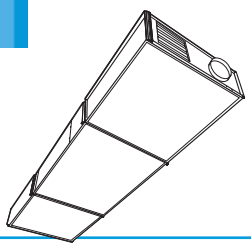


XB55-QA(AT)

MVHR with Heat Recovery

QA = Ecosmart Adapt Trend Controls

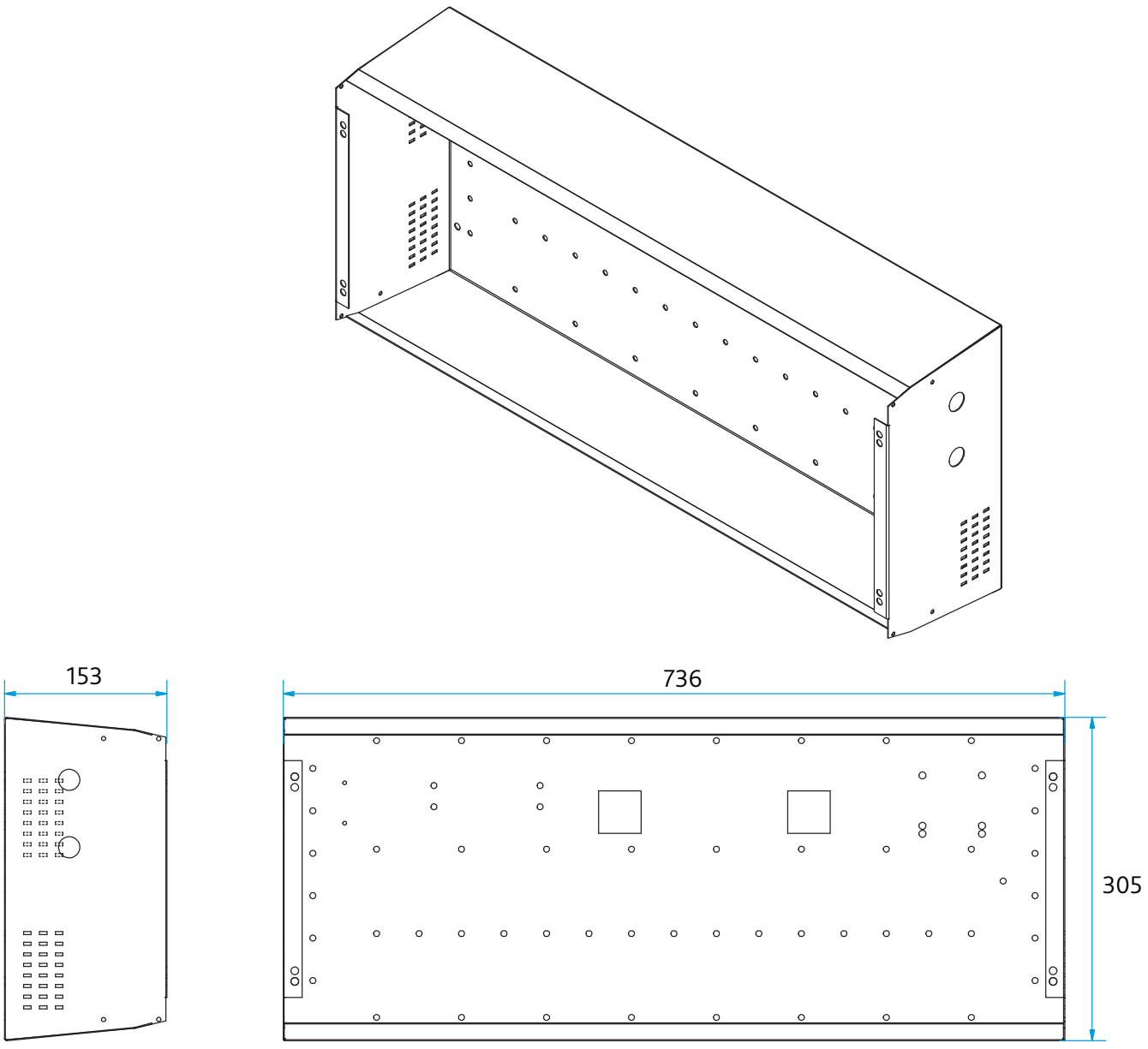
Addendum to 671508

1.0 Introduction

The information contained in this document provides specific details of the controls changes for the XB55-(L/R)N unit that has been modified to use Ecosmart Adapt Trend controls. This document is intended for installers and users and must be read in conjunction with the XBOXER 55 installation, operating and maintenance instructions, leaflet number 671508.

2.0 Control Box Dimensions

Figure 1. Control box dImensions.



3.0 Description Of Control - Software Strategy

The system incorporates a web enabled Trend IQ422/12/LAN/BAC/230 controller.

3.1 Unit Contains The Following Controllable Items:

- Inlet damper (if fitted).
- Extract damper (if fitted).
- Heat recovery & bypass damper.
- Heating coil.
- Cooling Coil
- Supply fan speed.
- Extract fan speed.

3.2 Enable Signal

The unit can be enabled via the following methods:

- Software switch (ENABLE) via SDU, IQView4, IQView8 or network.
- Switched live (230VAC) input, PIR etc.
- Low voltage contact.
- Night cooling / summer free-cooling strategy.
- Scheduled via weekly calendar.

When the enable signal is removed, the unit will run on for a time defined by the run-on setpoint. If an electric heater is fitted, the fans will automatically run-on for an extra 2 minutes, without heating, in order to dissipate residual heat.

3.3 Occupancy Control

When a Trend occupancy sensor is selected via UI4 & 5 software module, the control will look for a Trend OCC-U sensor in the appropriate input.
An occupied signal will give an enable signal.
0V = Occupied
14V = Unoccupied

3.4 Boost

When the control receives a boost signal the fans will run at boost speed. Once the signal is removed the fans will run on for a time defined by the boost run-on setpoint.

3.5 Trickle Mode

When trickle mode is active, the fans will run at their minimum speed even when there is no enable signal. Heating and cooling will also function in this mode if available.

3.6 CO_2 Control

When a CO2 sensor is selected via UI4 & 5 function knobs, and an enable signal is received, ventilation will increase to reduce CO2 concentration the target CO2 setpoint. The target CO2 sensor setpoint can be changed as one of the commissioning setpoints.

3.7 Supply Temperature Control

While an enable signal is present, this mode modulates heating, cooling & heat exchanger bypass dampers with the aim of the supply air reaching the temperature setpoint. Please note that heating and cooling outputs will only function if the HeatingType or CoolingType setpoints are set to heating or cooling options.

3.8 Frost Protection

Should the internal temperature of the unit fall below a value defined in the commissioning variables, the control will override all heating/cooling logic to open the LPHW or CW control valves, if fitted. This is to allow any protective flow through the heating/cooling coils. The supply fan will also stop and the appropriate frost protection software module will enter an alarm state. This period will last for a minimum of 5 minutes by default. The fault relay will also open. Heat and cool demand relays will not operate but digital inputs "Frost Protecting LPHW" or "Frost protecting CW" will enter an alarm state. Please note that frost protection will only function if the HeatingType or CoolingType setpoints are set to LPHW or CW.

3.9 Night Cooling / Summer Free Cooling

Once enabled in software, this routine uses an individual time schedule to cool the fabric of the building at night using only the external air. This mode only functions if the daytime temperature is above the setpoint, cooling is possible and if the cooling air is not too cold.

3.10 Alarms

3.10.1 CRITICAL ALARM (LATCHING)

Once in critical alarm state the unit will drive all heating and cooling outputs to 0V. Other functions continue as normal. The critical alarm is latched and required manual reset to clear.

Causes of critical alarm:

- Fan fail via alarm circuit 1.
- Heater overtemp via alarm circuit 1.

3.10.3 Maintenance Alarms (Non-Latching)

Once in maintenance alarm state the only action taken is de-energising of the fault relay. Once the trigger is removed, the alarm will reset automatically.

Causes of maintenance alarm:

- Condensate pump fault via alarm circuit 2 (This bypasses the heater exchanger automatically).
- Sensor failure.
- Low supply temperature, default 8°C.
- Frost protection routine active, deafult 4°C (Only runs if water valves are selected as fitted).
- Excessively high supply temperature reading (this will stop heating).
- Filter fault

All alarms have a hold off period set by the setpoint "Alarm delay".

3.10.2 Thermal Trip

In case of software failure, as a final resort, the electric heater is protected by a fail-safe thermal overload switch. This switch disables the heater controller once the temperature reaches 80°C. When this occurs, the critical alarm will latch in software.
Once the unit cools, the contactor will re-engage but the heater signal will remain at 0V until the critical fault is reset in software or by power cycle.

3.11 Setpoints

Most of the following are user adjustable within engineered limits:

Point Name	Description	Range	Default
ENABLE	Software enable switch	Off / On	Off
RUNONTIME	Run-on timer value	0 - 3600 Seconds	0
TRICKLEMODE	When on, fans will trickle even with no enable signal	Off / On	Off
SETTEMP	Desired temperature setpoint	10°C to 30°C	22
DEADBAND	Dead-band for temp control	0.5°K to 10°K	3
BOOST	Software boost switch	Off / On	Off
BOOSTRUNON	Boost run on	0 - 3600 Seconds	0
FROSTPROTEMP	Temperature, below which, any water valves will be overridden open	-40°C to 10°C	4
MINFROSTPROTECTPERIOD	Minimum time frost protection will be enabled	0 - 600 Seconds	300
DAMPERDELAY	Startup delay to allow I/o dampers to open	0 - 300 Seconds	0
ALARMDELAY	Alarm hold-off delay	0 - 20 Seconds	5
HIGHAIRTEMPALARM	High supply air temp alarm temperature	30°C to 70°C	50
LOWTEMPALARM	Low supply air temp alarm temperature	-40°C to 20°C	8
FORCESTOPONLOWTEMP	Stops fans upon LOWTEMPALARM	Off / On	Off
ALARMRESET	Resets any latched alarms (Resets to Off Automatically)	Off / On	Off
SUPPLYFANMAX	Individual fan maximum speed settings	20 - 100%	100
SUPPLYFANMIN	Individual fan minimum speed settings (trickle speed)	0 - 100%	20
EXTRACTFANMAX	Individual fan maximum speed settings	20 - 100%	100
EXTRACTFANMIN	Individual fan minimum speed settings (trickle speed)	0 - 100 %	20
SUPPLYFANBOOST	Supply fan boost speed	20 - 100%	100
EXTRACTFANBOOST	Extract fan boos speed	20 - 100%	100
SUPPLYFANSTARTVOLTAGE	The voltage threshold of passing 0% rotational speed	0 - 5V	1
EXTRACTFANSTARTVOLTAGE	The voltage threshold of passing 0% rotational speed	0 - 5V	1
SUPPLYFANVOLTAGELIMIT	The maximum voltage to be supplied to the fan motor	6 - 10V	10
EXTRACTFANVOLTAGELIMIT	The maximum voltage to be supplied to the fan motor	6 - 10V	10
CO2TARGET	The target setpoint for CO2 control	0 - 10000 PPM	650
CO2RANGEMIN	The lower limit CO_2 value corresponding to the limit voltage	0 - 10000 PPM	0
CO2VOLTAGEMIN	The lower limit voltage corresponding to the limit of range	0 - 10 VDC	0
CO2RANGEMAX	The upper limit CO_2 value corresponding to the limit voltage	0 - 10000 PPM	2000
CO2VOLTAGEMAX	The upper limit voltage corresponding to the limit of range	0 - 10 VDC	10
CO2-LOOPGAIN	CO_2 Loop Gain	0 to -30	-0.5
CO2-LOOPINTEGRAL	CO_2 Loop Integral	0 to 30	10
CO2-LOOPDERIVATIVE	CO_2 Loop derivative	0 to 30	0

Point Name	Description	Range	Default
SUMMERNIGHTFREECOOLACTIVE	Set night cooling mode as active	Off / On	Off
SUMMERNIGHTFREECOOLMINTEMP	Night cooling lower cut-off temperature	5°C to 30°C	10
SUMMERNIGHTFREECOOLFANSPEED	Night cool fan speed	20 to 100 %	80
STC-COOLLOOPGAIN	Supply Temp Control - Cool Loop Gain	0 to -30	-5
STC-COOLLOOPINTEGRAL	Supply Temp Control - Cool Loop Integral	0 to 30	2
S TC-COOLLOOPDERIVATIVE	Supply Temp Control - Cool Loop Derivative	0 to 30	0
2STC-HEATLOOPGAIN	Supply Temp Control - Heat Loop Gain	0 to -30	-5
STC-HEATLOOPINTEGRAL	Supply Temp Control - Heat Loop Integral	0 to 30	2
STC-HEATLOOPDERIVATIVE	Supply Temp Control - Heat Loop Derivative	0 to 30	0
HEATINGTYPE	Heating Type 0=None, 1=LPHW, 2=Electric	0 - 2	0
COOLINGTYPE	Cooling Type 0=None, 1=CW, 2=DX	0 - 2	0
UI4FUNCTION	Input 4 Function, 0 = None, 1 = CO2/T/D, 2 = Trend Occ, 3=FSC	0 - 3	0
UI5FUNCTION	Input 5 Function, 0 = None, 1 = CO2/T/D, 2 = Trend Occ, 3=FSC	0 - 3	0
TACHOFITTED	Is a tacho signal monitor PCB fitted?	Off / On	Model Dependant
SOFTWAREVERSION	Shows the software number & Version	N / A	0
FANANDHEATERTEST	Factory Use Only (This resets on power cycle)	Off / On	Off
WIRINGVERIFICATION	Factory Use Only (This resets on power cycle)	Off / On	Off
FORCEOVERHEAT	Factory Use Only (This resets on power cycle)	Off / On	Off
DAMPERBYPASS	Force bypass damper into bypass mode (This resets on power cycle)	Off / On	Off
DAMPEROUTOFBYPASS	Force bypass damper out of bypass mode (Pump failure or DAMPERBYPASS switch will override this) (This resets on power cycle)	Off / On	Off
F ANDAMPERTEST	Factory Use Only	Off / On	Off

3.12 Sensors and Touch Screens

To help you select the appropriate control solution for your application, simply refer to one of the options below.
For the full range and technical details, please visit www.nuaire.co.uk

Thermistor Temerature Sensors

Low cost thermistor sensors comprising insertion, clamp-on, and outside air versions. The insertion sensor may be used for duct or immersion purposes. It has a 6mm diameter brass probe which is suitable for retrofit immersion applications and will fit most existing pockets (universal fitting kit option).

Code: TB/TI/S - For duct or immersion use. Short 150mm.

TB/TI/L - For duct use only. Long 400mm.

Features

- Low cost
- High quality thermistors
- Brass probes
- M20 conduit entry with M16 cable gland
- IP67 housing
- Quarter turn quick release lid
- Easy to wire
- Universal kit option for retrofit of immersion sensors
- Adjustable insertion depth flange option for duct sensors

Duct Humidity & Temperature Sensors

Duct mounted relative humidity and temperature sensors for HVAC applications.
The certified 2% high accuracy (/2%) and standard 3% versions offer excellent linearity and stability over a wide humidity range (10 to 90 %RH).

Code: HT/D - Ductand thermistor sensor (+/-3%)

Features

- Pre-calibrated for ease of commissioning
- IP65
- Operates over 10 to 100% RH non-condensing
- ± 3% accuracy versions
- 2 part connectors for ease of installation
- Humidity sensor element protected by replaceable filter
- Capacitive humidity sensing element provides excellent long term stability
- Adjustable depth duct mounting flange option

CO_2 Sensors

The CO_2 duct and space sensors monitor the carbon dioxide concentration and temperature of the air. The space sensors have additional options of humidity monitoring and a 4 digit display. The display will show the measured values in succession. The duct sensor has a quick-release lid to facilitate installation.

Code: CO2/T/D - For duct or immersion use. Short 150mm.

CO2/T/S - **Space carbon dioxide concentration and temperature sensor.**

Features

- Low cost, high quality thermistor temperature sensor
- Humidity monitoring option for space sensor
- Optional digital display for space sensor
- M20 conduit entry with M16 cable gland
- IP67 housing (duct sensor)
- Quarter turn quick release lid (duct sensor)
- Two part terminals to facilitate wiring
- 24 Vac/dc supply
- Adjustable depth duct mounting flange option

Occupancy Sensors

The ceiling mounted OCC/U Ultrasonic Occupancy Detection System is specifically designed for combined HVAC and lighting control in open plan office environments.

Code: OCC/UD/DC - **Ultrasonic detector, adjustable in 1 direction.**

OCC/UDA/DC - **Ultrasonic detector, adjustable in 2 directions sensor.**

Features

- Monitors occupancy over approximately 5 m diameter floor space
- Fully automatic system operation
- Direct connection to IQ Controllers
- Lights never go off when needed (even detects hand movements)
- IP67 housing
- Quarter turn quick release lid
- Simple low cost installation
- Extendable coverage of up to 10 detectors per IQ input
- Corridor linking facility

Touch Screens

SDU Display

(10 x 6 inch).
RD/SDU-IQ2COMMSCABLE/3m – RJ11 plug to RJ11 plug cable (3m) for SDU.

IQVIEW4 Touch Screen Display
(6 x 4 inch). FPK/Plate - Mounting Plate
IQVIEW4/SM Box - Surface mount box for wall or panel.
Transformer for IQVIEW4 included.
ACC/24V - 230/24 VAC, 36VA

IQVIEW8 Touch Screen Display
(10 x 6 inch).
IQVIEW8/SM Box - Surface mount box for flat surfaces
Transformer for IQVIEW8 included.
ACC/24V - 230/24 VAC, 36VA

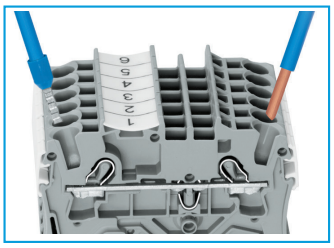
3.13 Connection Chart

	Description	IQ422 Terminal No.	Expansion Module Terminal No.	Din Rail Terminal No.	DI	AI	DO	AO
	Fresh Air Sensor	1 (4, 5)				1		
	Supply Air Sensor	2 (6, 7)				1		
	Return/Room Air Sensor	3 (8, 9)		25 - 26		1		
	Input 4	4 (10, 11)				1		
	Input 5	5 (12, 13)		31 - 32		1		
4DIX Input	Alarm Circuit 1 (Fan, Heater)	6 (14, 15)	4DIX Terminal A	27 - 28 (Some models)	1			
	Alarm Circuit 2 (Pump, Filter)		4DIX Terminal B	29 - 30	1			
	Volt-Free Enable Input Signal		4DIX Terminal C	33 - 34	1			
	Volt-Free Boost Input Signal		4DIX Terminal D	35 - 36	1			
	Extract Fan 0-10V	7 (16, 17)						1
	Supply Fan 0-10V	8 (18, 19)						1
	Heat Demand 0-10V	9 (20, 21)						1
	Cool Demand 0-10V	10 (22, 23)						1
3RM-1 Relay Module (TRM Mode wired for binary switching)	Bypass Damper	11 (24, 27)	Wired for binary switching. See 3RM Datasheet for info.				1	
	Healthy signal to Relay 4						1	
	Link from IQ422 GND to AC GND	11 (25)		23				
3RM-2 Relay Module (HRM Mode)	Volt-Free Fan Run Relay	12 (26, 27)	3RM-2 Relay 1				1	
	Volt-Free Cool Demand Relay		3RM-2 Relay 2				1	
	Volt-Free Heat Demand Relay		3RM-2 Relay 3				1	
	230V Enable Input			10	1			
	230V Fan Boost Input			11	1			
	Volt-Free Healthy Relay			13-14			1	

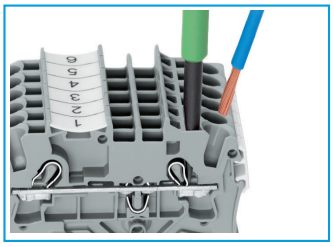
3.14 Terminals - Wire Connections

Figure 2. This control unit utilises WAGO's CAGE CLAMP® S terminal blocks, allowing for quick and easy connection.

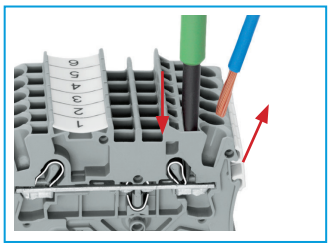
PUSH IN TERMINATION - Stripped solid conductors, fine-stranded conductors with ferrules, or ultrasonically "bonded" conductors are simply pushed in until they hit the backstop. No tool required.



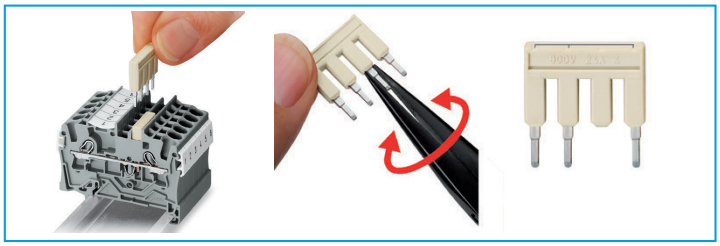
TERMINATION OF FINE-STANDED CONDUCTORS - Open the clamp by inserting an operating tool (as shown below) until it clicks into position. Then insert the conductor and remove the operating tool to complete the connection.



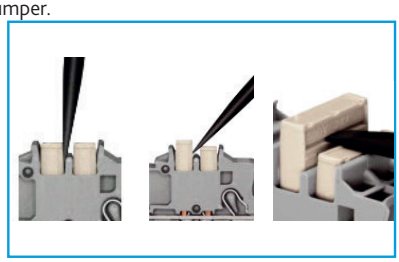
CONDUCTOR REMOVAL - Insert an operating tool in to the operating slot to remove the conductor, just like the original CAGE CLAMP® terminals blocks.



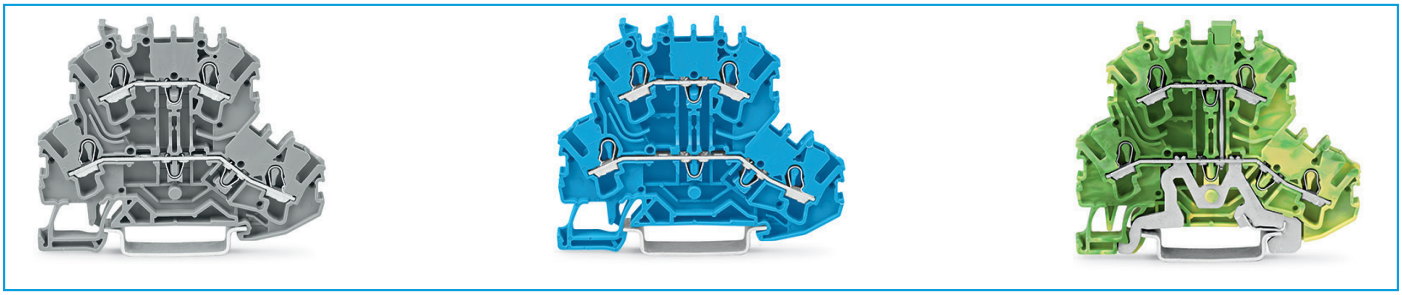
JUMPERS - Terminal blocks can be commoned together to increase the number of terminals at the same potential using push-in jumpers. In these cases the terminals are treated as one conductor.



JUMPER REMOVED - Insert the operating tool blade between the jumper and the partition wall of the dual jumper slots, then lift up the jumper.

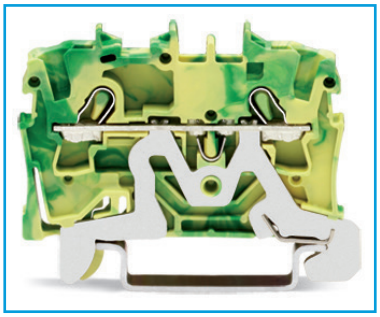


DOUBLE DECK TERMINAL BLOCK - Each deck has a different potential (2-conductor), which creates a space saving on the rail. Decks can be commoned to adjacent terminal blocks and/or the top to the bottom deck.



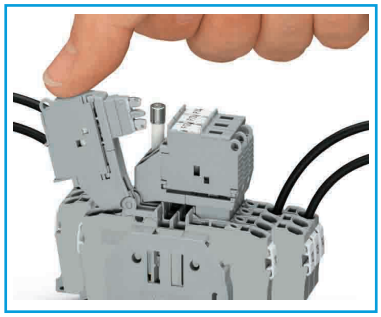
EARTH TERMINAL BLOCKS

The earth terminal block (green/yellow) has a direct electrical connection to the DIN rail, with the earthing foot (earth connection only).

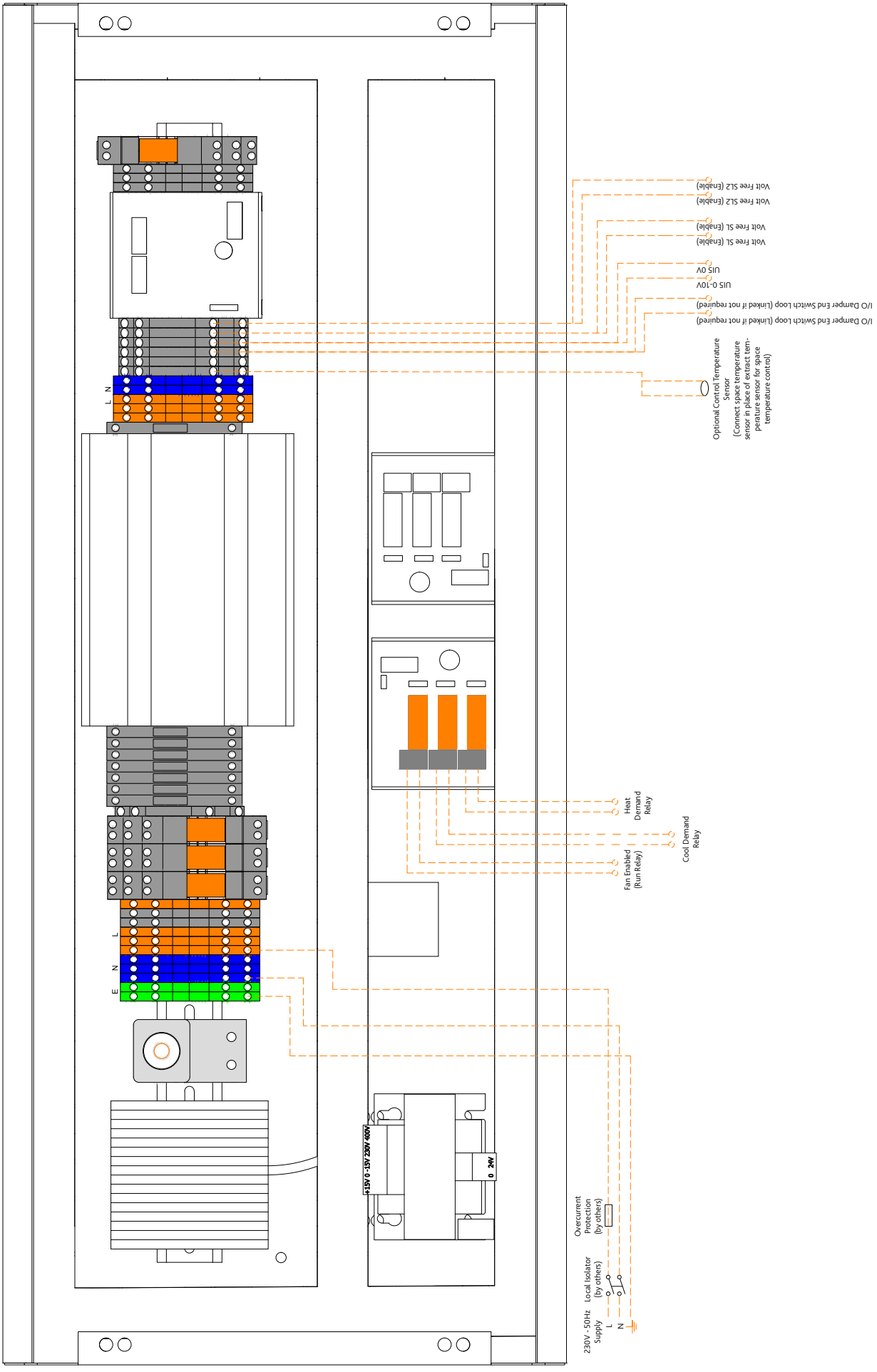


FUSE TERMINALS

Replaceable cartridge fuses are housed in quick release fuse terminals.



4.0 Physical Layout



5.0 Wiring Diagram