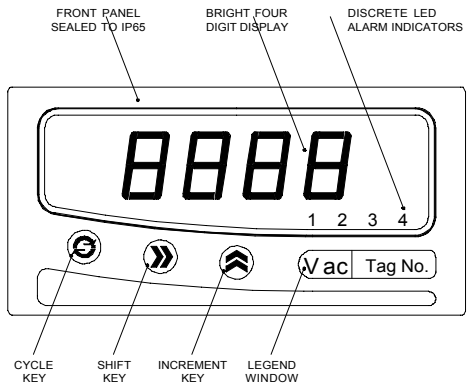
## 1.0 GENERAL

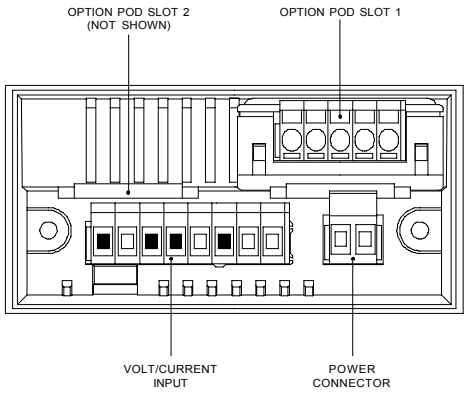
The unit is a highly accurate and stable digital indicator for displaying AC/DC current or voltage in true RMS. The unit can be used "stand alone" or, with the Modbus serial communications pod option, as part of a larger system.

The case design enables option Pods to be easily installed without the need for dismantling or re-calibration. A range of Pods are available for:

- Relay outputs
- Isolated 4-20 mA re-transmission
- Modbus serial communication.




The diagram shows the rear panel positions for all electrical connections.




## 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**

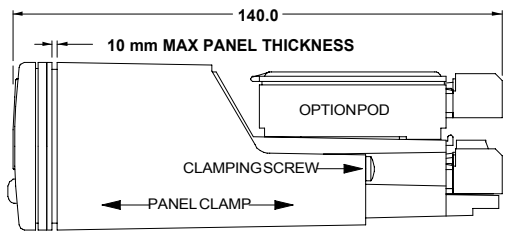
### 3.1 Safety Information

- **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 (3.5kv max) is provided between input and output circuits, and between inputs and communications (where fitted).

  Any terminals or wiring connected to the input, output or 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.
- The indicator must be panel mounted into a suitable enclosure, with at least IP20 protection behind panel.

### 3.2 Installing Into a Panel




Cutout 92.0/92.8 x 45.0/45.6 mm (DIN 43700)

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 overtightened).**

### 3.3 Wiring

All connections are made to sockets which are removable for ease of maintenance.

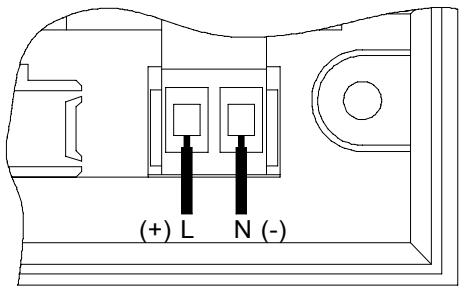
**Installation should be undertaken in accordance with relevant sections of BS6739 - British Standards code of practice for "Instrumentation in Process Control Systems: Installation design and practice".**

### 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.




To minimise potential noise problems, power the indicator from the same power branch or phase as that at the signal source.

# DM3430 TRUE RMS INDICATOR


Designed, manufactured and supported by :

STATUS INSTRUMENTS

Status Business Park. Tewkesbury.
Gloucestershire. GL20 8FD. UK
Tel : 01684 296818.
Fax : 01684 293746.
Email: support@status.co.uk Web:
www.status.co.uk





Stock code : 52-314-2317-01 Issue: 2

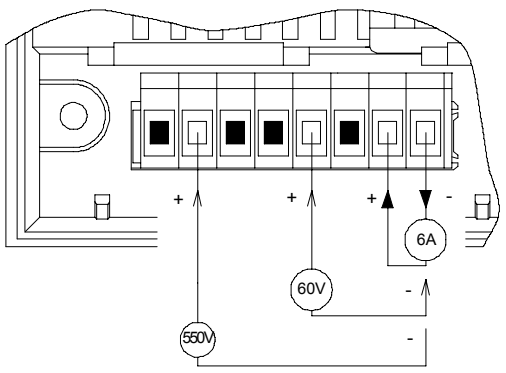

### 3.5 Input Connections

All input connections are made via the eight way socket at the rear of the unit (wire size 0 to 2.5mm²).

Isolation

The input is isolated by 3500V from the indicator circuitry and from the output options.

#### 3.5.1 Voltage and Current Measurement




Connect only one input at any time to the indicator. Wherever possible connect the neutral side or circuit common to the input - terminal.

Ensure power is disconnected prior to wiring.

## 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 pod.

### 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.

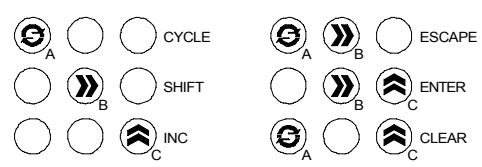
**EDIT** mode is entered from Menu Mode and allows the user to inspect and modify a parameter.

### 4.2 Key Definitions

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

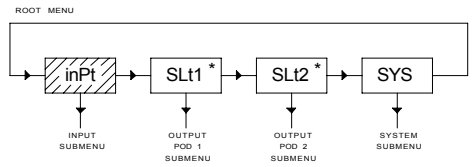
**CYCLE (A), SHIFT (B)** and **INC (C)** keys are pressed singularly.

**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 "inPt". 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 pods are fitted.

#### 4.3.1 Moving Around The Menu

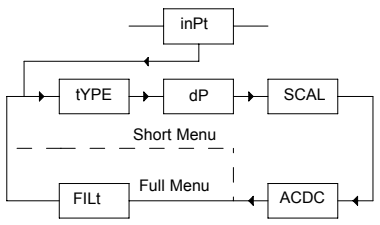
You can browse through the Root menu by pressing **CYCLE (A)** which moves the menu position from left to right (after reaching SYS, the menu position wraps around to the start).

#### 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.

tYPe 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.



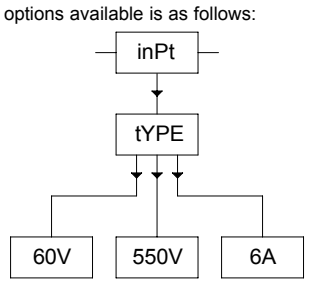
#### 4.3.3 Editing A Parameter

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.

Press the CYCLE (A) key until tYPe is displayed, then press SHIFT (B).

The current setting will now be shown flashing. This item is changed by pressing the INC (C) key.

The choice of options available is as follows:




Press the **INC (C)** key until "60V" is displayed.

Note that whilst the display is flashing, the option on the display has not been saved to memory. To select an option, the **ENTER** key sequence is used. Press **ENTER (B&C)**. The display will stop flashing momentarily before returning to Menu mode. The system automatically steps on to the next entry to speed the process of programming. This method of editing parameters is repeated throughout the menu structure.

#### 4.3.4 Returning From Submenus

To return up from the inPt menu to the root menu wait for 1 minute or press the **ESCAPE (A&B)** key.

Pressing the **ESCAPE** key from our current position in the Inputs submenu takes us back to the Root menu. The menu position will automatically step to the next menu item, if no pods are fitted the unit will show SYS, if pods are fitted SLt1 or SLt2 will be shown.

The Root menu, as its name suggests is not a submenu. Pressing the **ESCAPE (A&B)** key sequence whilst in the Root menu will take the user out of Menu mode and into Run mode. Thus the process variable will be shown on the display.

Refer to section 5.2 if an error code is shown after programming in menu mode.

### 4.4 The Menus

#### 4.4.1 The INPt (INPUT) Submenu

The INPt submenu is used to program all the characteristics of the input sensor and any signal conditioning that may be required. The selection of an option in the list may affect items further down. Therefore, during programming, the user should start at the top of the menu and work down, to avoid setting an option which may later become obsolete. Short menu only items shown in bold.

| TITLE | OPTIONS | DETAIL |
|---|---|---|
| tYPE | 60V, 550V, 6A | Input Type selection |
| dP | 888.8, 88.88, 8.888, 8888 | Defines decimal point location |
| ScAL | User defined scale | Multiplying factor applied to input |
| ACDC | AC, DC | AC / DC Selector |
| FiLt | nonE, 2.5, 10.5, Adaptive | Input Filtering or smoothing |

#### 4.4.2 The SyS (System) Submenu

| TITLE | OPTIONS | DETAIL |
|---|---|---|
| LiSt | FuLL, SHrt | Selects full or short menu |
| cLEn | oFF, on | Clear enable (option pods) |
| SPEn | oFF, on | Setpoint enable (option pods) |
| AdEL | oFF,2,5,10,20,60,120,240 | Power-up alarm delay |
| PASS | 4 digit passcode | Modify any password code |
| oFFS | User defined offset | Take care when replacing sensor |

Refer to section 7.0 for SLt menu structures.

## 5.0 OPERATION

### 5.1 Run Mode Operation

The normal display shown in this mode is the process variable.

| KEYPRESS | ACTION |
|---|---|
| **CYCLE (A)** | View setpoints (Adjust value if SPEn enabled) |
| **CLEAR (A&C)** | Reset relay latch and peak-valley (cLEn enabled) |
| **SHIFT (B)** | View peak memory |
| **INC (C)** | View valley memory |

## 6.0 SPECIFICATION @20 ºC

| Waveform Type 1V Peak | Crest Factor (V Peak/ V RMS) | True RMS Value | Mean Value Calibrated to read RMS | % Error in Mean circuit* |
|---|---|---|---|---|
| Pure Sine Wave | 1.41. | 0.707 | 0.707 | 0% |
| Symmetrical Square Wave | 1 | 1 | 1.11 | 0.5% |
| Pure Triangle Wave | 1.73 | 0.577 | 0.555 | 0.5% |
| SCR Waveforms<br>50% Duty Cycle<br>25% Duty Cycle | <br>2<br>4.7 | <br>0.495<br>0.212 | <br>0.354<br>0.15 | 2.2% |

### 6.1 Input Specification

| | | |
|---|---|---|
| Accuracy ±0.1%FSD | | 0.1% of rdg/ |
| Thermal Drift | | 0.02% / ºC |
| Input Impedance | 550V | 10mW |
| | 60V | 1mW |
| | 6A | 0.02W |
| Isolation | | 3.5KV |
| Ranges | | ±550Vdc ; 550Vac |
| | | ±60Vdc ; 60Vac |
| | | ±5A ; 5Aac |

### 6.2 General Specification @ 20 ºC

| | | |
|---|---|---|
| Input/Output Isolation | | 3.5KV rms (galvanically isolated) |
| Update time | | 250 mS maximum |
| Time Constant (Filter off) | | <1 second (to 63% of final value) |
| Filter Factor | | Off, 2 Seconds, 10 Seconds or Adaptive |
| Warm-up time | | 2 minutes to full accuracy |
| Display Range | | -999 to 9999 |
| Power Supply | S1 | 90-253 VAC 50/60 Hz |
| | S2 | 20-35 VDC; 24Vac ±10% |
| Power Consumption | | 6VA Maximum (options fitted) |
| Supply Isolation | | 3.5KV |
| Environmental | | |
| Sealing to PANEL | | IP65 |
| Ambient Operating Range | | -30 to +60 ºC |
| Ambient Storage Temperature | | -50 to +85 ºC |
| Ambient Humidity Range | | 10 to 90% RH non condensing |
| Approvals | | |
| EMC | Emissions | BS EN50081-1 pending |
| | Susceptibility | BS EN50082-2 pending |
| Electrical Safety | | BS EN61010-1 pending |
| | | UL pending |

**Environmental Approvals for Tension Clamp Terminals**

| | |
|---|---|
| Low Temperature | IEC 68-2-1 |
| Dry Heat | IEC 512-6-9 |
| Damp Heat | IEC 512 -6-3 |
| Damp Heat cyclical | IEC 68-2-30 |
| Salt Spray | IEC 512-6-6 |
| Sulphur Dioxide | IEC 68-2-46 |
| Hydrogen Sulphide | IEC 68-2-16 |
| Gas Tightness | IEC 512-Pr.11n |

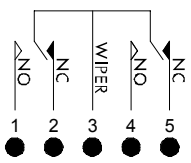
## 7.0 OPTION PODS

#### 7.0.1 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 supporting latch situated beneath the pod by pushing the back cover forward, the pod can then be lifted away from the instrument connector.

### 7.1 Dual Relay Pod. POD-3000/02




The relay pod has two "change over" relays with a common wiper.

NC = Normally closed
NO = Normally open

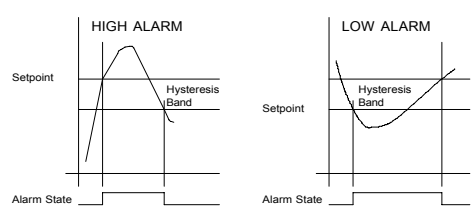
#### 7.1.1 SLT1, SLT2 (Relay Pod) Submenu

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

| TITLE | OPTIONS | DETAIL |
|---|---|---|
| AL 1 | Hi, Lo | Alarm action |
| SEt1 | User defined | PV at which the alarm triggers |
| dEL1 | off, 2, 5, 10, 20, 60, 120, 240 | Alarm delay |
| HYS1 | User defined | Hysterisis band (see below) |
| LAt1 | oFF, on | Sets latching to on or off |
| inUI | oFF, on | Invert relay operation |

Continues through for Relays 2 - 4 (when fitted).

Hysteresis Operation



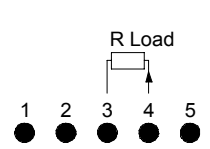

#### 7.1.2 Relay Specification

| | AC | DC |
|---|---|---|
| Maximum Load | 7A @ 250V | 7A @ 30V |
| Maximum Power | 1750VA | 210W |
| Maximum Switching | 250V | 125V |
| Electrical Life | 105 operations at rated load | |
| Mechanical Life | 50 Million operations | |

### 7.2 Isolated 4-20mA Re-transmission Pod. POD-3000/03

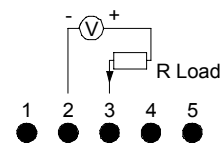
The re-transmission pod (when fitted) is designed to provide 0-10mA, 0-20mA or 4-20mA output in active or passive modes. The output can be any portion of the display. The pod can be used in two modes:

Active (Source)




Max RLoad = 1K

Passive (Sink)




RLoad < (V-2) K Ohm
22
And Vmax = 30V

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

#### 7.2.1 SLT1, SLT2 (Re-transmission Pod) Submenu

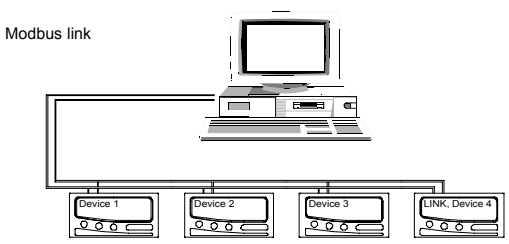
| TITLE | OPTIONS | DETAIL |
|---|---|---|
| SPan | 4-20mA, 0-20mA, 0-10mA | User defined output current |
| rt lo | User defined | Low span range, to match display |
| rt HI | User defined | High span range, to match display |

#### 7.2.2 Re-Transmission Pod Specification

| | |
|---|---|
| Minimum Current Output | > 0mA |
| Maximum Current Output | < 23mA |
| Accuracy | 0.07% or 5µA, which ever is greater |
| Maximum External Power Supply | 30V (passive mode) |
| Voltage Effect | 0.2µA / V |
| Ripple Current | <3µA |
| Isolation | 500V AC |
| Temperature Stability | 1µA / ºC |

### 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

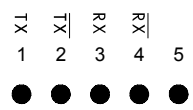
| TITLE | OPTIONS | DETAIL |
|---|---|---|
| Addr | User defined | Instrument device number |
| baud | 9.6, 19.2 | User selected baud rate |
| Line | 2, 4 | 4 Wire or 2 wire half duplex RS 485 |

#### 7.3.2 Comms Pod Specification

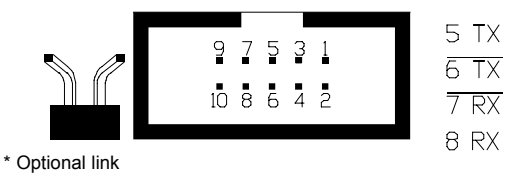
Configuration, system I/O and display unit PC communication.

| | |
|---|---|
| Physical Layer | 4 wire or 2 wire half duplex RS485 |
| Isolation | 500V AC |
| Maximum Fan out | 32 units |
| Software Baud Rate | 19,200 or 9,600 |
| Protocol | Modbus RTU format |

* Optional link




Ribbon cable connection version




* Optional link

* 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.

Full details of the modbus protocol are supplied separately with the pod.

## 8.0 MECHANICAL DETAIL

| | |
|---|---|
| Material | ABS/PC |
| Weight | 200g |
| Flammability | IEC707 FV0 |
| Pod weight | 40g typical |
| Panel cutout | 92mm x 45mm |