

# User Operation Manual:

## 4 and 6 Channel Eurotherm Module



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# INTRODUCTION

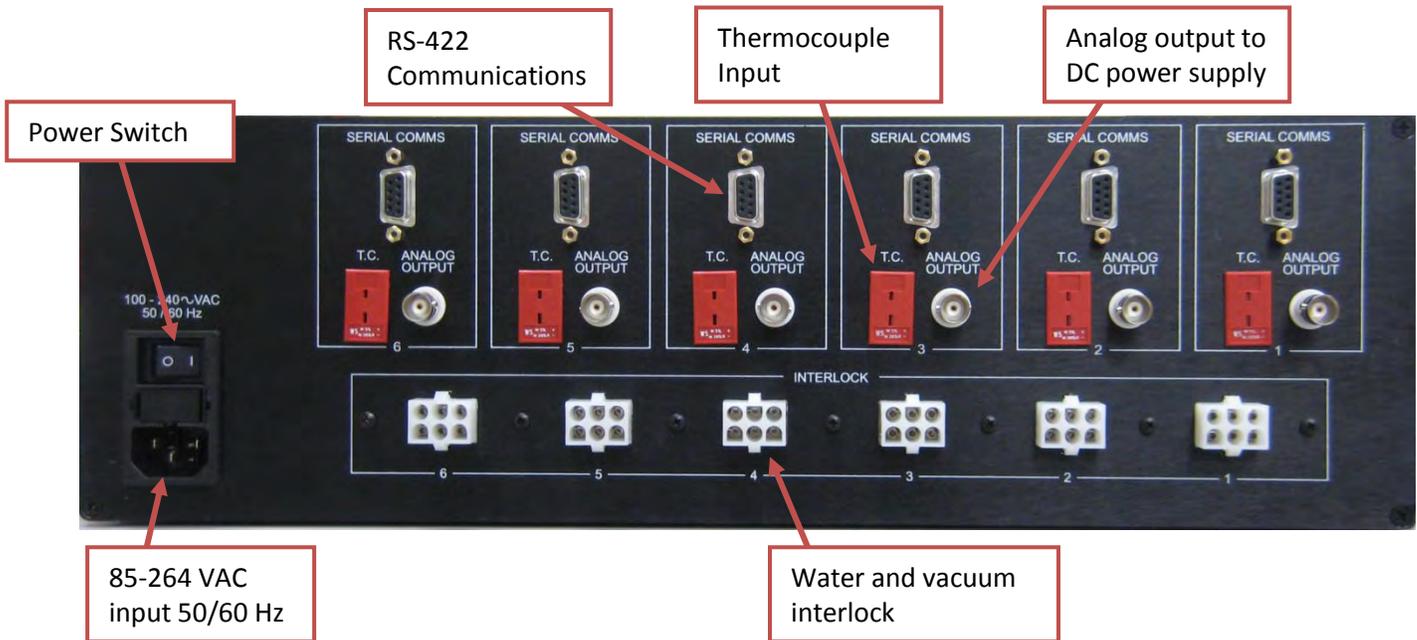
## Product Description

The Eurotherm module provides a convenient and flexible solution to implementing temperature control loops on an MBE system. Available in either 4, 6, or 12 channel (dual loop) configurations, each controller has individual external connectors for thermocouple input, analog output, RS-422 communications, and water and vacuum interlocks. All of the connectors and pinouts have been designed to be compatible with cables that are commonly found in modern MBE systems allowing for drop in replacement of failed OEM power supplies.

Analog output from each Eurotherm controller can be used to control a programmable DC power supply using either voltage or current control as configured within the Eurotherm menus.

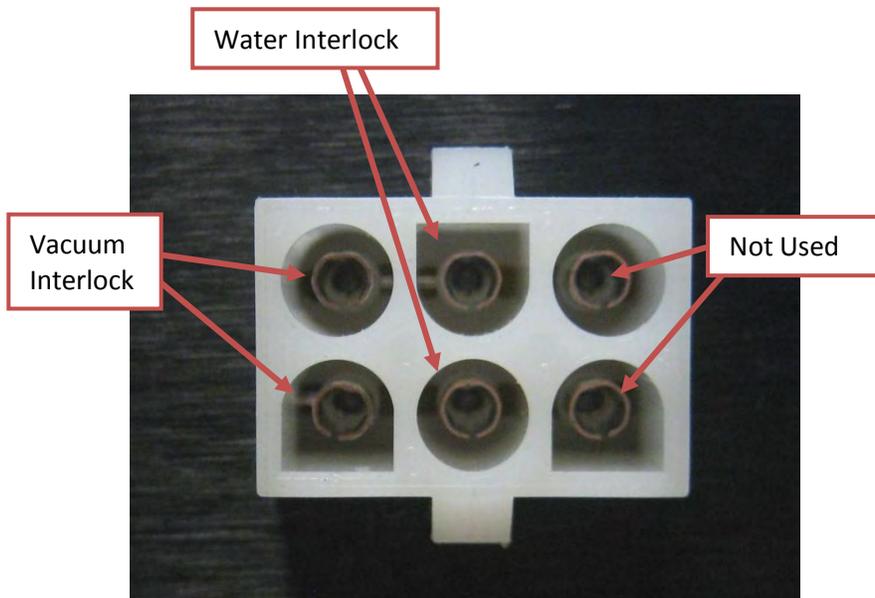
## INSTALLATION

### Rear Panel



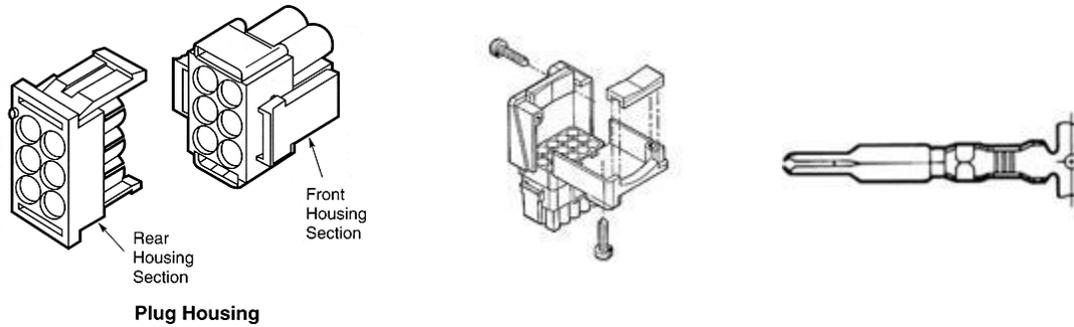
## Interlock Connection

An interlock circuit inside the unit provides relay inputs for vacuum and water interlocks. The vacuum interlock should make a closed circuit between the two pins on the interlock connector to indicate that the vacuum level is good. This will cause the interlock indicator on the front panel to illuminate if the green LED option was selected or to turn off the indicator if the red LEDs were selected. In both cases, the **LA** input is activated in the Eurotherm 2404 or 2408 controller. The center 2 pins are used for the water failure relay. If the water fails, these two pins should be connected together and the **LB** input will be activated. **Func** under **LA** should be setup for **Stby** which will turn off the output signal. **Func** under **LB** should be set to **SP.2** . This will cause the controller to go to a 2<sup>nd</sup> setpoint if the water fails. To deactivate these interlocks, select none for **LA** and **LB**.



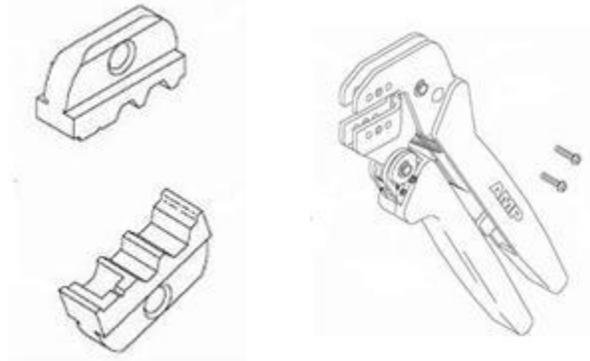
Mating connectors are manufactured by Tyco Electronics and available from [www.digikey.com](http://www.digikey.com), [www.newark.com](http://www.newark.com) and [www.mouser.com](http://www.mouser.com) . The following parts are needed to make one connector:

- (quantity 1) PLUG HOUSING MATE-N-LOCK 6 POSITION Manuf. Part No.: 770020-1
- (quantity 6) Crimp Pin 20-14 AWG MATE-N-LOK Manuf. Part No.: 770250-1
- (quantity 1) 6 Pin Soft Shell MATE-N-LOK Manuf. Part No.: 640715-1



The tool and die set used to crimp the pins on the wires for this connector is:

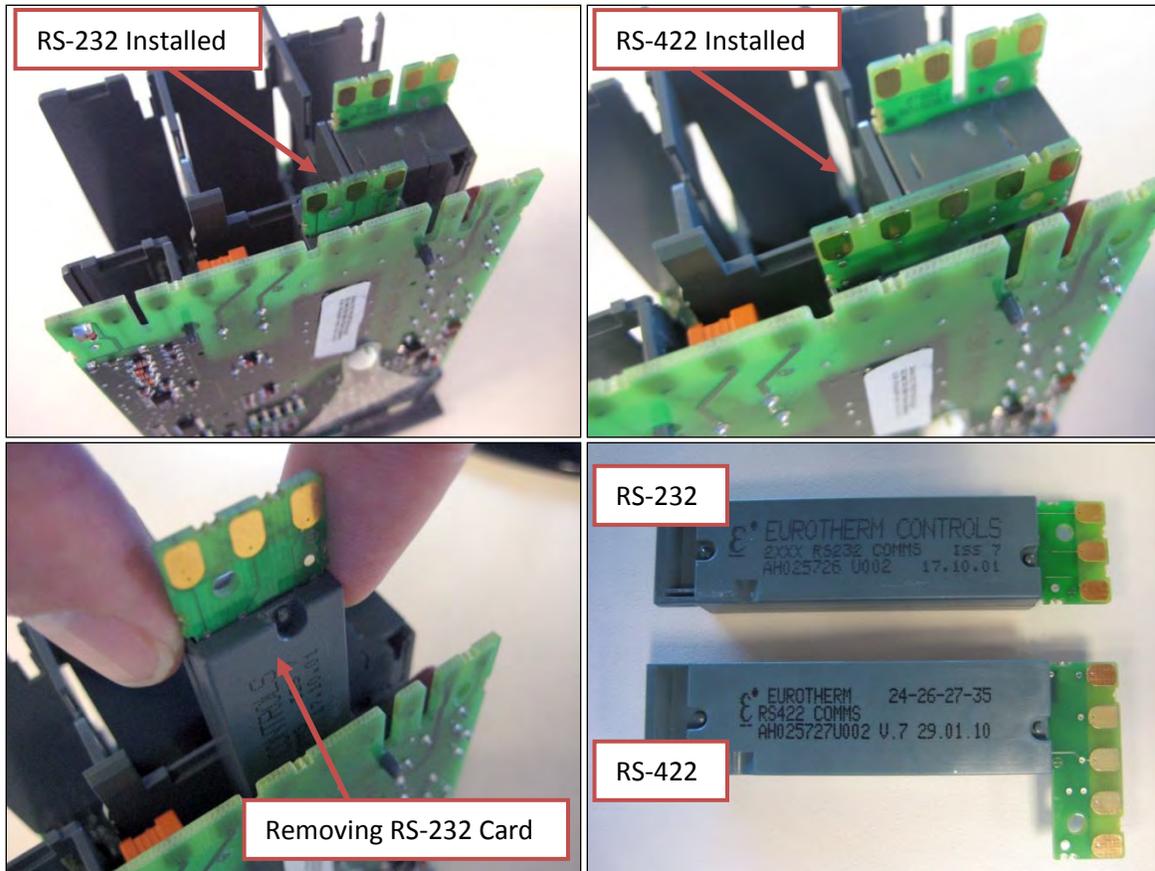
PRO CRIMPER HAND TOOL W/O DIES Manuf. Part No.: 354940-1  
 TOOL DIESET 14-20AWG UNI-MATE Manuf. Part No.: 90546-2



## Eurotherm Hardware Setup

When using Eurotherms 2404 or 2408 controllers that have been removed from failed Veeco power supplies, hardware and configuration changes must be made to work with our Eurotherm modules.

Change the serial communication board from RS-232 to RS-422. The Eurotherm part number required to make the change is: SUB24/EIA422. There are no settings that need to be changed - just this card. The reason the change is required is that the Veeco power modules internally make a conversion from to RS-232 in the Eurotherm controller to RS-422/485 on the rear panel DB9 connector.



## Eurotherm Software Setup

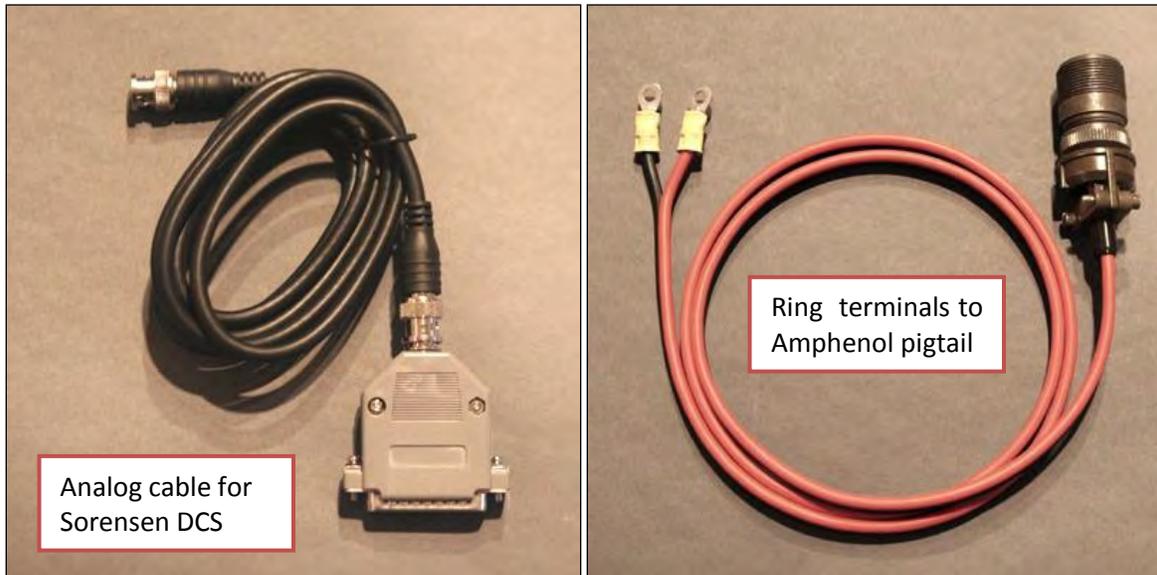
Change configuration settings in the Eurotherms. To enter configuration mode, see Appendix A or the 2400 series Installation and Operation Handbook. Once in configuration mode, use the navigation chart in Appendix B.

The analog output is by default set to 4-20 mA. To change this to 0-5v or 0-10v, step through the list headers to **1A**. In this list, change **unit** from **mA** to **volLt**. Change **Out.L** to zero and **Out.H** to the maximum programming voltage of the power supply being used. If in doubt, set the **Out.H** to a low value such as 1V and measure the power supply output with the Eurotherm in manual mode with 100% output. Some power supplies enter an overvoltage mode if the programming voltage exceeds the maximum. To ensure this does not occur, it may be required to set the maximum output (**Out.H**) to slightly below the power supply input range (5.0V -> 4.9V).

The interlock functions are defined by **LA** and **LB** in configuration mode. To duplicate the default functionality of the Veeco power modules, change **Func** under **LA** from **SP.2** to **Stby**. This will cause the output to go to zero if there is a vacuum failure. To cause the controller to go to setpoint 2 when there is a water failure, change **Func** under **LB** from **nonE** to **SP.2**.

## Connection to Sorensen DCS power supplies

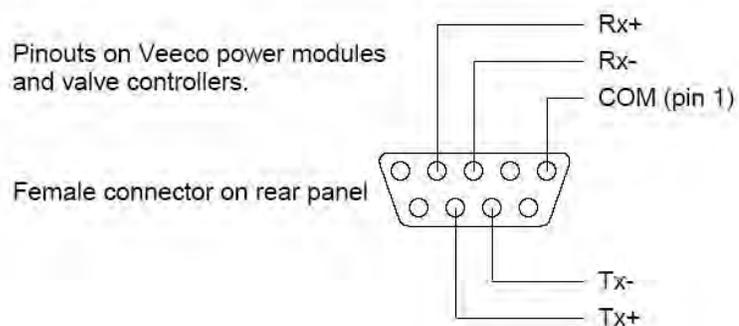
BNC connectors on the rear panel are connected to the analog output of the Eurotherm controllers. The analog output can be used to control any programmable DC power supply. Standard cables are available for connecting to Sorensen DCS power supplies to simplify installation.



## Remote Serial Operation

A DB9 connector on the back of the unit allows for remote operation using the EBiSynch or Modbus communications protocol.

The pin-out of the female DB9 connector is shown below:



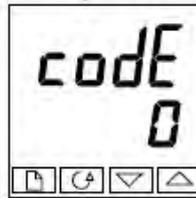
All the ports can be connected together with a ribbon cable (available from Riber USA)

# Appendix A: Entering configuration (reproduced from Eurotherm Documentation)

## SELECTING AN ACCESS LEVEL

Access to Full, Edit or Configuration levels is protected by a password to prevent unauthorised access.

If you need to change the password, see Chapter 6, *Configuration*.



### Access list header

Press  until you reach the access list header 'ACCESS'.

Press .

### Password entry

The password is entered from the 'code' display.

Enter the password using  or . Once the correct password has been entered, there is a two second delay after which the lower readout will change to show 'PASS' indicating that access is now unlocked.

The pass number is set to '1' when the controller is shipped from the factory.

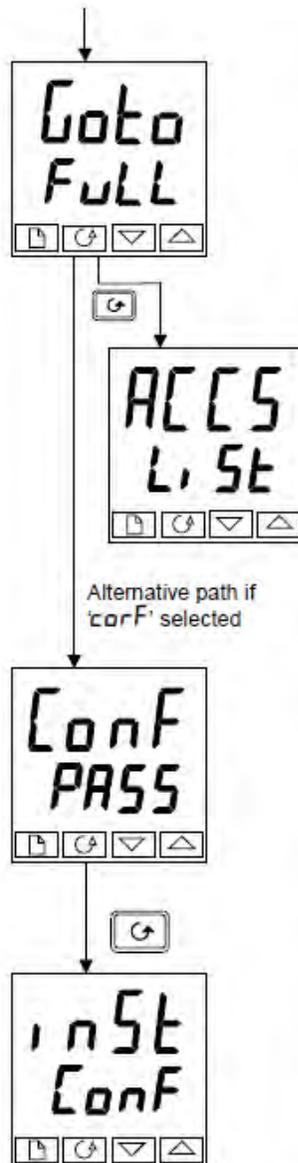
*Note:* A special case exists if the password has been set to '0'. In this case access will be permanently unlocked and the lower readout will always show 'PASS'.

Press  to proceed to the 'Auto' page.

(If an *incorrect* password has been entered and the controller is still 'locked' then pressing  returns you to the 'ACCESS' list header.)

### Access to Read-only Configuration

From this display, pressing  and  together will take you into Read-Only Configuration without entering a password. This will allow you to view all of the configuration parameters, but not adjust them. If no button is pressed for ten seconds, you will be returned to the Home display. Alternatively, pressing  and  together takes you immediately back to the Home display.



### Level selection

The 'Goto' display allows you to select the required access level.

Use **▲** and **▼** to select from the following display

codes:

- OPE-**: Operator level
- FULL**: Full level
- Edi t**: Edit level
- CONF**: Configuration level

Press **↻**

If you selected either 'OPE-', 'FULL' or 'Edi t' level you will be returned to the 'ACCS' list header in the level that you chose. If you selected 'CONF', you will get a display showing 'CONF' in the upper readout (see below).

### Configuration password

When the 'CONF' display appears, you must enter the Configuration password in order to gain access to this level. Do this by repeating the password entry procedure described in the previous section.

The configuration password is set to '2' when the controller is shipped from the factory. If you need to change the configuration password, see Chapter 6, *Configuration*.

Press **↻**

### Configuration level

The first display of configuration is shown. See Chapter 6, *Configuration*, for details of the configuration parameters.

For instructions on leaving configuration level, see Chapter 6, *Configuration*.

### Returning to Operator Level

To return to operator level from either 'FULL' or 'Edi t' level, repeat entry of the password and select 'OPE-' on the 'Goto' display.

In 'Edi t' level, the controller will automatically return to operator level if no button is pressed for 45 seconds.

### Chapter 6 CONFIGURATION

This chapter consists of six topics:

- SELECTING CONFIGURATION LEVEL
- LEAVING CONFIGURATION LEVEL
- SELECTING A CONFIGURATION PARAMETER
- CHANGING THE PASSWORDS
- NAVIGATION DIAGRAM
- CONFIGURATION PARAMETER TABLES.

In configuration level you set up the fundamental characteristics of the controller. These are:

- The type of control (e.g. reverse or direct acting)
- The Input type and range
- The Setpoint configuration
- The Alarms configuration
- The Programmer configuration
- The Digital input configuration
- The Alarm Relay configuration
- The Communications configuration
- The Modules 1, 2 & 3 configuration
- Calibration
- The Passwords.

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#### WARNING

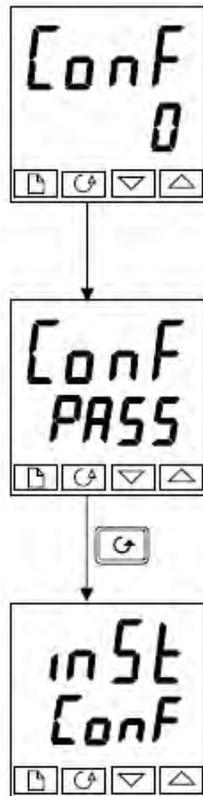
**Configuration is protected by a password and should only be carried out by a qualified person, authorised to do so. Incorrect configuration could result in damage to the process being controlled and/or personal injury. It is the responsibility of the person commissioning the process to ensure that the configuration is correct.**

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## SELECTING CONFIGURATION LEVEL

There are two alternative methods of selecting Configuration level:

- If you have already powered up, then follow the access instructions given in Chapter 3, *Access levels*.
- Alternatively, press  and  together when powering up the controller. This will take you directly to the 'CONF' password display.



### Password entry

When the 'CONF' display appears, you must enter the Configuration password (which is a number) in order to gain access to Configuration level.

Enter the password using the  or  buttons. The configuration password is set to '2' when the controller is shipped from the factory.

Once the correct password has been entered, there is a two second delay, after which the lower readout will change to 'PASS' indicating that access is now unlocked.

*Note:* A special case exists if the password has been set to '0'. In this situation, access is permanently unlocked and the lower readout will always show 'PASS'.

Press  to enter configuration.

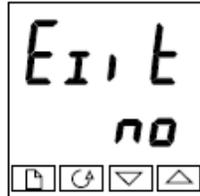
(If an incorrect password has been entered and the controller is still 'locked' then pressing  at this point will take you to the 'Err' display with 'r0' in the lower readout. Simply press  to return to the 'CONF' display.)

You will obtain the first display of configuration.

### LEAVING CONFIGURATION LEVEL

To leave the Configuration level and return to Operator level Press  until the 'E I, t' display appears.

Alternatively, pressing  and  together will take you directly to the 'E I, t' display.



Use  or  to select 'rES'. After a two-second delay, the display will blank and revert to the Home display in Operator level.

### SELECTING A CONFIGURATION PARAMETER

The configuration parameters are arranged in lists as shown in the navigation diagram in Figure 6.1.

To step through the list headers, press the Page  button.

To step through the parameters within a particular list press the Scroll  button.

When you reach the end of the list you will return to the list header.

You can return directly to the list header at any time by pressing the Page  button.

#### Parameter names

Each box in the navigation diagram shows the display for a particular parameter. The upper readout shows the name of the parameter and the lower readout its value. For a definition of each parameter, see the Configuration Parameter Tables at the end of this chapter. To change the value of a selected parameter, use the  and  buttons.

The navigation diagram shows all the lists headers and parameters that can, potentially, be present in the controller. In practice, those actually present will vary according to the particular configuration choices you make.

### CHANGING THE PASSWORDS

There are TWO passwords. These are stored in the Password configuration list and can be selected and changed in the same manner as any other configuration parameter.

The password names are:

'ALLP' which protects access to Full level and Edit level  
'CRFP' which protects access to Configuration level.

**NAVIGATION DIAGRAM (PART A)**

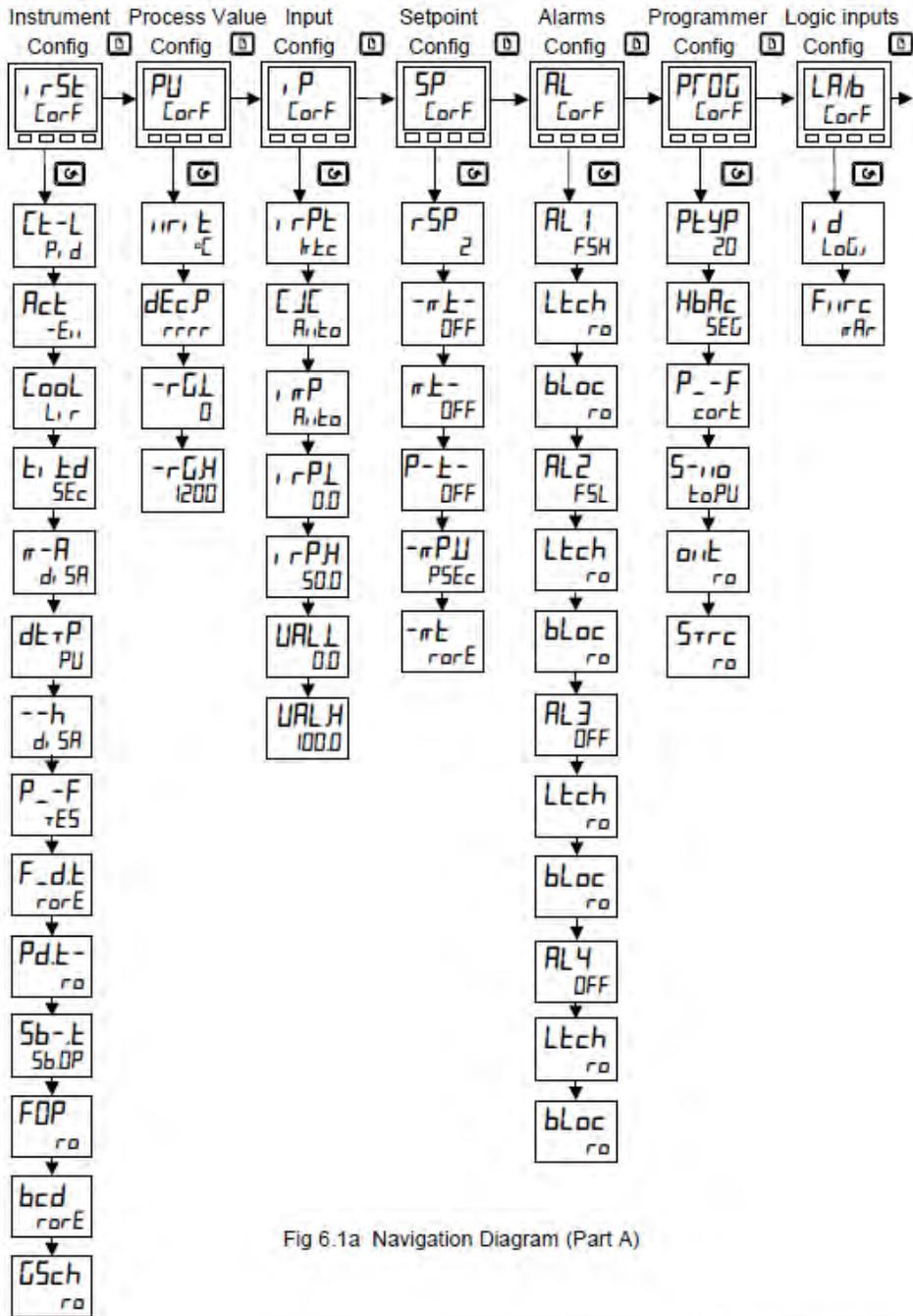
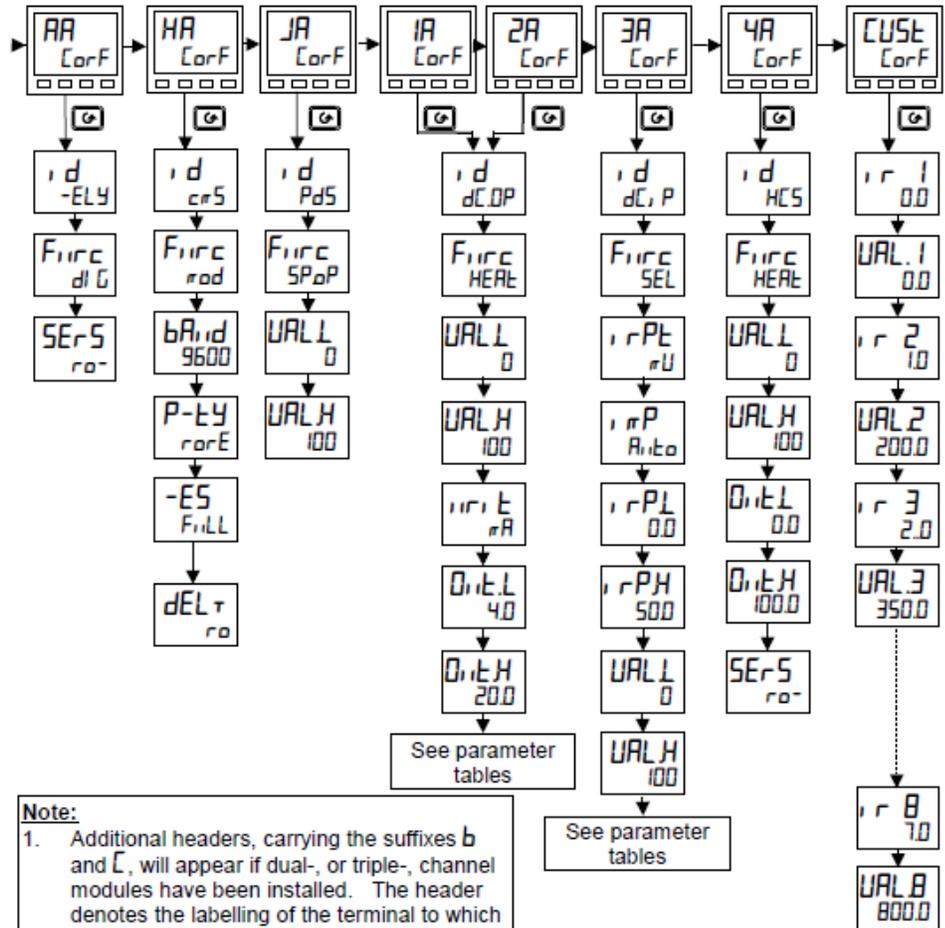


Fig 6.1a Navigation Diagram (Part A)

**NAVIGATION DIAGRAM (PART B)**

Alarm relay Config Comms 1 Config Comms 2 Config Module 1 Config (1) Module 2 Config (1) Module 3 Config (1) Module 4 <sup>(2)</sup> Config Custom <sup>(3)</sup> Config



**Note:**

1. Additional headers, carrying the suffixes **b** and **C**, will appear if dual-, or triple-, channel modules have been installed. The header denotes the labelling of the terminal to which the output function is connected.
2. Module 4 is the High Current Switch Module. This is only available in the Model 2404 controller on controllers manufactured before Jan-04.
3. 8-point custom linearisation. Only appears when either **3A** or **P-Config** has **irP t = irUL**, or **irAL**, or **UL**.
4. The navigation diagram shows typical parameters, but is dependant upon the exact configuration of the instrument. The following sheets show the full list of parameters.

See parameter tables

Fig 6.1b Navigation Diagram (Part B)

**NAVIGATION DIAGRAM (PART C)**

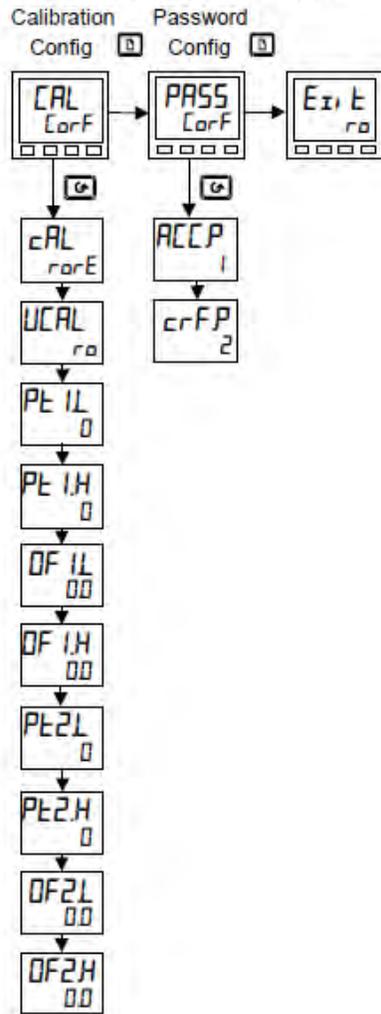


Fig 6.1c Navigation Diagram (Part C)