

VARIABLE SPEED FAN CONTROL PANEL 30 kW - 37 kW

Technical information and operating instructions



Introduction:

The SE Controls Variable Speed Fan Control Panel is a modular design that is built and tested to provide a method of operating a single 400 V three-phase 50Hz duty/ standby fan arrangement

It must not be used for any other application or in conjunction with other manufacturers' products without prior consultation with SE Controls.

Installation of this equipment must only be carried out by competent and qualified persons.

This information pack must be retained for future reference by the client and be made available for reference by persons installing, servicing or modifying the panel.

Application:

The Variable Speed Fan Control Panel is a control system designed to operate 400 V/ 3PH/50Hz fans in a duty and standby configuration for smoke control in a powered extract system.

The control of environmental fans is also possible when specific additional packs are fitted.

Operating from a 400 V supply, the Variable Speed Fan Control Panel can control fans up to 30kW - 37kW (Standard Versions).

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Important Notices

- Do NOT allow abuse or mishandling of the device.
- Do NOT adjust or alter the device or its enclosure including labelling/markings.
- Do NOT use this controller for any other purpose other than that intended by the manufacturer.
- Do NOT allow installation of this equipment by persons not electrically qualified.
- Damage to the equipment due to failure to test the electrical integrity of external wiring will invalidate any warranties.
- Failure to install the device in accordance with the manufacturer's instructions will invalidate any warranties.
- Failure to follow current electrical regulations governing the installation of fixed equipment can lead to prosecution and may invalidate any warranties.
- Where a replacement is needed for consumable items e.g. fuses, they must be replaced with parts of equivalent manufacturing standard, compliance and rating.

SE Controls accepts no liability for failure to comply with the these statements or the installation and operation guidance in the following sections of this guide and reserves the right to invalidate the warranty of the controller

SE Controls reserves the right to introduce any modifications and improvements to the contents of this publication without the obligation of giving prior notice.

1. General Information

1.1. General Safety Information



Read and observe the information contained in these instructions.

Please keep these safety instructions for future reference and maintenance. Reliable operation and the prevention of damage and risks are only assured if the equipment is assembled carefully and the settings are carried out according to these instructions and to the operating instructions of the drives.

Please observe the exact terminal assignment, the minimum and maximum power ratings (see technical data) and the installation instructions.

1.2. Health and Safety



Electrical Safety: Warning 230 V ac or 400 V ac mains supply can cause death, serious injury or considerable material damage.

Competence: This equipment is designed for professional installation only by qualified, trained and safety conscious electricians or skilled and trained staff with considerable knowledge of electrical equipment installation. These instructions must be followed and retained for future reference.

Application: this equipment is designed exclusively for the purposes of controlling automatically smoke and natural ventilation equipment.



Personal Protective Equipment: It is recommended that suitable PPE is worn at all times during the installation and connection of products in accordance with a recommended safe system of work.



Handling and storage: This equipment is heavy. Care must be taken in transportation to the installation location and during fitting. The equipment must not be dropped, impacted, allowed to get wet or abused in any other way.

The panel should be kept in an upright position at all times and should not be stacked more than one high during shipping or storage.

Mishandling can result in serious damage to the housing and the components therein.



Risk of crushing: this equipment can automatically close windows and other appliances without warning. Risk of serious injury from crushing of hands or fingers.

1.3. Environment



Redundant electronic products are classified as hazardous waste under the WEEE regulations (Waste Electrical and Electronic Equipment). Electronic parts must be disposed by an authorised and licensed recycler. They must not be disposed of in household waste or 'general waste' skips.

If recycling facilities are not locally available, contact SE Controls who can arrange for recycling and disposal of old electronic products.

1.4. User Responsibilities

United Kingdom Only: BS 7346-8:2013 is a British Standard code of practice for the planning, design, installation, commissioning and maintenance of smoke control systems. Section 9 of the standard (Maintenance and Servicing) states that frequent inspection of the system should be undertaken by a named suitably-trained member of the premises management team.

Routine inspection of the system should be carried out in accordance with BS 9999:2008, Annex V.

For countries outside the United Kingdom:

Please check with the local fire authority in your area regarding smoke control legislation, different user responsibilities may apply.

Smoke control equipment should only be maintained by a competent person with specialist knowledge of smoke control systems and sufficient information regarding the system.

1.5. Maintenance



A smoke control system should be checked and serviced periodically in accordance to local smoke control legislation.

Smoke control systems have to be serviced and checked for defects at least once per year by an authorised, trained and competent person.

Within the UK a suitable service contract with SE Controls is recommended for this purpose.

The system must be protected against unintentional start-up!

After maintenance, modification or repair the system must be functionally retested.

Compatibility; this equipment should only be used to operate with motors and other products approved by SE Controls. No liability will be accepted and neither guarantee nor service is provided if unapproved products are used in conjunction with this equipment.

1.6. Installation and Connection



Installation should be carried out by an authorised, trained and competent electrician.

Ensure correct cable type is used throughout the installation. All low voltage cables are to be routed separately from mains voltage cables and other electrically noisy cables. Flexible cables must not be plastered over and freely suspended cables must be provided with strain relief. Cables must be installed in such a way that they cannot be sheared, twisted, pierced or otherwise damaged during installation or use. Junction boxes should be accessible for inspection and maintenance.

Do not attempt to install or alter the installation of the panel whilst connected to the power supply.

1.7. Fault Finding



In the unlikely event that a problem occurs with the control panel, users are urged to contact SE Controls for assistance.

There are no user repairable parts. Fault rectification must only be carried out by authorised and competent persons.

1.8. Contact Information

For sales, technical support and maintenance please contact:

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Tel: 01543 443060

E-mail: info@secontrols.com

Website: www.secontrols.com

2. Specification

2.1. Device Overview

Part number	30-37kW Fan Control Panel FCS0295XXXX
Dimensions	1600 x 1200 x 400 mm (H x W x D) – Standard Versions
Mass Approx.	140-210 kg ¹
Supply	400 V ac 50/60 Hz
Output	Up to 61.5A (37kW Inverter version) – Other versions to be advised
Cable Entries	Cable entries are via up to 35mm stranded or 50mm solid
IP Rating	IP55
Humidity Range	10% - 90% Non-Condensing
Storage	– 20°C to 50°C
Operating Temp	-5°C to 40°C (Internal climate controlled via internal cooling fan and/or enclosure heater)
Altitude	Up to 1000 metres above sea level without de-rating (2000 metres max)
Standard Finish	Powder Coated RAL 7035

¹Dependant on a variety of factors, including, but not limited to, system specification, inverter size, ACOPS requirements, additional NV fan control and panel location.

2.2. External Indication

Lamp	Detail
Standby	Lit when panel is healthy
Duty Fan Activated	Lit when duty fans are running
Standby Fan Activated	Lit when standby fans are running
Fault	Lit when the duty fan or the duty Inverter are faulty or an internal fault has occurred.

2.3. Fuses

Fuse	Rating	Function
F01	T 3 A	Service Socket
F02	T 6.3A	L3 Distribution
F03	T 6.3 A	PSU Distribution
F04	T 10A	Battery Backup
F05	T 1A	Fan Damper (TB15)
F06	T 1A	NV Fan Damper (TB14)
F07	T 1A	NV Fan (230v) (TB13)
F08-F23	T 0.2A	Pressure Sensors

All fuses must be T rated.

2.4. Miniature Circuit Breakers

MCB	Rating	Function
CB01	D 40A	Input Inverter 1
CB02	D 40A	Input Inverter 2
CB03	C 10A	PSU 1 + Cooling Fan
CB04	C 4A	PSU 2
CB05	D 40A	Output Inverter 1
CB06	D 40A	Output Inverter 2
CB07	D 16A	400 V NV Fan – if fitted

2.5. Recommended Cables Types

Cabling For	Minimum number of cores	Recommended Cable Type
Incoming Supply	4 + Earth	FP Plus
Incoming Earth Cable	3 + Earth	FP Plus
Duty and Standby Fan	3 + Earth	FP Plus
Network	2 + Earth	FP Plus

All cabling will be in accordance with relevant standards and regulations for electrical Installation such as BS7671.

2.6. Volt Free Indication

Terminal	Description
TB16	Healthy system
TB17	Duty Fan or Standby Fan Activated
TB18	Lift to Ground

3. Connections

3.1. Connections

The 10 mm terminals (fan connections) have a cable capacity of 10 mm² stranded or 16 mm² solid. All 4 mm terminals have a cable capacity of 2.5 mm² stranded or 4 mm² solid.

Each terminal is identified with a 2-letter code which is expanded on the terminal label. The following sections are to be used for guidance only and are subject to change.

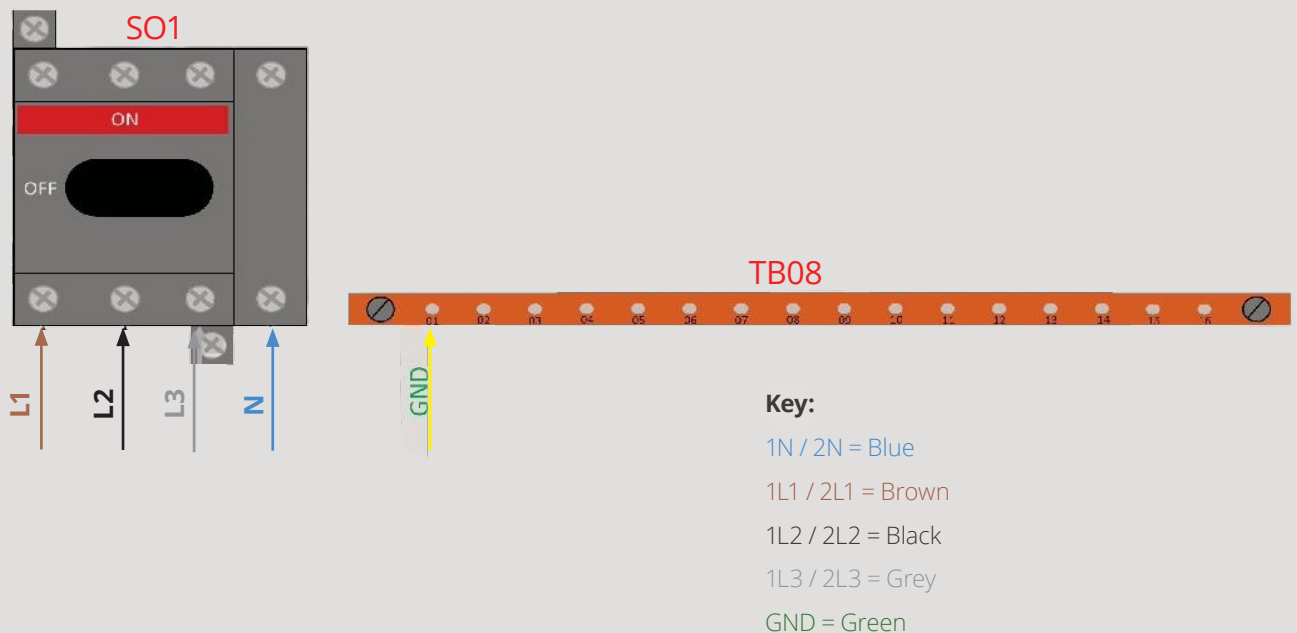
Strip the outer sheath of all cables back to the entry point of the enclosure. Ensure enough sheath is left to provide mechanical protection against cable movement over time.

Inner cable cores should be dressed under the edges of the terminals. This provides a neater and more ordered solution. Only strip inner cores sufficiently to make a good electromechanical contact with the terminal blocks.

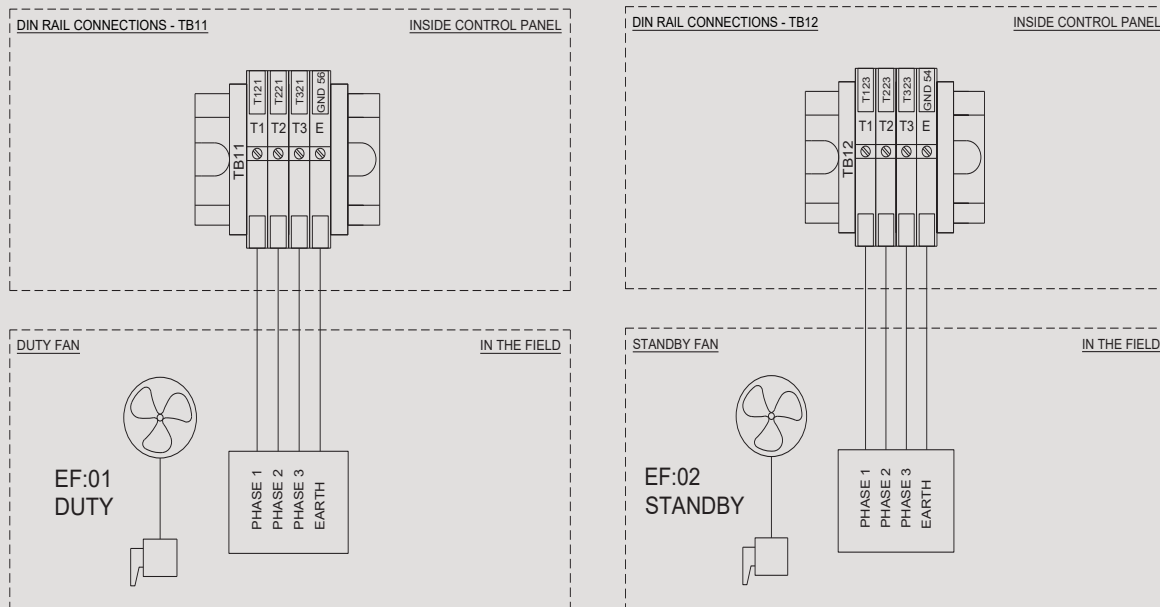
3.2 Three Phase Power in Connection

Ensure the supply is securely isolated before connecting. Connect only the primary mains cables.

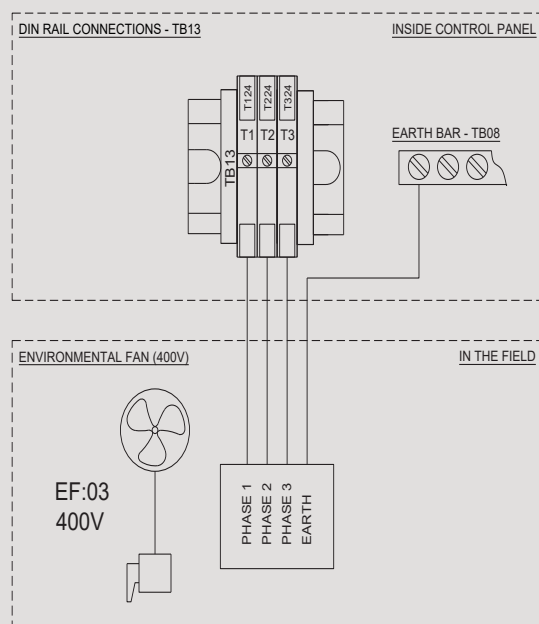
The Earthing cable should be connected to TBO8 (Earth bar).



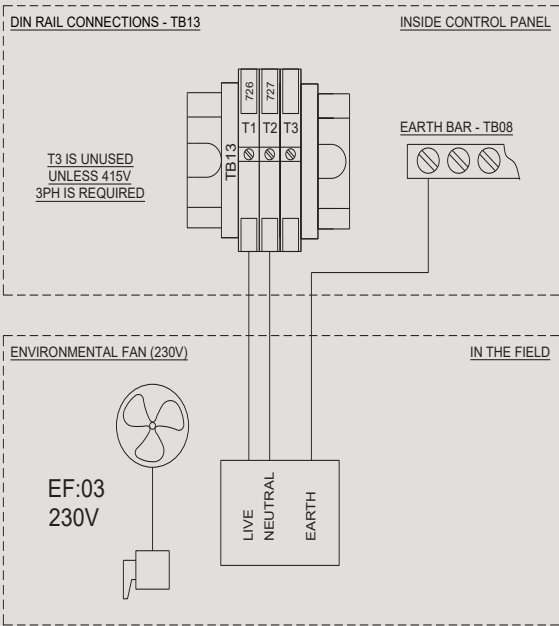
3.3. Duty Fan and Standby Fan Connections (TB11 & TB12)



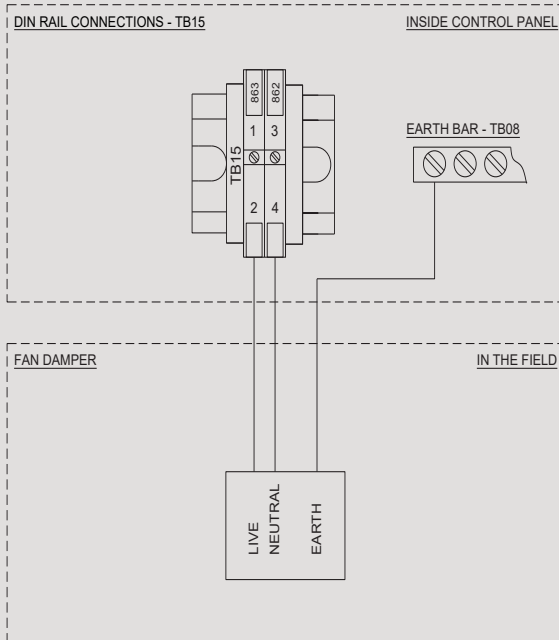
3.4. 400 V ac NV Fan Connections (TB13, if this option pack is fitted)



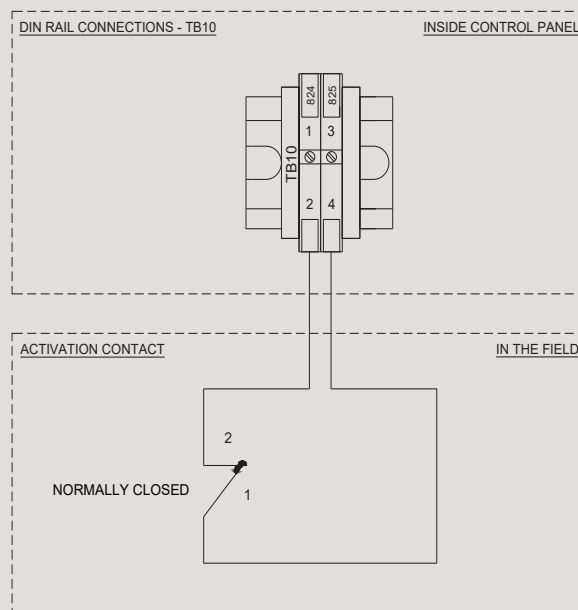
3.5. 230 V ac NV Fan Connections (TB13)



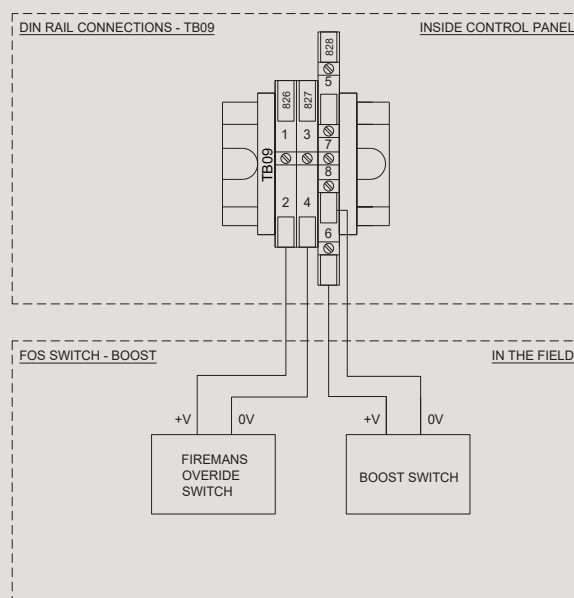
3.6. Fan Damper Connection (TB15)



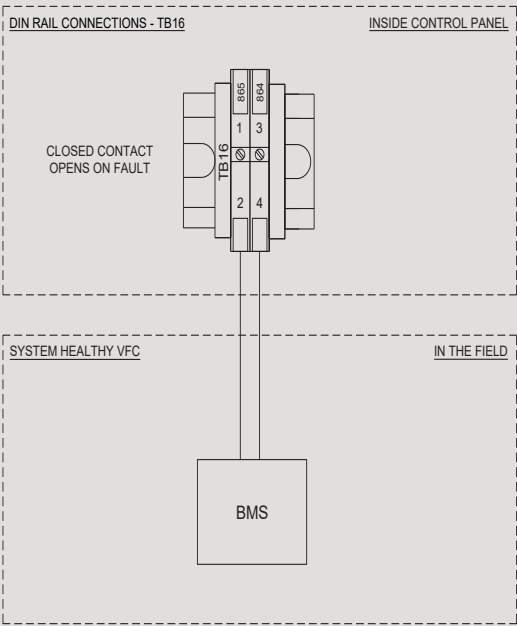
3.7. Activation Contact (TB10)



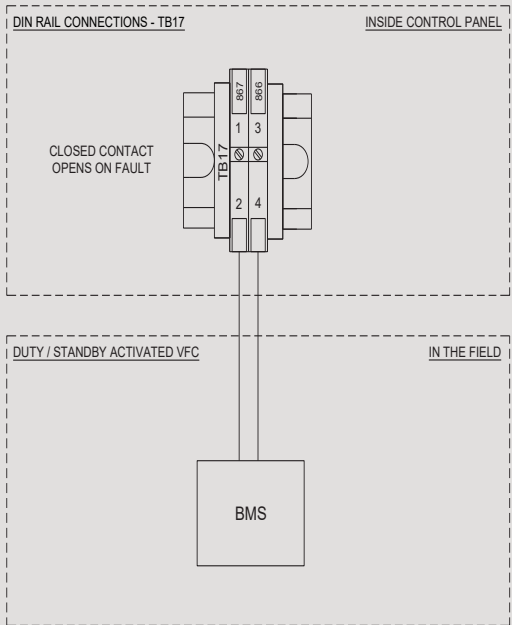
3.8. Firemans Override Switch - FOS - and Boost (TB09)



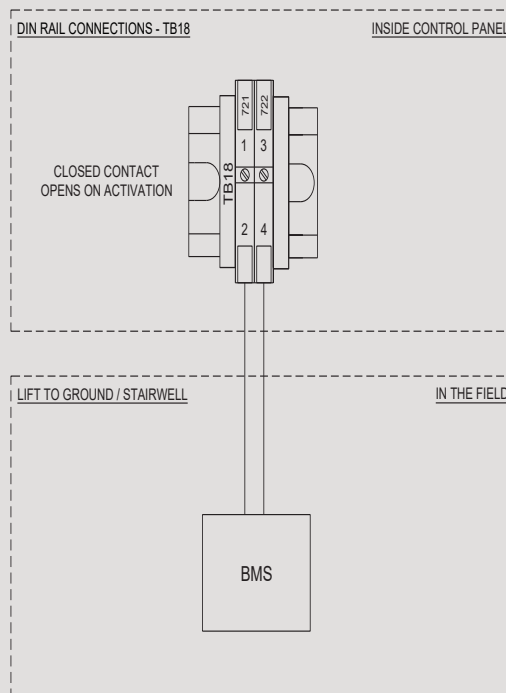
3.9. Healthy Contact (TB16)



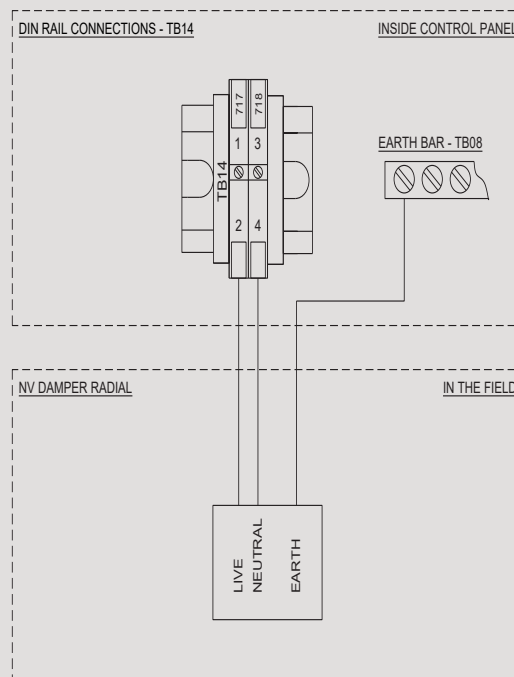
3.10. Duty/Standby Fan Activated (TB17)



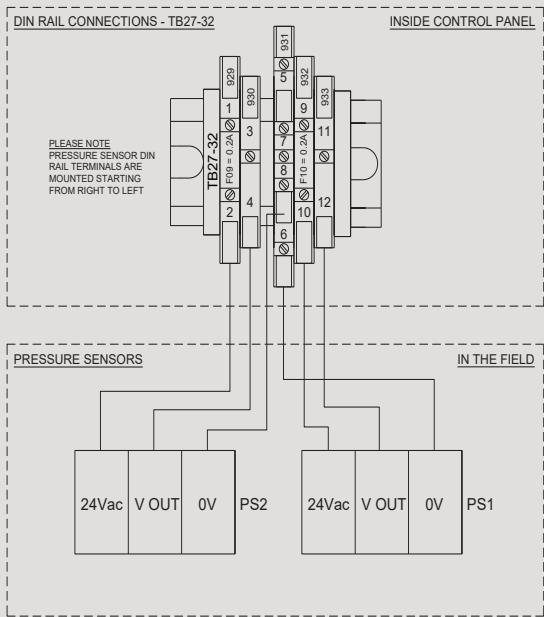
3.11. Lift to Ground/Stairwell (TB18)



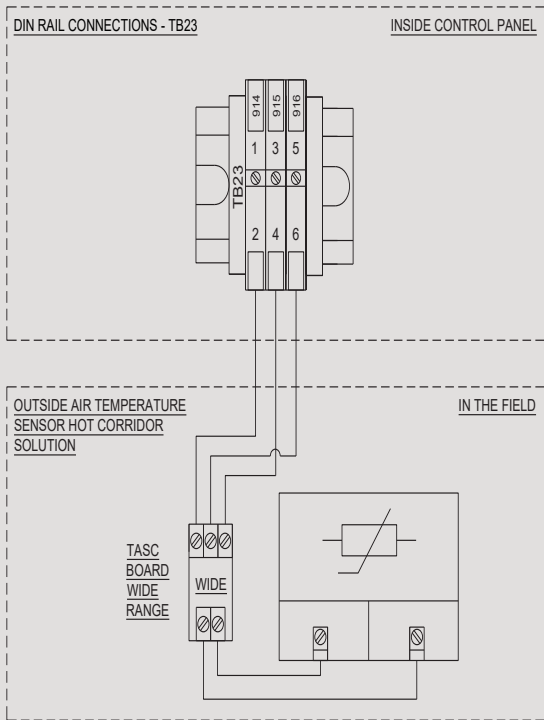
3.12. Environmental Damper Radial (TB14, if this option pack is fitted)



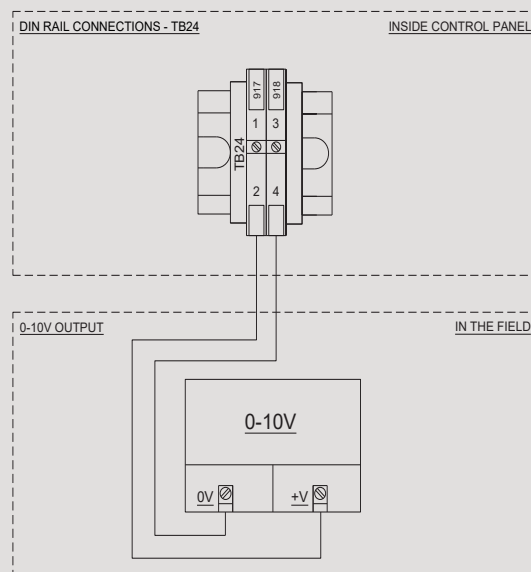
3.13. Pressure Sensor Connectors (TB27-32)



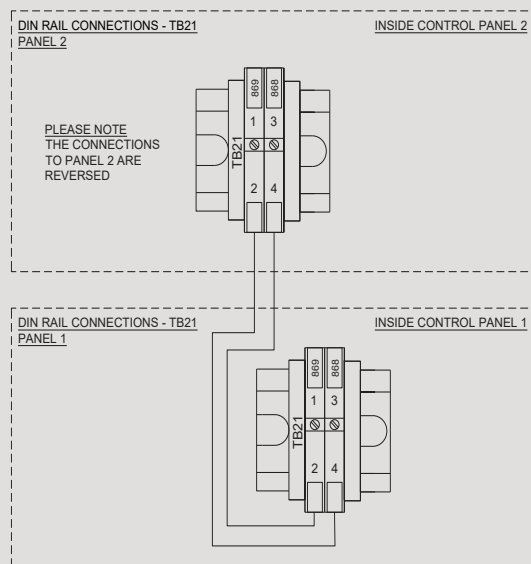
3.14. Outside Temperature / Hot Corridor Solution -(TB23 if this option is fitted)



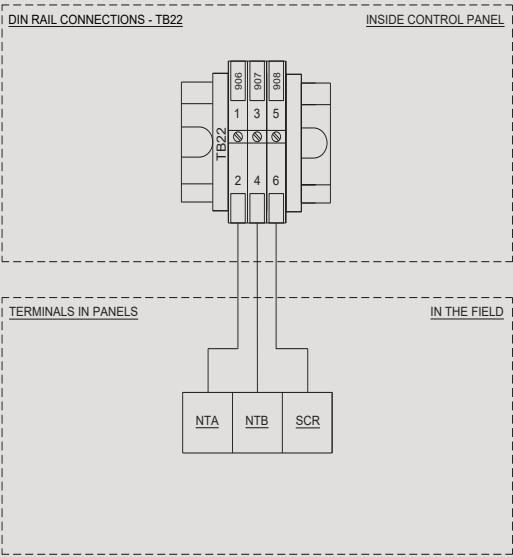
3.15. 0-10V Output (TB24, if this option pack is fitted)



3.16. Push-Pull Panel Link Connection (TB21, if this option is fitted)



3.17. OSLink Connection (TB22, if this option is fitted)



4. System Design

4.1. System Design

Design of a smoke and heat control scheme is a technically complex task and needs to consider both national legal requirements and local fire/ building regulations. This is beyond the scope of this document. If in doubt, consult SE Controls or approved agents who can give further guidance.

The system design documentation should include the 'Cause and Effect' list or similar to identify the essential smoke control functions of the system.

Before installation of any system, the following should be considered and documented where necessary.

4.2. Design checklist for each VS Fan Panel:

Location: Installation is in a clean, dry and secure internal location, accessible for maintenance.

Location: Not installed in sealed enclosure.

Location: Distance to the fans. Cable voltage drop is proportional to cable length, so locating the panel far from the load may require heavier gauge of cable. The addition of chokes may also be required when fans are located away from the panel.

Environment: Internal Fan Panel must not be subject to very cold temperatures.

Electrical Load: The Full Load Current (FLC) of the fan must be lower than the maximum continuous output current of the inverter.

Electrical: Provision of Single 400 V 3Ph/50Hz from external ACOPS unit or primary and secondary 400 V/ 3Ph/ 50Hz supplies into internally fitted ACOPS unit

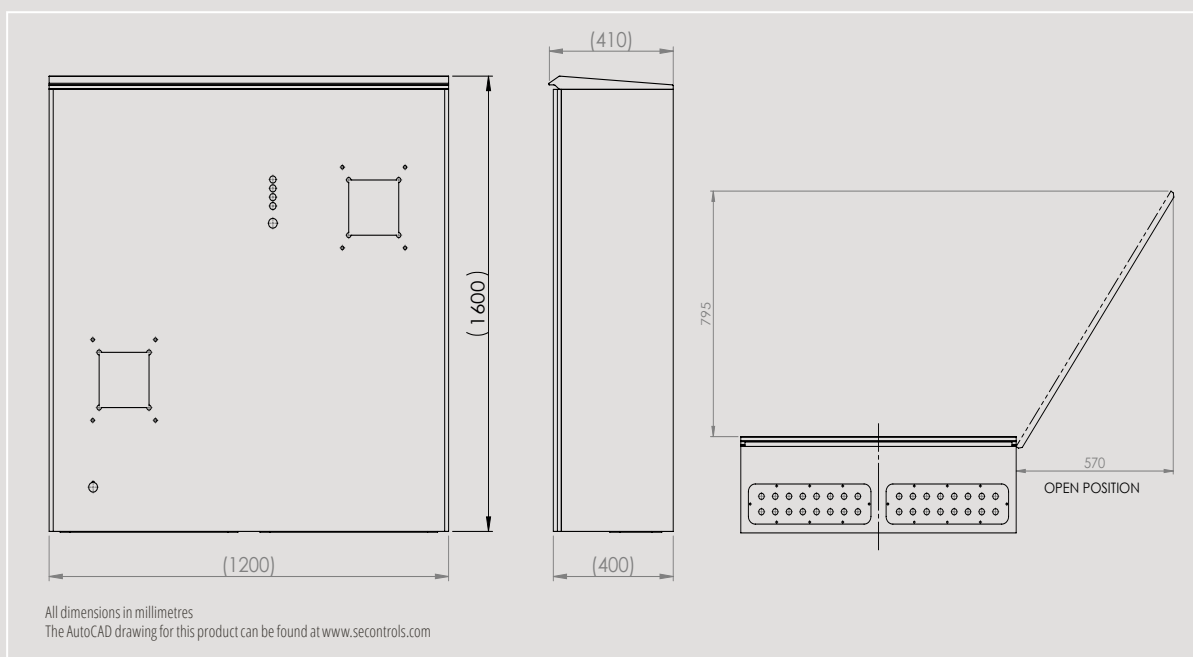
5. Installation, Commissioning and Fault Finding

5.1. Fixing

When installing a panel internally, the fixing brackets should be screwed to the panel first. Then, hold the panel against the surface to which it is to be fixed. Mark through the holes. Drill appropriate sized pilot/fixing holes and use plastic plugs/cavity fixings where appropriate. Use appropriate bolts to secure the panel firmly.

When installing the panel externally, the fixing brackets may not be necessary as the panel is usually installed on a Metal Framing (uni-strut). Therefore, the panel can be screwed directly to the frame.

- Installation of the panel in very warm locations (e.g. boiler rooms, hot plant rooms) should be avoided. The panel needs to be installed in a well ventilated space with room to fully open the door.
- The panel must be firmly fixed to a solid surface. The panel can be mounted on any vertical surface such as a wall.
- The panel must be accessible for maintenance.
- Locating the panel a long distance from the load (fans) will increase cable voltage drops on long cables and may require use of more expensive cables with greater cross-section and even the addition of chokes.



5.2. First power-up tests

Full commissioning of a new system requires the availability of three phase and neutral electrical supply.

If activation is via a fire alarm controlled relay, ensure the fire alarm is normally closed when the system is healthy.

For networked systems, an unbound, faulty or disconnected OSLink card may cause a fault indication. For OSLink, check that the green status LED of the network is lit solid and if necessary re-initialise the network by pressing the button on the OSLink card to re-bind.

Where a 'Cause and Effect' (functional specification) is available, this will document a complete list of the required functions which must all be verified in turn. If this specification detail is not available, the commissioning engineer must ensure that each input is tested. This may require triggering of smoke detectors and simulating of fire alarm inputs.

5.3. Inverter First Time Set Up and Parameters

Below is a list of parameters that will be set during the production build and test.

Parameter	Setting Required	Description
20.01	[2] In1 Start, In2 Dir	Ext1 Commands
20.04	[3] DI2	Ext1 In2 source
20.21	[0] Request	Direction
20.41	[1] Not Used	Start interlock 1
37.02	[2] Motor Current %	ULC Supervision Signal
37.04	[2] Fault	ULC underload actions
37.16	000.0Hz	ULC frequency table point 1
37.22	10.0%	ULC underload point 2
37.23	10.0%	ULC underload point 3
37.24	10.0%	ULC underload point 4
37.25	10.0%	ULC underload point 5
37.42	00005.0s	ULC underload timer

The Time and Date will also be set/checked as this will give an event log for any future faults or activations. This can be changed in the via the 'Primary Settings, clock, region, display, date and time'. Also ensure to select the Daylight Saving and set to EU.

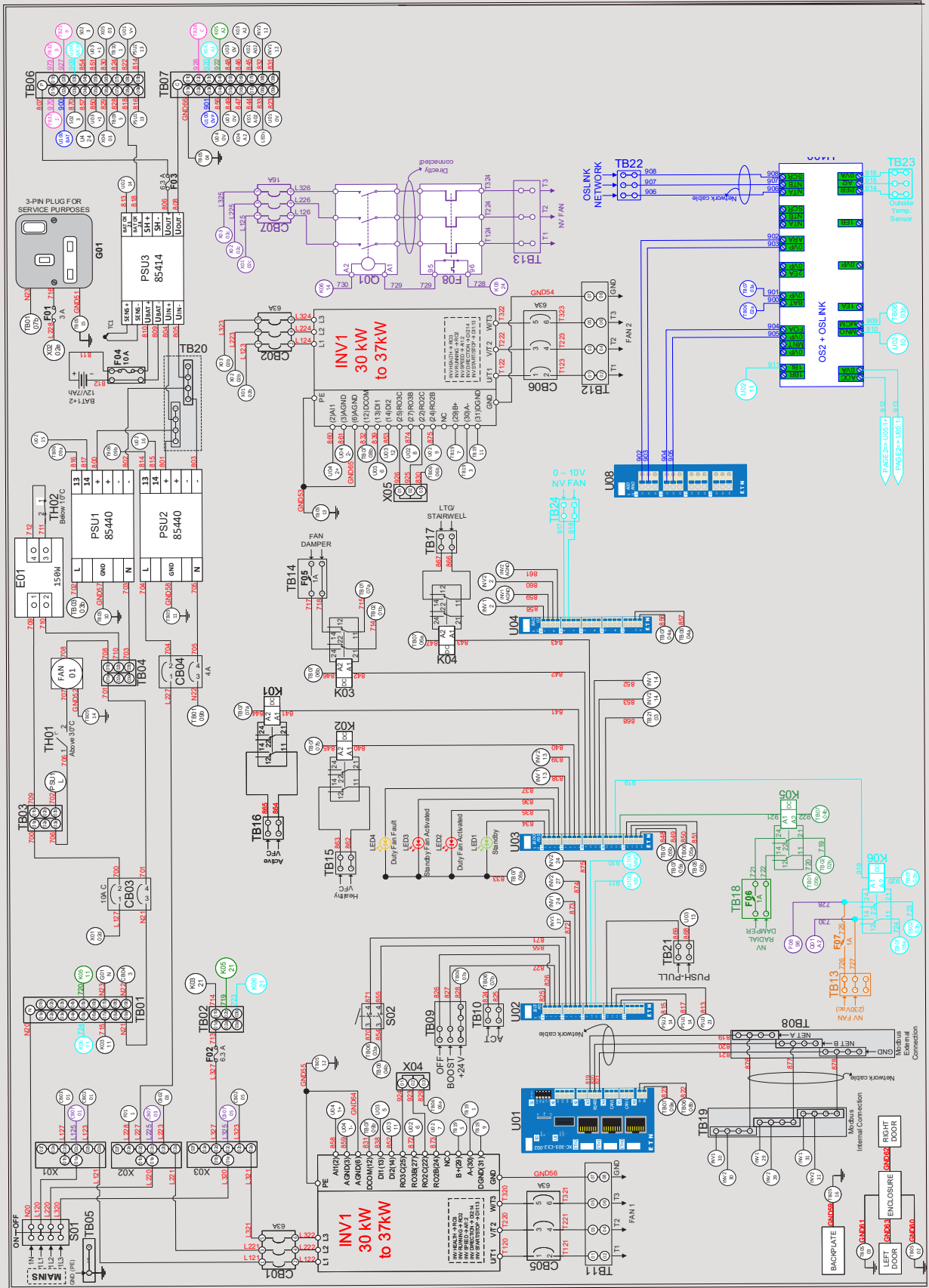
Next is a list of parameters that need to be changed when testing the inverters with a motor drive. Typically, this is what will be changed by the engineer on site for the specific motor/fan it is commissioning the system with.

Parameter	Setting Required	Description
99.06	Info found on motor plate	Motor nominal current
99.09	Info found on motor plate	Motor nominal speed
99.10	Info found on motor plate	Motor nominal power
99.11	Info found on motor plate	Motor nominal cos Φ

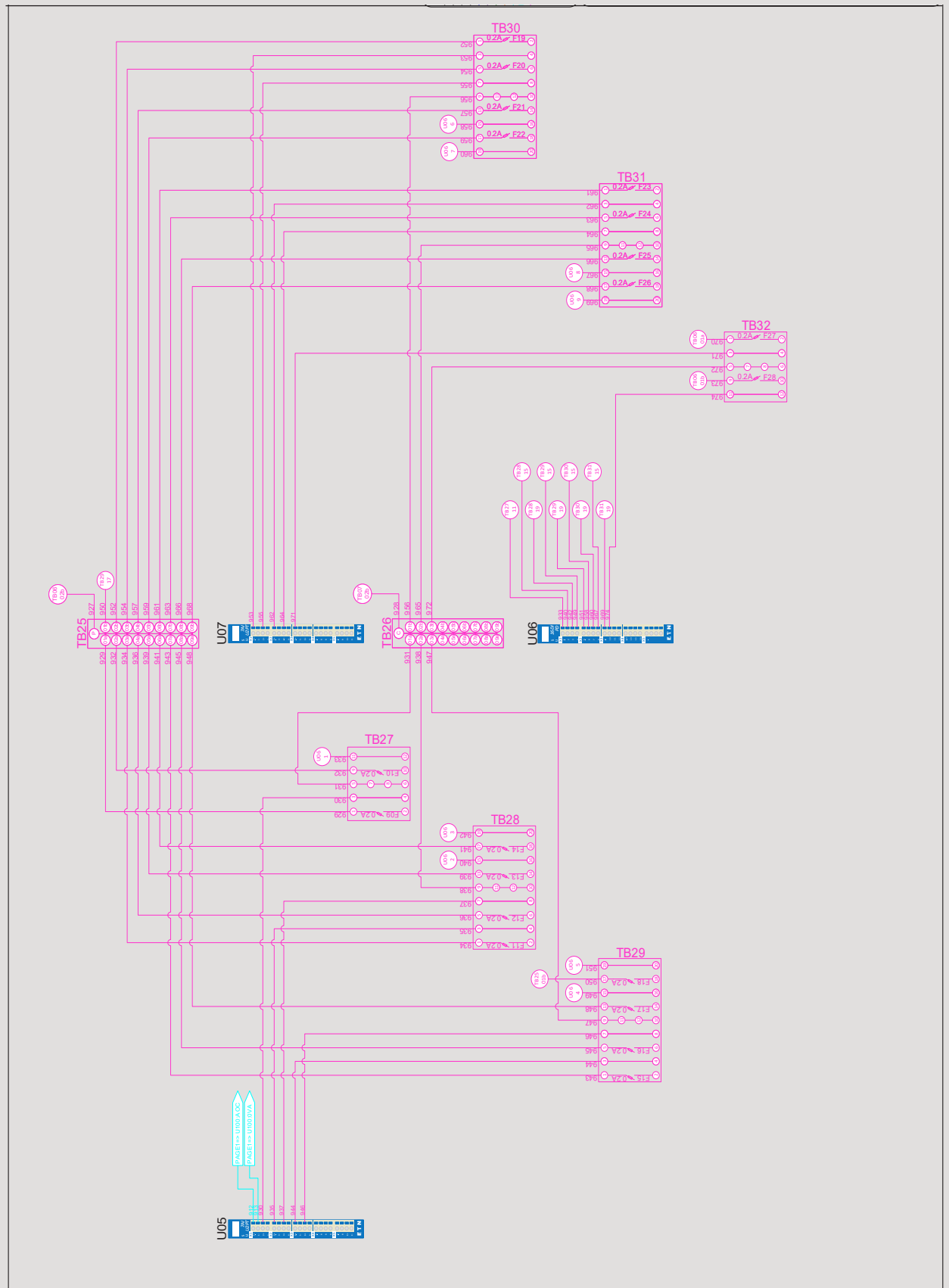
5.4. Basic Fault Finding for Standard Version

No operation, No LEDs illuminated.	Check if the isolator S01 is switched on.
	Check if all circuit breakers are toggled to the ON position.
	Measure the voltage between terminal 1 and 3 of CB01, which should be $\pm 25 \text{ V ac}$.
	Measure the voltage between terminal 1 of TB06 and terminal 1 of TB07, which should be $24 \text{ V dc} \pm 5 \text{ V dc}$.
Duty Fan not running	Check the voltage in between the terminals of the Standby LED, which should be $24 \text{ V dc} \pm 5 \text{ V dc}$.
	Check if the display of the INV 1 is lit.
	Check if the display of the INV 1 is showing a frequency higher than 0.00 Hz.
	Make sure that the First-Time setup of the INV 1 was carried out.
	Make sure that the ACT contact (TB10) is open.
	Check the connections between TB11 and the Duty Fan.
Standby Fan not running	Check if the Fireman's Override Switch (FOS) is not in OFF position.
	Check if the Duty fan is not running.
	Check if the display of the INV 2 is lit.
	Check if the display of the INV 2 is showing a frequency higher than 0.00 Hz.
	Make sure that the First-Time setup of the INV 2 was carried out.
	Check the connections between TB12 and the Standby Fan.
Permanent Activation	Check if the Fireman's Override Switch (FOS) is not in OFF position.
	Check the connections between the panel and fire alarm system.;

6. Wiring Schematic (Includes all Option Packs)



6. Wiring Schematic (Includes all Option Packs)



Notes:



Creating a healthier & safer environment

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