ACC-Imtech-NavVision-BNWAS-Manual v1.4

Automation Competence Center

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References

IMO Res.A.694(17), MSC.128(75), MSC.191(79), IEC 60945 (2002) inc. corr.1 (2008), IEC 61162 Series, IEC 62288 Ed.2.0 (2008), IEC 62616 (2010) , IEC 61696-1 IEC FDIS Ed.2 TC80-690 FDIS VDR, IEC 61924-2 NEN-EN-IEC Ed.1 2012-12

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Introduction

The Imtech NavVision BNWAS is a stand-alone BNWAS system that can run separately on any bridge. The advantage of this system is, that it can seamlessly integrate in existing and new integrated bridge systems such as the Unimacs 4500. The strength of the BNWAS is the fact that it will always work autonomously as soon as the connection to an integrated system is lost. The BNWAS is fully compliant to all the rules as mentioned in the references section.

Abbreviations list

HMI	Human Machine Interface
BNWAS	Bridge Navigational Watch Alarm System
Td	Time dormant
WAP	Watch Alarm Panel
DAP	Duty Alarm Panel
OOW	Officer Of the Watch
AC	Alternating Current
API	Application Programming Interface
AWG	American Wire Gauge
CAN	Controller Area Network
COM	Communication
CPU	Central Processing Unit
CTS	Clear To Send
DC	Direct Current
DCD	Data Carrier Detect
DIN	Deutsches Institut für Normung
DSR	Data Set Ready
DTR	Data Terminal Ready
EEPROM	Electrically Erasable Programmable Read-only Memory
EMC	Electromagnetic Compatibility
EN	Europese Norm
ESD	Electrostatic Discharge
GND	Ground
ID	Identifier
IEC	International Electrotechnical Commission
IM	Installation Manual
I/O	Input/Output
IP	Ingress Protection / Internet Protocol
LED	Light Emitting Diode
MDIX	Medium-Dependent Interface Crossover
PLC	Programmable Logic Controller
RISC	Reduced Instruction Set Computer
RMS	Root Mean Square
RTC	Real Time Clock
RxD	Received Data
SRAM	Static Random Access Memory
TCP	Transmission Control Protocol
TxD	Transmitted Data

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1. Overview

The Imtech NavVision BNWAS Is a standalone, type approved BNWAS system that can be used on all vessels that need a mandatory BNWAS. Its basic setup consists of the following parts:

- Beijer Exter T70-bl
- Wago I/O system 750

Additionally the following parts are provided:

- Phoenix Contact FL switch SFNT series
- Watch Alarm Panel 1st, 2nd and 3rd stage
- Reset Buttons

Schematically it will look as shown in Figure 1-1

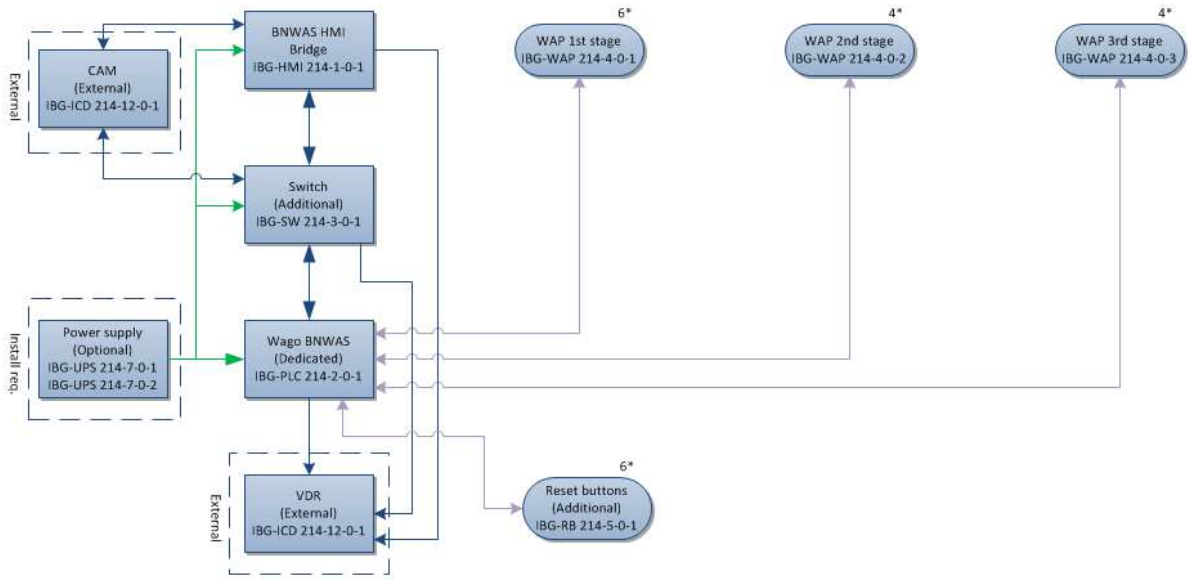

Figure 1-1: BNWAS standard setup

: The serials in the figure, like IGB-XXX 214-x-x-x refers to the specified manuals on that item that can be found on sharepoint.

This standalone system can also be integrated in the Imtech Unimacs bridge, or in the NavVision AM(C)S system. In that case a few extra items will be added to the standard topology. This can be an addition to the standard topology, but it can also replace items in the standard setup. Reset buttons can be made obsolete because there is a screen with a reset button on the AM(C)S at every control position and EVE-messages can be used to confirm the ability of the OOW, also WAP panels can be redundant because there are already DAP's in the 2nd and 3rd stage cabins.

Schematically it will look as shown in Figure 1-2

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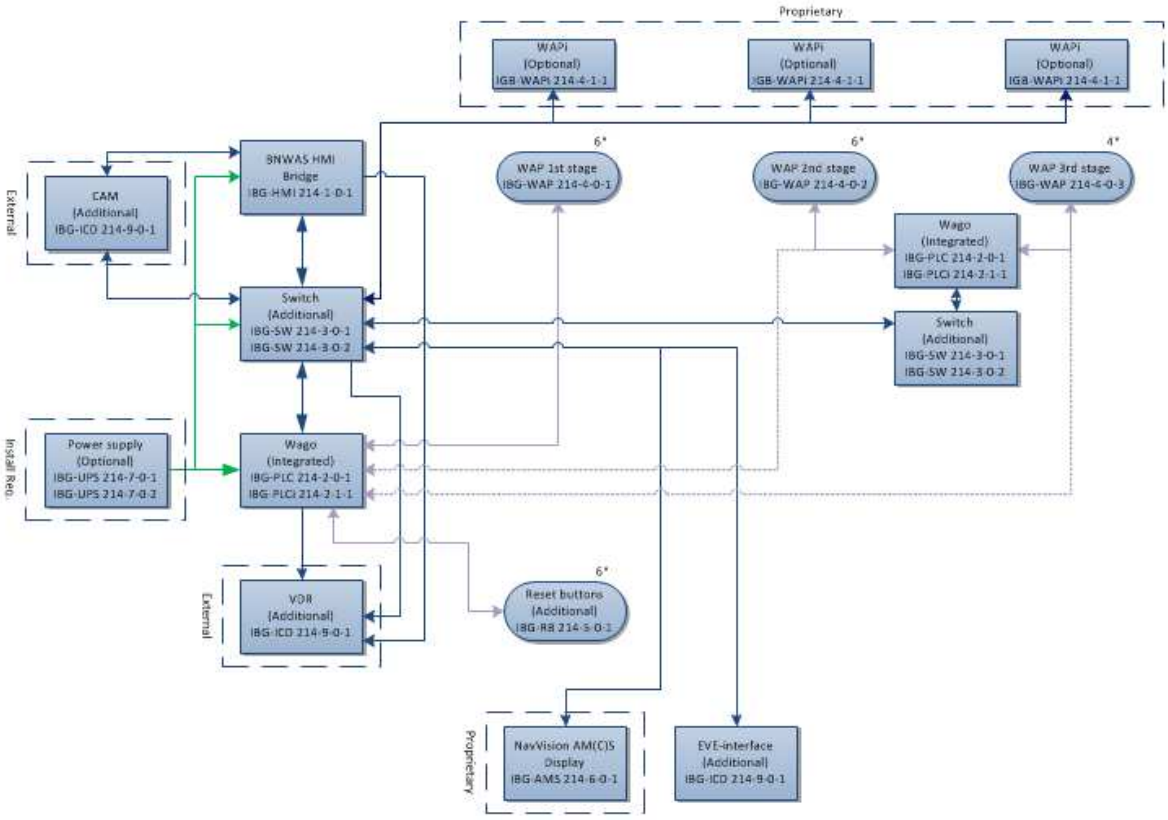

Figure 1-2: BNWAS integrated setup

1.1 Layout of the manual

This manual will incorporate three different stages of the mandatory manuals. It will be divided into the following subsections:

- Installation manual
- User manual
- Maintenance manual

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2. Installation

2.1 Introduction

With installation of the standard BNWAS setup the parts that are point of interest are the following:

- Beijer Exter T70-bl
- Wago I/O system 750

And additionally

- Phoenix Contact FL switch SFNT series
- Watch Alarm Panel 1st, 2nd and 3rd stage
- Reset Buttons

2.2 Beijer Exter T70-bl

2.2.1 Specifications

– Installation plate thickness: 1.5 - 9.0 mm (0.06 - 0.35 inch)
– Space requirements when installing the operator panel:

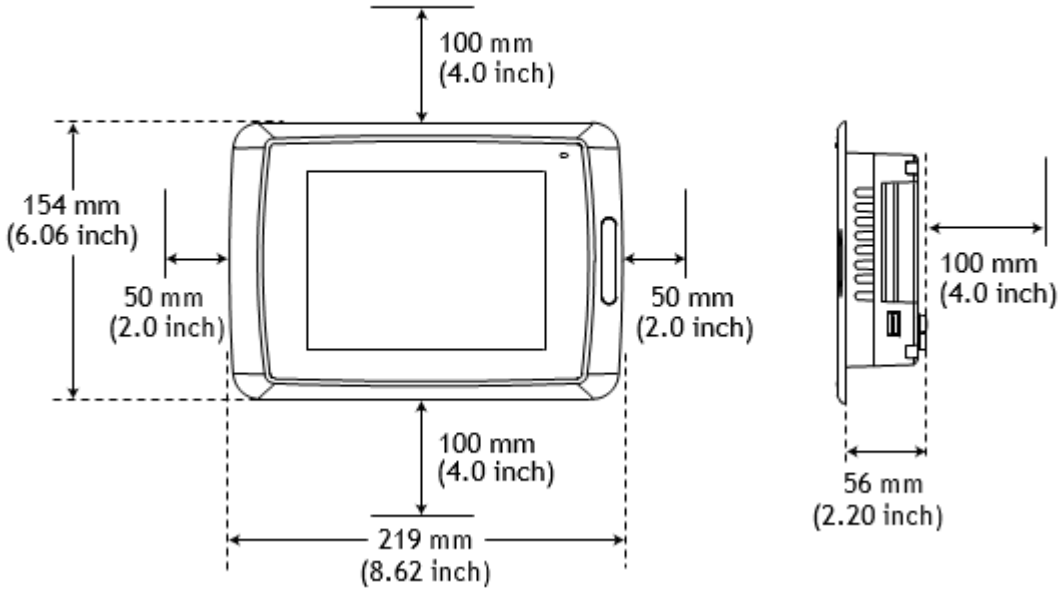

Figure 2-1: Dimensions

1. Unpack and check the delivery (see Figure 2-2). If damage is found, notify the supplier.

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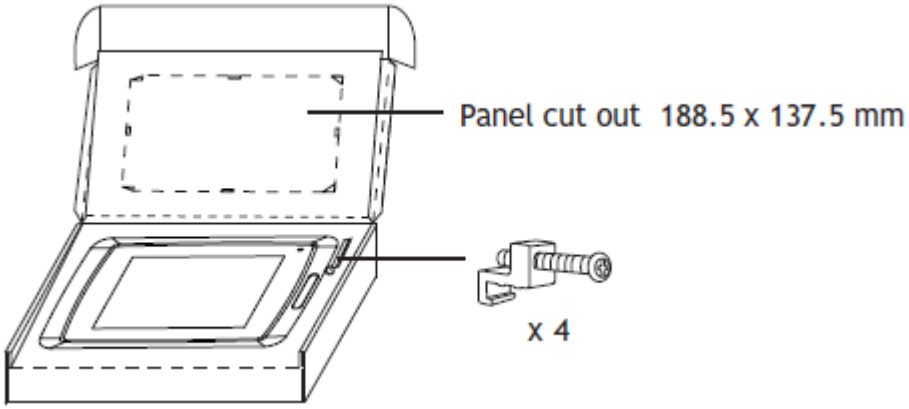

Figure 2-2: Delivery and contents

NOTE

Place the operator panel on a stable surface during installation. Dropping it or letting it fall may cause damage.

2. Place the panel cut-out where the operator panel is to be situated, draw along the outer sides of the holes and cut according to the markings (see Figure 2-3).

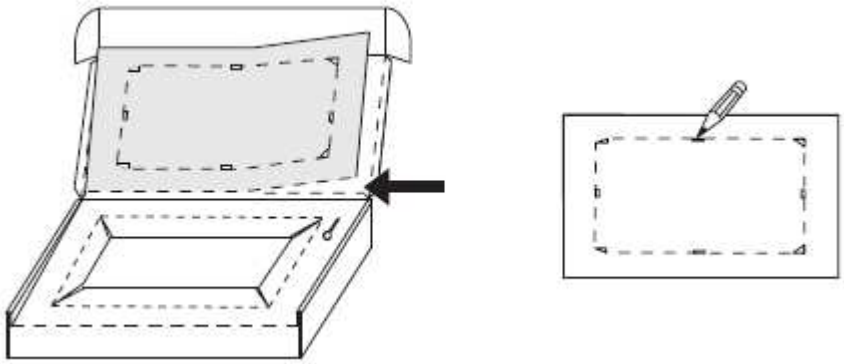

Figure 2-3: Panel cut-out

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3. Secure the operator panel in position, using all the fastening holes and the provided brackets and screws (see Figure 2-4).

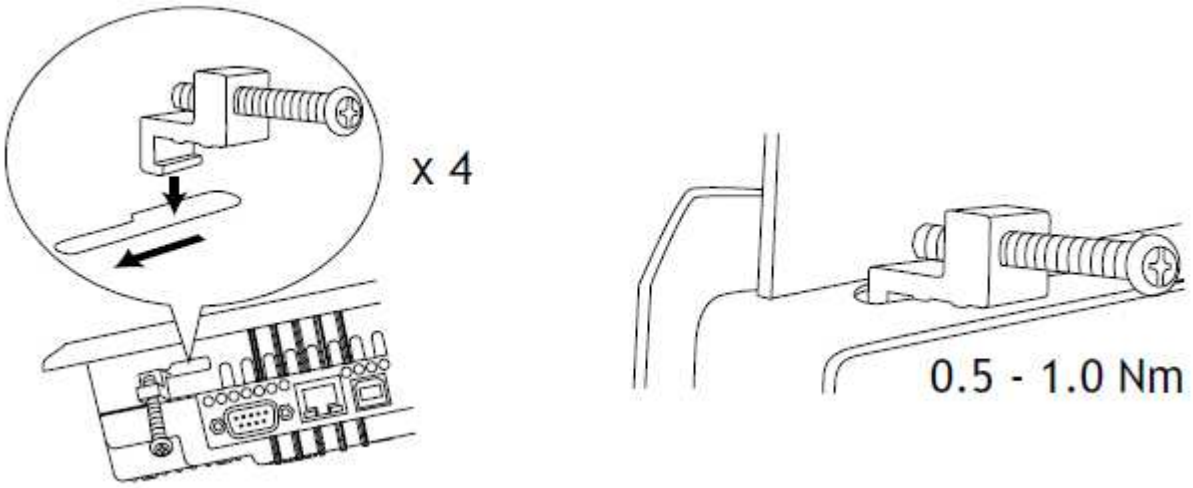

Figure 2-4: Fastening holes and brackets

4. Connect the cables in the specified order.

CAUTION

Ensure that the operator panel (ref. A, Figure 2-5) and the controller system have the same electrical grounding (reference voltage level), otherwise errors in communication may occur.

5. Use an M5 screw and a grounding conductor (as short as possible) with a cross-section of minimum 2.5 mm^2 (ref. B).

CAUTION

- **Use only shielded communication cables**
- **Separate high voltage cables from signal and supply cables (ref. C)**
- **The operator panel must be brought to ambient temperature before it is started up. If condensation forms, ensure that the operator panel is dry before connecting it to the power outlet (ref. D).**
- **Ensure that the voltage and polarity of the power source is correct.**

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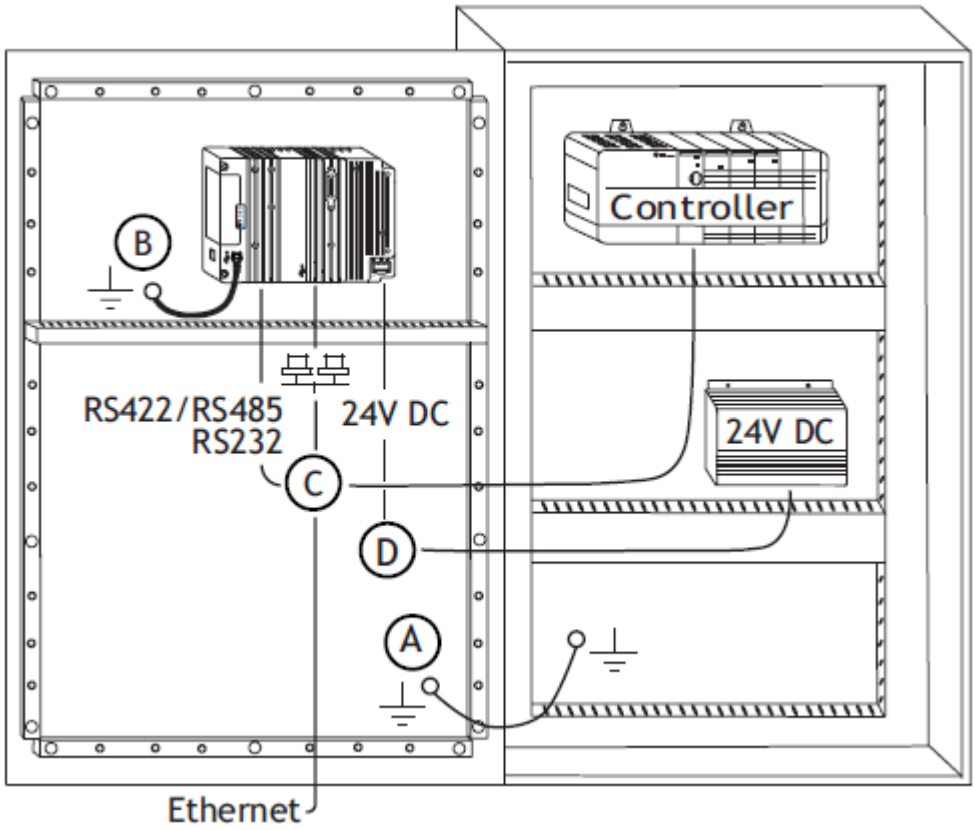

Figure 2-5: Cable connections

1.6. Carefully remove the laminated film over the operator panel display, to avoid static electricity that could damage the panel.

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2.2.2 Mode switches

CAUTION

- **All mode switches (see Figure 2-6) must be in OFF position during operator panel use.**
- **The mode switches should not be touched unless by qualified personnel.**

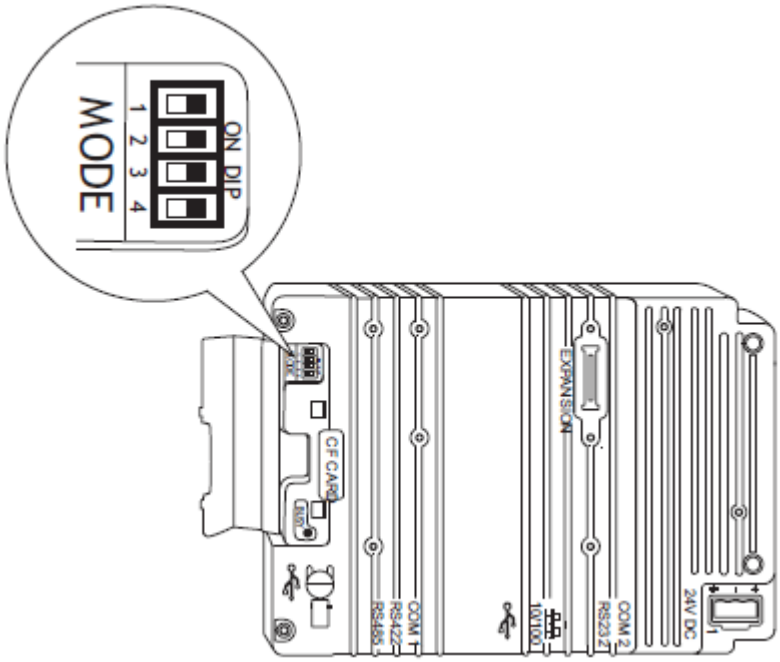

Figure 2-6: Mode switches

2.2.3 Connections to the controller

For information about the cables to be used when connecting the operator panel to the controller, please refer to the help file for the driver in question.

~~2.2.3~~2.2.4 Other connections and peripherals

CAUTION

When using a compact flash card, do not remove the card when the busy indicator is illuminated.

Cables, peripheral equipment and accessories must be suitable for the application and its environment. For further details or recommendations, please refer to the supplier (see references).

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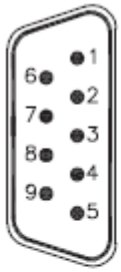
~~2.2.4~~2.2.5 Communication ports

RS-232:



D–sub
9–pin Male

Pin no	Signal	Signal Name	Signal direction
1	DCD	Data Carrier Detect	Input
2	RD	Receive Data	Input
3	TD	Transmit Data	Output
4	DTR	Data Terminal Ready	Output
5	SG	Signal Ground	–
6	DSR	Data Set Ready	Input
7	RTS	Request To Send	Output
8	CTS	Clear To Send	Input
9	RI	Ring Indicator	Input

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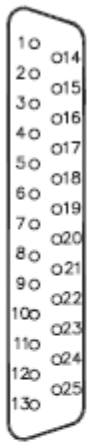
RS-422/485:



D–sub
25–pin Female

	RS-422		RS-485	
Pin no	Signal	Signal direction	Signal	Signal direction
2	TxD+	Output	Tx/Rx+	In/Output
15	TxD–	Output	Tx/Rx–	In/Outpul
3	RxD+	Input		
16	RxD–	Input		
4	RTS+	Output		
17	RTS–	Output		
5	CTS+	Input		
18	CTS–	Input		
20	1)			
21	1)			
6	Do not use		2) Bus termination	4) Connect to pin no.19 for bus–termination.
19	Do not use		3) Bus termination	See above
7,8	0V		0V	
14	+5V <100mA	Output	+5V <100mA	Output

1) Pin no 20 connected to pin no 21 internal in the terminal
2) Directly connected internaly to pin no. 2 (Tx/Rx+).
3) Connected to pin no. 15 (Tx/Rx–) internaly via a 120ohm 1/4W resistor.
4) NOTE! Only the first and the last unit on the bus should be terminated.

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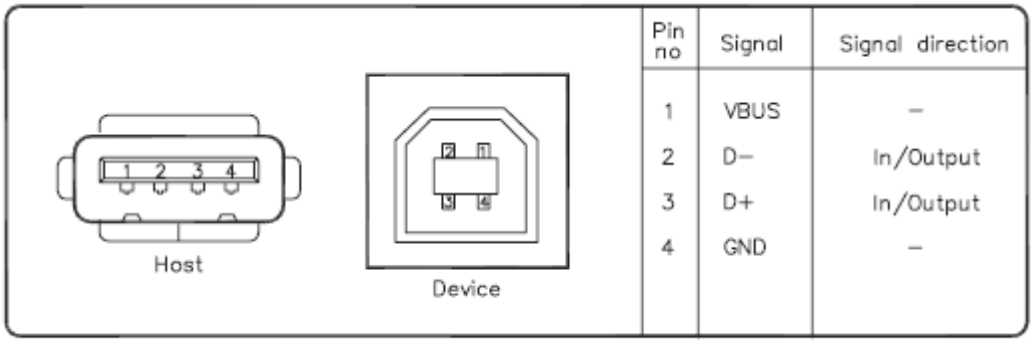
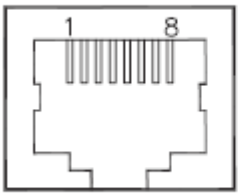
USB:



Pin no	Signal	Signal direction
1	VBUS	–
2	D–	In/Output
3	D+	In/Output
4	GND	–

Frame connected to chassis.

Ethernet:



Pin no	Signal	Signal direction
1	Tx+	Output
2	Tx–	Output
3	Rx+	Input
6	Rx–	Input
4,5,7,8	GND	

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The panel should be installed in an environment that does not exceed 0-50 degrees Celsius when installed horizontally and 0-40 degrees Celsius when installed vertically. The relative humidity should be between 0-85 % (non-condensed). Only indoor use.
The power supply is class 2, +24V DC (20-30 V DC).

Mandatory to use at least Cat5E cable for Lan-connection.

~~2.2.5~~2.2.6 Installation

The Beijer Exter T70-bl comes with a standard software version that needs to be changed to a proprietary version.

To install the software, the following steps have to be made

~~2.2.5.1~~2.2.6.1 Boot the Exter T70 system

The system automatically boots when the power is connected.

~~2.2.5.2~~2.2.6.2 Connect the Exter T70 to the maintenance PC

Using a cross-over cable between the PC and Exter T70 panel or a straight-cable between a network switch and the PC and the network switch and the panel.

 *: be sure that only one uninitialized Exter T70 panel is connected to your network to prevent IP conflicts.*

~~2.2.5.3~~2.2.6.3 Check the IP address of the maintenance PC

The IP address of the maintenance PC should be in the same subnet as the Exter T70.
Default settings of the Exter T70: IP: 192.168.1.1, Subnet-Mask: 255.255.0.0.

~~2.2.5.4~~2.2.6.4 Copy the new software

To do this, open Windows Explorer and go to the local copy of the Alarm Panel Software (to be found at Sharepoint). Select the folder “NavVisionUpdate” and click right mouse button and select
“Copy”

 *: Make sure you use the right version for the BNWAS setup. At least the version of DisplayServer.exe needs to be 2.0*

 *: The NavVision software version needs to be 9.18.4.100 or higher.*

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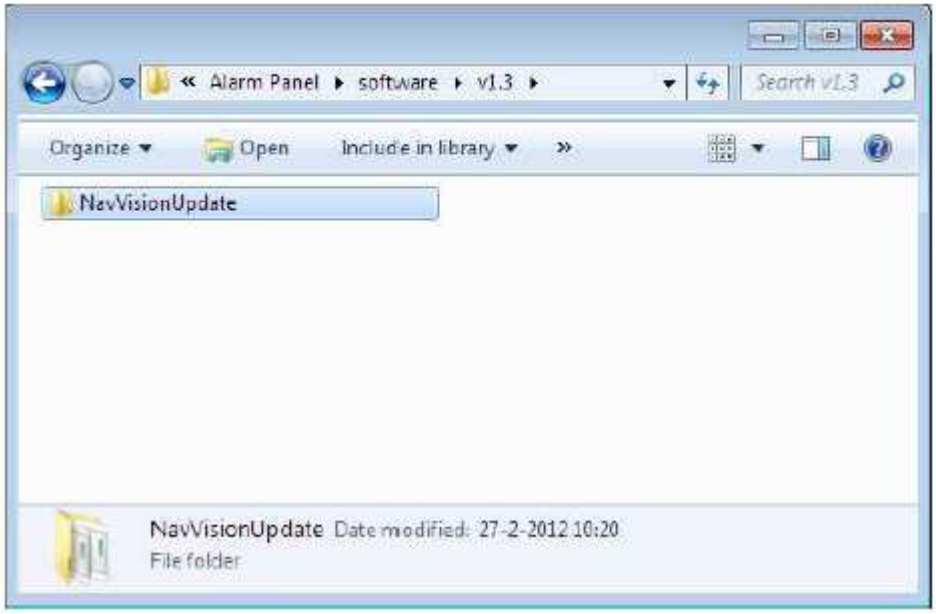

Figure 2-7: Copy local files

~~2.2.5.5~~2.2.6.5 Open an FTP connection to the Exter T70 panel.

You can do this by opening Windows Explorer and entering the ftp address in the address-bar.
By default it is: ftp://free:technics@192.168.1.1
Change the IP address by the assigned IP address in FT NavVision, when the Exter T70 was already initialized.

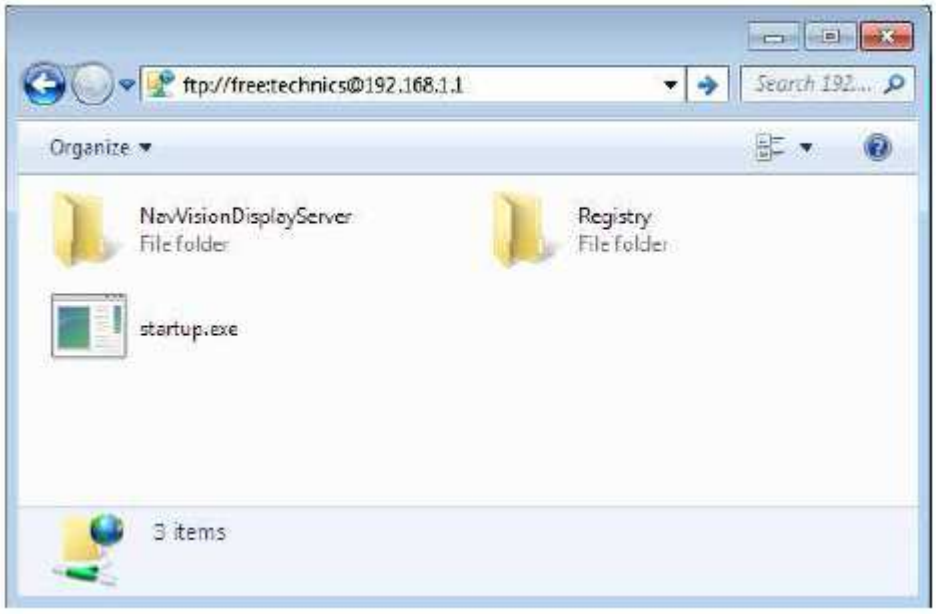

Figure 2-8: Enter FTP address

~~2.2.5.6~~2.2.6.6 Paste the files you have just copied

To do this, press right mouse button and select “Paste”

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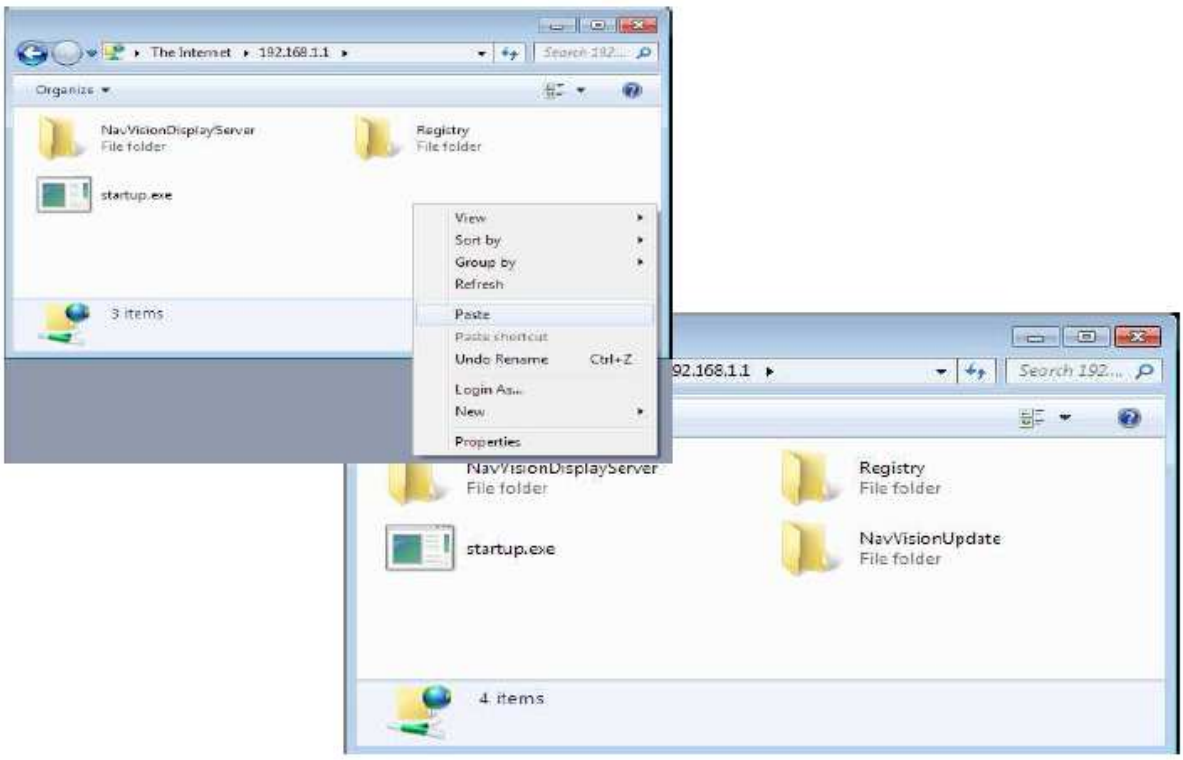

Figure 2-9: Paste new files

~~2.2.5.7~~2.2.6.7 Activating update

The panel will automatically update, when it is the first time the software is installed on the Exter T70. When it's an update of the Exter T70, the power to the unit should be turned off and on again.

~~2.2.5.8~~2.2.6.8 BNWAS.ini

Make a textfile by right-clicking on the desktop and choose "New/TextDocument" (see Figure 2-10).Rename this textfile to "BNWAS.ini". Put the file in the root of the DAP (can be just the empty file)

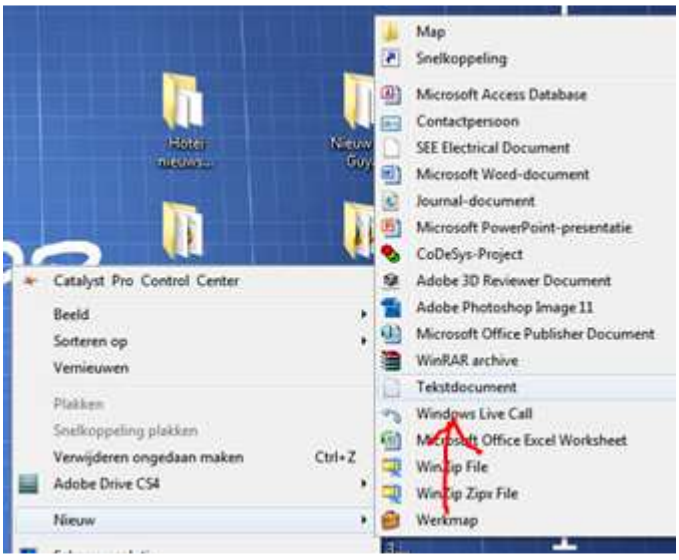

Figure 2-10: Make the BNWAS.ini

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The system is now completely functional and is ready to be used. When it starts up again it will show the standard DAP display as long as there is connection to the NavVision AMCS. As soon as this connection is lost, the DAP will fall back to the BNWAS HMI (see Figure 3-1).

2.3 Wago I/O system 750

2.3.1 Specification

2.3.1.1 Procedure

Wherever possible, the components are to be stored in their original packaging. Likewise, the original packaging provides optimal protection during transport.
When assembling or repacking the components, the contacts must not be soiled or damaged. The components must be stored and transported in appropriate containers/packaging. Thereby, the ESD (Electrostatic Discharge) information is to be regarded.

Statically shielded transport bags with metal coatings are to be used for the transport of open components for which soiling with amine, amide and silicone has been ruled out, e.g. 3M 1900E.

2.3.1.2 Manufacturing number

The manufacturing number indicates the delivery status directly after production. This number is part of the lateral marking on the component.
In addition, starting from calendar week 43/2000 the manufacturing number is also printed on the cover of the configuration and programming interface of the field bus coupler or controller.

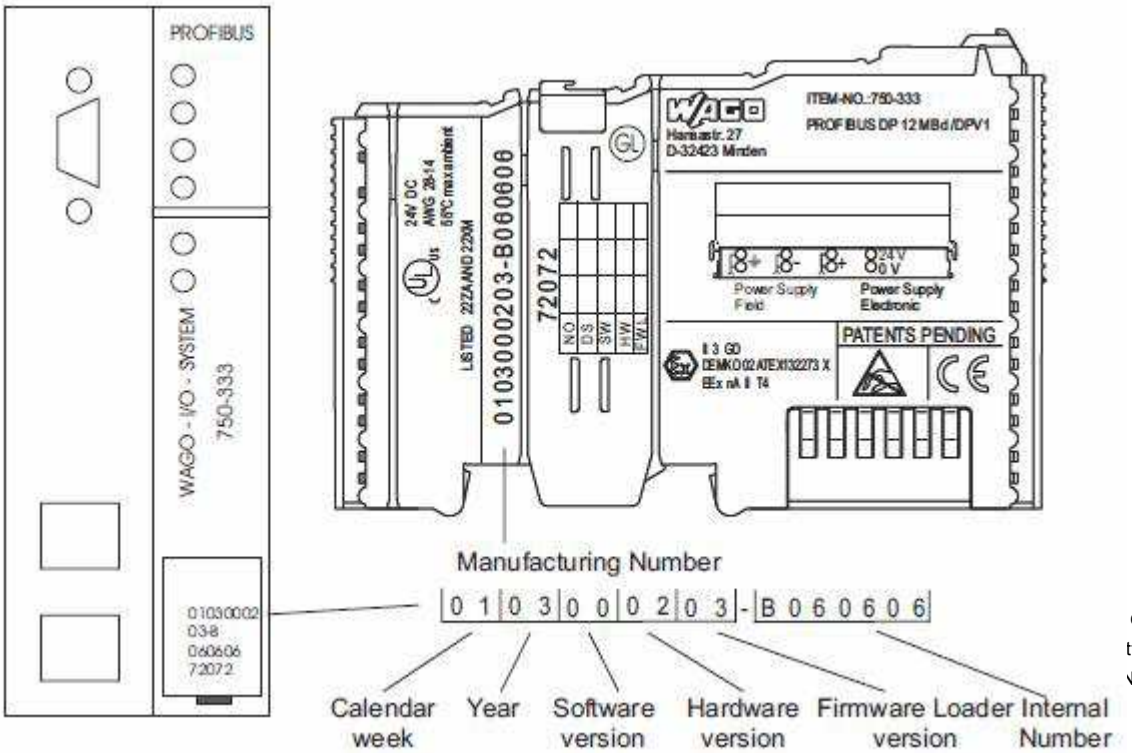

Figure 2-11: Manufacturing number

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2.3.1.3 General description

The WAGO I/O system is a modular, field bus independent I/O system.
It is comprised of a field bus coupler/controller (1) and connected field bus modules (2) for any type of signal. Together, these make up the field bus node. The end module (3) completes the node.

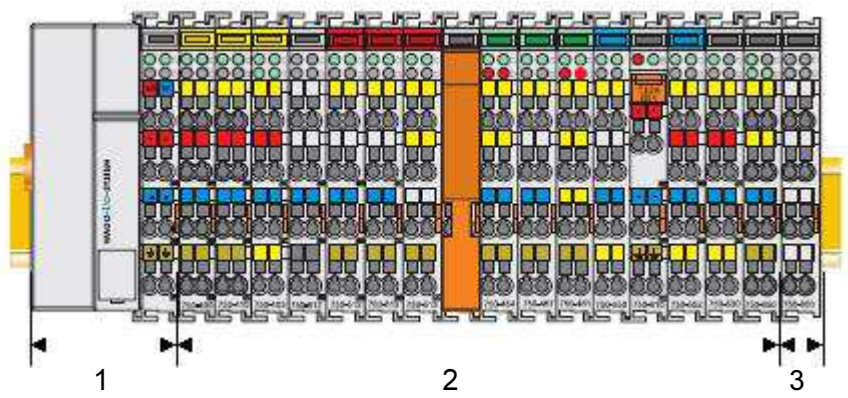

Figure 2-12: Field bus Independent I/O system

Couplers/controllers for field bus systems such as PROFIBUS, INTERBUS, ETHERNET TCP/IP, CAN (CAN open, Device Net, CAL), MODBUS, LON and others are available.

The coupler/controller contains the field bus interface, electronics and a power supply terminal. The field bus interface forms the physical interface to the relevant field bus. The electronics process the data of the bus modules and make it available for the field bus communication. The 24 V system supply and the 24 V field supply are fed in via the integrated power supply terminal.

The field bus coupler communicates via the relevant field bus. The programmable field bus controller (PFC) enables the implementation of additional PLC functions.

Bus modules for diverse digital and analog I/O functions as well as special functions can be connected to the coupler/controller. The communication between the coupler/controller and the bus modules is carried out via an internal bus.

The system has a clear port level with LEDs (see 3.1.3) for status indication, insertable mini WSB markers and pullout group marker carriers.

The 3-wire technology supplemented by a ground wire connection allows for direct sensor/ actuator wiring.

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2.3.1.4 Dimensions

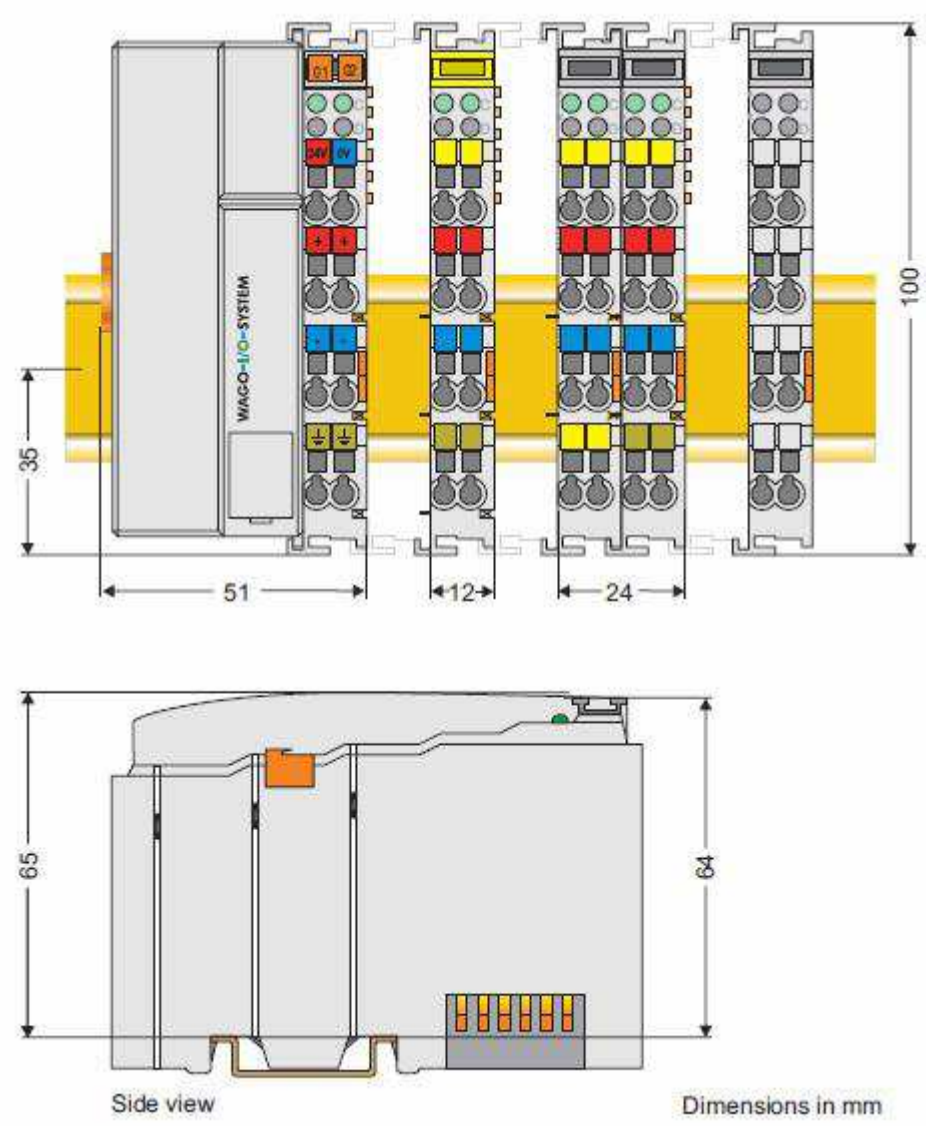

Figure 2-13: Dimensions

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2.3.1.5 Installation position

Along with horizontal and vertical installation, all other installation positions are allowed.

NOTE

In the case of vertical assembly, an end stop has to be mounted as an additional safeguard against slipping.

WAGO item 249-116 End stop for DIN 35 rail, 6 mm wide

WAGO item 249-117 End stop for DIN 35 rail, 10 mm wide.

2.3.1.6 Total expansion

The length of the module assembly (including one end module of 12 mm width) that can be connected to the coupler/controller is 780 mm. When assembled, the I/O modules have a maximum length of 768 mm.

Examples:

64 I/O modules of 12 mm width can be connected to one coupler/controller 32 I/O modules of 24 mm width can be connected to one coupler/controller.

Exception:

The number of connected I/O modules also depends on which type of coupler/ controller is used. For example, the maximum number of I/O modules that can be connected to a Profibus coupler/controller is 63 without end module.

The maximum total expansion of a node is calculated as follows:

WARNING

The maximum total length of a node without coupler/controller must not exceed 780 mm. Furthermore, restrictions made on certain types of couplers/controllers must be observed (e.g. for Profibus).

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2.3.1.7 Assembly onto a carrier rail

All system components can be snapped directly onto a carrier rail in accordance with the European standard EN 50022 (DIN 35).

NOTE

Carrier rails have different mechanical and electrical properties. For the optimal system setup on a carrier rail, certain guidelines must be observed:

The material must be non-corrosive

Most components have a contact to the carrier rail to ground electromagnetic disturbances. In order to avoid corrosion, this tin-plated carrier rail contact must not form a galvanic cell with the material of the carrier rail, which generates a differential voltage above 0.5 V (saline solution of 0.3% at 20°C)

The carrier rail must optimally support the EMC measures integrated into the system and the shielding of the bus module connections

A sufficiently stable carrier rail should be selected and, if necessary, several mounting points (every 20 cm) should be used in order to prevent bending and twisting (torsion).

The geometry of the carrier rail must not be altered in order to secure the safe hold of the components. In particular, when shortening or mounting the carrier rail, it must not be crushed or bent

The base of the I/O components extends into the profile of the carrier rail. For carrier rails with a height of 7.5 mm, mounting points are to be riveted under the node in the carrier rail (slotted head captive screws or blind rivets).

2.3.1.8 Spacing

The spacing between adjacent components, cable conduits, casing and frame sides must be maintained for the complete field bus node.
The spacing creates room for heat transfer, installation or wiring. The spacing to cable conduits also prevents conducted electromagnetic interferences from influencing the operation.

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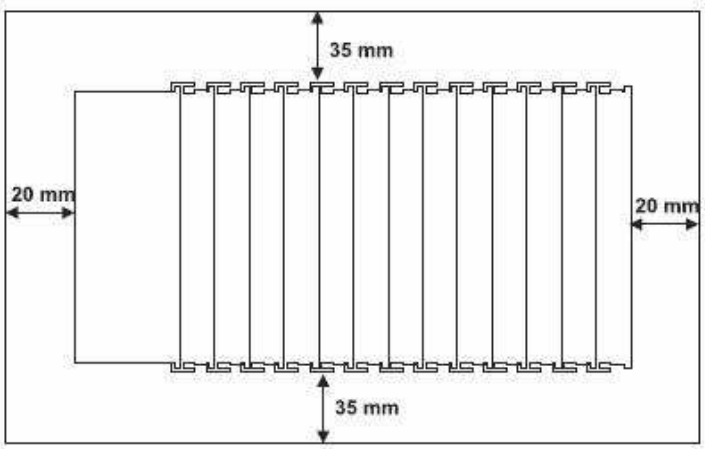

Figure 2-14: Spacing

2.3.1.9 Installation and removal of the components

WARNING

Before working on the components, turn off the voltage supply.

In order to safeguard the coupler/controller from jamming, it should be fixed onto the carrier rail with the locking disc to do so, push on the upper groove of the locking disc using a screwdriver. To pull out the field bus coupler/controller, release the locking disc by pressing on the bottom groove with a screwdriver and then pulling the orange colored unlocking lug.

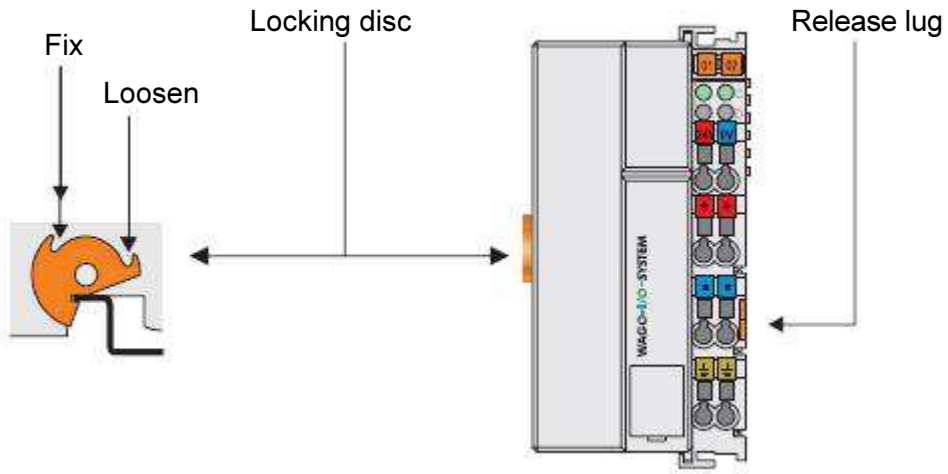

Figure 2-15: Coupler/controller and unlocking lug

It is also possible to release an individual I/O module from the unit by pulling an unlocking lug.

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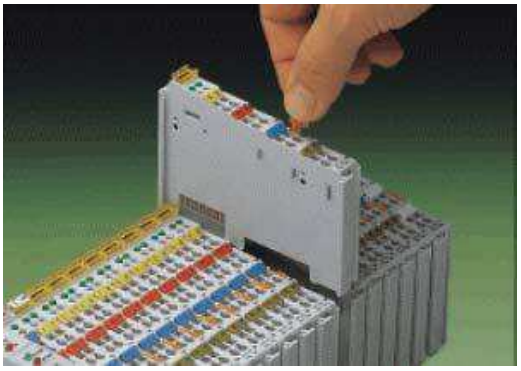

Figure 2-16: Removing of bus terminal

2.3.1.10 Assembly sequence

WARNING

Never plug bus modules from the direction of the end terminal. A ground wire power contact, which is inserted into a terminal without contacts, e.g. a 4-channel digital input module, has a decreased air and creepage distance to the neighbouring contact.

Always terminate the field bus node with an end module (750-600).

The reliable positioning and connection is made using a tongue and groove system. Due to the automatic locking, the individual components are securely seated on the rail after installing. Starting with the coupler/controller, the bus modules are assembled adjacent to each other according to the project planning. Errors in the planning of the node in terms of the potential groups (connection via the power contacts) are recognized, as the bus modules with power contacts (male contacts) cannot be linked to bus modules with fewer power contacts.

2.3.1.11 Internal bus / data contacts

WARNING

Do not touch the gold spring contacts on the I/O modules in order to avoid soiling or scratching.

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Figure 2-17: Data contacts

2.3.1.12 ESD (Electrostatic Discharge)

CAUTION

The modules are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the modules, ensure that the environment (persons, workplace and packing) is well grounded. Avoid touching conductive components, e.g. gold contacts.

2.3.1.13 Power contacts

CAUTION

The power contacts are sharp-edged. Handle the module carefully to prevent injury.

Please take into consideration that some bus modules have no or only a few power jumper contacts. The design of some modules does not allow them to be physically assembled in rows, as the grooves for the male contacts are closed at the top.

Self-cleaning power contacts are situated on the side of the components, which further conduct the supply voltage for the field side. These contacts come as touch proof spring contacts on the right side of the coupler/controller and the bus module. As fitting counterparts the module has male contacts on the left side.

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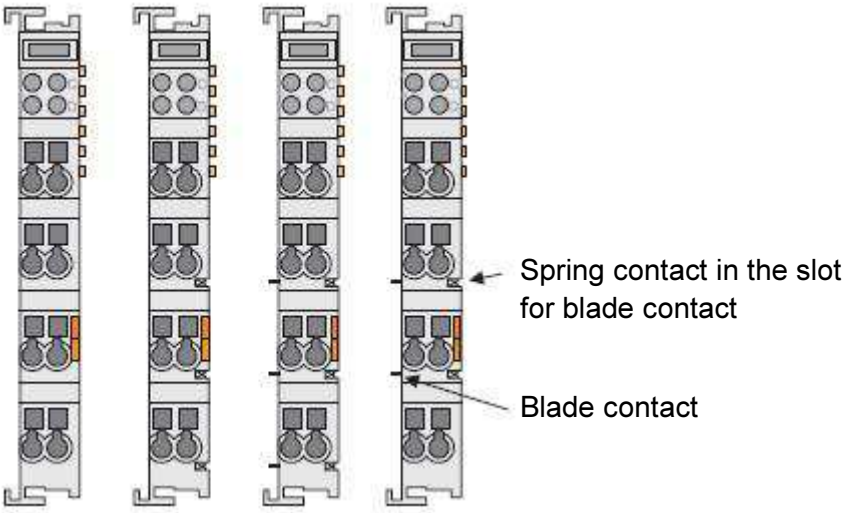

2.3.1.14 Wire connection

All components have CAGE CLAMP® connections.
The WAGO CAGE CLAMP® connection is appropriate for solid, stranded and fine–stranded conductors. Each clamping unit accommodates one conductor.

Figure 2-7: CAGE CLAMP® connection

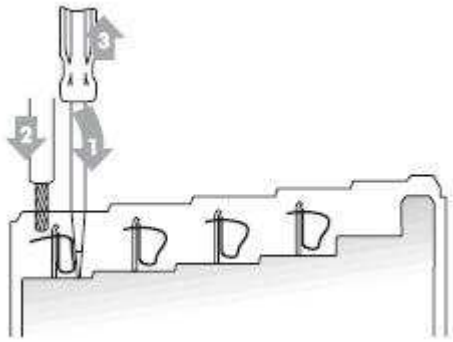

Figure 2-18: CAGE CLAMP® connection

The operating tool is inserted into the opening above the connection. This opens the CAGE CLAMP®. Subsequently the conductor can be inserted into the opening. After removing the operating tool, the conductor is safely clamped.

More than one conductor per connection is not permissible. If several conductors have to be made at one connection point, then they should be made away from the connection point using WAGO

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Terminal Blocks. The terminal blocks may be jumpered together and a single wire brought back to the I/O module connection point.

NOTE

If it is unavoidable to jointly connect 2 conductors, then a ferrule must be used to join the wires together.

Ferrule	
Length	8 mm
Nominal cross section (max.)	1 mm^2 for 2 conductors with 0.5 mm^2 each
WAGO Product	216-103 or products with comparable properties

2.3.1.15 Connection

NOTE
The use of an incorrect supply voltage or frequency can cause severe damage to the component.

The system requires a 24 V direct current system supply (-15% or +20 %). The power supply is provided via the coupler/controller and, if necessary, in addition via the internal system supply modules (750-613).

The voltage supply is reverse voltage protected.

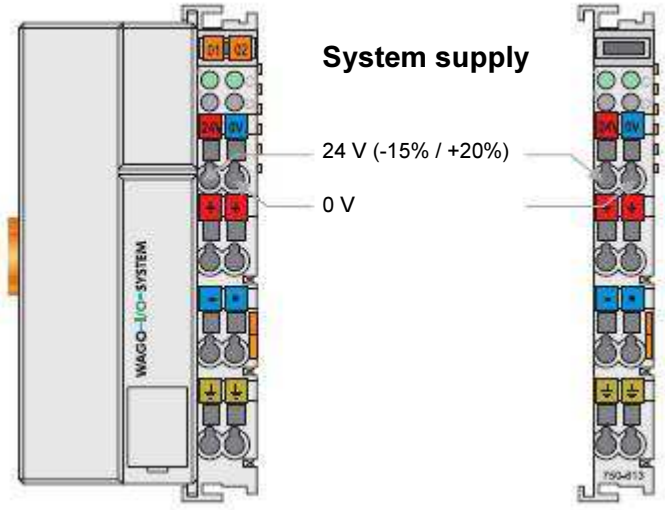

Figure 2-19: System supply

The direct current supplies all internal system components, e.g. coupler/controller electronics, field bus interface and bus modules via the internal bus (5 V system voltage). The 5 V system voltage is electrically connected to the 24 V system supply.

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NOTE
Resetting the system by switching on and off the system supply, must take place simultaneously for all supply modules (coupler/controller and 750-613).

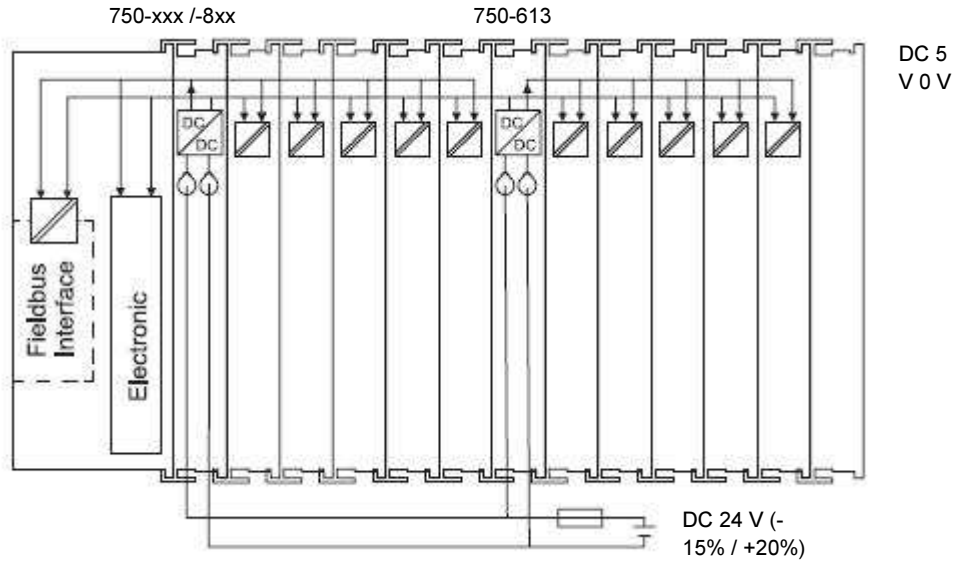

Figure 2-20: System voltage

2.3.1.16 Connection

Sensors and actuators can be directly connected to the relevant channel of the bus module in 1-/4 conductor connection technology. The bus module supplies power to the sensors and actuators. The input and output drivers of some bus modules require the field side supply voltage.

The coupler/controller provides field side power (24 VDC). In this case it is a passive power supply without protection equipment.
Power supply modules are available for other potentials, e.g. 230 VAC. Likewise, with the aid of the power supply modules; various potentials can be set up. The connections are linked in pairs with a power contact.

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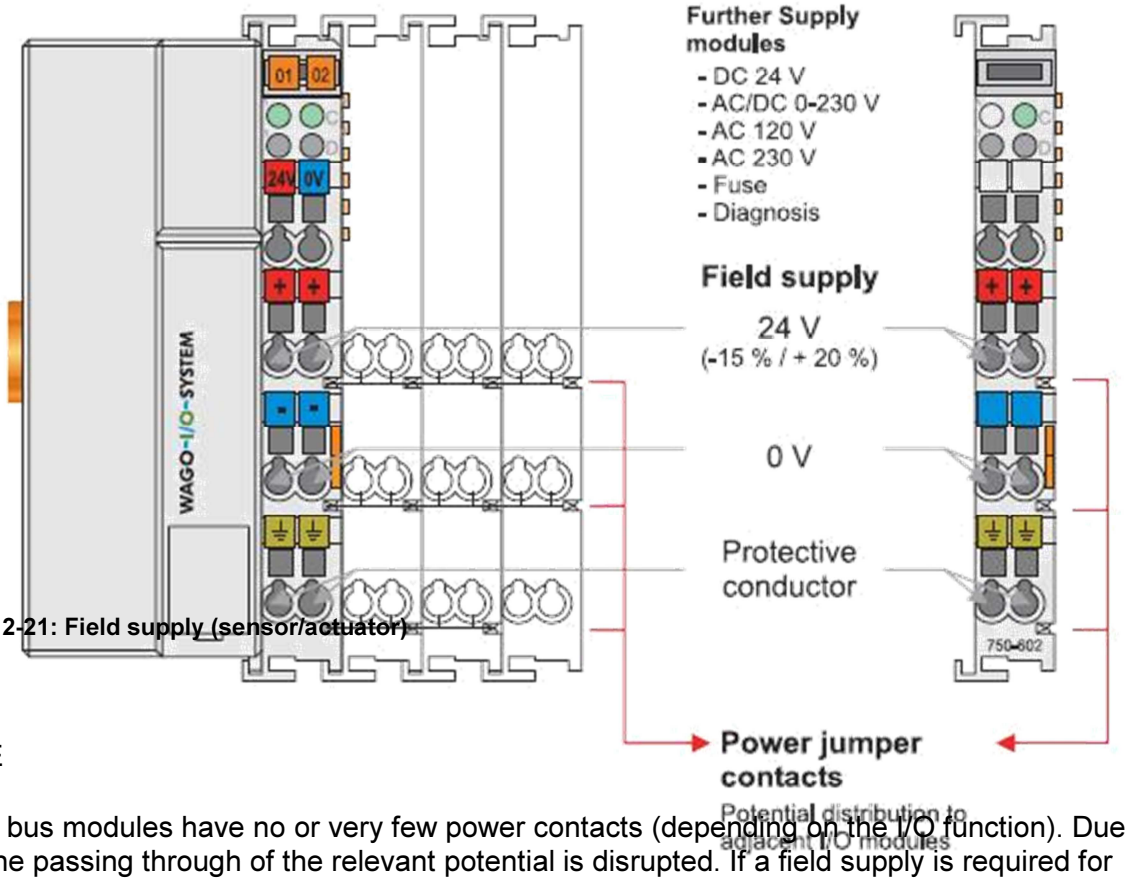

Figure 2-21: Field supply (sensor/actuator)

NOTE

Some bus modules have no or very few power contacts (depending on the I/O function). Due to this, the passing through of the relevant potential is disrupted. If a field supply is required for subsequent bus modules, then a power supply module must be used. Note the data sheets of the bus modules.

In the case of a node setup with different potentials, e.g. the alteration from 24 VDC to 230 VAC, a spacer module should be used. The optical separation of the potentials acts as a warning to heed caution in the case of wiring and maintenance works. Thus, the results of wiring errors can be prevented.

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The supply voltage for the field side is automatically passed to the next module via the power jumper contacts when assembling the bus modules.
The current load of the power contacts must not exceed 10 A on a continual basis. The current load capacity between two connection terminals is identical to the load capacity of the connection wires.

By inserting an additional power supply module, the field supply via the power contacts is disrupted. From there a new power supply occurs which may also contain a new voltage potential.

2.3.1.17 Fusing

Internal fusing of the field supply is possible for various field voltages via an appropriate power supply module.

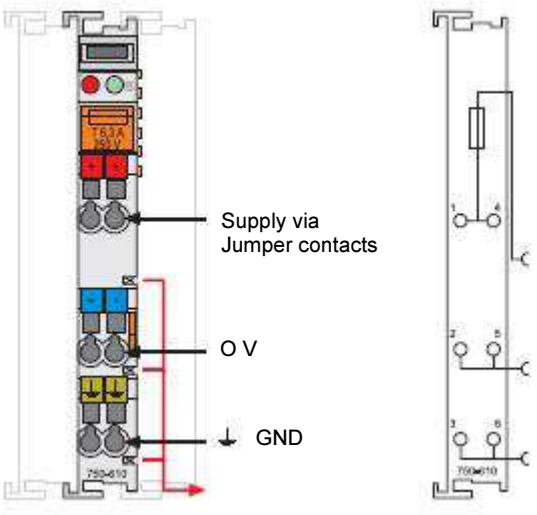

Figure 2-22: Supply module with fuse carrier

WARNING

In the case of power supply modules with fuse holders, only fuses with a maximum dissipation of 1.6 W (IEC 127) must be used.

750-601	24 VDC, supply/fuse
750-609	230 VAC, supply/fuse

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750-615	120 VAC, supply/fuse
750-610	24 VDC, supply/fuse/diagnosis
750-611	230 VAC, supply/fuse/diagnosis

In order to insert or change a fuse, or to switch off the voltage in succeeding bus modules, the fuse holder may be pulled out. In order to do this, use a screwdriver for example, to reach into one of the slits (one on both sides) and pull out the holder.

Figure 2-23: Removing the fuse carrier

Lifting the cover to the side opens the fuse carrier

Figure 2-24: Opening the fuse carrier

Figure 2-25: Change fuse

After changing the fuse, the fuse carrier is pushed back into its original position.

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2.3.1.18 Grounding the DIN rail

CAUTION

Care must be taken to ensure the flawless electrical connection between the carrier rail and the frame or housing in order to guarantee sufficient grounding.

When setting up the framework, the carrier rail must be screwed together with the electrically conducting cabinet or housing frame. The framework or the housing must be grounded. The electronic connection is established via the screw. Thus, the carrier rail is grounded.

2.3.1.19 Insulated assembly

Insulated assembly has been achieved when there is constructively no direct conduction connection between the cabinet frame or machine parts and the carrier rail. Here the earth must be set up via an electrical conductor.

The connected grounding conductor should have a cross section of at least 4 mm^2.

Recommendation

The optimal insulated setup is a metallic assembly plate with grounding connection with an electrical conductive link with the carrier rail.
The separate grounding of the carrier rail can be easily set up with the aid of the WAGO ground wire terminals.

Article #	Description
283-609	Single-conductor ground (earth) terminal block make an automatic contact to the carrier rail; conductor cross section: 0.2 -16 mm^2 *NOTE: Also order the end and intermediate plate (283-320)*

2.3.1.20 Grounding function

The grounding function increases the resistance against disturbances from electro-magnetic interferences. Some components in the I/O system have a carrier rail contact that dissipates electro-magnetic disturbances to the carrier rail.

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CAUTION

Care must be taken to ensure the direct electrical connection between the carrier rail contact and the carrier rail. The carrier rail must be grounded.

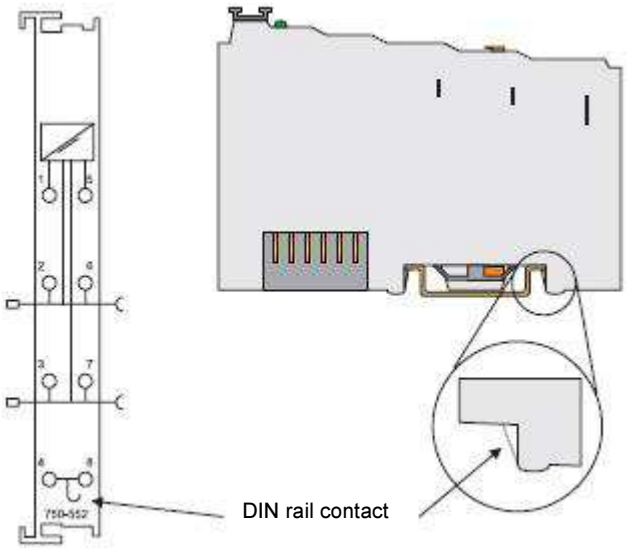

Figure 2-26: Carrier rail contact

2.3.1.21 Shielding (screening)

CAUTION

Constant shielding is absolutely required in order to ensure the technical specifications in terms of the measurement accuracy.
The data and signal conductors should be separated from all high-voltage cables. The cable shield should be potential. With this, incoming disturbances can be

easily diverted.

The shielding should be placed over the entrance of the cabinet or housing in order to already repel disturbances at the entrance.

The shielding of the data and signal conductors reduces electromagnetic interferences thereby increasing the signal quality. Measurement errors, data transmission errors and even disturbances caused by over-voltage can be avoided.

2.3.1.22 Bus conductors

The shielding of the bus conductor is described in the relevant assembly guidelines and standards of the bus system.

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2.3.1.23 Signal conductors

NOTE

For better shield performance, the shield should have previously been placed over a large area. The WAGO shield connection system is suggested for such an application.

This suggestion is especially applicable when the equipment can have even current or high impulse formed currents running through it (for example through atmospheric end loading).

Bus modules for most analog signals along with many of the interface bus modules include a connection for the shield.

2.3.1.24 WAGO Shield (screen) connecting system

The WAGO shield connecting system includes a shield clamping saddle, a collection of rails and a variety of mounting feet. Together these allow many different possibilities.

Figure 2-27: WAGO shield (screen) connecting system

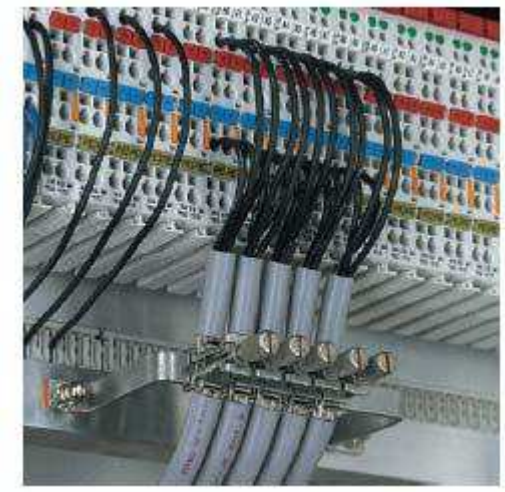

Figure 2-28: Application of WAGO shield (screen) connecting system

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2.3.1.25 Assembly guidelines / standards

DIN 60204	Electrical equipping of machines
DIN EN 50178	Equipping of high-voltage systems with electronic components (replacement for VDE 0160)
EN 60439	Low voltage – switch box combinations

2.3.1.26 Hardware

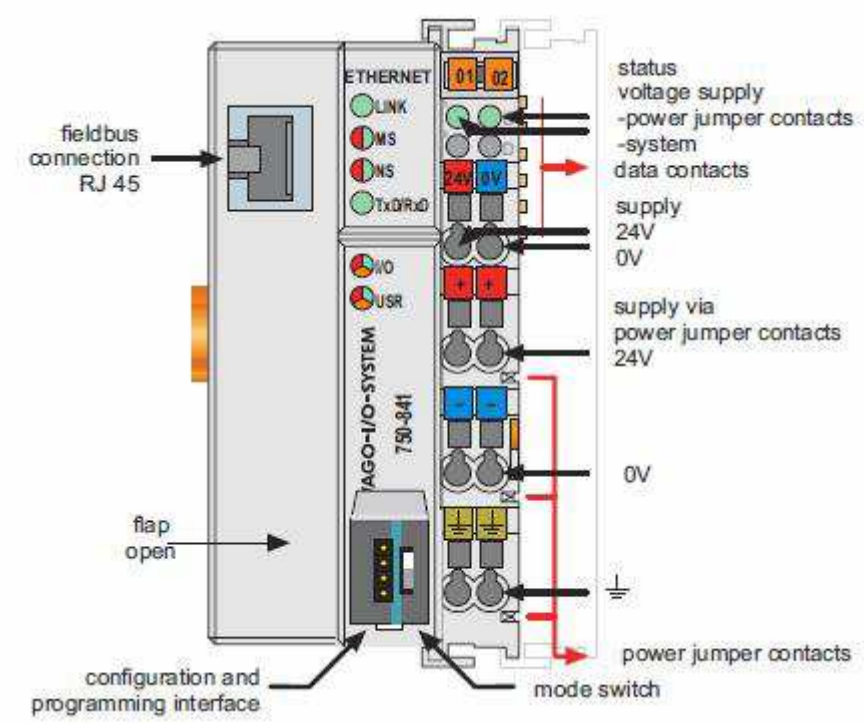

Figure 2-29: Field bus controller Ethernet TCP/IP

The field bus controller comprises of:

Device supply with internal system supply module for the system supply as well as power jumper contacts for the field supply via assembled I/O modules

Field bus interface with the bus connection

Display elements (LEDs) for status display of the operation, the bus communication, the operating voltages as well as for fault messages and diagnosis

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Configuration and programming interface Operating mode switch

Electronics for communication with the I/O modules (internal bus) and the field bus interface.

2.3.1.27 Device supply

The supply is via fed in via terminal blocks with CAGE CLAMP® connection. Device supply is intended for system supply and field side supply.

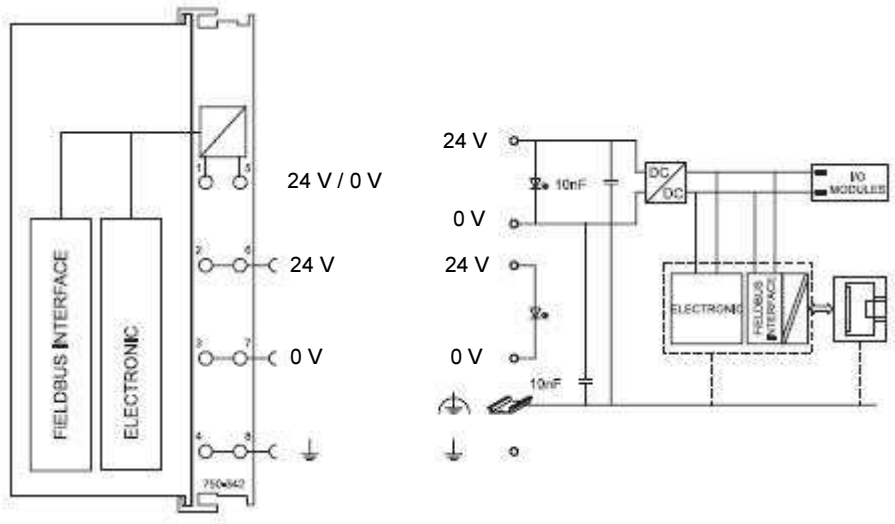

Figure 2-30: Device supply

The integrated internal system supply module generates the necessary voltage to supply the electronics and the connected I/O modules.
The field bus interface is supplied with electrically isolated voltage from the internal system supply module.

2.3.1.28 Field bus connection

Connection to the field bus is by a RJ45 connector. A category 5, shielded/unshielded twisted pair cable (S-UTP) with an impedance of 100-Ohm ±15% is mandatory as a connecting line for the 10BaseT Interface.

The connection point is physically lowered for the coupler/controller to fit in an 80 mm high switch box once connected.
The electrical isolation between the field bus system and the electronics is achieved by means of DC/DC converters and optocouplers in the field bus interface.

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Contact	Signal	
1	TD +	Transmit +
2	TD -	Transmit +
3	RD +	Receive +
4		Free
5		Free
6	RD -	Receive -
7		Free
8		Free

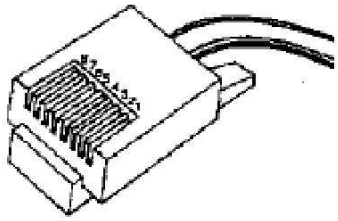

Figure 2-31: RJ45 connector

NOTE
Only for use in LAN, do not for telecommunication circuit connections.

2.3.1.29 Display elements

The operating condition of the field bus controller or node is displayed via light diodes (LED). For more detailed information, please refer to the *"WAGO Ethernet TCP/IP 750-881 Manual"*.

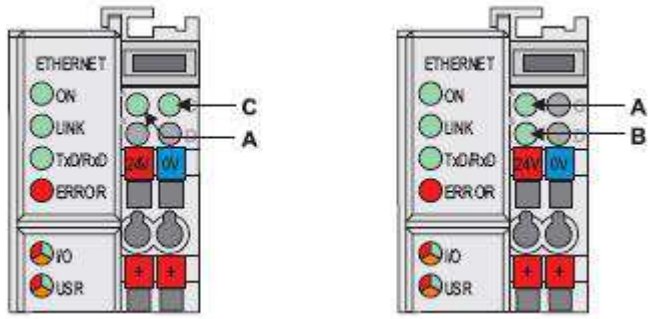

Figure 2-32: Display elements

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LED	Color	Meaning
ON	Green	Field bus initialization is correct.
	Off	Field bus initialization is not correct, no function or self-test.
LINK	Green	Link to a physical network exists.
	Off	No link to a physical network.
TxD / RxD	Green	Data exchange taking place.
	Off	No data exchange.
ERROR	Red	Error on the field bus.
	Off	No error on field bus, normal operation.
I/O	Green	Field bus controller operating perfectly, data cycle on the internal bus.
	Off	No data cycle on the internal bus.
	Red	1. During startup of field bus controller: Internal bus being initialized, startup displayed by LED flashing fast for approx. 1-2 seconds 2. After startup of field bus controller: Errors, which occur, are indicated by three consecutive flashing sequences. There is a short pause between each sequential flash.
USR	Red / Green / Orange	The “USR” LED can be selected by a user program in a programmable field bus controller.
A	Green	Status of the operating voltage – system
B or C	Green	Status of the operating voltage – power jumper contacts (LED position is manufacturing dependent).

2.3.1.30 Display elements (power supply filter 24 VDC - 750-626)

WARNING

The maximum current of the filter module is 10 A. When configuring the system it is important not to exceed the maximum/sum current. However, if such a case should occur, another supply module must be added.

The filter module 750-626 can be used with all couplers/controllers of the WAGO-I/O-SYSTEM 750.

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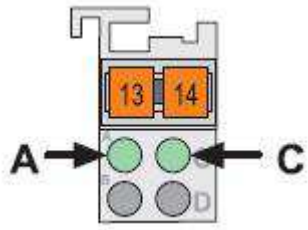

Figure 2-33: Display elements (power supply filter 24 VDC - 750-626)

LED	Designation	State	Function
A (green)	Status Voltage supply - System	Off	No 24 VDC system voltage supply.
		On	24 VDC system voltage supply.
C (green)	Status voltage Supply - Power jumper Contacts.	Off	No 24 VDC voltage supply via power jumper contacts.
		On	24 VDC voltage supply via power jumper contacts.

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2.3.1.31 Technical specifications

System data	
No. of nodes	Limited by ETHERNET specification
Transmission medium	Twisted Pair S-UTP 100 Ω cat. 5
Bus coupler connection	RJ45
Max. length of field bus segment	100 m between hub station and 750-841; max. length of network limited by ETHERNET specification
Baud rate	10/100 Mbit/s
Protocols	MODBUS/TCP (UDP), ETHERNET/IP, HTTP, BootP, DHCP, DNS, SNTP, FTP, SNMP
Programming	WAGO -I-PRO CAA
IEC 61131-3-3	IL, LD, FBD, ST, SFC
Technical data	
No. of I/O modules with bus extension	64 250
Field bus: Input process image max. Output process image max. Input variables max. Output variables max.	 2 kByte 2 kByte 512 Byte 512 Byte
Configuration possibility	Via PC
Program memory	512 kByte
Data memory	256 kByte
Non- volatile memory	24 kByte (16 k retain, 8 k flags)
Max. no. of socket connections	3 HTTP, 15 MODBUS/TCP, 10 FTP, 2 SNMP, 5 for IEC 61131-3 programs, 2 for WAGO-I/O-PRO
Power fail-RTC -Buffer	Min. 6 days
Voltage supply	24 VDC (-25 % / + 30 %)
Input current$_{max}$	500 mA at 24 V
Efficiency of the power supply	87 %
Internal current consumption	300 mA at 5 V
Total current for I/O modules	1700 mA at 5 V
Isolation	500 V system/supply
Voltage via power jumper contacts	24 VDC (-25 % / + 30 %)
Current via power jumper contacts$_{max}$	DC 10 A
Dimensions (mm) W x H x L	51 x 65* x 100 (*from upper edge of DIN 35 rail)
Weight	± 184 g
Accessories	
WAGO-I/O-PRO 32 or WAGO-I/O-PRO CAA	759-332 759-333

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2.3.2 Installation

The basic wago will consist of the following modules as seen in the overview (see Figure 2-34).

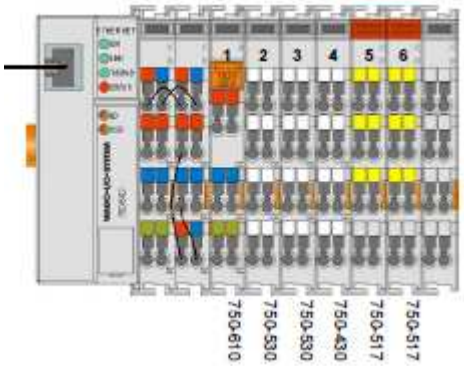

Figure 2-34: PLC overview

2.3.2.1 PLC explanation and settings

In the following exploded views (see Figure 2-35 and Figure 2-36) you can see which fields are attached to which PLC slide. These settings suffice the mandatory rules as stated in MSC128(75).

These fields are also described in the Product description v1.2 and can be subdivided in the following:

6* WAP 1st stage
4* WAP 2nd stage
4* WAP 3rd stage
6* Timer reset button
1* Stage 1 alarm out to VDR
1* Stage 2 alarm out to VDR
1* Stage 3 alarm out to VDR
1* Common failure alarm out
1* in BNWAS on/off
1* in BNWAS auto

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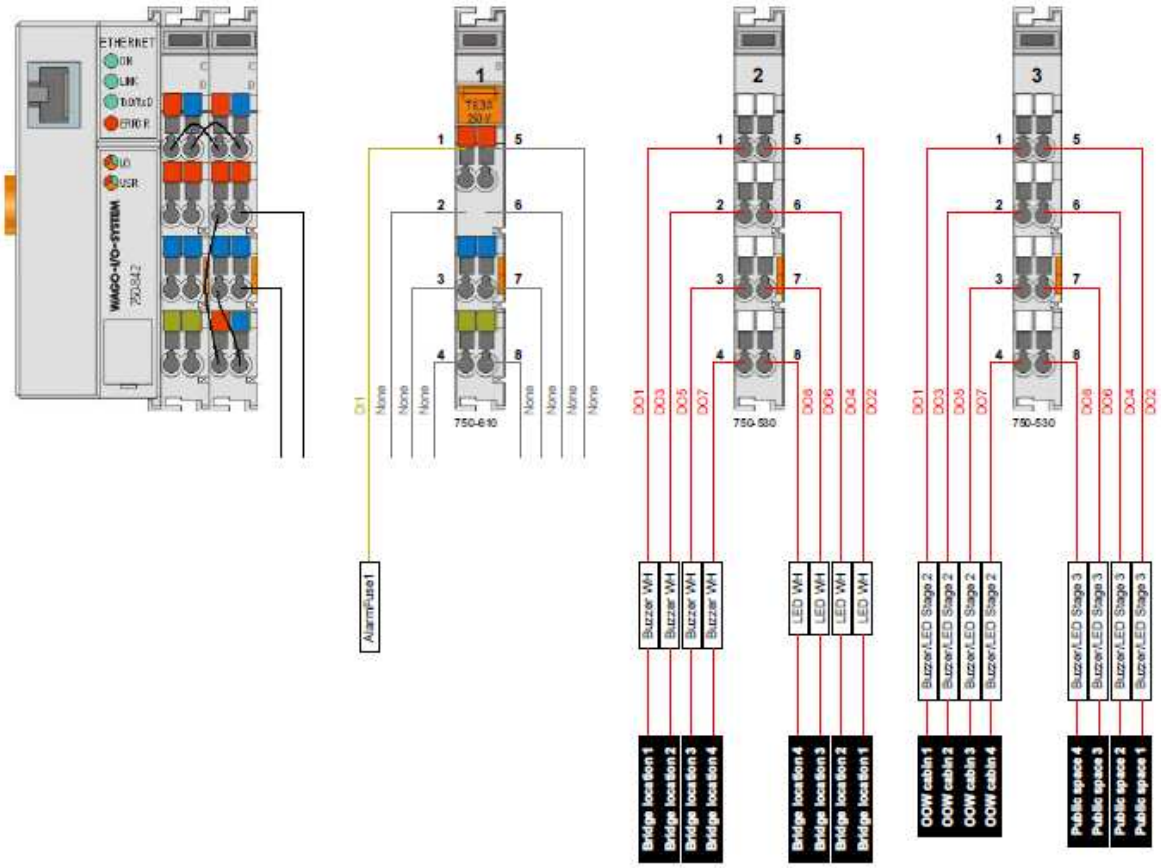

Figure 2-35: Exploded view 1

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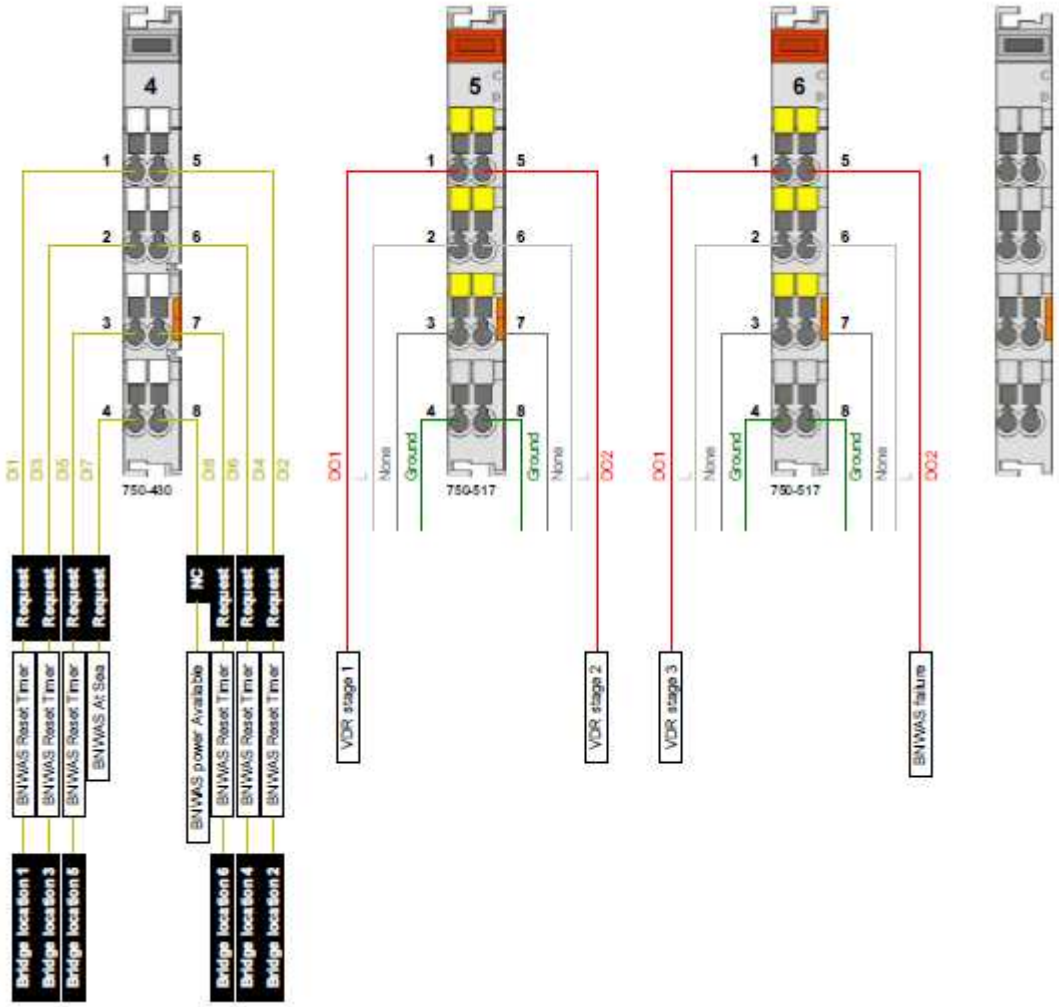

Figure 2-36: Exploded view 2

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2.4 Phoenix Contact FL switch SFNT series

2.4.1 Specification

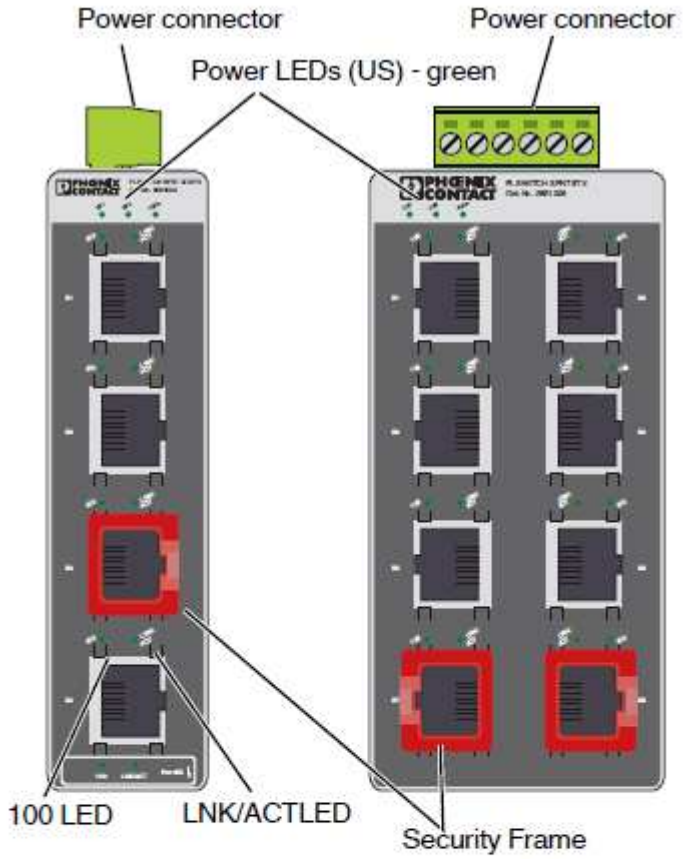

Figure 1 Power Connector, LED Locations and Security Frame

5.1 Diagnostic and Status Indicators

Des.	Color	Status	Meaning
US1 and US2	green	ON	Supply voltage (US) in the tolerance range
		OFF	Supply voltage (US) too low
Alarm	red	ON	US1 or US2 is too low or missing
			Port link failure
		OFF	Normal operation

Figure 2-37: Drawing and diagnostics

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General Data	
Function	Switch/repeater; conforms to standard IEEE 802.3
Latency of the communication processor	8 µs plus frame time
Housing dimensions (width x height x depth)	
5-port switch, without connectors 8-port switch, without connectors	30 x 130 x 100 mm 50 x 130 x 100 mm
Weight, without connectors	
FL SWITCH SFNT 5TX(-C) FL SWITCH SFNT 8TX(-C) FL SWITCH SFNT 4TX/FX(-C) FL SWITCH SFNT 7TX/FX(-C) FL SWITCH SFNT 7TX/FX ST(-C) FL SWITCH SFNT 6TX/2FX(-C) FL SWITCH SFNT 6TX/2FX ST (-C)	271 g 457 g 276 g 464 g 465 g 484 g 484 g
Operating temperature	-40°C to 75°C
Storage temperature	-40°C to 85°C
Degree of protection	IP20, DIN 40050, IEC 60529
Protection class	Class 3 VDE 0106; IEC 60536
Humidity (operation and storage)	5% to 95%, no condensation
Air pressure (operation)	62 kPa to 108 kPa, 4160 m above sea level
Air pressure (storage)	62 kPa to 108 kPa, 4160 m above sea level
Mounting	NS 35 (EN 60715)
Preferred mounting position	Perpendicular to a standard mounting rail
Connection to protective earth ground	Snapped onto a grounded mounting rail

Supply Voltage (US)	
Connection type	Removable, screw-clamp connector
Wire size (solid/stranded/AWG)	0.2 to 2.5 mm² / 0.2 to 2.5 mm² / 24 to 12 AWG
Recommended PE wire size	2.5 mm²
Nominal power supply	24 V DC
Permissible ripple	3.6 V_{pp} within the permissible voltage range
Permissible voltage range	9 V DC to 32 V DC
Test voltage	500 V DC for one minute
Protection against polarity reversal	Present

Figure 2-38: General data

2.4.2 Installation

Install requirements are set in the specifications. Lan cables to be used must be at least Cat5E.

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2.5 Watch Alarm Panel 1st, 2nd and 3rd stage

2.5.1 Specification

The panels are shown in the following figures:

Figure 2-39: BNWAS WAP small

These panels can be used on the bridge, but also on the locations where the 2nd and 3rd stage alarms need to be shown.

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2.5.2 Installation

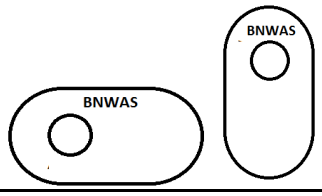
Panel horizontal-vertical	
	
Location of use:	All spaces where Bridge duty crew can be available (no duty select)

Figure 2-40: BNWAS panel small

Button	Color	Function	NavVision© Field (Button/Led)
BNWAS	Red	Bridge duty and timer reset	Station Bridge Deadman Silence
			Station Bridge Deadman Alarm Active LED
Buzzer		Alarm***	Station Bridge Deadman Alarm Buzzer

Figure 2-41: BNWAS panel small field assignment

The panels come pre-wired. The cables can be directly connected to the wago, or through a terminal (if the distance is longer). The wiring lies outside the scope of the type approval.

The panels can be mounted on practically every surface. It is a non-flush mounting. The panels are tightened by 4 screws or bolts.

2.6 Reset Buttons

2.6.1 Specification

- **Dot and Ring Illuminated Vandal Resistant Security Switches**
- **Front panel sealed to IP66**
- **Marine grade stainless steel**
- **Screw terminals or 2.8mm tabs**
- **Bright daylight LEDs**
- **22mm dia**
- **Red or green illumination**
- **Tactile feel**

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Figure 2-42: Specifications

2.6.2 Installation

The illuminated switches can be used to provide pushbuttons that can be used to reset the BNWAS timer. By holding the pushbutton for more than 3 seconds, the emergency alarm will be triggered. This way we have an emergency call button at all stations and the button is tamper-proof.

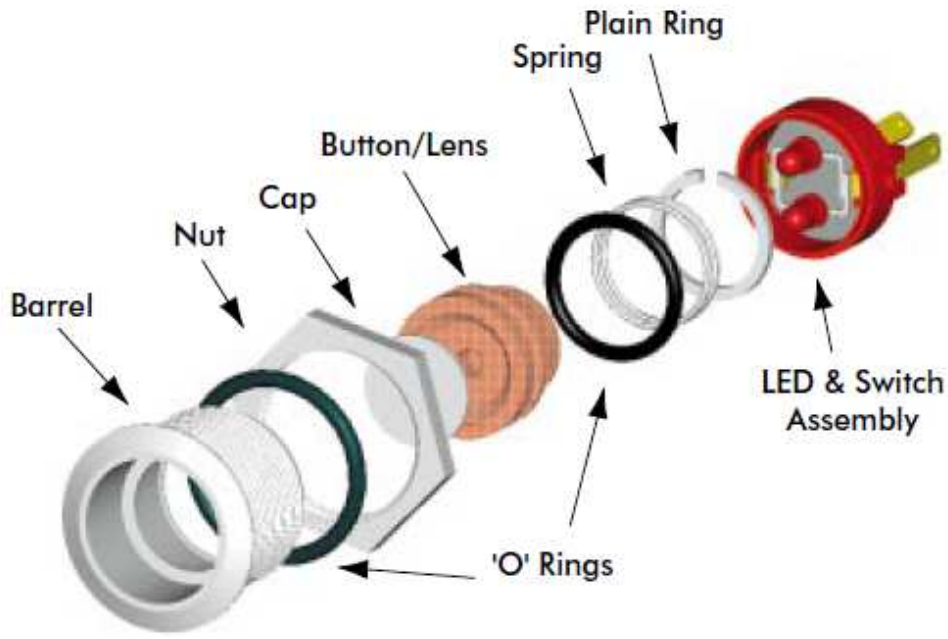

Figure 2-43: Bulgin security switch-illiminated

2.7 Installation requirement Power supply

Derived from the NEN-EN-IEC 62616 Chapter 5 (Design and installation requirements), paragraph 5.3 (Power supply), the following installation requirement will be observed:

(128/A6.3) The BNWAS shall be powered from the ship's main power supply. The malfunction indication, and all elements of the Emergency Call facility, if incorporated, shall be powered from a battery maintained supply.

Taking in consideration that the following test of this requirement will be fully incorporated and obliged to:

Confirm by inspection of documented evidence and measurement that when the supply of power is removed from the equipment the malfunction indication and Emergency Call facility operates for a period of 6 h.

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Considering this, the installation will be powered in such a way, that all parts of the BNWAS that holds the malfunction indication (Wago, DAP) and the emergency call function (Wago, DAP, Switches) will function for an additional 6 hour after loss of power.

Also take in consideration that if this power supply fails completely, it is necessary to have a dedicated alarm that will warn the crew that the power to the BNWAS is lost.

The Reset buttons needs to be illuminated. Therefore 24v from the bridge instrument power supply need to be delivered to each reset button.

2.8 Addendum

In the extended BNWAS setup a lot of other external or proprietary devices will be integrated. We will not discuss these devices here because they are described in their own respective manuals.

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2.9 Setup

To set-up the system, you can use the special Windows configuration tool and a working version of NavVison (version 9.18.4.100 or higher). NavVision will be used to set-up the DAP's and Wago's (giving IP addresses).The configuration tool can be used to set-up the BNWAS part of the system. As of version 9.18.4.100 it is also possible to configure the BNWAS from within NavVision itself.

2.9.1 NavVision

Within NavVision the right IP addresses will be set for the Wago's and DAP's that are in the system. If not on board, a laptop can be used to set this up. Once the IP addresses are set they will be retained in the Wago or the DAP. Be sure to write down this addresses for future reference.

2.9.2 BNWAS configuration tool

A special configuration tool for the BNWAS is available called "BCBNWAS.exe". Put this file in a folder on your laptop together with the BNWAS.ini file we mentioned earlier. When double-clicked the following screen will appear:

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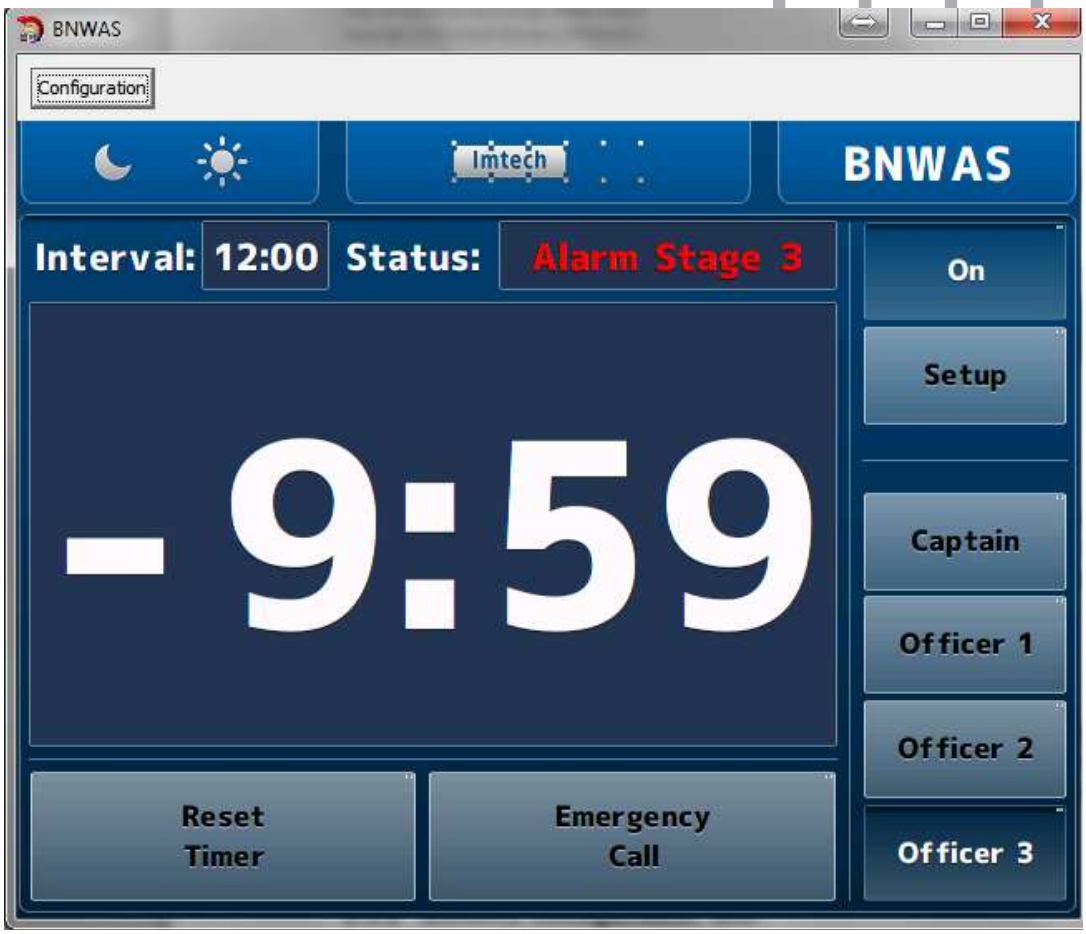

Figure 2-44: BNWAS configuration screen

This looks exactly like the Standard BNWAS HMI with the only difference that it has a configuration button. When you click the configuration button the following screen will appear:

OR

In NavVision go to Tools>AlarmStations>Alarm Settings and there you will find the same configurator (see Figure 2-45).

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Figure 2-45: BNWAS configuration in NavVision

Settings that can be made

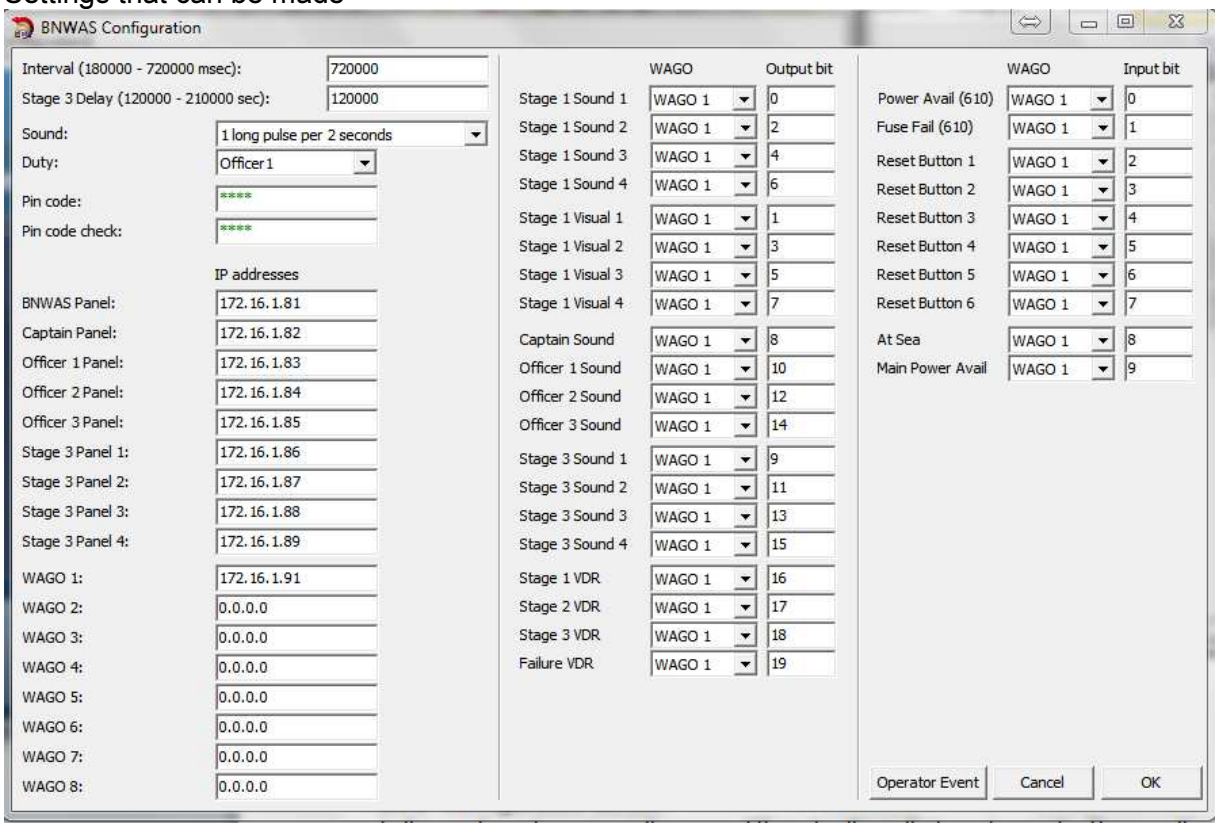

Figure 2-46: BNWAS configuration screen

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The different parts of this configuration screen will be discussed hereafter.

2.9.3 Configuration screen

In the configuration screen there are different settings that can be made. These settings will be split up hereafter.

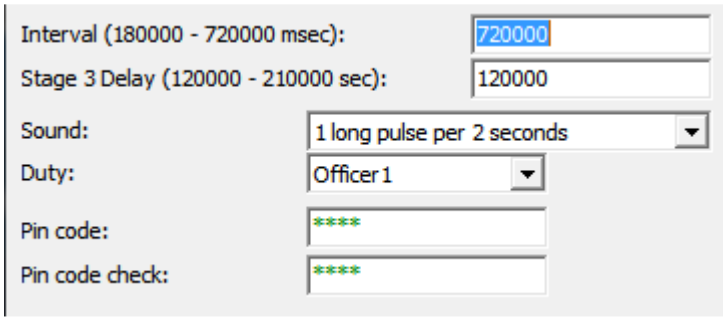

Figure 2-47: General settings

In the general settings, the same settings can be made as can be done in the program itself under “setup”.

Setting	Detail
Interval	Set interval of Td between 3 and 12 minutes (180000-720000 msec)
Stage 3 Delay	Delay of the stage 3 time between 2 and 3,5 minutes
Sound	Change the modulation of the alarm-sound
Duty	Select OOW on duty
Pin code	Set Pin code for setup
Pin code check	Pin code check

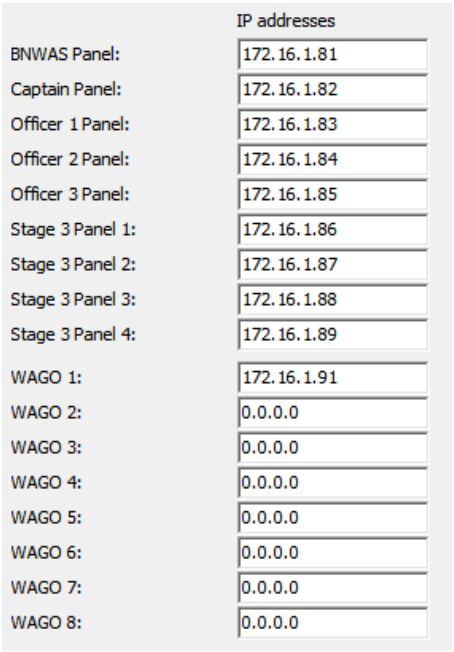

Figure 2-48: IP address settings

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In the IP address section, settings can be made to distinguish the different panels and WAGO's. The main panel (the panel in charge) is always the BNWAS panel.

If used in the system other DAP's can be set as 2nd or 3rd stage panels by selecting their respective IP addresses behind the right panel. There are four 2nd stage panels

- Captain panel
- Officer 1 panel
- Officer 2 panel
- Officer 3 panel

And four 3rd stage panels

- Stage 3 panel 1
- Stage 3 panel 2
- Stage 3 panel 3
- Stage 3 panel 4

The IP addresses of the DAP's and the WAGO's are first set in NavVision. Corresponding you can set these IP addresses to the right DAP panel or WAGO.

 *: If no other DAP or WAGO is used, leave the IP addresses at 0.0.0.0*

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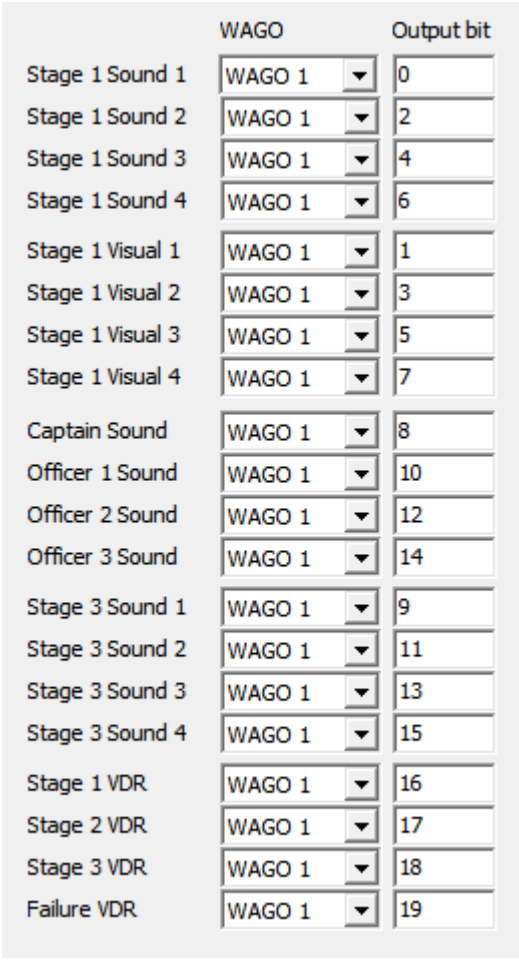

Figure 2-49: Wago output bit setting

The Audible and visual outputs are set here. Each output represents a stage of the BNWAS system. These outputs will be set on the dedicated Wago slice. There are 3 different stages of alarm outputs and a separate output to the VDR.

- Stage 1 Visual 1 (2,3,4) – output to the bridge visual alarms
- Stage 1 sound 1 (2,3,4) – output to the Bridge Audible alarms
- Captain, Officer 1,2,3 sound – combined visual and audible output to the duty cabin
- Stage 3 sound 1 (2,3,4) – combined visual and audible output to the 3rd stage places
- Stage 1,2,3, failure VDR – output to the VDR for mandatory alarms

In the column “WAGO” you can choose on which WAGO the connection is made. This depends on the order of the setup. Normally it is just 1 WAGO, so you can leave it as is. If the setup is divided over more WAGO’s The order is set by the IP range

- 172.16.1.91 = WAGO 1
- 172.16.1.92 = WAGO 2
- 172.16.1.93 = WAGO 3
- Etc

In the column “Output bit” you can set the exact pin on the particular slice where that field is connected to.

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: Notice that for the Output bit we count via the internal program of the WAGO. So we count all the available outputs from the beginning of the WAGO (see Figure 2-51*)*

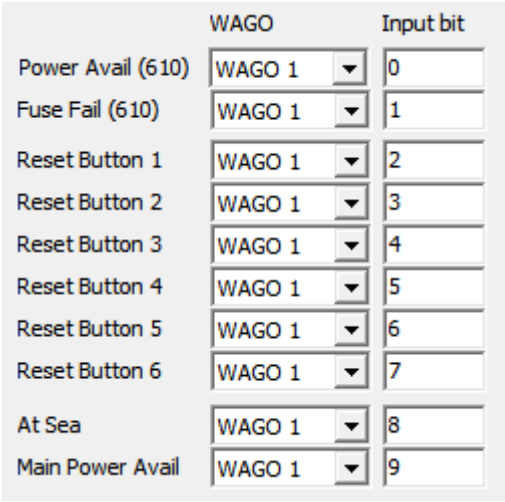

Figure 2-50: Wago Input bit setting

In the column “WAGO” you can choose on which WAGO the connection is made. This depends on the order of the setup. Normally it is just 1 WAGO, so you can leave it as is. If the setup is divided over more WAGO’s The order is set by the IP range.

- 172.16.1.91 = WAGO 1
- 172.16.1.92 = WAGO 2
- 172.16.1.93 = WAGO 3
- Etc

In the column “Input bit” you can set the exact pin on the particular slice where that field is connected to.

: Notice that for the Output bit we count via the internal program of the WAGO. So we count all the available outputs from the beginning of the WAGO (see Figure 2-51*)*

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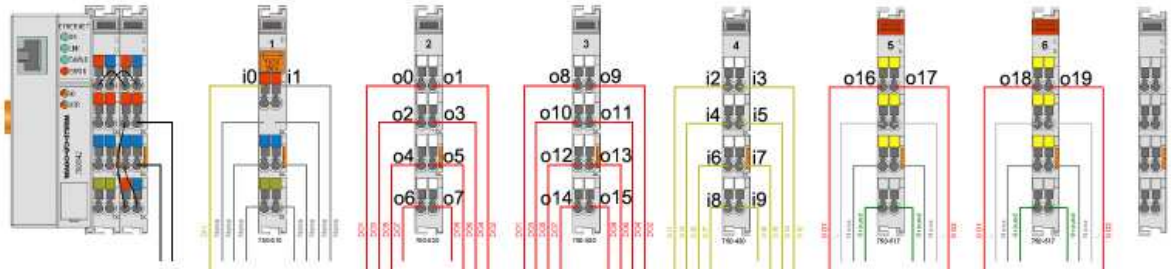

Figure 2-51: Input Output counting Wago (i=Input, o=Output)

2.9.4 Configuring from within NavVision

Within NavVision go to Tools>Alarm Panels>Alarm Settings. There you will find the same configuration tool as described before.

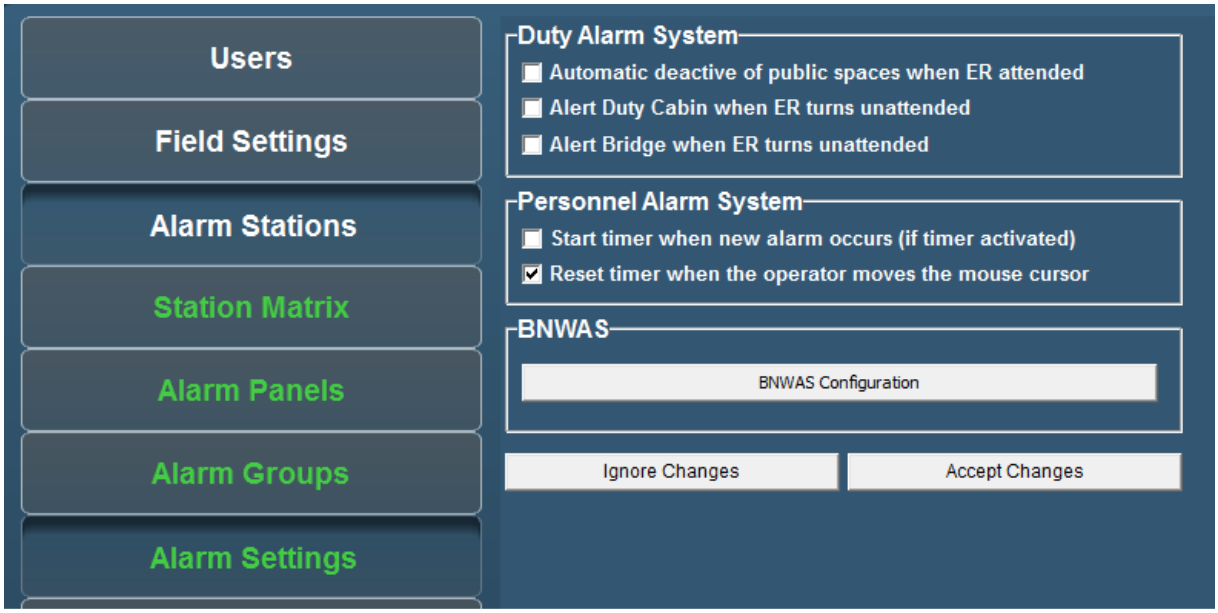

Figure 2-52: BNWAS configuration within NavVision

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3. User

3.1 Introduction

It is possible that you use the BNWAS as a standalone version, but it can also be used in conjunction with the Unimacs bridge. It even can be used with other bridge systems, as long as these systems give the standard EVE-messages.

In this manual we will attend to both ways in the same explanation because the mere differences are just on interface basis and not system-wise.

So when we discuss the interface of the BNWAS system, it can be the interface on the standalone BNWAS or on the integrated BNWAS. It can be the interface on the bridge-panel, but also the interface on the panel in the captain's cabin. The manual is just the integral explanation of the Imtech BNWAS.

3.2 The HMI overview

The HMI consists of a main screen that holds all the functionality for the BNWAS and a setup-screen that can be used to set up the necessary settings. In the following figures we will explain the functionality and functions on the HMI.

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Figure 3-1: Main BNWAS HMI

3.3 The HMI explained

The functions of the HMI are described in the following figures. These are mostly self-explanatory. Where not really clear, an additional explanation will be given.

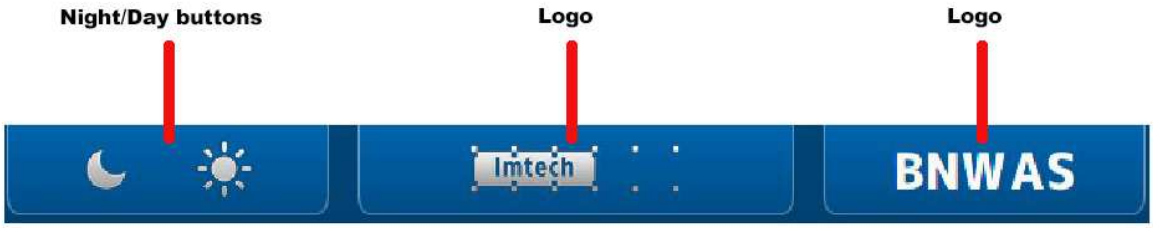

Figure 3-2: HMI top bar

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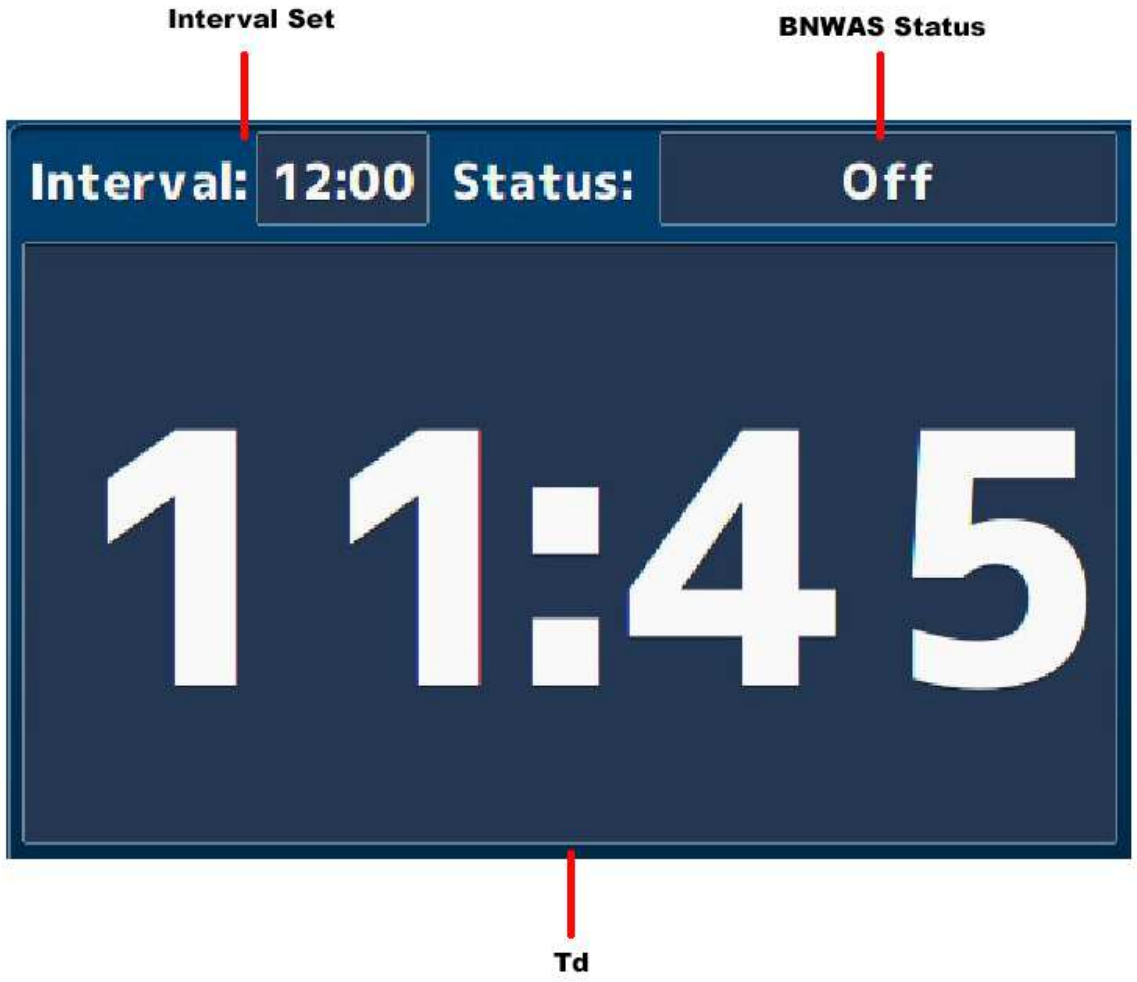

Figure 3-3: HMI main screen

Figure 3-4: HMI bottom bar

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: The reset timer and emergency call buttons are only available when the panel is placed on the bridge. Any other location will show these buttons, but they will not be operational.

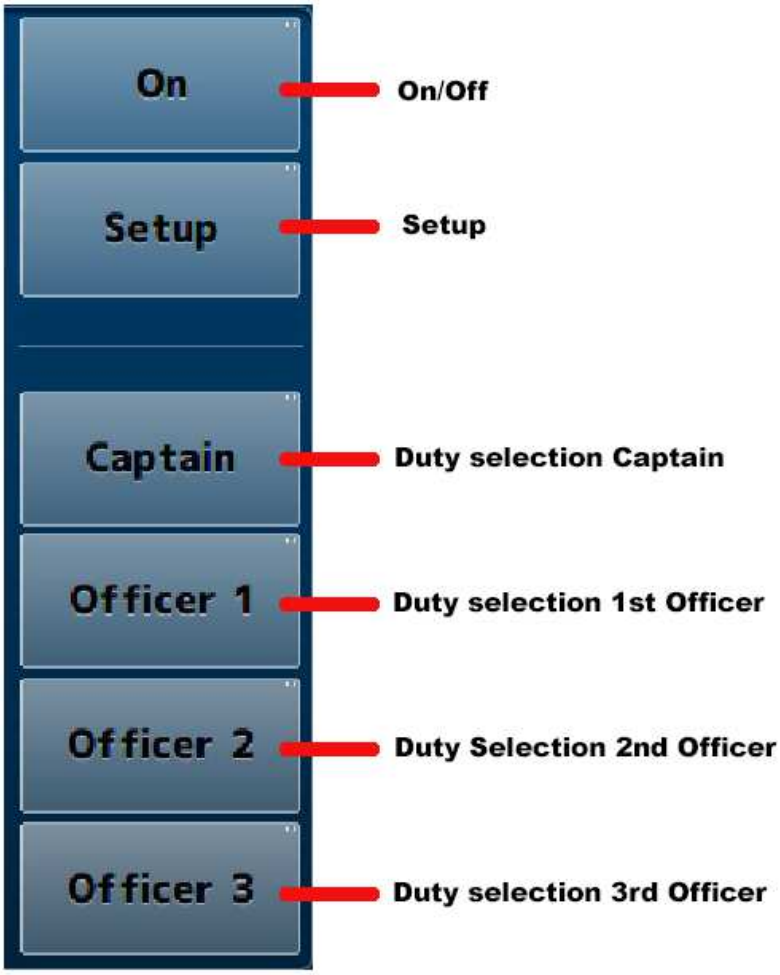

Figure 3-5: HMI Panel

: When you operate the "on/off" or "setup" button a keypad will appear where you have to type a "password." (See Figure 3-7*).*

3.4 The setup page

By clicking on the setup-button a new screen will appear. This is the setup screen. It looks quite the same as the main window as it has only a few settings in the main panel (see Figure 3-8).

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Figure 3-6: Setup screen

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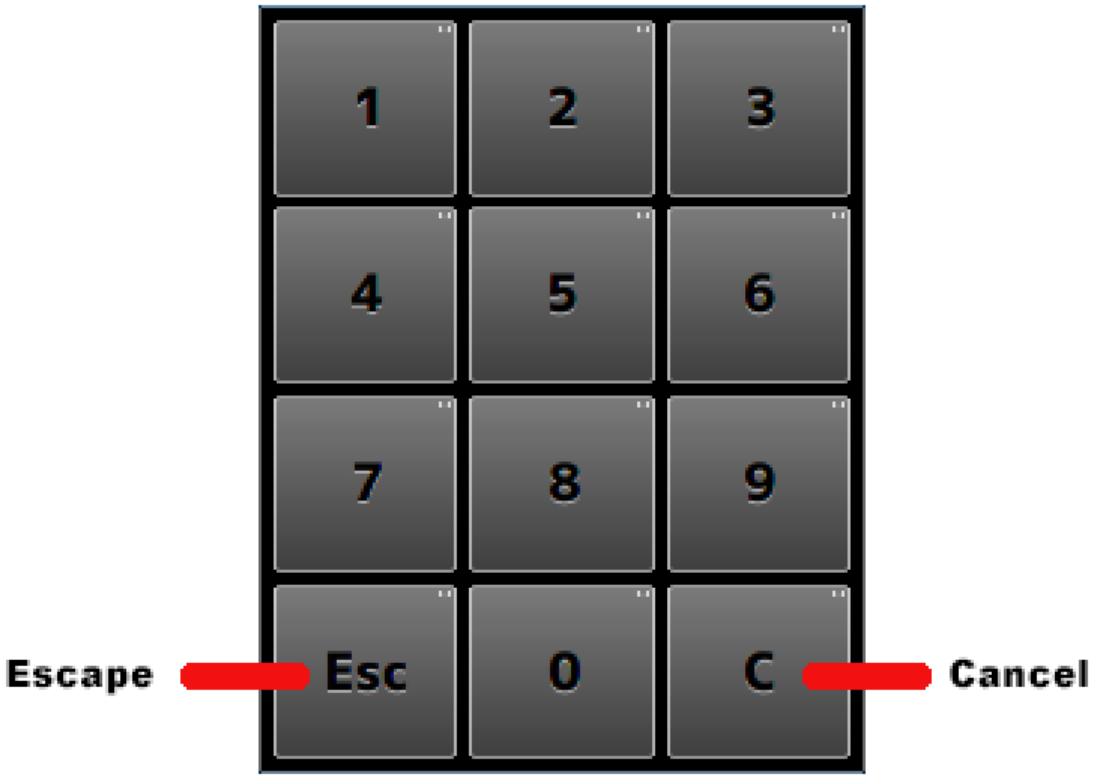

Figure 3-7: Keypad

The functions, with their respective explanation, are shown in the following figure.

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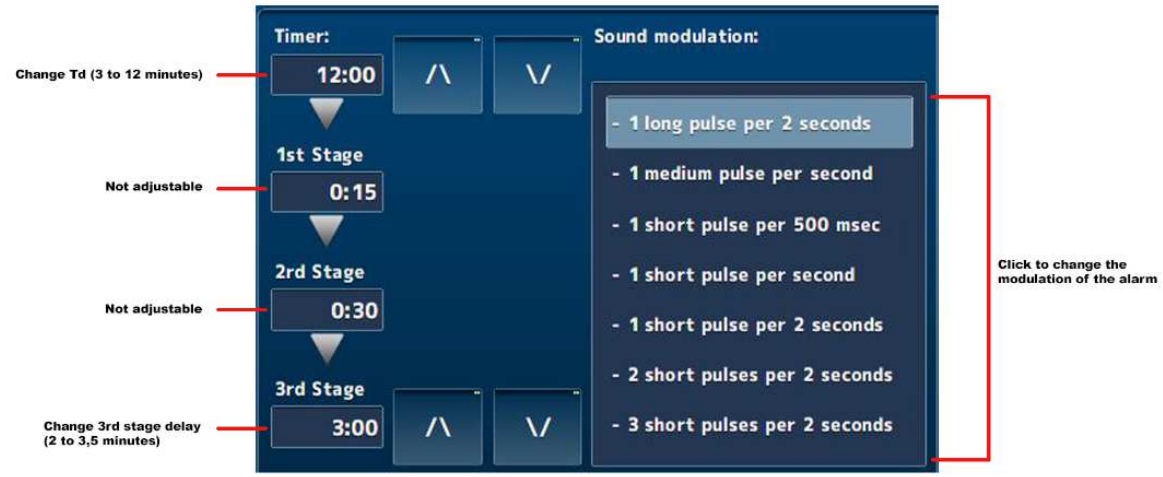

Figure 3-8: Setup main screen

: With the arrow-buttons in the setup page you can increase or decrease the Td and/or 3rd stage delay time.

3.5 The different statuses

Here we show the different states of the BNWAS HMI.

Figure 3-9: At Sea status

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Figure 3-10: Failure status

Figure 3-11: Alarm Stage 1 status

Figure 3-12: Alarm Stage 2 status

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Figure 3-13: Alarm Stage 3 status

Once a working server of NavVision is connected to the same system, the HMI of NavVision will be overwritten on the DAP's. It is just the HMI. The BNWAS will still be the one that handles all the BNWAS features.

It will look as in the following figure:

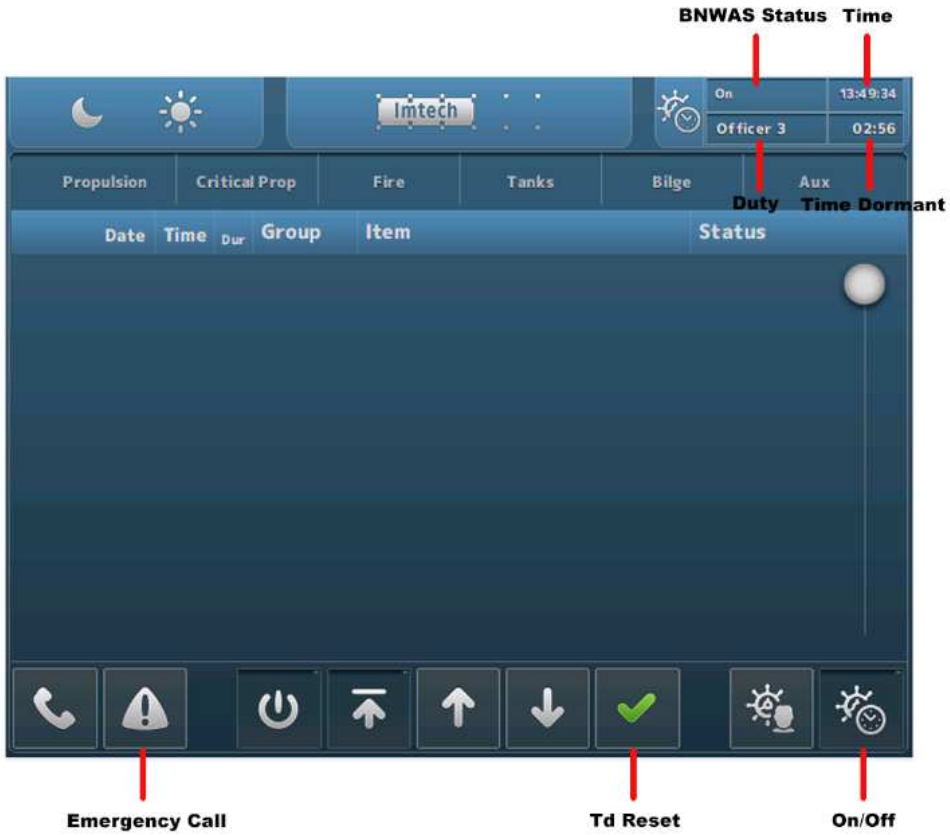

Figure 3-14: NavVision HMI on DAP

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On the server of NavVision you will have an equal kind of display as shown in the following figure.

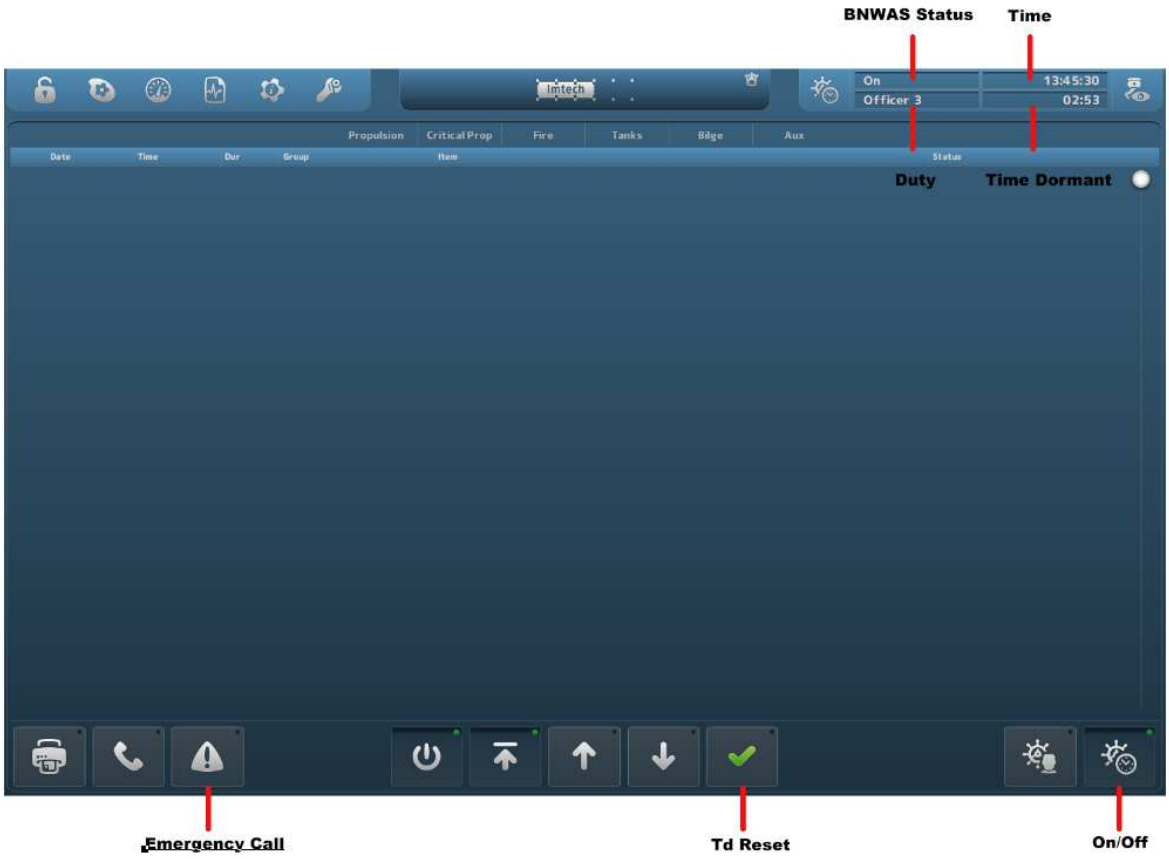

Figure 3-15: NavVision Native screen

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4. Maintenance

4.1 Introduction

The maintenance of the system is quite easy, once the system is installed and working, there is not much that need to be changed. It can be necessary to install a newer version, once some update to the system has been made (think of a new DAP or an adjustment to the program), but that is all there is to maintenance. The rest of the system is tight enough that is does not need any adjustments.

4.1.1 Setting up a new DAP

4.1.1.1 Installation

The Beijer Exter T70-bl comes with a standard software version that needs to be changed to a proprietary version.

To install the software, the following steps have to be made

4.1.1.2 Boot the Exter T70 system

The system automatically boots when the power is connected.

4.1.1.3 Connect the Exter T70 to the maintenance PC

Using a cross-over cable between the PC and Exter T70 panel or a straight-cable between a network switch and the PC and the network switch and the panel.

 *: be sure that only one uninitialized Exter T70 panel is connected to your network to prevent IP conflicts.*

4.1.1.4 Check the IP address of the maintenance PC

The IP address of the maintenance PC should be in the same subnet as the Exter T70. Default settings of the Exter T70: IP: 192.168.1.1, Subnet-Mask: 255.255.0.0.

4.1.1.5 Copy the new software

To do this, open Windows Explorer and go to the local copy of the Alarm Panel Software (to be found at Sharepoint). Select the folder “NavVisionUpdate” and click right mouse button and select
“Copy”

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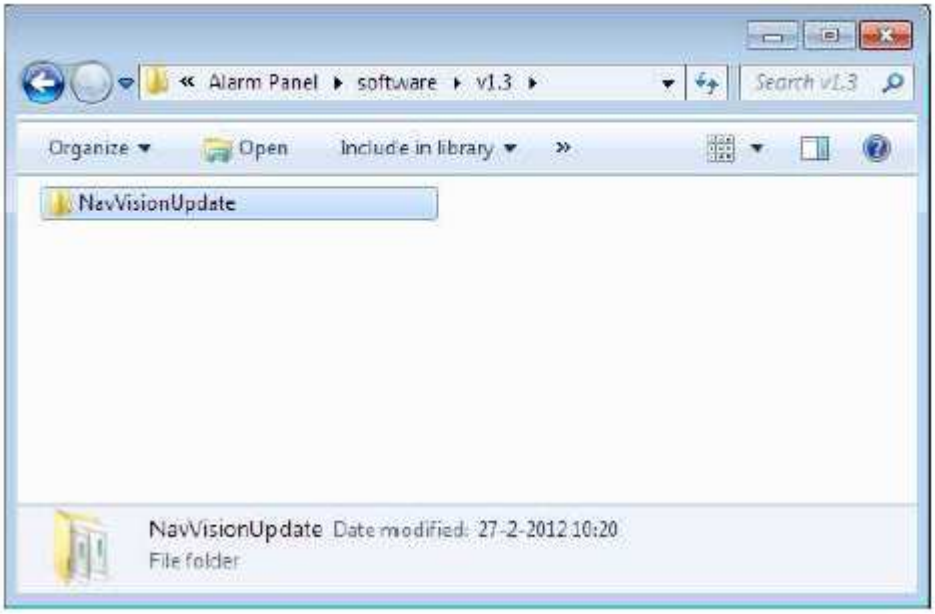

Figure 4-1: Copy local files

4.1.1.6 Open an FTP connection to the Exter T70 panel.

You can do this by opening Windows Explorer and entering the ftp address in the address bar. By default it is: ftp://free:technics@192.168.1.1
Change the IP address by the assigned IP address in FT NavVision, when the Exter T70 was already initialized.

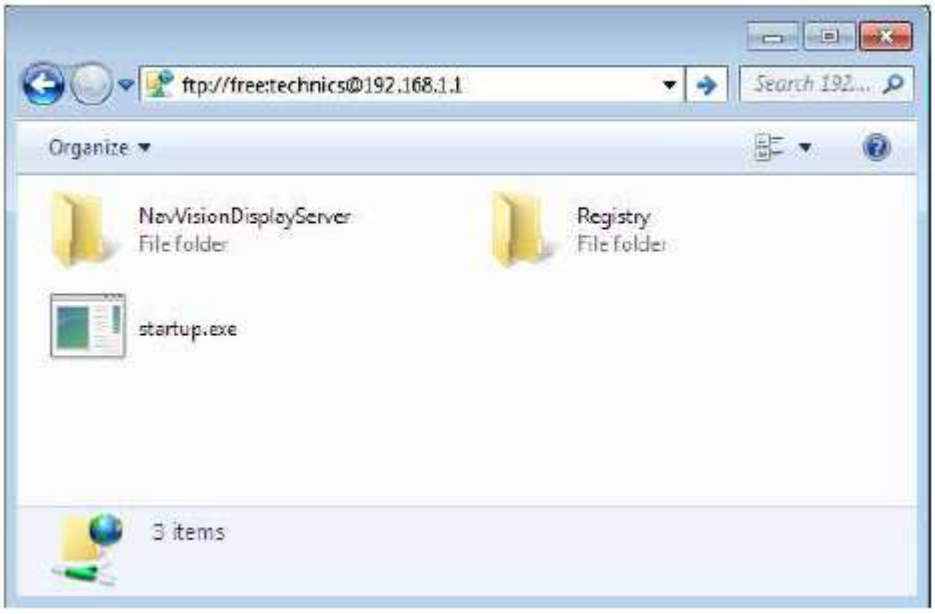

Figure 4-2: Enter FTP address

4.1.1.7 Paste the files you have just copied

To do this, press right mouse button and select “Paste”

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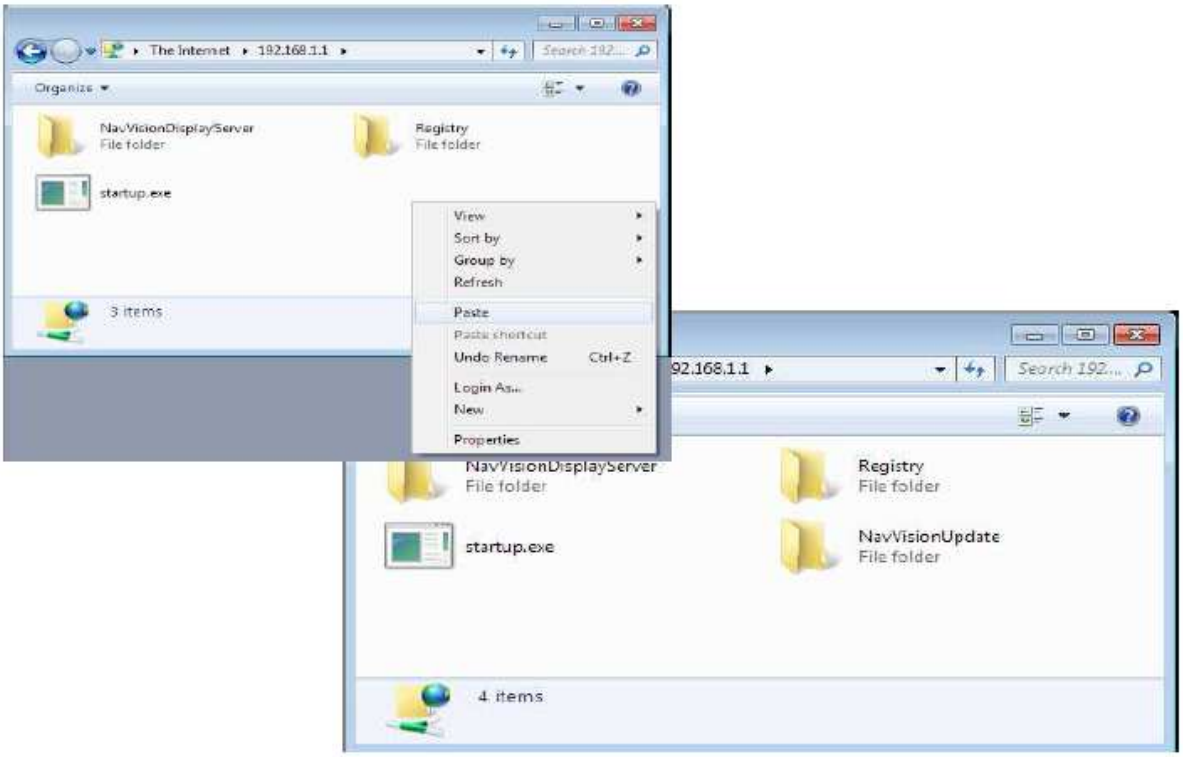

Figure 4-3: Paste new files

4.1.1.8 Activating update

The panel will automatically update, when it is the first time the software is installed on the Exter T70. When it's an update of the Exter T70, the power to the unit should be turned off and on again.

4.1.1.9 BNWAS.ini

Take the latest "BNWAS.ini" from sharepoint. Put that in the root of the DAP

The system is now completely functional and is ready to be used

4.1.2 Setting a DAP with NavVision AMCS

When you install a DAP and the system is connected to a working version of the Imtech NavVision AM(C)S, just go to settings/alarm stations/alarm panels. Fill in the new MAC-address, the Alarm station, the DAP type and the IP-address. NavVision will take care of the rest now. (See Figure 4-4).

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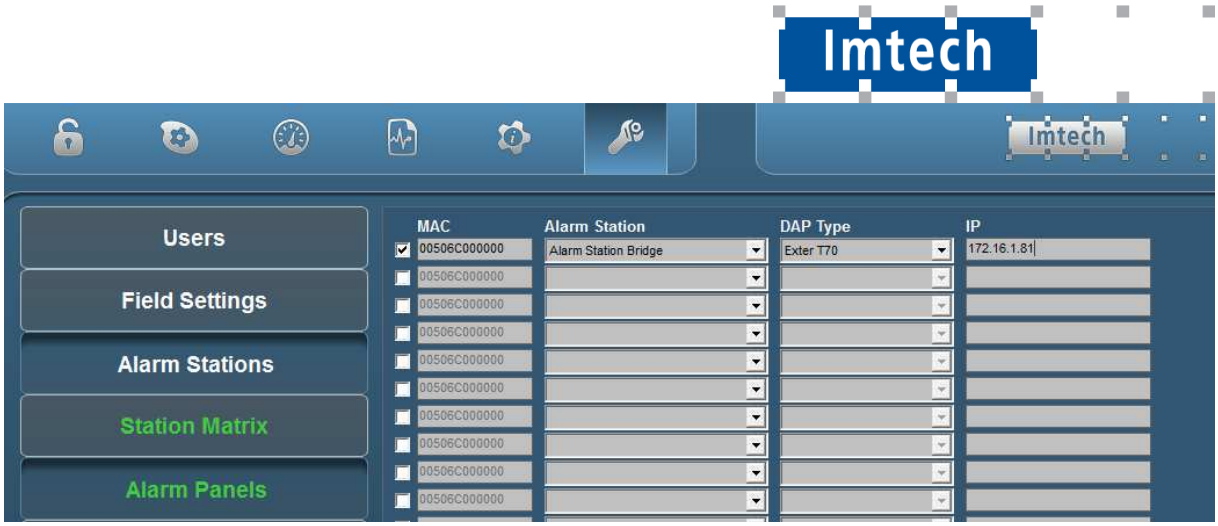

Figure 4-4: Alarm panel setup

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