

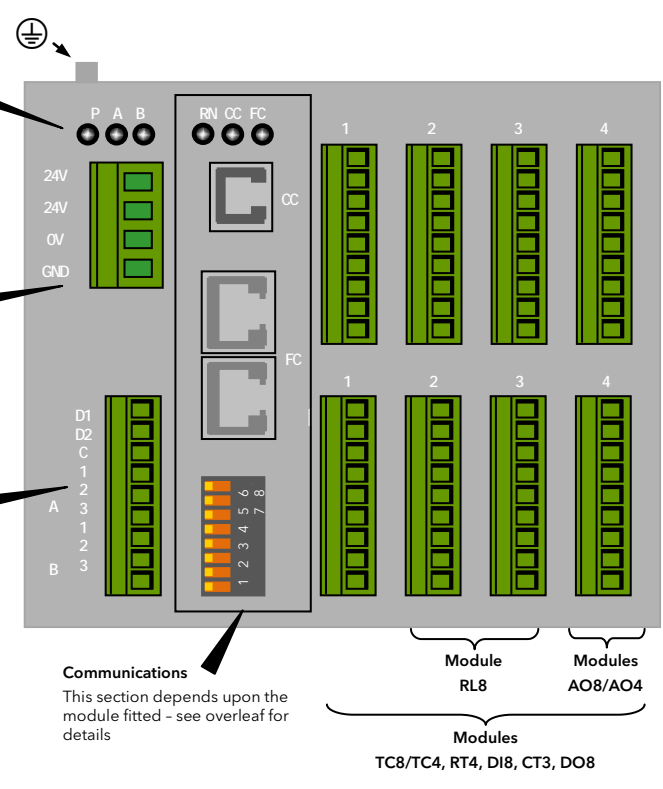
Legend	Colour	Function	Action
P	Green	Power Status	On - Power on Off - Power off
A	Red	Relay A state	On - Energised Off - De-energised
B	Red	Relay B state	On - Energised Off - De-energised

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

These terminals can accept wire sizes 0.25 - 2.1mm (30-12 awg).
Tightening torque 0.5 to 0.6Nm (≈ 5 lb.in.)

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

Legend	Function	Specifications
D1	Digital input 1	Digital Inputs: -28.8V to +5V = Off
D2	Digital input 2	+5V to 10.8V = undefined
C	Digital input common	+10.8V to +28.8V = On
A1	Relay A normally open	Typical drive current: 2.5mA @ 10.8V
A2	Relay A normally closed	Relay contacts: 1 Amp max, 42V dc max.
A3	Relay A common	
B1	Relay B normally open	These terminals can accept wire sizes 0.25 - 1.6mm (30-14 awg).
B2	Relay B normally closed	Tightening torque 0.22 to 0.45Nm (2 - 4 lb.in.)
B3	Relay B common	



CAUTION

The Mini8 Controller is intended for operation at safe low voltage levels, except the Relay Module. Voltages in excess of 42V dc must NOT be applied to any terminals other than the Relay Module, RL8. A protective Earth connection is required. ALWAYS ensure that the protective Earth is fitted first and disconnected last.

Do NOT replace the battery. Return the unit to the factory if replacement is required.

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 Blinking - No traffic or offline Blinking - Comms Traffic
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 failure Blinking Red/Green - Comms fault
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 Checksum failure Blinking Red/Off - Recoverable fault. Comms. error between network and DeviceNet interface. Blinking Red/Green - Power-up tests, failure to enter cyclic states or invalid Baud rate

TC8/TC4 Thermocouple Input

Note: TC4 supports channels 1 to 4 only

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-

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 Analogue Output (slot 4 only)

Note: AO4 supports channels 1 to 4 only

Output current - 0 to 20mA, 360 ohm 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 -

INSTALLATION SAFETY REQUIREMENTS

This instrument is intended for industrial temperature and process control applications within the requirements of the European Directives on Safety and EMC. Information contained here is subject to change without notice. While every effort has been made to ensure the accuracy of the information, your supplier shall not be held liable for errors contained herein.

Safety and EMC protection can be seriously impaired if the unit is not used in the manner specified. The installer must ensure the safety and EMC of the installation. This instrument complies with the European Low Voltage Directive 2006/95/EC, by application of safety standard EN 61010.

Unpacking and storage. If on receipt, the packaging or unit is damaged, do not install but contact your supplier. If being stored before use, protect from humidity and dust in an ambient temperature range of -20°C to +70°C.

Electrostatic discharge precautions. Always observe all electrostatic precautions before handling the unit.

Service and repair. This instrument has no user serviceable parts. Contact your supplier for repair.

Cleaning. Isopropyl alcohol may be used to clean labels. Do not use water or water based products. A mild soap solution may be used to clean other exterior surfaces.

Electromagnetic compatibility. This instrument conforms to the essential protection requirements of the EMC Directive 2004/108/EC, by the application of a Technical Construction File. It satisfies the general requirements of the industrial environment defined in EN 61326.

Symbols. If any of the symbols shown below are used on the instrument they have the following meaning:

CE Mark: Refer to manual. Risk of electric shock. Take precautions against static ESD symbol. Earth symbol. TCA-tick Australia (ACA) and New Zealand (RSM). Dispose of properly. China RoSH (Wheel) Logo. Complies with the RoHS2 (2011/65/EU) directive. Earlier RoHS symbol (RoSH1). Protected by DOUBLE INSULATION.

Installation Category and Pollution Degree. This unit has been designed to conform to BSEN61010 installation category II and pollution degree 2, defined as follows:-

- Installation Category II (CAT II). The rated impulse voltage for equipment on nominal 230V supply is 2500V.
- Pollution Degree 2. Normally only non-conductive pollution occurs. However, a temporary conductivity caused by condensation must be expected.

Personnel. Installation must only be carried out by suitably qualified personnel

Enclosure of Live Parts. To prevent hands or metal tools touching parts that may be electrically live, the unit must be installed in an enclosure.

Caution: Live sensors. The controller is designed to operate if the temperature sensor is connected directly to an electrical heating element. However, you must ensure that service personnel do not touch connections to these inputs while they are live. With a live sensor, all cables, connectors and switches for connecting the sensor must be mains rated for use in 230Vac +15% CATII.

Wiring. It is important to connect the unit in accordance with the data in this sheet. Always use copper cables. Wiring must comply with all local wiring regulations, i.e. UK, the latest IEE wiring regulations, (BS7671), and USA, NEC Class 1 wiring methods.

Voltage rating. The maximum voltage applied to the following terminals must not exceed 230Vac +15% :- relay output to logic; dc or sensor connections; any connections to ground. The controller must not be wired to a three phase supply with an unearthed star connection.

Electrically Conductive pollution e.g. carbon dust, MUST be excluded from the unit enclosure. Where necessary, fit an air filter to the air intake of the enclosure. Where condensation is likely, include a thermostatically controlled heater in the enclosure.

Grounding of the temperature sensor shield. In some installations it is common practice to replace the temperature sensor while the controller is still powered up. Under these conditions, as additional protection against electric shock, we recommend that the shield of the temperature sensor is grounded. Do not rely on grounding through the framework of the machine.

Over Temperature Protection. To prevent overheating of the process under fault conditions, a separate over-temperature protection unit should be fitted which will isolate the heating circuit. This must have an independent temperature sensor. Alarm relays within the unit will not give protection under all failure conditions.

Installation Requirements for EMC. To comply with European EMC directive certain installation precautions are necessary:-

- General guidance. Refer to EMC Installation Guide, Part no. HA025464.
- Relay outputs. It may be necessary to fit a suitable filter to suppress conducted emissions. Filter requirements depend on the type of load.
- Table top installation. If using a standard power socket, compliance with commercial and light industrial emissions standard is usually required. To comply with conducted emissions standard, a suitable mains filter must be installed.

ROSH STATEMENT

Restriction of Hazardous Substances (RoHS)

Product group: Mini8 Controller

Table listing restricted substances

Chinese: 限制使用材料—一览表

产品	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
Mini8 Controller	X	O	X	O	O	O
印刷线路板组件	X	O	X	O	O	O
附属物	O	O	O	O	O	O

English: Restricted Materials Table

Product	Pb	Hg	Cd	Cr(VI)	PBB	PBDE
Mini8 Controller	X	O	X	O	O	O
PCBA	X	O	X	O	O	O
Enclosure	O	O	O	O	O	O

Approval

Name: Martin Greenhalgh Position: Quality Manager Signature: [Signature] Date: 09/12/2007

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MINI8™ CONTROLLER

INSTALLATION AND WIRING INSTRUCTIONS

Power Supply

I/O Connection Terminals

Standard I/O Connection Terminals

Communications Connection Terminals (Version dependent)

Barcode: * H A 0 2 8 4 9 7 *

HA028497/11 CN34980 11/16

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

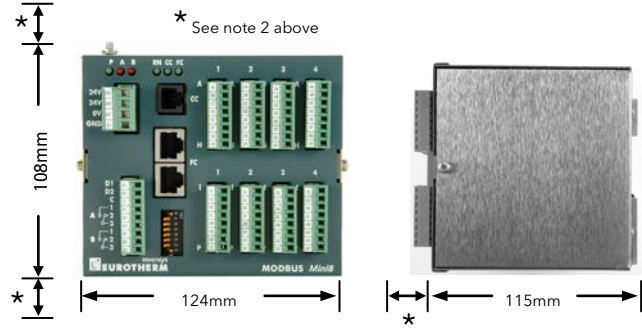
INSTALLING THE MINI8 CONTROLLER

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:

- The controller is for interior use only, and must be mounted in a suitable enclosure.
- A gap of at least 25mm should be left above and below the unit, for ventilation, and in front of it, for cable clearance.



DIN RAIL MOUNTING

- Mount the DIN rail horizontally, using suitable bolts.

Note:

The unit is NOT designed to be mounted in any other orientation.

- Ensure that the DIN rail makes good electrical contact with the metal base of the panel.
- Hook the upper edge of the DIN rail clip on the instrument onto the top of the DIN rail.
- 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, a screwdriver should be used carefully to lever down the DIN rail locking mechanism and the unit lifted 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

WARNING



This instrument is fitted with a back up 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.

For further information see User Manual HA028581 at www.eurotherm.co.uk.

COMMUNICATIONS INTERFACE

Various operational functions are indicated through the LED's 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 during configuration.

9 Pin DF to PC Com port	RJ11 Pin	Function
-	6	(N/C)
3 (TX)	5	RX
2 (RX)	4	TX
5 (OV)	3	0V (Gnd)
	2	(N/C)
	1	Reserved

Appropriate cable is available from the supplier, order code SubMin8/cable/config.

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.

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	RxB
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

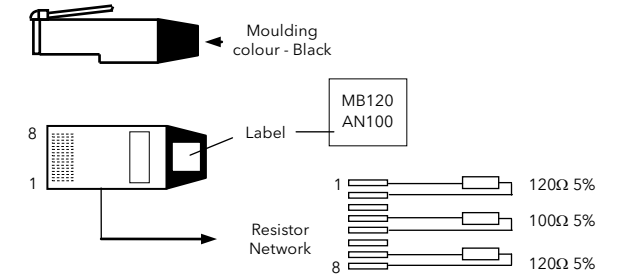
Plug shroud to cable screen

Pin 8

Pin 1

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

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	

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.



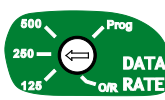
Note: Any address between 64 and 99 is ignored. The address must be configured using iTools.

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	CC LED	Function
Green	Run mode	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
Steady red	Non-recoverable fault
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	Communications port 'FC'
Switches 1 to 8 OFF	Normal working
Switches 1 to 8 ON	Boot mode ON
Switches 1 to 7 OFF	DHCP ON
Switch 8 ON	This is the same as Modbus/TCP above.

COMMUNICATIONS - ETHERCAT

EtherCAT module

OP LED	Run Status	CC LED	Configuration Port Status
Steady green	Run mode	Flashing green	EIA232 configuration port activity
Off	Not running	Off	Configuration port inactive
Flashing green	Standby	On	Not applicable

Note: For EtherCAT the RN LED is replaced by OP.

RUN LED	EtherCAT Slave Run Status
Off	Initialisation
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	Error Status -
Off	No error
Steady red	No communications
Double flash red	Communications with master has failed
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)	EtherCAT slaves
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.	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.

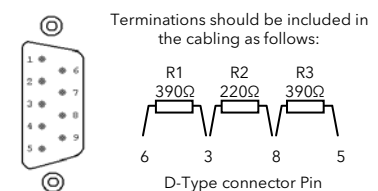
Note: Profibus cabling must make provision for line terminators.

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.



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

BAUDRATE

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

Address

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

Notes:

- Switch position 8 is not used, and address 0 is invalid.
- 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

COMMUNICATIONS - CANOPEN

Instruments supplied after July 2009 no longer support CANopen interface.

Information remains available in the User Manual HA028581 which may be downloaded from www.eurotherm.co.uk.