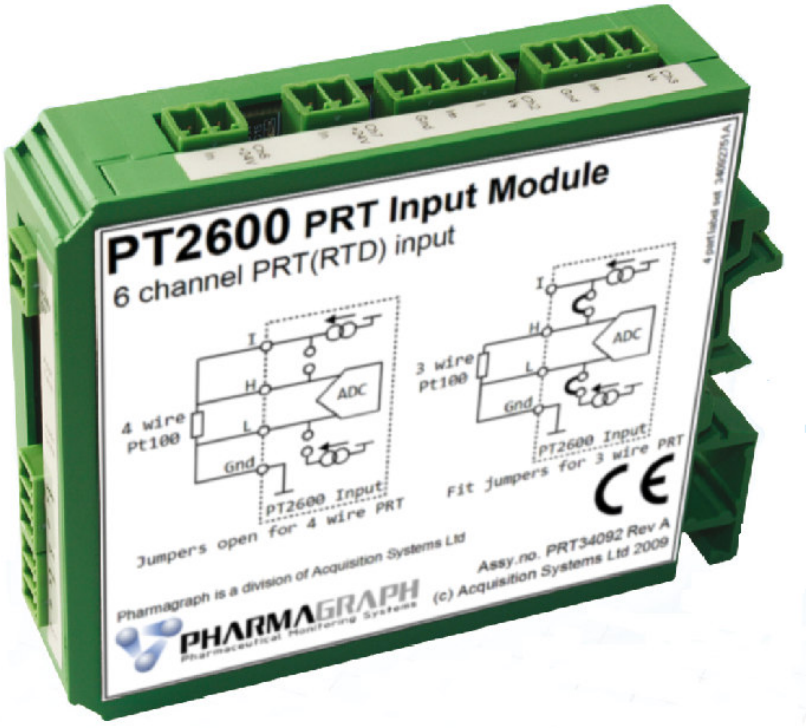
INSTALLATION AND OPERATING MANUAL

PT2600 6 Chan PRT Input Module

ASL, Pharmagraph Division



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REVISION HISTORY

Date	Revision	Updated by	Detail
05 Nov 2009	1.00	J. McCollin	Created
21 Jan 2010	1.01	K.J.McWilliam	Updated following review
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1 INTRODUCTION

This document constitutes the Installation and Operating Manual for the PT2600 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 PT2600 6 Chan PRT Input Module provides:

- 6 PT100 3 or 4 wire input channels.

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 whilst the channel is being measured.

Calibration constants are held in flash memory within the unit.

The modules are connected to a computer using an RS485 link. Two ports are supplied, a host and an auxiliary port. The host port is generally used for connection to a host computer.

The second (Aux) RS485 bus may be used for:

- Calibration of the module.
- Connection to a slave PC if used as part of a dual-redundant system.

2 SPECIFICATION

- 6 Analog inputs for PT100 sensors

  Linearisation to IEC751 or JIS C1604
  Output available in ℃ or ℉

- DIN rail mounted enclosure

  Width 23mm

  Height 85mm

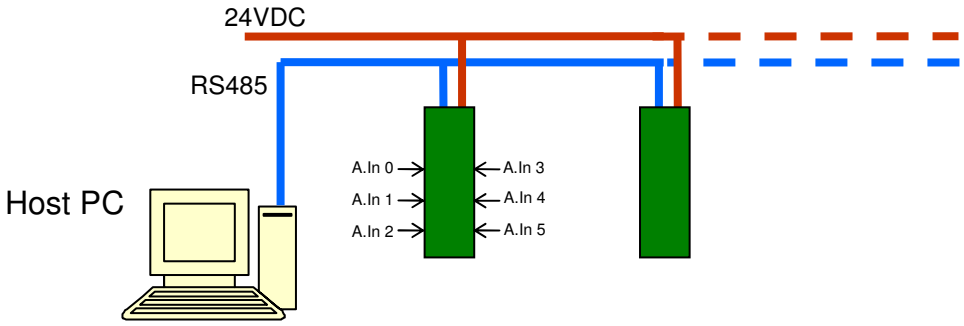
  Depth 105mm

  Weight 85g

- Power supply
  24VDC ±10%
  100mA (typ.), 200mA (max.)
- Interfaces
  RS485 host, 19k2 baud, 1.2km
  RS485 aux, 19k2 baud, 1.2km
- Environmental
  Operating temperature 0 to 50℃
  Storage temperature -20 to 60℃
- Measurement
  Accuracy ±0.15℃
  Temperature coefficient 0.005℃/℃
  Series mode rejection 65dB

3 AN OVERVIEW OF THE PT2600

The general arrangement of a system using PT2600 modules shown below:



3.1 Power Supply

A suitable 24Vdc supply should be provided to the PT2600 enclosure.

3.2 Communications Interfaces

An RS485 bus from the enVigil Server PC should be connected to the PT2600 host port. If required, a second PC can be connected to the Aux port. (See section 5 for further details).

3.3 PRT Inputs

Each module has 6 PRT inputs which are designed to energise and monitor 3 or 4 wire PT100 sensors. The module provides a 1mA current for energising the sensor and a second 1mA source for compensating for lead resistance in 3 wire mode. 3 or 4 wire operation is selected by fitting jumpers inside the unit.

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

4 PT2600 OPERATION

4.1 Address Selection

Two binary-coded-decimal address switches define the *host* RS485 address, and must be set in the range 0 to 31 to correspond with each device used in the configuration software. SW1 are the 'Units' and SW2 are the 'Tens'.

NOTE: The address switches are also used to configure some special mode selections such as 'Self-test' and 'Re-transmit' modes (see section 7).

4.2 Mode Selection

Switch 3 selects the temperature units and the linearization to be performed. It is set according to the following table

Switch SW3	Off	On
1	℃	℉
2	IEC751 (α = 0.00385)	JIS C1604 (α = 0.003916)

Note that SW3 positions are 'ON' when the slider is away from the position number, towards the 'ON' legend.

5 CONNECTING THE PT2600

5.1 DC Power Connection

Connect the DC supply to **JP1**via a 2 pin header plug.

JP1 Pin No.	Description
1 (nearest to module corner)	+24Vdc
2	0V

Immediately after power is applied to the module the diagnostic LEDs D3 (red) and D4 (green) flash to indicate the firmware version. For example, two red flashes followed by one green flash indicates firmware version 2.1.

5.2 Host RS485 Connection

Connect the RS485 bus from the host PC to the host port via a three pin header plug.

JP2 Pin no.	Signal Description
1	RS485A
2	RS485B
3	Screen

When using RS485 over long distances, the bus may need to be terminated and biased. Biasing can be done by switching SW3/3 and SW3/4 to 'ON' on one of the PCB's (usually the last module in the line.) Termination can be done by fitting a suitable terminator to the last module in the line.

The Host RS485 port has two diagnostic LEDs to assist in on-site fault finding. The red LED (D3) pulses for 10ms for each *received* character and the green LED (D4) pulses for each *transmitted* character.

5.3 Aux RS485 Connection

If part of a dual-redundant (master/slave) system then connect the Aux RS485 bus of this module to the slave computer using a three pin plug.

JP3 Pin no.	Signal Description
1	RS485A
2	RS485B
3	Screen

The Aux RS485 port has two diagnostic LEDs to assist in on-site fault finding. The red LED (D5) pulses for 10ms for each *received* character and the green LED (D6) pulses for each *transmitted* character.

5.3.1 Aux Interface as part of a fault-tolerant system

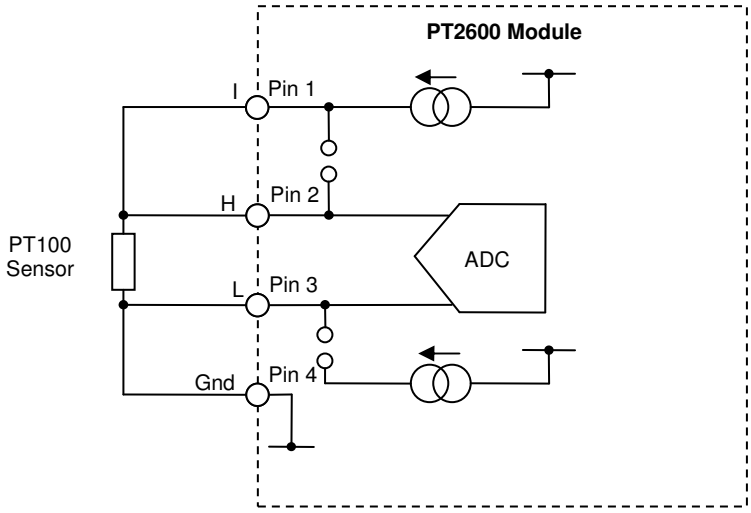
The auxiliary RS485 bus from the second PC (or Serial Device Server if used) should be looped into and out of each module in turn, until the last module is reached. Only the final module in the chain can have the aux RS485 bus terminated by switching S3/6 to 'ON' on the controller PCB. It should be noted that termination should only necessary for extremely long cable lengths and that not all RS485 interfaces (or Serial Device Servers) are capable of driving terminated busses.

In this mode JP3 is used for Aux RS485 in and out.

5.3.2 Aux Interface as a host RS485 re-transmitter

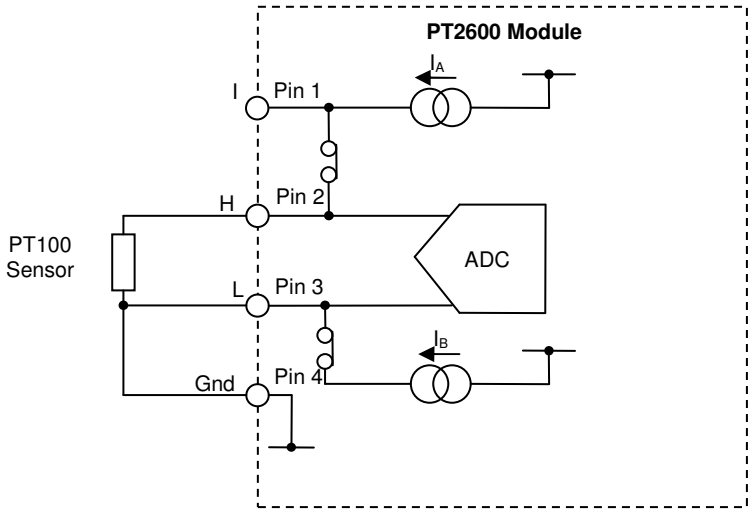
When used as a re-transmitter for the host RS485 bus, the *last* module that forms part of the first bus segment should be set to 'Re-transmit' mode (see section 7.1) and the Aux 485 interface from that module should be connected to the host RS485 of the *first* module that forms part of the second bus segment.

5.4 4 Wire PRT Connection



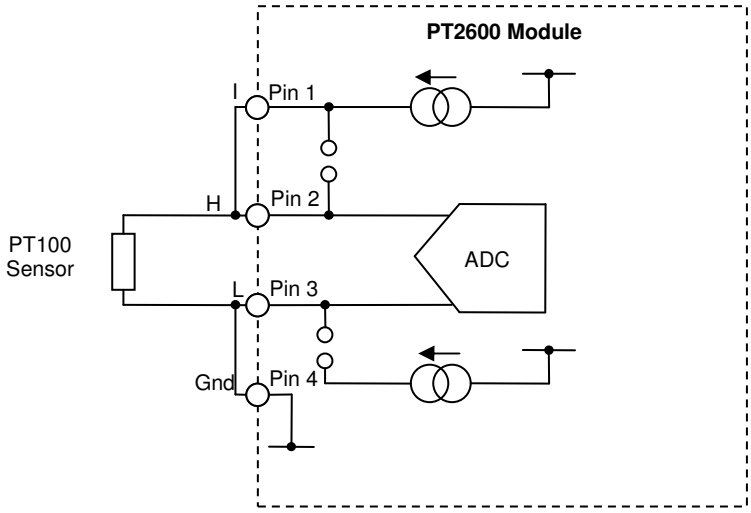
The jumpers should not be fitted for 4 wire mode. (This is the factory default setting). The second current source is not used in this mode.

5.5 3 Wire PRT Connection



Both jumpers should be fitted for 3 wire mode. I_A flows in the H lead and I_B flows in the L lead. If I_A and I_B are equal and the lead resistances are equal, the voltage drops down the leads will cancel each other out.

5.6 2 Wire PRT Connection



6 RESISTANCE MEASUREMENT

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 resistor and the resistance reported is corrected by 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. A sensor error value is reported if the temperature is outside the range -200 to 850°C.

7 MODE SELECTION

7.1 Re-transmit Mode Selection

To enable or disable 'Re-transmit' mode or to enable 'Self-test' mode, some special addresses are used once at power-up only:

Address at power-up	Meaning
0 thru 31	Normal operation
97	Disable 'Re-transmit' mode
98	Enable 'Re-transmit' mode

For example, to enable 'Re-transmit' mode you must first set the switches to 98 then power the module off then on again. You must then set the address switches to the desired address, then power the module off and on again before beginning normal operation.

The Re-transmit mode is non-volatile and will be retained through power cycles since it is stored in flash memory internal to the module.

7.2 Self-Test Mode Selection

Self test is normally reserved for factory use and is enabled by selecting address 99.

Address at power-up	Meaning
0 thru 31	Normal operation
99	Self-test mode:

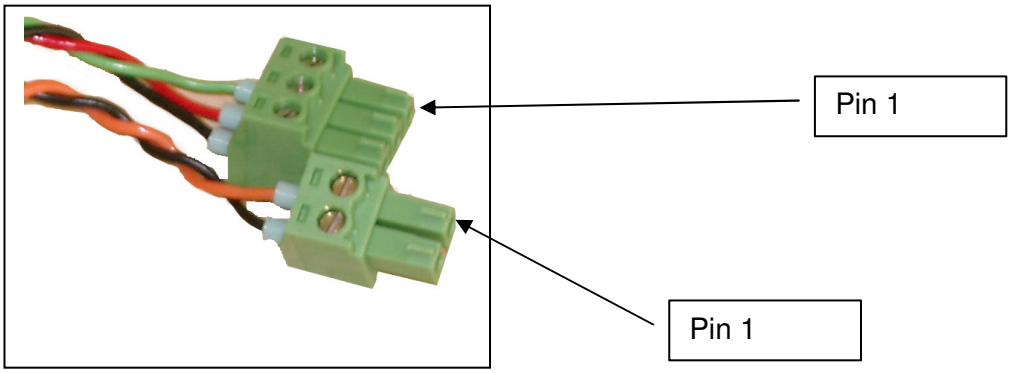
Setting the address to 99 will make the PT2600 cycle through a self-test routine designed to allow the module to be functionally tested. Self-test cycle comprises:

- Outputting in ASCII readable format to both the Host and Aux RS485 ports:
  - Module address.
  - Firmware version.
  - Switch settings.
  - Resistance values.
  - Temperature values.
- LEDs D2 thru D7 are each lit in turn for half a second. During this period, any characters received will be echoed at the end of this period.

8 ORIENTATION OF HEADER CONNECTORS

To improve ease of installation, two part headers are used for all external connections to the module.

It is however, vital that the correct orientation of the two part connectors is observed. Pin 1 of the header on the PCB is always at the *left* when looking into the header with the PCB viewed from the edge. Failure to observe the correct orientation may result in damage to the module or failure to operate
correctly

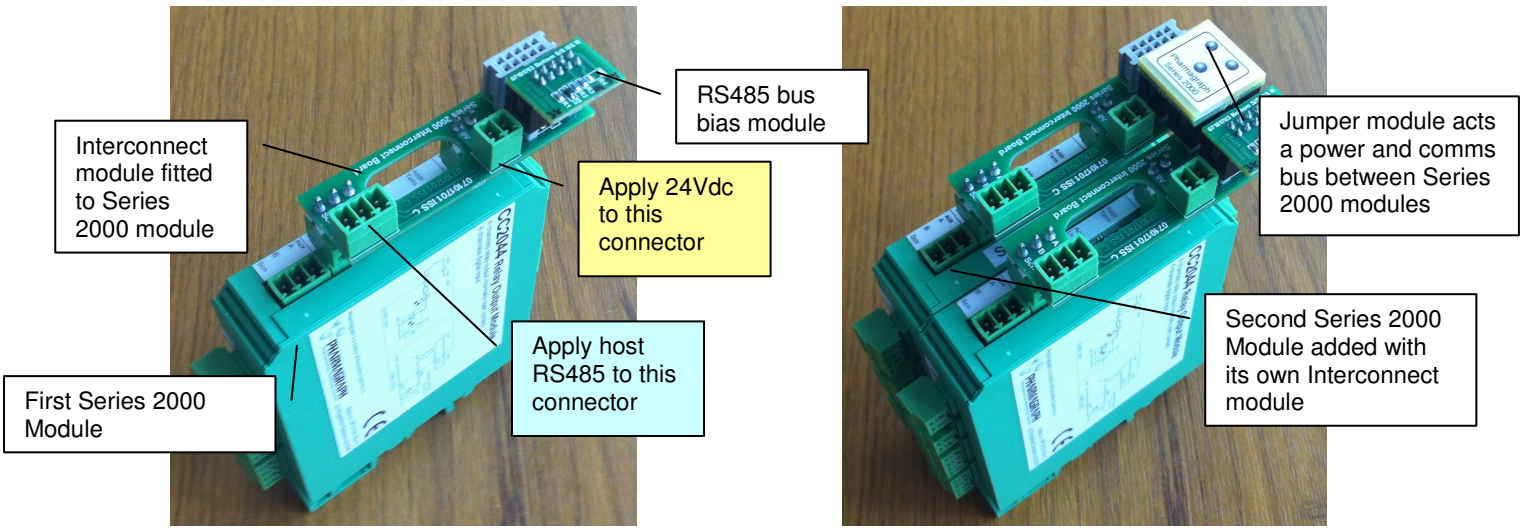


Orientation of pin 1 on two-part headers

9 USING SERIES 2000 INTERCONNECT MODULES

Where multiple Series 2000 modules are adjacent, the Series 2000 Interconnect Modules help provide a simple and convenient method of delivering 24V power via a self-resetting (1 Amp) fuse and the host RS485 bus to each module. The Series 2000 Interconnect also provides a mechanism for attaching a RS485 bus bias module. This is often used to improve the reliability of RS485 by defining the signals levels on the RS485 bus when no device is driving it. The address switches and diagnostic LEDs remain accessible through an aperture in the Interconnect Module.

Each Series 2000 Module ships with an 'Interconnect Module' and a 'Jumper module' that may be used to connect to the previous Series 2000 module as shown below:



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