

# Stacklight ESL-04

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User Guide



**⚠ WARNING**

**Read all safety warnings and instructions**

Failure to follow the safety warnings and instructions may result in electric shock, fire and/or serious injury.

**Save all warnings and instructions for future reference**

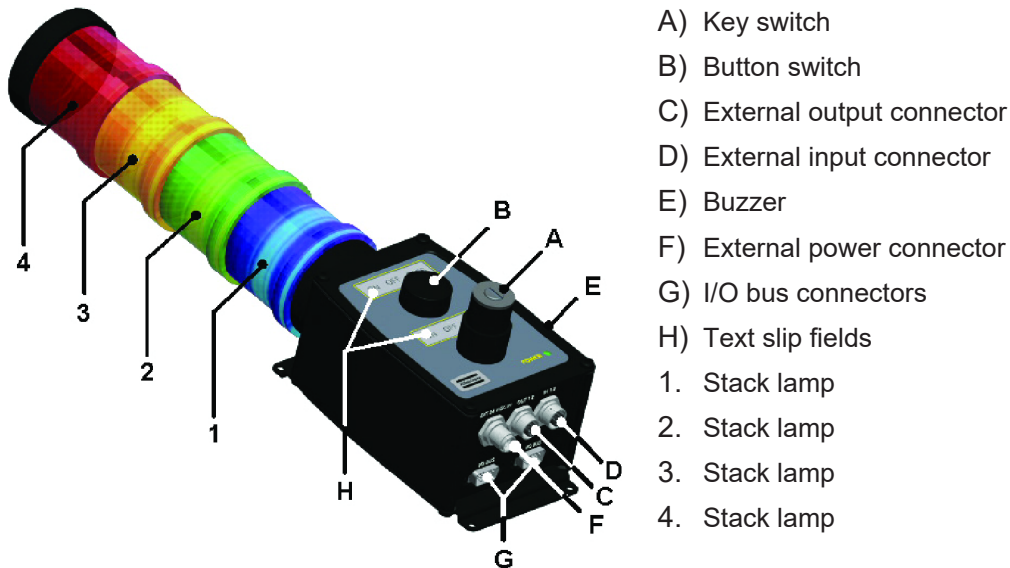


## Introduction

### Stacklight ESL-04

Stacklight ESL-04 is a flexible light and switch device designed to interface with controllers equipped with the following types of I/O bus connectors:

- I/O Bus connectors
- MACS I/O connectors



The standard version of Stacklight ESL-04 offered for sale has:

- 4 configurable lights
- 1 configurable push button
- 1 configurable key switch
- 1 configurable buzzer
- 24 V DC external input
- External outputs (output 1 and 2)
- External inputs (input 1 and 2)
- 2 I/O bus connections

Stacklight ESL-04 can be customized as follows:

- A stack of four lights. One optional light can be added to this stack. You can also customize the order and the color of lights.
- Two positions, A and B, which can be customized with indicator lamps or switches.
- A buzzer placed on the side of the box that has a fixed frequency of 3000 Hz. The buzzer can be configured to activate on any tightening controller signal.
- Two external outputs, two external inputs and a connector for external power.
- Two I/O bus connectors. A termination plug, should be applied to the second I/O bus connector if it is at the end of the I/O bus line. The I/O bus termination plug is listed in the accessory list.
- Two text slip fields for optional front panel labels which are detailed in section *Optional text slips* [Page 000].

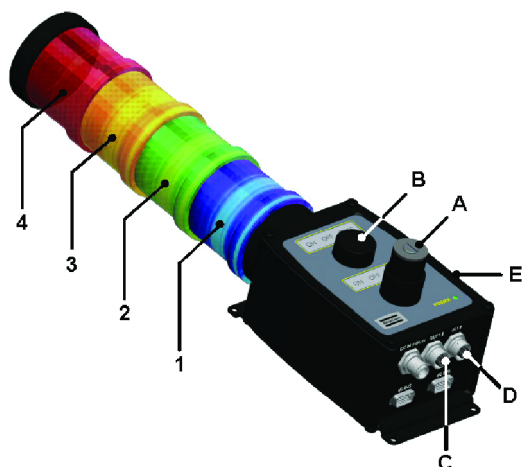
## World release 5 software

To configure software settings, go the appropriate section below for instructions on current controller type.

### Power Focus and Pulsor Focus example setup

The tables show an example mapping of inputs and outputs for Stacklight ESL-04 with either the Power Focus or Pulsor Focus controller. Configuration involves hardware settings and a software setup in the Atlas Copco software, either ToolsTalk Power Focus or ToolsTalk Pulsor.

An indicator lamp or stack lamp uses one output and a switch uses two inputs. If a two-way switch is used, then A1/B1 represents the left switch state and A2/B2 the right switch state. When a push button or one-way switch is used it is enough to configure A1/B1 (but it is possible to use both outputs for different functions).



#### I/O device 1:

Relay	Stacklight ESL-04 part	Input	Stacklight ESL-04 part
1	Stack lamp [1]	1	External input 1 [D]
2	Stack lamp [2]	2	External input 2 [D]
3	Stack lamp [3]	3	Switch state [A1]
4	Stack lamp [4]	4	Switch state [A2]
5	Stack lamp [5] (optional)	5	Switch state [B1]
6	Lamp [A]	6	Switch state [B2]
7	Lamp [B]	7	Not used
8	Buzzer [E] (sound 1)	8	Not used

#### I/O device 2:

Relay	Stacklight ESL-04 part	Input	Stacklight ESL-04 part
1	Buzzer [E] (sound 2)	1	Not used
2	External output 1 [C]	2	Not used
3	External output 2 [C]	3	Not used
4	Not used	4	Not used
5	Not used	5	Not used
6	Not used	6	Not used
7	Not used	7	Not used
8	Not used	8	Not used

**NOTICE** Ensure that the Communication Mode switch is set to default setting. See Hardware set-up. Ensure that the Address switch is set to its default setting, or to any other valid address that is vacant. See Hardware set-up.

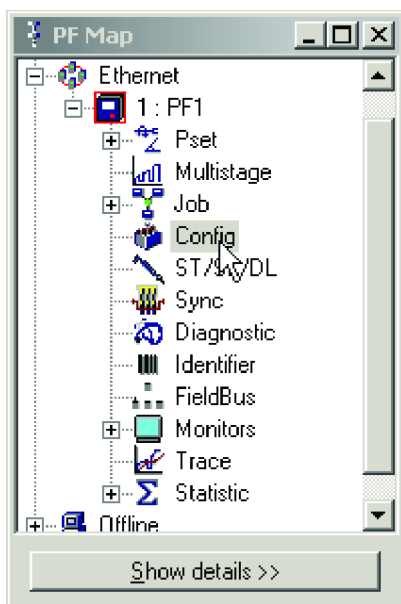
### ToolsTalk configuration example

This section includes a step-by-step instruction on how to setup a Stacklight ESL-04 as according to the following example:

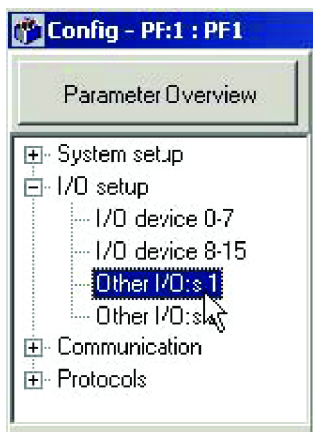
- Stack lamp 1 indicating tightening result with high torque.
- Stack lamp 2 indicating an okay (OK) tightening result.
- Stack lamp 3 indicating tightening result with low torque.
- Stack lamp 4 indicating a tightening result that is not okay (NOK).
- The push button used for acknowledging event.
- The key switch used for batch increment and to reset batch.
- The buzzer sound alerting on unacceptable tightening and when the tool is locked.

To begin the setup, do the following:

1. Connect Stacklight ESL-04 to the controller with an I/O bus cable.
2. Open ToolsTalk and connect the controller.
3. In the **PF Map**; double click **Config**.



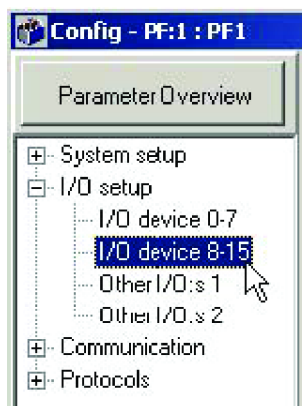
4. In the **Config** project tree, select **Other I/O:s 1**.



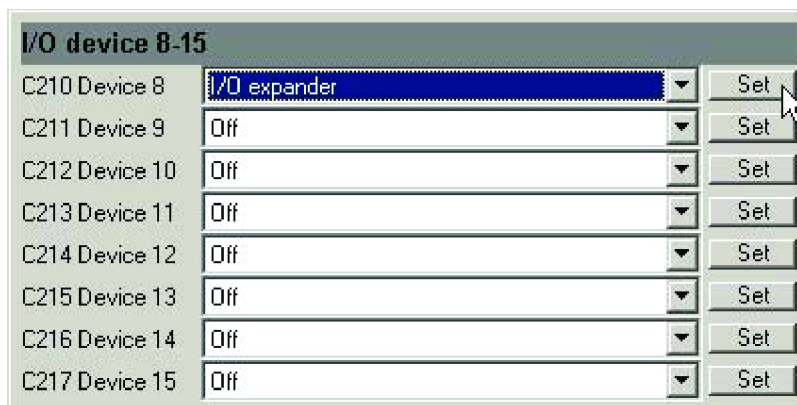
5. Select **Tool trigger** for option **Tool start select source**.



6. In the **Config** project tree, select **I/O device 8-15**.



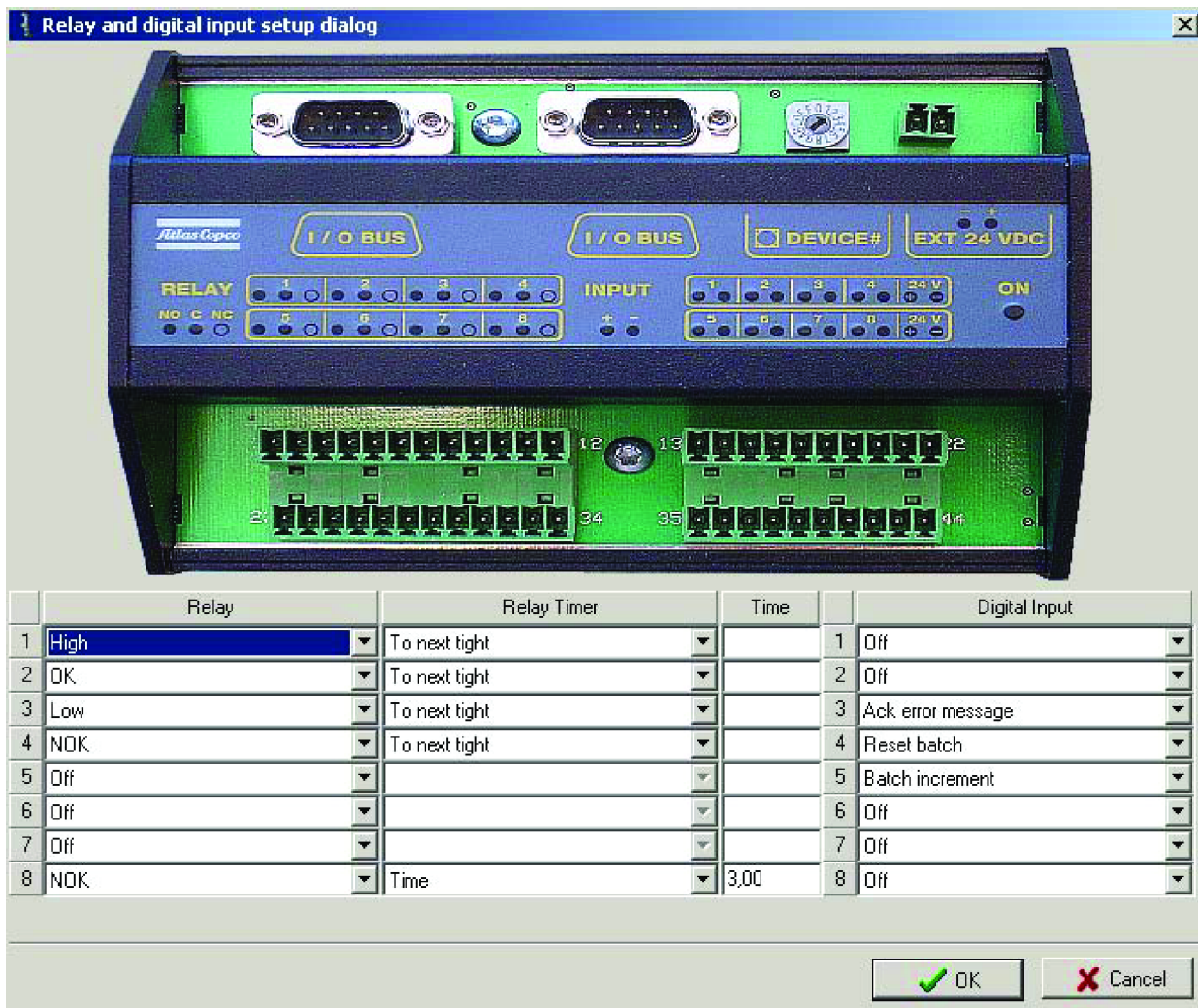
7. Select **I/O expander** on the item list for **Device 8** and click the Set button to access **Relay and Digital input setup** dialog.



Assign signal variables to stacklight channels by selecting one from each item list.

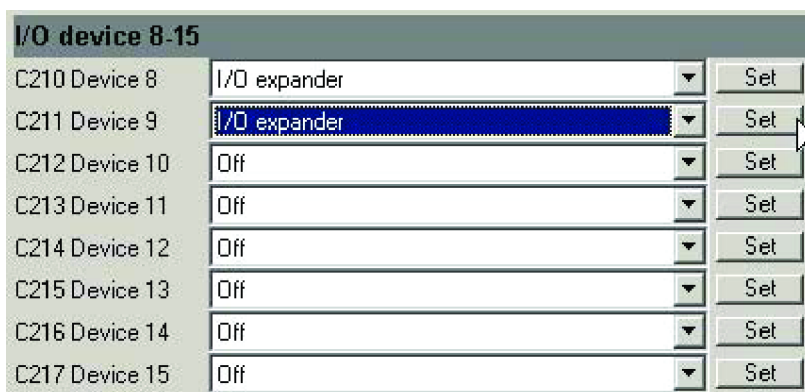
To obtain the example setup shown in the figure below, assign the following:

1. **High** to relay output 1, connected to Stack lamp 1.
2. **OK** to relay output 2, connected to Stack lamp 2.
3. **Low** to relay output 3, connected to Stack lamp 3.
4. **NOK** to relay output 4, connected to Stack lamp 4.
5. **NOK** to relay output 8, connected to the Buzzer. Input 3 in its Time duration box.
6. **Ack error message** to digital input 3, connected to the left key switch state.
7. **Reset batch** to digital input 4, connected to the right key switch state.
8. **Batch increment** for digital input 5, connected to the push button. Then click OK.



To complete the setup, do the following:

- Select I/O expander for option **Device 9** and click **Set** to access the **Relay and Digital Input setup** dialog box.



Continue to assign signal variables to stacklight channels by selecting one from each item list.

To obtain the example setup shown in the figure below, do the following:

1. Assign **Tool locked** to relay output 1, connected to the buzzer.
2. Set **Relay Timer** to **Tracking event** in its item list for to relay output 1.
3. Click **OK** and then **Store** to save settings.
4. Close the **Relay and Digital Input setup** dialog box to complete the setup session.

	Relay	Relay Timer	Time		Digital Input
1	Tool locked	Tracking event		1	Off
2	Off			2	Off
3	Off			3	Off
4	Off			4	Off
5	Off			5	Off
6	Off			6	Off
7	Off			7	Off
8	Off			8	Off

**NOTICE** The user guide for the tightening controller includes a detailed parameter list of valid signals.

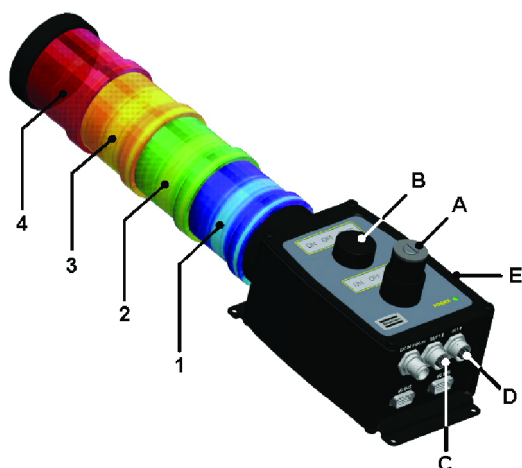
## DS or DL Advanced Drive example setup

Stacklight ESL-04 is configured as one I/O device for communication with the DS Advanced drive or the DL Advanced Drive.

The table shows an example mapping of inputs and outputs for Stacklight ESL-04 with either a Power Focus or a Pulsor Focus controller. Configuration involves hardware settings and a software setup in the Atlas Copco software ToolsTalk DS/DL.

The Tensor DS and Tensor DL drive has a reduced number of available external inputs and outputs in comparison to Power Focus, Pulsor Focus and PowerMACS. Therefore some functions are missing

An indicator lamp or stack lamp uses one output. A switch uses two inputs. If a two-way switch is used, then A1/B1 represents the left switch state and A2/B2 the right switch state. When a push button or one-way switch is used it is enough to configure A1/B1. It is possible to use both outputs for different functions.



I/O device 1:

Relay	Stacklight ESL-04 part	Input	Stacklight ESL-04 part
1	Stack lamp [1]	1	External input 1 [D]
2	Stack lamp [2]	2	External input 2 [D]
3	Stack lamp [3]	3	Switch state [A1]
4	Stack lamp [4]	4	Switch state [A2]
5	Stack lamp [5] (optional)	5	Switch state [B1]
6	External output 1 [C]	6	Switch state [B2]
7	External output 2 [C]	7	Not used
8	Buzzer [E] (sound 1)	8	Not used

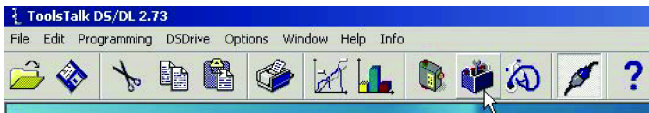
**NOTICE** Ensure that the Communication Mode switch is set for Tensor controllers. See Hardware set-up. Ensure that the Address switch is set for Tensor controllers. See Hardware set-up.

## ToolsTalk DS/DL configuration example

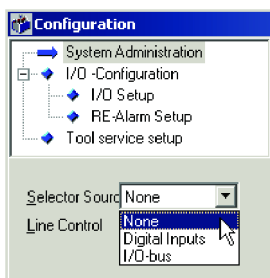
This section includes a step-by-step instruction on how to setup a Stacklight ESL-04 standard ESL-04 with:

- Stack lamp 1 indicating tightening result with high torque.
- Stack lamp 2 indicating an okay (OK) tightening result.
- Stack lamp 3 indicating tightening result with low torque.
- Stack lamp 4 indicating a tightening result that is not okay (NOK).
- The push button used for acknowledging of events.
- The key switch used for batch increment and to reset batch.
- The buzzer sound alerting on an unacceptable tightening.

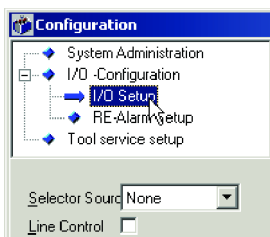
1. Connect Stacklight ESL-04 to the drive by using the **I/O bus cable**.
2. Open **ToolsTalk** and connect the tightening controller.
3. In the menu, click on the **Configuration** symbol.



4. In the Configuration window, select **None** for option **Selector Source**.



5. Open the **I/O Setup** section under **I/O-Configuration** in the configuration tree window.



Access the configuration dialog box for **I/O Expander**.

Assign signal variables to stacklight channels by selecting one from each item list. To obtain the example setup shown in the figure below, assign the following:

1. **Ack Error** for digital input 3 connected to the push button.
2. **Batch increment** for digital input 5 connected to the left key switch state.
3. **Reset batch** for digital input 6 connected to the right key switch state.
4. **High Torque** to relay output 1 connected to Stack lamp 1.
5. **OK** to relay output 2 connected to Stack lamp 2.
6. **Low** to relay output 3 connected to Stack lamp 3.
7. **NOK** to relay output 4 connected to Stack lamp 4.
8. **NOK** to relay output 8 connected to the Buzzer.
9. Set **Relay Time** to three seconds. Click Store and close dialog boxes to complete the software configuration.

I/O Expander			
Input		Relay	Relay Time
1.	Not used	High Torque	To Next Tightening
2.	Not used	OK	To Next Tightening
3.	Ack Error	Low Torque	To Next Tightening
4.	Not used	NOK	To Next Tightening
5.	Batch increment	Not used	To Next Tightening
6.	Reset batch	Not used	To Next Tightening
7.	Not used	Not used	To Next Tightening
8.	Not used	NOK	Time: 3,00 Sec

**NOTICE** The user guide for the tightening controller includes a detailed parameter list of valid signals.

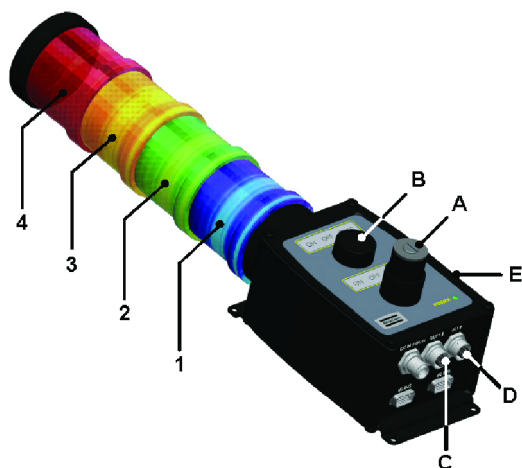
## PowerMACS example setup

Stacklight ESL-04 is configured as one I/O device with 8 inputs and 16 outputs for PowerMACS communication. The configuration is made via the Atlas Copco software WinTC.

**NOTICE** Ensure that the Communication Mode switch is set for PowerMACS. See Hardware set-up. Ensure that the Address switch is set on a valid address for PowerMACS. See Hardware set-up.

The table below shows an example mapping of inputs and outputs for Stacklight ESL-04 with PowerMACS.

A light/lamp uses one output and the switch uses two inputs. If a two-way switch is used, then [x1] (where "x" is the switch position) represents the left switch state and [x2] the right switch state. When a push button or one-way switch is used it is enough to configure [x1] (but it is possible to use both outputs for different functions).



I/O device 1:

Input address	Stacklight ESL-04 part	Output address	Stacklight ESL-04 part
600.0	External input 1 [D]	800.0	Stack lamp [1]
601.0	External input 2 [D]	801.0	Stack lamp [2]
602.0	Switch state [A1]	802.0	Stack lamp [3]
603.0	Switch state [A2]	803.0	Stack lamp [4]
604.0	Switch state [B1]	804.0	Stack lamp [5] (optional)
605.0	Switch state [B2]	805.0	Lamp [A]
606.0	Not used	806.0	Lamp [B]
607.0	Not used	807.0	Buzzer sound 1 [E]

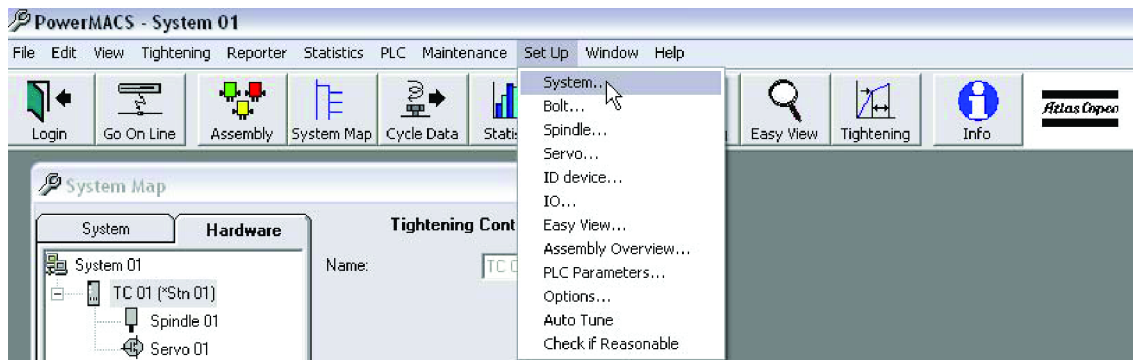
Input address	Stacklight ESL-04 part	Output address	Stacklight ESL-04 part
608.0	Not used	808.0	Buzzer sound 2 [E]
609.0	Not used	809.0	External output 1 [C]
610.0	Not used	810.0	External output 2 [C]
611.0	Not used	811.0	Not used
612.0	Not used	812.0	Not used
613.0	Not used	813.0	Not used
614.0	Not used	814.0	Not used
615.0	Not used	815.0	Not used

### WinTC configuration example

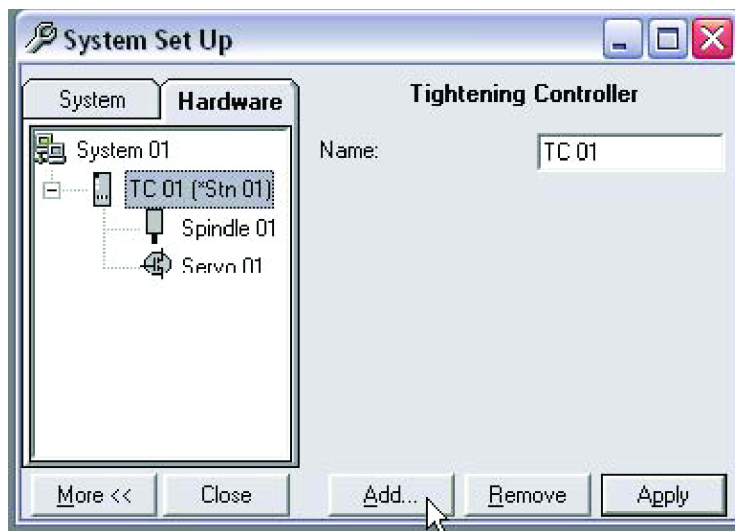
This section includes a step-by-step instruction on how to setup a Stacklight ESL-04 standard ESL-04 with:

- Stack lamp 1 indicating tightening result with high torque
- Stack lamp 2 indicating an okay (OK) tightening result
- Stack lamp 3 indicating tightening result with low torque
- Stack lamp 3 indicating the Running signal from the controller
- Stack lamp 4 indicating a tightening result that is not okay (NOK)
- The push button used as light test button
- The buzzer sound alerting on a tightening result that is not okay

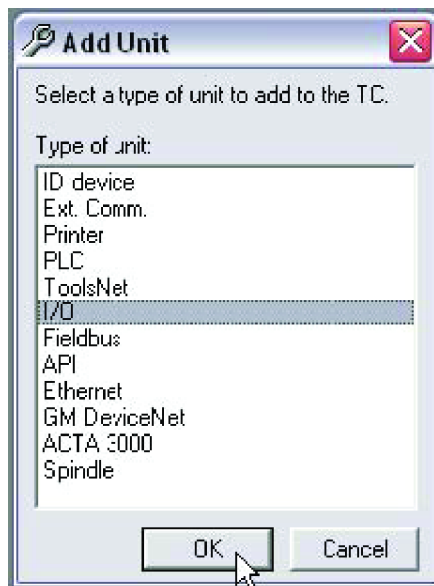
1. Connect Stacklight ESL-04 to the PowerMACS controller with a MACS I/O cable.
2. Open WinTC and connect PowerMACS.
3. Click **Go On Line** in the WinTC tool bar.
4. In the **Set Up** menu, select **System**.



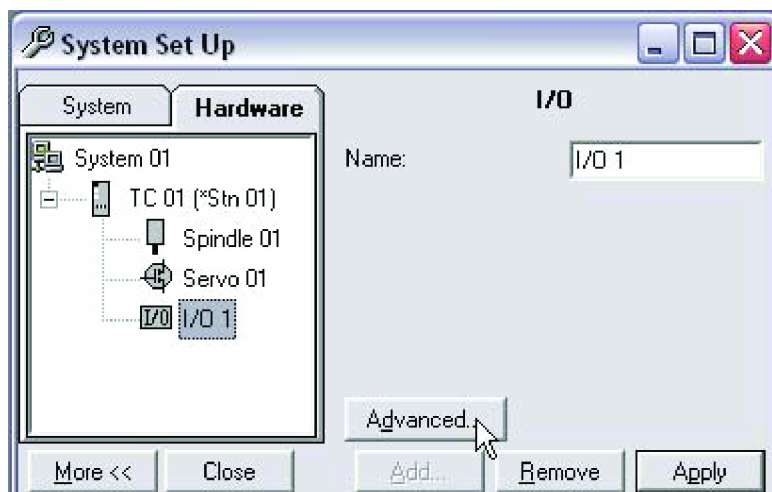
5. Click **Go Off Line** in the WinTC tool bar.
6. The **System Set Up** window appears.



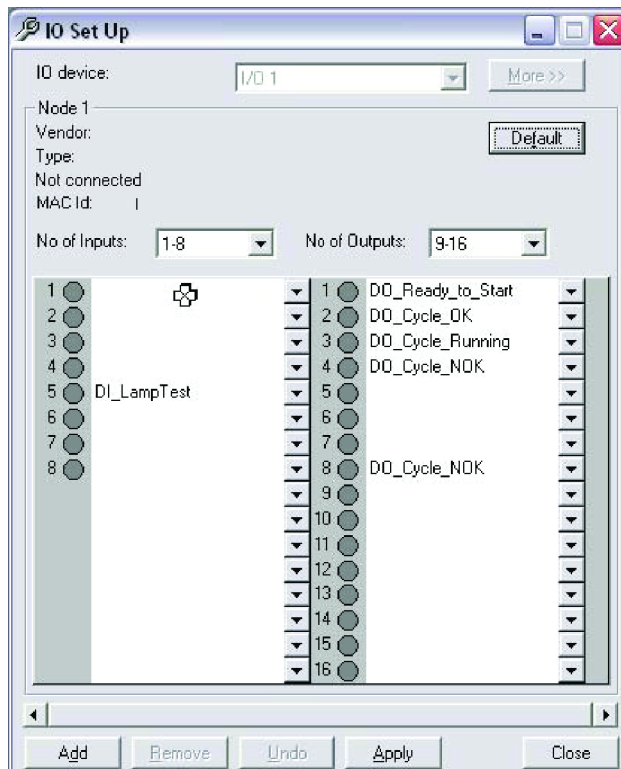
7. Open the **Hardware** tab and mark the station primary **TC** to configure.
8. Click the **More** button and then click **Add**.
9. The **Add Unit** window appears.



10. Mark **I/O** and click **OK**.
11. In the **System Set Up** window select the added I/O device and click **Advanced**.



12. The **IO Set Up** window appears.



13. Set number of in- and outputs to **1-8** in both item lists.

14. Assign signal variables to channels by selecting one from each item list.

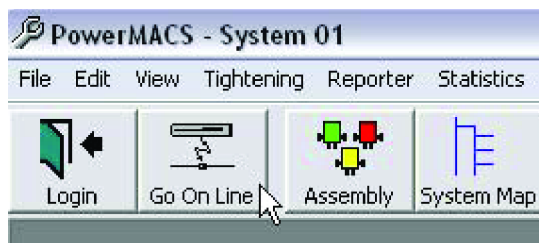
Set (signal -- channel):

- DI\_LampTest -- Input 5
- DO\_Ready\_to\_Start -- Output 1
- DO\_Cycle\_OK -- Output 2
- DO\_Cycle\_Running -- Output 3
- DO\_Cycle\_NOK -- Output 4
- DO\_Cycle\_NOK -- Output 8

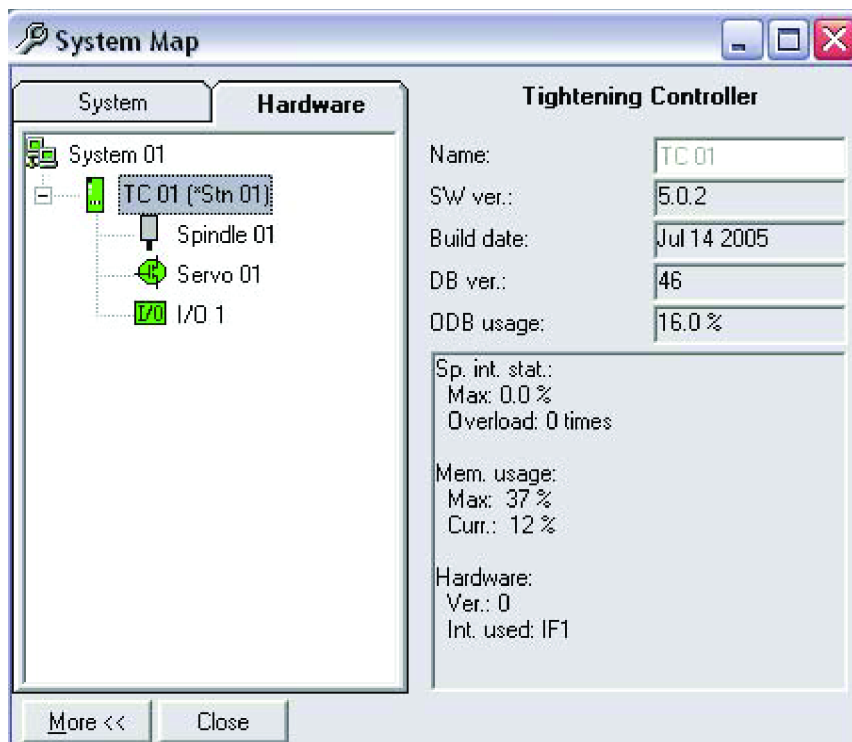
15. Set all other in- and outputs blank.

16. Click **Apply** and then **Close**.

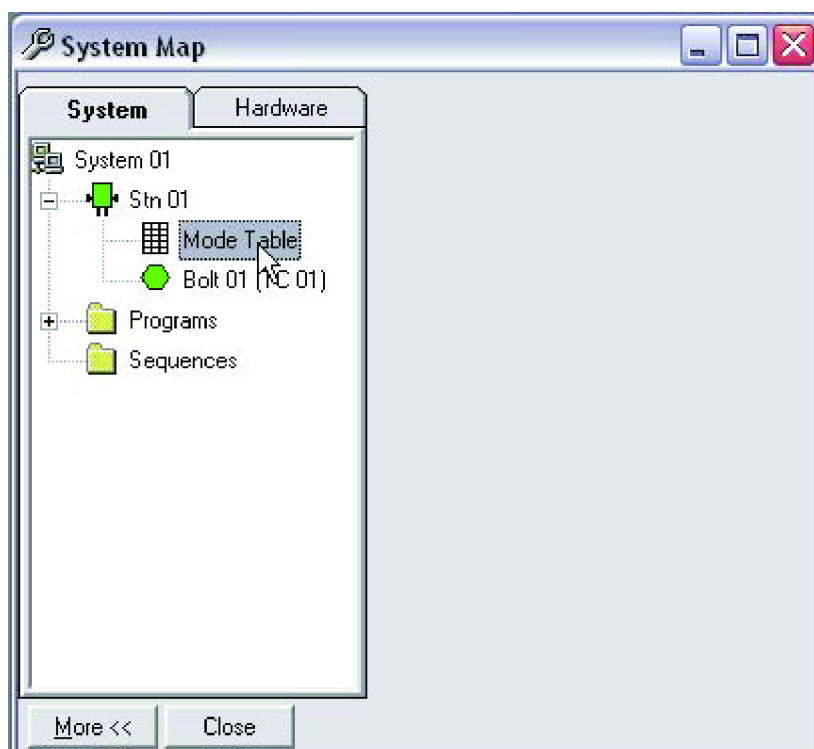
17. Click **Go On Line** on the WinTC main window toolbar



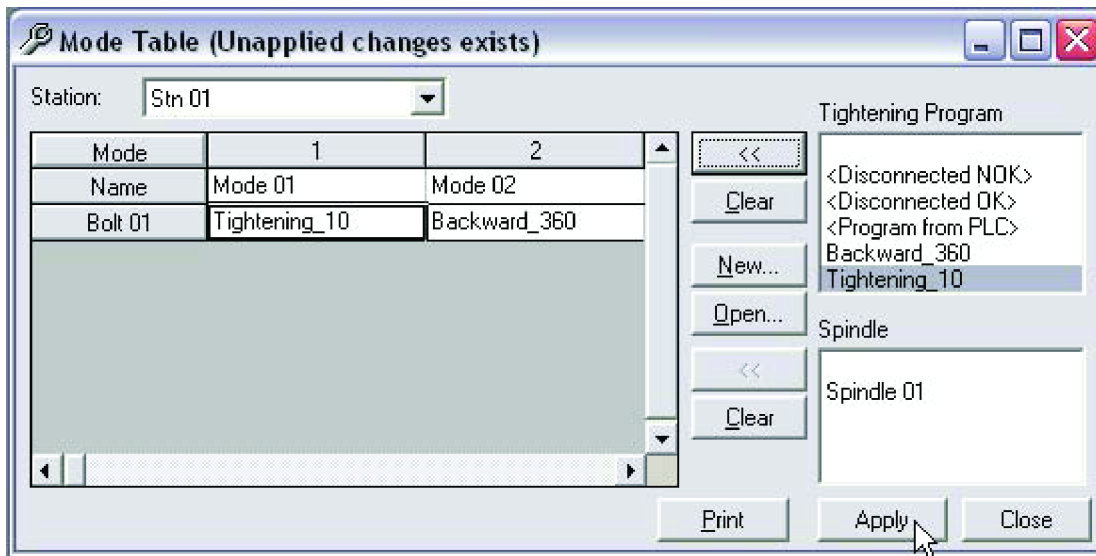
18. The I/O device should now be activated (indicated by green) in the **System Map**.



19. Open the **System** tab and double-click on **Mode Table**.

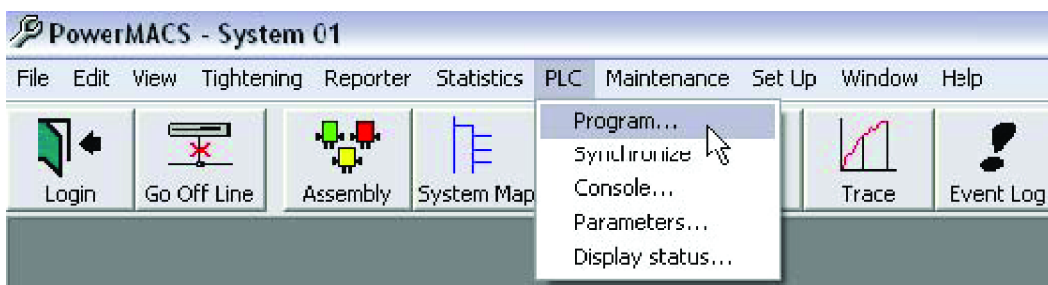


20. Select and add tightening programs to **Mode 1** and **Mode 2**.

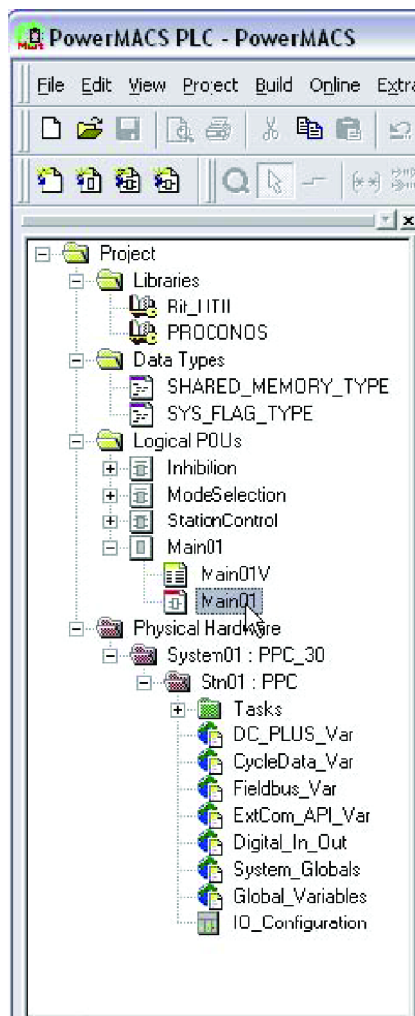


**NOTICE:** See the PowerMACS user manual for how to create tightening programs.

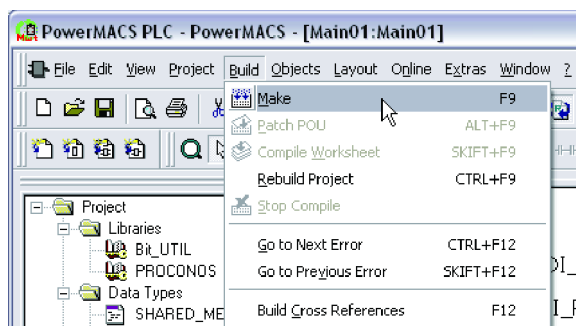
21. Click **Apply**.
22. Click **PLC** in the ToolsTalk main window menu bar and **Program** in the **PLC** menu to access the **PowerMACS PLC** dialog box with its **Project Tree** Window.



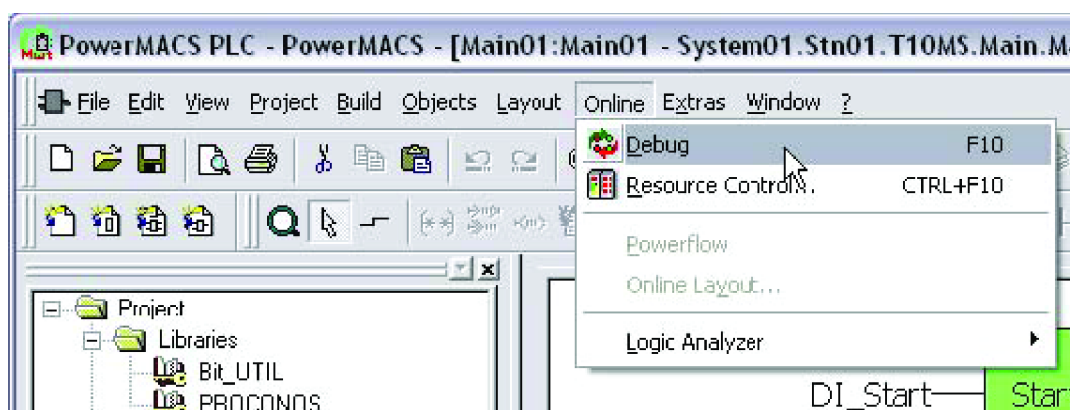
23. Click **Main01** in the **Project Tree** Window project tree.



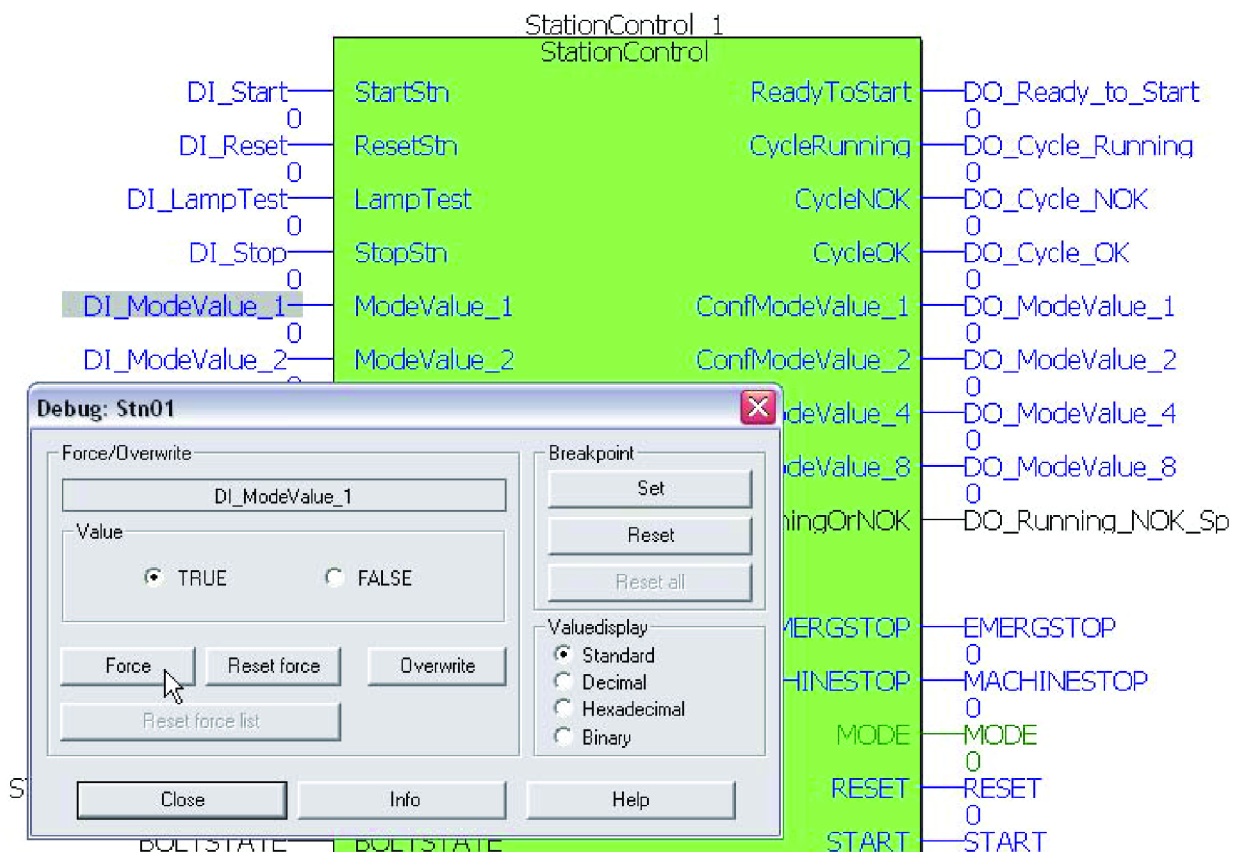
24. Click **Build** on the **PowerMACS PLC** window menu bar and then click **Make**.



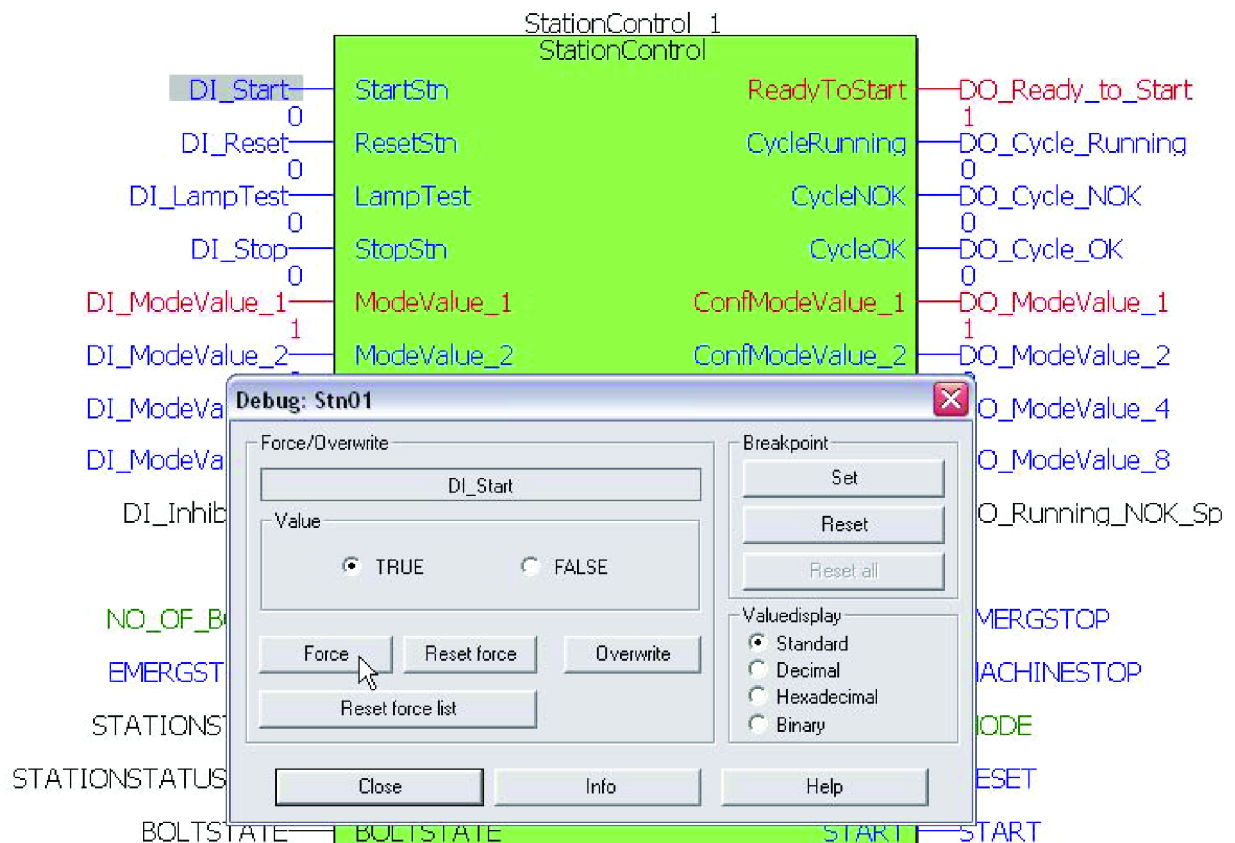
25. Click **Online** on the **PowerMACS PLC** window menu bar and click **Debug** on its drop down menu.



26. Double-click **DI\_ModeValue\_1** and then click **Force**.

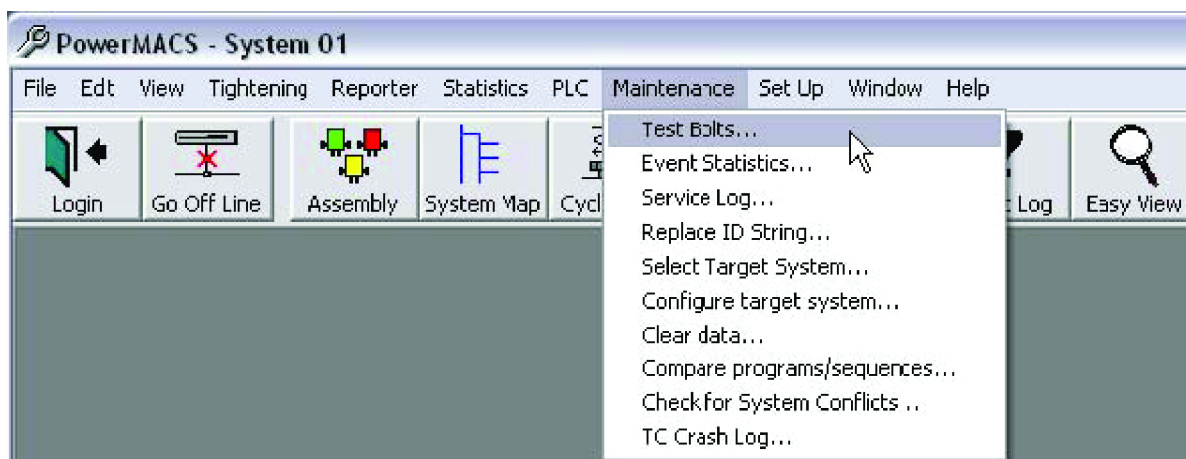


27. Double-click **DI\_Start** and then click **Force** in the pop up window.

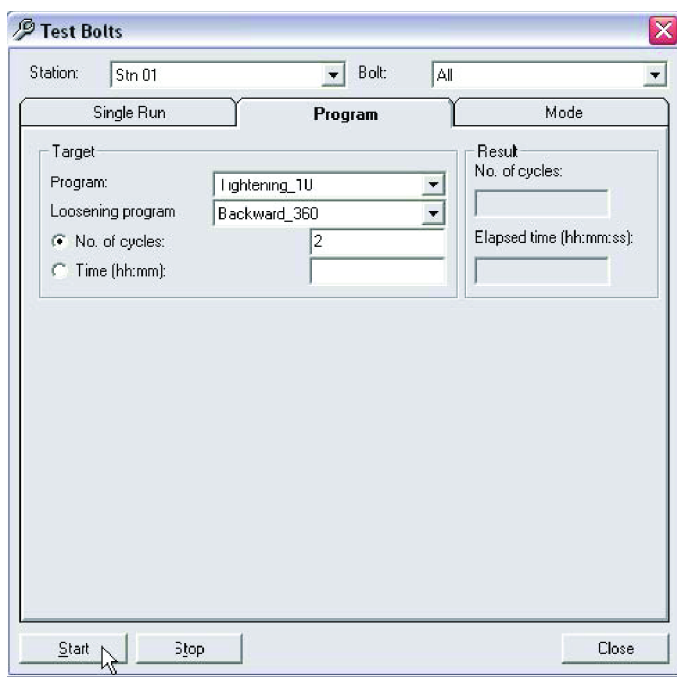


28. Close the **PowerMACS PLC** window.

29. In the **Maintenance** menu, select **Test Bolts**.



30. The Test Bolts dialog box appears.



31. In the **Program** tab, select target for **Program**, **Loosening program** and **No. of cycles**.

32. Click **Start** to start the PowerMACS tightening process.

33. Check the Stacklight ESL-04 functionality according to the configuration made.

**NOTICE** Read the PowerMACS user manual for further details on PowerMACS and WinTC.

## World release 7 software


To configure software settings, go the appropriate section below for instructions on current controller type.

### Power Focus

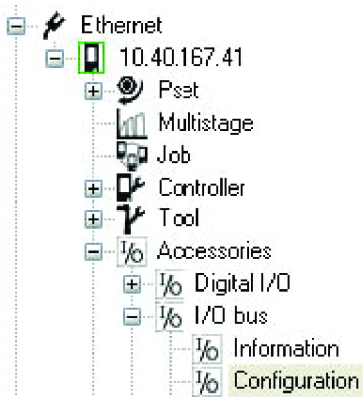
The following instructions are valid for the following software in world release 7:

- ToolsTalk Power Focus
- ToolsTalk Pulsor

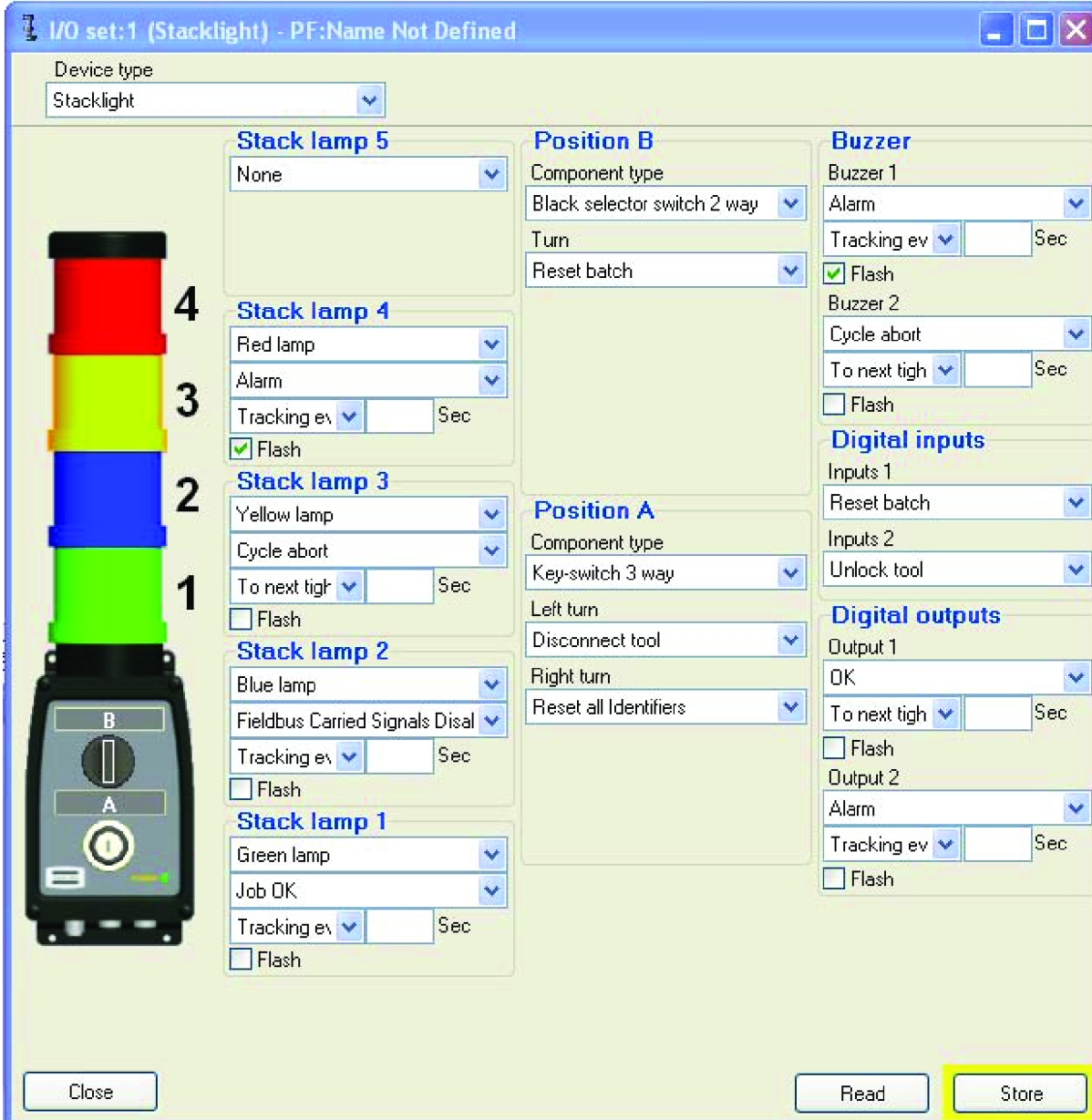
To set up Stacklight ESL-04 in world release 7 ToolsTalk, do the following:

1. Follow instructions in the controller user guide to access the ToolsTalk main window toolbar.
2. Click  in the main window toolbar to access the Power Focus map (**PF Map**).

3. Click  to open **Accessories**, **I/O bus** and **Configuration** in succession on the **PF Map**.



4. Right click **Configuration** and click **Create new I/O Device** to access the **Create new I/O Device** dialog box.
5. In the **Create new I/O Device** dialog box; set **New I/O device ID** corresponding to the current hardware setting. See *Hardware set-up [Page 000]* for details on the address switch. Set **Device type** to **Stacklight** in its item list and then click **Ok**. This enables access to the **I/O set** dialog box.
6. Assign signal variables to stacklight channels by selecting one from each item list. If applicable, set time duration by changing default option from **To next tight** to **Time** option in the item list. Input a **Time duration limit** from 0.01 to 60 seconds in the **Sec** box.



I/O set:1 (Stacklight) - PF:Name Not Defined

Device type  
Stacklight

**Stack lamp 5**  
None

**Stack lamp 4**  
Red lamp  
Alarm  
Tracking ev [ ] Sec  
☒ Flash

**Stack lamp 3**  
Yellow lamp  
Cycle abort  
To next tigh [ ] Sec  
☐ Flash

**Stack lamp 2**  
Blue lamp  
Fieldbus Carried Signals Disal  
Tracking ev [ ] Sec  
☐ Flash

**Stack lamp 1**  
Green lamp  
Job OK  
Tracking ev [ ] Sec  
☐ Flash

**Position B**  
Component type  
Black selector switch 2 way  
Turn  
Reset batch

**Position A**  
Component type  
Key-switch 3 way  
Left turn  
Disconnect tool  
Right turn  
Reset all Identifiers

**Buzzer**  
Buzzer 1  
Alarm  
Tracking ev [ ] Sec  
☒ Flash  
Buzzer 2  
Cycle abort  
To next tigh [ ] Sec  
☐ Flash

**Digital inputs**  
Inputs 1  
Reset batch  
Inputs 2  
Unlock tool

**Digital outputs**  
Output 1  
OK  
To next tigh [ ] Sec  
☐ Flash  
Output 2  
Alarm  
Tracking ev [ ] Sec  
☐ Flash

Close Read Store

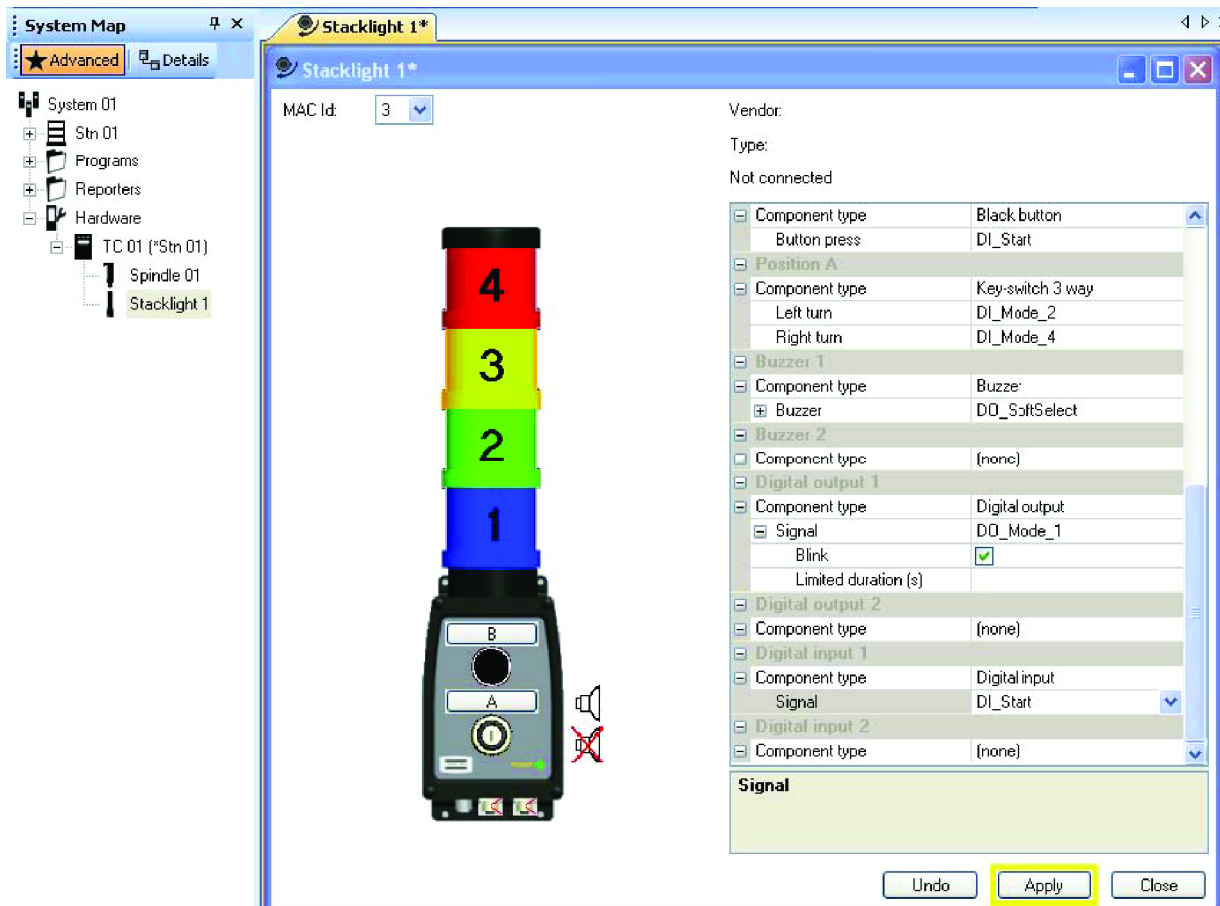
**NOTICE!** The user guide for the tightening controller includes a detailed parameter list of valid signals.

- Click **Store** and **Close** to store settings, complete setup and return to the **PF Map** window.

## PowerMACS 4000


To set up the I/O box in world release 7 ToolsTalk PowerMACS, do the following:

- Follow instructions in the PowerMACS user guide to access the ToolsTalk main window **System Map** and the **Items** tab of the **Dynamic Tool** menu.
- Drag and drop an I/O icon from the Items tab to a Tightening Controller (TC) on the **System Map**.
- Right click on that I/O icon and select **Advanced Device Settings** to access the IO Set Up dialog box.



4. Set **MAC Id** to the same setting as the hardware switch. See *Hardware set-up [Page 000]* for details on the address switch.

**NOTICE:** The valid MAC Id is any vacant address setting 1-6.

5. Click  to open positions and assign signal variables to components by selecting one from each item list.

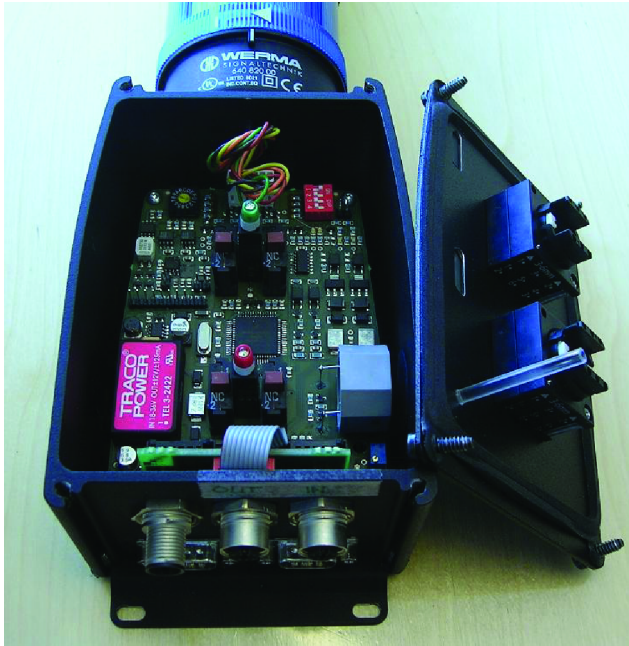
**NOTICE:** The user guide for the tightening controller includes a detailed parameter list of valid signals.

6. Click **Apply** and **Close** to end the **I/O Set Up** dialog.

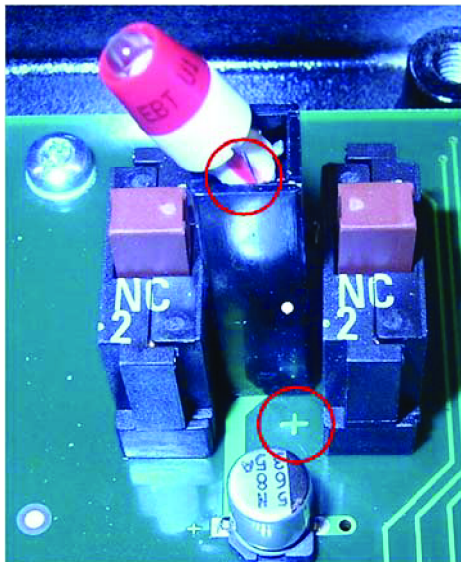
## Hardware

### Hardware setup

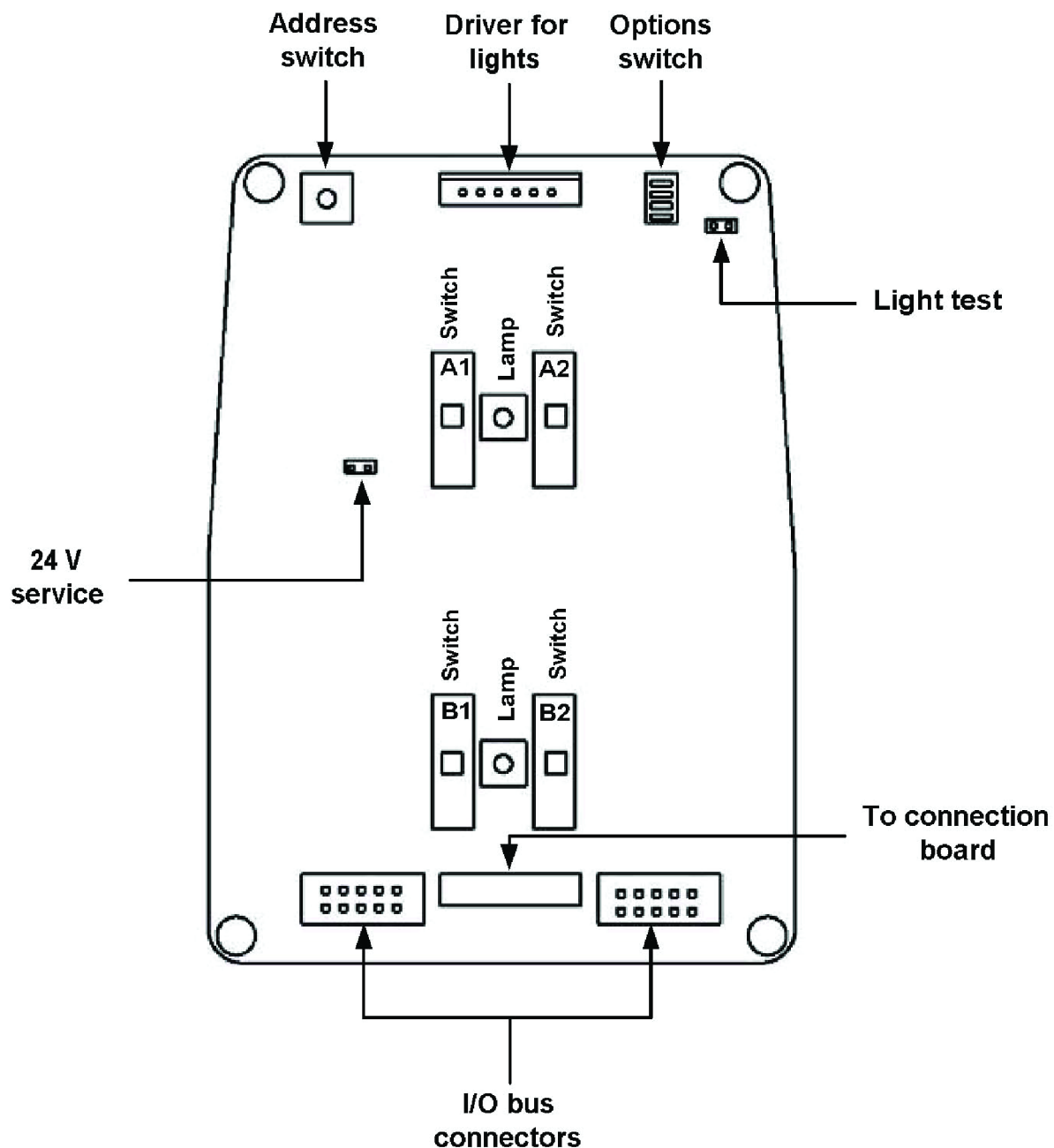
To access the main board and make a hardware configuration change it is necessary to open the Stacklight ESL-04 device. Loosen the four screws on the front panel and remove the lid.



When fastening a new LED (light-emitting diode), the red mark on the LED should point at the plus mark on the printed circuit card.

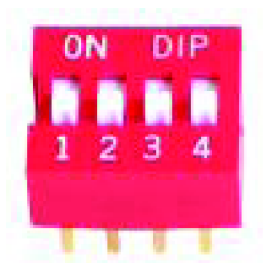


Sketch of the Stacklight ESL-04 main board



### Communication Mode switch

Set communication mode according to the following:

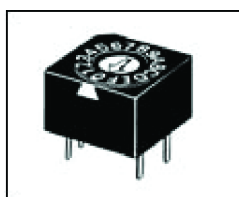


Position 1	Position 2	Position 3	Position 4	Communication mode
0	0	0	0	Power Focus or Pulsor Focus

Position 1	Position 2	Position 3	Position 4	Communication mode
1	0	0	0	PowerMACS
0	1	0	0	DS or DL Advanced Drive
1	1	0	0	n/a

### Address switch

The sixteen position rotary selector on the circuit board is an address switch for setting node or device address in the I/O box. The positions are hexadecimal numbers. The decimal numerical value for A is 10. Hexadecimal F equals decimal 15. To alter the setting, use a small flat bladed screwdriver that fits the slot and turn the rotary selector.



Apply default setting is 3 if it is vacant. If it is already occupied in a current configuration, set another address. The following addresses are valid alternatives:

- 1-F for :
  - Power Focus
  - Pulsor Focus
  - DS Advanced Drive
  - DL Advanced Drive
- 1-6 for PowerMACS

### 24 V DC external input

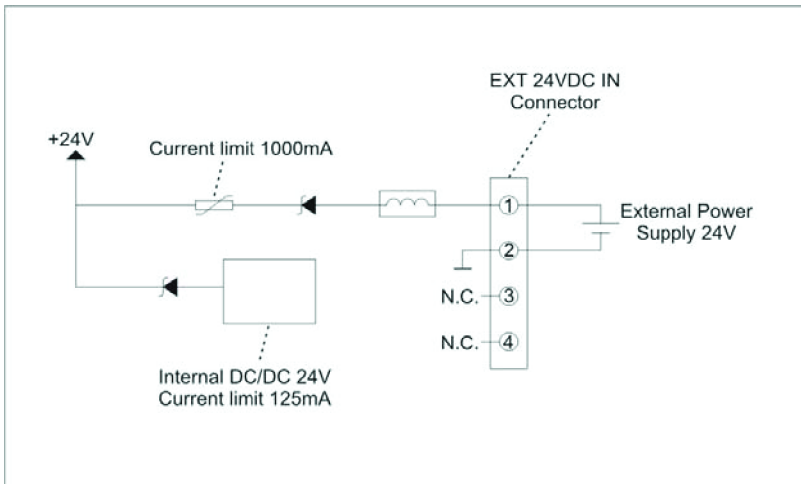
The 24 V C external input is a 4 pin coded M12 male connector. It is possible to feed Stacklight ESL-04 with an extra 24 V DC through this input, which is useful when the external output needs more current than the internal power can deliver.

**NOTICE** Without external 24 V connected the maximum current in the external input connector and output connector is 100 mA combined. With external feed max 500 mA each.



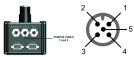
Pin	Function
1	+24 V DC in (max 1 A)
2	GND
3	NC
4	NC

**NOTICE** The 24 V out is isolated from the controller safety ground. If an external 24 V supply is connected it must also be isolated.



### External outputs

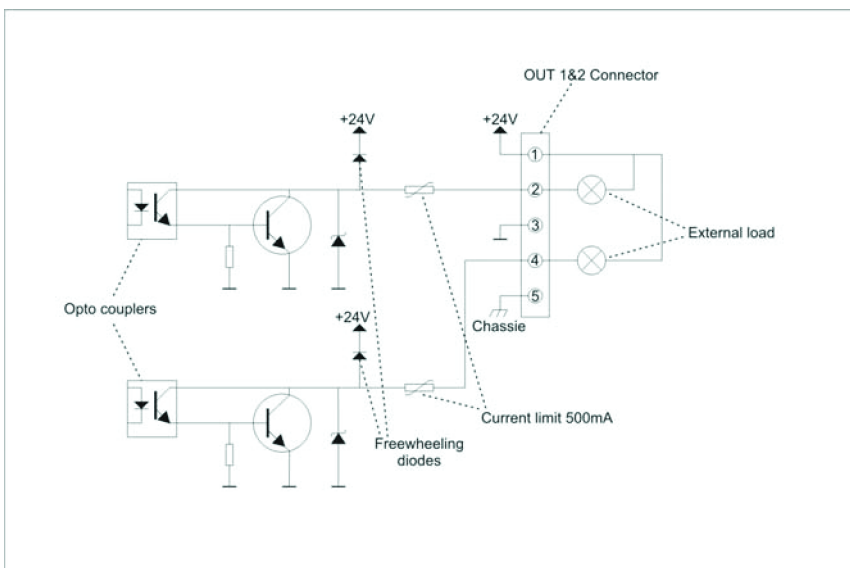
The external output 1 and 2 is a 5 pin coded M12 female connector. These connectors are optoisolated semiconductor outputs, short circuit protected and also protected against inverse connection.



Pin	Function
1	+24 V DC out (max 0,1/1 A fused)*
2	Output 1 (max 500 mA fused)*
3	GND
4	Output 2 (max 500 mA fused)
5	GND Housing

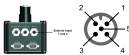
\* Without external 24 V connected the maximum current is 100 mA combined. With external feed, max 1 A combined.

**NOTICE** The 24 V out is isolated from the controller safety ground. If an external 24 V supply is connected it must also be isolated.



### External inputs

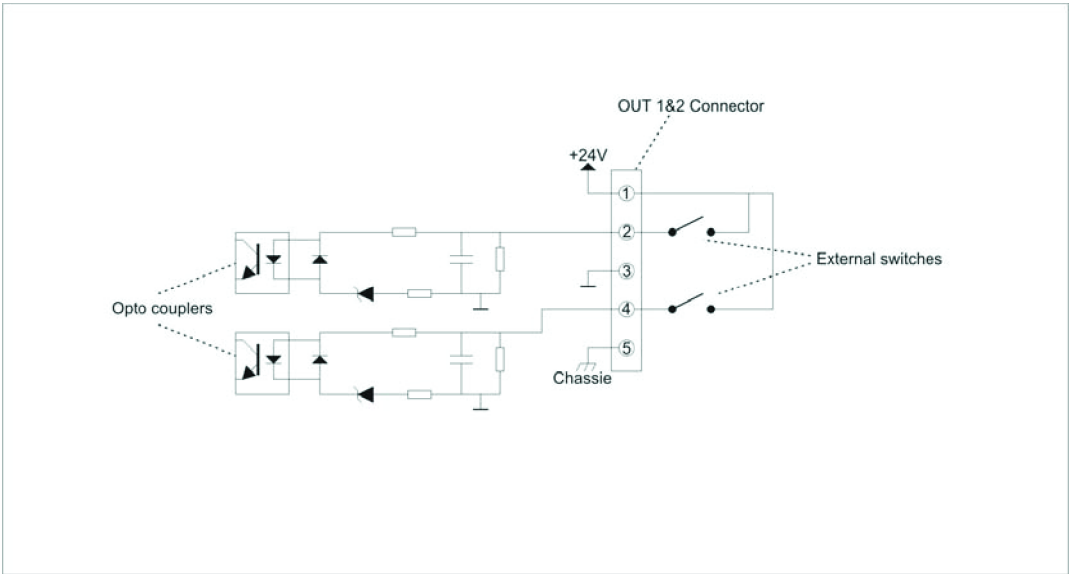
The External input 1 and 2 is a 5 pin coded M12 female connector. These inputs are designed according to IEC 61131-2 type 2, optoisolated. Nominal input voltage is 24 V DC (0-state 0-5V; transition 5-11V; 1-state 11-30 V) The connector is protected against inverse connection.



Pin	Function
1	+24 V DC out (max 0,1/1 A fused)*
2	Input 1
3	GND
4	Input 2
5	GND Housing

\* Without external 24 V the maximum combined current is 100 mA. With external feed the maximum combined current is 1 A.

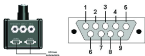
**NOTICE** The 24 V out is isolated from the controller safety ground. If an external 24 V supply is connected it must also be isolated.



I/O bus connectors

Use one of the two DSUB-9 male I/O bus connectors to connect Power Focus, Pulsor Focus, PowerMACS or DS/DL.

**NOTICE** It is recommended not to use I/O cables longer than 100 meters.



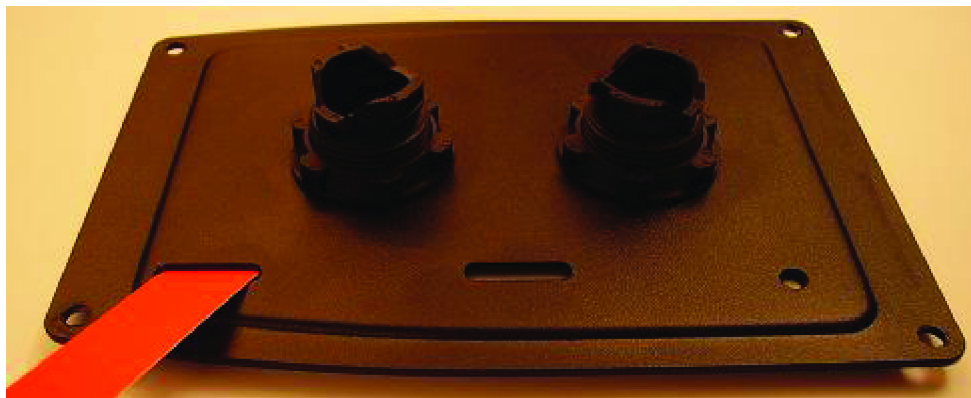
**NOTICE** Put a termination plug to one of the I/O bus connectors if the Stacklight ESL-04 device is at the end of the I/O bus line. For connection with PowerMACS to work: Connect pin 1 and 9 together and also connect pin 3, 4 and 6 together.

Pin	Function
1	+24 V isolated
2	Signal Low
3	0 V (+8V isolated)
4	0 V (+8V isolated)
5	NC
6	0 V (+8V isolated)
7	Signal High
8	NC
9	+8 V isolated (for I/O Bus) +24 V isolated (for MACS I/O)

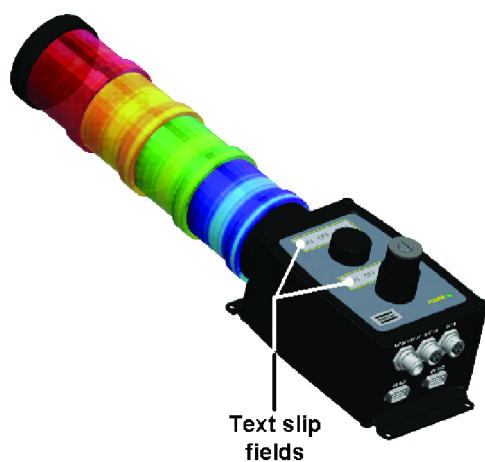
## Optional text slips

To fit a text slip in a front panel slot, do the following:

1. Remove the front panel from Stacklight ESL-04.
2. Cut a 70×15 mm paper rectangle.
3. Fit the label text within 51×13 mm on the paper rectangle.
4. Slip the text slip into the slot in the back of the front plate.
5. Repeat steps 2 to 4 in for a second label.



**NOTICE** Paper rectangles are longer than the slots to have a grip for easy replacement. A laminate printer may be used to add laminating to an 80 gram A4 sheet of paper for the labels.





Original instructions



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