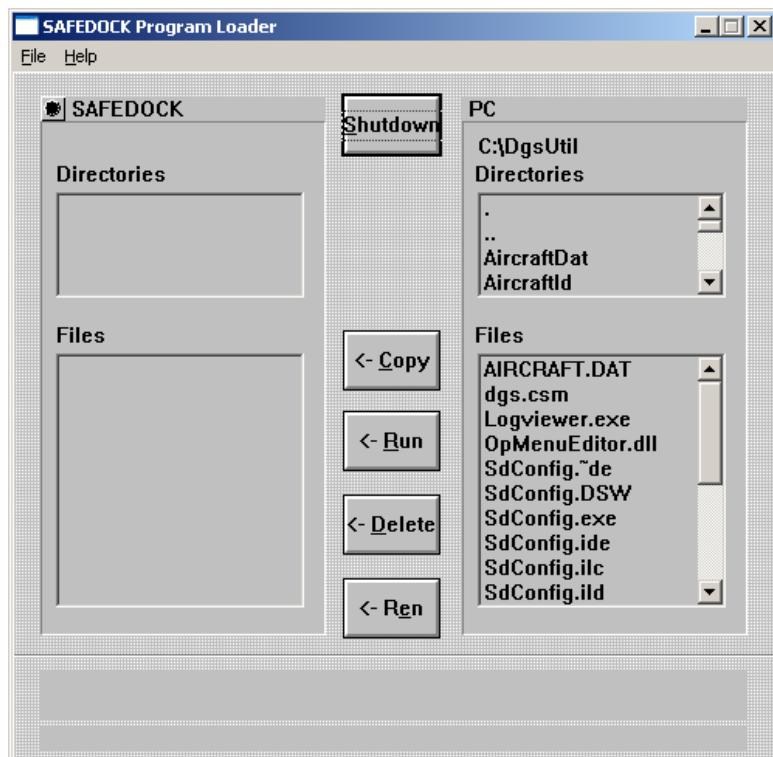


FIGURE 4A.7 PROGRAM LOADER SCREEN

The Loader will start by polling a specific loader address at the connected Safedock system. If Safedock is not in the normal operation mode, its corresponding loader routine will answer the polls, and the round indicator field at the left of the text "SAFEDOCK" on the screen's title bar will flash. Directories and file names will be displayed on the screen, and the system is now ready for software up-dates.

#### 5.1.2 Function Buttons

The Program Loader dialog provides the following functions:

(a) **ShutDwn**

This function is used to Shut Down the Safedock system before Program Load shall be done.

(b) **Copy**

The file to be copied from the PC computer shall first be selected. Clicking the Copy button will create a copy of the file in the root or the selected directory of Safedock.

- (c) **Run**  
An executable file in Safedock can be run by clicking this button.
- (d) **Delete**  
A selected file in Safedock can be deleted using this function.
- (e) **Ren**  
After a file has been selected, clicking this button will give the opportunity to rename the file.

## 5.2 LOG ON TO A SAFEDOCK SYSTEM

### 5.2.1 General

**Note:** The SAFEDOCK system may be installed with an optional authorisation check feature. The description in the sections below is relevant only when this option is installed.

If the Safedock system is in normal operation mode, the program loader must be activated first. This is possible to do if Safedock has status Free Closed or Free Open, which means that no operation is going on at the stand, no error condition exists and no aircraft is parked at the stand. In this case the Safegate system can be forced to enter the "load" state by clicking the "Shutdn" (shut down) button on the screen. However, first this command guides the operator to a log-on procedure, which has to be completed before program load can be performed.

**Caution:** The Stand to be worked on is selected during the preceding CONNECT sequence, where the Stand's name is assigned. When the Loader software has been connected to Safedock, there is no automatic identification made of the Safedock system, as only the loader is active here. Therefore, it is recommended to create an empty directory of Safedock with the name of the stand, e.g. Stand60L. This will help to identify the stand during program load.

### 5.2.2 Log On Procedure

As soon as a maintenance operator wants to send any data to a Safedock system, the window below will pop up, and he has to enter a password. When this is done successfully, the data is automatically loaded down the line to Safedock, and the files of Safedock will be presented on the left side of the Program Loader dialog.

The figure below is an example of password entering dialog box.



FIGURE 4A.8 CONFIRMATION DIALOG BOX

**Note:** Maintenance password used for this kind of confirmation is set from the menu "New Password" of the dialog "SAFEDOCK Configuration".

### 5.3

#### PROGRAM LOAD

##### 5.3.1

#### Software Release

Suppose that the new release of SAFEDOCK software is stored on the PC disk. The file name would be Sdnnn-NNN.exe, where Sd stands for Safedock, nnn is the version number and NNN is the airport denomination.

##### 5.3.2

#### Load Procedure

The load procedure shall be done according the following sequence:

- (a) Copy the new file Sdnnn-NNN.exe from the PC to SAFEDOCK's root directory. A copying file message will be displayed. The data transfer is completed, when the message 'Copying file Sdnnn-NNN.exe done' is displayed.
- (b) Rename Sdnnn-NNN.exe, and set the new name SAFEDOCK.EXE. At this moment the old EXE file will be deleted automatically, and after that the new file will be renamed.
- (c) Exit Program Loader. The Safedock system will start up within a minute.
- (d) Check the Safedock configuration of stop distances per aircraft type.
- (e) Complete the procedure by making a walk-test.

## 6. SAFEDOCK CONFIGURATION DIALOGS

### 6.1 GENERAL

The SAFEDOCK Configuration System, which is installed on a maintenance PC platform, comprises one main dialog and another four dialog boxes:

SAFEDOCK Configuration, with:

- (i) Stand Configuration
- (ii) Operator Panel Layout
- (iii) SAFEDOCK Parameters
- (iv) SAFEDOCK Calibrate dialog

This section contains a brief explanation about each screen and its functions.

### 6.2 SAFEDOCK CONFIGURATION MAIN DIALOG

#### 6.2.1 General

The SAFEDOCK Configuration dialog consists of a menu, two status fields, four system operation buttons, and a system message field. The menu provides access to a set of system functions.

Parameters and Aircraft profiles are stored in the file AIRCRAFT.DAT and the directory PROFILES respectively. It is important that these two items are in the same directory as SDCONFIG.EXE for making the configuration of Safedock work.

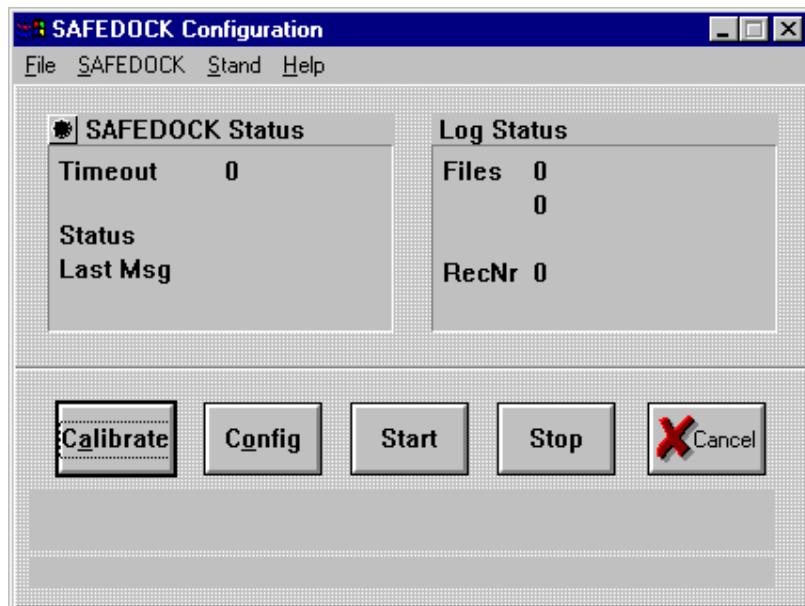


FIGURE 4A.9 STAND CONFIGURATION MAIN SCREEN

#### 6.2.2 Functions from the Menu bar

The menu contains the following submenus and functions:

(a) **File: Exit**

This menu option exits the configuration part of program. The program can also be exited by pressing the 'Esc' key or the 'Cancel' button.

- (b) **SAFEDOCK: Get Log**  
This menu option starts a dump of the logged data from the last docking made by the SAFEDOCK system. The last docking is held in volatile memory on the Control Unit, and is valid as long as the SAFEDOCK system has not been powered down. The log is reset every time a new docking is started.
- (c) **SAFEDOCK: Get Shortlog**  
This menu option starts a dump of the last docking events in short format. Before the dump is started, a "Save As" dialog box will be displayed so that the log file can be saved with a specific name.
- (d) **SAFEDOCK: Get Amplog (option)**  
This menu option starts a dump of laser amplitude information, which can be recorded during self-test.
- (e) **SAFEDOCK: Reset**  
This function will restart the SAFEDOCK Control Unit.
- (f) **SAFEDOCK: Set Date and Time**  
This function sets Date and Time on the SAFEDOCK. These data are retrieved from the PC running this program. When this menu is selected, date and time are sent to SAFEDOCK.
- (g) **SAFEDOCK: New password**  
This function is used, when creating new password for maintenance staff
- (h) **SAFEDOCK: Erase password**  
The supervisor uses this function, when the maintenance password has to be erased.
- (i) **SAFEDOCK: Operator Password**  
Maintenance staff uses this function for creating new passwords for Safegate operators.
- (j) **SAFEDOCK: Aircraft.Dat Version**  
This function is used to display the version ID of the Aircraft.Dat data file used by the SdConfig tool.
- (k) **SAFEDOCK: Erase stand Cfg: (option with old Controller Boards)**  
Erases on board FLASH memory. This option must be used when FLASH write errors occur.
- (l) **Stand: Configure**  
Used to access the SAFEDOCK Stand Configuration mode.
- (m) **Stand: Calibrate**  
Used to access the SAFEDOCK Calibration mode.
- (n) **Help: About**  
Display version information about the Configuration System

## 6.2.3

### SAFEDOCK Status Field

The 'SAFEDOCK Status' field displays information about the current state of the SAFEDOCK system:

- (a) **Communication Indicator**  
The round communication indicator located in the top left corner of the SAFEDOCK Status field, flashes black/white for each successful communication attempt between the maintenance PC and the SAFEDOCK system.

(b) **Time-out**

The time-out field indicates the number of failed communication attempts, made by the maintenance PC, to the SAFEDOCK system. A single count indicates the SAFEDOCK system is busy. A continuing count means there is a problem with the communication between the PC and the SAFEDOCK.

(c) **Status**

The mode, or status, of the SAFEDOCK system is reflected in the status field.

The possible modes are:

- (i) Idle - The SAFEDOCK is ready to start a new docking
- (ii) Start - A docking has been started, and the SAFEDOCK is performing a system start-up test.
- (iii) Catching - The SAFEDOCK is looking for an aircraft.
- (iv) Tracking - The SAFEDOCK is locked onto an object (aircraft).

(d) **Last Msg**

The Last Msg (last message) field displays the last docking status message sent by the SAFEDOCK. The possible messages are:

- (i) Restarted - The SAFEDOCK system has restarted.
- (ii) Start Docking - A new docking has been started.
- (iii) Catch Found - An object has been detected in the catching area.
- (iv) Catch Failed - The docking has been aborted during capture.
- (v) Lost Track - The SAFEDOCK has failed to lock on to an object.
- (vi) Identified - The object has been identified as an aircraft of the selected type.
- (vii) Id Failed - The docking has been aborted. The SAFEDOCK has failed to identify the object as an aircraft of the selected type.
- (viii) Aborted - The docking has been aborted.
- (ix) Too far - The aircraft has travelled past the 'too far' limit for the aircraft type.
- (x) Docking OK - The aircraft has reached the correct stopping position.
- (xi) Mirror Error - An error controlling the mirrors has been detected. The docking attempt is aborted.
- (xii) Laser Error - An error with the laser range finder has been detected. The docking attempt is aborted.
- (xiii) Auto Cal Error - The SAFEDOCK has failed to find the calibration plate during auto calibration. The docking will not be allowed to continue.

## 6.2.4

### Log Status Field

The log status field displays information for transfer of SAFEDOCK log data to the maintenance PC.

(a) **Files**

The files field displays the number of log files received since the counter was last reset. If the maintenance PC is connected to the SAFEDOCK at the end of a docking, the log data will automatically be transferred to the PC. The log data will be saved in a file named with date and time from the PC clock with the extension \*.SDL (e.g. 01241135.SDL).

(b) **RecNr**

The RecNr (record number) displays the number of records of log data that have been transferred. At the end of a successful download, the message 'Rec OK' will be displayed.

#### 6.2.5

##### Function Buttons

The SAFEDOCK Configuration system, which has a Start and Stop function button, also incorporates direct access function buttons for the SAFEDOCK Calibrate and Stand Configuration (Config) programs.

(a) **Calibrate**

The calibrate button is used to enter the SAFEDOCK Calibration mode.

(b) **Config**

Used to access the STAND Configuration mode.

(c) **Start**

The start button is used to start a docking from the maintenance program.  
Used for testing only.

(d) **Stop**

The stop button is used to abort a docking from the maintenance PC. Used for testing only.

(e) **Cancel**

The cancel button is used to exit the configuration part of program.

#### 6.2.6

##### SAFEDOCK System Message Field

The system message field is used to display miscellaneous messages generated by the SAFEDOCK system.

#### 6.3

##### CALIBRATION DIALOG – BLACK AND WHITE

#### 6.3.1

##### General

The calibration dialog box is used to set and check the sighting points for the SAFEDOCK system. The dialog box comprises a SAFEDOCK View window, a Depth field, a Marker field and a sweep Count field. A Sighting point selector field refers to the Forward Offset and Calibration view Offset fields. A Centre line Definition field refers to the sighting points displayed in the SAFEDOCK View window (only version 5 or higher).

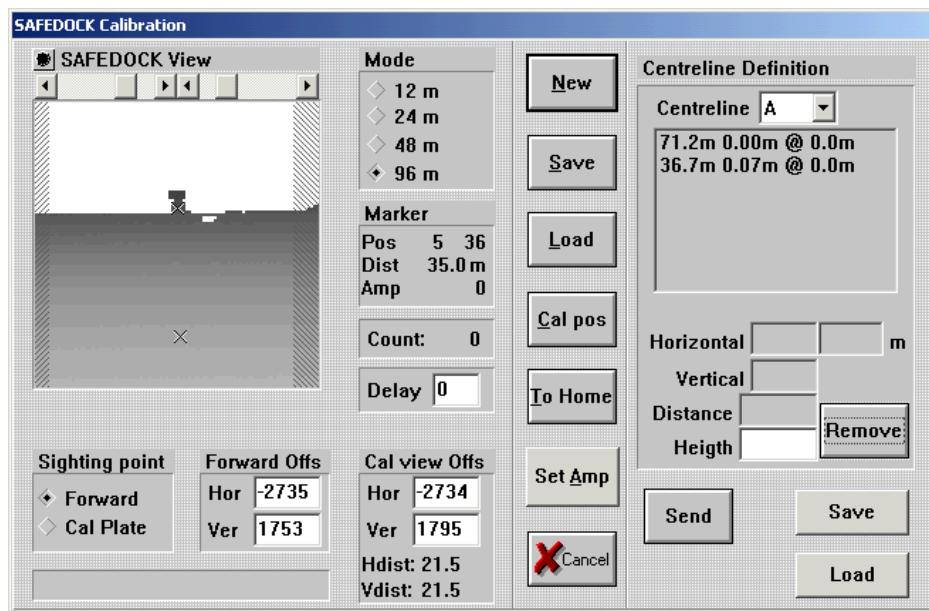


FIGURE 4A.10 CALIBRATION SCREEN

### 6.3.2

#### SAFEDOCK View Window

The ‘View’ window is used to display the range values transmitted by the laser unit. The distance values are displayed using a 128 grey scale screen. The darker the colour is, the longer is the distance. No echo or an echo with a low intensity is indicated by the colour white. The grey scale/range depth can be changed via the depth field.

After completing an entire picture scan, a thin cross is displayed in the centre of the view. The centre of this cross represents the system sighting point (forward view only). This only applies to Safedock versions older than 5. In newer versions a small cross in the View window displays each point defining the centreline.

Placing the cursor in the required position and pressing the right mouse button can check the exact distance value for each point. The distance to the selected point will be displayed in the marker field.

### 6.3.3

#### Data Fields

##### (a) Mode

The depth buttons are used to change the depth colour resolution for the SAFEDOCK View. Large depth values will show less detail. Everything beyond the depth value will be shown in black and the resolution will become coarser.

##### (b) Marker field

The marker field can be used to check the distance value for a single echo in the SAFEDOCK view window. To display the single echo position in the marker field, move the cursor to the required location in the view window, and click on the right mouse button.

##### (c) Sweep Count field

The sweep count field displays the number of sweeps made by the scanning unit and recorded by the maintenance PC. A complete picture scan comprises 100 sweeps, each with 100 echoes. To scan a new picture, wait until the count is 0 (empty), or 100 (completed).

##### (d) Delay field

The delay field can be used to insert a time delay between pressing the 'new' button and start of picture scan. This delay gives the user time to position him on the centreline before the system starts to scan a new picture.

- (e) **Sighting Point field**  
The field facilitates setting or checking of the forward or calibration plate sighting points. The forward view, which is used during a docking, should be set parallel to the centreline. The calibration plate view is the one, where SAFEDOCK expects to find the calibration reference object.
- (f) **Forward Offset field**  
The forward offset is the distance the mirrors must travel from the fixed 'home' position to find the forward sighting point. The offset values range from -3200 to +3200.
- (g) **Cal View Offset field**  
The distance that the mirrors must travel from the fixed 'home' position, to find the view of the calibration object.
- (h) **Centre line Definition Field**  
This field consist of a list of points defining the centreline.
- (i) **Horizontal**  
This is the horizontal stepper motor position for the selected centreline point.
- (j) **Vertical**  
This is the vertical stepper motor position for the selected centreline point.
- (k) **Distance**  
This is the distance between the laser unit and the selected centreline point.
- (l) **Height**  
This is the vertical distance from ground to the calibration object. This distance will be set to 0.0 meters as the system uses the ground level as calibration point.
- (m) **Centreline**  
This selector field defines the active centreline. The Safedock system can optionally be configured to handle up to three centrelines (A, B and C). When a new centreline is to be defined/observed, the user can use this centreline selector to select which centreline to be defined/observed.
- (n) **Left/Right clip adjustment**  
Above the 'Safedock View Window' there are two horizontal scrollbars. By dragging the scrollbars, the system can be instructed to ignore fixed objects at the left and/or right edges of the laser scanning unit's field of view, when it attempts to detect an approaching aircraft. The area that the system will ignore will be greyed-out in the View window. The left/right clip area is configured individually per centreline.  
This feature is implemented for Safedock version 5.40 or higher.

### 6.3.4

#### Function Buttons

The function buttons are used for the operation of the calibration mode.

- (a) **New**  
The New button transmits the new offset values to the SAFEDOCK system, and start gathering a new picture scan to verify the sighting point.  
This function is protected by a confirmation code to avoid unintentional alteration of the settings.
- (b) **Save (Safedock view)**

- The leftmost Save button is used to save a copy of the current scanned picture for later review.
- (c) **Load (Safedock view)**  
Used to load a previously saved scanned picture.
- (d) **Cal Pos/Cal Mode**  
This function is used to mark the position of the calibration object within the calibration view.  
When the Check box 'Cal Plate' under Sighting Points is checked, the button will have the text 'Cal Pos'. When check box 'Forward' under Sighting Points is checked, the button will have the text 'Cal Mode' (this only applies to Safedock version 5.0+ or higher)  
When 'Cal Pos' mode is activated, calibration control checkpoints can be defined. When 'Cal Mode' is activated, definition of centreline can be done.
- (e) **Save (Centreline definition)**  
The rightmost Save' button is used to save the centerline definition to disk.
- (f) **Load (Centreline definition)**  
The rightmost 'Load' button is used to load a centerline definition from disk.
- (g) **Send**  
The Send' button is used to download the centerline definition to Safedock.
- (h) **Cancel**  
The Cancel button is used to exit the calibration dialog box.
- (i) **To Home**  
This function is used for finding the distance from current mirror position to the home position of the stepper motors.  
To check the home position, first the mirrors must be manually turned and directed to a position pointing toward the centreline. After that the 'To Home' button is pressed, and the number of steps, corresponding to the distance, will appear in the 'Forward Offs' box.  
These offset values can now be used as a sighting point when making a new calibration picture.
- (j) **Set Amp**  
This function button is not used.

## 6.4

### CALIBRATION DIALOG – COLOUR

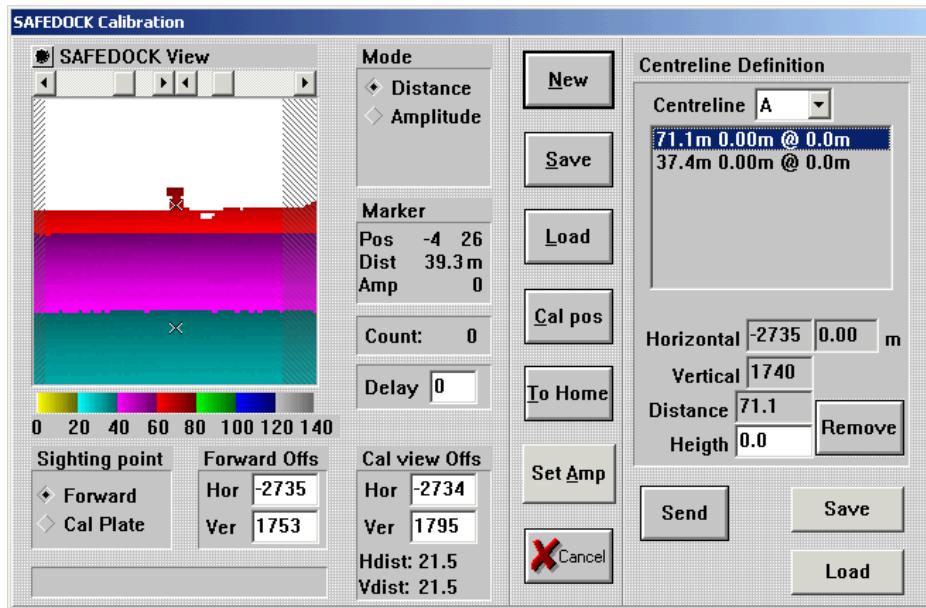


FIGURE 4A.11 CALIBRATION SCREEN

#### 6.4.1

##### General

From version 2.5 and higher there is a colour option added to SDConfig.exe. The functionality is the same as described above. However, the SAFEDOCK View Window displays the range values transmitted by the laser unit using a colour representation of the distance value. A colour bar is also added below the 'View Window' to give the user a reference. The colours make it easier to distinguish details in the picture.

When using colour mode, the function of the 'Mode' field changes from 'depth' selector to distance or amplitude selector.

#### 6.4.2

##### Mode Field

###### (a) Distance

The 'distance' mode is used when distance values are to be displayed in the 'View Window'.

###### (b) Amplitude

In amplitude mode, the 'Safedock View Window' will display the amplitude values from the laser unit. This function requires a laser unit supporting amplitude values.

## 6.5

### STAND CONFIGURATION DIALOG

#### 6.5.1

##### General

The stand configuration dialog box is accessed via the "Config" button in the SAFEDOCK Configuration screen. The dialog box is used to select aircraft types for docking and to set and modify stop positions for the aircraft types. The dialog box comprises several function buttons, a stand identification field, and an aircraft data field.

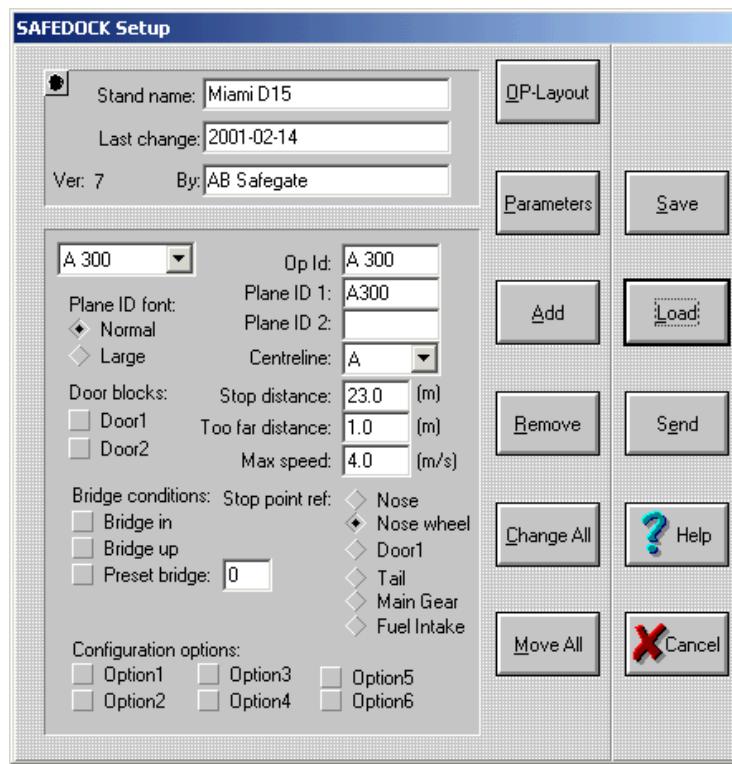


FIGURE 4A.12 STAND CONFIGURATION DIALOG BOX

### 6.5.2 Function Buttons

The Stand Configuration Dialog also incorporates 11 direct access function buttons. These are:

- OP-Layout**  
This function is used to configure the Operator Panel of the SAFEDOCK system.
- Parameters**  
This function is used to access the stand installation parameters.
- Add**  
This function allows a new aircraft type to be added to the set of aircraft types configured to dock, using the SAFEDOCK system.
- Remove**  
This function removes the currently selected aircraft type from the set of aircraft types configured.
- Change All**  
The function allows the setting of a new absolute stop position for all configured aircraft types. This function, with the dialog box below, is normally used only when a new stand configuration is being created.

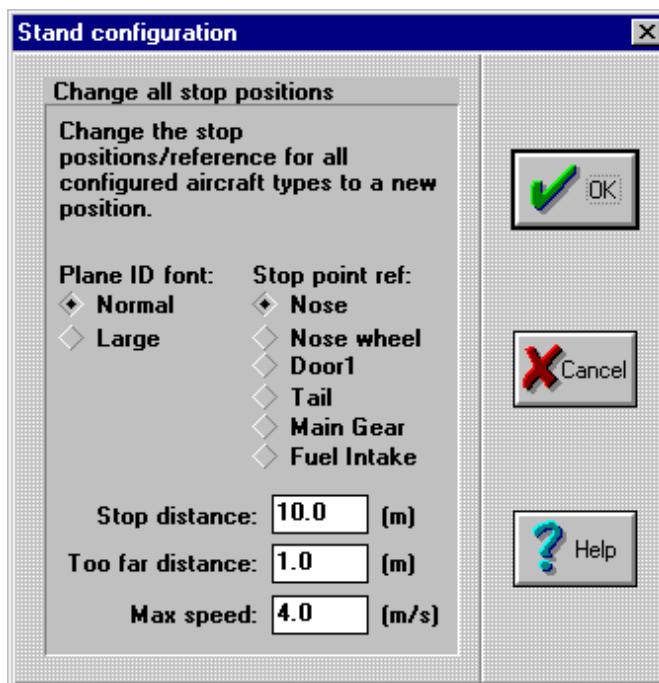


FIGURE 4A.13 CHANGE ALL DIALOG BOX

(f) **Move All**

This function, with the dialog box below, is used to move the stop position, for all configured aircraft types, the same length relative to the old stop position. Normally this is used for fine adjustment of the stop positions during installation.

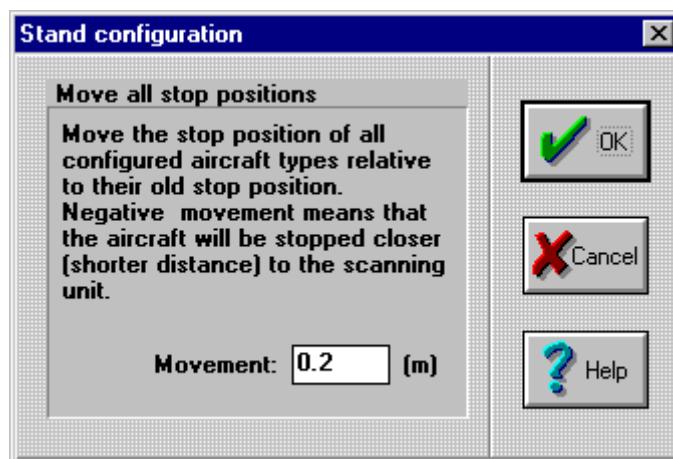


FIGURE 4A.14 MOVE ALL DIALOG BOX

(g) **Save**

Allows the current configuration to be saved to disk on the maintenance computer. It is recommended that a copy of the current configuration, for each SAFEDOCK system, is kept on a diskette. Such a back-up facility will permit

the configuration of the system to be restored, if a system part needs to be replaced.

(h) **Load**

Allows a previously saved configuration to be restored from disk. The loaded configuration can then be sent to the SAFEDOCK system (see Function buttons, Save).

(i) **Send**

Sends the current configuration to the SAFEDOCK system. After this function is performed, the SAFEDOCK system will check the new aircraft types against the aircraft profile database currently loaded into the system. If a new aircraft type has been added, the SAFEDOCK system will request a new set of profiles. A message will be displayed while the new profile is being downloaded. This function is protected by a confirmation code to avoid unintentional alteration of the settings.

A correct data transfer to SAFEDOCK will be confirmed by the message 'Configuration received OK'. This message shall always be checked.

(j) **Cancel**

Exit the stand configuration dialog box.

### 6.5.3

#### The Stand Identification Field

This field is used to identify the stand for which the configuration is made.

(a) **Stand name**

In this field is the name of the Stand, free text.

(b) **Last change**

This field is intended to hold the date of the last change to the configuration.

(c) **By**

This field is intended to hold the signature of the person who made the last change.

### 6.5.4

#### Aircraft Data Field

This field is used for all necessary information on aircraft. Distance stated in metres below, may, as an alternative, be displayed in feet.

(a) **Aircraft type**

The aircraft type drop-down combo contains a list of all the aircraft types currently configured for docking using the SAFEDOCK system. The currently selected aircraft type is displayed on the top of the combo. Use the mouse, or the arrow keys to select a new aircraft type.

(b) **Plane ID font**

The plane ID font selects how the aircraft ID is displayed:

- (i) Normal - A single height font is used for aircraft ID. On systems equipped with two alphanumeric lines, aircraft ID on line 1 and subtype/door information on line 2 will be displayed.
- (ii) Large - A double height font is used for aircraft ID. This option requires a display with two alphanumeric lines. Subtype/door information will be displayed alternating with aircraft ID.

(c) **Plane ID 1 & 2**

These plane ID fields contain the text to be shown on the display for the aircraft:

- (i) Plane ID 1 - The aircraft generic type name.

- (ii) Plane ID 2 - Aircraft subtype displayed together/alternating with aircraft generic type name.
- (d) **OP ID**  
The OP ID field contains the aircraft type name that will be displayed in the operator panel. This is by default the same as the aircraft type displayed in the 'aircraft type' selection box.
- (e) **Centreline**  
The centreline selector field is used to select the centreline to be used for the selected aircraft type. The Safedock system can optionally be equipped to support up to three centrelines (A, B and C).
- (f) **Stop distance**  
The stop distance field displays the current distance (at ground level) from the scanning unit to the selected stop point reference for the aircraft.
- (g) **Too far distance**  
The too far distance field displays the distance, beyond the stop position at which the SAFEDOCK system will display a 'TOO FAR' message. Adjustable in 0.1 m increments; Normal Too Far Distance is 1.0 meter.
- (h) **Max Speed**  
The Max Speed field displays the currently selected max speed for approaching aircraft. Adjustable in 0.1 m/s increments; Normal speed limit is 4.0 m/s.  
Values below 1.0 m/s will disable the 'Slow' down function.
- (i) **Stop point ref**  
The stop point reference buttons display the currently selected stop point reference for the aircraft type.  
The possible stop point references are:
  - (i) Nose - The nose point of the aircraft.
  - (ii) Nose wheel - The aircraft nose wheel.
  - (iii) Door 1 - The forward door of the aircraft. This can be used for stands with a fixed bridge.
  - (iv) Tail - The aircraft tail point.
  - (v) Main gear - The aircraft main gear.
  - (vi) Fuel intake - The fuel intake of the aircraft. This can be used for stands with fixed fuel pits.
- (j) **Door blocks**  
The door blocks are used for aircraft types with two doors (i.e. B747). The facility disables docking to one of the aircraft doors. If a docking is started with a door selection matching a blocked door, the docking will be aborted with an error message.  
The possible door blocks are:
  - (i) Door 1 - No docking to door 1 (forward door) is allowed at this stand for the aircraft type selected.
  - (ii) Door 2 - No docking to door 2 (aft door) is allowed at this stand for the aircraft type selected.
- (k) **Bridge conditions**  
The check boxes for bridge conditions can be used to force the bridge to be in a specific position for docking to start. The bridge conditions correspond to signals sent from the bridge controller unit to the SAFEDOCK system.

The possible bridge conditions are:

- (i) Bridge in - The bridge must be fully retracted, prior to docking.
- (ii) Bridge up - The bridge must be in its upper position, prior to docking.
- (iii) Preset bridge - This condition means that the SAFEDOCK will send the specified code to the bridge controller at the start of a docking of this aircraft type. This signal can be used to pre-set the bridge to an aircraft-dependent position. The valid codes are from 1-63.
- (iv) If the program version includes support for two inputs for Bridge Up, option 5 is used to specify which of the two inputs shall be used for each aircraft type. To use this feature, select Bridge up only for aircraft types using the primary bridge position, and both bridge up and option 5 for aircraft using the alternate bridge position. It is very important that the correctness of this configuration is verified as an erroneous configuration can result in a hazardous situation, which can possibly lead to physical damage to both persons and airport equipment.

(I) **Configuration options**

The six check boxes labelled Option 1 through Option 6 can be used to select site-specific, aircraft type dependent options. Examples of site-specific options are:

- (i) Option 1 can be used to exclude engine measurement from the verification process for the selected aircraft type.
- (ii) Option 2 can be used to tell the system to perform the engine check on the right side (towards the bridge).
- (iii) Option 3 can be used to exclude engine measurement from the verification process for the selected aircraft type during DOWN GRADE conditions only
- (iv) Option 4 can be used to extend the ID FAIL limit with an additional distance of 10m. (10m is the default, but a software with a different distance can be ordered)
- (v) Option 5 can (if the Safedock is configured to use this feature) be used to specify an alternative Bridge Up input.

## 6.6

### OPERATOR PANEL LAYOUT FOR SDK VERSION 5.86 AND EARLIER

#### 6.6.1 General

The Operator Panel Layout Dialog Box is used to select the aircraft types that will be available for direct selection from the operator panel.

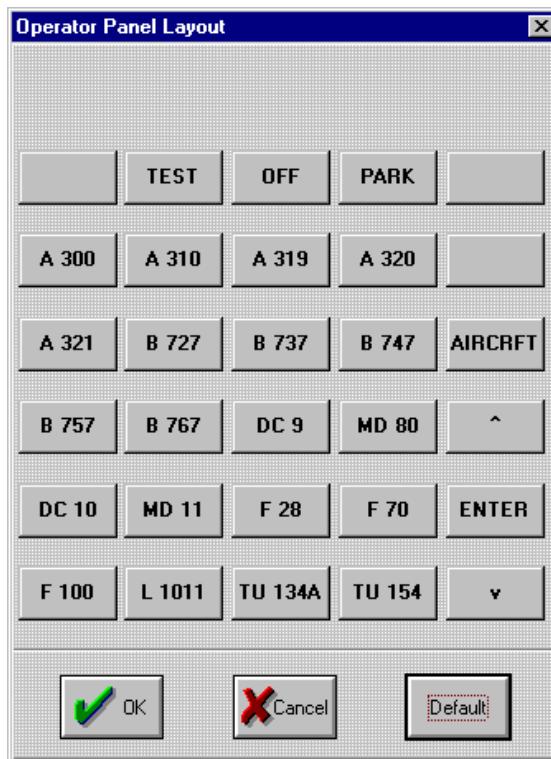


FIGURE 4A.15 OPERATOR PANEL LAYOUT DIALOG BOX

When pressing an aircraft selection button, a dialog box will open, allowing input of the aircraft types to be selected using this button.

#### 6.6.2 Function Buttons

The buttons have the following functions:

- (a) **OK**  
This button is used to confirm the current setting, and return to the stand configuration dialog.  
NOTE: the changes made are only local. To update the SAFEDOCK system, the SEND function must be executed from the stand configuration dialog.
- (b) **Cancel**  
Exit the Operator Panel Layout dialog, without making any changes to the current setting.
- (c) **Default.**  
This function will assign a default aircraft setting to each of the aircraft buttons.
- (d) **Aircraft Buttons**

These functions buttons are customised, intended to be used for the 20 most common aircraft types at the airport. For other aircraft types the scrolling function must be used.

(e) **Decorative Buttons**

The box is made with a number of buttons, which only purpose is to make the outlook more like the actual Operator Panel. These buttons are: TEST, OFF, PARK., AIRCRAFT, ^, ENTER and v. These buttons cannot be configured.

### 6.6.3 Configuration of Aircraft Buttons

By pressing an aircraft selection button, a dialog box will open, allowing configuration of up to 10 aircraft types, selectable using this button on the operator panel. Note that multiple aircraft types per button is an option, the standard system will always use the first aircraft type from the list.

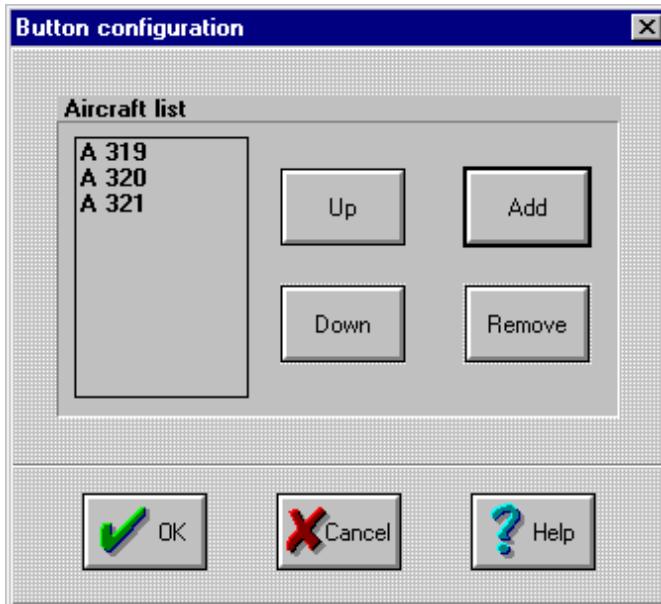


FIGURE 4A.16 AIRCRAFT BUTTON CONFIGURATION DIALOG BOX

A new aircraft type can be added to the list by pressing the Add button, and selecting the new aircraft type from the selection dialogue that will be presented.

An aircraft type can be removed from the list by first selecting the aircraft, and pressing the Remove button.

The Up and Down buttons can be used to change the order of aircraft types in the list by moving the selected aircraft type Up/Down.

NOTE: The changes made are only local. To update the SAFEDOCK system, the SEND function must be executed from the stand configuration dialog. This procedure will require a password.

The aircraft selection procedure at Operator Panel is as follows:

- (a) When the Safedock operator activates a button that is configured with more than one aircraft, the system will present the first aircraft type from this list to the operator.
- (b) The operator can use the up and down arrow keys to select an aircraft from the list.
- (c) The operator confirms the selected aircraft type by pressing the Enter key.

## 6.7

### OPERATOR PANEL LAYOUT FOR SDK VERSION 5.87 AND LATER

#### 6.7.1

##### General

In version 5.87 of Safedock a new file was introduced, named *menu.cfg*. This file specifies the layout of the aircraft selection menu on the Operator Panel.

The new version does *not* replace the old version of the menu editor, it only supports the new version of the menu introduced in Safedock 5.87. Note that the old version of the menu is still supported by Safedock 5.87 and above and some newer versions still use the old menu system.

The menu can be constructed in three ways:

- a) By creating menu nodes for all brands under “Aircraft” and then adding the aircrafts to these nodes, and then assigning aircrafts and brands to the OP panel buttons using shortcuts.
- b) By adding the aircrafts directly to the OP panel buttons.
- c) A combination of A and B.

It's recommended to use option A, since it makes it is the most structured way.

#### 6.7.2

##### Opening the Menu Editor

The new menu editor is opened in the same way as the older version, by clicking the *OP-Layout* button in the SD Config software. Note that the new editor is only opened when the menu was found on the Safedock system. If no menu was found the old version of the editor is opened.

#### 6.7.3

##### Forced Opening of the Menu Editor

The two menu editors can be forced to open by pressing and holding *shift* while clicking the *OP-Layout* button in SD Config. This will reverse the behaviour of the system by opening the new editor, when normally the old version would have been opened and vice versa.

#### 6.7.4

##### User Interface

When the editor is opened any existing menu is loaded into the editor and displayed as shown in the figure below. (Unless opened as described in 6.6.3) The editor consists of the following elements:

- a) **Ok**  
Saves any changes made and closes the editor. Note that all changes are saved locally. If you want to update the Safedock, you must send the configuration by using the *Send* button in SD Config.
- b) **Cancel**  
Closes the editor, discarding all changes.
- c) **Open**  
Opens a dialog, allowing the user to loads a menu from disk into the editor.
- d) **Save As**  
Opens a dialog, allowing the user to save the current menu from the editor to disk. The file name should be <Airport><Stand>.cfg
- e) **Add menu**  
Adds a new menu in the currently selected menu node. Example: BOEING
- f) **Add shortcut**  
Adds a new shortcut in the currently selected menu node. A shortcut is a link to another menu.

**g) Add aircraft**

Adds a new aircraft in the currently selected menu node.

**h) Delete**

Deletes the currently selected item in the menu.

**i) Tree view of menu**

This view shows the layout of the menu.

**j) List of contents in menu node**

This view shows the contents of the currently selected menu node.

**k) Current menu node**

This label shows the full path of the currently selected menu node.

**l) Operator panel**

The Operator Panel simulates the real OP panel by opening the corresponding menu in the tree view.

**m) List of aircrafts in Safedock but not in menu**

This list contains all aircrafts listed in Safedock but not in the menu. These aircrafts can be added using Drag and Drop. Valid targets are the tree view and list view.

**n) List of aircrafts in menu but not listed in Safedock**

This list contains all aircrafts that exist in the menu but are not listed (configured) in Safedock. By selecting an item in this list it is automatically shown in both the tree view and the list view. The aircraft must be deleted or added to the Safedock configuration. Refer to section 6.5. When completing the menu configuration this list shall be empty, as it shall not be possible to select an aircraft that is not configured in Safedock.

By selecting item/items in the list, and right clicking over them, the items can be deleted from the menu.

Letters in the figure below refer to the above section.

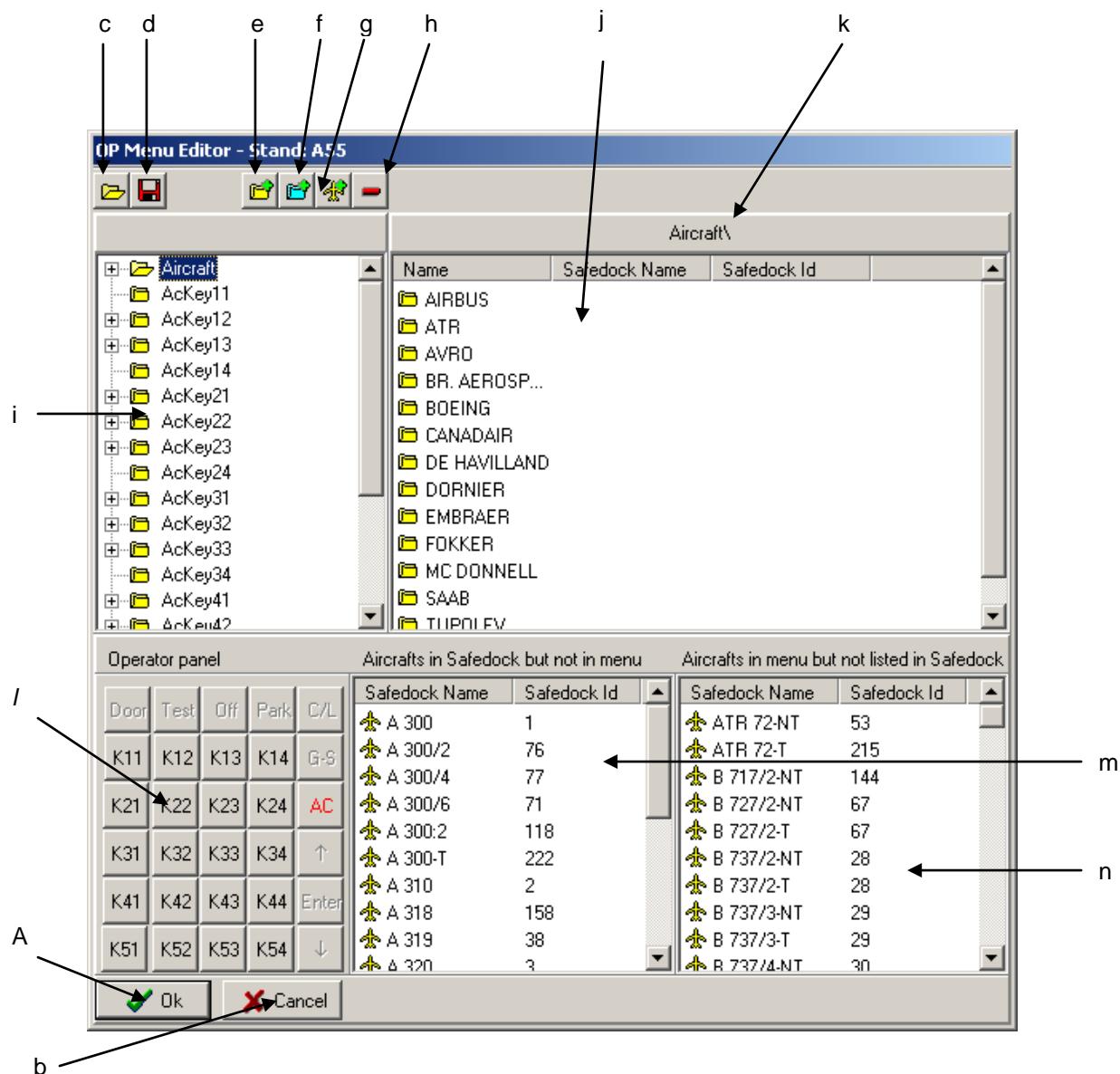


FIGURE 4A.17 NEW OPERATOR PANEL LAYOUT DIALOG BOX

## 6.7.5

### Adding and Deleting Items

Adding and removing menus, shortcuts to menus/aircrafts and aircrafts is done by using the buttons on the top of the editor. Follow these steps to add an item:

- Select the menu node in which you wish to add an item.
- Click the button corresponding to the item you wish to add. The editor now shows one of the following dialog boxes:

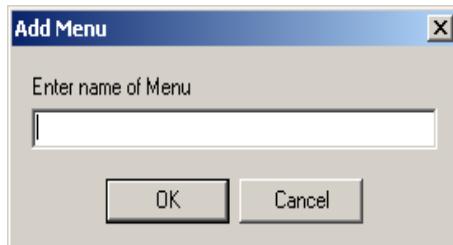


FIGURE 4A.18 ADD MENU



FIGURE 4A.19 SELECT AIRCRAFT

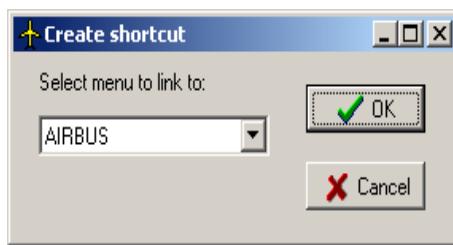


FIGURE 4A.20 CREATE SHORTCUT

- In the case of the Add Menu dialog you simply enter the desired name and click Ok to add it to the menu.

Creating a shortcut is just as simple as adding a menu. The only difference is that you now have a predefined list to choose from. When you have made your choice just press Ok to add the shortcut. Note that only one shortcut can exist in each menu node.

Adding an aircraft is also an easy task. Select the type of aircraft and enter the name. Keep in mind that this is the name that will be shown on the OP panel on the Safedock station.

Deleting an item is done by first selecting the item in the list view and then clicking the delete button. The root elements (Aircraft, AcKeyNN) in the menu cannot be deleted.

**Note:** When a line break is desired in a menu item, the character “^” shall be inserted at the desired position.

## 6.7.6

### Moving Items in the Menu

You can move items in the menu by using "Drag'n'Drop". Valid source/target combinations are the following:

Source	Target	System response
List view	Tree view	The dragged item is moved to the new location.
List view	List view	The dragged item is moved to the new position in the list.

## 6.8 INSTALLATION PARAMETERS

### 6.8.1 General

The SAFEDOCK Parameters dialog box permits the installation (at a stand) of parameters needed to operate the SAFEDOCK system. When the dialog box is opened, the current setting for all parameters has been dumped up-line from SAFEDOCK and is displayed in their respective fields. The unit of measure for all distance values is the meter (m). The SAFEDOCK Parameters dialog box also incorporates four function buttons.

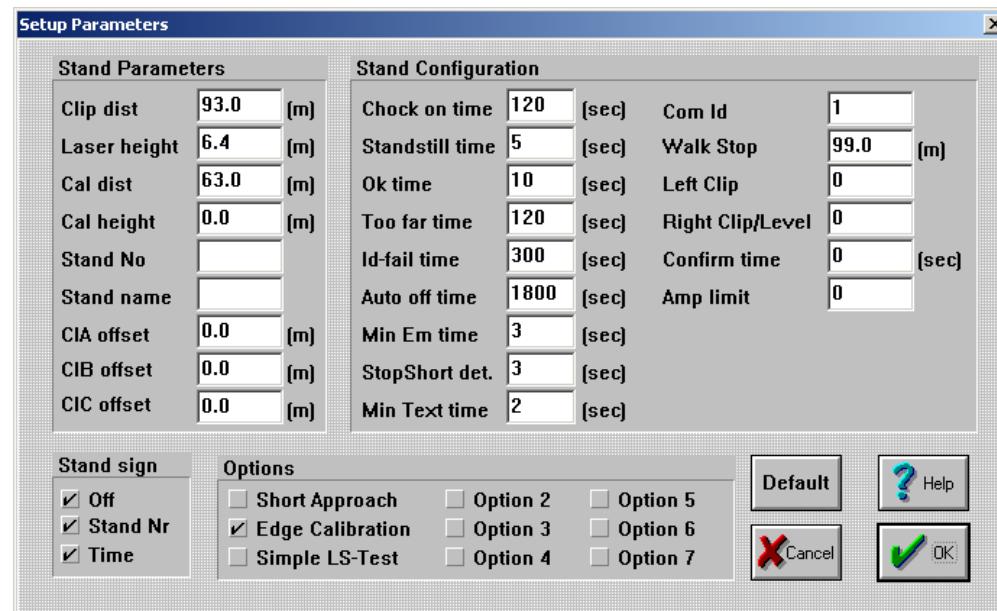


FIGURE 4A.21 SAFEDOCK PARAMETER DIALOG BOX

### 6.8.2 Function Buttons

Function buttons are as follows:

(a) **Default**

This function will set all stand configuration times to their default values.

(b) **Cancel**

Permits an exit of the parameters dialog box without making any changes to the parameters in the SAFEDOCK system.

(c) **OK**

This button is used to confirm the current setting, and to return to the stand configuration dialog.

**NOTE:** The changes made are only local. To update the SAFEDOCK system, the SEND function must be executed from the stand configuration dialog.

### 6.8.3 Stand Parameters

The parameter field contains the following variables:

(a) **Clip dist**

The clip distance is the maximum range considered by the SAFEDOCK system. This is also the maximum distance at which the system will be searching for an approaching aircraft. The maximum range (distance) of

SAFEDOCK must not extend to the taxiway. Failure to comply will mean that SAFEDOCK may detect aircraft passing in front of the laser, on their way to a different stand.

(b) **Laser height**

The Laser height is defined from ground level to the centre of the larger mirror, at which the SAFEDOCK scanning unit has been mounted.

On Safedock version 5 or higher, this is calculated automatically during calibration. It will not be possible to change this field manually.

(c) **Cal dist**

The distance, at ground level, from the scanning unit (front) to the position of the calibration object, used to set the calibration point. On Safedock version 5 or higher, this is calculated automatically during calibration. It will not be possible to change this field manually.

(d) **Cal height**

The height, from ground level, to the centre of the object used to set the calibration point. On Safedock version 5 or higher, this is calculated automatically during calibration. Thus, It will not be possible to change this field manually.

(e) **Stand No**

A text string of up to 5 characters, used for displaying the stand sign when the system is idle.

(f) **Stand name**

An additional text string of up to 5 characters, displayed alternating with the Stand No.

(g) **CIA, CIB, CIC offset**

These parameters are used for small parallel adjustments (< 0.3 metre) of a centreline that has been newly defined.

#### 6.8.4

#### Stand Configuration

Stand Configuration are the significant settings for timers and Com (communication) ID:s for each stand. Please refer to detailed description below. The configuration field contains the following variables:

(a) **Chock on time**

The time (in seconds) that the 'CHOCK ON' message will be displayed.

(b) **Standstill time**

The time (in seconds) that the aircraft must be at a standstill before the docking is considered complete.

(c) **OK time**

The time (in seconds) that the 'OK' message will be displayed.

(d) **Too far time**

The time (in seconds) that the 'TOO FAR' message will be displayed.

(e) **Id fail time**

The time (in seconds) that the 'ID FAIL' message will be displayed. During this time, it is possible to restart the docking without identification, as long as the same aircraft type is selected again.

(f) **Auto Off time**

The maximum time (in seconds) that the system will remain in capture mode. If no object has been detected during this time, the system will shut down.

(g) **Min Em time**

- Minimum time for showing the STOP information on display.
- (h) **StopShort det.**  
The minimum time an aircraft must be found to be at a standstill short of the stop position for a stop short condition to be generated.
- (i) **Min Text time**  
The minimum time an I/O controlled text message, such as Chock on, PCA On/Off and 400Hx On/Off, is displayed, even if another I/O controlled message need to be displayed. Any I/O controlled message that occurs during this time will be queued for later display.
- (j) **Com id**  
Communication ID for the stand. It is only used together with the central docking system GOS.
- (k) **Walk Stop**  
Distance from laser to stop position of walk test. This function is obsolete from SAFEDOCK version 5.40.
- (l) **Left Clip/Right Clip**  
These settings instruct the system to ignore fixed objects at the left and/or right edges of the laser scanning unit's field of view, when it attempts to detect an approaching aircraft.  
This only applies to Safedock version less than 5.40. For version 5.40 or higher, see headline 'Calibration dialog – black and white / Data Fields'.  
From version 7.22, this field can be used to set the stand id when using the SimmTronic interface.
- (m) **Right Clip/Level**  
For version 5.85 or higher this parameter can be used to set the minimum laser amplitude level required for detecting disturbing echoes from the laser window, e.g. VIEW BLOCK detection.
- (n) **Confirm Time**  
The value entered in this field specifies the time, in seconds, to wait for a reply from GOS when an operation that requires a confirmation from GOS is performed.
- (o) **Amp limit**  
This field is no longer in use.

## 6.8.5

### Stand Sign

The Stand Sign options can be individually enabled/disabled. The possible options are:

- (a) Off - The display is blanked.
- (b) Stand No - The display will show Stand number and Stand name; this option would also display current time alternating, with some SAFEDOCK software versions (e.g. Oslo).
- (c) Time - The display will show current time.

Selecting both Stand No and Time means that both these information types can be selected from the Operator Panel.

## 6.8.6 Options

This entry field includes customer's special functions.

(a) **Short Approach**

When short approach is selected, the wing check will only be executed on one side of the aircraft.

(b) **Edge Calibration**

When edge calibration is selected, the Safedock system will use the 'Edge Calibration' method when doing 'auto calibration' check.

If not selected, only a simple calibration check will be done, testing the distance to a defined spot.

(c) **Simple LS-Test**

This option must be used when the LaserScan test is used for first-generation Riegl LRF units. Without this option, a system with a first-generation Riegl LRF will always fail the LaserScan test.

(d) **Option 2**

If the Safedock system is configured to use the 3964R communication protocol for communication with a PBB, this option can be used to set an alternate I/O area. Checking this box will change the base address area to DB30, from its default value of DB20. This allows two Safedock systems to be connected to a single bridge.

(e) **Option 3**

If the Safedock system is configured to use the 3964R communication protocol for communication with a PBB, this option can be used to disable the bridge-in checks done through the protocol. This allows the same software to be run on systems both with and without the required hardware, or to keep the system operational even if the bridge is out of order.

(f) **Option 4-7**

These options are reserved for site-specific variations.

## 7. SAFEDOCK SET-UP PROCEDURE

### 7.1 GENERAL

This section is a step-by-step description of how to perform the set-up of a Safedock system. The set-up is done in the following steps:

- (a) Defining a centreline
- (b) Verifying a centreline definition
- (c) Setting calibration check points
- (d) Configuration of stand parameters such as:
  - (i) Time Parameters and COM ID
  - (ii) Aircraft types
  - (iii) Stop positions per aircraft type
  - (iv) Display format, and other functions per aircraft type
  - (v) Operator Panel keyboard layout
- (e) Backup of Stand configuration files

### 7.2 DEFINING A CENTRELINE

A centreline is defined by a series of lines described by their endpoints. To define a straight centreline on even ground, only two points are required. If the centreline is straight, but the ground slope varies, it is recommended to place a centreline definition point on each break in the ground slope. If the centre line deviates vertically with more than 0.3 m from a straight line, additional definition points must be used (to avoid error in the nose height measurement). To describe a curved centreline, a series of points, 5-10 points, must be entered to describe the curve as a series of lines. The most distant Centreline point shall be at or near the clip distance. The closest CL point shall be at the closest stop position.

A calibration picture can be gathered, either using the 'New' function/button, or by left clicking on the desired centre position for the new picture. A new picture will be collected. No change of the Safedock calibration is made.

When the 'Cal Mode' function is activated, the calibration dialog is extended with a 'Centreline definition' field. This field consists of a centreline selector, a list of points defining the centreline, a data field containing information about the selected CL point, a 'Remove' button to erase the selected CL point, 'Save' and 'Load' buttons to save/load the centreline definition to disk and a 'Send' button to download the centreline definition to Safedock.

Centreline points can be defined in 'distance' or 'amplitude' mode of the calibration picture. The main difference is the reference object needed, to detect and mark the points on the centreline.

In 'distance' mode a CL point is defined by pressing and holding the '**shift**' key while left clicking on the desired point in the picture. An automatic search will be initiated, attempting to find the ground at the centre of the selected object. The new CL point will be marked using a black/white cross in the calibration picture. A CL point can be manually defined by pressing and holding the '**ctrl**' key while left clicking on the desired point in the picture. Using the manual mode can be necessary, if the automatic search fails to correctly identify the ground beneath the object. In 'amplitude' mode only the manual selection method is available.

The procedure for defining a centreline is:

- (a) Place a well-defined object (in 'distance' mode: a plate with width > 0.8m and height > 1.5 m with diffuse white surface; in 'amplitude' mode: a 0.1 x 0.1 m high reflective plate) centred on the centreline, just before the clip distance..
- (b) Enter SAFEDOCK Calibration Dialog, select 'forward sighting point'.

- (c) Activate 'Cal Mode'.
- (d) Use the centreline selector to select the centreline to define.
- (e) Make a calibration picture, where the object is clearly visible: distance or amplitude mode.
- (f) Left click on the reference object in the picture, while pressing the 'shift' key. Use the centre of the object, not the top, to make it easier for the search algorithm. This is only available in 'distance' mode.
- (g) If the automatic search fails to identify the CL point, this point can be erased and a new one entered manually by 'ctrl'-clicking on the desired point.
- (h) Move the object to the next point along the centreline and repeat items e-g. A new picture toward the current position can be taken by pressing the 'New' button. If the centre of the picture must be adjusted for the object to be seen, left click on the desired picture centre.
- (i) If there are fixed objects visible in the calibration view that may interfere with the docking procedure (such as the Passenger boarding bridge), the system can be instructed to ignore any objects to the left/right of the current centreline. Use the two clip control scrollbars located above the calibration view window to adjust the active view area of the system. Any part of the picture not part of the active view will be shown through a grey hatch pattern. Adjust the active view area until any fixed obstacle is completely greyed-out. Pulling the scrollbar all the way to the centre of the view disables side clipping.
- (j) When the centreline definition is completed, it shall be sent to Safedock by activating the 'Send' function. It is recommended to always save a copy of the centreline definition on a diskette. The saved centreline definition can be used to restore the system in case of a hardware failure.
- (k) Perform a 'Walk Test' to verify the centreline, just defined.

All CL points from the selected centreline within the current picture are shown as black/white crosses.

The default top position of a calibration picture is 1 degree above the furthest CL point of centreline A.

NOTE: It's important that the Clip Distance, one of the SAFEDOCK Parameters, is set to a value beyond the furthest point, before the centreline definition procedure is carried out, as no picture will be generated beyond the clip distance.

### 7.3

### VERIFYING A CENTRELINE DEFINITION

An existing centreline definition can be checked using the following procedure:

- (a) Enter SAFEDOCK Calibration Dialog, select 'forward sighting point', and activate 'Cal Mode'.
- (b) Use the centreline selector to select the centreline to verify.
- (c) Check distance/height for each centreline point:
  - (i) Take a calibration picture where the centreline point is visible. As no object is in the picture, only the ground shall be visible.
  - (ii) Position the mouse cursor over the centreline point and 'right click' to display the distance reading to the ground at this point in the 'marker' field.
  - (iii) Compare the distance reading with the stored distance value (from the CL definition field) for this point. Due to the geometrical configuration, a larger difference can be tolerated at longer distances.

- The difference shall not exceed 3% of the stored distance value, i.e. 0.6m at 20m and 3.0m at 100m.
- (d) Check lateral position for each centreline point:
    - (i) Position an object on the centreline at the same distance as the centreline point.
    - (ii) Take a calibration picture where the centreline point and the object are visible.
    - (iii) The centreline point shall be in the centre of the object, as this marks the centre of the actual centreline to use.
  - (e) If a point is found to be incorrect, it must be erased and a new centreline point must be defined.

## 7.4

### SETTING CALIBRATION CHECK POINTS

The calibration check points are used by the system at the start of every docking procedure to verify the operation of the system. Depending on configuration, the Safedock system can use one of the two following calibration check methods: 'Edge Calibration' or 'Non Edge Calibration'. From version 5.60 of Safedock this can be configured with SdConfig, version 3.0 or higher. In older version of Safedock the type of calibration check is hard coded.

#### 7.4.1

##### Edge Calibration

The procedure to create a set of calibration control points is:

- (a) Enter SAFEDOCK Calibration Dialog, select 'Cal Plate sighting point' and take a calibration picture to find the calibration object, the plate or another defined object.

Note that a new centre for the calibration picture is set, whenever the calibration picture is left-clicked in 'Cal Point' mode. This is the procedure to find the calibration object.
- (b) When the object has been found in the picture, then make a *distance check* by setting the crosshair in the middle of the calibration object and press the right mouse button a couple of times. Note the distance values. These should be consistent to the object distance.
- (c) Check also that the distance to objects outside the edges of the calibration object is more than 1 metre away.
- (d) Press "Cal Pos". The program will first ask for a horizontal 'calibration edge' (the edge found during a horizontal scan). Locate the crosshair on the intended calibration object, close to the edge, and press the left mouse button. A horizontal line will be marked across the picture, with a small notch where the edge is expected.
- (e) The program will then ask for a vertical 'calibration edge' (the edge found during a vertical scan). Repeat the process for the vertical 'calibration edge', by marking an edge of the vertical sweep.
- (f) Confirm both edge selections by pressing the 'Cal pos' button again. This action will down load the new calibration edge parameters to Safedock. After that the 'Hdist' and 'Vdist' fields shall have distance values, which must not diverge more than  $\pm 0.1$  metre from the distance checked above.
- (g) The horizontal and vertical positions of calibration edges can, but need not, be on the same object. They must always be visible within the same scanned picture, however.
- (h) Verify this calibration setup procedure by starting docking a couple of times, observing the result of the calibration test. Check the 'HEdge' and 'VEdge' parameters on the bottom row of the SAFEDOCK Configuration Dialog. Each

value should not exceed 2. If one of these values exceeds 4, AUTO CAL ERROR will be displayed, and the calibration set-up procedure described here, has to be repeated.

#### 7.4.2

#### Non Edge Calibration

This method is equal to 'Edge Calibration' except when horizontal and vertical 'calibration edge' is selected. This method doesn't require the calibration checkpoints to be located close to the edge of the defined calibration obstacle.

### 7.5

### CONFIGURATION OF STAND PARAMETERS

When the SAFEDOCK system has been installed and calibrated, the set-up procedure can take place for the particular Stand concerned. This section describes the moments to be carried out and how to manage the configuration data for each Stand. Please refer to the above paragraph 'Stand Configuration Dialog'.

A configuration file for each Stand shall be maintained throughout the system life cycle.

After the Stand Configuration dialog is entered, the configuration shall be carried out as follows:

- (a) Enter Stand name, date of this change and the maintenance operator name. These data will be a part of the stand configuration file to be stored later on.
- (b) Click the 'Parameters' button to enter the SAFEDOCK Parameter dialog. The following parameters shall be stated:
  - (i) Clip distance, the maximum sight range of the laser scanner
  - (ii) Stand No and Stand name, two alternating text strings that can be displayed
  - (iii) Centreline offset
  - (iv) Chock on time; Standstill time; OK time; Too far time; Id-fail time; Auto off time; and Min Em time
  - (v) Com Id that shall be 0, when GOS is not used. Otherwise it's the COM address, known by GOS.
  - (vi) Walk Test stop position
  - (vii) The parameter 'Right Clip' can be used to adjust the sensitivity of VIEW BLOCK detection. Please refer to the section below.
  - (viii) Confirm time; which is the maximum time for waiting on a response from GOS/FIS upon a 'Docking Request' query.
  - (ix) Finally the Stand Sign options shall be selected: Off, Stand No and/or Time
- (c) The sensitivity of VIEW BLOCK detection is adjusted, when required, as follows:
  - (i) Make sure that the window and mirrors are acceptably clean
  - (ii) Take a calibration picture aimed above ground level, such that no object is present in the system's view. A series of yellow echoes with distances in the range of 0.2 – 0.4 m should be present. It is these echoes that cause the 'View Blocked' condition.
  - (iii) Note the average amplitude value from these yellow echoes. The amplitudes should be fairly low (<10), as the window is acceptably clean
  - (iv) Enter Parameter mode in Safedock configuration
  - (v) Enter the noted amplitude value +1 as the 'Right Clip' parameter and send the configuration back to Safedock
  - (vi) Start a docking procedure. No 'View Blocked' condition should occur

- (vii) If the 'View Blocked' condition remains, increase the amplitude value by one and repeat from (iv)
  - (viii) Position a blocking object in front of the window and start a docking procedure. The docking shall be aborted with VIEW BLOCK.
- (d) From the Stand Configuration Dialog aircraft types, that are relevant for the stand, must be added one at a time. Please note that the software item AIRCRAFT.DAT must be in the same directory as SDCONFIG.EXE. For each aircraft type the following parameters must be entered:
- (i) Plane ID font, Normal or Large.
  - (ii) Bridge connections used; Bridge In signal and/or Bridge Out signal; also if the 'Preset Bridge' option is used, meaning that a special binary code for aircraft type is passed to the Bridge system. '0' would mean no such interface.
  - (iii) 'Op Id', which means the aircraft type/subtype that shall be displayed on the Operator panel, when selected.
  - (iv) Plane ID1 and Plane ID2, which are the aircraft type and the subtype to be shown on the SAFEDOCK display, when docking is started.
  - (v) The centreline (A, B or C) to be used for docking of this aircraft type.
  - (vi) Stop distance and reference (nose, wheel or door etc.) for the particular aircraft.
  - (vii) 'Too far' distance, at which the display would show 'Too Far'.
  - (viii) Max Speed, during docking, that would result in a SLOW message.
- Please note that the functions 'Change All' will affect all configured aircraft types, and shall only be used at the very initial configuration of a Stand.
- The function 'Move All' will also affect all the configured aircraft types, and shall only be used for a small adjustment of the stop positions.
- (e) Click the 'OP-Layout' button to enter the Operator Panel Layout dialog. Refer to the above sections OPERATOR PANEL LAYOUT FOR SDK VERSION 5.86 AND EARLIER or OPERATOR PANEL LAYOUT FOR SDK 5.87 AND LATER
- (f) It's recommended that the configuration done so far be SAVED now. The file name should be <Airport><Stand>.gte, but it's up to the operator to assign this file name. If the new Operator Panel Menu type is used also the file <Airport><Stand>.cfg shall be saved.
- (g) The Configuration File shall now be sent to SAFEDOCK, by using the 'Send' button. An old file can be restored from the Maintenance PC by using the 'Load' function, and after that be sent to SAFEDOCK.
- (h) The configuration procedure is completed, when the 'Config Received' message pops up.
- (i) A WalkTest must be performed, before any docking procedure can take place after a reconfiguration of Safedock.

## 7.6

### BACKUP OF STAND CONFIGURATION FILES

A Configuration File, one for each Stand at an airport shall be maintained throughout the life cycle of the docking system. It's recommended that the files should be stored in a directory called SAFEDOCK\STAND, and the name of the files should be [Airport code]\_[Stand name].gte. The operator himself has to assign these names.

A configuration printout program, called StandConfigPrint.exe, is available for making hard copies of these files.

## 8. SAFEDOCK UPDATE PROCEDURES

### 8.1 GENERAL

This section describes the steps to follow when a part of the Safedock system is to be updated. The parts that can be updated include the Safedock program, aircraft data and aircraft profiles.

### 8.2 UPDATING SAFEDOCK PROGRAM

To install a new version of the Safedock program on a system, the following steps must be taken:

- (a) Copy the new program onto the same disk that holds the SDCONFIG.EXE utility program.
- (b) Follow the steps outlined in section 5 to install the new software.

### 8.3 UPDATING AIRCRAFT DATA

All data about the different aircraft types used by the Safedock system are contained in a file named AIRCRAFT.DAT. This file will be updated as needed by Safegate, whenever a new aircraft model is made available for docking to the Safedock system. To update a Safedock system with the new aircraft data, the following steps must be taken:

- (a) Copy the new AIRCRAFT.DAT file into the directory that holds the SDCONFIG.EXE utility program.
- (b) Use the SDCONFIG utility to connect to the Safedock system in configuration mode. Refer to section 6 for details.
- (c) Enter stand configuration.
- (d) As the current configuration of the Safedock system is being dumped to the PC, each aircraft data record is checked against the AIRCRAFT.DAT file. If a newer version of the aircraft data is found in the AIRCRAFT.DAT file, the newer data will be used and an information message is displayed: 'Aircraft nnnn: data updated'.
- (e) If the 'data updated' message was given, the data has been updated on the PC side only. To effectuate the update on the Safedock system, the new data must be loaded onto the Safedock system using the 'SEND' function.

### 8.4 UPDATING AIRCRAFT PROFILES

All aircraft profiles are contained in a sub-directory named 'PROFILES', located in the directory containing the SAFEDOCK.EXE utility program. Each profile set is made up of two files, one for the horizontal profile and one for the vertical. New or updated profiles will be made available as needed by Safegate International AB whenever a new aircraft model is made available for docking to the Safedock system. To update a Safedock system with the new aircraft profile, the following steps must be taken:

- (a) Copy the profile file(s) into the PROFILES directory.
- (b) Use the SDCONFIG utility to connect to the Safedock system in configuration mode. Refer to section 6 for details.
- (c) Enter stand configuration.
- (d) When the dump of the current configuration from Safedock to the PC is finished, activate the 'SEND' function to load the data back onto the Safedock system.
- (e) After the configuration has been sent to the Safedock system, a verification of profiles will be performed. Each profile required by the current configuration of the Safedock will be checked against the profile on the PC. If a newer version is found on the PC it will be downloaded to the Safedock system.

**CHAPTER 4 MAINTENANCE - APPENDIX B**  
**STAND CONFIGURATION PRINTOUT UTILITY**  
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## 1. INTRODUCTION

### 1.1 GENERAL

The utility program StandConfigPrint.exe is built up as a regular text editor with a standard Windows menu, a pop up menu for quick commands and a tool bar. The program can read and printout the following files:

- (a) Safedock Configuration Files (name.gte)
- (b) Safedock Short form log Files (name.slg)
- (c) Any plain text file (name.txt).
- (d) DGS log files (name.sdl).

The program's text editor is a read-only editor. Thus the user will not be able to change the file. The user can open one or several files at the same time, and each file will be separated by a page break. This is only implemented as a separator in the editor and will not be printed out.

Several files can be saved and merged as one text file (name.txt) for future use.

The program also provides a printout option for each specific file. Each file printed out will have a header and footer with different information depending on the file type being processed.

### 1.2 INSTALLATION DIRECTIVES

StandConfPrint.exe is the name of the program file. It shall be noted that the file AIRCRAFT.DAT must be stored in the same directory as StandConfPrint.exe before this program is executed.

## 2. USER INSTRUCTION

The utility program is used as described below:

(a) **To open a file**

Proceed as follows:

- (i) If the new Operator Panel menu system is used in DGS (cannot be displayed by this program) it's convenient to disable display of the old OP menu configuration, which is included in the .gte files. This can be done by checking the 'Ignore Op Menu' item in the 'Format' menu. The program stores the selected option into the registry, and will therefore remember previous selection at restart of the program.
- (ii) Enter the file menu and choose 'Open'. The 'Open' dialog box will show .gte files by default. If a .slg or .sdl file shall be opened, the file specific file format must be selected in the dialog box. The "show all files option" will display all the files in the directory.
- (iii) Mark the file to be opened and press the 'Open' button. The file will now be visible in the text editor window.

(b) **To open several files at one time**

Enter the file menu and choose 'Open'. Hold down the Control key and mark the files you want to open and press the 'Open' button. The files will now be visible in the text editor window. This might take a while depending on the number of files to be opened and the type of computer.

(c) **To open all files at one time**

Enter the file menu and choose 'Open'. Put the cursor over the dialog box and press the left mouse button. Now, press Ctrl + A and all files will now be marked. Press the 'Open' button to process all files.

(d) **To open one file from Windows explorer**

The configuration file types .gte, slg, sdl, or .txt files can be associated with the program, which gives the possibility to open a configuration file by double-clicking on it from explorer.

(e) **To save a file**

Enter the file menu and choose 'Save As'. Enter the name of the file into the File Name Property. If no file extension is provided from the user, the default file extension will be 'txt'.

(f) **Search for a text**

Enter the Search menu and choose 'Find'. A dialog box will appear on the screen. Enter the text string to search for and press 'Find next'.

(g) **Using the Pop Up Menu**

A fast way to access the menu options is to place the cursor over the editor and right click. A menu will be displayed where these commands can be selected. All commands work in the same way as above described.

(h) **Using the Tool Bar**

A fast way to access the 'open', 'save' and 'print' options is to place the cursor over a button and left-click on it with the mouse. To 'open', 'save' and 'print' from here is done the same way as above described. Further, the tool bar also contains a button for program version description.

(i) **To print a file/files**

Proceed as follows:

- (i) Enter the File Menu and choose 'Printer Setup'. Make necessary adjustments for your computer and printer such as Paper orientation,

Paper size and Type of printer to use and press the 'OK' button to confirm and exit.

- (ii) Enter the File Menu and choose 'Print'.
- (iii) Press the 'OK' button to start printing.

(j) **To Select Short Log File Contents**

When a Short Log from Safedock version 5.60 or later is processed, the user is requested to select the type of Short log information to read and printout.

- (i) Docking log, i.e. events from dockings
- (ii) Error log, i.e. error events from dockings
- (iii) Event log, i.e. all events except the docking and error events mentioned above
- (iv) All events, i.e. all events on system (docking, errors, event etc.)

### 3. FILE PRINT-OUT EXAMPLES

#### 3.1 GENERAL

The StandConf Print-Out Utility has support for print-out of the following files:

- (a) Safedock Short Log files (name.slg)
- (b) Safedock Configuration files (name.gte)
- (c) Safedock DGS Log files (name.sdl)
- (d) Any plain text files (name.txt)

The screen and printout layouts are detailed in the following sections.

#### 3.2 SHORT LOG SCREEN LAYOUT

The screen below shows the contents/records of the Short Log file that can be selected (one or several options), after one or several Short Log files have been opened.

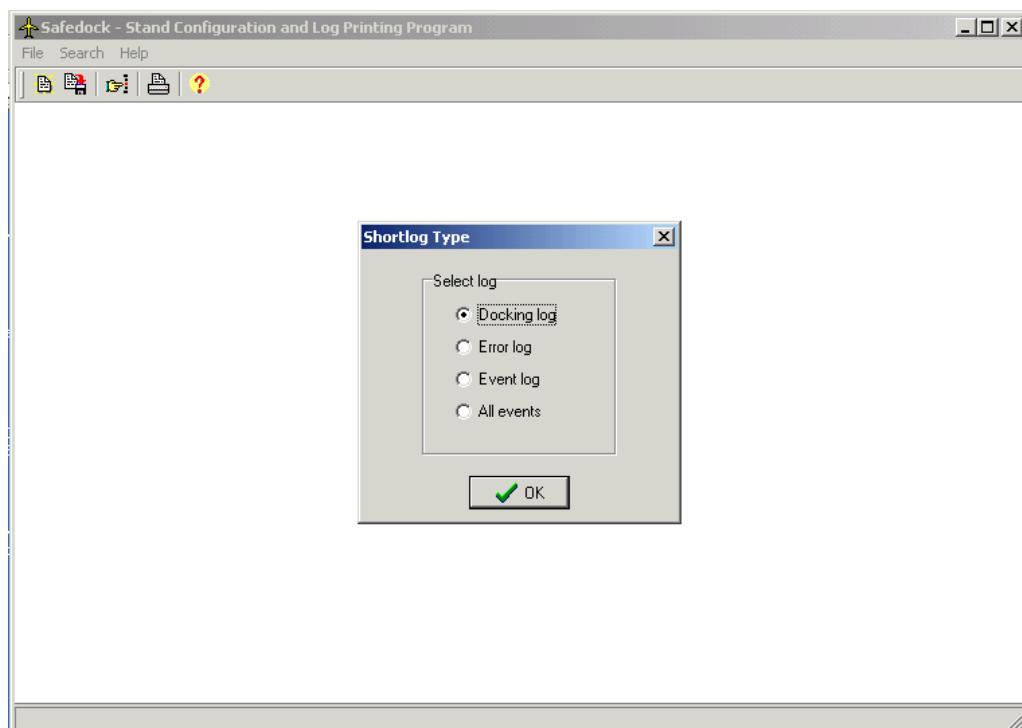


FIGURE 4B.1 SELECTION OF SHORT LOG CONTENTS

The picture below shows the opened Short Log file with the option ‘Docking Log’ contents selected.

Every record starts with a header that includes date and time for docking start. The header of Docking Log records is always ended with the Aircraft Type being docked.

The docking record is stored after the event that terminated the docking procedure, e.g. Shut Down, ParkOn or an Error. Docking records are shown on screen and printed out in chronological order from bottom to top of page.

If no record data follow after the header, this means that docking has been interrupted by some error or a Shut Down command at an early stage.

Safedock - Stand Configuration and Log Printing Program			
File	Search	Format	Help
03-03-06 21:02:18 B 734	21:05:26 Capt 78.8	21:05:41 ID 40.4	21:05:55 Stop 31.5
	21:06:01 Roll 0.3		
03-03-06 18:24:49 B 733	18:25:10 Capt 79.2	18:25:14 ID 64.8	18:25:37 Stop 31.5
	18:25:43 Roll 0.6		
03-03-06 17:19:09 B 734	17:20:03 Capt 70.8	17:24:38 Capt 79.1	17:24:43 ID 61.9
	17:24:54 Stop 31.5	17:25:00 Roll 1.3	
03-03-06 15:24:35 B 734	15:33:09 Capt 78.3	15:33:13 ID 61.3	15:33:28 Stop 31.5
	15:33:34 Roll 1.0		
03-03-06 11:59:21 MD 87	12:00:08 Capt 77.6	12:00:12 ID 56.6	12:00:25 Stop 27.5
	12:00:31 Roll 0.4		
03-03-06 09:53:27 B 763	09:54:54 Capt 78.7	09:55:00 ID 60.2	09:55:25 Stop 27.5
	09:55:32 Roll 0.6		
03-03-06 06:25:49 B 743	06:30:02 Capt 78.9	06:30:07 ID 67.3	06:30:49 Stop 19.5
	06:30:54 Roll 0.9		
02-02-05 10:20:18 A 220			

FIGURE 4B.2 SHORT LOG DOCKING RECORDS

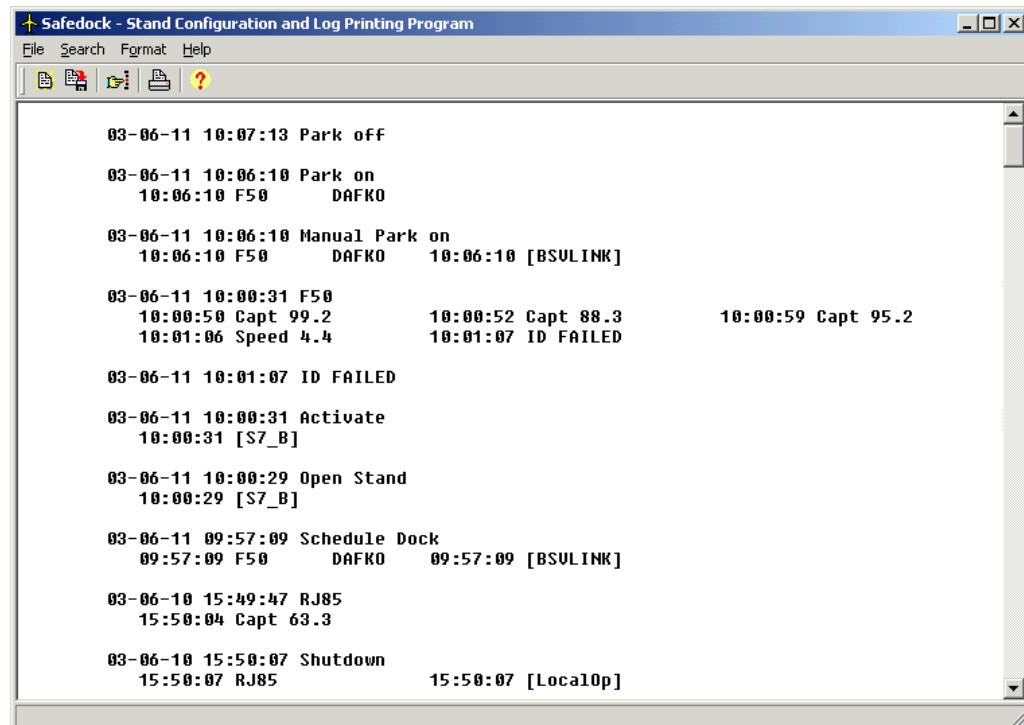
The picture below shows the opened Short Log file with the contents 'All Events' selected.

Every record starts with a header including date and time. The header of an Event (e.g. a command or status change) or an Error always ends with the type of Event or Error being detected.

Note that the header of a Docking Log record is always ended with the Aircraft Type being docked!

Since a docking record is stored after the Event, which terminated the docking procedure (e.g. Shut Down, ParkOn or an Error), these Events will be reported first (from bottom to top of page) on the screen/printout. It means that docking events in the docking record and other (controlling) Events are not reported in a chronological order.

**Note:** Data within brackets indicate the source of command. The data DAFKO in the example below is a Flight reference.



The screenshot shows a Windows application window titled 'Safedock - Stand Configuration and Log Printing Program'. The menu bar includes 'File', 'Search', 'Format', and 'Help'. Below the menu is a toolbar with icons for file operations. The main window displays a log of events. The log entries are as follows:

```
03-06-11 10:07:13 Park off
03-06-11 10:06:10 Park on
    10:06:10 F50      DAFKO
03-06-11 10:06:10 Manual Park on
    10:06:10 F50      DAFKO  10:06:10 [BSULINK]
03-06-11 10:00:31 F50
    10:00:50 Capt 99.2   10:00:52 Capt 88.3   10:00:59 Capt 95.2
    10:01:06 Speed 4.4   10:01:07 ID FAILED
03-06-11 10:01:07 ID FAILED
03-06-11 10:00:31 Activate
    10:00:31 [S7_B]
03-06-11 10:00:29 Open Stand
    10:00:29 [S7_B]
03-06-11 09:57:09 Schedule Dock
    09:57:09 F50      DAFKO  09:57:09 [BSULINK]
03-06-10 15:49:47 RJ85
    15:50:04 Capt 63.3
03-06-10 15:50:07 Shutdown
    15:50:07 RJ85      15:50:07 [LocalOp]
```

FIGURE 4B.3 SHORT LOG ALL EVENTS SELECTED

### 3.3 SAFEDOCK SHORT LOG PRINTOUT

Safedock Short Form Log files (name.slg) have the header and contents illustrated by the example below, when printed out:

SAFEDOCK	SAFEDOCK SHORT FORM LOG	1(1)
	File Name: 30.slg	
00-11-25 20:22:22 Ac B 757		
20:23:37 GATE BLOCKED	20:24:01 Capt 89.5	20:24:05 ID 86.7
20:24:19 Speed 2.8	20:24:28 Stop 50.5	20:24:33 Roll 0.9
00-11-25 18:57:10 Ac B 737		
19:03:22 Capt 88.9	19:03:22 ID 87.4	19:03:48 Stop 50.5
19:03:54 Roll 0.7		
00-11-25 17:46:42 Ac B 757		
17:48:20 Capt 87.6	17:48:23 ID 85.4	17:48:53 Stop 41.5
17:48:59 Roll 0.5		
00-11-25 16:16:29 Ac B 737		
16:18:50 Capt 88.9	16:18:54 ID 87.1	16:19:11 Stop 50.5
16:19:18 Roll 1.0		
00-11-25 14:35:37 Ac B 737		
14:37:36 Capt 87.4	14:37:39 ID 85.8	14:37:58 Stop 50.5
14:38:04 Roll 0.6		
00-11-25 12:11:32 Ac F 70		
12:12:34 Capt 87.8	12:12:35 ID 86.5	12:13:00 Stop 49.8
12:13:06 Roll 0.6		
00-11-25 10:42:04 Ac B 757		
10:42:47 Capt 87.9	10:42:48 ID 85.8	10:43:18 Stop 41.5
10:43:24 Roll 0.5		

### 3.4

#### STAND CONFIGURATION SCREEN LAYOUT

The screen layout below is showing a Safedock Stand Configuration file, where the Operator Panel menu is NOT configured to be 'ignored'.

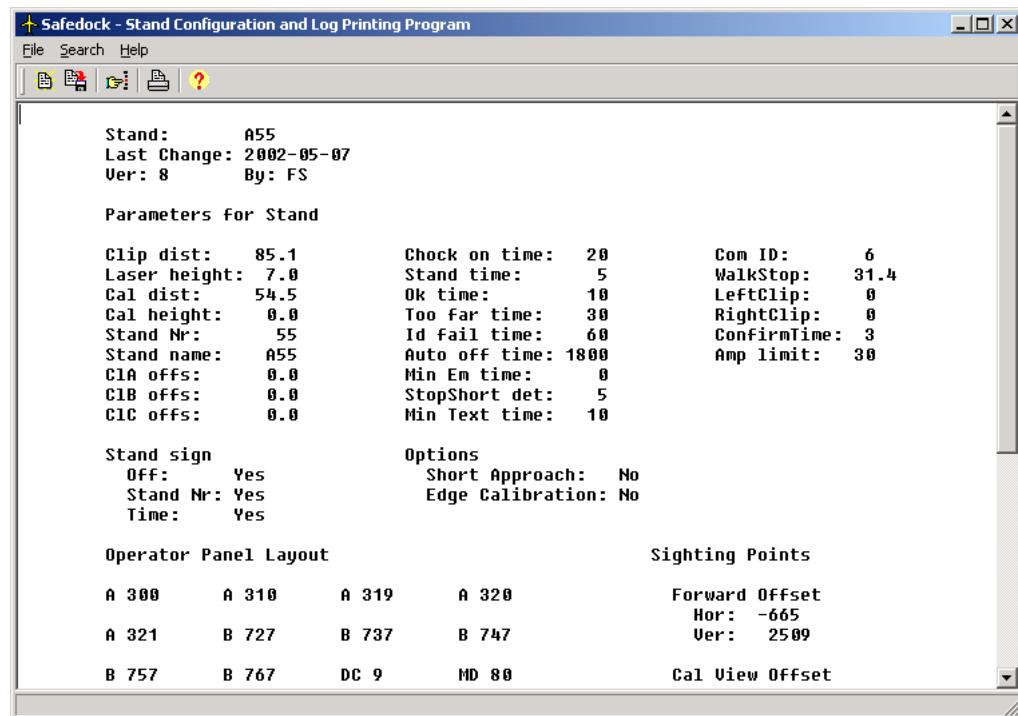


FIGURE 4B.4 CONFIGURATION SCREEN LAYOUT

### 3.5

#### STAND CONFIGURATION PRINTOUT

Stand Configuration Files (name.gte) have the header and contents illustrated by the example below, when printed out. The Operator Panel Menu has NOT been configured to be 'ignored'.

**Note:** This printout can be used at commissioning as a test report after system set-up and check of stop positions (WalkTest).

## SAFEDOCK

### STAND CONFIGURATION FILE NAME: 26A.GTE

1(n)

Stand: GATE26a  
Last Change: 990914  
Ver: 8 By: FSsafegate

#### Parameters for Stand

Clip dist:	75.0	Chock on time:	120	Com ID:	26
Laser height:	7.0	Stand time:	5	WalkStop:	29.2
Cal dist:	52.0	Ok time:	10	LeftClip:	0
Cal height:	0.0	Too far time:	120	RightClip:	0
Stand Nr:	26	Id fail time:	300	ConfirmTime:	5
Stand name:		Auto off time:	1800	Amp limit:	0
CLA offs:	0.1	Min Em Time:	15		
CLB offs:	0.2	StopShort det:	5		
CLC offs:	0.1	Min Text time:	10		

Stand sign	Options
Off: No	Short Approach: No
Stand Nr: Yes	Edge Calibration: Yes
Time: No	

#### Operator Panel Layout

B 737      B 727

MD 80  
DC 9  
MD 90

A 320  
A 319  
A 321

B 757      B 767      ATR 42      DH 7  
                ATR 72      DH 8

F 28      F 27      BAE 146      SF 2000  
F 100      F 50      CANARJ

#### Sighting Points

Forward Offset  
Hor: -2505  
Ver: 2689

Cal View Offset  
Hor: -2366  
Ver: 2641

HDist: 258  
VDist: 260

#### Aircraft Data

Aircraft	Text1	Text2	CL	Stop Dist	Stop Ref	Too Far	Slow Down	Br In	Br Up	Br Code	Door1 Block	Door2 Block	ID Font
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
A 319	A319		A	29.2	Wheel	1.0	2.5	X		0			Std
A 320	A320		B	29.2	Wheel	1.0	2.5	X		0			Std
A 321	A321		C	29.2	Wheel	1.0	2.5	X		0			Std

Stop Dist 29.2 checked: \_

B 737/1	B737		A	31.4	Wheel	1.0	2.5	X		0			Std
B 737/2	B737		A	31.4	Wheel	1.0	2.5	X		0			Std
B 737/3	B737		A	31.4	Wheel	1.0	2.5	X		0			Std

Stop Dist 31.4 checked: \_

.....

Contractor's repr. .... Customer's repr.

### 3.6

### SAFEDOCK LOG SCREEN LAYOUT

The Screen layout below shows a Safedock Log file.

Every record starts with a header that includes date and time for docking start. The header always ends with the Aircraft Type being docked.

Events that could be recorded are described in a section below.

Safedock - Stand Configuration and Log Printing Program			
File	Search	Format	Help
2003-06-11 10:00:31 F50	10:00:50 Capt 99.2	10:00:52 Capt 88.3	10:00:59 Capt 95.2
10:01:01 Centre 78.1	10:01:06 Speed 4.4	10:01:06 16m to stop	
10:01:07 ID FAILED			
2003-06-11 08:02:02 F50	08:02:34 Capt 95.7	08:02:43 Capt 98.6	08:03:16 Capt 91.8
08:05:42 Capt 87.1	08:05:45 Capt 90.0	08:07:20 Capt 98.4	
08:07:22 Right 87.3	08:07:23 Centre 85.3	08:07:26 ID 72.7	
08:07:31 16m to stop	08:07:32 Speed 3.0	08:07:37 Stop 44.3	
08:07:43 Roll 1.5	08:07:43 Too far 1.5		
2003-06-09 13:50:13 F50	13:52:16 Capt 99.6	13:52:49 Capt 96.2	13:52:51 Capt 96.3
13:53:43 Capt 95.7	13:53:46 Centre 82.9	13:53:50 ID 70.0	
13:53:54 16m to stop	13:53:54 Right 56.3	13:54:02 Stop 44.3	
13:54:10 Roll 2.8	13:54:10 Too far 2.8		
2003-06-10 17:56:32 F50	17:58:17 Capt 97.1	17:58:35 Capt 98.3	17:58:37 Centre 89.0
17:58:40 ID 81.1	17:58:46 16m to stop	17:58:49 Speed 2.6	
17:59:18 Left 43.6	17:59:18 Stop 44.3	17:59:20 SBU STOP	
17:59:30 Roll 0.6			
2003-06-08 19:08:41 F50	19:10:31 Capt 95.9	19:10:33 Capt 85.3	19:10:36 Centre 74.1
19:10:37 ID 69.1	19:10:42 16m to stop	19:10:58 Stop 44.3	
19:11:04 Roll 0.9			

FIGURE 4B.5 SAFEDOCK LOG SCREEN LAYOUT

3.7 SAFEDOCK LOG PRINTOUT

Safedock Log Files (name.sdl) have a header and contents illustrated by the example below, when printed out:

SAFEDOCK

SAFEDOCK DGS LOG

1(1)

File Name: 30.sdl

---

2000-09-12 08:56:07 A 330

08:57:01 Capt 87.9 08:57:04 Id 85.4 08:57:06 Centre 80.1

08:57:09 Left 78.2 08:57:11 Centre 74.4 08:57:13 Left 71.1

08:57:15 Centre 69.6 08:57:17 16m to stop 08:57:27 Stop 39.6

08:57:33 Roll 0.8

3.8 TEXT FILE PRINTOUT

Text Files (.txt) have the header illustrated below, when being printed out. Text files could be compositions of Stand configuration files or Short form log files, and therefore they have no document name in the header. Just the file name is printed out.

SAFEDOCK

1(n)

File Name: namn.txt

---

(file contents)

.....

.....

## 4. DESCRIPTION OF LOG FILE MESSAGES

### 4.1 GENERAL

The following is a description of the most common messages that can appear in a Short Log and DGS Log.

<b>Ac</b>	Aircraft type selected
<b>Error</b>	Docking procedure has been interrupted, and an error code is reported.
<b>Capt</b>	Ac nose has been captured at the reported distance from the A-VDGS unit.
<b>Speed</b>	Allowed speed has been exceeded, and actual speed is reported.
<b>ID</b>	Ac has been identified at the reported distance to its nose
<b>Stop</b>	Ac has reached the configured stop position. (related to nose, wheel or door depending on configuration), and STOP has been displayed.
<b>Roll</b>	Ac has passed the configured stop position by the reported distance.
<b>Too far</b>	Ac has passed the configured 'Too Far Distance', and TOO FAR has been displayed.
<b>Stop Short</b>	Ac was found to be at a standstill shy of the stop position.
<b>Em Stop</b>	Emergency Stop button has been pressed, and STOP has been displayed.
<b>16m to Stop</b>	Ac is less than 16 meters from stop position.
<b>Left</b>	Ac is to the left of centre line (bridge side), resulting in corrective guidance.
<b>Right</b>	Ac is to the right of centre line, resulting in corrective guidance.
<b>Centre</b>	Ac is on centre line; no corrective guidance is given.
<b>Downgrade</b>	The system has reduced viewing conditions.
<b>Dead man's</b>	The Dead man's switch has been released.
<b>INTERLOCK</b>	Docking procedure is blocked due to condition at adjacent stand.
<b>LASER ERROR</b>	Laser not sending data
<b>MIRROR ERROR</b>	Mirror movement error
<b>AUTOCAL</b>	Auto calibration has failed
<b>ERROR</b>	
<b>DATA ERROR</b>	Installation data error
<b>PROFILE ERROR</b>	Profile data error
<b>FLASH ERROR</b>	Flash memory error
<b>LOOP ERROR</b>	Loop error, unknown loop polled – obsolete
<b>CONFIG ERROR</b>	Configuration error
<b>DOOR BLOCKED</b>	Door blocked
<b>DISPLAY ERROR</b>	Display board/boards broken <ul style="list-style-type: none"><li>• <b>Major:</b> [address...] Card [address] is not responding</li><li>• <b>Minor:</b> [address...] Card [address] is responding but a few LED:s may be broken on the board</li></ul>

<b>RESTARTED</b>	CU has restarted
<b>ID FAILED</b>	Identification of assigned aircraft has failed
<b>TOO FAST</b>	Aircraft is approaching too fast
<b>BRIDGE NOT IN</b>	Bridge is not in
<b>BRIDGE NOT UP</b>	Bridge is not up
<b>PARAMETER ERROR</b>	Gate parameter error
<b>SBU STOP</b>	Anomalous error during docking
<b>OP-ERROR</b>	Operator panel faulty
<b>EM-CIRCUIT ERROR</b>	Emergency stop circuit broken
<b>LASER AMP ERROR</b>	Laser amplitude check error
<b>GATE BLOCKED</b>	Object between docking system and stop position
<b>CENTRELINE ERROR</b>	Undefined/Invalid centreline
<b>VIEW BLOCKED</b>	Laser view through the window is blocked
<b>APRON BLOCKED</b>	Object detected during Apron Check
<b>WALKTST REQUIRED</b>	A Walktest is required due to changes in the Safedock configuration
<b>TEMP OUT OF RANGE</b>	Any of the temperature sensors in the Safedock is out of range.
<b>LASERSAFE ERROR</b>	Fault in laser-scanner test circuitry.
<b>Local operations</b>	All local operations, such as start docking and confirm scheduled docking, are logged.
<b>Remote operations</b>	All remote operations, such as schedule docking, are logged.
<b>PIN</b>	The Password/PIN entered at the OP Panel.

**CHAPTER 4 MAINTENANCE - APPENDIX C**  
**DOCK VIEWER UTILITY (OPTION)**  
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## 1. INTRODUCTION

### 1.1 GENERAL

The utility program DockViewer.exe is built up as a regular text editor with a standard Windows menu, a pop up menu for quick commands and a tool bar. The program can read and printout the following files:

- (a) Safedock Configuration Files (filename.gte)
- (b) Safedock Short form Log Files (filename.slg)
- (c) Safedock Long Log Files (filename.sdl)
  - (i) Long Log Simple Contents format
  - (ii) Long Log Detailed Contents format
- (d) Any plain text file (filename.txt)

The program's text editor is a read-only editor. Thus the user will not be able to change the file. The user can open one or several files at the same time, and each file will be separated by a page break. This is only implemented as a separator in the editor and will not be printed out.

Several files can be saved and merged as one text file (filename.txt) for future use.

The program also provides a printout option for each specific file. Each file printed out will have a header and footer with different information depending on the file type being processed. This information is not seen in the edit window.

### 1.2 INSTALLATION DIRECTIVES

DockViewer.exe is the name of the program file. It shall be noted that the file AIRCRAFT.DAT must be stored in the same directory as DockViewer.exe, before this program is executed.

## 2. USER INSTRUCTION

The DockViewer utility program is used as described below:

(a) **To open a file**

Proceed as follows:

- (i) If the Soft Key Operator Panel menu system is used in DGS (this menu cannot be displayed by this program, but with the SDCONFIG program) it's convenient to disable display of the old OP menu configuration, which is included in the .gte files. This can be done by checking the 'Ignore Op Menu' item in the 'Format' menu. The program stores the selected option into the registry, and will therefore remember previous selection at restart of the program.
- (ii) Enter the file menu and choose 'Open'. The 'Open' dialog box will show .gte files by default. If a .slg or .sdl file shall be opened, the file specific file format must be selected in the dialog box. The "show all files option" will display all the files in the directory.
- (iii) Mark the file to be opened and press the 'Open' button. The file will now be visible in the text editor window.

(b) **To open several files at one time**

Enter the file menu and choose 'Open'. Hold down the Control key and mark the files you want to open and press the 'Open' button. The files will now be visible in the text editor window. This might take a while depending on the number of files to be opened and the type of computer.

(c) **To open all files at one time**

Enter the file menu and choose 'Open'. Put the cursor over the dialog box and press the left mouse button. Now, press Ctrl + A and all files will now be marked. Press the 'Open' button to process all files.

(d) **To open one file from Windows explorer**

The configuration file types .gte, slg, sdl, or .txt files can be associated with the program, which gives the possibility to open a configuration file by double-clicking on it from explorer.

(e) **To save a file**

Enter the file menu and choose 'Save As'. Enter the name of the file into the File Name Property. If no file extension is provided from the user, the default file extension will be 'txt'.

(f) **Search for a text**

Enter the Search menu and choose 'Find'. A dialog box will appear on the screen. Enter the text string to search for and press 'Find next'.

(g) **Using the Pop Up Menu**

A fast way to access the menu options is to place the cursor over the editor and right click. A menu will be displayed where these commands can be selected. All commands work in the same way as above described.

(h) **Using the Tool Bar**

A fast way to access the 'open', 'save' and 'print' options is to place the cursor over a button and left-click on it with the mouse. To 'open', 'save' and 'print' from here is done the same way as above described. Further, the tool bar also contains a button for program version description.

(i) **To print a file/files**

Proceed as follows:

- (i) Enter the File Menu and choose 'Printer Setup'. Make necessary adjustments for your computer and printer such as Paper orientation,

Paper size and Type of printer to use and press the ‘OK’ button to confirm and exit.

- (ii) Enter the File Menu and choose ‘Print’.
- (iii) Press the ‘OK’ button to start printing.

(j) **To Select Short Log File Contents**

When a Short Log from Safedock version 5.60 or later is processed, the user is requested to select the type of Short log information to read and printout.

- (i) Docking log, i.e. events from dockings
- (ii) Error log, i.e. error events from dockings
- (iii) Event log, i.e. all events except the docking and error events mentioned above
- (iv) All events, i.e. all events on system (docking, errors, event etc.)

(k) **To Select Long Log Simple or Detailed Contents Format**

The Long Log is processed from an .sdl file. The contents format to be displayed is determined by the “View sdl-files as Long Log Detailed” mark in the “Format” menu. By clicking this menu item, the user can choose to view the Long Log with detailed contents. If this menu item is not marked the Long Log file will be viewed in Long Log Simple contents format. Note that the “View sdl-files as Long Log Detailed” mark can be reached also in the Pop Up Menu.

### 3. SCREEN LAYOUT AND PRINT-OUT EXAMPLES

#### 3.1 GENERAL

The Dock Viewer utility has support for print-out of the following files:

- (a) Safedock Short Log (filename.slg)
- (b) Safedock Configuration (filename.gte)
- (c) Safedock Long Log in Simple Contents Format (filename.sdl)
- (d) Safedock Long Log in Detailed Contents Format (filename.sdl)
- (e) Any plain text file (filename.txt)

The screen and printout layouts are detailed in the following sections.

#### 3.2 SHORT LOG SCREEN LAYOUTS

The screen below shows the contents/records of the Short Log that can be selected (one or several options), after one or several Short Logs have been opened.

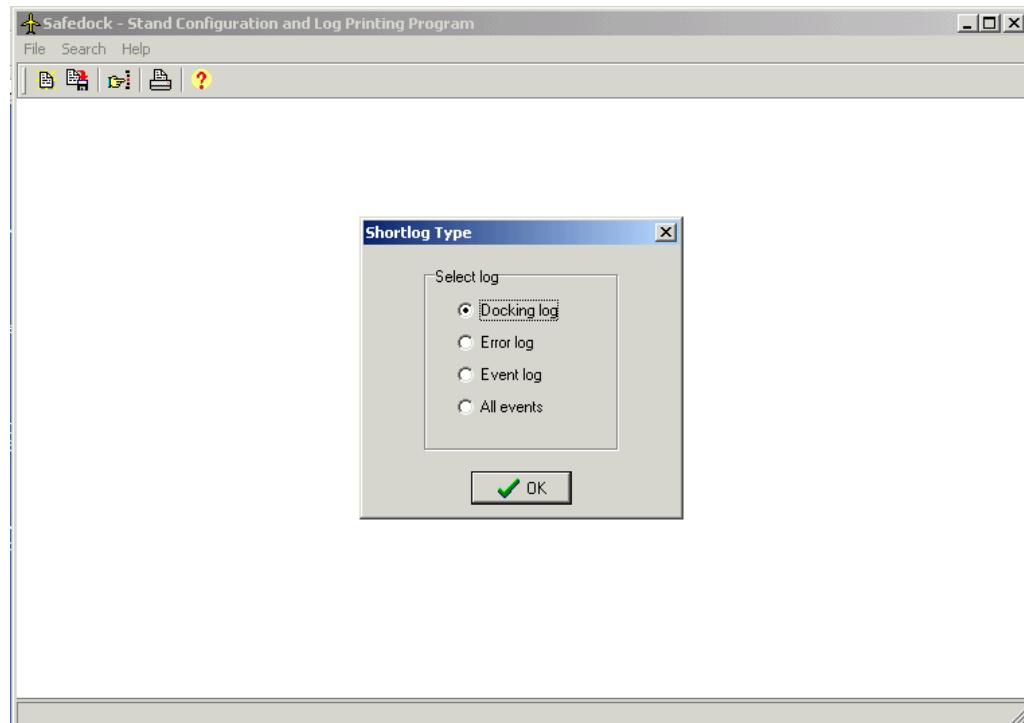


FIGURE 4C.1 SELECTION OF SHORT LOG CONTENTS

The picture below shows the opened Short Log with the option 'Docking Log' contents selected.

Every record starts with a header that includes date and time for docking start. The header of Docking Log records is always ended with the Aircraft Type being docked.

The docking record is stored after the event that terminated the docking procedure, e.g. Shut Down, ParkOn or an Error. Docking records are shown on screen and printed out in chronological order from bottom to top of page.

If no record data follow after the header, this means that docking has been interrupted by some error or a Shut Down command at an early stage.

Safedock - Stand Configuration and Log Printing Program			
File	Search	Format	Help
03-03-06 21:02:18 B 734	21:05:26 Capt 78.8	21:05:41 ID 40.4	21:05:55 Stop 31.5
	21:06:01 Roll 0.3		
03-03-06 18:24:49 B 733	18:25:10 Capt 79.2	18:25:14 ID 64.8	18:25:37 Stop 31.5
	18:25:43 Roll 0.6		
03-03-06 17:19:09 B 734	17:20:03 Capt 70.8	17:24:38 Capt 79.1	17:24:43 ID 61.9
	17:24:54 Stop 31.5	17:25:00 Roll 1.3	
03-03-06 15:24:35 B 734	15:33:09 Capt 78.3	15:33:13 ID 61.3	15:33:28 Stop 31.5
	15:33:34 Roll 1.0		
03-03-06 11:59:21 MD 87	12:00:08 Capt 77.6	12:00:12 ID 56.6	12:00:25 Stop 27.5
	12:00:31 Roll 0.4		
03-03-06 09:53:27 B 763	09:54:54 Capt 78.7	09:55:00 ID 60.2	09:55:25 Stop 27.5
	09:55:32 Roll 0.6		
03-03-06 06:25:49 B 743	06:30:02 Capt 78.9	06:30:07 ID 67.3	06:30:49 Stop 19.5
	06:30:54 Roll 0.9		
03-03-06 10:20:18 A 220			

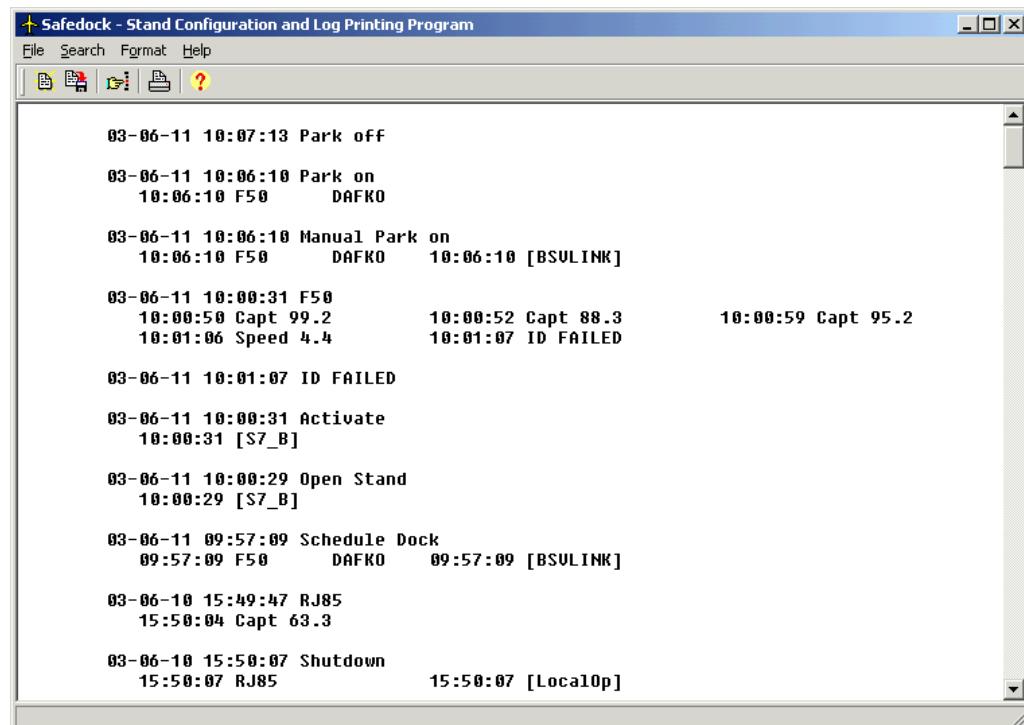
FIGURE4C.2 SHORT LOGS DOCKING RECORDS

The picture below shows the opened Short Log with the contents 'All Events' selected. Every record starts with a header including date and time. The header of an Event (e.g. a command or status change) or an Error always ends with the type of Event or Error being detected.

**Note:** The header of a Docking Log record is always ended with the Aircraft Type being docked!

Since a docking record is stored after the Event, which terminated the docking procedure (e.g. Shut Down, ParkOn or an Error), these Events will be reported first (from bottom to top of page) on the screen/printout. It means that docking events in the docking record and other (controlling) Events are not reported in a chronological order.

**Note:** Data within brackets indicate the source of command. The data DAFKO in the example below is a Flight reference.



The screenshot shows a Windows application window titled "Safedock - Stand Configuration and Log Printing Program". The menu bar includes "File", "Search", "Format", and "Help". Below the menu is a toolbar with icons for file operations. The main window displays a list of log entries in a text-based format. The entries are timestamped and describe various events such as Park off, Park on, Manual Park on, Schedule Dock, and Shutdown. Some entries include aircraft identifiers (F50, RJ85) and flight references (DAFKO, [BSULINK], [S7\_B], [Local0p]).

Date	Time	Event Description	Source
03-06-11	10:07:13	Park off	
03-06-11	10:06:10	Park on	
	10:06:10	F50	DAFKO
03-06-11	10:06:10	Manual Park on	
	10:06:10	F50	DAFKO
	10:06:10	[BSULINK]	
03-06-11	10:00:31	F50	
	10:00:50	Capt 99.2	
	10:01:06	Speed 4.4	
	10:00:52	Capt 88.3	
	10:01:07	ID FAILED	
03-06-11	10:00:59	Capt 95.2	
03-06-11	10:01:07	ID FAILED	
03-06-11	10:00:31	Activate	
	10:00:31	[S7_B]	
03-06-11	10:00:29	Open Stand	
	10:00:29	[S7_B]	
03-06-11	09:57:09	Schedule Dock	
	09:57:09	F50	DAFKO
	09:57:09	[BSULINK]	
03-06-10	15:49:47	RJ85	
	15:50:04	Capt 63.3	
03-06-10	15:50:07	Shutdown	
	15:50:07	RJ85	
	15:50:07	[Local0p]	

FIGURE4C.3 SHORT LOGS ALL EVENTS' RECORDS

### 3.3 SAFEDOCK SHORT LOG PRINTOUT

Safedock Short Form Log (filename.slg) have the header and contents illustrated by the example below, when printed out:

<b>SAFEDOCK</b>	<b>SAFEDOCK SHORT FORM LOG</b>	<b>1(1)</b>
	<b>File Name: 30.slg</b>	
<hr/>		
00-11-25 20:22:22 Ac B 757		
20:23:37 GATE BLOCKED	20:24:01 Capt 89.5	20:24:05 ID 86.7
20:24:19 Speed 2.8	20:24:28 Stop 50.5	20:24:33 Roll 0.9
00-11-25 18:57:10 Ac B 737		
19:03:22 Capt 88.9	19:03:22 ID 87.4	19:03:48 Stop 50.5
19:03:54 Roll 0.7		
00-11-25 17:46:42 Ac B 757		
17:48:20 Capt 87.6	17:48:23 ID 85.4	17:48:53 Stop 41.5
17:48:59 Roll 0.5		
00-11-25 16:16:29 Ac B 737		
16:18:50 Capt 88.9	16:18:54 ID 87.1	16:19:11 Stop 50.5
16:19:18 Roll 1.0		
00-11-25 14:35:37 Ac B 737		
14:37:36 Capt 87.4	14:37:39 ID 85.8	14:37:58 Stop 50.5
14:38:04 Roll 0.6		
00-11-25 12:11:32 Ac F 70		
12:12:34 Capt 87.8	12:12:35 ID 86.5	12:13:00 Stop 49.8
12:13:06 Roll 0.6		
00-11-25 10:42:04 Ac B 757		
10:42:47 Capt 87.9	10:42:48 ID 85.8	10:43:18 Stop 41.5
10:43:24 Roll 0.5		

### 3.4

#### STAND CONFIGURATION SCREEN LAYOUT

The screen layout below is showing a Safedock Stand Configuration, where the Operator Panel menu is NOT configured to be 'ignored'.

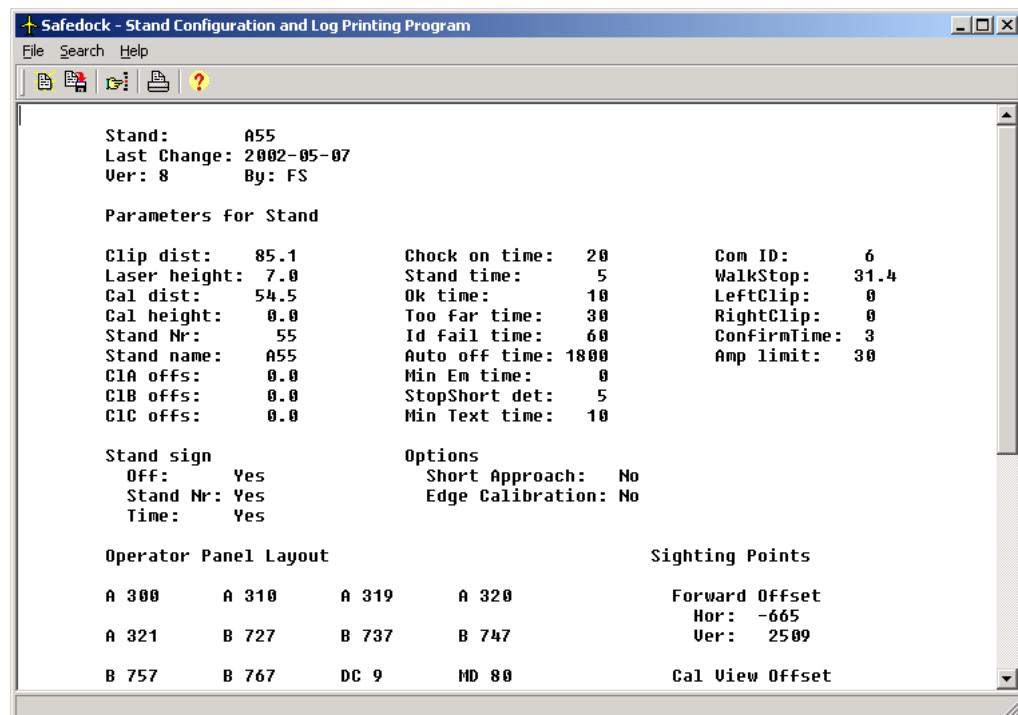


FIGURE 4C.4 STAND CONFIGURATION SCREEN LAYOUT

### 3.5

#### STAND CONFIGURATION PRINTOUT

Stand Configuration (filename.gte) have the header and contents illustrated by the example below, when printed out. The Operator Panel Menu has NOT been configured to be 'ignored'.

**Note:** This printout can be used at commissioning as a test report after system set-up and check of stop positions (WalkTest).

## SAFEDOCK

### STAND CONFIGURATION

1(n)

FILE NAME: 26A.GTE

Stand: GATE26a  
Last Change: 990914  
Ver: 8 By: FSsafegate

#### Parameters for Stand

Clip dist:	75.0	Chock on time:	120	Com ID:	26
Laser height:	7.0	Stand time:	5	WalkStop:	29.2
Cal dist:	52.0	Ok time:	10	LeftClip:	0
Cal height:	0.0	Too far time:	120	RightClip:	0
Stand Nr:	26	Id fail time:	300	ConfirmTime:	5
Stand name:		Auto off time:	1800	Amp limit:	0
CLA offs:	0.1	Min Em Time:	15		
CLB offs:	0.2	StopShort det:	5		
CLC offs:	0.1	Min Text time:	10		

Stand sign	Options		
Off:	No	Short Approach:	No
Stand Nr:	Yes	Edge Calibration:	Yes
Time:	No		

#### Operator Panel Layout

B 737      B 727

MD 80

DC 9

MD 90

A 320

A 319

A 321

B 757      B 767

ATR 42      DH 7

ATR 72      DH 8

F 28      F 27

BAE 146      SF 2000

F 100      F 50

CANARJ

#### Sighting Points

Forward Offset  
Hor: -2505  
Ver: 2689

Cal View Offset  
Hor: -2366  
Ver: 2641

HDist: 258  
VDist: 260

#### Aircraft Data

Aircraft	Text1	Text2	CL	Stop	Stop	Too	Slow	Br	Br	Br	Door1	Door2	ID
				Dist	Ref	Far	Down	In	Up	Code	Block	Block	Font
A 319	A319		A	29.2	Wheel	1.0	2.5	X		0			Std
A 320	A320		B	29.2	Wheel	1.0	2.5	X		0			Std
A 321	A321		C	29.2	Wheel	1.0	2.5	X		0			Std

Stop Dist 29.2 checked: \_

B 737/1	B737	A	31.4	Wheel	1.0	2.5	X	0	Std
B 737/2	B737	A	31.4	Wheel	1.0	2.5	X	0	Std
B 737/3	B737	A	31.4	Wheel	1.0	2.5	X	0	Std

Stop Dist 31.4 checked: \_

.....  
Contractor's repr.

.....  
Customer's repr.

### 3.6

#### SAFEDOCK LONG LOG; SIMPLE CONTENTS FORMAT

The Screen layout below shows Safedock Long Logs with Simple Contents Format.

Every record starts with a header that includes date and time for docking start. The header always ends with the Aircraft Type being docked. The picture below illustrates several Long Log Files.

Recorded events are described in a section below.

Safedock - Stand Configuration and Log Printing Program			
File	Search	Format	Help
2003-06-11 10:00:31 F50	10:00:50 Capt 99.2	10:00:52 Capt 88.3	10:00:59 Capt 95.2
	10:01:01 Centre 78.1	10:01:06 Speed 4.4	10:01:06 16m to stop
	10:01:07 ID FAILED		
2003-06-11 08:02:02 F50	08:02:34 Capt 95.7	08:02:43 Capt 98.6	08:03:16 Capt 91.8
	08:05:42 Capt 87.1	08:05:45 Capt 90.0	08:07:20 Capt 98.4
	08:07:22 Right 87.3	08:07:23 Centre 85.3	08:07:26 ID 72.7
	08:07:31 16m to stop	08:07:32 Speed 3.0	08:07:37 Stop 44.3
	08:07:43 Roll 1.5	08:07:43 Too far 1.5	
2003-06-09 13:50:13 F50	13:52:16 Capt 99.6	13:52:49 Capt 96.2	13:52:51 Capt 96.3
	13:53:43 Capt 95.7	13:53:46 Centre 82.9	13:53:50 ID 70.0
	13:53:54 16m to stop	13:53:54 Right 56.3	13:54:02 Stop 44.3
	13:54:10 Roll 2.8	13:54:10 Too far 2.8	
2003-06-10 17:56:32 F50	17:58:17 Capt 97.1	17:58:35 Capt 98.3	17:58:37 Centre 89.0
	17:58:40 ID 81.1	17:58:46 16m to stop	17:58:49 Speed 2.6
	17:59:18 Left 43.6	17:59:18 Stop 44.3	17:59:20 SBU STOP
	17:59:30 Roll 0.6		
2003-06-08 19:08:41 F50	19:10:31 Capt 95.9	19:10:33 Capt 85.3	19:10:36 Centre 74.1
	19:10:37 ID 69.1	19:10:42 16m to stop	19:10:58 Stop 44.3
	19:11:04 Roll 0.9		

FIGURE 4C.5 LONG LOG - SIMPLE CONTENTS FORMAT

### 3.7

#### SAFEDOCK LONG LOG; SIMPLE CONTENTS PRINTOUT

The Safedock Long Log with Simple Contents (filename.sdl) have a header and contents illustrated by the example below, when printed out:

SAFEDOCK

SAFEDOCK DGS LOG

1(1)

File Name: 30.sdl

---

2000-09-12 08:56:07 A 330

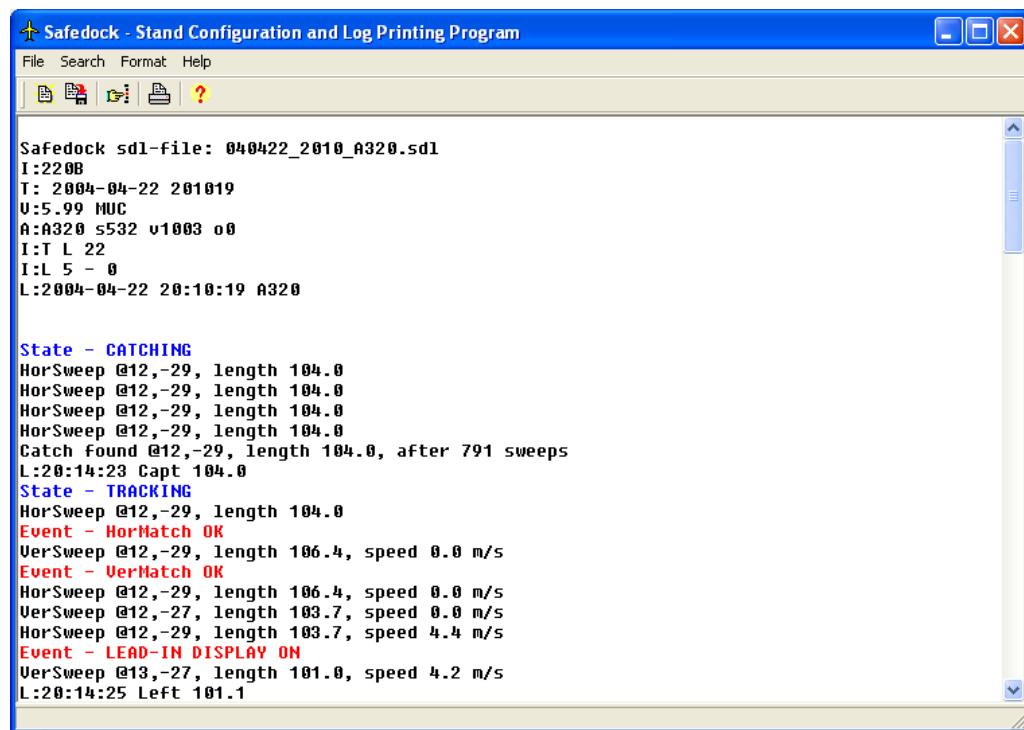
08:57:01 Capt 87.9	08:57:04 Id 85.4	08:57:06 Centre 80.1
08:57:09 Left 78.2	08:57:11 Centre 74.4	08:57:13 Left 71.1
08:57:15 Centre 69.6	08:57:17 16m to stop	08:57:27 Stop 39.6
08:57:33 Roll 0.8		

### 3.8

#### SAFEDOCK LONG LOG; DETAILED CONTENTS FORMAT

The Screen layout below shows Safedock Long Log with Detailed Contents.

The Long Log Detailed Contents format starts with information about this particular docking, i.e. file name, gate name, time, date, aircraft type etc.



The screenshot shows a Windows application window titled "Safedock - Stand Configuration and Log Printing Program". The menu bar includes File, Search, Format, and Help. The toolbar has icons for Open, Save, Print, and Help. The main text area displays the following log data:

```
Safedock sdl-file: 040422_2010_A320.sdl
I:220B
T: 2004-04-22 201019
U:5.99 MUC
A:A320 s532 v1003 o0
I:T L 22
I:L 5 - 0
L:2004-04-22 20:10:19 A320

State - CATCHING
HorSweep @12,-29, length 104.0
HorSweep @12,-29, length 104.0
HorSweep @12,-29, length 104.0
HorSweep @12,-29, length 104.0
Catch Found @12,-29, length 104.0, after 791 sweeps
L:20:14:23 Capt 104.0
State - TRACKING
HorSweep @12,-29, length 104.0
Event - HorMatch OK
VerSweep @12,-29, length 106.4, speed 0.0 m/s
Event - VerMatch OK
HorSweep @12,-29, length 106.4, speed 0.0 m/s
VerSweep @12,-27, length 103.7, speed 0.0 m/s
HorSweep @12,-29, length 103.7, speed 4.4 m/s
Event - LEAD-IN DISPLAY ON
VerSweep @13,-27, length 101.0, speed 4.2 m/s
L:20:14:25 Left 101.1
```

FIGURE4C.6 LONG LOG - DETAILED CONTENTS FORMAT

Some of the rows in the memo are blue; these messages represent a change of state for the Safedock guidance procedure.

Some of the rows in the memo are red; these messages indicate an event of some kind. For instance "LEAD-IN DISPLAY ON" indicates that the Safedock pilot guidance display has started to guide the pilot towards the stop position.

The rows that start with HorSweep/VerSweep each represent a horizontal/vertical laser sweep. These rows also carry information about the positions of the two mirrors, measured distance to the aircraft nose, estimated speed of the aircraft and if possible the measured nose height of the aircraft.

### 3.9

#### TEXT FILE PRINTOUT

Text Files (.txt) have the header illustrated below, when being printed out. Text files could be compositions of Stand configuration files or Short form log files, and therefore they have no document name in the header. Just the file name is printed out.

SAFEDOCK

1 (n)

File Name: namn.txt

---

(file contents)

.....  
.....

## 4. LOG CONTENTS MESSAGES

### 4.1 SHORT LOG AND LONG LOG SIMPLE CONTENTS MESSAGES

The following is a description of the most common messages that can appear in Safedock Short Log and Safedock Long Log with Simple Contents Format.

<b>Ac</b>	Aircraft type selected
<b>Error</b>	Docking procedure has been interrupted, and an error code is reported.
<b>Capt</b>	Ac nose has been captured at the reported distance from the A-VDGS unit.
<b>Speed</b>	Allowed speed has been exceeded, and actual speed is reported.
<b>ID</b>	Ac has been identified at the reported distance to its nose
<b>Stop</b>	Ac has reached the configured stop position. (related to nose, wheel or door depending on configuration), and STOP has been displayed.
<b>Roll</b>	Ac has passed the configured stop position by the reported distance.
<b>Too far</b>	Ac has passed the configured 'Too Far Distance', and TOO FAR has been displayed.
<b>Stop Short</b>	Ac was found to be at a standstill shy of the stop position.
<b>Em Stop</b>	Emergency Stop button has been pressed, and STOP has been displayed.
<b>16m to Stop</b>	Ac is less than 16 meters from stop position.
<b>Left</b>	Ac is to the left of centre line (bridge side), resulting in corrective guidance.
<b>Right</b>	Ac is to the right of centre line, resulting in corrective guidance.
<b>Centre</b>	Ac is on centre line; no corrective guidance is given.
<b>Downgrade</b>	The system has reduced viewing conditions.
<b>Dead man's</b>	The Dead man's switch has been released.
<b>INTERLOCK</b>	Docking procedure is blocked due to condition at adjacent stand.
<b>LASER ERROR</b>	Laser not sending data
<b>MIRROR ERROR</b>	Mirror movement error
<b>AUTOCAL</b>	Auto calibration has failed
<b>ERROR</b>	
<b>DATA ERROR</b>	Installation data error
<b>PROFILE ERROR</b>	Profile data error
<b>FLASH ERROR</b>	Flash memory error
<b>LOOP ERROR</b>	Loop error, unknown loop polled – obsolete
<b>CONFIG ERROR</b>	Configuration error
<b>DOOR BLOCKED</b>	Door blocked
<b>DISPLAY ERROR</b>	Display board/boards broken <ul style="list-style-type: none"><li>• <b>Major:</b> [address...] Card [address] is not responding</li><li>• <b>Minor:</b> [address...] Card [address] is responding but a few LED:s may be broken on the board</li></ul>
<b>RESTARTED</b>	CU has restarted

<b>ID FAILED</b>	Identification of assigned aircraft has failed
<b>TOO FAST</b>	Aircraft is approaching too fast
<b>BRIDGE NOT IN</b>	Bridge is not in
<b>BRIDGE NOT UP</b>	Bridge is not up
<b>PARAMETER ERROR</b>	Gate parameter error
<b>SBU STOP</b>	Anomalous error during docking
<b>OP-ERROR</b>	Operator panel faulty
<b>EM-CIRCUIT ERROR</b>	Emergency stop circuit broken
<b>LASER AMP ERROR</b>	Laser amplitude check error
<b>GATE BLOCKED</b>	Object between docking system and stop position
<b>CENTRELINE ERROR</b>	Undefined/Invalid centreline
<b>VIEW BLOCKED</b>	Laser view through the window is blocked
<b>APRON BLOCKED</b>	Object detected during Apron Check
<b>WALKTST REQUIRED</b>	A Walktest is required due to changes in the Safedock configuration
<b>TEMP OUT OF RANGE</b>	Any of the temperature sensors in the Safedock is out of range.
<b>LASERSAFE ERROR</b>	Fault in laser-scanner test circuitry.
<b>Local operations</b>	All local operations, such as start docking and confirm scheduled docking, are logged.
<b>Remote operations</b>	All remote operations, such as schedule docking, are logged.
<b>PIN</b>	The Password/PIN entered at the OP Panel.

#### 4.2

#### LONG LOG DETAILED CONTENTS MESSAGES

The following is a description of the most common messages that can appear in Long Log Detailed Contents format. The messages are divided into two categories – States and Events. A “State” shows the overall state of the Safedock for the moment. An “Event” is a notification of an occurrence that has just happened. The “State” and “Event” messages all together constitute a detailed picture of the Safedock docking procedure.

<b>State – CATCHING</b>	Safedock is searching for an approaching aircraft
<b>State – TRACKING</b>	Safedock tries to guide the airplane towards the stop position
<b>State - EM STOP</b>	One of the emergency stop buttons have been pressed
<b>State - GATE BLOCKED</b>	The gate is blocked

<b>Event - MIRROR ERROR</b>	Some error has occurred with the mirrors
<b>Event - MIRROR POSITION ERROR</b>	Mirrors are not able to reach their correct position
<b>Event - SLOW DOWN ON</b>	The pilot display shows "SLOW"
<b>Event - SLOW DOWN OFF</b>	The pilot display no longer shows "SLOW"
<b>Event - FIRE ALARM</b>	The fire alarm is active
<b>Event - APRON CHECK</b>	The apron is scanned by Safedock
<b>Event - Engine check beyond right clip</b>	The engine is beyond the right clip
<b>Event - Engine check beyond left clip</b>	The engine is beyond the left clip
<b>Event - Wing check beyond left clip</b>	The measurement point for left wingcheck is beyond the left clip
<b>Event - Wing check beyond right clip</b>	The measurement point for right wingcheck is beyond the right clip
<b>Event - Lost track, retrying</b>	Safedock has lost track of the airplane
<b>Event - Off track, starting over</b>	Too many lost tracks, starting over at catch
<b>Event – EngineCheck</b>	An engine check is started
<b>Event - EngineCheck OK</b>	An engine check has been performed with a positive result
<b>Event - HorMatch OK</b>	The horizontal nose profile measurement is according to the reference values for the specific airplane
<b>Event - VerMatch OK</b>	The vertical nose profile measurement is according to the reference values for the specific airplane
<b>Event - NoseHeight OK</b>	The nose height measurement is according to the reference values.
<b>I: L-ERR2</b>	No data from laser
<b>I: L-ERR3</b>	No data from laser even after multiple tries.
<b>I: L-ERR4</b>	An error occurred while processing data from laser
<b>I: M-ERR5</b>	Mirror positioning error
<b>I: LM-ERR1</b>	No mirror movement detected



**CHAPTER 4 MAINTENANCE - APPENDIX D**  
**CONFIGURATION OF 54-KEY KEYBOARD EXTENSION (OPTION)**  
**CONTENTS**

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3.	<b>CONFIGURATION INSTRUCTIONS .....</b>	2

## 1. SCOPE

This document describes how to configure the 54-key keyboard extension connected to Safedock's SoftKey operator panel.

## 2. GENERAL INFORMATION

The keyboard extension is configured in the same way as the SoftKey operator panel, using the menu editor in SD Config with three exceptions:

- Only one aircraft can be configured per key/menu.
- The keys/menus have predefined names. (r1c1, r4c2,etc.)
- All keys/menus for the extension resides in the root key named AcKey11

## 3. CONFIGURATION INSTRUCTIONS

- (a) Open the menu editor as described in Chapter 4 Maintenance - Appendix A.
- (b) Under the root key named AcKey11, create menus named r1c1 to r9c6. For example, "r1c1" for row one, column one. Also see the image below.

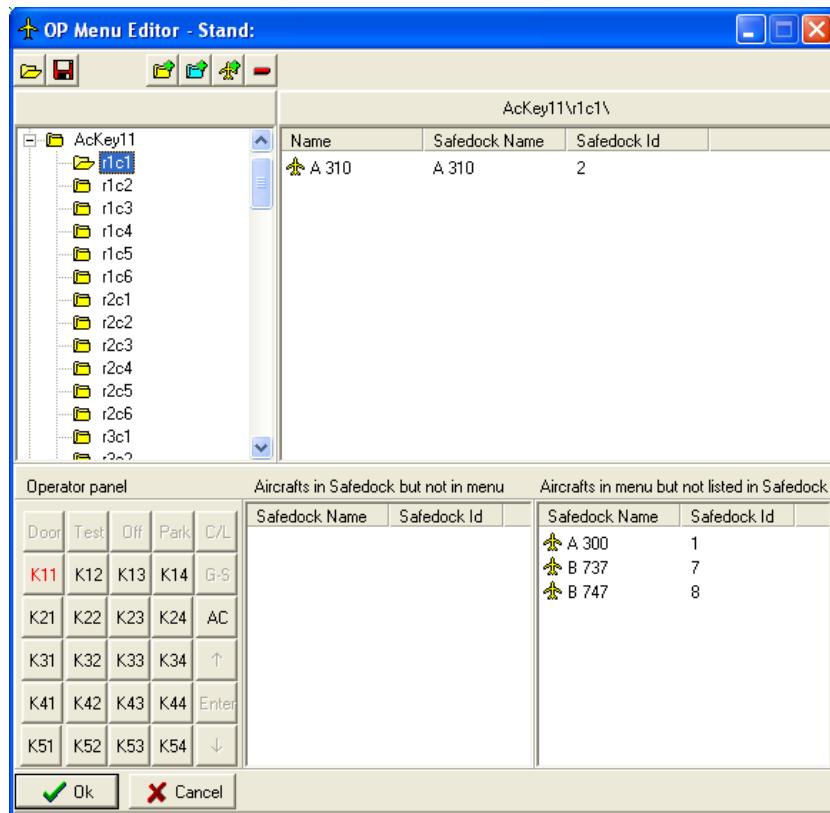


FIGURE 4D.1 OP MENU EDITOR

- (c) Now place the aircraft, for which a docking is to be started when pressing the key in question, in the corresponding menu. As the image shows, a docking for the A 310 will be started when pressing the first key in the first column (upper left corner of the keyboard extension). If more than one aircraft are placed in the menu, only the first aircraft will be accessible for start of docking.

## CHAPTER 4 MAINTENANCE - APPENDIX E

### CONFIGURING AN A-VDGS USING THE MEWTOCOL PROTOCOL (OPTION)

#### 1. GENERAL

The *MEWTOCOL* protocol is an ASCII based protocol specified in the document “FP2 ETLAN.pdf” written by *Matsushita Electric Works (Europe) AG*. The Safedock system uses this protocol to report its current status to the bridge.

#### 2. OPERATION

Every two seconds the system will try to send the systems current status to the *utilPort* (at the time of writing com6, marked J14 on the board) using the *MEWTOCOL* protocol. The task will try to resend three times if no acknowledgement is received or if it could not send due to some other error. If the resend fails the packet will be discarded and normal operation resumed. Safedock will send the current status and aircraft code. At the end of the docking procedure it will report the over- and undershoot, also known as stop position.

**NOTE:** If a manual park has been done, over/undershoot will be null (Hex 0x1999)

#### 3. CONFIGURING AN A-VDGS FOR USE WITH MEWTOCOL

The system requires the aircraft number to be sent to be entered into the configuration using the Safedock Configuration utility. The number is entered into the text box named “*Preset bridge*” for each aircraft; the checkbox to the left of the text box does not need to be checked. Valid range of data is between 0 and 5999. See the picture below.

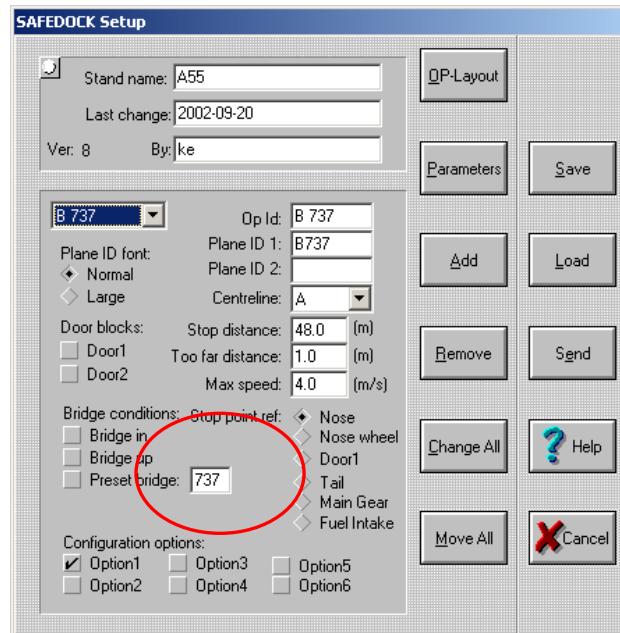


FIGURE 4E.1 SAFEDOCK SETUP

#### 4. DATA SENT THROUGH THE MEWTTOCOL PROTOCOL

The following table shows what data is sent for the different A-VDGS statuses.

Status (Hex)	Command	Starting Word (Dec)	Ending Word (Dec)	DGS Status (Hex)	AC Id (Hex)	Stop pos (Hex)
<b>Ready</b>	#WDD	00100	00102	0x1	0x1999	0x1999
<b>Error</b>	#WDD	00100	00102	0x2	0x1999	0x1999
<b>Emergency Stop</b>	#WDD	00100	00102	0x3	0x1999	0x1999
<b>Docking</b>	#WDD	00100	00102	0x4	AC Id*	0x1999
<b>Parked</b>	#WDD	00100	00102	0x5	AC Id*	Stop pos.**

\*) Aircraft Id as entered according to point 3.

\*\*) When a manual docking has been made the Stop position is set to the null value 0x1999.

##### 4.1 EXAMPLE OF RAW DATA PACKAGES:

An “<” is also accepted instead of an “%” as starting character.

###### **Status Ready:**

%01#WDD00100001029919991999195AC<sub>R</sub>

###### **Status Docking (Plane id 747, Stop pos 3):**

%01#WDD00100001020400EB02030050C<sub>R</sub>

###### **Acknowledgment:**

%01\$WD13C<sub>R</sub>

## CHAPTER 4 MAINTENANCE - APPENDIX F

### CONFIGURATION FOR TWO BRIDGES

### USING DUAL SAFE POSITIONS (OPTION)

#### 1. SCOPE

This document describes how to configure a Safedock system that uses the “four finger control” (4FC for short) option.

#### 2. LIMITATIONS

Any software using 4FC cannot use the “Preset Value” to give information to bridges since the field used for this is not used for the 4FC. For details, please refer to document FDS-Sd705.dec.

#### 3. USED INPUTS

The inputs used are as follows:

- OP input 1 (bit 0) (previously used for bridge up) - J8 Pin 1 & 2.
- OP input 2 (bit 1) (previously used for bridge in) - J8 Pin 3+4.
- OP input 5 (bit 4) (previously used for second bridge in) - J8 Pin 9+10.
- OP input 7 (bit 6) (previously used for alternate input in dual safe positions) - J8 Pin 13+14.

These inputs are then inserted into a byte in the following manner (number represents the input number):

7	5	2	1	7	5	2	1
---	---	---	---	---	---	---	---

The least significant nibble (four rightmost bits) represents bridge in inputs and the most significant nibble (four left most bits) represents bridge up inputs. As this table shows, an input can be used for both bridge in and bridge up checks.

#### 4. CONFIGURATION

When configuring the 4FC, the field named “Preset bridge” in SD Config is used to set a desired bit mask (per aircraft) that will be used to determine if a bridge is in position or not. To enable the 4FC the checkbox “Preset bridge” must be selected. A thing worth noting is that the normal Bridge In and Bridge Up features take precedence over 4FC, so if one or both of these check boxes are checked they will override the bridge in or bridge up part of the 4FC, respectively.

As described above, the bridge in and bridge up checks uses one nibble each. Given this information, we can now create a bit mask (entered into the “Preset Bridge” textbox) that specifies how the system shall behave. See the table below for examples.

	Bridge Up mask				Bridge In mask					
Input #	7	5	2	1	7	5	2	1	Value entered	System behaviour
Value	128	64	32	16	8	4	2	1		
	0	0	0	0	0	0	0	0	0	Bridge positions not important
	0	0	0	0	0	0	0	1	1	OP Input 1 must be active System indicates Bridge not In
	0	0	0	0	0	0	1	0	2	OP Input 2 must be active System indicates Bridge not In
	1	0	0	0	0	0	0	1	129	OP Input 7 and 1 must be active System indicates Bridge not In and Bridge Not Up
	1	1	0	0	0	0	1	1	195	OP Input 7, 5, 2, 1 must be active System indicates Bridge not In and Bridge Not Up
	1	1	1	1	0	0	0	0	240	OP Input 7, 5, 2, 1 must be active System indicates Bridge Not Up
	0	0	0	0	1	1	1	1	15	OP Input 7, 5, 2, 1 must be active System indicates Bridge Not In

#### 5. CONTROLLING OPERATOR PANEL OUTPUT SIX

Since bridge codes are disabled when using 4FC, option six can be used (per A/C type) to control operator panel output six. If selected, the output will be activated before, and deactivated after, the docking in progress signal status changes.

## CHAPTER 4 MAINTENANCE - APPENDIX G

### SAFEDOCK LOADER - UPDATE INSTRUCTIONS (OPTION)

#### 1. INTRODUCTION

##### 1.1 IMPORTANT NOTE

Please read this entire document before attempting to perform an update.

##### 1.2 GENERAL

When new software is to be downloaded to the Safedock, the software LOADER.EXE is used as an interface between SDCONFIG.EXE and the 'disk on chip'. The 'Loader' is located on the flash disk. It starts automatically whenever the Safedock is powered up. If SAFEDOCK.EXE exists on the 'disk on chip', the 'Loader' starts up the program. This document is a description of how to update the loader software itself, or how to update the Safedock startup procedure.

#### 2. THE STARTUP PROCEDURE

The write-protected file Autoexec.bat controls the startup procedure of the safedock system. First the loader is executed, allowing for a connection to the program loader part of the SdConfig utility. When the loader is finished, the Safedock program is executed, and will continue to run until the system is deactivated. With the introduction of Loader version 2.0 and Autoexec.bat version 2.0, a few notable modifications were made:

- (a) In order to allow faster cold start of the Safedock system, the Loader will not activate unless the emergency stop button is activated at a system restart.
- (b) With Safedock version 5.68 and higher, access to the loader is also accepted upon shutdown or reset commands from operator panel/SdConfig utility. With Safedock version 5.67 and earlier, it is necessary to activate the emergency stop after executing any of these commands in order to activate the loader.

#### 3. UPDATE OF SOFTWARE

##### 3.1 UPDATE OF LOADER.EXE

The following steps need to be taken to update the Loader.exe file:

- (a) Start the program SDCONFIG.EXE on the maintenance PC, and enter the 'program load' part.
- (b) Press the 'Shutdown' button to shut down the software SAFEDOCK.EXE. This will allow a connection to LOADER.EXE. (This might take 15 to 20 seconds).
- (c) Copy the programs MKLOAD2.EXE and NEWLOAD.EXE (the new 'Loader') to the 'disk on chip'. If the file copy fails, try to delete some of the existing files to free space on the flash disk. The following files are essential for the system and may never be deleted: COMMAND.COM, DELAY.EXE, LOADER.EXE, NODOG.EXE and AUTOEXEC.BAT

When centreline and gate configuration files have to be deleted in order to free space on the 'disk on chip', it is desirable to first save these files on the PC. This will make reconfiguration of the Safedock a lot easier.

- (d) When MKLOAD2.EXE and NEWLOAD.EXE have been copied to flash disk, select MKLOAD2.EXE on the Safedock side and press the 'RUN' button to execute the program. This program will delete the old LOADER.EXE, then rename NEWLOAD.EXE to LOADER.EXE and finally delete itself.
- (e) When connection to the new loader is established, the version number for the loader will be displayed in the lower left corner of SDCONFIG.EXE. Check that the loader version reported matches the version of the distributed loader.
- (f) Check that both MKLOAD2.EXE and NEWLOAD.EXE are deleted from the 'disk on chip'.

### 3.2 UPDATE OF AUTOEXEC.BAT

The following steps need to be taken to update the Autoexec.bat file:

- (a) Start the program SDCONFIG.EXE on the maintenance PC, and enter the 'program load' part.
- (b) Press the 'Shutdown' button to shut down the software SAFEDOCK.EXE. This will allow a connection to LOADER.EXE. (This might up to 30 seconds).
- (c) Copy the programs MKLOAD2.EXE and NEWAUTO.BAT (the new 'startup procedure') to the 'disk on chip'. If the file copy fails, try to delete some of the existing files to free space on the flash disk. The following files are essential for the system and may never be deleted: COMMAND.COM, DELAY.EXE, LOADER.EXE, NODOG.EXE and AUTOEXEC.BAT

When centreline and gate configuration files have to be deleted in order to free space on the 'disk on chip', it is desirable to first save these files on the PC. This will make reconfiguration of the Safedock a lot easier.

- (d) When MKLOAD2.EXE and NEWAUTO.BAT have been copied to the flash disk, select MKLOAD2.EXE on the Safedock side and press the 'RUN' button to execute the program. This program will delete the old AUTOEXEC.BAT, then rename NEWAUTO.BAT to AUTOEXEC.BAT and finally delete itself.
- (e) When connection to the new loader is established, the version number for the loader will be displayed in the lower left corner of SDCONFIG.EXE. Check that the loader version reported matches the version of the distributed loader.
- (f) Check MKLOAD2.EXE and NEWAUTO.BAT are deleted from 'disk on chip'.

### 3.3 UPDATE NOTES

Note that it is possible to update both the loader and the startup procedure in the same run of the MKLOAD2 program by copying all three files (MKLOAD2.EXE, NEWLOAD.EXE and NEWAUTO.BAT) and then running the MKLOAD2 program.

Note that the LOADER program from version 2.0 and higher require the startup procedure as implemented in AUTOEXEC.BAT version 2.0 or greater.

**THIS MEANS THAT BOTH THE LOADER AND AUTOEXEC.BAT MUST BE UPDATED AT THE SAME TIME.**

### 3.4 PROCESS SPAWNING

Loader versions 2.3 or later (in conjunction with SD Config version 3.14 or later) has the ability to spawn a process, i.e execute a program, while remaining in memory and without relying on autoexec.bat.

This feature can be used to restore a system from a lock-out, which occurs if autoexec.bat isn't updated together with the Loader. This can be done by uploading the correct .bat file and spawning the MkLoad2.exe program.

To access the spawn command in SD Config, a key must be added to the [Setup] section in sdconfig.ini, see the example below.

```
[Setup]
Metric=YES
RemotePassword=YES

.

.

SPAWN=YES
```

Once the SPAWN key/value pair has been added and the file has been saved you shall reopen SD Config and reconnect to the Loader. You will then see an additional button labelled Spawn. This button works similar to the run-button.

The last step is to select mkload2.exe (after uploading the file newauto.bat) and click the Spawn-button. Answer yes to the question and await the result of the spawn command in the status bar of SD Config.

**CHAPTER 4 MAINTENANCE - APPENDIX H**  
**OPERATOR PANEL SOFTKEY SETUP (OPTION)**  
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## 1. SCOPE

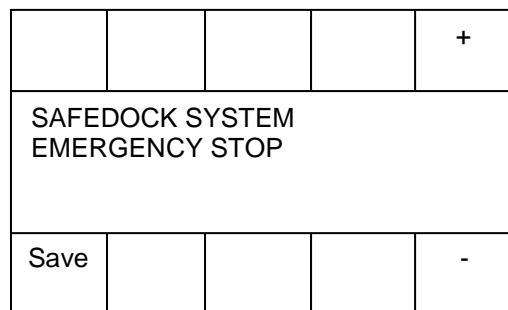
This document explains different setup procedures for a Softkey Operator Panel (OP).

### 1.1 GENERAL

Configuration of the OP requires the power to the unit can be cut. An exception is for contrast adjustment, which can be adjusted while Safedock software is running.

## 2. CONTRAST AJUSTMENT

The display contrast can be adjusted when the system is in emergency stop mode. Press the right arrow key to access the contrast adjustment menu, the display shows the following:



Use +/- keys to adjust the contrast; when the contrast is adjusted, the current value is shown, replacing the emergency stop message. Once contrast is satisfactory, press the **Save** key to store the value. Releasing emergency stop or pressing the **CANCEL** button restores the contrast to its original (or last saved) value.

If there are multiple OPs connected to the same Safedock system, they all display the same text. However, each unit is managed separately, for example a contrast change only affects the unit on where keys are being pressed and settings are saved.

*Note: It is not recommended to adjust the contrast for multiple OP units at the same time, as the text on all units is the result of the last key press, no matter which OP unit key is pressed. In other words, the OP unit which sends the last key press is in control of the contrast change menu for all OPs. If the Safedock system receives commands from alternating OP units, it only requests and displays the current contrast value without making any changes.*

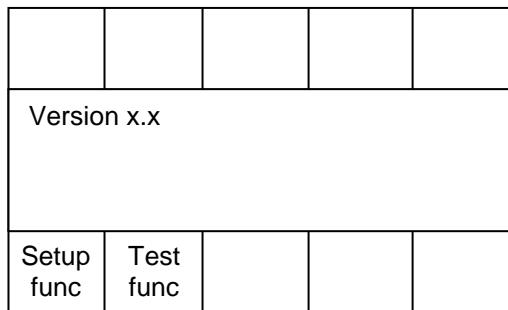
*For more information, see 9 Extra Operator Panel (option) on page 6.*

### 3. NAVIGATING MENUS

#### 3.1 ENTERING SETUP MODE

To enter the setup menus:

- (a) Open the OP unit box and disconnect the J1 connector, to power off the unit.  
If J2 is connected, it must also be disconnected until setup is completed.
- (b) Press and hold the **CANCEL** key and reconnect J1.  
The display shows the setup main menu with version info and two keys:  
**Setup func** and **Test func**.



- (c) Release the **CANCEL** key.

*Note: After setup is completed, J2 may be reconnected.*

#### 3.2 EXITING SETUP MODE

When all settings are completed, the OP unit is put back into operation by pressing the **ENTER** key from the setup main menu.

#### 3.3 ACCESSING SETUP FUNCTIONS AND NAVIGATING THE MENUS

- (a) While in the setup main menu, press the **Setup func** key to access the setup functions.
- (b) Press a designated key to access the desired setup function.
- (c) Press the **CANCEL** key to leave a setup function and return to the setup function menu.

#### 3.4 RETURNING TO SETUP MAIN MENU AND SAVING SETTINGS

Press the **CANCEL** key to return to the setup main menu. If the current menu is the setup functions menu, the unit prompts to save the settings or not. Press **YES** to save or **NO** to discard any changes made.

### 3.5 SETUP FUNCTION PARAMETERS

There are several parameters available to set in the OP unit as follows:

			-	+
LCD Contr	Com1 Addr	Com2 Addr	Key Form	Deflt

Press a designated key to select a parameter and then use the + and – keys to modify each parameter.

#### 3.5.1 LCD Contrast

The default value is 25. Adjust the contrast as required so that the background is not too dark and the display texts are easy to read.

#### 3.5.2 Com1 address

A communication Com1 address is used for OP to Safedock communication. Valid addresses use variables: 1-4 (OP default is set to 1).

**Note:** Each OP must have its own unique address. Using the same address in two or more units (extra OPs) connected to a Safedock gives unpredictable results. This parameter only affects OP units with software version 1.2 or later and when connected to a Safedock system with version 7.08 or later.

For more information, see 9 Extra Operator Panel (option) on page 6.

#### 3.5.3 Com2 address (not in use)

**Note:** The Com2 address is not currently in use or supported by software.

#### 3.5.4 Key Form

There are three key forms available in the OP unit software. Key form two must be used as it shows information texts for selection using adjacent softkeys, as intended in the software design.

**Note:** Do not use key form zero or one as they wrongly give an impression of a touch display. If key form is changed, the selected key form is not shown until the Setup functions menu is shown.

#### 3.5.5 Default

The **Deflt** key sets all parameters to their default values as follows:

LCD contrast = 25. Com1 address = 1, Com2 address = 1 and Key form = 2.

### 3.6 TEST FUNCTIONS

There are several test functions available to diagnose an OP unit as follows:

	OFF	ON	-	+
Keyb Test	Com1 Test	Com2 Test	Out Test	Displ Test

#### 3.6.1 Keyboard Test

If **Keyb Test** is selected, press each key to verify a unique number appears in the display.

**Note:** The **CANCEL** key does not display a number, it returns to the test functions menu.

#### 3.6.2 Com1 Test

If **Com1 Test** is selected, the display shows data sent and received on Com 1 (J1). The sent (out) and received (in) character must always be the same.

**Note:** Com1 Test can only be performed when the Safedock software is not running as Safedock data interferes with the test. A connection to the Loader using SD Config is required before starting this test.

#### 3.6.3 Com2 Test (not in use)

**Note:** Com2 test is not currently in use or supported by software.

#### 3.6.4 Output Test

Connect a cable specifically designed for testing the outputs to connector J9 to test outputs 1-6. Connect the cable to J10 for test of outputs 7-11. Use the +/- keys to select the output and then the **On/Off** keys to toggle the current output.

To test output 12 (Maintenance relay), using an ohm-meter connected to J1 pin 3 and J3 pin 1. Toggle the output and verify that the ohm-meter indicates this.

The status of output 13 (heater) is indicated by LED D17 on the circuit board. Toggle the output and verify that the LED is lit only when the output is active.

#### 3.6.5 Input Test

The input test is automatically enabled. Whenever a change is detected on the inputs the display shows the current status of all inputs.

To test the inputs, connect to the outputs with a specific cable design. To test inputs 0 to 7, connect the cable between J9 and J8. This makes outputs 1-5 control inputs 0-4 and output 6 controls all three inputs 5, 6 and 7.

Connect the cable between J9 and J7 to test inputs 8 – 15. This makes outputs 1-5 control inputs 8-12 and output 6 controls input 13, 14 and 15.

#### 3.6.6 Display Test

If selected, a pattern appears in the display.

#### 3.6.7 Temperature sensor

When entering the test functions menu the temperature measurement from a sensor appears on the display, for example **Temp: 26**. To test this sensor, chill IC11 and check the temperature value in the display falls.

#### 4.

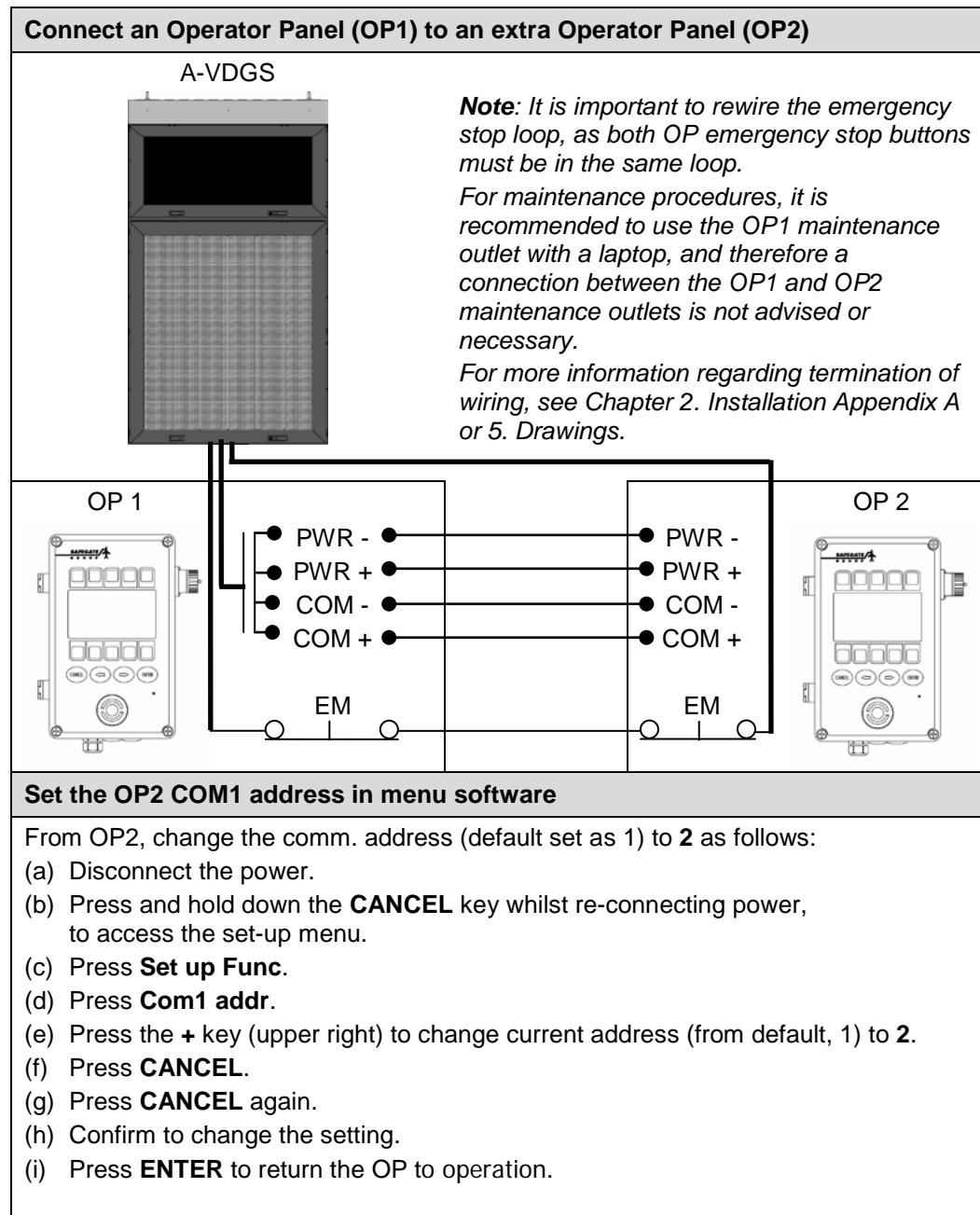
#### EXTRA OPERATOR PANEL (OPTION)

The OP can be connected to an extra OP, to control Safedock from another place.

The extra OP must also be set with a unique Com1 address. For example, if OP1 Com1 address is 1 (default) then OP2 Com1 address is to be set to 2.

**Note:** The system only accepts input via the first OP (Com1 address 1). Outputs on all connected OPs are always in the same state.

Connect and set an extra OP as follows:



**CHAPTER 5**  
**DRAWINGS**  
**LIST**

<b>Drawing Title</b>	<b>Drawing Number</b>
590131 - Stepper Motor Card	*SG590131-001-01
590137 - Temperature Card, COMPONENT AND PARTS LIST	SG590137-000
590222 - Cable Entry Cover Plate (3 hole) ASSEMBLY	SG590222-001-01
590222 - Cable Entry Cover Plate	SG590222-201-01
590255 - HEATER	SG590255-106-01
590255 - LIGHT SENSOR ASSEMBLY	SG590255-108-01
590255 – COMMUNICATION CABLE	SG590255-109-01
590255 – SCANNING MOTOR	SG590255-111-01
590255 – OPTICAL ENCODER CABLE	*SG590255-112-01_RVC
590255 – LASER RANGE FINDER ASSEMBLY	SG590255-113-01
590256 - T1 Display 42 CARD	SG590256-001-01
590258 - Terminal Server (Tibbo) COMMUNICATION ASSEMBLY	*SG590258-001-01_RVA
590258 - COMMUNICATION CABLE	*SG590258-100-01
590258 - COMMUNICATION CABLE	*SG590258-100-01_RVA
590258 – PATCH CABLE	*SG590258-101-01_RVC
590259 - T1 Supercooler	SG590259-001-01
590261 - T1 Installation Hardware	SG590261-001-01
590262 - CAT6 Filter	*SG590262-001-01_RVA
590264 - T1 Ventilation Assm	SG590264-001-01
590266 - Utility Outlet	*SG590266-001-01_RVA
590268 – CONTROL CABLE	SG590268-101-01
590268 – CONTROL CABLE	SG590268-102-01
590268 – CONTROL CABLE	SG590268-103-01
590268 – POWER CABLE	SG590268-111-01
590273 - Network Switch_Media Adapter	*SG590273-001-01_RVB
590281 - Cabinet, T2	SG590281-001-01
590360 - Cabinet, T3	SG590360-001-01
590399 - CU Replacement Kit	SG590399-001-01
590405 - Laser Cooling Fan COMPONENT PART LIST	SG590405-000-01
590405 - Laser Cooling Fan	SG590405-001-01
590405 - BRACKET	SG590405-200-01
590479 - Ventilation Fan, T2 & T3 COMPONENT PART LIST	*SG590479-001-01_RVE
590486 - Defroster Assembly, T2-T3 COMPONENT PART LIST	SG590486-000-01
590486 - Defroster Assembly, T2-T3	SG590486-001-01
590487 - Calibration Mirror	SG590487-001-01
590495 - Soft Key Operator Panel COMPONENT PART LIST	SG590495-010-01
590495 - Soft Key Operator Panel ASSEMBLY CONNECTION	SG590495-011-01

<b>Drawing Title</b>	<b>Drawing Number</b>
590495 - Soft Key Operator Panel INSTALLATION	SG590495-015-01
590512 - Scanner Heating Element	SG590512-001-01
590525 - Softkey OP-Panel with Deadman COMPONENT PART	SG590525-000-01
590525 - Softkey OP-Panel with Deadman ASSEMBLY	SG590525-001-01
590525 - Softkey OP-Panel with Deadman INSTALLATION	SG590525-005-01
590543 - Supercooler, T2	*SG590543-001-01_RVD
590543 – COOLING UNIT	SG590543-100-01
590543 – COOLING UNIT COMPONENT PART LIST	SG590543-100-02
590543 - Supercooler, COVER	SG590543-200-01
590543 - Supercooler, GASKET	SG590543-201-01
590543 - Supercooler, FILTER	SG590543-202-01
590553 - Supercooler, T3	*SG590553-001-01_RVC
590553 - COOLING UNIT	SG590553-100-01
590553 - COOLING UNIT COMPONENT PART LIST	SG590553-100-02
590553 - Supercooler, COVER	SG590553-200-01
590553 - Supercooler, GASKET	SG590553-201-01
590553 - Supercooler, FILTER	SG590553-202-01
590559 - Scanning Assembly, T2-T3 Heated COMPONENT PART	*SG590559-000-01_RVB
590559 - Scanning Assembly, T2-T3 CONNECTION	*SG590559-001-01_RVA
590559 - Scanning Assembly, T2-T3	*SG590559-004-01_RVA
590559 - Scanning MOTOR	*SG590559-101-01_RVA
590559 – OPTICAL ENCODER CABLE	*SG590559-201-01.RVA
590560 - Scanning Assembly, T2-T3 Non-heated COMPONENT	*SG590560-000-01_RVB
590560 - Scanning Assembly	*SG590560-001-01_RVA
590577 - Softkey OP-Panel with Extra Relays COMPONENT	SG590577-000-01
590577 - Softkey OP-Panel	SG590577-001-01
590577 - Softkey OP-Panel INSTALLATION	SG590577-005-01
590577 - Softkey OP-Panel WIRING ASSEMBLY	SG590577-100-01
590606 - Gate Sign, T1	SG590606-001-01
590606 - Gate Sign, T1 CONNECTION	SG590606-004-01
590606 - Gate Sign, T1 REFLECTOR MOUNTING PLATE	SG590606-200-01
590606 - Gate Sign, T1 LAMP HOLDER BRACKET	SG590606-201-01
590606 - Gate Sign, T1 CABINET	SG590606-202-01
590606 - Gate Sign, T1 REFLECTOR LAMP ASSEMBLY	SG590606-203-01
590606 - Gate Sign, T1 REFLECTOR LAMP ASSY CONNECTION	SG590606-203-02
590611 - Network Switch, 4x RJ45 & 1x ST	*SG590611-001-01_RVD
590616 - Heater LED Display	*SG590616-001-01_RVD
590619 - T2 Display gen.2	*SG590619-001-01_PC
590619 - T2 Display gen.2 LIGHT SENSOR ASSEMBLY	*SG590619-101-01
590619 - T2 Display gen.2 MOUNTING PLATE	*SG590619-200-01
590620 - T3 Display gen.2 LIGHT SENSOR ASSEMBLY	*SG590620-001-01_PE

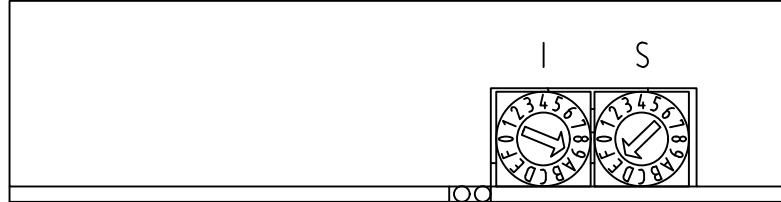
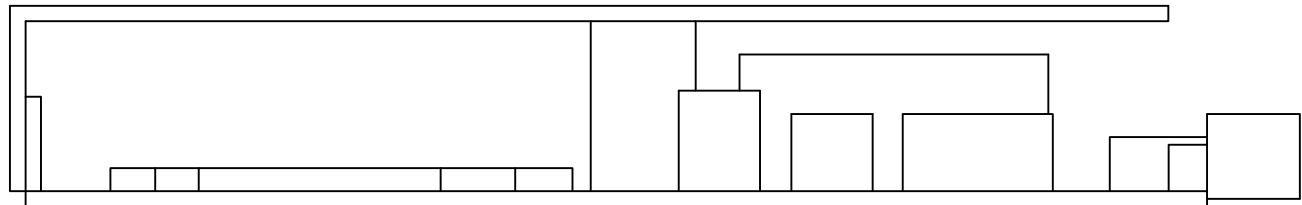
Drawing Title	Drawing Number
590620 - T3 Display gen.2 MOUNTING PLATE	*SG590620-200-01
590621 - Control & Power Assembly	*SG590621-001-01_RVF
590621 – DGS SYSTEM + UPS, CONNECTION	SG590621-004-01_RVF
590621 – CONTROL CABLE VERTICAL SCANNING MOTOR	*SG590621-101-01
590621 – CONTROL CABLE HORIZONTAL SCANNING MOTOR	*SG590621-102-01
590621 – CONTROL CABLE LASER RF - TEMP SENSOR	*SG590621-103-01
590621 – POWER CABLE DEFROSTER/HEATER/LASER COOL	*SG590621-104-01
590621 – POWER CABLE WIRING ASSEMBLY	*SG590621-105-01
590621 – POWER CABLE WIRING ASSEMBLY	*SG590621-106-01
590621 – POWER CABLE WIRING ASSEMBLY	*SG590621-107-01
590621 – POWER CABLE WIRING ASSEMBLY	*SG590621-108-01
590621 – POWER CABLE WIRING ASSEMBLY	*SG590621-110-01
590621 – POWER CABLE T1	*SG590621-111-01
590621 – WIRING ASSEMBLY DISPLAY POWER	*SG590621-112-01
590621 – WIRING ASSEMBLY DISPLAY POWER T1/T2	*SG590621-113-01
590621 – COMMUNICATION CABLE LED DISPLAY	*SG590621-114-01
590621 – WIRING ASSEMBLY	*SG590621-115-01
590621 – CONTROL CABLE	*SG590621-116-01
590621 – CONTROL CABLE HORIZONTAL SCANNING MOTOR T1	*SG590621-117-01
590621 – CONTROL CABLE LASER T1	*SG590621-118-01
590621 – COMMUNICATION CABLE LED DISPLAY T2/T3	*SG590621-119-01_RVA
590621 – WIRING ASSEMBLY	*SG590621-120-01
590621 – MOUNTING PLATE	*SG590621-203-01_PA
590621 – LABEL CU BOARD LED	*SG590621-205-01
590623 – COMMUNICATION ASSEMBLY I/O MODULE	SG590623-001-01_RVA
590980 - T1 Assembly	*SG590980-001-01_RVB
590982 - T2 Assembly	*SG590982-001-01.RVB
590984 - T3 Assembly	*SG590984-001-01_RVB

Drawing Title	Drawing Number
<b>ACCESSORIES</b>	
590221 - U-CLAMP AND FASTENERS FOR Ø139.7 MM POLE	SG590221-001-01
590353 - SDK3 INSTALLATION HARDWARE FOR Ø143 MM POLE	SG590353-001-01
590353 - CLAMP FOR Ø143 MM POLE	SG590353-201-01
590354 - SDK3 INSTALLATION HARDWARE T3 FOR Ø275 MM POLE - SUN SHADE PANELS	SG590354-001-01
590354 - CLAMP FOR Ø275 MM POLE	SG590354-201-01
590354 - UPPER TILT BRACKET FOR Ø275 MM POLE	SG590354-202-01
590354 - PROFILE	SG590354-203-01
590354 - BRACE	SG590354-204-01
590354 - LOWER TILT BRACKET FOR Ø275 MM POLE	SG590354-205-01
590355 - SUPPORT FIXTURE ASSEMBLY	SG590355-001-01
590355 - SUPPORT FIXTURE	SG590355-201-01
590355 – CROSS MEMBER	SG590355-202-01
590355 - U-CLAMP	SG590355-203-01
590356 - SDK3 INSTALLATION HARDWARE FOR Ø139.7 MM - SUN SHADE PANELS	SG590356-001-01
590483 - INSTALLATION HARDWARE, T2-T3 ON Ø140 MM POLE	SG590483-001-01
590496 - CALIBRATION TARGET	SG590496-001-01
590507 - USB MAINTENANCE INTERFACE	SG590507-001-01
590507 - MAINTENANCE INTERFACE CABLE	SG590507-100-01
590515 – LOWER TILT BRACKET	SG590515-204-01
590515 – UPPER TILT BRACKET	SG590515-211-01
590515 – PROFILE	SG590515-212-01
590515 – BRACE	SG590515-213-01
590533 - CENTERLINE TARGET	SG590533-001-01
590533 - TARGET ANGLE	SG590533-200-01
590547 - CAMERA MOUNTING ASSEMBLY	SG590547-001-01
590547 - CAMERA MOUNTING BRACKET	SG590547-200-01
590547 - RAIL	SG590547-201-01
590547 - PLATE	SG590547-202-01
590547 – EXTERNAL CAMERA INSTALLATION	SG590547-203-01
590556 - SDK SUPPORT FOR WIBE MAST	SG590556-001-01
590556 - CROSS MEMBER	SG590556-201-01
590556 - CLAMP PLATE	SG590556-202-01

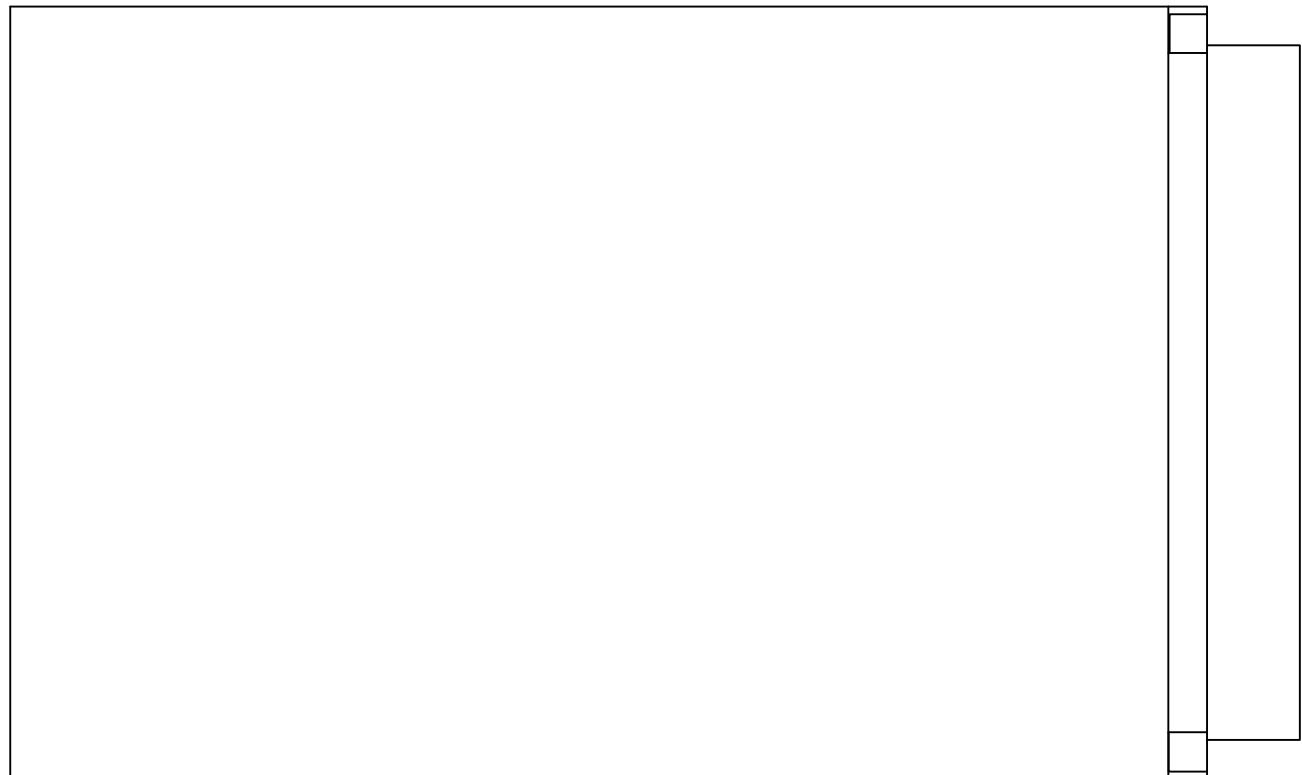
Drawing Title	Drawing Number
590557 - U-CLAMP FOR Ø100 MM PIPE	SG590557-001-01
590561 - U-CLAMP FOR Ø214 MM PIPE	SG590561-001-01
590595 - U-CLAMP – FOR Ø6 IN PIPE	SG590595-001-01



Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
		STEPPER MOTOR DRIVE CIRCUIT, EDM-453			EDM-452-00	PORTESCAP, SWITZERLAND	EDM-452-00	API PORTESCAP SCANDINAVIA AB, SWEDEN



NOTE:  
SETTINGS FOR ROTORY  
SWITCHES I & S  
I = 9  
S = E



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all  
tolerances are according to

Surface Coating

STEPPER MOTOR DRIVER CIRCUIT  
FOR SCANNING MOTORS

Drawn by: G.O. Date drawn: 2002-03-05 Checked by:

App. by: Date approved: Project No.: Drawing No.

SG590131-001-01 Rev. B Sheet 1 of 1 Scale 1:1

B	DIP-switch settings shown graphically	2002.09.05	G.O.		
A	Parts List updated	2002.05.08	G.O.		
Revision	Description	Date	Drawn by:	Checked by:	Approved

# SG590137-000

## DEFROSTER ASSEMBLY

### REVISIONS

B. File format changed from dwg to xls: R1 alternative resistor added  
; By: G.O.: Date: 2009-02-26 .

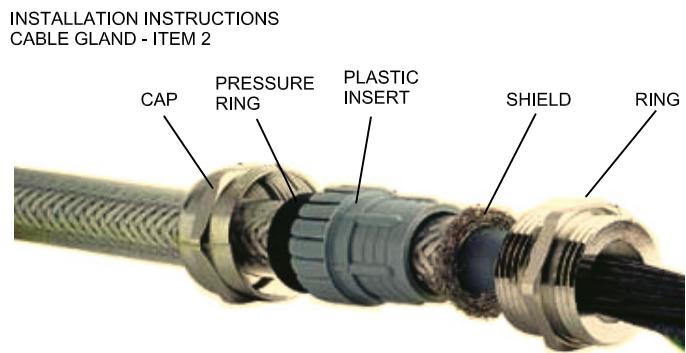
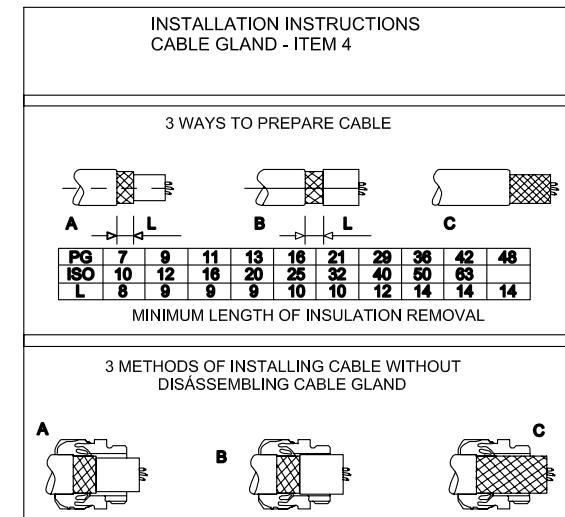
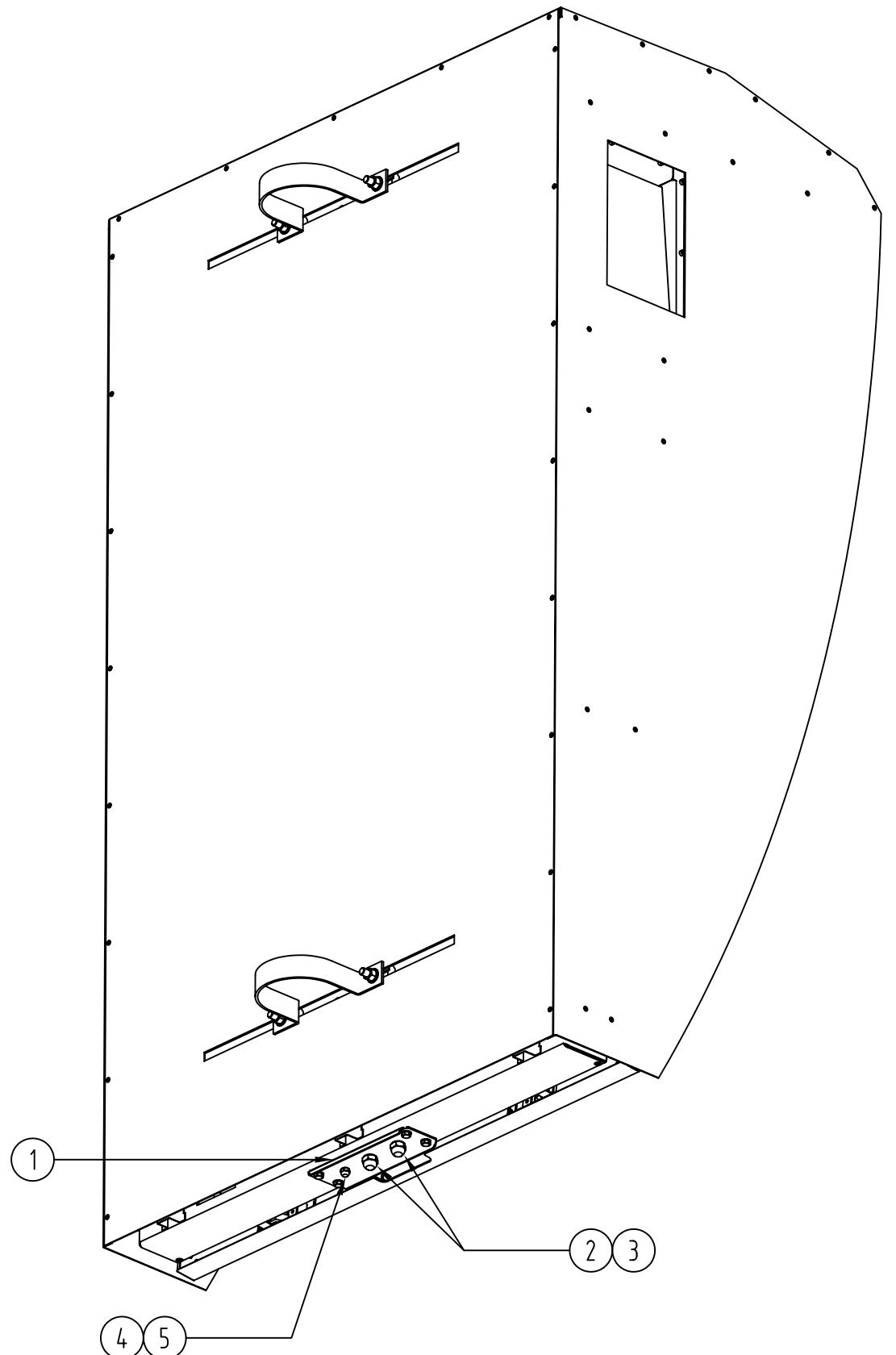
### ASSMBLY LEVEL DOCUMENT LIST

SG590137-000.xls	PARTS LIST
GERBER_SG590137-100-R1.zip	GERBER FILE
PCB_SG590137-100-REV1.pdf	PCB FILE
SCH_SG590137-100-REV1.pdf	SCHEMATIC FILE
SG590137-100_R1.pcb	
SG590137-100_R1.sch	

### COMPONENT AND PARTS LIST

POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFEGRATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART NO.	SUPPLIER
	1	PRINTED CIRCUIT BOARD	SG590137-100					
B1	1	JUMPER						
B2	1	JUMPER						
C1	1	CAPACITOR, POLYESTER, 0.1 µF, 63 V					511012	BEJOKEN
C2	1	CAPACITOR, TANTAL, 47 µF, 10 V					67-762-15	ELFA
J1	1	CONNECTOR			MSTB2,5/4-5,08	PHOENIX CONTACT		
R1	1	RESISTOR, 1.2 kOhm, ±1 %, alt. 1.21 kOhm						
R2-R4	3	RESISTOR, 5,1 kOhm, ±1 %						
R5	1	RESISTOR, 3.3 kOhm, ±1 %						
R6	1	RESISTOR, 2.2 kOhm ±1 %						
U1	1	DIGITAL THERMOMETER AND THERMOSTAT						

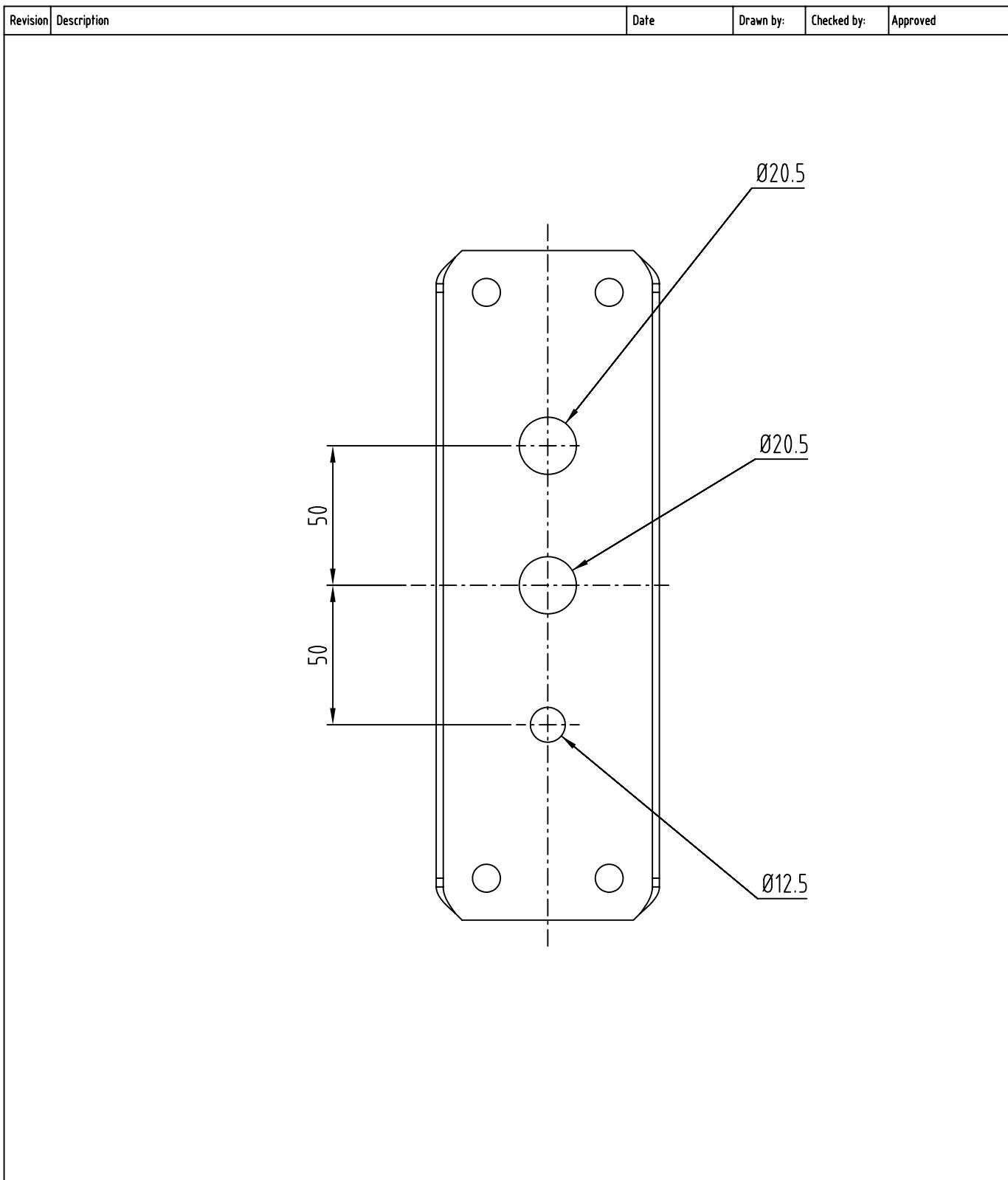
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE ENTRY COVER PLATE	SG590222-201-01					
2	2	CABLE GLAND, RUTAB EMC PERFECT			50.620M/EMV	RUTAB, SWEDEN	1476023	AHLSELL, SWEDEN
3	2	JAM NUT, RUTAB EMC, M20			50.220MPOT	RUTAB, SWEDEN	1476513	AHLSELL, SWEDEN
4	1	CABLE GLAND, RUTAB EMC EEX II			221284	RUTAB, SWEDEN	1476041	AHLSELL, SWEDEN
5	1	JAM NUT, RUTAB EMC, M12			50.212MPOT	RUTAB, SWEDEN	1476511	AHLSELL, SWEDEN



Assembly Instructions

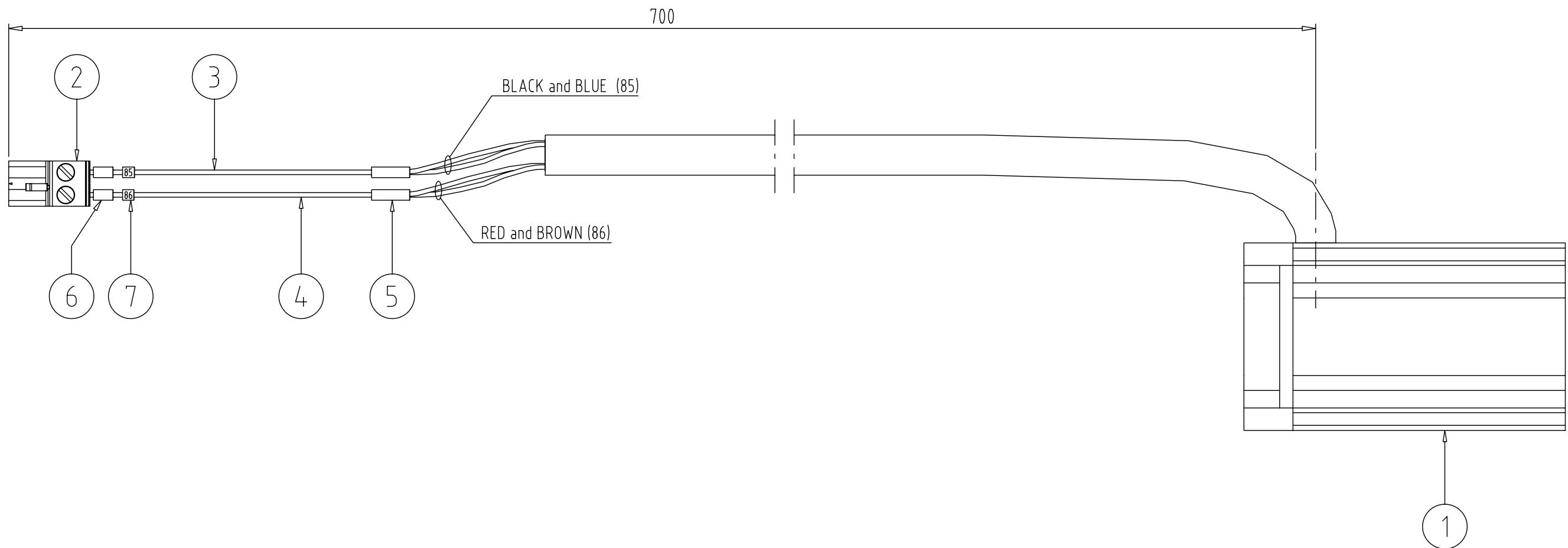
- 1.) Remove approx. 10mm of the cable's insulation and expose the shield
- 2.) Guide the cable through the cable gland cap, the pressure ring and the plastic insert.
- 3.) Bend the shield outward approx. 90°.
- 4.) Press the shield bac ove the plastic insert.
- 5.) Using the plastic insert, push the cable into the base until the shield bottoms in the base.
- 6.) Push the cap over the plastic insert and tighten thoroughly.

<b>SAFE GATE</b>				Unless otherwise indicated, all tolerances are according to		Sharp Edges
				Surface Coating		Weight
CABLE ENTRANCE COVER PLATE ASSM.						
Drawn by: G.O.	Date drawn: 2009-02-19	Checked by:				
App. by:	Date approved:	Project No.:		Drawing No. SG590222-001-01	Rev.	Sheet 1 of 1
Approved				Scale		



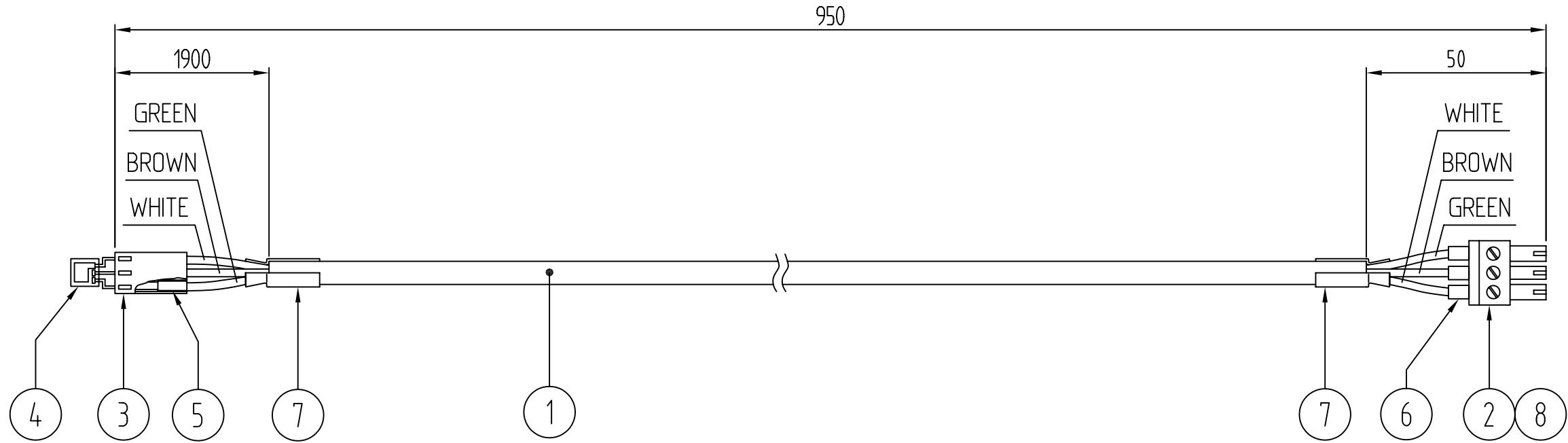
	COVER PLATE		NPP 913798				
Item No	Qty.	Name	Description	Dimensions	Remark		
<b>SAFEGATE</b>		Unless otherwise indicated, all tolerances are according to ISO-2768-C		ISO-2768-C	Sharp Edges R = 0.5		
<b>G R O U P</b>		Surface Coating		Weight			
CABLE ENTRY COVER PLATE							
Drawn by: G.O.	Date drawn: 2009.02.19	Checked by: 					
App. by:	Date approved:	Project No.:	Drawing No. SG590222-201-01	Rev.	Sheet 1 of 1		
				Scale	1:2		

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	HEATER, CIRRUS C40/1-60W-24V-DC-24V-0-0-1-0				DBK		OEM ELECTRONICS
2	1	CONNECTOR, MSTB 2,5/2-ST-5,08			1757019	PHOENIX CONTACT		
3		ELECTRICAL WIRE, UL1007/1569, BLACK, AWG 20			3053 BLACK	ALPHA WIRE	5522909	ELFA
4		ELECTRICAL WIRE, UL1007/1569, RED, AWG 20			3053 RED	ALPHA WIRE	5522925	ELFA
5	2	BUTT SPLICE, SK1525					4822909	ELFA
6	2	BOOTLACE FERRUL, H 0.5/14					9026060000	WEIDMÜLLER
7		WIRE MARKERS, NUMBERING ACCORDING TO ILLUSTRATION		PA02	PARTEX			



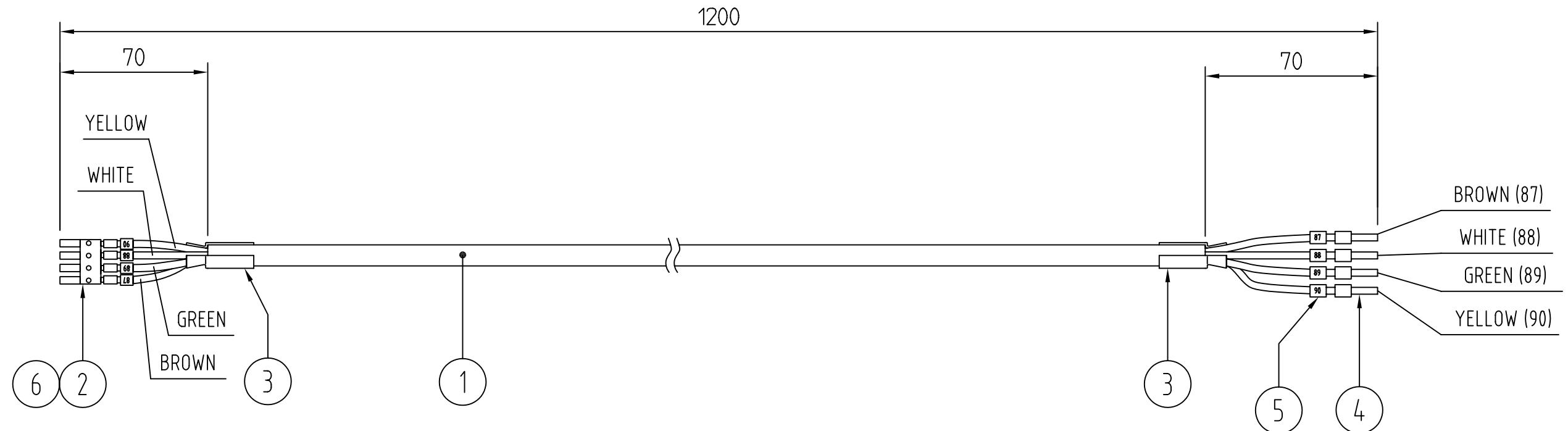
<b>SAFE GATE</b> <b>G R O U P</b>				Unless otherwise indicated, all tolerances are according to ISO-2768-C		Sharp Edges R = 0.5			
Safegate International AB MALMÖ, SWEDEN				Surface Coating		Weight			
<b>HEATER</b>									
Drawn by: G.O.	Date drawn: 2008.03.16	Checked by:							
App. by:	Date approved:	Project No.:			Drawing No. SG590255-106-01	Rev. A	Sheet 1 of 1	Scale NONE	
A	WIRE NUMBER 85-21 CHANGED TO 85		Date	Drawn by:	Checked by:	Approved			
Revision	Description								

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, LIYY, 3x0.34mm <sup>2</sup>					7852030	NOVUM
2	1	CONTACT, MC 1.5/3-ST-3.81			1803581	PHOENIX CONTACT		
3	1	CONTACT			0-925366-3	AMP		
4	1	LIGHT SENSOR			TSL235R	TAOS		
5	3	CRIMP TERMINALS			1-141708-1	AMP		
6	3	BOOTLACE FERRULES, H 0.34/12					9025790000	WEIDMULLER
7	2	SHRINK WRAP, L = 20					55-070-25	ELFA
8	1	LABEL, SK 3.81/2.8: S0, TEXT: J10		0805056	PHOENIX CONTACT			



<b>SAFE GATE</b>  Safegate International AB MALMÖ, SWEDEN				Unless otherwise indicated, all tolerances are according to			Sharp Edges			
				Surface Coating			Weight			
LIGHT SENSOR ASSEMBLY										
Drawn by: G.O.	Date drawn: 2008.03.15	Checked by:		App. by:	Date approved:	Project No.:	Drawing No. SG590255-108-01	Rev.	Sheet 1 of 1	Scale NONE

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, LiYY, 7x0x0.34mm <sup>2</sup>						
2	1	CONNECTOR, MC1.5/4-ST-3.81			1803594	PHOENIX CONTACT		
3	2	SHRINK WRAP, L = 20					55-070-25	ELFA
4	8	BOOTLACE FERRULE, H 0.34/12					9025790000	WEIDMÜLLER
5		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
6	1	LABEL, SK 3.81/2.8: SO, TEXT: J8			0805056	PHOENIX CONTACT		



NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
0	11-01044100	2
7	11-01044107	2
8	11-01044108	8
9	11-01044109	4

Item No	Quantity	Name of item	Description	Dimensions	Remark
			Unless otherwise indicated, all tolerances are according to		Sharp Edges
			Surface Coating		Weight
<b>SAFE GATE</b> <b>G R O U P</b> Safegate International AB MALMÖ, SWEDEN					
Drawn by: G.O.	Date drawn: 2008.03.15	Checked by:			
App. by:	Date approved:	Project No.:	Drawing No. SG590255-109-01	Rev.	Sheet 1 of 1
				Scale NO SCALE	

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	STEPPER MOTOR, P850		2014800002	ESCAP			
2	1	OPTICAL ENCODER CABLE	SG590255-112-01					
3	1	PLUG FOR SOCKET CONTACTS			182642-1	AMP	4450045	ELFA
4	1	CABLE CLAMP WITH STRAIN RELIEF			182655-1	AMP	4450433	ELFA
5	13	SOCKET, TIN PLATED			163088-1	AMP	4450722	ELFA

PIN NUMBER ASSIGNMENT FOR WIRES

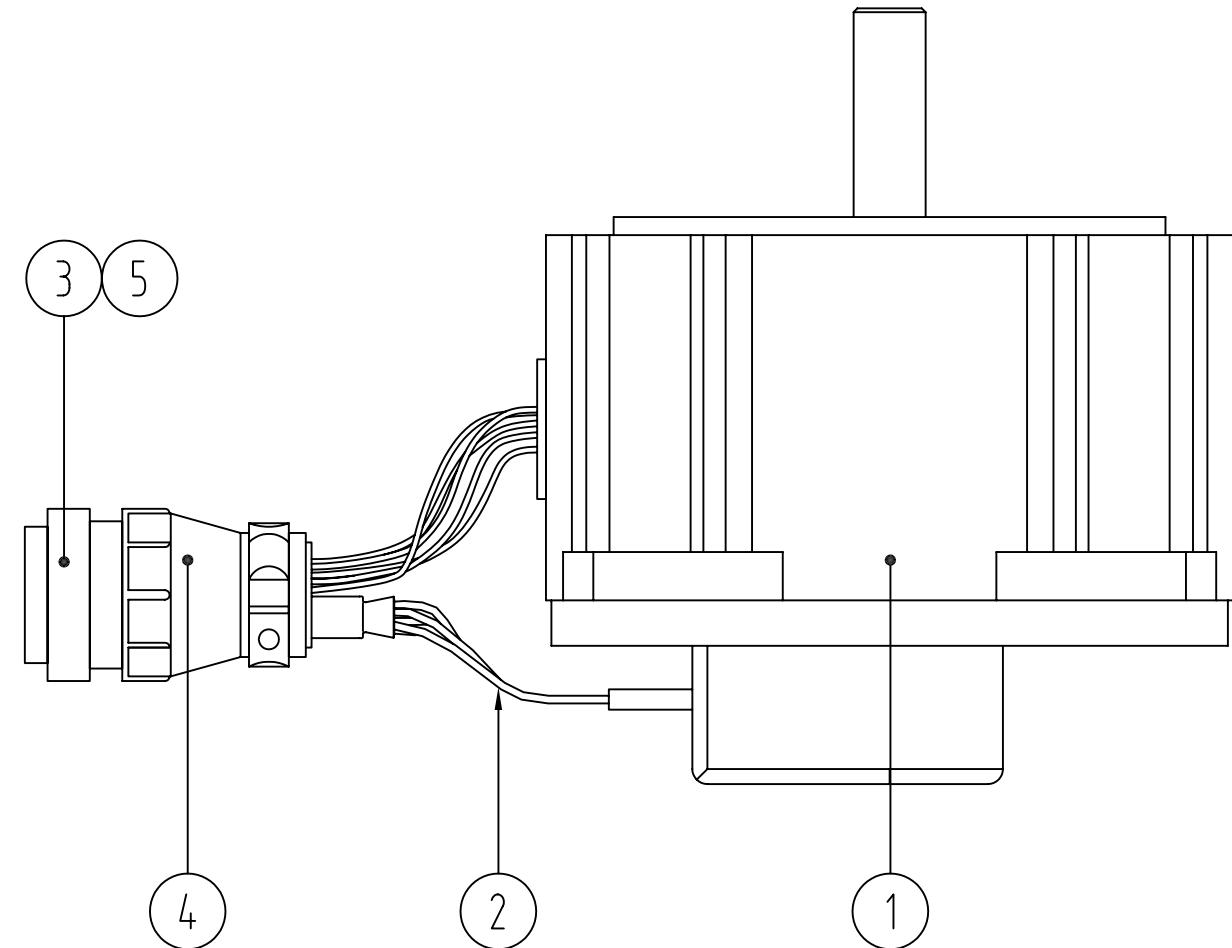
BROWN (PIN 1)
BROWN/WHITE (PIN 2)
RED (PIN 3)
RED/WHITE (PIN 4)
ORANGE (PIN 5)
ORANGE/WHITE (PIN 6)
YELLOW (PIN 7)
YELLOW/WHITE (PIN 8)

PLUG FOR SOCKET CONTACTS
BROWN (PIN 9)
YELLOW (PIN 10)
GREEN (PIN 11)
GRAY (PIN 12)
WHITE (PIN 13)

STEPPER MOTOR

OPTICAL ENCODER



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to  
Surface Coating

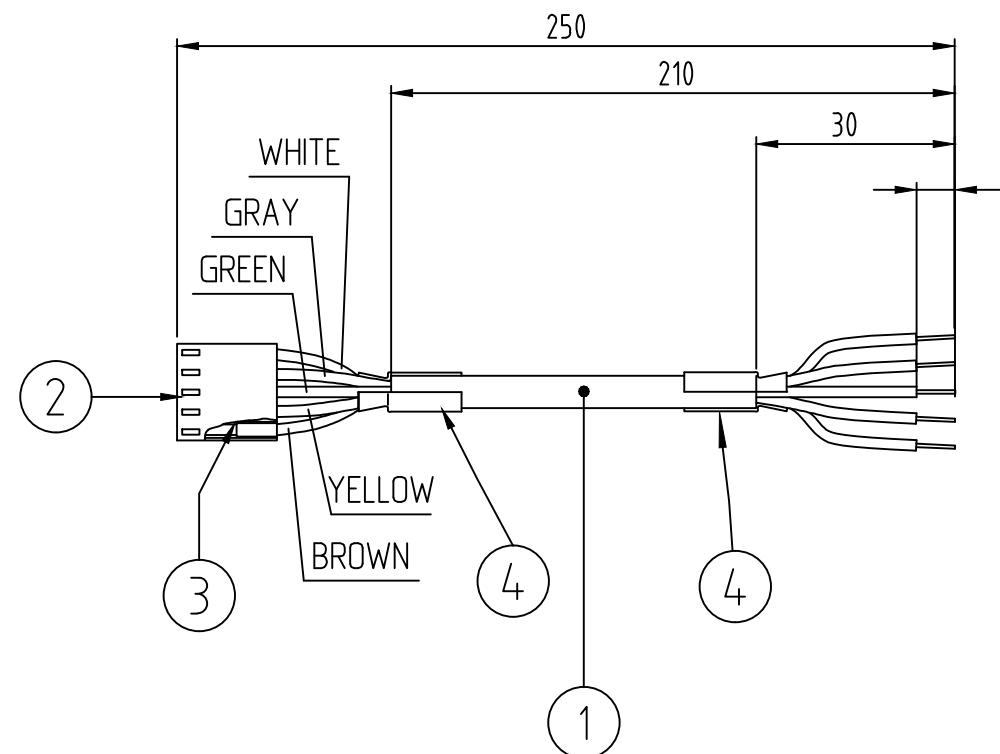
Sharp Edges

Weight

SCANNING MOTOR

Drawn by: G.O.	Date drawn: 2008.09.30	Checked by:	
App. by:	Date approved:	Project No.:	
Drawing No. SG590255-111-01		Rev.	Sheet 1 of 1
		Scale	1:1

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, LiYY, 5x0.34						
2	1	CONTACT HOUSING			0-925366-5	AMP		
3	5	CRIMP TERMINALS			1-141708-1	AMP		
4	2	SHRINK WRAP, L = 20 mm						

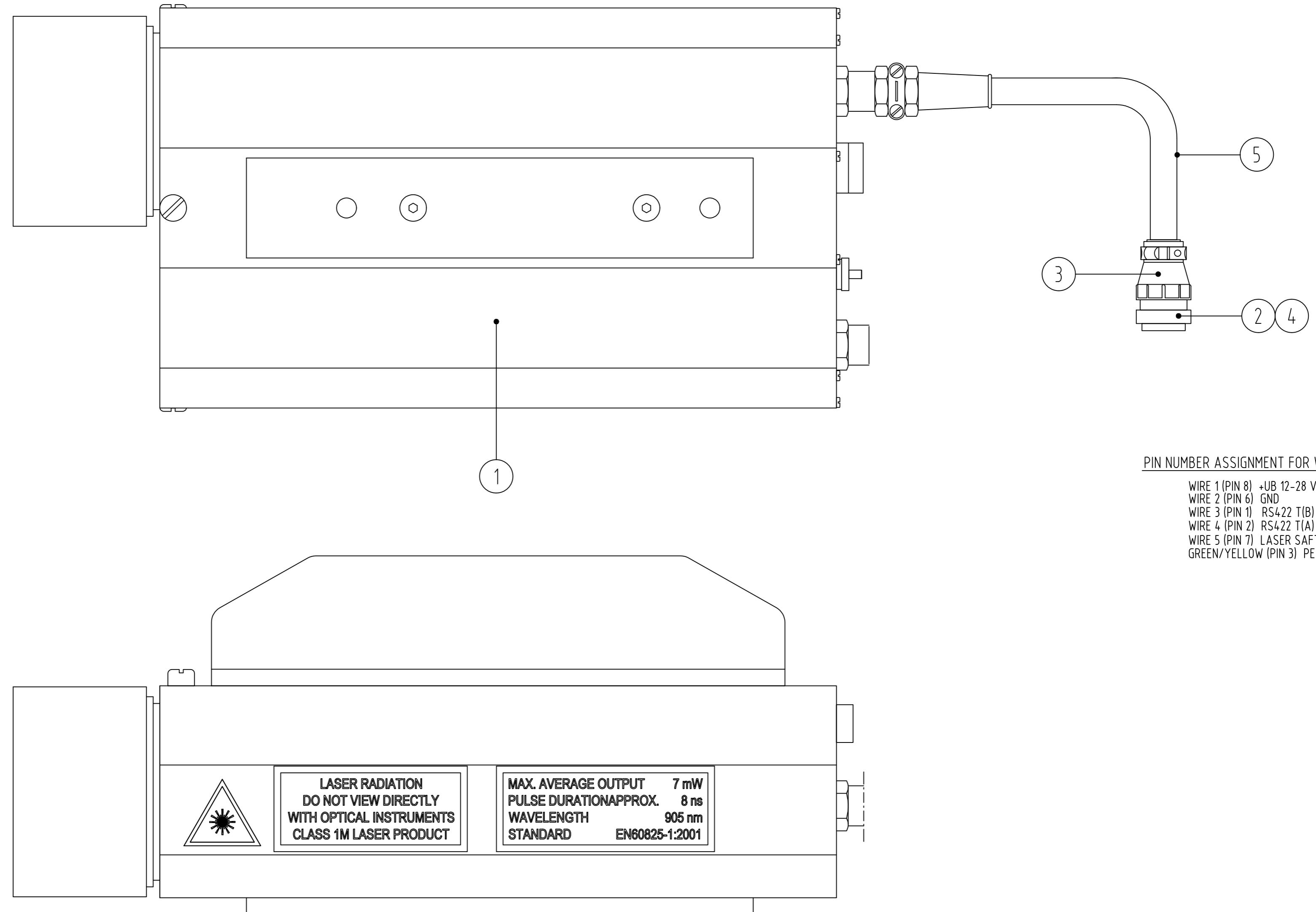


Safegate International AB  
MÄLÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to ISO-2768-C			Sharp Edges R = 0.5
Surface Coating			Weight
OPTICAL ENCODER CABLE T1			
Drawn by: G.O.	Date drawn:	Checked by:	
App. by:	Date approved:	Project No.:	Drawing No. SG590255-112-01
			Rev. C
			Sheet 1 of 1
			Scale

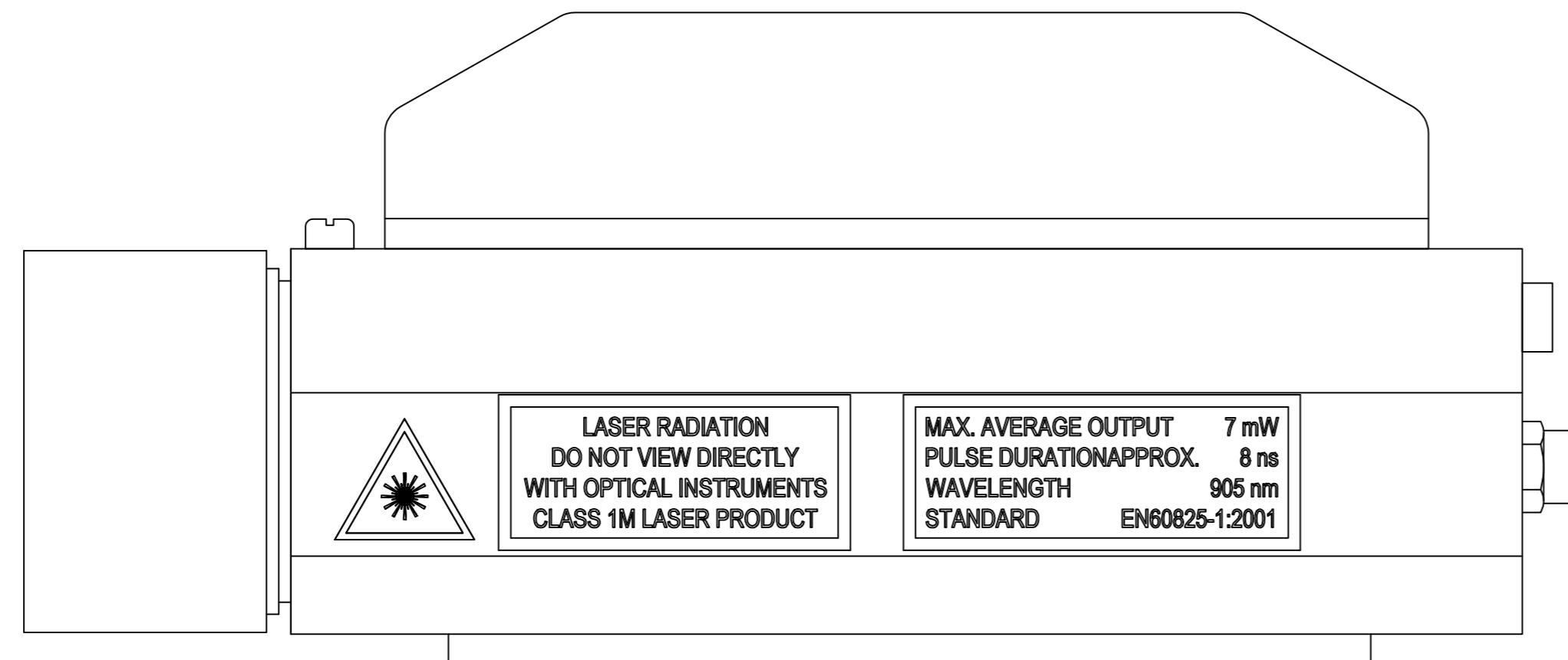
C	length for cable updated	2012.01.23	A.S		
B	BOM and drawing changed	2012.01.20	A.S		
A	Cable length added, drawing number added	2010.05.25	A.S		
Revision	Description	Date	Drawn by:	Checked by:	Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	LASER RANGE FINDER			LD3-06AT	RIEGL		
2	1	PLUG FOR SOCKET CONTACTS			182645-1	AMP	4450029	ELFA
3	1	CABLE CLAMP WITH STRAIN RELIEF			182663-1	AMP	4450425	ELFA
4	6	SOCKET, TIN PLATED			163088-1	AMP	4450722	ELFA
5	1	CABLE LENGTH 300mm						



## PIN NUMBER ASSIGNMENT FOR WIRES

WIRE 1 (PIN 8) +UB 12-28 V DC  
WIRE 2 (PIN 6) GND  
WIRE 3 (PIN 1) RS422 T(B)  
WIRE 4 (PIN 2) RS422 T(A)  
WIRE 5 (PIN 7) LASER SAFTY LOCK  
GREEN/YELLOW (PIN 3) PE



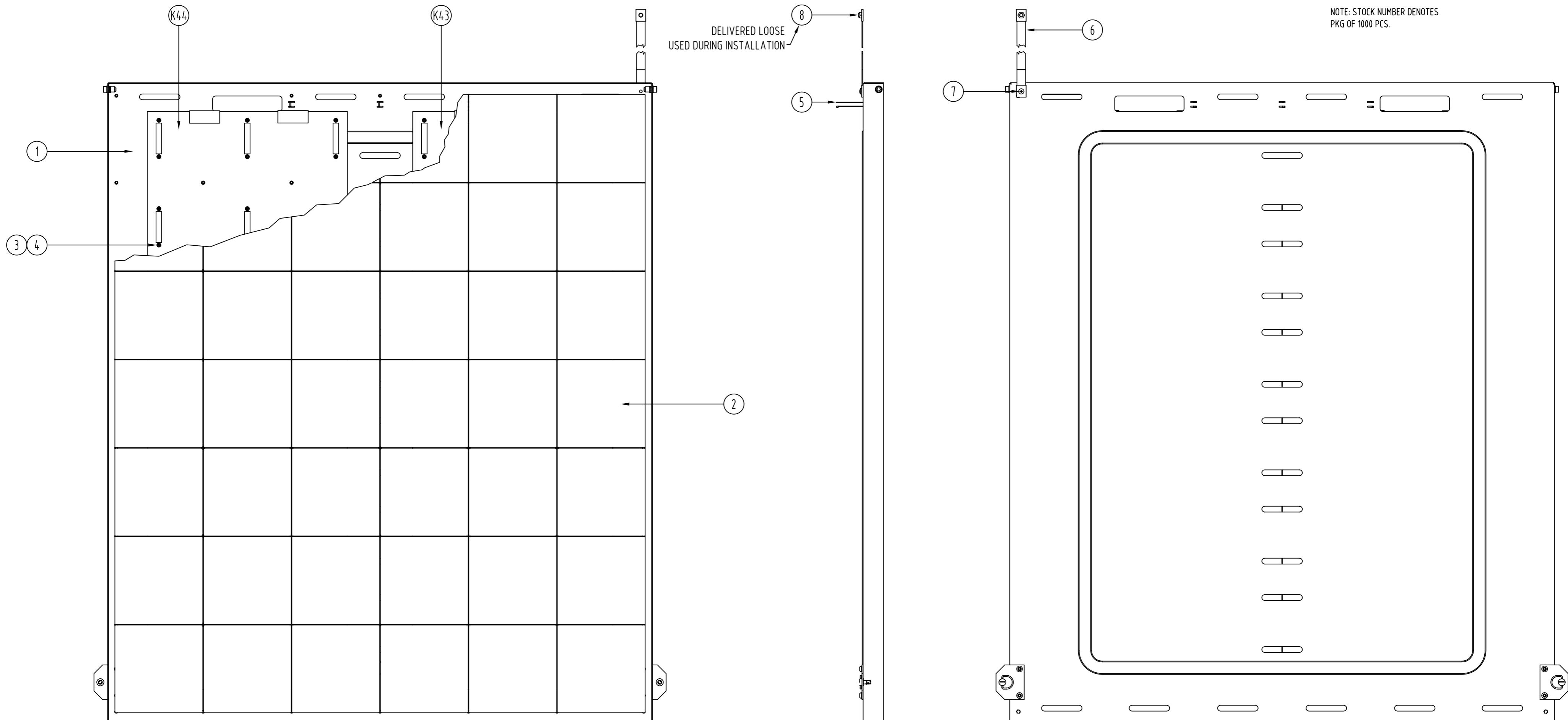
Safegate International AB  
MÄLÖ, SWEDEN

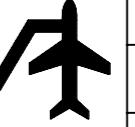
unless otherwise indicated, all tolerances are according to	Sharp Edges
Surface Coating	Weight

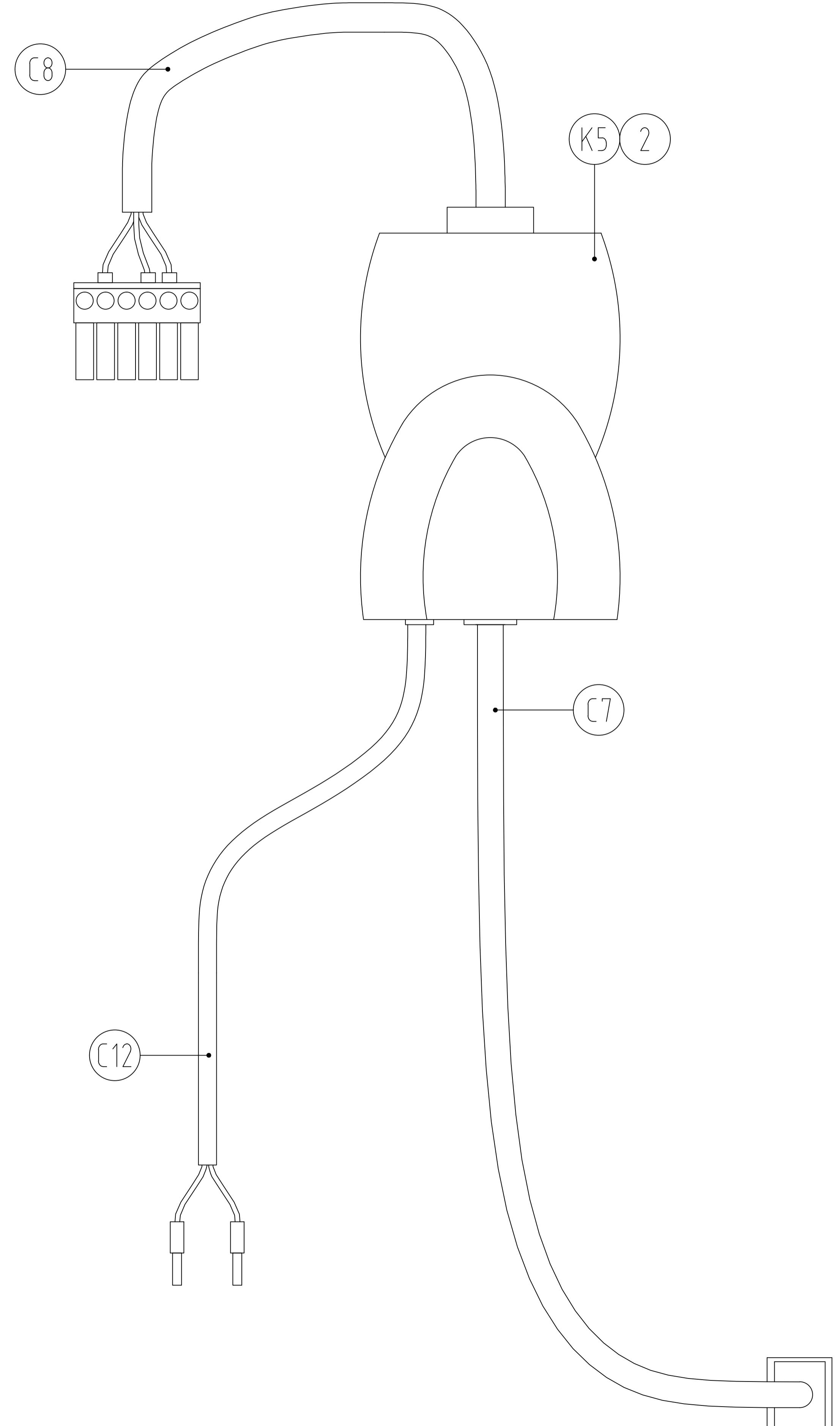
# LASER RANGE FINDER ASSEMBLY

B	Note for cable added	2010.05.25	A.S			Drawn by: G.O.	Date drawn: 2008.09.30	Checked by:				
A	Note for pin number assignments updated with wire function.	2009.02.17	G.O.			App. by:	Date approved:	Project No.:	Drawing No. S6590255-113-01	Rev.	Sheet 1 of 1	Scale 1:1
Revision	Description	Date	Drawn by:	Checked by:	Approved							

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
K43-K44	2	BACKPLANE PCB	SG590572-100					
1		DISPLAY MOUNTING PLATE	NPP 912755					
2	42	DISPLAY PCB, YELLOW/RED		590570				
3	84	SCREW, MRT M3x6, ZINC PLATED						
4	84	FLAT WASHER, BRB 3.2x8x0.4, ZINC PLATED						
5	3	CABLE TIE, 100x2.5, BLACK					55-157-21, SEE NOTE	ELFA
6	1	GROUND STRAP, 16 mm <sup>2</sup> , 200 mm					55-097-57	ELFA, SWEDEN
7	1	SHEET METAL SCREW, RSX-Z ST5.5x13, ZINC PLATED						
8	1	LOCKNUT, M6, ZINC PLATED						



<b>SAFEGATE</b>  <b>G R O U P</b>			Unless otherwise indicated, all tolerances are according to Surface Coating			Sharp Edges
Safegate International AB MALMÖ, SWEDEN						Weight
DISPLAY, 42 CARD						
Drawn by: G.O.	Date drawn: 2008.03.25	Checked by: 				
App. by:	Date approved:	Project No.:				Drawing No. SG590256-001-01
Rev. A	Sheet 1 of 1	Scale 1:5				



Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K5					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN
2	1	DIN RAIL CLAMP					90-1121	DIREKTRONIK, SWEDEN
4	2	END BRACKET, CLIPFIX 35-5					3022276	PHOENIX CONTACT, SWEDEN
C7	1	PATCH CABLE	SG590258-101-01					
C8	1	COMMUNICATION CABLE	SG590258-100-01					
C12	1	POWER CABLE (SEE NOTE)						
K5	1	TERMINAL SERVER, EHERNET-RS232, 10-24 VDC		DS-202	TIBBO TECHNOLOGY, TAIWAN	24-0594	DIREKTRONIK, SWEDEN	
-		WIRING MATERIALS FOR POWER CABLE C12						
2		CRIMP LUG, H 05/14					9026060000	WEIDMÜLLER, SWEDEN
		WIRE MARKERS, PARTEX PA02, MARKING					SEE NOTE	WEIDMÜLLER, SWEDEN

#### NOTE FOR POWER CABLE C12

THE POWER CABLE IS MADE FROM THE CABLE THAT IS ATTACHED TO THE TRANSFORMER, WHICH IS DELIVERED WITH THE TERMINAL SERVER, K5. CUT THE CABLE AT THE END NEAR THE TRANSFORMER AND DISCARD THE TRANSFORMER

SEPARATE THE WIRES FOR APPROX. 50 mm OF THE CABLE'S LENGTH. MARK THE CONDUCTOR THAT IS CONNECTED TO THE INSIDE CYLINDRICAL SURFACE OF THE CONTACT WITH THE NUMBER 23. MARK THE CONDUCTOR THAT IS CONNECTED TO THE OUTSIDE CYLINDRICAL SURFACE OF THE CONTACT WITH THE NUMBER 22. REMOVE THE INSULATION FROM THE CONDUCTORS AND ATTACH THE CRIMP LUGS.

#### NOTE FOR WIRE MARKERS

NO. PART NO.

2 11-01044102

3 11-01044103

<b>SAFEgate</b> 		Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges
GROUP		Weight	
Safegate International AB MALMÖ, SWEDEN			
COMMUNICATION ASSEMBLY WITH TIBBO TERMINAL SERVER, PHOENIX CONTACT NETWORK SWITCH/MEDIA CONVERTER			
Drawn by:	Date drawn: G.O. 2008-05-18	Checked by:	
Revision:	Description:	Date:	Drawn by:
App. by:	Date approved:	Project No.:	
Drawing No. SG590258-001-01		Rev. A	Sheet 1 of 1
Scale 1:1.15			

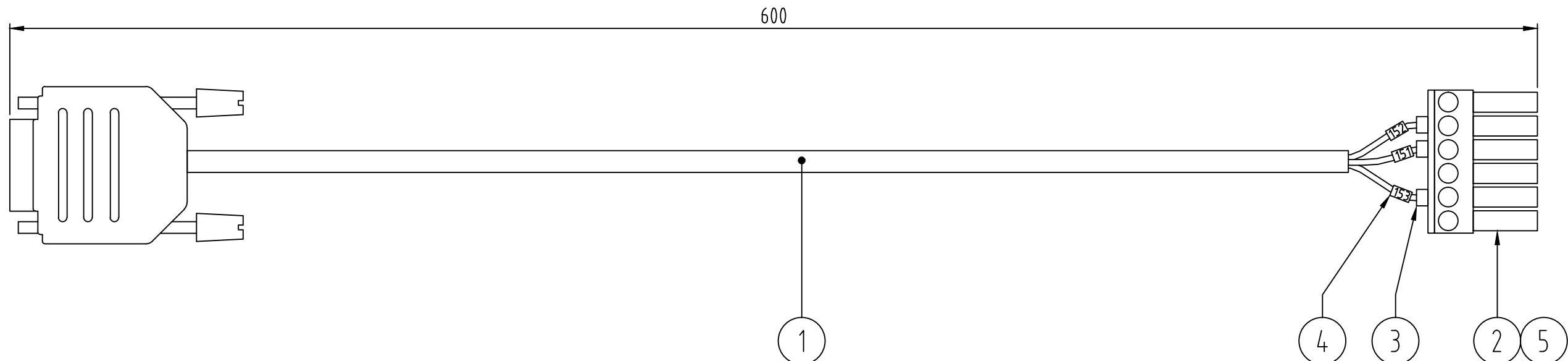
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, 9-PIN D-SUB, DB9F-DB9M, L = 1.8 m (See note)					25-962-11	ELFA, SWEDEN
2	1	CONTACT, MC 1,5/6-ST-3,81					1803617	PHOENIX CONTACT AB, SWEDEN
3	3	CRIMP LUG, H 0.25/10					9026050000	WEIDMÜLLER, SWEDEN
4		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER, SWEDEN
5	1	LABEL, SK 3,81/2,8: SO, TEXT: J21					0805056	PHOENIX CONTACT, SWEDEN

NOTE FOR WIRE MARKERS

NO. PART NO. QTY.

- 1 11-01044101 4
- 2 11-01044102 1
- 3 11-01044103 1
- 5 11-01044105 3

THE COMMUNICATION CABLE IS MADE FROM A STANDARD CABLE.  
CUT OFF THE MALE D-SUB CONTACT AND SHORTEN THE CABLE TO  
LENGTH GIVEN IN THE DIMENSION BELOW. PLACE CRIMP LUGS ON  
THE ENDS OF THE EXPOSED WIRES.



D-SUB PIN	WIRE MARKING
2	151
3	152
5	153



Safegate International AB  
MALMÖ, SWEDEN

Drawn by:	Date drawn:	Checked by:	
G.O.	2008-05-18		
App. by:	Date approved:	Project No.:	

Unless otherwise indicated, all tolerances are according to Sharp Edges

Surface Coating Weight

COMMUNICATION CABLE  
TERMINAL SERVER

Drawing No. SG590258-100-01 Rev. Sheet Scale  
1 of 1

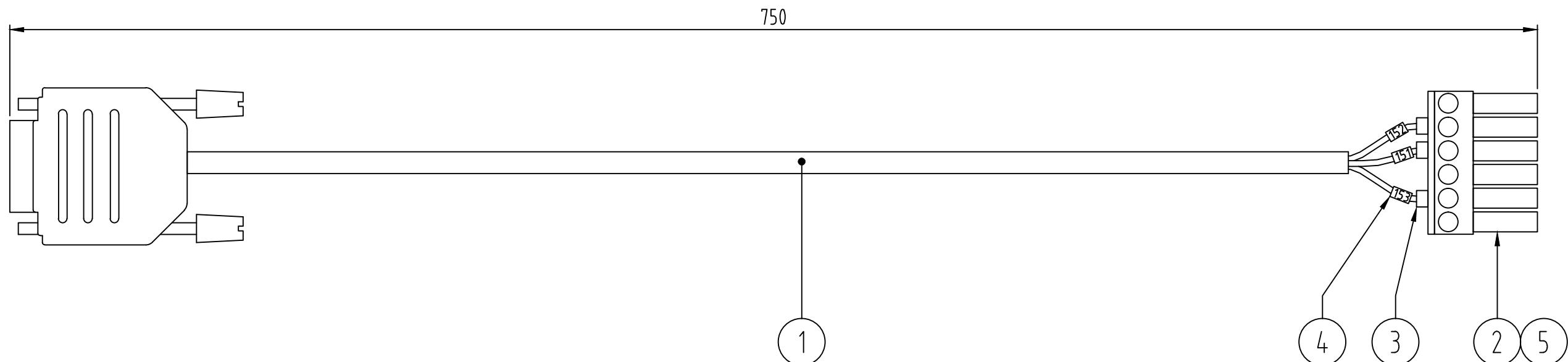
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, 9-PIN D-SUB, DB9F-DB9M, L = 1.8 m (See note)					25-962-11	ELFA, SWEDEN
2	1	CONTACT, MC 1,5/6-ST-3,81					1803617	PHOENIX CONTACT AB, SWEDEN
3	3	CRIMP LUG, H 0.25/10					9026050000	WEIDMÜLLER, SWEDEN
4		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER, SWEDEN
5	1	LABEL, SK 3,81/2,8: SO, TEXT: J21					0805056	PHOENIX CONTACT, SWEDEN

NOTE FOR WIRE MARKERS

NO. PART NO. QTY.

- 1 11-01044101 4
- 2 11-01044102 1
- 3 11-01044103 1
- 5 11-01044105 3

THE COMMUNICATION CABLE IS MADE FROM A STANDARD CABLE.  
CUT OFF THE MALE D-SUB CONTACT AND SHORTEN THE CABLE TO  
LENGTH GIVEN IN THE DIMENSION BELOW. PLACE CRIMP LUGS ON  
THE ENDS OF THE EXPOSED WIRES.



D-SUB PIN	WIRE MARKING
2	151
3	152
5	153

A	Length changed from 600 to 750mm	2012.02.29	A.S.		
Revision	Description	Date	Drawn by:	Checked by:	Approved

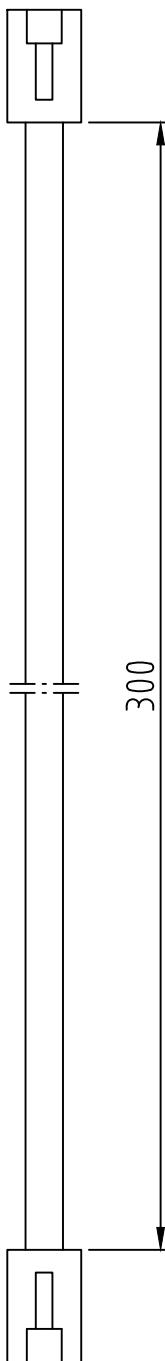
**SAFE GATE**

Safegate International AB  
MALMÖ, SWEDEN

Drawn by: G.O.	Date drawn: 2008-05-18	Checked by: 
App. by:	Date approved:	Project No.:

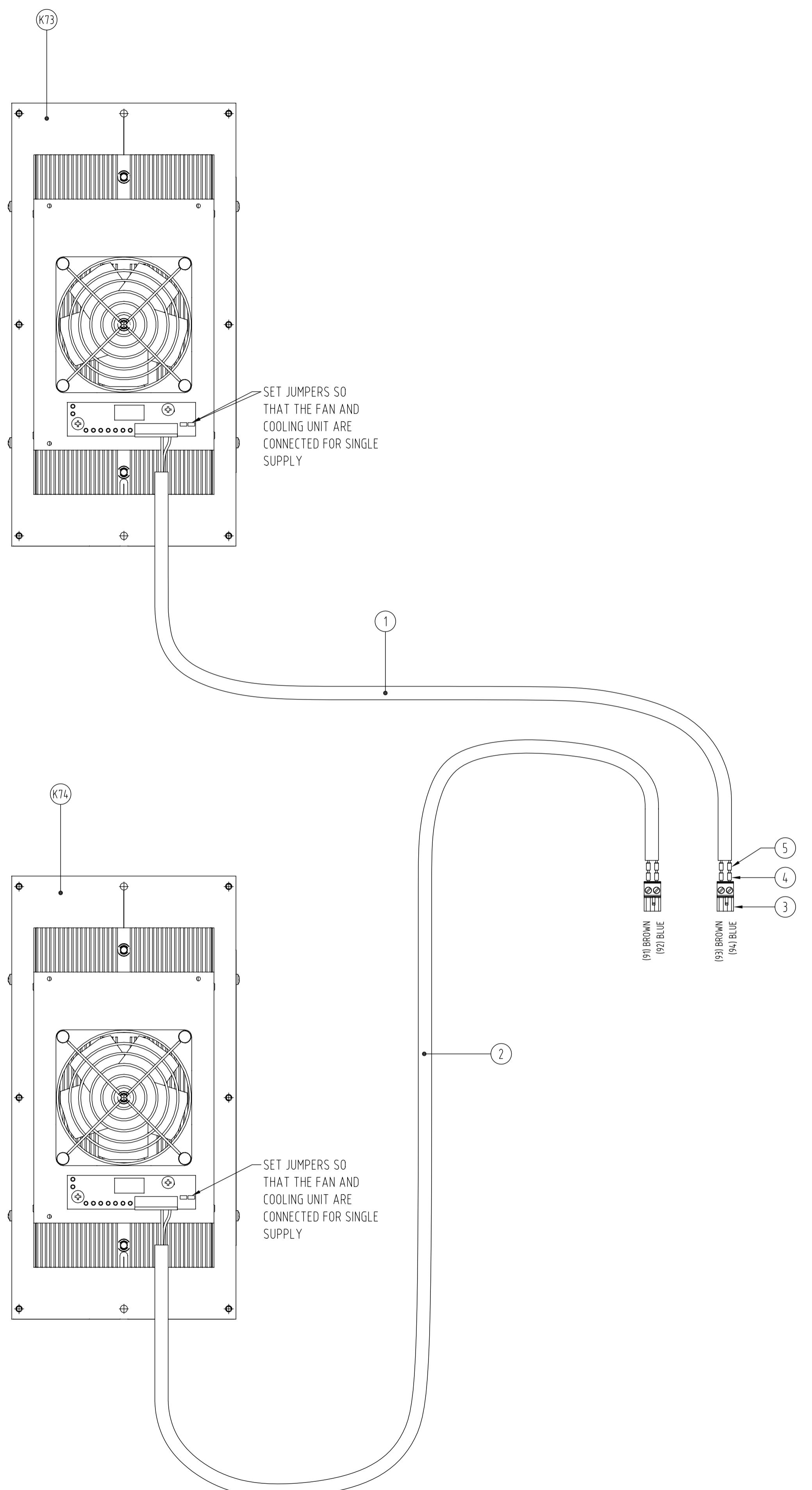
Drawing No. SG590258-100-01	Rev. A	Sheet 1 of 1	Scale
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Revision	Description	Date	Drawn by:	Checked by:	Approved
C	Length changed	2011-11-18	A.S		



2	2	MODULAR PLUG, RJ45	4269593		ELFA
1	1	CABLE, CAT5	5576509		ELFA
Item No	Qty.	Name	Description	Dimensions	Remark
			Unless otherwise indicated, all tolerances are according to Surface Coating		Sharp Edges Weight
			PATCH CABLE		
<b>SAFEGATE</b>  <b>G R O U P</b> Safegate International AB MALMÖ, SWEDEN					
Drawn by: G.O.	Date drawn: 2008-05-18	Checked by:			
App. by:	Date approved:	Project No.:	Drawing No. SG590258-101-01	Rev. C	Sheet 1 of 1
				Scale	

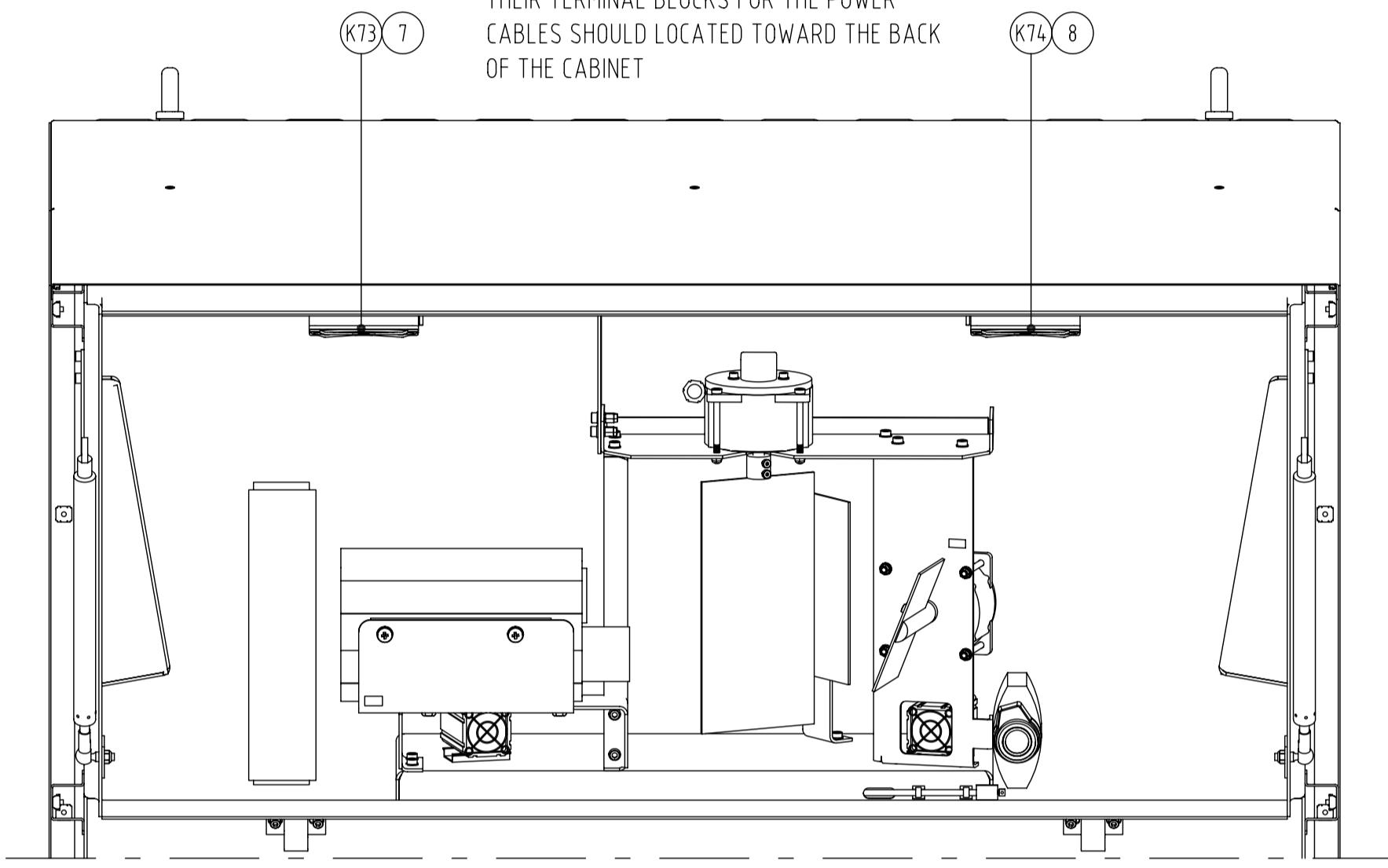
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
K73-K74	2	AIR TO AIR COOLING UNIT			AA-100-24-23-00-10	LAIRD TECHNOLOGIES, SWEDEN		
1	1	CABLE, HOFVV-F, 2 X 0.75, GRAY, L = 800					55-609-25	ELFA AB, SWEDEN
2	1	CABLE, HOFVV-F, 2 X 0.75, GRAY, L = 1420					55-609-25	ELFA AB, SWEDEN
3	2	CONNECTOR, MSTB 2,5/2-ST-5,08					1757019	PHOENIX CONTACT, SWEDEN
4	8	CRIMP FERRULE, H 0.75/14					902607000	WEIDMÜLLER, SWEDEN
5	5	WIRE MARKERS PA02, OR EQV.		PA02	PARTEX, SWEDEN		55-028-10, SEE NOTE 2	ELFA, SWEDEN
6	5	CABLE TIE, 71x1,8, BLACK					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN
7	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K73					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN
8	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K74					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN



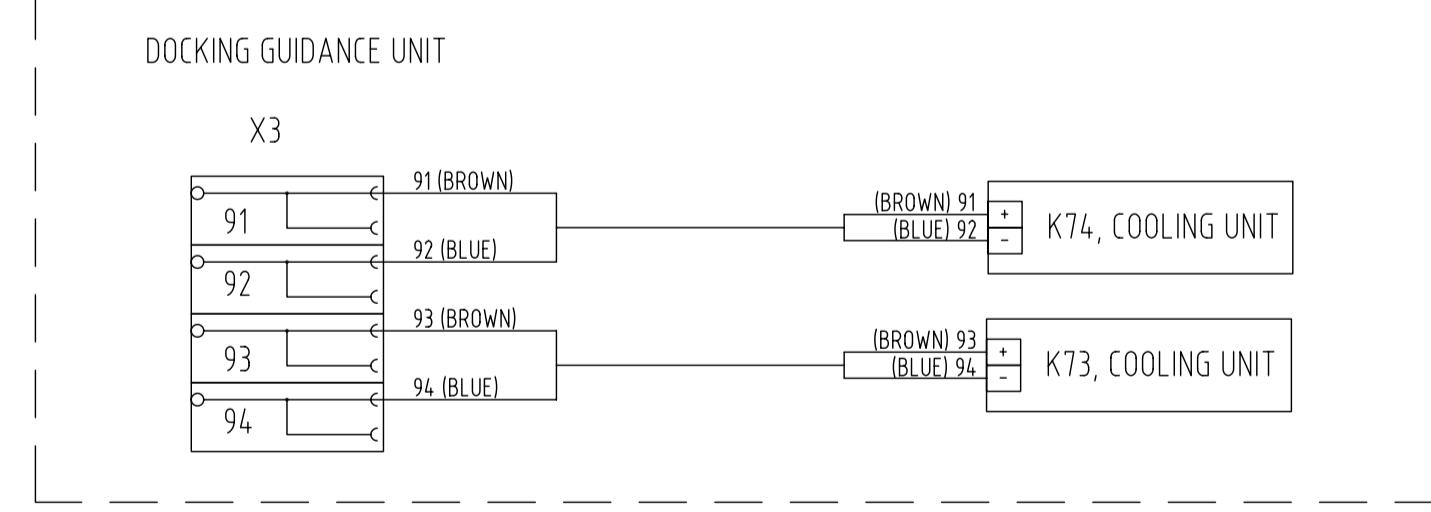
NOTE 1: PLACE IDENTIFIER  
LABELS ON BACK WALL OF  
CABINET UNDER RESPECTIVE  
UNIT.

NOTE 2: STOCK NUMBER  
REFERS TO A PACKAGE OF  
1000 PIECES.

WHEN THE COOLING UNITS ARE INSTALLED,  
THEIR TERMINAL BLOCKS FOR THE POWER  
CABLES SHOULD LOCATED TOWARD THE BACK  
OF THE CABINET

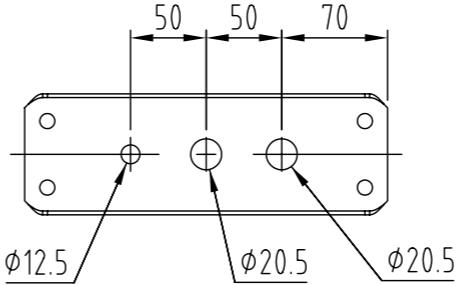
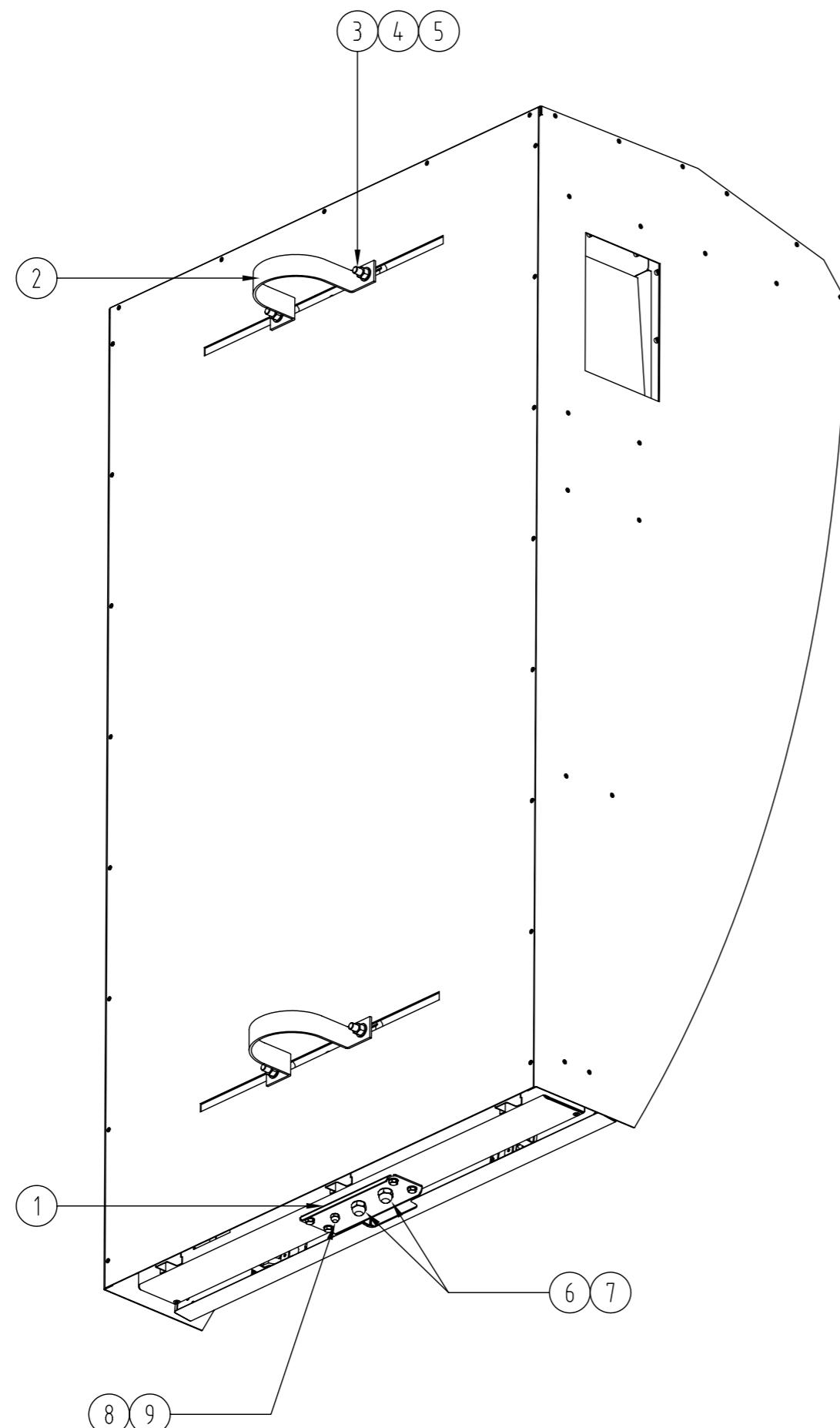


COMPONENT PLACEMENT IN  
DOCKING GUIDANCE UNIT  
PARTIAL FRONT VIEW,  
DOOR REMOVED

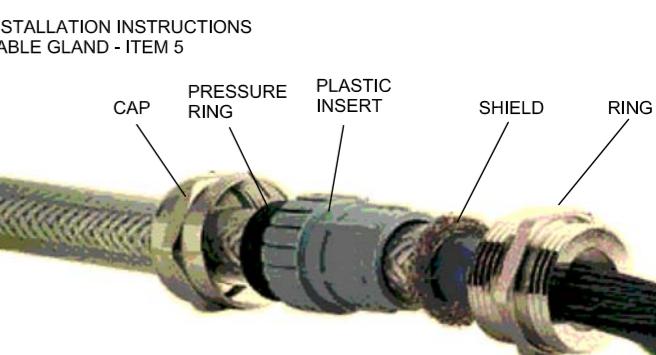
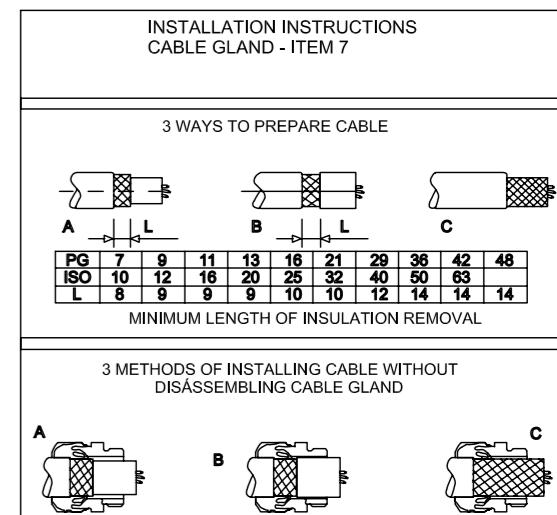


CONNECTION DIAGRAM

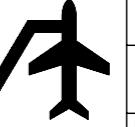
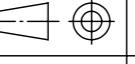
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	COVER PLATE (DELIVERED AS PART OF CABINET ASSEMBLY)	NPP 913798					
2	2	CLAMP	AT 605283					
3	4	T-BOLT AND NUT, HS 50/30 - fv - M12 x 40			12-1769	HALFAN, GERMANY		SIFVERT SKRUV, SWEDEN
4	4	NUT, ISO 4032, M12, GALVANIZED						
5	4	WASHER, DIN 125 13x24x2.5, GALVANIZED						
6	2	CABLE GLAND, RUTAB EMC PERFECT			50.620M/EMV	RUTAB, SWEDEN	1476023	AHLSSELL, SWEDEN
7	2	JAM NUT, RUTAB EMC, M20			50.220MPOT	RUTAB, SWEDEN	1476513	AHLSSELL, SWEDEN
8	1	CABLE GLAND, RUTAB EMC EEX II			221284	RUTAB, SWEDEN	1476041	AHLSSELL, SWEDEN
9	1	JAM NUT, RUTAB EMC, M12			50.212MPOT	RUTAB, SWEDEN	1476511	AHLSSELL, SWEDEN



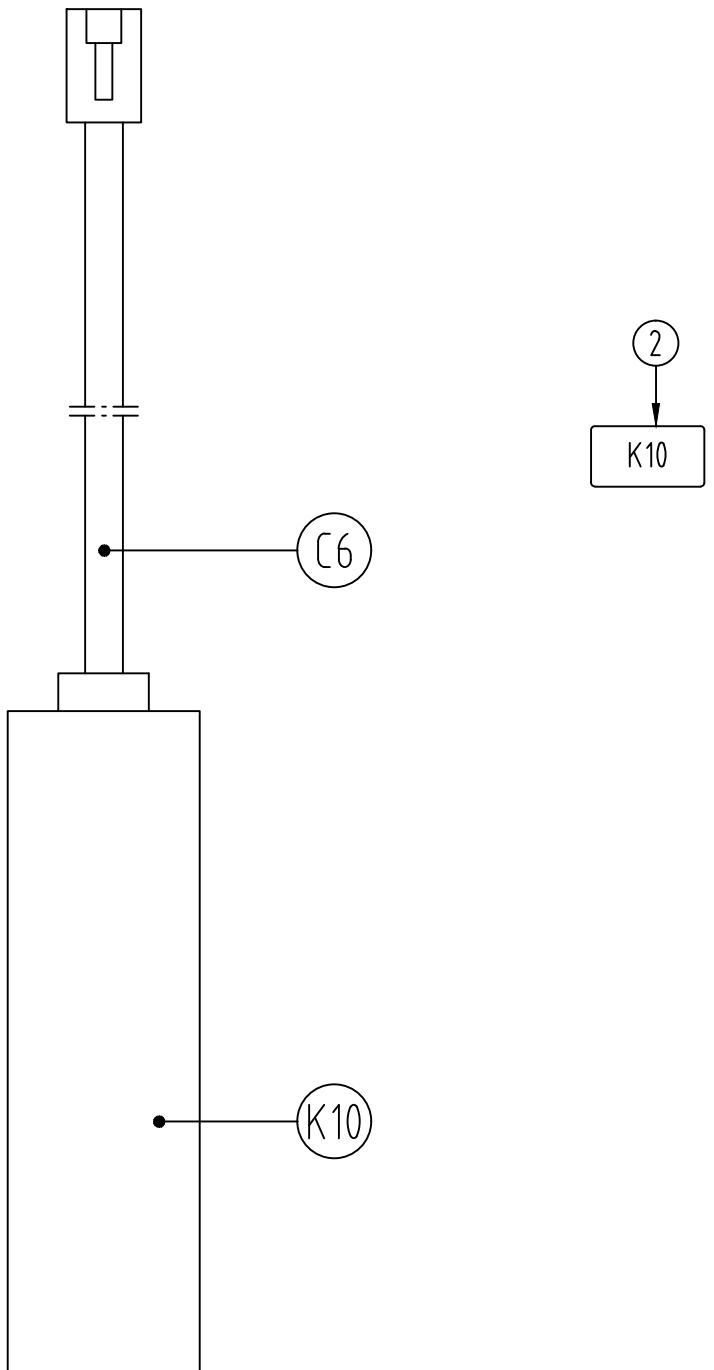
HOLE PATTERN IN  
ITEM 1, COVER PLATE  
FOR CABLE GLANDS



Assembly Instructions  
 1.) Remove approx. 10mm of the cable's insulation and expose the shield  
 2.) Guide the cable through the cable gland cap, the pressure ring and the plastic insert.  
 3.) Bend the shield outward approx. 90°.  
 4.) Press the shield bac ove the plastic insert.  
 5.) Using the plastic insert, push the cable into the base until the shield bottoms in the base.  
 6.) Push the cap over the plastic insert and tighten thoroughly.

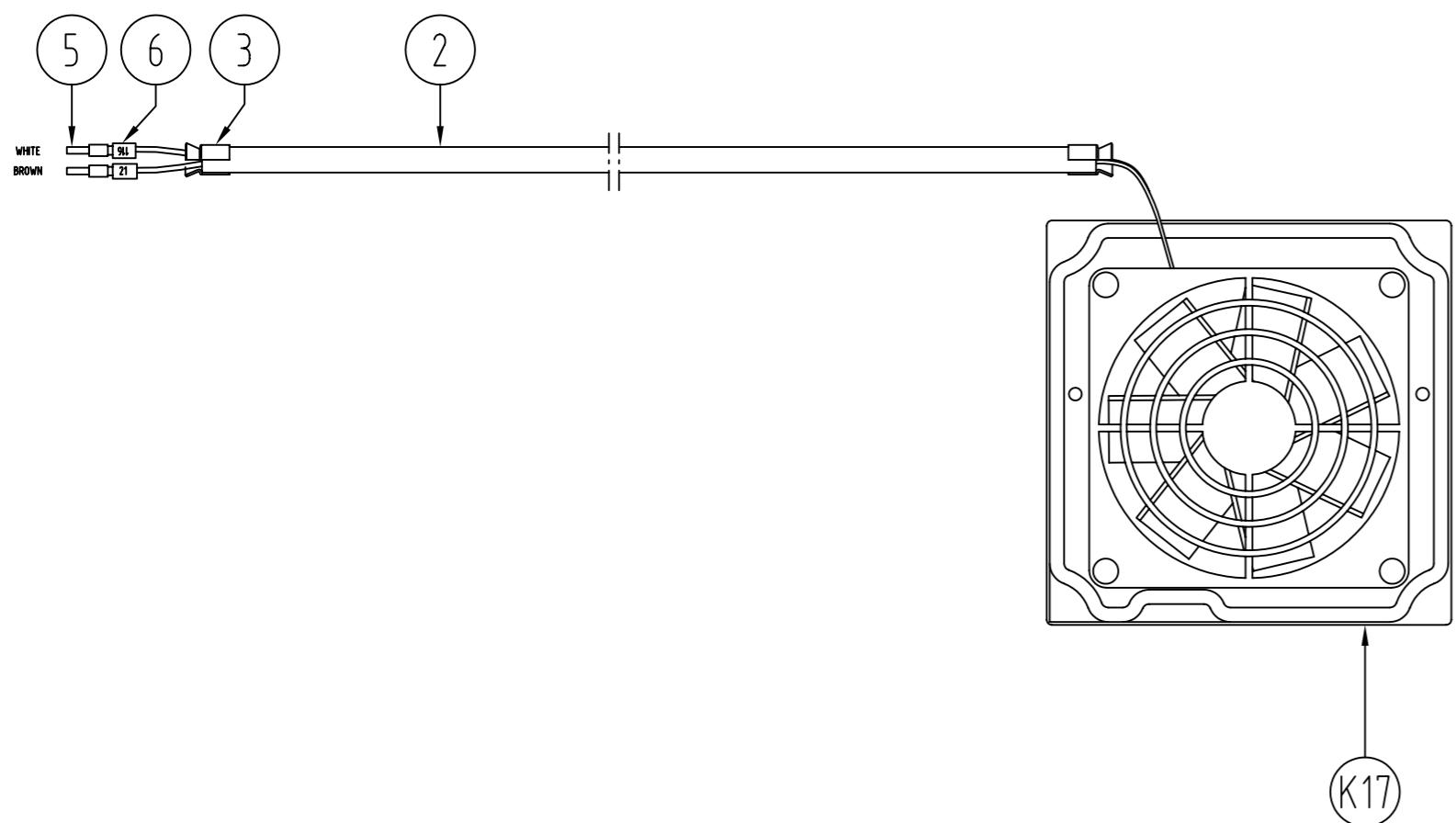
<b>SAFEGATE</b>  <b>G R O U P</b>			Unless otherwise indicated, all tolerances are according to Surface Coating			Sharp Edges
Safegate International AB MALMÖ, SWEDEN						
<b>INSTALLATION HARDWARE</b> FOR T1 NOTE: ALL ASSEMBLY PERFORMED ON SITE						
Drawn by: G.O.	Date drawn: 2008-05-20	Checked by: 	App. by:	Date approved:	Project No.:	Drawing No. SG590261-001-01
						Rev. Sheet 1 of 1 Scale

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	2	END BRACKET, CLIPFIX 35-5					3022276	PHOENIX CONTACT, SWEDEN
2	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K10					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN
C6	1	PATCH CABLE	SG590258-101-01					
K10	1	CAT 6 TRANSIENT FILTER, D-LAN-CAT.6+					2881007	PHOENIX CONTACT, SWEDEN

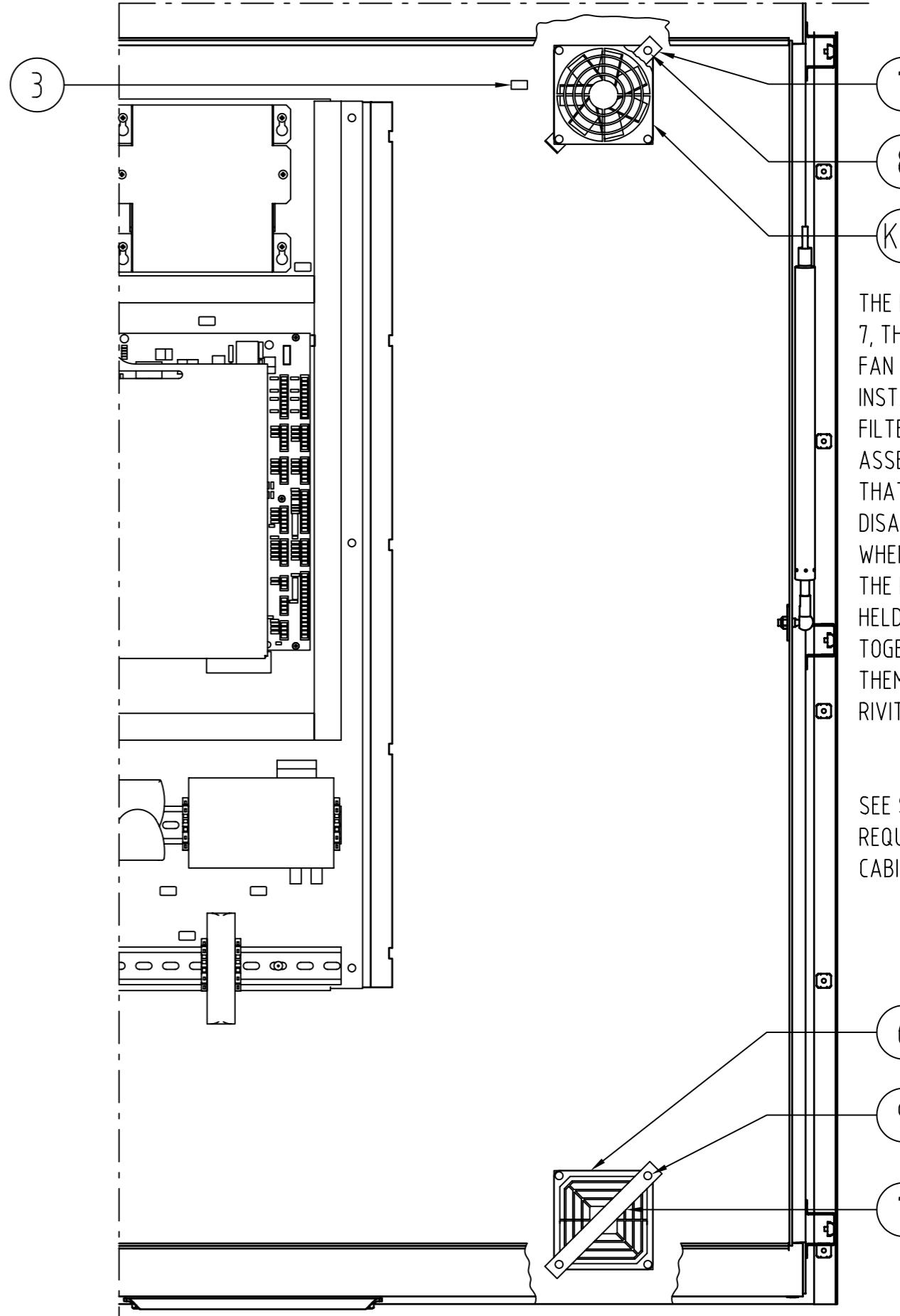
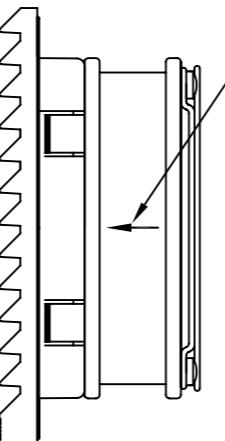


<b>SAFE GATE</b> <b>G R O U P</b>				Unless otherwise indicated, all tolerances are according to			Sharp Edges	
				Surface Coating			Weight	
CAT6 FILTER								
Safegate International AB Malmö, Sweden								
Drawn by:	Date drawn:	Checked by:						
G.O.	2008-05-18							
App. by:	Date approved:	Project No.:						
A	Drawing Changed		2011.11.04	A.S.				
Revision	Description		Date	Drawn by:	Checked by:	Approved	Drawing No.	Rev.
							SG590262-001-01	A
							Sheet	1 of 1
							Scale	

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
K17	1	FILTER FAN, 116.5x116.5, 24 V DC					3321027	RITTAL, SWEDEN
1	1	OUTLET FILTER, 116.5x22,					3321.207	RITTAL, SWEDEN
2	1	ELECTRICAL CABLE, LIYY, 2x0.34, L = 1200mm					7852020	AB NOVUM, SWEDEN
3	1	LABEL, YELLOW, 15x8, TEXT: K17					21302G	TECHNOTRADE, SWEDEN
4	2	HEAT SHRINKABLE TUBING, Ø6.4, BLACK					5507009	ELFA, SWEDEN
5	4	BOOTLACE FERRULE, H 0.34/12					9025790000	WEIDMÜLLER, SWEDEN
6		WIRE MARKERS, NUMBERING AS SHOWN ON ILLUSTRATION		PA02		PARTEX, SWEDEN		
7	2	FILTER BRACKET	SG590264-204-01					
8	4	SNAP RIVIT, PLASTIC, BLACK		SR 4120B	RICHCO		1261732	FARNELL
9	2	SNAP RIVIT, PLASTIC, WHITE		SR 4060W	RICHCO		1261722	FARNELL

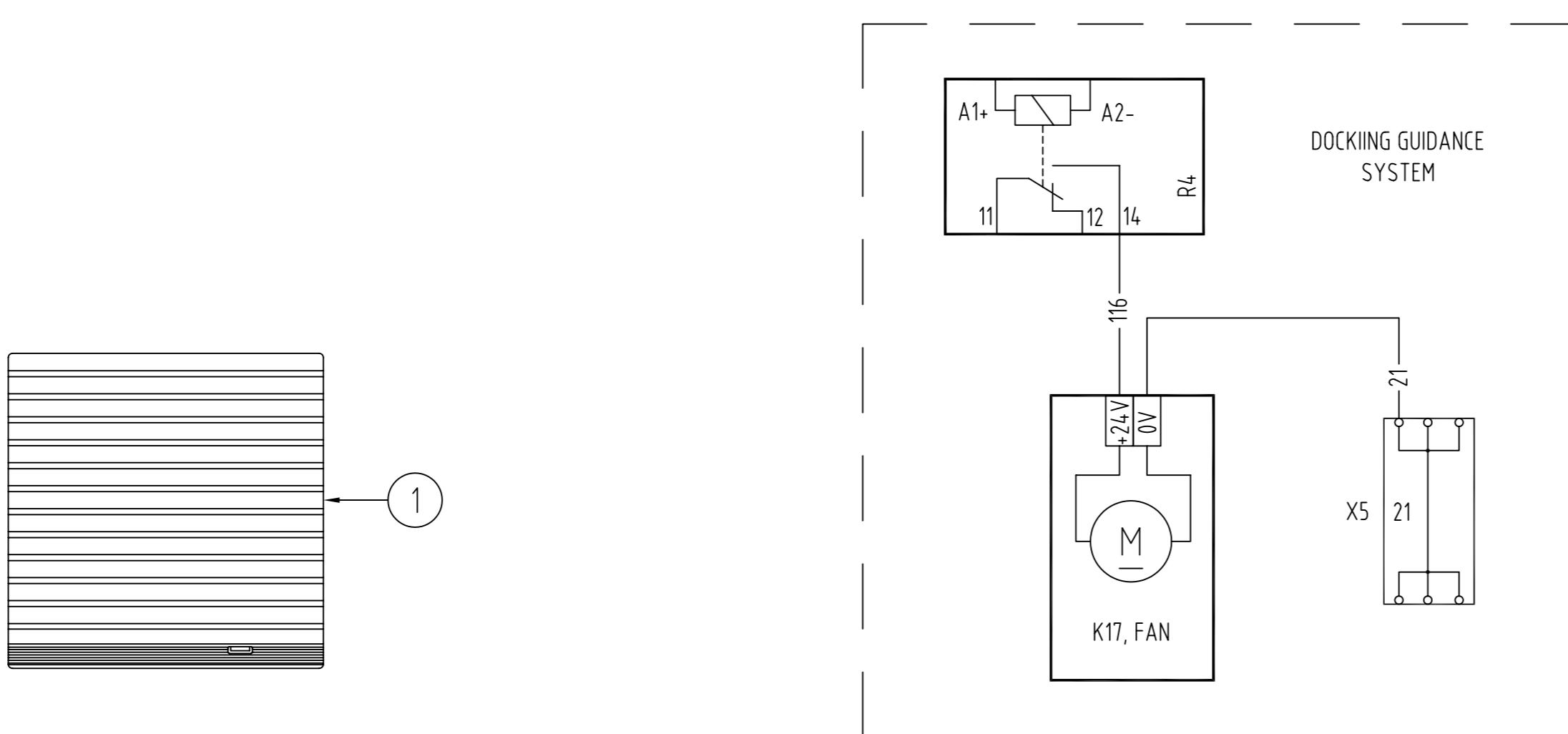


NOTE: MAKE SURE THAT THE FAN'S AIR FLOW DIRECTION IS IN THE DIRECTION SHOWN BY THE ARROW WHEN REASSEMBLING.



THE FILTER BRACKET, ITEM 7, THAT HOLDS THE FILTER FAN ASSEMBLY IN PLACE, IS INSTALLED BETWEEN THE FILTER AND THE FAN IN THE ASSEMBLY. THIS REQUIRES THAT THE UNIT BE DISASSEMBLED. WHEN INSTALLING DISCARD THE PLASTIC RIVETS THAT HELD THE ASSEMBLY TOGETHER AND REPLACE THEM WITH THE PLASTIC RIVETS IN ITEM 8.

SEE SG590264-203-01 FOR REQUIRED MODIFICATION OF CABINET.



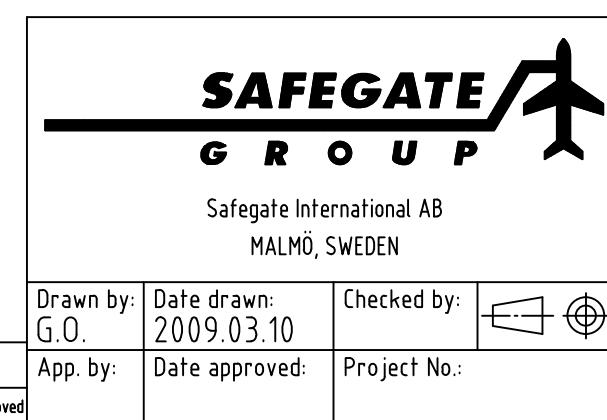
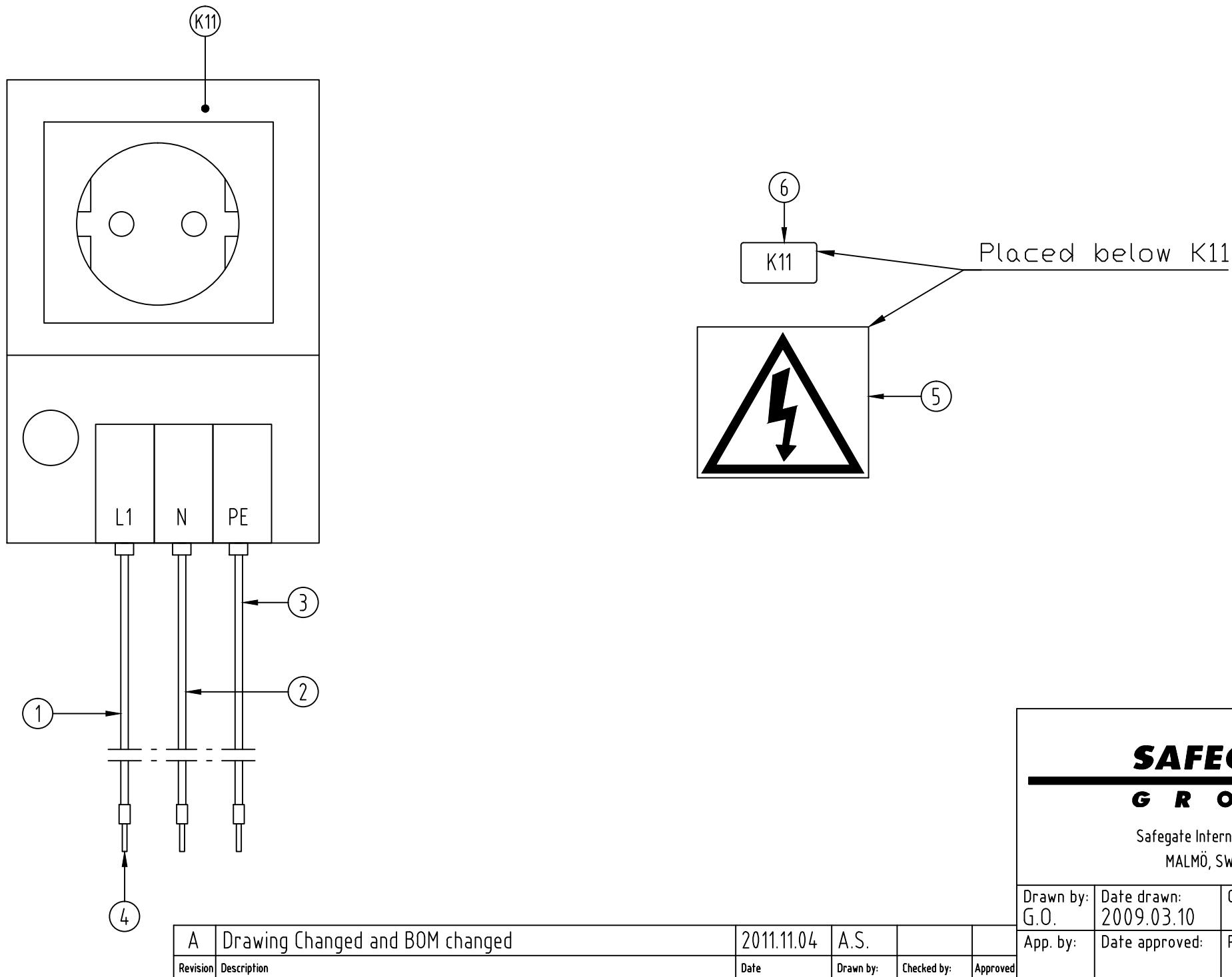
CONNECTION DIAGRAM

B	REFERENCE ADDED FOR DRAWING FOR CABINET MODIFICATION	2009.02.19	G.O.	
A	ITEMS 7-9 ADDED, ASSEMBLY NOTE ADDED	2008.06.26	G.O.	

Revision Description Date Drawn by Checked by Approved

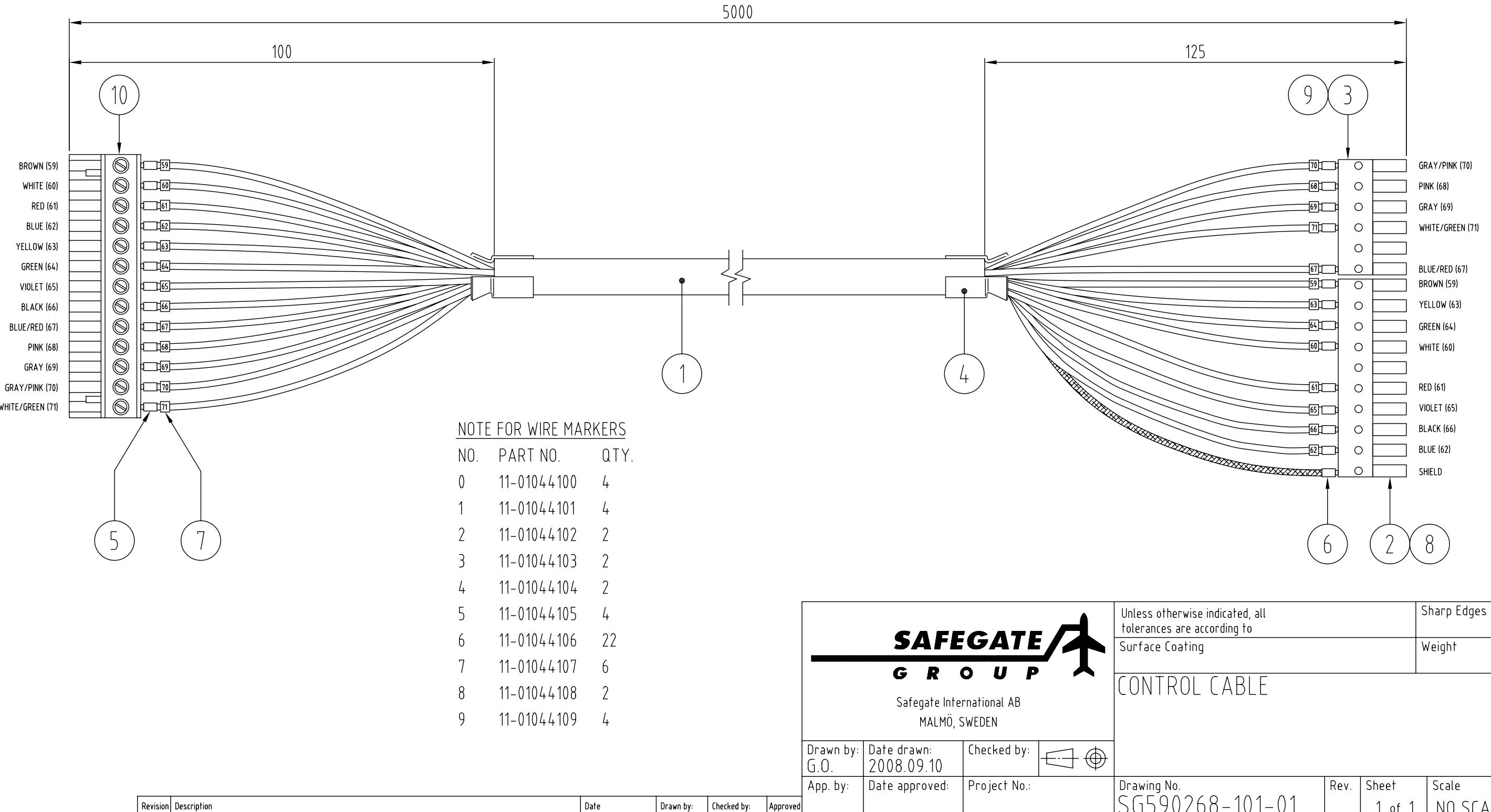
<b>SAFEGATE GROUP</b>			Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges
Safegate International AB MALMÖ, SWEDEN			Weight	
VENTILATION ASSEMBLY FOR T1				
Drawn by: G.O.	Date drawn: 2008-05-16	Checked by:		
App. by:	Date approved:	Project No.:		
Drawing No. SG590264-001-01			Rev. B	Sheet 1 of 1
Scale 1:2				

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	MAINS WIRE, UL 1015, BROWN, AWG 16					5526017	ELFA AB, SWEDEN
2	1	NEUTRAL WIRE, UL 1015, BLUE, AWG 16					5526066	ELFA AB, SWEDEN
3	1	GND WIRE, UL 1015, YELLOW/GREEN, AWG 16					5526082	ELFA AB, SWEDEN
4	3	CRIMP LUG, H2.5/14					902610000	WEIDMÜLLER, SWEDEN
5	1	WARNING LABEL, SHOCK HAZARD					PLD-56	PANDUIT NORDIC, SWEDEN
6	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K11					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN
K11	1	POWER OUTLET FUSE, SD 035, DIN STYLE			03500.0-00	STEGO ELEKTRONIK, GERMANY	03500.0-00	STEGO NORDEN, SWEDEN
K11	1	POWER OUTLET FUSE, SD 035, French Model			03501.0-00	STEGO ELEKTRONIK, GERMANY	03501.0-00	STEGO NORDEN, SWEDEN
K11	1	POWER OUTLET FUSE, SD 035, British Style			03503.0-00	STEGO ELEKTRONIK, GERMANY	03503.0-00	STEGO NORDEN, SWEDEN
K11	1	POWER OUTLET FUSE, SD 035, US Style			03504.0-00	STEGO ELEKTRONIK, GERMANY	03504.0-00	STEGO NORDEN, SWEDEN

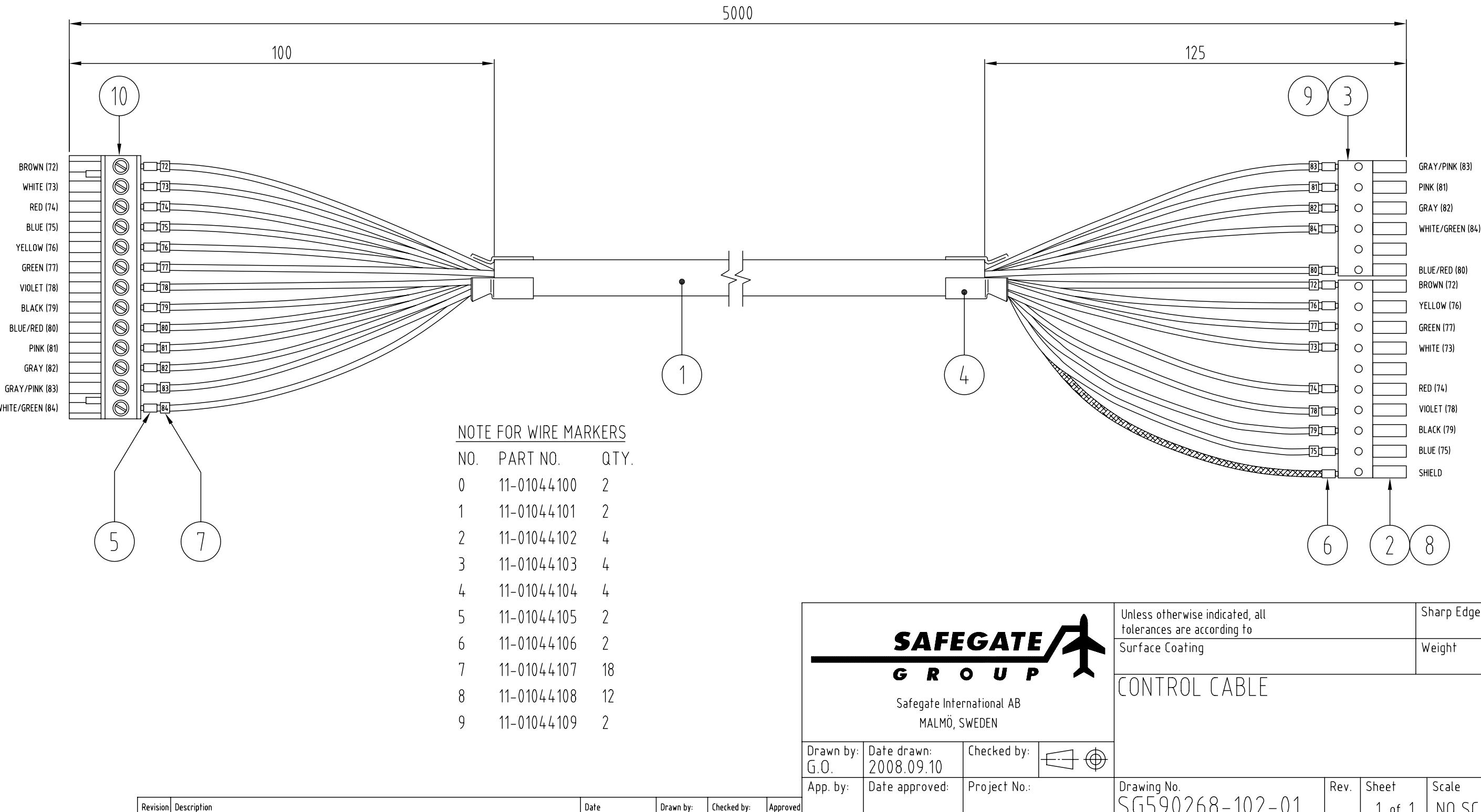


Drawing No. SG590266-001-01	Rev. A	Sheet 1 of 1	Scale 1:1
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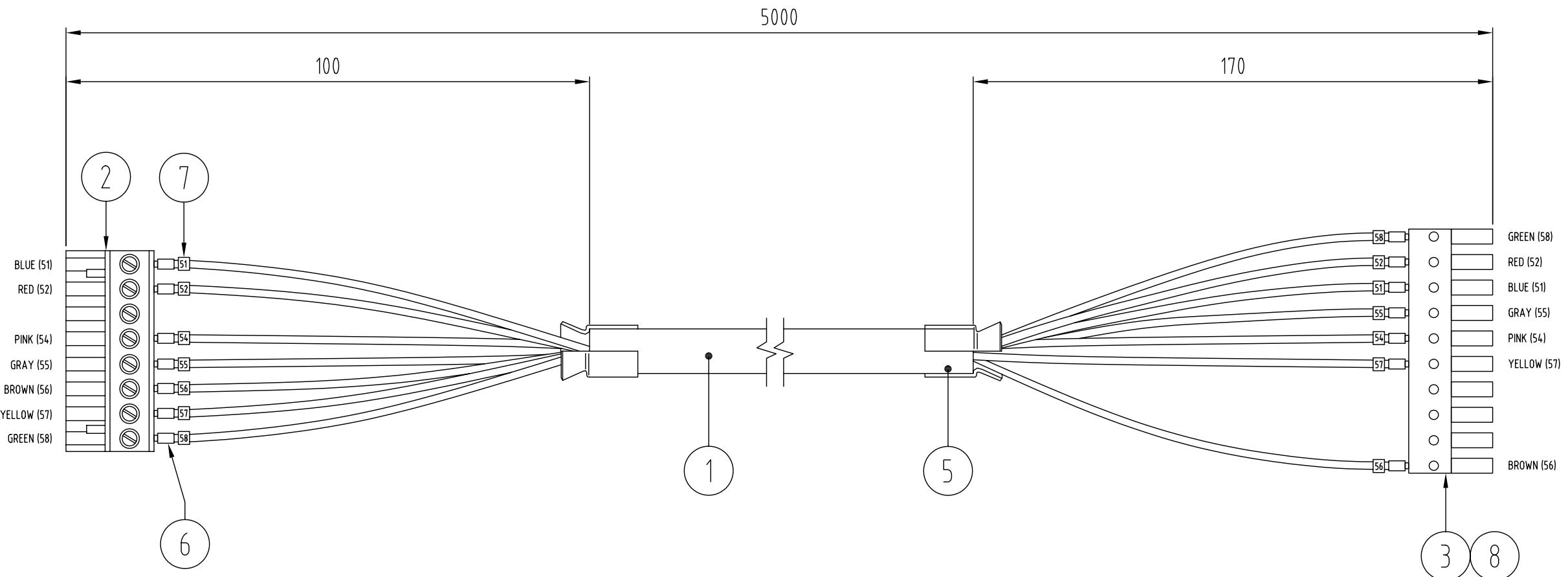
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, CYLIYCY, 8 x 2 x 0.25						
2	1	CONNECTOR, MC1.5/10-ST-3.81			1803659	PHOENIX CONTACT, GERMANY	1803659	PHOENIX CONTACT, SWEDEN
3	1	CONNECTOR, MC1.5/6-ST-3.81			1803617	PHOENIX CONTACT, GERMANY	1803617	PHOENIX CONTACT, SWEDEN
4	2	HEAT SHRINKABLE TUBING, Ø9.5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA, SWEDEN
5	26	CRIMP LUG, H 0.25/12			9025780000	WEIDMÜLLER, GERMANY	9025780000	WEIDMÜLLER, SWEDEN
6	1	CRIMP LUG, H 1.5/14			9026090000	WEIDMÜLLER, GERMANY	9026090000	WEIDMÜLLER, SWEDEN
7		WIRE MARKERS, PARTEX PA02			SEE NOTE	WEIDMÜLLER, GERMANY	SEE NOTE	WEIDMÜLLER, SWEDEN
8	1	LABEL, SK 3,81/2,8: SO, TEXT: J22			0805056	PHOENIX CONTACT, GERMANY	0805056	PHOENIX CONTACT, SWEDEN
9	1	LABEL, SK 3,81/2,8: SO, TEXT: J13			0805056	PHOENIX CONTACT, GERMANY	0805056	PHOENIX CONTACT, SWEDEN
10	1	CONNECTOR, MSTB 2,5/13-ST-5,08			1757129	PHOENIX CONTACT, GERMANY	1757129	PHOENIX CONTACT, SWEDEN



Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, CYLIYCY, 8 x 2 x 0.25						
2	1	CONNECTOR, MC1.5/10-ST-3.81			1803659	PHOENIX CONTACT		
3	1	CONNECTOR, MC1.5/6-ST-3.81			1803617	PHOENIX CONTACT		
4	2	HEAT SHRINKABLE TUBING, Ø9.5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA, SWEDEN
5	26	BOOTLACE FERRULE, H 0.25/12					9025780000	WEIDMÜLLER
6	1	BOOTLACE FERRULE, H 1.5/14					9026090000	WEIDMÜLLER
7		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
8	1	LABEL, SK 3.81/2.8: S0, TEXT: J15			0805056	PHOENIX CONTACT		
9	1	LABEL, SK 3.81/2.8: S0, TEXT: J20			0805056	PHOENIX CONTACT		
10	1	CONNECTOR, MSTB 2.5/13-ST-5.08			1757129	PHOENIX CONTACT		



Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, LIYCY, 4 x 2 x 0.25						
2	1	CONNECTOR, MSTB 2,5/8-ST-5,08			1757077	PHOENIX CONTACT		
3	1	CONNECTOR, MC1.5/10-ST-3.81			1803659	PHOENIX CONTACT		
5	2	HEAT SHRINKABLE TUBING, Ø9.5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA, SWEDEN
6	14	BOOTLACE FERRULE, H 0.25/12					9025780000	WEIDMÜLLER
7		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
8	1	LABEL, SK 3,81/2,8: SO, TEXT: J28			0805056	PHOENIX CONTACT		



NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
1	11-01044101	2
2	11-01044102	2
4	11-01044104	2
5	11-01044105	16
6	11-01044106	2
7	11-01044107	2
8	11-01044108	2



Safegate International AB  
MALMÖ, SWEDEN

Drawn by: G.O. Date drawn: 2008.09.10 Checked by:

App. by: Date approved: Project No.: Drawing No.

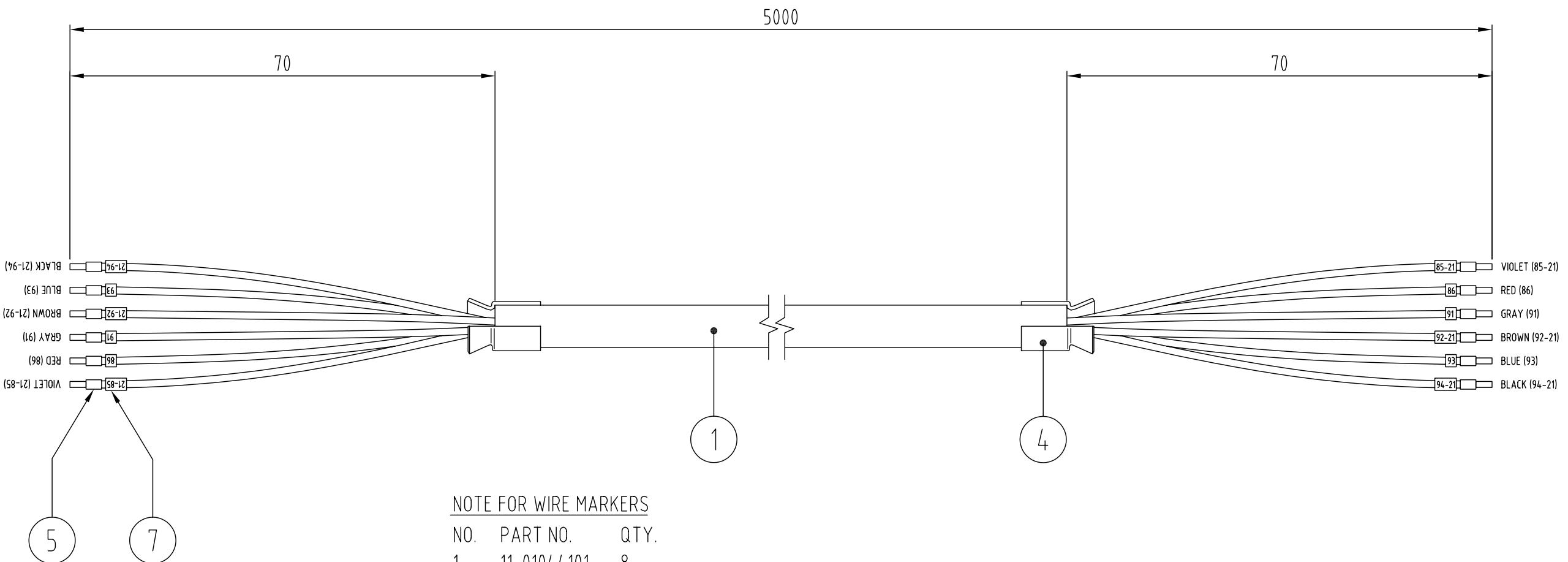
Unless otherwise indicated, all tolerances are according to Sharp Edges

Surface Coating Weight

CONTROL CABLE

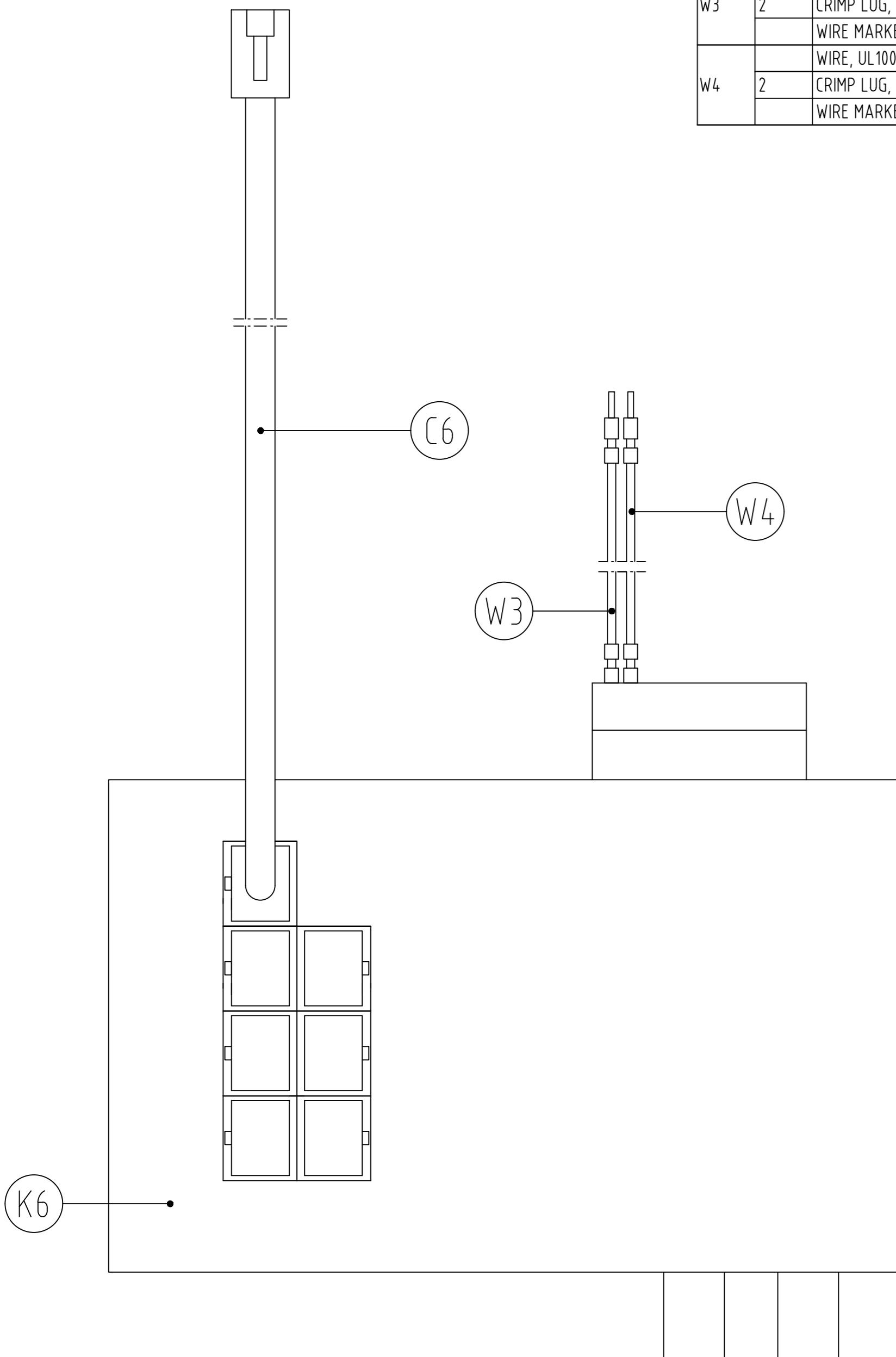
SG590268-103-01 Rev. Sheet Scale  
1 of 1 NO SCALE

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, ÖLFLEX CLASSIC 100 8G0,75			0010 027	LAPP KABEL		
2	2	HEAT SHRINKABLE TUBING, Ø9,5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA, SWEDEN
3	12	BOOTLACE FERRULE, H 0,75/14					9026070000	WEIDMÜLLER
4		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER



<b>SAFE GATE</b> G R O U P			Unless otherwise indicated, all tolerances are according to Surface Coating		Sharp Edges Weight
Safegate International AB MALMÖ, SWEDEN			POWER CABLE		
Drawn by: G.O.	Date drawn: 2008.09.10	Checked by:			
App. by:	Date approved:	Project No.:	Drawing No. SG590268-111-01		
			Rev.	Sheet	Scale
			1 of 1		NO SCALE

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K6					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN
C6	1	PATCH CABLE	SG590258-101-01					
K6	1	NETWORK SWITCH, FL SWITCH SF 7TX/FX ST			2832577	PHOENIX CONTACT		
		WIRE, UL1007/1569, AWG 20, RED, L = 1000					5522925	ELFA, SWEDEN
W3	2	CRIMP LUG, H 0.5/14					9026060000	WEIDMÜLLER, SWEDEN
		WIRE MARKERS, PARTEX PA02, MARKING - 3					SEE NOTE	WEIDMÜLLER, SWEDEN
W4	2	WIRE, UL1007/1569, AWG 20, BLACK, L = 1000					5522909	ELFA, SWEDEN
		CRIMP LUG, H 0.5/14					9026060000	WEIDMÜLLER, SWEDEN
		WIRE MARKERS, PARTEX PA02, MARKING - 2					SEE NOTE	WEIDMÜLLER, SWEDEN

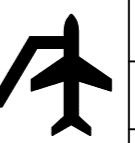


NOTE FOR WIRE MARKERS

NO. PART NO.

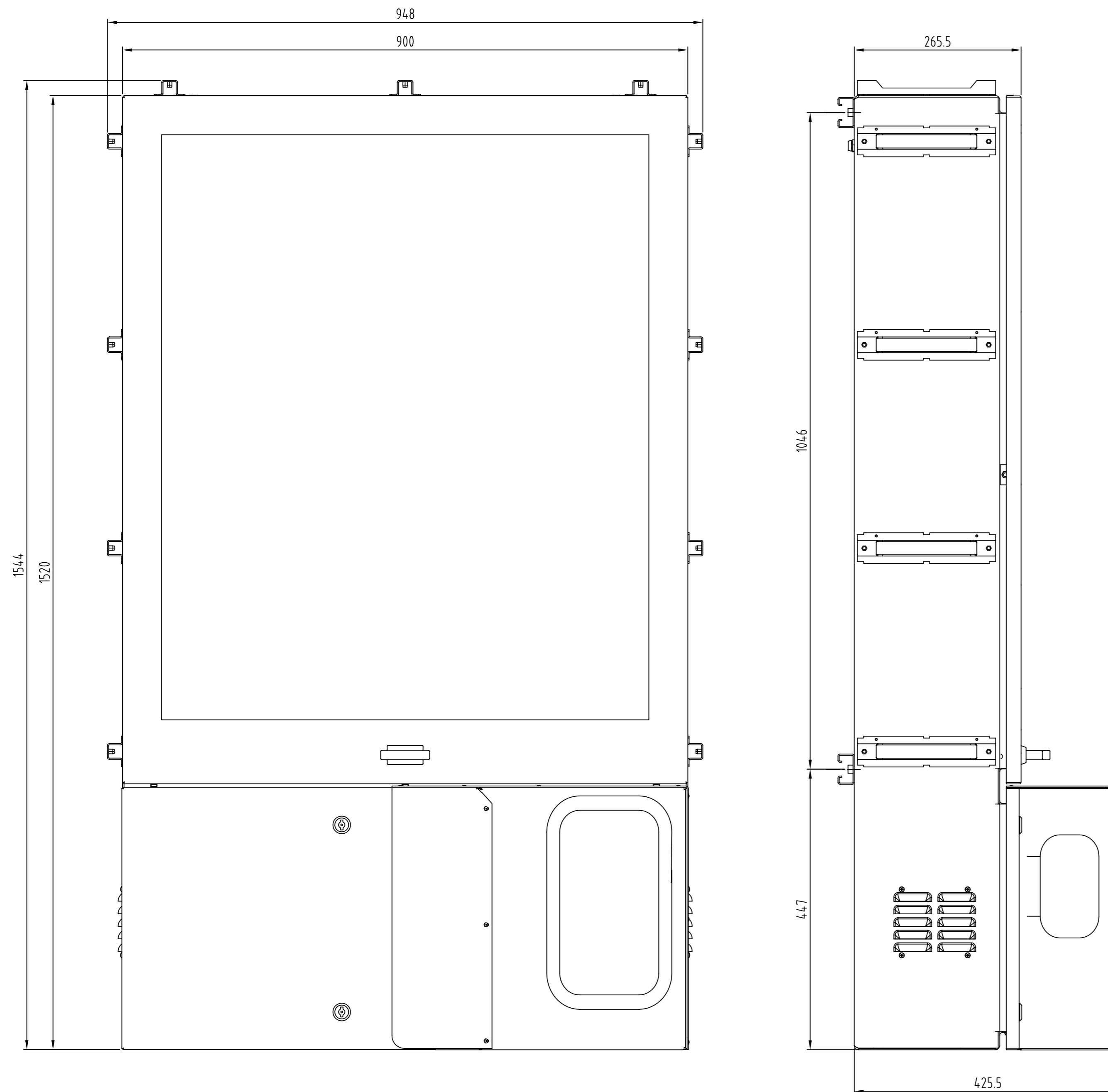
2 11-01044102

3 11-01044103

<b>SAFE GATE</b>  <b>G R O U P</b>				Unless otherwise indicated, all tolerances are according to			Sharp Edges
				Surface Coating			Weight
NETWORK SWITCH FOR T1 DOCKING GUIDANCE SYSTEM							
Drawn by:	Date drawn:	Checked by:					
G.O.	2009.02.04						
App. by:	Date approved:	Project No.:					
				Drawing No.			
				SG590273-001-01			Rev. B Sheet 1 of 1 Scale 1:1:5

B	Connection diagram removed	2011-11-16	A.S.		G.O.	Date drawn:	2009.02.04	Checked by:	
A	Connection diagram changed; Item C6 and key for configuration codes added	2009.03.08	G.O.			App. by:	Date approved:	Project No.:	
Revision	Description	Date	Drawn by:	Checked by:	Approved				

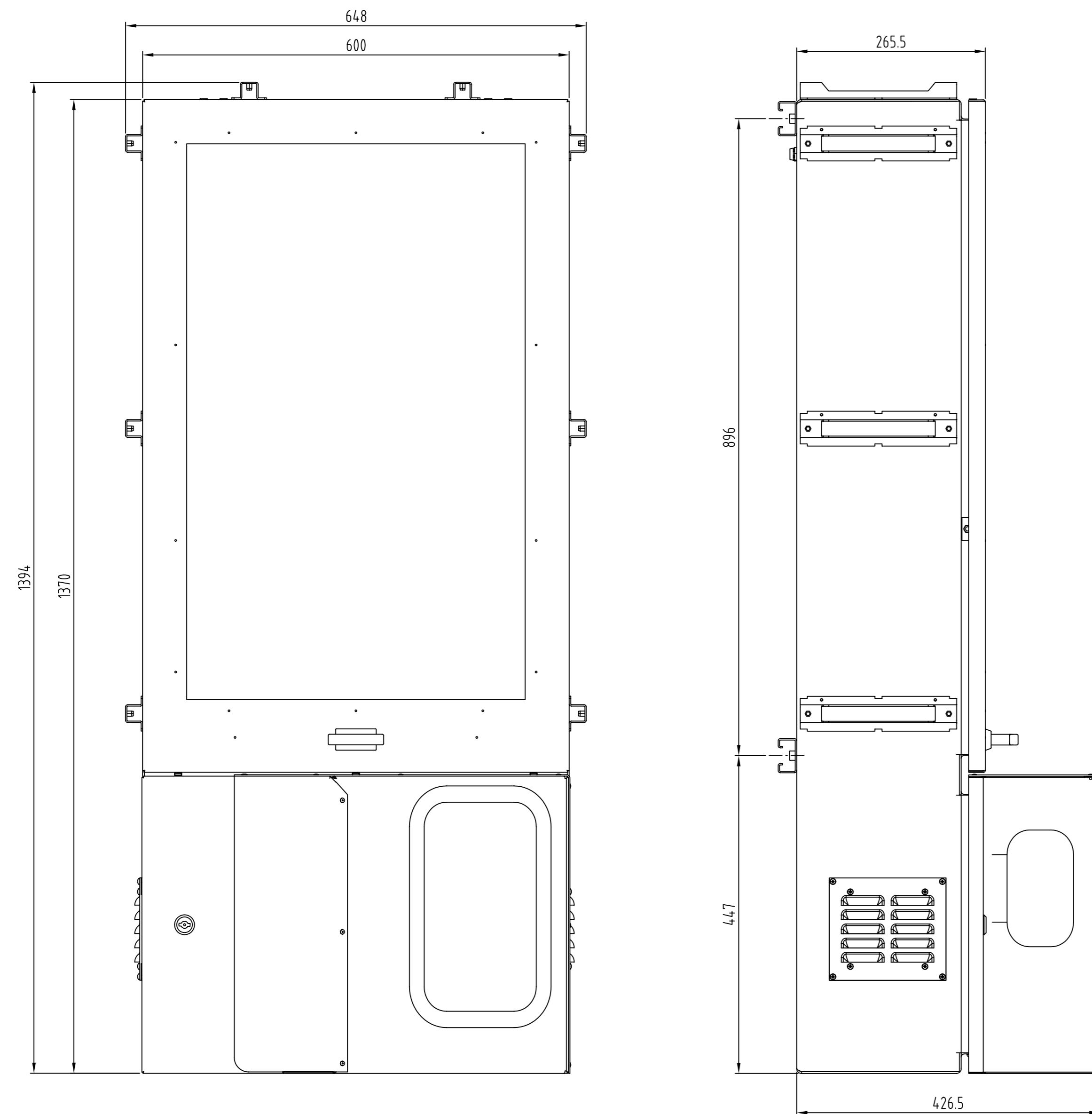
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
		Enclosure, T2			915889, Rev. 1	NPP		

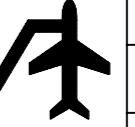


Safegate International AB  
MÄLÖ, SWEDEN

Drawn by: G.O.	Date drawn: 2008.12.11	Checked by:	Sharp Edges
App. by:	Date approved:	Project No.:	Weight
<b>ENCLOSURE FOR T2 SIZE DOCKING GUIDANCE UNIT</b>			
Drawing No. SG590281-001-01	Rev.	Sheet 1 of 1	Scale 1:5

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
		ENCLOSURE, T3			916350, Rev.0	NPP		

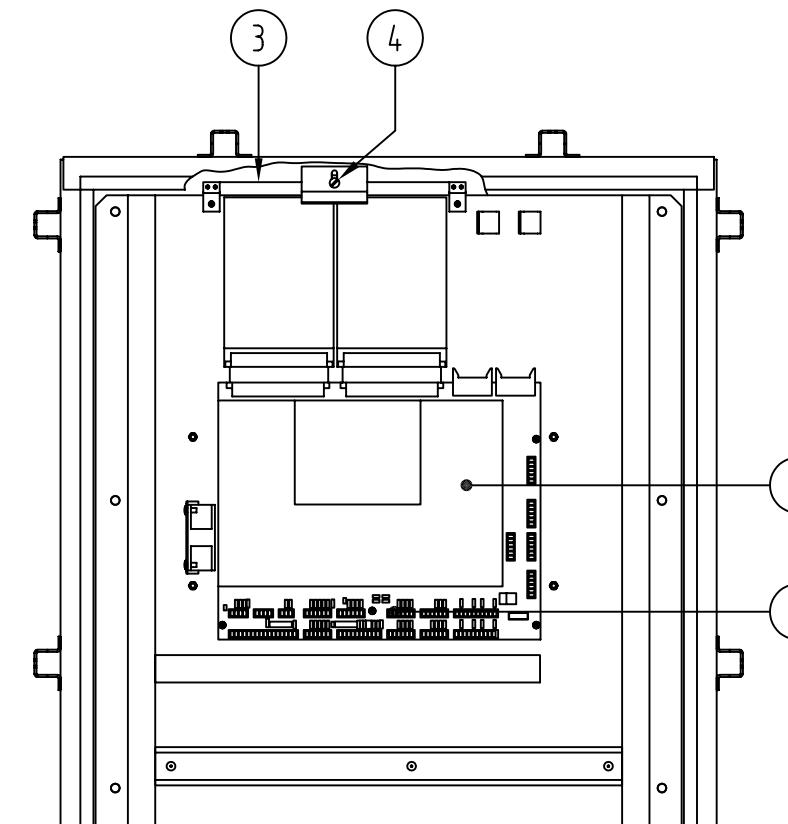


<b>SAFEGATE</b>  <b>G R O U P</b>			Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges
Safegate International AB MALMÖ, SWEDEN			Weight	
Drawn by: G.O.	Date drawn: 2008.12.11	Checked by:		
App. by:	Date approved:	Project No.:	Drawing No. SG590360-001-01	Rev. Sheet Scale 1 of 1 1:5

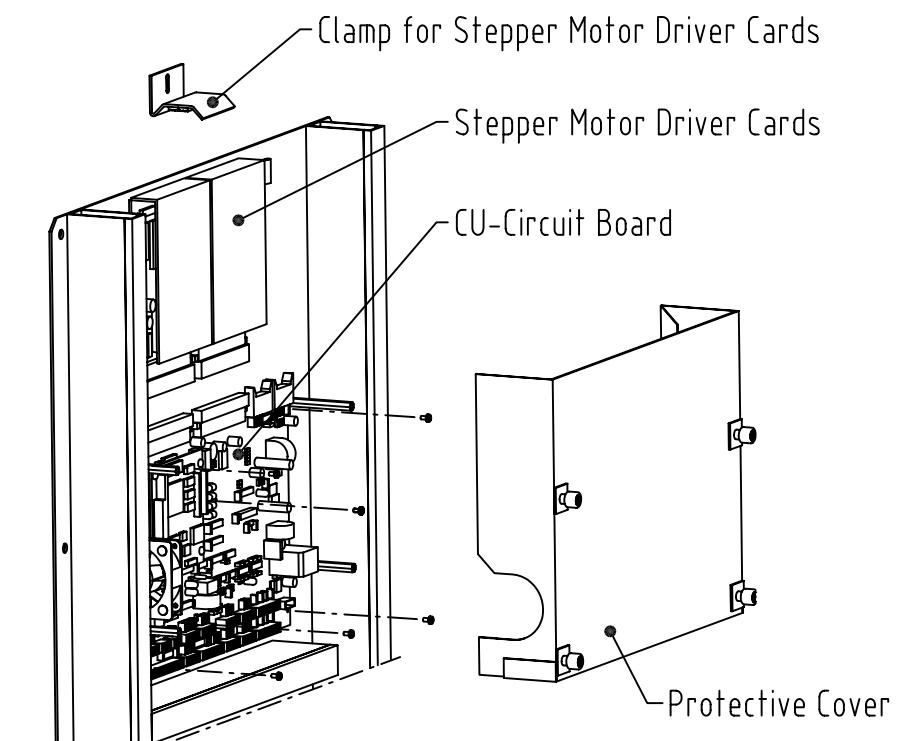
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CARRIER BOARD AND CPU ASSEMBLY	SG590524-000					
2	1	DOCKING BOARD	SG590562-000					
3	1	EXTENSION ASSEMBLY	SG590399-201-01					
4	1	SCREW, LKCS, M4x12, ZINC PLATED						
5	1	HOLD DOWN BRACKET	SG590399-205-01					

Instructions for replacing CU-circuit board, SG590125-000, with model SG590524-000

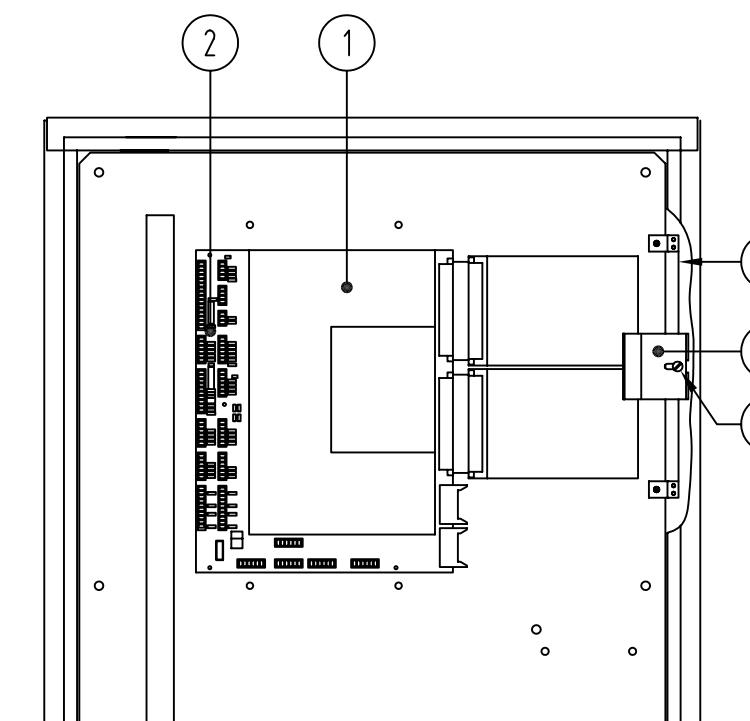
1. If possible, download and save the existing configuration of the system using the SD-Config tool. This will make configuration of the new board easier.
2. With power off, remove the protective cover for the CU-circuit board assembly.
3. Disconnect all wiring from the CU-circuit board.
4. Remove the clamp that holds the stepper motor driver cards in place by undoing the fastener that holds it in place.
5. Remove the stepper motor driver cards by pulling them upwards from the CU-circuit board.
6. On model where there is a welded stud that is used as the fastening point for the clamp for the stepper motor driver cards, carefully break the stud off. This is best done by using a twisting force on the stud.
7. Remove the CU-circuit board by removing the six fasteners that hold it in place on the stand-offs. Note: Be care not to loosen the stand-offs as it can be difficult to re-tighten them without loosening the mounting plate.
8. Fasten the new docking board in place on the stand-offs.
9. Position the Carrier Board-CPU assembly over the mating contacts and stand-offs on the docking board and press until the contacts are seated and the locking tabs on the stand-offs make a clicking sound.
10. Re-install the stepper motor driver cards.
11. Position the extension assembly on the top edge of the mounting plate so that is centered above the stepper motor driver cards, and then tighten the set screws on the extension plate.
12. For systems, where the stepper motor driver cards are mounted vertically, attach the original clamp to the extension assembly; for other systems, use the clamp that supplied with the kit. Use the screw that is supplied with the replacement kit to do this.
13. Re-connect all wiring.
14. Re-install the protective cover.
15. Power up the system and install and configure the software for the docking system. Note: The new CU-circuit board requires software version 8 or higher to run properly.



Placement of New Parts, Systems with Vertically Mounted Stepper Motor Driver Cards



Part Identification for Disassembly



Placement of New Parts, Systems with Horizontally Mounted Stepper Motor Driver Cards

<b>SAFE GATE</b>  <b>G R O U P</b> Safegate International AB MALMÖ, SWEDEN			
Drawn by: G.O.	Date drawn: 2008.11.10	Checked by:	
App. by:	Date approved:	Project No.:	
Drawing No. SG590399-001-01		Rev.	Sheet 1 of 1
		Scale	

Unless otherwise indicated, all tolerances are according to				Sharp Edges
Surface Coating				Weight
<b>CU-REPLACEMENT KIT</b> <b>WITH EXTENSION PLATE ASSEMBLY</b> <b>FOR REPLACEMENT OF CU-CIRCUIT BOARD ASSEMBLY 590125</b>				
Drawn by:	Date drawn: 2008.11.10	Checked by:		
App. by:	Date approved:	Project No.:		
Drawing No. SG590399-001-01	Rev.	Sheet 1 of 1	Scale	

# SG590405-000-01

## PRODUCT CONFIGURATION FILE, PRODUCT 590405

## COOLING FAN FOR RIEGL LASER RANGE FINDER

### REVISIONS

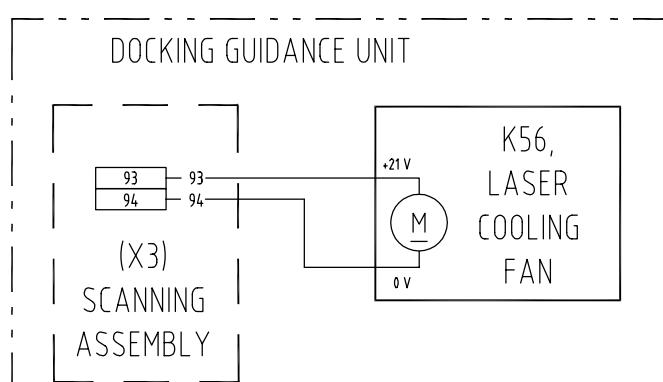
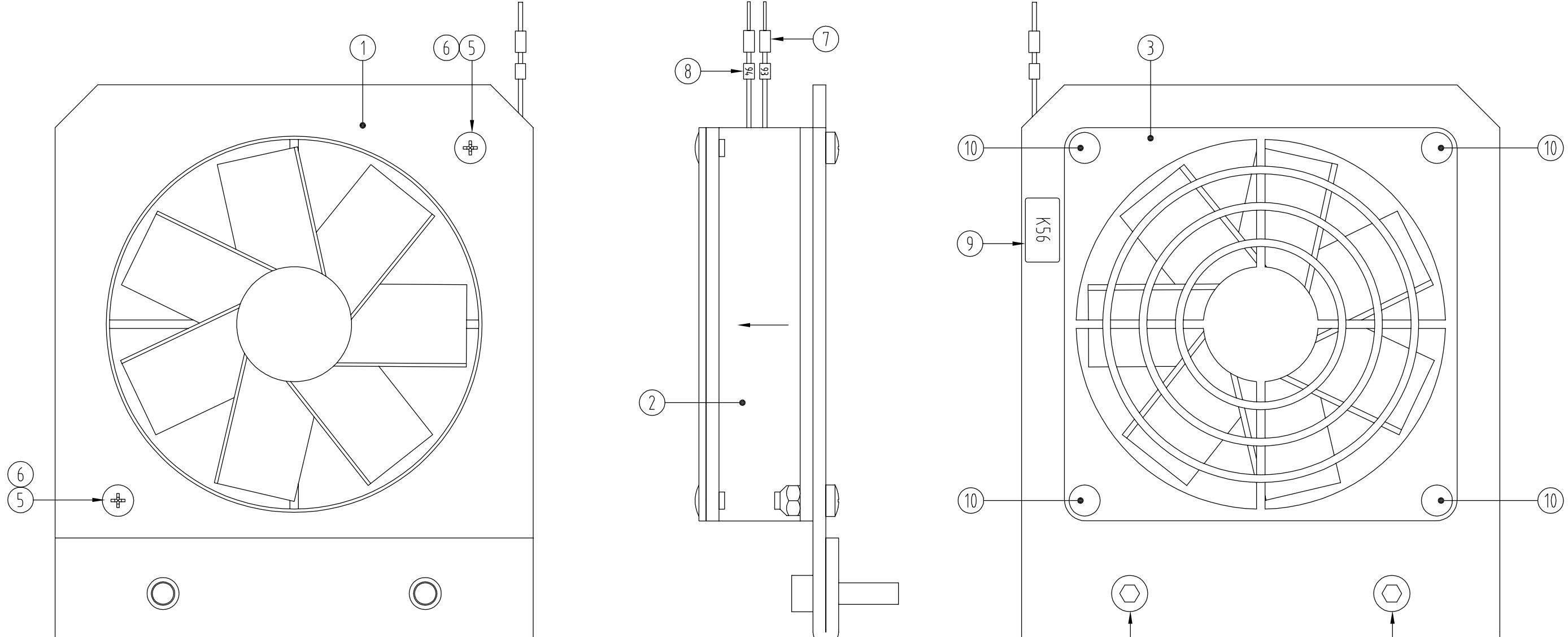
B. ITEM 8 ADDED. BY: G.O. DATE: 2003-03-20  
C. ITEM 8 CHANGED. ITEM 9 ADDED BY: G.O. DATE: 2004.03.08  
D. ITEMS 2 & 3 CHANGED, ITEM 10 ADDED. BY: G.O., DATE: 2006.09

### ASSEMBLY LEVEL DOCUMENT LIST

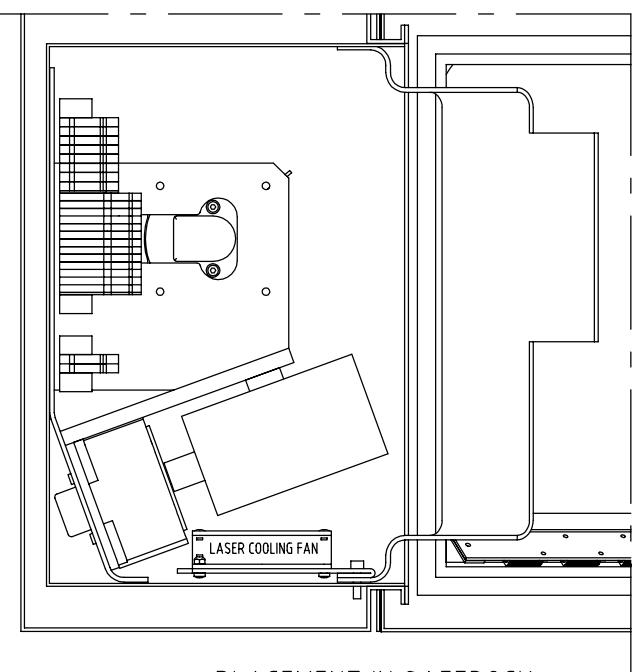
SG590405-000-01	PRODUCT CONFIGURATION FILE
SG590405-001-01	PRODUCT ASSEMBLY AND COMPONENT PLACEMENT

### COMPONENT AND PARTS LIST

POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFEGRATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART NO.	SUPPLIER
1	1	BRACKET	SG590405-200-01					
2	1	FAN, 92x92, 24 VDC			3414NGH	PAPST GERMANY	9600450	FARNELL SWEDEN
3	1	FINGER GUARD, LZ23K					1171817	FARNELL SWEDEN
4	1	ALLEN HEAD SCREW, ISO 4762, M5 x 20 ZINK PLATED					MC6S M5 x 20 8.8 fzb	BIX SWEDEN
5	2	SCREW, ISO-7045, M4x12, ZINK PLATED					MRX-Z 4x12 4.8 fzb	BIX SWEDEN
6	2	LOCKNUT, ISO 7040, M4, ZINK PLATED					DIN 985 M4 fzb	BIX SWEDEN
7	2	CRIMP LUG, H0.25/12			9025780000	WEIDMÜLLER, GERMANY	9025780000	WEIDMÜLLER, SWEDEN
8		WIRE MARKERS						
	1	PARTEX PA02, TEXT: 3			11-01044103	WEIDMÜLLER, GERMANY	11-01044103	WEIDMÜLLER, SWEDEN
	1	PARTEX PA02, TEXT: 4			11-01044104	WEIDMÜLLER, GERMANY	11-01044104	WEIDMÜLLER, SWEDEN
	2	PARTEX PA02, TEXT: 9			11-01044109	WEIDMÜLLER, GERMANY	11-01044109	WEIDMÜLLER, SWEDEN
9	1	COMPONET IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K56					21302G	TECHNOTRADE SCANDINAVIA AB SWEDEN
10	4	RIVIT, PLASTIC			094 0330 699 01	SKIFFY THE NETHERLANDS		BUFAB-BIX SWEDEN



CONNECTION DIAGRAM



NOTE: ALLEN HEAD SCREW, ITEM 4, ARE USED FOR INSTALLATION, AND ARE DELIVERED LOOSE.

**SAFE GATE**  
G R O U P

Safegate International AB  
MALMÖ, SWEDEN

Drawn by: G.O.	Date drawn: 2001-10-15	Checked by:	Sharp Edges
App. by:	Date approved:	Project No.:	Surface Coating
COOLING FAN FOR RIEGL LASER RANGE FINDER			Weight
Drawing No. SG590405-001-01	Rev. C	Sheet 1 of 1	Scale 1:1

C Item 10 added.

Revision Description

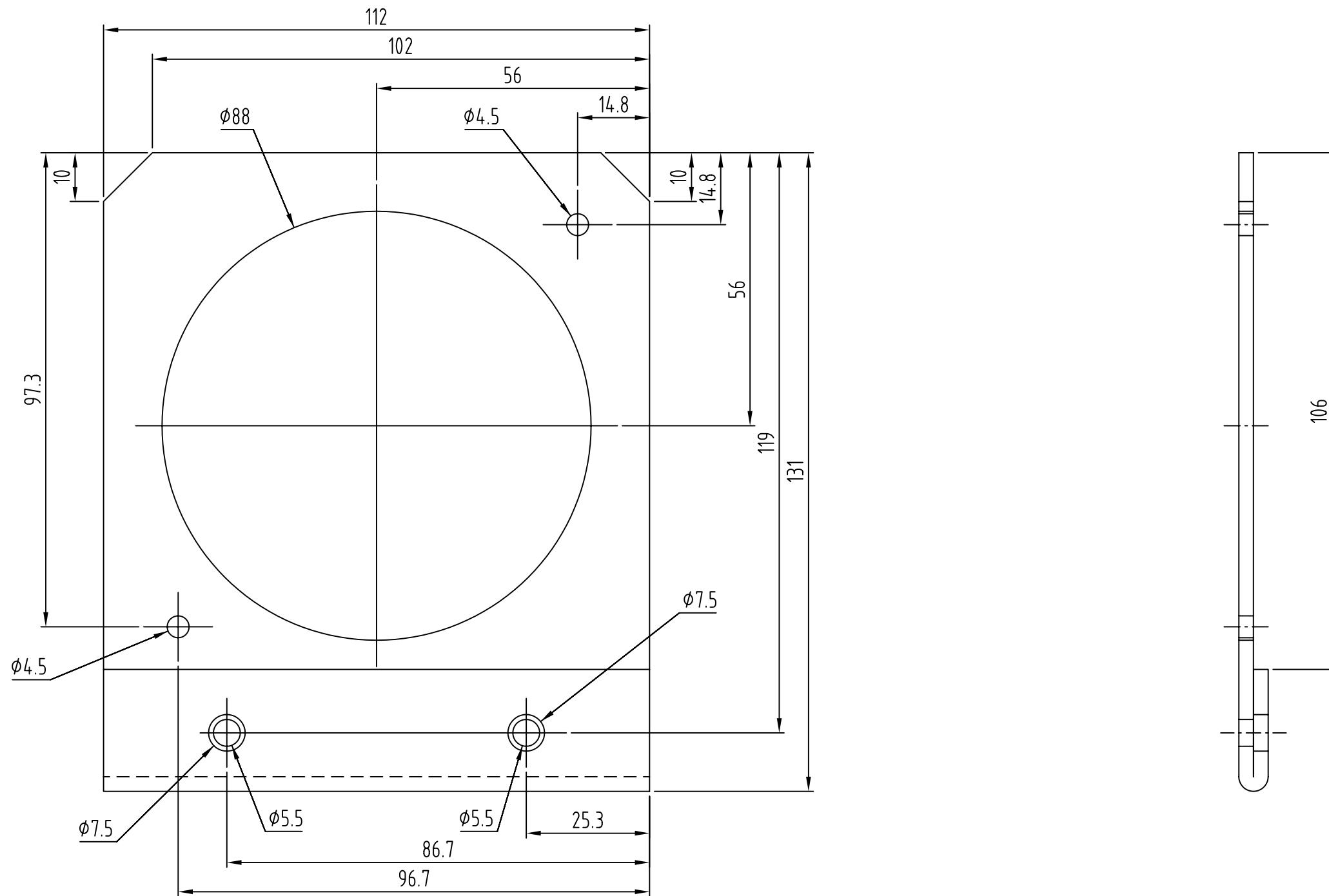
2006.09.25 G.O.

Date Drawn by:

Checked by:

Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
		ALUMINUM SHEET, EN1050-H14, t = 3	SG590405-200-01					



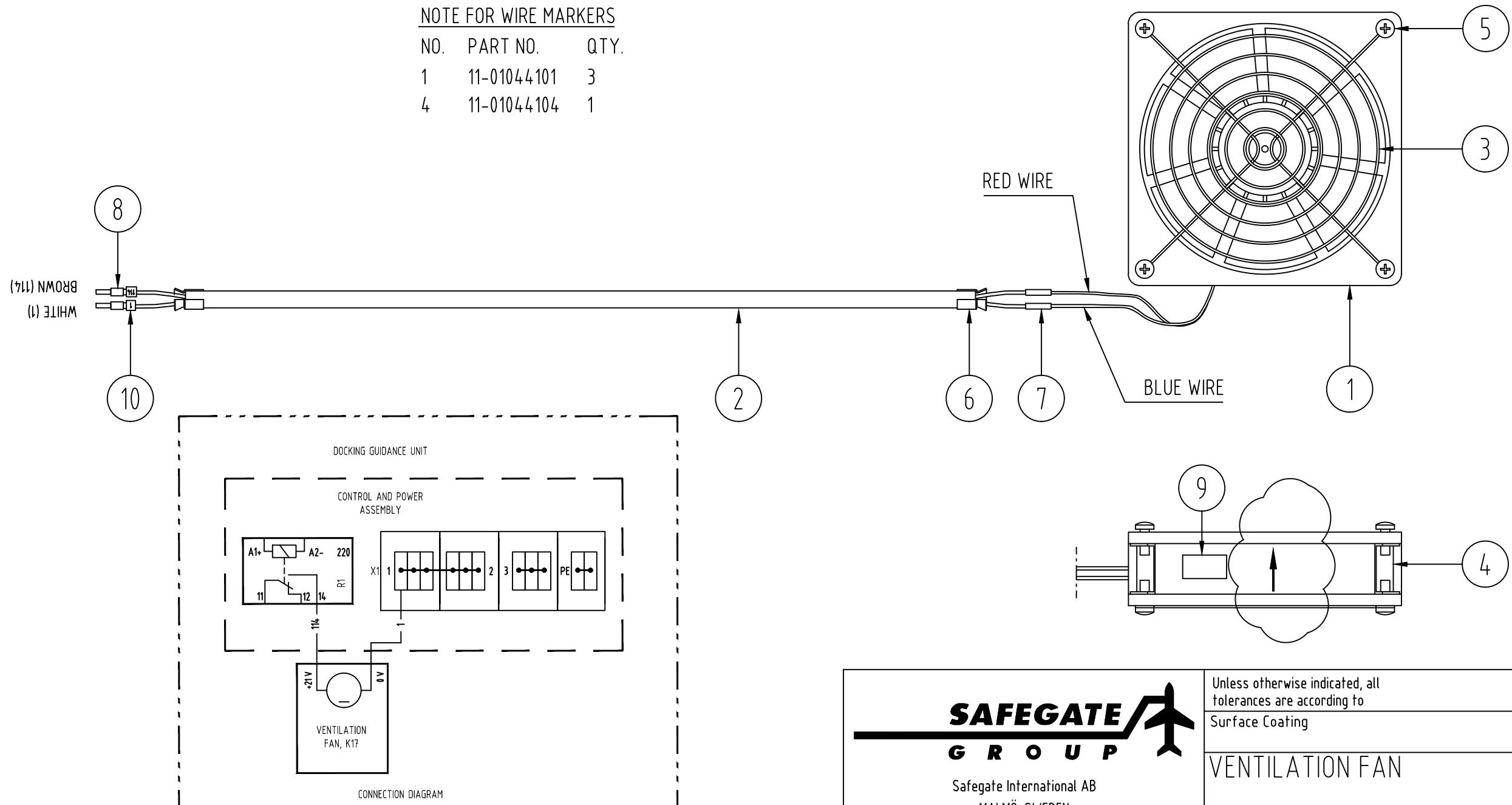
Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to	ISO-2768-m	Sharp Edges R = 0.5
Surface Coating		Weight
<b>BRACKET</b>		
COOLING FAN FOR RIEGL LASER RANGE FINDER		
Drawing No.	Rev.	Sheet
SG590405-200-01		1 of 1
		Scale 1:1

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	FAN, 119x119, 24 V DC			4314U	EBM-PAPST, GERMANY	337-3317 9600175	RS COMPONENTS, SWEDEN FARNELL, SWEDEN
2	1	ELECTRICAL CABLE, LIYY, 2x0.34, L = 1900mm					7852020	AB NOVUM, SWEDEN
3	1	FINGER GUARD, METAL					735-991	FARNELL, SWEDEN
4	4	MOUNTING CLIP		LZ212		PAPST, GERMANY	311-1623	FARNELL, SWEDEN
5	4	SCREW, ISO 7049, ST3.5x9.5, STAINLESS STEEL						FARNELL, SWEDEN
6	2	HEAT SHRINKABLE TUBING, Ø6.4, BLACK			FIT-221-1/4	ALPHA WIRE	5507009	ELFA, SWEDEN
7	2	CRIMP SPLICE, TINNED COPPER, PVC, GREEN					48-212-45	ELFA, SWEDEN
8	2	CRIMP LUG, H 0.34/12			9025790000	WEIDMÜLLER, GERMANY	9025790000	WEIDMÜLLER, SWEDEN
9	1	LABEL, YELLOW, 15x8, TEXT: K17					21302G	TECHNOTRADE, SWEDEN
10		WIRE MARKERS, PARTEX PA02		SEE NOTE	WEIDMÜLLER, GERMANY		SEE NOTE	WEIDMÜLLER, SWEDEN

NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
1	11-01044101	3
4	11-01044104	1



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to  
Sharp Edges

Surface Coating

Weight

VENTILATION FAN

Drawn by: G.O.	Date drawn: 2003.03.07	Checked by:	
App. by:	Date approved:	Project No.:	
			Drawing No. SG590479-001-01
			Rev. E Sheet 1 of 1 Scale NO SCALE

E	Cable length changed, drawing now valid for T2 and T3	2011.10.18	A.S.		
D	FAN MODEL, ITEM 1 AND AIR FLOW DIRECTION CHANGED	2007.10.18	G.O.		
Revision	Description	Date	Drawn by:	Checked by:	Approved

# SG590486-000-01

## DEFROSTER ASSEMBLY

### REVISIONS

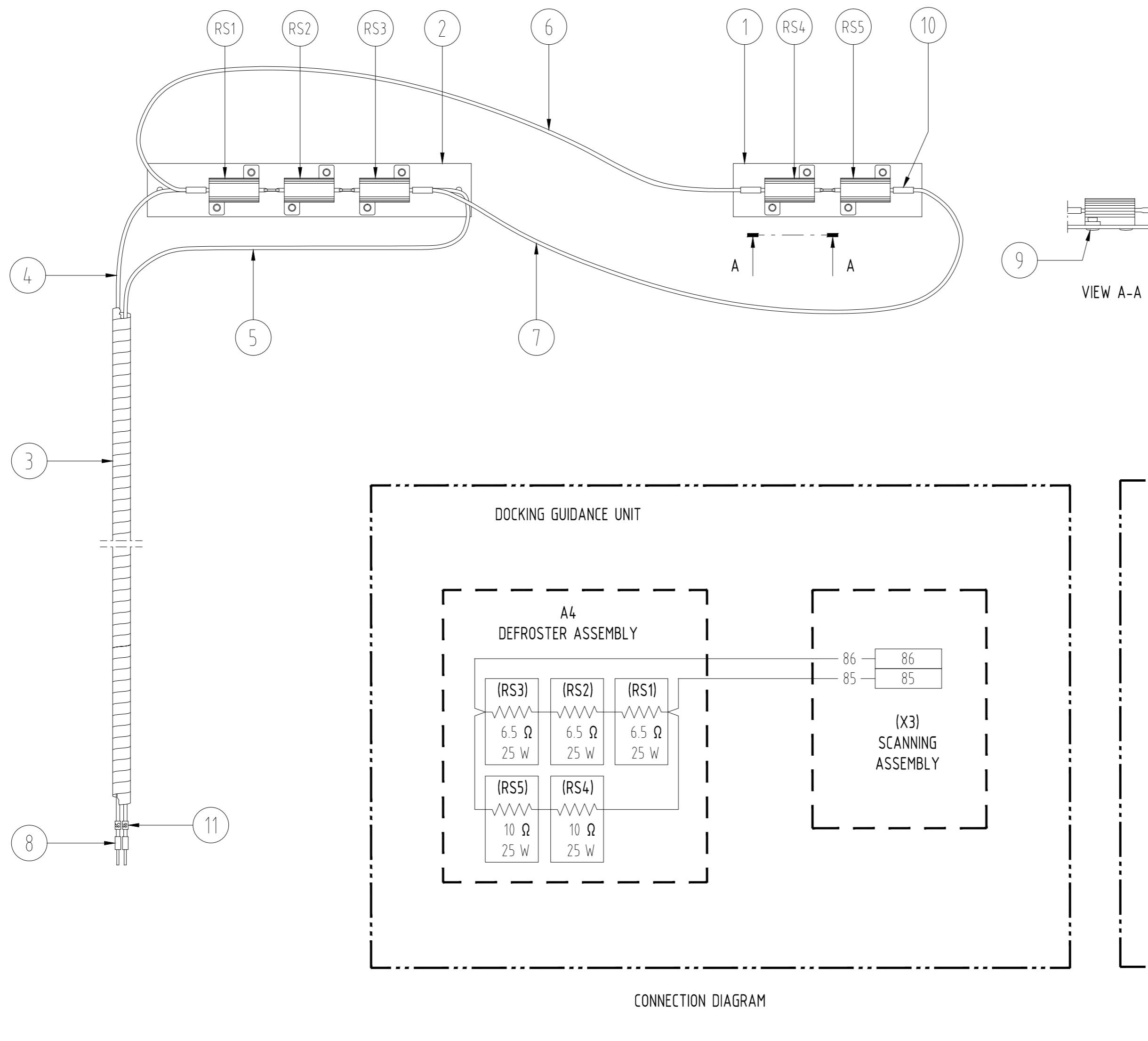
A. Items 4 thru 7 changed. By: G.O. Date: 2004.09.21

### ASSMBLY LEVEL DOCUMENT LIST

SG590486-000-01 PRODUCT CONFIGURATION FILE  
SG590486-001-01 COMPONENT PLACEMENT AND CONNECTION DIAGRAM

### COMPONENT AND PARTS LIST

POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFEGATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART NO.	SUPPLIER
RS1-RS3	3	POWER RESISTOR, 6.5 Ohm, 25 W			HS25 6R8 J	ARCOL, ENGLAND		
RS4-RS5	2	POWER RESISTOR, 10 Ohm, 25 W			HS25 10R J	ARCOL, ENGLAND		
1	1	DEFROSTER PLATE	AT 606373					
2	1	DEFROSTER PLATE	AT 606103					
3	1	SPIRAL WIRE GUARD, DIA. 10 mm					E 29 933 10	AHLSSELL, SWEDEN
4	1	WIRE, UL1007/1569, AWG 20, BLACK, L = 820 mm			3053 BLACK	ALPHA WIRE, USA	5522909	BEJOKEN, SWEDEN
5	1	WIRE, UL1007/1569, AWG 20, BLACK,L = 1000 mm			3053 BLACK	ALPHA WIRE, USA	5522909	BEJOKEN, SWEDEN
6	1	WIRE, UL1007/1569, AWG 20, BLACK,L = 350 mm			3053 BLACK	ALPHA WIRE, USA	5522909	BEJOKEN, SWEDEN
7	1	WIRE, UL1007/1569, AWG 20, BLACK,L = 350 mm			3053 BLACK	ALPHA WIRE, USA	5522909	BEJOKEN, SWEDEN
8	2	CRIMP LUG, H 0,5/14			9026060000	WEIDMÜLLER, GERMANY	9026060000	WEIDMÜLLER, SWEDEN
9	14	POP RIVIT, AL/AC, BLACK, 3,2 X 8						
10	4	SHRINK WRAP, L = 15					55-070-25	ELFA, SWEDEN
11		WIRE MARKERS						
	1	PARTEX PA02, TEXT: 5			11-01044105	WEIDMÜLLER, GERMANY	11-01044105	WEIDMÜLLER, SWEDEN
	1	PARTEX PA02, TEXT: 6			11-01044106	WEIDMÜLLER, GERMANY	11-01044106	WEIDMÜLLER, SWEDEN
	2	PARTEX PA02, TEXT: 8			11-01044108	WEIDMÜLLER, GERMANY	11-01044108	WEIDMÜLLER, SWEDEN
12	1	CABLE TIE MOUNT, BLACK					55-140-96	TECHNOTRADE SWEDEN
13	1	CABLE TIE, 71x1.8, NATURAL			PLT.6SM-C0	PANDUIT, USA	5502828	ELFA, SWEDEN
14	1	LABEL, YELLOW, 15x8, TEXT: R1-R3					21302G	TECHNOTRADE SWEDEN
15	1	LABEL, YELLOW, 15x8, TEXT: R4-R5					21302G	TECHNOTRADE SWEDEN

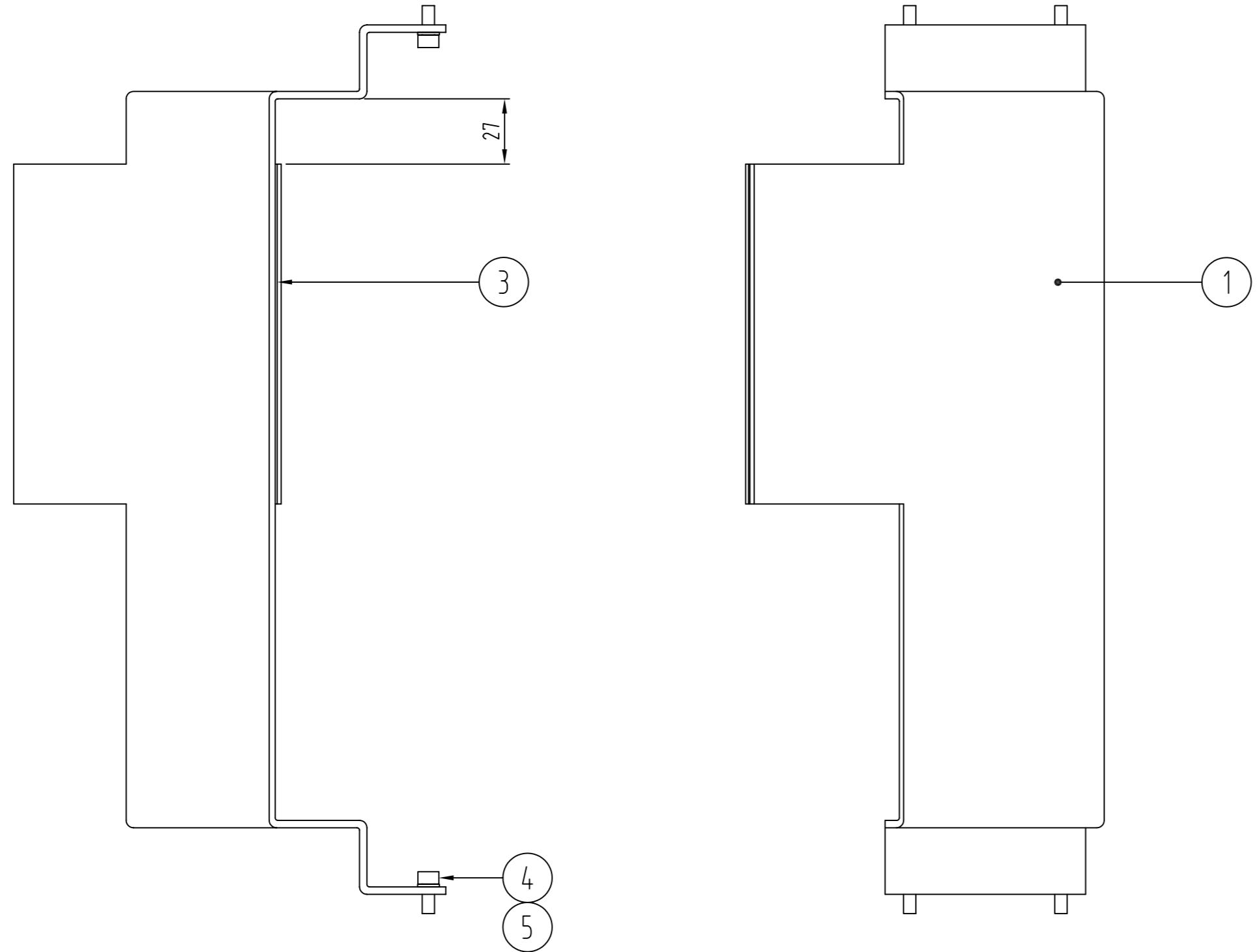


CONNECTION DIAGRAM

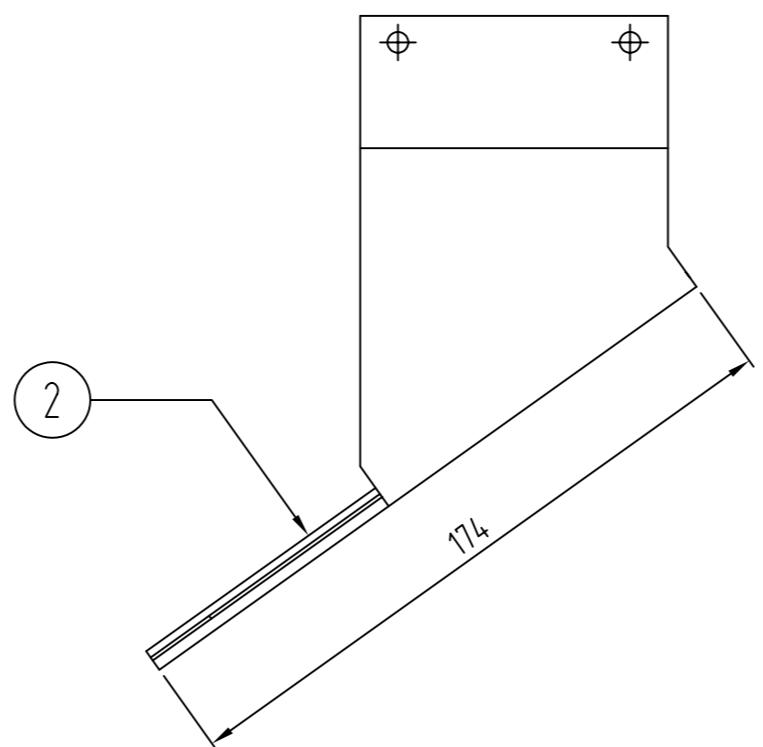
COMPONENT PLACEMENT  
IN SAFEDOCK

<b>SAFEGATE</b>  <b>G R O U P</b>			Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges
Safegate International AB MALMÖ, SWEDEN			Weight	
<b>DEFROSTER ASSEMBLY</b>				
Drawn by: G.O.	Date drawn: 2003.03.19	Checked by: 		
App. by:	Date approved:	Project No.:	Drawing No. SG590486-001-01	Rev. Sheet 1 of 1 Scale 1:2

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	BRACKET	AT 601492					
2	1	DIELECTRIC MIRROR, 138x174x2				SEE NOTE		
3		DOUBLE-SIDED TAPE, 19 mm			4246	3M, SWEDEN		
4	4	SCREW, ISO 4762, M5x12, ZINC PLATED						
5	4	LOCK WASHER, DIN 127, 9.2x5.1x1.2, ZINC PLATED						



NOTE: DIELECTRIC MIRROR  
OPTIMIZED FOR 910 nm  
Si & SiO<sub>2</sub> REFLECTIVE COATING  
SUPPLIER: SPECTROGON



<b>SAFEGATE</b>  <b>G R O U P</b>			Unless otherwise indicated, all tolerances are according to ISO-2768-c			Sharp Edges
						R = 0.5
			Surface Coating			Weight
<b>CALIBRATION MIRROR</b>						
Drawn by: G.O.	Date drawn: 2003.03.19	Checked by: 	App. by:	Date approved:	Project No.:	Drawing No. SG590487-001-01
						Rev. A
						Sheet 1 of 1
						Scale 1:2

A ITEM 3 CHANGED

Revision Description

2008-06-02 G.O.

Date Drawn by: Checked by: Approved

Drawn by: Date drawn: Project No.:

Approved

Drawing No.  
SG590487-001-01

Rev. A

Sheet 1 of 1

Scale 1:2

# SG590495-010-01

## SOFT KEY OPERATOR PANEL

### PRODUCT CONFIGURATION FILE,

#### REVISIONS

C. Item S1 N/O contact added. By: G.O. Date 2005-02-11  
 D. Item K2 Changed. By: G.O. Date 2009-04-22

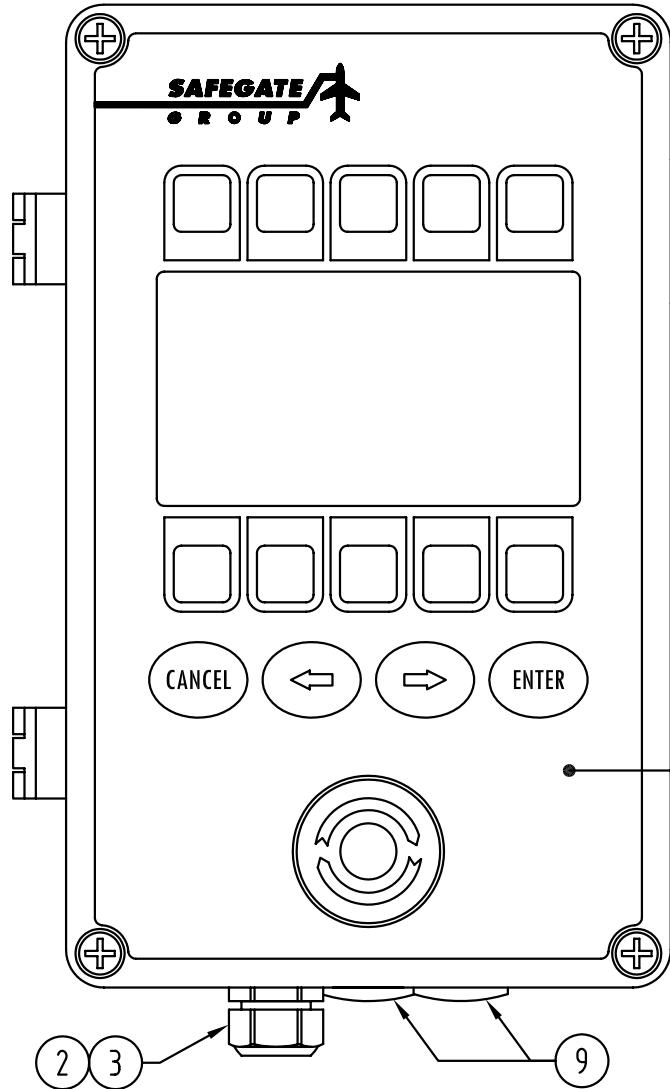
#### ASSMBLY LEVEL DOCUMENT LIST

SG590495-010-01 PRODUCT CONFIGURATION FILE  
 SG590495-011-01 ASSEMBLY AND CONNECTION DIAGRAM

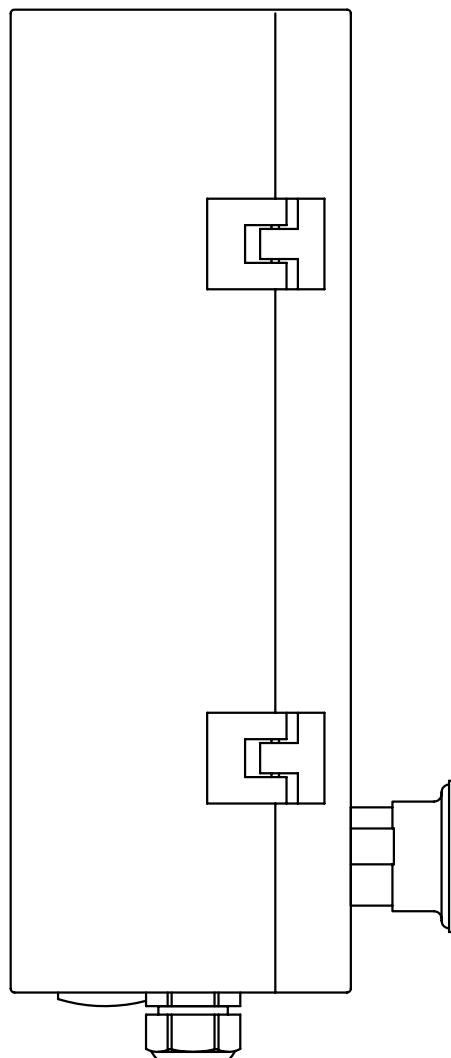
#### COMPONENT AND PARTS LIST

POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFEGRATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART	SUPPLIER
K1	1	CIRCUIT BOARD	SG590495-000-01					
K2	1	SOFT KEY TOUCH PAD			18071, Rev. A1	STEEL GRAPH, SWEDEN		
P1	1	CONNECTOR, EITHER OF FOLLOWING						
		FEMALE CONNECTOR, CA3GD, 4 POLE			932321-100	HIRSCHMANN Electronics GmbH & Co. KG GERMANY	662279	BEJOKEN AB SWEDEN
		FEMALE CONNECTOR, C16-1 TYPE, 4 POLE			T3111-000	AMPHENOL GERMANY	4456158	ELFA SWEDEN
	1	PROTECTION CAP, EITHER OF FOLLOW						
		CA 00 SD 4			831531-100	HIRSCHMANN Electronics GmbH & Co. KG GERMANY	662285	BEJOKEN AB SWEDEN
		C16-1 TYPE			T6483-000	AMPHENOL GERMANY	4456455	ELFA SWEDEN
S1	1	EMERGENCY STOP SWITCH ASSEMBLY			XB4BS542	SCHNEIDER ELECTRIC, SWEDEN	XB4BS542	SCHNEIDER ELECTRIC, FRANCE
	1	NORMALLY OPEN CONTACT			ZBE-101	SCHNEIDER ELECTRIC, SWEDEN	ZBE-101	SCHNEIDER ELECTRIC, FRANCE
1	1	ALUMINIUM ENCLOSURE	SG590495-200-01					
2	1	CABLE GLAND			AHLSSELL		14 761 13	AHLSSELL, SWEDEN
3	1	JAM NUT			AHLSSELL		14 765 33	AHLSSELL, SWEDEN
4	4	STAND OFF, M3 X 20					DSS M3050X20	BIX, SWEDEN
5	4	SCREW, ISO 2009, M3 X 6, ZINC PLATED						
6	4	NUT, ISO 4032, M3						
7	4	WASHER, DIN 125, 3.2 X 6 X 0.5						
8	2	SCREW, ISO 1207, M3 X 10, STAINLESS STEEL						
9	2	PLUG, GRAY, POLYETHYLEN					1470181	AHLSSELL, SWEDEN
10	1	SCREW, DIN 7985, M6 X12, ZINC PLATED						
11	1	QUICK TIE ANCHOR					55-033-13 see note	ELFA SWEDEN
12	1	QUICK TIE, 99x2.5					55-035-94 see note	ELFA SWEDEN
---	1	WIRING MATERIALS						
	1	WIRE, H05V-K, 0.5 mm <sup>2</sup> , BLACK						
	6	CRIMP LUG, H 0.5/14			9026060000	WEIDMÜLLER, GERMANY	9026060000	WEIDMÜLLER, SWEDEN
	2	CABLE TIE, 71X1,8, BLACK				PANDUIT	55-028-02	ELFA, SWEDEN

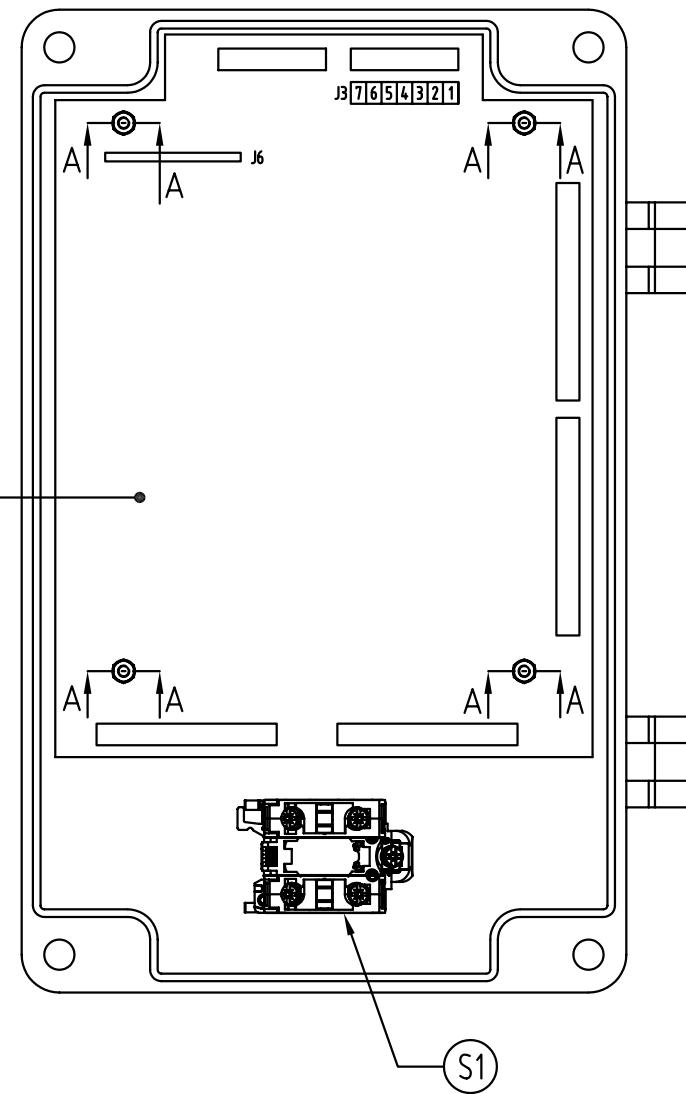
Note: Part number refers to package of 100 pcs.



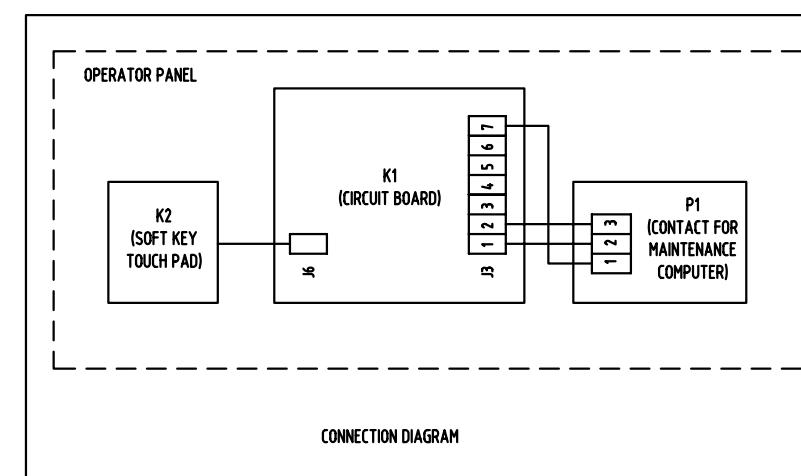
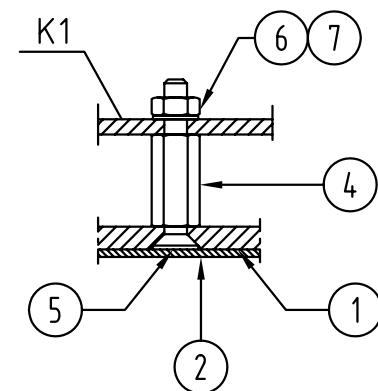
FRONT VIEW



LEFT SIDE VIEW



FRONT VIEW, HOUSING OPENED



SECTION A, SCALE 1:1

**SAFEGATE**  
G R O U P

Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to	Sharp Edges
Surface Coating	Weight

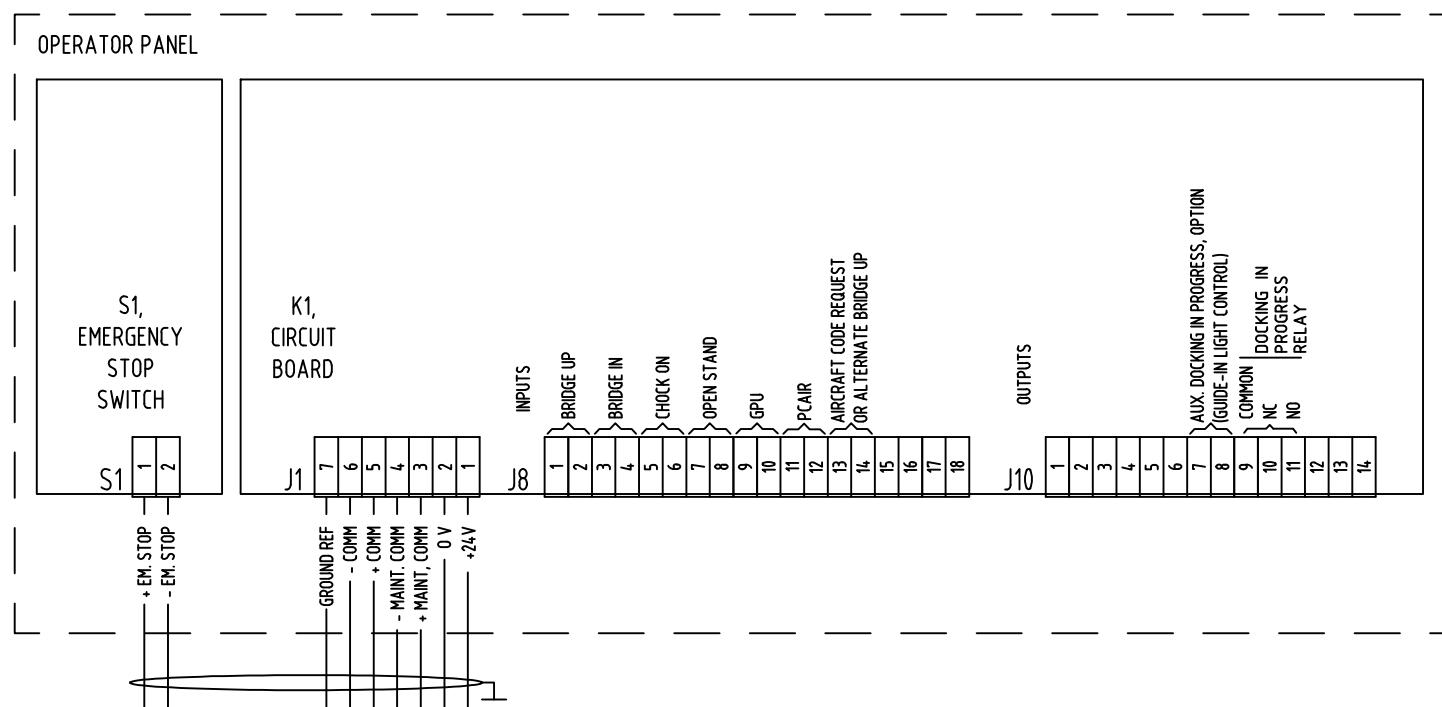
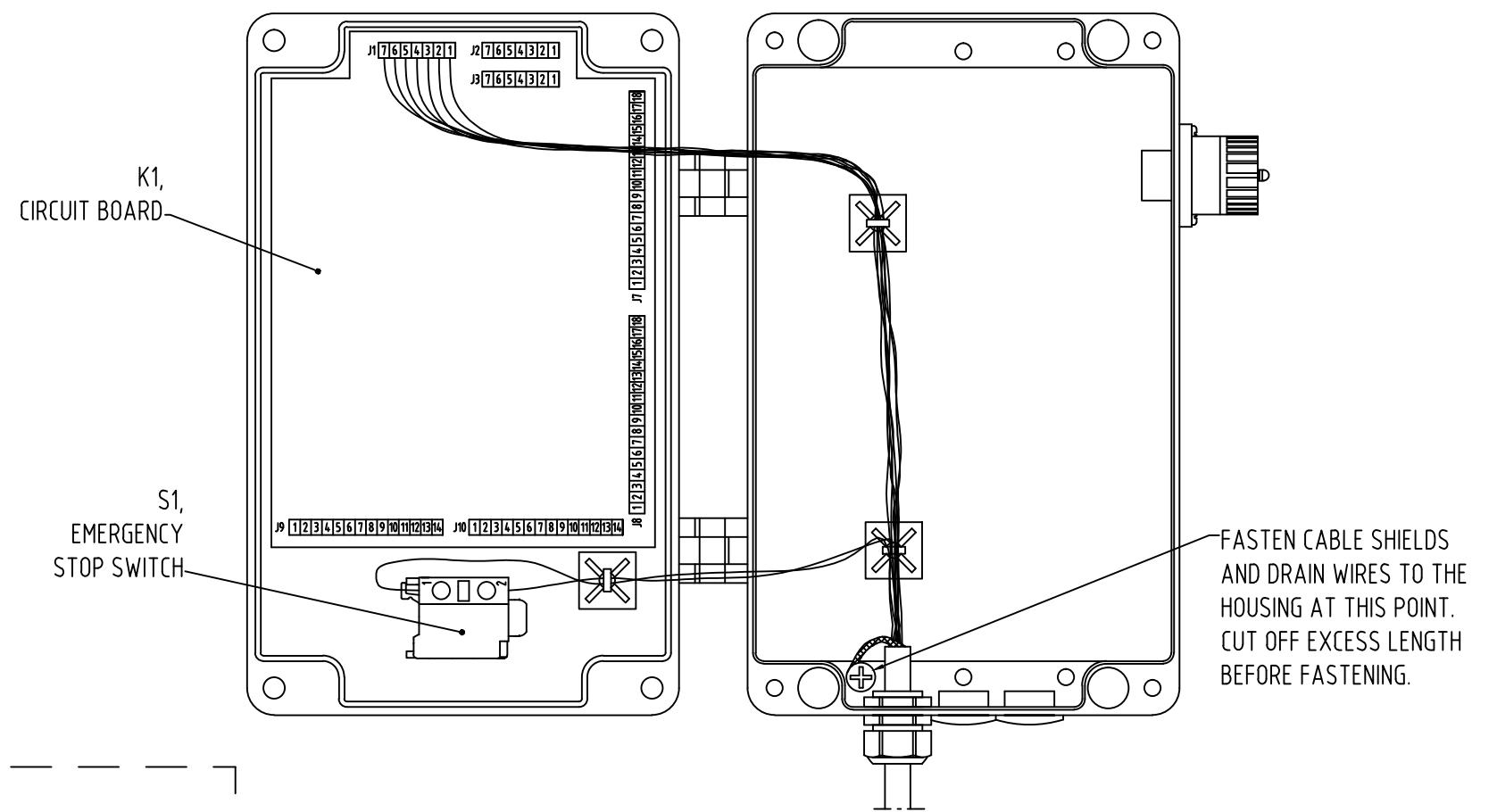
### SOFT KEY OPERATOR PANEL

B	Item S1 changed.	2005.02.11	G.O.		
A	Items 11 and 12 added	2004.04.28	G.O.		
Revision	Description	Date	Drawn by:	Checked by:	Approved

Drawn by: G.O.	Date drawn: 2003.11.14	Checked by: 	
App. by:	Date approved:	Project No.:	

Drawing No. SG590495-011-01	Rev. B	Sheet 1 of 1	Scale 1:5
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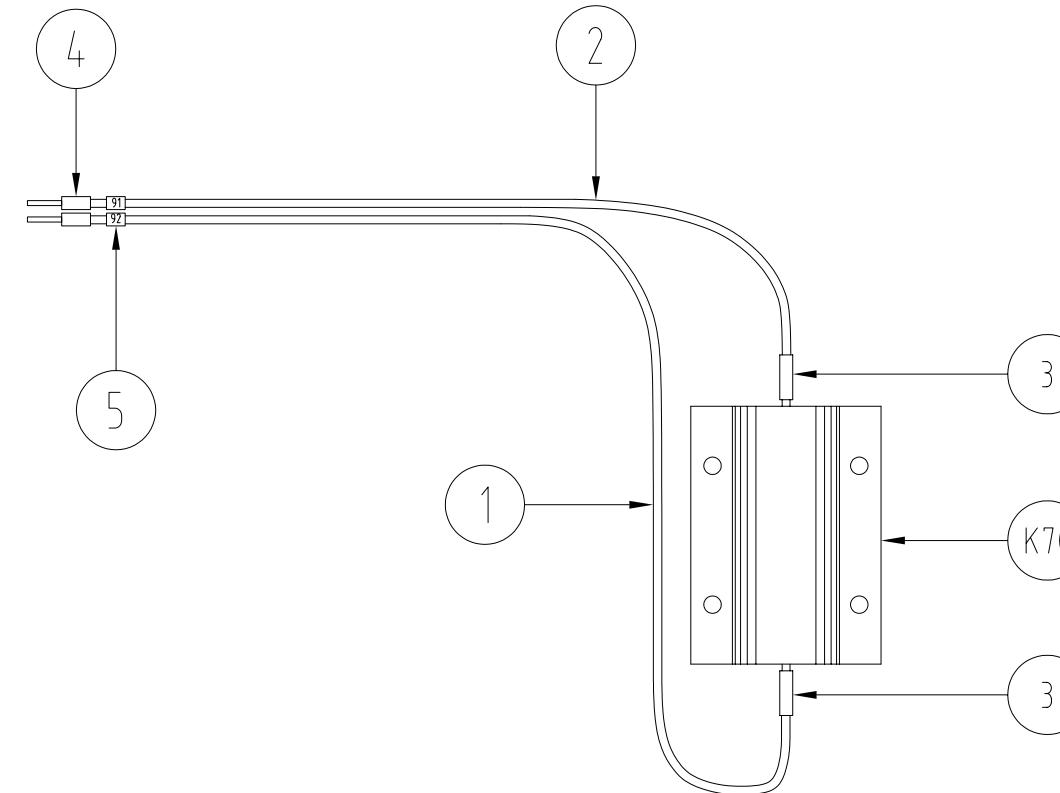
### ASSEMBLY AND CONNECTION DIAGRAM



OPERATOR PANEL, FRONT VIEW WITH COVER OPEN

<b>SAFEGRATE</b> <b>G R O U P</b> Safegate International AB Malmö, Sweden				Unless otherwise indicated, all tolerances are according to			Sharp Edges
				Surface Coating			Weight
SOFT KEY OPERATOR PANEL							
INSTALLATION DIAGRAM							
Drawn by:	Date drawn:	Checked by:		App. by:	Date approved:	Project No.:	Drawing No.
G.O.	2004-05-11						SG590495-015-01
							Rev. C
							Sheet 1 of 1
							Scale

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
K70		POWER RESISTOR, 10 Ohm, 100 W					60-681-26	ELFA, SWEDEN
1	1	WIRE, UL 1007/A569, AWG 20, L = 270 mm, BLACK			3053 BLACK	ALPHA WIRE, USA	55-229-09	ELFA, SWEDEN
2	1	WIRE, UL 1007/A569, AWG 20, L = 120 mm, BLACK			3053 BLACK	ALPHA WIRE, USA	55-229-09	ELFA, SWEDEN
3	2	SHRINK WRAP, L = 15					55-070-25	ELFA, SWEDEN
4	2	CRIMP LUG, H 0,5/14			9026060000	WEIDMÜLLER, GERMANY	9026060000	WEIDMÜLLER, SWEDEN
5		WIRE MARKERS						
1		PARTEX PA02, TEXT: 1					11-01044101	WEIDMÜLLER, SWEDEN
1		PARTEX PA02, TEXT:2					11-01044102	WEIDMÜLLER, SWEDEN
2		PARTEX PA02, TEXT: 9					11-01044109	WEIDMÜLLER, SWEDEN



Safegate International AB  
MALMÖ, SWEDEN

Drawn by: G.O.	Date drawn: 2004-01-19	Checked by:	
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App. by:	Date approved:	Project No.:	
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Unless otherwise indicated, all tolerances are according to		Sharp Edges
Surface Coating		Weight
<b>HEATING ELEMENT FOR SCANNING ASSEMBLY</b>		
Drawing No. SG590512-001-01	Rev. A	Sheet 1 of 1
Scale NO SCALE		

A	Items 1 and 2 changed	2004-09-20	G.O.		
Revision	Description	Date	Drawn by:	Checked by:	Approved

# SG590525-000-01

## SOFT KEY OPERATOR PANEL WITH DEAD MAN SWITCH

PRODUCT CONFIGURATION FILE,

REVISIONS

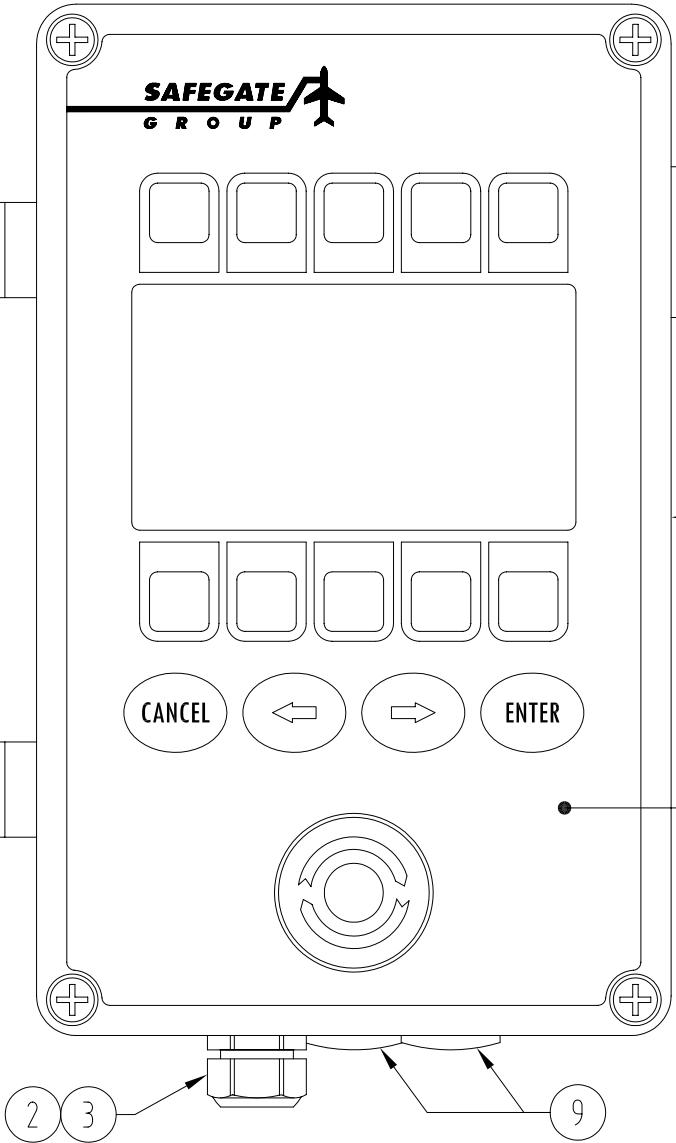
### ASSEMBLY LEVEL DOCUMENT LIST

SG590525-000-01	PRODUCT CONFIGURATION FILE
SG590525-001-01	ASSEMBLY AND CONNECTION DIAGRAM

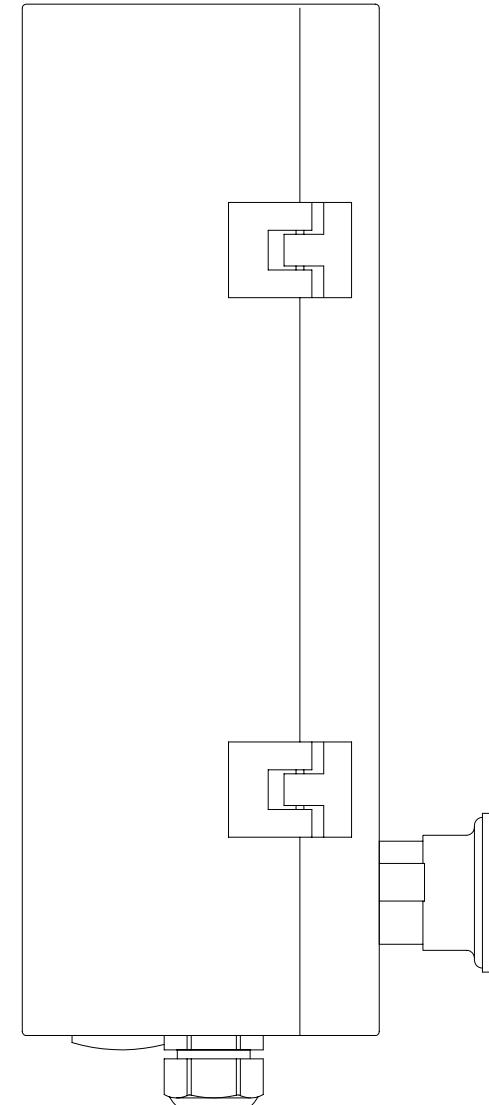
### COMPONENT AND PARTS LIST

POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFEGATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART N	SUPPLIER
K1	1	CIRCUIT BOARD	SG590495-000-01					
K2	1	SOFT KEY TOUCH PAD			SAFEGATE 8484	STEELGRAPH, SWEDEN		
P1	1	CONNECTOR, EITHER OF FOLLOWING						
		FEMALE CONNECTOR, CA3GD, 4 POLE			932321-100	HIRSCHMANN Electronics GmbH & Co. KG GERMANY	662279	BEJOKEN AB SWEDEN
		FEMALE CONNECTOR, C16-1 TYPE, 4 POLE			T3111-000	AMPHENOL GERMANY	4456158	ELFA SWEDEN
	1	PROTECTION CAP, EITHER OF FOLLOW						
		CA 00 SD 4			831531-100	HIRSCHMANN Electronics GmbH & Co. KG GERMANY	662285	BEJOKEN AB SWEDEN
		C16-1 TYPE			T6483-000	AMPHENOL GERMANY	4456455	ELFA SWEDEN
S1	1	SWITCH ASSEMBLY, DEAD MAN			XB4-BC21	SCHNEIDER ELECTRIC, SWEDEN	XB4-BC21	SCHNEIDER ELECTRIC, FRANCE
1	1	ALUMINIUM ENCLOSURE	SG590495-200-01					
2	1	CABLE GLAND			AHLSELL		14 761 13	AHLSELL, SWEDEN
3	1	JAM NUT			AHLSELL		14 765 33	AHLSELL, SWEDEN
4	4	STAND OFF, M3 X 20					DSS M3050X20	BIX, SWEDEN
5	4	SCREW, ISO 2009, M3 X 6, ZINC PLATED						
6	4	NUT, ISO 4032, M3						
7	4	WASHER, DIN 125, 3.2 X 6 X 0.5						
8	2	SCREW, ISO 1207, M3 X 10, STAINLESS STEEL						
9	2	PLUG, GRAY, POLYETHYLEN					1470181	AHLSELL, SWEDEN
10	1	SCREW, DIN 7985, M6 X12, ZINC PLATED						
11	3	QUICK TIE ANCHOR					55-033-13 see note	ELFA SWEDEN
12	3	QUICK TIE, 99x2.5					55-035-94 see note	ELFA SWEDEN
---	1	WIRING MATERIALS						
	1	WIRE, H05V-K, 0.5 mm <sup>2</sup> , BLACK						
	6	CRIMP LUG, H 0.5/14			9026060000	WEIDMÜLLER, GERMANY	9026060000	WEIDMÜLLER, SWEDEN
	2	CABLE TIE, 71X1,8, BLACK				PANDUIT	55-028-02	ELFA, SWEDEN

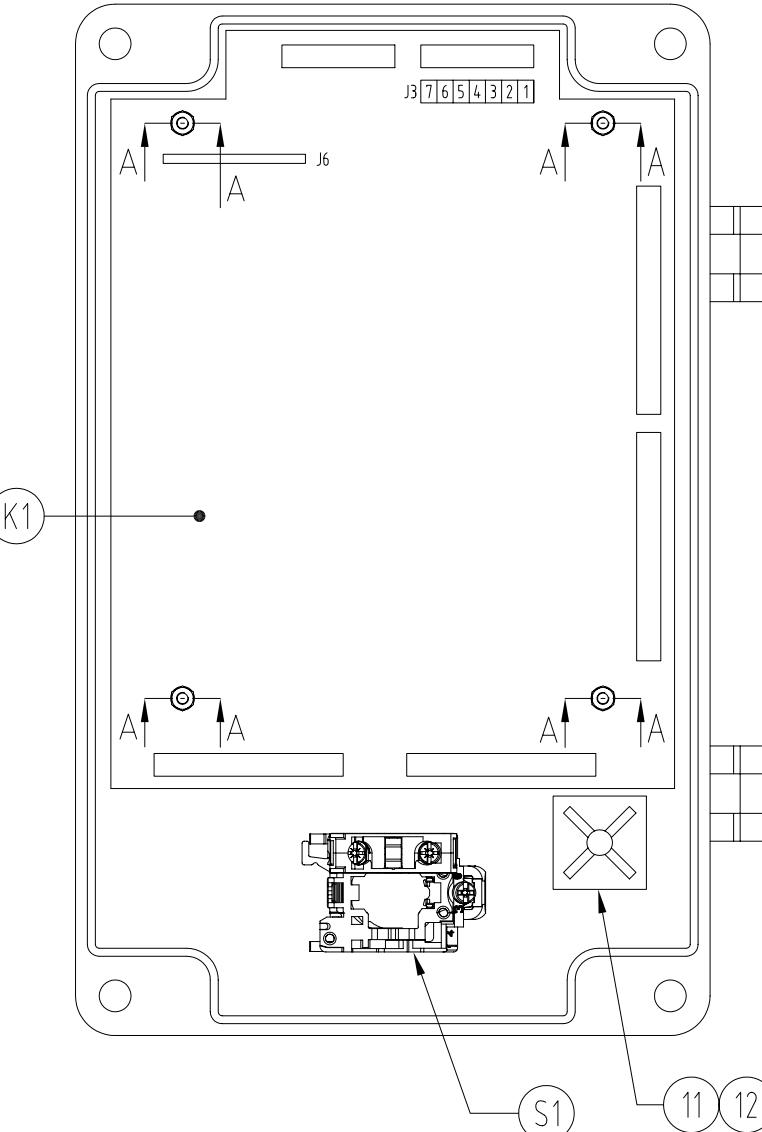
Note: Part number refers to package of 100 pcs.



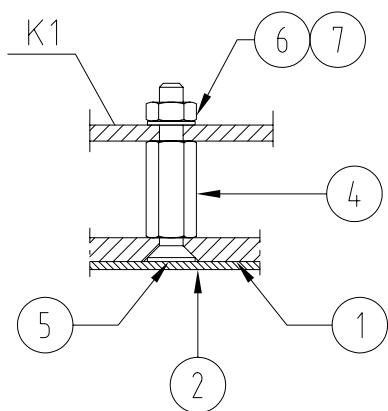
FRONT VIEW



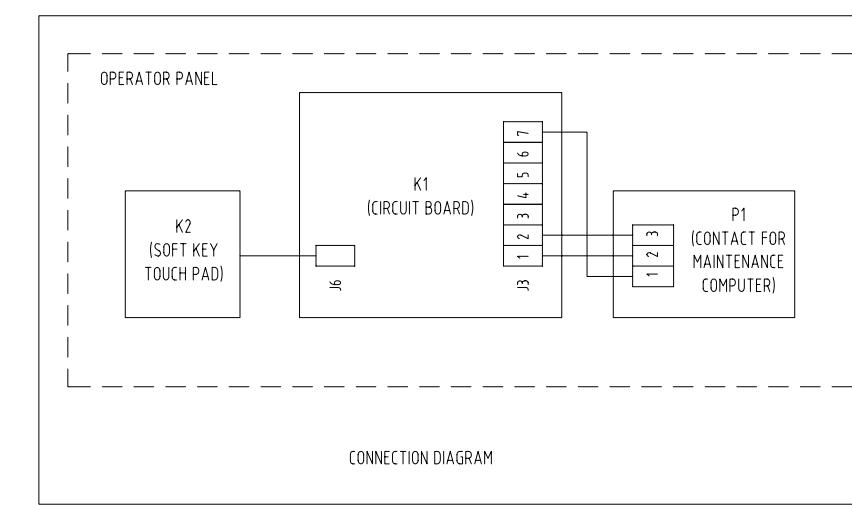
LEFT SIDE VIEW



FRONT VIEW, HOUSING OPENED



SECTION A, SCALE 1:1



CONNECTION DIAGRAM

**SAFEGATE**  
G R O U P

Safegate International AB  
MALMÖ, SWEDEN

Drawn by: G.O.	Date drawn: 2004.11.03	Checked by:
App. by:	Date approved:	Project No.:

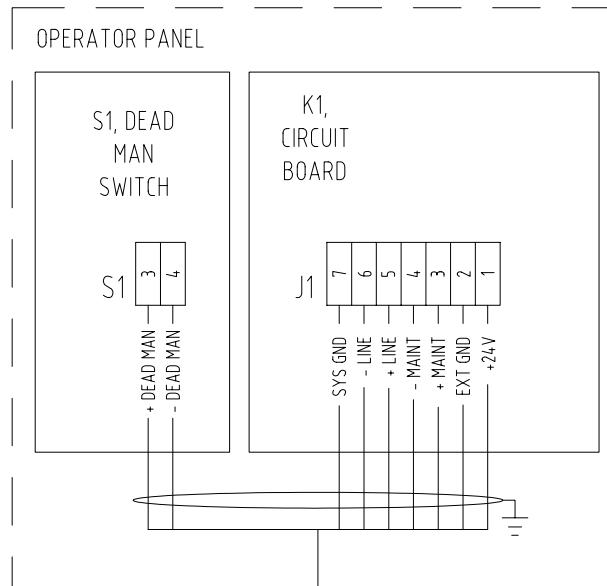
Unless otherwise indicated, all tolerances are according to  
Surface Coating

Sharp Edges  
Weight

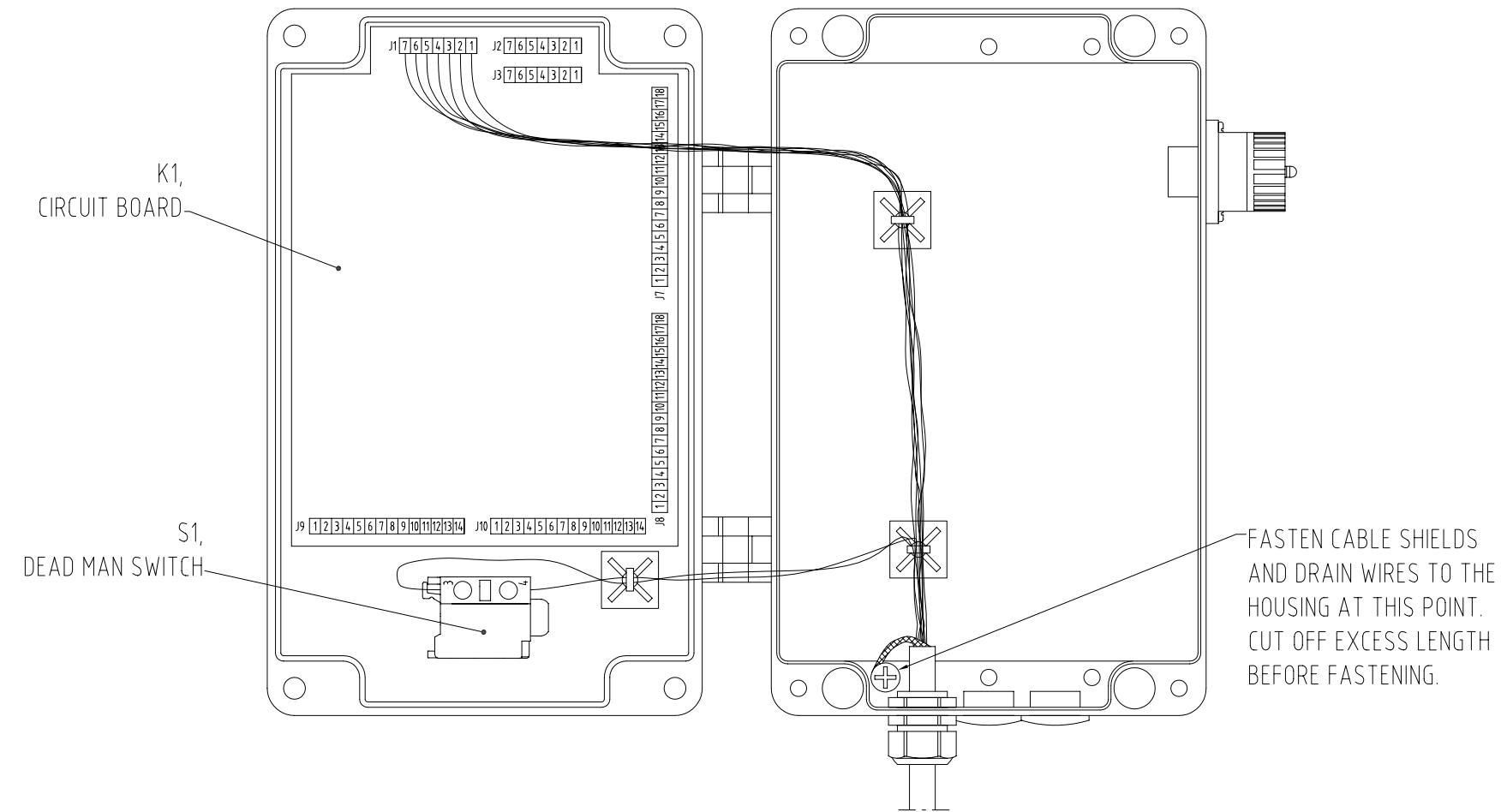
SOFT KEY OPERATOR PANEL  
WITH DEAD MAN SWITCH

ASSEMBLY AND CONNECTION DIAGRAM

Drawing No. SG590525-001-01	Rev.	Sheet	Scale
	1 of 1		1:5



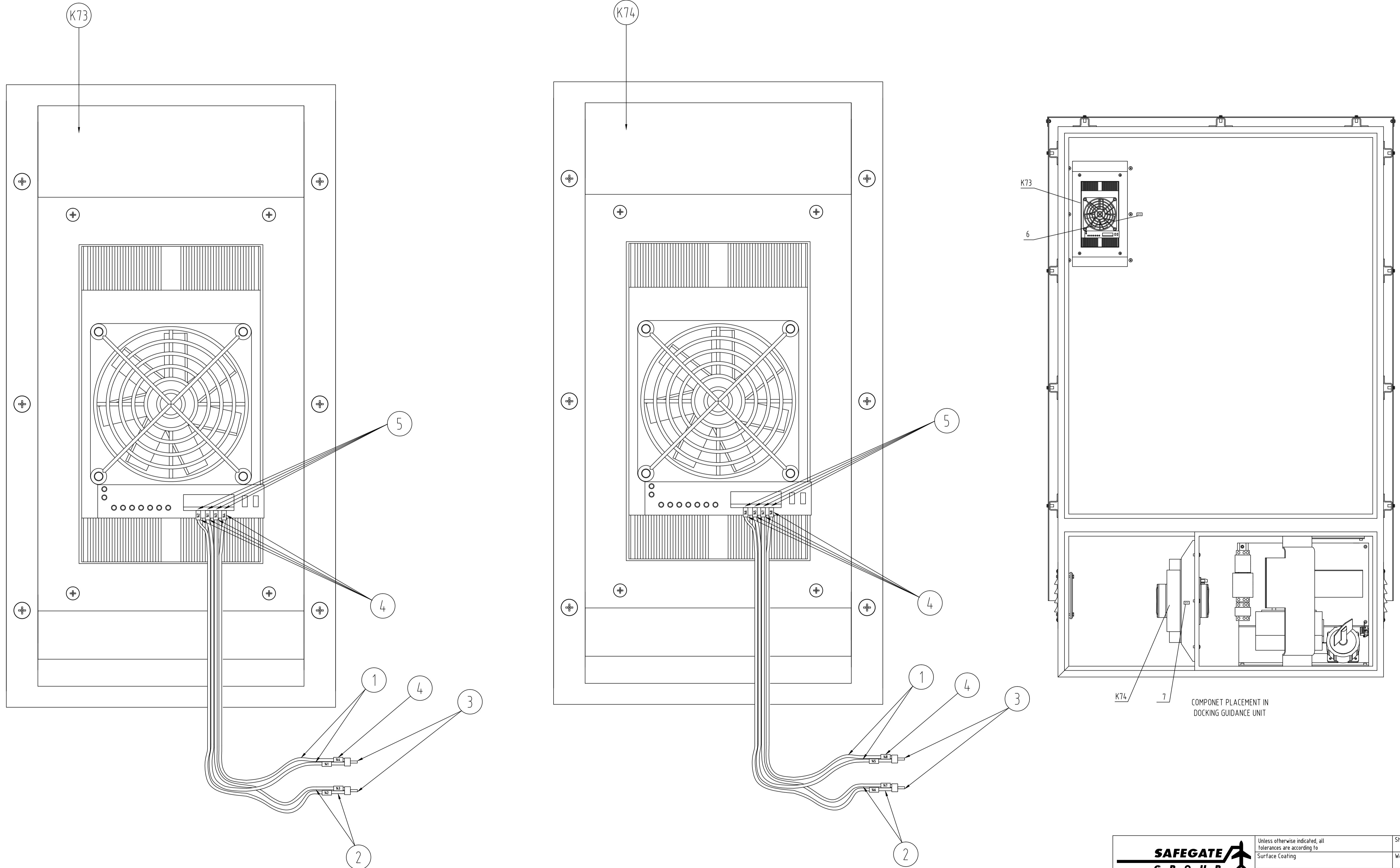
D6S



OPERATOR PANEL, FRONT VIEW WITH COVER OPEN

<b>SAFE GATE</b> <b>G R O U P</b>		Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges
Safegate International AB MALMÖ, SWEDEN			Weight
<b>SOFT KEY OPERATOR PANEL WITH DEAD MAN SWITCH</b>			
<b>INSTALLATION DIAGRAM</b>			
Drawn by: G.O.	Date drawn: 2004-11-03	Checked by: [Signature]	Drawing No. SG590525-005-01
App. by:	Date approved:	Project No.:	Rev. Sheet Scale
Revision	Description	Date	Drawn by: Checked by: Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	4	WIRE, UL1007/1569, AWG 20, BLACK						
2	4	WIRE, UL1007/1569, AWG 20, RED						
3	4	CRIMP LUG, H 2x0.5						
4	4	WIRE MARKERS, PARTEX PA02						
5	4	CRIMP LUG, H 0.5/14						
K73-K74	2	COOLING UNIT	SG590543-100-01					
6	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K73					213026	TECHNOTRADE SCANDINAVIA AB, SWEDEN
7	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K74					213026	TECHNOTRADE SCANDINAVIA AB, SWEDEN

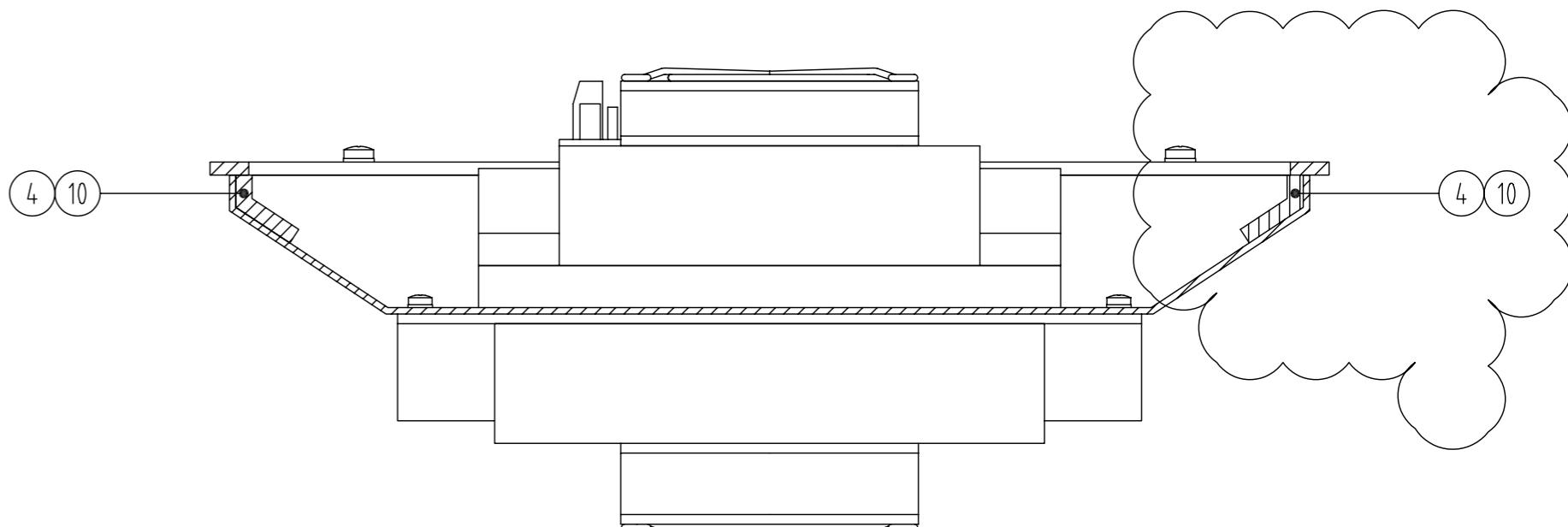
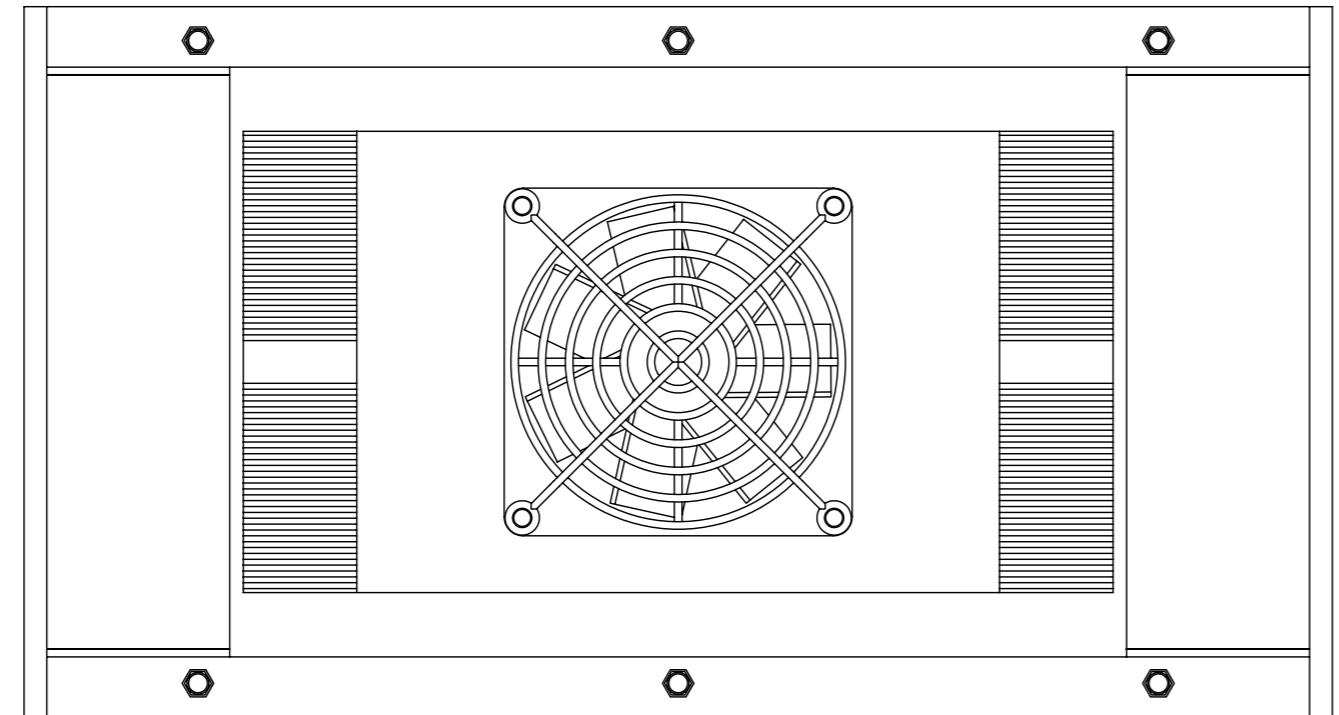


D	Cable changed	2011.01.22	A.S.	
C	Drawing and BOM changed	2011.11.17	A.S.	
B	T2 changed, position for T2 changed	2011.03.22	A.S.	
A	Connection for K73 and K74 changed	2005.09.14	G.O.	
Revision	Description	Date	Drawn by	Checked by

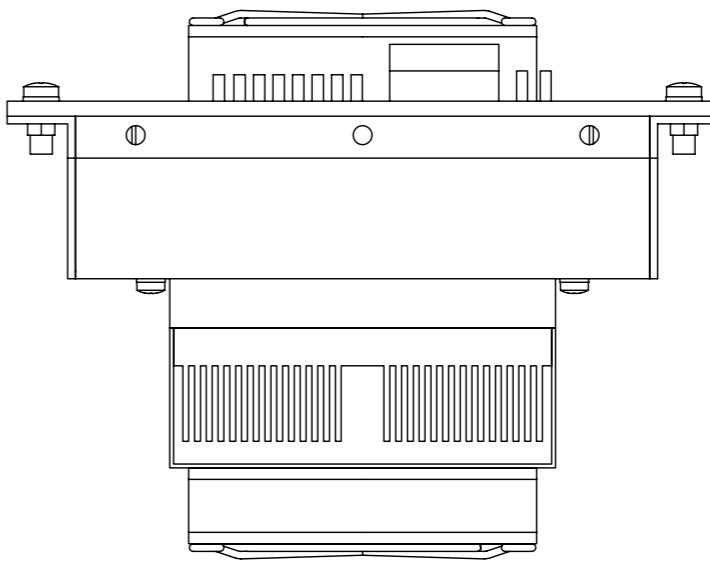
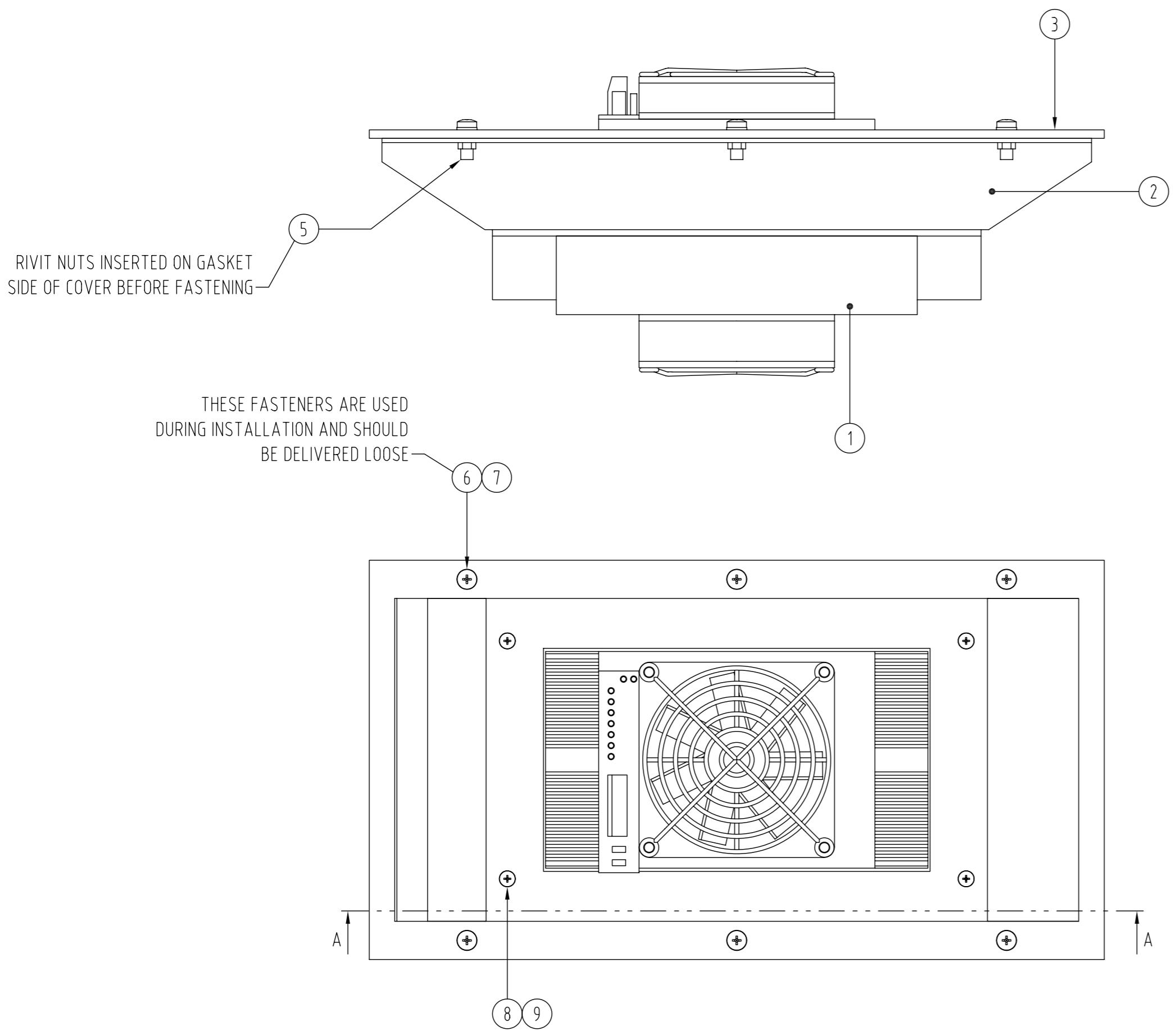
**SAFE GATE**  
GROUP

Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges		
	Weight		
COOLING ASSEMBLY, T2			
Drawn by: G.O.	Date drawn: 2005.08.17	Checked by:	
App. by:	Date approved:	Project No.:	
Drawing No. SG590543-001-01	Rev. D	Sheet 1 of 1	Scale 1:2



SECTION A-A



C	Extra filter, Item 4, added.	2007.08.06	G.O.			Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges
B	Section A-A added	2006.11.09	G.O.				Weight
A	Views updated to reflect change of supercooler model	2005.09.13	G.O.			COOLING UNIT SEE SG590543-100-02 FOR PARTS LIST	
Revision	Description	Date	Drawn by:	Checked by:	Approved	SG590543-100-01	Rev. C Sheet 1 of 1 Scale 1:2
			G.O.				

**SAFEGATE** **GROUP**

Safegate International AB  
MALMÖ, SWEDEN

Drawn by:	Date drawn:	Checked by:
G.O.	2005.08.17	
App. by:	Date approved:	Project No.:

# SG590543-100-02

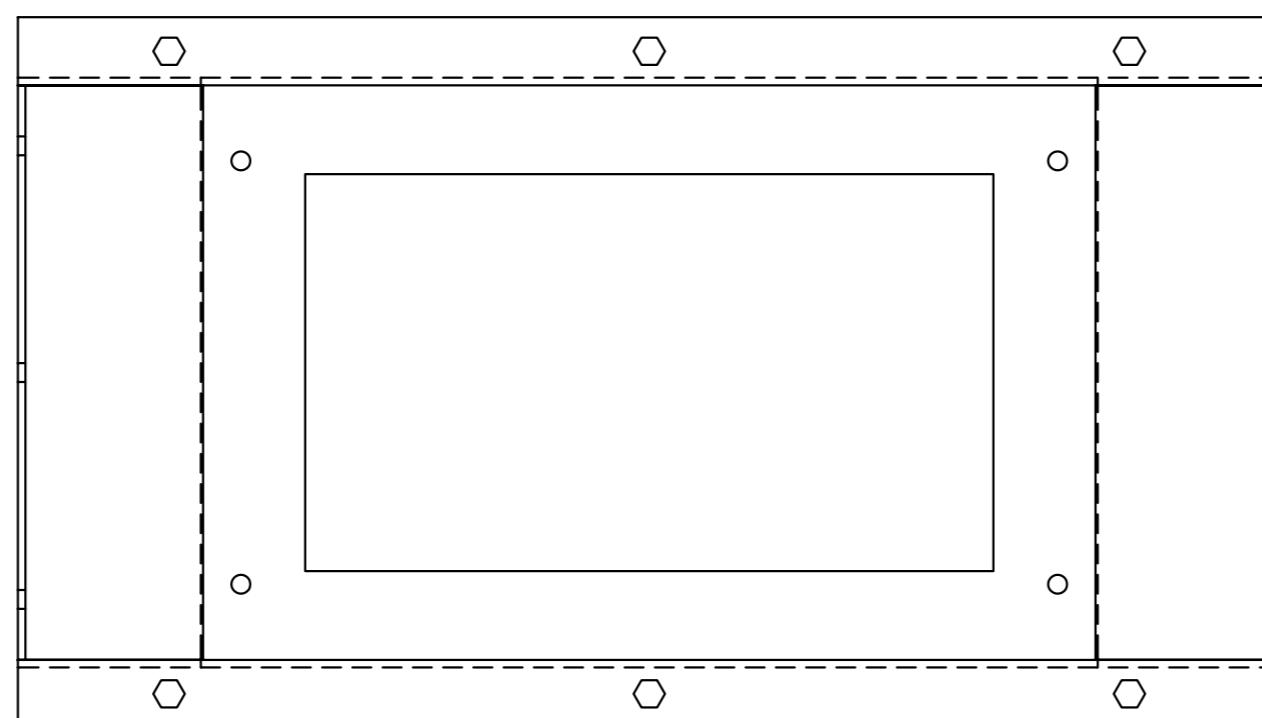
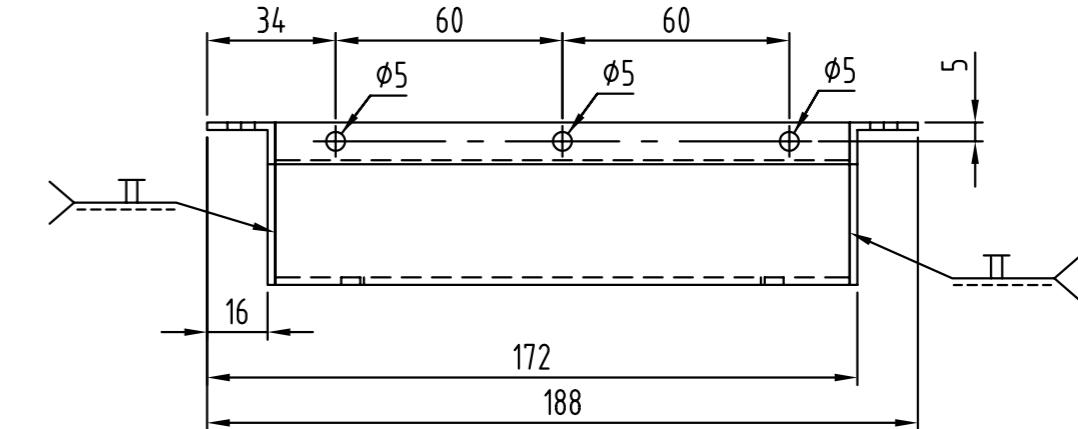
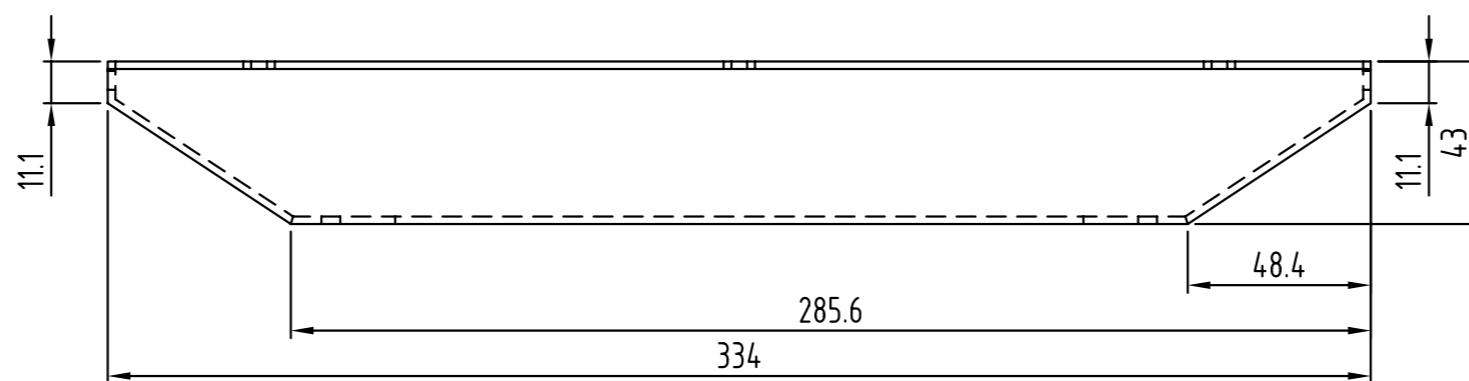
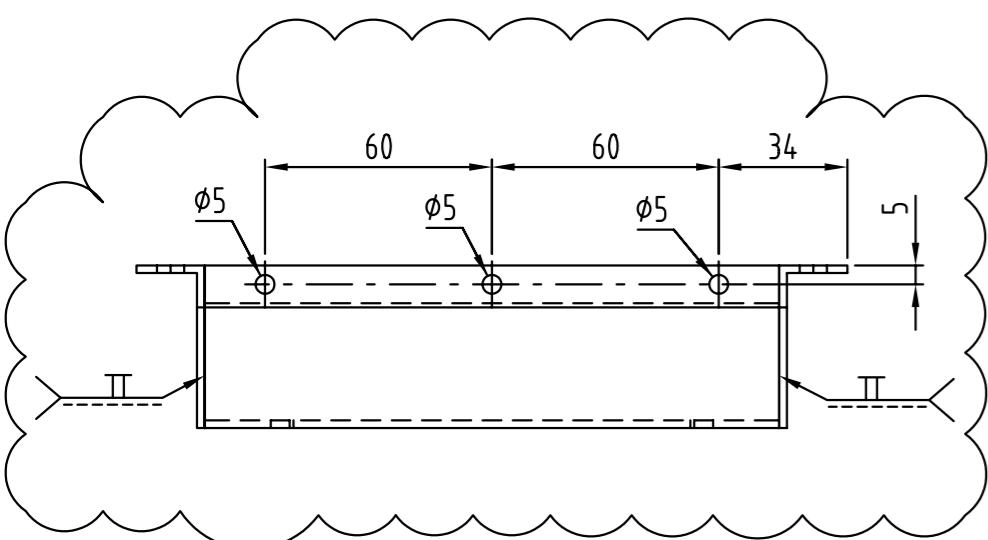
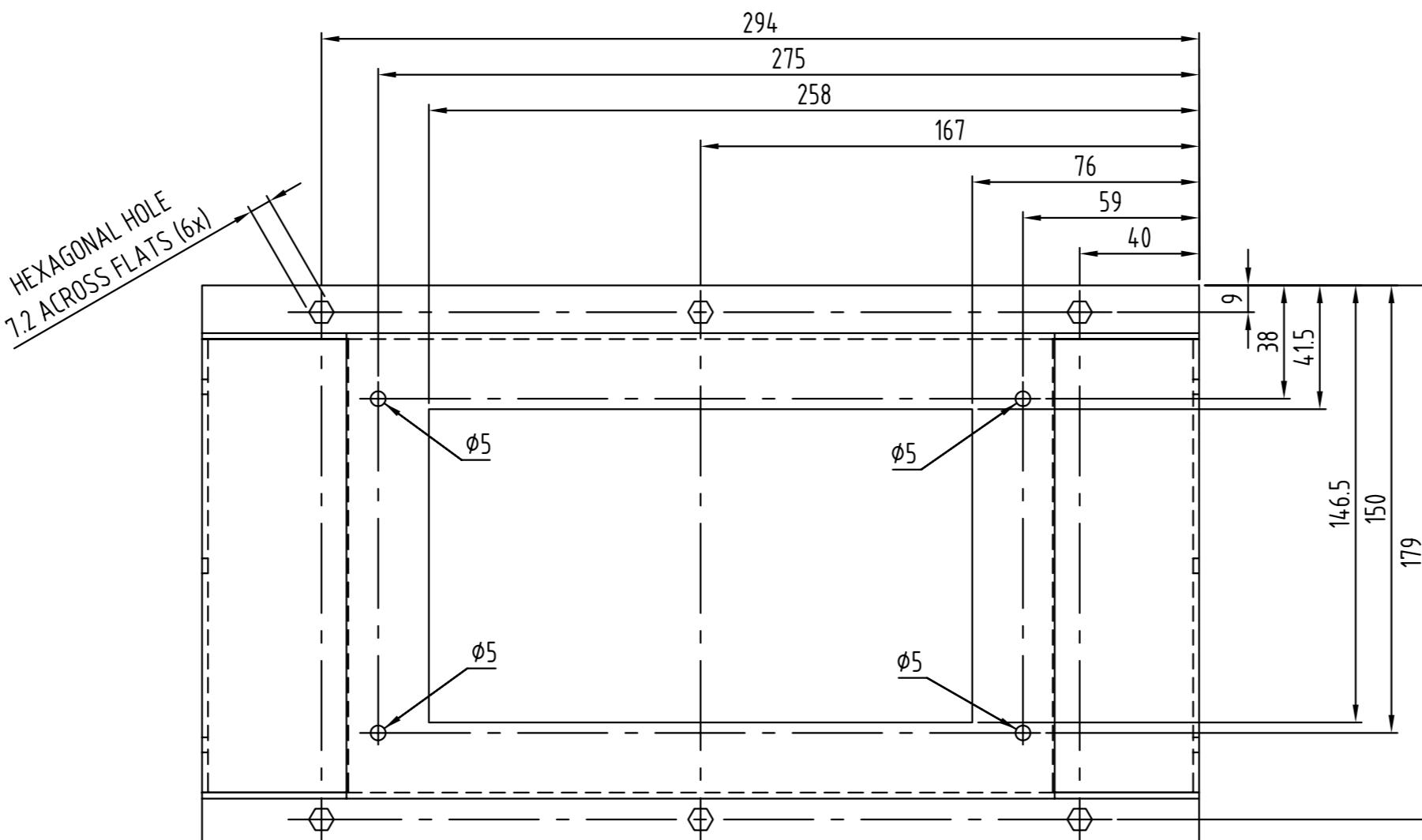
## COOLING UNIT

### REVISIONS

- A. Item 1, Part No. Changed. By: G.O. Date: 2005.09.14  
B. Item 4, Quantity changed. By: G.O. Date 2007.08.06

COMPONENT AND PARTS LIST FOR SG590543-100-01								
POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFEGRATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART NO.	SUPPLIER
1	1	THERMOELECTRIC COOLER, 24 V, 58W AIR TO AIR			AA-060-24-23-00-10	SUPERCOOL AB, SWEDEN	AA-060-24-23-00-10	SUPERCOOL AB, SWEDEN
2	1	COOING UNIT COVER	SG590543-200-01					
3	1	GASKET	SG590543-201-01					
4	2	FILTER	SG590543-202-01					
5	6	RIVIT NUT. M5, CLOSED, HEXAGONAL, STAINLESS STEEL						
6	6	SCREW, DIN-7985, M5x16, STAINLESS STEEL						
7	6	LOCKWASHER, DIN 127B, 5.1x9.2x1.2, STAINLESS STEEL						
8	4	SCREW, DIN-7985, M4x12, STAINLESS STEEL						
9	4	LOCKWASHER, DIN 127B, 4.1x7.6x0.9, STAINLESS STEEL						
10		SPRAY ADHESIVE, TYPE 76 (See Note)			3M			

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
		ALUMINUM SHEET, EN1050-14, $t = 2$						



PAINT NOTES:

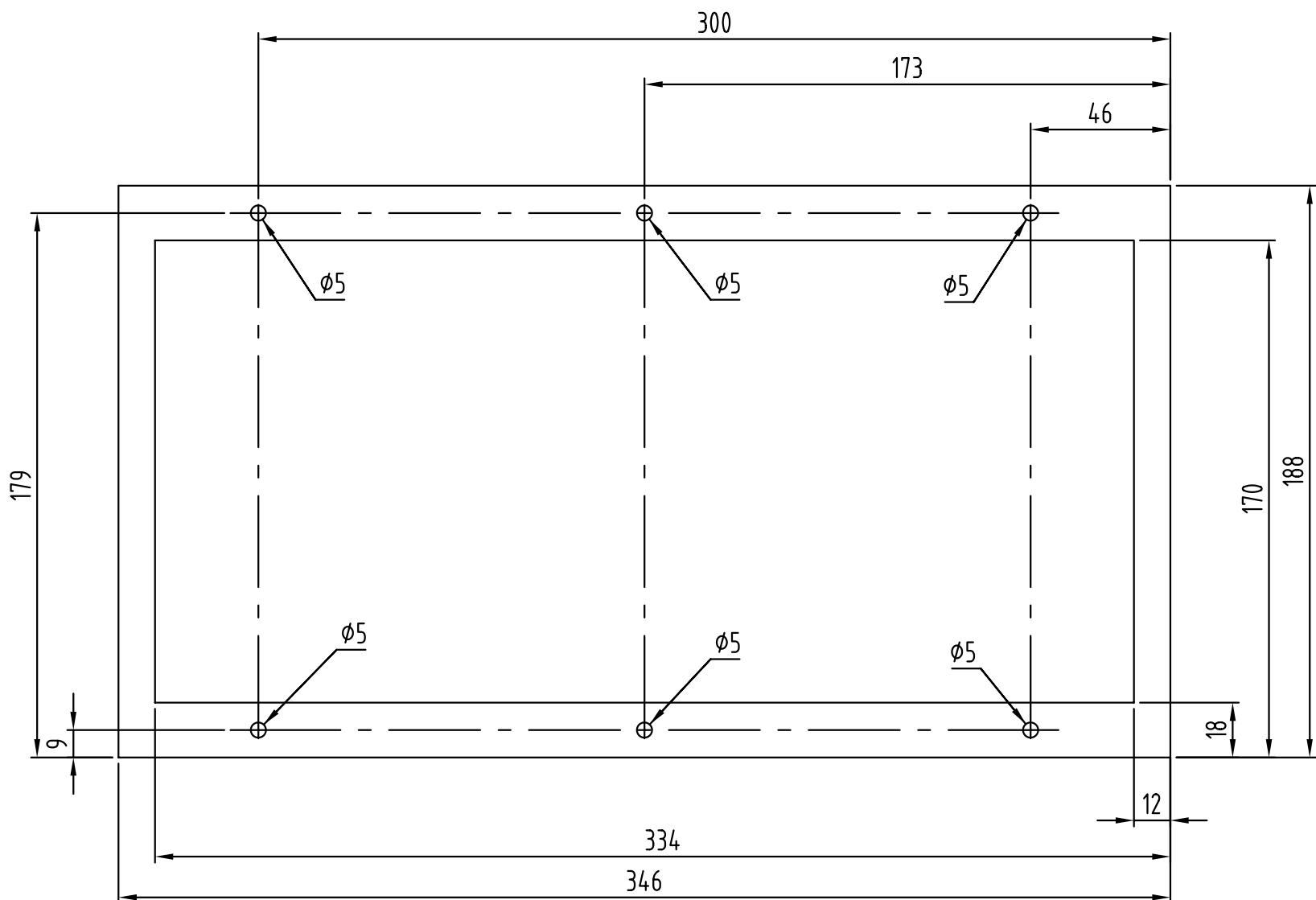
PAINT: POWDER PAINT  
 INTERPON D2000, COLOR: VENUS OR  
 INTERPON 810, RAL COLORS  
 COLOR SPECIFIED WITH ORDER  
 MANUFACTURER: AKZO NOBEL POWDER COATINGS  
 BEFORE PAINTING, THE PART SHALL BE COATED  
 WITH BONDERITE NT CONVERSION COATING.  
 APPLICATION OF THE CONVERSION COAT SHALL  
 FOLLOW THE PRETREATMENT PROCESS SPECIFIED  
 BY THE CONVERSION COATING MANUFACTURER,  
 HENKEL TECHNOLOGIES.

<b>SAFEGATE</b>  G R O U P			Unless otherwise indicated, all tolerances are according to ISO-2768-m	Sharp Edges $R = 0.5$
Safegate International AB MALMÖ, SWEDEN			Surface Coating	Weight
COVER FOR SUPERCOOLER				
Drawn by: G.O.	Date drawn: 2005.08.16	Checked by: 		
App. by:	Date approved:	Project No.:		
Drawing No. SG590543-200-01			Rev. B	Sheet 1 of 1
			Scale 1:2	

B	Three Ø5 holes added	2007.08.06	G.O.	
A	PAINT NOTE ADDED	2006.03.10	G.O.	

Revision Description Date Drawn by Checked by Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
		FOAM RUBBER, CLOSED CELL EPDM-SBR, $t = 4$		1722		NATIONAL GUMMI, SWEDEN	1722	NATIONAL GUMMI, SWEDEN



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to ISO-2768-m Sharp Edges  
Surface Coating Weight

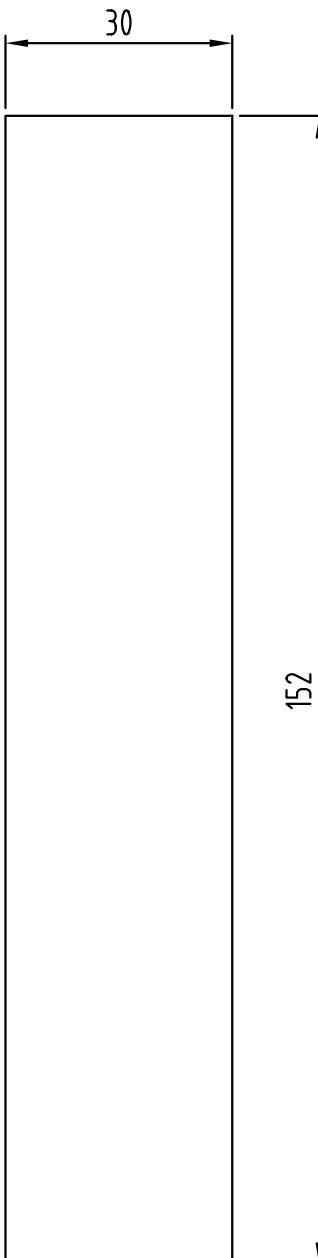
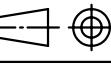
GASKET  
SUPERCOOLER COVER

Drawn by: G.O. Date drawn: 2005.08.16 Checked by:

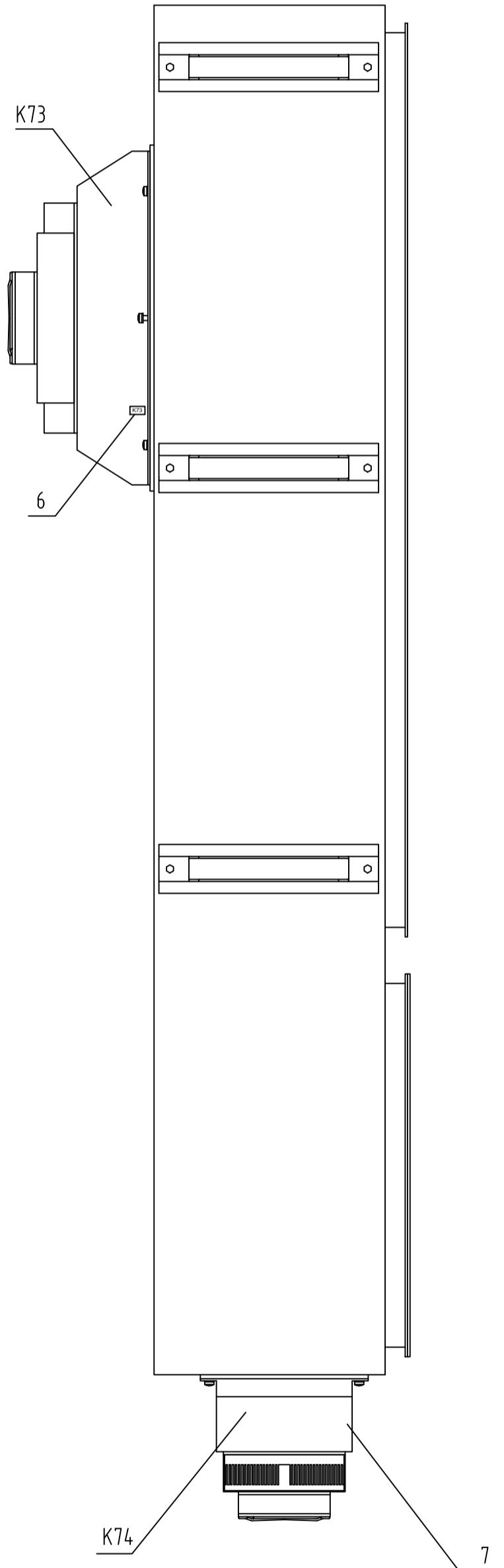
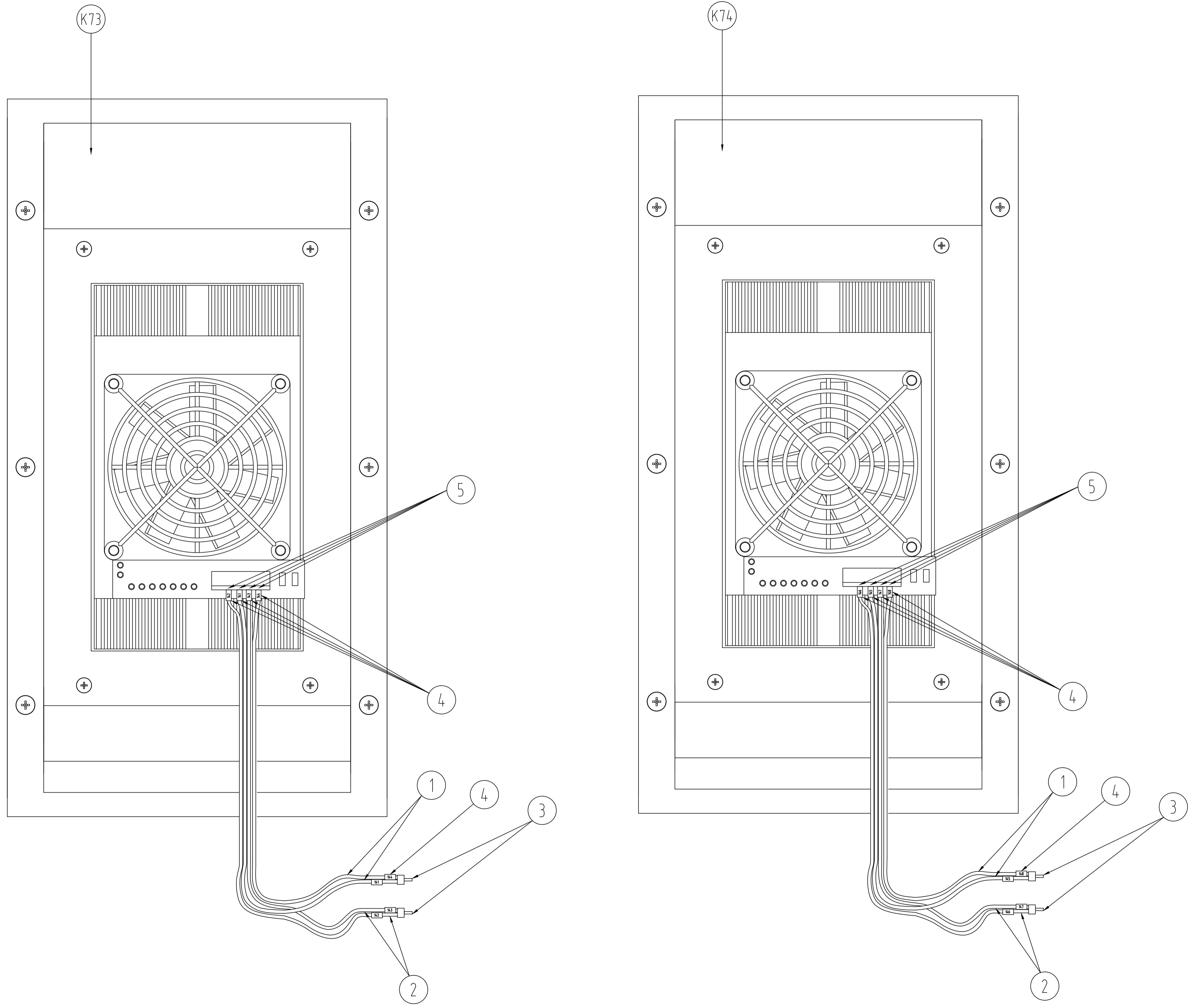
App. by: Date approved: Project No.: Drawing No.

SG590543-201-01 Rev. A Sheet 1 of 1 Scale 1:1

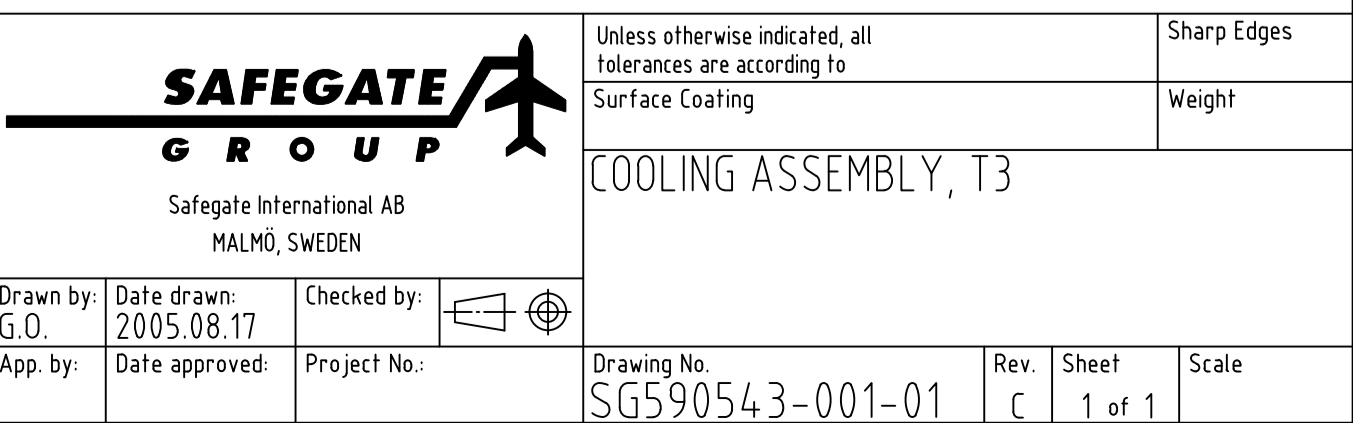
A	Hanging dimension corrected	2005.08.23	G.O.		
Revision	Description	Date	Drawn by:	Checked by:	Approved

Revision	Description	Date	Drawn by:	Checked by:	Approved
					
MANUFACTURER: RITTAL SCANDINAVIA AB PACKAGE OF 5 SIZE: 176x176	FILTER MATERIAL	SK3181.100		SEE NOTE	
Item No	Qty.	Name	Description	Dimensions	Remark
			Unless otherwise indicated, all tolerances are according to	ISO-2768-C	Sharp Edges
			Surface Coating		Weight
			FILTER COOLING UNIT		
Drawn by: G.O.	Date drawn: 2005.08.17	Checked by: 			
App. by:	Date approved:	Project No.:	Drawing No. SG590543-202-01	Rev.	Sheet 1 of 1
				Scale	1:1

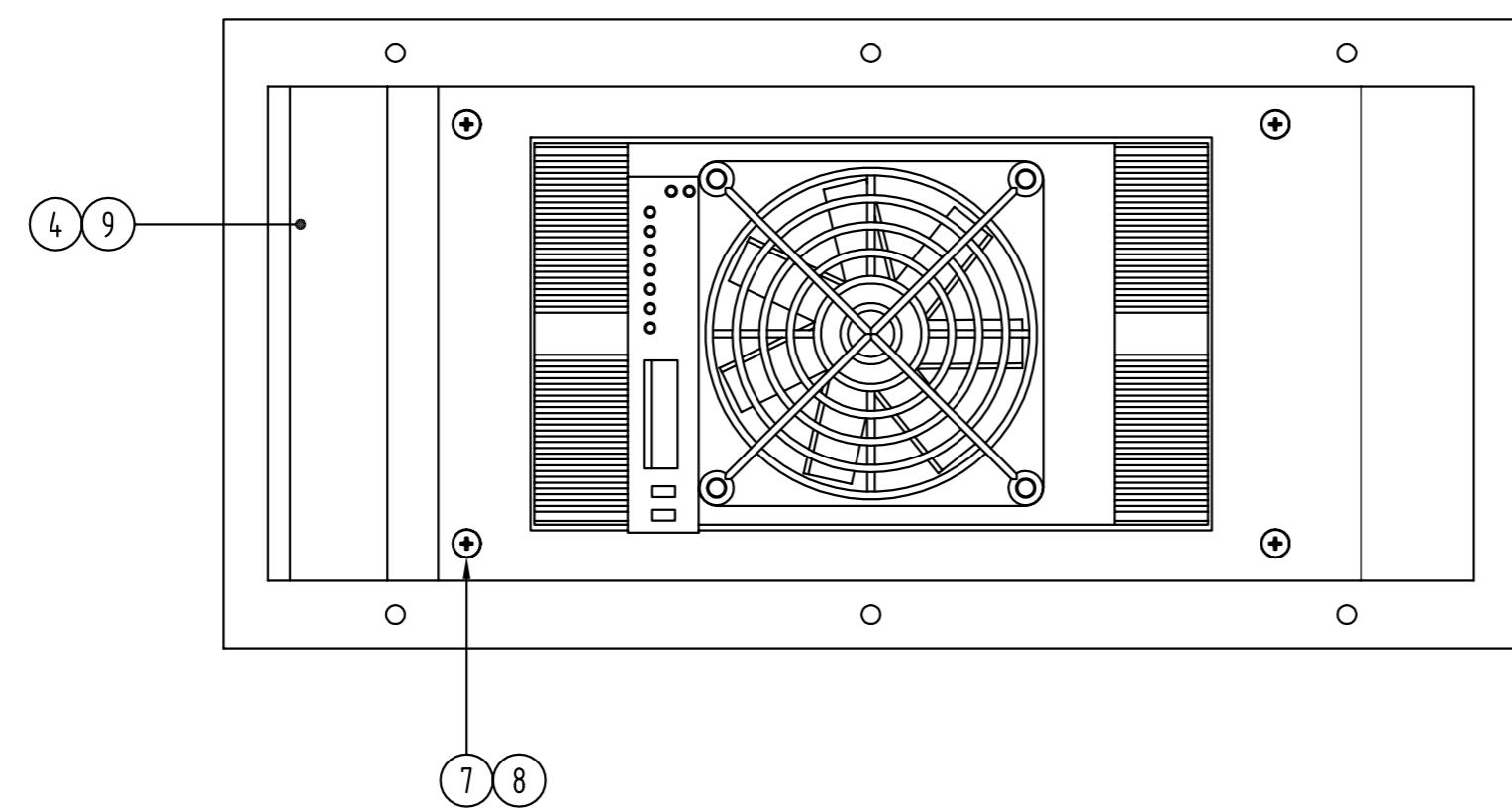
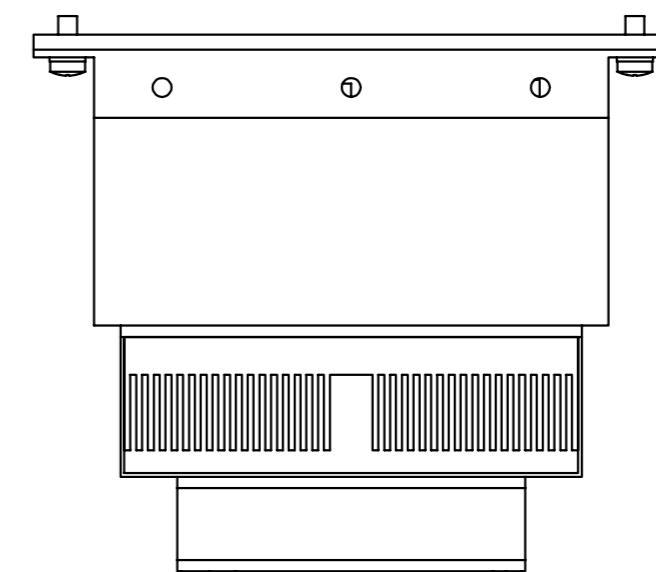
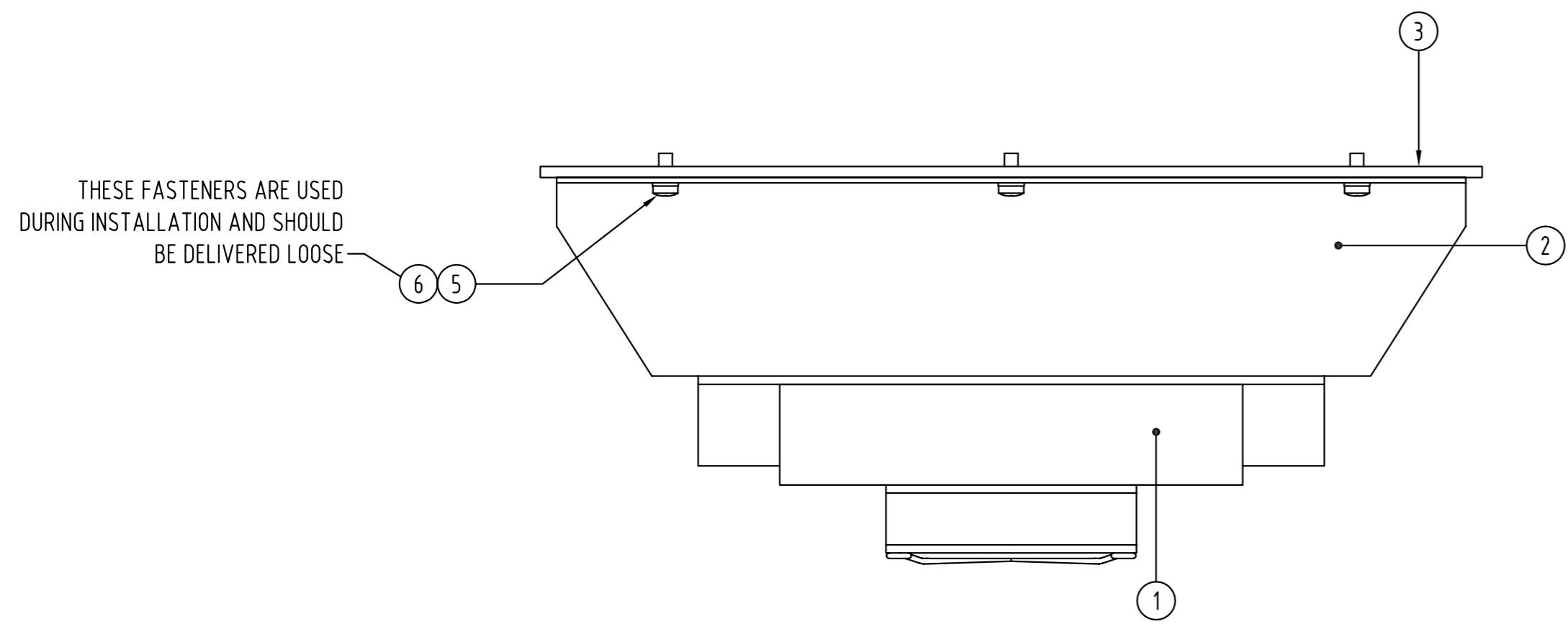
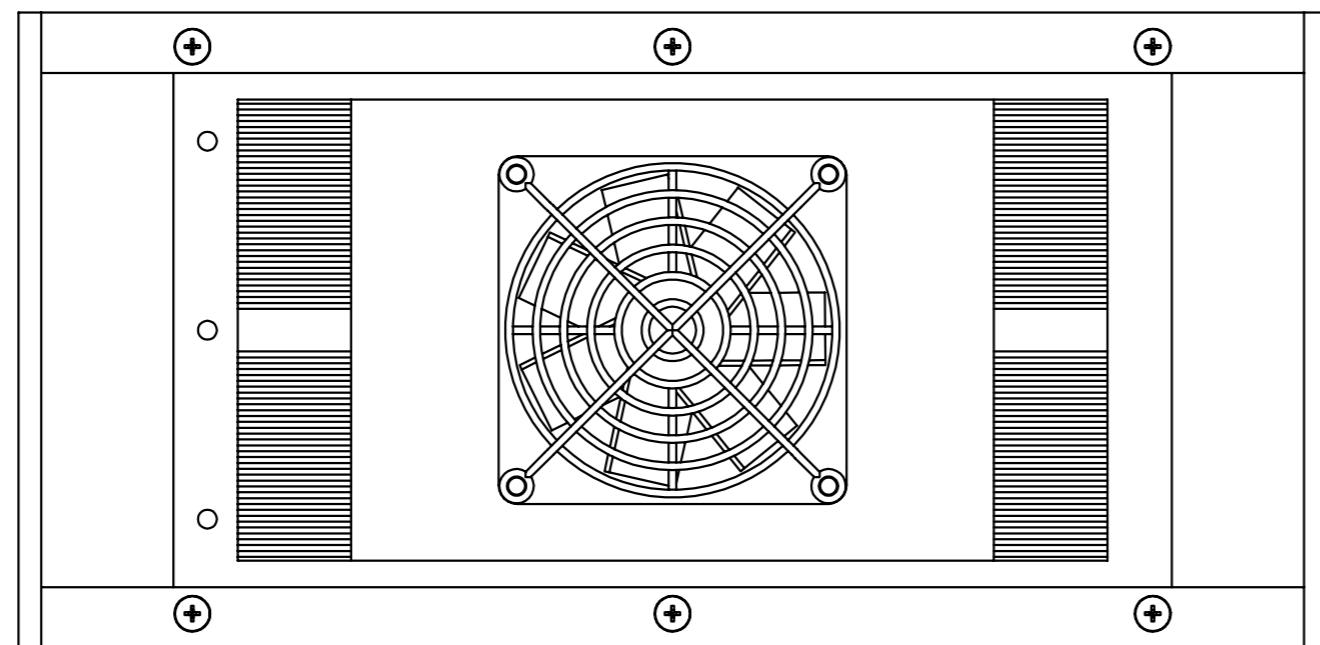
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	4	WIRE, UL1007/1569, AWG 20, BLACK						
2	4	WIRE, UL1007/1569, AWG 20, RED						
3	4	CRIMP LUG, H 2x0.5						
4	4	WIRE MARKERS, PARTEX PA02						
5	4	CRIMP LUG, H 0.5/14						
K73-K74	2	COOLING UNIT	SG590553-100-01					
6	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K73					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN
7	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K74					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN

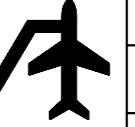


## COMPONENT PLACEMENT IN DOCKING GUIDANCE UNIT



C	Cable changed	2011.01.24	A.S.			MALMO, SWEDEN						
B	Drawing and BOM changed	2011.11.17	A.S.			Drawn by: G.O.	Date drawn: 2005.08.17	Checked by:				
A	Connection for K73 and K74 changed	2005.09.14	G.O.			App. by:	Date approved:	Project No.:	Drawing No. SG590543-001-01	Rev. C	Sheet 1 of 1	Scale
Revision	Description	Date	Drawn by:	Checked by:	Approved							



<b>SAFEGATE</b>  <b>G R O U P</b>			Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges
Safegate International AB MALMÖ, SWEDEN			Weight	
<b>COOLING UNIT FOR SAFEDOCK 3 SEE SG590543-100-02 FOR PARTS LIST</b>				
Drawn by: G.O.	Date drawn: 2005.11.15	Checked by:		
App. by:	Date approved:	Project No.:	Drawing No. SG590553-100-01	Rev. Sheet Scale 1 of 1 1:2

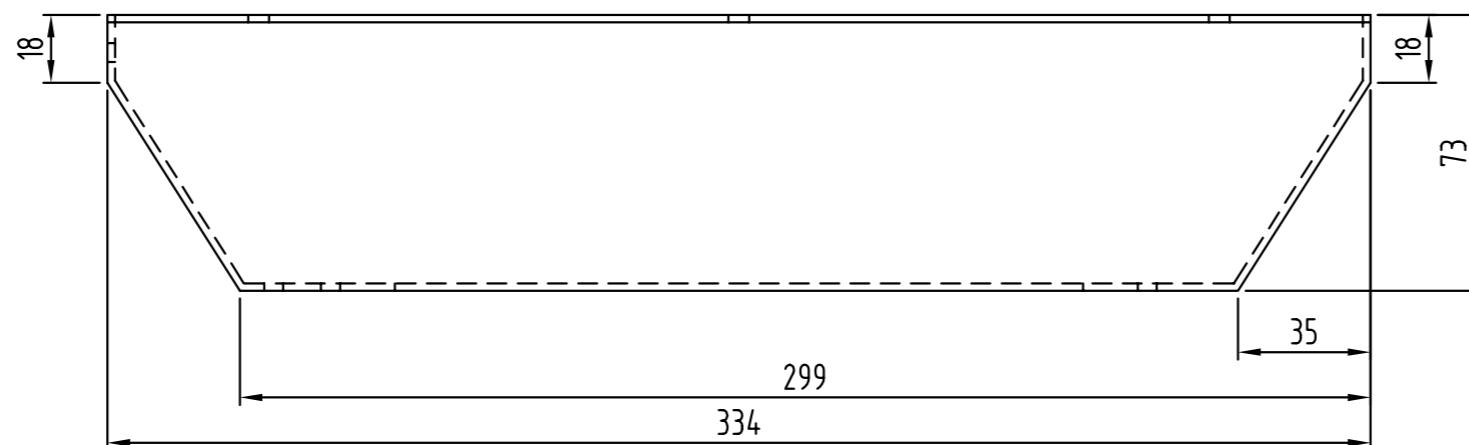
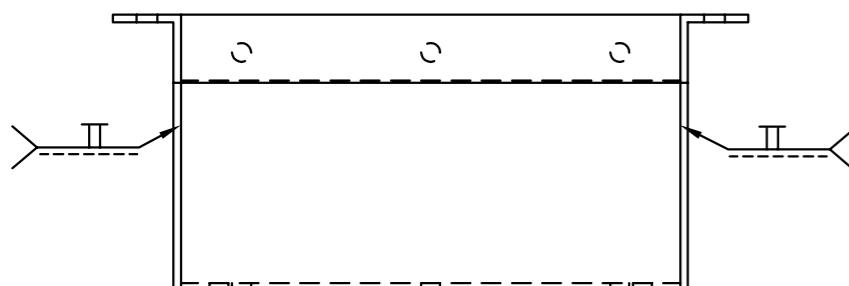
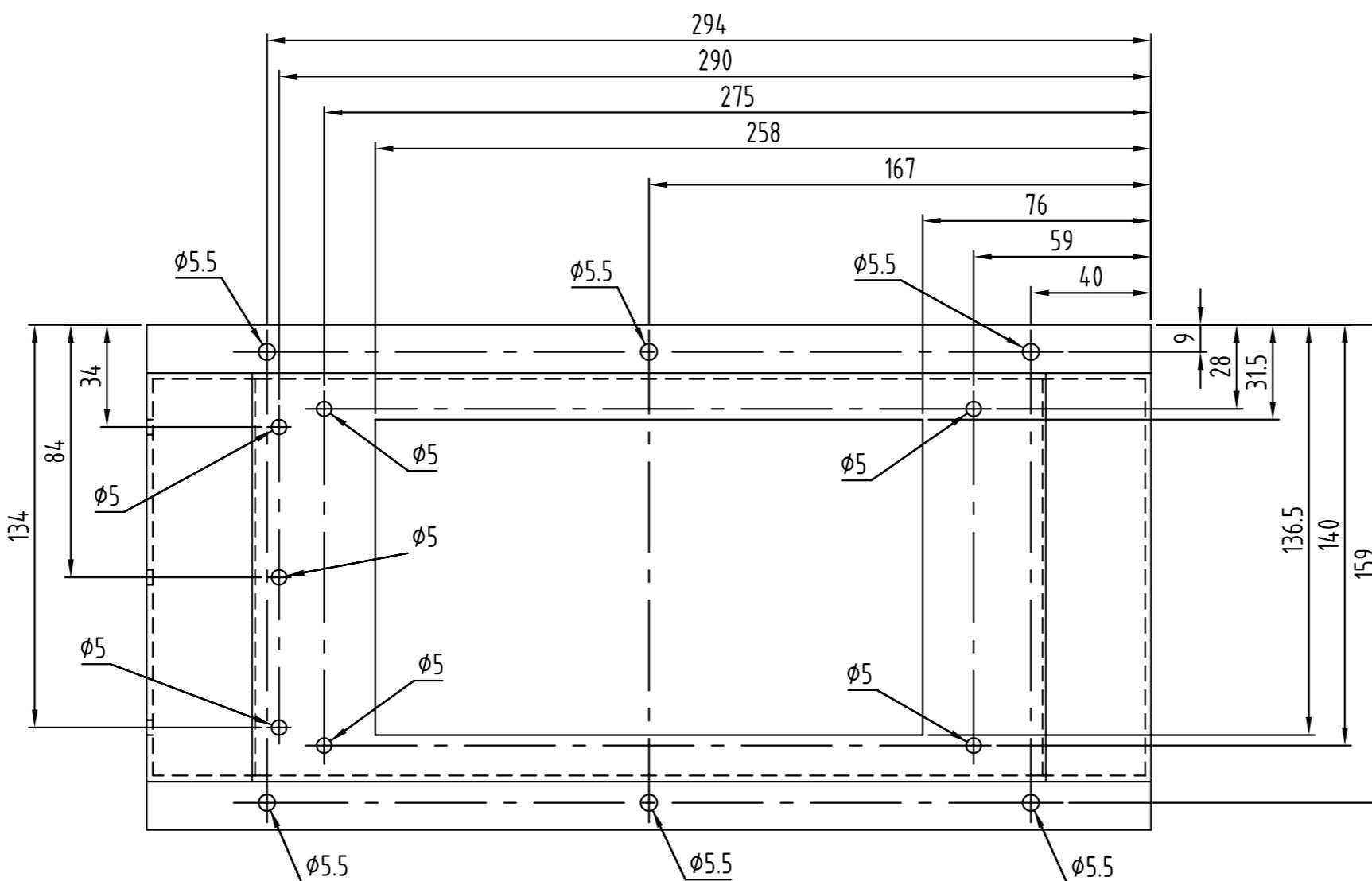
# SG590553-100-02

## COOLING UNIT, FOR SAFEDOCK 3

### REVISIONS

COMPONENT AND PARTS LIST FOR SG590553-100-01								
POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFE GATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART NO.	SUPPLIER
1	1	THERMOELECTRIC COOLER, 24 V, 58W AIR TO AIR			AA-060-24-23-00-10	SUPERCOOL AB, SWEDEN	AA-060-24-23-00-10	SUPERCOOL AB, SWEDEN
2	1	COOING UNIT COVER	SG590553-200-01					
3	1	GASKET	SG590553-201-01					
4	1	FILTER	SG590553-202-01					
5	6	SCREW, DIN-7985, M5x16, STAINLESS STEEL						
6	6	LOCKWASHER, DIN 127B, 5.1x9.2x1.2, STAINLESS STEEL						
7	4	SCREW, DIN-7985, M4x12, STAINLESS STEEL						
8	4	LOCKWASHER, DIN 127B, 4.1x7.6x0.9, STAINLESS STEEL						
9		SPRAY ADHESIVE, TYPE 76 (See Note)			3M			

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
		ALUMINUM SHEET, EN1050-14, $t = 2$						



<b>SAFEGATE</b>  G R O U P			Unless otherwise indicated, all tolerances are according to ISO-2768-m Sharp Edges R = 0.5		
Safegate International AB MALMÖ, SWEDEN			Surface Coating Weight		
COVER FOR SUPERCOOLER FOR SUPERCOOLER FOR SAFEDOCK 3					
Drawn by: G.O.	Date drawn: 2005.11.15	Checked by: 	App. by:	Date approved:	Project No.:
			Drawing No. SG590553-200-01	Rev. A	Sheet 1 of 1
			Scale 1:2		

A PAINT NOTE CHANGED

Revision Description

2006.03.10 G.O.

Date Drawn by Checked by Approved

Drawn by: Date drawn: G.O. 2005.11.15

App. by Date approved: Project No.:

Drawing No. SG590553-200-01

Rev. A

Sheet 1 of 1

Scale 1:2

#### PAINT NOTES:

PAINT: POWDER PAINT

INTERPON D2000, COLOR: VENUS OR

INTERPON 810, RAL COLORS

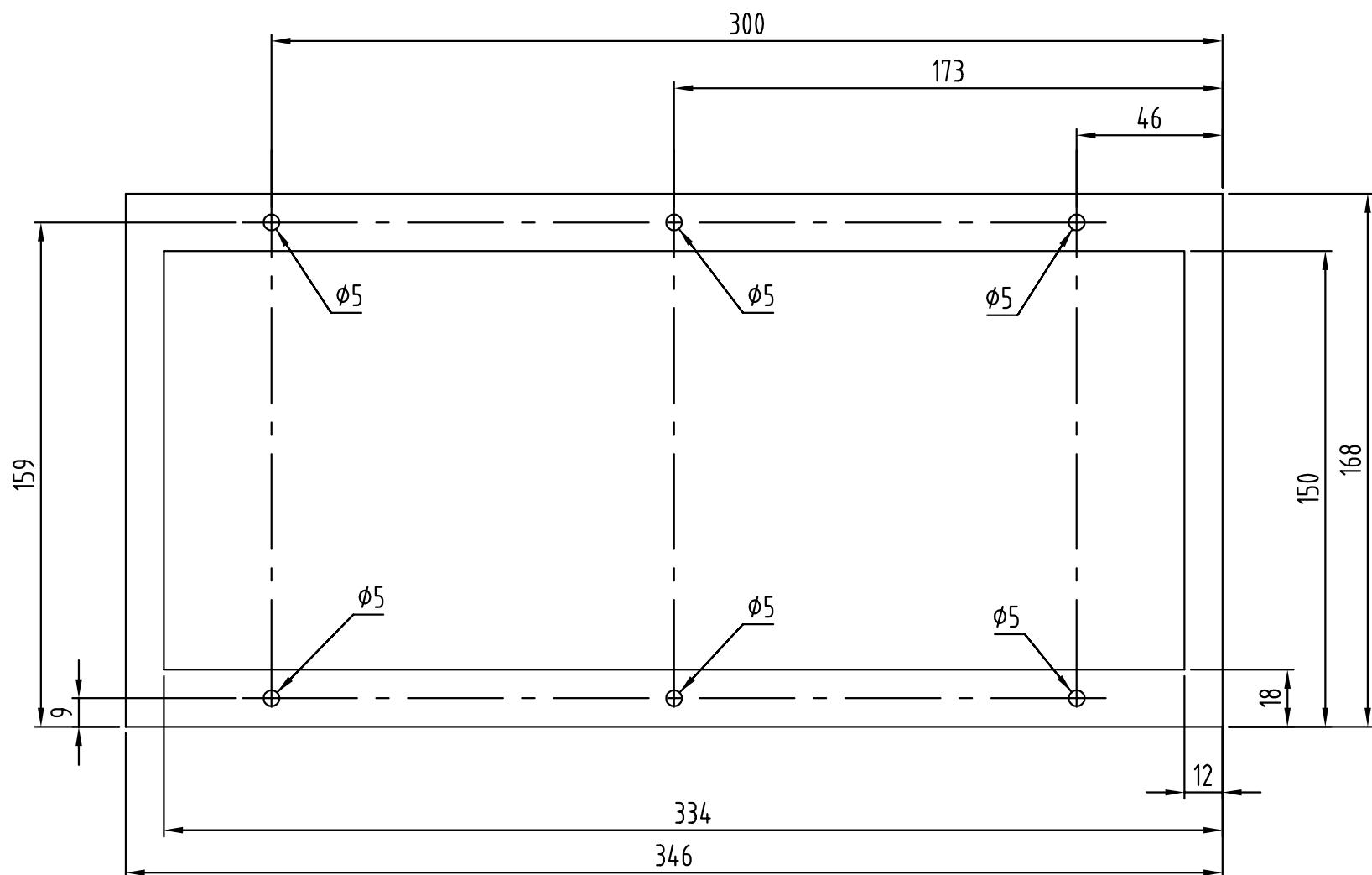
COLOR SPECIFIED WITH ORDER

MANUFACTURER: AKZO NOBEL POWDER COATINGS

BEFORE PAINTING, THE PART SHALL BE COATED  
WITH BONDERITE NT CONVERSION COATING.

APPLICATION OF THE CONVERSION COAT SHALL  
FOLLOW THE PRETREATMENT PROCESS SPECIFIED  
BY THE CONVERSION COATING MANUFACTURER,  
HENKEL TECHNOLOGIES.

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
		FOAM RUBBER, CLOSED CELL EPDM-SBR, $t = 4$		1722		NATIONAL GUMMI, SWEDEN	1722	NATIONAL GUMMI, SWEDEN



Safegate International AB  
MALMÖ, SWEDEN

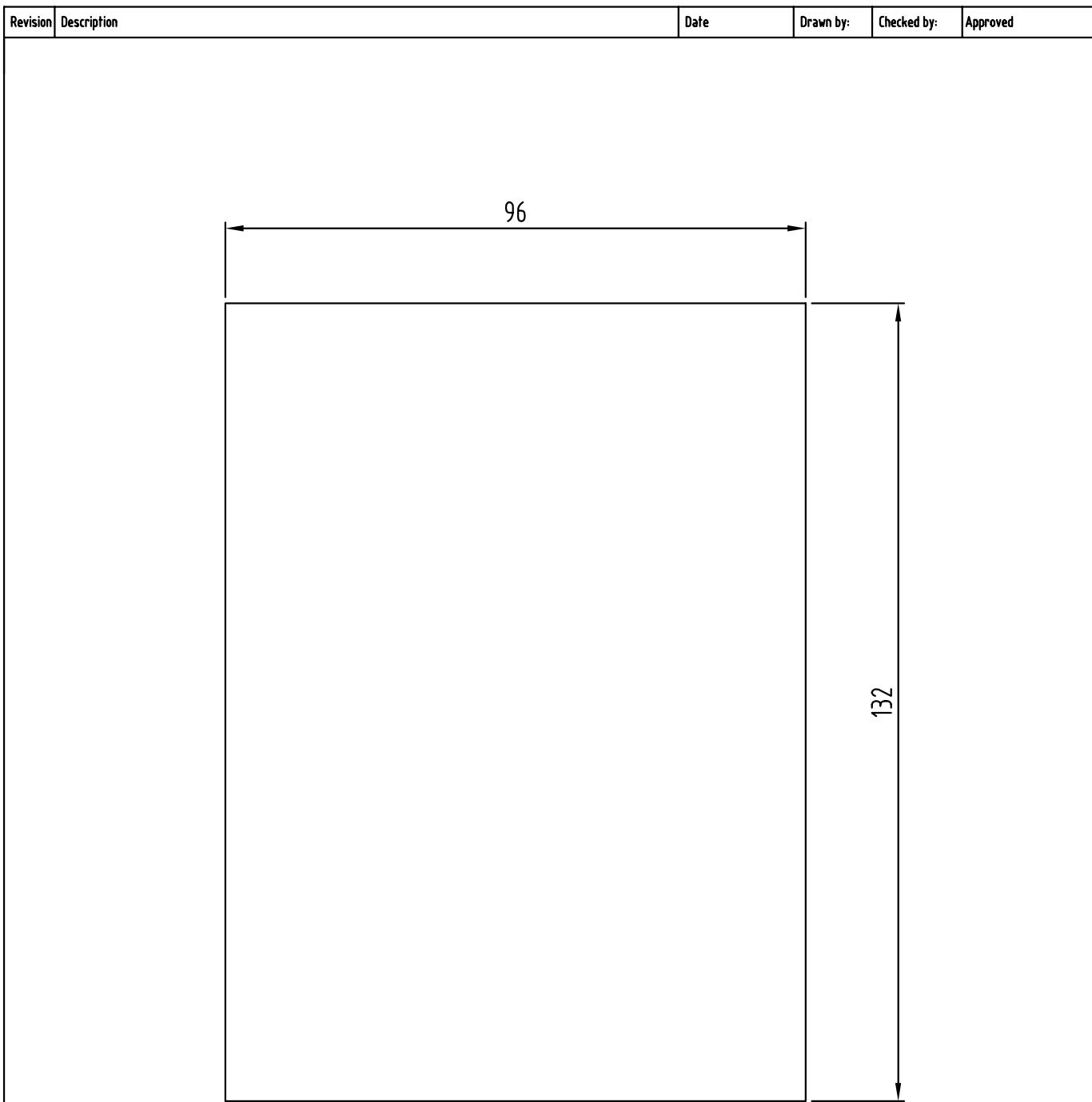
Unless otherwise indicated, all tolerances are according to ISO-2768-m Sharp Edges  
Surface Coating Weight

GASKET  
SUPERCOOLER COVER, FOR SDK3

Drawn by: G.O. Date drawn: 2005.11.15 Checked by:

App. by: Date approved: Project No.:

Drawing No. SG590553-201-01 Rev. 1 of 1 Sheet 1 of 1 Scale 1:1



MANUFACTURER:  
RITTAL SCANDINAVIA AB  
PACKAGE OF 5  
SIZE: 176x176

		FILTER MATERIAL	SK3181.100		SEE NOTE
Item No	Qty.	Name	Description	Dimensions	Remark
		<b>SAFEGATE</b>	Unless otherwise indicated, all tolerances are according to	ISO-2768-C	Sharp Edges
		<b>G R O U P</b>	Surface Coating		Weight
		Safegate International AB MALMÖ, SWEDEN	FILTER COOLING UNIT, FOR SDK3		
Drawn by: G.O.	Date drawn: 2005.11.15	Checked by: 			
App. by:	Date approved:	Project No.:	Drawing No. SG590553-202-01	Rev.	Sheet 1 of 1
				Scale	1:1

# SG590559-000-01

## SCANNING ASSEMBLY WITH 24 V HEATER

### REVISIONS

B. Item M2's drawing number changed. Quantity of items 15 and 16 changed By: A.S., Date: 2012-01-17

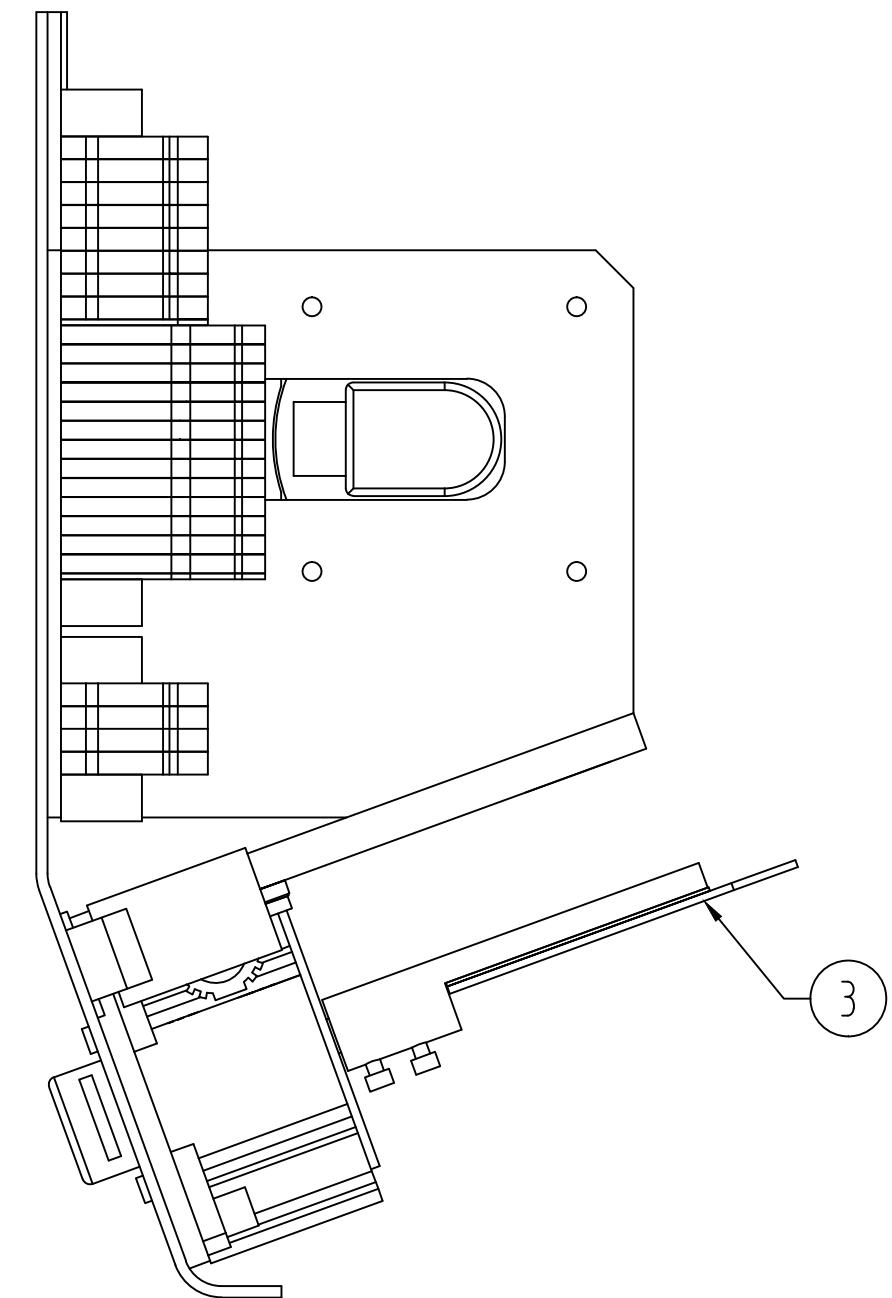
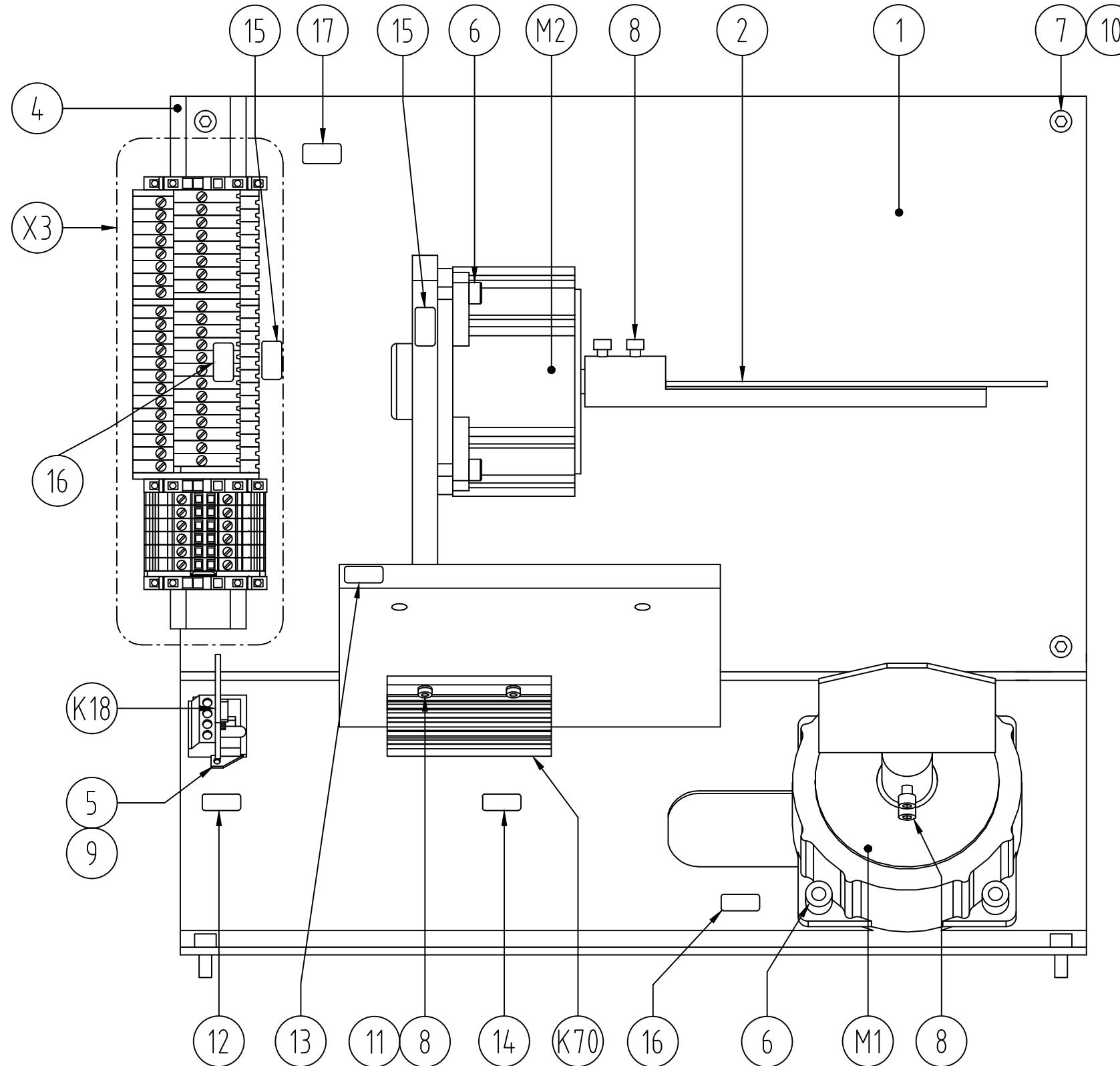
### ASSMBLY LEVEL DOCUMENT LIST

SG590559-000-01	PRODUCT CONFIGURATION FILE
SG590559-001-01	COMPONENT PLACEMENT
SG590559-004-01	CONNECTION DIAGRAM

### COMPONENT AND PARTS LIST

POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFE GATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART NO.	SUPPLIER
K18	1	TEMPERATURE SENSOR	SG590137-000					
K70	1	HEATING ELEMENT	SG590512-001-01					
M1	1	HORIZONTAL SCANNING MOTOR	SG590559-101-01					
M2	1	VERTICAL SCANNING MOTOR	SG590559-101-01					
X3		CONNECTION HARDWARE AS FOLLOWS						
	20	UKK 3-MSTB-5,08		2770888	PHOENIX CONTACT, GERMANY	2770888	PHOENIX CONTACT, SWEDEN	
		TERMINAL MARKERS, ZB5,08, NO.S51, 52, 54 - 72		0809803	PHOENIX CONTACT, GERMANY	0809803	PHOENIX CONTACT, SWEDEN	
	1	UKK 3-MSTB-5,08-PE		1876615	PHOENIX CONTACT, GERMANY	1876615	PHOENIX CONTACT, SWEDEN	
		TERMINAL MARKER, ZB5,08, NO. 53		0809803	PHOENIX CONTACT, GERMANY	0809803	PHOENIX CONTACT, SWEDEN	
	6	UT 2,5		3044076	PHOENIX CONTACT, GERMANY	3044076	PHOENIX CONTACT, SWEDEN	
		TERMINAL MARKER, ZB5, NO.S 85 - 86, 91-94		1050017	PHOENIX CONTACT, GERMANY	1050017	PHOENIX CONTACT, SWEDEN	
	1	D-UKK 3-MSTB-5,08		2770891	PHOENIX CONTACT, GERMANY	2770891	PHOENIX CONTACT, SWEDEN	
	1	DP-UKK 3-MSTB-5,08		2770600	PHOENIX CONTACT, GERMANY	2770600	PHOENIX CONTACT, SWEDEN	
	1	DG-UKK 3-MSTB-5,08		2770613	PHOENIX CONTACT, GERMANY	2770613	PHOENIX CONTACT, SWEDEN	
	1	D-UT 2,5/10		3047028	PHOENIX CONTACT, GERMANY	3047028	PHOENIX CONTACT, SWEDEN	
	3	CLIPFIX 35-5		1201442	PHOENIX CONTACT, GERMANY	1201442	PHOENIX CONTACT, SWEDEN	
1	1	MOUNTING FIXTURE	AT 601462					
2	1	LARGE SCANNING MIRROR	AT 606323					
3	1	SMALL SCANNING MIRROR	AT 600794					
4	1	DIN MOUNTING RAIL, NX 35/7,5-AL, L = 215		0801704	PHOENIX CONTACT, GERMANY	0801704	PHOENIX CONTACT, SWEDEN	
5	1	TERMINAL BLOCK, MSTBU 2,5/4-STD-5,08		1824146	PHOENIX CONTACT, GERMANY	1824146	PHOENIX CONTACT, SWEDEN	
6	8	SCREW, ALLEN HEAD, ISO 4762, M5 x 20H						
7	6	SCREW, ISO 4762, M5x12, ZINC PLATED						
8	8	SCREW, ISO 4762, M4x8H, ZINC PLATED						
9	2	SCREW, ISO 7045, M2x6H, ZINK PLATED						

POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFE GATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART NO.	SUPPLIER
10	6	LOCK WASHER, DIN 127, 9.2x5.1x1.2, ZINC PLATED						
11	4	LOCK WASHER, DIN 127, 7.6x4.1x0.9						
12	1	LABEL, YELLOW, Text: K18, 15x8					21302G	TECHNOTRADE SWEDEN
13	1	LABEL, YELLOW, Text: K19, 15x8					21302G	TECHNOTRADE SWEDEN
14	1	LABEL, YELLOW, Text: K70, 15x8					21302G	TECHNOTRADE SWEDEN
15	2	LABEL, YELLOW, Text: M1, 15x8					21302G	TECHNOTRADE SWEDEN
16	2	LABEL, YELLOW, Text: M2, 15x8					21302G	TECHNOTRADE SWEDEN
17	1	LABEL, YELLOW, Text: X3, 15x8					21302G	TECHNOTRADE SWEDEN



**SAFE GATE**  
G R O U P

Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to  
Surface Coating

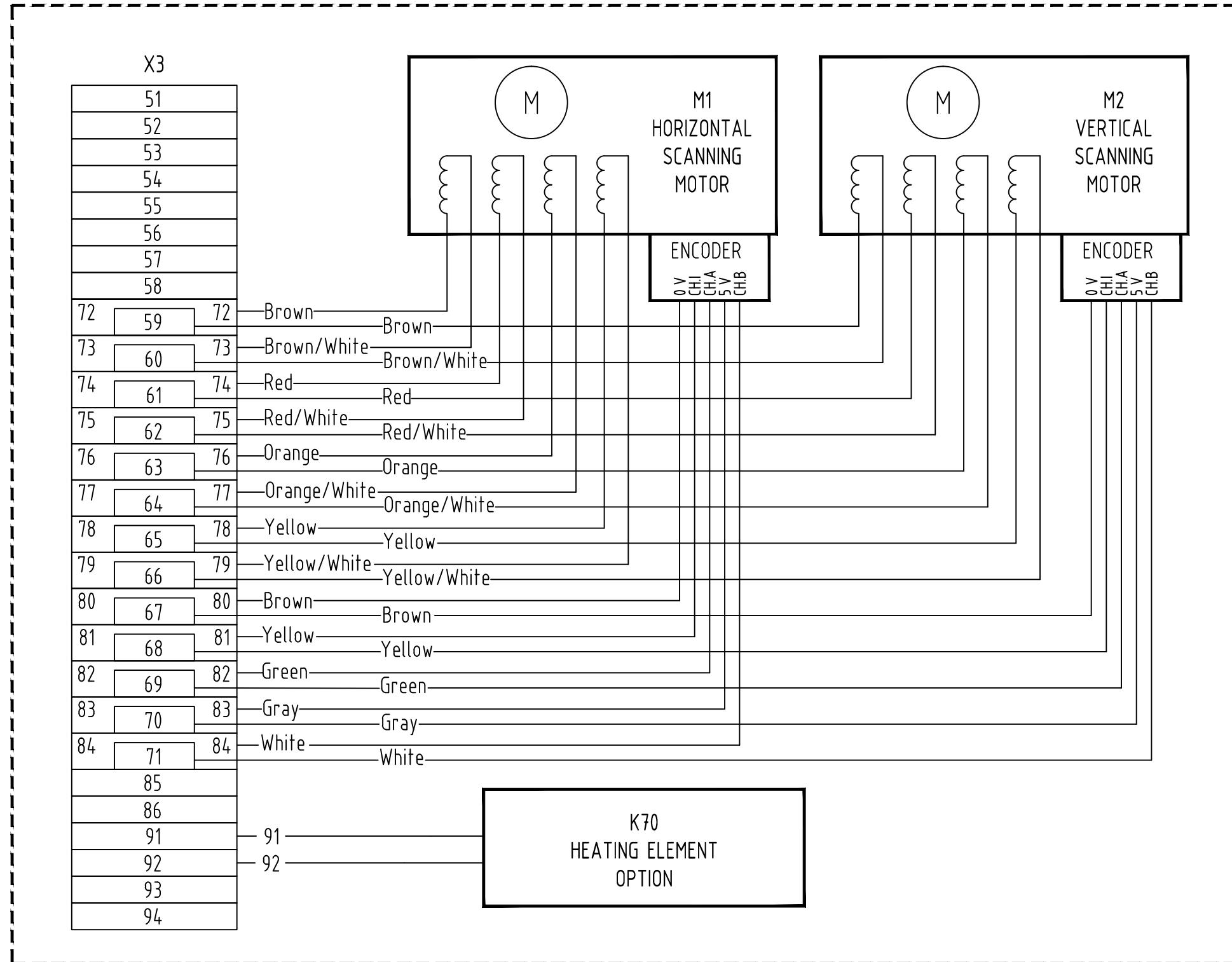
Sharp Edges  
Weight

### SCANNING ASSEMBLY WITH 24 V HEATER

FOR CONNECTION DIAGRAM SEE SG590559-004-01  
COMPONENT AND PARTS PLACEMENT

Drawn by:	Date drawn:	Checked by:		
G.O.	2006.05.10			
App. by:	Date approved:	Project No.:		
			Drawing No.	
			SG590559-001-01	Rev. A
			Sheet 1 of 1	Scale 1:2

A	Extra items 15 and 16 added	2012.01.17	A.S.		
Revision	Description	Date	Drawn by:	Checked by:	Approved



<b>SAFE GATE</b>		Unless otherwise indicated, all tolerances are according to	Sharp Edges
G R O U P		Surface Coating	Weight
SCANNING ASSEMBLY			
CONNECTION DIAGRAM			
Drawn by: G.O.	Date drawn: 2006.05.09	Checked by:	Sharp Edges
App. by:	Date approved:	Project No.:	Surface Coating
		Drawing No. SG590559-004-01	
Rev. A	Sheet 1 of 1	Scale	

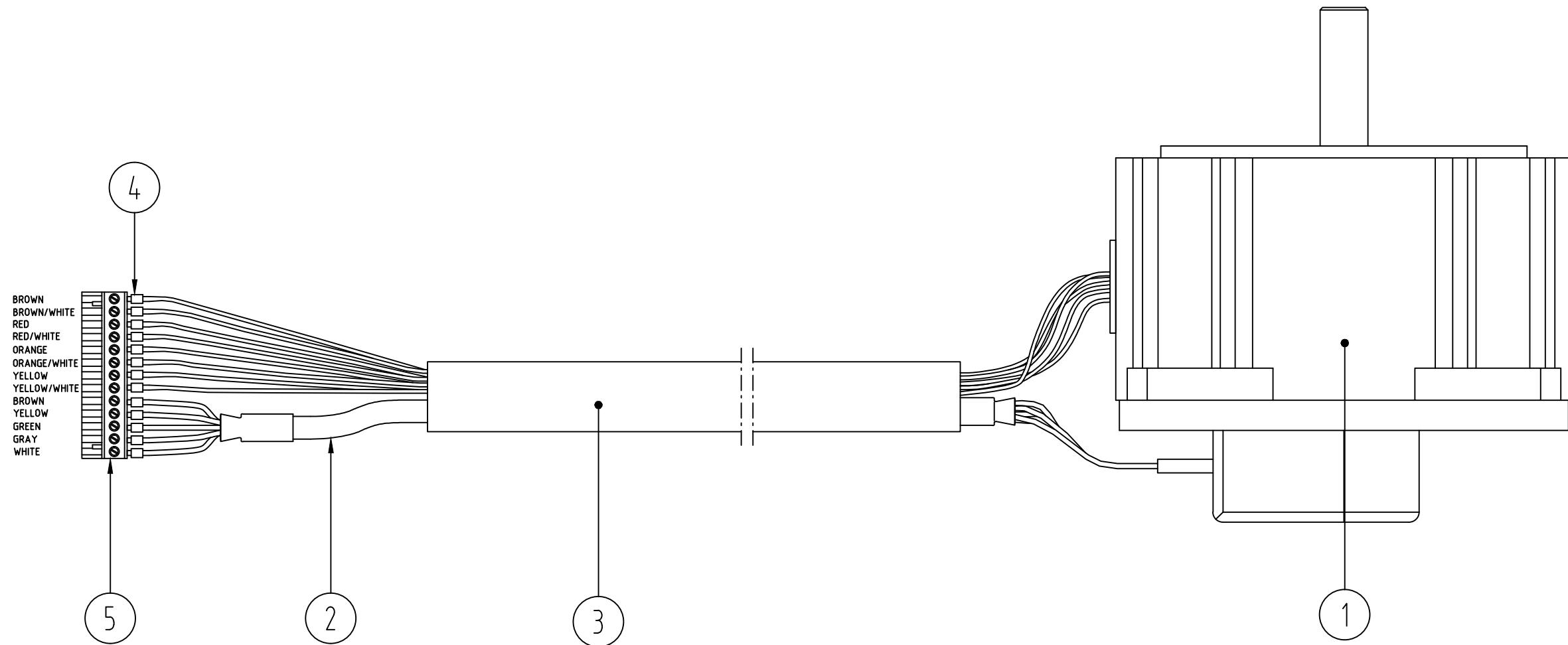
A Number replaced with color coding, K70 option added

Date 2012.01.17 A.S.

Drawn by: Checked by: Approved

Revision Description

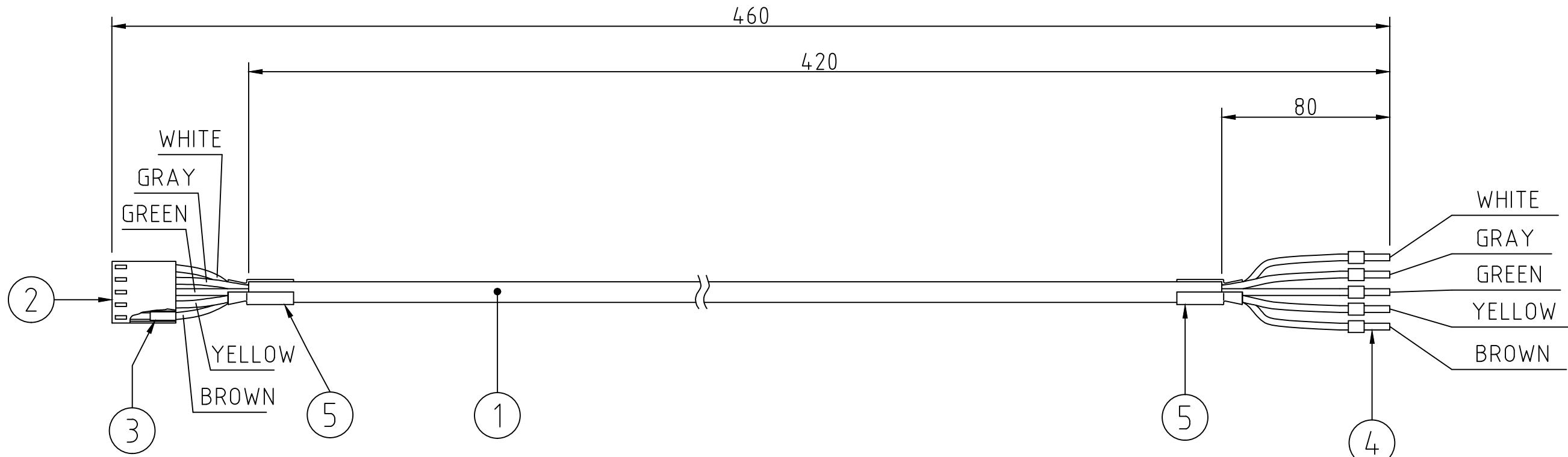
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	STEPPER MOTOR, P850			2014800002	ESCAP		
2	1	OPTICAL ENCODER CABLE	SG590559-201-01					
3	1	CABLE GUARD, L = 250 mm			SHR 08 - 6NB	RICHCO		
4	8	CRIMP TERMINAL					31-1348	BEJOKEN
5	1	CONTACT, MSTB2,5/13-ST-5,08			1757129	PHOENIX CONTACT		

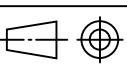


<b>SAFE GATE</b> <b>G R O U P</b>				Unless otherwise indicated, all tolerances are according to			Sharp Edges
				Surface Coating			Weight
SCANNING MOTOR							
Drawn by:	Date drawn:	Checked by:					
G.O.	2006.05.10						
App. by:	Date approved:	Project No.:					
				Drawing No.	Rev.	Sheet	Scale
				SG590559-101-01	A	1 of 1	1:1

A	Number for cable removed, BOM changed			2012.01.17	A.S		
Revision	Description			Date	Drawn by:	Checked by:	Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, LIYY 5X0X0.34mm <sup>2</sup>						
2	1	CONTACT			0-925366-5	AMP		
3	5	CRIMP TERMINAL			1-141708-1	AMP		
4	5	CRIMP TERMINAL					31-1348	BEJOKEN
5	2	SHRINK WRAP, L=20mm			55-070-25			ELFA



<b>SAFEgate</b> 		Unless otherwise indicated, all tolerances are according to		Sharp Edges
		Surface Coating		Weight
OPTICAL ENCODER CABLE T2/T3				
Drawn by:	Date drawn:	Checked by:		
A.S.	2012.01.17			
App. by:	Date approved:	Project No.:	Drawing No.	Rev.
			SG590559-201-01	Sheet A 1 of 1
Revision	Description	Date	Drawn by:	Approved
				Scale 1:1

A	Cable changed from 7 to 5 leads	2012.01.24	AS		
Revision	Description	Date	Drawn by:	Checked by:	Approved

# SG590560-000-01

## SCANNING ASSEMBLY

### REVISIONS

B. Item M2's drawing number changed. Quantity of items 15 and 16 changed By: A.S., Date: 2012-01-17

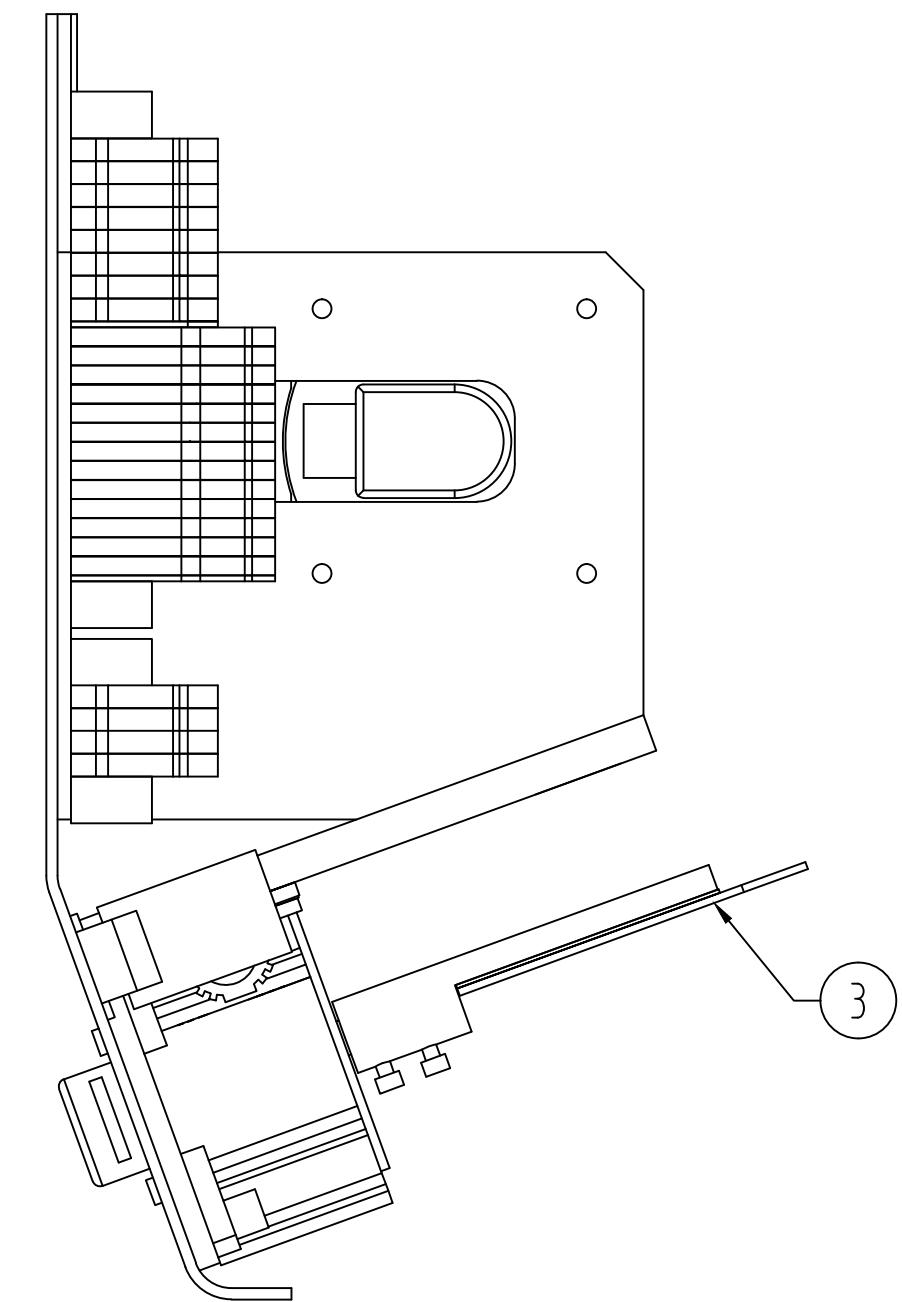
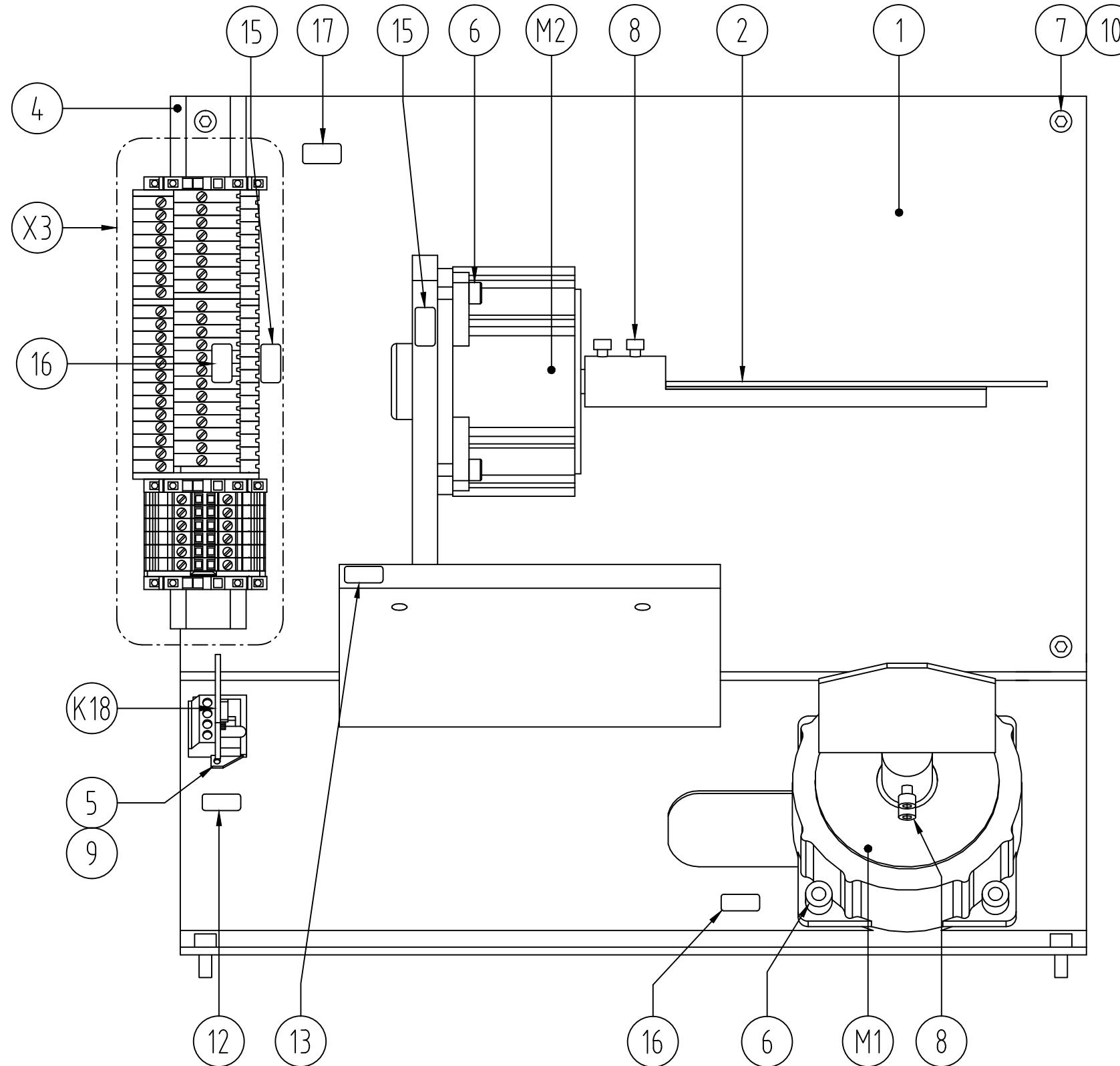
### ASSMBLY LEVEL DOCUMENT LIST

SG590560-000-01	PRODUCT CONFIGURATION FILE
SG590560-001-01	COMPONENT PLACEMENT
SG590560-004-01	CONNECTION DIAGRAM

### COMPONENT AND PARTS LIST

POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFE GATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART NO.	SUPPLIER
K18	1	TEMPERATURE SENSOR	SG590137-000					
M1	1	HORIZONTAL SCANNING MOTOR	SG590559-101-01					
M2	1	VERTICAL SCANNING MOTOR	SG590559-101-01					
X3		CONNECTION HARDWARE AS FOLLOWS						
	20	UKK 3-MSTB-5,08			2770888	PHOENIX CONTACT, GERMANY	2770888	PHOENIX CONTACT, SWEDEN
		TERMINAL MARKERS, ZB5,08, NO.S51, 52, 54 - 72			0809803	PHOENIX CONTACT, GERMANY	0809803	PHOENIX CONTACT, SWEDEN
	1	UKK 3-MSTB-5,08-PE			1876615	PHOENIX CONTACT, GERMANY	1876615	PHOENIX CONTACT, SWEDEN
		TERMINAL MARKER, ZB5,08, NO. 53			0809803	PHOENIX CONTACT, GERMANY	0809803	PHOENIX CONTACT, SWEDEN
	6	UT 2,5			3044076	PHOENIX CONTACT, GERMANY	3044076	PHOENIX CONTACT, SWEDEN
		TERMINAL MARKER, ZB5, NO.S 85 - 86, 91-94			1050017	PHOENIX CONTACT, GERMANY	1050017	PHOENIX CONTACT, SWEDEN
	1	D-UKK 3-MSTB-5,08			2770891	PHOENIX CONTACT, GERMANY	2770891	PHOENIX CONTACT, SWEDEN
	1	DP-UKK 3-MSTB-5,08			2770600	PHOENIX CONTACT, GERMANY	2770600	PHOENIX CONTACT, SWEDEN
	1	DG-UKK 3-MSTB-5,08			2770613	PHOENIX CONTACT, GERMANY	2770613	PHOENIX CONTACT, SWEDEN
	1	D-UT 2,5/10			3047028	PHOENIX CONTACT, GERMANY	3047028	PHOENIX CONTACT, SWEDEN
	3	CLIPFIX 35-5			1201442	PHOENIX CONTACT, GERMANY	1201442	PHOENIX CONTACT, SWEDEN
1	1	MOUNTING FIXTURE	AT 601462					
2	1	LARGE SCANNING MIRROR	AT 606323					
3	1	SMALL SCANNING MIRROR	AT 600794					
4	1	DIN MOUNTING RAIL, NX 35/7,5-AL, L = 215			0801704	PHOENIX CONTACT, GERMANY	0801704	PHOENIX CONTACT, SWEDEN
5	1	TERMINAL BLOCK, MSTBU 2,5/4-STD-5,08			1824146	PHOENIX CONTACT, GERMANY	1824146	PHOENIX CONTACT, SWEDEN
6	8	SCREW, ALLEN HEAD, ISO 4762, M5 x 20H						
7	6	SCREW, ISO 4762, M5x12, ZINC PLATED						
8	4	SCREW, ISO 4762, M4x8H, ZINC PLATED						
9	2	SCREW, ISO 7045, M2x6H, ZINK PLATED						
10	6	LOCK WASHER, DIN 127, 9.2x5.1x1.2, ZINC PLATED						

POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFE GATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART NO.	SUPPLIER
12	1	LABEL, YELLOW, Text: K18, 15x8					21302G	TECHNOTRADE SWEDEN
13	1	LABEL, YELLOW, Text: K19, 15x8					21302G	TECHNOTRADE SWEDEN
15	2	LABEL, YELLOW, Text:M1, 15x8					21302G	TECHNOTRADE SWEDEN
16	2	LABEL, YELLOW, Text:M2, 15x8					21302G	TECHNOTRADE SWEDEN
17	1	LABEL, YELLOW, Text: X3, 15x8					21302G	TECHNOTRADE SWEDEN



**SAFE GATE**  
G R O U P

Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to  
Surface Coating

Sharp Edges  
Weight

### SCANNING ASSEMBLY

FOR CONNECTION DIAGRAM SEE SG590559-004-01  
COMPONENT AND PARTS PLACEMENT

Drawn by:	Date drawn:	Checked by:		Sharp Edges
G.O.	2006.05.10			
<b>SCANNING ASSEMBLY</b>				
App. by:	Date approved:	Project No.:		Weight
Drawing No.				
SG590560-001-01	Rev. A	Sheet 1 of 1	Scale 1:2	

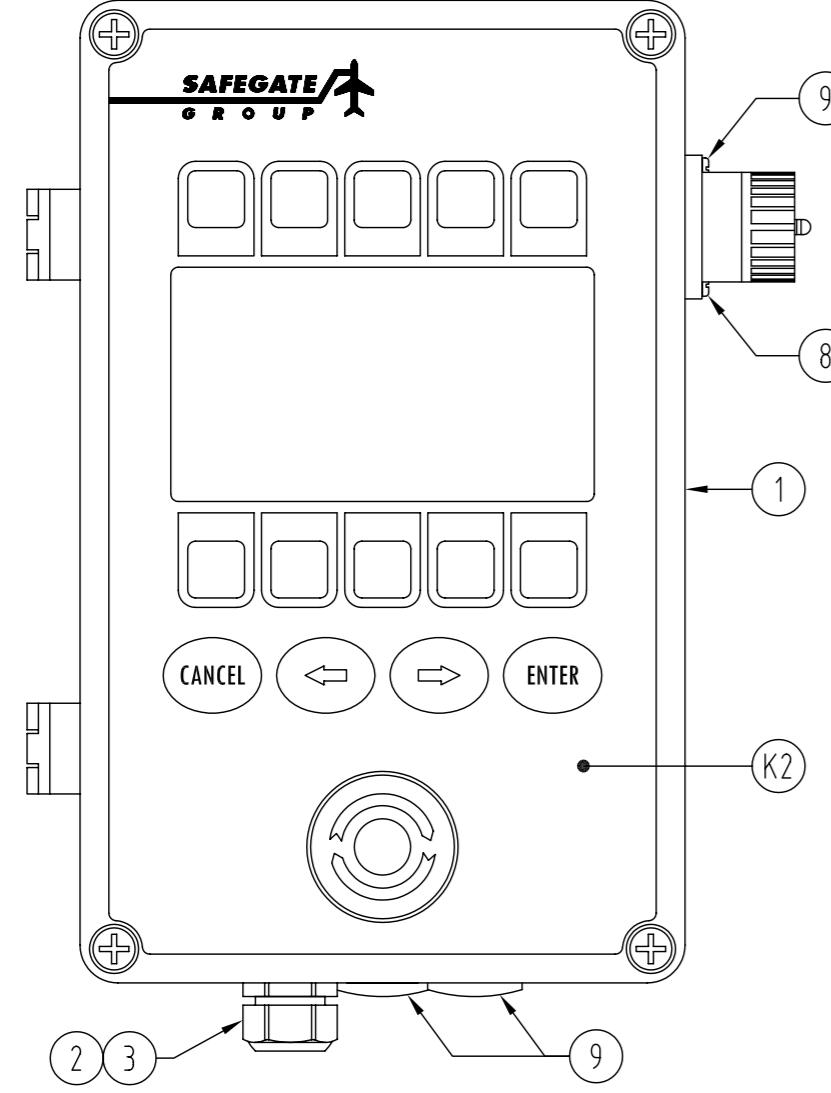
A	Extra items 15 and 16 added	2012.01.17	A.S.		
Revision	Description	Date	Drawn by:	Checked by:	Approved

## PRODUCT CONFIGURATION FILE,

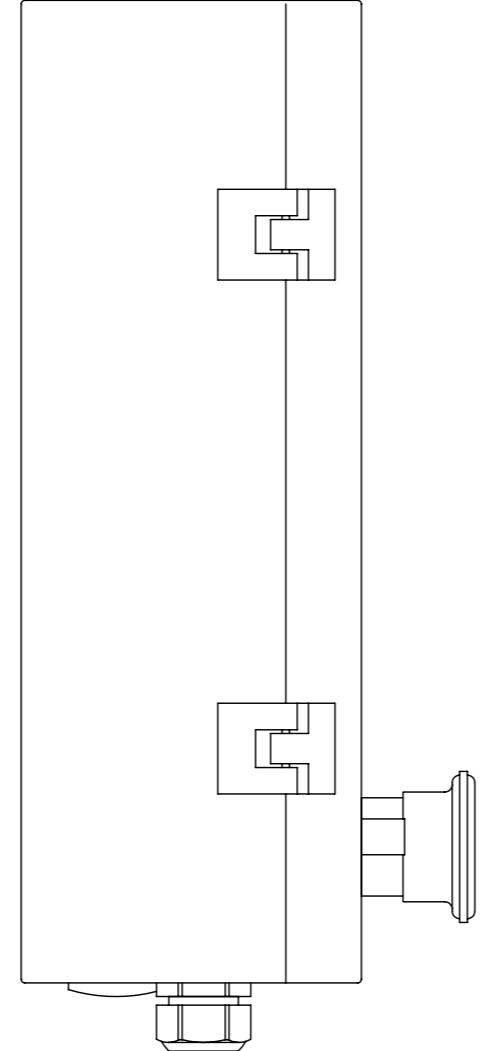
## REVISIONS

ASSMBLY LEVEL DOCUMENT LIST								
SG590577-000-01		PRODUCT CONFIGURATION FILE						
SG590577-001-01		ASSEMBLY AND CONNECTION DIAGRAM						
COMPONENT AND PARTS LIST								
POSITION	QUANTITY	DESCRIPTION/RATINGS	DRAWING NO.	SAFEGATE PROD. NO.	MANU. PART NO.	MANUFACTURER	SUPPLIER'S. PART	SUPPLIER
K1	1	CIRCUIT BOARD	SG590495-000-01					
K2	1	SOFT KEY TOUCH PAD			SAFEgate 8484	STEELGRAPH, SWEDEN		
P1	1	CONNECTOR, EITHER OF FOLLOWING						
		FEMALE CONNECTOR, CA3GD, 4 POLE			932321-100	HIRSCHMANN Electronics GmbH & Co. KG GERMANY	662279	BEJOKEN AB SWEDEN
		FEMALE CONNECTOR, C16-1 TYPE, 4 POLE			T3111-000	AMPHENOL GERMANY	4456158	ELFA SWEDEN
	1	PROTECTION CAP, EITHER OF FOLLOW						
		CA 00 SD 4			831531-100	HIRSCHMANN Electronics GmbH & Co. KG GERMANY	662285	BEJOKEN AB SWEDEN
		C16-1 TYPE			T6483-000	AMPHENOL GERMANY	4456455	ELFA SWEDEN
S1	1	EMERGENCY STOP SWITCH ASSEMBLY			XB4BS542	SCHNEIDER ELECTRIC, SWEDEN	XB4BS542	SCHNEIDER ELECTRIC, FRANCE
	1	NORMALLY OPEN CONTACT			ZBE-101	SCHNEIDER ELECTRIC, SWEDEN	ZBE-101	SCHNEIDER ELECTRIC, FRANCE
1	1	ALUMINIUM ENCLOSURE	SG590495-200-01					
2	1	CABLE GLAND			AHLSELL		14 761 13	AHLSELL, SWEDEN
3	1	JAM NUT			AHLSELL		14 765 33	AHLSELL, SWEDEN
4	4	STAND OFF, M3 X 20					DSS M3050X20	BIX, SWEDEN
5	4	SCREW, ISO 2009, M3 X 6, ZINC PLATED						
6	4	NUT, ISO 4032, M3						
7	4	WASHER, DIN 125, 3.2 X 6 X 0.5						
8	2	SCREW, ISO 1207, M3 X 10, STAINLESS STEEL						
9	2	PLUG, GRAY, POLYETHYLEN					1470181	AHLSELL, SWEDEN
10	1	SCREW, DIN 7985, M6 X12, ZINC PLATED						
11	1	QUICK TIE ANCHOR					55-033-13 see note	ELFA SWEDEN
12	1	QUICK TIE, 99x2.5					55-035-94 see note	ELFA SWEDEN
13	1	WIRING ASSEMBLY	SG590577-100-01					
---	1	WIRING MATERIALS						
		WIRE, H05V-K, 0.5 mm <sup>2</sup> , BLACK						
	8	CRIMP LUG, H 0.5/14			9026060000	WEIDMÜLLER, GERMANY	9026060000	WEIDMÜLLER, SWEDEN
	2	CABLE TIE, 71X1,8, BLACK				PANDUIT	55-028-02	ELFA, SWEDEN

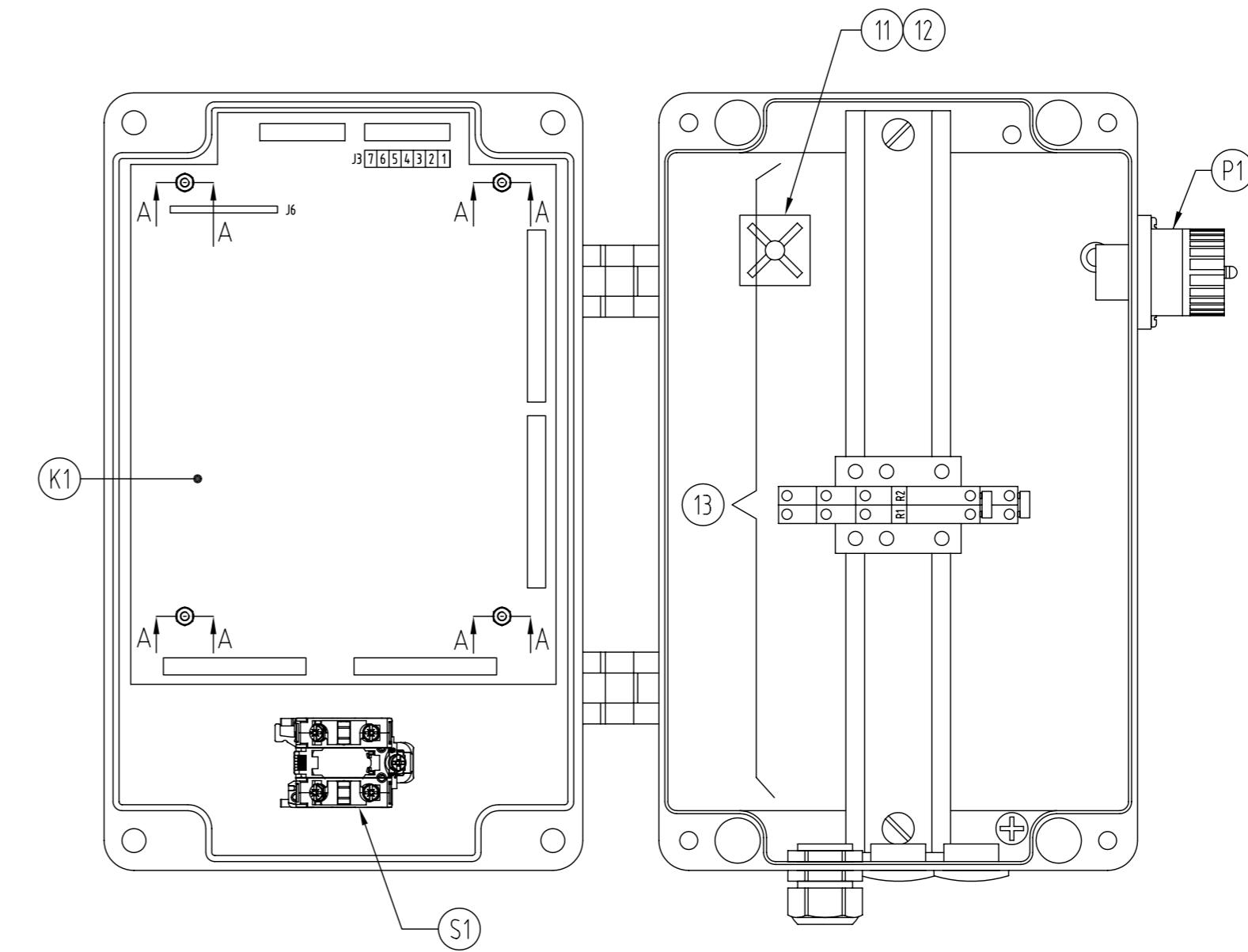
Note: Part number refers to package of 100 pcs.



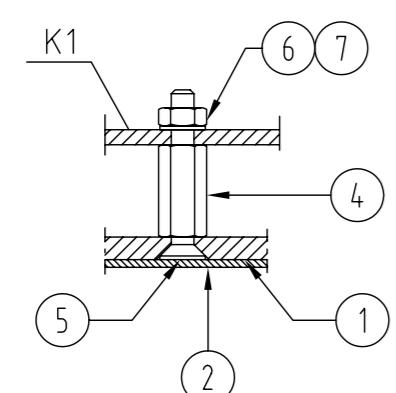
FRONT VIEW



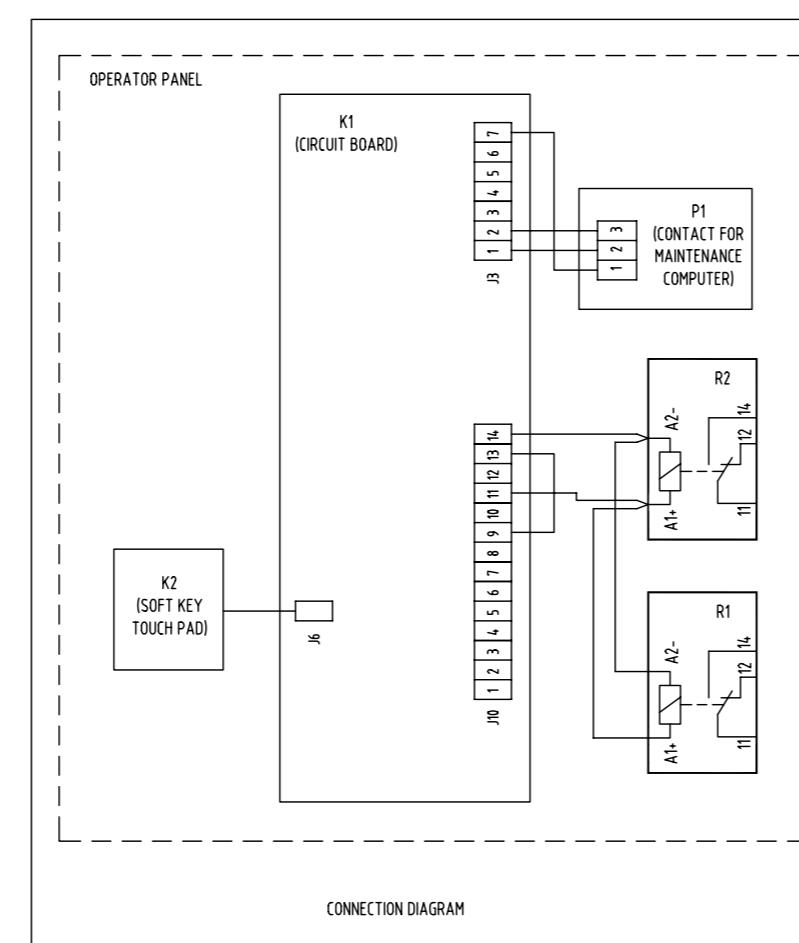
LEFT SIDE VIEW

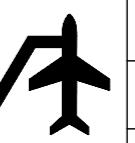


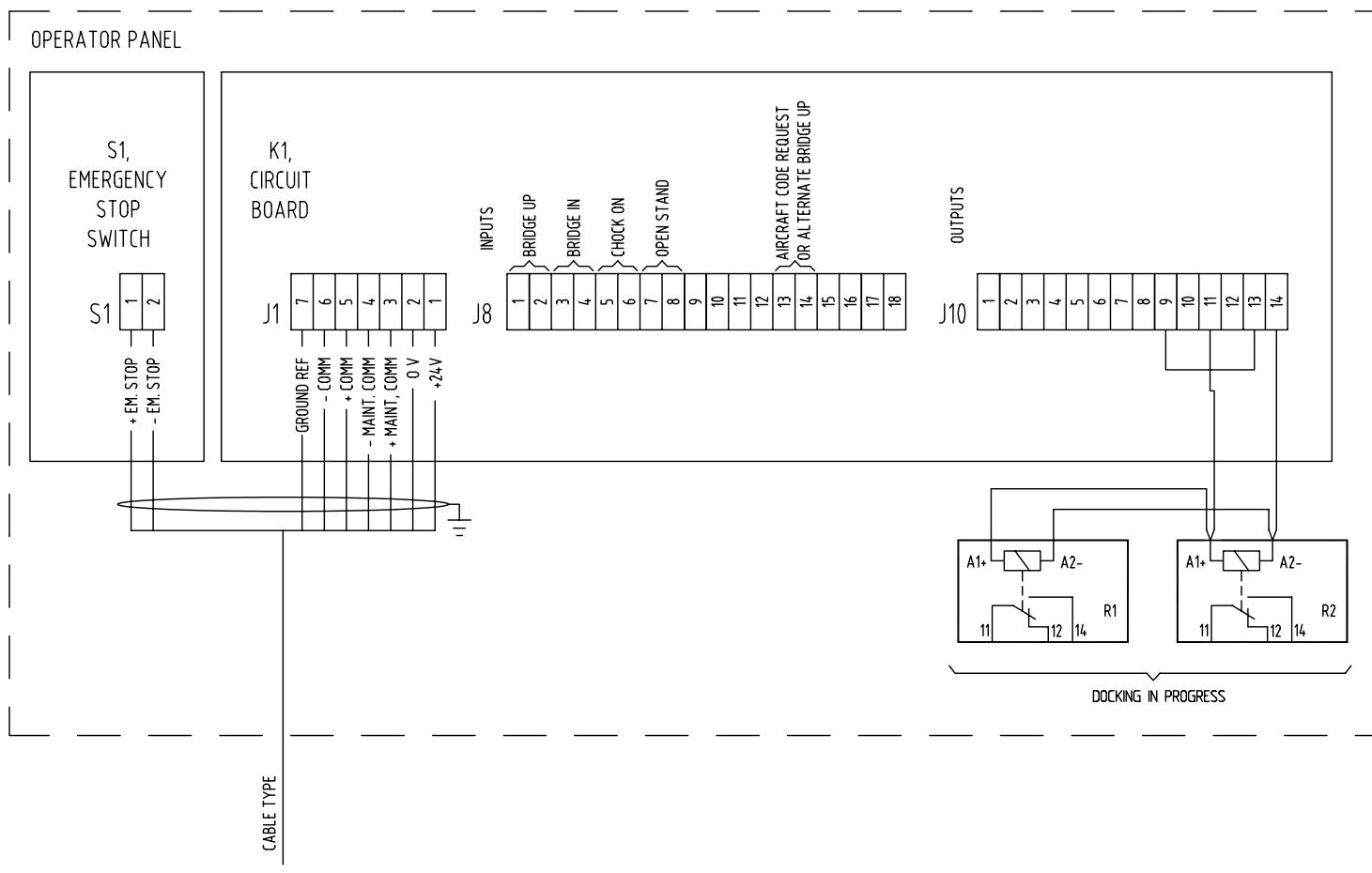
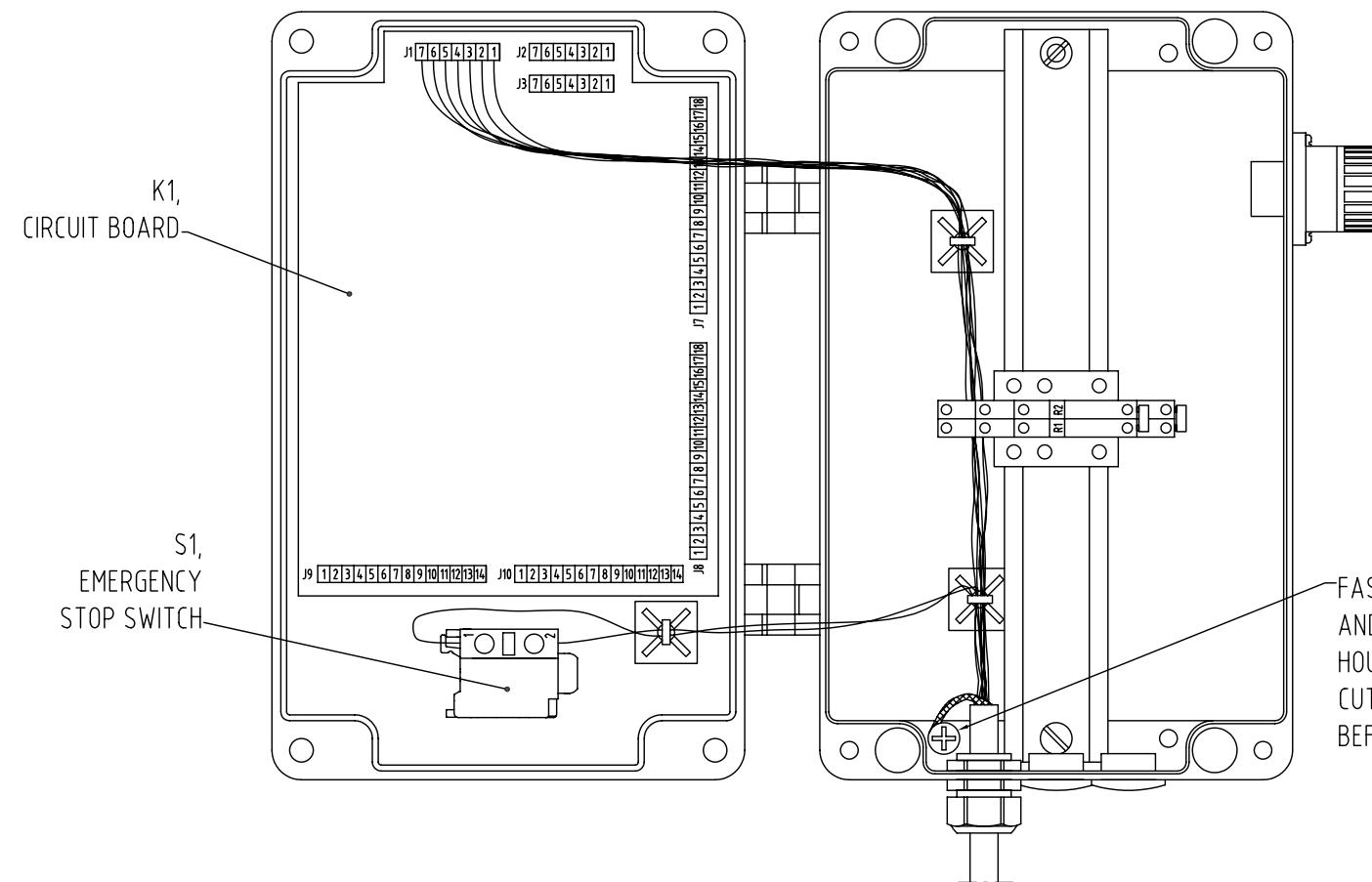
FRONT VIEW, HOUSING OPENED



SECTION A, SCALE 1:1



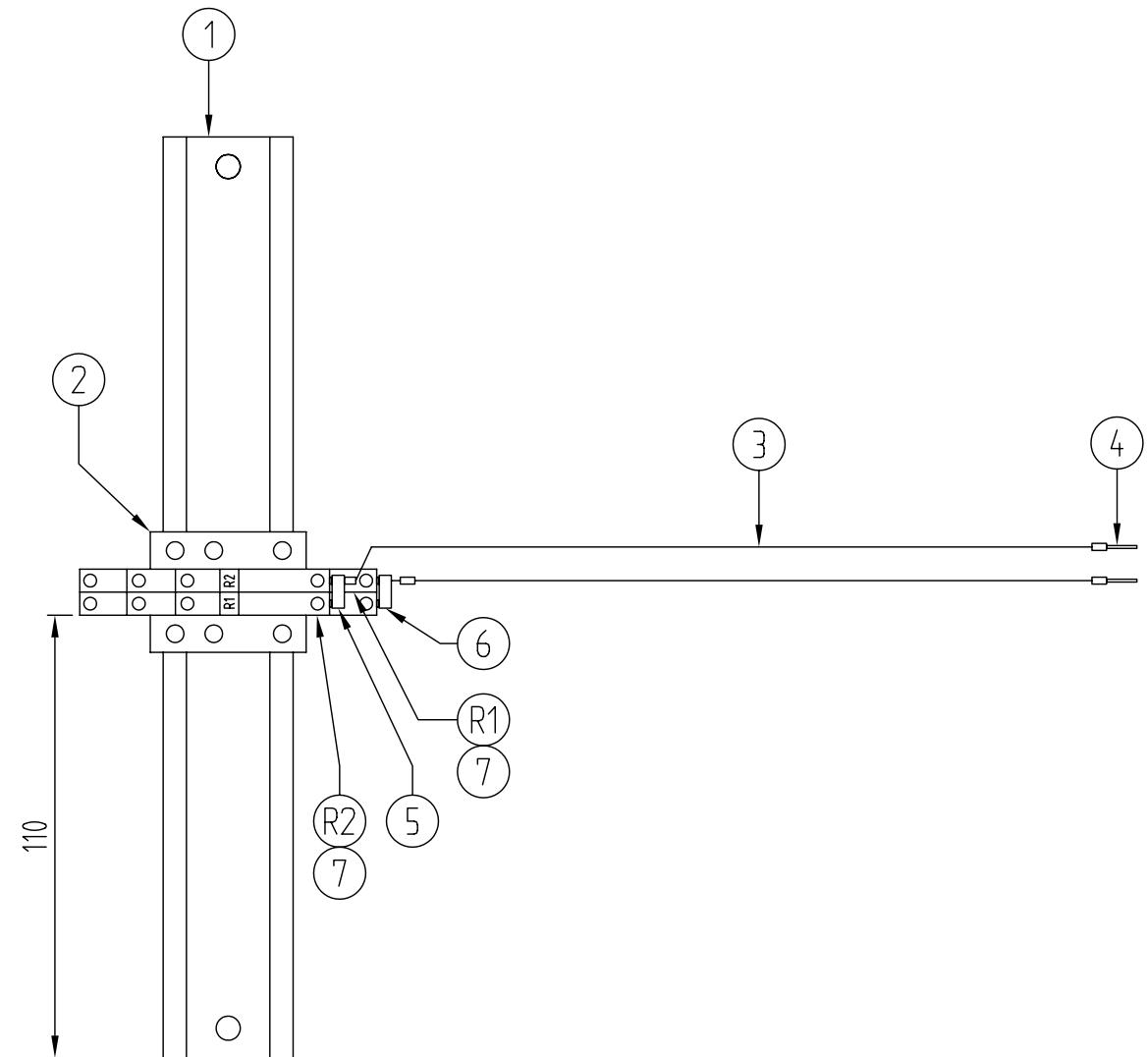
<b>SAFEGATE</b>  <b>G R O U P</b>			Unless otherwise indicated, all tolerances are according to Surface Coating			Sharp Edges			
SAFEGATE International AB MALMÖ, SWEDEN									
SOFT KEY OPERATOR PANEL WITH EXTRA RELAYS FOR DOCKING IN PROGRESS INDICATION									
Drawn by: G.O.	Date drawn: 2007.08.08	Checked by: 							
App. by:	Date approved:	Project No.:	Drawing No. SG590577-001-01	Rev.	Sheet	Scale 1 of 1			



OPERATOR PANEL, FRONT VIEW WITH COVER OPEN

<b>SAFE GATE</b> <b>G R O U P</b> Safegate International AB MALMÖ, SWEDEN				Unless otherwise indicated, all tolerances are according to		Sharp Edges			
Surface Coating				Weight					
<b>SOFT KEY OPERATOR PANEL</b> WITH EXTRA RELAYS FOR DOCKING IN PROGRESS INDICATION									
<b>INSTALLATION DIAGRAM</b>									
Drawn by: G.O.	Date drawn: 2007.08.08	Checked by:		App. by:	Date approved:	Project No.: Drawing No. SG590577-005-01			
Rev. 1 of 1	Sheet 1 of 1	Scale							

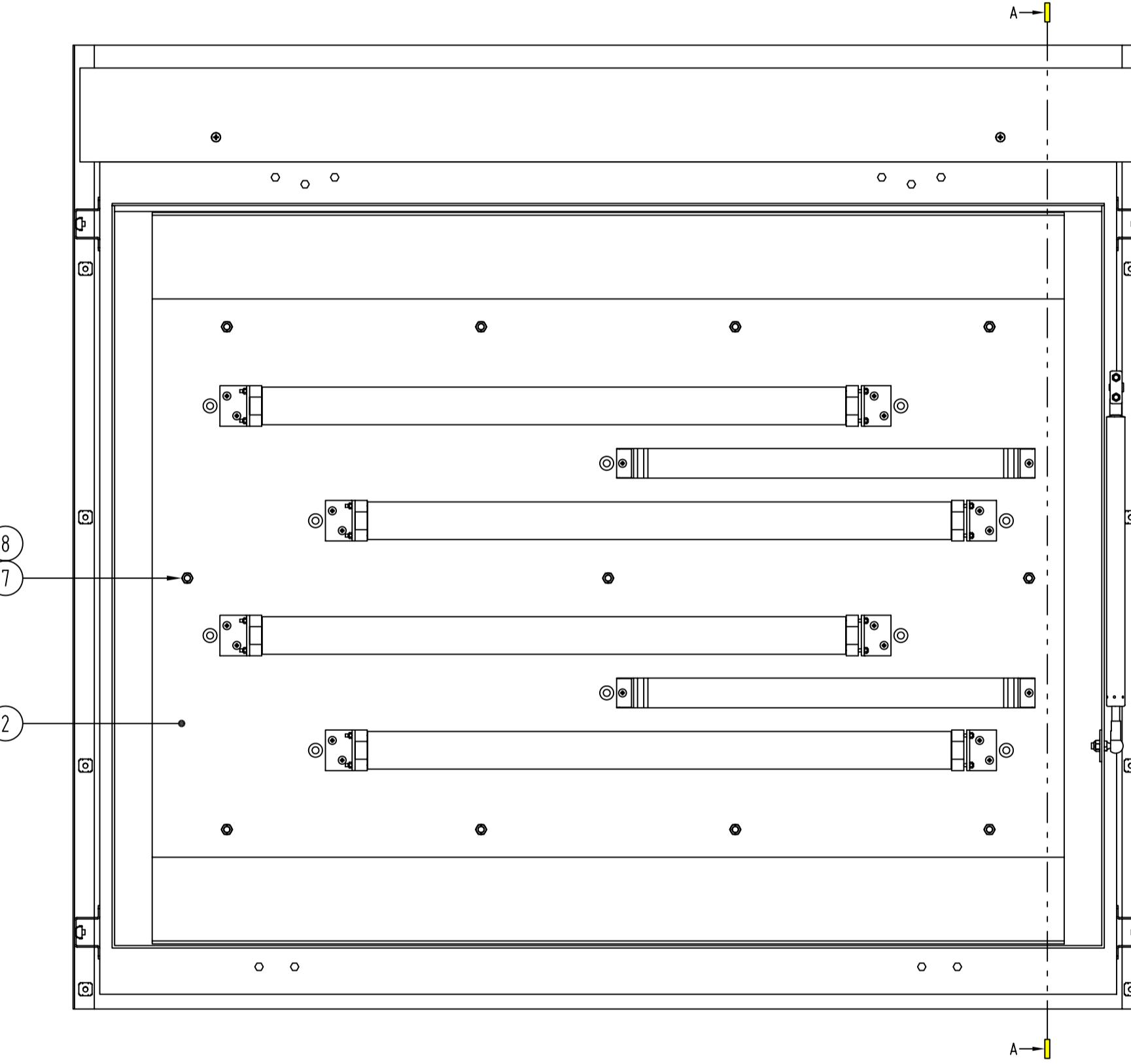
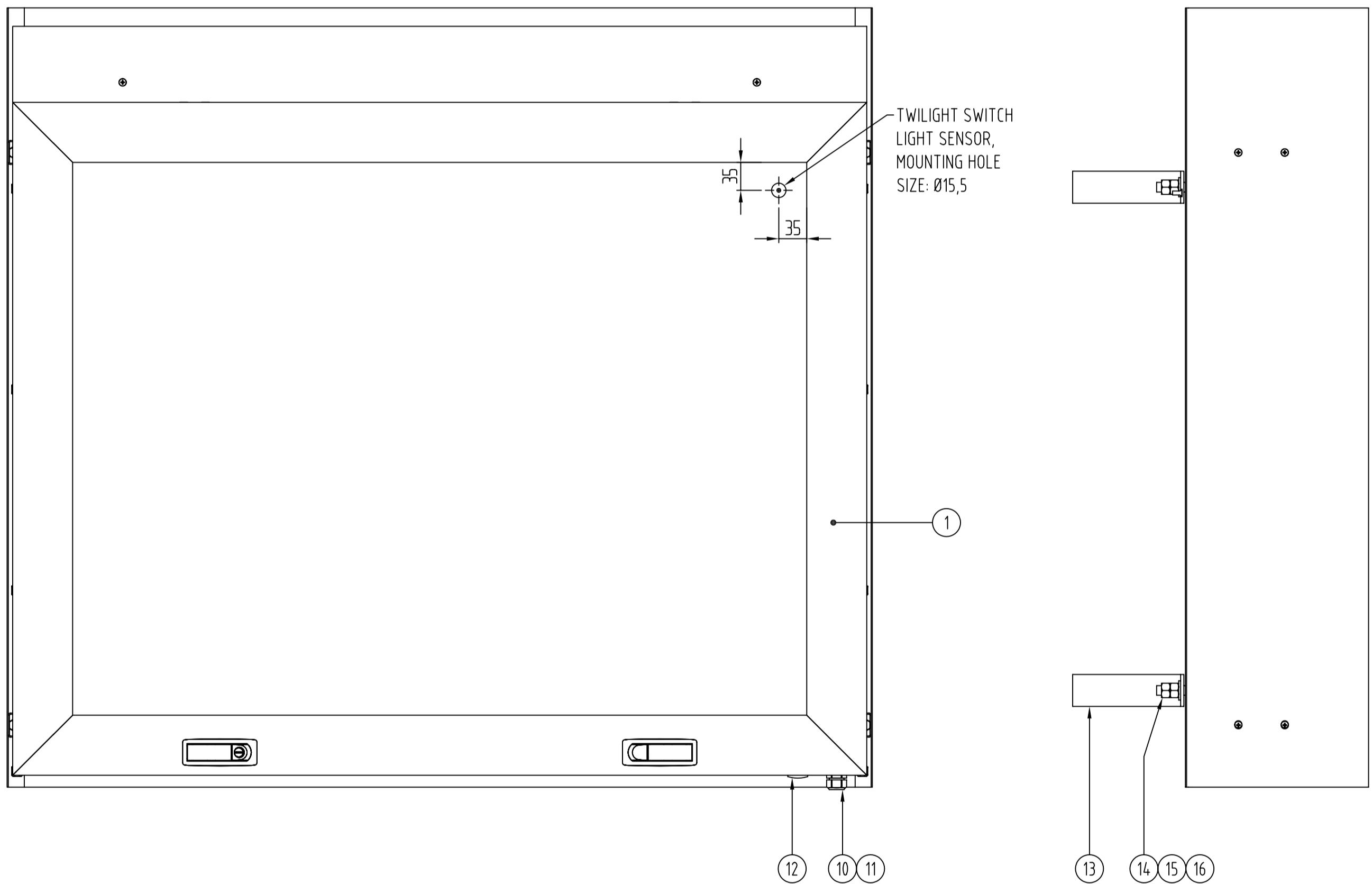
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
R1, R2	2	RELAY, DEK-REL-G24/21			2964500	PHOENIX CONTACT, GERMANY	2964500	PHOENIX CONTACT AB, SWEDEN
1	1	TERMINAL CONTACT MOUNTING RAIL	SG590418-202-01					
2	2	END STOP, E/UK			1201442	PHOENIX CONTACT, GERMANY	1201442	PHOENIX CONTACT AB, SWEDEN
3	2	WIRE, H05V-K, 0.5 mm <sup>2</sup> , BLACK, L = 350 mm						
4	4	CRIMP TERMINAL, H 0.5/14			902606000	WEIDMÜLLER GmbH & Co., GERMANY	0890800	SELGA, SWEDEN
5	1	JUMPER, 2 POLE, RED, EB 2-DIK RD			2716693	PHOENIX CONTACT, GERMANY	2716693	PHOENIX CONTACT AB, SWEDEN
6	1	JUMPER, 2 POLE, BLUE, EB 2-DIK BU			2716648	PHOENIX CONTACT, GERMANY	2716648	PHOENIX CONTACT AB, SWEDEN
7	2	NUMBER MARKERS FOR RELAYS			SEE NOTE 1	PHOENIX CONTACT, GERMANY	SEE NOTE 1	PHOENIX CONTACT AB, SWEDEN



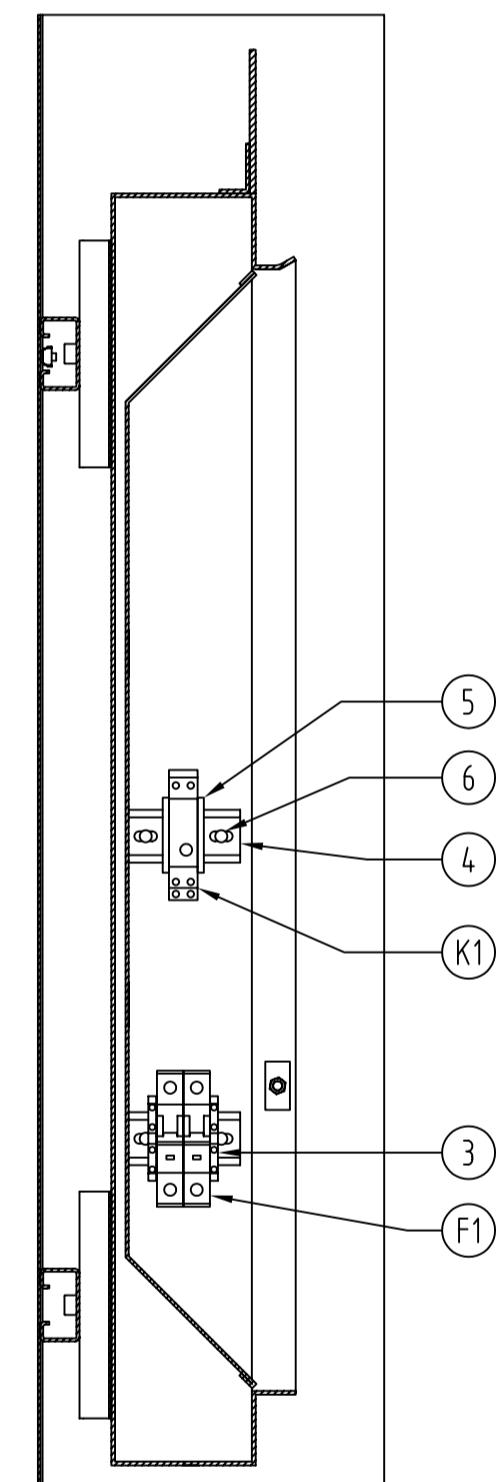
NOTE 1  
MANF. PART NO.: 1050017  
SUPPLIER'S STOCK NO.: 1050017  
ZB 5: UNMARKED, FOR RELAY  
IDENTIFICATION,  
MARK WITH R1 AND R2.

<b>SAFE GATE</b> <b>G R O U P</b> Safegate International AB MALMÖ, SWEDEN				Unless otherwise indicated, all tolerances are according to		Sharp Edges		
				Surface Coating		Weight		
WIRING ASSEMBLY OPERATOR PANEL WITH EXTRA DOCKING IN PROGRESS RELAYS								
Drawn by: G.O.	Date drawn: 2007.08.07	Checked by:						
App. by:	Date approved:	Project No.:			Drawing No. SG590577-100-01	Rev.	Sheet 1 of 1	Scale
Revision		Description		Date	Drawn by:	Checked by:	Approved	

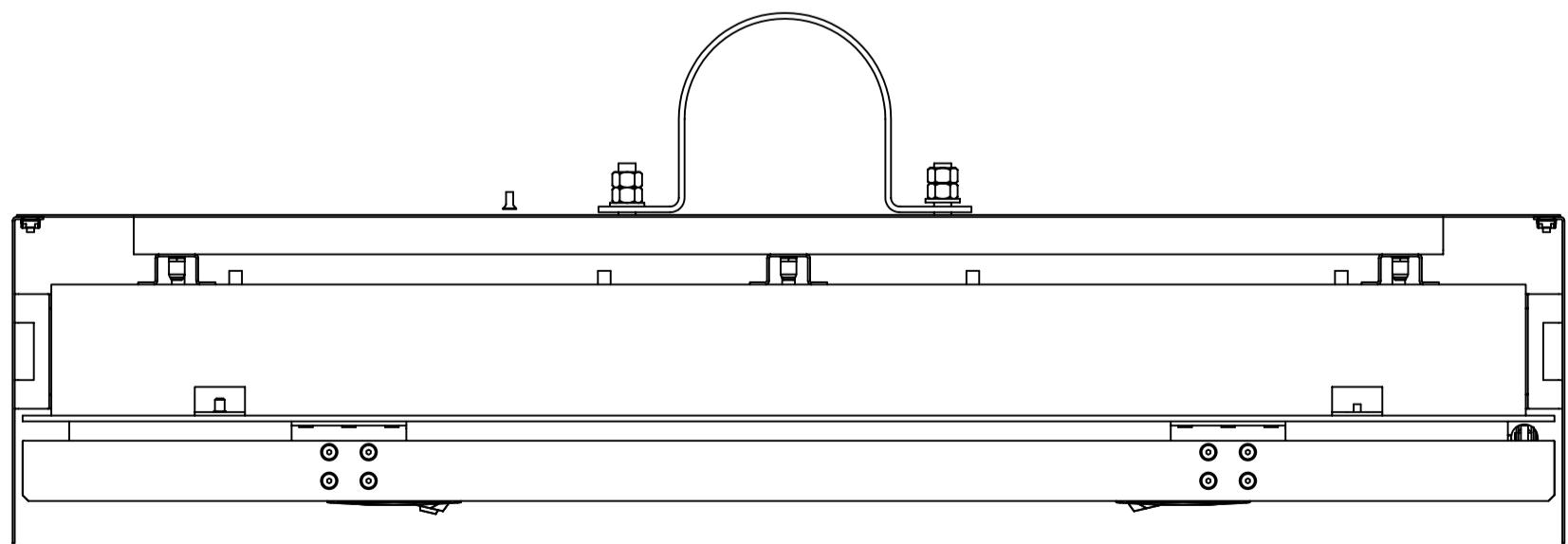
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CIRCUIT BREAKER, C60N, 6A-TYPE C			24447	MERLIN GERIN/SCHNEIDER ELECTRIC		
1	1	TWILIGHT SWITCH, LUNA 108			108 0 700	THEBEN		
1	1	CABINET ASSEMBLY	SG590606-202-01					
2	1	REFLECTOR AND LAMP ASSEMBLY	SG590606-203-01					
3	2	GROUND TERMINAL, UDK3.PE, OR EQUIV.			2775456	PHOENIX CONTACT		
4	2	DIN RAIL	SG590606-204-01					
5	2	CLIPFIX 35-5 OR EQUIV.			3022276	PHOENIX CONTACT		
6	4	BLIND POP-RIVET, 3,2x8LF, ALUMINIUM/STEEL, OR EQUIV.						
7	11	LOCKNUT, DIN 982, M6, ZINC PLATED						
8	11	NUT, DIN 934, M6, ZINC PLATED						
10	1	CABLE GLAND, M20, NYLON					1476113 OR EQUIV.	AHLSSELL
11	1	JAM NUT, M20, NYLON					1476533 OR EQUIV.	AHLSSELL
12	1	PLUG, GRAY, POLYETHYLEN					1470181 OR EQUIV.	AHLSSELL
13	2	CLAMP	AT 605283					
14	4	T-BOLT AND NUT, HS 50/30 - fv - M12 x 40			12-1769	HALFAN, GERMANY		
15	8	NUT, ISO 4032, M12, GALVANIZED						
16	4	WASHER, DIN 125 13x24x2,5, GALVANIZED						
-		WIRING MATERIALS AS FOLLOWS						
		ELECTRICAL WIRE, H05V-K, 0,5 mm <sup>2</sup> , BROWN, TOTAL LENGTH: 700 mm						
		ELECTRICAL WIRE, H05V-K, 0,5 mm <sup>2</sup> , BLUE, TOTAL LENGTH: 600 mm						
		ELECTRICAL WIRE, H05V-K, 0,5 mm <sup>2</sup> , YELLOW/GREEN, TOTAL LENGTH: 550 mm						
5	2	BOOTLACE FERRULE, 2x0,5 mm <sup>2</sup>					48-236-13 OR EQUIV.	ELFA
2	2	BOOTLACE FERRULE, 0,5 mm <sup>2</sup>					48-315-66 OR EQUIV.	ELFA

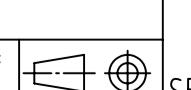


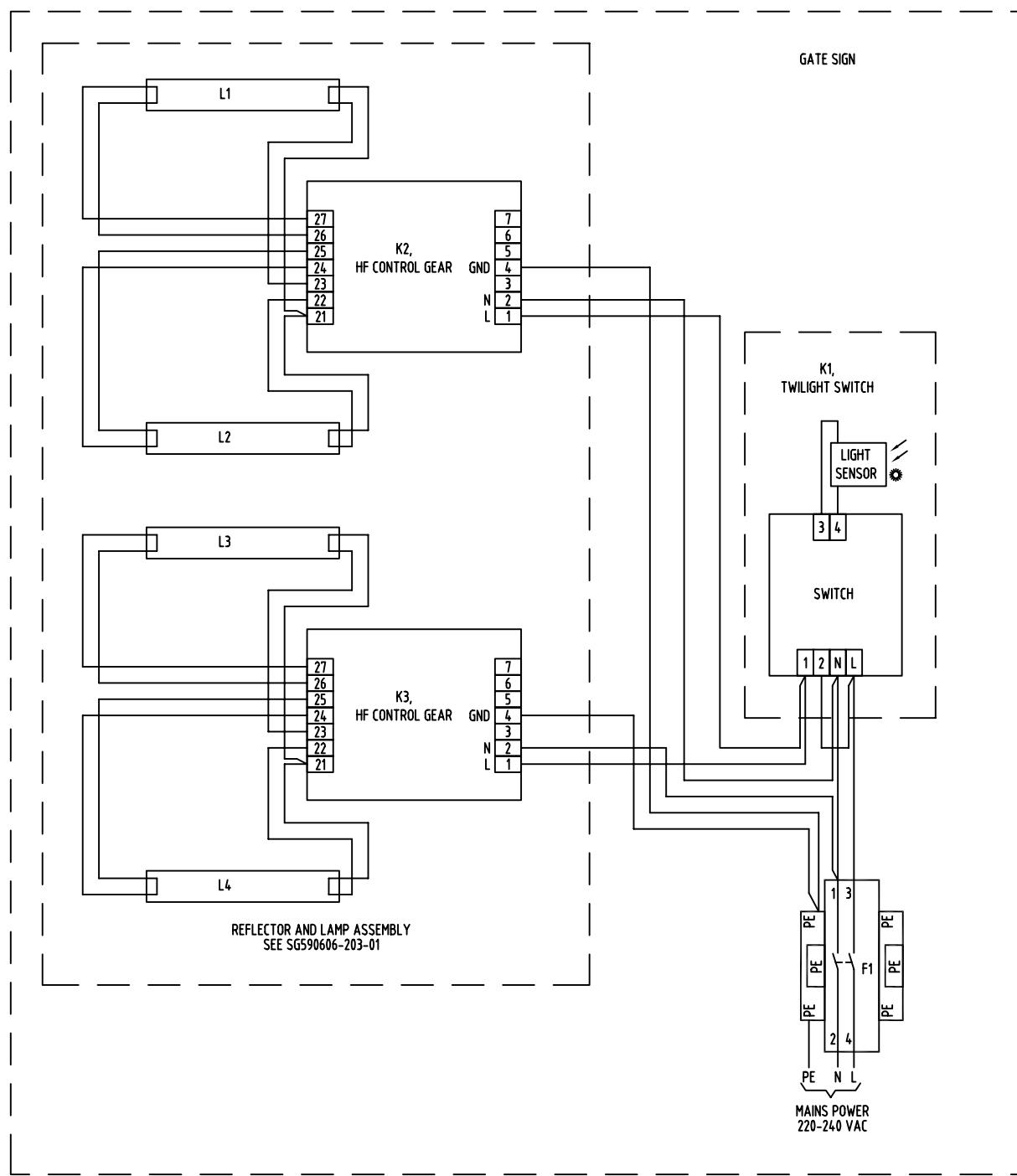
FRONT VIEW, DOOR REMOVED



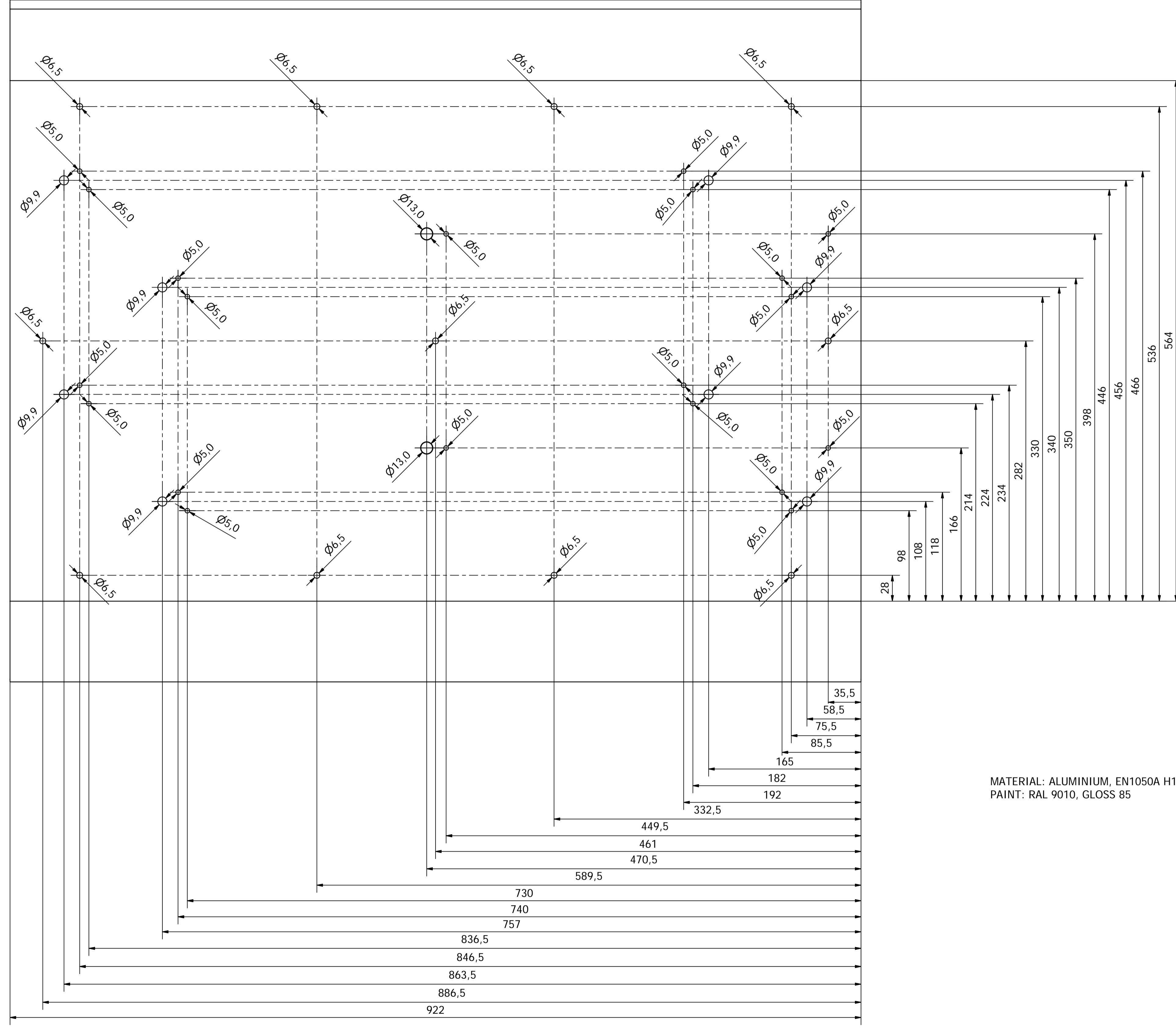
SECTION A-A



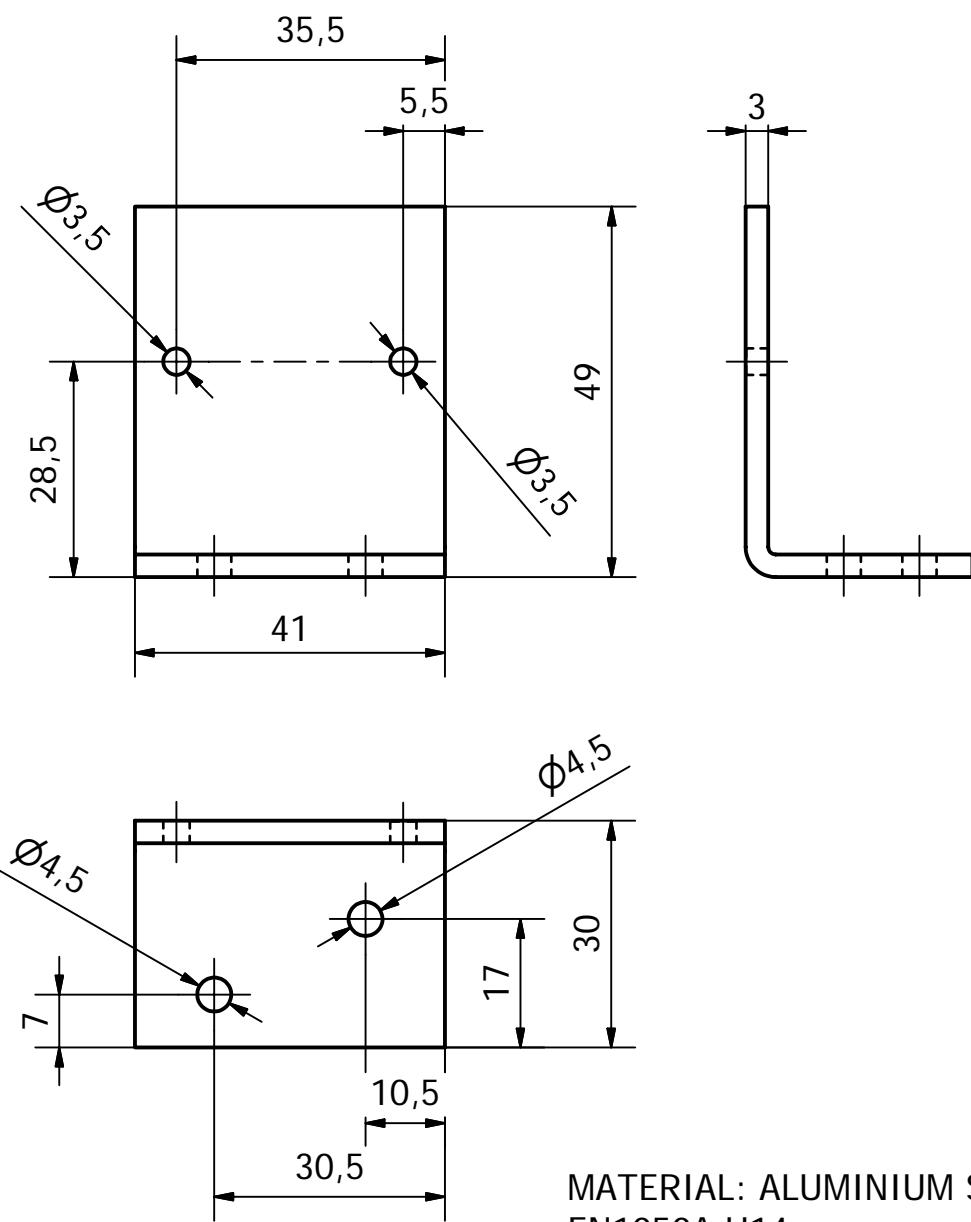
<b>SAFEGATE</b> 		G R O U P		Safegate International AB MALMÖ, SWEDEN		Unless otherwise indicated, all tolerances are according to Surface Coating		Sharp Edges
GATE SIGN		FOR T1 DOCKING GUIDANCE SYSTEM						
SEE SG590606-004-01 FOR CONNECTION DIAGRAM								
Drawn by:	Date drawn:	Checked by:		G.O.:	2009.04.05	Approved:	Project No.:	Weight
App. by:	Date approved:							
Revision:	Description:	Date:	Drawn by:	Checked by:	Approved:	Drawing No.:	Rev. Sheet	Scale
						SG590606-001-01	1 of 1	1:5



<b>SAFEGLIDE</b> <b>G R O U P</b>				Unless otherwise indicated, all tolerances are according to			Sharp Edges			
				Surface Coating			Weight			
<b>GATE SIGN</b> FOR T1 DOCKING GUIDANCE SYSTEM CONNECTION DIAGRAM										
Drawn by: G.O.	Date drawn: 2009.04.03	Checked by:								
App. by:	Date approved:	Project No.:					Drawing No. SG590606-004-01	Rev.	Sheet 1 of 1	Scale
Revision	Description	Date	Drawn by:	Checked by:	Approved					



SAFEGATE GROUP		REFLECTOR/MOUNTING PLATE		
Safegate International AB MALMO, SWEDEN		Unless otherwise indicated, all tolerances are according to Surface Coating		
Drawn by: G.O.	Date drawn: 2008-06-04	Checked by: [Signature]		Sharp Edges
App. by:	Date approved:	Project No.:		Weight
Drawing No. SG590606-200-01	Rev. A	Sheet 1 of 1	Scale 1:2.5	



MATERIAL: ALUMINIUM SHEET,  
EN1050A H14



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all  
tolerances are according to

Surface Coating

Sharp Edges

Weight

## LAMP HOLDER BRACKET

Drawn by:  
G.O.

Date drawn:  
2008-06-04

Checked by:



Drawing No.  
SG590606-201-01

Rev.  
1

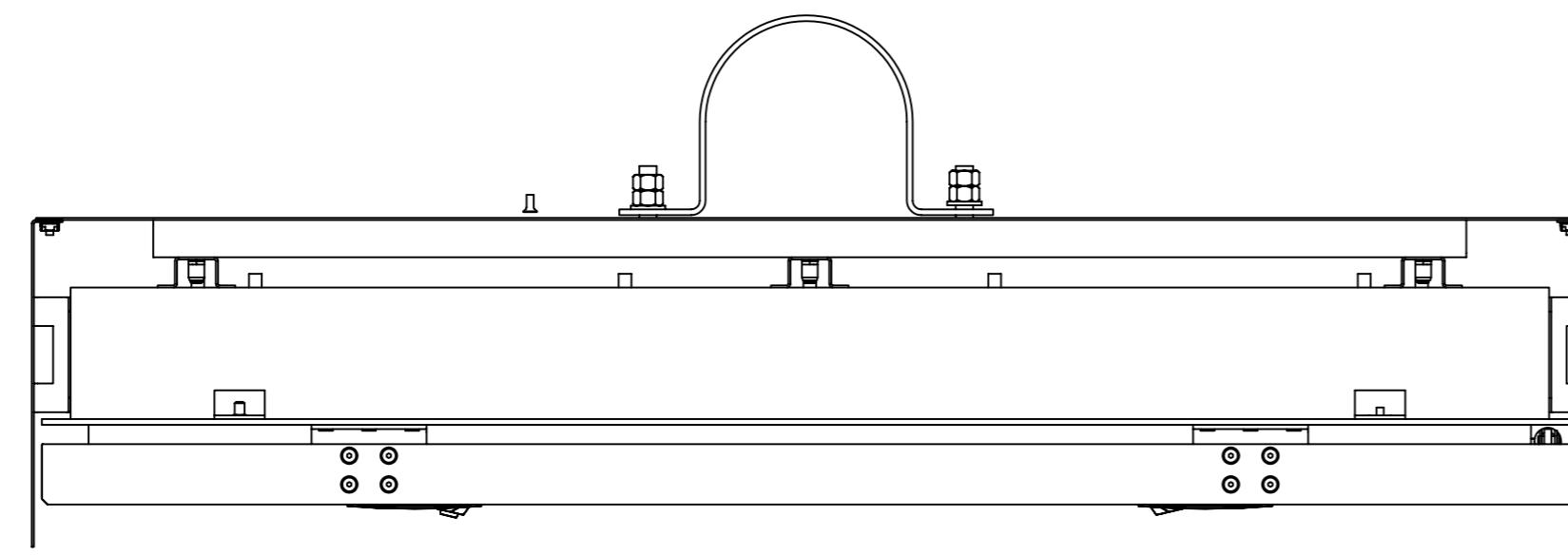
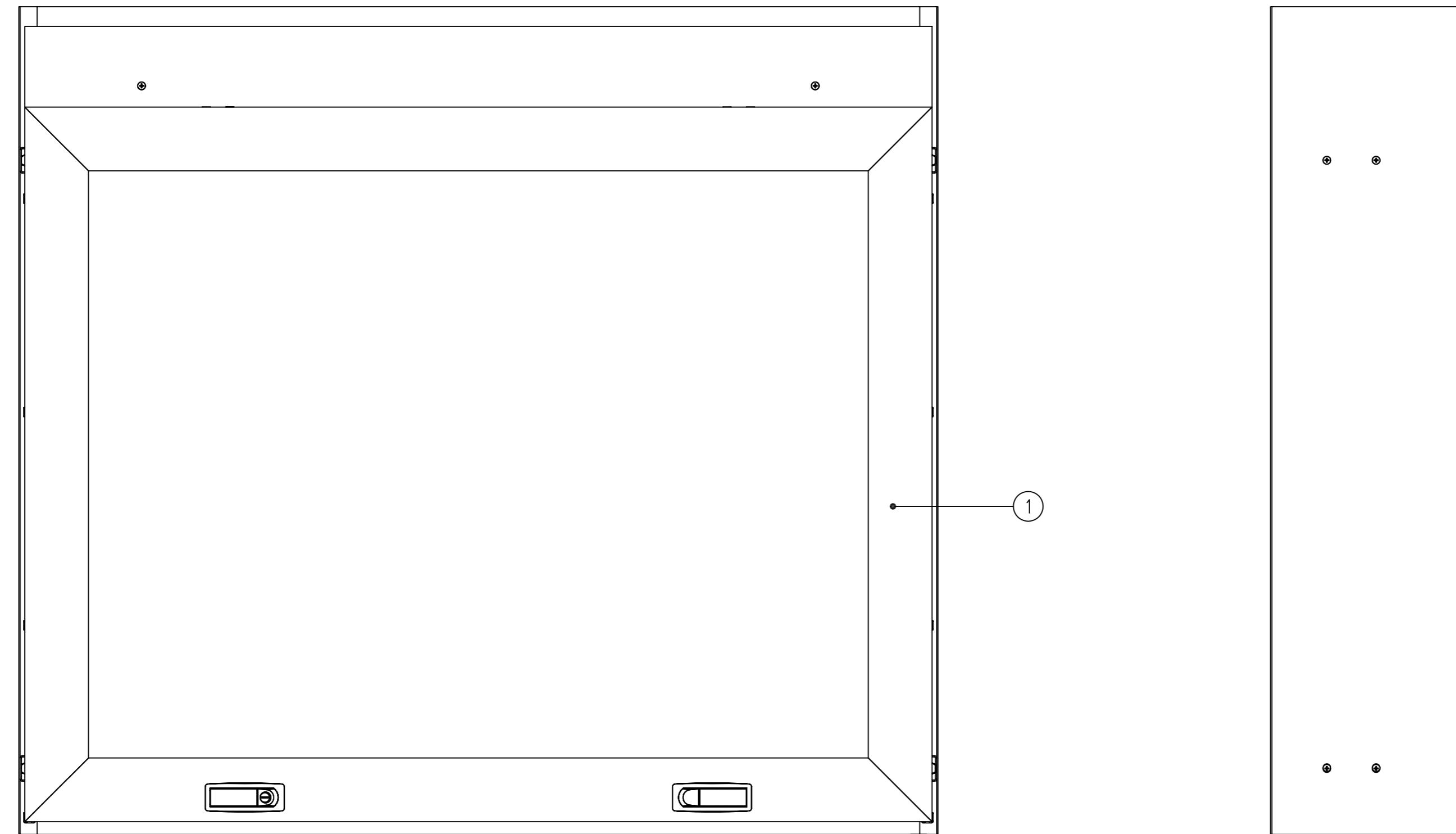
Sheet  
of  
1

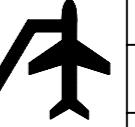
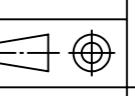
Scale  
1:1

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	ENCLOSURE	NPP 914686					

NOTES:

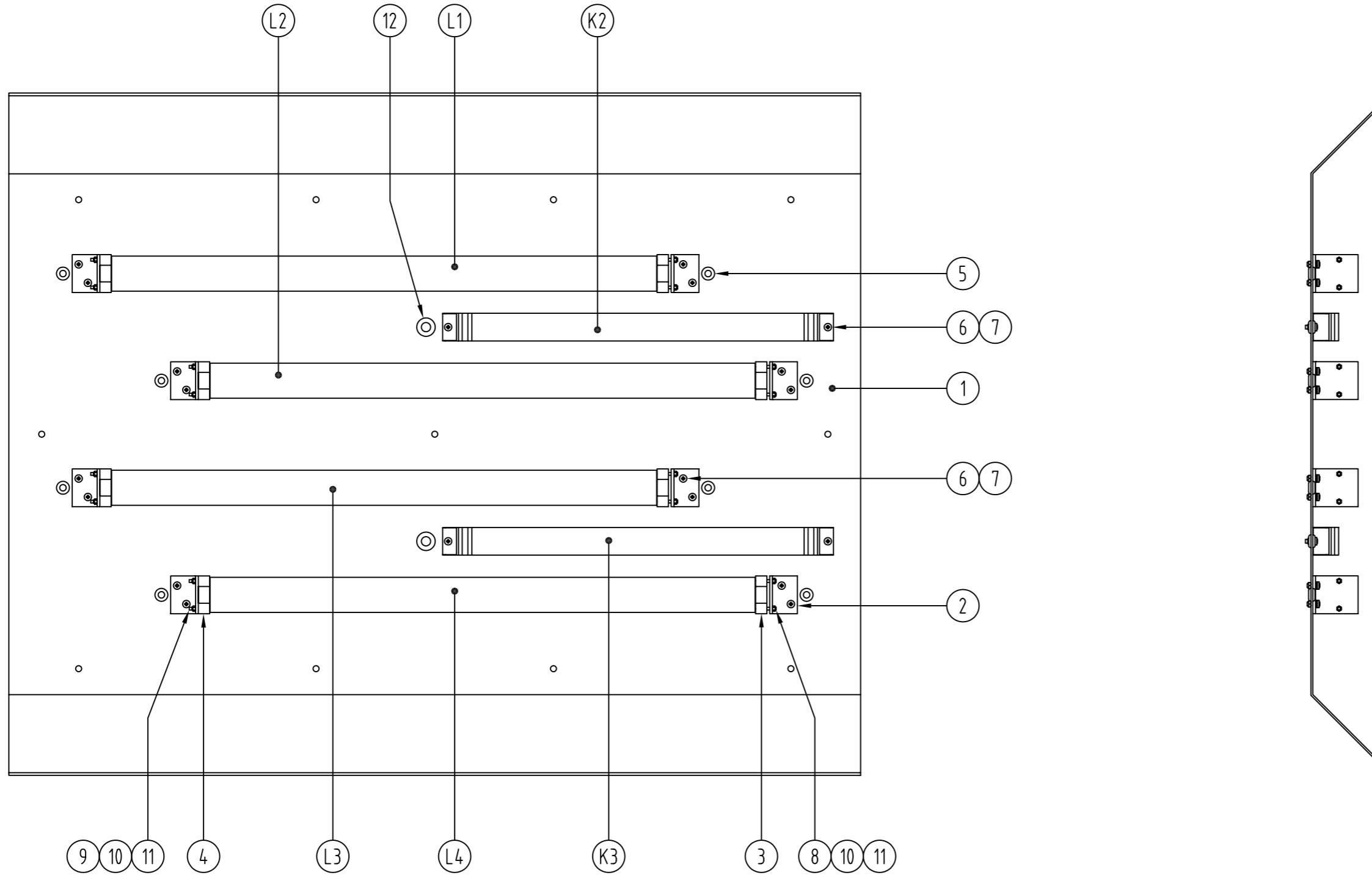
1. THE POLYCARBONATE SIGN FRONT THAT IS INSTALLED IN THE DOOR, NPP DRAWING 501368, NEEDS TO BE ORDERED SEPARATELY THROUGH A-SKYLT AND DELIVERED TO NPP PRIOR TO ASSEMBLY.  
A FULL SCALE DRAWING OF THE LEGEND FOR THE SIGN FRONT IN PDF-FILE FORMAT NEEDS TO ACCOMPANY THE ORDER.
2. THE SUNSHADE PANELS ARE TO BE DELIVERED UN-ATTACHED TO THE CABINET ASSEMBLY.

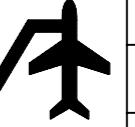


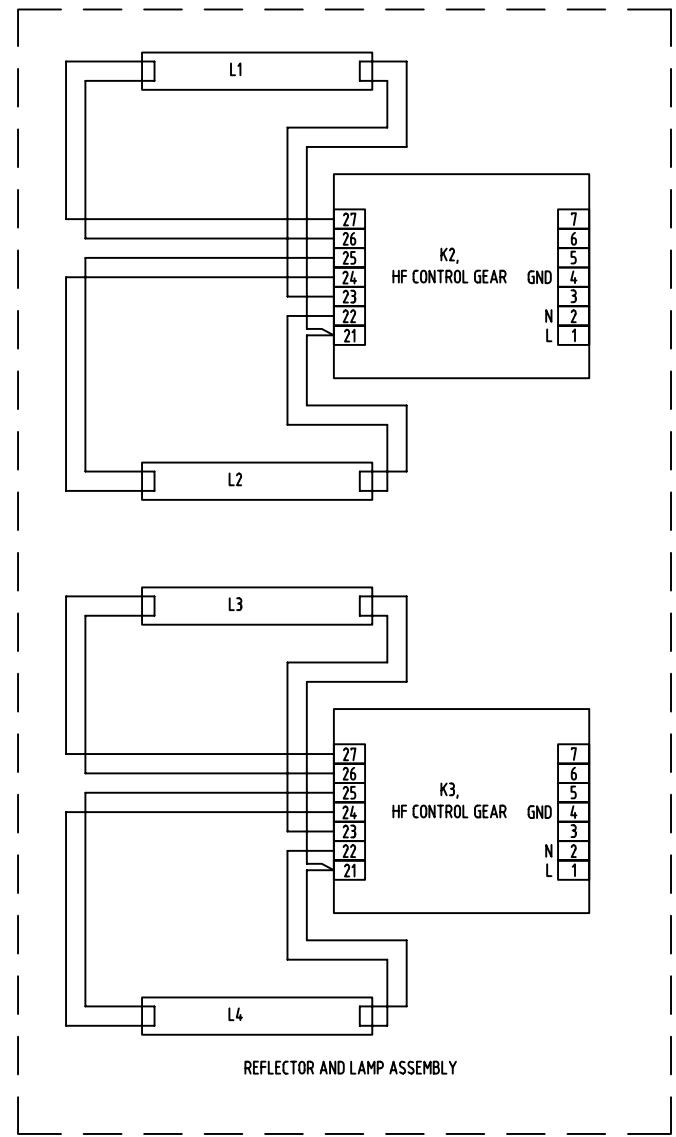
<b>SAFEGATE</b>  <b>G R O U P</b>			Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges
Safegate International AB MALMÖ, SWEDEN			Weight	
Drawn by: G.O.	Date drawn: 2009.04.21	Checked by: 		
App. by:	Date approved:	Project No.:	Drawing No. SG590606-202-01	Rev. Sheet Scale 1 of 1 1:5

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
L1-L4	4	FLUORESCENT LAMP, MASTER TL-D SUPER 80 16W/840 1SL, OR EQUIV.			631473 40	PHILIPS		
K2-K3	2	HF CONTROL GEAR, QTi 2x14/24/21/39				OSRAM	33-551-53	ELFA
1	1	REFECTOR/MOUNTING PLATE	SG590606-200-01					
2	8	LAMPHOLDER BRACKET	SG590606-201-01					
3	4	LAMPHOLDER, 46101			101647	VOSSLOH-SCHWABE		
4	4	LAMPHOLDER, 46100			101643	VOSSLOH-SCHWABE		
5	8	RUBBER GROMMET, 7.0x14					55-005-33	ELFA
6	20	SCREW, DIN7985, M4x10, ZINC PLATED						
7	20	LOCKNUT, DIN 985, M4, ZINC PLATED						
8	8	SCREW, DIN7985, M3x25, ZINC PLATED						
9	8	SCREW, DIN7985, M3x16, ZINC PLATED						
10	16	LOCK WASHER, DIN 6798A, 3.7x7x0.5, ZINC PLATED						
11	16	NUT, DIN 934, M3, ZINC PLATED						
12	2	RUBBER GROMMET, 10x15,7					55-005-41	
-		ELECTRICAL WIRE, H05V2-U, 0,5mm <sup>2</sup> , TOTAL LENGTH = 8,8 m, OR EQUIV.					55-316-78	ELFA

NOTE: THE ELECTRICAL WIRING IS TO BE RUN BETWEEN THE ELECTRONIC CONTROL GEAR AND THE LAMP HOLDERS ON THE BACK SURFACE OF THE REFECTOR/MOUNTING PLATE . ANCHOR THE WIRES AWAY FROM PROTRUDING SCREWS/NUTS WITH TAPE AT SEVERAL POINTS TO PREVENT THE WIRES FROM BEING PINCHED WHEN THE ASSEMBLY IS INSTALLED IN THE CABINET.

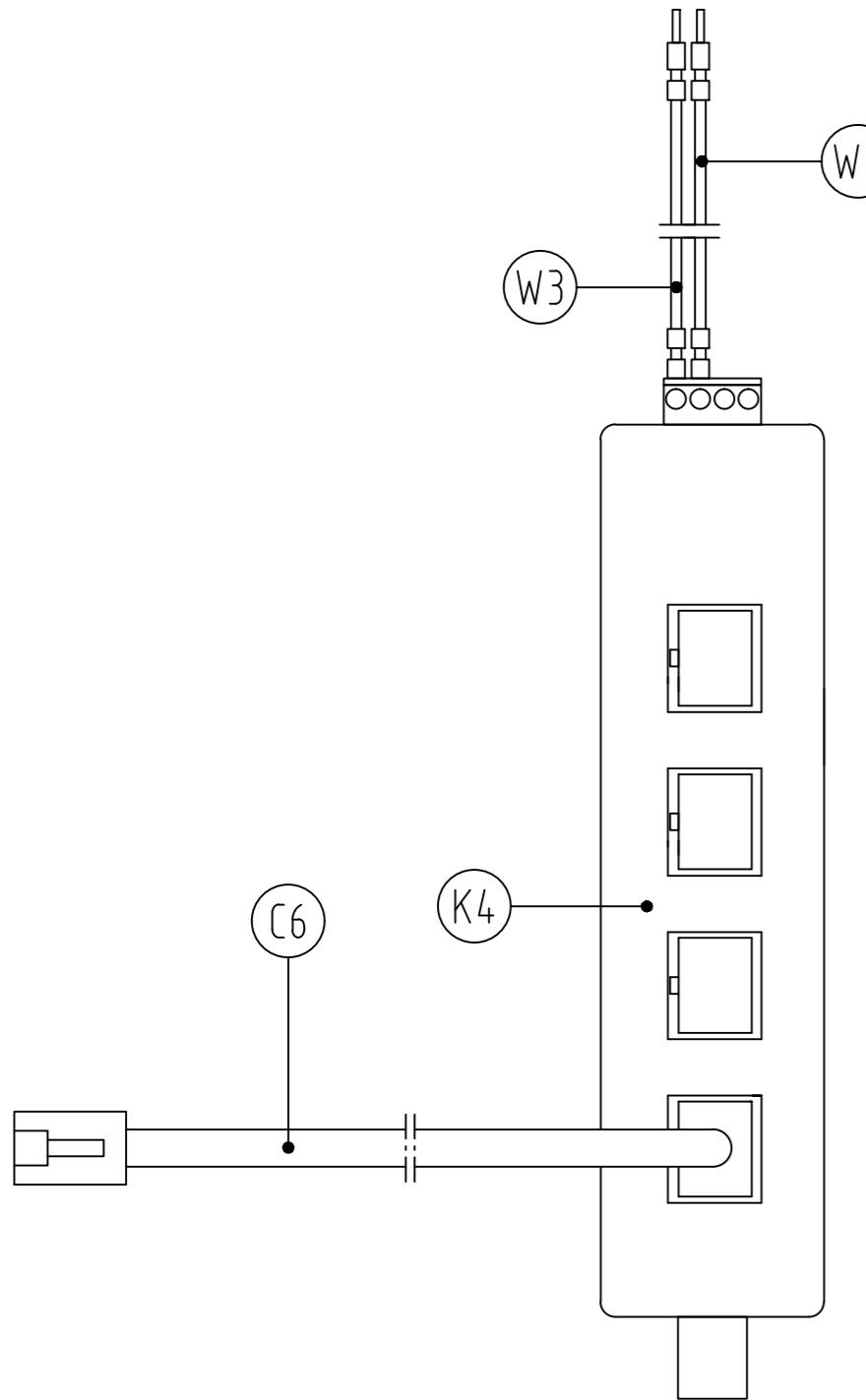


<b>SAFEGATE</b>  <b>G R O U P</b>			Unless otherwise indicated, all tolerances are according to Surface Coating			Sharp Edges
Safegate International AB MALMÖ, SWEDEN						Weight
REFLECTOR AND LAMP ASSEMBLY						
Drawn by: G.O.	Date drawn: 2009.04.05	Checked by: 	SEE SG590606-203-02 FOR CONNECTION DIAGRAM			
App. by:	Date approved:	Project No.:	Drawing No. SG590606-203-01	Rev.	Sheet	Scale 1:5



<b>SAFEGLATE</b> <b>G R O U P</b> Safegate International AB MALMÖ, SWEDEN				Unless otherwise indicated, all tolerances are according to Sharp Edges Surface Coating Weight		
<b>REFLECTOR AND LAMP ASSEMBLY</b> <b>CONNECTION DIAGRAM</b>						
SEE SG590606-203-01 FOR ASSEMBLY						
Drawn by: G.O.	Date drawn: 2009.04.05	Checked by:				
App. by:	Date approved:	Project No.:	Drawing No. SG590606-203-02			
			Rev.	Sheet	Scale	
1 of 1						

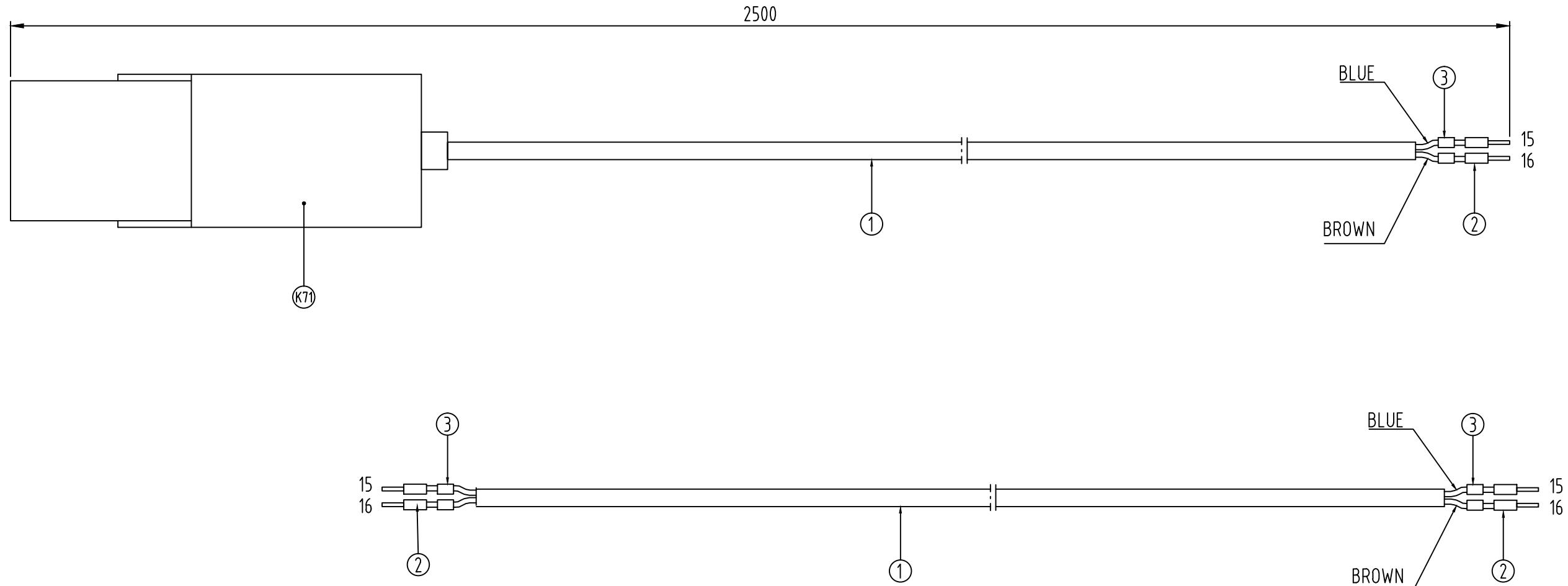
Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	COMPONENT IDENTIFIER LABEL, YELLOW, 15x8mm, TEXT: K4					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN
C6	1	PATCH CABLE	SG590258-101-01					
K4	1	NETWORK SWITCH, FL SWITCH SFN 4TX/FX ST		2891453	PHOENIX CONTACT, GERMANY	2891453	PHOENIX CONTACT, SWEDEN	
		WIRE, UL1007/1569, AWG 20, RED, L = 400		3053 RED	ALPHA WIRE, USA	5522925	ELFA, SWEDEN	
W3	2	CRIMP LUG, H 0.5/14		9026060000	WEIDMÜLLER, GERMANY	9026060000	WEIDMÜLLER, SWEDEN	
		WIRE MARKERS, PARTEX PA02, MARKING - 3		SEE NOTE	WEIDMÜLLER, GERMANY	SEE NOTE	WEIDMÜLLER, SWEDEN	
W4	2	WIRE, UL1007/1569, AWG 20, BLACK, L = 400		3053 BLACK	ALPHA WIRE, USA	5522909	ELFA, SWEDEN	
		CRIMP LUG, H 0.5/14		9026060000	WEIDMÜLLER, GERMANY	9026060000	WEIDMÜLLER, SWEDEN	
		WIRE MARKERS, PARTEX PA02, MARKING - 2		SEE NOTE	WEIDMÜLLER, GERMANY	SEE NOTE	WEIDMÜLLER, SWEDEN	



D	Connection diagram removed	2011.11.11	A.S.		
C	Bom changed	2011.09.16	A.S.		
B	Position K4 changed	2011.03.22	A.S.		
A	Connection diagram changed; Key for configuration codes added.	2009.03.06	G.O.		
Revision	Description	Date	Drawn by:	Checked by:	

 <b>SAFE GATE</b> <b>G R O U P</b> SafeGate International AB Malmö, Sweden			Unless otherwise indicated, all tolerances are according to Surface Coating			Sharp Edges
						Weight
NETWORK SWITCH - MEDIA CONVERTER 4 RJ45 PORTS AND 1 FIBER OPTIC, ST, PORT						
Drawn by: G.O.	Date drawn: 2008.11.23	Checked by: 	App. by:	Date approved:	Project No.:	Drawing No. SG590611-001-01
Rev. D	Sheet 1 of 1	Scale 1:1, 1:5				

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
K71	1	HEATING ELEMENT, 110-230 V AC, 50 W			3105.340	RITTAL, GERMANY		
1	1	Ölflex Control 3G1,0mm <sup>2</sup> , L = 2300 mm	T2				281803	Miltronic AB, SWEDEN
1	1	Ölflex Control 3G1,0mm <sup>2</sup> , L = 2100 mm	T3				281803	Miltronic AB, SWEDEN
2	4	INSULATED FERRULE, E2512-BLUE					48-303-60	ELFA, SWEDEN
3	4	WIRE MARKERS, PARTEX PA02/3		SEE NOTE 1	WEIDMÜLLER GmbH & Co., GERMANY	SEE NOTE 1	WEIDMÜLLER, SWEDEN	



NOTE 1

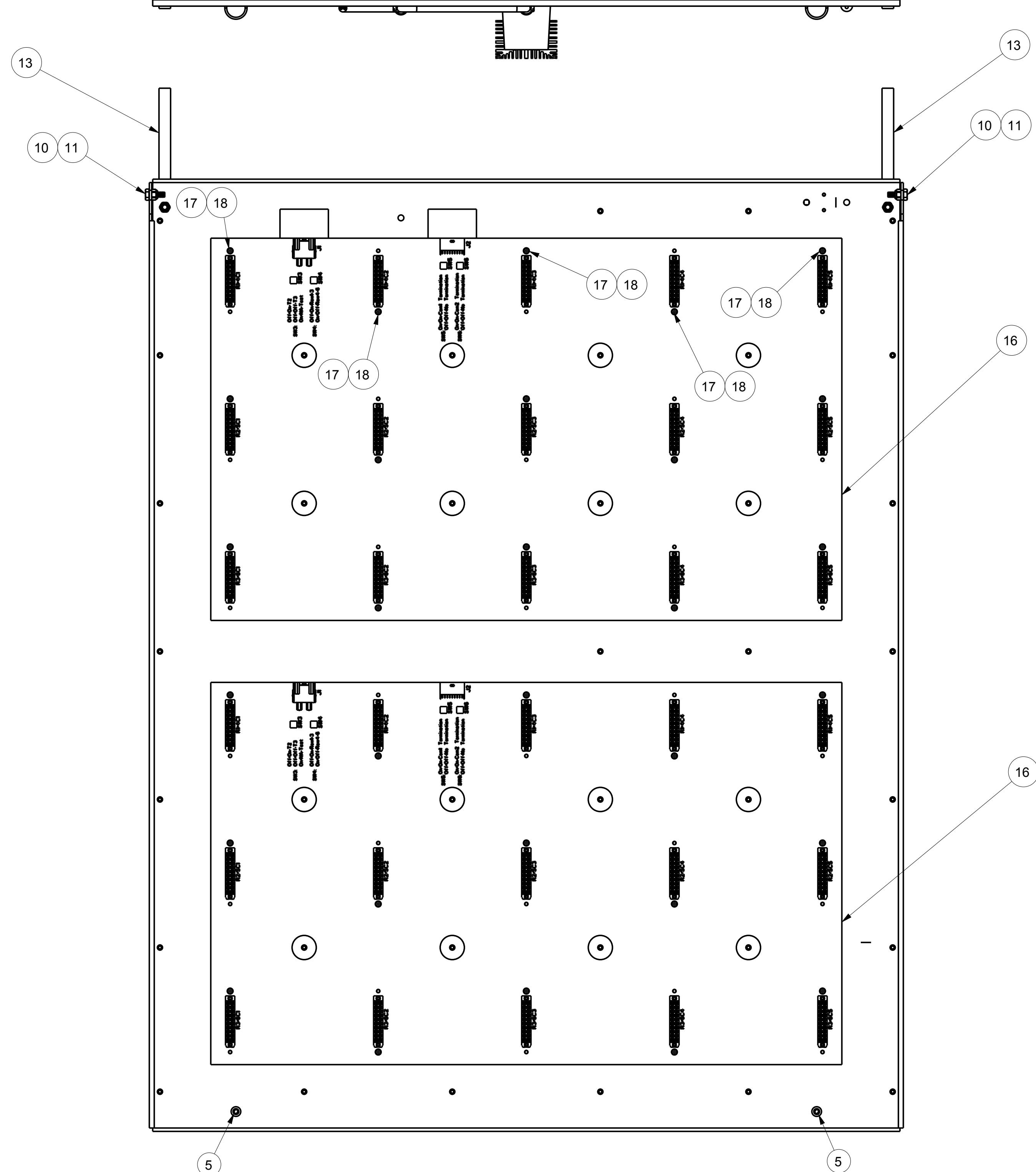
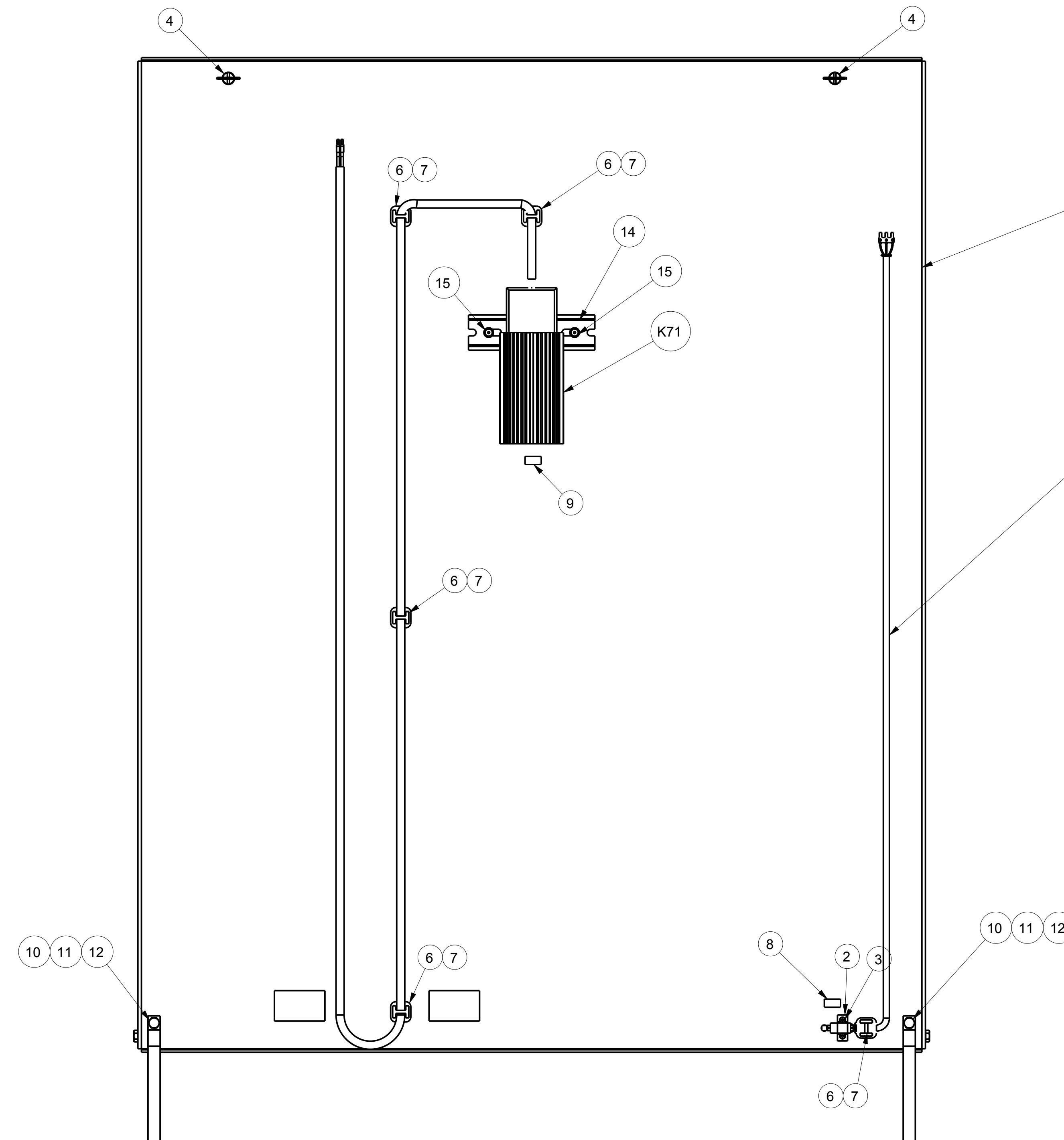
MARK BOTH ENDS OF EACH WIRE ACCORDING TO THE  
NUMBERING SHOWN ABOVE.

SYMBOL	MANF. PART NO.	SUPPLIERS STOCK NO.
1	11-01040101	2980401
5	11-01040105	2980405
6	11-01040106	2980406

D	BOM changed now valid for T2 and T3	2011.11.11	A.S.		
C	Unmounted cable added	2011.10.04	A.S.		
B	Unmounted cable added	2011.05.04	A.S.		
Revision	Description	Date	Drawn by:	Checked by:	Approved

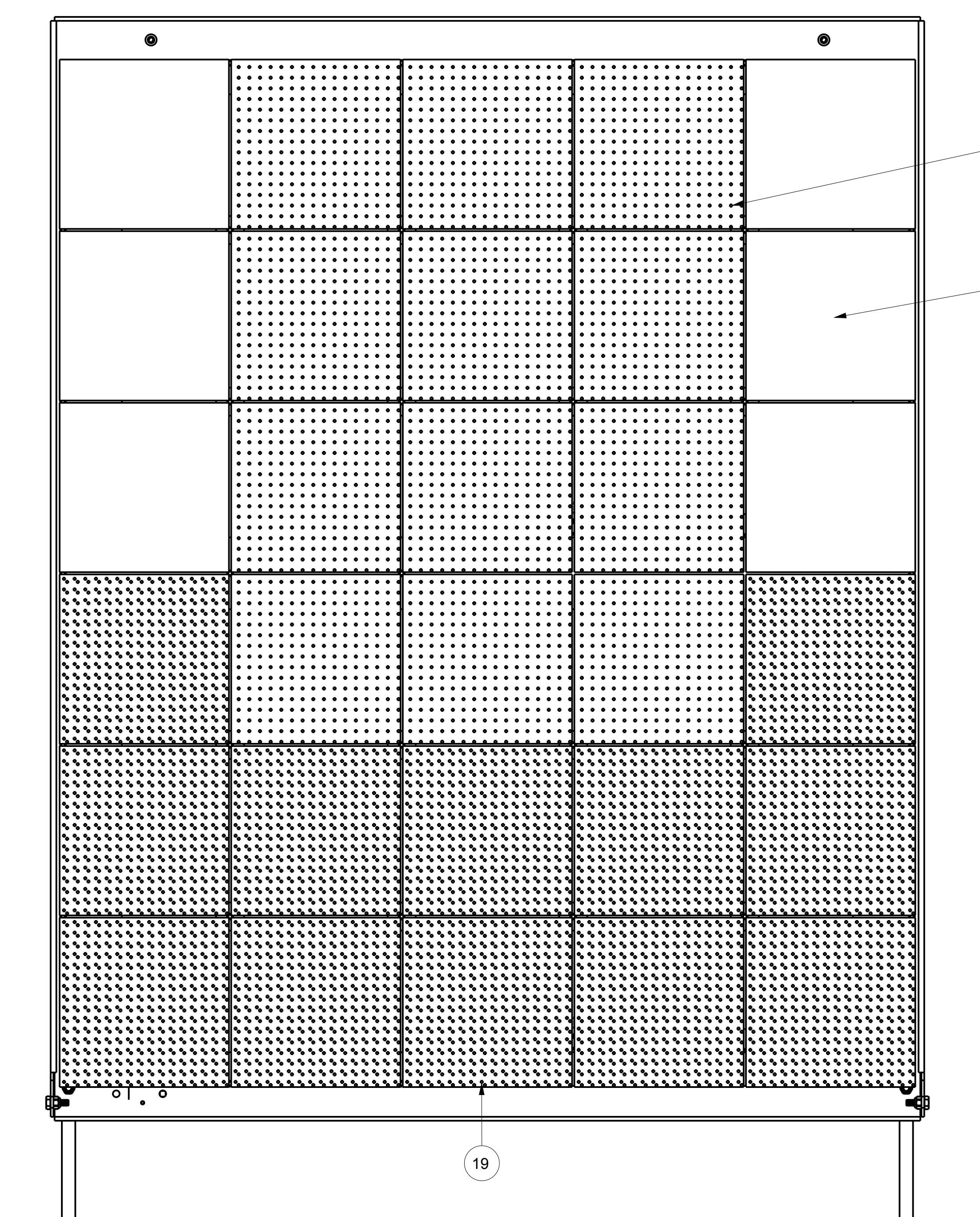
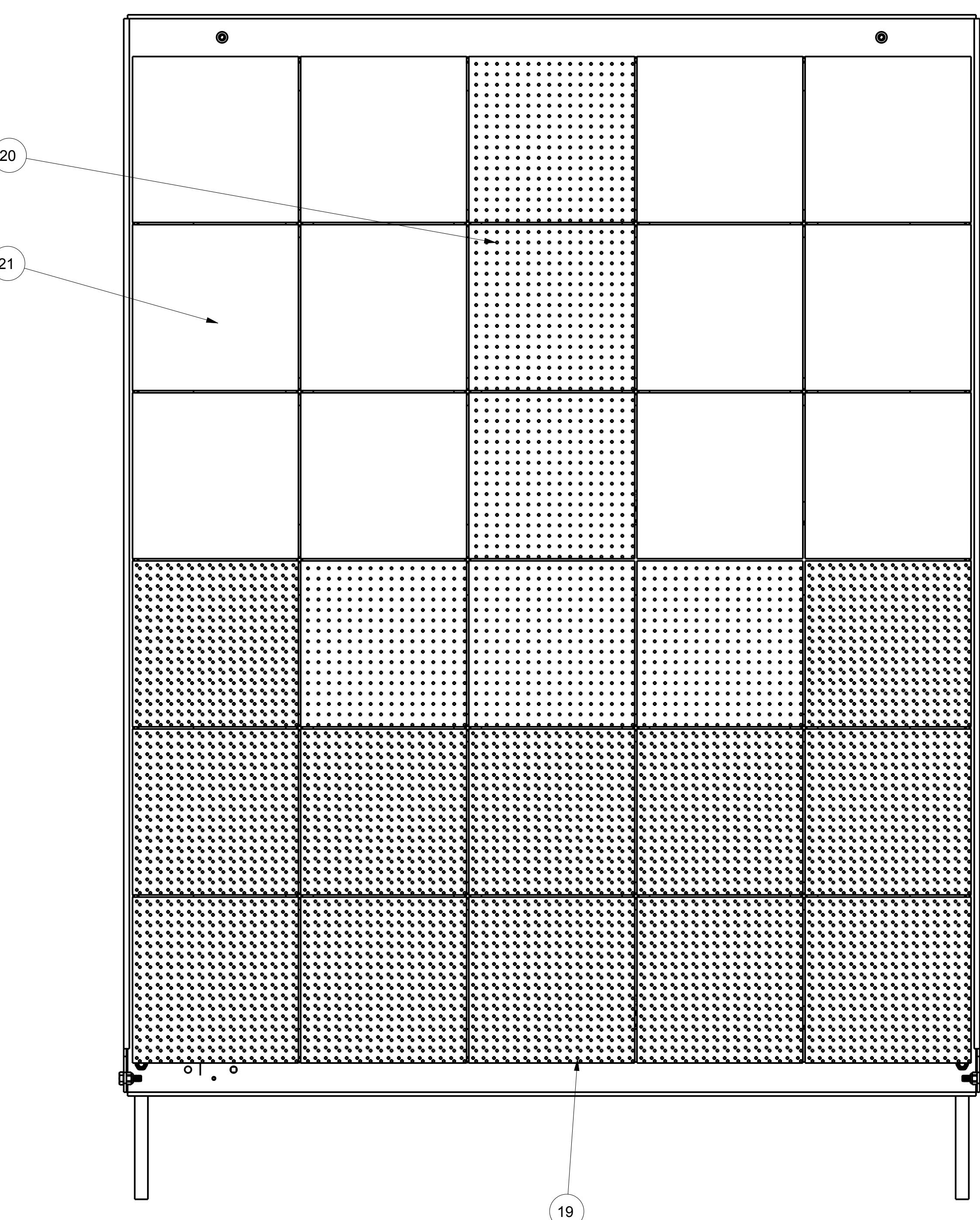
<b>SAFE GATE</b>  Safegate International AB Malmö, SWEDEN				Unless otherwise indicated, all tolerances are according to Surface Coating			Sharp Edges
Drawn by: A.S.	Date drawn: 2010.09.23	Checked by:		Weight			
App. by:	Date approved:	Project No.:	HEATER FOR LED DISPLAY				
			Drawing No. SG590616-001-01	Rev.	Sheet	Scale	
			D	1 of 1			

Position	Quantity	Description	Drawing Number	Model	Manufacturer	Supplier's. Part No.	Supplier
K16	1	Light Sensor Assembly	SG590619-101-01	ALL			
K71	1	Heater Assembly	SG590616-001-01	ALL			
1	1	Mounting Plate	SG590619-200-01	ALL			
2	1	Cable Clamp		ALL		310018	Bejoken AB
3	2	Screw, ISO7049, ST2.9x13, zinc plated		ALL			
4	2	1/4 Turn Fastener		ALL		316411190	Aero Material
5	2	Washer		ALL		326100040	Aero Material
6	5	Anchor, SCF1, Snap-On, For Quick Tie		ALL		1516442	Ahlsell
7	5	Quick Tie, T18R, Black, 104x2,5		ALL		1516055	Ahlsell
8	1	Label, Yellow, Text: K16, 15x8		ALL		21302	Technotrade
9	1	Label, Yellow, Text: K71, 15x8		ALL		21302	Technotrade
10	4	Bolt, ISO 4017, M6x16, Zinc Plated		ALL			
11	4	Lock Nut, DIN 985, M6, Zinc Plated		ALL			
12	2	Lock Washer, DIN 6798A, AZ 6,4		ALL			
13	2	Ground Strap, A=16, L=200		ALL		55-097-57	ELFA
14	1	DIN RAIL, NS 35/7,5 PERF	SG590616-100-01	ALL			
15	2	Popnit BIG HEAD 3,2x7,9		ALL			
16	2	Back Plane PCB		ALL			
17	30	M3x8 DIN 7984, Zinc Plated		ALL			
18	30	Lock Washer, M3 DIN 6798		ALL			
19	10	LED PCB Y-R, 16x16		ALL		SGA908-210656LF	
20	6	LED PCB Y, 16x16		T2-18		SGA908-211289LF	
21	12	LED PCB, BLIND		T2-18		SGA908-211356LF	
20	12	LED PCB Y, 16x16		T2-24		SGA908-211289LF	
21	6	LED PCB, BLIND		T2-24		SGA908-211356LF	



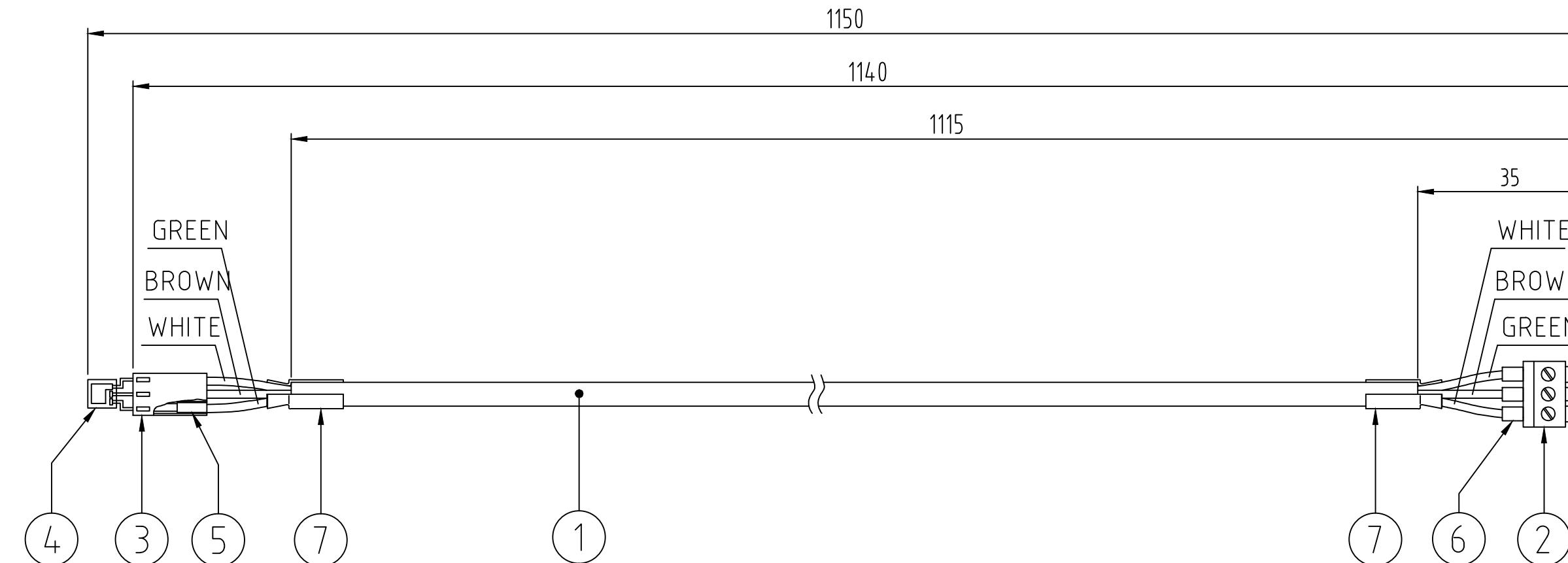
T2-18

T2-24



Gen. tolerance				
Surface treatment				
Basic material				
Info				
Description				
DISPLAY T2				
PC	2011-02-10	A.S	Numbers for LED-pots added:	Date drawn: 2011.10.10
PB	2011-12-07	K.J	BOM changed:	Approved by:
Issue No.	Issue date	Issue by	Issue checked by	Date approved:
Project No.	Drawing No.	Rev.	PC	Scale: 0,333
	590619-001-01		A0	Size: A0
				Sheet: 1(1)

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, LIYY, 3x0.34mm <sup>2</sup>					7852030	NOVUM, SWEDEN
2	1	CONTACT, MC 1.5/3-ST-3.81			1803581	PHOENIX CONTACT, GERMANY	1803581	PHOENIX CONTACT, SWEDEN
3	1	CONTACT			0-925366-3	AMP, USA		
4	1	LIGHT SENSOR			TSL235R	TAOS, USA		
5	3	CRIMP TERMINALS			1-141708-1	AMP, USA		
6	3	CRIMP TERMINALS, H 0.34/12			9025790000	WEIDMULLER, GERMANY	9025790000	WEIDMULLER, SWEDEN
7	2	SHRINK WRAP, L = 20					55-070-25	ELFA, SWEDEN



Safegate International AB  
MALMÖ, SWEDEN

Drawn by: A.S. Date drawn: 2011.09.04 Checked by:

App. by: Date approved: Project No.: Drawing No.

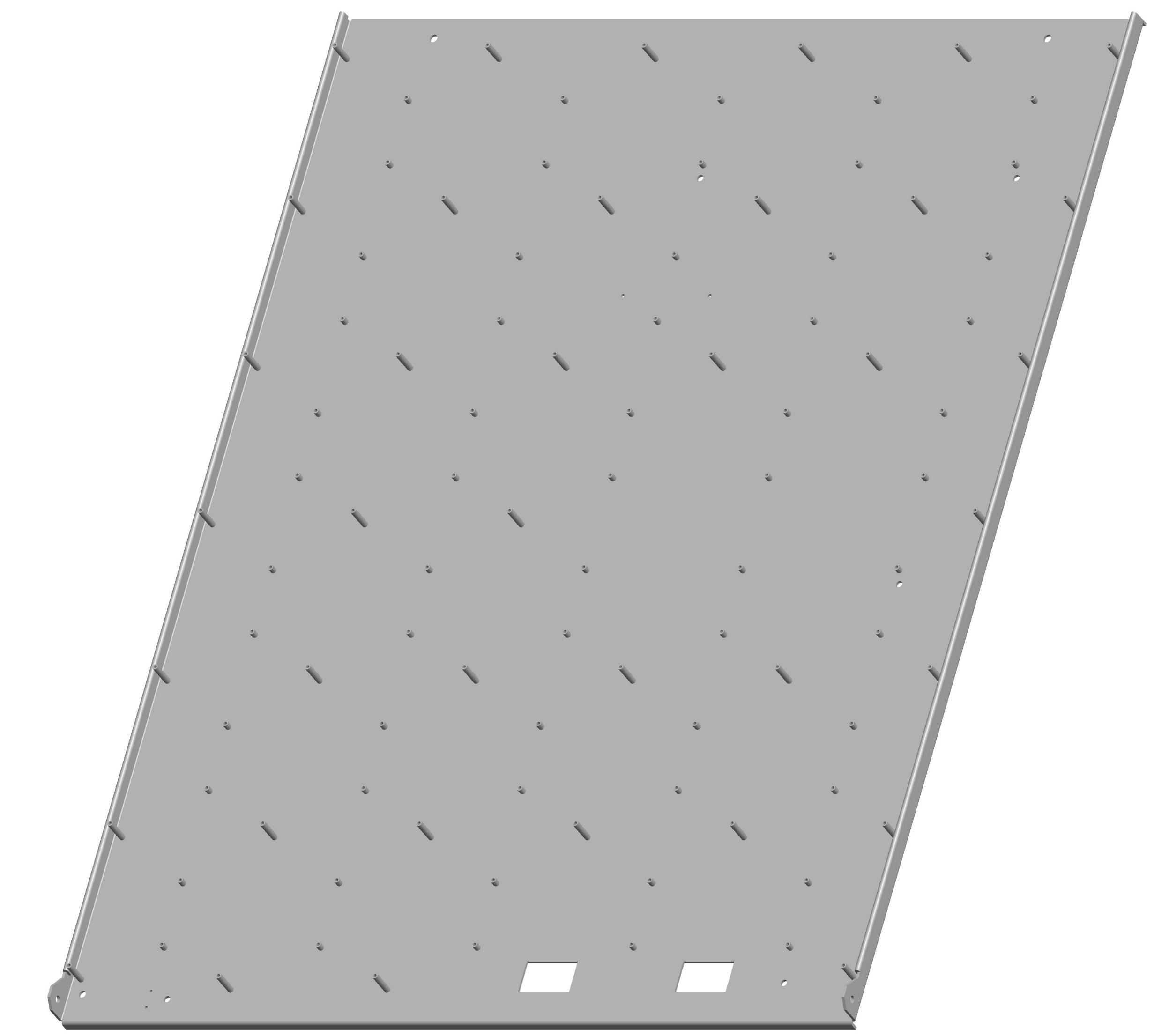
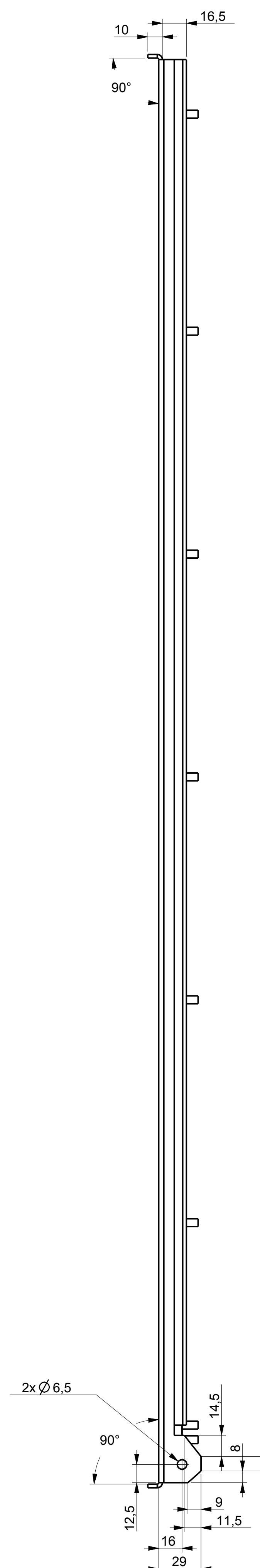
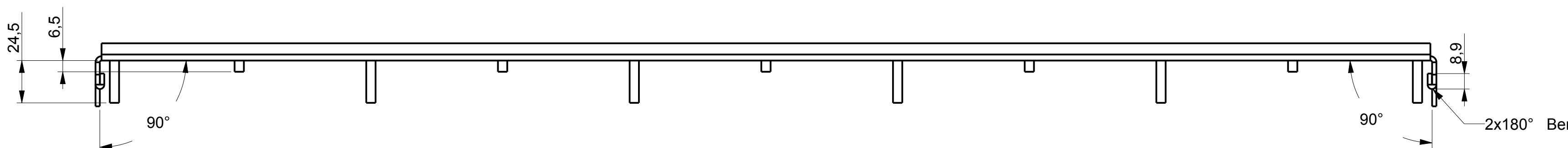
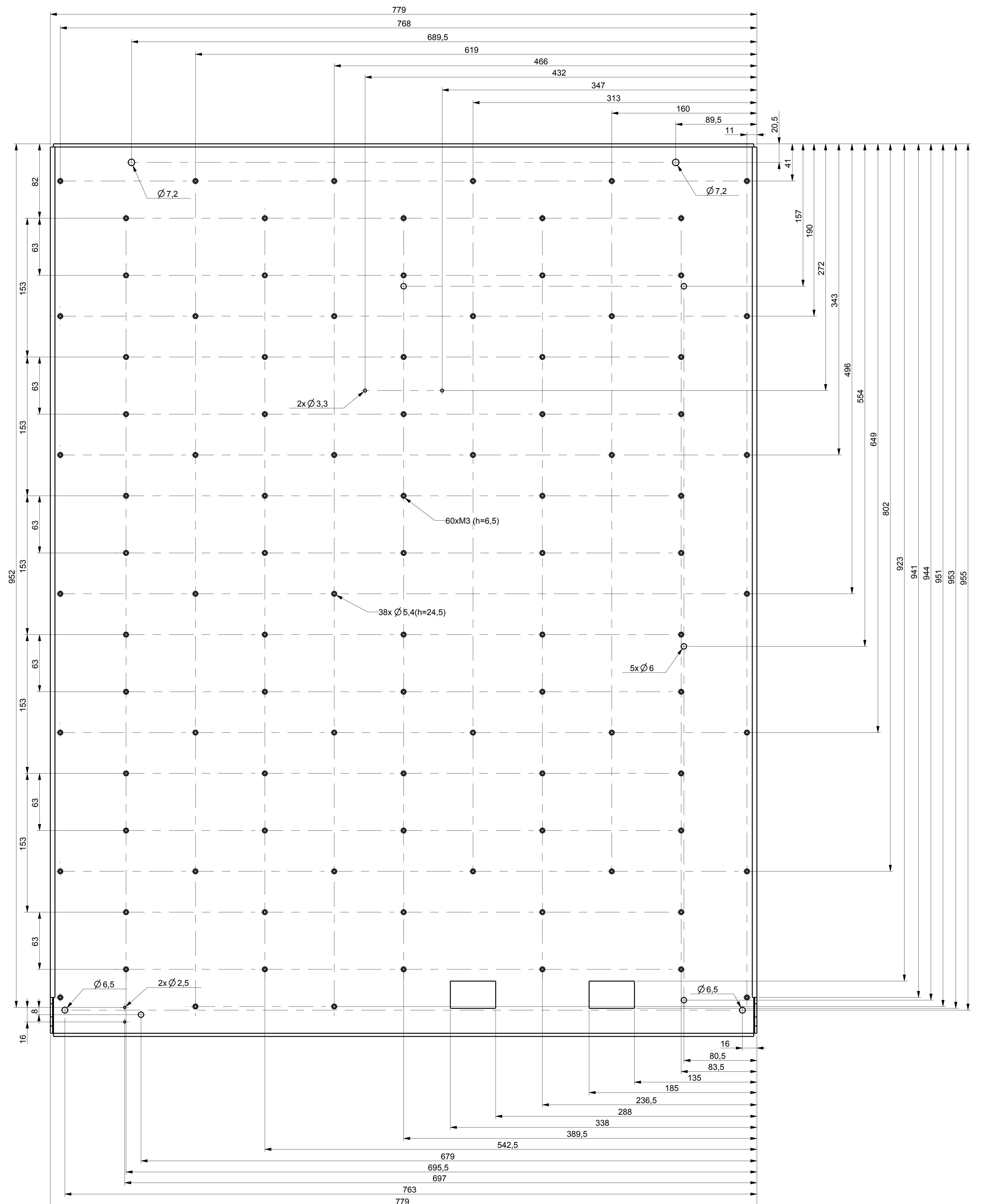
Unless otherwise indicated, all tolerances are according to Sharp Edges

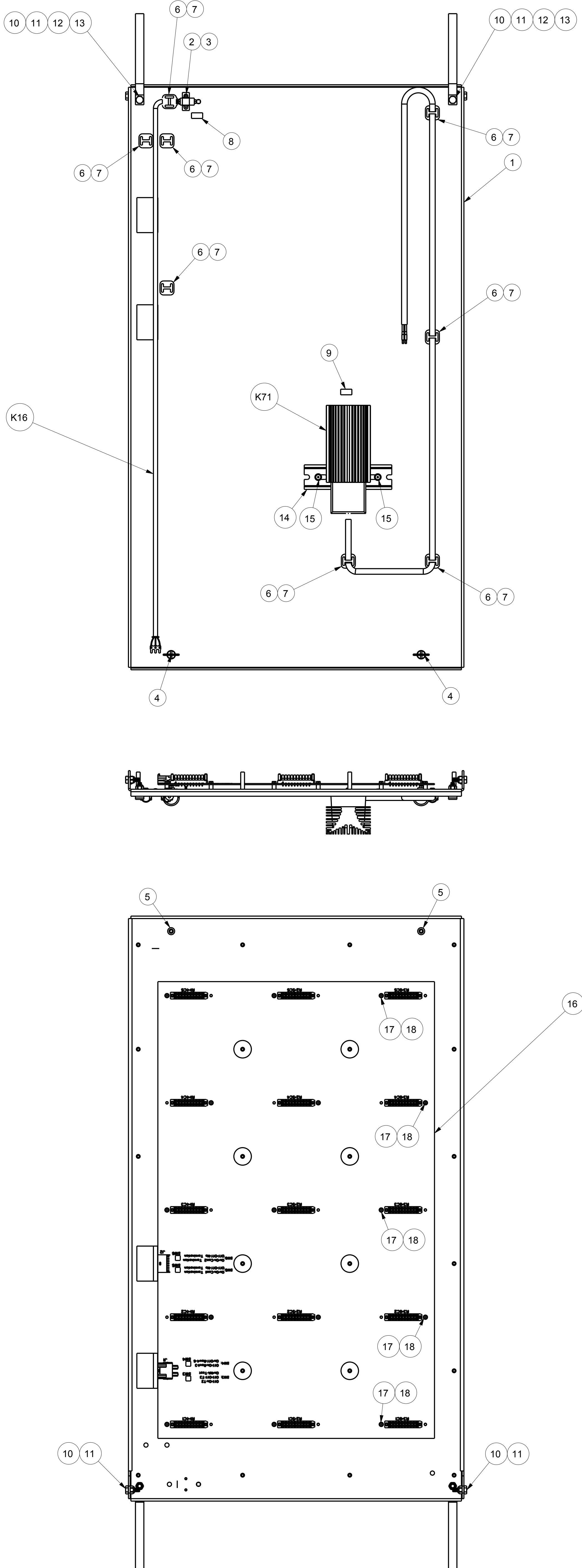
Surface Coating Weight

LIGHT SENSOR ASSEMBLY  
T2/T3

SG590619-101-01 Rev. Sheet Scale  
1 of 1 NONE

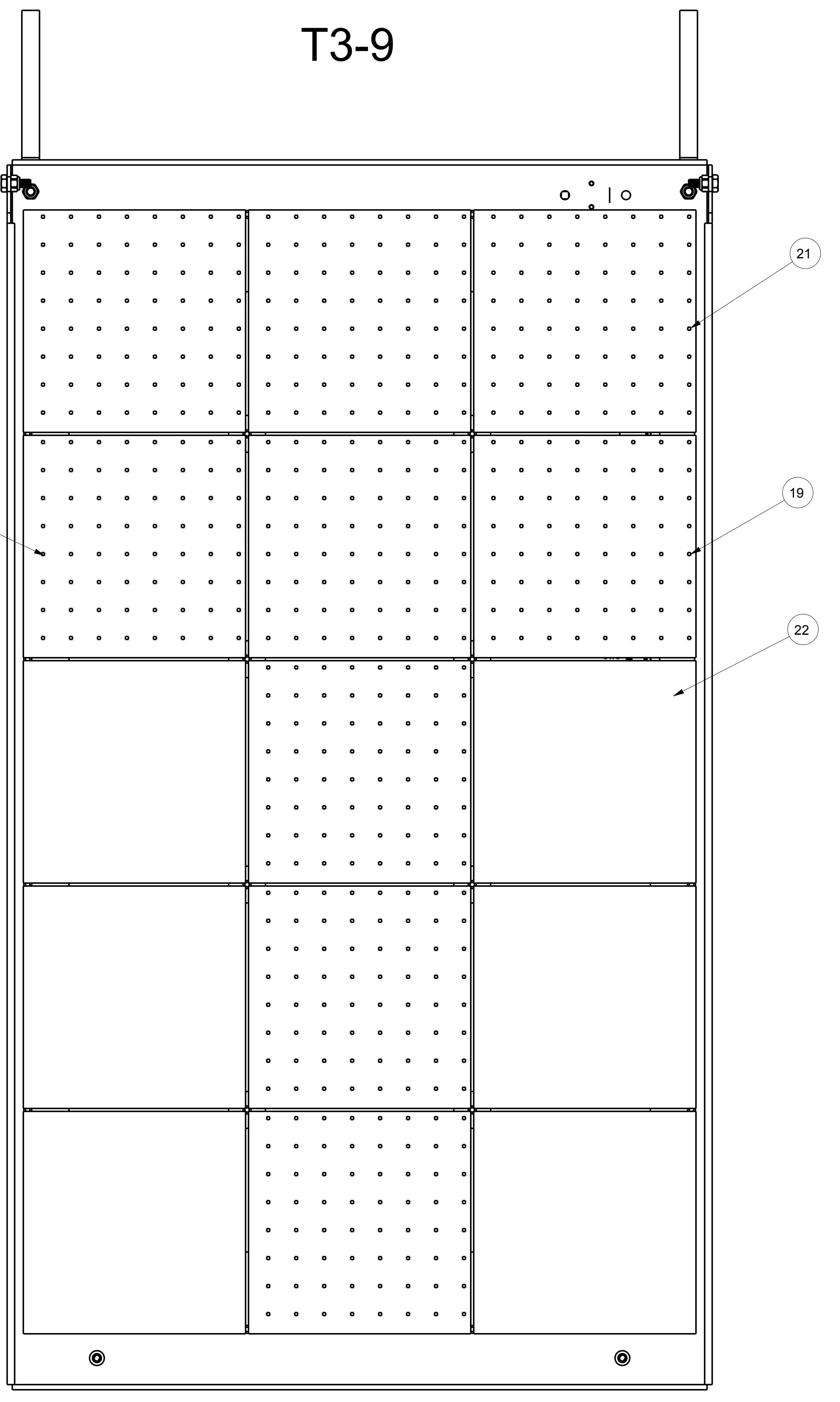
Revision	Description	Date	Drawn by:	Checked by:	Approved



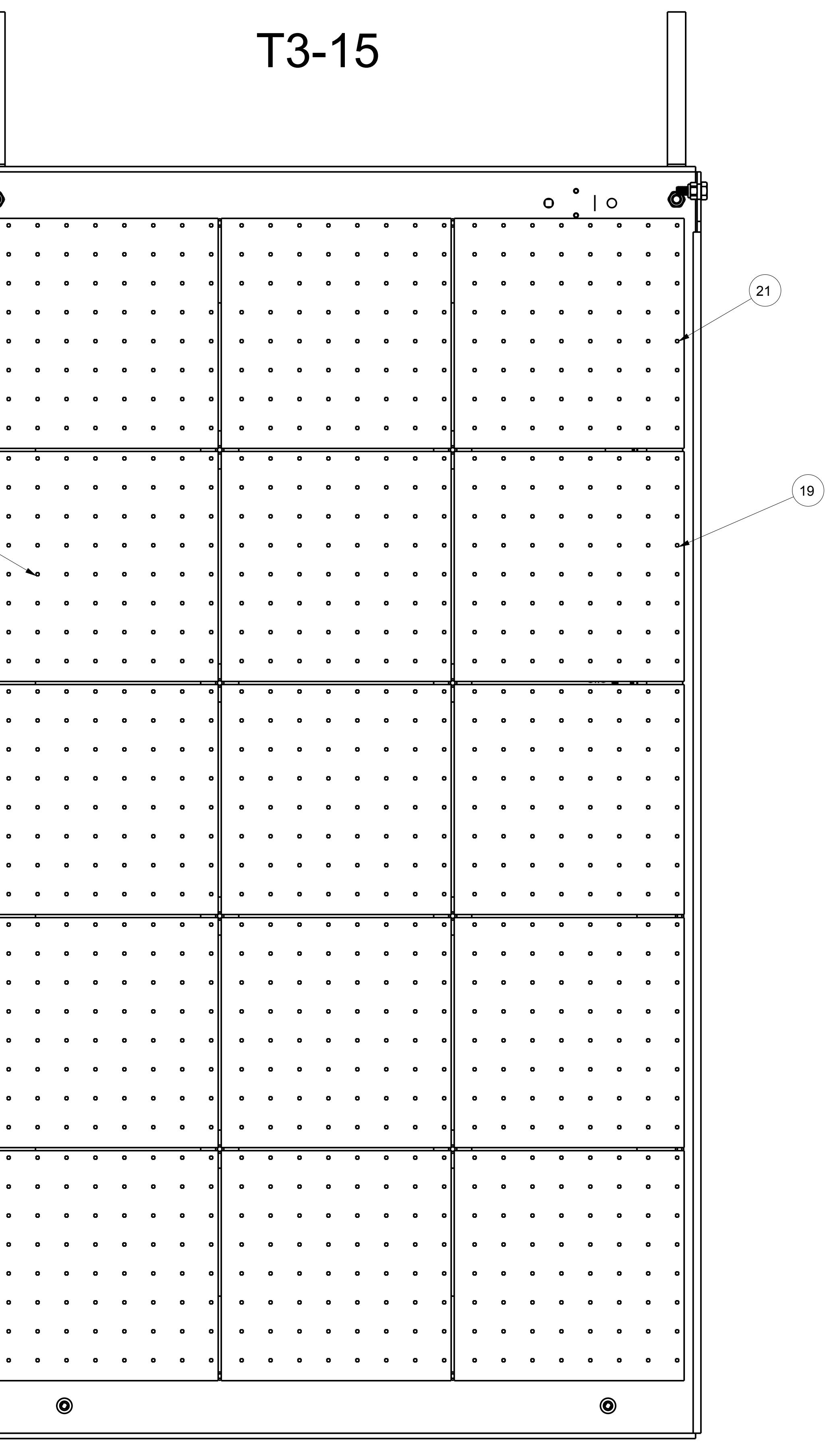


Position	Quantity	Description	Drawing Number	Model	Manufacturer	Supplier's. Part No.	Supplier
	1	Light Sensor Assembly	SG590619-101-01	ALL			
	1	Heater Assembly	SG590616-001-01	ALL			
	1	Mounting Plate	SG590620-200-01	ALL			
	1	Cable Clamp		ALL		310018	Bejoken AB
	2	Screw,ISO7049, ST2.9x13, zink plated		ALL			
	2	1/4 Turn Fastener		ALL		316411190	Aero Material
	2	Washer		ALL		326100040	Aero Material
	8	Anchor, SCFI, Snap-On, For Quick Tie		ALL		1516442	Ahlsell
	8	Quick Tie, T18R, Black, 104x2,5		ALL		1516055	Ahlsell
	1	Label, Yellow, Text: K16, 15x8		ALL		21302	Technotrade
	1	Label, Yellow, Text: K71, 15x8		ALL		21302	Technotrade
	4	Bolt, ISO 4017, M6x16, zink plated		ALL			
	4	Lock Nut, Din 985, M6, zink plated		ALL			
	2	Lock Washer		ALL			
	1	Ground Strap, A=16, L=200		ALL			
	1	DIN RAIL, NS 35/7,5 PERF	SG590616-100-01	ALL		55-097-57	ELFA
	2	Popnit BIG HEAD, 3,2x7,9		ALL			
	1	Back Plane, PCB		ALL			
	15	M3x8, DIN 7984, Zink Plated		ALL			
	15	Lock Washer, M3, DIN 6798		ALL			
	1	LED PCB, Half Y Left, Half R Right, 8x8		ALL		SGA908-211291LF	
	1	LED PCB, Half Y Right, Half R Left, 8x8		ALL		SGA908-211292LF	
	7	LED PCB, Y, 8x8		T3-9		SGA908-210658LF	
	6	LED PCB, BLIND		T3-9		SGA908-211356LF	
	13	LED PCB, Y, 8x8		T3-15		SGA908-210658LF	

-9



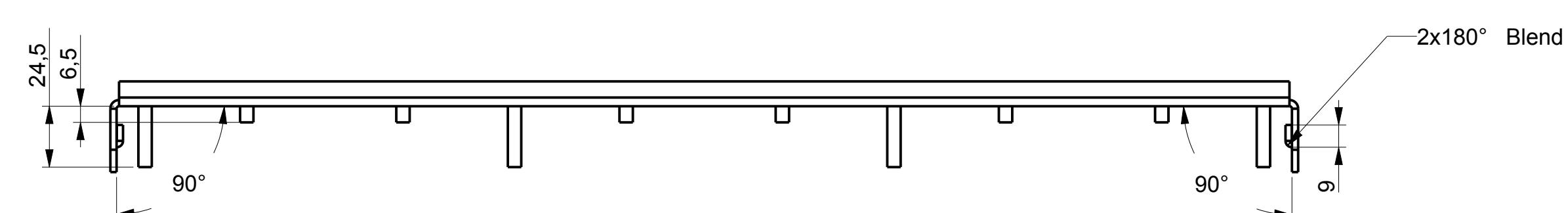
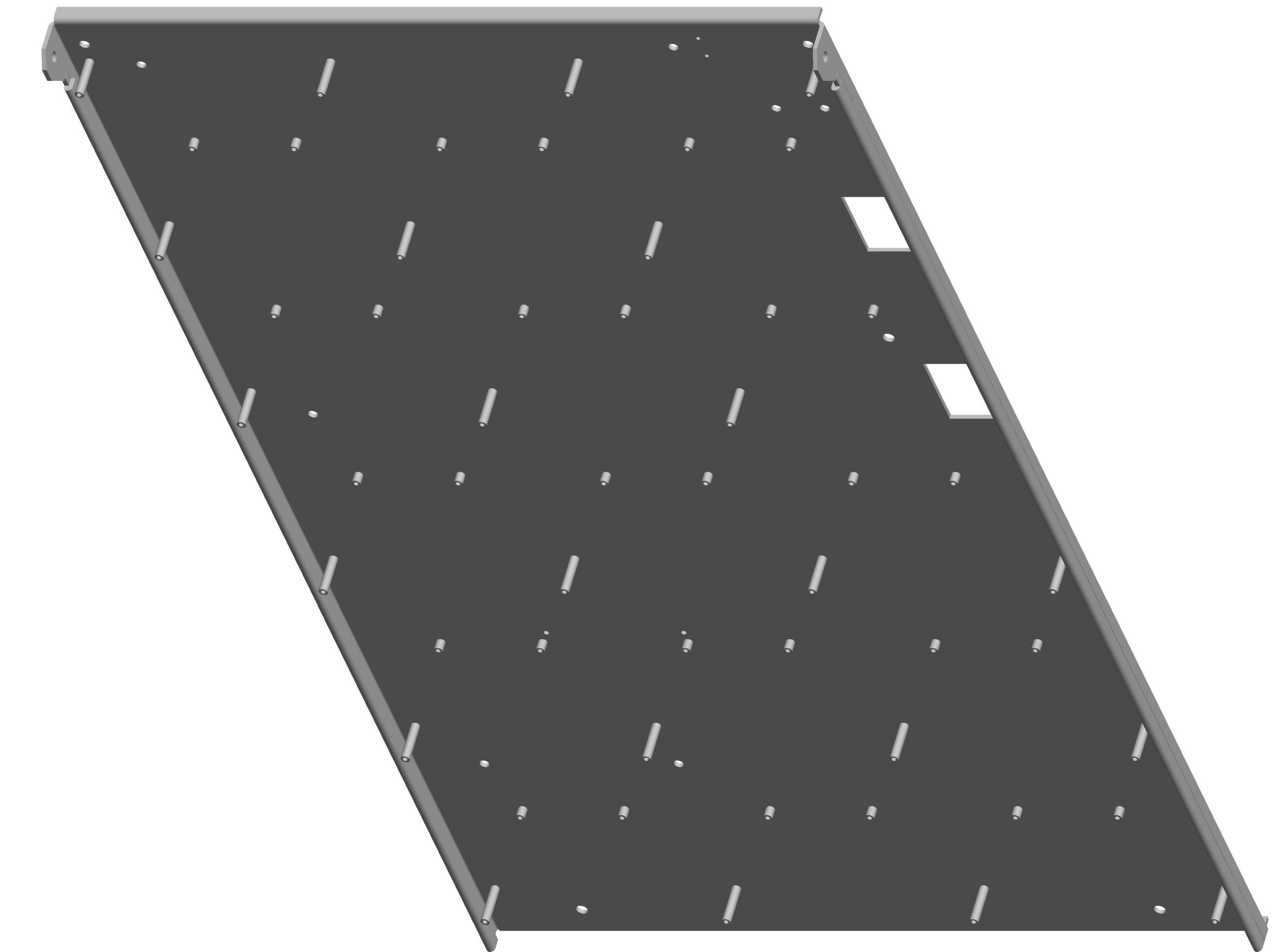
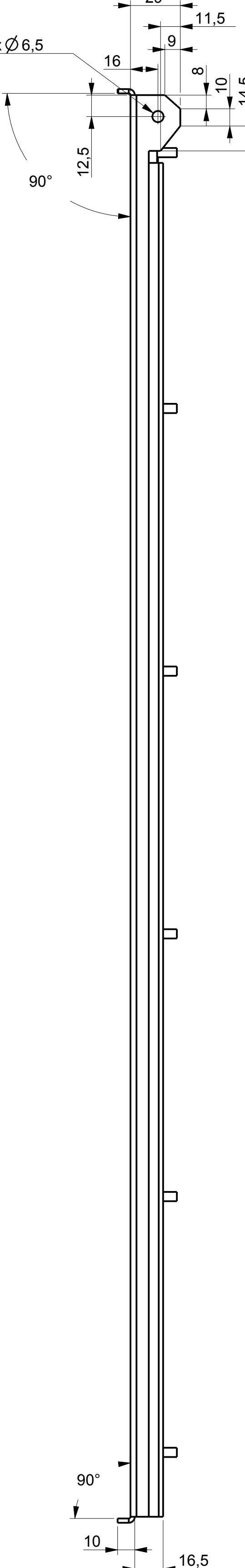
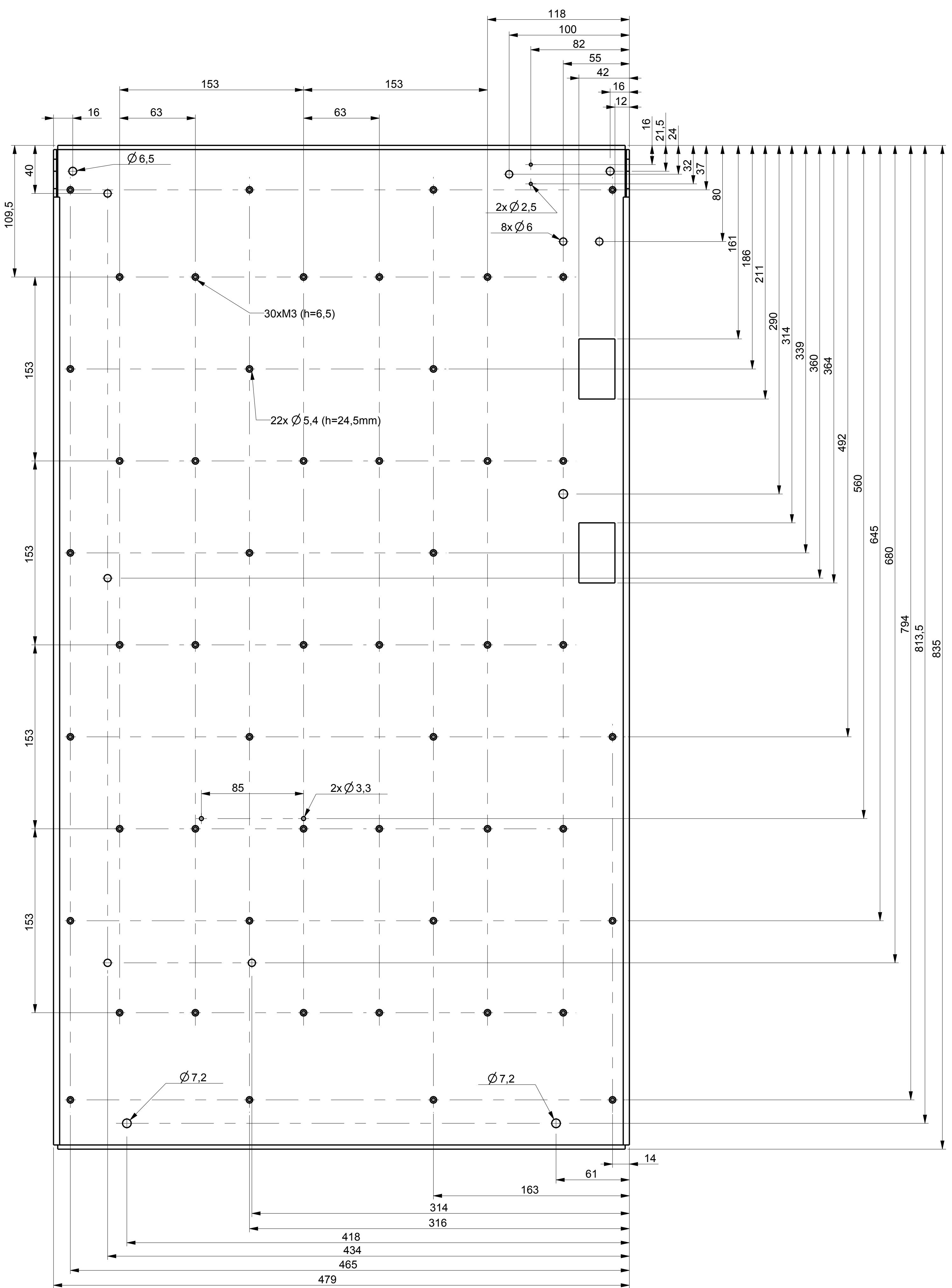
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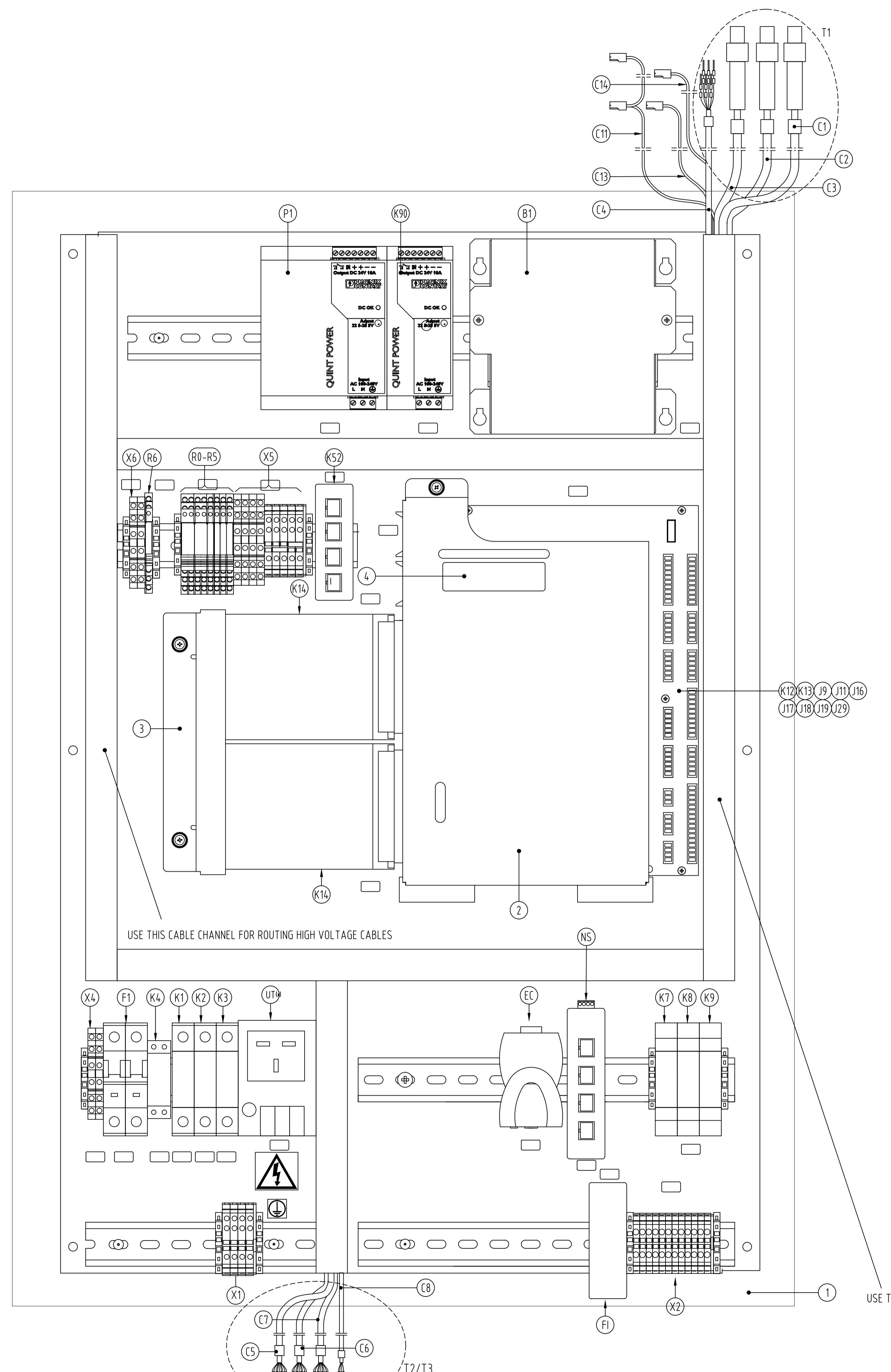


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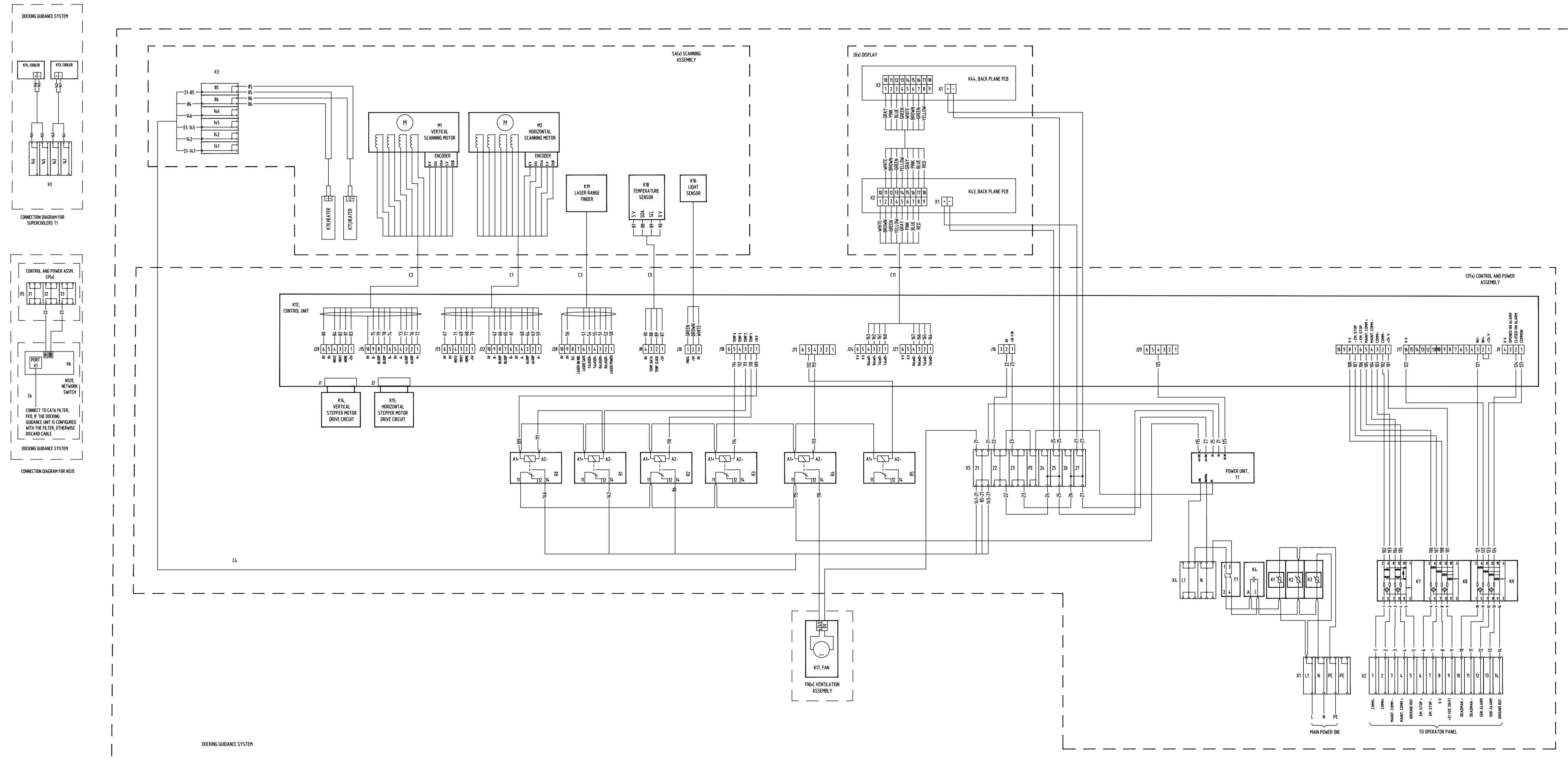
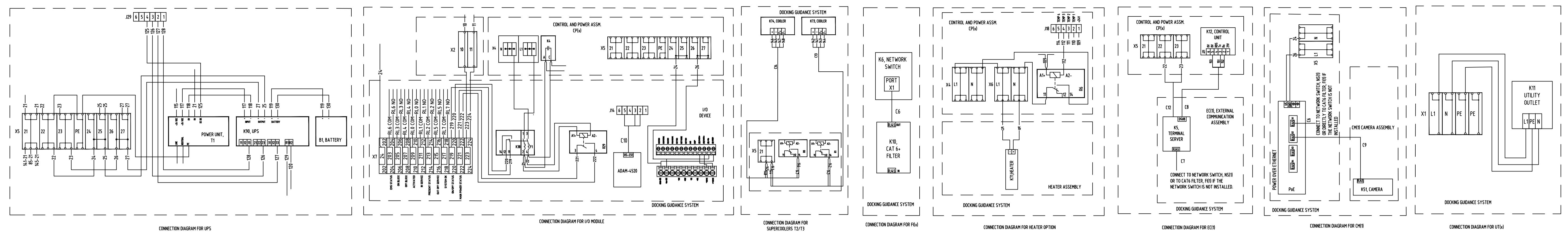
SCALE 0,500

						Gen. tolerance			
						Surface treatment			
						Basic material			
						Info			
2012-02-10	A.Strandberg		Number for LED-pcbs added	Drawn by: <b>A.Strandberg</b>	Date drawn: <b>2011.10.18</b>	Description <b>DISPLAY T3</b>			
2011-12-08	K.Johansson		BOM changed	Approved by:	Date approved:				
2011-11-15	A.Strandberg		BOM changed	Project No.	Drawing No. <b>590620-001-01</b>				
2011-10-21	A.Strandberg		Type of LED pcb for possition 20 changed		Rev.	Scale	Size	Sheet	
Issue date	Issue by	Issue checked by	Issue text			PE	0,333	A0	1(1 )

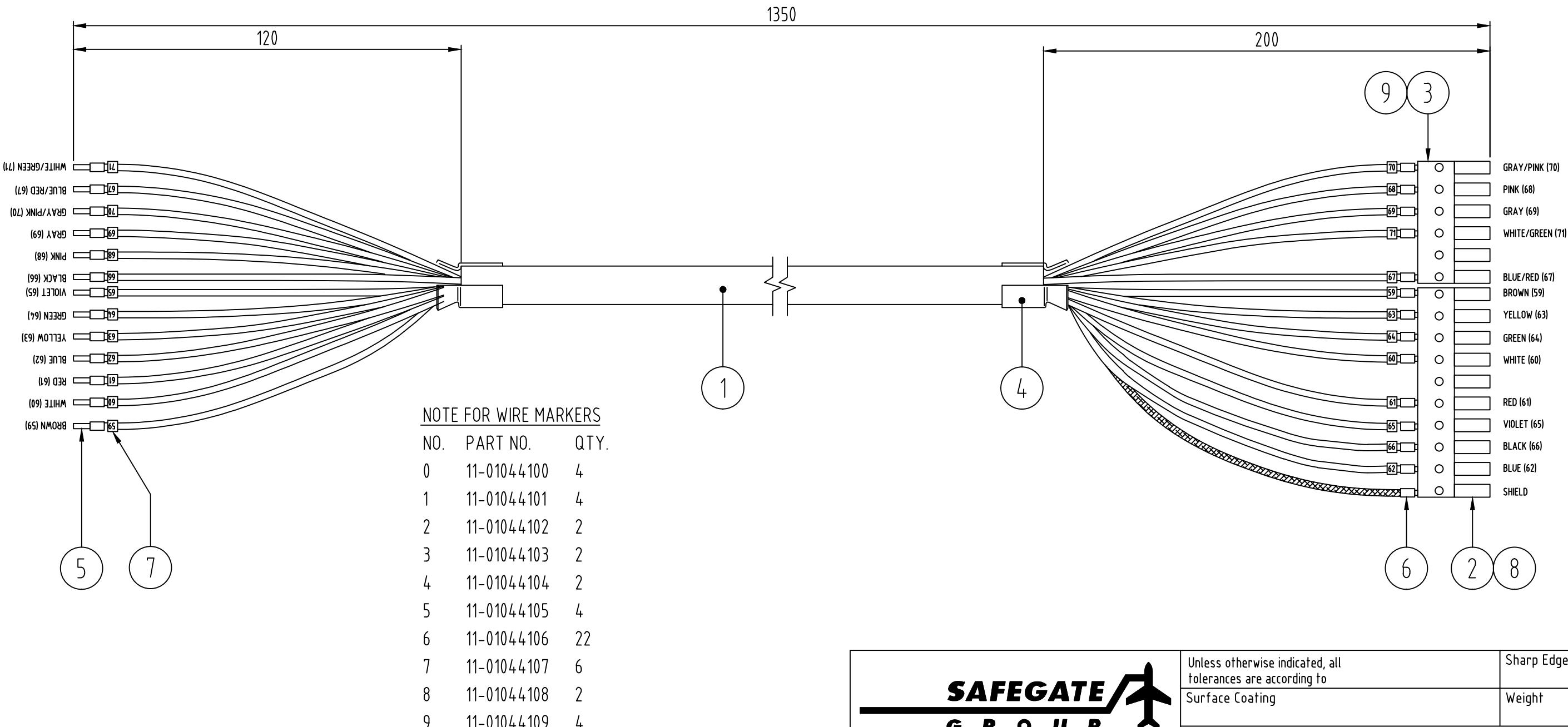




Item	Quantity	Description/Ratings	Standard/Option	T1/T2/T3	Drawing No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock No.	Supplier
B1	1	UPS-BAT/URLA/ 24DC/7.2AH	Option (UPS)	T1/T2/T3	2320319	PHOENIX CONTACT			
B2	1	Quint-Adapter/4	Option (UPS)	T1/T2/T3	2866857	PHOENIX CONTACT			
C11	1	COMMUNICATION CABLE	Standard	T1	SG590621-114-01				
	1	COMMUNICATION CABLE	Standard	T2/T3	SG590621-119-01				
C13	1	POWER CABLE ASSM., DISPLAY	Standard	T1/T2/T3	SG590621-112-01				
C14	1	POWER CABLE ASSM., DISPLAY	Standard	T1/T2	SG590621-113-01				
C1	1	CONTROL CABLE	Standard	T1	SG590621-116-01				
C2	1	CONTROL CABLE	Standard	T1	SG590621-117-01				
C3	1	CONTROL CABLE	Standard	T1	SG590621-118-01				
C4	1	POWER CABLE	Standard	T1	SG590621-111-01				
C5	1	CONTROL CABLE	Standard	T2/T3	SG590621-101-01				
C6	1	CONTROL CABLE	Standard	T2/T3	SG590621-102-01				
C7	1	CONTROL CABLE	Standard	T2/T3	SG590621-103-01				
C8	1	POWER CABLE	Standard	T2/T3	SG590621-104-01				
F1	1	CIRCUIT BREAKER	Standard	T1/T2/T3	MG24447	SCHNEIDER ELECTRIC			
J9	1	WIRING ASSEMBLY	Standard	T1/T2/T3	SG590621-105-01				
J11	1	WIRING ASSEMBLY	Standard	T1/T2/T3	SG590621-106-01				
J16	1	WIRING ASSEMBLY	Standard	T1/T2/T3	SG590621-107-01				
J17	1	WIRING ASSEMBLY	Standard	T1/T2/T3	SG590621-108-01				
J18	1	WIRING ASSEMBLY	Standard	T1/T2/T3	SG590621-110-01				
J19	1	WIRING ASSEMBLY	Standard	T1/T2/T3	SG590621-115-01				
J29	1	WIRING ASSEMBLY	Standard	T1/T2/T3	SG590621-120-01				
K1-K3	3	BASE UNIT, VAL-MS 230 BE	Standard	T1/T2/T3	2798844	PHOENIX CONTACT			
	3	PLUG-IN MODULE, VAL-MS 230 ST	Standard	T1/T2/T3	2817741	PHOENIX CONTACT			
K4	1	MAINS FILTER	Standard	T1/T2/T3	SG590621-109-01				
	1	OVERVOLTAGE PROTECTOR							
K7	1	PLUG-IN MODULE, PT5-HF-5 DC-ST	Standard	T1/T2/T3	2838762	PHOENIX CONTACT			
	1	BASE UNIT, PT 2X2-BE	Standard	T1/T2/T3	2839208	PHOENIX CONTACT			
	1	END STOP, CLIPFIX 35-5	Standard	T1/T2/T3	3022276	PHOENIX CONTACT			
	1	OVERVOLTAGE PROTECTOR							
K8-K9	2	BASE UNIT, PT 4x1-BE	Standard	T1/T2/T3	2839363	PHOENIX CONTACT			
	2	PLUG-IN MODULE, PT4X1-24DC-ST	Standard	T1/T2/T3	2838322	PHOENIX CONTACT			
	1	END STOP, CLIPFIX 35-5	Standard	T1/T2/T3	3022276	PHOENIX CONTACT			
K12	1	SAFEDOCK CONTROL UNIT	Standard	T1/T2/T3	590587				
K14	2	STEPPER MOTOR DRIVE CIRCUIT	Standard	T1/T2/T3	590131				
K90	1	QUINT-UPS/ 24DC/ 24DC/20	Option (UPS)	T1/T2	2320241	PHOENIX CONTACT			
	1	QUINT-UPS/ 24DC/ 24DC/20	Option (UPS)	T3	2320238	PHOENIX CONTACT			
	1	RELAYS							
R0-R1	2	PLC RELAY, PLC-RSC- 24DC/21HC	Standard	T1/T2/T3	2967620	PHOENIX CONTACT			
	2	BRIDGE, FBST 500-PLC RD	Standard	T1/T2/T3	2966786	PHOENIX CONTACT			
	1	TERMINAL MARKER, ZB 10, SO/CMS R0-R1	Standard	T1/T2/T3	1050525	PHOENIX CONTACT			
	1	RELAYS							
R2-R5	4	PLC RELAY, PLC-RSC-24DC/21	Standard	T1/T2/T3	2966171	PHOENIX CONTACT			
	1	BRIDGE, FBST 500-PLC RD	Standard	T1/T2/T3	2966786	PHOENIX CONTACT			
	1	TERMINAL MARKER, ZB 6, SO/CMS R2-R5	Standard	T1/T2/T3	1050499	PHOENIX CONTACT			
	1	END STOP, CLIPFIX 35-5	Standard	T1/T2/T3	3022276	PHOENIX CONTACT			
	1	RELAYS							
R6	1	PLC RELAY, PLC-RSC-24DC/21	Option	T2/T3	2966171	PHOENIX CONTACT			
	1	TERMINAL MARKER, ZB 6, SO/CMS R2-R5	Option	T2/T3	1050499	PHOENIX CONTACT			
	1	END STOP, CLIPFIX 35-5	Option	T2/T3	3022276	PHOENIX CONTACT			
P1	1	QUINT-PS/1AC/24DC/40	Standard	T1/T2	2866789	PHOENIX CONTACT			
	1	QUINT-PS/1AC/24DC/20	Standard	T3	2866776	PHOENIX CONTACT			
	1	X1, TERMINAL CONTACT GROUP							
	1	TERMINAL CONTACT, UT 4-TWIN	Standard	T1/T2/T3	3044364	PHOENIX CONTACT			
	1	TERMINAL CONTACT, UT 4-TWIN BU	Standard	T1/T2/T3	3044500	PHOENIX CONTACT			
	2	TERMINAL CONTACT, UT 4-TWIN PE	Standard	T1/T2/T3	3044380	PHOENIX CONTACT			
	1	END COVER, D-UT 2.5/4-TWIN	Standard	T1/T2/T3	3047141	PHOENIX CONTACT			
	2	END STOP, CLIPFIX 35-5	Standard	T1/T2/T3	3022276	PHOENIX CONTACT			
X1	14	TERMINAL CONTACT GROUP							
	1	TERMINAL CONTACT, UT 2.5	Standard	T1/T2/T3	3044076	PHOENIX CONTACT			
	1	END COVER, D-UT 2.5/10	Standard	T1/T2/T3	3047028	PHOENIX CONTACT			
	2	END STOP, CLIPFIX 35-5	Standard	T1/T2/T3	3022276	PHOENIX CONTACT			
X2	2	TERMINAL MARKER, ZB5, NOS. 1-14	Standard	T1/T2/T3	1050017	PHOENIX CONTACT			
	2	TERMINAL CONNECTOR, DIKD 1.5-PV	Standard	T1/T2/T3	2715092	PHOENIX CONTACT			
	1	END STOP, CLIPFIX 35-5	Standard	T1/T2/T3	3022276	PHOENIX CONTACT			
X4	4	TERMINAL CONTACT GROUP							
	1	TERMINAL CONTACT, UT 4-TWIN	Standard	T1/T2/T3	3044364	PHOENIX CONTACT			
	1	TERMINAL CONTACT, UT 4-TWIN-PE	Standard	T1/T2/T3	3044380	PHOENIX CONTACT			
	1	END, COVER, D-UT 2.5/4-TWIN	Standard	T1/T2/T3	3047141	PHOENIX CONTACT			
X5	2	BRIDGE, PBS 2-6	Standard	T1/T2/T3	3030336	PHOENIX CONTACT			
	2	TERMINAL MARKER, ZB6, NOS. 24-27	Standard	T1/T2/T3	1051016	PHOENIX CONTACT			
	3	TERMINAL MARKER, ZB6, LGS: PE	Standard	T1/T2/T3	2715092	PHOENIX CONTACT			
	3	TERMINAL CONNECTOR, DIKD 1.5-PV	Standard	T1/T2/T3	1051016	PHOENIX CONTACT			
	1	END STOP, CLIPFIX 35-5	Standard	T1/T2/T3	3022276	PHOENIX CONTACT			
X6	4	TERMINAL CONTACT GROUP							
	2	TERMINAL CONNECTOR, DIKD 1.5-PV	Option (Heater)	T2/T3	2715092	PHOENIX CONTACT			
	1	END STOP, CLIPFIX 35-5	Option (Heater)	T2/T3	3022276	PHOENIX CONTACT			
	1	TERMINAL MARKER, ZB 6, LGS: L1, N	Option (Heater)	T2/T3	1051414	PHOENIX CONTACT			
	1	WIRING MATERIALS FOR ITEMS NOT SPECIFIED ELSEWHERE							
	1	MAINS WIRE, UL 1007/A569, AWG 16, BROWN	Standard						
	1	NEUTRAL WIRE, UL 1007/A569, AWG 16, BLUE	Standard						
	1	GROUND WIRE, UL 1007/A569, AWG 16, YELLOW/GREEN	Standard						
	1	WIRE WITH END MARKING: (22-24) UL1007/1569, AWG 20, BLACK	Standard						
	1	WIRES WITH END MARKINGS: (23-26), (115-115), (120-120), (129-129) UL1007/1569, AWG 20, RED	Standard						
	1	WIRES WITH END MARKINGS: (25-25), (118-118), ELECTRICAL WIRE, UL1007/1569, AWG 16, BLACK	Standard						
	1	WIRES WITH END MARKINGS: (27-27), (117-117), UL1007/1569, AWG 16, RED	Standard						
	1	BOOTLACE FERRULE FOR AWG 20 WIRE: H 0.5/14	Standard						
	1	BOOTLACE FERRULE FOR AWG 16 WIRE: H 1.5/14	Standard						
	1	BOOTLACE FERRULE FOR TWO AWG 16 WIRES: H 2x1.5	Standard						
	1	BOOTLACE FERRULE FOR AWG 10 WIRE: H 6/20 (WIRES FROM BATTERY, B1)	Standard						
	1	WIRE MARKERS: PARTEX PA02 OR EQV.	Standard						
	1	NUMBERS AS PER CONNECTION DIAGRAM	Standard						
	1	CONTROL & POWER MOUNTING PLATE	Standard	T1/T2/T3	SG590621-203-01				
	2	CU-COVER	Standard	T1/T2/T3	NPP 915607				
	3	STEPPER MOTOR CARD HOLDER							



Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, CYLIYCY, 8 x 2 x 0.25						
2	1	CONNECTOR, MC1.5/10-ST-3.81			1803659	PHOENIX CONTACT, GERMANY	1803659	PHOENIX CONTACT, SWEDEN
3	1	CONNECTOR, MC1.5/6-ST-3.81			1803617	PHOENIX CONTACT, GERMANY	1803617	PHOENIX CONTACT, SWEDEN
4	2	HEAT SHRINKABLE TUBING, Ø9.5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA, SWEDEN
5	26	CRIMP LUG, H 0.25/12			9025780000	WEIDMÜLLER, GERMANY	9025780000	WEIDMÜLLER, SWEDEN
6	1	CRIMP LUG, H 1.5/14			9026090000	WEIDMÜLLER, GERMANY	9026090000	WEIDMÜLLER, SWEDEN
7		WIRE MARKERS, PARTEX PA02			SEE NOTE	WEIDMÜLLER, GERMANY	SEE NOTE	WEIDMÜLLER, SWEDEN
8	1	LABEL, SK 3,81/2,8: S0, TEXT: J22			0805056	PHOENIX CONTACT, GERMANY	0805056	PHOENIX CONTACT, SWEDEN
9	1	LABEL, SK 3,81/2,8: S0, TEXT: J13			0805056	PHOENIX CONTACT, GERMANY	0805056	PHOENIX CONTACT, SWEDEN



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to Sharp Edges

Surface Coating Weight

CONTROL CABLE  
CU / VERTICAL SCANNING MOTOR, T2/T3

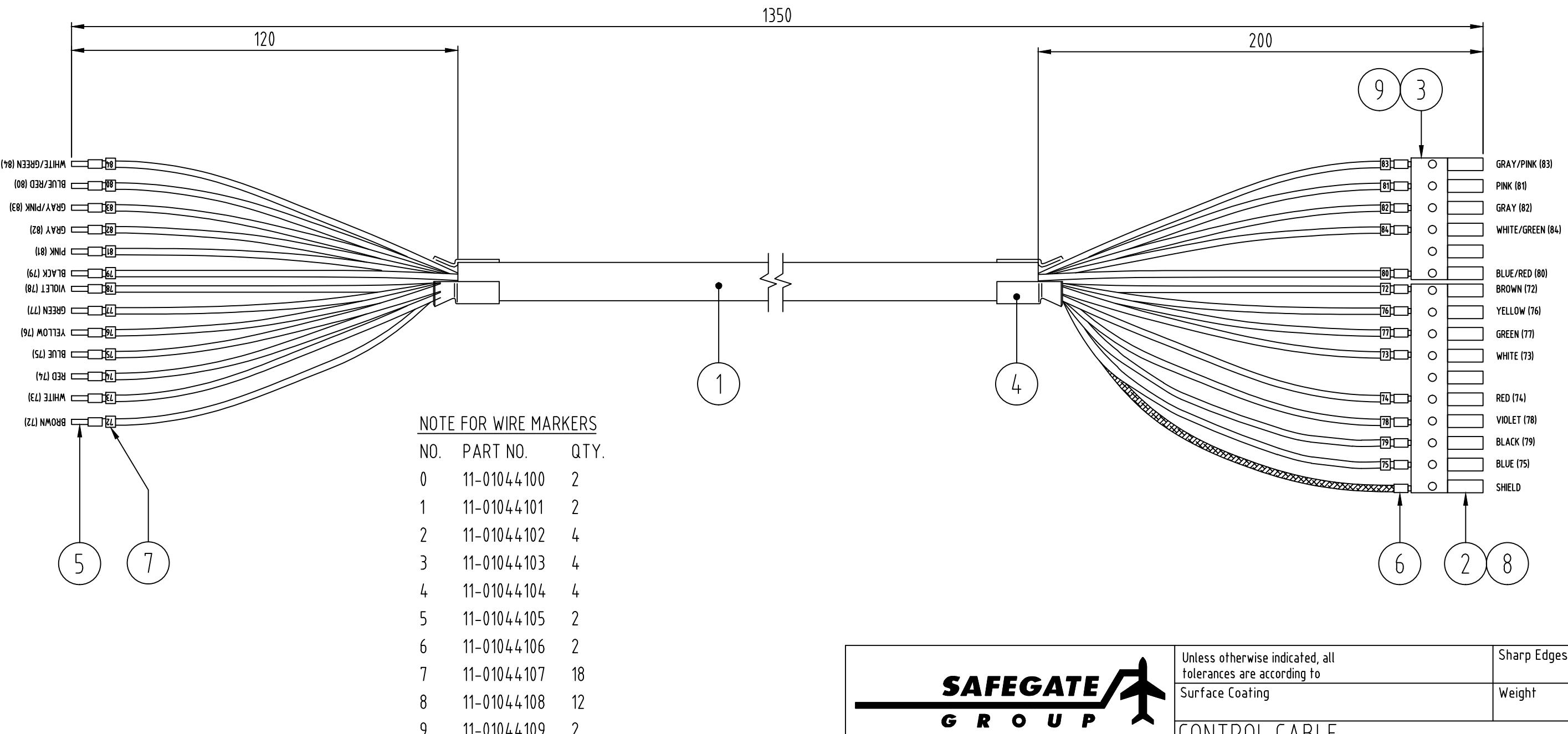
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:	
App. by:	Date approved:	Project No.:	

Drawing No.  
SG590621-101-01

Rev. | Sheet  
1 of 1 | Scale  
NO SCALE

Revision	Description	Date	Drawn by:	Checked by:	Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, CYLIYCY, 8 x 2 x 0.25						
2	1	CONNECTOR, MC1.5/10-ST-3.81			1803659	PHOENIX CONTACT, GERMANY	1803659	PHOENIX CONTACT, SWEDEN
3	1	CONNECTOR, MC1.5/6-ST-3.81			1803617	PHOENIX CONTACT, GERMANY	1803617	PHOENIX CONTACT, SWEDEN
4	2	HEAT SHRINKABLE TUBING, Ø9.5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA, SWEDEN
5	26	CRIMP LUG, H 0.25/12			9025780000	WEIDMÜLLER, GERMANY	9025780000	WEIDMÜLLER, SWEDEN
6	1	CRIMP LUG, H 1.5/14			9026090000	WEIDMÜLLER, GERMANY	9026090000	WEIDMÜLLER, SWEDEN
7		WIRE MARKERS, PARTEX PA02			SEE NOTE	WEIDMÜLLER, GERMANY	SEE NOTE	WEIDMÜLLER, SWEDEN
8	1	LABEL, SK 3,81/2,8: SO, TEXT: J15			0805056	PHOENIX CONTACT, GERMANY	0805056	PHOENIX CONTACT, SWEDEN
9	1	LABEL, SK 3,81/2,8: SO, TEXT: J20			0805056	PHOENIX CONTACT, GERMANY	0805056	PHOENIX CONTACT, SWEDEN



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to Sharp Edges

Surface Coating Weight

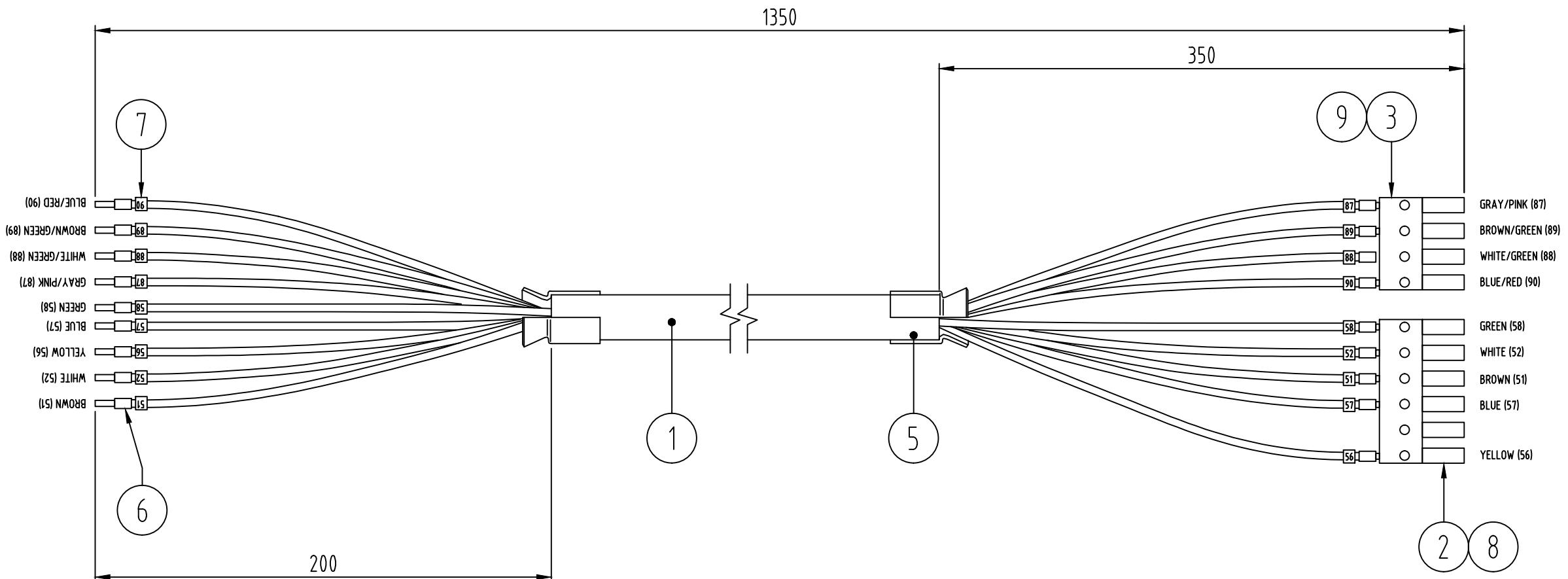
CONTROL CABLE  
CU / HORIZONTAL SCANNING MOTOR, T2/T3

Drawn by: A.S. Date drawn: 2011-11-16 Checked by: App. by: Date approved: Project No.:

Drawing No. SG590621-102-01 Rev. Sheet Scale  
1 of 1 NO SCALE

Revision	Description	Date	Drawn by:	Checked by:	Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, CYLIYCY, 8 x 2 x 0.25						
2	1	CONNECTOR, MC1.5/6-ST-3.81			1803617	PHOENIX CONTACT, GERMANY	1803617	PHOENIX CONTACT, SWEDEN
3	1	CONNECTOR, MC1.5/4-ST-3.81			1803594	PHOENIX CONTACT, GERMANY	1803594	PHOENIX CONTACT, SWEDEN
5	2	HEAT SHRINKABLE TUBING, Ø9.5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA, SWEDEN
6	18	CRIMP LUG, H 0.25/12			9025780000	WEIDMÜLLER, GERMANY	9025780000	WEIDMÜLLER, SWEDEN
7		WIRE MARKERS, PARTEX PA02			SEE NOTE	WEIDMÜLLER, GERMANY	SEE NOTE	WEIDMÜLLER, SWEDEN
8	1	LABEL, SK 3,81/2,8: S0, TEXT: J12			0805056	PHOENIX CONTACT, GERMANY	0805056	PHOENIX CONTACT, SWEDEN
9	1	LABEL, SK 3,81/2,8: S0, TEXT: J8			0805056	PHOENIX CONTACT, GERMANY	0805056	PHOENIX CONTACT, SWEDEN



#### NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
0	11-01044100	4
2	11-01044102	2
5	11-01044105	10
6	11-01044106	2
7	11-01044107	4
8	11-01044108	10
9	11-01044109	4



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to Sharp Edges

Surface Coating Weight

CONTROL CABLE  
CU / LASER RANGE FINDER - TEMP. SENSOR, T2/T3

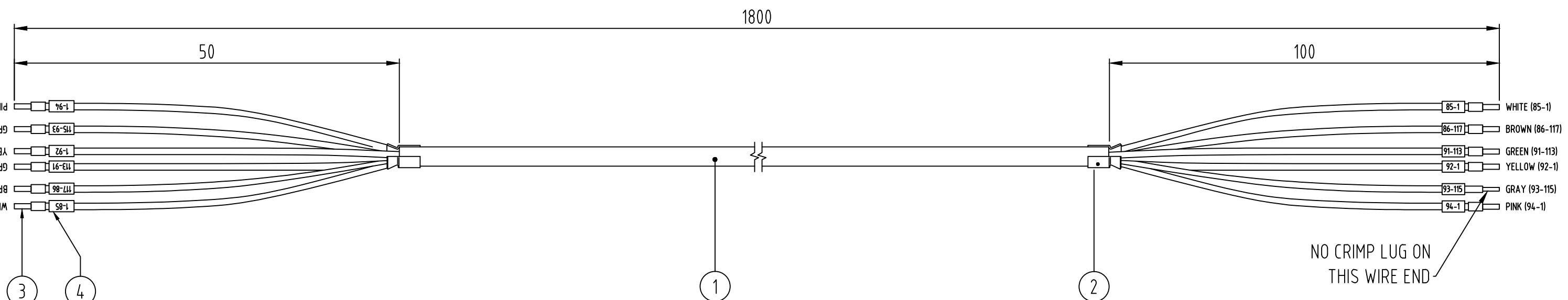
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:	
App. by:	Date approved:	Project No.:	

Drawing No.  
SG590621-103-01

Rev. | Sheet  
1 of 1 | NO SCALE

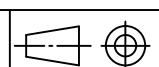
Revision	Description	Date	Drawn by:	Checked by:	Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, LIYY, 6 x 0.5					7853060	AB NOVUM, SWEDEN
2	2	HEAT SHRINKABLE TUBING, Ø9.5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA, SWEDEN
3	11	CRIMP LUG, H 0.5/14			9026060000	WEIDMÜLLER, GERMANY	9026060000	WEIDMÜLLER, SWEDEN
4		WIRE MARKERS, PARTEX PA02			SEE NOTE	WEIDMÜLLER, GERMANY	SEE NOTE	WEIDMÜLLER, SWEDEN

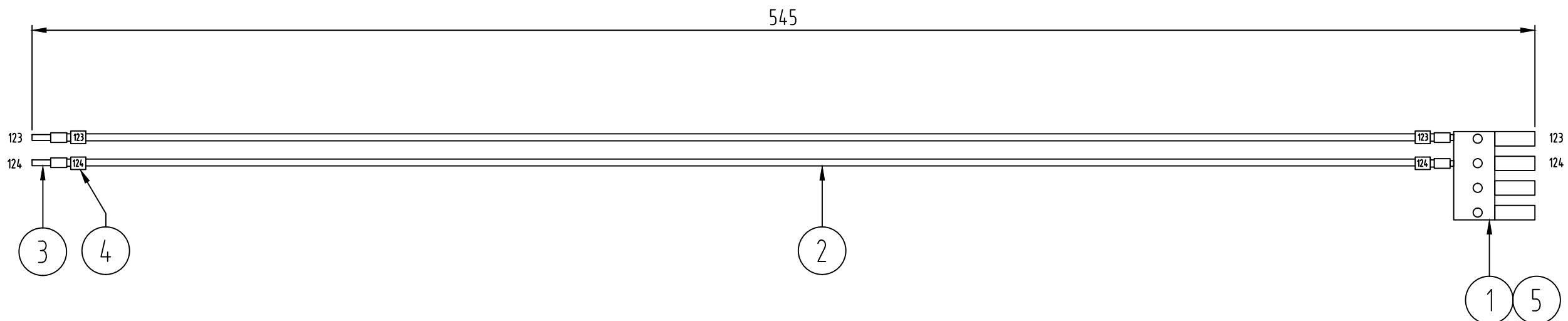


#### NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
-	11-01044561	12
1	11-01044101	20
2	11-01044102	2
3	11-01044103	4
4	11-01044104	2
5	11-01044105	4
6	11-01044106	2
7	11-01044107	2
8	11-01044108	4
9	11-01044109	8

<b>SAFE GATE</b>  <b>G R O U P</b> Safegate International AB MALMÖ, SWEDEN				Unless otherwise indicated, all tolerances are according to			Sharp Edges
				Surface Coating			Weight
POWER CABLE DEFROSTER / HEATER/ LASER COOLING FAN, T2/T3							
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:			Drawing No. SG590621-104-01		
App. by:	Date approved:	Project No.:					
Date	Drawn by:	Checked by:	Approved	Rev.	Sheet	Scale	
Revision	Description			1 of 1			
NO SCALE							

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CONNECTOR, MC1.5/4-ST-3.81			1803594	PHOENIX CONTACT		
2		ELECTRICAL WIRE, UL1007/1569, RED, AWG 20						
3	4	BOOTLACE FERRULE, H 0.5/14					9026060000	WEIDMÜLLER
4		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
5	1	LABEL, SK 3,81/2,8: SO, TEXT: J9			0805056	PHOENIX CONTACT		



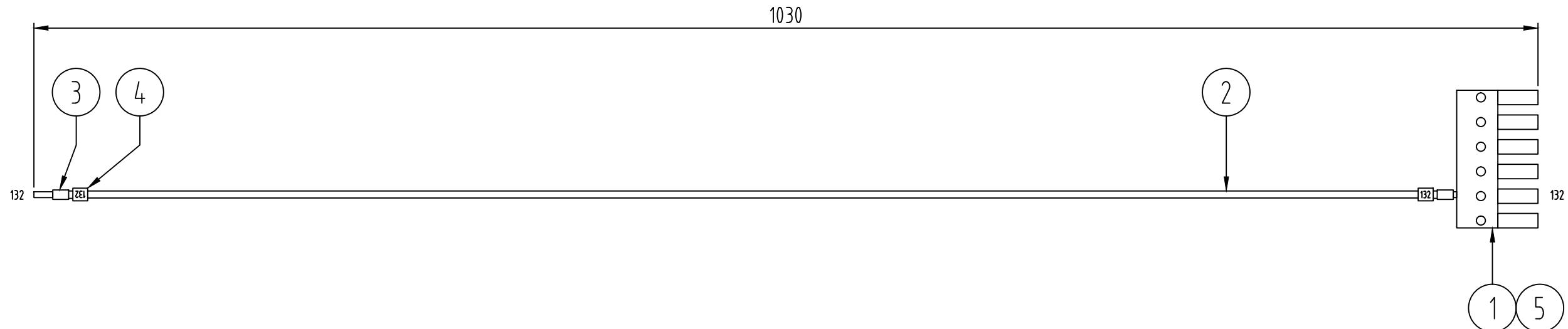
NOTE FOR WIRE MARKERS

NO. PART NO. QTY.

1	11-01044101	4
2	11-01044102	4
3	11-01044103	2
4	11-01044104	2

<b>SAFE GATE</b> G R O U P			Unless otherwise indicated, all tolerances are according to		Sharp Edges
			Surface Coating		Weight
WIRING ASSEMBLY					
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:			
App. by:	Date approved:	Project No.:	Drawing No. SG590621-105-01		
			Rev.	Sheet 1 of 1	Scale NO SCALE

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CONNECTOR, MC1.5/6-ST-3.81			1803617	PHOENIX CONTACT		
2		ELECTRICAL WIRE, UL1007/1569, RED, AWG 20						
3	2	BOOTLACE FERRULE, H 0.5/14					9026060000	WEIDMÜLLER,
4		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER,
5	1	LABEL, SK 3,81/2,8: SO, TEXT: J11			0805056	PHOENIX CONTACT,		

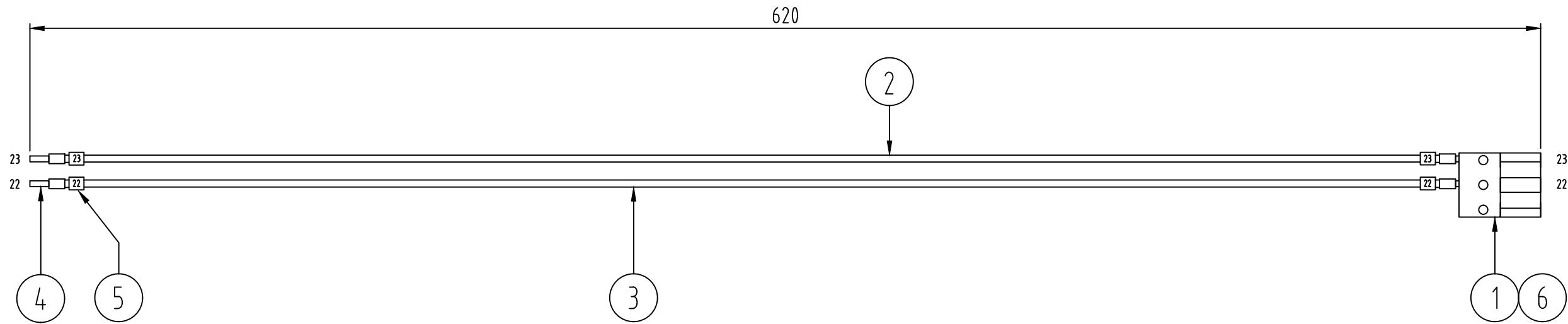


NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
1	11-01044101	2
2	11-01044102	2
3	11-01044103	2

<b>SAFE GATE</b>			Unless otherwise indicated, all tolerances are according to		Sharp Edges
			Surface Coating		Weight
WIRING ASSEMBLY					
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:			
App. by:	Date approved:	Project No.:	Drawing No. SG590621-106-01		
			Rev.	Sheet	Scale
				1 of 1	NO SCALE

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CONNECTOR, MSTB 2.5/3-ST-5.08			1757022	PHOENIX CONTACT		
2	1	ELECTRICAL WIRE, UL1007/1569, AWG 16, RED						
3	1	ELECTRICAL WIRE, UL1007/1569, AWG 16, BLACK						
4	4	BOOTLACE FERRULE, H 1.5/14					9026090000	WEIDMÜLLER
5		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
6	1	LABEL, SK 5.08/3,8: SO, TEXT: J16			0805085	PHOENIX CONTACT		

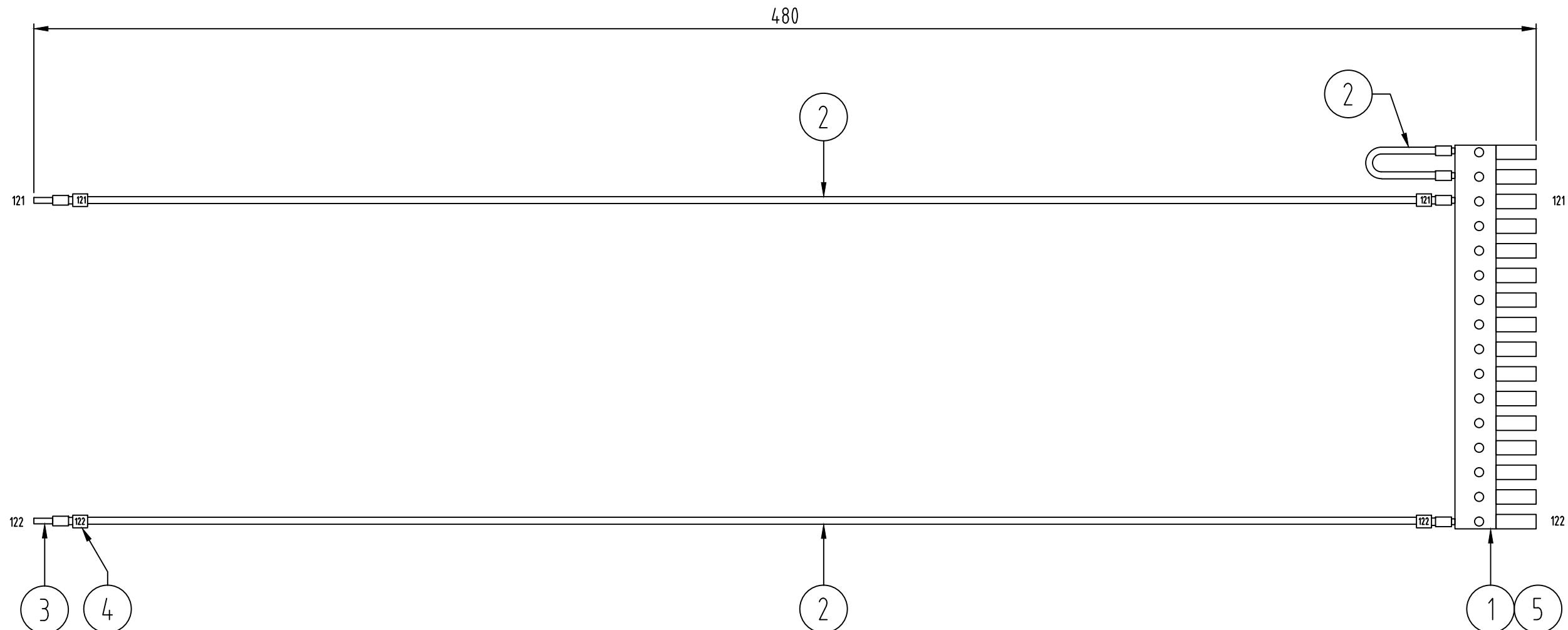


NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
2	11-01044102	6
3	11-01044103	2

<b>SAFE GATE</b>			Unless otherwise indicated, all tolerances are according to Surface Coating		Sharp Edges
Safegate International AB MALMÖ, SWEDEN			WIRING ASSEMBLY		Weight
Drawn by: A.S	Date drawn: 2011-11-11	Checked by:			
App. by:	Date approved:	Project No.:	Drawing No. SG590621-107-01		Rev.   Sheet 1 of 1   Scale NO SCALE

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CONNECTOR, MC1.5/16-ST-3.81			1803714	PHOENIX CONTACT		
2		ELECTRICAL WIRE, UL1007/1569, RED, AWG 20						
3	6	BOOTLACE FERRULE, H 0.5/14					9026060000	WEIDMÜLLER
4		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
5	1	LABEL, SK 3,81/2,8: SO, TEXT: J17			0805056	PHOENIX CONTACT		

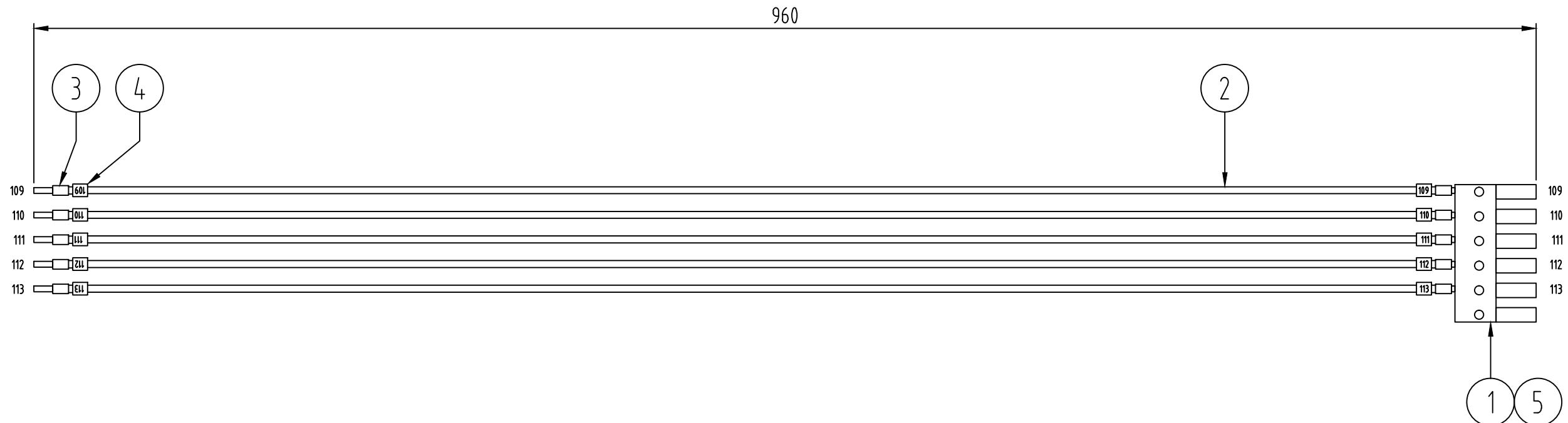


NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
1	11-01044101	6
2	11-01044102	6

<b>SAFE GATE</b>			Unless otherwise indicated, all tolerances are according to		Sharp Edges
			Surface Coating		Weight
WIRING ASSEMBLY					
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:			
App. by:	Date approved:	Project No.:	Drawing No. SG590621-108-01		
			Rev.	Sheet	Scale
				1 of 1	NO SCALE

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CONNECTOR, MC1.5/6-ST-3.81			1803617	PHOENIX CONTACT		
2		ELECTRICAL WIRE, UL1007/1569, RED, AWG 20						
3	10	BOOTLACE FERRULE, H 0.5/14					9026060000	WEIDMÜLLER
4		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
5	1	LABEL, SK 3,81/2,8: SO, TEXT: J18			0805056	PHOENIX CONTACT		

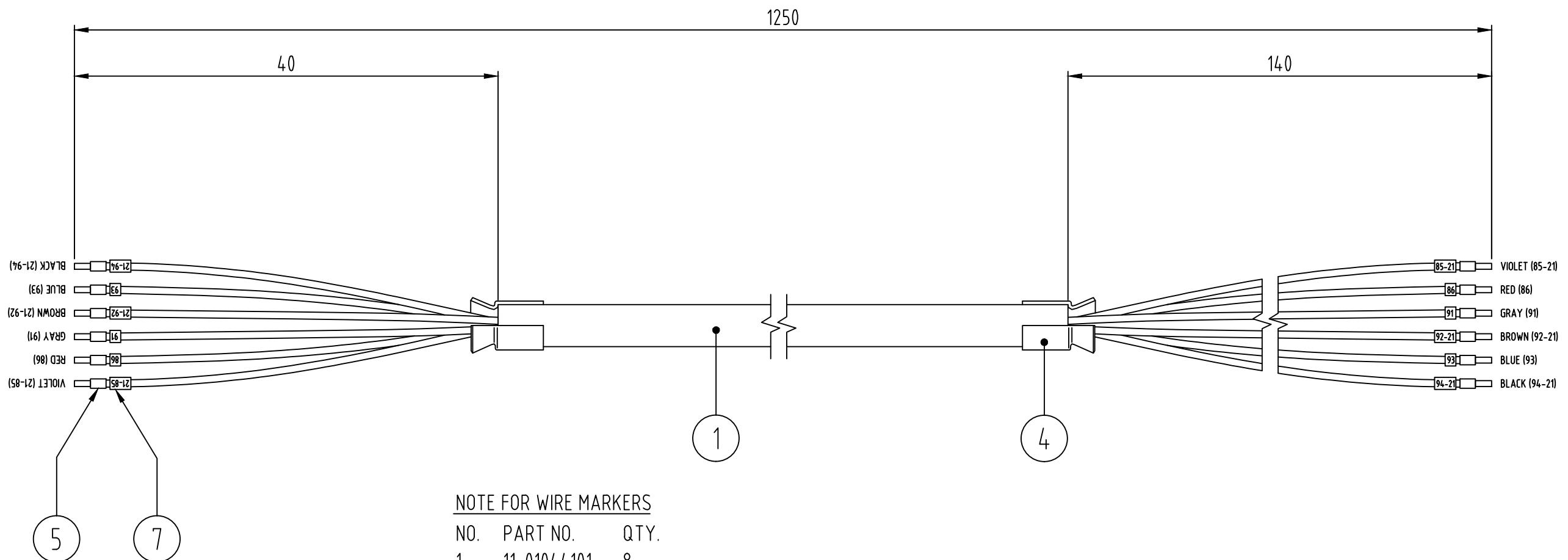


#### NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
0	11-01044100	4
1	11-01044101	20
2	11-01044102	2
3	11-01044103	2
9	11-01044109	2

<b>SAFE GATE</b>			Unless otherwise indicated, all tolerances are according to		Sharp Edges
			Surface Coating		Weight
WIRING ASSEMBLY					
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:			
App. by:	Date approved:	Project No.:			Drawing No. SG590621-110-01
			Rev.	Sheet 1 of 1	Scale NO SCALE

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, ÖLFLEX CLASSIC 100 8G0,75			0010 027	LAPP KABEL		
2	2	HEAT SHRINKABLE TUBING, Ø9,5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA, SWEDEN
3	12	BOOTLACE FERRULE, H 0,75/14					9026070000	WEIDMÜLLER
4		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER



NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
1	11-01044101	8
2	11-01044102	8
3	11-01044103	2
4	11-01044104	2
5	11-01044105	4
6	11-01044106	2
8	11-01044108	4
9	11-01044109	8



Safegate International AB  
MALMÖ, SWEDEN

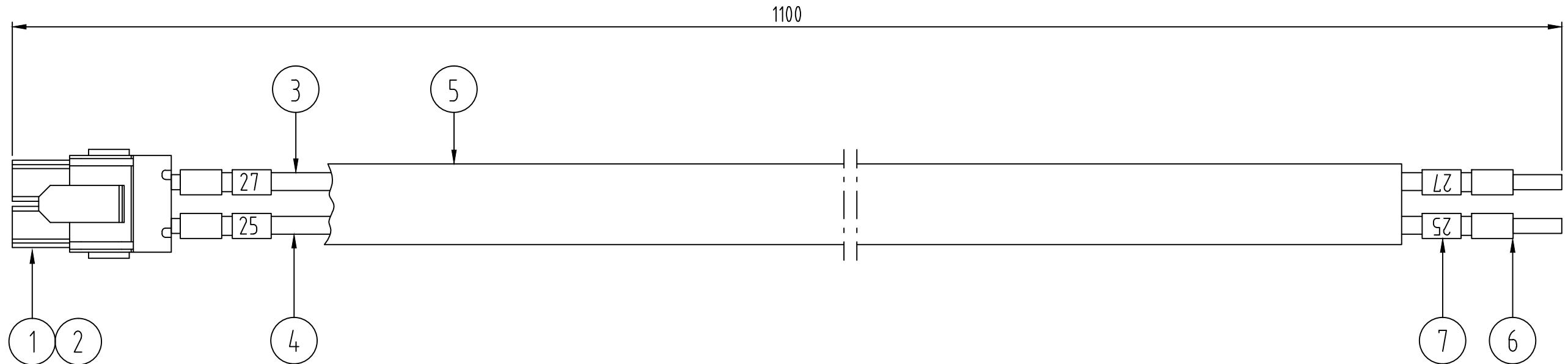
Unless otherwise indicated, all tolerances are according to	Sharp Edges
Surface Coating	Weight

POWER CABLE  
T1

Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:	
App. by:	Date approved:	Project No.:	

Drawing No. SG590621-111-01	Rev.	Sheet 1 of 1	Scale NO SCALE
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Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	RECEPTACLE HOUSING, MINI FIT SR., 10 mm PITCH,			42816-0212	MOLEX		
2	2	TERMINAL, MINI FIT SR., 10 mm PITCH			42815-0012	MOLEX		
3	1	ELECTRICAL WIRE, RK (H07V-K), 4 mm <sup>2</sup> , RED					0309832	SELGA, SWEDEN
4	1	ELECTRICAL WIRE, RK (H07V-K), 4 mm <sup>2</sup> , BLACK					0309822	SELGA, SWEDEN
5	1	PVC TUBING, I.D. 8.38, BLACK, L = 1040					55-062-41	ELFA, SWEDEN
4	4	BOOTLACE FERRULE, 4 mm <sup>2</sup>					48-303-78	ELFA, SWEDEN
7		WIRE MARKERS, NUMBERING AS SHOWN ON ILLUSTRATION		PA-1		PARTEX, SWEDEN		



Safegate International AB  
MALMÖ, SWEDEN

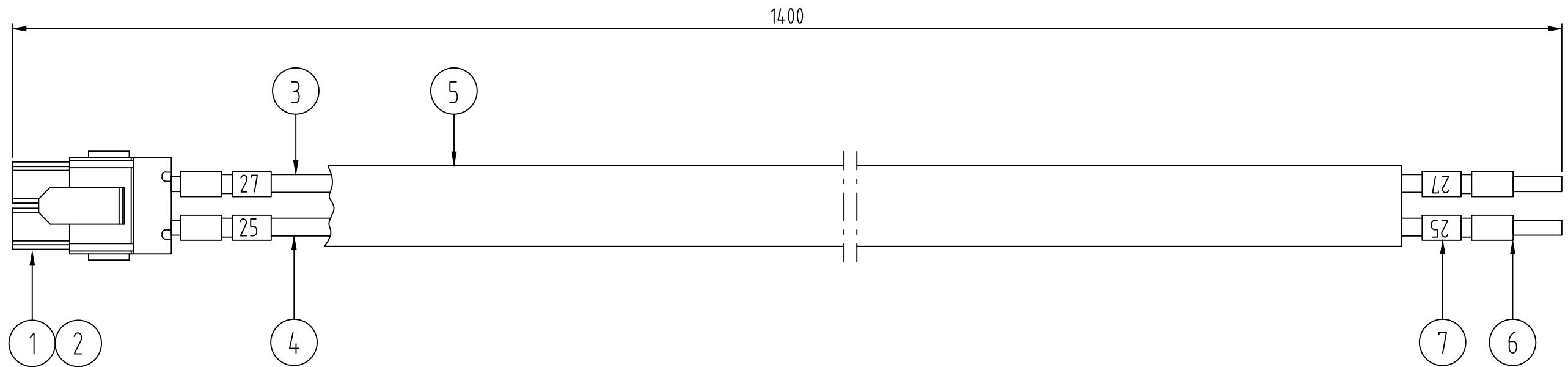
Unless otherwise indicated, all tolerances are according to	Sharp Edges
Surface Coating	Weight
WIRING ASSEMBLY	
DISPLAY POWER	

Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:	
App. by:	Date approved:	Project No.:	

Drawing No. SG590621-112-01	Rev.	Sheet 1 of 1	Scale NO SCALE
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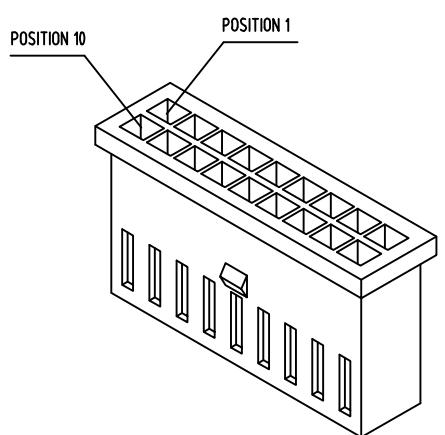
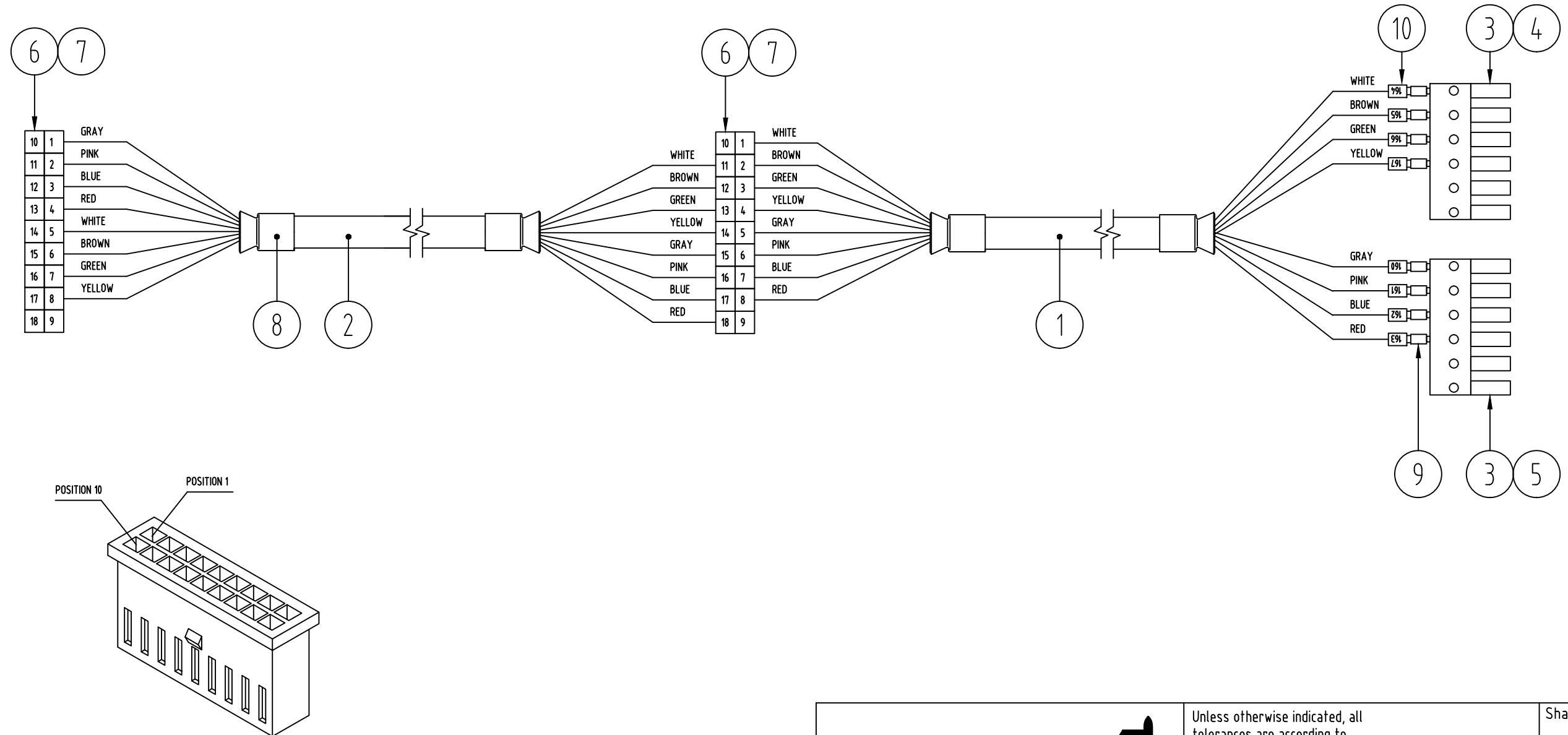
Revision	Description	Date	Drawn by:	Checked by:	Approved
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Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	RECEPTACLE HOUSING, MINI FIT SR., 10 mm PITCH,			42816-0212	MOLEX		
2	2	TERMINAL, MINI FIT SR., 10 mm PITCH			42815-0012	MOLEX		
3	1	ELECTRICAL WIRE, RK (H07V-K), 4 mm <sup>2</sup> , RED					0309832	SELGA, SWEDEN
4	1	ELECTRICAL WIRE, RK (H07V-K), 4 mm <sup>2</sup> , BLACK					0309822	SELGA, SWEDEN
5	1	PVC TUBING, I.D. 8.38, BLACK, L = 1340					55-062-41	ELFA, SWEDEN
4	4	BOOTLACE FERRULE, 4 mm <sup>2</sup>					48-303-78	ELFA, SWEDEN
7		WIRE MARKERS, NUMBERING AS SHOWN ON ILLUSTRATION		PA-1		PARTEX, SWEDEN		



<b>SAFEgate</b>  Safegate International AB Malmö, Sweden				Unless otherwise indicated, all tolerances are according to Surface Coating			Sharp Edges	
							Weight	
WIRING ASSEMBLY DISPLAY POWER, T1/T2								
Drawn by: A.S	Date drawn: 2011-11-16	Checked by:	 		App. by:		Drawing No. SG590621-113-01	
Date	Drawn by:	Checked by:						Approved
Revision	Description						1 of 1	NO SCALE

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, LIYCY, 4 x 2 x 0.25, L = 1100						
2	1	CABLE, LIYCY, 4 x 2 x 0.25, L = 750						
3	2	CONNECTOR, MC1.5/6-ST-3.81					1803617	PHOENIX CONTACT, SWEDEN
4	1	LABEL, SK 3,81/2,8: SO, TEXT: J27					0805056	PHOENIX CONTACT, SWEDEN
5	1	LABEL, SK 3,81/2,8: SO, TEXT: J24					0805056	PHOENIX CONTACT, SWEDEN
6	2	CONNECTOR HOUSING, AMPMODU MOD. II, DOUBLE ROW		280513	TYCO ELECTRONICS			
7	24	CRIMP TERMINAL, .100 AMPMODU		187270-1	TYCO ELECTRONICS			
8	4	HEAT SHRINKABLE TUBING, Ø9.5, BLACK		FIT-221-3/8	ALPHA WIRE		5507108	ELFA, SWEDEN
9	8	BOOTLACE FERRULE, H 0.25/12					9025780000	WEIDMÜLLER, SWEDEN
10		WIRE MARKERS, NUMBERS AS SHOWN ON ILLUSTRATION		PA02	PARTEX			



ITEM 6, CONTACT ORIENTATION  
AND TERMINAL POSITIONS



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to Sharp Edges

Surface Coating Weight

COMMUNICATION CABLE  
LED DISPLAY FOR T1

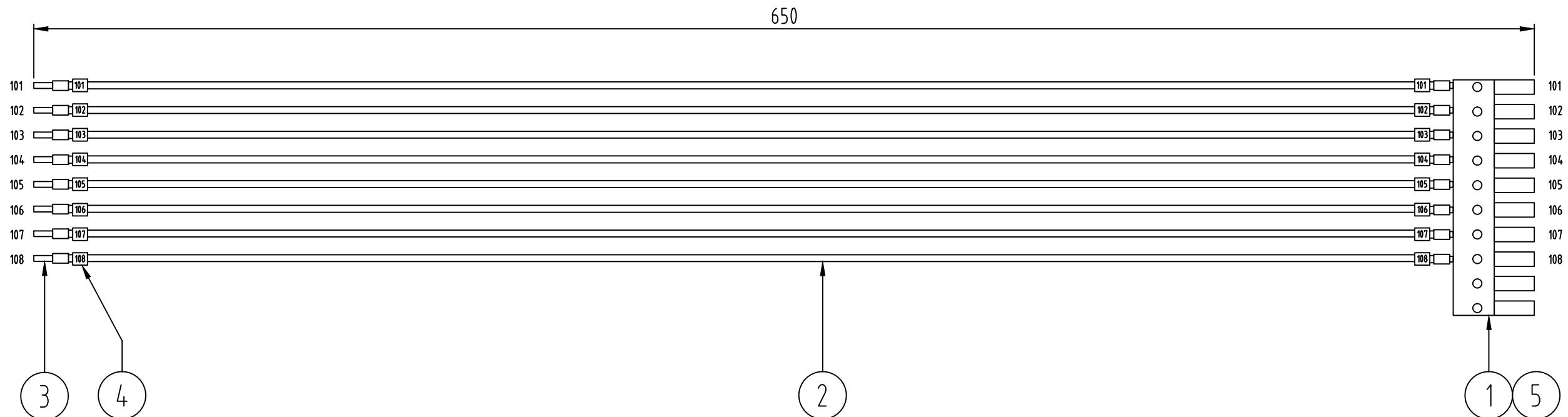
Drawn by: A.S. Date drawn: 2011-11-06 Checked by:

App. by: Date approved: Project No.:

Drawing No. SG590621-114-01 Rev. 1 Sheet 1 of 1 Scale NO SCALE

Revision	Description	Date	Drawn by:	Checked by:	Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CONNECTOR, MC1.5/10-ST-3.81			1803659	PHOENIX CONTACT		
2	8	ELECTRICAL WIRE, UL1007/1569, RED, AWG 20						
3	16	BOOTLACE FERRULE, H 0.5/14					9026060000	WEIDMÜLLER
4		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
5	1	LABEL, SK 3,81/2,8: SO, TEXT: J19			0805056	PHOENIX CONTACT, GERMANY	0805056	PHOENIX CONTACT, SWEDEN



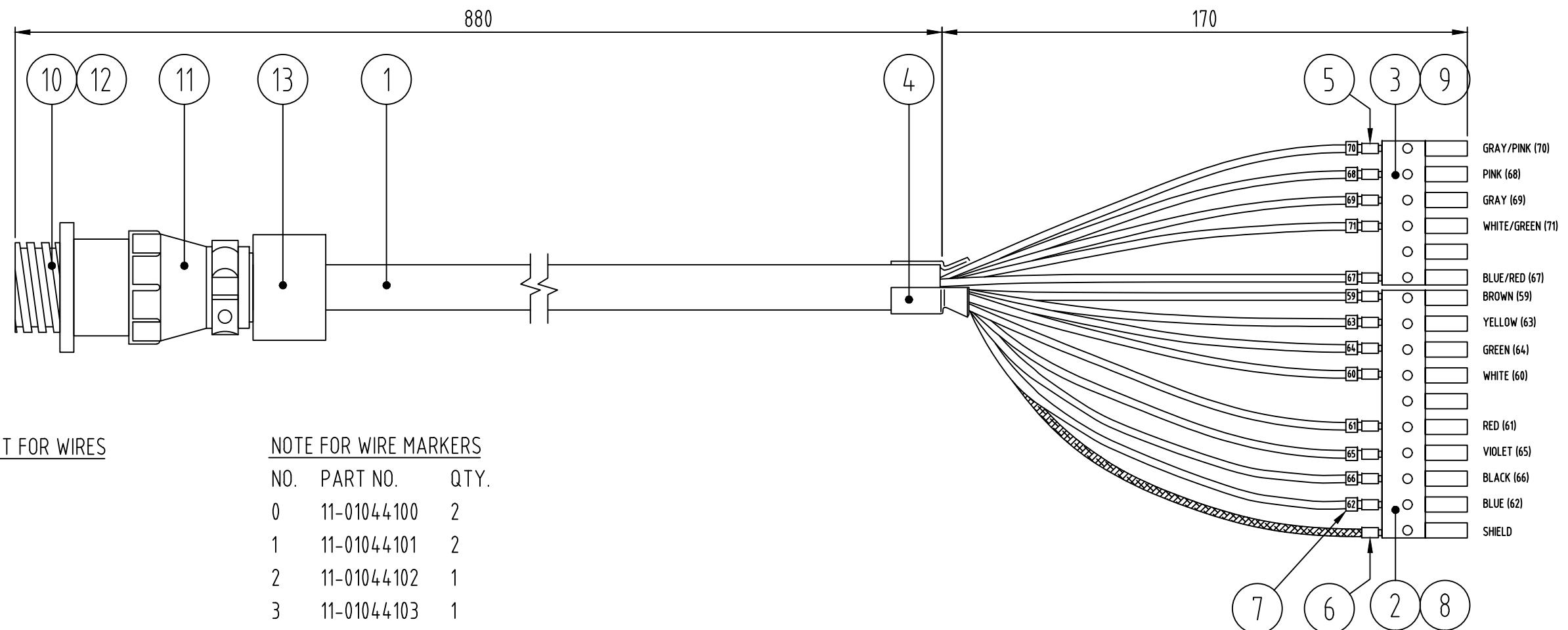
#### NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
0	11-01044100	8
1	11-01044101	9
2	11-01044102	2
3	11-01044103	2
4	11-01044104	2
5	11-01044105	2
6	11-01044106	2
7	11-01044107	2
8	11-01044108	2



Unless otherwise indicated, all tolerances are according to			Sharp Edges
Surface Coating			Weight
<b>WIRING ASSEMBLY</b>			
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:	
App. by:	Date approved:	Project No.:	Drawing No. SG590621-115-01
			Rev.   Sheet 1 of 1   Scale NO SCALE

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, CYLICCY, 8 x 2 x 0.25						
2	1	CONNECTOR, MC1.5/10-ST-3,81			1803659	PHOENIX CONTACT		
3	1	CONNECTOR, MC1.5/6-ST-3,81			1803617	PHOENIX CONTACT		
4	2	HEAT SHRINKABLE TUBING, Ø9.5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA
5	13	BOOTLACE FERRULE, H 0.12/12					9025780000	WEIDMÜLLER
6	1	BOOTLACE FERRULE, H 1,5/14					9026090000	WEIDMÜLLER
7		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
8	1	LABEL, SK 3,81/2,8: SO, TEXT: J22					SEE NOTE	WEIDMÜLLER
9	1	LABEL, SK 3,81/2,8: SO, TEXT: J13					SEE NOTE	WEIDMÜLLER
10	1	RECEPTACLE FOR PIN CONTACTS			183077-1	AMP	4457909	ELFA
11	1	CABLE CLAMP WITH STRAIN RELIEF			182655-1	AMP	4450433	ELFA
12	13	PIN CONTACT			163086-1	AMP	4450714	ELFA
13	1	STAR-TEC FERRITE RING			74271221	WÜRTH ELEKTRONIK		



#### PIN NUMBER ASSIGNMENT FOR WIRES

BROWN (PIN 1)  
WHITE (PIN 2)  
RED (PIN 3)  
BLUE (PIN 4)  
YELLOW (PIN 5)  
GREEN (PIN 6)  
VIOLET (PIN 7)  
BLACK (PIN 8)  
BLUE/RED (PIN 9)  
PINK (PIN 10)  
GRAY (PIN 11)  
GRAY/PINK (PIN 12)  
WHITE/GREEN (PIN 13)

#### NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
0	11-01044100	2
1	11-01044101	2
2	11-01044102	1
3	11-01044103	1
4	11-01044104	1
5	11-01044105	2
6	11-01044106	11
7	11-01044107	6
8	11-01044108	1
9	11-01044109	2



Unless otherwise indicated, all tolerances are according to  
Surface Coating

Sharp Edges  
Weight

CONTROL CABLE  
VERTICAL SCANNING MOTOR, T1

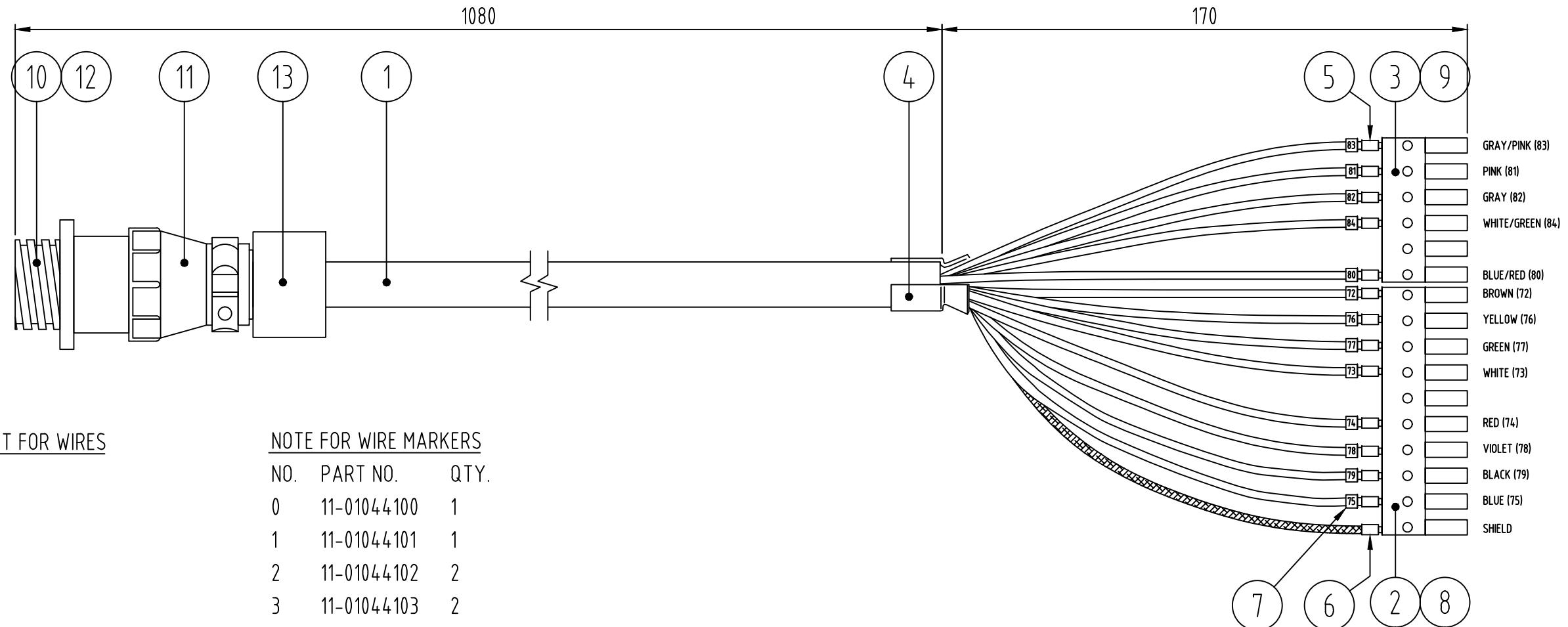
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:	
App. by:	Date approved:	Project No.:	

Drawing No.  
SG590621-116-01

Rev. 1 of 1  
Sheet 1 of 1  
Scale

Revision	Description	Date	Drawn by:	Checked by:	Approved
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Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, CYLICCY, 8 x 2 x 0.25						
2	1	CONNECTOR, MC1.5/10-ST-3,81			1803659	PHOENIX CONTACT		
3	1	CONNECTOR, MC1.5/6-ST-3,81			1803617	PHOENIX CONTACT		
4	2	HEAT SHRINKABLE TUBING, Ø9.5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA
5	13	BOOTLACE FERRULE, H 0.12/12					9025780000	WEIDMÜLLER
6	1	BOOTLACE FERRULE, H 1,5/14					9026090000	WEIDMÜLLER
7		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
8	1	LABEL, SK 3,81/2,8: SO, TEXT: J15					SEE NOTE	WEIDMÜLLER
9	1	LABEL, SK 3,81/2,8: SO, TEXT: J20					SEE NOTE	WEIDMÜLLER
10	1	RECEPTACLE FOR PIN CONTACTS			183077-1	AMP	4457909	ELFA
11	1	CABLE CLAMP WITH STRAIN RELIEF			182655-1	AMP	4450433	ELFA
12	13	PIN CONTACT			163086-1	AMP	4450714	ELFA
13	1	STAR-TEC FERRITE RING			74271221	WÜRTH ELEKTRONIK		



PIN NUMBER ASSIGNMENT FOR WIRES

BROWN (PIN 1)  
 WHITE (PIN 2)  
 RED (PIN 3)  
 BLUE (PIN 4)  
 YELLOW (PIN 5)  
 GREEN (PIN 6)  
 VIOLET (PIN 7)  
 BLACK (PIN 8)  
 BLUE/RED (PIN 9)  
 PINK (PIN 10)  
 GRAY (PIN 11)  
 GRAY/PINK (PIN 12)  
 WHITE/GREEN (PIN 13)

NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
0	11-01044100	1
1	11-01044101	1
2	11-01044102	2
3	11-01044103	2
4	11-01044104	2
5	11-01044105	1
6	11-01044106	1
7	11-01044107	9
8	11-01044108	6
9	11-01044109	1



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to Sharp Edges

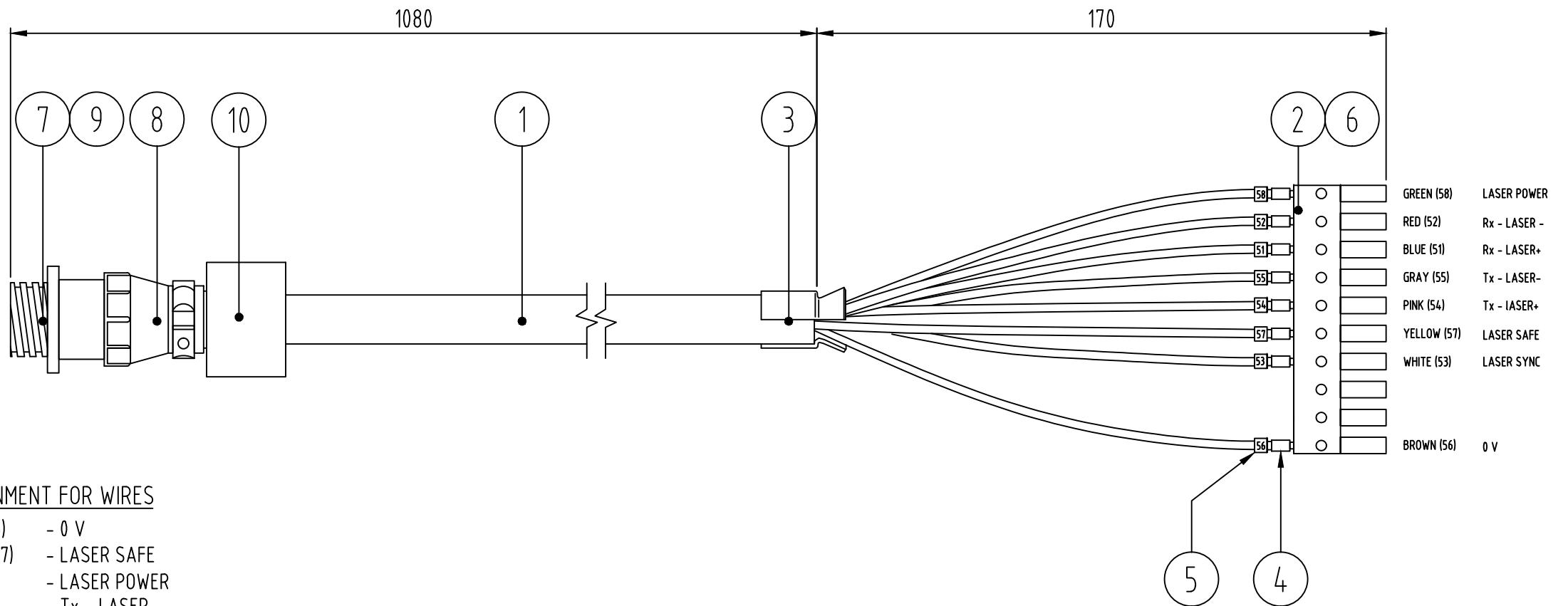
Surface Coating Weight

CONTROL CABLE  
HORIZONTAL SCANNING MOTOR, T1

Drawn by: A.S. Date drawn: 2011-11-16 Checked by:   
 App. by: Date approved: Project No.: Drawing No. SG590621-117-01 Rev. 1 Sheet 1 of 1 Scale

Revision	Description	Date	Drawn by:	Checked by:	Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, LIYCY, 4 x 2 x 0.25						
2	1	CONNECTOR, MC1.5/10-ST-3,81			1803659	PHOENIX CONTACT		
3	1	HEAT SHRINKABLE TUBING, Ø9.5, BLACK			FIT-221-3/8	ALPHA WIRE	5507108	ELFA
4	7	BOOTLACE FERRULE, H 0.25/12					9025780000	WEIDMÜLLER
5		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
6	1	LABEL, SK 3,81/2,8: SO, TEXT: J28			0805056	PHOENIX CONTACT		
7	1	RECEPTACLE FOR PIN CONTACTS			183079-1	AMP	4457891	ELFA
8	1	CABLE CLAMP WITH STRAIN RELIEF			182663-1	AMP	4450425	ELFA
9	7	PIN CONTACT			163086-1	AMP	4450714	ELFA
10	1	STAR-TEC FERRITE RING			74271221	WÜRTH ELEKTRONIK		



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to  
Surface Coating

Sharp Edges

Weight

CONTROL CABLE  
LASER, T1

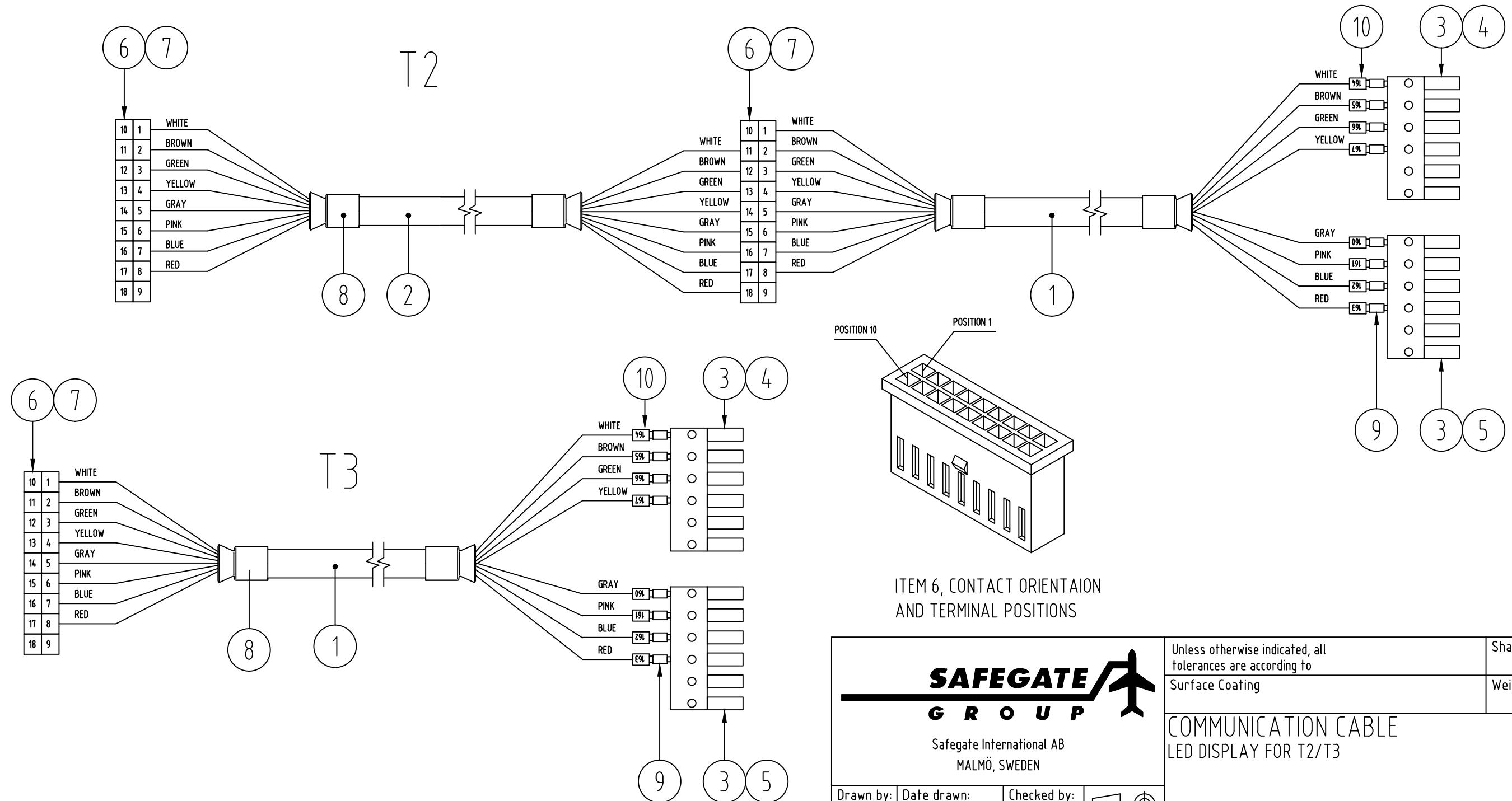
Drawn by: A.S.	Date drawn: 2011-11-11	Checked by:	
App. by:	Date approved:	Project No.:	

Drawing No.  
SG590621-118-01

Rev. | Sheet  
1 of 1 | Scale

Revision	Description	Date	Drawn by:	Checked by:	Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CABLE, LIYCY, 4 x 2 x 0.25, L = 1100						
2	1	CABLE, LIYCY, 4 x 2 x 0.25, L = 750						
3	2	CONNECTOR, MC1.5/6-ST-3.81					1803617	PHOENIX CONTACT, SWEDEN
4	1	LABEL, SK 3,81/2,8: SO, TEXT: J24					0805056	PHOENIX CONTACT, SWEDEN
5	1	LABEL, SK 3,81/2,8: SO, TEXT: J27					0805056	PHOENIX CONTACT, SWEDEN
6	2	CONNECTOR HOUSING, AMPMODU MOD. II, DOUBLE ROW		280513	TYCO ELECTRONICS			
7	24	CRIMP TERMINAL, .100 AMPMODU		187270-1	TYCO ELECTRONICS			
8	4	HEAT SHRINKABLE TUBING, Ø9.5, BLACK		FIT-221-3/8	ALPHA WIRE		5507108	ELFA, SWEDEN
9	8	BOOTLACE FERRULE, H 0.25/12					9025780000	WEIDMÜLLER, SWEDEN
10		WIRE MARKERS, NUMBERS AS SHOWN ON ILLUSTRATION		PA02	PARTEX			



Safegate International AB  
MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to  
Sharp Edges

Surface Coating

Weight

COMMUNICATION CABLE  
LED DISPLAY FOR T2/T3

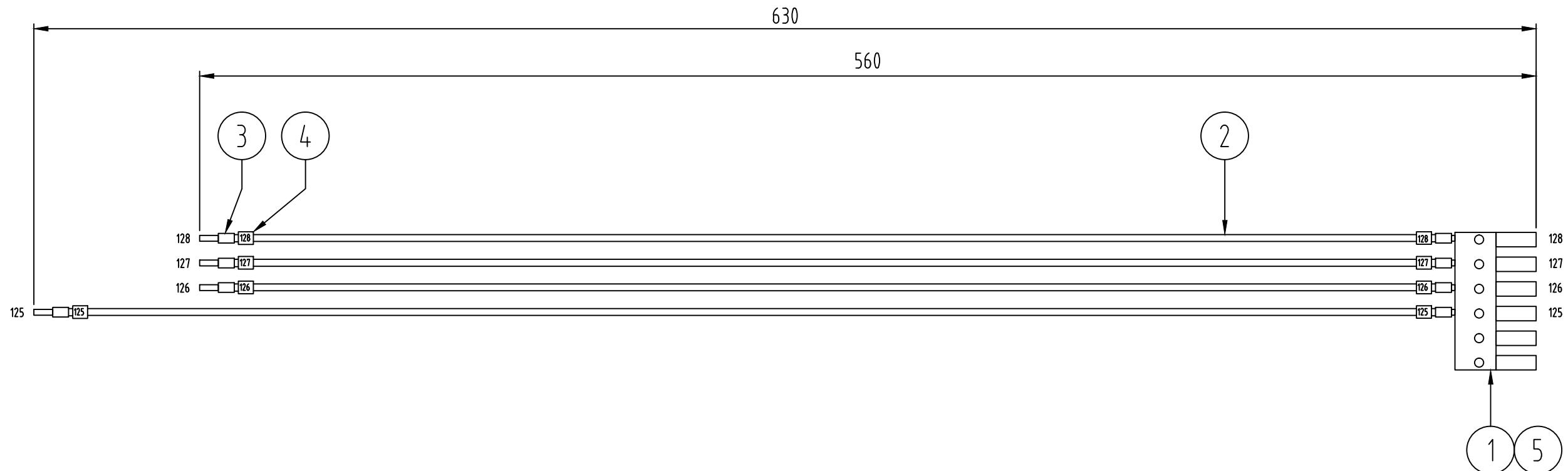
Drawn by: A.S. Date drawn: 2011-09-04 Checked by:

App. by: Date approved: Project No.:

Drawing No. SG590621-119-01 Rev. Sheet 1 of 1 Scale NO SCALE

Revision	Description	Date	Drawn by:	Checked by:	Approved

Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	1	CONNECTOR, MC1.5/6-ST-3.81			1803617	PHOENIX CONTACT		
2		ELECTRICAL WIRE, UL1007/1569, RED, AWG 20						
3	8	BOOTLACE FERRULE, H 0.5/14					9026060000	WEIDMÜLLER
4		WIRE MARKERS, PARTEX PA02					SEE NOTE	WEIDMÜLLER
5	1	LABEL, SK 3,81/2,8: SO, TEXT: J29			0805056	PHOENIX CONTACT		

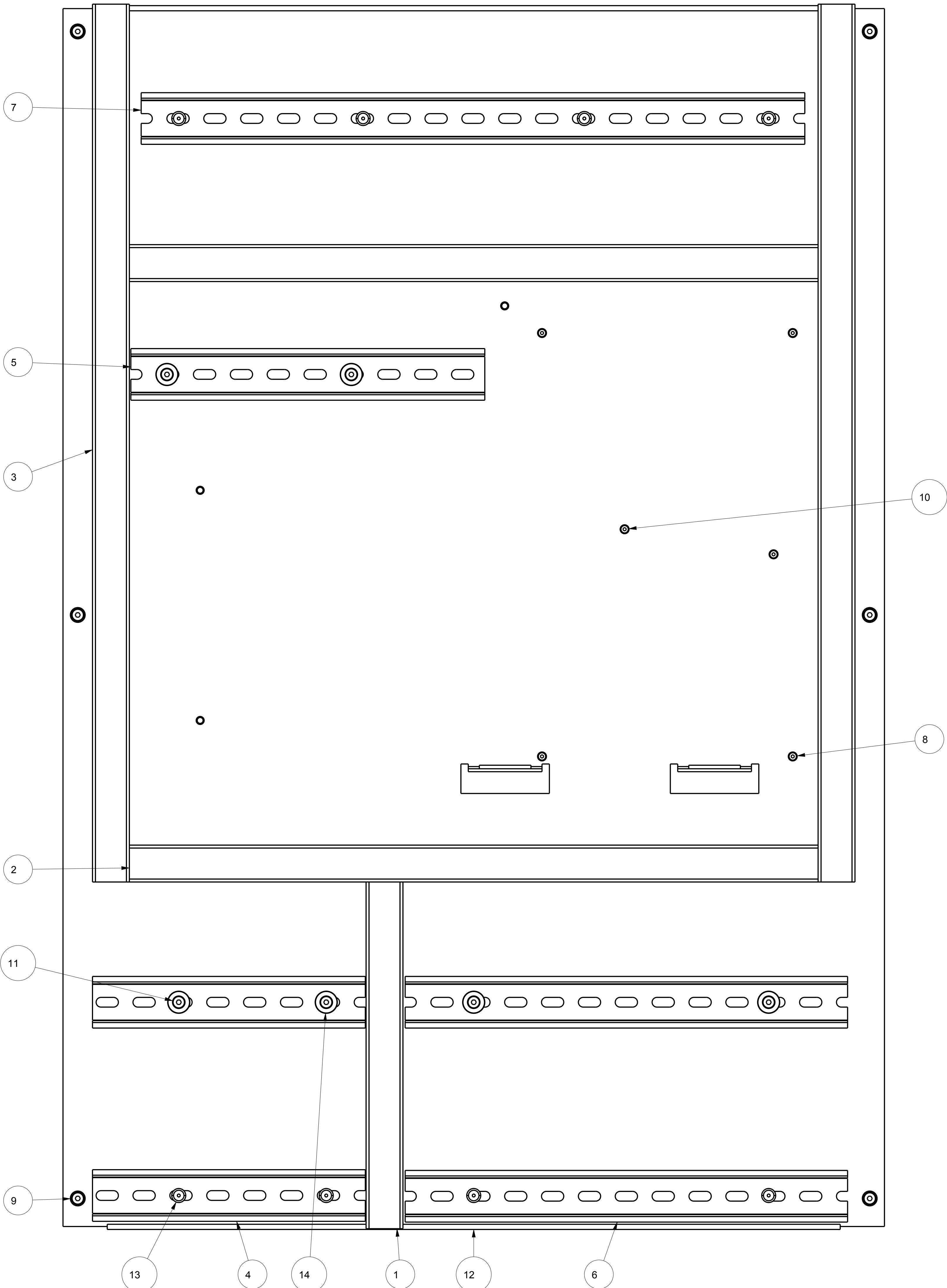


NOTE FOR WIRE MARKERS

NO.	PART NO.	QTY.
1	11-01044101	8
2	11-01044102	8
5	11-01044105	2
6	11-01044106	2
7	11-01044107	2
8	11-01044108	2

<b>SAFE GATE</b>			Unless otherwise indicated, all tolerances are according to		Sharp Edges
			Surface Coating		Weight
WIRING ASSEMBLY					
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:			
App. by:	Date approved:	Project No.:	Drawing No. SG590621-120-01		
			Rev.	Sheet 1 of 1	Scale NO SCALE

Position	Quantity	Description	Material	Drawing No.	Size	Manu. Part No.	Manufacturer	Supplier's Part	Supplier
1	1	CABLE_CHANNEL_235MM	Plastic		L=235mm	T1-E 25x60 G	IBOCO	2990122	AHLSSELL
2	2	CABLE_CHANNEL_467MM	Plastic		L=467mm	T1-E 25x60 G	IBOCO	2990122	AHLSSELL
3	2	CABLE_CHANNEL_595MM	Plastic		L=595mm	T1-E 25x60 G	IBOCO	2990122	AHLSSELL
4	2	DIN_RAIL_185MM	Steel	SG590621-200-01	NS35/7,5 L=185mm				
5	1	DIN_RAIL_240MM	Steel	SG590621-204-01	NS35/7,5 L=240mm				
6	2	DIN_RAIL_300MM	Steel	SG590621-201-01	NS35/7,5 L=300mm				
7	1	DIN_RAIL_450MM	Steel	SG590621-202-01	NS35/7,5 L=450mm				
8	6	LOCK_WASHER_M3	Zinc Plated		3.2x6x1.2				
9	6	LOCK_WASHER_M5	Zinc Plated		5.1x9x1.5				
10	6	M3X8_DIN_7985	Zinc Plated		M3x8				
11	12	M5X10_DIN7984	Zinc Plated		M5x10				
12	1	MOUNTING_PLATE	Aluminum	NPP 912748					
13	8	POPNIT_BIG_HEAD_3_2	Zinc Plated		Ø 3.2x7.9 head=9.5				
14	6	WASHER_LARGE_M5			5.3x15x1.2mm				

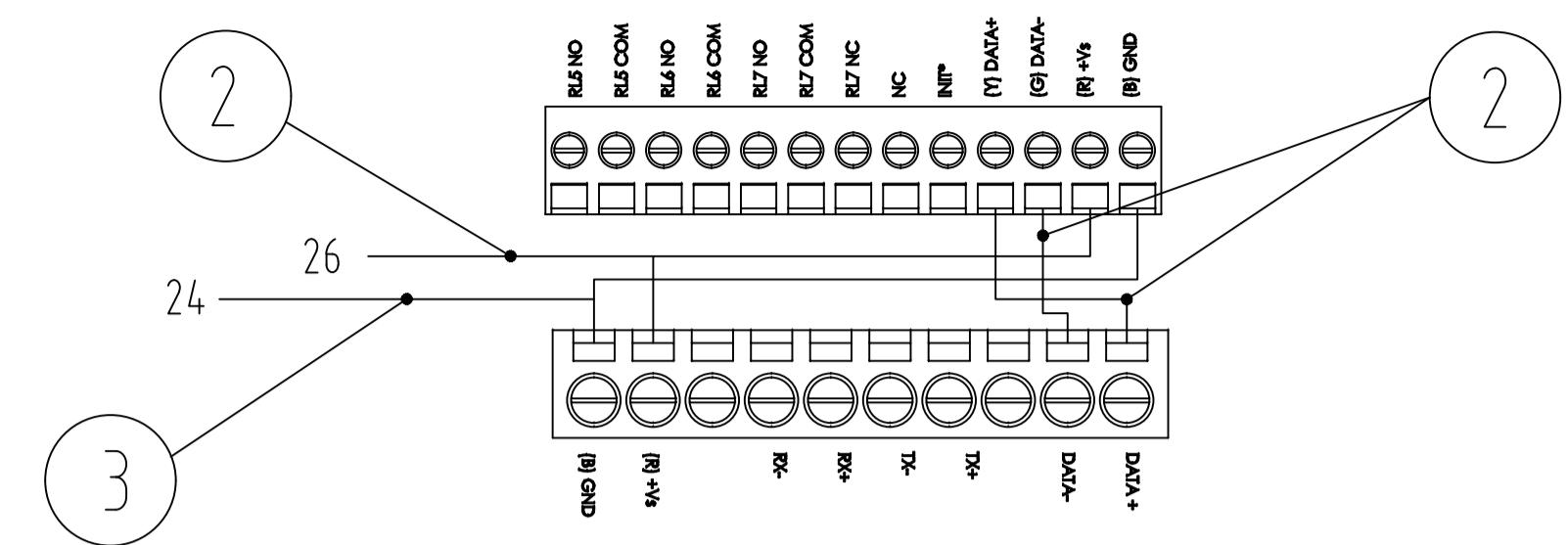


Issue No.	Issue date	Issue by	Issue checked by	Issue text	Drawn by: A.Strandberg	Date drawn: 2011.08.31	Description <b>Mounting Plate</b>			
					Approved by:	Date approved:				
					Project No.	Drawing No. SG590621-203-01	Rev. PA	Scale 0,667	Size A0	Sheet 1(1)

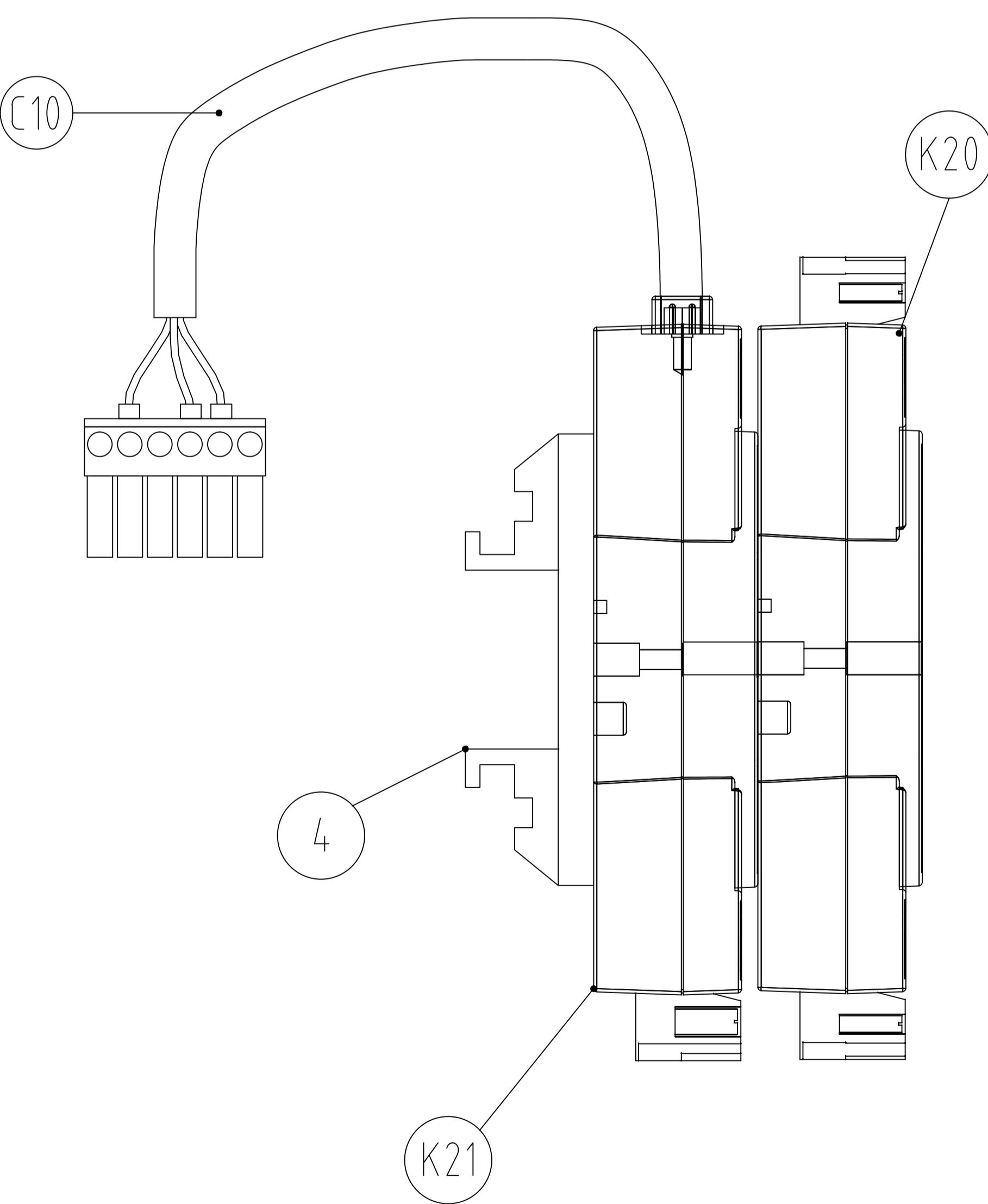
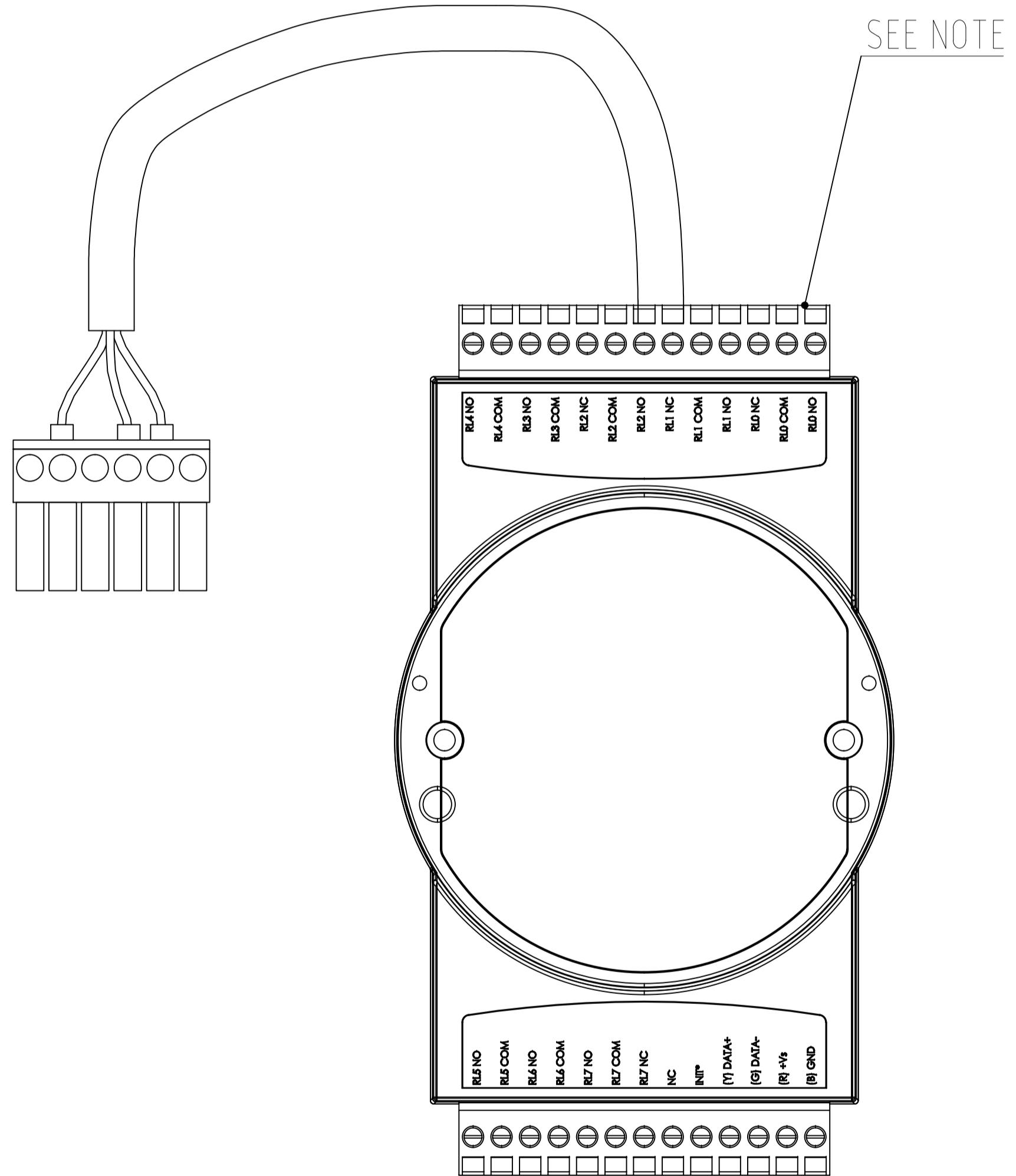
Revision	Description	Date	Drawn by:	Checked by:	Approved

USE CU LED LABEL FILE,  
590254-205-01, FOR GLOBALMARK  
LABEL PRINTER TO CREATE LABEL

	B-588VINYL FILM, WHITE	76576	100 mm	BRADY		
Item No	Qty.	Name	Description	Dimensions	Remark	
			Unless otherwise indicated, all tolerances are according to	ISO-2768-C	Sharp Edges R = 0.5	
			Surface Coating	Weight		
 Safegate International AB MALMÖ, SWEDEN			<b>LABEL</b> CU-BOARD LED'S			
Drawn by: A.S.	Date drawn: 2011-11-16	Checked by:				
App. by:	Date approved:	Project No.:	Drawing No. SG590621-205-01	Rev.	Sheet 1 of 1	Scale



Item	Quantity	Description/Ratings	Drawing No.	Safegate Product No.	Manufacturer's Part No.	Manufacturer	Supplier's Stock Number	Supplier
1	2	COMPONENT LABEL, YELLOW, 15x8mm, TEXT: K20 and K21					21302G	TECHNOTRADE SCANDINAVIA AB, SWEDEN
K20	1	8-ch Relay Output Module with Modbus			ADAM-4068-BE	Advantech		
K21	1	RS-232 to RS-422/485 Converter			ADAM-4520-D2E	Advantech		
C10	1	COMMUNICATION CABLE	SG590623-100-01					
2	3	WIRE, UL1007/1569, AWG20, RED						
3	1	WIRE, UL1007/1569, AWG20, BLACK						
4	1	DIN RAIL CLAMP (Comes with ADAM-4520)						
-		WIRING MATERIALS						
		CRIMP LUG, H 0.5/14					9026060000	WEIDMÜLLER, SWEDEN
		WIRE MARKERS, PARTEX PA02, MARKING					-	WEIDMÜLLER, SWEDEN



#### NOTE 1

On active signal, a loop between NO and COM is created for that Telay (RL).  
Example: When the system reports Active, a loop between RL0 COM and RL0 NO is created.

- RL0 Actived
- RL1 In Service
- RL2 Present Status
- RL3 On Block
- RL4 Off Block
- RL5 Out Off Service
- RL6 EMS Status
- RL7 System OK

B RL6 and RL7 changed

A RL6 changed

Revision Description

20120403 A.S

20120308 A.S

Date Drawn by Checked by

Drawn by Date drawn:

A.S. 2012-02-21

Approved

Drawn by Date drawn:

A.S. 2012-02-21

Approved

Drawn by Date drawn:

A.S. 2012-02-21

Approved

Unless otherwise indicated, all tolerances are according to Surface Coating

Sharp Edges

Weight

COMMUNICATION ASSEMBLY  
I/O Module



Safegate International AB  
MALMÖ, SWEDEN

Drawing No.

SG590623-001-01

Rev. B

Sheet 1 of 1

Scale

**CONFIGURATION KEY**

 USE THE SYSTEM'S CONFIGURATION CODE  
 TO DETERMINE THE SYSTEM ASSEMBLY.

Designation	Code (x)	Item	Type	Drawing No.
T1-				
CB(x)	1	Cabinet	Standard	SG590253-002-01
CE(x)	1	Cable Entry Cover Plate	Standard, 3-Hole	SG590222-001-01
CL(x)	1	Cooling	Cooler Assembly	SG590259-001-01
CM(x)	1	Camera	Axis M113	SG590612-001-01
CP(x)	1	Control & Power	w/o UPS	SG590621-001-01
	2		w/ UPS	SG590621-001-01
D(x)	1	Display	1-42	SG590256-001-01
EC(x)	1	External Comm.	Tibbo	SG590258-001-01
FI(x)	1	Filter	Cat 6	SG590262-001-01
FN(x)	1	Vent. Assembly	Standard	SG590264-001-01
H(x)	1	Installation Hardware	AT&T Pole	SG590221-001-01
NS(x)	1	Network Switch	Standard	SG590273-001-01
SA(x)	1	Scan. Assm.	Standard	SG590255-000-01
UT(x)	1		DIN (Schuko)	SG590266-001-01
	2		British Standard	SG590266-001-01
	3		U.S. Standard	SG590266-001-01
	4		French Standard	SG590266-001-01

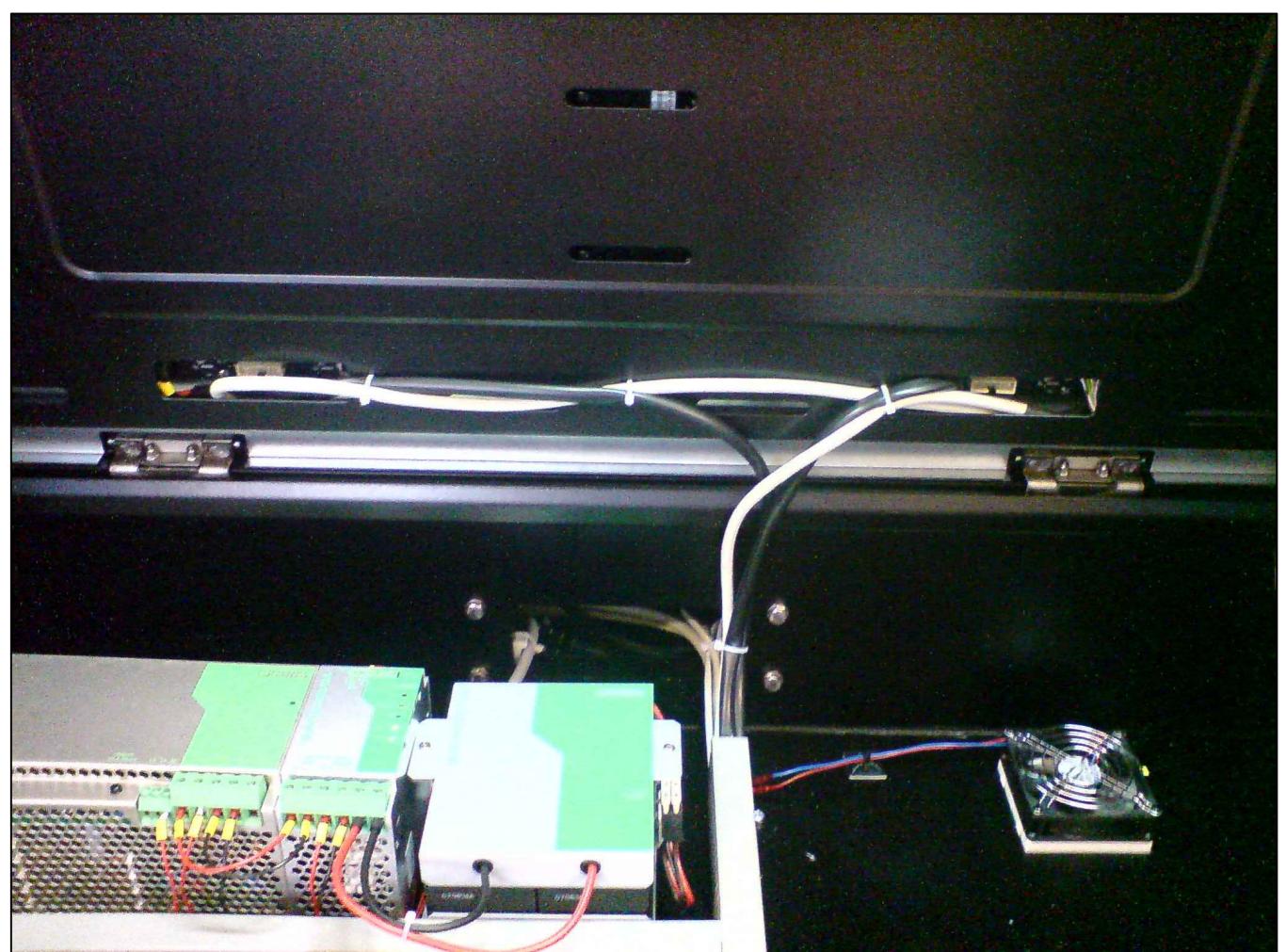
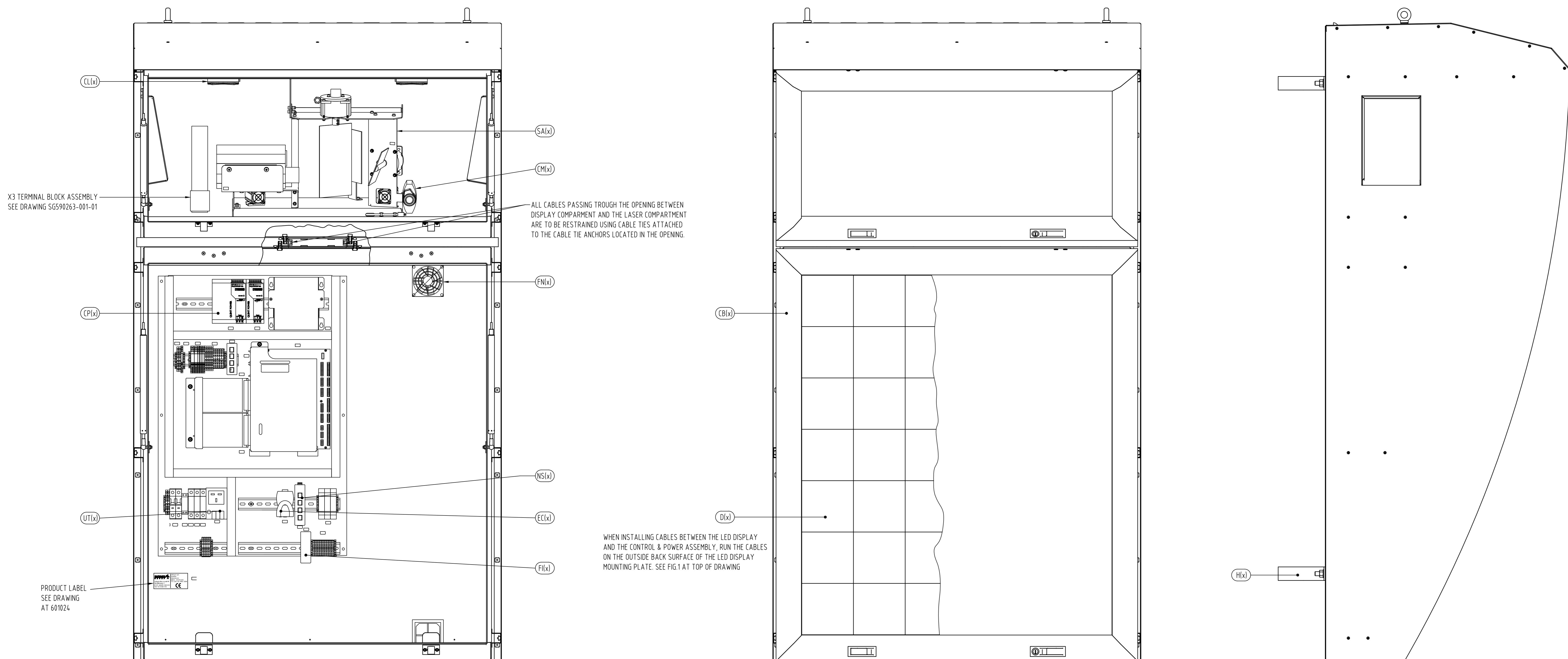


FIG. 1, CABLE PLACEMENT, LED DISPLAY



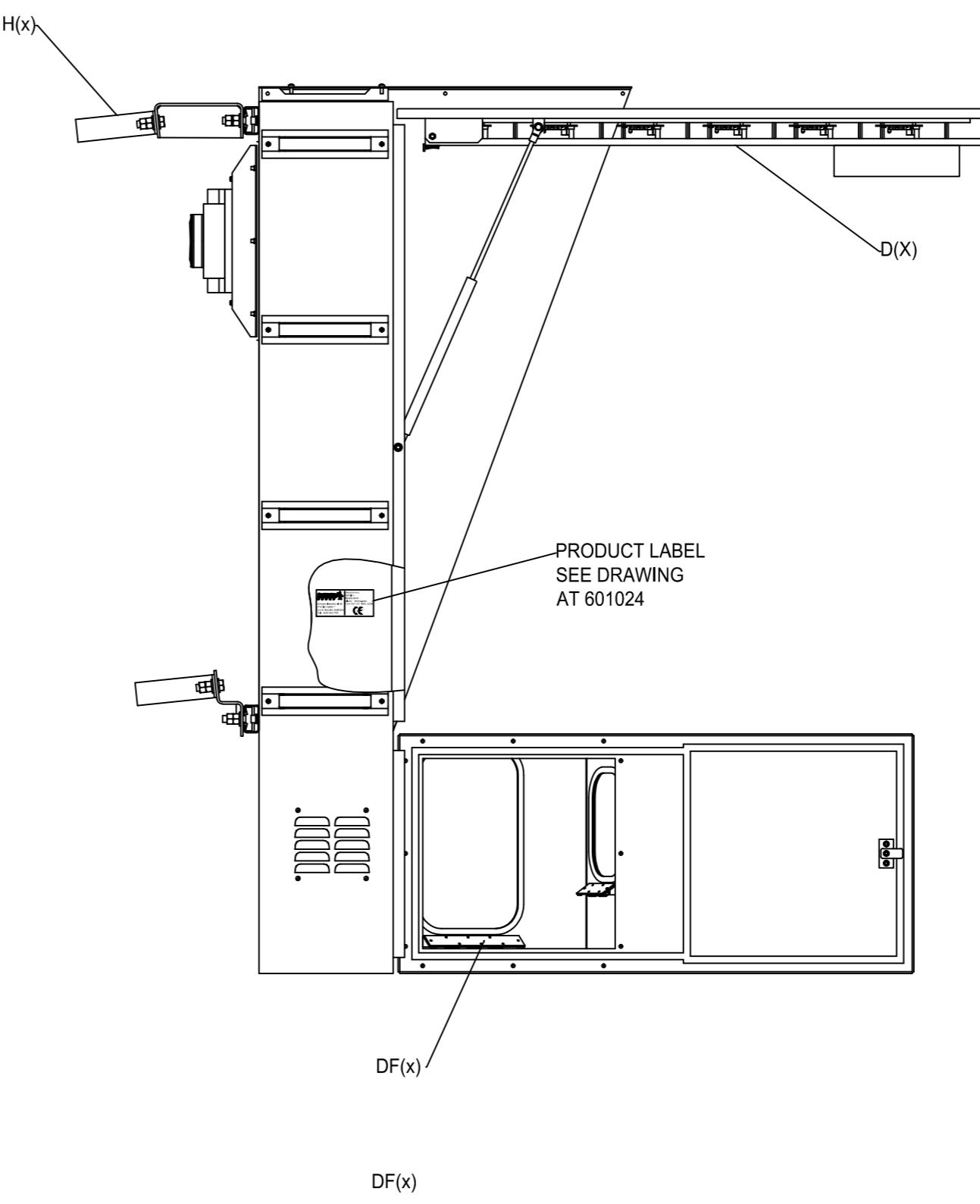
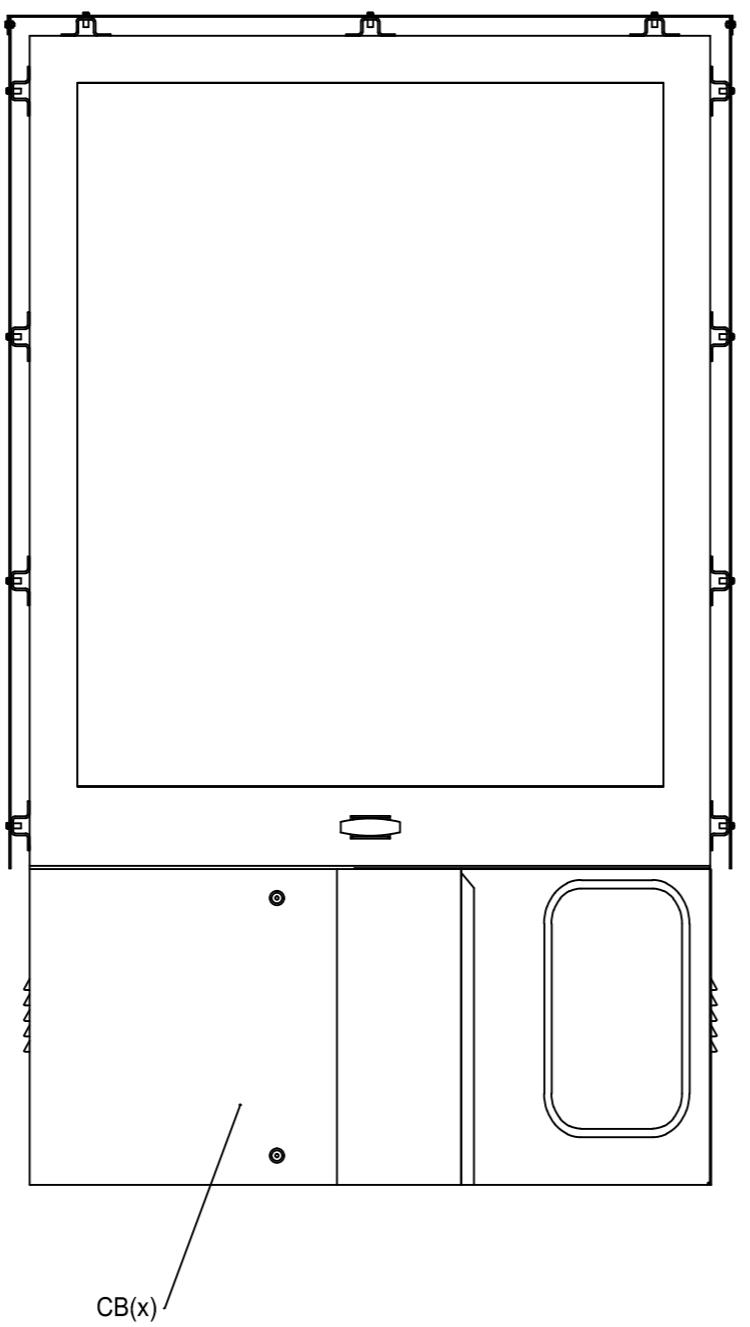
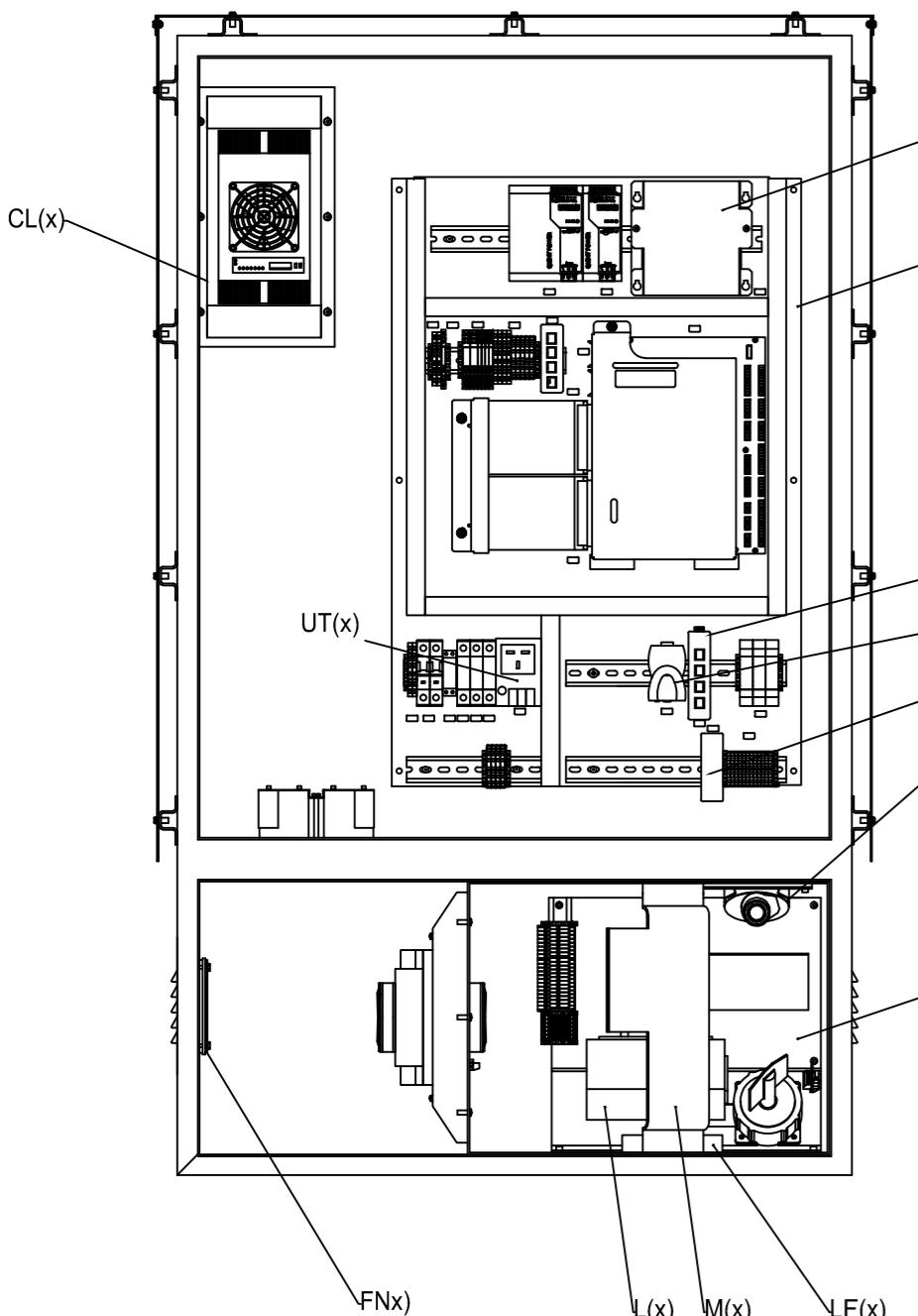
FRONT VIEW, DOORS REMOVED

<b>SAFE GATE GROUP</b>		Unless otherwise indicated, all tolerances are according to Surface Coating		Sharp Edges
Safegate International AB MALMO, SWEDEN		T1 DOCKING GUIDANCE SYSTEM COMPONENT PLACEMENT AND CONFIGURATION KEY SET DRAWING SG590621-004-01 FOR CONNECTION DIAGRAM		
B	Configuration key changed and updated	2011.11.17	A.S.	Drawn by G.O. Date drawn 2009.03.08 Checked by Project No.
A	Configuration key changed and updated	2011.03.22	A.S.	App. by Date approved Drawing No. SG590980-001-01 Rev. Sheet 1 of 1 Scale 15
Revision	Description	Date	Drawn by	Checked by Approved

**CONFIGURATION KEY**

 USE THE SYSTEM'S CONFIGURATION CODE  
 TO DETERMINE THE SYSTEM ASSEMBLY.

Designation	Code (x)	Item	Type	Drawing No.
T2-				
CB(x)	1	Cabinet	Standard	SG590281-001-01
	2		Adapted for Supercooler	SG590282-001-01
CL(x)	1	Cooling	Supercooler Assembly	SG590543-001-01
CM(x)	1	Camera	Axis M1113	SG590612-001-01
CP(x)	1	Control & Power	Standard	SG590476-000-01
D(x)	1	Display	2-18, w/heater	SG590466-000-01
	2		2-18	SG590467-000-01
	3		2-24, w/heater	SG590468-000-01
	4		2-24	SG590469-000-01
D(x)	1	Display V2.0	2-18, w/heater	SG590619-001-01
	2		2-18	SG590619-001-01
	3		2-24, w/heater	SG590619-001-01
	4		2-24	SG590619-001-01
DF(x)	1	Defroster Assembly	Heaters for scanning windows	SG590486-000-01
EC(x)	1	External Comm.	Tibbo	SG590258-001-01
FI(x)	1	Filter	Cat 6	SG590262-001-01
FN(x)	1	Vent. Assembly	Standard	SG590479-001-01
H(x)	1	Installation Hardware	Ø 16 mm Å [ ]	SG590483-001-01
L(x)	1	Laser Range Finder	LE90-3AT/98	SG590114-000-01
LF(x)	1	Laser Cooling Fan	Standard	SG590405-000-01
M(x)	1	Calibration Mirror	Standard	SG590487-001-01
NS(x)	1	Network Switch	4 RJ45 ports and 1 fiber optic port with ST contact	SG590611-001-01
SA(x)	1	Scanning Assembly	w/heater	SG590559-000-01
	2		w/o heater	SG590560-000-01
UP(x)	1	Uninterruptable Power Supply	Standard	SG590621-001-01
UT(x)	1	Utility Outlet	DIN (Schuko)	SG590266-001-01
	2		British Standard	SG590266-001-01
	3		U.S. Standard	SG590266-001-01
	4		French Standard	SG590266-001-01



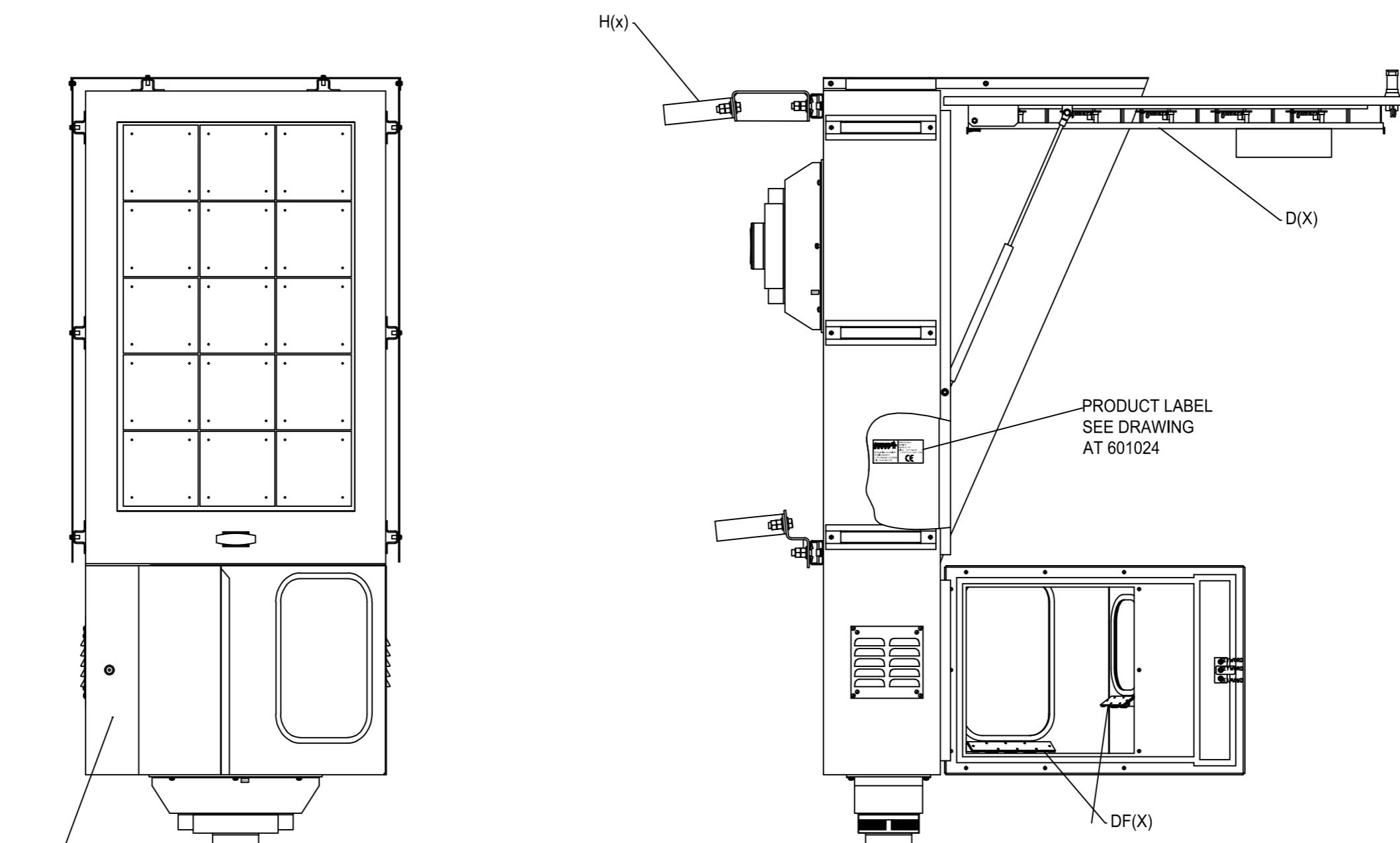
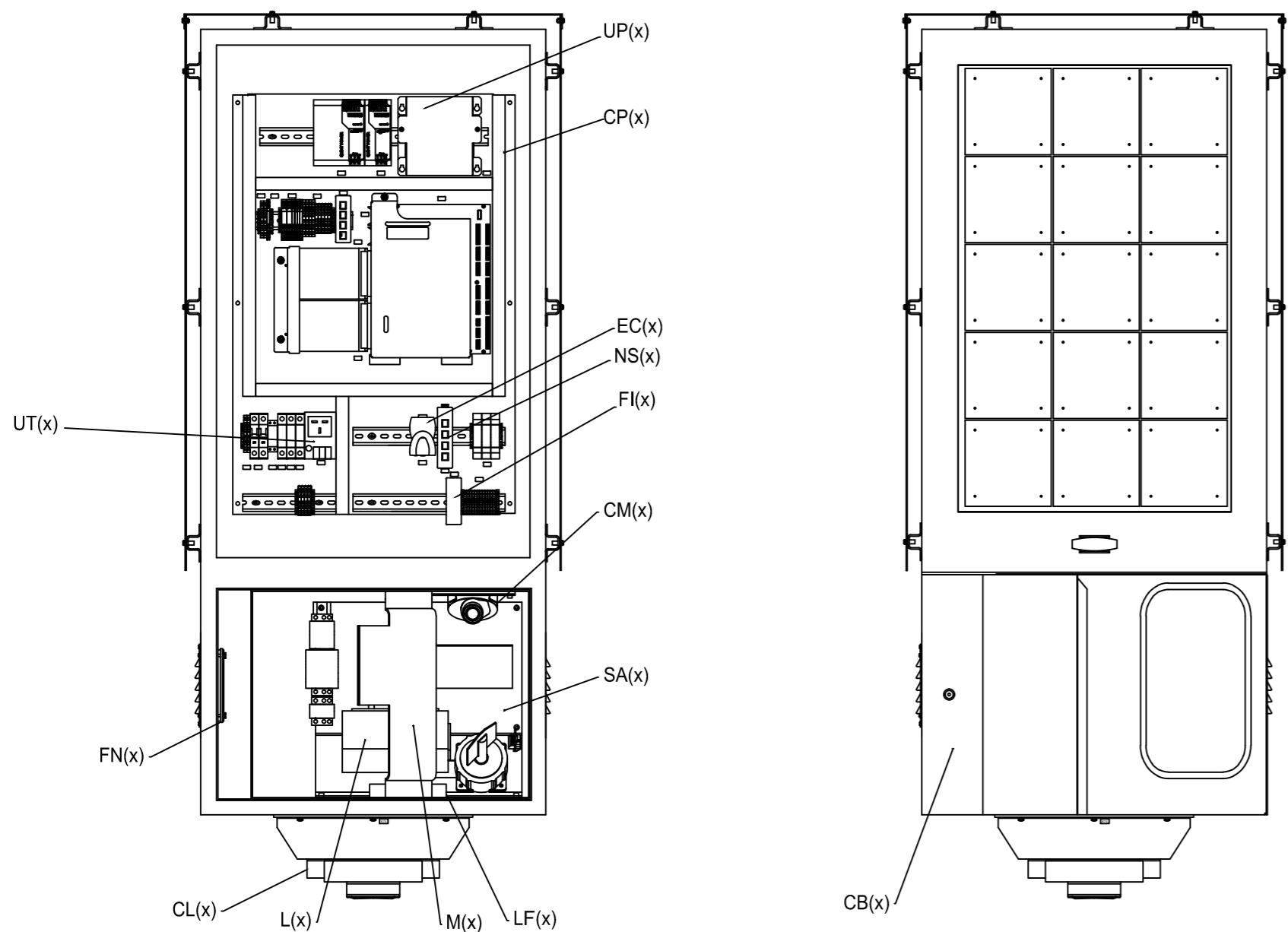
Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges
	Weight
<b>T2 DOCKING GUIDANCE SYSTEM</b>	
COMPONENT PLACEMENT AND CONFIGURATION KEY	
SEE SG590982-004-01 FOR CONNECTION DIAGRAM	
Drawn by: G.O. Date drawn: 2009.03.01 Checked by:	
App. by: Date approved: Project No.: Drawing No. SG590982-001-01	Rev. B Sheet 1 of 1 Scale

B	Configuration key changed	2011.03.22	A.S.			
A	Configuration key changed	2010.10.19	A.S.			
Revision	Description	Date	Drawn by:	Checked by:	Approved	

**CONFIGURATION KEY**

 USE THE SYSTEM'S CONFIGURATION CODE  
 TO DETERMINE THE SYSTEM ASSEMBLY.

Designation	Code (x)	Item	Type	Drawing No.
T3-				
CB(x)	1	Cabinet	Standard	SG590360-001-01
	2		Adapted for Supercooler	SG590361-001-01
CL(x)	1	Cooling	Supercooler Assembly	SG590553-001-01
CM(x)	1	Camera	Axis M1113	SG590612-001-01
CP(x)	1	Control & Power	Standard	SG590476-000-01
D(x)	1	Display	3-9, w/heater	SG590472-000-01
	2		3-9 w/o heater	SG590503-000-01
	3		3-15, w/heater	SG590473-000-01
	4		3-15, w/o heater	SG590504-000-01
	1	Display V2.0	3-9, w/heater	SG590620-001-01
	2		3-9 w/o heater	SG590620-001-01
	3		3-15, w/heater	SG590620-001-01
	4		3-15, w/o heater	SG590620-001-01
DF(x)	1	Defroster Assembly	Heaters for scanning windows	SG590486-000-01
EC(x)	1	External Comm.	Tibbo	SG590258-001-01
FI(x)	1	Filter	Cat 6	SG590262-001-01
FN(x)	1	Vent. Assembly	Standard	SG590479-001-01
H(x)	1	Install. Hardware	Q1 A-AHUE A[1]	SG590483-001-01
L(x)	1	Laser Range Finder	LE90-3AT/98	SG590114-000-01
LF(x)	1	Laser Cooling Fan	Standard	SG590405-000-01
M(x)	1	Calibration Mirror	Standard	SG590487-001-01
NS(x)	1	Network Switch	4 RJ45 ports and 1 fiber optic port with ST contact	SG590611-001-01
SA(x)	1	Scan. Assm.	w/heater	SG590559-000-01
	2		w/o heater	SG590560-000-01
UP(x)	1	Uninterrupt -able Power Supply	Standard	SG590621-001-01
UT(x)	1	Utility Outlet	DIN (Schuko)	SG590266-001-01
	2		British Standard	SG590266-001-01
	3		U.S. Standard	SG590266-001-01
	4		French Standard	SG590266-001-01


**SAFE GATE**
  
**G R O U P**

 Safegate International AB  
 MALMÖ, SWEDEN

Unless otherwise indicated, all tolerances are according to Surface Coating	Sharp Edges
	Weight
<b>T3 DOCKING GUIDANCE SYSTEM</b>	
COMPONENT PLACEMENT AND CONFIGURATION KIT	
SEE DRAWING SG590984-004-01 FOR CONNECTION DIAGRAM	
Drawn by: G.O. Date drawn: 2009-03-05 Checked by:	
App. by: Date approved: Project No.: Drawing No. SG590984-001-01 Rev. B Sheet 1 of 1 Scale	

B	Configuration key changed and updated	2011.11.17	A.S.		Drawn by: G.O. Date drawn: 2009-03-05 Checked by:
A	Configuration key changed and updated	2011.03.22	A.S.		App. by: Date approved: Project No.: Drawing No. SG590984-001-01 Rev. B Sheet 1 of 1 Scale
Revision	Description	Date	Drawn by:	Checked by:	Approved



# Check in to the future

How many aircraft can your airport handle today? Can this number be increased without adverse effects on the airport's safety level? It is a known fact that traffic volume will rise in the foreseeable future. More movements will demand monitoring of the entire airport. Requirements will be sharpened and the development of an integrated system

controlling not only ground movements but also air traffic close to the airport is of the highest interest. The International Civil Aviation Organization (ICAO) already describes A-SMGCS, Advanced Surface Movement Guidance and Control System, as the answer to the future modern airport need to control the entire airport space in one superior system.

To a larger extent than today's systems, A-SMGCS will rely on automated processes to give both pilots and traffic controllers exact information about positions and directions. Safegate Group delivers complete A-SMGCS solutions already, as well as all vital parts relating to it. Safegate Group can check your airport into the future – today!



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For more contact information and details:  
[www.safegate.com](http://www.safegate.com)