INSTALLATION AND OPERATING MANUAL

PT3800 8 Chan PRT Input Module

ASL, Pharmagraph Division

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TABLE OF CONTENTS

REVISION HISTORY

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1 INTRODUCTION

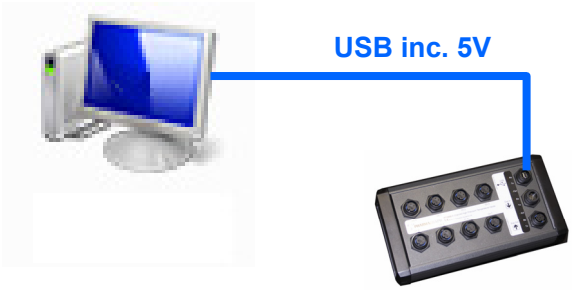
This document constitutes the Installation and Operating Manual for the PT3800 PRT Input Module. It should be read in conjunction with the enVigil software manual that describes the configuration and operation of the monitoring software.

The PT3800 8 Chan PRT Input Module provides:

- 8 PT100 4 wire input channels (up to 4 of which can be digital)
- 4 Digital inputs for status or motion detection
- USB and RS485 communication interfaces

The modules are ‘zero-configuration’ devices. No addresses need be set up and no configuration of input types is required. The module is self-addressing and the probe attached to each input determines the type of measurement that is be made.

The modules have flexible communication options for connection between the host PC and the first module including USB and RS485.



Expansion to subsequent modules is via the ‘Expansion Out’ port.

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2 SPECIFICATION

- 8 Analog inputs for PT100 sensors
  - Linearisation to IEC751 (default) or JIS C1604
  - Output available in °C (default) or °F
- 4 Digital inputs for door switches or motion detectors
- Desktop enclosure with optional wall mount brackets
  - Width 220mm
  - Height 120mm
  - Depth 55mm (without probes connected)
  - Weight 400g approx.
- Power supply
  - 5VDC ±10%
  - 50mA (typ.), 100mA (max.)
- Interfaces
  - USB 2.0 from host
  - RS485 from host or Expansion In, 19k2 baud, 1.2km
  - RS485 Expansion Out, 19k2 baud, 1.2km
- Environmental
  - Operating temperature 0 to 50°C
  - Storage temperature -20 to 60°C
- Measurement
  - Accuracy ±0.15°C
  - Temperature coefficient 0.005°C /°C
  - Series mode rejection 65dB

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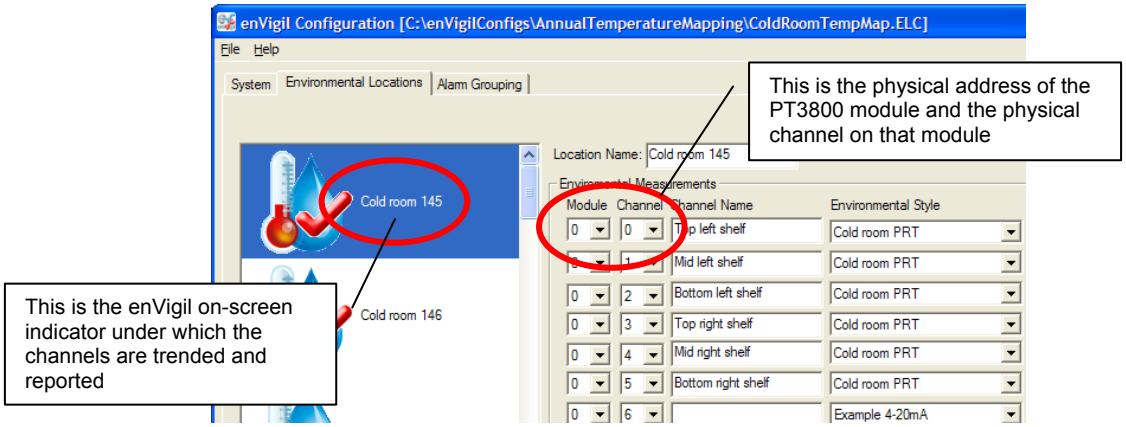
3 AN OVERVIEW OF THE PT3800

PT3800 can be used in either temporary or permanent monitoring scenarios. In a temporary set up such as a temperature mapping exercise in a laboratory environment, the PT3800 can be connected directly to a host PC or laptop via USB. Expansion beyond the initial 8 channels can be accommodated by attaching expansion modules via single cable that carries power and communications between the PT3800 modules.

In a permanent set up such as a temperature monitoring system, the PT3800 can be connected using RS485 throughout.

In all cases, the devices are self-addressing and require no switches to be set. The first unit in the chain automatically assumes the lowest address, with subsequent units in the chain adopting higher addresses without any configuration. A maximum of 20 units may be daisy chained in this manner, effectively forming module addresses 0 through 19 in the enVigil software:



3.1 Power Supply

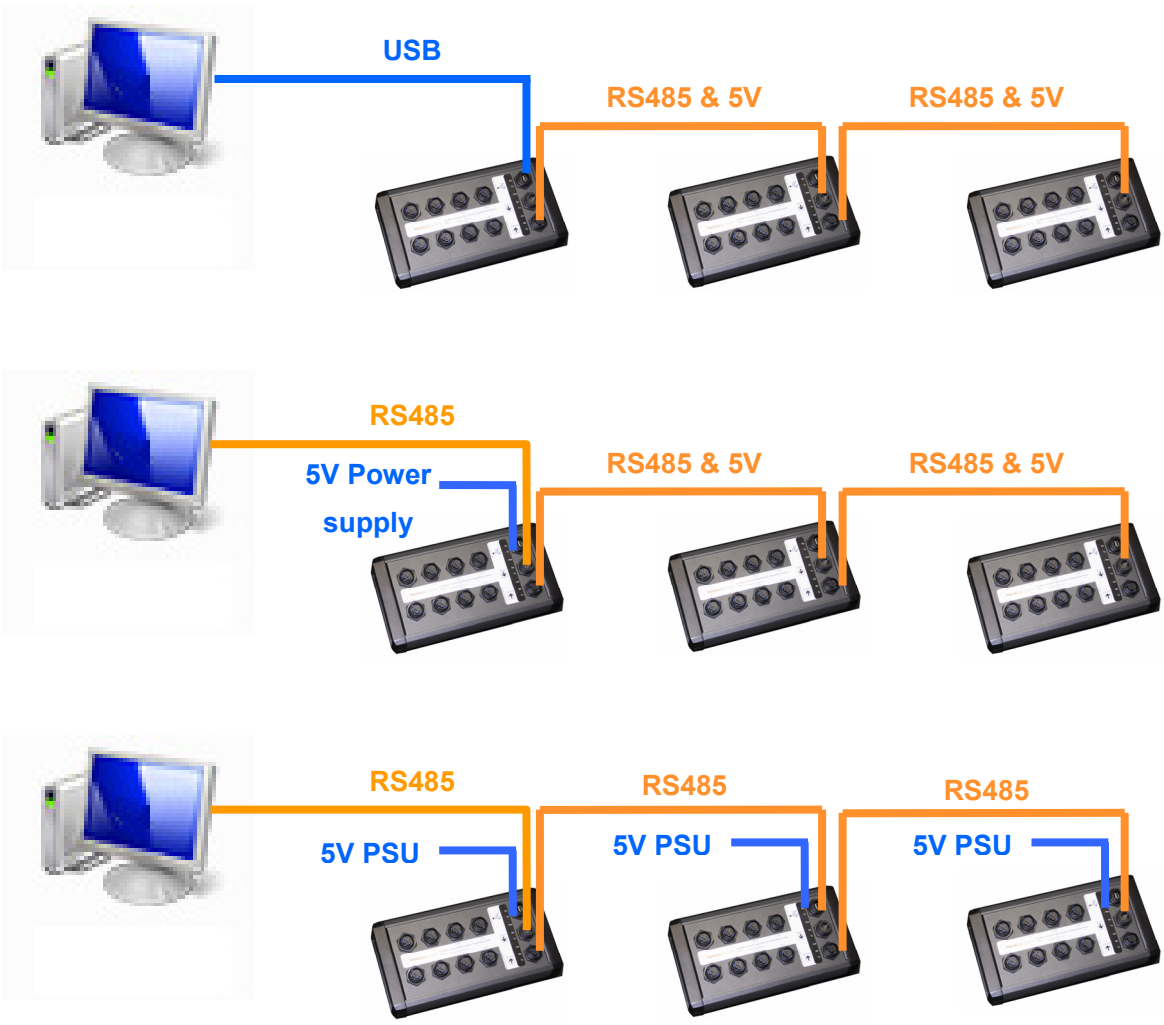
A suitable 5Vdc supply should be provided to the PT3800 enclosure either directly via the USB connector or via the 'Expansion In' connector. The USB port forms a convenient mechanism for connection of both communications and power from the host PC but is limited by the 5 metre length of a USB cable. Where the PC is more than 5m from the first PT3800 then RS485 should be used from the host PC and the USB port may be used simply to power the PT3800 via a local power supply.

3.2 Communications Interfaces

The first module in a system requires a communication link from the host PC. This can either be via the USB connection or the 'Expansion In' RS485 port.

When using the USB port, the PT3800 appears as a USB Serial COM port. The COM port number is assigned when the PT3800 is first connected to the PC and the USB drivers are installed. Note that when connecting a *different* PT3800 device in place of the original device, then Windows will assign a different COM port number. You must then use the Windows Device Manager to restore the COM port number back to the original setting, otherwise the enVigil software driver will not be able to address the new PT3800 (unless the driver is reconfigured to match the new COM port number).

Alternatively you may connect the enVigil Server PC to the first PT3800 using the 'Expansion In' port which is an RS485 bus. If any subsequent PT3800 units are required, they are connected in a daisy chain where the 'Expansion Out' port of the first unit connects to the 'Expansion In' of the next unit and so on.



NOTE: USB and 'Expansion In' cannot be used for communications simultaneously.

3.3 PRT Inputs

Each module has 8 PRT inputs designed to connect to 4 wire PT100 sensors. The module provides a 1mA current pulse for energising the sensor.

The voltage developed across the sensor is measured and the resistance calculated. Switch settings determine if this resistance is to be converted to °C or °F using either the IEC751 tables (commonly known as α = 0.00385) or the JIS C1604 tables (α = 0.003916).

Each input has dual 1mA current sources for the energisation of sensors and contains all the circuitry for measuring the resistance. The currents are switched on only while the channel is being measured.

Calibration constants are held in flash memory within the unit.

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4 CONNECTING THE PT3800

4.1 Power Connection

If not using USB for communications to the first module, then a 5Vdc supply can be connected to USB input connector. The connector is Buccaneer mini USB type B and many mobile phone charger power supplies are readily available that will connect directly. A Buccaneer IP68 rated cable (Buccaneer part number PX0441) with a matching plug may be used if moisture ingress is possible in the operating environment.

Note that immediately after power is applied to the module, the red 'Exp.In Rx' and 'Exp.In Tx' green LEDs flash to indicate the firmware version. For example, two red flashes followed by one green flash indicates firmware version 2.1 also known as 'BA'.

4.2 'Expansion In' Connection

The 'Expansion In' port can be used to connect from previous modules in the chain or if forming the first element in the chain, then the host PC can connect to the module via this port. The power required to drive this module (and subsequent modules) may be supplied via this port if spare cores are available in the communications cable.

This port is a 6 pin socket so a Buccaneer 6 pin cable plug (Buccaneer part number PX0410/06P) is required to connect to this.

'Expansion In' Plug Pin no.	Signal Description
1	RS485A
2	RS485B
3	Screen (Ground)
4	Ground
5	5Vdc power input
6	5Vdc power input

Pins of the module's plug are numbered clockwise starting at the 12 o'clock position with pin 6 being in the centre. Note that this is opposite to the 'Expansion Out' socket.

The 'Expansion In' port has two diagnostic LEDs to assist in on-site commissioning and fault finding. The red LED (Rx) pulses for 10ms for each *received* character and the green LED (Tx) pulses for each *transmitted* character.

4.3 'Expansion Out' Connection

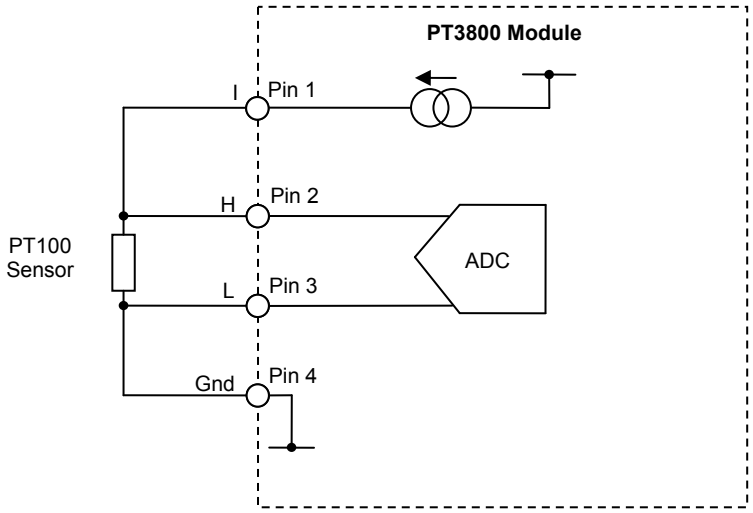
If expansion to additional modules is required then they are connected via the 'Expansion Out' port that carries RS485 communications and 5Vdc power. This port is a 6 pin plug so a Buccaneer 6 pin cable socket (Buccaneer part number PX0410/06S) is required to connect to this.

'Expansion Out' Socket Pin no.	Signal Description
1	RS485A
2	RS485B
3	Screen (Ground)
4	Ground
5	5Vdc power output
6	5Vdc power output

Pins of the module's socket are numbered anti-clockwise starting at the 12 o'clock position with pin 6 being in the centre. Note that this is opposite to the 'Expansion In' plug.

The 'Expansion Out' port has two diagnostic LEDs to assist in on-site commissioning and fault finding. The red LED (Rx) pulses for 10ms for each *received* character and the green LED (Tx) pulses for each *transmitted* character.

4.4 Connecting a 4 Wire PRT



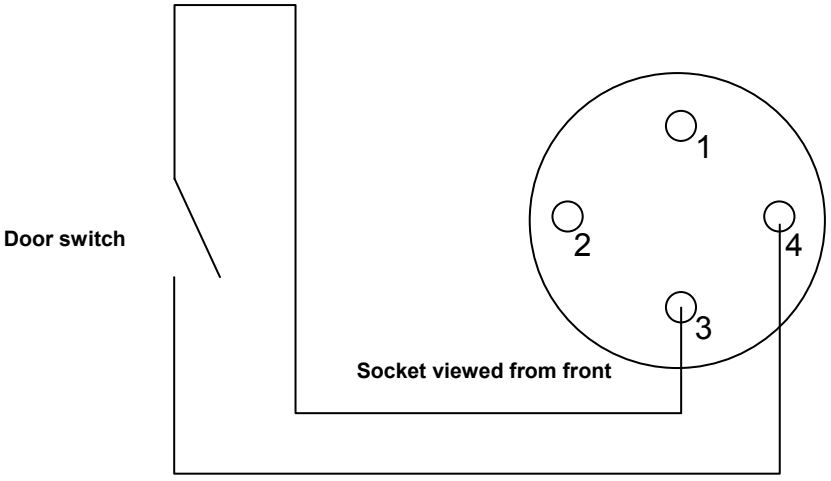
Connect a 4 wire PRT probe to any channel numbered zero thru seven. The module automatically detects that this is a PRT and configures the measurement internally.

The resistance of the PRT is measured by passing a 1mA current through the PRT and measuring the voltage developed. Internally the current is also passed through a precision, low drift reference resistor and the resistance reported is corrected using this measurement. Any drift in the values of the current source or the voltage measurement are therefore compensated for.

The resistance is converted to a temperature and a sensor error value reported if the temperature is outside the range -200 to 850°C.

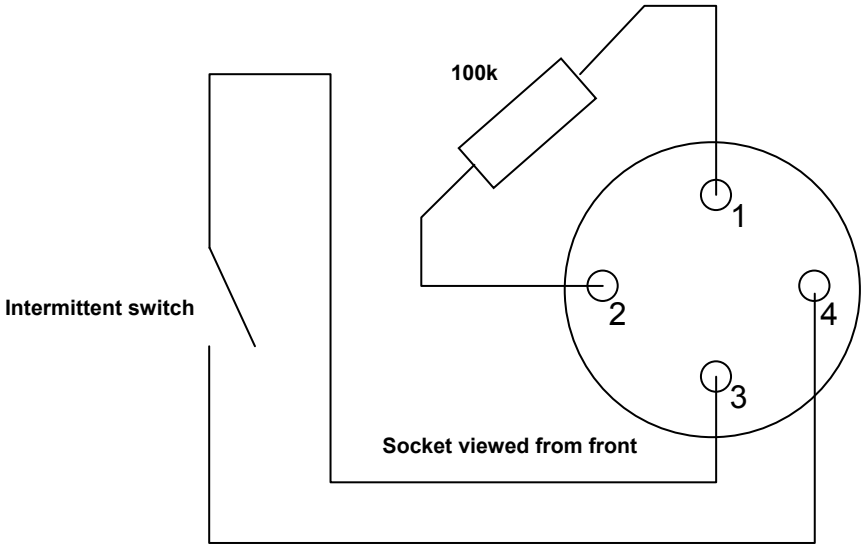
Note that 3 wire PRTs are not supported, but a 2 wire PRT may be connected by shorting pins 1 and 2 and by shorting pins 3 and 4 to simulate a 4 wire probe. 2 wire measurements however, are vastly inferior to 4 wire measurements.

4.5 Connecting a switch input



If a switch (typically a door switch) is connected across pins 3 and 4 then the module configures this as a digital input. When the switch is closed the measured input becomes a logic one, when open the measured input becomes a logic one.

4.6 Connecting a motion detection input



If a mercury switch (or equivalent intermittent switch) is connected across pins 3 and 4 while a ~100k resistor is applied across pins 1 and 2 then the module configures this as a motion detection input. If this input state does not change within a 30 second period, then the measured input becomes a logic zero.

5 PT3800 Mode Selection

5.1 Mode Selection

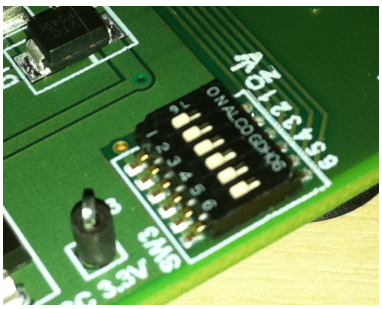
Switch 3 (internal to the module) selects the temperature units and the linearization to be performed. It is set according to the following table:

Switch SW3	Off (default)	On
1	°C	°F
2	IEC751 (α = 0.00385)	JIS C1604 (α = 0.003916)

The defaults are °C and IEC linearization which are the most commonly used.

To gain access to SW3 you must remove the right hand end cap by unscrewing the two M3 screws and turning the module upside down,

Note that SW3 positions are 'ON' when the slider is towards the right (towards the 'ON' legend on the PCB).



5.2 Self-Test Mode

Self test is normally reserved for factory use and is enabled by selecting address 99 on the internal switches SW2 and SW1.

Address at power-up	Meaning
00	Normal operation
99	Self-test mode

Setting the address to 99 will make the PT3800 cycle through a self-test routine designed to allow the module to be functionally tested. The self-test cycle comprises:

- Outputting in ASCII readable format to both the Host and Aux RS485 ports:
  - Module address.
  - Firmware version.
  - Switch settings.
  - Resistance values.
  - Temperature values.
- The front panel LEDs are each lit in turn for half a second.