

# DGS

## DOCKING GUIDANCE SYSTEM

### SAFEDOCK - TYPE 2 & 2S





## THE SAFEGATE DOCKING GUIDANCE SYSTEM

The Safegate Docking Guidance system is designed to provide fast, smooth and safe guidance during the aircraft's approach to the aircraft stand.

The system is based on laser scanning technology, and it tracks nose height and lateral and longitudinal position on the aircraft. This 3D 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 information, aircraft type, door in use etc is shown on a LED-display that is clearly visible for both pilots. The system can also be used at aircraft stands with multiple and curved centrelines.

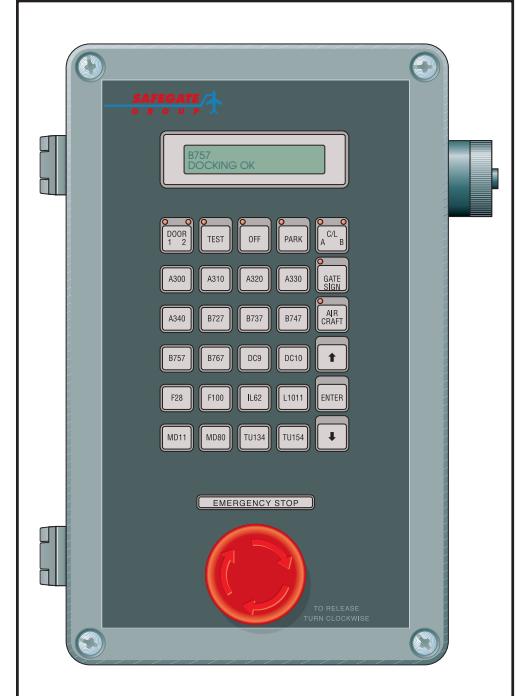
Continuous closing rate information, as tracked by the laser unit, is displayed to the pilot.

The system is comprised of a solid state, computerized design and operates in a fail-safe manner. Information is displayed using high intensity LED's with life expectancies far exceeding conventional lamps. All LED display modules have the same design and have their own processor, which allows for minimal internal wiring and easy maintenance.

The system can be controlled either from the Operator Panel, located in the passenger boarding bridge or at ground level, or from a Gate Operating System (GOS), connected to any Airport Computer System.

The Operator Panel is mainly used to start the docking procedure and for emergency stops. The Panel is equipped with a communication port for connection of a PC used for maintenance and programming purposes.

The maintenance and configuration software for the Docking Guidance System has a Windows based man machine interface which makes it easy to use.



## BUILT-IN SAFETY

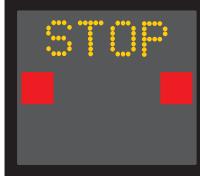
The docking system has a built-in error detection program. If an error occurs in the system, the type and location of the error will be shown on the LCD display of the operator panel. At the same time, the display unit will light two rectangular, red fields in the azimuth guidance portion of the display, and the alphanumeric portion of the display will show "ERR".

If any of the errors listed below occurs after the system has been started, and while an aircraft is approaching the aircraft stand, the display will show the word "STOP" and/or two rectangular red fields in the azimuth guidance portion of the display will be lit.

- **Communication between the display and the control unit is interrupted.**
- **Fault in the emergency stop circuits.**
- **A software error has been detected.**
- **The scanning unit has stopped tracking the aircraft.**
- **The scanning unit is malfunctioning.**



ERROR



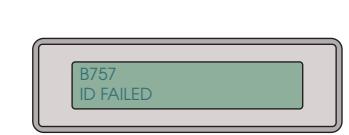
STOP

## CALIBRATION CHECK

At the beginning of each docking procedure the system automatically controls the scanning unit by checking the position of a known target. If the scanned coordinates for the target do not match, the system will stop the docking procedure, and two rectangular red fields in the azimuth guidance portion of the display will be lit. The "AUTOCAL ERROR" error message will also be displayed in the operator panel's LCD-display.

## MANUAL EMERGENCY STOP

When the emergency stop push button, at the operator panel, is activated, the display will show "STOP". Additional emergency stop buttons and/or a second operator panel, can be installed around the stand.



B757  
ID FAILED

## AIRCRAFT VERIFICATION (OPTIONAL)

One important safety feature of the Safedock Docking Guidance System is its ability to verify the approaching aircraft type for a safe parking at the aircraft stand. This feature will direct the pilot to STOP, if the aircraft type selected by the operator is not verified by the system or if the aircraft has not been verified before 12m from the stop-position. The display will show STOP IDFAIL.

If the operator is certain that selected aircraft is correct, even if the system has not verified the aircraft type, he can (by activating the aircraft type again) override the aircraft verification phase. The system will then guide the aircraft to the stop position.

If the detected aircraft is lost during docking, e.g. depending on an object passing in front of the laser, the system will direct the pilot to WAIT. The docking procedure will continue as soon as the laser detects the aircraft again.

GOS



## CONTINUOUS TEST PROCEDURE

The Docking Guidance System performs a continuous diagnostic check. This takes place even when the system is idle. If an error occurs, an error message will be displayed on the alphanumeric display and/or on the operator panel if possible. Error messages or signals will also be sent to the Gate Operating System (GOS) or to a Maintenance system, if connected.

## STANDARD AND OPTIONAL DISPLAYS

The display consists of a number of combinations of LED-modules. Fixed text strings have a maximum length of 6 characters and rolling text strings have a maximum of 20 characters. The system is visible and readable from both pilots-positions and fulfils and exceeds the requirements laid down in ICAO Annex 14 item 5.3.21.

The Standard Type 2 display has totally 13 LED-modules including:

- **1 row of 5 yellow LED modules for Alpha numerical text**
- **1 row of 3 yellow and 2 red LED-modules for aircraft azimuth guidance and stop indication**
- **1 column of 3 yellow LED-modules in the centre for the stopping position indicator.**

The Type 2S has in addition to Standard Type 2 (totally 19 LED-modules):

- **2 (totally 3) columns displaying the aircraft's position to centreline and stop-position by means of an arrow or an aircraft symbol.**

The Type 2D has in addition to Standard Type 2 (totally 18 LED-modules):

- **1 (totally 2) rows displaying Alpha numerical text.**

The Type 2SD is a combination of 2S & 2D (totally 24 LED-modules):

**Standard Messages** (all types):

**Aircraft Type, Distance to Stop, Stop OK, Wait, Too Far, Slow Down, Error Codes, Door No, Stand No, Time**

**Optional Messages** (Type 2D/2SD):

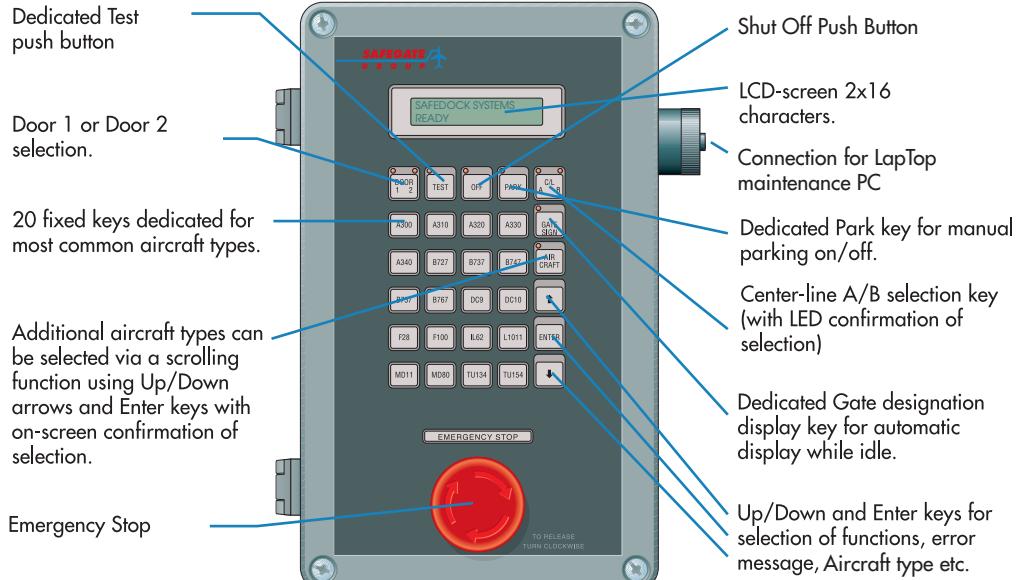
(all types): **Flight No, Messages, Distance to Stop, Large text.**

**Distance to Stop**

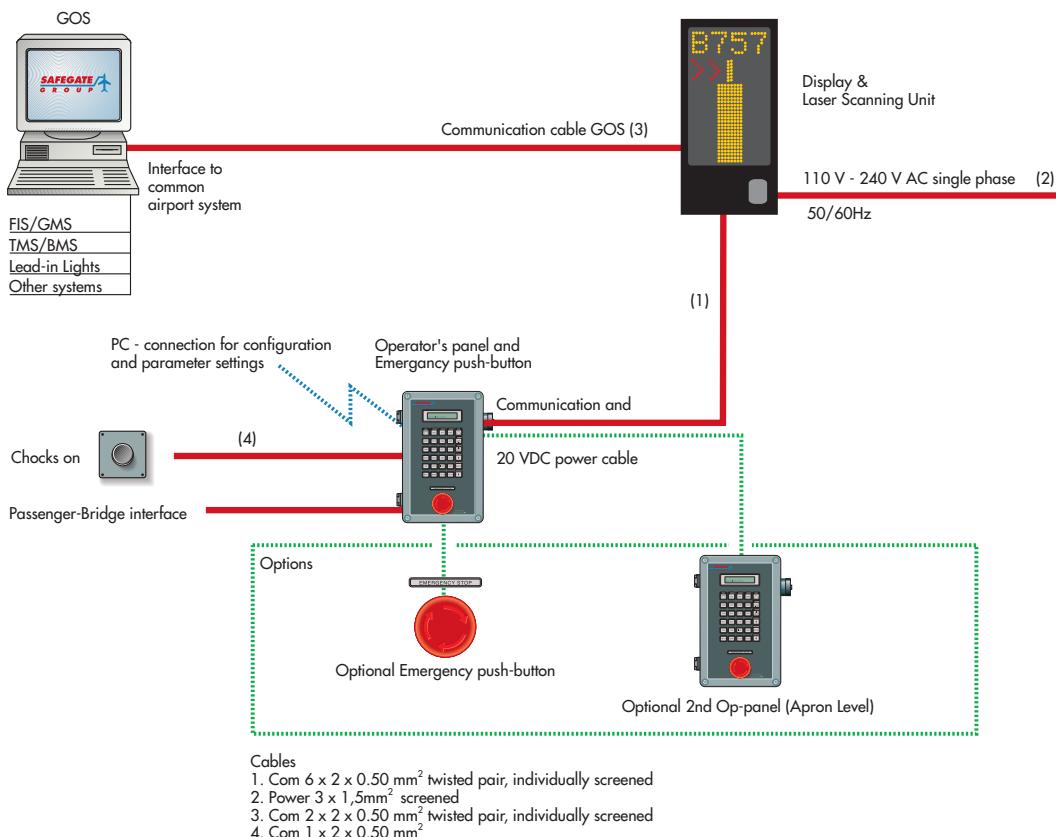
A Standard Type 2 can easily be upgraded to an D/S/SD-model by adding a number of LED-modules and a change of software.



# OPERATOR'S PANEL



## TYPICAL INSTALLATION



## PILOT INSTRUCTIONS, TYPE 2 DISPLAY

Check that the correct aircraft type is displayed.  
The scrolling arrows indicate that the system is activated.

Follow the lead in line.

When the solid yellow stopping position indicator appears, the aircraft has been caught by the scanning unit. The scanning unit now checks that the aircraft is the correct type and the display provides azimuth guidance information.

Look for the flashing red arrow and solid yellow arrow which provide azimuth guidance information.

The flashing red arrow shows which direction to steer, while solid yellow arrow gives an indication of how far the aircraft is off of the centerline.

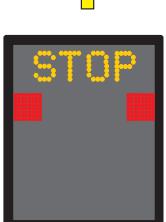
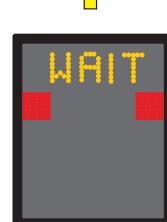
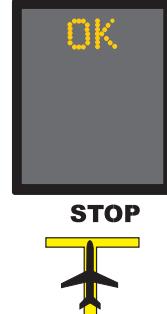
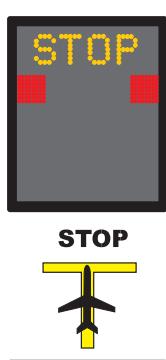
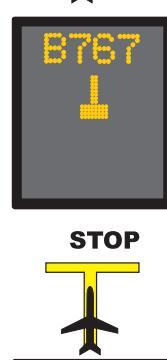
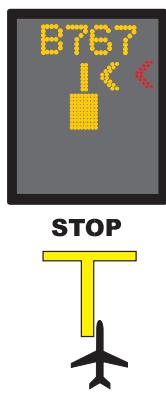
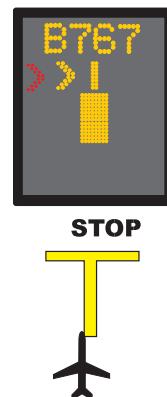
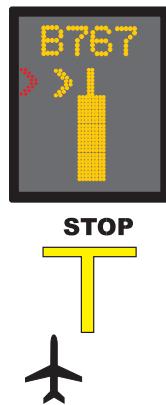
When the aircraft is 12 m from the stop position, closing rate information is given. "Distance to run" is indicated by turning off one row of LED's for each one half meter that the aircraft advances toward the stop position.

When the correct stop position is reached, all of the LED's in the stopping position indicator will be closed, the word "STOP" appears in the display and two red rectangular fields will light in the azimuth guidance area of the display.

If the aircraft stops in the correct position, "OK" will be displayed after a few seconds.

If the aircraft has gone past the correct stop position, the display will show "TOO FAR".

The aircraft type must be verified at least 12 m before the correct stop position. If this does not occur, the system displays "STOP" with two red rectangular fields being lit in the azimuth guidance area of the display. While the aircraft is stopped, the system will attempt to verify it. If successful, the docking procedure will continue. If an unverified object is found in the scanning area during docking, the system will show "WAIT". When the object has disappeared, the procedure will be resumed.



# PILOT INSTRUCTIONS, TYPE 2S DISPLAY

Check that the correct aircraft type is displayed.  
The scrolling arrows indicate that the system is activated.

Follow the lead in line.

When the solid yellow stopping position indicator appears, the aircraft has been caught by the scanning unit. The scanning unit now checks that the aircraft is the correct type and the display provides azimuth guidance information.

Look for the flashing red arrow and solid yellow arrow which provide azimuth guidance information.

The flashing red arrow shows which direction to steer. The solid yellow arrow symbolizes the aircraft and gives an indication of how far the aircraft is from the centerline and the stop position

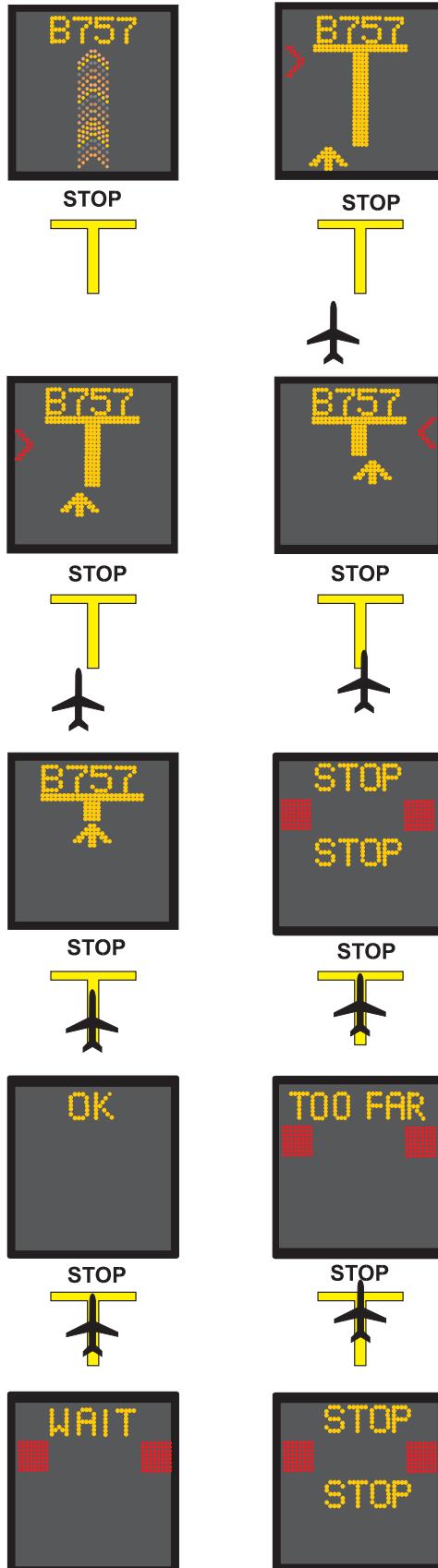
When the aircraft is 12 m from the stop position, closing rate information is given. "Distance to run" is indicated by turning off one row of LED's in the closing rate field for each one half meter that the aircraft advances toward the stop position.

When the correct stop position is reached, all of the LED's in the stopping position indicator will be closed, the word "STOP" will appear in the display and two red rectangular fields will light in the azimuth guidance area of the display.

If the aircraft stops in the correct position, "OK" will be displayed after a few seconds.

If the aircraft has gone past the correct stop position, the display will show "TOO FAR".

The aircraft type must be verified at least 12 m before the correct stop position. If this does not occur, the system displays "STOP" with two red rectangular fields being lit in the azimuth guidance area of the display. While the aircraft is stopped, the system will attempt to verify it. If successful, the docking procedure will continue. If an unverified object is found in the scanning area during docking, the system will show "WAIT". When the object has disappeared, the procedure will be resumed.



# SAFEDOCK CONFIGURATION SYSTEM

The SAFEDOCK Configuration System, which is installed on a maintenance PC or on the GOS, is comprised of two main items:

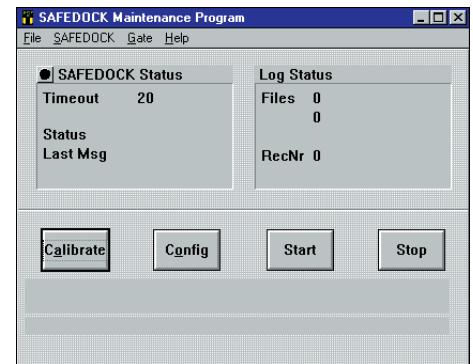
- SAFEDOCK Program Loader
- SAFEDOCK Configuration Software

The Configuration Software has a main menu, from which the following two functions are selected:

- SAFEDOCK Configuration (incl SAFEDOCK Parameter Load & Operator Panel Setup)
- SAFEDOCK Calibration

## SAFEDOCK CONFIGURATION MAIN MENU

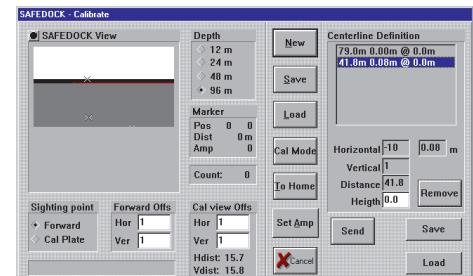
The SAFEDOCK Configuration menu consists of SAFEDOCK status fields, buttons for selection of Calibration or Configuration, and another two for SAFEDOCK operations. The menu also provides access to a set of other system functions.



SAFEDOCK Configuration Main Menu

## SAFEDOCK CALIBRATION

The calibration dialogue box is used to set and check the sighting points for the SAFEDOCK system. The dialogue box comprises a SAFEDOCK view window; a depth selector, position marker, sweep count field and view selector field; a forward and cal plate offset field, and function selection buttons.

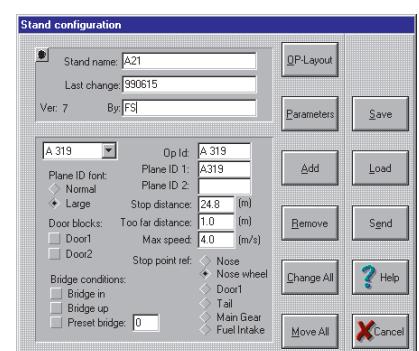


SAFEDOCK Calibrate Dialogue Box

## SAFEDOCK CONFIGURATION

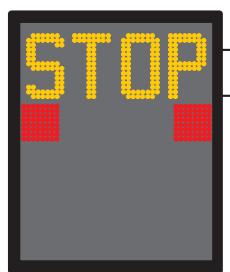
The stand configuration dialogue box is accessed via the config button in the main menu. The dialogue box is used to select the aircraft types for docking with the system and to set and modify stop positions for the aircraft types.

The stand configuration dialogue box consists of buttons for function selection, a stand identification field and an aircraft data field.



SAFEDOCK Stand Configuration Dialogue Box

Pilot Information.

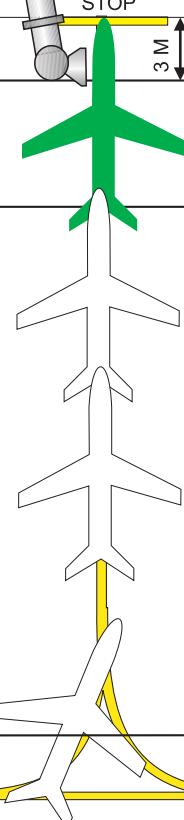


TERMINAL

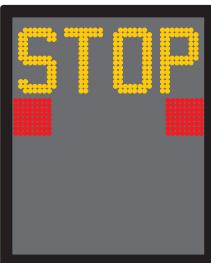
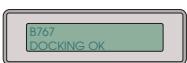
DGS

STOP

6-50 M  
3 M  
12 M

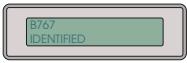


Operator's Information.

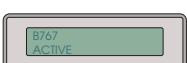
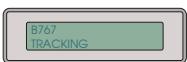


Latest accepted  
Identification,

Identification Failed



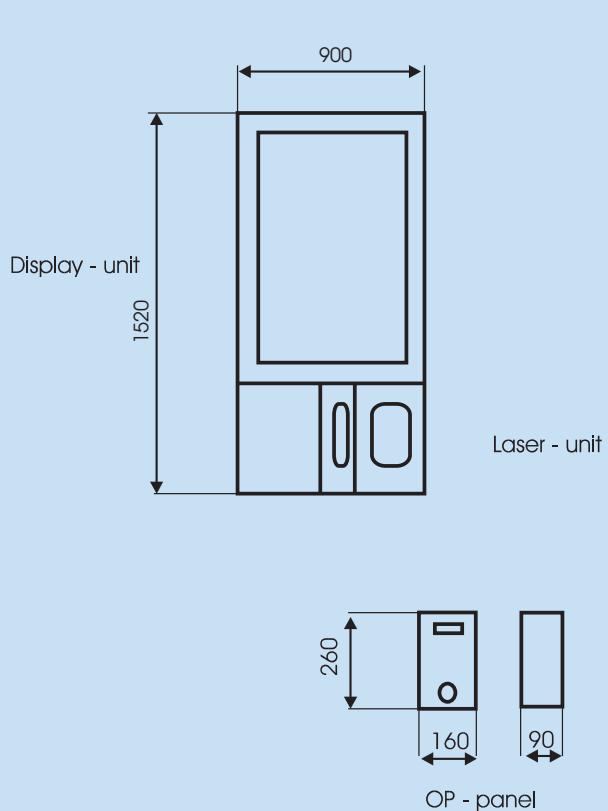
Closing Rate information,  
Azimuth Guidance and  
Identification.



# TECHNICAL DATA

## TECHNICAL SPECIFICATION

Laser type:	Eye-safe laser diode CENELEC EN 60825 - 1994 US center for Devices for Radiological Health Class 1
Laser Wavelength:	903 nm
Distance between Laser and stop position:	6-50 m
Horizontal scanning range:	±13°
Vertical scanning range:	-25°/+20°
Stop position accuracy:	0,1 m
Azimuth guidance accuracy:	0,2°
Display type:	High intensity LED
Display visibility:	150 m
Encapsulation:	IP 54/IP 65
Operational temperature range:	-40°C to + 55°C
Control panel Interface:	RS 485
Data Interface:	RS232 and RS485
Power supply:	115/230 V AC, 50/60Hz
Display dimension:	1520x900x260 mm (650 mm incl. sun cover)
Operator's Panel dimension	260x160x90 mm
Weight total	85kg



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