EPC3000 Module Changing Guide

EPC3016, EPC3008, EPC3004

HA033123ENG Issue 1

Date (Oct 2017)

Eurotherm®

by **Schneider** Electric

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To Change I/O Modules

Purpose

The purpose of this guide is to explain the procedures and precautions to be taken to allow authorised and qualified personnel to change input/output (I/O) modules in EPC3000 series controllers. Use this document together with those listed below.

Related Documents

EPC3000 series User Guide part number HA032842
iTools Help Manual part number HA028838
EPC3000 Series Installation and Wiring Guide part number HA032934

These manuals are available from www.eurotherm.co.uk and also on the Product DVD supplied with iTools configuration software

Kits of Parts

Each kit is supplied containing three I/O modules, optional snubbers and a self adhesive label set as listed in the table below.

Module	Controller order code	I/O Positions
Relay output with snubber *	R2	1, 2, 4 (4 is not available in EPC3016)
Relay output without snubber	R1	1, 2, 4 (4 is not available in EPC3016)
Triac output with snubber	T2	1, 2, 4 (4 is not available in EPC3016)
Triac output without snubber *	T1	1, 2, 4 (4 is not available in EPC3016)
Analogue (DC) output	D1	1, 2, 4 (4 is not available in EPC3016)
Logic output	L2	1, 2, 4 (4 is not available in EPC3016)
Self adhesive label set		Labels are required for traceability purposes

* Snubbers are supplied as separate items. Ship one snubber as standard with every controller for use with the changeover relay OP3. Ship also one snubber (if ordered) with every relay and triac output module.
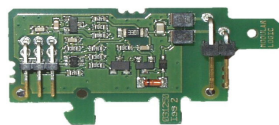

Relay output
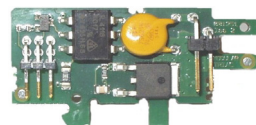
Triac output

Analogue output

Logic output

Snubber

The position of each module type is indicated in the table and corresponds with fields 3, 4 and 5 of the controller order code. The part of the controller order code concerning I/O is shown in the section 'Labels'.

Safety and Precautions

In addition to the Safety and Warning information listed below, please observe all safety instructions given in the Related documents listed above.

⚠ **DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Power down all equipment before starting the installation, removal, wiring, maintenance or inspection of the product.

Always use properly rated voltage sensing device to confirm the power is off.

Power line and output circuits must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment. i.e. UK, the latest IEE wiring regulations, (BS7671), and USA, NEC Class 1 wiring methods.

Charged capacitors

Before removing an instrument from its sleeve, disconnect the supply and wait at least two minutes to allow capacitors to discharge. Avoid touching the exposed electronics of the instrument when withdrawing it from the sleeve.

Failure to follow these instructions will result in death or serious injury.

⚠ **WARNING**

UNINTENDED EQUIPMENT OPERATION

Electrostatic discharge precautions.

Always observe all electrostatic precautions before handling the unit. When the controller is removed from its sleeve, some of the exposed electronic components are vulnerable to damage by electrostatic discharge from someone directly handling the controller.

Hazard of Incorrect Configuration.

Incorrect configuration can result in damage to the process and/or personal injury and must be carried out by a competent person authorised to do so. It is the responsibility of the person commissioning the controller to ensure the configuration is correct

Failure to follow these instructions can result in death, serious injury or equipment damage.

<table>
<tr><td colspan="1">⚠ **CAUTION**</td></tr>
</table>

⚠ **CAUTION**
REASONABLE USE AND RESPONSIBILITY The safety of any system incorporating this product is the responsibility of the assembler/installer of the system. The information contained in this guide is subject to change without notice. While every effort has been made to ensure the accuracy of the information, Eurotherm shall not be held liable for errors contained herein. The controller is intended for industrial temperature and process control applications when it will meet the requirements of the European Directives on Safety and EMC. Use in other applications, or failure to observe the installation instructions of this and other EPC3000 series manuals may impair safety or EMC. The installer must ensure the safety and EMC of any particular installation. **Failure to use approved software/hardware with our hardware products can result in injury, harm, or improper operating results.**

Symbols

Various symbols may be used on the controller. They have the following meaning:

⚠ Refer to manual.

⚠ Risk of electric shock.

⚠ Take precautions against static.

Ⓒ The RCM is a trademark owned by Australian and New Zealand Regulators." with RCM mark

㊵ Complies with the 40 year Environment Friendly Usage Period.

Ⓡ Restriction of Hazardous Substances

To Change I/O Modules

Remove the controller from its sleeve

Ensure that the controller is disconnected from the supply and wait at least two minutes to allow capacitors to discharge. Remove the controller from its sleeve by easing the two front latches outwards and pulling it forward out of the sleeve, taking note of the safety precautions detailed above.

I/O modules are mounted on the 'Power Supply PCB' (PSU) (on the left looking from the rear).

Remove the Power Supply PCB

Remove this printed circuit board from the controller to gain access to the modules as follows:

Using your thumb lift up the top edge (A) of the transparent PCB retaining clip (part of the window assembly) to release the top of the PCB. Then repeat with the bottom edge (B) and remove the PCB.

Module positions
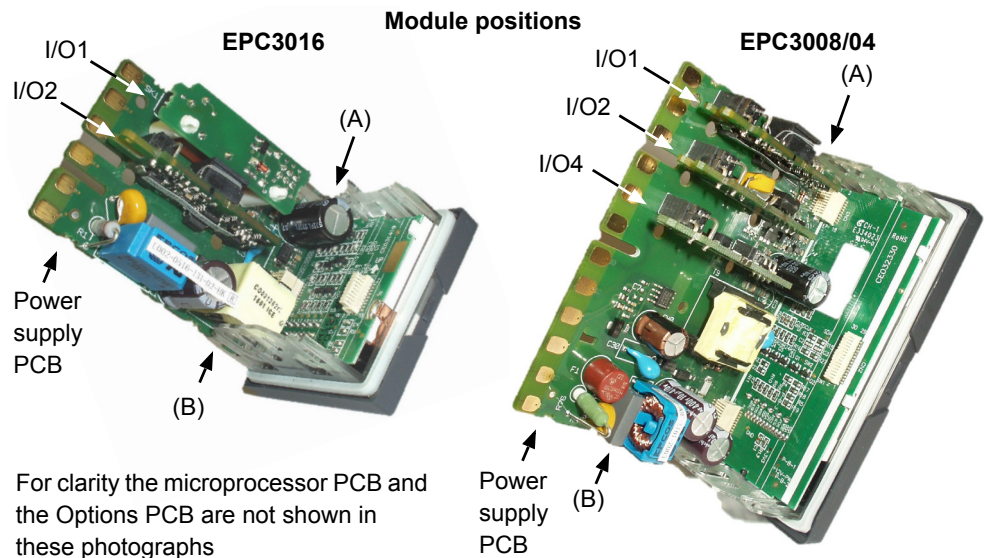
For clarity the microprocessor PCB and the Options PCB are not shown in these photographs

Note: The power supply board may be 24Vac/dc denoted on the PCB by 'LV PSU BOARD' (controller order code VL) or 100 – 230Vac denoted on the PCB by 'HV PSU BOARD' (controller order code VH).

Locations of Modules

In EPC3008/04 there are three locations where modules can be fitted and two in EPC3016 as shown below. The type of module fitted is dependent on fields 3, 4 and 5 of the order code.
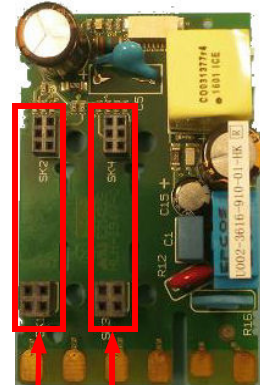
Power supply PCB EPC3008 and EPC3004   Power supply PCB EPC3016
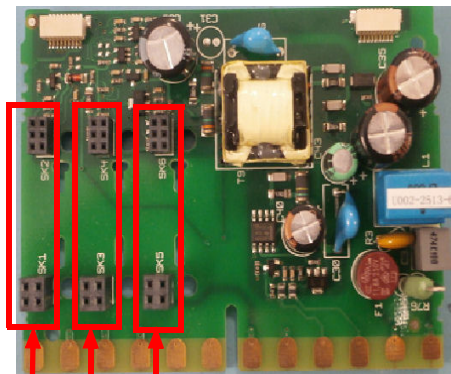
Field 3   Field 5   These are the fields in the   Field 3
                             controller order code.
   Field 4   Field 4

Removing Modules from the PSU

If modules are already fitted it may be necessary to remove them. This may be done as described below:

For Relay Output Module

The relay module is held in place using two snap rivets. These are to help prevent it being dislodged when in use or in transit due to vibration. To remove the relay module it is necessary to pinch the bottom of each snap rivet (C) and gently withdraw the relay module from the board. The careful use of a small pair of pliers may be helpful.


(C)
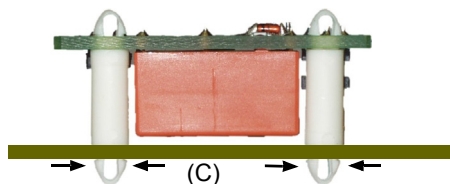
For Triac, Logic & DC Output

For all other modules, from the underside of the Power Supply PCB, push up on the right hand retaining spur of the module (D) as shown in the first diagram. Avoid the possibility of pins becoming bent by ensuring that the module is not lifted at an excessive angle. The retaining hook on the left hand spur (E) will then be released from the PCB so that the module can be pushed upwards and lifted clear of the connector. The module can then be removed from the PCB.

Power supply PCB

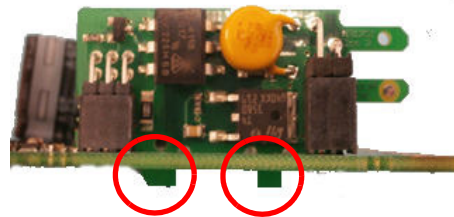(D)   (E)
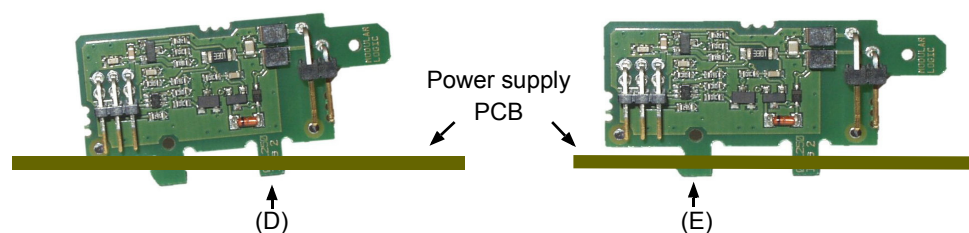
Fit Modules to the PSU

Position the module (all types) so that the 6 pins and the 2 pins on the module line-up with the corresponding connectors on the PSU.

6 pin connector   2 pin connector
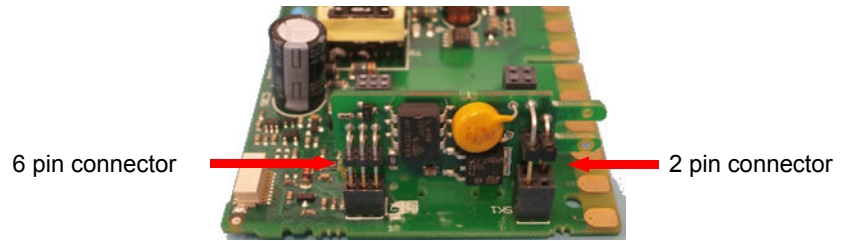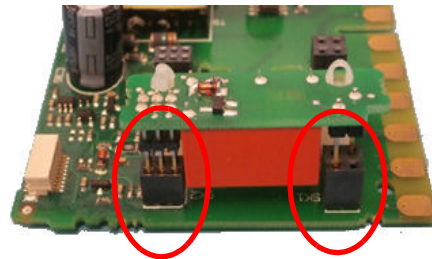
For Triac, Logic & DC Output

Push the module down onto the PSU.

Ensure that the 2 tabs on the module are protruding on the other side of the PSU
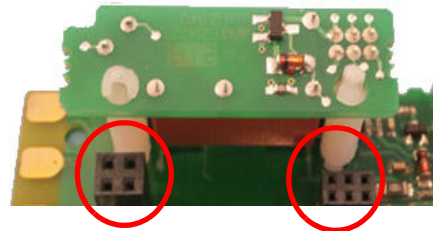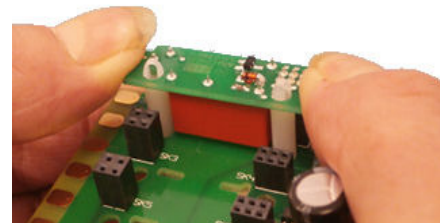
For Relay

The Relay module is positioned so that the pins line-up with the connectors on the PSU

Check that the two snap rivets are lined up with the holes in the PSU

With both thumbs, press down on the relay PCB until the 2 snap rivets have locked in the holes of the PSU.

Re-fit the PSU to the Window Assembly

Locate the PSU board into the top and bottom slots of the transparent window assembly lifting it slightly to allow the board to be slipped into the slots. Carefully push the board into place until an audible click is heard indicating that the printed circuit board is latched into the window assembly.
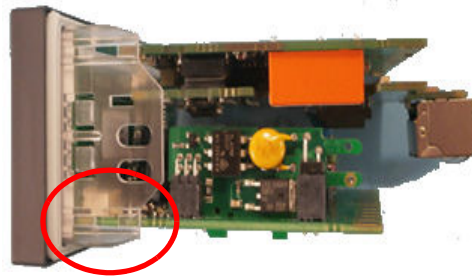
It is vital that the mating connectors between the PSU and Display Board are not forced into place
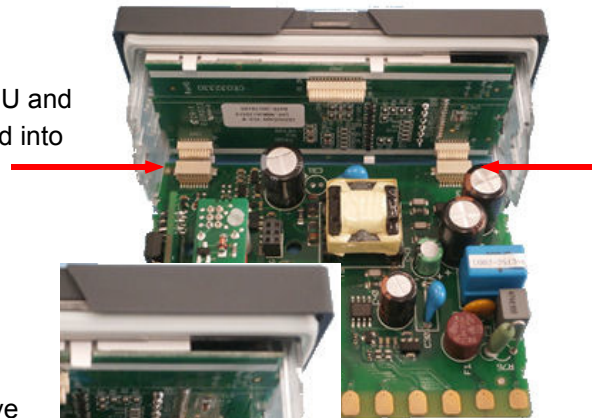
Ensure both connectors have fully closed with no gap
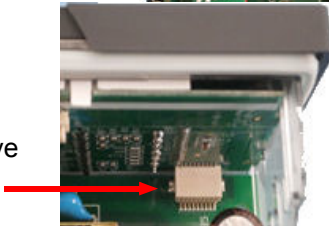
Polarising pegs

The controller sleeve is fitted with polarising pegs which are designed to help prevent non isolated modules such as the logic output to be fitted into a position which may be at high potential.

Wherever a logic module is positioned the polarising peg must be down. For any other module the pegs must point up.

Logic module in slot 1

Relay, Analogue or Triac module in slots 2 and 3

Logic module in slot 2

Relay, Analogue or Triac module in slots 1 and 3

Logic module in slot 3

Relay, Analogue or Triac module in slots 2 and 3
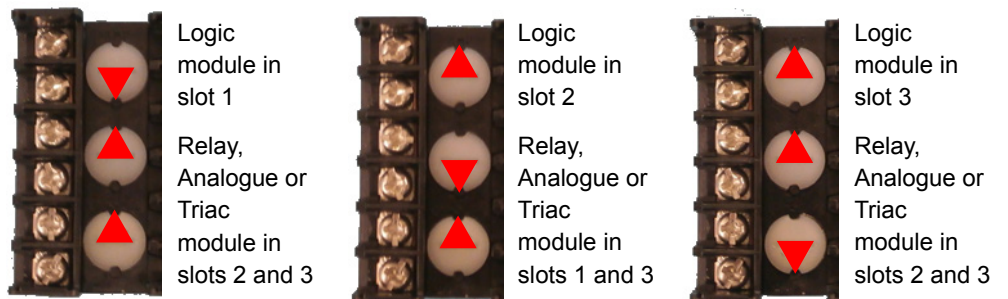
Fit the Controller into its Sleeve

Fit the Instrument Assembly into the sleeve, with the top of the Window matching the top of the Sleeve.

TOP
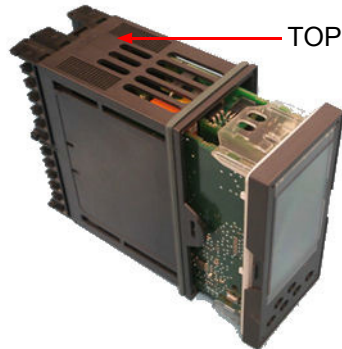
When the instrument is pushed in fully listen for an audible "click" as the front latches of the Sleeve engage with the front panel. If not push the latches back into place.

If instrument does not fit, check the following:-

• Positions of Polarizing Pegs.

• Correct location of PCB's in the Window assembly.
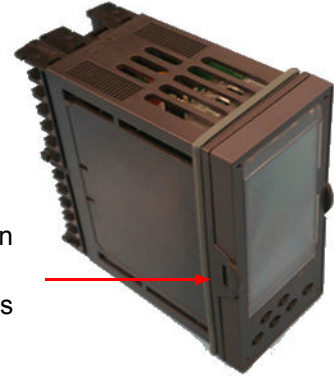
• The controller is being re-fitted in the sleeve from which it was removed. [A controller powered by 24V (order code VL) cannot be fitted into a sleeve intended for a controller powered by 100 - 230V (order code VH) and vice versa]. Make sure that the serial number printed on the label on the sleeve matches the serial number printed on the inside of the transparent window assembly in the controller.

Configuration

iTools configuration software is recommended to configure the functionality of the controller.

Connect the controller to a PC running iTools. The controller may be connected to the PC using the configuration clip, Eurotherm part number EPCACC/USBCONF, or by any other means convenient to the user.

The controller may be powered or un-powered when connected to the configuration clip in this case it will receive its power from the USB clip. If the controller is powered the display will show the message 'FITTED HARDWARE DIFFERS FROM EXPECTED HARDWARE' if one or more I/O modules have been changed.

Put the controller into configuration mode by pressing the 'Access' button in iTools.

Open the 'Instrument' list and choose 'Modules'.

Select the module type
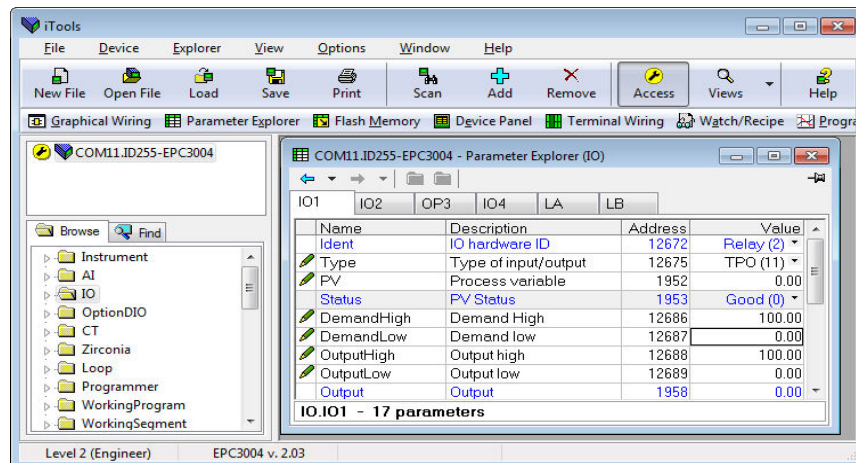
The fitted module will be recognised by the controller. If this is different from the I/O expected then, using the drop down under IO Expected, select the correct module type.
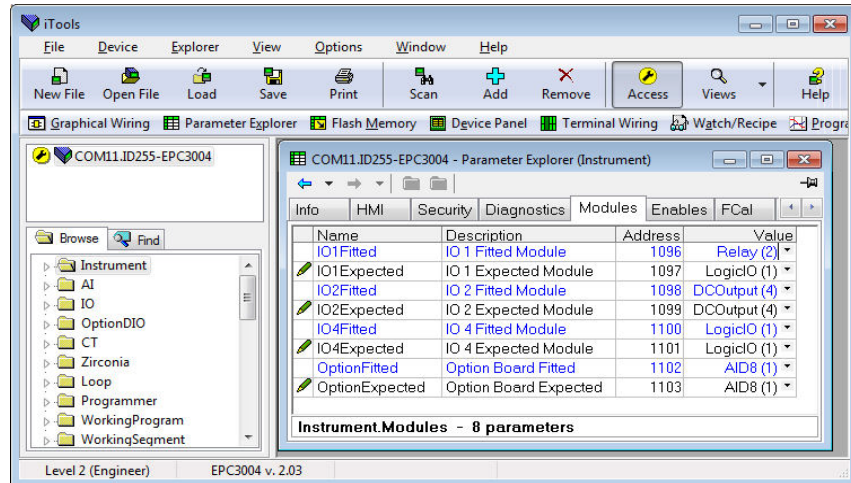
Configure the I/O

The I/O can then be configured as required by selecting 'IO' in the iTools browser. Then IO1, IO2 or IO4 as appropriate.

Press the 'Access' button to de-select configuration mode.

Configuration of the controller is described in the EPC3000 series User Guide part number HA032842.

iTools is also described in manual HA028838.

Both manuals are available from www.eurotherm.co.uk.

Functional test

As a minimum the I/O should be bench tested to make sure that it operates correctly. One way to do this is to load 'no application' into the controller. This means that none of the I/O is soft wired and can, therefore, be set using the IO browser list.

The following simplified functional test uses this approach to verify that the changed modules are working correctly.

General

Use a multi-meter connected to each output to be tested.

Power-up the controller. Observe all Safety notices and Wiring recommendations given in the section "Related Documents" on page 2.

If modules have been changed the controller will display HARDWARE DIFFERS FROM EXPECTED

iTools

1. Press 'Access' to select configuration level.

2. From the browser, select 'Qcode' and set 'Application' to 'None'.

3. Turn back to operator level

4. From the browser (shown in section "Configure the I/O" on page 10) select the I/O to be tested (e.g. IO1).

5. For each I/O set the 'PV' parameter and observe the 'Output' parameter, Front panel beacons (**1** , **2** and **3**), multi-meter readings and other conditions in accordance with the following tables.

Relay

PV parameter Toggle 'PV' between 1 and 0	'Output' parameter	Front panel beacon	Meter reading. Set meter to resistance	Other
0	0	Off	Open circuit	Listen for audible click
100 (or 1)	1	On	Short circuit	If 'Type' = TPO, test at other intermediate levels to observe time proportioning
50	0 to 1	Switches at approximately 50% On 50% Off		

Logic

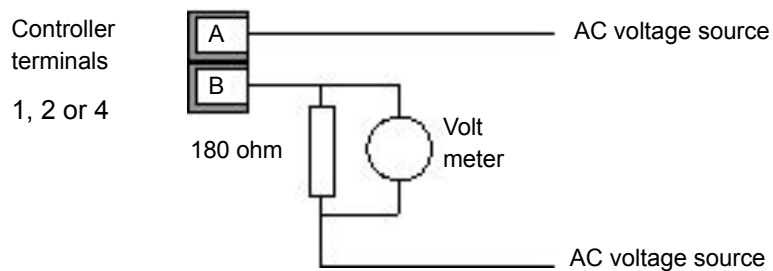| PV parameter Toggle 'PV' between 1 and 0	'Output' parameter	Front panel beacon	Meter reading. Set meter to volts	Other
0	0	Off	0V (nominal)	
100 (or 1)	1	On	12V (nominal)	If 'Type' = TPO, test at other intermediate levels to observe time proportioning
50	0 to 1	Flashing	Flickering	

Analogue

The analogue output values depend upon the range configured. These may be 0-20mA, 4-20mA, 0-10V, 0-5V. These ranges are limited by the setting of the OutputHigh and OutputLow parameters.

PV parameter Toggle 'PV' between 0 and 100	'Output' parameter	Front panel beacon	Meter reading. Set meter to mA or volts	Other
0	Output low limit e.g. 4mA	Off	Range low limit e.g. 0mA, 4mA, 0V	Test at other intermediate levels to observe analogue values between low and high limits
100	Output High limit e.g. 20mA	On	Range high limit e.g. 20mA, 10V, 5V	
50	Mid point e.g. 12mA	On	Mid range e.g. 12mA, 10mA, 5V, 2.5V	

Triac

To test the physical switching of a triac requires an ac voltage source and a resistive load. A suggested resistor value of 180 Ohms and an AC voltage source of 30Vrms is suitable and the circuit rated at least 10 Watts.

Connect the components as shown in the diagram:

PV parameter Toggle 'PV' between 1 and 0	'Output' parameter	Front panel beacon	Meter reading. Set meter to voltage	Other
0	0	Off	0 V	
100	1	On	AC supply volts	If 'Type' = TPO, test at other intermediate levels to observe time proportioning
50	0 to 1	Flashing	AC supply volts flickering	

Logic Input

An analogue I/O module and a logic I/O module can be configured for Logic input using the relevant IO tab in iTools.

Wire a switch across the selected input and monitor the 'PV' parameter.

With the 'Sense' parameter = normal, close the switch - 'PV' will change from 0 to 1.

With the 'Sense' parameter = inverted, close the switch - 'PV' will change from 1 to 0.

Logic Input

An analogue I/O module and a logic I/O module can be configured for Logic input using the relevant IO tab in iTools.

Labels

Labels, which include the order code, are fitted to the controller sleeve and are required for traceability purposes. Ensure that this order code corresponds to the modules now fitted by pealing off the individual labels and placing them into the correct slots as shown in the following code example:

EPC3004	CC	VH	L2	R2	D1	XX	XX	etc
			IO1				Option I/O	
				IO2				
					IO4			
					(IO4 EPC3008 and EPC3004 only)			

L2 Logic output, R1 Relay output; D1 Analogue output: T1 Triac output

R2 Relay output with snubber; T2 Triac output with snubber

Example: EPC3xxx -- / V- / R1 / L2 / D1 / -- \ IE /….

IO1 = relay output on terminals 1A/1B (no snubber fitted); IO2 = Logic output on terminals 2A/2B; IO4 = Analogue (DC) output on terminals 4A/4B.

Note: The complete order code is described in the User Manual. Only the part relevant to these instructions is reproduced above.

Location of labels

EPC3016 left hand side label showing ordering code

EPC3008/04 left hand side label showing ordering code

Record Keeping

For every controller which has been modified, please make a record, for traceability purposes, of the following details in the spreadsheet which can be obtained from Eurotherm on request:

- Serial number

- Controller configuration

- The person who performed the functionality test

- Shipping date

Please periodically return this spreadsheet to your Eurotherm contact.

Scan for local contents