

Functional insulation 🗕 🗕 –

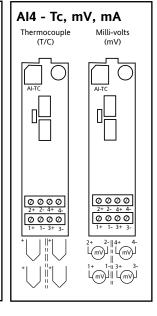
against electric shock.

against electric shock.

This is defined as: Insulation between conductive parts that is necessary only for the proper functioning of the equipment. This does not necessarily provide protection

against electric shock.
Reinforced insulation =:=:=:=:
This is defined as: Insulation between conductive parts, which provides protection

* This supply is an external power supply to power plant devices. For power rating see Technical Specification for the module. Appendix A.



A02-V, mA Voltage, mA 0 0 0 0 1+ 1- 2+ 2-

Voltage mode: The input impedance 'Rv' of the device connected

to the analogue output module must be $>2K\Omega$ for 10V range.

Current mode: The input impedance (or loop impedance) 'Ri' of the device connected to the analogue output module must be $<600\Omega$

Installation Safety Requirements

Various symbols are used on the instrument, they have the following meaning:



Caution (refer to the accompanying documents)





Personnel

Installation must only be carried out by qualified personnel..

Enclosure of live parts To prevent hands or metal tools touching parts that may be electrically live,

the controller must be installed in an enclosure.

Blank Terminal Unit Bases are supplied to hold 2, 4, 8 or 16 modules. In the event that a base is not fully populated a blank terminal unit, part number 026373, will be supplied with the system. It is important that this is fitted into the position

immediately to the right of the last module in order to maintain IP20 rating. Caution: Live sensors

The controller is designed to operate with the temperature sensor 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.

Wiring

It is important to connect the controller in accordance with the wiring data given in this instruction sheet. Take particular care not to connect AC supplies to the low voltage sensor input or other low level inputs and outputs. Only use copper conductors for connections (except thermocouple inputs) and ensure that the wiring of installations comply with all local wiring regulations. For example in the UK use the latest version of the IEE wiring regulations (BS7671). In the USA use NEC Class 1 wiring methods.

Power Isolation

The installation must include a power isolating switch or circuit breaker. This device should be in close proximity (1 meter) to the controller, within easy reach of the operator and marked as the disconnecting device for the

Earth Leakage Current

Due to RFI Filtering there may be an earth leakage current of up to 3.5mA. This may affect the design of an installation of multiple controllers protected by Residual Current Device (RCD) or Ground Fault Detector, (GFD) type

Overcurrent Protection

It is recommended that the DC power supply to the system is fused appropriately to protect the cabling to the units. The 2500 provides a fuse on the IOC Terminal Unit to protect the supply from a fault within the 2500. **Voltage Rating**

The maximum continuous voltage applied between any of the following terminals must not exceed 264Vac:

DI6 input or RLY4 relay output to logic, dc or sensor connections;

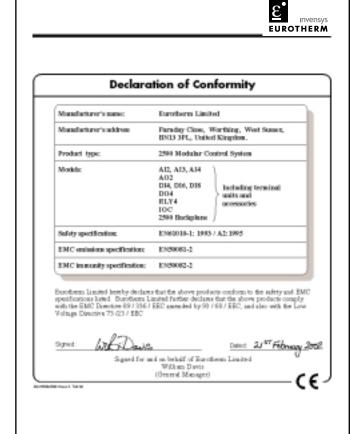
any connection to ground

The controller should not be wired to a three-phase supply with an unearthed star connection. Under fault conditions such a supply could rise above 264Vac with respect to ground and the product would not be safe. **Conductive Pollution**

Electrically conductive pollution must be excluded from the cabinet in which the controller is mounted. To secure a suitable atmosphere in conditions of conductive pollution, fit an air filter to the air intake of the cabinet. Where condensation is likely, include a thermostatically controller heater in the cabinet.

Installation requirements for EMC

To ensure compliance with the European EMC directive certain installation precautions are necessary as follows: For general guidance refer to Eurotherm Controls EMC Installation Guide, HA025464, When using relay outputs it may be necessary to fit a filter suitable for suppressing the emissions. The filter requirements will depend on the type of load. For typical applications we recommend Schaffner FN321 or FN612.



EUROTHERM MODEL 2500 DIN RAIL

CONTROLLER

2500B Base

invensys

INSTALLATION AND WIRING INSTRUCTIONS

WHAT IS THE 2500?

The 2500 is a modular system which can provide multi-loop PID control, analogue and digital I/O, signal conditioning and computational blocks with a variety of plug-in modules.

I/O Control Moduel (IOC) Always mounted in the left 2500M Plug-in I/O Modules hand position Can be mounted in any order

Plant and Process Connections port (RS485/422)

The base unit (2500B) can be provided in different sizes, with up to 16 I/O modules. The base can be mounted on DIN rail (35mm top-hat), or just bolted to a wall.

Terminal units (2500T) clip into the base, providing customer connections to and from the plant devices and interconnections between modules and the Input Output Control module (IOC). Terminal units are specific to particular modules. I/O Modules (2500M) clip into the Terminal Units. These modules are dedicated to specifc functions- analogue or digital, input or output. The IOC module (2500E or 2500C) contains the configuration for the system and communications support. Three communications versions are available for Modbus, Profibus or DeviceNet.

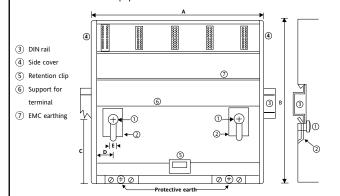
The system requires 24Vdc at less than 100mA module. A suitable power supply is 2500P available in 2.5, 5 or 10 amp versions.

Part No. HA027773 Issue 3.2 Ian-04

The Base

To mount the base

This unit is intended to be mounted within an enclosure or in an environment suitable for IP20 rated equipment. It can be DIN rail or bulkhead mounted.



Model	Dimensions (mm)			Weights	(Kgms)		
2500B	Α	В	C	D	E	No	All
						models	models
						fitted	fitted
S02	87	180	68	15	5	0.6	1.0
504	137	180	68	15	5	0.6	1.0
S08	239	180	68	15	5	1.1	1.7
S10	289	180	68	15	5	1.3	1.9
S12	340	180	68	15	5	1.6	2.1
S16	442	180	68	15	5	2.1	2.7

DIN Rail Mounting (horizontal)

- Mount the DIN rail horizontally, using suitable bolts.
- 2. Ensure that the DIN rail makes good electrical contact with the metal base of the enclosure.
- Loosen screws (1) in the base, and allow them, and the associated base retention clips (2) to drop to the bottom of he screw slot.
- 4. In the back of the base is an extruded slot which locates with the DIN rail(3).
- 5. Fit the top edges of this into the top edge of the DIN rail (3). Slide the screws (1) with the associated clips (2) upwards as far as they will go towards the top of the screw slots. The angled edge of the base retaining clip (2) must locate behind the bottom edge of the DIN rail.
- 6. Tighen the screws (1).

DIN Rail Mounting (vertical)

Caution! It is acceptable to mount the 2500 base vertically. If it is mounted vertically, however, it is advisable to fit a fan in the cubicle to ensure a free flow of air around the modules.

- Mount the DIN rail vertically, using suitable bolts.
 Ensure that the DIN rail makes good electrical contact with the metal base of the enclosure
- 3. Loosen screws (1) in the base, and move them and the associated base retention clips (2) to the bottom of the screw slot.
- 4. In the back of the base is an extruder slot which locates with the DIN rail
- 5. Fit the top edge of this into the top edge of the DIN rail (3)
- 6. Slide the screws (1) with the associated clips (2) upwards as far as they will go towards the top of the screw slots. The angled edge of the base retaining clip (2) must locate behind the bottom edge of the DIN rail.
- Tighten the screws.

- **Direct Panel Mounting**1. Remove the screws (1) and base retention clips (2)
- Hold the base horizontally or vertically on the panel and mark the position of the two holes on the panel.
- 3. Drill two 5.2mm holes in the panel.4. Using M5 bolts supplied, secure the base to the metal panel.

(±) /I\ **CAUTION** Do not operate the equipment without a protective earth conductor connected to

one of the earth terminals on the base unit. The earth cable should have at least the current rating of the largest power cable used to connect to the unit. Connect the protective earth with a suitable tinned copper eyelet, and use the screw ans washer supplied with the base unit, tightened to a torque of 1.2Nm (910.5lbin).

This connection also provides a ground for EMC purposes. For DIN rail mounting, use symmetrical DIN rail to EN50022-35 X 7.5 or 35 X 15 mounted horizontally or vertically.

Connecting the 24Vdc Power Supply

Caution: Before proceeding with any wiring on this unit, please read section on Wiring, and Safety and EMC information. It is the responsibility of the installer to ensure the safety and EMC compliance of any particular installation.

The power supply is the 2500P. This is a DIN rail mounted unit, which may be mounted adjacent to the 2500 base or remotely. Alternatively, an existing power supply may be used provided it meets the specification below

The IOC terminal unit contains a fuse and a reverse biased power diode. If the power is wired reverse polarity the fuse will blow and protect the complete 2500 base from damage. The fuse is not user replacable. The unit should be returned to the factory for replacement.

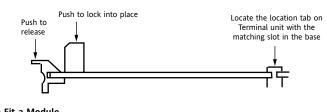
Power supply specification

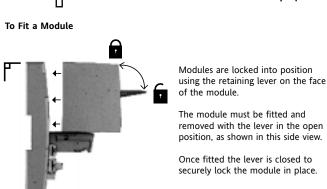
Power supply voltage:	18.0Vdc min to 28.8Vdc max
Supply ripple:	2Vp-p max
Power consumption:	90W max. per base

Note:- The current taken by each module is 100mA on average. 18V is the absolute lower limit. The use of an 18V power supply with any appreciable voltage drop may cause unpredictable or out of specification operation.

To Fit Terminal Unit

Assembling I/O Modules & Terminal Units





The Configuration Port

An RS232 configuration port is provided on the front of the IOC, via a RJ11 socket. When the IOC is powerd up with a PC connected to the RJ11 configuration port, it will start in configuration mode. Alternatively, the IOC is put into configuration mode by setting a command from the configuration . software.

Note:- Existing configuration mode must be done using iTools or through communications.

The IOC will not control the process if:

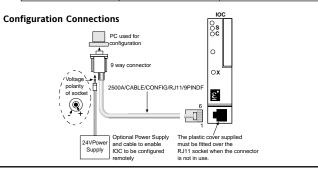
- It is in configuration mode or standby mode A network watchdog time-out occurs (if configured)

It is removed from the system Under these conditions all modules will enter a 'safe' state. Generally this defaults as digital output modules will go to an OFF state, and analogue output modules will go to a minimum output state (generally 0V or 4mA). Unless set

Connections to this socket are given below:

otherwise in the configuration.

Pin connections RJ11 into IOC	Pin connections on 9 way D-type into PC	Pin connections on 25 way D-type into PC
6 no connection	-	
5 RX	3 TX	2TX
4 TCX	2RX	3RX
3 0V	5 0V	7 0V
2 no connection		
1 24V (in)		
Screen	Screen	1 Screen



IOC Terminal unit Address Switches



P=Parity on, P=Parity off, O=Odd, E=Even

Sixty-three Modbus addresse can be set in binary using positions 1 to 6. Parity has three possible states - none/even/odd - using SW7 & 8 as above If the address switch is set to all OFF then the IOC expects to have it address set by the configuration tools. For addresses between 65 and 255 the address switch must be set all OFF and the addres

set in iTools.

Profibus 8 7 6 5 4 3 2 64 32 16 8 4 2 1

The switch gives 127 addresses from 1 to 127. Address 0 is invalid. Switch 8 is not normally used. If, however, it is set to ON the unit address is settable Addresses from u ...

SW7 SW8 Communication...

0 0 125K baud

0 1 250K baud

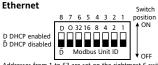
1 0 500K baud

1 1 Both speed and node address controlled

8 7 6 5 4 3 2 1 position

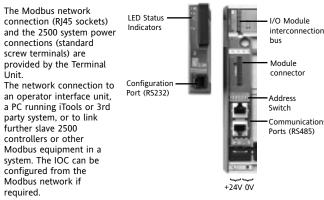
₽ OFF

DeviceNet



Addresses from 1 to 63 are set on the rightmost 6 switches. The leftmost switch may be used to enable DHCP Ethernet addressing, if all switches are off, the Modbus address and DHCP enable will be determined by the value seen in the iTools Operator.

Modbus Communications



Cor

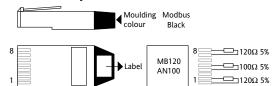
RJ45 pin	Colour	EIA485	2 wire	4 wire
1	Orange/White	В	D-	TX-
2	Orange	Α	D+	TX+
3	Green/White	Gnd	Gnd	Gnd
4	Blue			
5	Blue/White			
6	Green	Gnd	Gnd	Gnd
7	Brown/White	В		RX-
8	Brown	Α		RX+
Screen			-	-

WARNING CABLE COLOURS MAY CHANGE!

Modbus - RJ45 Communications Line Terminator

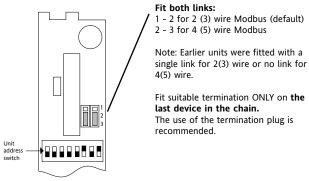
The communications line must be terminated using the appropriate load resistors. To minimise on site wiring and to provide the correct resistor values, 'Terminator' are available from Eurotherm.

2500A/TERM/MODBUS/RJ45



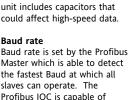
The terminator is plugged into the last RI45 socket in the chain. If the operating interface is a PC or PLC this should be terminated in accordance using the appropriate load resistors

RS422-RS485 Modbus communications selection

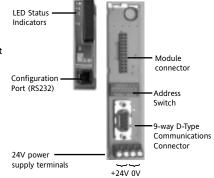


Profibus DP and DPv1 Communications

There are two ProfiBus TU options: a standard 9-Way D-type, and a dual RJ45 unit. The latter is similar to the Modbus terminal unit, but must not be confused; the Modbus unit includes capacitors that could affect high-speed data.



operating at 12Mbaud.



Connections to the Network Connectors

The 9 pin D-Type connector is intended for installations using standard Profibus cables:

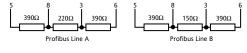
Pin No.	Signal Name	Meaning
1	Shield	Shield (ground)
2	Not used	
3	RxD/TxD-P	Receive/Transmit - Data 'P'
4	Not used	
5	DGND	Data ground
6	VP	Voltage - Plus
7	Not used	
8	RxD/TxD-N	Receive/Transmit - Data 'N'
9	Not used	

Profibus 9-pin D-Type Connections

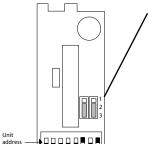
ProfiBus - 9 Pin connectors communications line terminators. For 9 pin D connectors standard ProfiBus cables should be used. These cables have

special headers on the 9 pin D male connector which allow one or two cables to be connected into them and have a small termination load built in with an ON/OFF switch, which is set to ON at the two ends of the link.

The ProfiBus standard states that two types of cable, 'Line A' and 'Line B', may be used. The termination details for these two types of cable are shown below:



Profibus RJ45 type - built-in communictions line terminators



Fit both links:

- 2 to terminate the Profibus network 2 - 3 no termination

Fit suitable termination ONLY on the last device in the chain. On earlier units the use of the termina-

tion plug is recommended on later units fit either the termination unit or both links in position 1 & 2.

Note: Earlier units were fitted with a single link. On these units this link has no function and the system should be terminated using the termination plug.

ſ	RJ45 pin	Colour	Signal
	1	Orange/white	Date 'N'
	2	Orange	Date 'P'
	3	Green/white	Gnd
	4	Blue	-
	5	Blue/white	-
	6	Green	+15V
	7	Brown/white	-
ſ	8	Brown	-
_			

Profibus 9-pin D-Type Connections

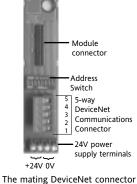
Moulding Profibus

2500A/TERM/PROFIBUS/RJ45



DeviceNet Communications The DeviceNet Communications

IOC is identified by the front label and the order code printed on the side label. This IOC must be used with the DeviceNet Terminal Unit. The DeviceNet Connector is selected to comply with the Devicenet Open Connector specification (5-way, 5.08mm pitch).



(female Open Connector) is supplied to facilitate screwing user wiring. The pin functions are marked on the TU.

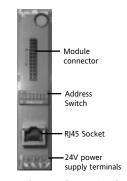
Pin Number	Function
1	V+
2	CAN H
3	DRAĪN
4	CAN L
5	V-

DeviceNet Terminators

The DeviceNet specification states that the bus terminators should not be included as any part of a master or slave. They are not supplied as part of the 2500 DeviceNet termination assembly.

Ethernet Communications

The Ethernet IOC is defined by the front label and the order code printed on the side label. This IOC must be used with the Ethernet Terminal Unit. The Ethernet port is a 10baseT port and can be connected to a hub or switch with Cat5 cable via the standard RJ45 connector. Alternatively, an RI45 cross-over cable may be used to connect direct to a pc 10baseT network



Connections to the RJ45 Socket The RI45 socket is connected

according to the Ethernet standard.

RJ45 pin	Colour	Signal
1	Orange/white	TX+
2	Orange	TX-
3	Green/white	RX+
4	Blue	-
5	Blue/white	-
6	Green	RX-
7	Brown/white	-
8	Brown	-

