1.0 GENERAL

The unit is a highly accurate and stable digital process indicator that accepts all commonly used process signals. The unit can be used "stand alone" or, with the Modbus serial communications pod option, as part of a larger system.

The case design enables option Pods to be easily installed without the need for dismantling or recalibration. A range of Pods are available for:
- Relay outputs
- Isolated 4-20 mA retransmission
- Modbus serial communication.

2.0 UNPACKING

Please inspect the instrument carefully for any signs of shipping damage. The packaging has been designed to afford maximum protection; however, we cannot guarantee that mishandling will not have damaged the instrument. In the case of this unlikely event, please contact your supplier immediately and retain the packaging for subsequent inspection.

3.0 INSTALLATION

THIS SECTION FOR USE BY COMPETENT PERSONNEL ONLY

3.1 Safety Information

- WARNING READ SAFETY INFORMATION BELOW BEFORE INSTALLATION

- WARNING Hazardous voltages may be present on the terminals - the equipment must be installed by suitably qualified personnel and mounted in an enclosure providing protection to at least IP20.

- ISOLATION The power supply terminals and associated internal circuitry are isolated from all other parts of the equipment in accordance with BS EN61010-1 for connection to a Category II supply (pollution degree 2).

Functional isolation (500V max) is provided between input and output circuits, and between inputs and communications (where fitted).

Any terminals or wiring connected to the input/output communications terminals which are accessible in normal operation must ONLY be connected to signals complying with the requirements for Safety extra low voltage (SELV) circuits.

- WARNING If not installed in accordance with these instructions, protection against electrical hazards may be impaired

- Installation overvoltage category - 2 (as per BS EN61010-1).

- The mains supply to the equipment must be protected by an external 1 Amp fuse and a suitable switch or circuit breaker which should be near the equipment.

- The equipment contains no user serviceable parts.

3.2 Installing into a Panel

Refer to section 8.0 for Mechanical Detail.

The maximum panel thickness is 10mm. The instrument case has an integral gasket which forms a seal when the instrument is tightened against the panel. The panel should be clean, smooth and at least 1.6mm thick for the seal to be effective.

- WARNING Use only the retaining screws provided to clamp the instrument to the panel (screws must be tightened sufficiently to effect a seal but must never be over tightened).
3.3 Wiring
All connections are made to sockets which are removable for ease of maintenance.
Installation should be undertaken in accordance with relevant sections of BS5739 - British Standards code of practice for "Instrumentation in Process Control Systems: Installation design and practice".

3.4 Power Supply
The Power supply rating will be indicated on the top of the instrument, ensure it is correct for the application.
The mains supply to the equipment must be protected by an external 1 Amp fuse and a suitable switch or circuit breaker which should be near the equipment.

Wires are retained by screws. Ensure that the exposed section of the wire is fully inserted and that no loose strands are exposed.

3.5 Sensor Connections
All sensor connections are made via the five way "fast wiring" socket on the rear of the unit (wire size 0.5 to 1.5mm2).

3.5.1 Current Measurement of an Internally Powered Loop

A 24V internal power supply is available to power external field transmitters.

3.5.2 Current Measurement of an Externally Powered Loop

3.5.3 Voltage Connection

To make a connection, insert small screwdriver blade into tension clamp of (1), push and twist to deflect clamp into open position. Do not lever screwdriver thus forcing connector body sideways. Insert conductor tail sufficiently into (2) then release screwdriver. Ensure wire goes firmly without weak spots or bends.

4.0 PROGRAMMING THE INSTRUMENT

The unit is a microprocessor based instrument enabling it to satisfy a variety of applications. All programming is available from the front panel or via a PC using the RS485 Modbus communications port.

4.1 Programming Guide

The unit has three operating modes. These are -
- RUN (DISPLAYS PROCESS VARIABLE)
- MENU
- EDIT

RUN is the principal mode of operation, which displays the Process Variable from which all other modes are accessed. The unit will always time-out back to this mode after one minute.

MENU mode provides access to the programmable parameters.

EDIT mode is entered from Menu Mode and allows the user to inspect and modify a parameter.

4.2 Key Definitions

All programming is done using the three front panel keys, A, B and C are shown to assist the tutorial.

CYCLE (A), SHIFT (B) and INC (C) keys are pressed singularly.

ESCAPE (A&B), ENTER (B&C) and CLEAR (A&C) are obtained by simultaneously pressing the two keys.

4.3 Entering Menu Mode

The Root Menu mode is accessed from "RUN" by pressing ENTER (B&C) followed by CYCLE (A). The display will now show "rPT". In order to understand what this means, the following diagram shows where we are within the basic Root menu.

* Slot menus only appear when respective option pads are fitted.

4.3.1 Moving Around The Menu

You can browse through the Root menu by pressing CYCLE (A) which moves the menu position from left to right (after reaching SYS, the menu position wraps around to the start).

4.3.2 Entering A Submenu

To enter a submenu, first cycle around the Root menu until the required submenu is displayed. For the purposes of this tutorial press the CYCLE (A) key until InPt is displayed. Pressing SHIFT (B) enters the Input Submenu.

InPt menu will now be displayed. The diagram shows our position in relation to other items in the menu.

Pressing CYCLE (A) moves left to right, wrapping around at the end. The unit alters items in the menu list depending upon settings made.

4.3.3 Editing A Parameter

The items displayed in the menu can either be submenus, parameters or numbers, most of the items in the inputs menu are parameters which can be edited.
5.2 Failure Modes

If the input is outside the measuring range of the instrument, the following error messages will be shown:

<table>
<thead>
<tr>
<th>Input</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over range</td>
<td></td>
</tr>
<tr>
<td>Under range</td>
<td></td>
</tr>
</tbody>
</table>

6.0 SPECIFICATION @20 °C

6.1 Process Specification

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>0-1 volts / 1-5 volts / 0-10 volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>0.005% FS</td>
</tr>
<tr>
<td>Thermal Drift</td>
<td>Zero</td>
</tr>
<tr>
<td>Span</td>
<td>0.1μV / °C</td>
</tr>
<tr>
<td>Current Range</td>
<td>0.02mA / 0.4mA / 0-10mA</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>47 ohm (current)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.005% FS</td>
</tr>
<tr>
<td>Thermal Drift</td>
<td>100 μV / °C</td>
</tr>
<tr>
<td>Exciation</td>
<td>24V ±5% @ 50 mA</td>
</tr>
</tbody>
</table>

6.2 General Specification @20 °C

- Input/Output Isolation: 500VAC rms (galvanically isolated)
- Update time: 250 ms maximum
- Time Constant (Filter factor): <1 second (to 63% of final value)
- Filter Factor: O/S, 10 Seconds or Adaptive
- Warm-up time: 2 minutes to full accuracy
- Display Range: -999 to 9999
- Power Supply: 51 / 52
- Power Consumption: 6W Max (no options fitted)
- Environmental: INGS
- Sealing to PANEL: IGNS
- Ambient Operating Range: -30 to +60 °C
- Ambient Storage Temperature: -50 to +85 °C
- Ambient Humidity Range: 10 to 90% RH non-condensing
- Approvals: EMI, NCC
- Emissions BS EN50081-1
- Susceptibility BS EN50082-2
- Electrical Safety BS EN61010-1
- UL pending

7.0 OPTION PODS

7.1 Installing Pods

*Power must be removed from unit before adding/removing a pod.*

Slot 1 (alarm 1 and 2) should be positioned on the left side of the unit looking from the front to correspond to front panel alarm indicator, slot 2 (alarm 3 and 4) is positioned on the right.

To install an option pod, slide back the cover to its next engaging position and push the pod connection within the mating connector.

To remove an option pod, disengage the support latch situated beneath the pod by pushing the back cover forward, the pod can then be lifted away from the instrument connector.

7.1.1 SLT1, SLT2 (Relay Pod) Submenu

Each relay can be set as high or low alarm independently.

<table>
<thead>
<tr>
<th>TITLE</th>
<th>OPTIONS</th>
<th>DETAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL1</td>
<td>Hi, Lo</td>
<td>Alarm action</td>
</tr>
<tr>
<td>SET1</td>
<td>User defined</td>
<td>PV at which the alarm triggers</td>
</tr>
<tr>
<td>HYST1</td>
<td>User defined</td>
<td>Hysteresis band (see below)</td>
</tr>
<tr>
<td>LATCH</td>
<td>OFF, on</td>
<td>Sets latching to on or off</td>
</tr>
<tr>
<td>IN</td>
<td>OFF, on</td>
<td>Invert relay operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continues through for Relays 2 - 4 (when fitted).</td>
</tr>
</tbody>
</table>
7.2 Isolated 4-20mA Re-transmission Pod. POD-3000/03

The re-transmission pod (when fitted) is designed to provide 0-10mA, 0-20mA or 4-20mA output in active or passive modes. The output can be any portion of the display. The pod can be used in two modes:

Active (Source)

Passive (Sink)

\[ R \text{ Load} = \frac{V_{\text{max}}}{R_{\text{Load}}} \]

Note: Only one Re-transmission pod can be fitted.

7.3.2 Comms Pod Specification

Configuration, system I/O and display unit PC communication.
Physical Layer: 4 wire or 2 wire half duplex RS485
Isolation: 500V AC
Maximum Freq. Out: 32 units
Software Baud Rate: 19,200 or 9,600
Protocol: Modbus RTU format

* Optional link

5 TX
6 TX
7 RX
8 RX

* Connection of the link connects a 100 ohm termination resistor across pins 7 and 8. This resistor should only be selected for the instrument furthest away from the host.

8.0 MECHANICAL DETAIL

Material: A95/PC
Weight: 200g
Flammability: IEC707 FW0
Pod weight: 45g typical
Panel cutout: 92mm x 45mm

7.3 Modbus Serial Communications Pod. POD-3000/05

The diagram below shows a PC connected to Modbus pods.

7.3.1 SLT1, SLT2 (Communications) Submenu

<table>
<thead>
<tr>
<th>TITLE</th>
<th>OPTIONS</th>
<th>DETAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addr</td>
<td>User defined</td>
<td>Instrument device number</td>
</tr>
<tr>
<td>baud</td>
<td>User selected baud rate</td>
<td>4 Wire or 2 wire half duplex RS 485</td>
</tr>
<tr>
<td>Line</td>
<td>2, 4</td>
<td></td>
</tr>
</tbody>
</table>