AUTRO SAFE
Self Verify®

Release 4

Installation Handbook

AutroSafe Interactive Fire Detection System

По вопросам продаж и поддержки обращайтесь:

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Тула (4872)74-02-29
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Ульяновск (8422)24-23-59
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Installation Handbook, AutroSafe Interactive Fire Detection System, Release 4, 116-P-ASAFE-INSTALL/DGB Rev. J, 2016-05-09,
Autronica Fire and Security AS

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1. Introduction

1.1 About the Handbook

This handbook is intended to provide all necessary information for the installation of the AutroSafe Interactive Fire Detection System, Release 4. It also gives detailed information on connections to Autronica's local area network (AutroNet) and guidelines for the installation and addressing of loop units.

Information on the connection of detectors and other loop units to the detection loop is found in a separate handbook, Connecting Loop Units, 116-P-CONNECTLOOPUNIT/GBD (pdf filname connectloopunit_gbd).

⚠

POWER OFF!

Note that this handbook deals with the mechanical and electrical installation only. All tasks described in the handbook are to be performed without applying power to the system.
Power must not be applied before commissioning, refer to Commissioning Handbook.

The chapter «Service and Maintenance» outlines the recommended monthly and annual service and maintenance procedures that should be performed after the system has been commissioned.

1.2 The Reader

The handbook is intended to be used by Autronica Fire and Security trained service and technical personnel who are responsible for the installation of the AutroSafe Interactive Fire Detection System, Release 4.

1.3 Reference Documentation

The table below shows an overview of the technical marketing documentation for AutroSafe Interactive Fire Detection System, Release 4.

Document Name	Part number	File name
System Description	116-P-ASAFE-SYSTEMD/EGB	asafesystemd_egb
Installation Handbook	116-P-ASAFE-INSTALL/DGB	asafeinstall_dgb
Commissioning Handbook	116-P-ASAFE-COMMISS/EGB	asafecommiss_egb
User Guide, Remote Access	116-P-ASAFE-REMOTEAC/EGB	asaferemoteac_egb
Connecting Loop Units	116-P-CONNECTLOOPUNIT/DGB	connectloopunit_dgb
Operator's Handbook	116-P-ASAFE-OPERATE/FGB	asafeoperate_fgb
User Guide	116-P-ASAFE-USERGUI/LGB	asafeusergui_lgb
Wall Chart	116-P-ASAFE-WALLCHA/LGB	asafewallcha_lgb
Menu Structure	116-P-ASAFE-MENUSTR/MGB	asafemenustr_mgb
Datasheet; Fire Alarm Control Panel BS-420	116-P-BS420/CGB	bs420_cgb
Datasheet; Operator Panel BS-430	116-P-BS430/CGB	bs430_cgb
Datasheet; Repeater Panel BU-BV-420	116-P-BUBV420/CGB	bubv420_cgb
Datasheet; Fire Brigade Loop Panel BU-110	116-P-BU110/CGB	bu110_cgb
Datasheet; Information Loop Panel BV-110	116-P-BV110/CGB	bv110_cgb
Datasheet; Controller BC-420	116-P-BC420/CGB	bc420_cgb
Datasheet; Controller Unit Rack BC-440	116-P-BC440/CGB	bc440_cgb
Datasheet; Power Cabinet BP-405	116-P-BP405/CGB	bp405_cgb
Datasheet; Power Unit BPS-405	116-P-BPS405/CGB	bps405_cgb
Datasheet; Power Unit BPS-410	116-P-BPS410/CGB	bps410_cgb
Datasheet; AutroKeeper BN-180	116-P-BN180/CGB	bn180_cgb

For detailed technical information on Phoenix Ethernet Switches, refer to Phoenix Contact web site at

http://select.phoenixcontact.com/phoenix/dwl/dwlfr1.jsp?lang=en

2. Pre-installation

2.1 Location

The Fire Alarm Control Panel or Operator Panel must be located in, or nearby, the entrance according to local regulations and in consultation with the fire brigade.

Repeater Panels (Fire Brigade Panels and Information Panels), Controllers and Power Cabinets must be placed according to local regulations and in consultation with the fire brigade.

2.2 Environmental Requirements

For information on environmental requirements for AutroSafe equipment, refer to separate datasheets.

2.3 Mounting Height / Space Requirement
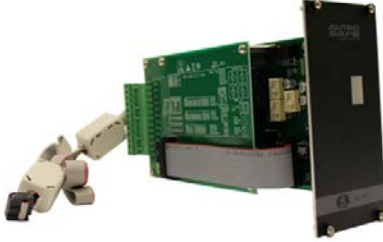
To ensure optimal readability of the Fire Alarm Control Panel's display, the recommended mounting height of this cabinet top is approximately 175 cm above the floor. Other panels should be mounted accordingly.

175 cm
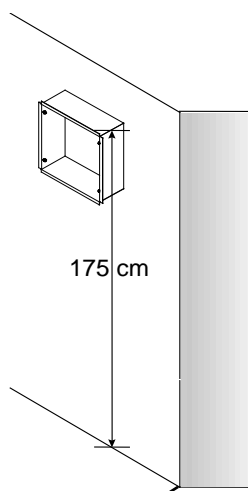
3. System Units – Overview

For detailed information on each system unit, refer to separate datasheets.

System Unit	Description
	Fire Alarm Control Panel BS-420 BS-420 is a complete fire alarm control panel with full operation capabilities. The panel serves as an operating panel for one or several defined *operation* zones. All alarm handling and system features can be controlled and monitored from the panel. The panel provides connections for: ■ 2 Ethernet ports and 2 USB host ports ■ 1 RS-232, RS-422 or RS-485 serial port for communication with third party equipment ■ 1 AutroFieldBus (AFB) interface ■ 1 AICom+ interface ■ FailSafe relay output ■ Power redundant Dimensions: HxWxD (mm): 350 x 350 x 194
	Operator Panel BS-430 BS-430 serves as an operating panel for one or several defined *operation* zones. All alarm handling and system features can be controlled and monitored from the panel. Dimensions: HxWxD (mm): 350 x 350 x 84
	Repeater Panel BU-BV-420 The Repeater Panel BU-BV-420 serves as both a Fire Brigade Panel and an Information Panel. Settings on a dipswitch determine the type of panel. The Fire Brigade Panel displays alarms and allows you to operate alarms and receive additional information related to the relevant operation zone. The Information Panel serves as an indication device only. It provides information related to the defined operation zone(s). Dimensions: HxWxD (mm): 195 x 350 x 84

	Controller BC-420 The Controller, BC-420, serves as a connection unit for the detection loop, alarm sounders, controls and inputs. It can accommodate up to a maximum of 12 modules. The panel provides connections for: ■ 2 Ethernet ports and 2 USB host ports ■ 1 RS-232, RS-422 or RS-485 serial port for communication with third party equipment ■ 1 AutroFieldBus (AFB) interface ■ 1 AlCom+ interface ■ FailSafe relay output Dimensions: HxWxD (mm): 350 x 350 x 194
	Controller BC-440 The Controller Rack Unit BC-440 serves as a connection unit for the detection loop, alarm sounders, controls and inputs. It is a variant of the BC-420 Controller prepared for rack installations. Together with the IO modules the unit will have the full functionality of the BC-420 Controller. Dimensions: 3Ux12HPx200mm
	Power Cabinet BP-405 The Power Cabinet BP-405 provides space for two 12V/18Ah batteries (not included). The power supply and battery brackets are already mounted when the cabinet is delivered from the factory. The cabinet provides: ■ Power Board BSF-400, including: ▪ AutroFieldBus interface ▪ 115VAC /230VAC input ▪ 6 outputs 24VDC (max. 2A each) ▪ 1 fault relay output Dimensions: HxWxD (mm): 420 x 346 x 146
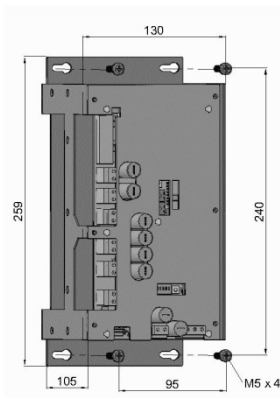
	Power Unit BPS-405 / BPS-410
	
	BPS-405: 24V/5A power supply
	BPS-410: 24V/10A power supply
	
	Both units include:
	■ Power Board BSF-400, including:
	   ■ AutroFieldBus interface
	   ■ 115VAC /230VAC input
	   ■ 6 outputs 24VDC (max. 2A each)
	   ■ 1 fault relay output
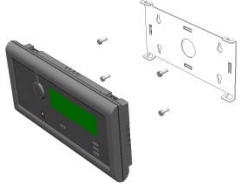	
	Dimensions:
	HxWxD (mm): 130 x 259 x 120

4. Loop Panels – Overview

The 100-series provides the following panels and wall brackets:

Information Loop Panel (BV-110) Mounted onto a wall bracket (UD-732). Dimensions (mm): HxWxD (mm): 310 x 154 x 45		
Fire Brigade Loop Panel (BU-110) Mounted onto a wall bracket (UD-732). Dimensions (mm): HxWxD (mm): 310 x 154 x 45		

5. Mounting Instructions

5.1 Introduction

This following chapters deal with the mounting of:

- Fire Alarm Control Panel BS-420 / Controller BC-420
- Operator Panel BS-430
- Repeater Panel BU-BV-420 (Fire Brigade Panel / Information Panel)
- Loop Panels (Information Loop Panel BV-110 and Fire Brigade Loop Panel BU-110)
- Power Cabinet BP-405
- Power Units BPS-405 and BPS-410

The following is delivered together with the system units:

- Fireman's key (delivered with all system units, except for BC-420 and BP-405/BPS-405/BPS-410)
- Unbraco key (to lock/unlock the front panel) – (not delivered with BP-405 /BPS-405/BPS-410)
- Plastic cap to cover the key hole (Repeater Panel only; when Repeater Panel BU-BV-420 is to be used as an Information Panel)
- 11 Rubber glands for entry of external cables
- Text foils
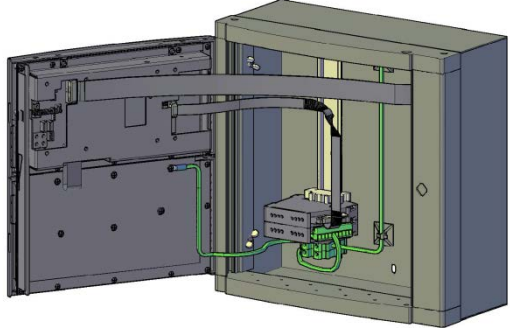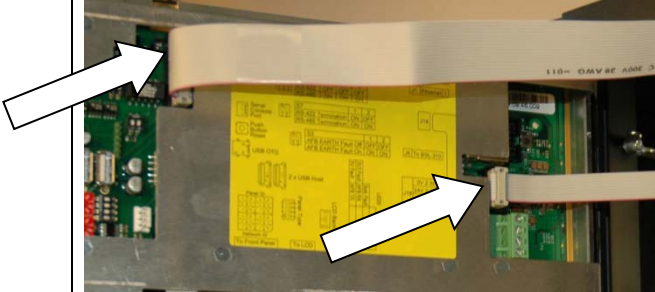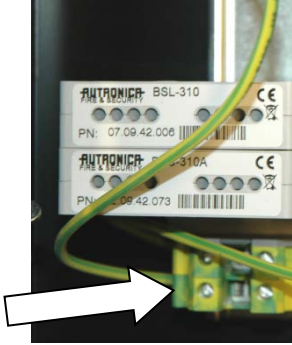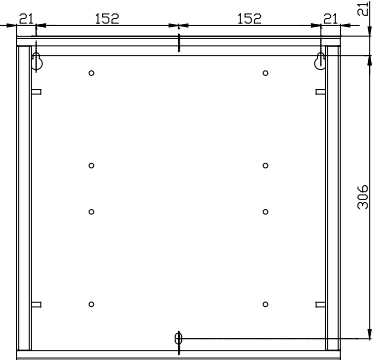
A general description of flush mounting Repeater Panel BU-BV-420 and Operator Panel BS-430 in a wall is described in a chapter 5.10.
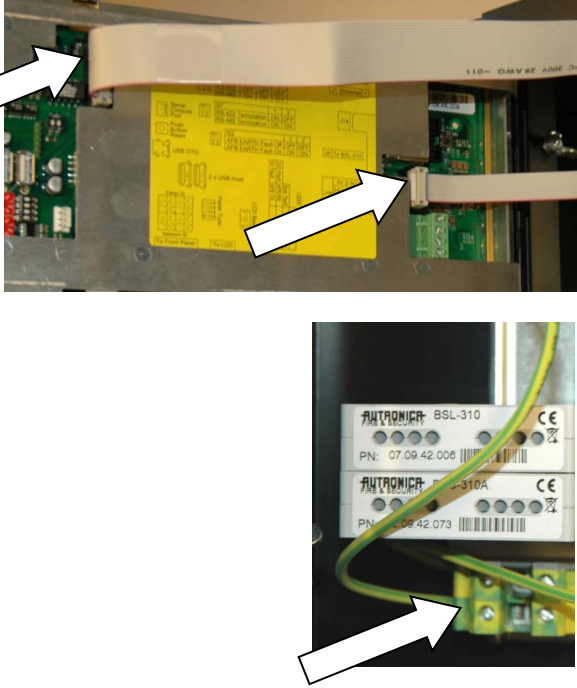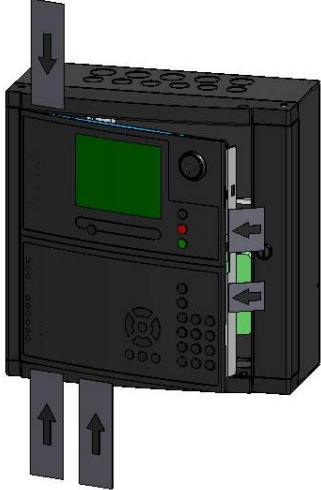
For information on mounting the Controller Rack BC-440, refer to separate datasheet.

This product contains static-sensitive devices.
Always use an antistatic wrist strap / earth bracelet to avoid any electrostatic discharge.
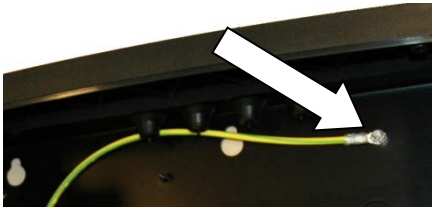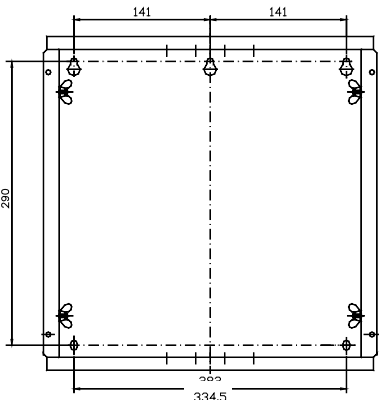
5.2 Mounting Fire Alarm Control Panel BS-420 / Controller BC-420
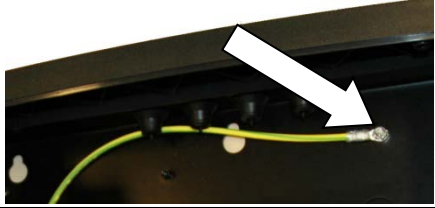
Instructions	Remarks	Illustrations
■ Unlock the front panel by turning the unbraco key clockwise. ■ Open the front panel.	In order to easily access the mounting holes when mounting the cabinet, the front panel should be removed.	
■ Disconnect both ribbon cables from the front panel.		
■ Unscrew and disconnect the earth cable from the termination block inside the cabinet.	Note: Do NOT unscrew the earth cable from the connection point on the front panel (PE=Protective Earth).	
■ Loosen the 4 wing nuts located on the right and left hand side of the cabinet, then close the front panel, and remove the front panel from the cabinet.		
■ Mark and drill the 3 holes according to the illustration.	The cabinet has 3 mounting holes located at the rear. The 2 upper holes are of key-hole-type.	
■ Partly fasten the upper		

Instructions	Remarks	Illustrations
screws. ■ Hang the cabinet onto the upper screws. ■ Partly fasten the bottom screw. ■ Tighten all screws.		
■ Feed all the external cables into the cabinet from the top or bottom through the suitable cable inlets.	For detailed information on the connection of external cables, see chapter 9.	
■ Reassemble the front panel and tighten the 4 wing nuts.		
■ Reconnect the cables between the front panel and the cabinet.		
■ Insert the text foils (in the appropriate language) into their respective positions.	For detailed description of the various text foils, see chapter 5.8.	
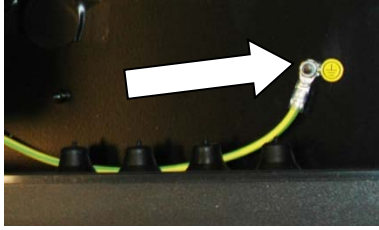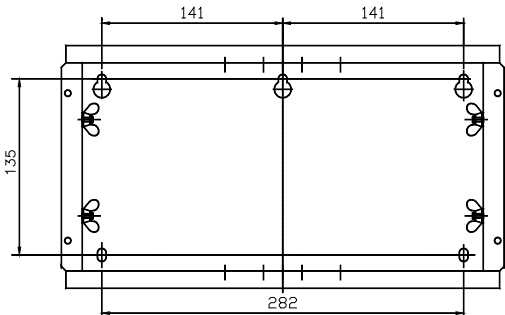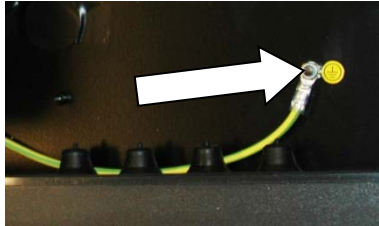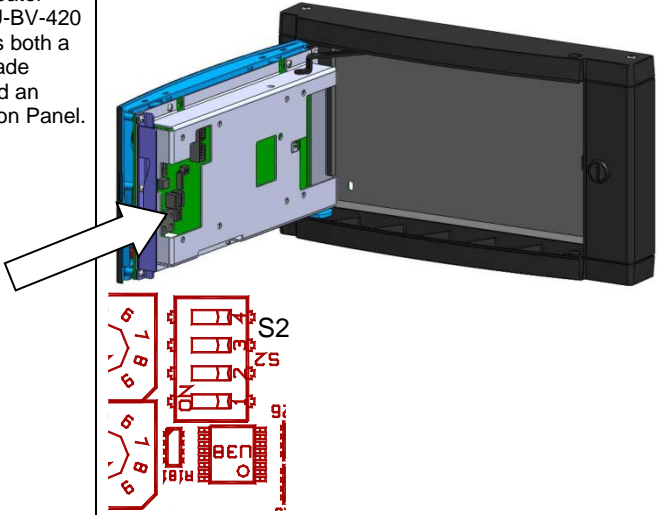
5.3 Mounting the Operator Panel BS-430

Instructions	Remarks	Illustrations
▪ Unlock the front panel by turning the unbraco key clockwise. ▪ Open the front panel.	In order to easily access the mounting holes when mounting the cabinet, the front panel should be removed.	
▪ Unscrew and disconnect the earth cable from the termination point inside the cabinet.	Note: Do NOT unscrew the earth cable from the connection point on the front panel (PE=Protective Earth). 	
▪ Unscrew the 4 wing nuts located on the right and left hand side of the cabinet, then close the front panel, and remove the front panel from the cabinet.		
▪ Mark and drill the 3 holes.	The cabinet has 5 mounting holes located at the rear. The 3 upper holes are of key-hole-type.	
▪ Partly fasten the upper screws. ▪ Hang the cabinet onto the upper screws. ▪ Partly fasten the bottom screw. ▪ Tighten all screws.		
▪ Feed all the external cables into the cabinet from the top through the suitable cable inlets.	For detailed information on the connection of external cables, see chapter 9.	
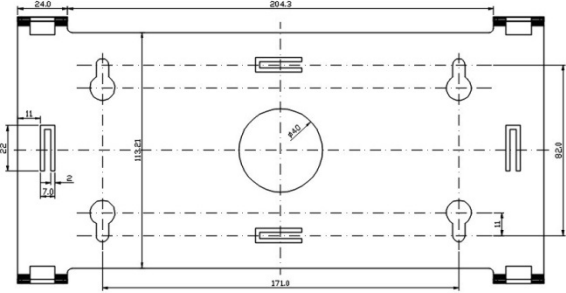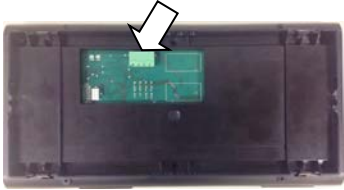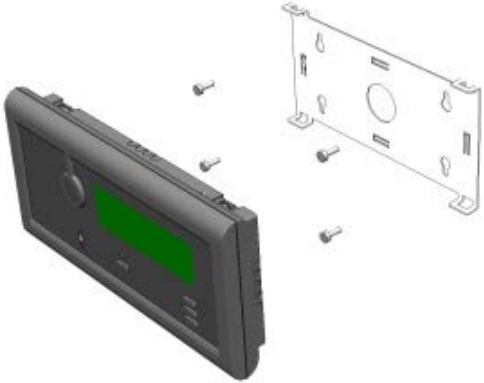
Instructions	Remarks	Illustrations
■ Reassemble the front panel and tighten the 4 wing nuts.		
■ Reconnect the earth cable to the termination point inside the cabinet (PE=Protective Earth).		
■ Insert the text foils (in the appropriate language) into the their respective positions.	For detailed description of the various text foils, see chapter 5.8.	

5.4 Mounting Repeater Panel BU-BV-420

Instructions	Remarks	Illustrations
■ Unlock the front panel by turning the unbraco key clockwise. ■ Open the front panel.	In order to easily access the mounting holes when mounting the cabinet, the front panel should be removed.	
■ Unscrew and disconnect the earth cable from the termination point inside the cabinet.	Note: Do NOT unscrew the earth cable from the connection point on the front panel (PE=Protective Earth).	
■ Unscrew the 4 wing nuts located on the right and left hand side of the cabinet, then close the front panel, and remove the front panel from the cabinet.		
■ Mark and drill all 3 holes.	The cabinet has 5 mounting holes located at the rear. The upper 3 holes are of key-hole-type.	
■ Partly fasten the upper screws. ■ Hang the cabinet onto the upper screws.		

Instructions	Remarks	Illustrations
■ Partly fasten the bottom screw. ■ Tighten all screws.		
■ Feed all the external cables into the cabinet from the top through the suitable cable inlets.	For detailed information on cable connections, see chapter 9.	
■ Reassemble the front panel and tighten the 4 wing nuts.		
■ Reconnect the earth cable to the termination point inside the cabinet (PE=Protective Earth).		
■ Set the appropriate dipswitch settings on dipswitch S2 (Controller Board BSA-400) according to the type of panel (either a Fire Brigade Panel or an Information Panel).	The Repeater Panel BU-BV-420 serves as both a Fire Brigade Panel and an Information Panel.	 Fire Brigade Panel S2-1 ON S2-2 ON S2-3 OFF S2-4 OFF Information Panel S2-1 ON S2-2 OFF S2-3 ON S2-4 OFF
■ If the panel is to be used as an Information Panel, snap the plastic cap on top of the keyhole.	The Information Panel is an indication device only. The plastic covering is delivered together with the panel.	
■ Insert the text foils (in the appropriate language) into the their respective positions.	For detailed description of the various text foils, see chapter 5.8.	

5.5 Mounting Loop Panels (BV-110 and BU-110)
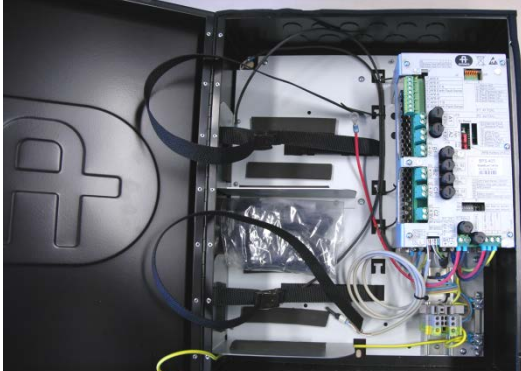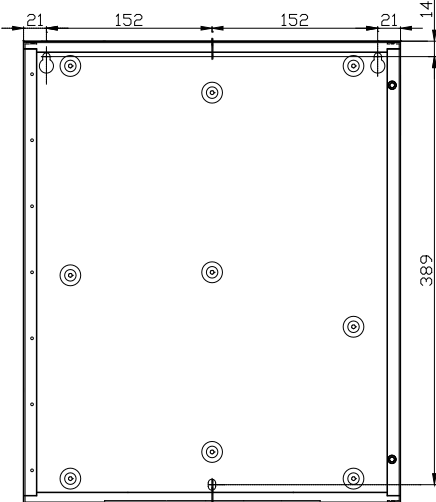
Instructions	Illustrations
■ Find the text foils in the relevant language for the panel, and insert the text foils in the correct locations (there are two different foils in one foil kit ■ Through the small hole near the slot, use a small screwdriver or similar to slightly bend the edge (approx. 1mm) of each foil until the edge slips behind the opening of the slot.	
■ Mount the wall bracket onto the wall. Make sure to mount the panel onto a wall with a flat surface in order to maintain IP rating (IP32).	
■ Connect AL_Com loop cables to the correct terminal points on connector J3: J3-1: In+ J3-2: In- J3-3: Out+ J3-4: Out-	
■ Place and centre the lower part of the panel onto the lower part of the bracket, then simply push the upper part of the panel towards the bracket until it snaps on.	
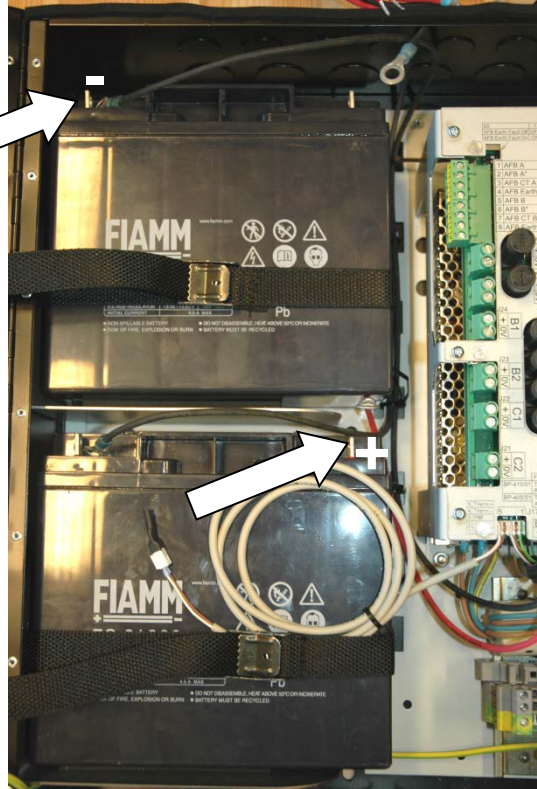
5.6 Mounting Power Cabinet BP-405

AutroSafe Release 4 provides a Power Cabinet BP-405 with space for two 12V/18Ah batteries (not included). The power supply and battery brackets are already mounted when the cabinet is delivered from the factory.
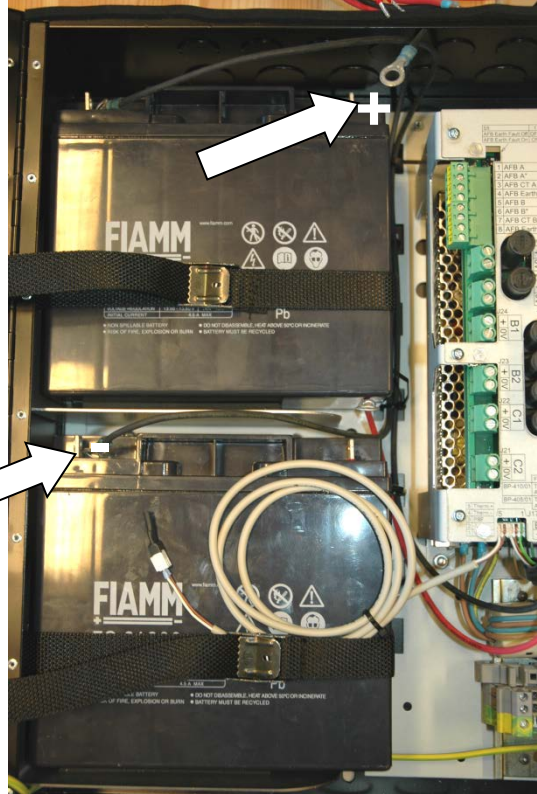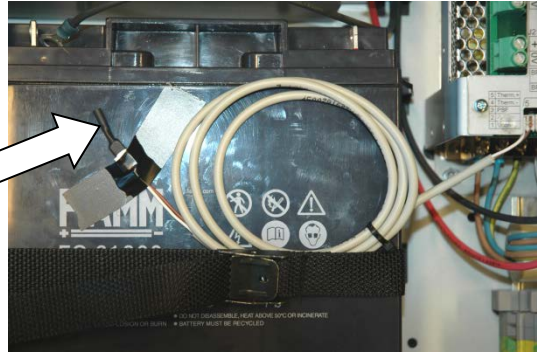
The mounting procedure deals with the mounting of the cabinet and the internal batteries.

Note that the Power Cabinet can be placed under and fastened directly to a Fire Alarm Control Panel BS-420 or a Controller BC-420. The position of the 11 cable inlets/outlets at the bottom of the BS-420/BC-420 match exactly with the ones on the top of the Power Cabinet BP-405.

Instructions	Remarks	Illustrations
■ Unlock the front door by unscrewing the door lock screws ■ Open the front door.		
■ Mark and drill holes.	The cabinet has 3 mounting holes located at the rear. The 2 upper holes are of key-hole-type.	
■ Partly fasten the upper screws. ■ Hang the cabinet onto the upper screws. ■ Partly fasten the bottom screw. ■ Tighten all screws.		

Instructions	Remarks	Illustrations
■ Insert both batteries in their appropriate locations with the battery poles facing up and towards the outside of the cabinet. ■ Tighten the strap around each battery.		
■ Connect the black cable from the connector on the Power Board to the minus pole on the uppermost battery. ■ Connect the red cable from the connector on the Power Board to the plus pole on the lowermost battery.	Make sure that the correct black cable is connected to the minus pole, i.e. the one that is connected to the Power Board on the other end.	

Instructions	Remarks	Illustrations
■ Power must not be applied before commissioning. ■ At a later stage (during commissioning) interconnect the other plus pole and minus pole on the batteries with the cable.	⚠ **POWER OFF!**	
■ Locate the wire (Part No. 116-XL-069) connected to the Power Board (Therm + and Therm-), then fasten the temperature sensor on the other end of the cable to the battery with a piece of tape.	Make sure that the sensor itself is securely fastened close to the battery. The length of the temperature sensor wire must not exceed 3m. Make sure that the wire is not placed close to other wires that conduct high current, as for example, wires for sounder circuits, 230VAC or 24VDC.	

5.7 Mounting Power Supply Unit BPS-405 / BPS-410

The unit can be mounted inside a rack or consol. The hole and screw dimensions are shown below.

Note that the BPS-410 Power Supply Unit 24VDC/10A is delivered as two separate part numbers:
- 116-BPS-410 for 230VAC
- 116-BPS-410/115 for 115VAC
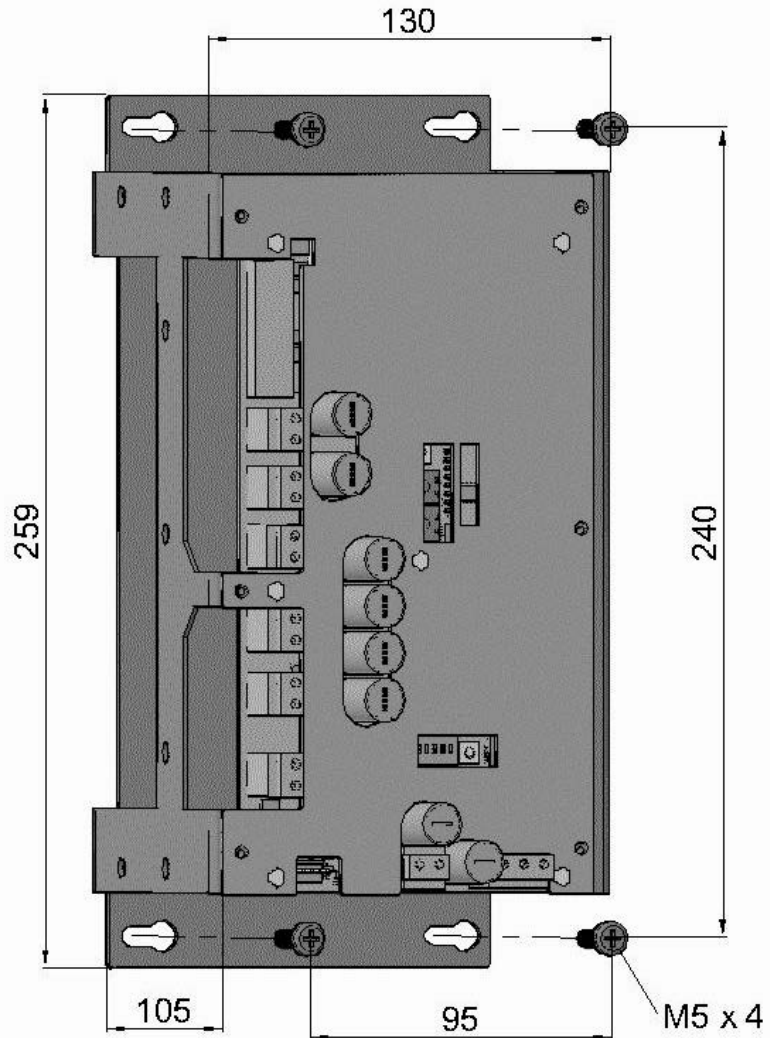
The dipswitch settings on the Power Board BSF-400 (dipswitch S6-6) determines the type of power unit.

Dip-switch	Name	Description
S6-6	Power Unit Type	ON: BPS-405 OFF: BPS-410

For further information on dipswitch settings, refer to Appendix B – Power Supply. Note that when using Power Unit BPS-410 (including a 24V/10A power supply), a calibration procedure must be performed. Refer to the Commissioning Handbook, Calibration Procedure – Power Unit BPS-410.

5.8 Inserting Text Foils

■ Find the text foils in the relevant language for the panel in question (foil sheets are delivered with the panel).

The part numbers are indicated below.
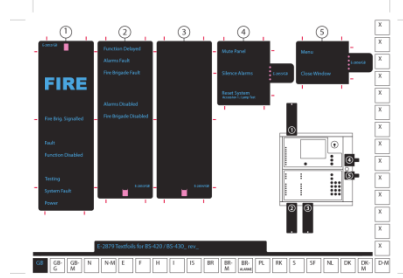
Example: Foil sheet for BS-420
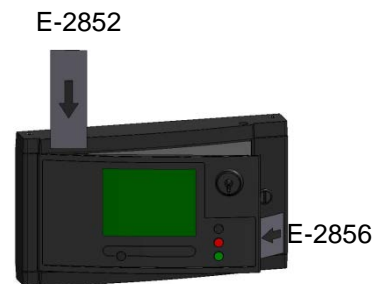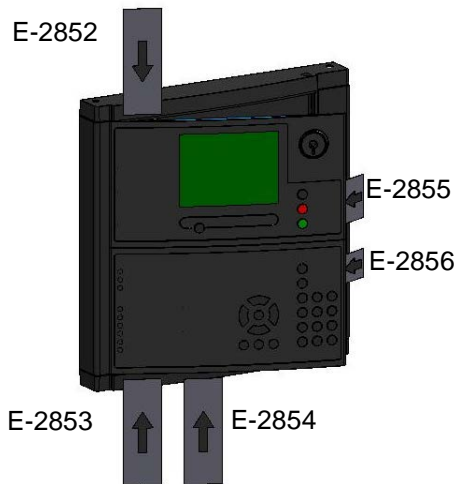
■ Make sure that you are holding the textfoil the correct way.
■ Bend the small flap towards the panel (as shown on the left most illustation below), then insert the foil into the appropriate slot, and slightly push it in as far as possible.
■ The foils that are to be inserted into the slot on the righ hand side of the panel front have a small flap which can easily be bent (along the perforation holes).

Fire Alarm Control Panel BS-420 is shown in the example below.

5.9 Cable Inlets / Outlets

When feeding the cables, use whichever is appropriate.
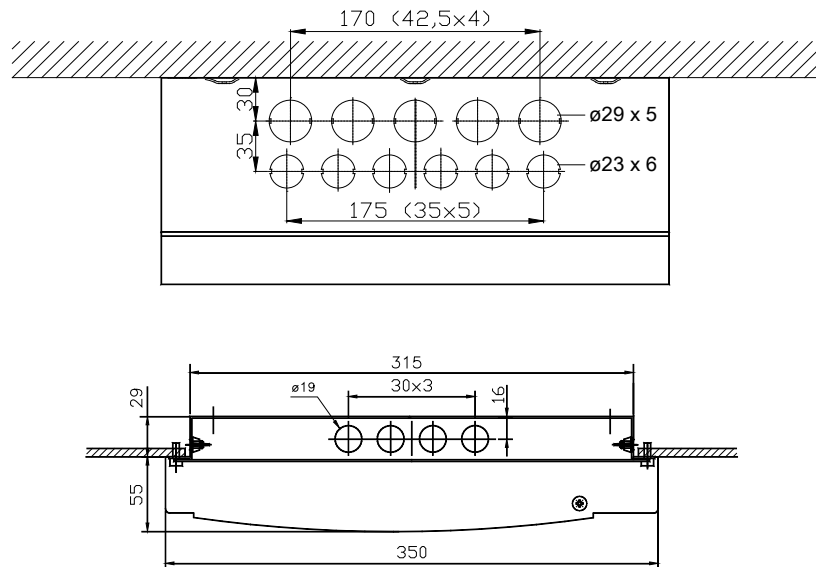
The illustration above shows the positioning and dimensions of the cable inlets for BS-420/BC-420 (the uppermost illustration) and BU-BV-420.

5.10 Cut Out Dimensions for Flush Mounting in a Wall

The Repeater Panel BU-BV-420 and Operator Panel BS-430 can be flush mounted in a wall.

5.10.1 Repeater Panel BU-BV-420

The illustration below shows the cabinet's cut out dimensions. The dimensions given include space for the cover frame.
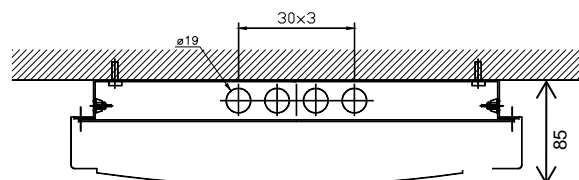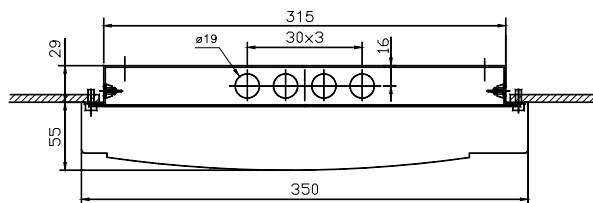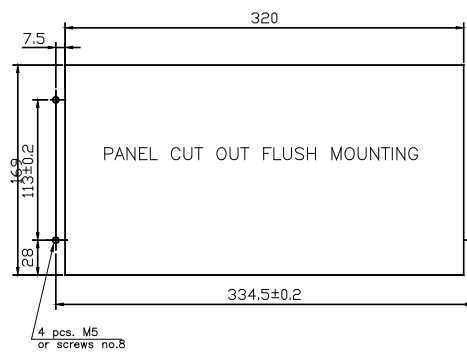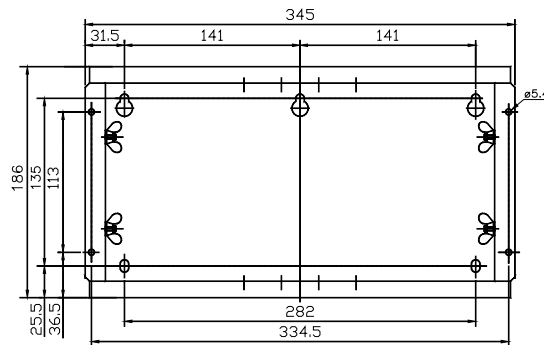
5.10.2 Operator Panel BS-430

The illustration below shows the cabinet's cut out dimensions. The dimensions given include space for the cover frame.
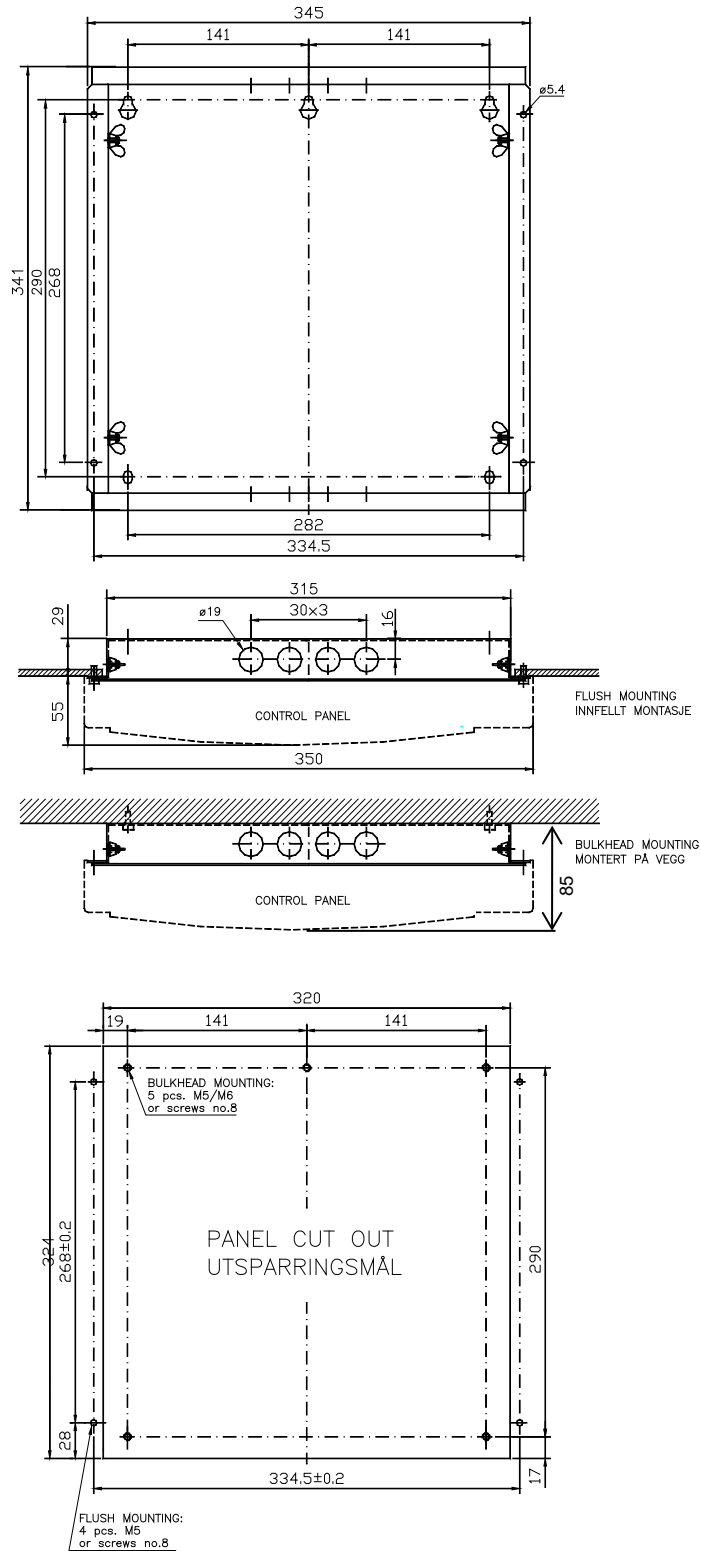
6. Power Consumption

6.1 Mains Power

6.1.1 BPS-405

The current consumption at 115V AC is 3,2A.
The current consumption at 230V AC is 1,6A.

The inrush peak current consumption is 35A.

6.1.2 BPS-410

The current consumption at 115V AC is 4,5A.
The current consumption at 230V AC is 1,9A.

The inrush peak current consumption is 35A.

6.2 System Units

System Unit	Current Consumption
Fire Alarm Control Panel BS-420 Controller BC-420	156mA/27V DC (idle) Max. 340mA/27V DC
Repeater Panel BU-BV-420	156mA/22,2V DC (idle) Max. 220mA/27V DC (lamp test)
Operator Panel BS-430	175mA/27V DC (idle) Max. 340mA/27V DC (lamp test)
Power Board BSF-400	85mA

6.3 Loop Units

For information on the current consumption for various loop units, refer to technical specifications provided in the relevant datasheets.

6.4 Phoenix Ethernet Switches

A network solution (AutroNet) with more than two panels requires the use of switches, unless AutroNet Ring Topology is used (refer to chapter 9.5.3). Only Phoenix Ethernet switches are approved and supported by Autronica Fire and Security AS. The switch type and the number of switches depend on the actual installation / network design (number of panels and the transmission length between the panels / switches).

For detailed technical information on the power consumption for Phoenix Ethernet Switches, refer to System Description, AutroSafe Interactive Fire Detection System.

6.5 Power Design Considerations

The Power Cabinet's (BP-405) power supply (BPS-405) has 3A available, as 2A is reserved for battery charging.

The supplies have three different output classes:
- A1/A2, rated 2A each. (May be paralleled for higher current). Will always be ON except in fault situations.
- B1/B2, rated 2A each. (May be paralleled for higher current)
- C1/C2, rated 2A each. (Cannot be paralleled. Will be turned OFF during every start-up/initialization.

Output class A1 may be paralleled with A2, and output class B1 may be paralleled with B2.

The outputs current is limited by the total available current, i.e. on a BP-405 Power Cabinet with battery, 2A is drawn from output A1, only 1A is available from output A2, and nothing available for the other outputs.

One BPS-405 unit can be connected to one battery set. A battery set may NOT be shared by several BPS-405 units.

The outputs from different BPS-405 units cannot be paralleled, as the power supplies are not designed for this. Earth fail detection will also fail. Regulations define that battery resistance shall be monitored, which prevents the use of common battery bank.

The A1/A2 outputs are not affected of a BPS-405 software failure. If one output (for example, A1) is short-circuited, the other ones are not affected. This does not apply when two outputs are paralleled, (for example, A1 and A2), as a short circuit in this case will disconnect both outputs.

7. Cable Connection Overview

Controller Board BSA-400

J18
4	-
3	+
2	-
1	+

Power Supply Module BSS-310A / BSS-311

10	
9	
8	
7	
6	
5	
4	-
3	-
2	+
1	+

TERMINAL BLOCK

1	2
3	4
5	6
7	8
9	10
11	12
13	14
15	16
17	18
19	20

Fire Alarm Control Panel BS-420

Cat.5
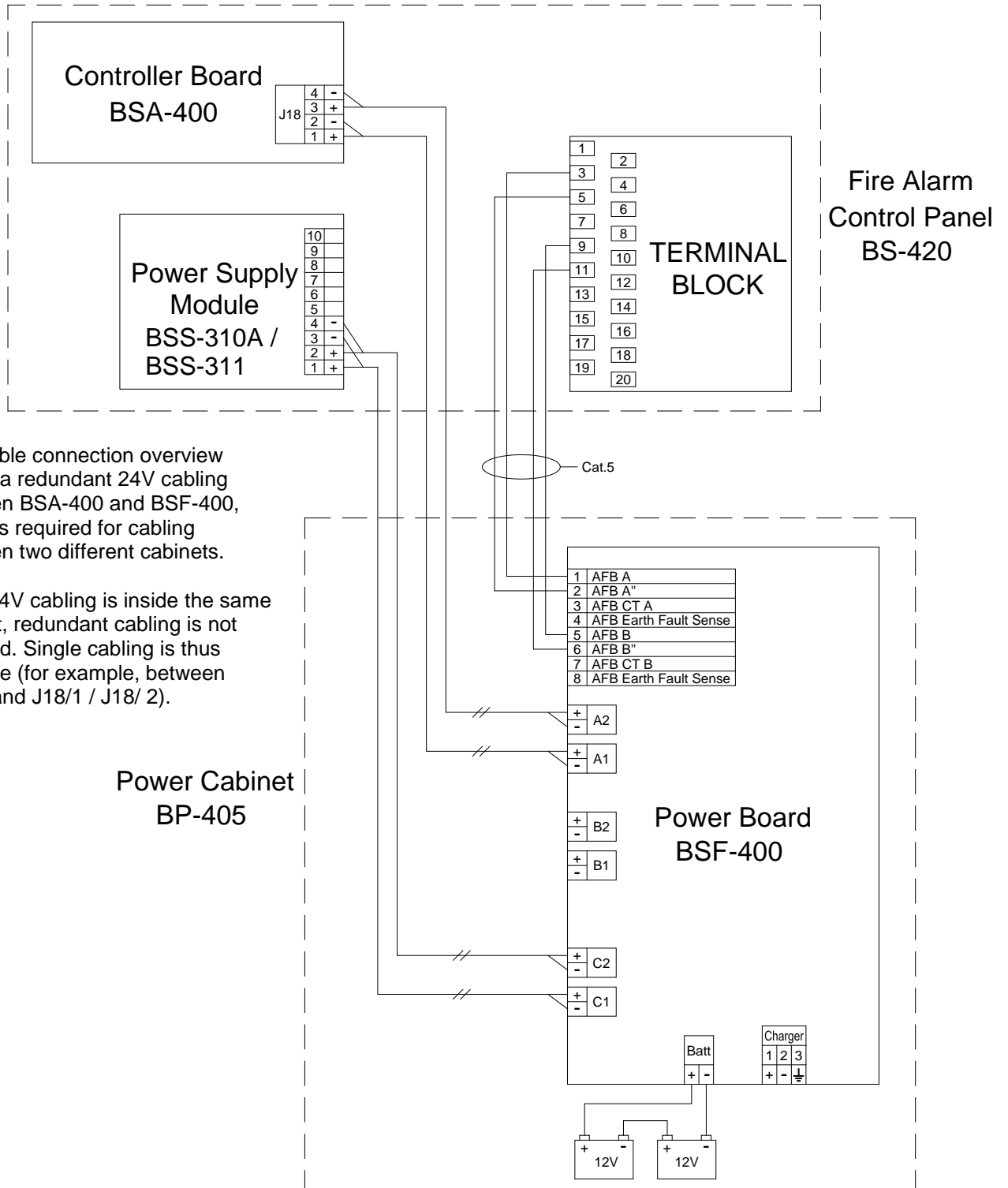
The cable connection overview shows a redundant 24V cabling between BSA-400 and BSF-400, which is required for cabling between two different cabinets.

If the 24V cabling is inside the same cabinet, redundant cabling is not required. Single cabling is thus possible (for example, between A1+/- and J18/1 / J18/ 2).

Power Cabinet BP-405

1	AFB A
2	AFB A"
3	AFB CT A
4	AFB Earth Fault Sense
5	AFB B
6	AFB B"
7	AFB CT B
8	AFB Earth Fault Sense

| + | A2 |
| - | |

| + | A1 |
| - | |

| + | B2 |
| - | |

| + | B1 |
| - | |

Power Board BSF-400

| + | C2 |
| - | |

| + | C1 |
| - | |

Batt
| + | - |

Charger
| 1 | 2 | 3 |
| + | - | ⏚ |

| + | - |
| 12V | |

| + | - |
| 12V | |

8. Connecting Internal Cables

8.1 Overview – BS-420 / BC-420

Multifunction cable
XGE-1/20-40

AL_Com+ cable
XGE-1/10-50
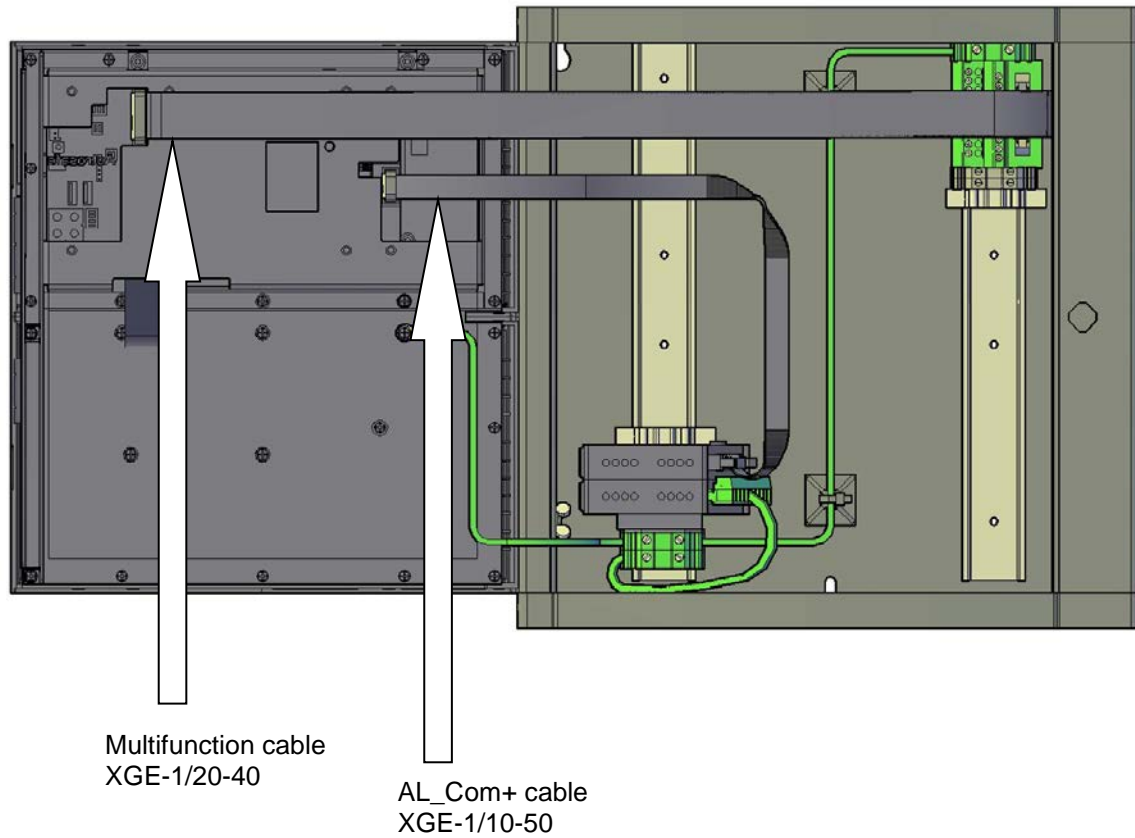
8.2 BS-420 / BC-420

8.2.1 AL_Com+ Connection on Controller Board BSA-400
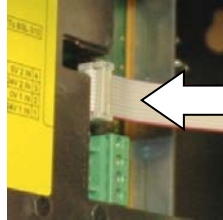
Connector J5
Cable XGE-1/10-50

8.2.2 AL_Com+ Connection on Communication Module BSL-310

Cable XGE-1/10-50
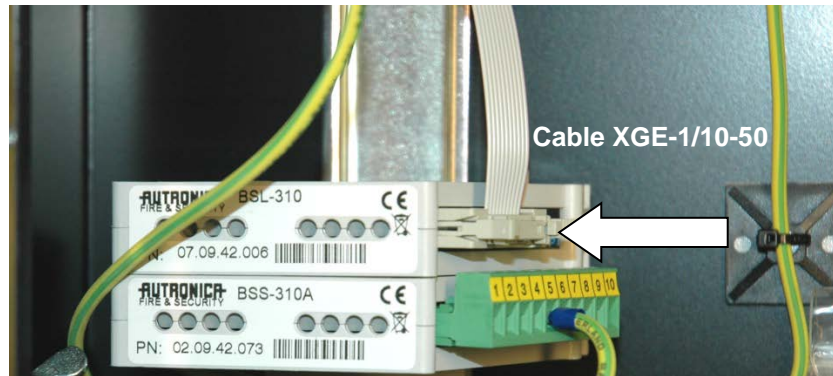
8.2.3 Multifunction Serial Port Connection on Controller Board BSA-400

A ribbon cable is connected between the Multifunction Serial Port Connector and the main terminal block (mounted on the DIN rail inside the cabinet).
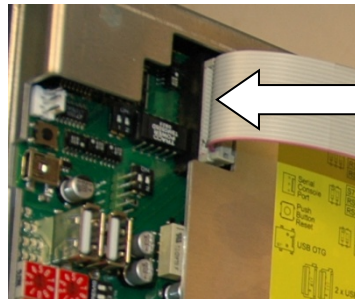
Connector J3
Multifunction cable XGE-1/20-40

8.2.4 Multifunction Serial Port Connection on Terminal Block, List L1

The ribbon cable from the Serial Port Connection on the Controller Board is connected to the main terminal block, list L1 (mounted on the DIN rail inside the cabinet).
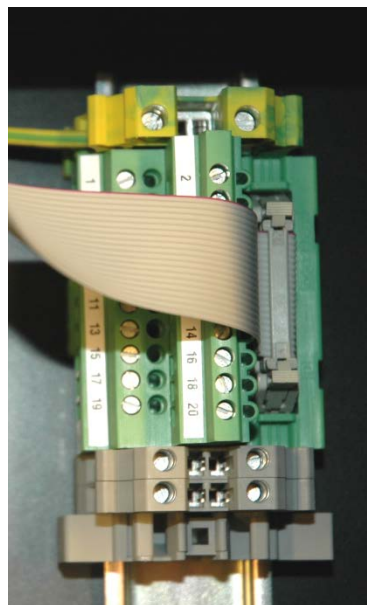
Multifunction cable
XGE-1/20-40

8.2.5 Multifunction Serial Port Connection Overview – BSA-400

Connection to terminal block (L1)	Description	Connector J3 on Controller Board BSA-400
L1.1	GND	J3.1
L1.2	GND	J3.2
L1.3	AutroFieldBus B	J3.3
L1.4	Multifunction Serial Port RS-422/RS485 A+	J3.4
L1.5	AutroFieldBus B'	J3.5
L1.6	Multifunction Serial Port RS-422/RS485 B-	J3.6
L1.7	AutroFieldBus B Reference	J3.7
L1.8	Multifunction Serial Port RS-422 X+	J3.8
L1.9	AutroFieldBus A	J3.9
L1.10	Multifunction Serial Port RS-422 Z+	J3.10
L1.11	AutroFieldBus A'	J3.11
L1.12	Multifunction Serial Port RS-232 TX	J3.12
L1.13	AutroFieldBus A Reference	J3.13
L1.14	Multifunction Serial Port RS-232 RX	J3. 14
L1.15	GND	J3.15
L1.16	Multifunction Serial Port Reference	J3.16
L1.17	Fault Relay Normal Open	J3.17
L1.18	GND	J3.18
L1.19	Fault Relay Normal Closed	J3.19
L1.20	Fault Relay Common	J3.20

8.3 BC-440

For information on the cabling to AutroSafe Controller Rack BC-440, refer to separate datasheet.

8.4 Internal Earth Cabling
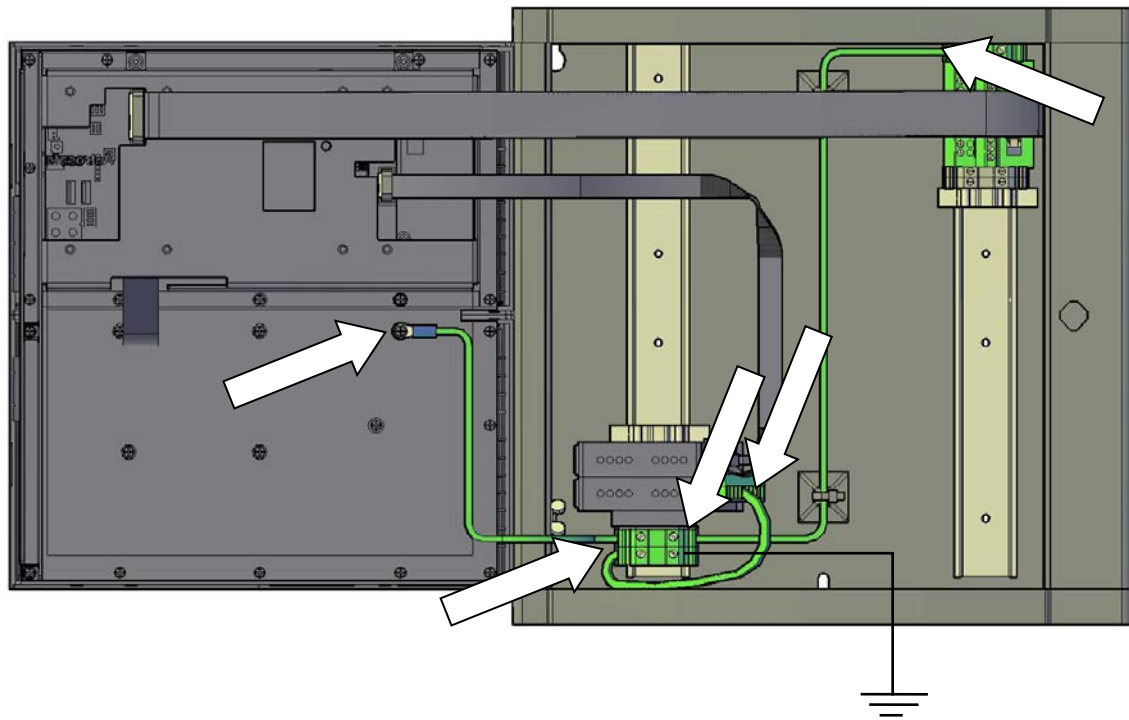
9. Connecting External Cables

9.1 Introduction

This chapter deals with the connection of external cables.

For more detailed information regarding the Controller Board BSA-400 and Power Board BSF-400, see Appendix.

9.2 Before Connecting Cables

POWER OFF!

- Before connecting cables, make sure that the mains power is *not* connected.

- Remove fuse F8 from the power supply in all Power Cabinets. Do not replace the fuse until commissioning of the system. Refer to the Commissioning Handbook.

9.3 Mains Wiring - Two-pole Disconnect Device

In the fixed mains wiring to the panel a two-pole disconnect device must be provided to disconnect the equipment from the power supply when servicing is required. Normally, this switch is a two-pole automatic fuse located in the fuse terminal box at the premises. This fuse location must be marked "Fire Alarm System". No other than the Fire Detection System shall be sourced from this switch.

The isolation of the mains wiring must be of either:
- inflammability class V2
  or
- the wiring has to be fixed to the cabinet separated from all other cables

9.3.1 Voltage Selection 115/230VAC on the BPS-405

■ Make sure that the mains power is *not* connected.

■ Use a screwdriver to slide the switch to the correct position according to the appropriate voltage (115/230VAC).
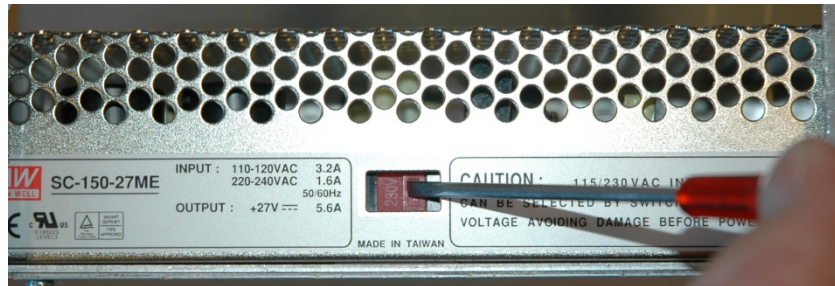
POWER OFF!

9.3.2 115/230VAC Voltage BPS-410

Note:
The BPS-410 Power Unit 24VDC/10A is delivered as two separate part numbers:
■ 116-BPS-410 for 230VAC
■ 116-BPS-410/115 for 115VAC

POWER OFF!

■ Make sure to use the correct unit according to the appropriate voltage (115/230VAC).

9.4 AutroFieldBus Connections

9.4.1 Connections to BS-420/BC-420 - Terminal Block (List 1)

Shielded cable required.
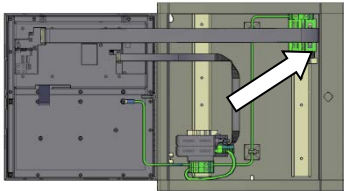
Terminal	Function
L1.9	AutroFieldBus A
L1.11	AutroFieldBus A'
L1.13	AutroFieldBus CT A
L1.3	AutroFieldBus B
L1.5	AutroFieldBus B'
L1.7	AutroFieldBus CT B
L1.15	Earth

Terminal block L1 with shielded AutroFieldBus cable
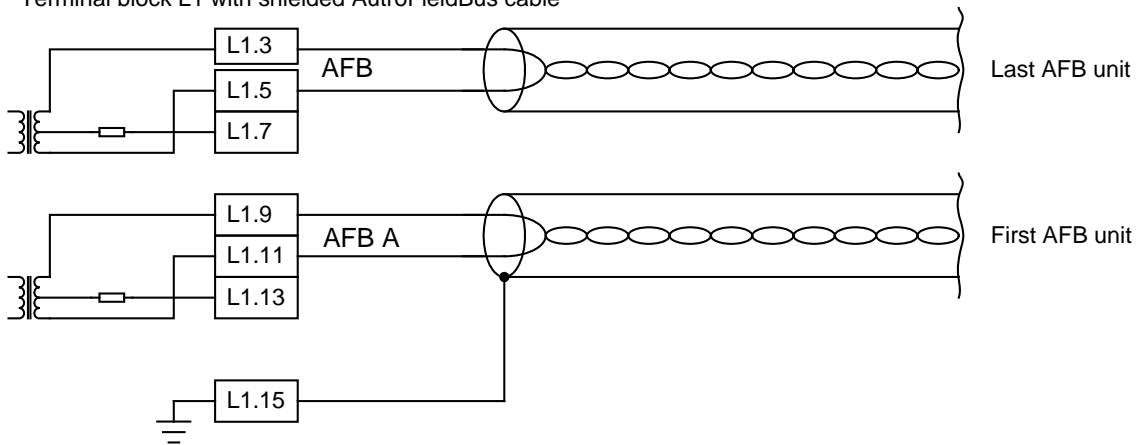
9.4.2 Connections to Connector J2, Power Board BSF-400
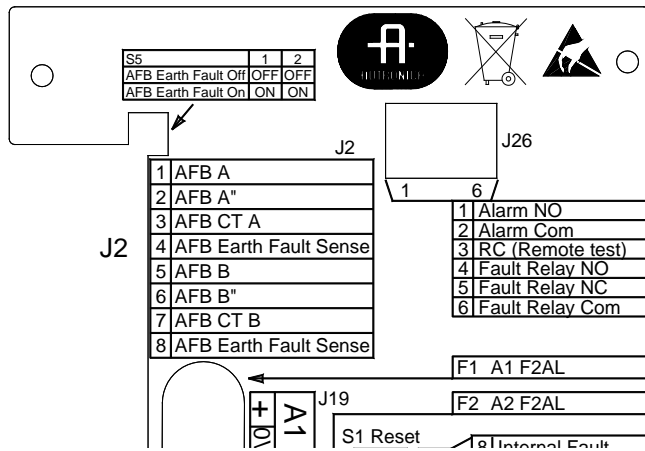
9.4.3 Example of the Interconnection of Several Power Cabinets

The example below shows the interconnection of two Power Cabinets on the AutroFieldBus. Note that the AutroFieldBus always goes from AFB A on the main terminal block inside BS-420/BC-420 to AFB B on the J2 connector on the Power Board BSF-400, then from AFB A to the next unit. The cable finally returns to AFB B on the main terminal block.
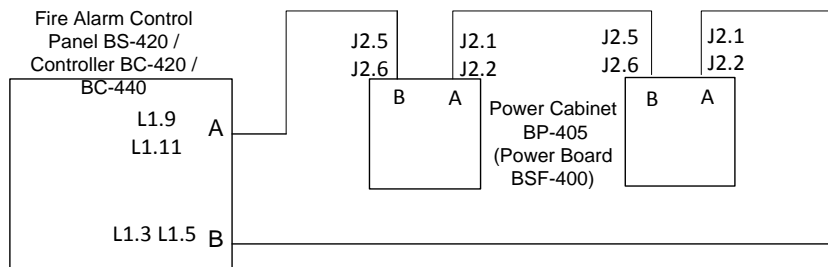
9.5 Connection of Network Cables (AutroNet)

Each panel provides two ports; Ethernet 1 and Ethernet 2. AutroNet consists of one of the following network topologies:
- AutroNet Redundant Star Topology
- AutroNet Single Star Topology
- AutroNet Ring Topology

9.5.1 AutroNet Redundant Star Topology

The illustration below shows an *example* of the fully redundant standard AutroNet, where the following guidelines apply:

- Connect the Ethernet cables for Ethernet 1 to and from the connections labeled Ethernet 1 (panels and Ethernet switches) throughout the entire system.
- Connect the Ethernet cables for Ethernet 2 to and from the connections labeled Ethernet 2 (panels and Ethernet switches) throughout the entire system.

FL SWITCH SFNT 5TX

Ethernet 2   Ethernet 2

Ethernet 1   Ethernet 1

Ethernet ports on Controller Board BSA-400

Ethernet 2

Ethernet 1

Ethernet 2   Ethernet 1
Controller

Ethernet 1   Ethernet 2
Fire alarm control panel

Ethernet 1   Ethernet 2
Repeater panel
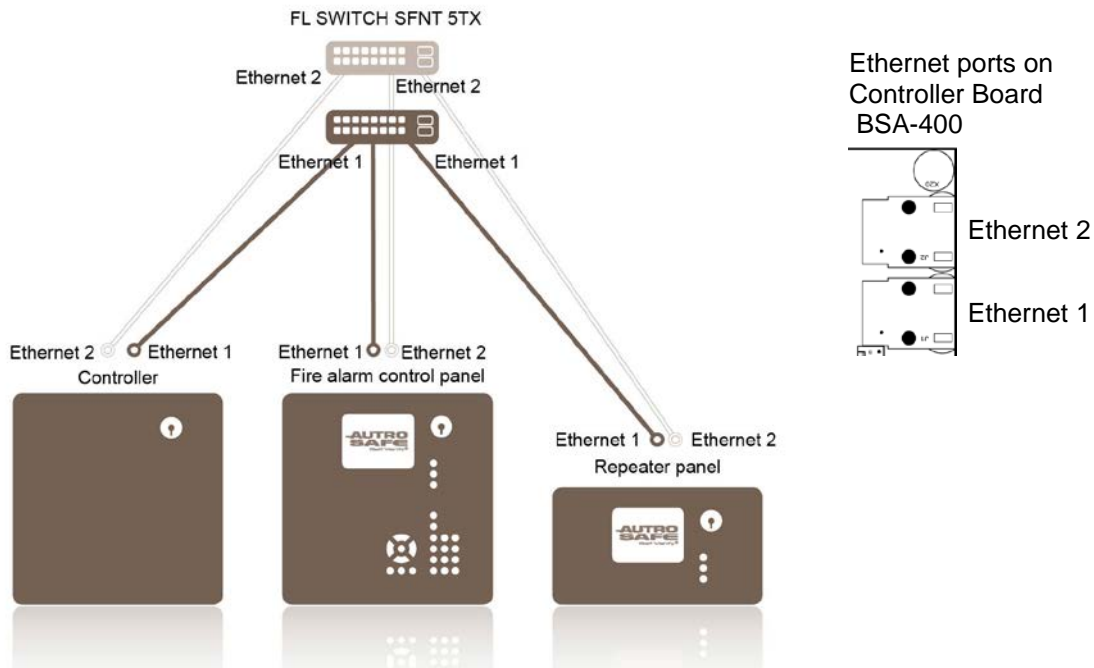
9.5.2 AutroNet Single Star Topology

As an option, AutroSafe 4 allows also single Ethernet connections to one or several panels in a system if redundancy is not required. Ethernet 1 must always be used for single Ethernet connections.

The *example* below is similar to the one in the previous chapter; all panels have redundant connections to the system, except for the Repeater Panel, which has a single Ethernet connection.

- Between the Repeater Panel and the Ethernet switch, make only a single Ethernet connection to and from Ethernet 1.
- Connect the remaining Ethernet cables as described in the previous chapter

FL SWITCH SFNT 5TX
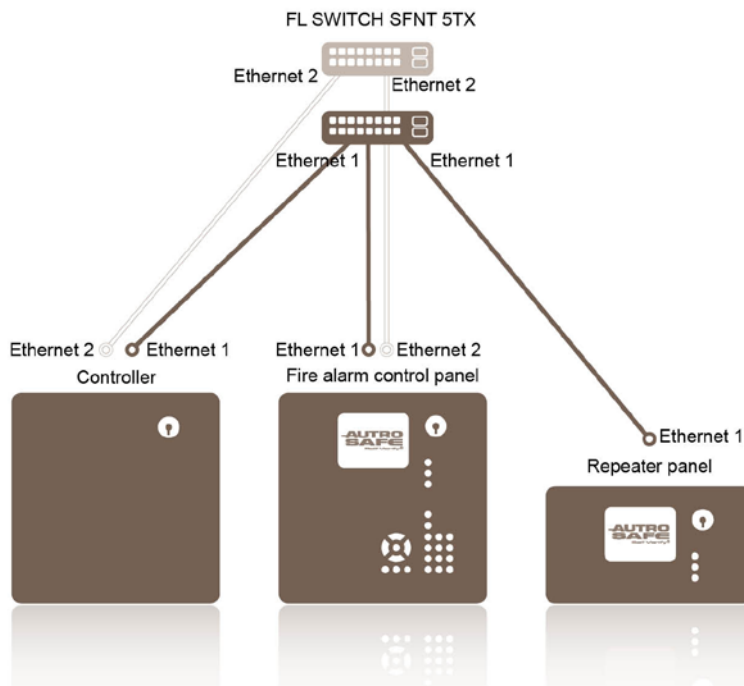
For single Ethernet connections, always use Ethernet port 1
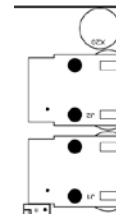
Ethernet 1

9.5.3 AutroNet Ring Topology

In an AutroNet Ring Topology all panels are connected to each other forming a closed loop. The first panel is connected to the second, the second is connected to the third, and so on (preferably from Ethernet 1 to Ethernet 2, from Ethernet 1 to Ethernet 2, from Ethernet 1 to Ethernet 2 and so on).

A ring topology is a redundant network, as all panels will continue to operate even with a single break or short-circuit on the ring.
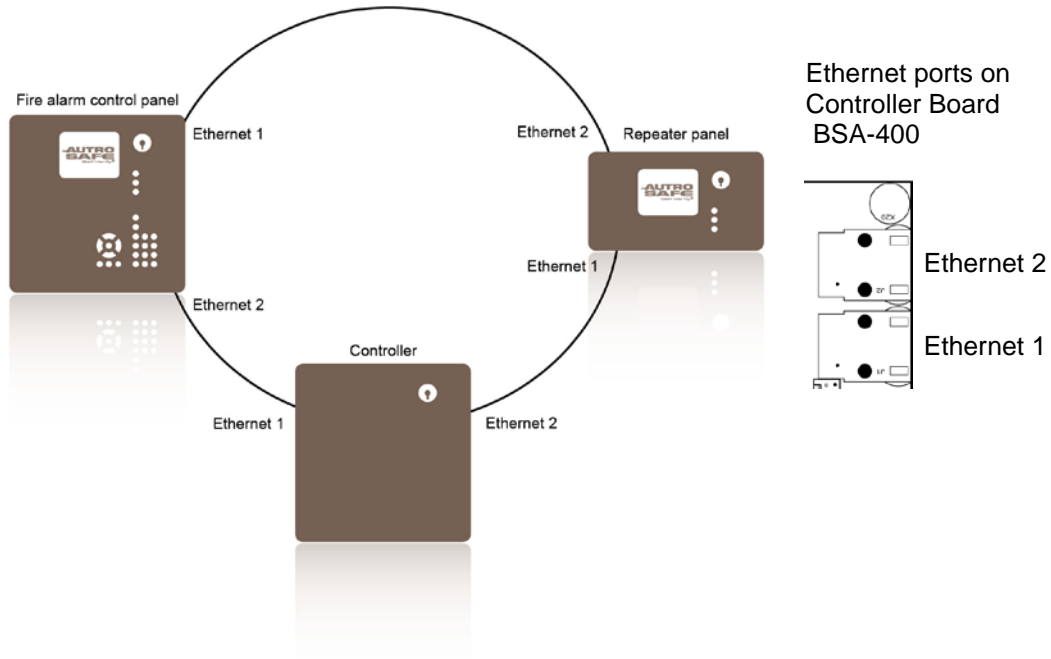
9.5.4 Connection to Controller Board BSA-400
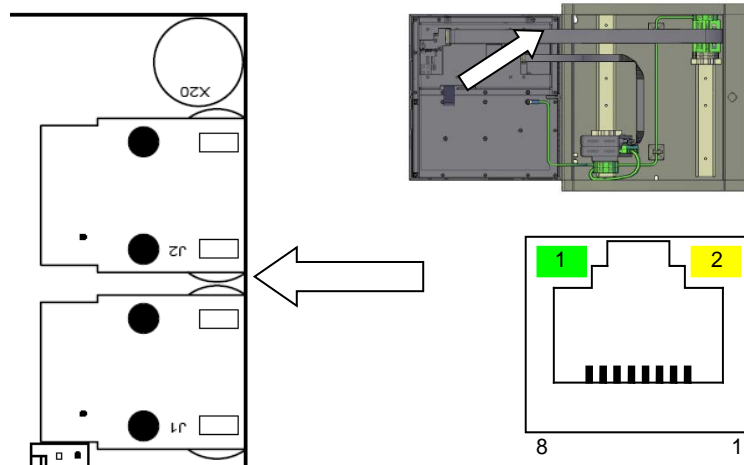
The BSA-400 board on all panels provides two separate 10/100Mbit Ethernet ports. The connector is an RJ-45 modular jack, suitable for shielded cable CAT5 which allows cable lengths up to 100m.

LED 1	Activity LED
LED 2	If ON, 100MBit/s, if OFF, 10MBit/s

9.5.5 Common Earth Connections

All panels must be connected to a common earth for EMC compliance.
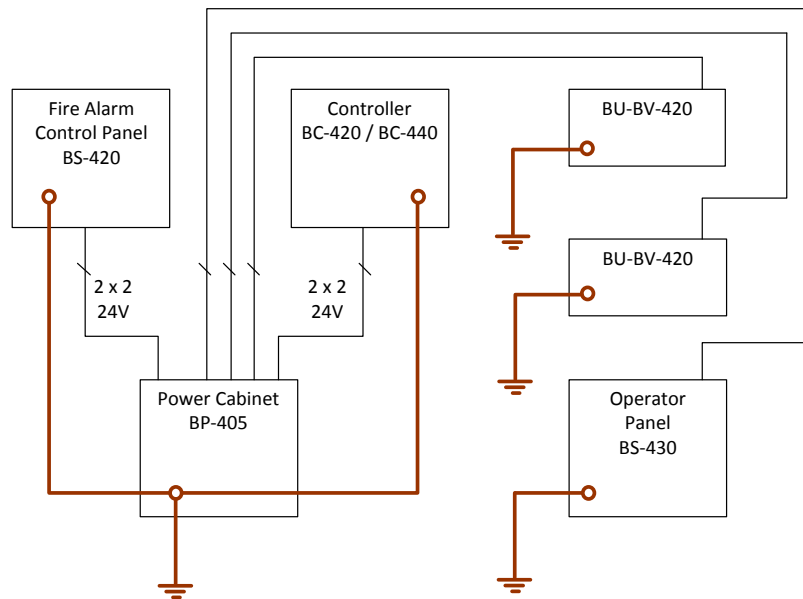
Shielded or armoured cable must be used for the 24V DC power supply.

9.6 RS-485 Connections to Terminal Block, List L1

Twisted pair, shielded cable is required.
Maximum 100Ω resistive loss.
Maximum total length 1200m.
Maximum cable capacitance 150 nF.

Terminal block list L1
RS-485

L1.4	RS-422/RS485 A+
L1.6	RS-422/RS485 B-
L1.16	Serial Reference

RS485 A+
RS485 B-
Serial Reference

9.7 RS-422 Connections to Terminal Block, List L1

J3.4	RS-422/RS485 A+
J3.6	RS-422/RS485 B-
J3.8	RS-422 X+
J3.10	RS-422 Z-
J3.16	Serial Reference

RX
TX

TX
RX

RS-422 X+
RS-422 Z-
RS-422 A+
RS-422 B-
Serial Reference
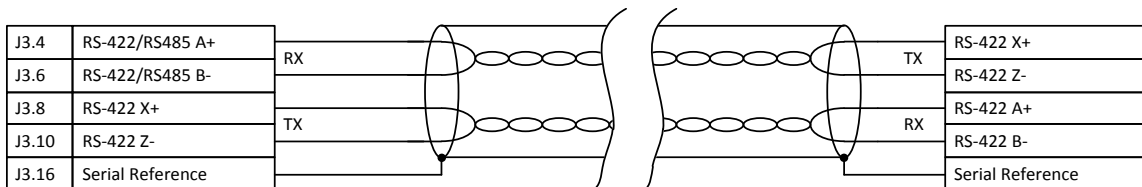
Schematic of port equivalent:
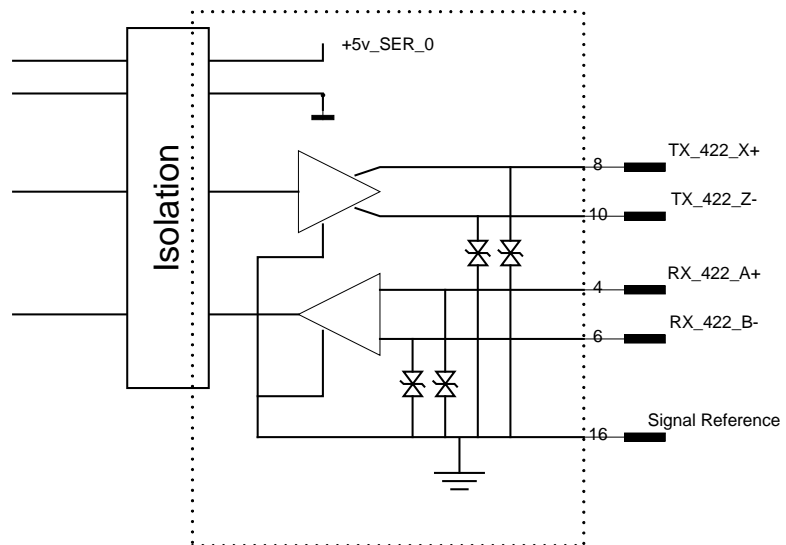
The protection shown in the schematic of port equivalent above is made for 1kV High Energy Surge. In addition, the connection is protected against wrong connections between Serial Reference and other signals (X->Signal ref, Z->Signal ref, A->Signal ref, B->Signal ref) for voltage up to 29V DC.

9.8 RS-232 Connections to Terminal Block, List L1

Terminal block list L1
RS-232

L1.12	RS-232 TX	→			RS-232 RX
L1.14	RS-232 RX	←			RS-232 TX
L1.16	Serial Reference				Serial Reference
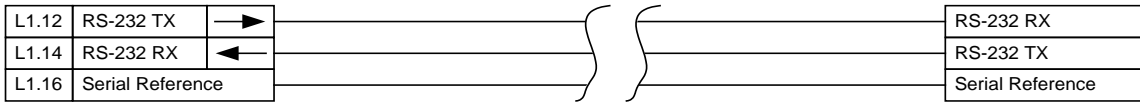
9.9 24V Power Connections

9.9.1 Connections to Controller Board BSA-400

24V power is supplied to connector J18 on the Controller Board BSA-400 on all panels.

From Power Board BSF-400
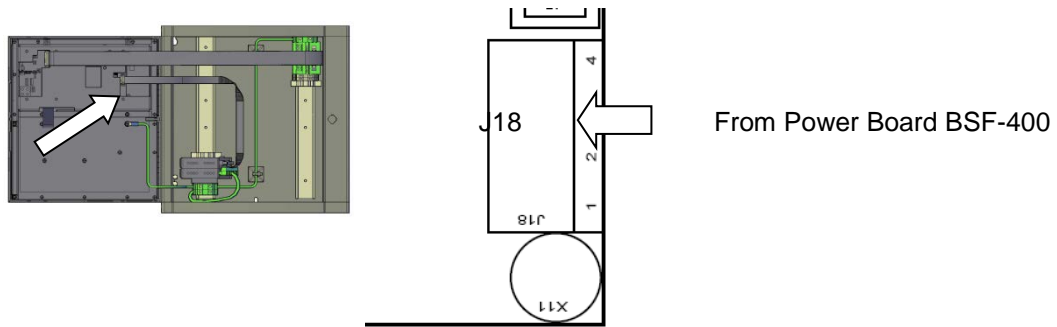
Redundant cabling:

Connector J18 on Controller Board BSA-400	Description		Connections to Power Board BSF-400
J18.1	+24V In 1		A1 +
J18.2	0V In 1	Interconnection	A1 0V
J18.3	+24V In 2		A2 +
J18.4	0V In 2		A2 0V

Single cabling:

Connector J18 on Controller Board BSA-400	Description		Connections to Power Board BSF-400
J18.1	+24V In 1		A1 +
J18.2	0V In 1	Interconnection	A1 0V
J18.3	+24V In 2		A1 +
J18.4	0V In 2		A1 0V

9.9.2 Connections to Power Board BSF-400
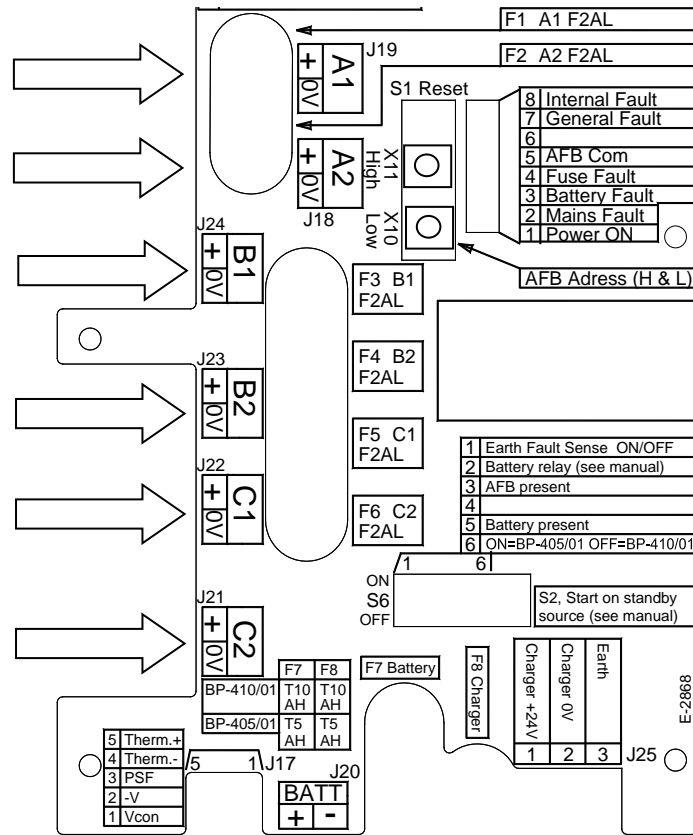
Output	Connections to BSF-400	Description	Intended to be used for:
A1	J19	+24V DC / 2A 0V	Monitored panel equipment.
A2	J18	+24V DC / 2A 0V	Monitored panel equipment.
B1	J24	+24V DC / 2A 0V	External equipment.
B2	J23	+24V DC / 2A 0V	External equipment.
C1	J22	+24V DC / 2A 0V	External equipment. 3 seconds break at initialization of panel.
C2	J21	+24V DC / 2A 0V	External equipment. 3 seconds break at initialization of panel.

9.9.3 Power Connection Overview

BSS-311 is required when redundant connection is used.
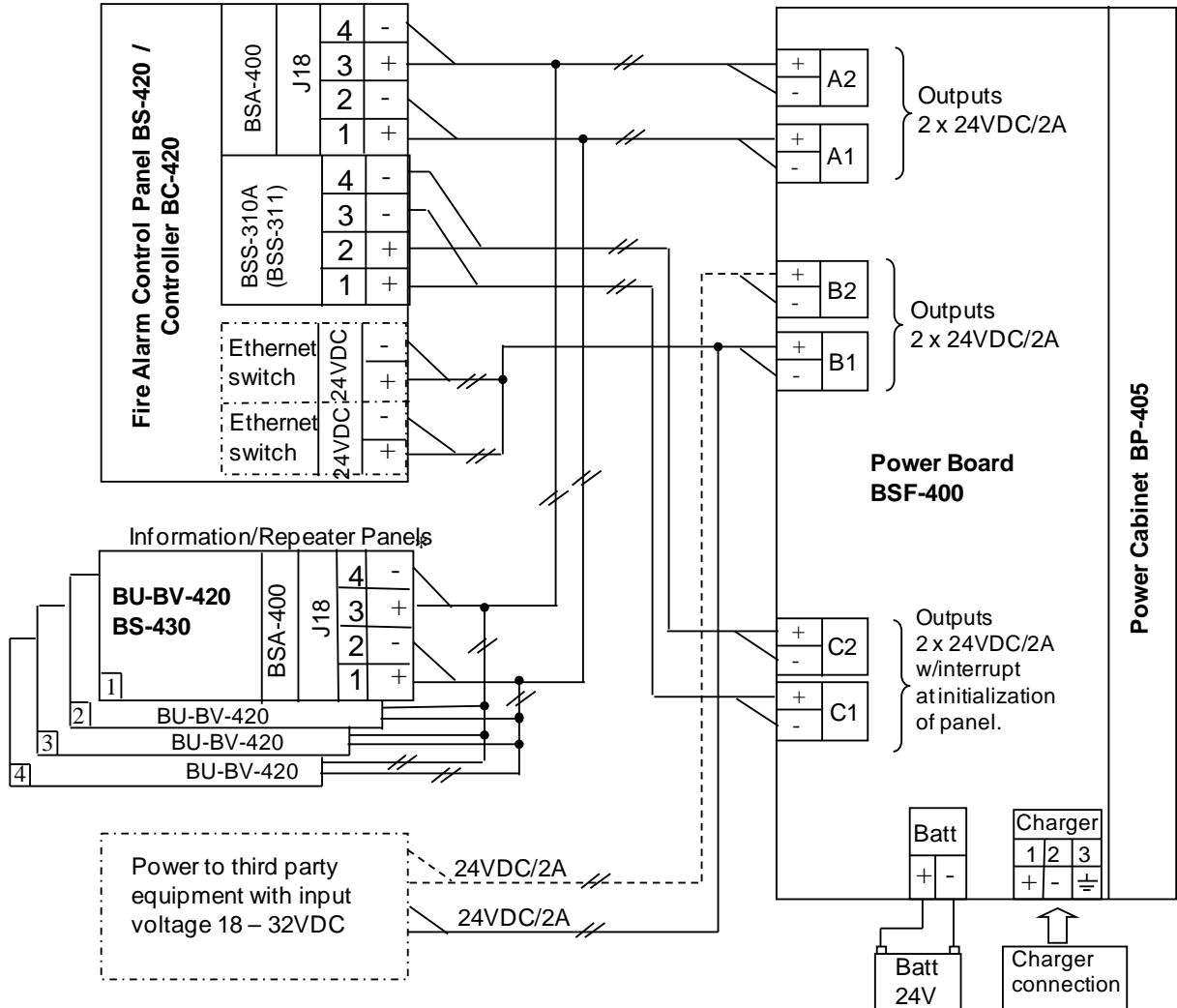
* External panels type BU-BV-420 and BS-430
   can be connected both to output A and B.
   Devide total power to both A and B.

------ Connected if needed.

9.10 Mains Power Connections

Power must not be applied before commissioning, refer to Commissioning Handbook.

⚠
POWER OFF!

When applying power during commissioning, always connect the cables to the batteries in the Power Cabinet BP-405 first, then power up the system shortly afterwards by connecting the mains cable to a mains socket (230V/115V AC) or by switching the power ON from an external main fuse box.

The connection of mains power (AC) to the Power Cabinet BP-405 is shown below. Note that the isolation must be kept on the mains cable as close up to the terminal points (L, N and ⏚) as possible.
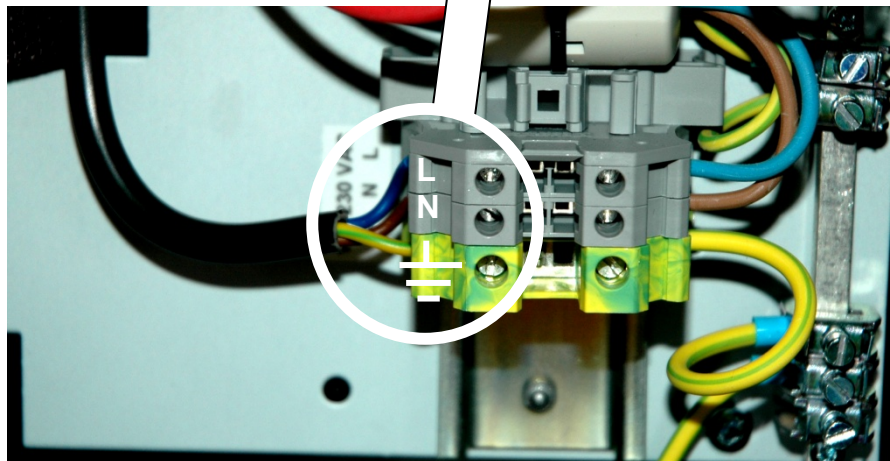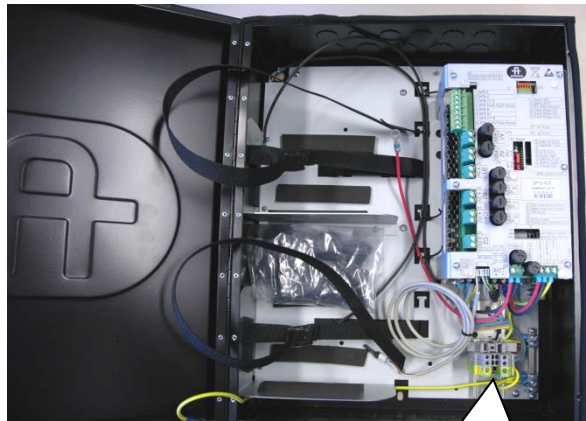
10. Installing I/O Modules

10.1 Introduction

This chapter provides information on the mounting and removal of I/O modules.

Note that the internal *Power Module (BSS-310A)* and the *Communication Module (BSL-310)* are already mounted in a fixed position when the product leaves the factory.

10.2 Front View of I/O Module
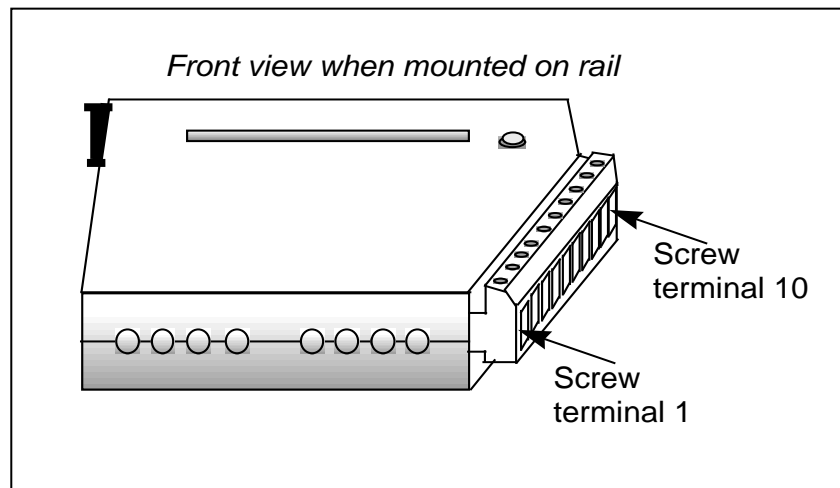
10.3 Mounting / Removing I/O Modules

10.3.1 General

Note! Make sure the mains power is OFF!

Note: The Power Module (BSS-310A) must always be mounted first on the rail - at the bottom - before any other modules. The Communication Module (BSL-310) is then mounted on top of the Power Module. If the optional Dual Power Monitoring Module BSS-311 is to be used, this module always has to be mounted at the bottom – before BSS-310A and BSL-310.

All other modules can be mounted in arbitrary order on top of these modules.

BSL-310

BSS-310A

(BSS-311, optional)

Fixed Position
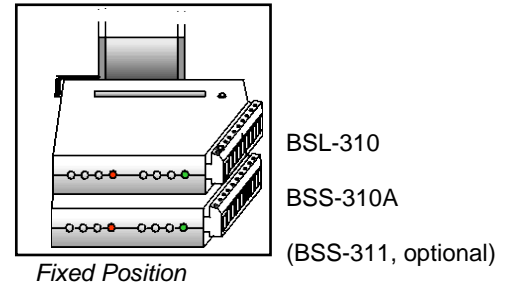
When the system is to be configured at a later point, note that the AutroSafe Configuration Tool graphically shows the first module on the top of the figure and the following in descending order. This may be opposite to the physical mounting, and must be taken into consideration when configuring the system. Also note that the configuration tool does not show the BSS-311 and BSL-310.

10.3.2 Mounting

The connection block on the I/O module must be pointing to the right when the module is to be inserted in a BS-420/BC-420 cabinet.

- Snap the right side of the fastener onto the mounting rail (1), then press the module slightly inwards (2) until the left side fastens.

2

1

- Then, carefully press the module downwards as far as possible. Make sure that the module is properly connected to the module below.
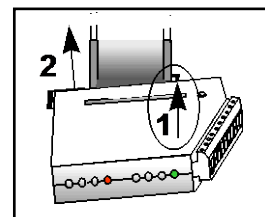
10.3.3 Removing

- Ensure the panel is not powered.

- Unplug the connection block.

- Use a screwdriver to carefully lift the topmost module upwards (1) until the connector between the modules is free.

- Use the screwdriver to slightly bend the left side of the fastener *towards left* (2) until it loosens, then remove (3) the module.

- If necessary, continue removing the next one in the same way.
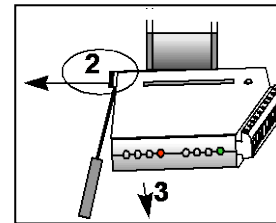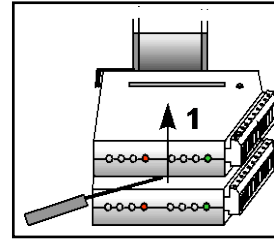
10.3.4 Before Connecting Cables

⚠

POWER OFF!

- Before connecting cables, make sure that the mains power is *not* connected.

10.4 Data Sheets - I/O Modules

The AutroSafe User Documentation provides data sheets for I/O modules, including a short description of the I/O module, its application, plus technical specifications and cabling.

11. Dual Safety Installation

11.1 Dual Safety System Overview

An AutroSafe system using the Dual Safety concept consists of a Primary System and a Secondary System. The purpose of the concept is to ensure that the Secondary System takes over the control of the detection loops if the Primary System or parts of it is lost for any reason.

To achieve this, the redundant loop control interface AutroKeeper BN-180 is required.

An AutroMaster can communicate with both the Primary and Secondary System via AutroCom.

The connections that are to be used between the Primary/Secondary System and the detection loops depend on distances and the number of Loop Driver Modules/detection loops used.

11.2 Rules of Thumb

Note that these rules of thumb goes for *both* systems in a Dual Safety configuration:

- Up to 6 Loop Driver Modules can be connected to one I/O stack
- Up to 12 Loop Driver Modules can be connected to one panel
- Up to 6 Loop Driver Modules can be connected to one panel directly (one I/O stack) if the cable length between the panel's main board AL_Com+ port and the I/O stack is less than 3 meters.
- Up to 12 Loop Driver Modules can be connected to one panel through AutroFieldBus (up to 12 I/O stacks). This solution has to be used if the cable length between the panel's main board and the I/O stack exceeds 3 meters, but can also be used for cable lengths less than 3 meters.

11.2.1 Example 1: Connections Using AL_Com+ only

The distance from the Primary Panel to the Loop Driver Module is less than 3 meters. An AL_Com+ flat ribbon cable is used between the panel AL_Com port and the I/O stack (including the Loop Driver Module).

The distance from the Secondary Panel to the Secondary Loop Driver Module is less than 3 meters. An AL_Com+ flat ribbon cable is used between the panel AL_Com port and the I/O stack (including the Secondary Loop Driver Module).
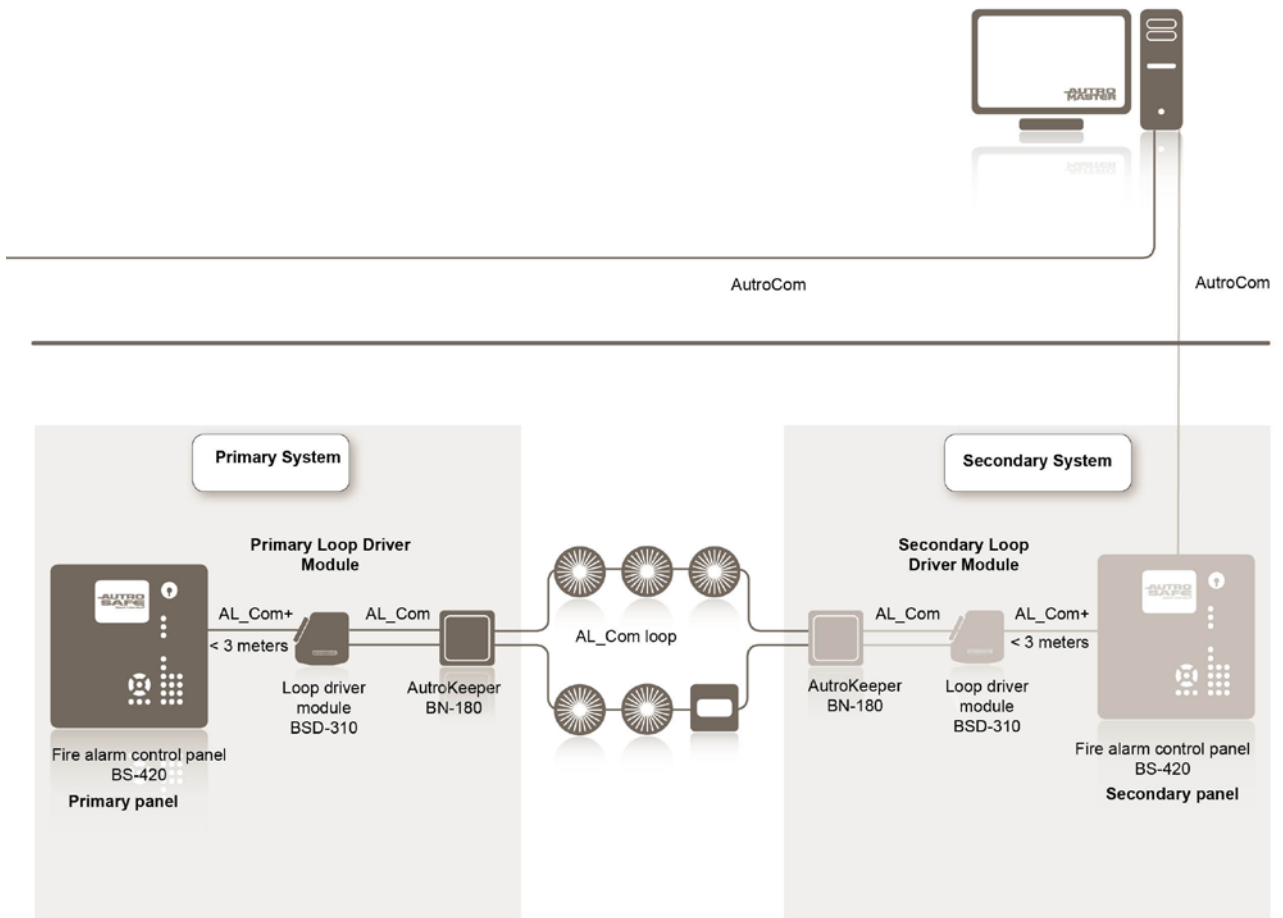
11.2.2 Example 2: Connections using both AL_Com+ and AutroFieldBus

The distance from the Primary Panel to the Primary Loop Driver Module is less than 3 meters. An AL_Com+ flat ribbon cable is used between the panel AL_Com port and the I/O stack (including the Loop Driver Module).

The distance from the Secondary Panel to the Secondary Loop Driver Module is more than 3 meters. An AL_Com+ flat ribbon cable (maximum 3 meters) is used between the AutroFieldBus (AFB) Protocol Converter BSD-321 and the I/O stack (including the Secondary Loop Driver Module). The AFB Protocol Converter is connected to the panel's AFB. The AFB cable length can be up to 1000 meters. Booster equipment can be added to exceed the AFB cable length even further.
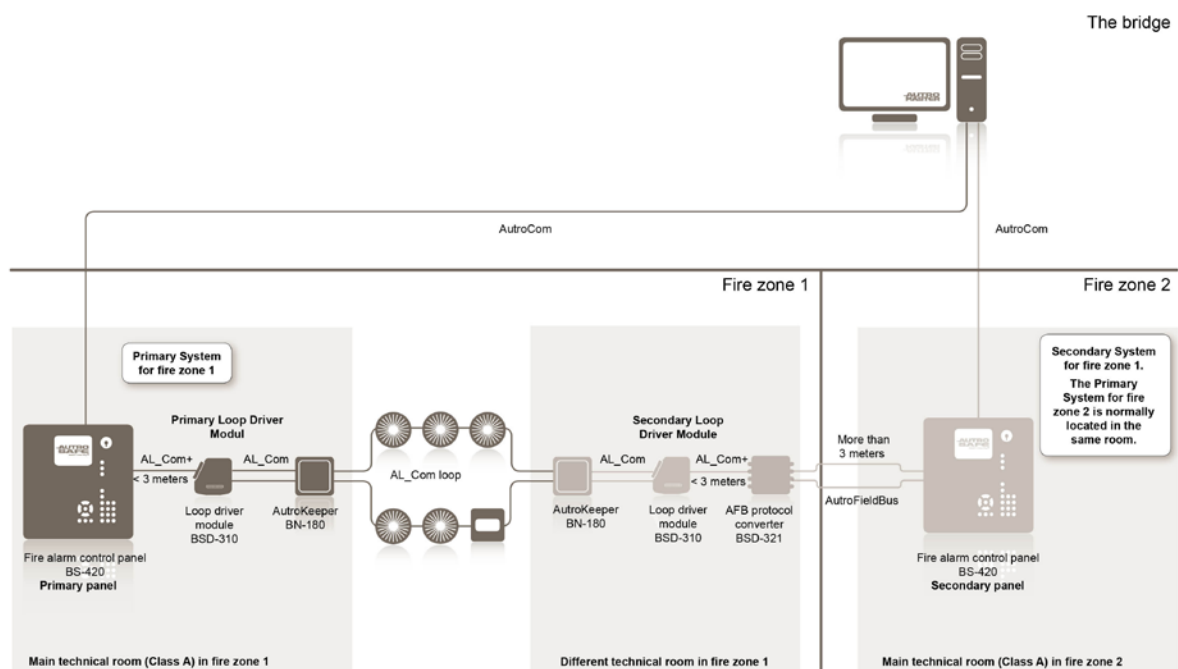
11.3 Connections Overview

There are two AutroKeepers BN-180 for each detection loop in a Dual Safety System (see next page). One must be assigned to the Primary System and the other to the Secondary System. The BSD-321 (if used) must be set to the Al_Com+ protocol (default).

The AutroKeeper is physically placed between the loop controller (BSD-310) and the detection loop (one belonging to the Primary System and one belonging to the Secondary System) and thus controlling/providing the loop controller access to the detection loop.

Secondary System

Fire Alarm Control Panel
BS-420

Termination Block

5	AFB B
6	AFB B'
1	AFB A
2	AFB A'

AutroFieldBus Protocol Converter BSD-321

AFB A	9
AFB A'	11
AFB B	3
AFB B'	5

| 25 TX Port 0 |
| 26 RX Port 0 |
| 27 GND Port 0 |
| 13 TX Port 1 |
| 14 RX Port 1 |
| 15 GND Port 1 |
| 16 IE Port 1 |
| 28 IE Port 0 |

Termination Block

| 3 TX |
| 7 RX |
| 10 GND |
| 9 CTS |
| 1 INT |

Communication Module BSL-310

| 3 TX |
| 7 RX |
| 10 GND |
| 9 CTS |
| 1 INT |

Loop Driver Module BSD-310

-5	IN
+4	
-2	OUT
+1	

AutroKeeper BN-180

-14	OUT
+13	
-16	IN
+15	
-12	IN
+11	
-10	OUT
+9	

Fire Alarm Control Panel BS-420

AutroKeeper BN-180

-10	OUT
+9	
-12	IN
+11	
-16	IN
+15	
-14	OUT
+13	

Loop Driver Module BSD-310

-2	OUT
+1	
-5	IN
+4	

Primary System

BN-180 as Standby

BN-180 as Active

Patented component to meet
the new SOLAS requirement

Secondary system for fire zone 1.
The primary system for fire zone 2 is normally located in the same room.

Fire alarm control panel
BS-420

AutroFieldBus

AFB protocol converter BSD-321

Loop driver module BSD-310

AutroKeeper BN-180

AL_Com+

AL_Com

Main technical room (Class A) in fire zone 2

Different technical room in fire zone 1

Secondary loop drivers for fire zone 1

AL_Com loop

Primary system for fire zone 1

AL_Com+

AL_Com

AutroKeeper BN-180

Loop driver module BSD-310

Fire alarm control panel
BS-420

Main technical room (Class A) in fire zone 1

11.3.1 Connections – AutroKeeper BN-180

Pin number	Description	
1	TTL COM	Debug port (internal use only)
2	TTL IN	Debug port (internal use only)
3	TTL OUT	Debug port (internal use only)
4	GND	
5	24V IN	Power In (Green LED)
6	0V IN	Power In
7	FAILSAFE COM	FailSafe Rel. (future)
8	FAILSAFE NO	FailSafe Rel. (future)
9	OUTLOOP +	To "first" Loop Unit
10	OUTLOOP -	--"--
11	INLOOP +	To "last" Loop Unit
12	INLOOP -	--"--
13	OUT +	To Loop Driver's IN +
14	OUT -	To Loop Driver's IN -
15	IN +	To Loop Driver's OUT+
16	IN -	To Loop Driver's OUT -
DIN rail conn. 1	24V IN	Power In
DIN rail conn. 2	0V IN	Power In
DIN rail conn. 3	Not used	
DIN rail conn. 4	Not used	
DIN rail conn. 5	GND	

11.3.2 Switch Settings – AutroKeeper BN-180

Dipswitch 1 determines whether the BN-180 in question is Primary or Secondary.

Dip-switch	Description (ON/OFF)
1	"Ascription" (use one of each): Off – Primary / On – Secondary
2	Off – Normal operation (Seen as AL_Com unit) On – Force Majeur (If Ascription Primary: Active, Secondary: Standby – automatic actions disabled)
3	When switched to On or Off the unit will be reset within 5 seconds

12. Cable Specifications

For the complete information on cable specifications, refer to Cable Specifications, part number 116-P-ASIFGCABLESPEC/CGB (file name: asafeifgcable_cgb).

13. Service and Maintenance

The AutroSafe Interactive Fire Alarm System provides a Log Menu, which records all system events, i.e. fire alarms, prealarms, faults, enablements/disablements, user operations and tests.
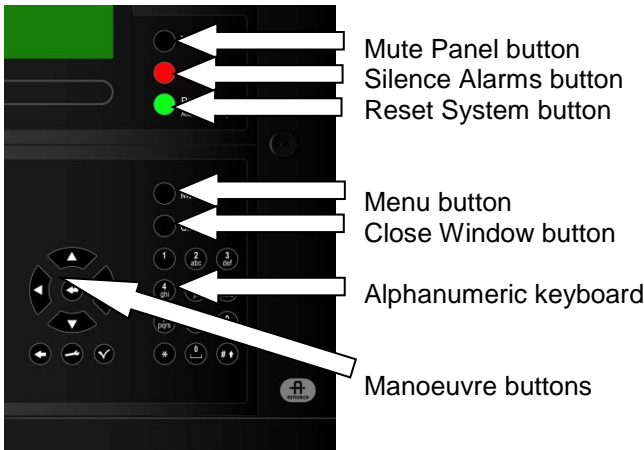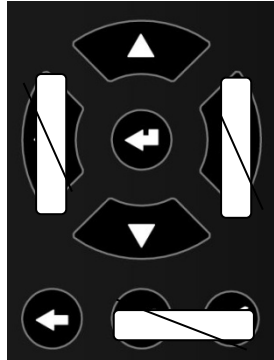
It is the system owner's or authorized personnel's duty to register all events in a Control Journal.

13.1.1 Monthly Maintenance

Step	Description	√
1	Look through the log journal to find any possible irregularities.	
2	Make sure that possible changes in the building structure or storage environment have not affected the detectors' capability to detect a potential fire.	
3	Make sure that the detectors are not covered with paint or contaminated with dust or dirt. Check the log for contaminated detectors (Service/Log menu).	
4	Perform a visual inspection of the panels/cabinet.	
5	Perform a simple test of display and panel functions	
6	Test the sounders.	

13.1.2 Annual Service and Maintenance

The whole system (control panel, detectors, control functions) should be inspected annually. An annual service inspection comprises the following:

Step	Description	√
1	To test the panel indicator lights and internal buzzer, press and hold the Reset button for at least 5 seconds. All indicators are lit and the buzzer is turned on. The test will automatically stop. The lamp test can be performed in access level 1 (no use of key).	
2	Test all operating keys by pressing each key (refer also to Operator's Handbook): All buttons will give a short "Beep" when pressed, except Mute button, Menu button and Reset System button (plus the ones that are not supported, see below). Mute Panel button Silence Alarms button Reset System button Menu button Close Window button Alphanumeric keyboard Manoeuvre buttons Note that the left/right arrow buttons and the two buttons in the lowermost right hand corner (indicated with a white line) are not yet supported:	
3	Perform a visual and functional inspection of manual call-points and automatic detectors. Check the log for contaminated detectors (Service/Log menu).	
4	Disable any alarm transference to the Fire Alarm Routing Equipment -FARE output.	
5	Activate the alarm system. Test all sounders by activating an alarm from a corresponding manual call-point.	
6	Test all control functions.	
7	Activate alarms from at least one detector/manual call-point in each zone and a check that all respective outputs are activated.	
8	Test the action of any auxiliary operating functions (disabling, cancelling and resetting buttons).	
9	Check the alarm transference outputs by connecting from outgoing outputs (potential free relay and 24V output) activated by alarm in a zone.	
10	Check the fault warning function from detector zones by removing a detector in each zone.	

Step	Description	√
	Activate a fault (remove battery fuse) and observe: - the *Fault* indicator starts to blink - a fault warning is displayed - the internal buzzer is turned ON - the Fault Warning Routing Equipment (FWRE) output is activated (if any)	
11	Verify all *conditions*, i.e.: - Fire Alarm condition - Fire Warning condition - Fault Warning condition - Disablement condition - Test condition	
12	On completion of checks, ensure that only the green "Power" indicator is ON when the panel is in its idle state (normal operation).	
13	Enable alarm transference to the Fire Alarm Routing Equipment -FARE output.	

The battery should be changed every 4 years. If a fault arises on the panel that cannot be rectified, contact your nearest Autronica Fire and Security office for qualified assistance.

13.1.3 SIL2 Approved Systems

For SIL2 approved systems, service and maintenance shall be carried out according to the proof test intervals stated on the AutroSafe 4 Oil&Gas SIL2 (G2) certificate with registration number 44 207 11 555929-001.

14. Appendix A - Controller Board BSA−400

14.1 Circuit Board Layout

Label on cover

To main Terminal Block. See manual for connections

E-2878

J2	Ethernet	2
J1	Ethernet	1

S6	1	2	3
RS-422	OFF	OFF	OFF
RS-485	ON	ON	ON

Serial Console Port

S7	1	2
RS-422 Termination	ON	ON
RS-485 Termination	ON	OFF

Push Button Reset

S3	1	2
AFB EARTH Fault Off	OFF	OFF
AFB EARTH Fault On	ON	ON

J5 | To BSL-310

USB OTG

2 x USB Host

J18	0V 2 IN	4
	24V 2 IN	3
	0V 1 IN	2
	24V 1 IN	1

LEDS: 5V Fault, 3V3 Fault, AFB RX, Syst. Fault, Power, AFB TX, MMC Act, Ser. Port Act, Heart Beat

Panel ID

Panel Type

LCD Backlight

Network ID

To Front Panel | To LCD

14.2 Location inside Fire Alarm Control Panel BS-420
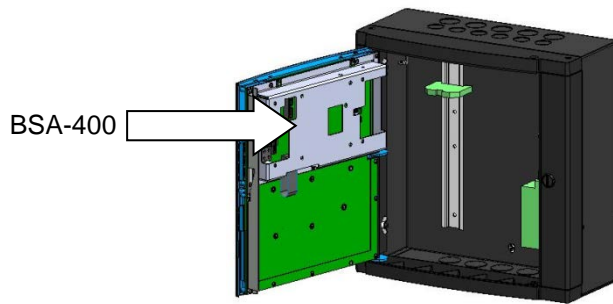
BSA-400

14.3 Description

The Controller Board BSA-400 is the main CPU which controls all system functionality.

The system offers the following communication ports:
- 2 Ethernet ports for AutroNet and/or AutroCom, plus downloading of configuration data and system software
- 1 AL_Com+ interface (loop communication)
- 1 RS-232, RS-422 or RS-485 serial port for communication with third party equipment (AutroCom /ESPA4.4.4/MODBUS/VDR)
- 1 AutroFieldBus (AFB) interface
- 2 USB host ports for the connection of a printer and for the connection of a memory stick for downloading configuration data and system software
- Interface for the connection of display and front board
- FailSafe relay output

14.4 Internal LED Indicators

BSA-400
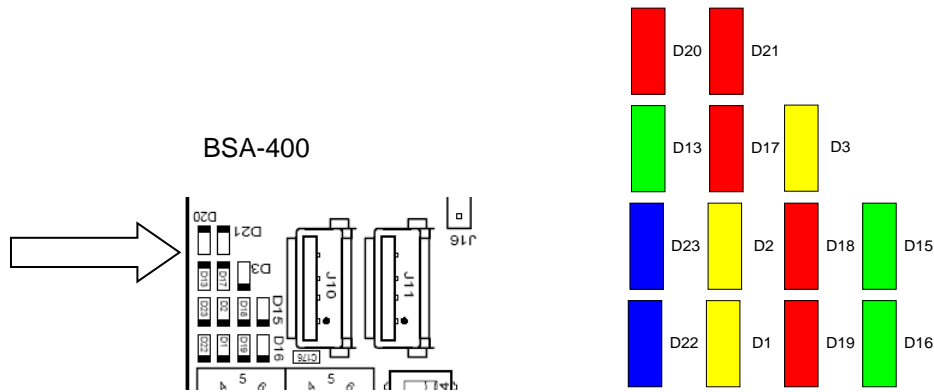
LED	Colour	Function
D1	Yellow	SD-Card activity indicator
D2	Yellow	USB Boot Time Rescue upgrade in progress
D3	Yellow	System fault LED, ON when system is locked in system fault
D13	Green	AutroFieldBus TX
D15	Green	NA
D16	Green	Power indicator
D17	Red	AutroFieldBus RX
D18	Red	NA
D19	Red	Serial Port activity indicator
D20	Red	System reset 5V
D21	Red	System reset 3,3V
D22	Blue	System heart beat
D23	Blue	NA

14.5 Power Input Connector J18 (screw terminal)

BSA-400

J18
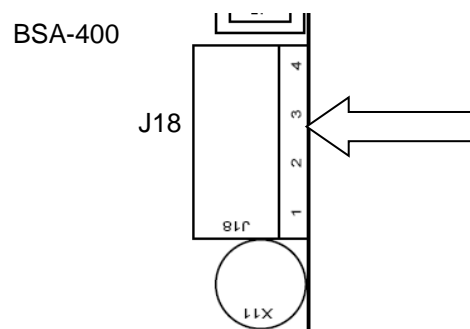
Connector J18 on Controller Board BSA-400	Description		Connection to Power Board BSF-400
J18.1	+24V DC In 1		A1 +
J18.2	0V In 1	Interconnection	A1 0V
J18.3	+24V DC In 2		A2 +
J18.4	0V In 2		A2 0V

14.6 Two-stage Push Button Reset (S5)

BSA-400
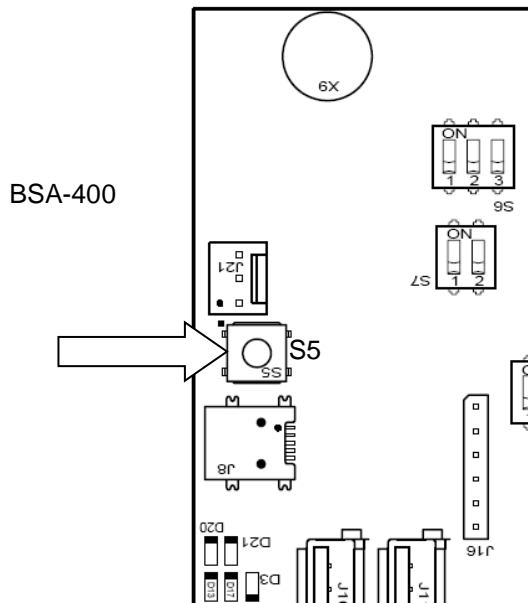
- To shut down the system in a controlled manner, push less than 1 second.
- To perform a hard reset without needing to do a controlled shutdown (the system is already in system fault condition), push and hold down the reset button S5 (approximately 10 seconds) until the red LED indicators D20 and D21 are lit for a short moment and you hear a click from the relay.

14.7 USB Ports (J10, J11)

BSA-400
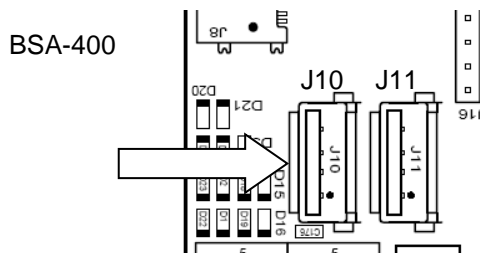
There are 2 standard USB full speed (480Mbit) host ports; type A connector. The ports are to be used for connection of an optional printer or a memory stick .

Each USB host port is limited to a maximum of 100mA load.

14.8 Multifunction Serial Port Connector J3 - AutroFieldBus and Fault Relay

A ribbon cable is connected between the Multifunction Serial Port Connector J3 and the main terminal block L1(mounted on the DIN rail inside the cabinet).

BSA-400
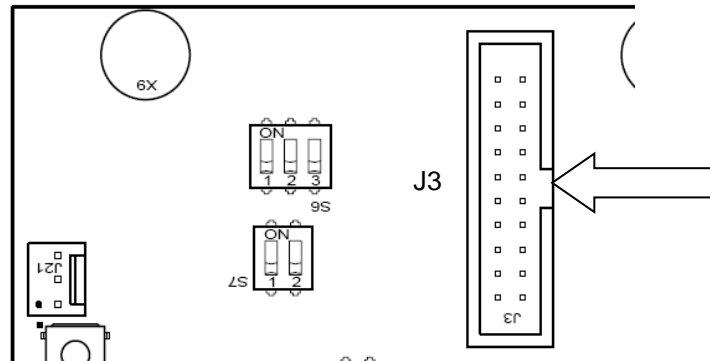
Connector J3 on Controller Board BSA-400	Description	Connections to terminal block (L1)
J3.1	GND	L1.1
J3.2	GND	L1.2
J3.3	AutroFieldBus B	L1.3
J3.4	Multifunction Serial Port RS-422/RS485 A+	L1.4
J3.5	AutroFieldBus B'	L1.5
J3.6	Multifunction Serial Port RS-422/RS485 B-	L1.6
J3.7	AutroFieldBus B Reference	L1.7
J3.8	Multifunction Serial Port RS-422 X+	L1.8
J3.9	AutroFieldBus A	L1.9
J3.10	Multifunction Serial Port RS-422 Z-	L1.10
J3.11	AutroFieldBus A'	L1.11
J3.12	Multifunction Serial Port RS-232 TX	L1.12
J3.13	AutroFieldBus A Reference	L1.13
J3. 14	Multifunction Serial Port RS-232 RX	L1.14
J3.15	GND	L1.15
J3.16	Multifunction Serial Port Reference	L1.16
J3.17	Fault Relay Normal Open	L1.17
J3.18	GND	L1.18
J3.19	Fault Relay Normal Closed	L1.19
J3.20	Fault Relay Common	L1.20

The built-in AutroFieldBus Master driver serves as a communication protocol between the AutroSafe panel, the BSD-340 PowerLoop drivers and BSD-321 protocol converters, plus Power Board BSF-400. It provides a redundant field bus system with a ring loop topology.

The AutroSafe panels have one AutroFieldBus connected, and each AutroFieldBus can host up to 31 bus units.

The AutroFieldBus has short-circuit detection/isolation technology which ensures that only one AutroFieldBus bus unit will be lost in case of internal failure (short-circuit).

The ring loop topology ensures that no detectors/field units will be lost due to a single break or short circuit of the AutroFieldBus cable.

The AutroFieldBus cable is normally 2-wire twisted pair category 5 copper cables, however, fibre optic cable is possible by use of separate signal converters. The AutroFieldBus uses the same guidelines as AUTROLON (AutroSafe version 3.8 and earlier), in terms of cable lengths, fibre modem and boosters.

14.9 AutroFieldBus Connections

14.9.1 Ribbon Cable Connector BSA-400 to Terminal Block L1

Shielded cable required.

Terminal on BSA-400	Function	Terminal Block List L1
J3.9	AutroFieldBus A	L1.9
J3.11	AutroFieldBus A'	L1.11
J3.13	AutroFieldBus CT A	L1.13
J3.3	AutroFieldBus B	L1.3
J3.5	AutroFieldBus B'	L1.5
J3.7	AutroFieldBus CT B	L1,7

BSA-400
Ribbon cable connector   Terminal block L1

Cable XGE-1/20-48
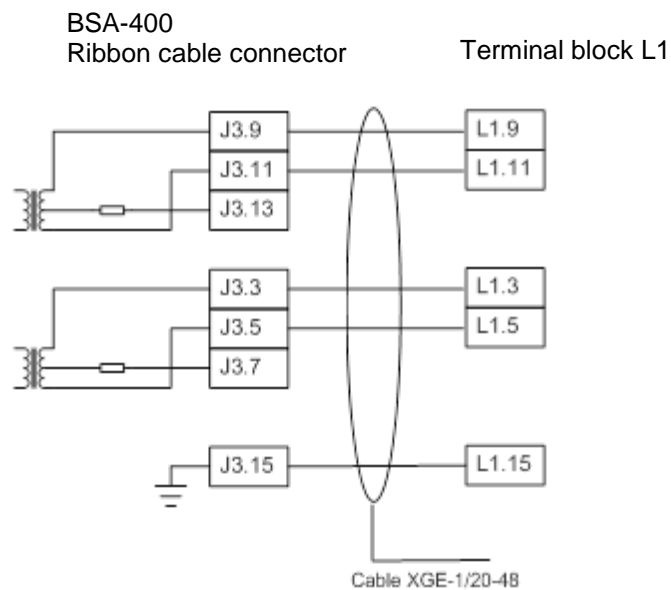
14.10 Multifunction Serial Port Dipswitch Settings – Switch S6 (RS-232, RS-422, RS-485)

BSA-400
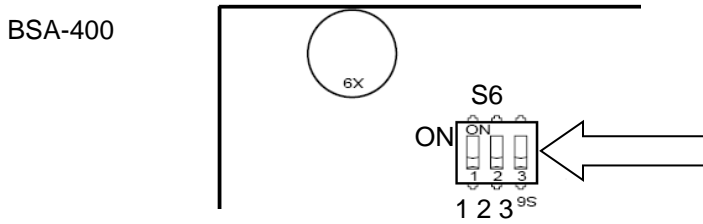
Switch	RS-232	RS-422	RS-485
S6.1	Not applicable	OFF	ON
S6.2	Not applicable	OFF	ON
S6.3	Not applicable	OFF: Full duplex, two-way simultaneous communication. ON: Half duplex	ON

14.11 Multifunction Serial Port Dipswitch Settings – Switch S7

BSA-400

Switch	RS-232	RS-422	RS-485
S7.1	Not applicable	ON	ON
S7.2	Not applicable	ON

RS-422 requires two pair of cables; one for RX and one for TX.

One switch is used for the termination of the RX line, the other switch is used for the termination of the TX line. Both switches must be ON. | OFF

RS-485 requires only one pair of cables where TX/RX are common. Switch S7.1 is used for the termination. S7.2 must be OFF. |

14.12 RS-485 Connections

14.12.1 Ribbon Cable Connector BSA-400 to Terminal Block L1

Ribbon cable connector				Terminal Block L1	
RS-422/RS485	A+	J3.4		L1.4	A+
RS-422/RS485	B-	J3.6		L1.6	B-
Serial Reference	0V	J3.16		L1.16	0V

Cable XGE-1/20-48
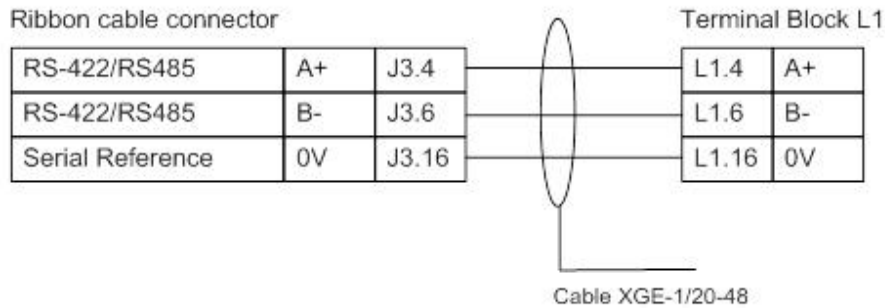
14.12.2 Switch Setting – Switch S6 and S7

Switch	RS-485
S6.1	ON
S6.2	ON
S6.3	ON
S7.1	ON
S7.2	OFF

14.13 RS-422 Connections

14.13.1 Ribbon Cable Connector BSA-400 to Terminal Block L1

Ribbon cable connector				Terminal Block L1	
RS-422/1	A+	J3.4		L1.4	X+
RS-422	B-	J3.6		L1.6	Z-
RS-422	X+	J3.8		L1.8	A+
RS-422	Z-	J3.10		L1.10	B-
Serial Reference	0V	J3.16		L1.16	0V

Cable XGE-1/20-48
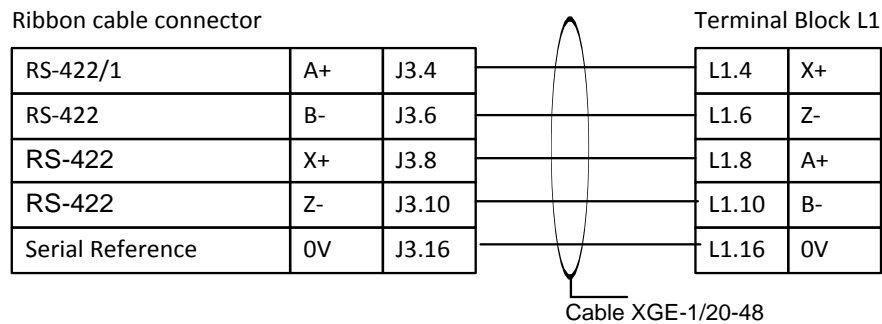
14.13.2 Switch Setting – Switch S6 and S7

Switch	RS-422
S6.1	OFF
S6.2	OFF
S6.3	OFF
S7.1	ON
S7.2	ON

14.13.3 Schematic of port equivalent:
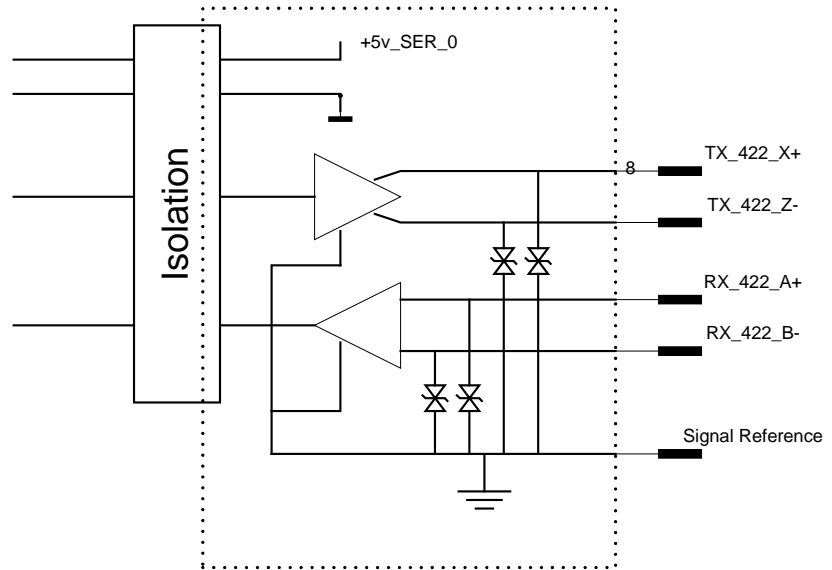
14.14 RS-232 Connections

14.14.1 Ribbon Cable Connector BSA-400 to Terminal Block L1
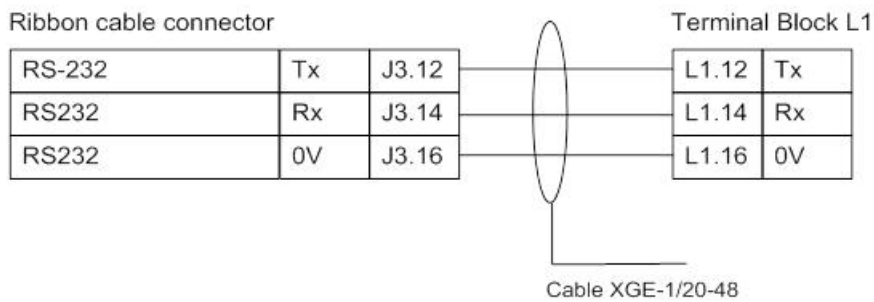
14.14.2 Switch Setting – Switch S6 and S7

Switch	RS-232
S6.1	Not applicable
S6.2	Not applicable
S6.3	Not applicable
S7.1	Not applicable
S7.2	Not applicable

14.15 Serial Debug Connector J21

A standard AutroSafe programming cable XJA-029 is to be connected to this connector. The interface uses RS-232 115,2kbaud 8N1.
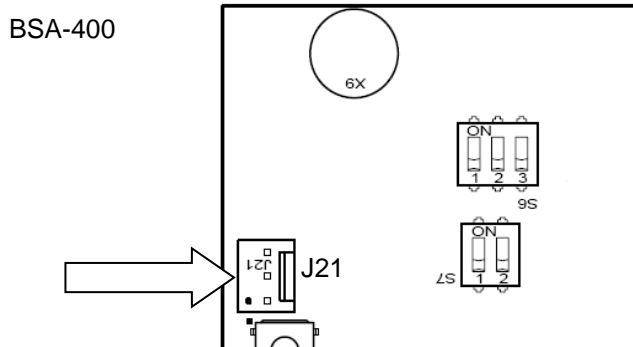
Connector	Description	Communication Parameters
J21.1	0V reference	
J21.2	RX	115,2kbaud 8 data bit, none parity, 1 stop bit
J21.3	TX	

14.16 AL_Com+ Connector J5

Connected to Communication Module BSL-310.

Cable part number: XGE-1/10-50
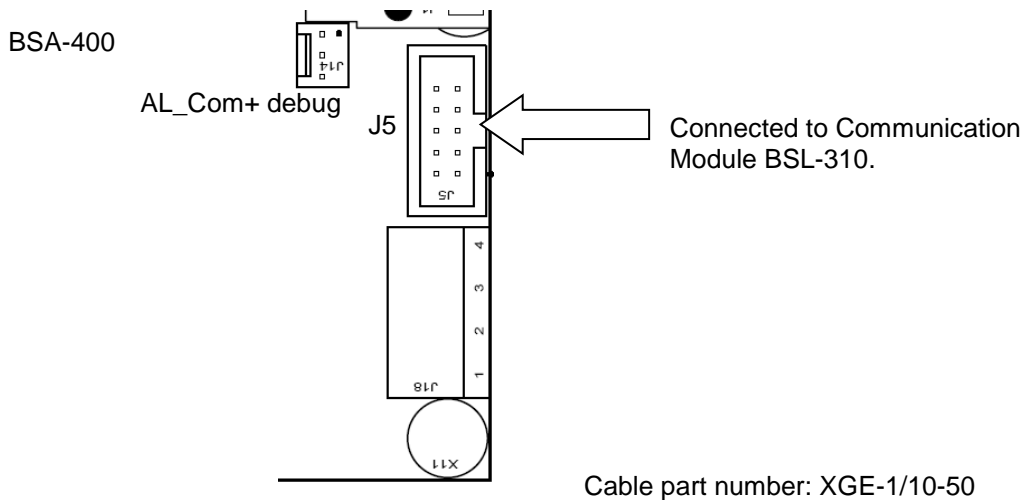
Connector	Description
J5.1	AL_Com+ CTS
J5.2	0VIN
J5.3	AL_Com+ RXD
J5.4	0VIN
J5.5	Not Connected
J5.6	0VIN
J5.7	AL_Com+ TXD
J5.8	0VIN
J5.9	AL_Com+ RTS
J5.10	0VIN

14.17 LCD Backlight Connector J17
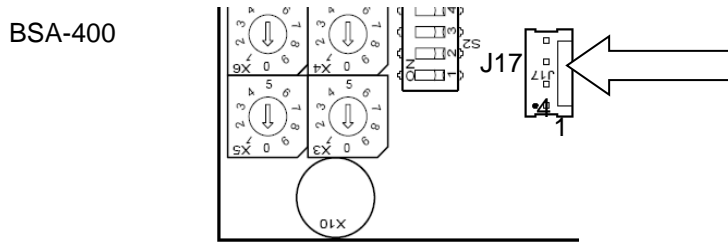
BSA-400

Connector	Description
J17.1	Backlight LED + 5V DC
J17.2	Backlight LED -
J17.3	Backlight LED -
J17.4	Backlight LED – 0V

14.18 Ethernet Ports (RJ-45 Connectors)
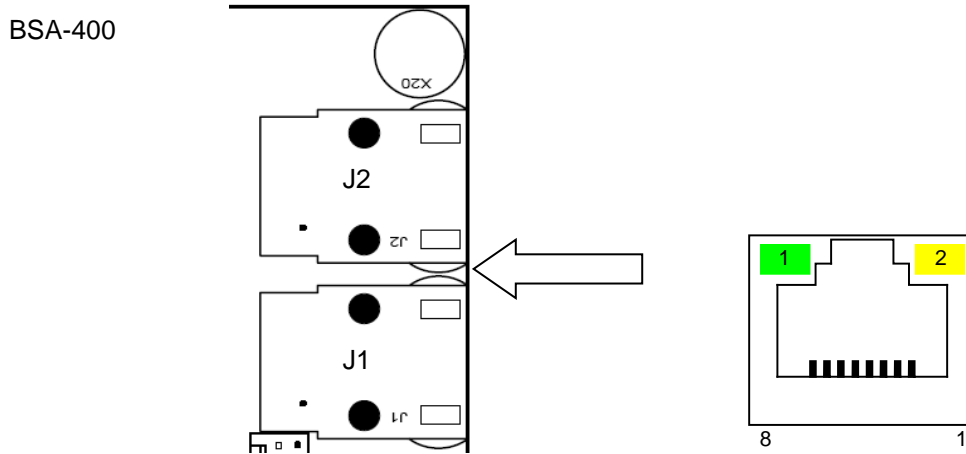
BSA-400

The BSA-400 board provides two separate 10/100Mbit Ethernet ports. Each connector has 2 built-in status LEDs; Link and Act/Speed. The connector is an RJ-45 modular jack, suitable for shielded cable CAT5 which allows cable lengths up to 100m.

Connector	Connector	Description
J1.1	J2.1	TX+, Transmit Data+
J1.2	J2.2	TX-, Transmit Data-
J1.3	J2.3	RX+, Transmit Data+
J1.4	J2.4	N.C.
J1.5	J2.5	N.C.
J1.6	J2.6	RX-, Transmit Data-
J1.7	J2.7	N.C.
J1.8	J2.8	N.C.

LED 1	Activity LED
LED 2	If ON, 100MBit/s, if OFF, 10MBit/s

14.18.1 Ethernet Straight Through Cable
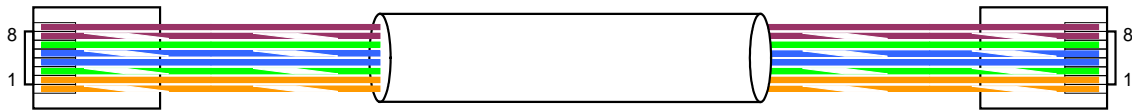
Name	Pin		Cable Color	Pin	Name
TX+	1		White/Orange	1	TX+
TX-	2		Orange	2	TX-
RX+	3		White/Green	3	RX+
	4		Blue	4	
	5		White/Blue	5	
RX-	6		Green	6	RX-
	7		White/Brown	7	
	8		Brown	8	

14.19 Fault messages Power Board BSF-400

Fault category: Power		
Fault message	**Cause**	**Remedy**
BSF-400 – Power supply fault General Fault LED blinking	Power supply OK, but power supply cable(s) unplugged	Re-insert power supply cables
	Power supply malfunction	Replace Mean Well or Power Box PSU unit.
BSF-400 – Mains fault Mains Fault LED blinking General Fault LED blinking	Mains is disconnected, loss of power from mains source	Re-insert mains plug, check mains power source
	Mean Well PSU control cable is disconnected/broken	Re-insert or replace control cable.
BSF-400 – Battery not connected Battery Fault LED blinking General Fault LED blinking	Battery is disconnected	Re-connect battery
	Battery is short circuited	Remove short circuit
BSF-400 – Battery fuse blown Fuse Fault LED blinking General Fault LED blinking	Battery fuse is blown	Replace with appropriate fuse
BSF-400 – Battery temperature sensor open circuit Battery Fault LED blinking General Fault LED blinking	Battery temperature sensor cable is disconnected or broken	Replace battery temperature sensor cable
BSF-400 – Battery temperature sensor short circuit Battery Fault LED blinking General Fault LED blinking	Battery temperature sensor cable is short circuited	Remove short circuit
BSF-400 Output [A1/A2/B1/B2/C1/C2] electronic fuse blown Fuse Fault LED blinking General Fault LED blinking	A short circuit or very high current draw has occurred on power output.	Warning: BSF-400 will try to re-power automatically. Remove corresponding fuse before working with faulty external equipment. Remove short circuit and press reset on AutroSafe panel to reset electronic fuse.

Fault category: Power		
Fault message	**Cause**	**Remedy**
BSF-400 Output [A1/A2/B1/B2/C1/C2] fuse blown Fuse Fault LED blinking General Fault LED blinking	The fuse is blown.	Replace with appropriate fuse
BSF-400 Output [A1/A2/B1/B2/C1/C2] voltage to low. General Fault LED blinking	This may occur when running on battery only and battery voltage is below 18V.	Insert mains to charge batteries.
	This warning may occur when a fuse is removed from an output with no load.	Accept fault in AutroSafe.
BSF-400 Battery Relay Fault	This warning may occur during start-up if a battery is not connected	Connect battery, or put dip switch 5 to OFF position if no battery is to be used
	The relay fault warning may occure if there is a hardware fault.	Replace BSF-400 board.
BSF-400 Battery voltage to low	This message may occur under start-up when battery voltage is to low, i.e. charging current is >1100mA.	Message will clear when charge current drops below 400mA.

15. Appendix B - Power Supply

15.1 Power Cabinet and Power Units

AutroSafe 4 provides the following power cabinet and power units:
- Power Cabinet BP-405
- Power Unit BPS-405
- Power Unit BPS-410

15.1.1 Power Cabinet BP-405

The Power Cabinet BP-405 contains the following:
- 24V/5A power supply (BPS-405, Meanwell Power Supply)
- Power Board BSF-400, including:
  - AutroFieldBus interface
  - 115VAC /230VAC input
  - 6 outputs 24VDC (max. 2A each)
  - 1 fault relay output
- 2x12V, 18Ah batteries

For detailed information, refer to this chapter (Power Supply) and datasheet.

15.1.2 Power Unit BPS-405

The Power Unit BPS-405 contains the following:
- 24V/5A power supply
- Power Board BSF-400, including:
  - AutroFieldBus interface
  - 115VAC /230VAC input
  - 6 outputs 24VDC (max. 2A each)
  - 1 fault relay output

For detailed information, refer to this chapter (Power Supply) and datasheet.

15.1.3 Power Unit BPS-410

Note:
The BPS-410 Power Unit 24VDC/10A is delivered as two separate part numbers:
- 116-BPS-410 for 230VAC
- 116-BPS-410/115 for 115VAC

The Power Unit BPS-410 contains the following:
- 24V/10A power supply
- Power Board BSF-400, including:
  - AutroFieldBus interface
  - 115VAC or 230VAC input
  - 6 outputs 24VDC (max. 2A each)
  - 1 fault relay output

For detailed information, refer to this chapter (Power Supply) and datasheet.

15.2 Circuit Board Layout BSF-400
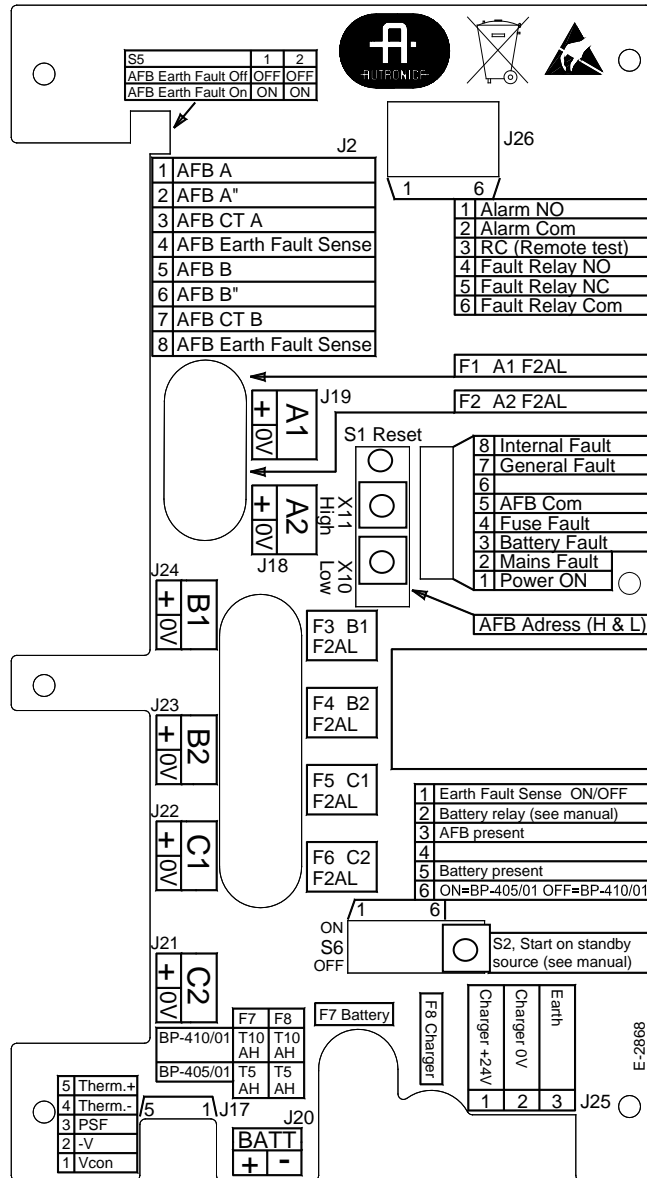
15.3 Description

BSF-400 is a power monitor and controller board providing a communication interface, AutroFieldBus. The board has also the ability to operate stand alone with no communication. The fault relay is energized as standard with its own watchdog.

The power board provides power to AutroSafe, AutroSafe's existing I/O module stacks, battery monitoring and charging, plus 24 voltage contacts for other external equipment.

- 2 x 24V outputs of 2A to AutroSafe panel
- 2 x 24V outputs of 2A to I/O stack
- 2 x 24V outputs of 2A to third-party equipment
- 1 input for battery
- 1 input for battery charger
- Communication
- Power control for battery
- Control signals for battery charger
- All internal voltage levels are monitored
- Temperature sensor for compensation of charger voltage

BSF-400 has short circuit protection on all outputs such that a short circuit will not affect other outputs. Batteries that are connected will be charged with temperature compensation to ensure long battery life regardless of temperature (within the specified operating temperature range).

All outputs on terminations A, B and C are specified to a maximum current of 2A. There are no minimum power ratings for the outputs. The maximum power that may be used from each output is 2A and there is a current limiter implemented at 7A.

15.4 Power Block Diagram – Example
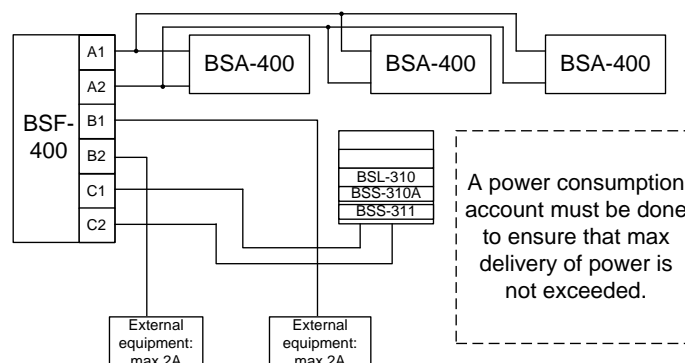
15.5 Batteries

The recommended cable parameter for BSF-400 is minimum 1,5mm^2 / 15,4 AWG.

There is no minimum requirement for drawing power.

15.5.1 Power Unit BPS-405

The inputs for the battery and the charger are specified to handle up to 10A. The fuses, F7 battery and F8 Charger, shall have 5A fuses.

Batteries that are to be used with BSF-400 are Fiamm batteries with the maximum size of 18Ah. The minimum size of batteries if batteries are connected is 7,2Ah.

The maximum current that may be drawn from the batteries when the primary power source is disconnected is 5A for BPS-405.

There is no minimum requirement for drawing power. The maximum power that may be drawn from BPS-405 is 3A.

I max A	Maximum battery current output when mains disconnected	Fuse F7: Charger, Battery
3A	5A	T5AH

The maximum internal resistance for a battery connected to a BSF-400 is 0,8Ω, any higher resistance than this will be detected as a fault in the battery by BSF-400.

NOTE:
If power to the system is supplied exclusively from the batteries (in case of a power supply failure), and the voltage is below 19V, the Power Board BSF-400 will perform a controlled shutdown (i.e. the power is switched OFF).

15.5.2 Power Unit BPS-410

The inputs for the battery and the charger are specified to handle up to 10A. The fuses, F7 battery and F8 Charger, shall have 10A fuses.

Batteries that are to be used with BSF-400 are Fiamm batteries with the maximum size of 18Ah. The minimum size of batteries is 12Ah.

The maximum current that may be drawn from the batteries when the primary power source is disconnected is 10A for BPS-410.

The maximum power that may be drawn from BPS-410 is 8A.

I max A	Maximum battery current output when mains disconnected	Fuse F7: Charger, Battery
8A	10A	T10AH

The maximum internal resistance for a battery connected to a BSF-400 is 0,6Ω, any higher resistance than this will be detected as a fault in the battery by BSF-400.

NOTE:
If power to the system is supplied exclusively from the batteries (in case of a power supply failure), and the voltage is below 19V, the Power Board BSF-400 will perform a controlled shutdown (i.e. the power is switched OFF).

15.6 Battery Charging

The charging voltage is temperature controlled, so optimal charge for each temperature is maintained.

Charge current for the BPS-405 is also controlled, so that the charging voltage will decrease when the charge current reaches 2A.

A "Battery voltage too low"-warning will display on AutroSafe systems connected to the BPS-405 or BPS-410 via AutroFieldBus. The message will clear when charge current drops below 400mA.

Attention: The battery temperature sensor must be placed on the batteries. If the sensor is placed in warmer or colder places, the charging voltage will be wrong, and lower battery capacity and/or shorter battery life may be expected.

The charging voltage at 25°C is 27, 2 V DC.

Note that when the BSF-400 board is turned OFF and batteries are connected to the battery termination, the leak current of the batteries is 6mA.

15.7 Button S2 – Start on S2 on Standby Source

By pressing button S2 one second, the system can be started (without mains source) from the battery when the battery voltage is >20V DC.

Note that, if the battery voltage is less than 20V DC, the button will have no affect (hardware controlled).

Troubleshooting:
In some cases the voltage can be slightly above 20V DC and drop rapidly to below 20V DC. The relay will then tend to chatter. In this case, it is recommended that the system is not started until the battery is fully charged.
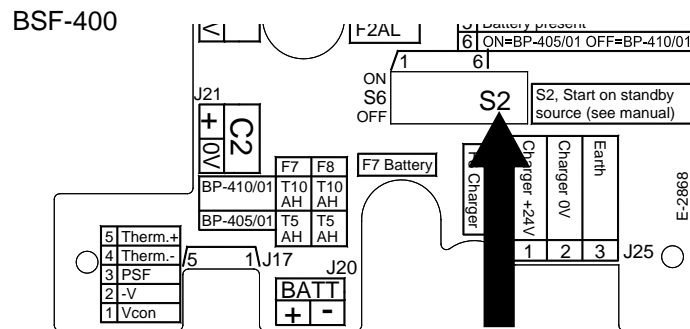
BSF-400

S2:
Start on
standby source

15.8 Configuration Settings

The BSF-400 board may be used in several different configurations.
The board is configured by means of two switches:

- Dipswitch S5 and S6 (refer to dipswitch tables, 0)
- Rotary switches X10 and X11 - AutroFieldBus address switch.
  Each Power Board is given a unique address.

If for any reason the settings on dipswitch S6, X10 or X11 have been
changed, the BSF-400 must be restarted by pressing the reset button
S1 for this change in order to be taken into account.

The power has two modes of user interaction; standalone (S6.3 OFF)
or with communication to the AutroSafe system.
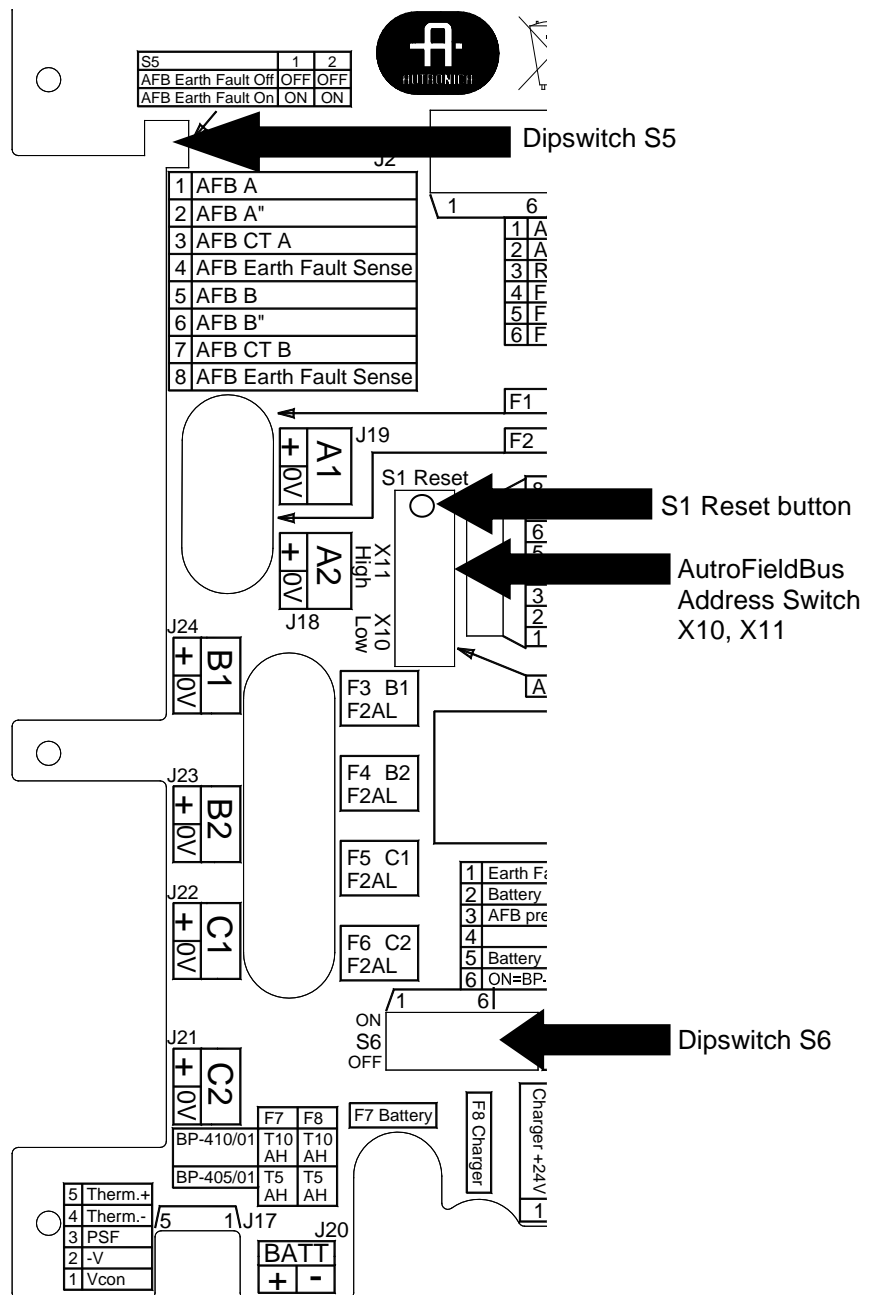
15.9 Dipswitch table – S5 and S6

Dipswitch table – S5

S5.1	S5.2	Function
OFF	OFF	AutroFieldBus earth fault OFF
ON	ON	AutroFieldBus earth fault ON

Dipswitch table – S6

Switch	Name	Comment
S6.1	Earth Fault	ON: Earth fault monitoring activated OFF: Earth fault monitoring deactivated
S6.2	--	NA
S6.3	AutroFieldBus	ON: AutroFieldBus connected OFF: AutroFieldBus not connected
S6.4	Not used	NA
S6.5	Battery	ON: Battery connected OFF: Battery not connected
S6.6	Power Unit Type	ON: BPS-405 OFF: BPS-410

15.10 Connectors

Connector	Description	BPS-405 / BPS-410
J25	Power Supply	To BSP-405 (Mean Well Power Supply)
J20	Battery connector	To Battery 27,3VDC charging
J17	Temp. sensor/Mean Well Control	Applies to BPS-405 only. Temperature sensor (close to battery) and Mean Well PSU (1-3) from power, (4-5) temp. sensor
J26 1-3	Powernet control	Applies to BPS-410 only. Control wires for power supply.
J26 4-6	Fault Relay	Applies to both BPS-405 and BPS-410. Fault Relay (NO, NC, com) Fault output.
J19	Output A1	24V/2A (BSA-400 V_{in}1 +/0V)
J18	Output A2	24V/2A (BSA-400 V_{in}2 +/0V)
J24	Output B1	24V/2A, general power output
J23	Output B2	24V/2A, general power output
J22	Output C1	24V/2A with interrupt at init
J21	Output C2	24V/2A with interrupt at init

The power outputs have different properties. They can all deliver 2A each (limited by total power available).

| Output	Description
Output A	These will always be ON. Will be turned OFF by a short- circuit only.
Output B	These are initially ON, but may be switched OFF/ON from AutroSafe.
Output C	These will be turned OFF during start-up of BSF-400 (initialization). May be switched OFF/ON from AutroSafe. Power to I/O modules.

15.11 Fault Relay Watchdog J26

The fault relay on the BSF-400 board has its own watchdog. If the CPU stops for any reason the watchdog will turn over the fault relay if it is not fed within 1 second.

If for any reason the BSF-400 restarts, it takes 5 seconds before the fault relay is in the correct position:

- J26.4 (normally open contact): closed contact when the unit is not supplied with power or there is a fault on the unit
- J26.5 (normally closed contact): closed when no faults exist
- J26.6 (common): common for fault relay
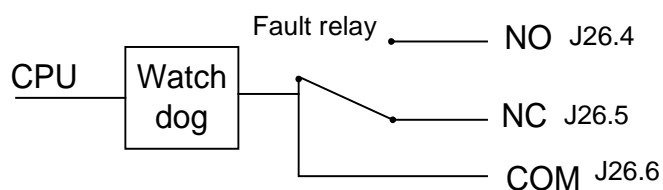
Note that the fault relay will not be turned over for communication faults on the AutroFieldBus.

The green and red LED beneath the cover are indicators for AFB-RX and – TX. Hearbeat is indicated when these LEDs are blinking simultaneously. Rapid blinking indicates heavy traffic on the AutroFieldBus. If the red LED is weak and the green one is not lit, there is no communication between the BSF-400 board and the AutroFieldBus.

LED number / Colour / Schematic reference	Mechanic name (E-2868)	Description
1. Green	Power ON	This LED signifies that the BSF-400 has power and will be OFF for 20 ms every second.
2. Yellow	Mains Fault	Will blink if power supply lacks 230V AC connection.
3. Yellow	Battery Fault	Blinking LED; for all battery faults, except when a battery fuse is blown
4. Yellow	Fuse Fault	Blinking LED for all fuse faults and also for all electronic fuse faults.
5. Yellow	AutroFieldBus Com	The LED is lit shortly if AutroFieldBus communication is received or transmitted.
6. Yellow		For future use.
7. Red	General Fault	Blinking LED if there are one or more faults in the power supply system.
8. Yellow	Internal Fault	Blinking LED if there exist one or more internal faults on the BSF-400. This includes temperature on the BSF-400 out of bounds. Internal faults are mostly PCB errors. This LED blinks in a much faster cycle than the others.

All blinking LEDs, except where otherwise stated, will blink with 0,5 seconds ON and 0,5 seconds OFF.

15.12 Battery Resistance Measurement

Every fourth hour, battery impedance measuring is conducted.

This is conducted by lowering the PSU voltage so that all loads are powered from the batteries for a period of 60 seconds, then a built in resistor is turned ON for 2 seconds. BPS-405/BPS-410 will then measure the voltage increase between the resistor ON and OFF and thus calculate the battery resistance. This measurement includes the wires to and from the battery.

The battery high resistance fault is given when the total resistance of the battery and battery cables is:

Type	Resistance
Power Unit BPS-405	0.8Ω
Power Unit BPS-410	0.6Ω

- If such a fault is given, check the cable resistance or replace the batteries.

15.13 Electronic fuses

15.13.1 Power outputs

Power outputs A1, A2, B1, B2, C1 and C2 are protected by both electronic and regular fuses. The electronic fuses will trip if a current between 3.5A and 7A is drawn. The electronic fuse will turn OFF power within approx. 10ms of a short circuit. The BSF-400 will try to turn ON power 3 times with ~50s interval between each try.

If an external fault is not resolved, BSF-400 will not try to re-power more than 3 times. A reset on an AutroSafe panel or pushing reset button S1 will force the BSF-400 to retry.

IMPORTANT:
To be safe, remove regular fuse before troubleshooting external faulty equipment.

15.13.2 Battery Input

The battery input is protected by an electronic short-circuit detector and a regular fuse. If a short circuit is detected, the battery relay will turn OFF within approx 50ms. The AutroSafe AutroFieldBus system will then report "Battery not connected".

15.14 Part of an AutroFieldBus Network

As a part of an AutroFieldBus network, the power module is configured before start-up using dipswitches, some data, for example, "Low voltage"-warning is given from an AutroSafe configuration via AutroFieldBus.

Diagnostic outputs are given onboard with LEDs and alarm relay, and on AutroSafe panels with audible alarms and display messages.

The LEDs and fault relay will not indicate any failure before the AutroSafe has AutroFieldBus connection and the AutroSafe system has been initialized.

15.15 Power Unit BPS-405 / BPS-410 as Standalone

In the standalone system, user input is given during installation only, using dipswitches onboard. Set dipswitch S6.3 OFF to set the power supply in standalone mode.

Diagnostic outputs are given onboard with LEDs and fault relay.

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