LED Indicators

Legend	Colour	Function	Action
P	Green	Power Status	On – Power on Off – Power off
A	Red	Relay A state	On – Energized Off - De-energized
B	Red	Relay B state	On – Energized Off - De-energized

Power Supply

Legend	Supply	
24V	24V dc	Linked
24V	24V dc	
0V	0V	
GND	Ground	

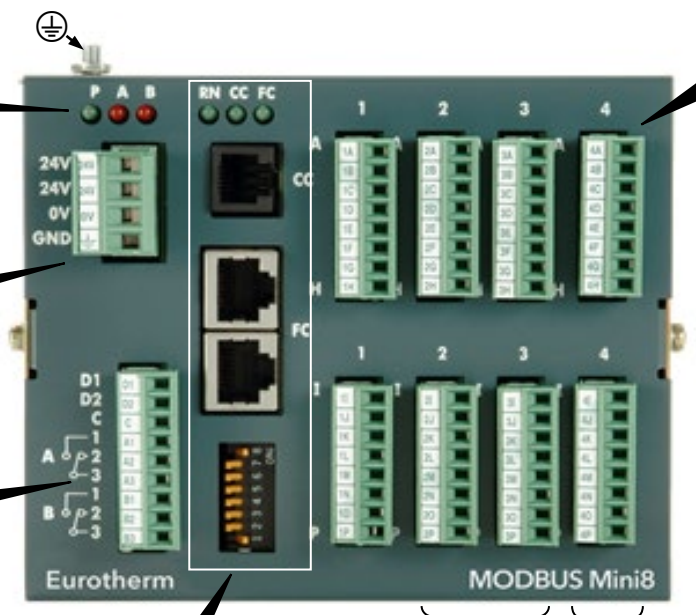
These terminals can accept wire sizes 0.2 – 2.5mm² (24–12 AWG).
Tightening torque 0.5 to 0.6Nm (≈ 5lb.in.)

Power Supply Specification

Voltage: 17.8V dc min to 28.8V dc max
Power consumption : 15W max

Standard I/O Connections

Legend	Function	Specifications
D1	Digital input 1	Digital Inputs: -28.8V to +5V = Off +5V to 10.8V = undefined +10.8V to +28.8V = On Typical drive current: 2.5mA @ 10.8V Relay contacts: 1 Amp max, 42V dc max. These terminals can accept wire sizes 0.14 – 1.5mm² (28– 16 AWG). Tightening torque 0.22 to 0.25Nm (1.95 – 2.21lb.in.)
D2	Digital input 2	
C	Digital input common	
A1	Relay A normally open	
A2	Relay A normally closed	
A3	Relay A common	
B1	Relay B normally open	
B2	Relay B normally closed	
B3	Relay B common	



Communications
This section depends upon the module fitted – see overleaf for details

Module RL8

Modules AO8/AO4

Modules ET8/TC8/TC4, RT4, DI8, CT3, DO8

Cable sizing for thermocouple inputs for ET8/TC8/TC4 modules

Module	Min size (solid)	Max size (solid)	Min size (flexible)	Max size (flexible)
ET8/TC8/TC4	0.14mm² (28AWG)	1.5mm² (16AWG)	0.14mm² (28AWG)	1.5mm² (16AWG)

Communication Interface LEDs

Leg.	Col.	Function	Action	
RN	Green	Run mode	On - Running Blinking - Standby/Config Off - Not Running	
CC	Green	Config activity	On - N/A Blinking - Config Traffic Off - N/A	
FC	Green	Field comms activity	On - Connected Blinking - Ready Off - Offline	Not applicable to Enhanced DeviceNet and EtherCAT
			Off - No traffic or offline Blinking - Comms Traffic	Modbus, Profibus, EtherNet
NET	Bi-Col	Network status Enhanced DeviceNet and EtherNet/IP	Off – Offline Blinking Green - Online but no connections On Green - Online with connections Blinking Red - Connection timed out On Red - Total connection loss Blinking Red/Green – Issue with Comms detected	
MOD	Bi-Col	Module status Enhanced DeviceNet and EtherNet/IP	Off - Power not supplied to network On Green - DeviceNet interface operational On Red - Power not supplied to controller or incorrect Checksum Blinking Red/Off - Recoverable fault detected. Comms. loss between network and DeviceNet interface. Blinking Red/Green - Power-up tests, unable to enter cyclic states or invalid Baud rate	

ET8/TC8/TC4 Thermocouple Input

Note: TC4 supports channels A to H. ET8/TC8 support channels A to P.

Isolation

- Channel to channel: 42V pk
- Channel to system: 42V pk

Legend	Function
A	TC1+
B	TC1-
C	TC2+
D	TC2-
E	TC3+
F	TC3-
G	TC4+
H	TC4-
I	TC5+
J	TC5-
K	TC6+
L	TC6-
M	TC7+
N	TC7-
O	TC8+
P	TC8-

RT4 2, 3, 4 Wire RTD Input

Isolation

- Channel to channel: 42V pk
- Channel to system: 42V pk

Legend	Function
A	CH1 I+
B	CH1 S+
C	CH1 S-
D	CH1 I-
E	CH2 I+
F	CH2 S+
G	CH2 S-
H	CH2 I-
I	CH3 I+
J	CH3 S+
K	CH3 S-
L	CH3 I-
M	CH 4 I+
N	CH4 S+
O	CH4 S-
P	CH4 I-

2 3 4 wire

DI8 Logic Input

Note: Input specification as for 'Standard I/O' above

Isolation

- Channel to channel: 42V pk
- Channel to system: 42V pk

Legend	Function
A	D1+
B	D1-
C	D2+
D	D2-
E	D3+
F	D3-
G	D4+
H	D4-
I	D5+
J	D5-
K	D6+
L	D6-
M	D7+
N	D7-
O	D8+
P	D8-

CT3 Current transformer Input

Note: Isolation provided by current transformers

Isolation

- Channel to channel: N/A
- Channel to system: N/A

Legend	Function
A	N/A
B	N/A
C	N/A
D	N/A
E	N/A
F	N/A
G	N/A
H	N/A
I	In1 A
J	In1 B
K	No connection
L	In2 A
M	In2 B
N	No connection
O	In3 A
P	In3 B

DO8 Logic Output

Note: Requires 24Vdc supply

Isolation

- Channel to channel: N/A
- Channel to system: 42V pk with independent supply

Legend	Function
A	Supply In +
B	Supply In +
C	OP1 +
D	OP2 +
E	OP3 +
F	OP4 +
G	Supply & OP-
H	Supply & OP-
I	Supply In +
J	Supply In +
K	OP5 +
L	OP6 +
M	OP7 +
N	OP8 +
O	Supply & OP-
P	Supply & OP-

Links are internally connected

RL8 Relay Output (slots 2 and/or 3 only)

Note: Protective earth conductor MUST be used if RL8 module is fitted

Contact voltage/current – 264Vac/2A RMS max.

Isolation

- Channel to channel: 264Vac basic
- Channel to system: Reinforced

Legend	Function
A	RLY1 A
B	RLY1 B
C	RLY2 A
D	RLY2 B
E	RLY3 A
F	RLY3 B
G	RLY4 A
H	RLY4 B
I	RLY5 A
J	RLY5 B
K	RLY6 A
L	RLY6 B
M	RLY7 A
N	RLY7 B
O	RLY8 A
P	RLY8 B

AO8/AO4 Analog Output (slot 4 only)

Note: AO4 supports channels 1 to 4 only

Output current – 0 to 20mA, 360Ω max load

Isolation

- Channel to channel: 42V pk
- Channel to system: 42V pk

Legend	Function
A	OP1 +
B	OP1 -
C	OP2 +
D	OP2 -
E	OP3 +
F	OP3 -
G	OP4 +
H	OP4 -
I	OP5 +
J	OP5 -
K	OP6 +
L	OP6 -
M	OP7 +
N	OP7 -
O	OP8 +
P	OP8 -

⚠⚠ DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH

Electrical equipment must be installed, operated and maintained by only qualified personnel.

Turn off all power to product and all I/O circuitry (alarms, control I/O etc.) before starting the installation, removal, wiring, maintenance or inspection of the product.

Power line and output circuits must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment, i.e. UK, the latest IEE wiring regulations, (BS7671), and USA, NEC class 1 wiring methods.

The Mini8 Controller is intended for operation at safe low voltage levels, except the Relay Module. Voltages in excess of 42V must NOT be applied to any terminals other than the Relay Module, RL8.

The unit must be installed in an enclosure or cabinet. Failure to do this impairs the safety of the unit. An enclosure or cabinet should provide fire enclosure and/or restriction of access to hazards.

Do not exceed the device's ratings.

This product must be installed, connected and used in compliance with prevailing standards and/or installation regulations. If this product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired.

Tighten terminal screws in conformance with the torque specifications.

Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.

The installer must ensure the mandatory protective ground connection is connected during installation. Connection of this protective ground connection must be made before turning on any power supplying this device.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

HAZARD OF FIRE

If upon receipt, the unit or any part within is damaged, do not install but contact your supplier.

Do not allow anything to fall or be inserted through the case apertures.

Ensure the correct wire gauge size is used per circuit and it is rated for the current capacity of the circuit.

When using ferrules (cable ends) ensure the correct size is selected and each is securely fixed to the wire using a crimping tool.

The controller must be connected to the correct rated power supply unit or supply voltage in accordance with the supply voltage rating displayed on the controller label. or in the User guide. Use only isolating PELV or SELV power supplies to supply power to the equipment.

Ensure only the originally supplied connectors are used.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not use the product for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.

Observe all electrostatic discharge precautions before handling the unit.

Electrically conductive pollution must be excluded from the cabinet in which the controller is mounted.

Use appropriate safety interlocks where personnel and/or equipment hazards exist.

Install and operate this equipment in an enclosure appropriately rated for its intended environment.

Routing of wires, to minimize the pick-up of EMI (Electromagnetic interference), the low voltage DC connections and the sensor input wiring must be routed away from high-current power cables. Where it is impractical to do this, use shielded cables with the shield grounded. In general, keep cable lengths to a minimum.

Do not disassemble, repair or modify the equipment. Contact your supplier for repair.

Ensure all cables and wiring harness are secured using a relevant strain relief mechanism.

It is important to wire the unit in accordance with the data in the User guide and use copper cables (except the thermocouple wiring).

The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise must be allowed to program, install, alter and commission this product.

Failure to follow these instructions can result in death, serious injury or equipment damage.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

This instrument is fitted with a backup battery which should be changed between 6 and 10 years of use.

It is important to maintain a record of instrument configuration or, preferably, a clone file which can be re-loaded after a battery change or any other maintenance.

The battery is not serviceable, contact your local service centre to make suitable arrangements.

Do not use or implement a controller configuration (control strategy) into service without ensuring the configuration has completed all operational tests, been commissioned and approved for service.

Failure to follow these instructions can result in death, serious injury or equipment damage.

ROHS STATEMENT

This certificate relates to the product model mentioned above. The data shown here is related to the following version of the China RoHS 2.0: Administrative Measures for the Restriction of Hazardous Substances in Electric Appliances and Electronic Products" released January 21st 2016.

部件名称 Part Name	有害物质 - Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
金属部件 Metal parts	o	o	o	o	o	o
塑料部件 Plastic parts	o	o	o	o	o	o
电子件 Electronic	x	o	o	o	o	o
触点 Contacts	o	o	x	o	o	o
线缆和线缆附件 Cables & cabling accessories	o	o	o	o	o	o

本表格依据SJ/T11364的规定编制。
O: 表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
X: 表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。

This table is made according to SJ/T 11364.
O: indicates that the concentration of hazardous substance in all of the homogeneous materials for this part is below the limit as stipulated in GB/T 26572.
X: indicates that concentration of hazardous substance in at least one of the homogeneous materials used for this part is above the limit as stipulated in GB/T 26572

Signed (Kevin Shaw, R&D Director): KShaw Date: 24th June 2016

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MINI8™ CONTROLLER

INSTALLATION AND WIRING INSTRUCTIONS

HA028497/15 CN37521 07/19

WHAT IS THE MINI8 CONTROLLER?

The Mini8 Controller is a compact multi-loop PID controller and data acquisition unit, offering a choice of I/O and field communications and designed for mounting on a 35mm 'Top Hat' DIN Rail.

Pre-assembled in the factory, the controller is fitted with all the I/O required for the application, as specified at time of order. With standard applications the Mini8 Controller can be supplied as a configured instrument or it can be configured using iTools configuration software running on a personal computer.

Eurotherm
by Schneider Electric

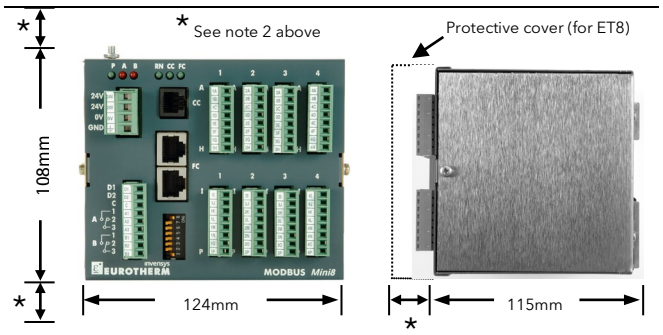
INSTALLING THE MINI8 CONTROLLER

MOUNTING THE UNIT

This unit is intended to be mounted horizontally on a symmetrical DIN rail, 35 x 7.5 or 35 x 15, to the requirements of EN50022.

Notes:

1. The controller is for interior use only and must be mounted in a suitable enclosure.
2. A gap of at least 25mm should be allowed above and below the unit, for ventilation. For cable clearance, a gap of 25mm (31mm if protective cover fitted) should be allowed at the front of the unit.



DIN RAIL MOUNTING

1. Mount the DIN rail horizontally, using suitable bolts.

Note: The unit is NOT intended to be mounted in any other orientation.

2. Ensure that the DIN rail makes good electrical contact with the metal base of the panel.
3. Hook the upper edge of the DIN rail clip on the instrument onto the top of the DIN rail
4. Slowly and firmly, rock the unit downwards until the DIN rail Locking Mechanism springs into place. This is confirmed by an audible 'Click'.

   The unit is now mounted to the DIN rail.

Note: To remove the unit, carefully use a screwdriver to lever down the DIN rail locking mechanism and lift the unit forward when released from the DIN rail.

Environmental Requirements	Minimum	Maximum
Temperature	0°C	55°C
Humidity (Relative – RH)	5% RH	95% RH
Altitude		2000m

PROTECTIVE COVER

When ET8 modules are fitted, also fit the clear protective cover to enhance thermal stability. The figure below shows the cover in place. The cover can be mounted either way up.

Note: If you are using ET8 modules, ensure that the firmware is at version 3.01 or higher.

COMMUNICATIONS INTERFACE

Various operational functions are indicated through the LEDs across the top of the unit.

All controllers have a configuration port 'CC' and a field communication port 'FC' on the communications module.

Note: If the Run mode green LED (RN) is permanently ON, the unit is operating normally.

CONFIGURATION PORT

The EIA232 configuration port (RJ-11 socket) is located to the right of the Power connector. The Mini8 Controller is configured using iTools configuration software running on a PC.

Note: The unit will NOT control whilst in configuration mode.

9 Pin DF to PC Com port	RJ11 Pin	Function	
-	6	(N/C)	Appropriate cable is available from the supplier, order code SubMin8/cable/config.
3 (TX)	5	RX	
2 (RX)	4	TX	
5 (0V)	3	0V (Gnd)	
	2	(N/C)	
	1	Reserved	

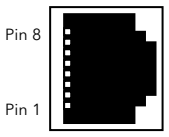
Note: The unit can also be configured to communicate via other protocols, as listed below, using the field network, dependent on the hardware fitted.

COMMUNICATIONS - MODBUS/TCP

Protocol is Modbus/TCP, 10 Base T on an EtherNet network.

The connector includes 2 LEDs, a Yellow LED showing communication activity and a Green LED showing transmitted data.

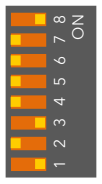
RJ45 PIN FUNCTIONS



RJ45	Colour	Signal
8	Brown	N/A
7	Brown/White	N/A
6	Green	Rx-
5	Blue/White	N/A
4	Blue	N/A
3	Green/White	Rx+
2	Orange	Tx-
1	Orange/White	Tx+
	Plug shroud to cable screen	

THE ADDRESS SWITCH

This switch is situated at the bottom of the Comms slot. Switches 1 to 7 are used to configure the instrument unit ident parameter. Switch 8 is used for DHCP (Dynamic Address) enabling.



OFF ↔ ON

SW	OFF	ON
8	DHCP disabled	DHCP enabled
7	N/A	Address 64
6	N/A	Address 32
5	N/A	Address 16
4	N/A	Address 8
3	N/A	Address 4
2	N/A	Address 2
1	N/A	Address 1

Note:

Use iTools to configure the address when the switches are set 0 and the unit identifier parameter is set to 'Instr'.

ALLOCATION OF ADDRESSES

DHCP is where the instrument (IP host) will ask a DHCP server to provide it with an IP Address. Typically, this happens at start-up, but can be repeated during operation. DHCP includes the concept of assigned values that will 'expire'.

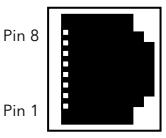
A DHCP server is required that can respond to the request. The DHCP server will need to be configured to correctly respond to the request. This configuration depends on the local company network policy.

COMMUNICATIONS - MODBUS

Protocol is Modbus RTU, EIA422, EIA485 3-wire or 5-wire.

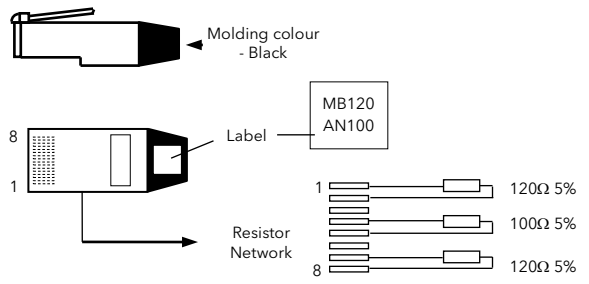
The Modbus network connection is two RJ45 sockets connected in parallel. This allows connections to be daisy-chained from one unit to the next using category 5 patch cables. The line terminator is required on the last unit in the chain.

RJ45 Pin	Colour	3-wire	5-wire
8	Brown	N/A	RxA
7	Brown/White	N/A	RxB
6	Green	N/A	Gnd
5	Blue/White	N/A	N/A
4	Blue	N/A	N/A
3	Green/White	Gnd	Gnd
2	Orange	A	TxA
1	Orange/White	B	TxB
Plug shroud to cable screen			



RJ45 COMMUNICATIONS TERMINATIONS

The communication line must be daisy-chained from unit to unit with the unit at each end of the chain correctly terminated. A black Modbus terminator containing the correct termination resistors is available from your supplier, order code SubMin8/TERM/MODBUS/RJ45.



Note:

The Baud rate defaults to 19200 but can be set during configuration using the iTools configuration software.

THE ADDRESS SWITCH

This switch is situated below the Comms connector.

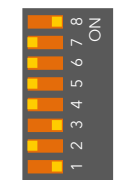
Each unit must have a unique address on the Modbus network.

Note:

If address 0 is set the unit will take the address and Parity settings from the configuration of the instrument.

SW	OFF	ON
8	3-wire	5-wire
7	No parity	Parity
6	Even	Odd
5	N/A	Address 16
4	N/A	Address 8
3	N/A	Address 4
2	N/A	Address 2
1	N/A	Address 1

Supports address 1 to 31



OFF ↔ ON

Firmware upgrades require all switches to be on. This applies to all protocols.

COMMUNICATIONS - DEVICENET®

This instrument supports DeviceNet, and Enhanced DeviceNet Protocols.

DeviceNet uses a 5-way screw terminal connector with 5.08mm pitch. The mating connector is supplied to aid user wiring.

Pin	Legend	Function
5	V+	V+
4	CH	CAN HIGH
3	DR	DRAIN
2	CL	CAN LOW
1	V-	V-

Enhanced DeviceNet uses an M12, five-pin 'Micro-Connect' connector.

Screened DeviceNet specified cable should be used for field wiring.

Pin	Legend	Function
5	CAN_L	CAN LOW
4	CAN_H	CAN HIGH
3	V-	V-
2	V+	V+
1	DR	DRAIN

Terminators

DeviceNet®/Enhanced DeviceNet®

The DeviceNet® specification states that the bus terminators (121Ω) must not be included as any part of a master or slave.

Note: Terminators are not supplied but must be used where required.

POWER

The bus is powered by the network at approximately 100mA.

ADDRESS CONFIGURATION

Each unit must have a unique network address, configured as shown below. The comms. module automatically restarts after the address has been edited.

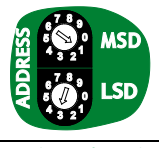
Note: iTools can be used to configure the address when the switches are set to 'off'.

SW	OFF	DeviceNet	Baud Rate		
			125K	250K	500K
8	Baud rate	Baud rate	OFF	OFF	ON
7	Baud rate	Baud rate	OFF	ON	OFF
6	-	Address 32			
5	-	Address 16			
4	-	Address 8			
3	-	Address 4			
2	-	Address 2			
1	-	Address 1			

OFF ↔ ON

The Enhanced DeviceNet® version uses 2 BCD rotary switches.

SW		Enhanced DeviceNet
0 to 9	MSD	First digit of address
0 to 9	LSD	Second digit of address
For example, an address of 13 would be configured by setting the MSD to 1 and LSD to 3.		

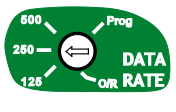


Note: Any address between 64 and 99 is ignored. The address must be configured using iTools.

BAUD RATE

All units must be set to the same Baud rate and must be restarted after the Baud rate is edited. For DeviceNet this is configured using the DIP switch as shown above.

For the Enhanced DeviceNet version a BCD rotary switch is used, as below. Only the indicated positions should be used.



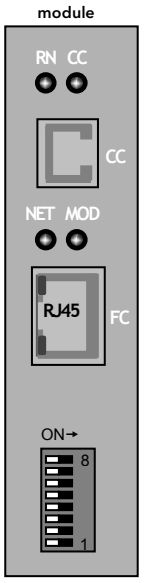
Note: Select the 'O/R' position to configure the baud rate using iTools.

Note: Select the 'Prog' position to enable firmware upgrades. The instrument may need a re-start.

COMMUNICATIONS - ETHERNET/IP

A gateway communications option card is installed in the Mini8 controller to implement the EtherNet/IP server (Adapter).

EtherNet/IP module



RN LED	Function
Green	Run mode

CC LED	Function
Green	Configuration comms activity (EIA232)

MOD LED	Module Status
OFF	No power
Flashing green	Standby / not configured
Steady green	On line / operating correctly
Flashing red	Minor recoverable fault detected
Steady red	Non-recoverable fault detected
Flashing green and red	Power up testing

NET LED	Network Status
OFF	Not on line
Flashing green	On line but no connection
Steady green	On line / operating correctly
Flashing red	Connection timeout
Steady red	Duplicate IP address
Flashing green and red	Initialisation

Feature Switch

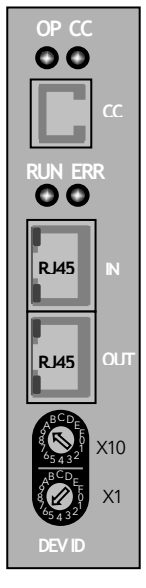
Switches 1 to 8 OFF	Normal working
Switches 1 to 8 ON	Boot mode ON
Switches 1 to 7 OFF Switch 8 ON	DHCP ON

Communications port 'FC'

This is the same as Modbus/TCP above.

COMMUNICATIONS - ETHERCAT

EtherCAT module



OP LED	Run Status
Steady green	Run mode
Off	Not running
Flashing green	Standby
Note: For EtherCAT the RN LED is replaced by OP.	

CC LED	Configuration Port Status
Flashing green	EIA232 configuration port activity
Off	Configuration port inactive
On	Not applicable

RUN LED	EtherCAT Slave Run Status
Off	Initialization
Flashing green	Pre-operational
Single flash green	Safe operational
Steady green	Operational
Flickering green	Boot mode Bootstrap state Or clone download is in progress

ERR LED	Status -
Off	Normal operation
Steady red	No communications
Double flash red	Communications with master lost
Single flash red	EtherCAT comms has changed the EtherCAT state autonomously
Blinking red	Mini8 controller and EtherCAT master configuration do not match

Feature Switch (HEX)

Valid address range 1 to FE (254).
The example shows an address of A6 (166).
A setting of FF (255) is reserved for boot mode.

EtherCAT slaves can be daisy chained using 2 x RJ45 connectors.

Switches or hubs should be EtherCAT compatible.

COMMUNICATIONS - PROFIBUS ™

Protocol is Profibus DP. There are two Profibus communications board options available.

■ 3-wire EIA485 connection via a 9 Pin D-type connector. Intended for installations using standard Profibus cables.

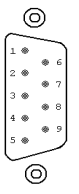
Note: Profibus cabling must make provision for line terminators.

■ 3-wire EIA485 connection via 2 RJ45 sockets.

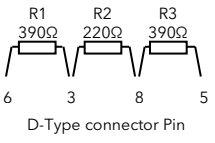
RJ45 Pin	9 PIN D-Type	Signal	Function
-	1	Shield	Shield (Gnd)
-	2	N/A	N/A
1	3	RxD/TxD-P (A)	Receive/Transmit Data 'P'
-	4	N/A	N/A
3	5	DGnd	Data Ground
6	6	VP	Voltage Plus
7	7	N/A	N/A
2	8	RxD/TxD-N (B)	Receive/Transmit Data 'N'
8	9	N/A	N/A

RJ45 Communication Terminators

The communication line must daisy-chained from unit to unit with the device at each end of the chain correctly terminated. For RJ45 units a (grey) Profibus terminator containing the correct termination resistors is available from your supplier, order code SubMin8/TERM/PROFIBUS/RJ45.



Terminations should be included in the cabling as follows:



For D-type termination, 390Ω resistors should be wired across pins 3 and 6 and pins 5 and 8 and a 220Ω resistor between pins 3 and 8.

BAUD RATE

The Baud rate is set by the Profibus master via the network.

ADDRESS CONFIGURATION

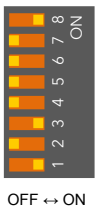
Set using the DIP switch located below the Comms connector. Each unit must have a unique address on the Profibus network.

Notes:

1. Switch position 8 is not used, and address 0 is invalid.
2. If all switch elements are set 'Off', the Profibus address will be set using iTools. Otherwise, the address set at the switch overrides any address set in iTools

SW	OFF	ON
8	N/A	N/A
7	N/A	Address 64
6	N/A	Address 32
5	N/A	Address 16
4	N/A	Address 8
3	N/A	Address 4
2	N/A	Address 2
1	N/A	Address 1

Supports address 1 to 127



OFF ↔ ON