1. INSTALLATION

CAUTION: Installation should be only performed by technically competent personnel. It is the responsibility of the installing engineer to ensure that the installation is made in a manner conforming to the local electrical code, and that the equipment is protected by a circuit breaker or fuse of the correct rating in accordance with the code.

To access the plug-in module, first remove the instrument from the housing:

a. Pull out the front cover of the front panel. This will remove all the switches and controls from the front panel. The buttons should then be visible as you look into the front panel from the side.

b. Press latch with screwdriver through top vent hole. Remove front from case. Detach main boards by lifting the lower and upper cutouts, as shown in the diagram.

c. Plug required modules into the correct connectors, as shown below.

Plug in the power board. This board will supply power to the other boards. The power board is indicated on the diagram.

d. Plug in the input boards. These boards will supply power to the other boards. The input boards are indicated on the diagram.

e. Place the modules in the slots in the instrument. The modules are numbered 1-8. The top slot is slot 1, the bottom slot is slot 8.

NOTE: Panel mounting should be fully isolated from any accessible parts of the instrument. Mounting screws should be of stainless steel or corrosion resistant material. Use of non-conductive materials is recommended.

2. POWER SUPPLY

Following the power-up self-test and logo screen, the instrument enters Operation Mode, from which the user can select the instrument’s Main Menu (refer to the user manual). Before powering up, the user should check the power supply to ensure it is within the specified range of 5.5 to 28 Vdc.

3. OPERATION MODE

This mode is entered at power-on, or can be accessed from the Main Menu. The initial screens shown in Operation Mode vary depending on the option selected, and the configuration. Subsequent screens display and may allow the selection or adjustment of process inputs, outputs, enable/disable control, auto-tune parameters, alarm limits, operation, alarm status, profiler & recorder status and graphical trend views.

Some screens will persist until the user navigates away, stay on the screen back to the main screen (refer to Operation Manual, in Screen Sequences).

Press or to move through the menu until the option is selected.

NOTE: the following screens can be made read only (see Display Configuration on page 6) and others may be removed from this mode altogether.

4. AUTOMATIC TUNING

To automatically optimise the PID tuning (PTU) in VMD mode for the process, select the first Cascade Control (Open Loop) by pressing the key. The PTU-pre-tune performs a single start-up disturbance test, follows steps, turns on the power and allows the user to specify the new tuning variables, and save the selection. The PTU-pre-tune does not change the selected “active PID set”.

If the process or auxiliary inputs are >5% above or below the scale max/min, the pre-tune will not engage if either proportional band is too close to the scale limits, or if the process within safe limits.

If Auto Pre-Tune is selected, a Standard Pre-Tune will attempt to start up at every power up. If the process or auxiliary inputs are >5% above or below the scale max/min, the pre-tune will not engage if either proportional band is too close to the scale limits, or if the process within safe limits. The pre-tune will start the process on the input selected.

NOTE: To pre-tune a cascade, first select “Cascade-Control” to tune the PID control on the slave. The slave has been allowed to run safely, remember to pre-tune the master-slave combination (this time select “Cascade-Control”). The slave remains on until you do this.

5. PID SETS & GAIN SCHEDULING

Up to 6 PID sets can be stored in the instrument, with each PID set containing a proportional, integral and derivative (P, I, D) gain set for each input. The PID sets can be used in a variety of ways, such as to control a process in a specific manner, or to control a process in a specific manner, or to control a process in a specific manner, or to control a process in a specific manner.

NOTE: Automatic tuning in be used only on PID sets that are not used.
8. CASCADE CONTROL MODE

A ratio control is used where the quantity of one of the materials is to be controlled in proportion to the quantity of a second material. The controller compares the measured values of the materials at the desired ratio by adjusting the flow of input 1. The flow of input 2 may be regulated by a separate controller. The process value of the slave controller is determined by the difference between the desired ratio and the actual ratio of input 1 and input 2.

**NOTE:** Ratio control is available on models fitted with the 2nd Universal Input (input 2). The 2nd Universal Input (input 2) must be configured as a separate control loop to use ratio control. The 2nd Universal Input (input 2) can either be a separate control loop or a ratio control loop.

It is now in the normal process display to display the process value and setpoint as relative values rather than the physical ratio or absolute values. A scaling factor is set such that the displayed value will be 1.0 at the correct stoichiometric ratio for the application. Inputs 1 and 2 are configured and scaled to match the attached flow meters. In this example a 4 to 20mA signal at x1 represents 0 to 100% of airflow into controlled by a valve. The second 4 to 20mA signal at x2 represents 0 to 100% of fuel. The fuel flow is not affected by this control loop. Atmoting air is in with the fuel at a constant rate \(x/0\). This must be considered when calculating the correct ratio mix. Total airflow is \(x/4\).

The stoichiometric factor, \(SFac\), is entered to match the desired ratio. \(Eg\) or 10 parts total airflow to one part fuel. \(SFac\) would be to 10. The setpoint (entered as a relative value such as 1.00) is multiplied by \(SFac\) when calculating the control deviation. An example is where \(SFac\) is 0.75 (in stoichiometric combustion). A setpoint of \(1.00\) and \(SFac\) of 0.75 causes a voltage doubling doubling loop and is driven at the same time, even under fault conditions. Automatic tuning is usually required for PI control, where the Derivative parameter is turned OFF.

9. DIGITAL INPUTS

Digital inputs can be inverted to reverse their action with an “on” input turning off. If a diagnostic screen assists commissioning and fault finding by showing the current signal state for digital inputs. A diagnostic screen assists commissioning and fault finding by showing the current signal state for digital inputs.

When a valve motor is in use it can be programmed to either the Open or Close terminal, causing the motor to be open or closed at the terminal other.

Switching actuators directly connected to the valve motor only must be used up to but not include the terminal. The internal relay and logic outputs are rated a maximum of 240VDC. Therefore, the maximum motor voltage being used is there is therefore 100% unless otherwise specified. Contactors interposing or other devices connecting the control valve must only be used with care. The digital outputs may not be energized under any condition or to provide notification.

When Wood Position Feedback is specified, a 4 to 20mA signal at \(x/2\) is compared to the desired position feedback. The difference is output to the control algorithm (Set Control Mode to Standard). The desired position feedback is usually provided by means of a potentiometer mechanically linked to the valve actuator. The position output of a related floating nozzle can be used to indicate the relative position. Flow meters typically have linear 0-20mA or 0-10V signals. To the position output of a related floating nozzle must be configured for this purpose.

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It is advisable to concentrate the break points in the area of t...signal

If Separate offsets are applied at two points in the range to eliminate both zero and...This method is used where...Refer to the control configuration screen on page

Process inputs can be adjusted to match the characteristics of the attached...Loop...process input. The controller can only use one setpoint sou...

NOTE: These methods do not alter the internal...If this feature is fitted, a new recorder sub-folder name before downloading data to/from the PC.

NOTE: If the file name already exists, the data will be overwritten.

NOTE: During Data Transfer, normal operation carries on in the background. The transfer of full memory can take up to 20 minutes. Only begin a Download if all alarms (e.g. setpoint changes) will not be required.

Calibration Reminder
- The time is shown in the format 0000-000-0000.
- The last 4 digits increment (e.g. 001-002-003-001) each time the data being uploaded or downloaded.
- If the file size reaches 65535 lines, if a recording is stopped then re-...NEW FILE AVAILABLE.

NOTE: If recorded, each alarm/change force an extra sample to be recorded to ensure the recording time availability.

Sample rate between 1 and 30 seconds are possible, with the data recorded until the memory is full, or continuous. First In First Out memory overwrites the oldest sample when full.

With Recorder Triggers:
- Recording starts if input reaches a new profile
- The last 4 digits increment (e.g. 001-002-003-001) each time the data being uploaded or downloaded.
- If the file size reaches 65535 lines, if a recording is stopped then re-started.
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**DIGITAL INPUTS & A & C**

- **Selects Digital Input Functions:**
  - Alarm Hysteresis
  - Process Control
  - Logic/High
  - Logic/Low
  - Indication

- **Type:**
  - Logic High
  - Logic Low
  - Power

- **Logic:**
  - Isolated
  - Non-Isolated

- **Isolation:**
  - Reinforced safety isolation from inputs and outputs.

**Thermocouple Temperature Calibrations**

- **Thermocouple Range:**
  - J
  - K
  - L
  - E
  - R
  - S

- **Isolation:**
  - DIGITAL
  - RELAY

**Supported Thermocouple Types & Ranges:**

- **J:**
  - -200°C to +1200°C

- **K:**
  - -50°C to +1372°C

- **L:**
  - -270°C to +662°C

- **E:**
  - -100°C to +1372°C

- **R:**
  - -200°C to +1824°C

- **S:**
  - -270°C to +1671°C

**Supported Linear Inputs & Offset/Range:**

- **Linear Input types:**
  - 10V DC
  - 0 to 10V DC
  - 0 to 5V DC
  - 0 to 50mV DC

- **Current Measurements:**
  - 4 to 20mA
  - 2 to 10V
  - 1 to 5V

**Supported Process Control Types & Ranges:**

- **Isolation:**
  - DIGITAL
  - RELAY

- **Isolated:**
  - 1 x DC Excitation output. Plug in Modules 1, 2 & 3.
  - 1 x Digital Input. Used in Modules 1, 2 & 3.
  - 1 x Relay Output. Used in Modules 1, 2 & 3.

**Thermocouple Input Drivers & Isolation:**

- **Driver Voltage:**
  - >10V

- **Type:**
  - Dual Relay

- **Inverted Logic:**
  - True or False

**Input Signals & Output Modes:**

- **Input Signals:**
  - 1 x Digital Input. Used in Modules 1, 2 & 3.
  - 1 x Relay Output. Used in Modules 1, 2 & 3.

- **Output Modes:**
  - Digital Input
  - Relay Output

**Alarm Settings & Schedules:**

- **Alarm Actions:**
  - Stop
  - Restart

**Power Requirements & Specifications:**

- **Power Supply:**
  - 24VDC

- **Dimensions:**
  - 63mm x 106mm

- **Output Power:**
  - 240W

**Safety & Compliance:**

- **UL:**
  - Complies with UL 494, CUL, CE, UK, C-Tick

- **IEC:**
  - Complies with IEC 61800-3, 2013

**Operational Conditions:**

- **Temperature:**
  - 0°C to 55°C

- **Humidity:**
  - 0% to 95% non-condensing

**Display & Interface:**

- **Display:**
  - 16 x 32 character, graphic LCD with a two colour LED backlight.

- **Resolution:**
  - 890 x 480 pixels

**System Architecture & Connectivity:**

- **Communication Options:**
  - Modbus TCP
  - Modbus ASCII

**Mode & Setting Options:**

- **Mode Selection:**
  - Auto / Manual

- **Setting Options:**
  - Alarm Hysteresis
  - Deadband

**Error Handling & Recovery:**

- **Error Recovery:**
  - Automatic or Manual

**Software & Configuration:**

- **Configuration Options:**
  - RS232 via PC Configurator Cable to RJ11 socket under case.

**Data Storage & Logging:**

- **Data Storage Options:**
  - Digital Memory
  - Process Log

**Backup & Restore Options:**

- **Backup & Restore:**
  - Digital Memory
  - Process Log

**Power Supply & Connections:**

- **Power Supply Options:**
  - 24VDC 22W

- **Connections:**
  - RS232 to PC, RJ11 to PC Data Logger

**Environmental & Physical Specifications:**

- **Temperature Range:**
  - -20°C to +70°C

- **Humidity Range:**
  - 0% to 95% non-condensing

**Electrical Specifications:**

- **Current Consumption:**
  - 240W

**Safety & Certification:**

- **Safety:**
  - EN 61010-2-040 Class II

**Display Details:**

- **Display Options:**
  - 16 x 32 character, graphic LCD with a two colour LED backlight.

**Conclusion:**

- **Product Summary:**
  - Complete Process Control System for Industrial Applications
  - Advanced Process Control Features
  - Robust Design for Industrial Environments
20. - Read Info

LED Labels: Problems, End Display, Stop, Power, Power OK, PO, PV, SP, Setpoint, Max, Min, Alarm, Alarm OK, Time, Date, Security, Recorder, Power, PO, PV, SP, Alarm, Alarm OK, Time, Date, Security, Recorder

21. SUPERVISOR MODE

The purpose of this function is to allow operators access to a lock-code protected sub-set of the configuration settings without providing them with the higher level configuration menu unlock code. The PC software is used to copy up to 512 parameter sets from configuration supervisor mode screens to a USB stick.

NOTE: Supervisor mode is only available if one or more screens has been successfully unlocked, and the access code is entered on those screens.