

Operator panel

External device

Atlas Copco Tools and Assembly Systems

9836 2456 01

2007-12

Edition 7



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1 Introduction

Operator panel is a flexible lamp and switch box designed to interface with controllers equipped with the following types of I/O bus connectors:

- I/O Bus
- MACS I/O

Operator panel has nine configurable positions for switches or indicator lamps. Different lamp and switch colors are detailed in section 4 *Spare part list* and all are available for ordering.

The lamp test button will light up all lamps and display segments without changing status on the bits reported to the tightening controller. The external outputs and buzzer will not be affected when pressing the button.

Operator panel is equipped with a user display and the soft select display. Each of those consist of two seven segments LED's (light-emitting diodes) to display numbers in the range 0-99.

The user display is normally used to show the present running Pset or Job, selected from the tightening controller.

The soft select display is connected to the soft select switch which is a binary coded rotary selector, primarily used for Pset or Job selections. The right switch position counts up and the left position counts down, with a repeat rate of 250 milliseconds. The settings for the soft select function can be changed, see section 3.2.1 *Options switch* for details.

The buzzer has a fixed frequency of 3000Hz and is activated with two outputs in the tightening controller.

Operator panel has two external outputs, two external inputs and a connector for external power.

The switch connector at position P can be connected directly to switches at positions I and J. See section 3.2.9 *Jumper groups* for details. Text slip fields to all panel positions as well as the panel itself are detailed in section 5 *Text slip fields*.

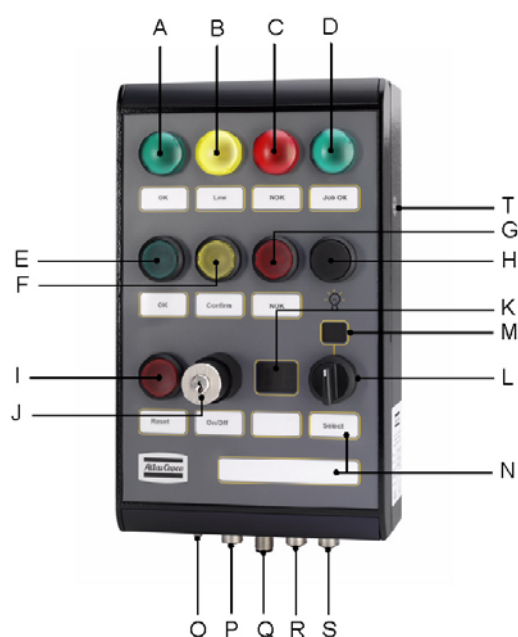


Figure 1: Positions on Operator panel

Position	Comment
A, B, C, D, E, F, G, I and J	Configurable for switches or indicator lamps.
H	Lamp test button
K	User display
L	Soft select switch
M	Soft select display
T	Buzzer
O	I/O bus connector
P	Switch connector
R	Two external outputs
S	Two external inputs
Q	External power connector
N	Text slip field

Table 1: Legend

1.1 Operator panel Advanced and Basic

Operator panel can be ordered in Advanced and Basic standard versions. See Table 2 below.



Customize Operator panel with accessories detailed in section 4 *Spare part list*.



Standard version	Parts	Ordering number
Operator panel Advanced 	4 configurable lamps 4 configurable push buttons 1 push button for lamp test 1 configurable key switch 1 configurable selector switch 1 configurable buzzer to indicate events Display for showing selector switch position Display for showing running Pset or Job I/O bus connection Switch connector 24 V DC external input External outputs (output 1 and 2) External inputs (input 1 and 2)	8433 0565 00
Operator panel Basic 	3 configurable lamps 3 configurable push buttons 1 push button for lamp test 1 configurable key switch 1 configurable buzzer to indicate events Display for showing running Pset or Job Display for showing selector switch position (if using a selector switch) I/O bus connection Switch connector 24 V DC external input External outputs (output 1 and 2) External inputs (input 1 and 2)	8433 0565 10

Table 2: Advanced and basic version

1.1.1 Default settings

Default settings for Operator panel Advanced and Basic:

- The communication mode is by default set to Power Focus and Pulsor Focus controllers. See section 3.2.1 *Options switch* for details on the communication mode switch.
- The node and device address is set to 3, which is the primary used in the Power Focus or Pulsor Focus. See section 3.2.2 *Address switch* for details on the address switch.
- The soft select switch [L] and soft select display [M] are disabled. To enable this switch and display, set options switch bit 5, see section 3.2.1 *Options switch*.
- The maximum value for the soft select switch [L] is set to F (hexadecimal digit). To change the value, see section 3.2.3 *MAX switch*.
- Switch [I] and switch [J] are in internal (INT) mode, which means the switches are connected internally to I/O Bus or MACS I/O. To change to external mode, when the switches are connected to the switch connector [P], see section 3.2.5 *Switch connector*.

2 Software

Follow instructions in the appropriate section below to configure the software settings. Configuration examples are included for world release 5 ToolsTalk and WinTC.

2.1 PowerFocus and PulsorFocus setup

Table 3 shows the mapping of inputs and outputs for Operator panel in the PowerFocus and PulsorFocus. An indicator lamp occupies one output and a switch occupies 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].

Device 1	Relay	Part	Input	Part
	1	Lamp [A]	1	Switch [A1]
	2	Lamp [B]	2	Switch [A2]
	3	Lamp [C]	3	Switch [B1]
	4	Lamp [D]	4	Switch [B2]
	5	Lamp [E]	5	Switch [C1]
	6	Lamp [F]	6	Switch [C2]
	7	Lamp [G]	7	Switch [D1]
	8	Lamp [I]	8	Switch [D2]
Device 2	Relay	Part	Input	Part
	1	Lamp [J]	1	Switch [E1]
	2	Lamp [L]	2	Switch [E2]
	3	Buzzer [T] bit 1	3	Switch [F1]
	4	Buzzer [T] bit 2	4	Switch [F2]
	5	Not used	5	Switch [G1]
	6	Soft select switch [L] (enable=1 disable=0)	6	Switch [G2]
	7	External output 1 [R]	7	External input 1 [S]
	8	External output 2 [R]	8	External input 2 [S]
Device 3	Relay	Part	Input	Part
	1	User display [K] bit 0	1	Switch [I1]
	2	User display [K] bit 1	2	Switch [I2]
	3	User display [K] bit 2	3	Switch [J1]
	4	User display [K] bit 3	4	Switch [J2]
	5	User display [K] bit 4	5	Soft select switch [L] bit 0
	6	User display [K] bit 5	6	Soft select switch [L] bit 1
	7	User display [K] bit 6	7	Soft select switch [L] bit 2
	8	User display [K] (enable=1 disable=0)	8	Soft select switch [L] bit 3

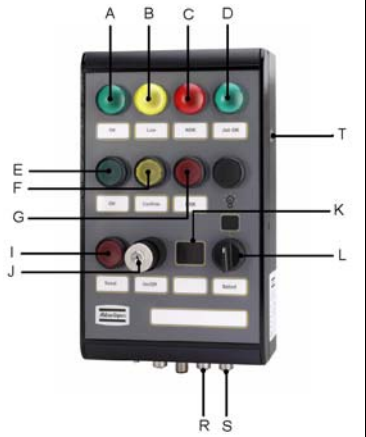


Table 3: I/O device settings for Power Focus and Pulsor Focus

2.1.1 W5 ToolsTalk Power Focus and ToolsTalk Pulsor

This section includes a configuration example and a step-by-step instruction on how to setup an Operator panel according to Figure 2.

The panel has five lamps; indicating “OK” cycles (lamp [A]), “NOK” (lamp [B]), “Low” (lamp [C]), “Job OK” (lamp [D]) and “Alarm” (lamp [G]).

There are also three push buttons used for “Batch increment” (switch [E]), “Ack error message” (switch [F]) and “Batch decrement” (switch [I]).

A key switch (switch [J]) is connected to signal “Abort Job”.

Job selection is done with a switch (soft select switch [L]) and the selection is displayed (soft select display [M]).

The current running Pset, received from the controller, is shown in the user display [K].

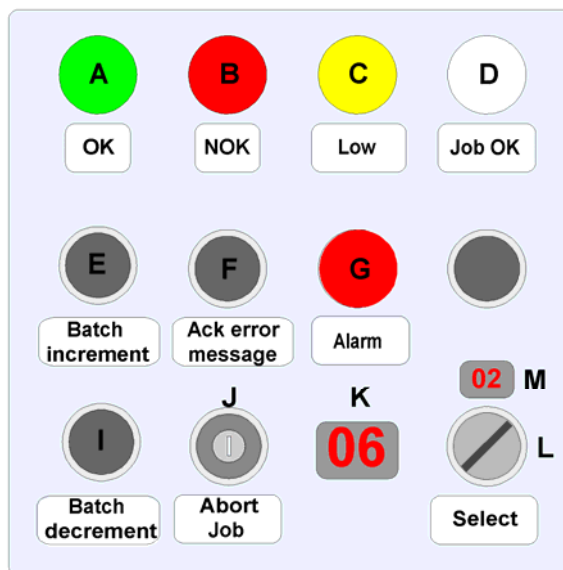


Figure 2: Operator panel configuration example

1. Connect Operator panel to the Power Focus or Pulsor Focus controller with the I/O Bus cable.
2. Open ToolsTalk PF and connect the controller
3. Create a couple of Psets and Jobs (Figure 3).



See the PowerFocus or PulsorFocus user manual for instructions on how to create Psets and Jobs.

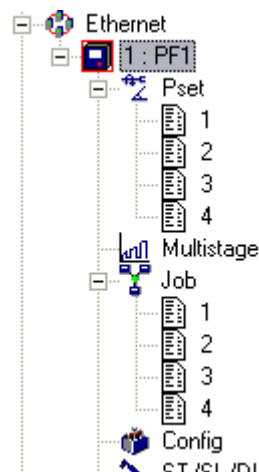


Figure 3: Created Psets and Jobs

4. In the **PF Map**, double click on **Config** (Figure 4).
5. In the **Config** menu tree, select **Other I/O:s 1** under I/O setup.
6. Select “Tool trigger” for the option C220 Tool start select source and select “Digin” for the option C221 Job select source (Figure 5).
7. Click OK.

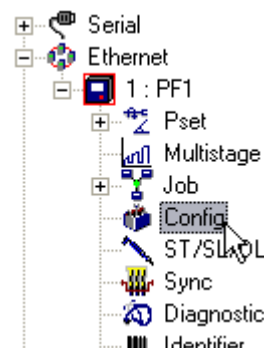


Figure 4: Select Config

Other I/O:s 1	
C220 Tool start select source	Tool trigger
C221 Job select source	Digin
C222 Pset select source	Off
C223 Tool light con source	PF-controlled 1

Figure 5: Other I/O:s 1

8. In the Config menu tree, select I/O device 8-15.
9. Select "I/O expander" for Device 8 and click Set (Figure 6).



The device address is default set to start at 8. To change the address, see section 3.2.2 Address switch.

I/O device 8-15		
C210 Device 8	I/O expander	Set
C211 Device 9	Off	Set
C212 Device 10	Off	Set
C213 Device 11	Off	Set
C214 Device 12	Off	Set
C215 Device 13	Off	Set
C216 Device 14	Off	Set
C217 Device 15	Off	Set

Figure 6: Select I/O expander for Device 8

10. The output (relay) and input dialog is displayed (Figure 7).
11. Select "OK" for Relay 1. This output is connected to lamp [A].
12. Select "NOK" for Relay 2. This output is connected to lamp [B].
13. Select "Low" for Relay 3. This output is connected to lamp [C].
14. Select "Job OK" for Relay 4. This output is connected to lamp [D].
15. Select "Alarm" for Relay 7. This output is connected to lamp [G].
16. Click OK when finished.

	Relay	Relay Timer	Time		Digital Input
1	OK	To next tight		1	Off
2	NOK	To next tight		2	Off
3	Low	To next tight		3	Off
4	Off			4	Off
5	Job OK	To next tight		5	Off
6	Off			6	Off
7	Alarm	Tracking event		7	Off
8	Off			8	Off

Figure 7: Output and input settings for Device 8

17. Select “I/O expander” for Device 9 and click Set (Figure 8).

I/O device 8-15		
C210 Device 8	I/O expander	Set
C211 Device 9	I/O expander	Set
C212 Device 10	Off	Set
C213 Device 11	Off	Set
C214 Device 12	Off	Set
C215 Device 13	Off	Set
C216 Device 14	Off	Set
C217 Device 15	Off	Set

Figure 8: Select I/O expander for device 9

18. The output (relay) and input dialog is displayed (Figure 9).
 19. Select “NOK” for Relay 3. This output is connected to buzzer [T].
 20. Select “PF ready” for Relay 6. This output is used to enable soft select display [M].



It is also possible to use the Options switch on the main board to enable the soft select switch [L] and soft select display [M], see section 3.2.1 Options switch

21. Select “Batch increment” for Digital input 1. This input is connected to switch [E].
 22. Select “Ack error message” for Digital input 3. This input is connected to switch [F].
 23. Click OK when finished.

Relay			Relay Timer	Time	Digital Input	
1	Off				1	Batch increment
2	Off				2	Off
3	NOK	Time	5,00	3	Ack error message	
4	Off			4	Off	
5	Off			5	Off	
6	PF ready	Tracking event		6	Off	
7	Off			7	Off	
8	Off			8	Off	

Figure 9: Output and input settings for Device 9

24. Select “I/O expander” for Device 10 and click Set (Figure 10)

I/O device 8-15		
C210 Device 8	I/O expander	Set
C211 Device 9	I/O expander	Set
C212 Device 10	I/O expander	Set
C213 Device 11	Off	Set
C214 Device 12	Off	Set
C215 Device 13	Off	Set
C216 Device 14	Off	Set
C217 Device 15	Off	Set

Figure 10: Select I/O expander for device 10

25. The output (relay) and input dialog is displayed (Figure 11).
26. Select “Running Pset bit 0” for Relay 1. Configuration of the user display [K] to show running Pset.
27. Select “Running Pset bit 1” for Relay 2. Configuration of the user display [K] to show running Pset.
28. Select “Running Pset bit 2” for Relay 3. Configuration of the user display [K] to show running Pset.
29. Select “Batch decrement” for Digital input 1. This input is connected to switch [I].
30. Select “Abort Job” for Digital input 3. This input is connected to switch [J].
31. Select “Job select bit 0” for Digital input 5 to configure soft select switch [L] to Job selector.
32. Select “Job select bit 1” for digital input 6 to configure soft select switch [L] to Job selector.
33. Select “Job select bit 2” for Digital input 7 to configure soft select switch [L] to Job selector.
34. Select “Job select bit 3” for Digital input 8 to configure soft select switch [L] to Job selector.
35. Click OK when finished.
36. Click Store to save settings.

	Relay	Relay Timer	Time		Digital Input
1	Running Pset bit 0	Tracking event		1	Batch increment
2	Running Pset bit 1	Tracking event		2	Off
3	Running Pset bit 2	Tracking event		3	Abort Job
4	Off			4	Off
5	Off			5	Job select bit 0
6	Off			6	Job select bit 1
7	Off			7	Job select bit 2
8	Off			8	Job select bit 3

Figure 11: Output and input settings for Device 10



2.1.2 W7 ToolsTalk Power Focus and ToolsTalk Pulsor

Instructions in this section are valid to the following software in world release 7:

- ToolsTalk Power Focus
- ToolsTalk Pulsor


For the sake of simplicity and to avoid having two almost identical sets of instructions in this document the Power Focus terminology is used in place of its Pulsor counterpart. For example; Power Focus Map is used in place of Pulsor Map.

To prepare the setup, do the following:

1. Connect Operator panel to the I/O Bus of the tightening controller.
2. Follow instructions in the tightening controller user guide to access the ToolsTalk main window toolbar.
3. Click  in the main window toolbar to access the Power Focus map (**PF Map**).
4. Click  to open **Accessories** and **I/O bus** in succession on the PF Map.
5. Right click the I/O bus **Information** branch and click **Open I/O Information** to open the **I/O Information** dialog box.
6. In the **I/O Information** dialog box; click **Automatic read** and set **500 ms** in the item list.

7. Ensure that the operator panel can be read in the as the device number corresponding to the operator panel address switch setting. See section for details on the hardware setting
8. Click **Close** to complete preparation and return to the **PF Map**.

To set up the operator panel, do the following:

1. Click  to open **Accessories** and **I/O bus** in succession on the **PF Map**.
2. Right click the I/O bus **Information** branch and click **Open I/O Information** to open the **I/O Information** dialog box.
3. Click the I/O device line corresponding to the operator panel address switch setting and click **Configuration** to access the **I/O Set** dialog box (Figure 12).

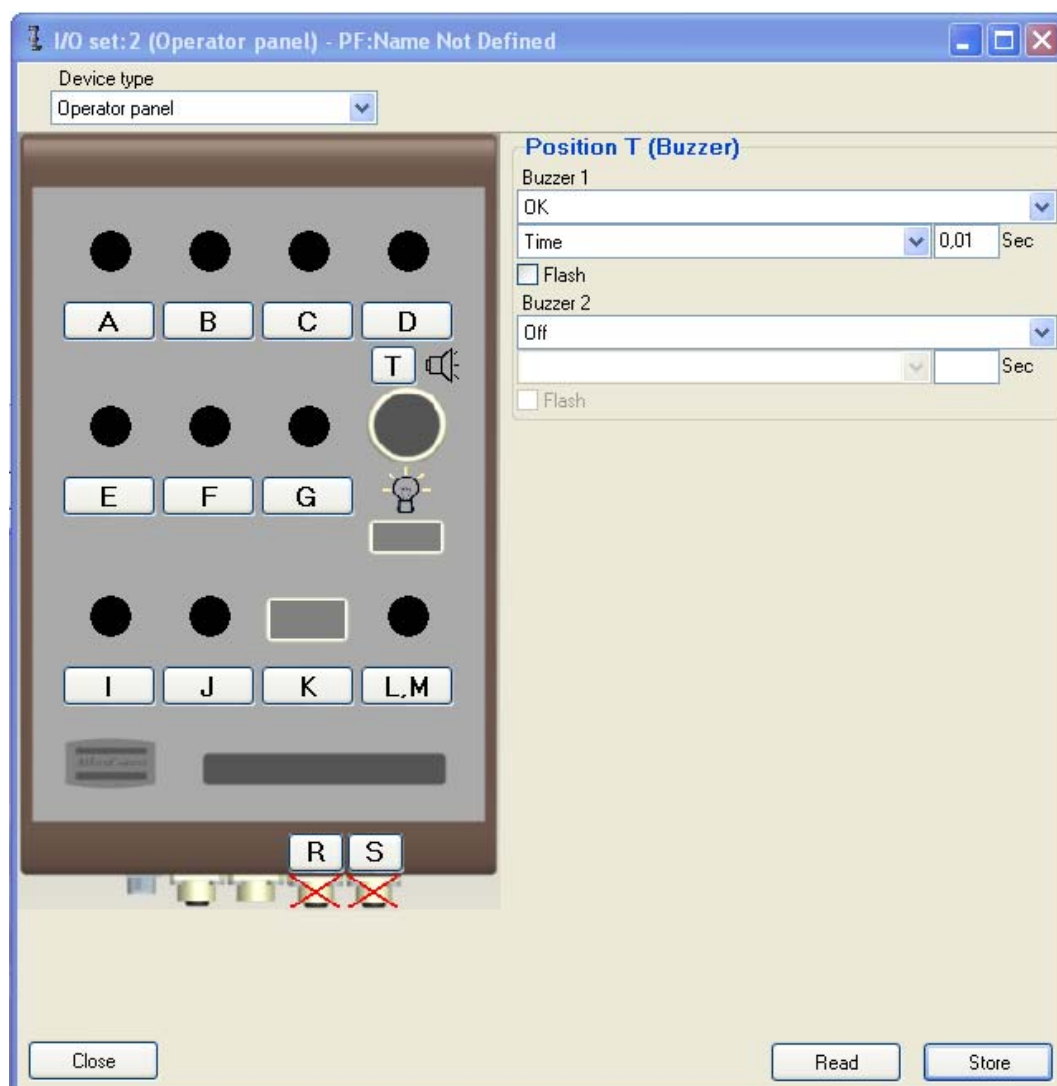


Figure 12: I/O set example

4. Ensure that **Device type** is set to **Operator panel**.
5. Click button **A** and select an option applicable for your current configuration, position A. (See section 2.2.1 *W5 WinTC* for an example configuration.)
6. Repeat previous step for all remaining applicable positions in the **I/O set** dialog box (Figure 12).
7. Click **Store** and **Close** to complete the setup session.

2.2 PowerMACS setup

Operator panel is configured as an I/O device with 24 inputs and 24 outputs in the PowerMACS. The configuration is done via the Atlas Copco software WinTC. Default is Operator panel configured to work with PowerFocus/PulsorFocus. To change the hardware settings to fit PowerMACS, see section 3.2 *Hardware setup*. Table 4 shows the mapping of inputs and outputs for Operator panel in the 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).

Inputs		Outputs	
Address	Part	Address	Part
600.0	Switch [A1]	800.0	Lamp [A]
601.0	Switch [A2]	801.0	Lamp [B]
602.0	Switch [B1]	802.0	Lamp [C]
603.0	Switch [B2]	803.0	Lamp [D]
604.0	Switch [C1]	804.0	Lamp [E]
605.0	Switch [C2]	805.0	Lamp [F]
606.0	Switch [D1]	806.0	Lamp [G]
607.0	Switch [D2]	807.0	Lamp [I]
608.0	Switch [E1]	808.0	Lamp [J]
609.0	Switch [E2]	809.0	Lamp [L]
610.0	Switch [F1]	810.0	Buzzer [T] sound 1
611.0	Switch [F2]	811.0	Buzzer [T] sound 2
612.0	Switch [G1]	812.0	Not used
613.0	Switch [G2]	813.0	Soft select switch [L] (enable=1 disable=0)
614.0	External input 1 [S]	814.0	External output 1 [R]
615.0	External input 2 [S]	815.0	External output 2 [R]
616.0	Switch [I1]	816.0	User display [K] bit 0
617.0	Switch [I2]	817.0	User display [K] bit 1
618.0	Switch [J1]	818.0	User display [K] bit 2
619.0	Switch [J2]	819.0	User display [K] bit 3
620.0	Soft select switch [L] bit 0	820.0	User display [K] bit 4
621.0	Soft select switch [L] bit 1	821.0	User display [K] bit 5
622.0	Soft select switch [L] bit 2	822.0	User display [K] bit 6
623.0	Soft select switch [L] bit 3	823.0	User display [K] (enable=1 disable=0)

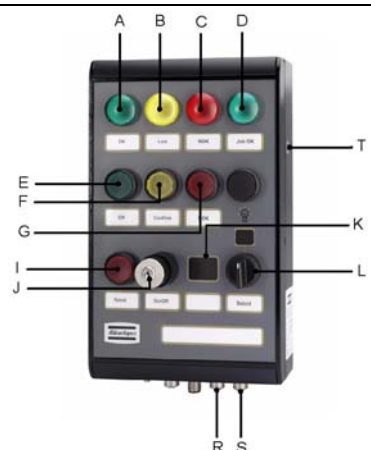


Table 4: Inputs and outputs addresses

2.2.1 W5 WinTC

This section includes a step-by-step instruction on how to setup an Operator panel according to Figure 13.

The panel has five lamps, indicating “OK cycles” (lamp [A]), “NOK cycles” (lamp [B]), “Running” (lamp [C]) and “Ready to start” (lamp [D]).

There are also three push buttons used for “Start” (switch [E]), “Machine stop” (switch [F]) and “Reset” (switch [G]).

A key switch (switch [J]) is used to select if the station runs in manual or automatic mode. In manual mode the mode number selection is done with the soft select switch [L] and the selection is displayed (soft select display [M]). The current running mode is shown in the user display [K].

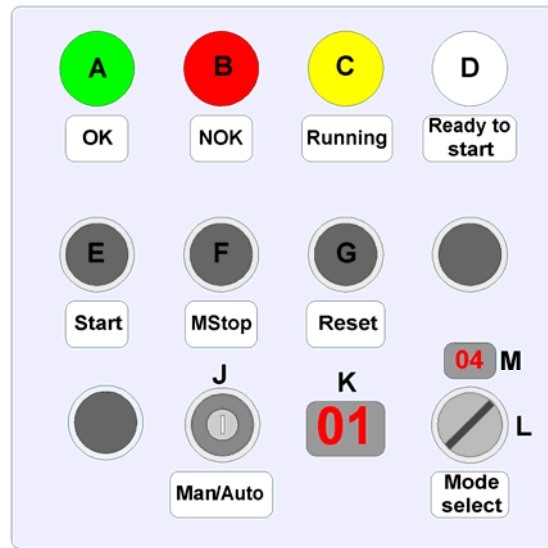


Figure 13: Operator panel configuration example

1. Connect Operator panel to the PowerMACS controller by using the cable.
2. Open WinTC and connect PowerMACS.
3. Click **Set Up** on the main window menu bar and click **System** in the drop down menu to access the **System Set Up** window.
4. Click the **Hardware** tab and then the Tightening Controller (TC) icon to configure.
5. Click **Go Off Line** in the WinTC main window toolbar
6. In the **System Setup Window**; click **More** and **Add** in succession to access the **Add Unit** dialog box.
7. In the **Add Unit** dialog; click **I/O** and **OK** in succession.
8. In the **System Set Up** window; click the added **I/O** icon and then click **Advanced** to access **IO Set Up** dialog box. See Figure 14.
9. Set number of in- and outputs to **17-24** in both item lists.

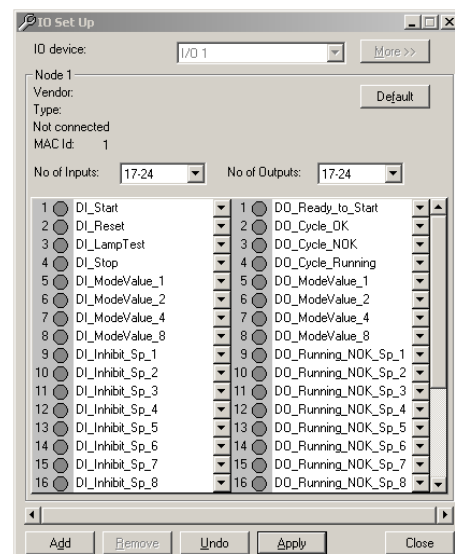



Figure 14: IO Set Up

To configure the signals, do the following:

1. Click **PLC** (Programmable Logic Controller) on the WinTC main window menu bar and click **Program** in the drop down menu to access the **PowerMACS_PLC** dialog box and its **Project Tree Window**.
2. Ensure access to the **Digital_In_Out*** branch by clicking any necessary  to open the tree structure. See Figure 15.
3. Right click **Digital_In_Out*** and click **Open Worksheet** to access the list of global variables
4. Right click on a digital input variable and click **Insert variable** in the pop up menu and insert **DI_Key_Man**. Input next vacant address number to the new signal in the ist worksheet cell.
5. Press down arrow key and repeat previous step to insert digital **DI_Key_Auto** and assign the next vacant address number to it. See Figure 16.
6. Also insert the new output **DO_EnableSoftSelect** and assign the next vacant address number to it. See Figure 17.
7. Connect the key selector to the **Enable soft select** function. Add **DO_EnableSoftSelect** at the end of the worksheet **Main**.
8. To make the automatic mode work, functions for selecting the mode number from a field bus or similar must be added. The mode selection must also be done in such a way that the input source for the mode selection is depending on the position of the switch [J]. The needed changes to make this to work are not described in this document. They are detailed in the tightening controller user guide.
9. Click Build **Set Up** on Power MACS build window menu bar and click **Make** to make the PLC program. Then close the **PowerMACS_PLC** dialog box.

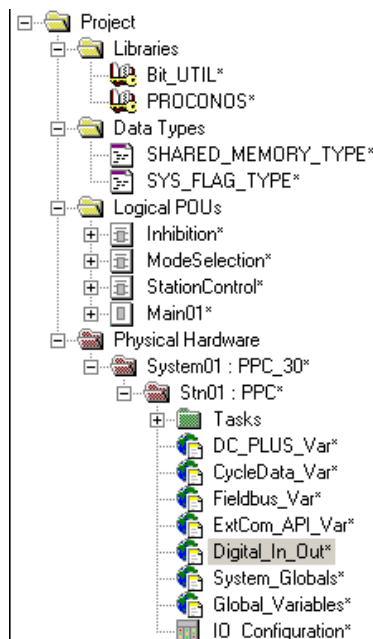


Figure 15: Worksheet Digital_In_Out



The PowerMACS user guide includes more detailed instructions on PLC programming.

```
(*****
(* Digital Inputs, 192 bytes (booleans) starting at address 600 *)
*****)
DI_Start          AT %IX 600.0   : BOOL;
DI_Reset          AT %IX 601.0   : BOOL;
DI_LampTest       AT %IX 602.0   : BOOL;
DI_Stop           AT %IX 603.0   : BOOL;
DI_ModeValue_1    AT %IX 604.0   : BOOL;
DI_ModeValue_2    AT %IX 605.0   : BOOL;
DI_ModeValue_4    AT %IX 606.0   : BOOL;
DI_ModeValue_8    AT %IX 607.0   : BOOL;

DI_Inhibit_Sp     AT %IB 608     : BOLT_IO_ARR;
DI_Inhibit_Sp_1   AT %IX 608.0   : BOOL;
DI_Inhibit_Sp_2   AT %IX 609.0   : BOOL;
DI_Inhibit_Sp_3   AT %IX 610.0   : BOOL;
DI_Inhibit_Sp_4   AT %IX 611.0   : BOOL;
DI_Inhibit_Sp_5   AT %IX 612.0   : BOOL;
DI_Inhibit_Sp_6   AT %IX 613.0   : BOOL;
DI_Inhibit_Sp_7   AT %IX 614.0   : BOOL;
DI_Inhibit_Sp_8   AT %IX 615.0   : BOOL;

DI_Key_Man        AT %IX 616.0   : BOOL;
DI_Key_Auto       AT %IX 617.0   : BOOL;
```

Figure 16: Add DI_Key_Man and DI_Key_Auto

```
(*****
(* Digital OUTPUTs, 192 bytes (booleans) starting at address 800 *)
*****)
DO_Ready_to_Start AT %QX 800.0   : BOOL;
DO_Cycle_OK       AT %QX 801.0   : BOOL;
DO_Cycle_NOK      AT %QX 802.0   : BOOL;
DO_Cycle_Running  AT %QX 803.0   : BOOL;
DO_ModeValue_1    AT %QX 804.0   : BOOL;
DO_ModeValue_2    AT %QX 805.0   : BOOL;
DO_ModeValue_4    AT %QX 806.0   : BOOL;
DO_ModeValue_8    AT %QX 807.0   : BOOL;

DO_Running_NOK_Sp AT %QB 808     : BOLT_IO_ARR;
DO_Running_NOK_Sp_1 AT %QX 808.0 : BOOL;
DO_Running_NOK_Sp_2 AT %QX 809.0 : BOOL;
DO_Running_NOK_Sp_3 AT %QX 810.0 : BOOL;
DO_Running_NOK_Sp_4 AT %QX 811.0 : BOOL;
DO_Running_NOK_Sp_5 AT %QX 812.0 : BOOL;
DO_Running_NOK_Sp_6 AT %QX 813.0 : BOOL;
DO_Running_NOK_Sp_7 AT %QX 814.0 : BOOL;
DO_Running_NOK_Sp_8 AT %QX 815.0 : BOOL;

DO_EnableSoftSelect AT %QX 816.0 : BOOL;
END_VAR
```

Figure 17: Add DO_EnableSoftSelect

To complete the operator panel I/O setup, do the following:

1. Open **IO Set Up** to configure the **I/O device** signals, see Figure 18 and Figure 19.
2. Assign global signal variables by selecting them from each channels item lists to suit your configuration, see Table 5
3. Click **Apply** and **Close** to complete the configuration session.

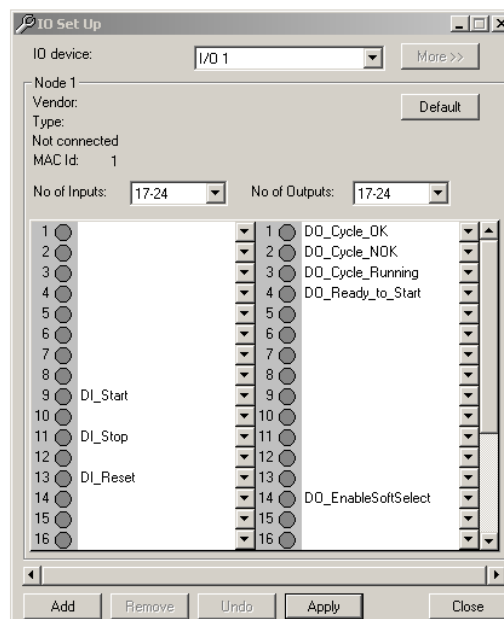


Figure 18: I/O Set Up

Input	Function	Part
9	Start	Switch [E1]
11	Mstop	Switch [F1]
13	Reset	Switch [G1]
19	Key manual mode	Switch [J1]
20	Key automatic mode	Switch [J2]
21	Mode value 1	Soft select bit 0
22	Mode value 2	Soft select bit 1
23	Mode value 4	Soft select bit 2
24	Mode value 8	Soft select bit 3
Output	Function	Part
1	OK	Lamp [A]
2	NOK	Lamp [B]
3	Running	Lamp [C]
4	Ready to start	Lamp [D]
14	Enable soft select	Switch [L] and display [M]
17	Mode value 1	Display bit 0
18	Mode value 2	Display bit 1
19	Mode value 4	Display bit 2
20	Mode value 8	Display bit 3

Table 5: I/O device signals

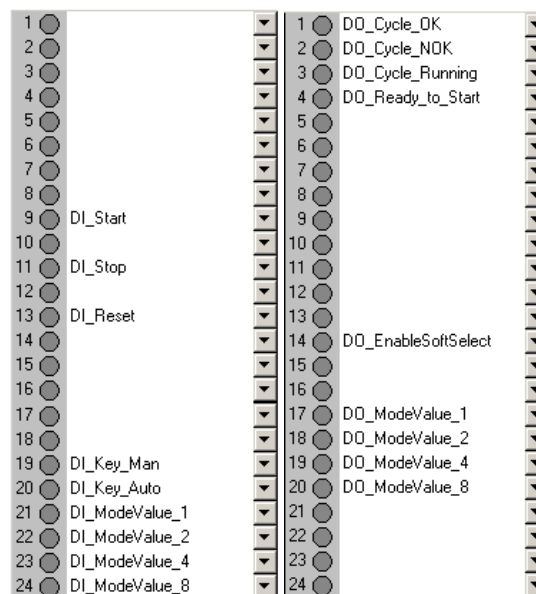


Figure 19: I/O mapping

2.2.2 W7 ToolsTalk PowerMACS

To set up the operator panel in world release 7 ToolsTalk PowerMACS, do the following:

1. Follow instructions in the PowerMACS user guide to access the ToolsTalk main window. Click the **System Map** icon on the main window toolbar to access the **System Map** window.
2. In the **System Map** window; right click the Tightening Controller (TC) icon to access the **Add Unit** dialog box and select **Operator panel** from its item list. See Figure 21.
3. In the **System Map** window; right click operator panel icon and then click **Advanced Device Settings** to access the **Operator panel** dialog box.
4. See Figure 21. Ensure that **MAC id** is set to the same setting as the address switch. See section 3.2.2 *Address switch* for details.

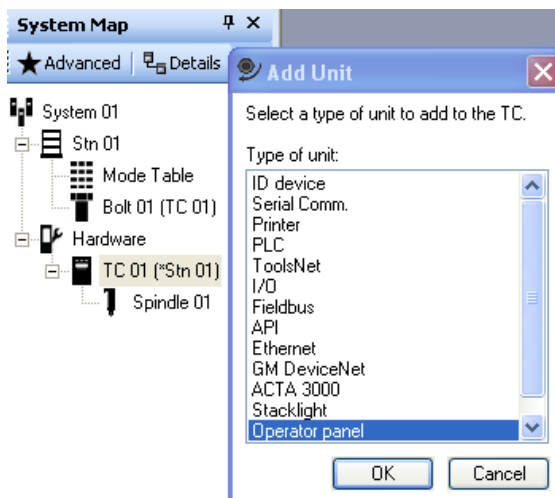


Figure 20: Add Unit to TC



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

5. Click a button to access a position on the operator panel. See section 2.2.1 *W5 WinTC* for an example system.
6. Set **Component type** and assign a signal variable to a position by selecting one from each item list to suit your current system. If applicable, click **Blink** and input an integer to set a number of seconds (1-32767) in the **Limited duration** box.
7. Repeat previous step for all remaining applicable positions in the **Operator panel** dialog box.

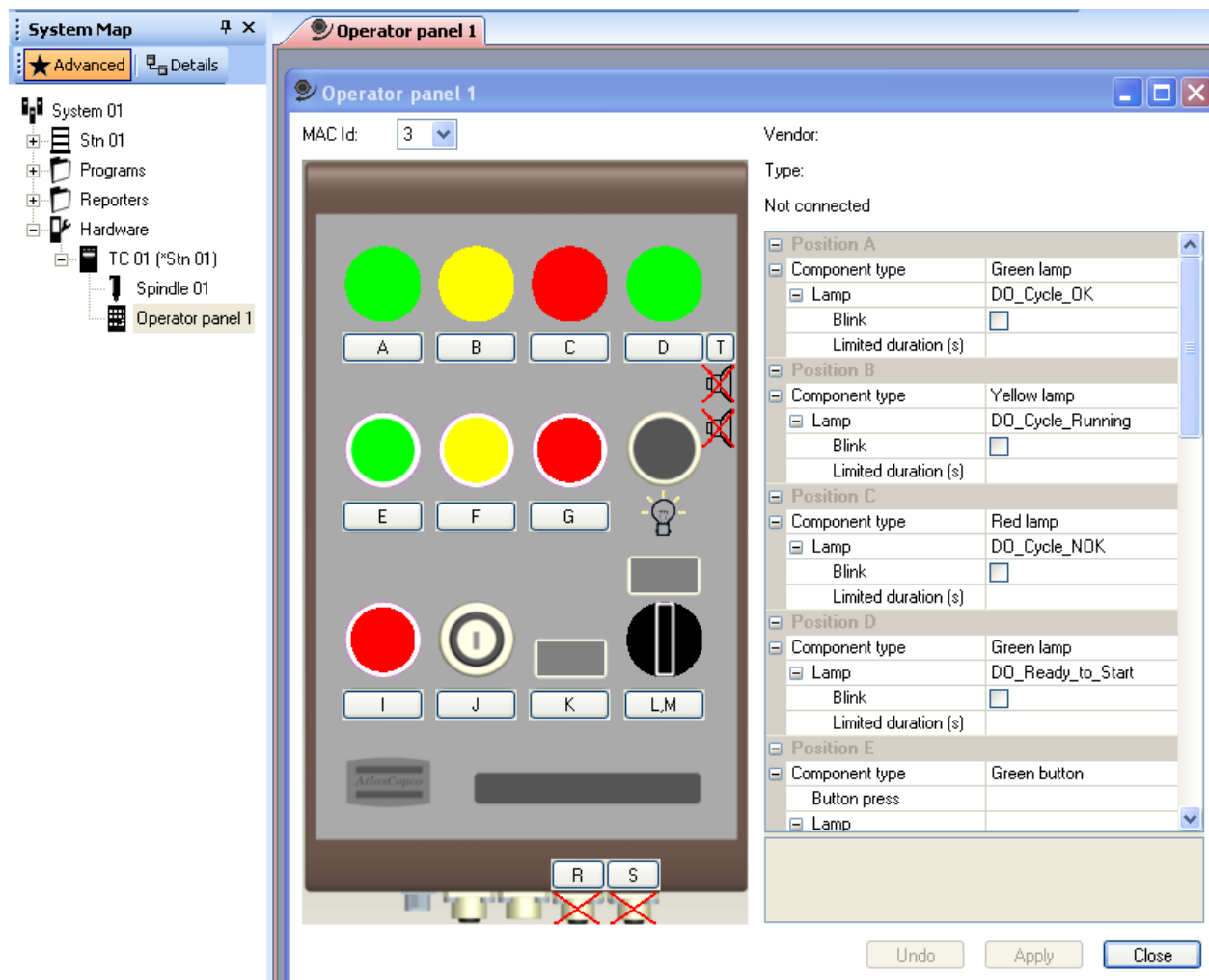


Figure 21 System map and operator panel dialog



The PowerMACS 4000 user guide includes a detailed parameter list for all signal variables.

Position “L,M” can be configured as a software activated switch, associated to any digital out signal. The configuration can be user defined by associating four bits to any digital in variable.

Position K is reserved for a mini display. The current mode setting is its default configuration. The configuration can be user defined by associating seven bits to any digital out variable.

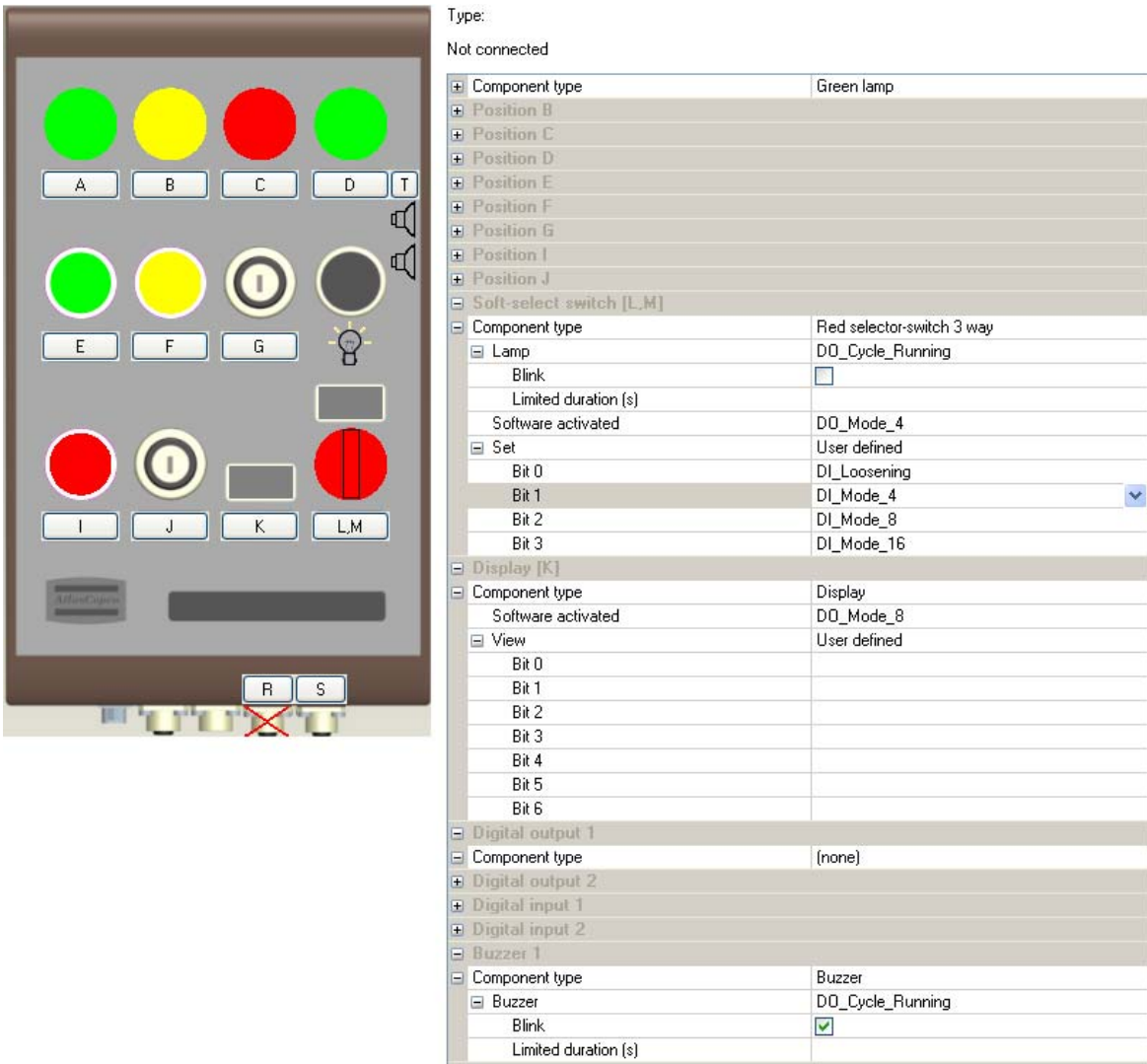


Figure 22: User defined digital I/O

8. Click Apply and Close to complete the I/O Setup dialog.

3 Hardware

3.1 Operator panel dimensions

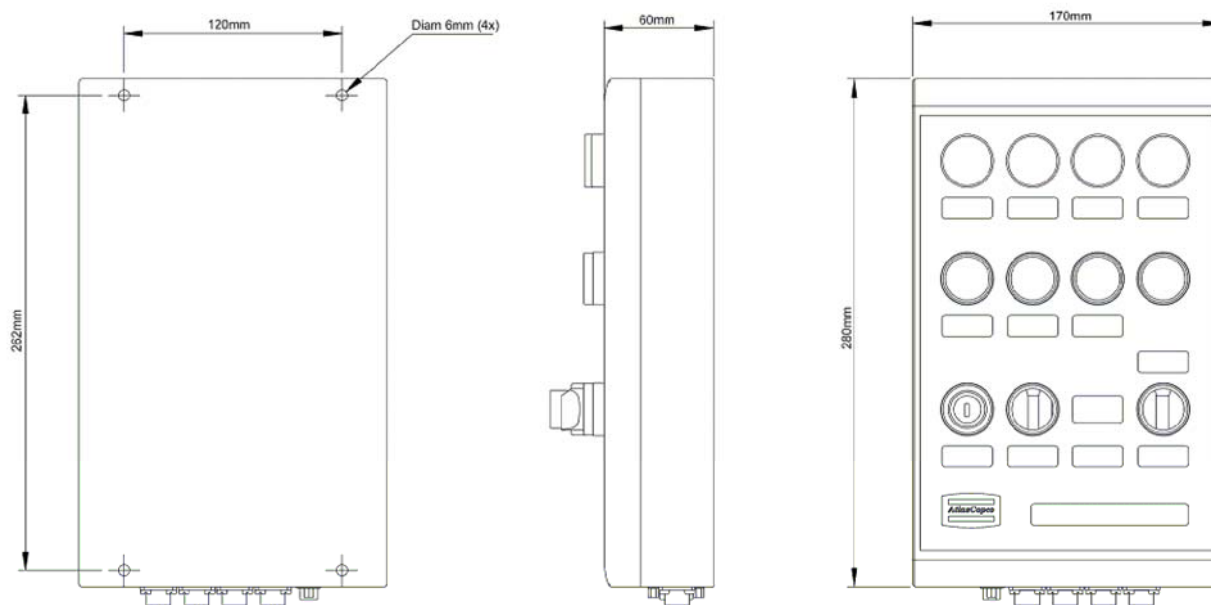


Figure 23: Operator panel hardware dimensions (in millimeter)

3.2 Hardware setup



To access the main board and make a hardware configuration/change it is necessary to open the Operator panel device. This is done by removing the upper and lower protecting cover and then loosen the four screws on the panel lid (Figure 24).



Figure 24: Operator panel main board (front lid removed)



When fastening a new LED lamp, the red mark on the lamp should point at the plus mark on the printed circuit card (Figure 25).

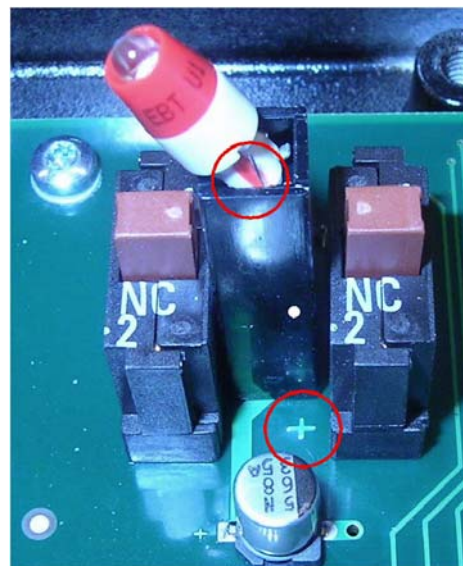


Figure 25: LED lamp fastening

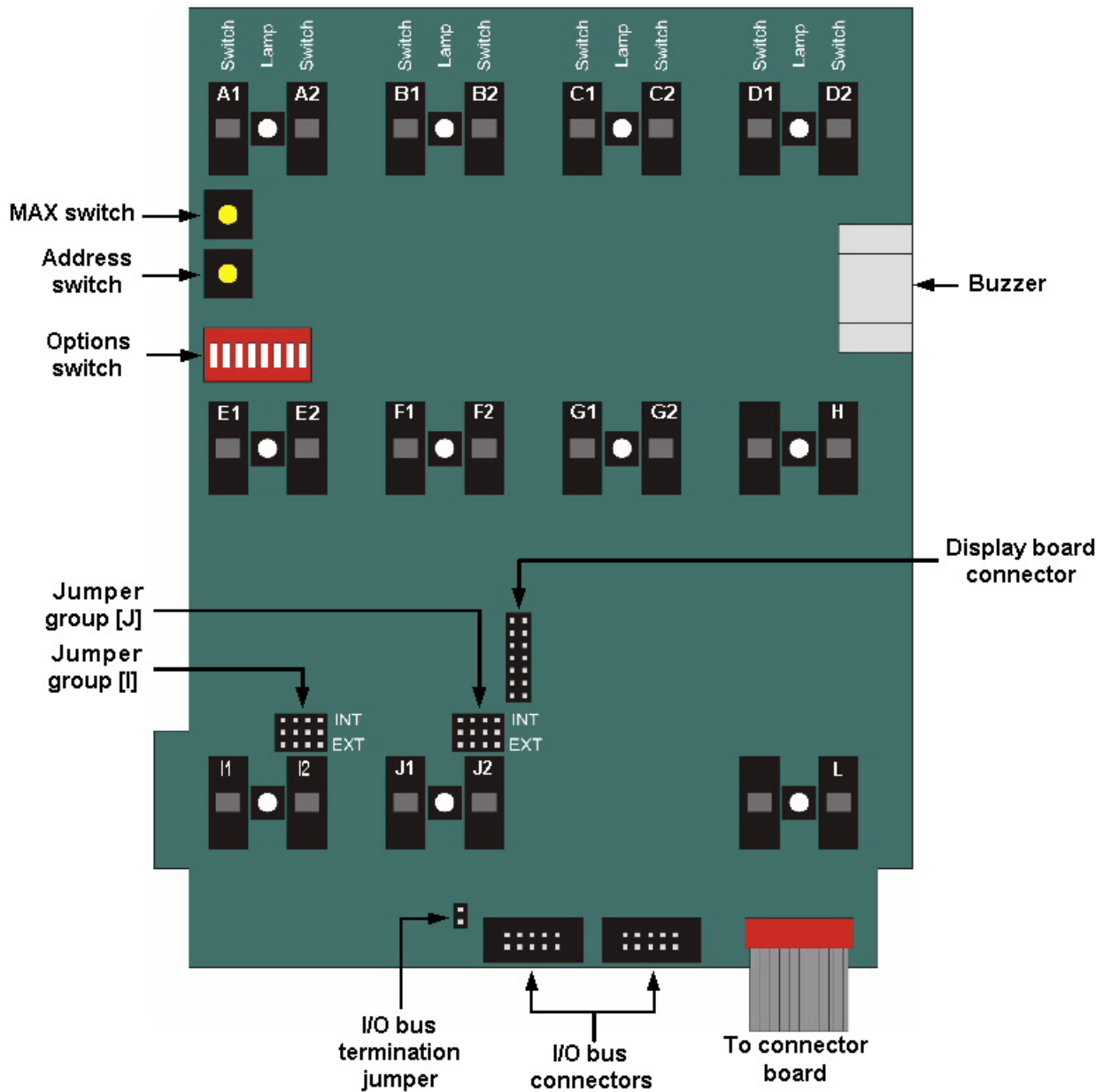


Figure 26: Sketch of the Operator panel main board

3.2.1 Options switch

The **options switch** on the main board (Figure 26 and Figure 27) is an 8 position DIP-switch which sets the communication mode and to select options for the soft select switch [L] and user display [K] (Table 6).



Figure 27:
Options switch

Position	Description	Options
1	Communication mode	OFF: PowerFocus/PulsorFocus ON: PowerMACS
2	Soft select switch [L] counter start value	OFF: start from 0 ON: start from 1
3	Soft select switch [L] counter wrap around	OFF: stop count at min/max ON: counter wrap around
4	Soft select switch [L] single bit count mode	OFF: normal count, 0/1 to the value set by the MAX switch (see section 3.2.3 <i>MAX switch</i>). ON: single bit count mode, only set one bit in the counter register 0 on display => 0000 on output 1 on display => 0001 on output 2 on display => 0010 on output 3 on display => 0100 on output 4 on display => 1000 on output Note! If the MAX switch is set to a value higher than 4, maximum value is still 4 in this mode.
5	Soft select switch [L] and display [M] enable/disable	OFF: controlled from bit in bitmap (soft select function enable/disable) ON: Permanently enabled
6	User display [K] enable/disable	OFF: controlled from bit in bitmap (display enable/disable) ON: permanently enabled
7 and 8	Reserved	Not used, default setting is off

Table 6: Options switch selections



Operator panel is by default configured for Power Focus or Pulsor Focus mode, with the soft select switch and the soft select display disabled.

3.2.2 Address switch

The **address switch** on the main board (Figure 26 and Figure 28) is a 16 position rotary selector which sets the node/device address for PowerFocus/PulsorFocus and PowerMACS. The positions are hexadecimal numbers. The decimal numerical value for A is 10. Hexadecimal F equals decimal 15.



Figure 28:
Address switch



Default is the switch is set to 8 (for PowerFocus/PulsorFocus communication).

In PowerFocus/PulsorFocus communication mode, the Operator panel uses three device addresses. The lowest address is set by the switch and the two consecutive are automatically selected. All three devices are functionally equivalent to I/O expanders. Valid address selections are 1 to D (D is equal to 13). For example, if address 8 (default for Operator panel) is chosen on the switch then Device 8, 9 and 10 are present and should be configured as three I/O expanders in the PowerFocus/PulsorFocus.

In PowerMACS mode the valid addresses are 1 to 6. The device should be configured as an I/O device with 24 inputs and 24 outputs in WinTC.

For tightening controller setup instructions see section **Error! Reference source not found. Error! Reference source not found.**

3.2.3 MAX switch

The **MAX switch** on the main board is a 16 position rotary selector which sets the maximum value for the soft select switch [L] (Figure 26 and Figure 29). Valid positions are 2 to F. The positions are hexadecimal numbers. The decimal numerical value for A is 10. Hexadecimal F equals decimal 15.



Figure 29:
MAX switch



The MAX switch is by default set to F.

The soft select function, switch [L] and display [M], has to be enabled for operational mode. When the switch function is disabled the display is blanked, the counter is unavailable and the soft select bits are all set to zero (0). Use the **options switch** bit 5 (see section 3.2.1 *Options switch*) to enable the soft select function.



For PowerFocus it is also possible to set soft selector enable bit to “PF ready” to enable the soft select function, see section 2.1.1 Error! Reference source not found..

3.2.4 I/O bus connector

The **I/O bus connector** (Figure 30 and Table 7) is a DSUB-9 male connector designed for I/O Bus and MACS I/O.



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



Figure 30: I/O bus connector

The two **I/O bus connectors** on the main board (Figure 26) have parallel circuits, and Operator panel has an integrated bus termination resistor and must be at one end of the I/O bus. It is possible to continue the I/O bus line by using a Y-splitter cable. In this case it is necessary to remove the **I/O bus termination jumper** on the main board (Figure 26).

Contact your local Atlas Copco representative to get information about available standard cables.



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 (+8 V isolated)
4	0 V (+8 V isolated)
5	NC
6	0 V (+8 V isolated)
7	Signal High
8	NC
9	+8 V isolated (for I/O Bus) +24 V isolated (for MACS I/O)

Table 7: Connector pins

3.2.5 Switch connector

The **switch connector** (Figure 31 and Table 8) is an 8 pin coded M12 female connector.

If the **jumper group** (see section 3.2.9 *Jumper groups*) is set to EXT, the Switch connector is connected directly to corresponding switch.

The switch rating is 24 V 0.5A at resistive load.



Figure 31: Switch connector

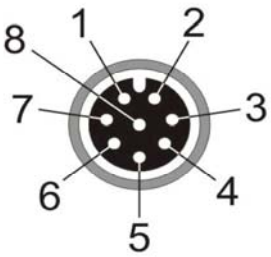
Pin	Function	
1	EXT I [I1]	
2	EXT I [I2]	
3	EXT I [I2]	
4	EXT I [I1]	
5	EXT J [J1]	
6	EXT J [J2]	
7	EXT J [J2]	
8	EXT J [J1]	

Table 8: Connector pins

3.2.6 24 V DC external input

The **24 V DC external input** (Figure 32 and Table 9) is a 4 pin coded M12 male connector. It is possible to feed Operator panel with an extra 24 V DC through this input. This is useful when the external output needs more current than the internal power can deliver.



Figure 32: 24 V DC external input connection

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

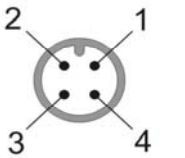


Table 9: Connector pins

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

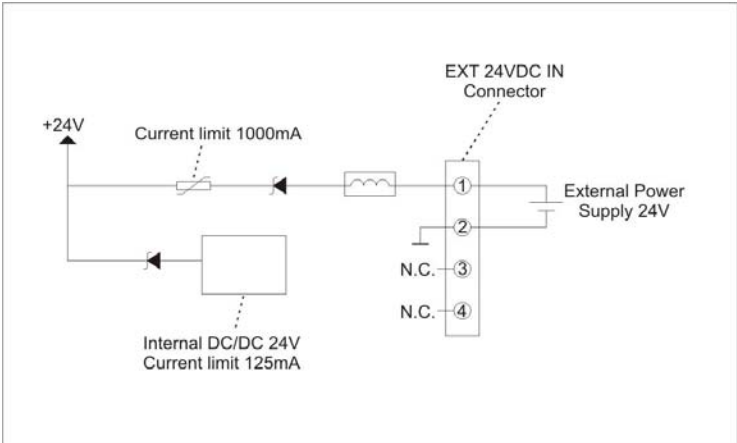
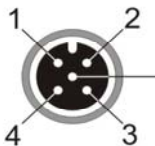


Figure 33: Connection diagram with 24 V DC external input connector

3.2.7 External outputs

The **external output 1 and 2** (Figure 34 and Table 10) 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 or 1 A fused)*
2	Output 1 (max 500 mA fused)
3	GND
4	Output 2 (max 500 mA fused)
5	GND Housing



External output
1 and 2

Figure 34: External output connector

Table 10: Connector pins

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



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

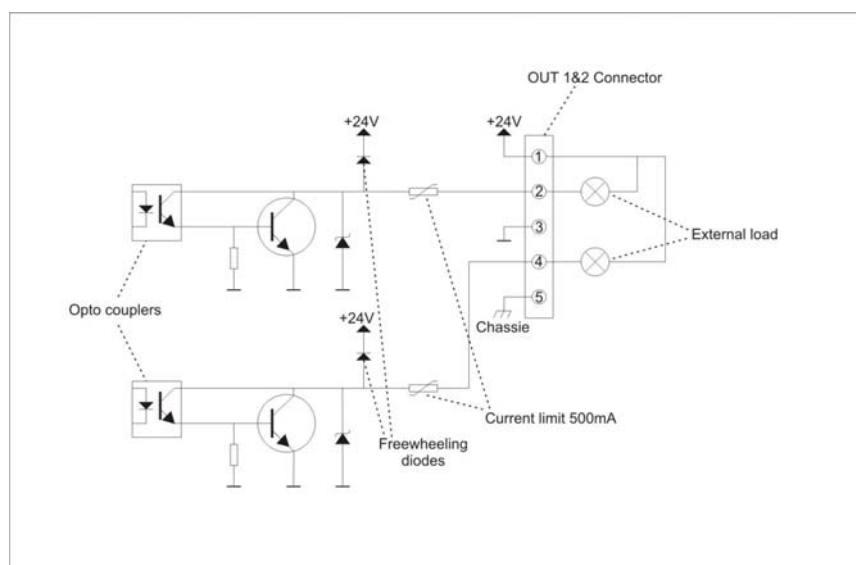


Figure 35: Connection diagram with external outputs

3.2.8 External inputs

The **external input 1 and 2** (Figure 36 and Table 11) 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 0-5 V; transition 5-11 V; 1-state 11-30 V). The connector is protected against inverse connection.



Figure 36: External input connector

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

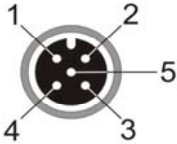


Table 11: Connector pins

* Without external 24 V the maximum current is 100 mA combined, with external feed; max 1 A combined.



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

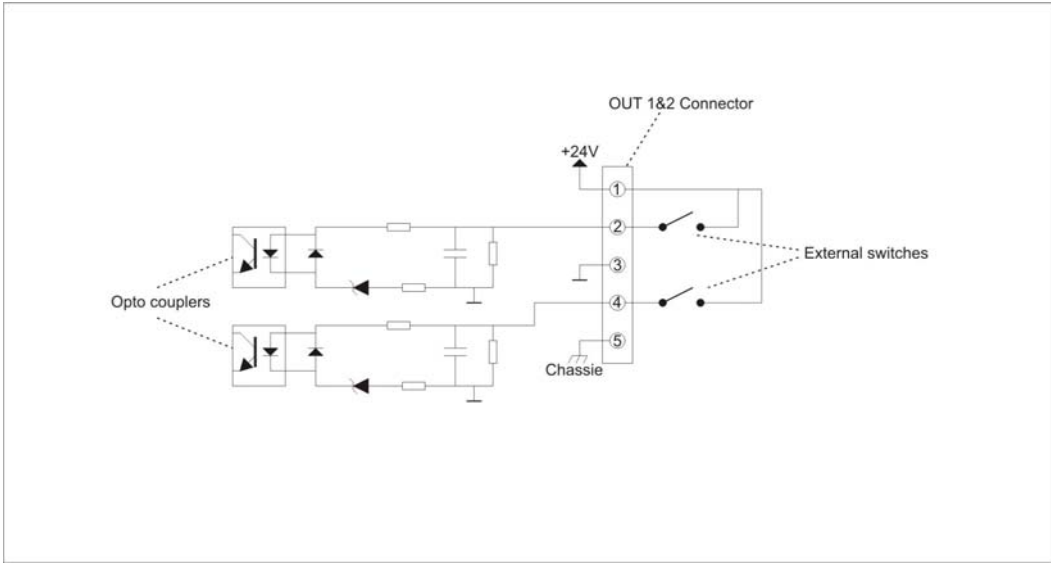


Figure 37: Connection diagram with external inputs

3.2.9 Jumper groups

Switch [I] and switch [J] can be used as hardwired switches and affects the switch connector [P] (see section 3.2.5 *Switch connector*). The function is selected with the two **jumper groups** on the main board (Figure 26). All jumpers in a group (four pieces) must have the same setting, INT (internal) or EXT (external).

When set to EXT, no bits from this source are sent to the controller.

- INT: normal use (connects internally to I/O Bus or MACS I/O)
- EXT: the switches are connected to the external inputs and outputs



When delivered both Jumper groups are default in INT mode.

When the **jumper groups** are mounted for external usage (Figure 38), the switches are connected to the 8 pole connector.

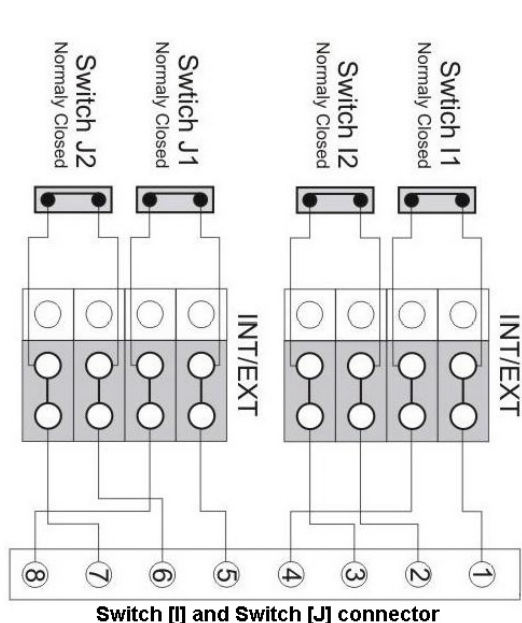


Figure 38: Jumper groups mounted for EXT (external) usage of switches

When the **jumper groups** are mounted for internal usage (Figure 39), the switches are connected to the CPU and not to the 8 pole connector.

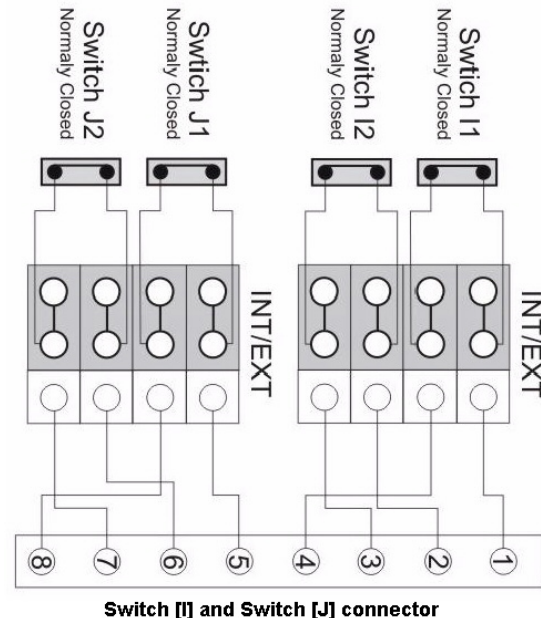


Figure 39: Jumper groups mounted for INT (internal) usage of switches

4 Spare part list



This symbol indicates spring return (momentary) for the switch.



This symbol indicates that switch stays in original position (no spring return).



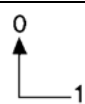





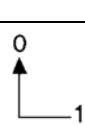

Type	Variant	Color	Type No.	Ordering No.	Description
 Key switch			K1	1089 0453 01	All keys have the same coding. No LED lamp is used together with a key switch.
			K2	1089 0453 02	
			K3	1089 0453 03	
 Lamp		Red	LR	1089 9076 25	The lamps are used together with a corresponding colored LED lamp, which has to be ordered separately.
		Green	LG	1089 9076 26	
		Yellow	LY	1089 9076 27	
		White	LW	1089 9076 28	
		Blue	LBLU	1089 9076 29	
 Selector switch		Red	S1R	1089 9337 84	The switches are used together with a corresponding colored LED lamp, which has to be ordered separately.
		Green	S1G	1089 9337 85	
		Black	S1BLK	1089 9337 86	
		Red	S2R	1089 9337 87	
		Green	S2G	1089 9337 88	
		Black	S2BLK	1089 9337 98	
		Red	S3R	1089 9337 73	
		Green	S3G	1089 9337 96	
		Black	S3BLK	1089 9337 97	
 Spring return push button		Red	P1R	1089 0370 01	The buttons are used together with a corresponding colored LED lamp, which has to be ordered separately.
		Green	P1G	1089 0370 02	
		Yellow	P1Y	1089 0370 03	
		White	P1W	1089 0370 04	

Table 12: Spare parts list

Type	Color	Type No.	Ordering No.	Description
 Spring return push button	Black		1089 0370 16	
 Without spring return push button	Red	P2R	1089 0370 11	The buttons are used together with a corresponding colored LED lamp, which has to be ordered separately.
	Green	P2G	1089 0370 12	
	Yellow	P2Y	1089 0370 13	
	White	P2W	1089 0370 14	
 Push turn function push button	Red	E1	1089 0362 74	Stop button. Delivered with a red LED. Only for switch position [I]. Hardwired via the switch connector [P].
 Blanking plug		B1	0697 9810 57	The blanking plug is for covering not used positions.
 LED lamp	Red		1089 9108 12	Wedge base 24 V DC W2 × 4.6d The LED lamps are used together with a lamp, switch or button with corresponding color.
	Green		1089 9108 13	
	Yellow		1089 9108 14	
	White		1089 9108 15	
	Blue		1089 9108 16	

Table 13: Spare parts list

5 Text slip fields

In back of the panel lid there is two slots for text slips. The text can be cut out from laminated paper and slide into the text slots, see instruction below.

1. Type suitable text in the positions on the template (Figure 40 and Figure 42).
2. Use an ordinary laser printer to printout the template on an 80 gram paper sheet.
3. Use a special laminate printer to add laminating pouches to the template.
4. Cut out the slips from the laminated template.



To be able to put the text slips out again, the slips have to be a bit longer than the slots.

5. Remove the upper and lower protective cover from the Operator panel device (Figure 41). Loose the four screws and remove the lid.
6. Slide the slips into the text slots on the back side of the panel lid.
7. Fit the panel lid back, tighten the four screws and put on the two protecting covers.
8. The text slips should now be visible on the front panel (Figure 41).

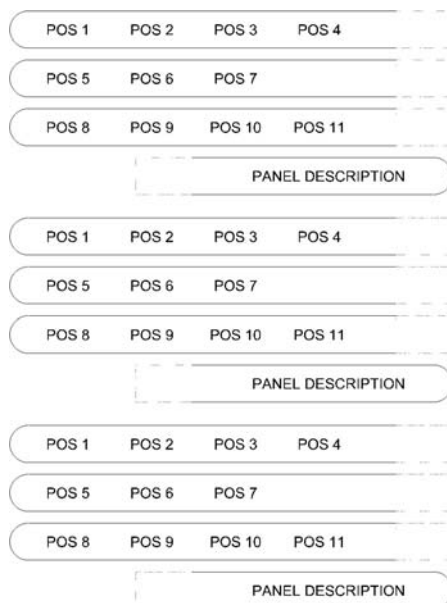


Figure 40: Text template layout

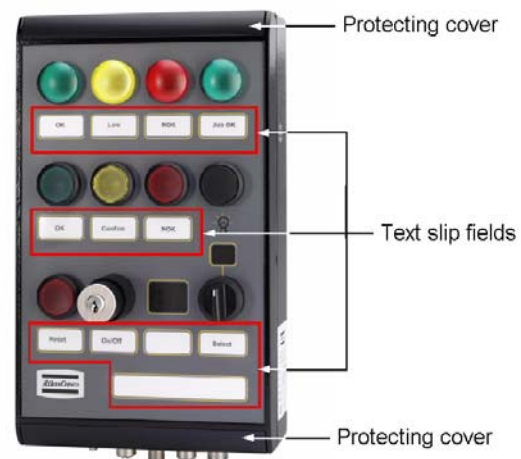


Figure 41: Text slip fields on the front panel

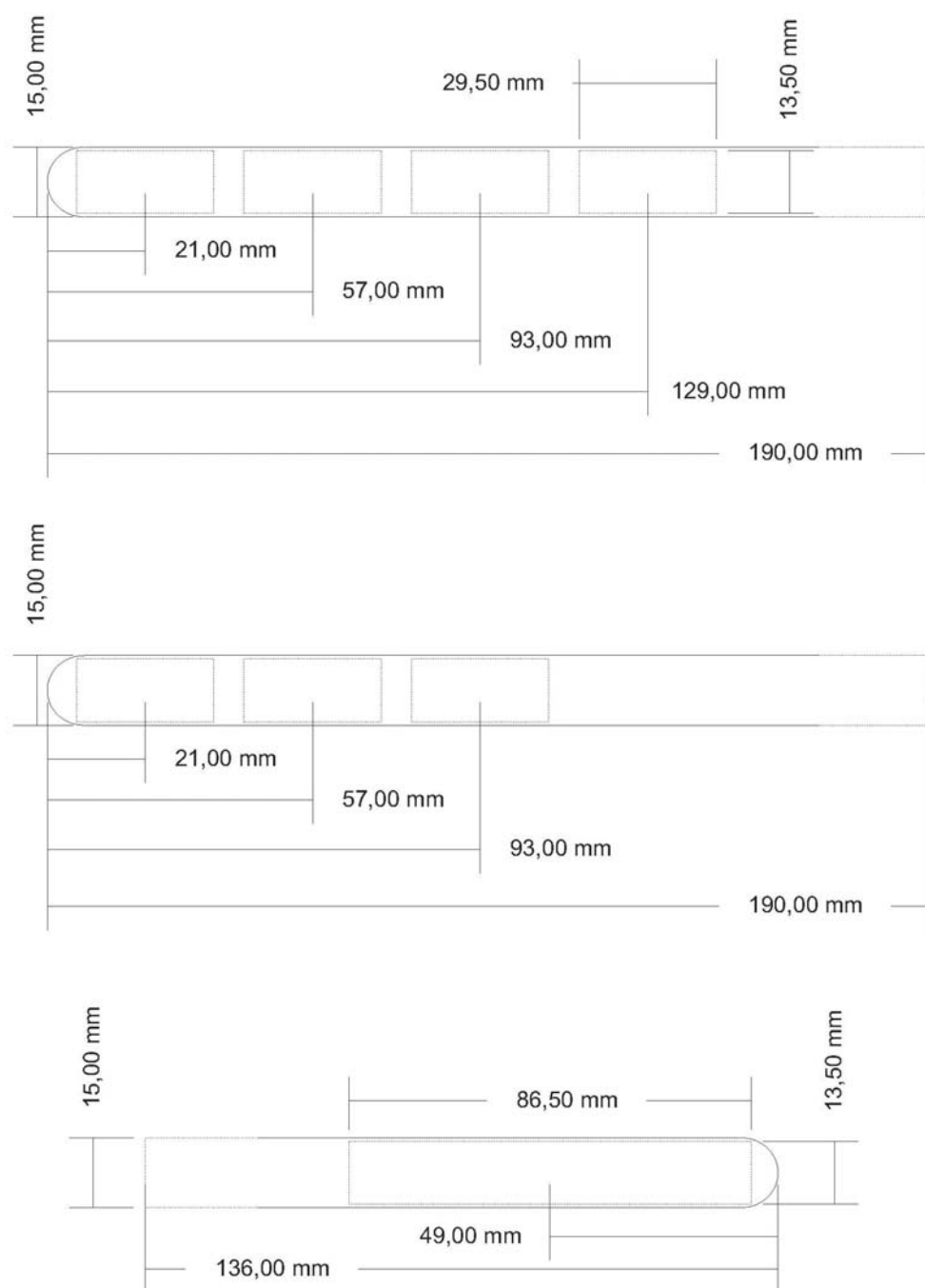


Figure 42: Text field dimensions

6 Error codes

When an error occurs in the Operator panel:

- The device is deactivated
- Communication is shut down
- All lamps are turned off and the user display goes blank
- The two outputs are set to zero (0)
- The soft select display shows a two digit error code blinking at 2 Hz.

Code	Description	Further information
80	I/O device address setting in Power Focus or Pulsor Focus mode is out of range.	Valid settings are in the range 1 to D (D=13). To change settings, see section 3.2.2 <i>Address switch</i> .
81	Setting for the node address in PowerMACS mode out of range.	Valid settings are in the range 1 to 6. To change settings, see section 3.2.2.
82	The MAX switch setting is out of range.	Valid settings are 2 to F (F=15). To change settings, see section 3.2.3.
83	Address collision in PowerMACS mode.	The node address must be changed. To change settings, see section 3.2.2.

Table 14: Error code descriptions

