TPS Control

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Control and drive unit

Valid for Version No. 1.2

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

Atlas Copco

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Introduction

Safety and operating instructions

⚠ WARNING Read all warnings and all instructions.

The safety and operating instructions as described in the Atlas Copco Product instructions that is included in the delivery of the system must be read and complied. Ensure that you read and understand all instructions. Failure to follow all the instructions may result in electric shock, fire and/or serious personal injury. All locally legislated safety regulations with regard to installation, operation and maintenance must be adhered to at all times. Refer installation and servicing to qualified personnel only.

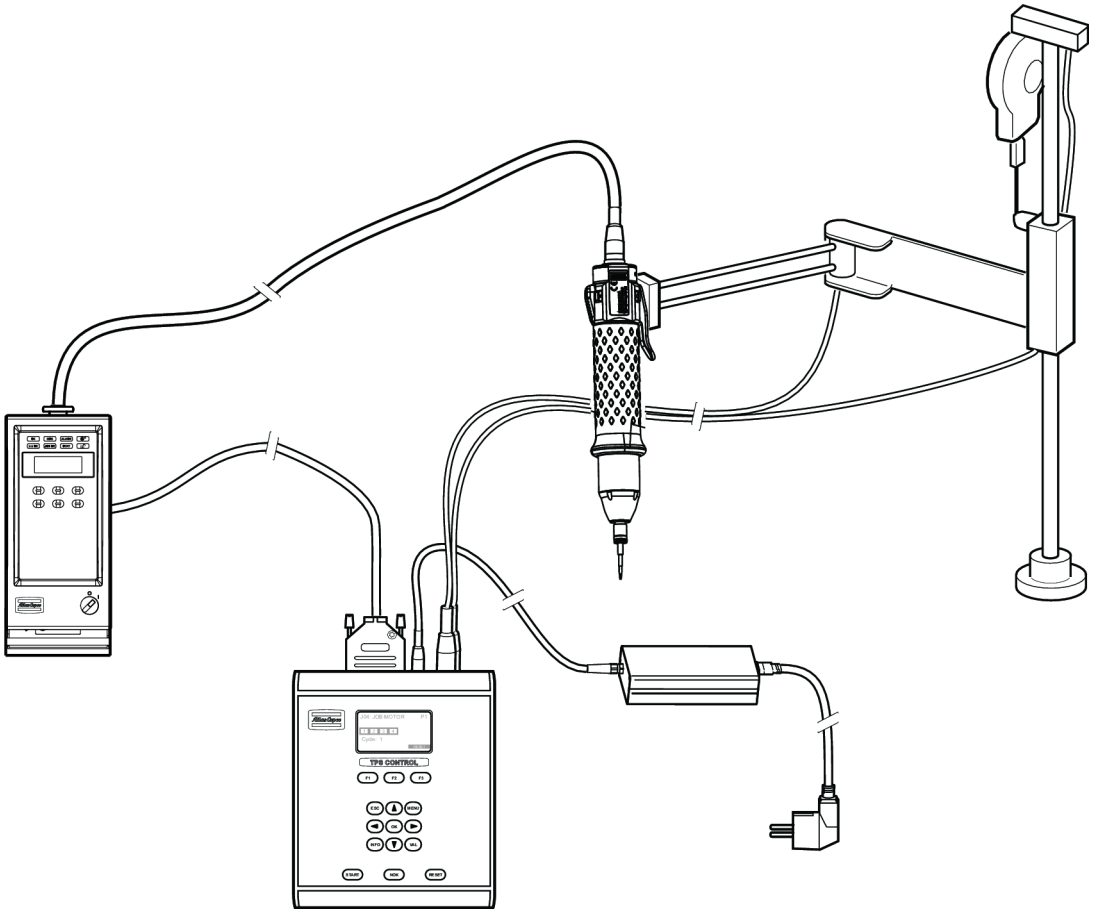
Save all instructions for future reference.

Contact your Atlas Copco representative if questions regarding the safety and operating instructions arise.

System overview

This user guide describes how to install, configure and use the Tool Positioning System (TPS) Control.

TPS Control is used for controlling and monitoring the tightening sequences and positioning operations for a variety of pneumatic and electronic tools. The TPS Control system is designed for the modern assembly industry with high demands on quality and production efficiency, and offers full modularity through the combination of different hardware and software.



A typical setup of the TPS contains the controller itself connected to a screwdriver and torque arm, with external operating and display elements and a digital I/O cable to a tool controller.

The TPS can either be used with a single tool or be connected to a torque arm that holds the tool. If the controller is used with a torque arm, the arm is equipped with an analogue and an SSI encoder that can detect the position of the screw being handled.

The TPS primarily monitors the sequence of screws and the tightening program, with and without position control.

The TPS can easily be connected to different tool controllers using digital 24 VDC signals. These digital input and output signals are used to enable and control workstations. The OK/NOK classification of the individual tightening operations is handled by the tool controllers which transmit these results through the digital input signals to the TPS Control. The TPS has 10 digital inputs and 6 digital outputs.

In TPS, the complete sequence definition for a work piece is called a job. The TPS can store up to 50 jobs with a total of 500 sequence element memories for positions used for these jobs. These sequence elements can be freely allocated to the 50 supported jobs. Each position within a job can be assigned to a specific Pset, or several positions can be assigned to the same Pset. Psets are configured in the ToolsTalk software, which contains the complete set of parameters that control the tightening process.

TPS Control can also handle additional functions, such as input queries defined for specific positions and external starting signals and output signals used in clamping procedures.

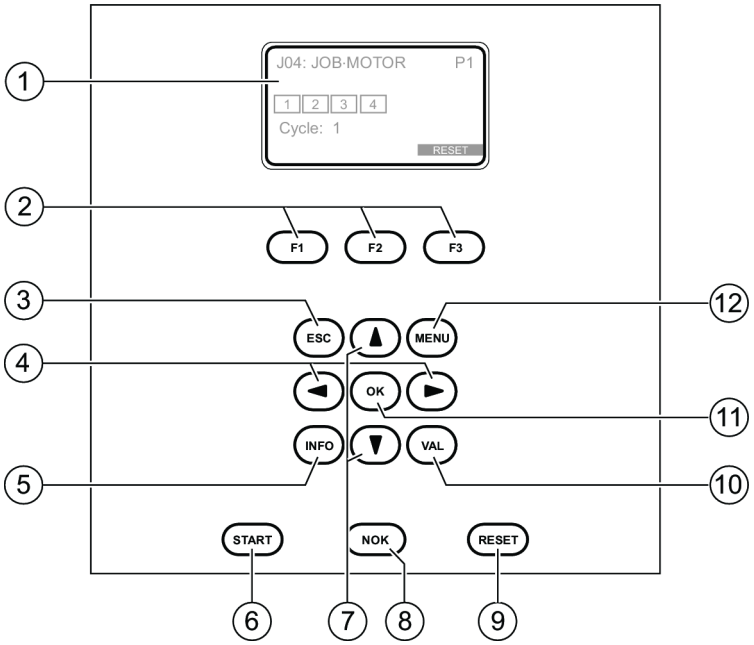
TPS Control can either be powered with an external power supply unit or through an external power signal from the tool controller. The external power supply unit and cord are ordered separately. Note that an external power supply unit is required for air tools, MicroTorque and EBL RE-Drive.

TPS controller

The main part of the TPS Control system is the TPS controller. It is contained in a metal casing with a front panel and connection interface on the short side of the unit. The front panel can be rotated 180 degrees to house the connections on the top or the bottom of the unit, depending on how the controller will be installed.

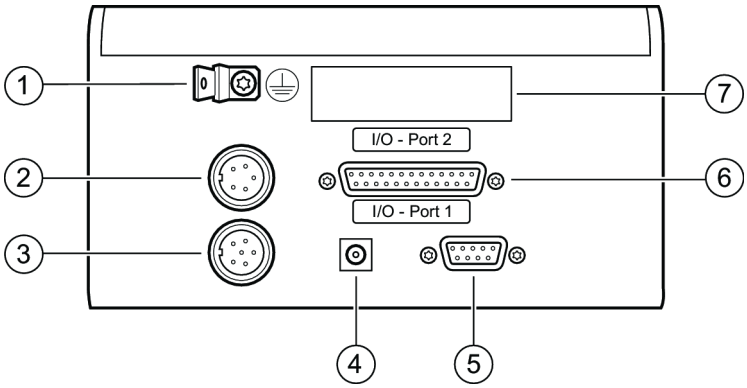
User Interface

You operate the controller using the front panel, which has a graphical display and a keyboard with special keys and navigation keys. The display has a resolution of 128 x 64 pixels and supports different fonts and text sizes as well as graphics. The display backlight has four colour options: red, green, blue, or white colour.



Number	Part	Description
1	Display	The front panel has a configurable display. A power-save function deactivates the backlight on the display if it is not used for a user-defined period of time (in minutes). The display is divided into three segments: ■ Upper part shows the last selected job/current job. ■ Middle part shows status information about ongoing operations. ■ Lower part shows the menu alternatives that can be accessed using the function keys.
2	Function keys	Soft keys which function according to what is displayed on the display screen.
3	ESC	Use this key to cancel any ongoing jobs or parameter settings. When cancelling parameter settings, no changes are stored in memory.
4	Left/Right arrow key	Use these keys to display parameter options or to create/remove positions when programming new jobs.
5	INFO	Press this key to get information about the TPS Control device ID, firmware version and activated licensed functions.
6	START	Use this key to start selected job.
7	Up/Down Arrow keys	When in parameter list, use these keys to go up or down in the list to select a desired parameter. For selected parameter, use the up/down arrow keys to change the options of the parameter.
8	NOK	Use this key to release the tool after a position has resulted in NOK state and the tool is disabled. This is only used if parameter NOK acknowledge has been set to ON.
9	RESET	Use this key to stop the ongoing job during any time of the procedure
10	VAL	Use this key to validate and store all changed parameters in memory
11	OK	Use this key to open the list with possible options for a selected parameter or confirm the selected option for the parameter.
12	MENU	Use this key to enter the setup menu parameters

Connections



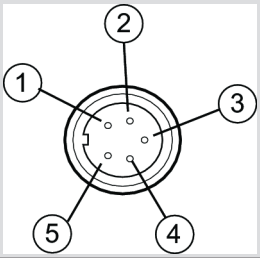
Number	Part	Description
1	Ground	For flash plug for ground connection.
2	Analogue encoder interface	For 5-pin flange socket (Binder, Series 680) connected to the analogue encoder on the torque arm
3	SSI encoder interface	For 7-pin flange socket (binder, Series 680) connected to the angle encoder on the torque arm
4	Power supply	For connection to the 24 VDC power supply unit, 5.5 mm socket with 2.1 mm center pin
5	RS-232C serial interface	For 9-pin Sub-D socket connected to the external equipment, for example Barcode scanner or PC
6	Digital I/O connection I/O Port 1	For 25-pin Sub-D socket connected to the tool controller.
7	I/O Port 2	Not used.

Ground connection

A 6.3 mm flash plug used for ground connection. This connection must be linked to the protective ground for safe operation of the TPS Control.

Analogue encoder connection

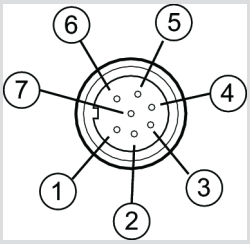
Interface with a 5-pole connection for an analogue encoder. Use a 5-pole pin plug from the Binder 680 Series. This encoder can either be of a lineary or angle type using analogue 0-10 V.



PIN	Signal
1	24 V Supply
2	24 V GND
3	Analogue input
4	Analogue GND
5	Not connected

SSI encoder connection

SSI interface with a 7-pole connection for the SSI encoder. Use a 7-pole pin plug from the Binder 680 Series.



PIN	Signal
1	24 V Supply
2	Clock +
3	Clock -
4	Data -
5	Data +
6	Not connected
7	24 V GND

Power supply

The TPS Control is powered by an external 24-volt power supply unit. The external power supply unit can be ordered as an accessory from Atlas Copco.

As an alternative, the unit can be supplied with 24 VDC from an external power signal through the I/O plug.

Power consumption

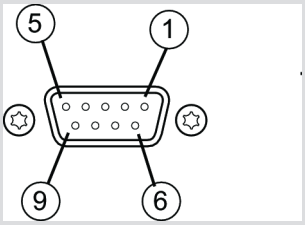
The table below shows the power consumption of the TPS Control.

Status	Power consumption
Inrush	400 mA
Operating	200 mA

RS-232C serial interface

Serial interface with a 9-pole connection for external devices, such as PC or barcode scanners. COM port settings: 9600 Baud to 115 KBaud.

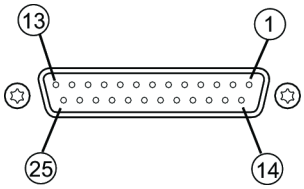
Note that for a PC a straight cable must be used. It is not possible to use the type of cross cable generally used for connection to Power Focus or Tensor.



PIN	Signal	Description
1	Not connected	
2	TxD	Transmit 1
3	RxD	Receive 1
4	Not connected	
5	GND	Potential-free GND of RS-232 interface
6	Not connected	
7	HSHI	Handshake input or Receive 2
8	HSHO	Handshake output (constantly -12 V) or Transmit 2
9	Not connected	

Digital I/O connection

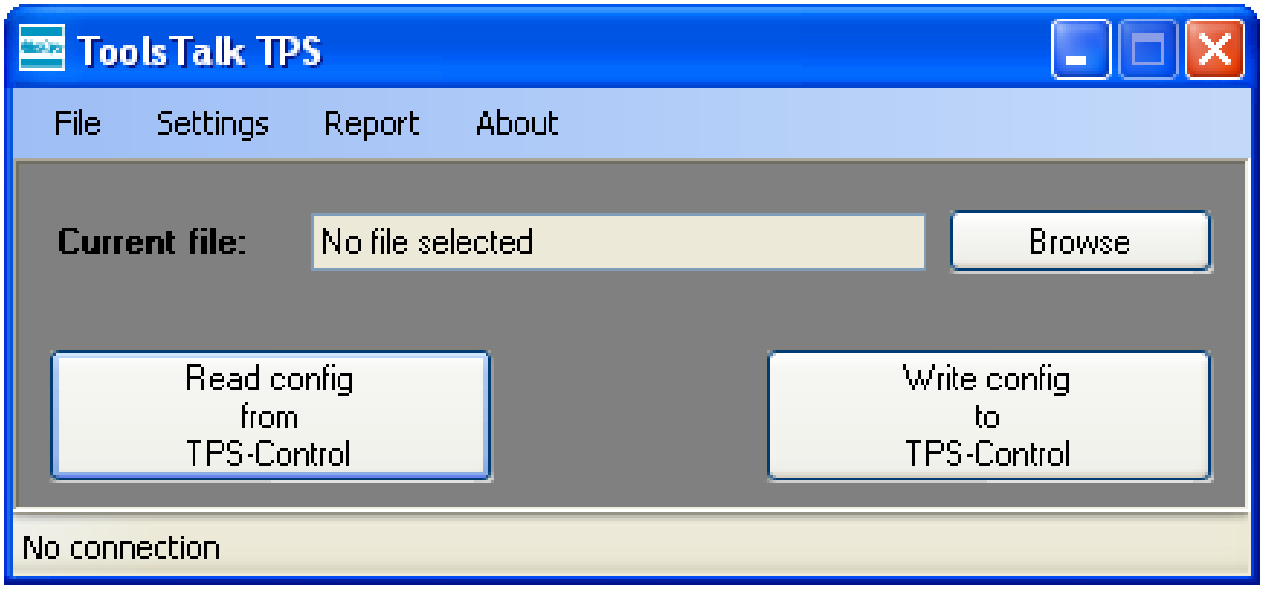
Digital I/O interface with a 25-pole connection for synchronization with tool controllers.



PIN	Signal I/O Port 1	Signal I/O Port 2	Description
1	GND 24 V	GND 24 V	
2	OUT 1	OUT 7	Output, positive switching 24V, max 0.7 A, short-circuit proof
3	OUT 2	OUT 8	Output, positive switching 24V, max 0.7 A, short-circuit proof
4	OUT 3	OUT 9	Output, positive switching 24V, max 0.7 A, short-circuit proof
5	IN 2	IN 12	Digital input 16-32 volt
6	IN 4	IN 14	Digital input 16-32 volt
7	GND 24 V	GND 24 V	
8	IN 6	IN 16	Digital input 16-32 volt
9	IN 9	IN 19	Digital input 16-32 volt
10	OUT 4	OUT 10	Output, positive switching 24V, max 0.7 A, short-circuit proof
11	OUT 5	OUT 11	Output, positive switching 24V, max 0.7 A, short-circuit proof
12	OUT 6	OUT 12	Output, positive switching 24V, max 0.7 A, short-circuit proof
13	GND 24 V	GND 24 V	
14	+24 V	+24 V	
15	GND 24 V	GND 24 V	
16	GND 24 V	GND 24 V	
17	IN 1	IN 11	Digital input 16-32 volt
18	IN 3	IN 13	Digital input 16-32 volt
19	IN 5	IN 15	Digital input 16-32 volt
20	IN 7	IN 17	Digital input 16-32 volt
21	IN 8	IN 18	Digital input 16-32 volt
22	IN 10	IN 20	Digital input 16-32 volt
23	GND 24 V	GND 24 V	
24	GND 24 V	GND 24 V	
25	Not connected	Not connected	

ToolsTalk TPS

ToolsTalk TPS is a Microsoft Windows application that simplifies setup of the system. Only the main functions needed for setting up the system are available in ToolsTalk TPS. The complete set of functions and parameters is available in the TPS controller.



In ToolsTalk TPS you can do the following:

- Handle TPS Control configuration files (select/read/write)
- Configure connection between PC and TPS Control
- Change language (ToolsTalk TPS)
- Handle report function (configure/create)
- Import licenses for optional functions
- Update firmware in TPS Control

Setup

Starting TPS

1. Connect cables and ground connection according to section TPS Controller.
2. Switch on the power. The controller starts up immediately.

Setting up TPS

Setting up system parameters

This section describes how to set up general system parameters in TPS.

1. Press **MENU**.
2. Press **SETUP**.
3. The default language is English. If you want to change the language, go to **Service** and press **OK** to enter the menu.
4. Select the appropriate language in **User language**. Confirm your selection with **OK**. Possible languages are English, German or French.
5. Press **VAL** to change to the selected language.
6. Go to **System parameter** and press **OK** to enter the menu.
7. Set **Special functions** to ON to view advanced programming functions. Press **OK**.
8. Enter values for additional parameters. The parameters and options are described in detail in section *System Parameters [Page 000]*.
9. Press **VAL** to confirm changes or **ESC** to quit without making any changes.

Setting up input and output parameters

This section describes how to set up the input signals and output signals in TPS for communication with the tool controller. Note that the input signals in the tool controller correspond to the output signals for TPS control, and the relays in the tool controller correspond to the input signals in TPS Control. For a complete parameter list, see section **Parameters, Input Configuration and Output Configuration**.

1. Go to **Input configuration**.
2. Set the required inputs corresponding to the relays set in ToolsTalk. See section **Connect TPS to tool control systems** for an example configuration.
3. Press **VAL** to confirm changes or **ESC** to quit without making any changes.
4. Go to **Output Configuration**.
5. Set the required outputs corresponding to the input signals set in ToolsTalk. See **Connect TPS to tool control systems** for an example configuration.
6. Press **VAL** to confirm changes or **ESC** to quit without making any changes.

Setting up encoder parameters

This section describes how to set the position parameters related to the analogue and SSI encoders on the torque arm that must be calibrated before any tightening operations can be created. For a complete list of position parameters, see section **Position**.

The parameters to set are as follows:

- SSI Interface parameters
  - SSI coding
  - SSI factor
  - SSI resolution
- Length
  - Length 1 (L1)
  - Length 2 (L2)

  The calculations of L1 and L2 differ, depending on what type of torque arm will be used.

The following arm types can be used together with TPS:

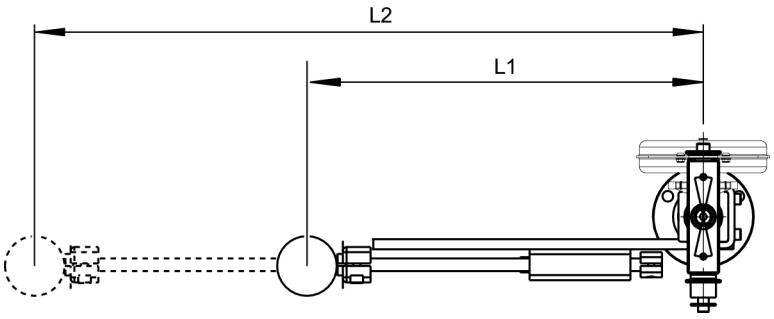
- Angle/Linear
- Linear/Linear
- Angle/Angle A (for arm types with an horizontal arm mounted to the left, 180 degrees analogue encoder mounted on the top of the arm)
- Angle/Angle B (for arm types with 360 degrees analogue encoder)
- Angle/Angle C (for arm types with an horizontal arm mounted to the right, 180 degrees analogue encoder mounted on the bottom of the arm)

Note! The Rotation stop kit must be kept intact on the torque arm to ensure that the analogue and SSI encoder will work properly. For more information on different arm types, see the applicable PI.

Setting up SSI Interface

See section **Position** to set up the parameters for SSI interface.

Setting up SML T arms

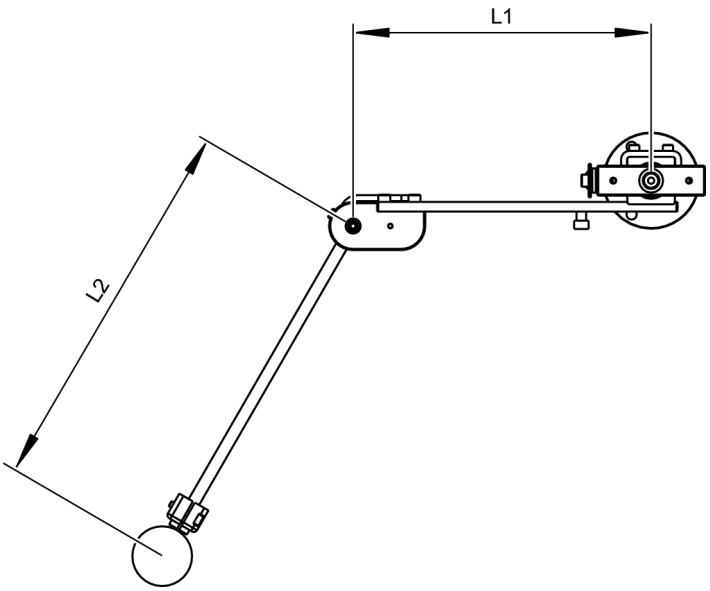


1. In TPS Control, go to **Position**.
2. Set **Arm type** to Angle/Linear.
3. Measure Length 1 (L1) on the torque arm from the centre of the axis to the centre of the tool when fully retracted to start position. Check that the encoder value is set to zero in this position in **Service>Test functions>Test Inputs**.
4. Measure Length 2 (L2) on the torque arm from the centre of the axis to the centre of the tool when fully protracted to maximum length.

   If the fully protracted arm has an analogue encoder value less than **1023**, the following formula should be used to calculate L2:

   $L2_{Input}$ = L1 + 1023 * (L2 - L1)/(D2 - D1), where D stands for encoder value.
5. Enter the values for L1 and L2 in **Length 1** and **Length 2**.
6. Press **VAL** to confirm changes or **ESC** to quit without making any changes.

Setting up SMS T arms



The figure above shows an SMS T arm from above with horizontal arm mounted to the left (angle/angle A).

1. In TPS Control, go to **Position**.
2. Set **Arm type** to one of the following angle/angle values:
   - Angle/Angle A (SMS T, position from above: horizontal arm mounted to the left, 180-degree analogue encoder mounted on top of the torque arm)
   - Angle/Angle B (Positioning arm with 360-degree analogue encoder)
   - Angle/Angle C (SMS T, position from above: horizontal arm mounted to the right, 180-degree analogue encoder mounted on bottom of the torque arm)

   For more information on how to mount the positioning encoder on either the top or the bottom of the torque arm, see the applicable torque arm instructions.
3. Measure Length 1 (L1) from the centre of the axis to the centre of the elbow when fully retracted to start position.
4. Measure Length 2 (L2) from the centre of the elbow to the centre of the tool when fully protracted to maximum length.
5. Enter the values for L1 and L2 in **Length 1** and **Length 2**.
6. Press **VAL** to confirm changes or **ESC** to quit without making any changes.
7. Go to **Service>Test functions>Test inputs** to check that the fully retracted arm has an analogue encoder value of 100.

   For information on how to set the encoder value to 100, see the applicable torque arm instructions.

Setting up SMC POSI L arms

1. In TPS Control, go to **Position**.
2. Set **Arm type** to Linear/Linear.
3. Set **Length 1** (L1) to **300**.
4. Set **Length 2** (L2) to **2000**.
5. Set **SSI coding** to **binary**.
6. Set **SSI resolution** to **24**, **SSI factor** to **1** and **SSI divider** to **2**.
7. Press **VAL** to confirm changes or **ESC** to quit without making any changes.

See section **Position** for more information on how to set up the parameters for SSI interface.

Setting up SMC POSI LA arms

1. In TPS Control, go to **Position**.
2. Set **Arm type** to Angle/Linear 2.
3. Set **Length 1** (L1) to **1056**.
4. Set **Length 2** (L2) to **4332,7**.
5. Set **SSI coding** to **binary**.
6. Set **SSI resolution** to **25**, **SSI factor** to **1** and **SSI divider** to **4**.
7. Set a value for **SSI code by length 0** by following the instruction below.
8. Press **VAL** to confirm changes or **ESC** to quit without making any changes.

How to retrieve the correct value for **SSI code by length 0**:

1. Go to **TPS menu setup->service->Test functions->Test inputs**.
2. By changing the arm linear position, the code for SSI sensor changes accordingly.
3. Change the arm linear position to the minimum arm length, to retrieve the correct code value to use in **SSI code by length 0**.

See section **Position** for more information on how to set up the parameters for SSI interface.

Setting up start parameters

This section describes how to set parameters required to start jobs with the TPS controller.

To set up start parameters controlled by external devices, see section **Sequence**.

1. Go to **System Parameter**.
2. In **Job Selection**, select Keyboard.
3. Go to **Sequence**.
4. Set start signal as follows:
   - Set to **Edge** if you want to start the job each time by pressing **Start** on the TPS controller.
   - Set to **Level** to start the job the first time by pressing **Start** on TPS controller. After that the job is started automatically.

Connecting TPS to tool control systems

Connecting to Power Focus 4000

This section describes how to configure Power Focus 4000 and TPS Control to set up communication between the controllers. Power Focus has four relay contacts (outputs) and four inputs that can be used for communication with TPS. All inputs and outputs can be configured using the ToolsTalk software. For a complete instruction of PF ToolsTalk, see the applicable Power Focus user guide.

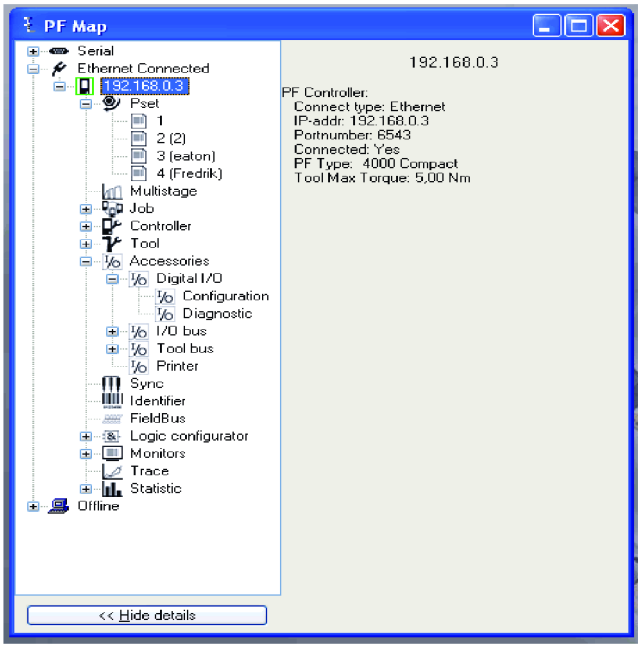
Note! This section describes an example of how to configure the tool controller and TPS. Depending on the type of operation you may need to set the inputs and outputs to other values.

1. Check that the digital I/O cable is connected to the TPS and the Power Focus.

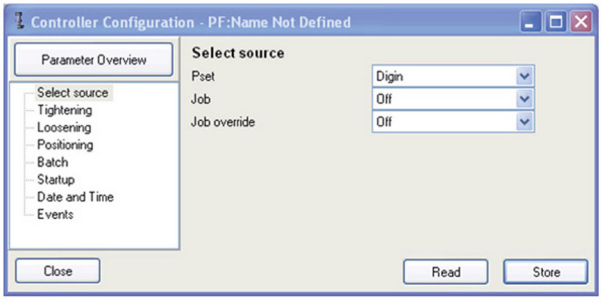
2. Check that a PC with the ToolsTalk PF software installed is connected to the Power Focus.

In **ToolsTalk PF**

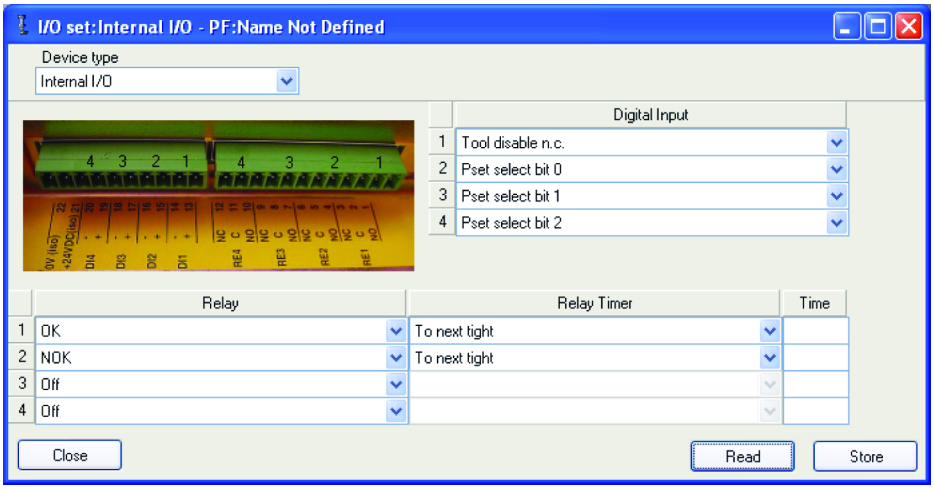
1. Depending on how Power Focus is connected to the PC, make sure it is visible in either **PF Map>Ethernet Connected** or **PF Map>Serial**.



2. In **PF Map** window, double-click on **Controller** and then double-click on **Configuration**. A new window appears.
3. In **Select Source**, set **Pset** to Digin to enable TPS to control which Pset to use. Click **Store**.



4. In **PF Map**, select **Accessories>Digital I/O** and double-click **Configuration**.
5. Set PF input signals in **Digital Input** and PF output signals in **Relay** according to the figure below.



6. Click **Store** to store all selected values in memory.

In **TPS Control**

1. Go to **Menu>Setup>Input Configuration** and set the signals and inputs matching the relay signals set up in ToolsTalk PF.

OK tool 1	IN-1
NOK tool 1	IN-2
Clamp closed	---
External start	---
External reset	---
INPUT CONFIGURATION	

2. Press **VAL** to confirm the selection.
3. Press **ESC** to leave the menu.
4. Go to **Output Configuration** and set the signals matching the input signals in the ToolsTalk PF.

Out tool enable	OUT-1
…	
Out Pset bit 1	OUT-2
Out Pset bit 2	OUT-3
Out Pset bit 4	OUT-4
OUTPUT CONFIGURATION	

5. Press **VAL** to confirm the selection.
6. Press **ESC** to leave the menu.

Connecting to Power Focus 600/Power Focus 6000

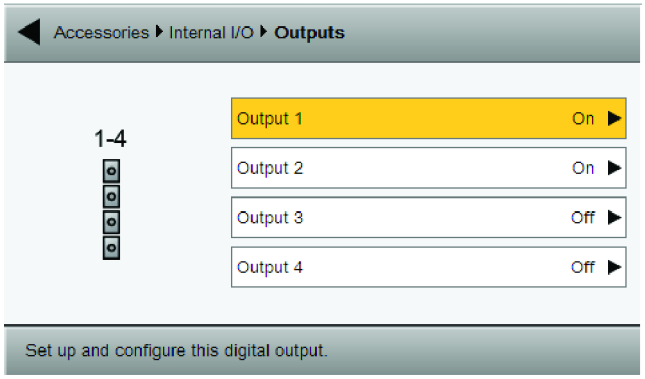
This section describes how to configure Power Focus 600/Power Focus 6000 and TPS Control to set up communication between the controllers. Power Focus has four relay contacts (outputs) and four inputs that can be used for communication with TPS. The Power Focus 600/Power Focus 6000 controller software is configured trough a web interface or the keypad. For a complete instruction of the Power Focus 600/Power Focus 6000 controller software, see the applicable Power Focus user guide.

Note! This section describes an example of how to configure the tool controller and TPS. Depending on the type of operation you may need to set the inputs and outputs to other values.

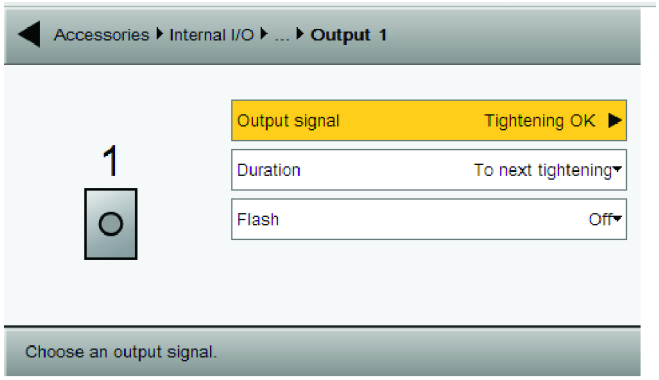
1. Check that the digital I/O cable is connected to the TPS and the Power Focus.

In **PF600/PF6000 or through a web interface (or ToolsTalk 2 for PF6000)**

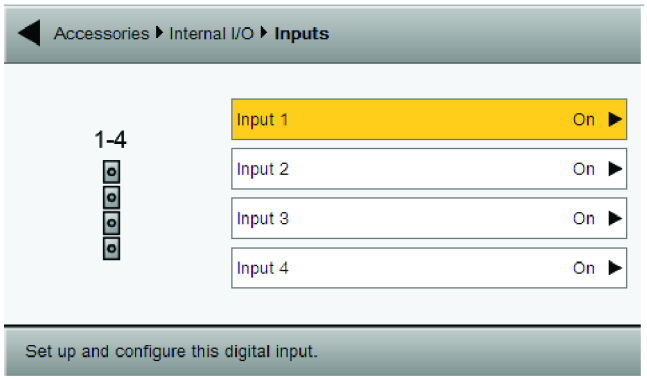
1. Go to **Accessories** >**Internal I/O**>**Outputs** and select Output 1.



2. Set Output 1 values as follows: Output signal =Tightening OK, Duration = To next tightening, and Flash = Off



3. Change to Output 2 and set values as follows: Output signal =Tightening NOK, Duration = To next tightening, and Flash = Off
4. Go to **Accessories** >**Internal I/O**>**Inputs**.



5. Set values for Input 1 to 4 as follows:
   - Input 1 = Lock tightening
   - Input 2 = Select input bit 0
   - Input 3 = Select input bit 1
   - Input 4 = Select input bit 2
6. Click **OK** to store all selected values in memory.

In **TPS Control**

1. Go to **Menu>Setup>Input Configuration** and set the signals and inputs matching the output signals set up in PF.

OK tool 1	IN-1
NOK tool 1	IN-2
Clamp closed	---
External start	---
External reset	---
INPUT CONFIGURATION	

2. Press **VAL** to confirm the selection.
3. Press **ESC** to leave the menu.
4. Go to **Output Configuration** and set the signals matching the input signals set up in PF.

Out tool disable	OUT-1
…	
Out Pset bit 1	OUT-2
Out Pset bit 2	OUT-3
Out Pset bit 4	OUT-4
OUTPUT CONFIGURATION	

5. Press **VAL** to confirm the selection.
6. Press **ESC** to leave the menu.

Connecting to Tensor DS Drive D312 or DL Drive D313

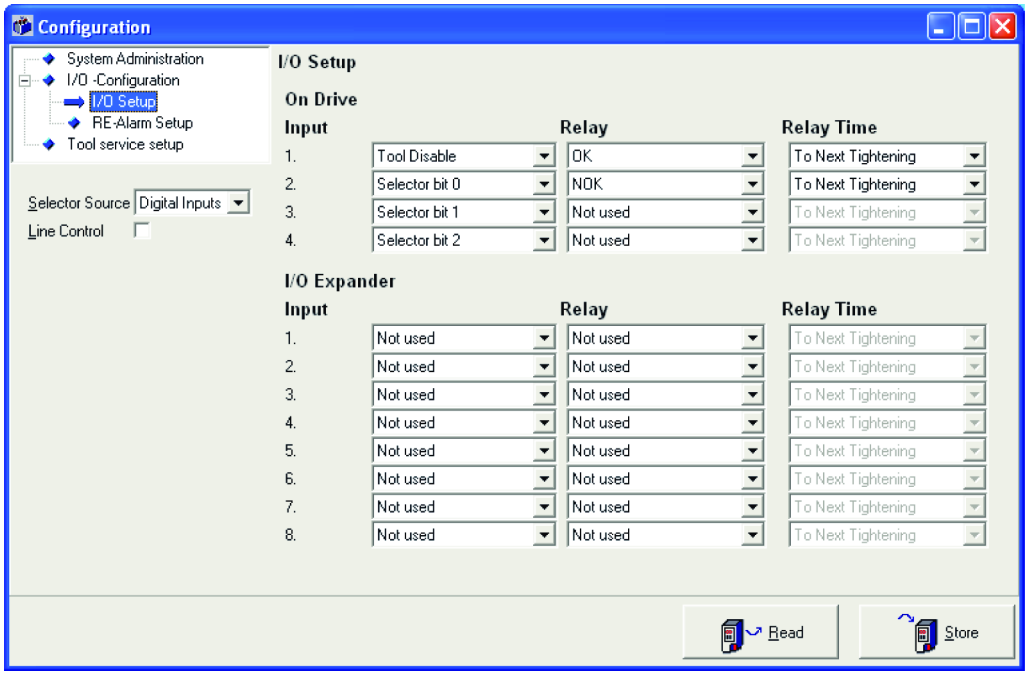
This section describes how to configure Tensor DS/DL Drive D312/D313 and TPS Control to set up communication between the controllers. Tensor DS/DL Drive D312/D313 has four relay contacts (outputs) and four inputs that can be used for communication with TPS. All inputs and outputs can be configured using the ToolsTalk software. For a complete instruction of ToolsTalk DSDL, see the applicable Tensor DS/DL Drive D312/D313 user guide.

Note! This section describes an example of how to configure the tool controller and TPS. Depending on the type of operation you may need to set the inputs and outputs to other values.

1. Check that the digital I/O cable is connected to the TPS and Tensor.
2. Check that a PC with the ToolsTalk software installed is connected to Tensor.

In **ToolsTalk DSDL**

1. Select **Configuration** in the menu **Window**. A new window appears.
2. Select **I/O Setup**.
3. Set **Select Source** to Digital Inputs.
4. Set input and output signals as seen in the figure below.



5. Click **Store** to store all selected values in memory.

In **TPS Control**

1. Go to **Menu>Setup>Input Configuration** and set the signals and inputs matching the relay signals set up in ToolsTalk DSDL.

OK tool 1	IN-1
NOK tool 1	IN-2
Clamp closed	---
External start	---
External reset	---
INPUT CONFIGURATION	

2. Press **VAL** to confirm the selection.
3. Press **ESC** to leave the menu.
4. Go to **Output Configuration** and set the signals matching the input signals in the tool controller.

Out tool disable	OUT-1
…	
Out Pset bit 1	OUT-2
Out Pset bit 2	OUT-3
Out Pset bit 4	OUT-4
OUTPUT CONFIGURATION	

5. Press **VAL** to confirm the selection.
6. Press **ESC** to leave the menu.

Connecting to MicroTorque G4

This section describes how to configure MicroTorque G4 and TPS Control to set up communication between the controllers. MicroTorque G4 has predefined outputs and inputs that can be used for communication with TPS. For a complete instruction of MicroTorque G4, see the MicroTorque System user guide.

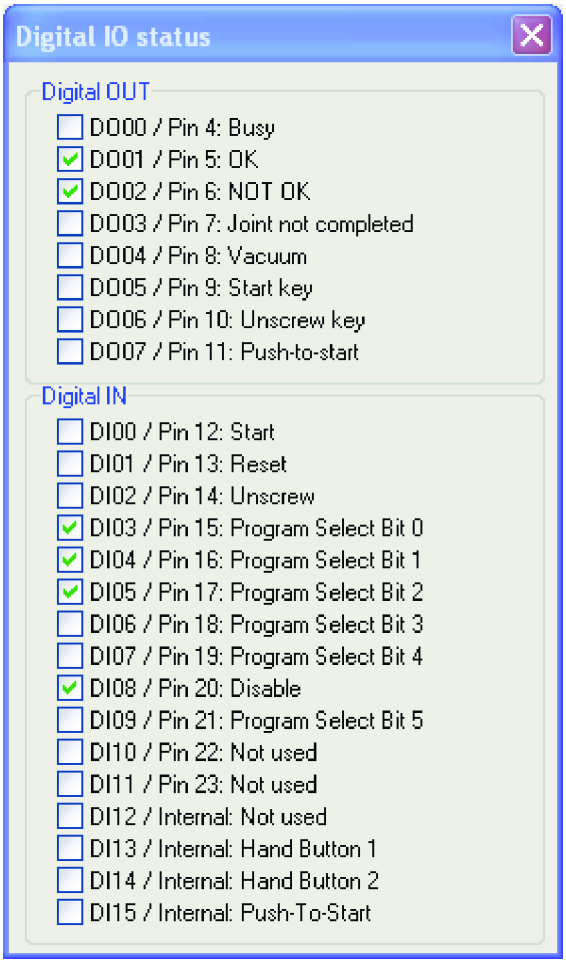
Note! This section describes an example of how to configure the tool controller and TPS. Depending on the type of operation you may need to set the inputs and outputs to other values.

To ensure that TPS works properly with MicroTorque G4, the function **Screw cycle sequence** must be **disabled**.

1. Check that the digital I/O cable is connected to TPS and MicroTorque G4.
2. Check that a PC installed with the ToolsTalk MT software version 4.44.00 or later is connected to the MicroTorque G4 with a firmware version 4.44.00 or later.

   In **ToolsTalk MT**

   1. In the folder Controller parameter set **TPS mode** to **On** to enable correct IO behavior.
   2. Check that the predefined input and output signals are set according to the figure below.



   In **TPS Control**

   1. Go to **Menu>Setup>Input Configuration** and set the signals and inputs matching the relay signals set up in ToolsTalk MT.

OK tool 1	IN-1
NOK tool 1	IN-2
Clamp closed	---
External start	---
External reset	---
INPUT CONFIGURATION	

2. Press **VAL** to confirm the selection.
3. Press **ESC** to leave the menu.
4. Go to **Output Configuration** and set the signals matching the input signals in the tool controller.

Out tool disable	OUT-1
…	
Out Pset bit 1	OUT-2
Out Pset bit 2	OUT-3
Out Pset bit 4	OUT-4
OUTPUT CONFIGURATION	

5. Press **VAL** to confirm the selection.
6. Press **ESC** to leave the menu.

Connecting to MTF 400

This section describes how to configure MTF 400 and TPS Control to set up I/O communication between the controllers. MTF 400 has several digital relay outputs and inputs that can be used for communication with TPS. All inputs and outputs can be configured using the ToolsTalk software. For a complete instruction of ToolsTalk MTF, see the ToolsTalk MTF user guide.

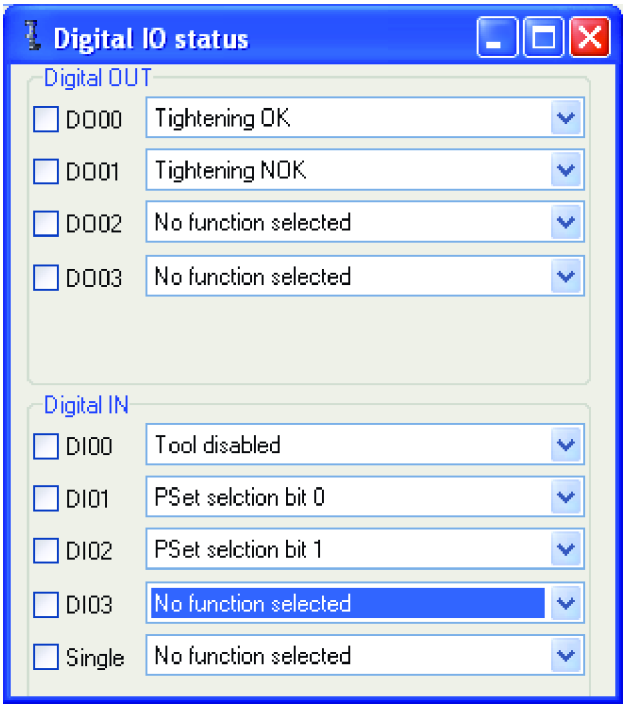
To ensure that the TPS works properly with MTF 400, the I/O connections must be connected in **PNP mode** (source type, positive logic), as described in the applicable instruction for separate MTF 400 controller.

Note! This section describes an example of how to configure the MTF 400 controller and TPS. Depending on the type of operation you may need to set the inputs and outputs to other values.

1. Check that the digital I/O cable is connected to the TPS and the MTF 400.
2. Check that a PC with the ToolsTalk MT software installed is connected to the MTF 400.

In **ToolsTalk MT**

1. Click **I/O state** to display the status of the controller I/O signal. A new window appears.
2. Set input and output signals as seen in the figure below.



3. Click **Save to controller** to store all selected values in the controller.

In **TPS Control**

1. Go to **Menu>Setup>Input Configuration** and set the input signals matching the output signals set up in ToolsTalk MT.

OK tool 1	IN-1
NOK tool 1	IN-2
Clamp closed	---
External start	---
External reset	---
INPUT CONFIGURATION	

2. Press **VAL** to confirm the selection.
3. Press **ESC** to leave the menu.
4. Go to **Output Configuration** and set the output signals matching the input signals in the tool controller.

Out tool disable	OUT-1
…	
Out Pset bit 1	OUT-2
Out Pset bit 2	OUT-3
Out Pset bit 4	---
OUTPUT CONFIGURATION	

5. Press **VAL** to confirm the selection.
6. Press **ESC** to leave the menu.

Connecting to MTF 6000

This section describes how to configure MTF 6000 and TPS Control to set up I/O communication between the controllers. MTF 6000 has several digital relay outputs and inputs that can be used for communication with TPS. All inputs and outputs can be configured using the ToolsTalk software. For a complete instruction of ToolsTalk MTF, see the ToolsTalk MTF user guide.

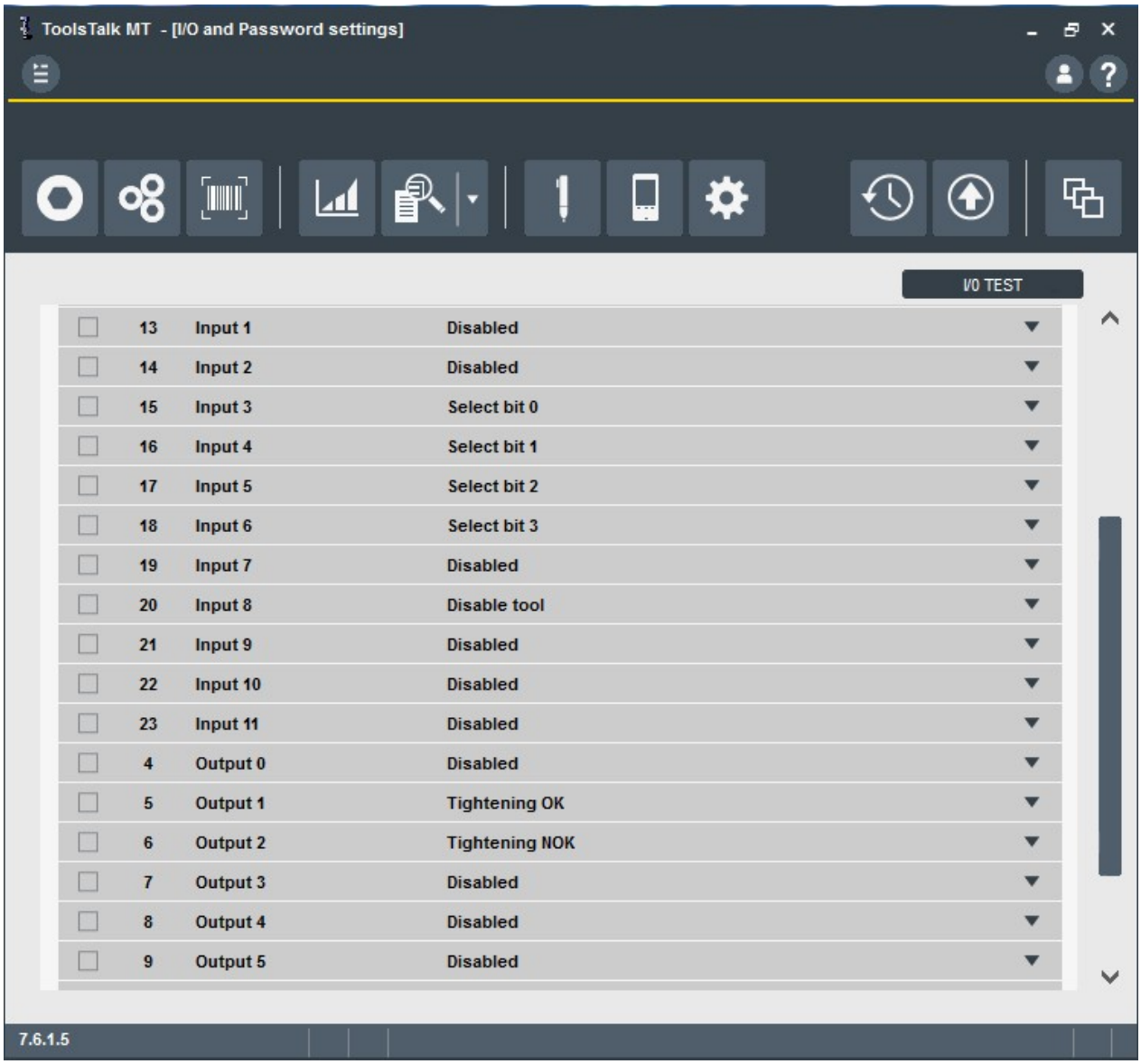
To ensure that the TPS works properly with MTF 6000, the I/O connections must be connected in **PNP mode** (source type, positive logic), as described in the applicable instruction for separate MTF 6000 controller.

Note! This section describes an example of how to configure the MTF 6000 controller and TPS. Depending on the type of operation you may need to set the inputs and outputs to other values.

1. Check that the digital I/O cable is connected to the TPS and the MTF 6000.
2. Check that a PC with the ToolsTalk MT software installed is connected to the MTF 6000.

In **ToolsTalk MT**

1. Click **I/O state** to display the status of the controller I/O signal. A new window appears.
2. Set input and output signals as seen in the figure below.



3. Click **Save to controller** to store all selected values in the controller.

In **TPS Control**

1. Go to **Menu>Setup>Input Configuration** and set the input signals matching the output signals set up in ToolsTalk MT.

OK tool 1	IN-1
NOK tool 1	IN-2
Clamp closed	---
External start	---
External reset	---
INPUT CONFIGURATION	

2. Press **VAL** to confirm the selection.
3. Press **ESC** to leave the menu.
4. Go to **Output Configuration** and set the output signals matching the input signals in the tool controller.

Out tool disable	OUT-1
…	
Out Pset bit 1	OUT-2
Out Pset bit 2	OUT-3
Out Pset bit 4	---
OUTPUT CONFIGURATION	

5. Press **VAL** to confirm the selection.
6. Press **ESC** to leave the menu.

Connecting to EBL RE-Drive

This section describes how to configure EBL RE-Drive and TPS Control to set up communication between the controllers. All digital inputs and outputs can be configured in the EBL RE-Drive controller. For a complete instruction of EBL RE-Drive, see the applicable EBL user guide.

Note! To ensure that the TPS works properly with EBL RE-Drive, the F3 button in EBL must be programmed with **Screwdriver operation set to OFF**.

1. Check that the digital I/O cable is connected to TPS and EBL RE-Drive as described in the table below.

TPS Controller		EBL RE-Drive	
Pin	Signal	Cable color	Connector
2	Out-1	Yellow	SET
3	Out-2	Brown	RESET
5	IN-2	White	Not used
6	IN-4	Purple	Not used
13	GND 24 V	Black	GND
14	+24 V	Red	+DC24V
17	IN-1	Blue	COMP
18	IN-3	Gray	Not used

For more information about EBL RE-Drive connections, see the applicable EBL RE-Drive User Guide.

In **EBL RE-Drive** controller

1. Hold the F1 button depressed.

2. Press the Reset button.
3. Wait for the buzzer to sound and the LED F1 changes to P
4. Release the F1 button.
5. Batch Number setting (LED F1 =) is selected. Set batch number to value **01**.
6. Press the F1 button repeatedly to change setting to System setting mode (LED F1 =).
7. The F2 button has no impact on I/O communication with TPS and can be set to any applicable value.
8. Press the F3 button to set screwdriver operation to **OFF**, that is either value **0** or value **1**.
9. To exit the Settings menu, hold the F1 button depressed until the buzzer sounds twice.

In **TPS Control**

1. Go to **Menu>Setup>Input Configuration** and set the signals and inputs matching the relay signals set up in EBL RE-Drive.

OK tool 1	IN-1
NOK tool 1	---
Clamp closed	---
External start	---
External reset	---
INPUT CONFIGURATION	

2. Press **VAL** to confirm the selection.
3. Press **ESC** to leave the menu.
4. Go to **Output Configuration** and set the signals matching the input signals in the tool controller.

Out tool enable	OUT-1
Out tool disable	OUT-2
Out Pset bit 1	---
Out Pset bit 2	---
Out Pset bit 4	---
OUTPUT CONFIGURATION	

5. Press **VAL** to confirm the selection.
6. Press **ESC** to leave the menu.

Connecting to air tools

Air tools are enabled as a licensed function. To enable the license for air tools, see section **Licence handling**.

All digital inputs and outputs are configured in the TPS. To set up I/O communication between TPS and the tool, use the following procedure:

In **TPS Control**

1. Go to **Menu>Setup>Input Configuration** and set the input signals as seen in the figure below.

Signal clutch 1	IN-2
Signal trigger 1	IN-1
Clamp closed	---
External start	---
External reset	---
INPUT CONFIGURATION	

2. Press **VAL** to confirm the selection.
3. Press **ESC** to leave the menu.
4. Go to **Output Configuration** and set the output signals as seen in the figure below.

Out tool enable	OUT-1
Out tool disable	---
Out in position	---
Out OK	---
Out NOK	---
OUTPUT CONFIGURATION	

5. Press **VAL** to confirm the selection.
6. Press **ESC** to leave the menu.

Installing an I/O extension board

⚠ **WARNING Make sure the TPS is disconnected from power mains before opening the TPS Control unit.**

Required tools:

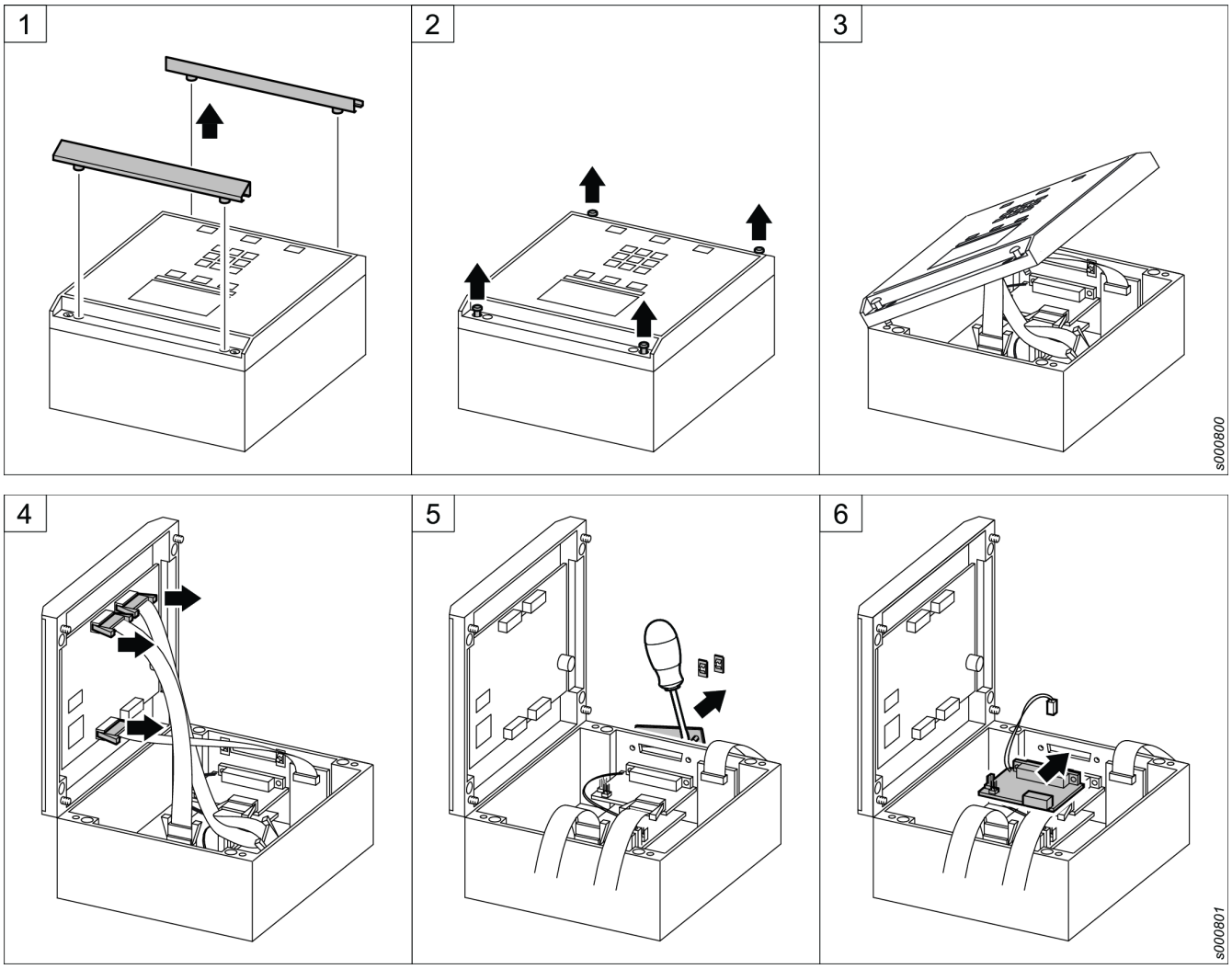
- Phillips screwdriver
- Slotted screwdriver
- Allen key

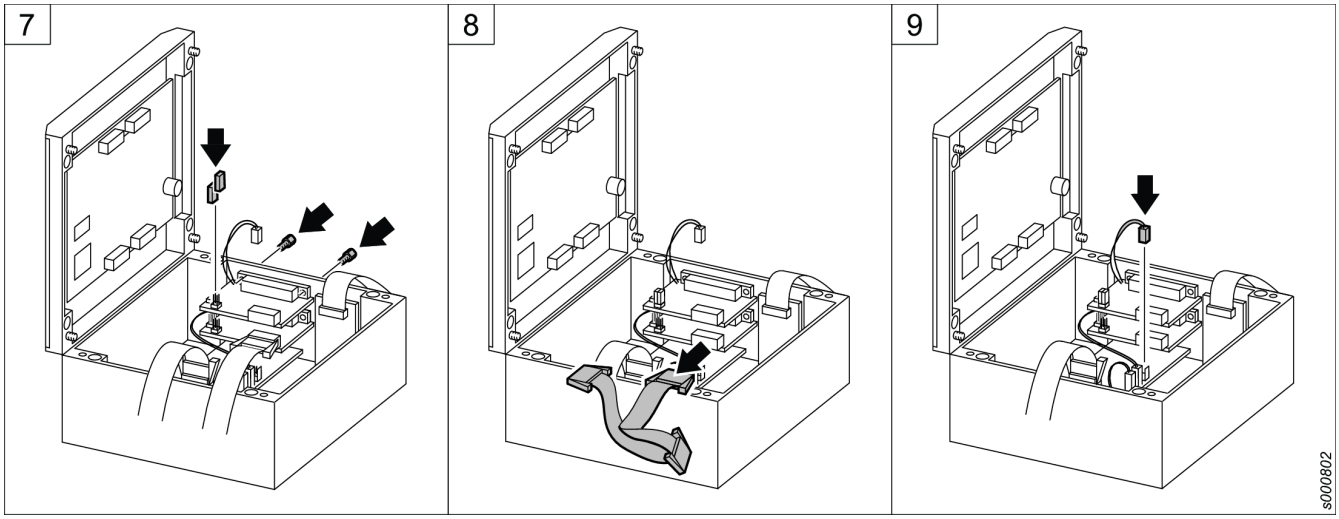
Installation procedure:

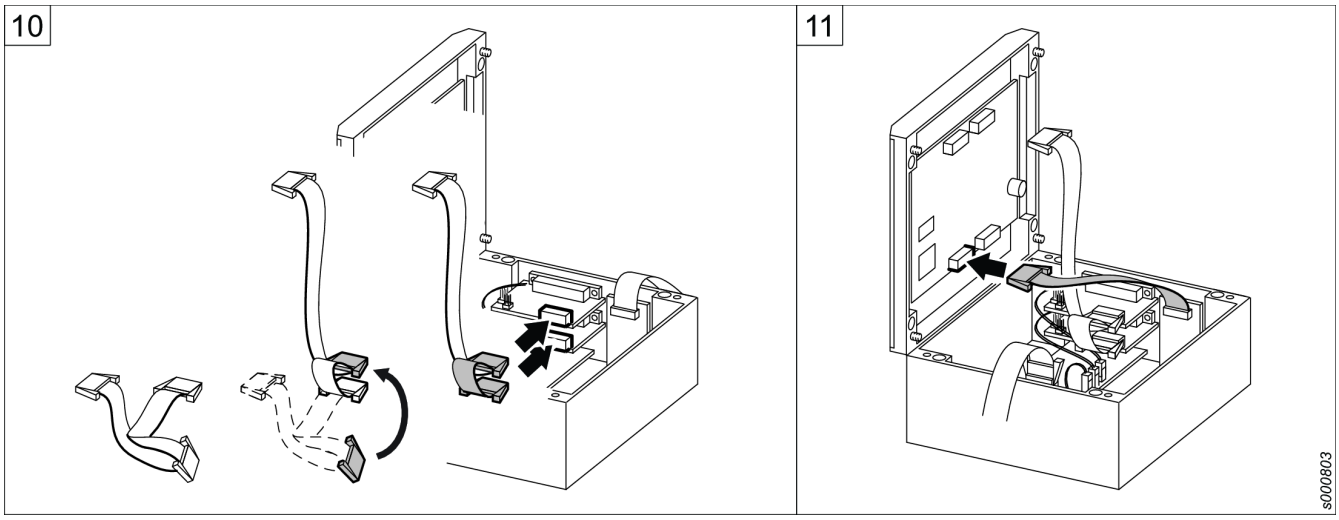
1. Remove the protective strips carefully from the front panel.
2. Using a Phillips screwdriver, unscrew the screws on the front panel.
3. Lift the front panel carefully to open the controller casing.
4. Disconnect the cables from the connectors on the main board situated inside the front panel.
5. Remove the plastic cover from I/O port 2 with a slotted screwdriver. Make sure that no parts of the plastic cover, including the metal clips holding the plastic cover, are left inside the controller casing.
6. Connect the additional I/O board into the empty slot for I/O port 2.
7. Fasten the board with the bolts, using an Allen key from the outside.

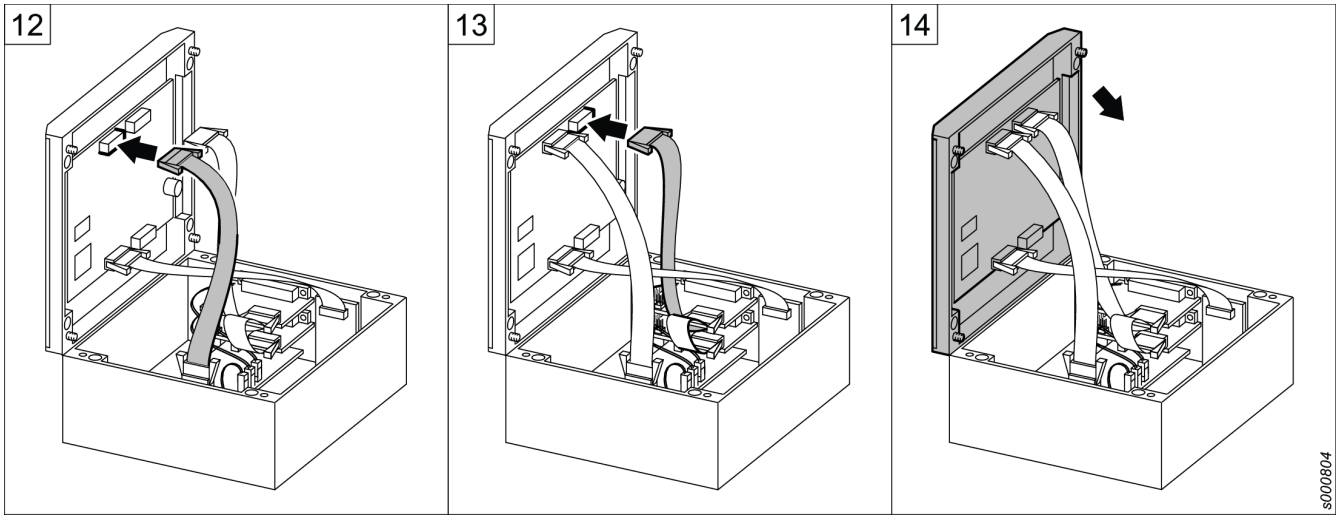
   When using the additional I/O board as an I/O extension board, make sure the board is equipped with jumpers (in closed position).
8. Disconnect the flat band cable from the original I/O board for easier connection of the additional I/O board.

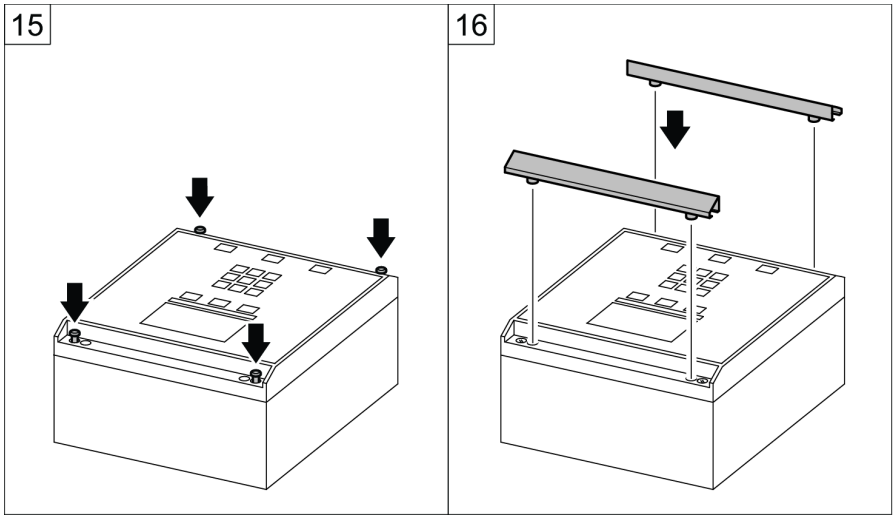
9. Connect the paired cable from the additional I/O board into the available slots on the connector on the lower board.
10. Connect the flat band cable between the two I/O boards.
11. Connect the flat band cable from the side-mounted encoder board to the connector on top of the main board.
12. Connect the flat band cable from the lower board to the rightmost connector on the main board.
13. Connect the flat band cable from the I/O boards to the leftmost connector on the main board.
14. Put the front panel back in the controller casing.
15. Tighten the front panel with the screws.
16. Put the protective strips back on the front panel.









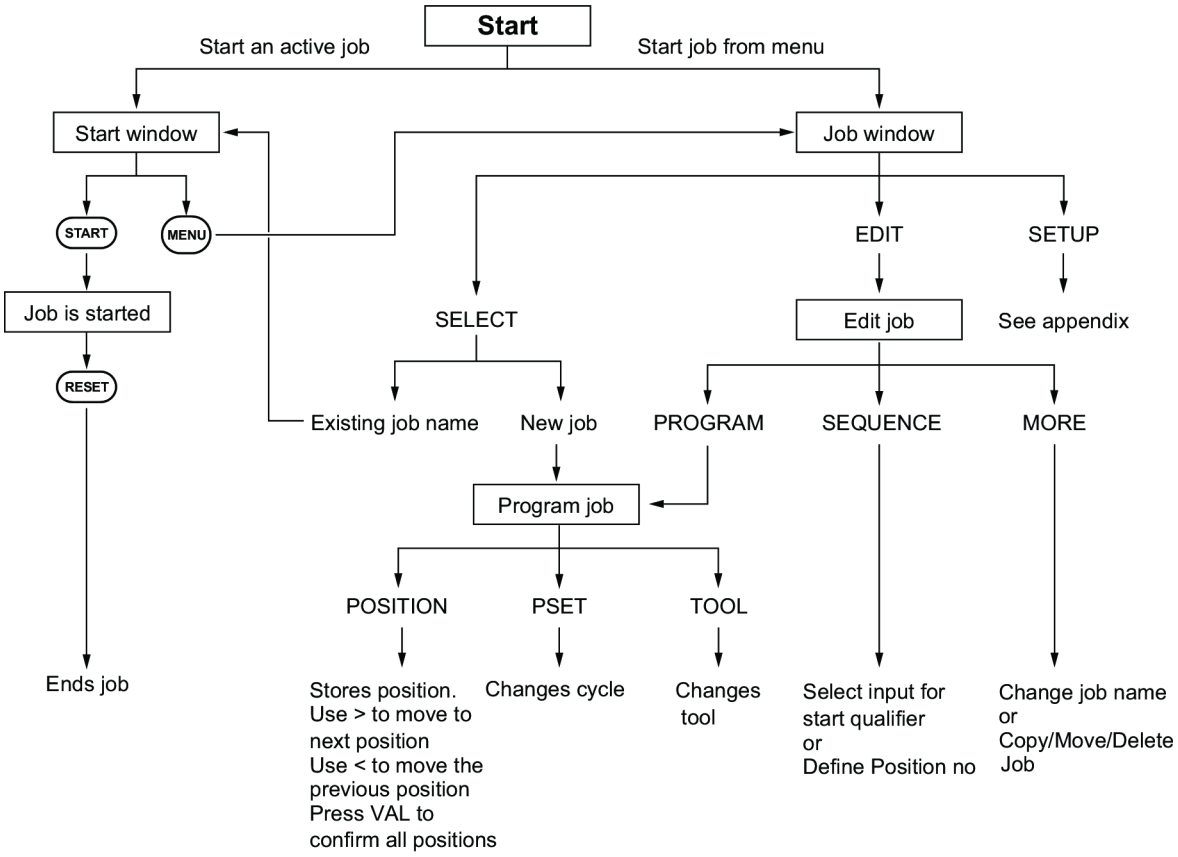


s000805

Operation

Quick guide

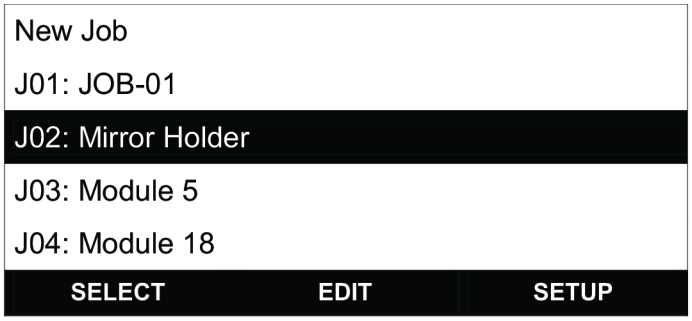
This section includes a quick guide how to start different jobs.



Job handling

When at least one job is programmed, you can activate the job menu by pressing the Menu key. This can only be done if no job is currently running.

Pressing the Menu key displays the following selection menu in the bottom line:



The following options are available from this menu:

- Existing jobs can be selected with the up/down arrow keys.
- OK or SELECT (F1) activates the job.
- The New Job option lets you program a new job.
- EDIT (F2) lets you edit the selected job.
- SETUP (F3) displays the Setup menu
- ESC can be used to exit the menu without making a selection.

The following colour codes are used in the graphical display to indicate the results of the operation:

Colour	Description
Blue	Position found
Red	Position lost
Green (blinking)	One sequence element processed correctly
Green (steady)	Complete job procedure performed correctly

Creating new job

This section describes how to program a new job.

1. Select **New Job** to program a new job. The position programming window will appear. Position 1 is automatically enabled.
2. Position the tool on the work piece where you want to program position 1. Press **POSITION** (F1) to store the position in memory. The inverted box indicates that the position is stored.
3. By default, Pset 1 is always suggested for the first position.

   If Output Pset Selection setup parameters have already been set, you can change the Pset with the Pset keys.

   Use Pset to enter the Pset number that should be transmitted to the screwdriver controller for this position.
4. Press the Right Arrow key to program the next position. The value for Pset is always copied from the previous position but can be changed when necessary.
5. Repeat steps 2-4 for all positions you want to program. When finished, press **VAL** to confirm the programmed positions.

If you want to delete a position during the programming procedure, press the Left Arrow key. The box with the position will be removed.

Starting existing job

This section describes how to start an already selected job or select and start an existing job from the job menu.

The display shows the previously selected job or, if a job is activated by an external device, the job currently selected through the relevant inputs.

1. To select this job, press START (F1). The job can also be started after an external start signal if the controller is connected to any external devices. See section **Parameters** for more details.

If you want to change the job, press **MENU** and select any of the available jobs with the up/down arrow keys. Press **OK** or **SELECT**to activate the job.

2. Position the tool in position 1. The LED backlight will remain white or flash green and white until the position is reached, depending on the results of the previous tightening operation position. As soon as the position is reached, the LED backlight will change to blue and the output enabling the screwdriver will be activated.
3. Perform the operation for this position.
4. If the screwdriver transmits an OK signal, the position is marked as processed (the corresponding box turns black) and the LED backlight will change to flashing green and white.

   Note! For EBL RE-Drive, you need to retract the tool from the current position before moving to the next position.
5. Move the tool to the next position. As soon as the next position is reached, the backlight will revert to blue.
6. Repeat steps 4-7 until all positions have been processed.
7. When the tightening operation is completed, the box symbol indicates this by changing colour.

If you have set the parameter Enable Backstep to ON, a Back button will show as soon as at least one position has been completed. The Back button is used to enable a repetition of a tightening operation, even in the event of an OK result.

If you want to stop the tightening operation, press the RESET button. Press Yes at the question **Really cancel the job?**. The procedure will stop and the LED backlight will change to red. The procedure will be displayed as NOK and the operation can be restarted by pressing the START button.

If the screwdriver transmits an NOK signal, the backlight will change to red and the tool will be disabled. The next step in the procedure depends on how the unit is configured in regards to the parameters Acknowledge NOK and NOK Max Count.

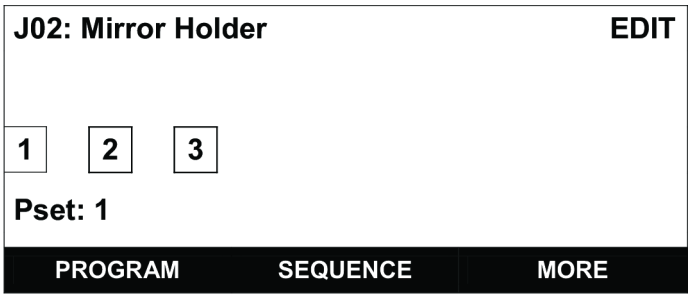
NOK acknowledgement not required: If NOK does not require an acknowledgement, the operator can immediately repeat the tightening operation for this screw; however, the tool must first have left the position of the current screw before the same screw is released again for processing. If the NOK Max Count parameter is set to any value except 0 (zero), the operator can only start the number of repeated attempts set in the parameter value. If the number is exceeded, a signal is issued and the Pset must be reset.

NOK acknowledgement required: The operator must press the NOK key on the device or, if accordingly configured, activate the external Acknowledge NOK input signal (for example, with a key switch). The position will be released for repeated processing after this acknowledgement has been signalled. If NOK acknowledge is activated, the NOK Max Counter parameter will not be evaluated.

In both cases, the operations can be cancelled with the Reset button.

Changing existing job

The EDIT menu lets you process an already-existing job. The following functions can be executed with a job in this area:



- PROGRAM lets you re-program the positions again. Only the same number of positions that were available before the job can be re-programmed.
- SEQUENCE lets you set the position queries and position-specific output signals. Furthermore, the Pset values can be subsequently changed for the specific positions.
- MORE opens another menu, from which you can change the job name or completely delete a job.
- Edit Job Name

You can enter a job name with up to 19 characters.

You can use upper-case letters, lower-case letters, numbers and special characters. To change character input, press the F1 key until the preferred input is displayed. Use the Arrow keys to change the job name.

To insert additional characters, use the Insert (F2) key.

To delete a selected character, use the Delete (F3) key.

- Copy an existing job

  Creates an exact copy of an existing job. Select a target location in the job list where you want to store the copy. The job will automatically get a different job name. If the selected target job is not empty, a question asking whether you want to replace this job will appear. If the query is confirmed with the OK button, the target job will be overwritten by the copy.

- Move a job

  Moves a job to a new location in the job list. The job will keep the original job name. If the selected target job is not empty, a question asking whether you want to replace this job will appear. If the query is confirmed with the OK button, the target job will be overwritten.

- Delete a job

  Completely removes a job. You will be asked to confirm the removal. Press OK to confirm.

Maintenance

Firmware updates

TPS Control provides two different options for updating the firmware in the TPS controller:

- Initiating firmware update from ToolsTalk TPS
- Initiating firmware update with an executable file

Both options requires connection between the TPS controller and a PC through the serial interface. Note that this function deletes the existing firmware in the TPS controller. The TPS controller cannot be operated without a matching update file.

Only trained personnel should update the firmware.

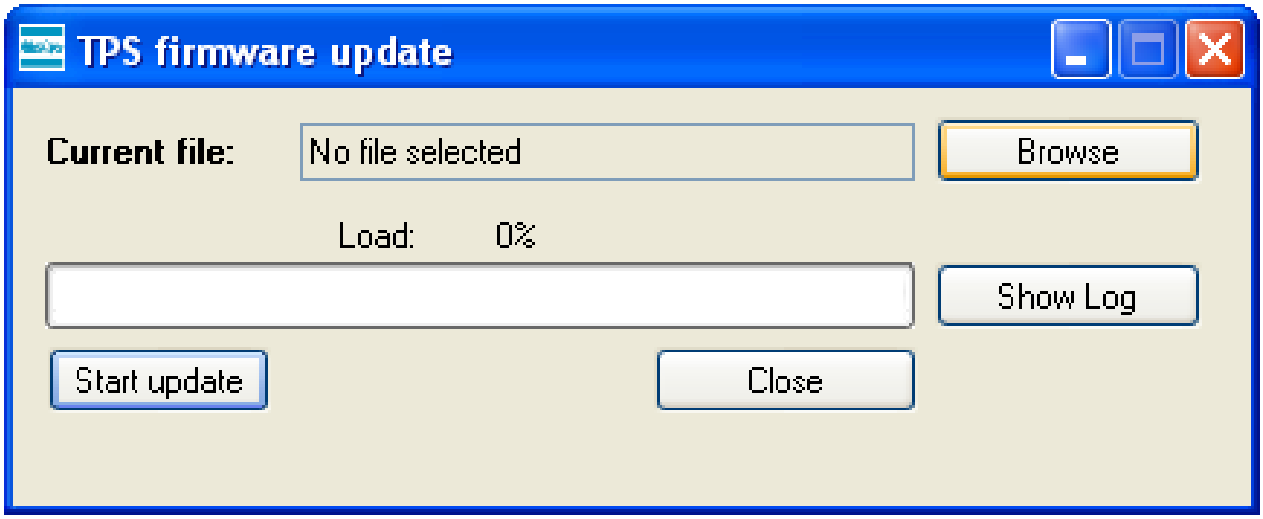
Initiating firmware update from ToolsTalk TPS

NOTICE Do not switch off the power during the firmware update! If you do, it may damage the unit.

1. Connect TPS and the PC with a straight serial cable. Make sure the TPS controller is turned on.
2. Start **ToolsTalk TPS** on the PC by either double-clicking on the icon on the desktop or clicking **Start menu>All programs>Atlas Copco Tools AB>ToolsTalk TPS**.
3. Go to **Settings>Update firmware**.
4. If no COM port has been selected earlier, a dialog window appears asking you to select connection parameter first. Click **OK**. A new window appears.

   Set the **COM port** that is used on the PC and **Baud rate**. Make a note of the port number for future reference.

   Note! The same baud rate must be set in TPS Control and the PC.
5. Turn on TPS Control.
6. Press **MENU > Setup**.
7. Select **Service**.
8. Select **Firmware Update**.
9. When the question **Erase flash?** appears in the display, press **OK** to start the firmware update or press **ESC** to cancel the firmware update process.
10. Wait until the display in TPS turns dark before proceeding with next step.
11. In the **TPS firmware update** window on the PC, select file by clicking on **Browse** and in the following window select the appropriate firmware file.



12. If you want to follow the process of the firmware update, click **Show Log**.
13. Click **Start update** to update the firmware in the unit.

The firmware update starts in the TPS controller. The firmware update takes approximately 2-3 minutes to finish. After that, the unit will automatically reset with the new firmware.

Initiating firmware update with an executable file

NOTICE Do not switch off the power during the firmware update! If you do, it may damage the unit.

1. Store the files blprog.exe and TPS-Control-V500.hex in the same directory on the PC.
2. Connect TPS and the PC with a serial cable.
3. Identify the COM port that is used on the PC. Make a note of the port number for future reference.
4. Turn on TPS Control.
5. Press **MENU > Setup**.
6. Select **Service**.
7. Select **Firmware Update**.
8. When the question **Erase flash?** appears in the display, press **OK** to start the firmware update or press **ESC** to cancel the firmware update process.
9. Wait until the display in TPS turns dark before proceeding with next step.
10. Double-click on the executable file named blprog.exe.
11. Enter the number of the COM port you are using.
12. When the program asks for what files to program, either press enter if there is only one hex file or, if there are multiple hex files, enter the full names of all of them.

The firmware update starts. It will take 2-3 minutes to finish updating. After that, the unit will automatically reset with the new firmware.

Reference

I/O configuration

Communication between TPS and Power Focus or DL/DS

This section gives an example of how to set up I/O communication between TPS and Power Focus.

Recommended cable: 4222 1715 xx (03 = 3 m, 10 = 10 m)

TPS I/O		Power Focus I/O
Output 1 (Pin 2)	→	Tool Enable, normally closed (Pin 13/14)

TPS I/O		Power Focus I/O
Output 2 (Pin 3)	→	Pset Select Bit 0 (Pin 15/16)
Output 3 (Pin 4)	→	Pset Select Bit 1 (Pin 17/18)
Output 4 (Pin 10)	→	Pset Select Bit 2 (Pin 19/20)
Input 1 (PIN 17)	←	OK (Pin 1/2)
Input 2 (Pin 5)	←	NOK (Pin 4/5)

Communication between TPS and MicroTorque G4 and MT6000

This section gives an example of how to set up I/O communication between TPS and MicroTorque G4.

Recommended cable: 4222 1734 XX (01 = 1.5 m, 03 = 3m)

TPS I/O		MicroTorque G4 I/O
Output 1 (Pin 2)	→	Disable (Pin 20)
Output 2 (Pin 3)	→	Pset Select Bit 0 (Pin 15)
Output 3 (Pin 4)	→	Pset Select Bit 1 (Pin 16)
Output 4 (Pin 10)	→	Pset Select Bit 2 (Pin 17)
Input 1 (PIN 17)	←	OK (Pin 5)
Input 2 (Pin 5)	←	NOK (Pin 6)

Communication between TPS and MicroTorque Focus 400

This section gives an example of how to set up I/O communication between TPS and MicroTorque Focus 400.

Recommended cable: 4222 1735 XX

TPS I/O		MicroTorque Focus I/O
Output 1 (Pin 2)	→	Tool Disable (Pin 8)
Output 2 (Pin 3)	→	Pset Select Bit 0 (Pin 9)
Output 3 (Pin 4)	→	Pset Select Bit 1 (Pin 10)
Input 1 (PIN 17)	←	Tightening OK (Pin 3)
Input 2 (Pin 5)	←	Tightening NOK (Pin 4)

Communication between TPS and EBL RE-Drive

This section gives an example of how to set up I/O communication between TPS and EBL RE-Drive.

Recommended cable: 4222 1733 XX

TPS I/O		Cable colour	EBL RE-Drive I/O
Output 1 (Pin 2)	→	Yellow	SET
Output 2 (Pin 3)	→	Brown	RESET
Input 1 (PIN 17)	←	Blue	COMP

Parameters

The system parameters, as well as a number of special functions, can be accessed from the Setup menu. To facilitate navigation, the Setup menu is divided into the following subgroups:

- System parameter
- Input configuration
- Output configuration

- Sequence
- Position
- Service

System parameter

Parameter name	Description	Range/Values
Station number	Identifier for the tightening system	0-255 Default: 0
Tool model	Defines the type of tool used. This parameter is only visible if the activation code for air tools has been entered.	Electric/Air tool Default: Electric
Position control	No = TPS Control is used without a torque arm (TPS Control is only used as counter) Yes = TPS Control is used with a torque arm (counter and position check)	No/Yes Default: Yes
Special functions	Determines whether advanced parameters will be visible in the display. Values set for the advanced parameters will still remain, even if this parameter is set to OFF.	Off/On Default: Off
Timed outputs	Sets the length of the pulse for output signals in each position that is defined as a pulse.	0.0 - 9.9 Default: 0.5
Job selection	Specifies whether the job selection is controlled by a barcode scanner, the keyboard or other external devices.	Ext. Inputs, Keyboard, Barcode Default: Keyboard
Sound signal	Determines whether and for which result the built-in beeper gives an acoustic signal.	Off, Signal OK, Signal NOK Default: Signal NOK
RS-232 set up	Sets the serial connection parameters (in a separate submenu)	
Display set up	Sets the display parameters (in a separate submenu)	
Enter password	Determines whether a fixed password should be entered in order to access the Setup Menu and Job Edit functions. If the password function is enabled, enter the following password in sequence upon request: NOK - Reset - VAL - INFO - ESC - MENU - OK	Off, Single, Always Default: Off

RS-232 set up

Parameter name	Description	Range/Values
C1:baudrate	Defines the transmission speed for the first serial interface	4800-115200 Default: 38400
C1:data bits	Allows you to set the data byte length for the first serial interface	7, 8 Default: 8
C1:parity	Allows you to define the parity method for the first serial interface	None, even, odd Default: None
C1:character delay	Defines a waiting period that occurs during transmission after each character (in ms)	0-20 ms Default: 0
C1:line delay	Defines a waiting period that occurs during transmission after each line (in ms)	0-99 ms Default: 0
C2:baudrate	Defines the transmission speed for the second serial interface (Barcode Scanner)	4800-115200 Default: 9600

Parameter name	Description	Range/Values
C2:data bits	Allows you to set the data byte length for the barcode reader interface	7, 8 Default: 8
C2:parity	Enables the definition of the parity method for the barcode reader interface	None, even, odd Default: None

Display set up

Parameter name	Description	Range/Values
Display contrast	Adapts the display contrast to the surroundings	30-63 Default: 48
Screen saver (min)	Sets the time limit for the idle period before the screensaver is activated.	Off, 1-15 minutes Default: 6
RGB portion Red	Sets a fixed percentage value to specify the amount of red, green and blue colour in the display backlight. For example, for a completely white backlight, set Red=100%, Green=100%, and Blue=100%. For a pure red backlight, set R=100%, G=0%, and B=0%.	25% 37% 50% 62% 100% Default: 50%
RGB portion Green	See RGB portion Red	25% 37% 50% 62% 100% Default: 50%
RGB portion Blue	See RGB portion Red	25% 37% 50% 62% 100% Default: 50%

Input configuration

Parameter name	Description	Range/Values
OK tool 1/ Signal clutch 1	**OK tool 1**: Valid for tool model = electrical Sets an external signal for an OK message from the tool controller. **Signal clutch 1**: Valid for tool model = air tool Used as clutch sensor input with the air tool. Note that if changing between electrical and pneumatic tools in parameter **tool model**, the setting for this parameter still remains the same. Make sure to change the value according to the correct input configuration for the tool in question.	---, IN-1-IN-10 Default: IN-2
NOK tool 1/ Signal trigger 1	**NOK tool 1**: Valid for tool model = electrical Sets an external signal for NOK message from Tool 1 controller. **Signal trigger 1**: Valid for tool model = air tool Used as trigger sensor input with the air tool (Tool 1) Note that if changing between electrical and pneumatic tools in parameter **tool model**, the setting for this parameter still remains the same. Make sure to change the value according to the correct input configuration for the tool in question.	---, IN-1-IN-10 Default: IN-1
Clamp closed	Sets an external signal for confirmation when clamping is engaged	---, IN-1-IN-10 Default: ---
External start	Sets an external input signal to start. If set, the corresponding keys will be deactivated on the keyboard.	---, IN-1-IN-10 Default: ---
External reset	Sets an external reset input. If set, the corresponding keys are deactivated on the keyboard. A high-level signal for this input results in the cancellation of a currently-processing job.	---, IN-1-IN-10 Default: ---
External repeat	Sets an external input for the Repeat/Back function. If this digital input is set, the corresponding button on the TPS keyboard is deactivated. The back function only applicable if Enable Backstep = On in the Sequence menu.	---, IN-1-IN-10 Default: ---
External NOK ackn.	Sets an external input for the NOK Acknowledge function. If this input is set, the corresponding button on the TPS keyboard is deactivated. Only applicable if NOK acknowledge = Yes in the Sequence menu	---, IN-1-IN-10 Default: ---

Parameter name	Description	Range/Values
Loosening / rework	Activates a Loosen and rework mode (repair mode) which enables you to go back to already-processed positions to unscrew, adjust or repair previous operations.	---, IN-1-IN-10 Default: ---
Force ext. Job selection	The input signal can force a change of the selected job method. If the input is inactive, the job will be selected with the method given in the system parameter Job selection. If the input is active, external inputs will select the job, regardless of the setting of system parameter job selection.	---, IN-1-IN-10 Default: ---
Jobselect bit 1	Bit 1 of a Job Select value (0-5 bits possible)	---, IN-1-IN-10 Default: ---
Jobselect bit 2	Bit 2 of a Job Select value (0-5 bits possible)	---, IN-1-IN-10 Default: ---
Jobselect bit 4	Bit 3 of a Job Select value (0-5 bits possible)	---, IN-1-IN-10 Default: ---
Jobselect bit 8	Bit 4 of a Job Select value (0-5 bits possible)	---, IN-1-IN-10 Default: ---
Jobselect bit 16	Bit 5 of a Job Select value (0-5 bits possible)	---, IN-1-IN-10 Default: ---
Jobselect bit 32	Bit 6 of a Job Select value (0-5 bits possible)	---, IN-1-IN-10 Default: ---

Output configuration

Parameter name	Description	Range/Values
Output ready	Is activated if the TPS can process a start signal.	---, OUT-1...OUT-6 Default: ---
Output in job	Is set to 1 when a job is being processed.	---, OUT-1...OUT-6 Default: ---
Out clamp 1	If the parameter Out clamp 2 is not set, this output actuates a spring valve. If the Out clamp 2 signal is set, the clamp 1 output will send the pulse to engage clamping.	---, OUT-1...OUT-6 Default: ---
Out clamp 2	If this output is set, both the clamp 1 and clamp 2 outputs will be used to actuate a pulse valve. In this case, clamp 1 sends the Engage Clamping signal and clamp 2 sends the Disengage Clamping signal. The pulse duration can be configured via the Clamping Pulse Duration item in the Process menu.	---, OUT-1...OUT-6 Default: ---
Out tool enable	Enables the tool controller as soon as the position is lost and, if applicable, defined additional query conditions are met.	---, OUT-1...OUT-6 Default: ---
Out tool disable	Disables the tool controller as soon as the position is reached and, if applicable, defined additional query conditions are met.	---, OUT-1...OUT-6 Default: ---
Out in position	Changes to active as soon as a specified position has been reached.	---, OUT-1...OUT-6 Default: ---

Parameter name	Description	Range/Values
Out OK	Output for the OK signal for individual tightening operations.	---, OUT-1...OUT-6 Default: ---
Out NOK	Output for the NOK signal for individual tightening operations	---, OUT-1...OUT-6 Default: ---
Out complete OK	Output for a job with all OK signals, that is, all positions successfully processed.	---, OUT-1...OUT-6 Default: ---
Out complete NOK	Output for a job with all NOK signals, which indicate that the job is cancelled.	---, OUT-1...OUT-6 Default: ---
Out Pset bit 1	Bit 1 of a Pset select value (0-8 bits possible) Only valid for tool model = electrical	---, OUT-1...OUT-6 Default: ---
Out Pset bit 2	Bit 2 of a Pset select value (0-8 bits possible) Only valid for tool model = electrical	---, OUT-1...OUT-6 Default: ---
Out Pset bit 4	Bit 3 of a Pset select value (0-8 bits possible) Only valid for tool model = electrical	---, OUT-1...OUT-6 Default: ---
Out Pset bit 8	Bit 4 of a Pset select value (0-8 bits possible) Only valid for tool model = electrical	---, OUT-1...OUT-6 Default: ---
Out Pset bit 16	Bit 5 of a Pset select value (0-8 bits possible) Only valid for tool model = electrical	---, OUT-1...OUT-6 Default: ---
Out Pset bit 32	Bit 6 of a Pset select value (0-8 bits possible) Only valid for tool model = electrical	---, OUT-1...OUT-6 Default: ---
Out Pset bit 64	Bit 7 of a Pset select value (0-8 bits possible) Only valid for tool model = electrical	---, OUT-1...OUT-6 Default: ---
Out Pset bit 128	Bit 8 of a Pset select value (0-8 bits possible) Only valid for tool model = electrical	---, OUT-1...OUT-6 Default: ---
Out I/O Rework	Output for an additional signal, which interacts with the OK output for individual tightening, but indicates that there was a preceding skip/forward operation in that job.	---, OUT-1...OUT-6 Default: ---

Sequence

Parameter name	Description	Range/Values
Label	Defines how a job should be started when the TPS receives label information from a barcode scanner	allow start, change job, start job Default: allow start
Start signal	Selects between ■ Edge To start a job, it is necessary to change from low to high input signal ■ Level Job always starts, when the input signal is high ■ Continuous To start a job requires a rising edge. Also, the start signal must be available during the entire operation (otherwise the operation will end)	Edge, Level, Continuous Default: Edge

Parameter name	Description	Range/Values
Debounce start	Defines the start evaluation of flank/duration time in 0.1 seconds (the signal must be low to ensure that flank is accepted). Definition of start evaluation of condition: forced interruption between the end of the last operation and the beginning of the new operation when the start signal is always high	Off. 0.1-9.9 seconds Default: Off
Start pause	Sets the minimum duration of an interruption before a new job can be started by the input. Only visible if start signal = Level	
Enable Backstep	Enables the operator to go back to a previous position and perform a procedure, even if the result of the previous operation was OK.	Off, On Default: Off
Forward step	Enables the operator to go forward one position after using the Back button without completing the position operation.	Off, On Default: Off
NOK acknowledge	Enables a tool to be released for the next operation in the case that the previous position has returned an NOK result.	Off, On Default: Off
NOK max count	Defines the maximum number of repeated attempts per position when the Pset has returned an NOK result. If the number is exceeded, a signal will be issued and the Pset will have to be reset.	Off, 1-99 Default: Off
NOK max acknowledge	Defines the maximum number of times the NOK button can be pressed after the Pset has returned an NOK result. If the number is exceeded, a signal will be issued and the Pset will have to be reset.	Off, On Default: Off
Max NOK's per job	Defines the maximum number of NOK results in a job. If the number is exceeded, a signal will be issued and the Pset will have to be reset.	Off, 1-255 Default: Off
Clamp delay	Defines how long clamping will be activated after start.	0.0-25.5 seconds Default: 0.0
Clamp time close		0.0-99.9 seconds Default: 0.0
Clamp time open		0.0-99.9 seconds Default: 0.0
Clamp pulse time		0.0-99.9 seconds Default: 0.0
Position timeout	Defines the maximum amount of time that can be spent in a position step.	Off, 1-99 seconds Default: Off
Missing pos.qualifier	Defines the system behaviour when the signal of a position query drops for more than 500 ms after being available once. ■ hold The system waits until the signal returns ■ abort The system interrupts this cycle with NOK	hold, abort Default: hold

Parameter name	Description	Range/Values
Rework Psets	Determines whether a loosen program or several tightening programs can be selected as Reworking special operations. The value entered equals the highest Pset number that can be selected in this operating mode. A 5 means that Pset 1-5 are available in reworking mode.	Loosen only, 1x Default: Loosen only
Loose Pset	Sets the Pset number for loosening operations being used in reworking mode. The Pset number may be within the range of the enabled reworking cycles (refer to the prior parameters) or outside of this range (Reworking Special Operation)	1-31 (depending upon the number of the configured cycle selection outputs) Default: 1
Enable during program	Allows TPS Control to perform operation procedures while programming positions.	Off, On Default: Off
Result report	Defines how TPS Control should report results from operations	Off, per position, per job Default: Off

Position

Parameter name	Description	Range/Values
Position window	Specifies the size of the rectangular search field surrounding the target position.	0.5-25.5 Default: 2.0
Position hysteresis	The position hysteresis is used together with parameter position window. When the tool is located near the edge of the search field defined as the position window, the position is only considered lost if the position hysteresis was exited. This parameter should always be set to a value greater than or equal to 1.	1.0-9.9 Default: 2.0
Arm type	Defines the torque arm type used. ■ Angle/Linear (for SML T) ■ Angle/Linear 2 (for SMC POSI LA) ■ Linear/Linear (for SMC POSI L) ■ Angle/Angle A (SMS T: horizontal arm mounted to the left, 180 degrees analogue encoder mounted on the top of the arm) ■ Angle/Angle B (positioning arm with 360 degrees analogue encoder) ■ Angle/Angle C (SMS T: horizontal arm mounted to the right, 180 degrees analogue encoder mounted on the bottom of the arm)	Angle/Linear Angle/Linear 2 Linear/Linear Angle/Angle A Angle/Angle B Angle/Angle C Default: Angle/Linear
Length 1	The length varies depending on the arm type. For more information, see section Set up TPS	
Length 2	The length varies depending on the arm type. For more information, see section Set up TPS.	
SSI coding	Defines the coding method used for the SSI Interface	Binary, Gray Default: Binary

Parameter name	Description	Range/Values
SSI resolution	Defines the SSI resolution in bits for the SSI sensor. TPS uses a 13-bit value to calculate the resolution; using a 13-bit encoder gives a maximum encoder value of 8191. If you are using an SSI sensor with a resolution other than 13, you will get a lower or higher maximum value. The aim is to come as close as possible to the value 8191. For lower values than 13 bits: SSI factor x Max value = Should return a value as close as possible to 8191. SSI Divider = 1 For higher values than 13 bits: SSI factor = 1 Max value / SSI Divider = Should return a value as close as possible to 8191.	8-24 Default: 13
SSI factor	See SSI resolution for explanation	1-99 Default: 1
SSI Divider	See SSI resolution for explanation	1, 2, 4, 8, 16, 32, 64, 128 Default: 1

Air option parameter

This menu is only visible if the parameter **tool model** is set to **Air tool**..

Parameter name	Description	Range/Values
Pneumatic Pset 1-4 T0	Sets the minimum time period that the tool must run before the tightening operation is evaluated. If the tool runs for less time period 2 times in a row, the TPS reports the operation as NOK. Depending on the time needed to run down and tighten the screw, you may need to adjust the parameter settings regarding time intervals for air tools.	0.00-0.40 seconds Default: 0.1
Pneumatic Pset 1-4 T1	Sets the minimum time period for which the tool must run to get an OK on the tightening operation. Depending on the time needed to run down and tighten the screw, you may need to adjust the parameter settings regarding time intervals for air tools.	0.0-99.9 seconds Default: 0.5
Pneumatic Pset 1-4 T2	Sets the maximum time period for which the tool can run to get an OK on the tightening operation. Depending on the time needed to run down and tighten the screw, you may need to adjust the parameter settings regarding time intervals for air tools.	0.0-99.9 seconds Default: 2.0

Barcode input

Parameter name	Description	Range/Values
Format label data	Opens a submenu.	
Define new code	Opens a submenu.	

Format label data

Parameter name	Description	Range/Values
Control length	Defines the length of the barcode label.	Variable, 1-53 Default: 8
Number of STX chars	Sets the number of prefix characters.	0-4 Default: 0
Character code STX1-STX4	Only visible if Number of STX chars = 1-4.	
Number of ETX chars	Sets the number of postfix characters	0-4 Default: 2
Character code ETX1-ETX4	Only visible if Number of ETX chars = 1-4.	
Id1 Length	Sets the number of characters used for the part of the barcode defined as Id1	0-32 Default: 0
Id1 position	Position of first character for reporting string Id1 (extracted from the Barcode)	1-128 Default: 1
Counted from	Id1 position to be counted from; either the head or the tail of the barcode string	head, tail Default: head
Id2 Length	Sets the number of characters used for the part of the barcode defined as Id2	0-32 Default: 0
Id2 position	Position of first character for reporting string Id2 (extracted from the Barcode)	1-128 Default: 1
Counted from	Id2 position to be counted from; either the head or the tail of the barcode string	head, tail Default: head

Parameter name	Description	Range/Values
Control length	Defines the length of the barcode label.	Variable, 1-53 Default: 8
Number of STX chars	Sets the number of prefix characters.	0-4 Default: 0
Character code STX1-STX4	Only visible if Number of STX chars = 1-4.	
Number of ETX chars	Sets the number of postfix characters	0-4 Default: 2
Character code ETX1-ETX4	Only visible if Number of ETX chars = 1-4.	
Id1 Length	Sets the number of characters used for the part of the barcode defined as Id1	0-32 Default: 0
Id1 position	Position of first character for reporting string Id1 (extracted from the Barcode)	1-128 Default: 1
Counted from	Id1 position to be counted from; either the head or the tail of the barcode string	head, tail Default: head
Id2 Length	Sets the number of characters used for the part of the barcode defined as Id2	0-32 Default: 0
Id2 position	Position of first character for reporting string Id2 (extracted from the Barcode)	1-128 Default: 1

Parameter name	Description	Range/Values
Counted from	Id2 position to be counted from; either the head or the tail of the barcode string	head, tail Default: head

Define new code

Parameter name	Description	Range/Values
Start position	Sets start position from where identification of the barcode should start.	1-255 Default: 1
Start counting from	Determines whether counting should start from beginning or end of a barcode.	head, tail Default: head
Code	Specifies the characters in the barcode that, if found, trigger a job to start.	A-Z, a-z, 0-9
Job number	Sets the job to start when the specified character code is found in a barcode	1-63 Default: 1

Service

Parameter name	Description	Range/Values
User language	Selects the language used in the operating dialogue. Possible options are English, German and French.	English Deutsch Francais Default: English
System information	Gives information regarding Device ID, software version and version number of the I/O modules and the enabled options	
Print out	Opens the submenu containing the printing functions	
Test functions	Opens the submenu containing the test functions	
Reset parameter + jobs	Resets all setup parameters to the factory settings and deletes all jobs.	
Reset jobs only	Deletes all jobs, but keeps the parameter settings.	
Reset system	Restarts the TPS Control system (according to the power-on cycle)	
Licence keys	Activates optional functions (in a separate submenu). Activation codes can be ordered from Atlas Copco using the unit device ID	
Firmware update	Prepares the unit for a firmware update through the serial interface.	

Print-Out

Parameter name	Description	Range/Values
Print parameters	Prints a plain text list of all setup parameters on the serial interface	
Print jobs	Prints a plain text list of all jobs on the serial interface	
Print all	Prints all parameters and all jobs on the serial interface	

Test functions

Parameter name	Description	Range/Values
Test inputs	A function that tests the digital inputs and sensor inputs for distance and angle sensors	
Test outputs	A function that tests the digital outputs	
Test TPS-Control	Runs several tests for the TPS control display and keyboard.	
Test I/O-Port 1	Runs a hardware test of the input/output module no.1	

Licence keys

Parameter name	Description	Range/Values
New licence key	Opens up a dialogue for entering licence functions	

Licence handling

The following optional functions can be activated by entering an activation code:

Licence number	Licence name
0	Pneumatic
3	Barcode scanner
6	Result reporting

The activation codes are provided by Atlas Copco Tools AB. Go to www.optionshop.de/acta to get an activation code.

1. To activate an activation code, go to **Service>Licence keys** and select **NEW** (F1).
2. Enter the activation code. Press **OK**.
3. The entered activation code is shown in the display. Press **VALID** (F3) to confirm the activation code.

After entering a valid activation code, the corresponding option is displayed in the menu of available options.

Any available option can be temporarily deactivated by placing the bar cursor on the appropriate option with the up/down arrow keys and pressing ON-OFF (F2). A [--] flag appears beside a deactivated option. Repeating the process reactivates the option.

DELETE completely removes the option. To re-enable the option, the enabling code must be re-entered.

To see which licensed functions have been activated, go to **Service>System information**.The parameter **Options** lists the available licence numbers.

Pneumatic function

TPS Control can be used with a pneumatic system for evaluating the OK/NOK for each individual tightening operation. This is done using a double sensor system (with digital inputs) connected to the air tool. In addition to positioning, TPS Control counts all correct tightenings in a batch and detects for example premature shut-off, stripped threads and wrong screw length.

To set up I/O communication between TPS and the air tool, see section **Connect TPS to tool control systems**.

Licensed function

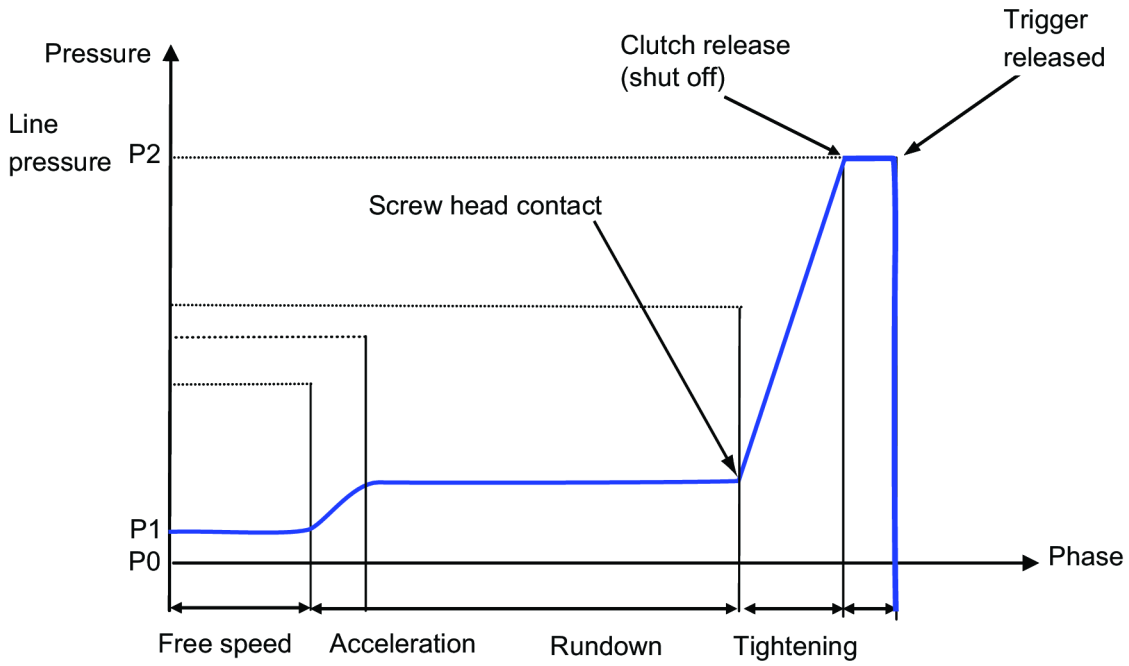
The pneumatic function is an optional licensed function. To activate the licence for air tools, see section **Licence handling**.

Pneumatic monitoring and controlling

Air tools with reporting functionality are equipped with a pneumatic signal output that indicates which phase of the tightening cycle the tool has reached, by means of variations in air pressure (see figure below). The pneumatic signal is located between the start valve and the shutoff valve of the driver and is carried through a small signal tube to two external pressure sensors. The pressure sensors produce digital signals used for controlling the air supply to the tool using a magnetic valve.

For TPS Control to function properly with air tools, it requires a stable air-line system without too much pressure fluctuations. You must therefore install a pressure gauge as close as possible to the TPS pneumatic system and for an optimal air signal, make sure the air cable length is no more than two meters.

To get significant pressure value difference between different tightening sequences, make sure that there are no leakages in the couplings and tubes.



The pneumatic signal is monitored during a programmable time window, defined by the air option parameters as descibed in *Parameters>Air option parameters [Page 000]*.

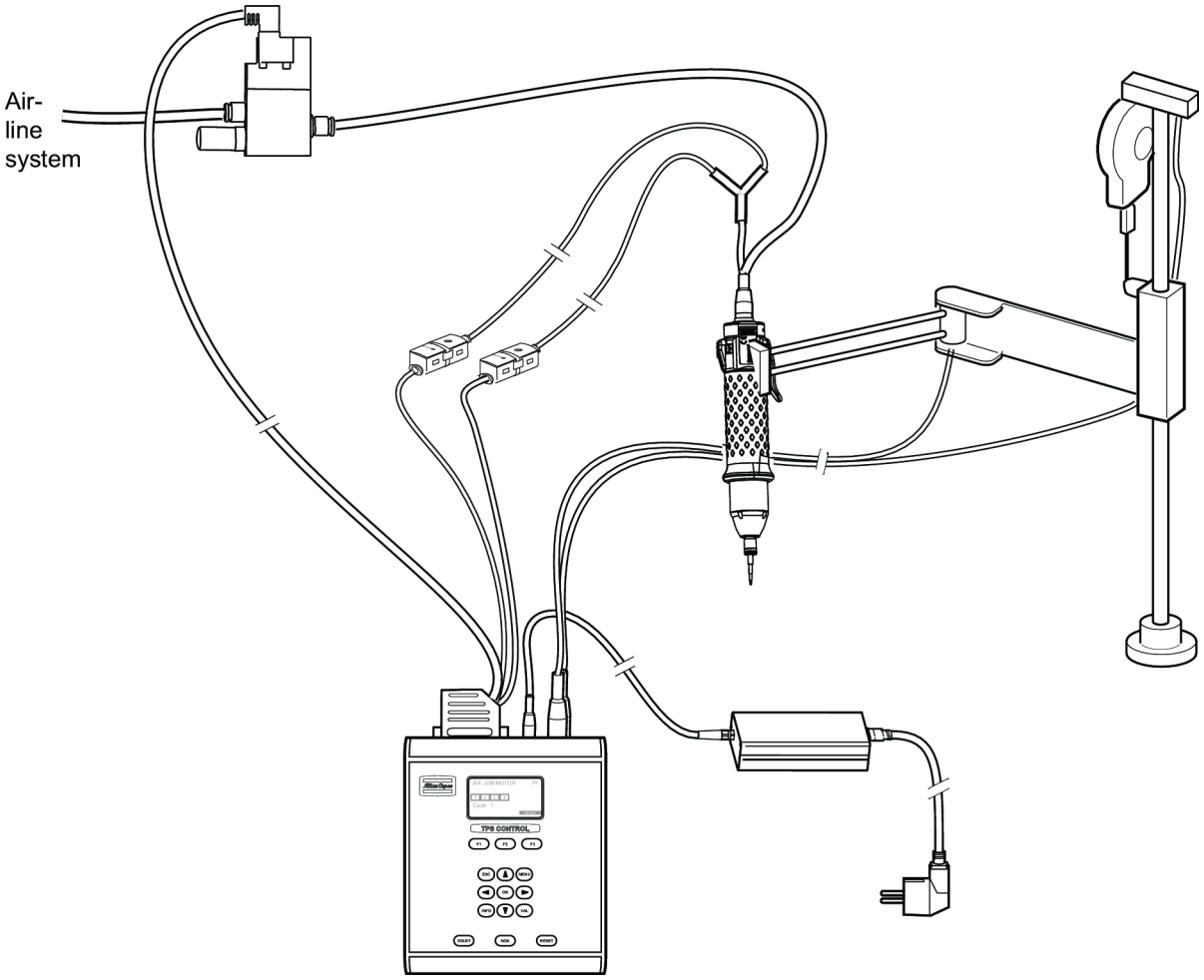
The phase Free speed mentioned in the figure above is not relevant for normal tightening operations, it is only used when programming pressure sensor B1 (see *Programming pressure sensors [Page 000]*).

In the TPS Control timers are triggered when certain pressure levels are reached:

- Pressure level 1 (P1) = Trigger pressed in by operator
- Pressure level 2 (P2) = Clutch release at the correct tightening torque

If the tightening operation cannot be completed within the programmed time window, an error signal is triggered. Error handling is described further in section *Troubleshooting [Page 000]*.

Setting up TPS in a pneumatic system



To install the TPS pneumatic components, perform the following procedure:

1. Cut the signal hoses (OD 4 mm) to be connected between the Y-coupling and the pressure sensors to the required length depending on where you will place the pressure sensors. If not already installed, cut the output signal hose from the tool to the Y-coupling to an applicable length.

   The length of the hoses must not exceed two meters.
2. Connect the signal hoses to the Y-coupling, tool and the pressure sensors. For information how to connect hoses to the pressure sensors, see the supplier's information for the pressure sensors.
3. Connect the supplied magnetic valve to the air-line system and to the tool.
4. Connect the I/O cable to the TPS Control.
5. Connect the analogue encoder and SSI encoder to the TPS Control.
6. Connect the external power supply unit to the TPS Control and the power mains.

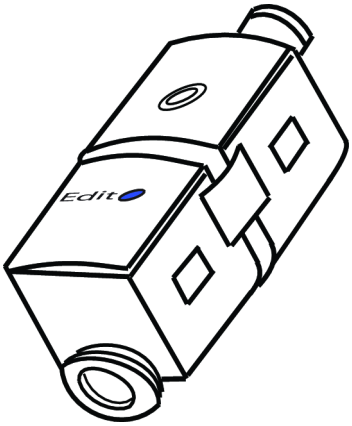
Programming pressure sensors

Before programming the pressure sensors, you must connect the tool directly to the air-line supply, by-passing the magnetic valve. You must also reduce the pressure in the air supply with at least 10 % to adjust for any pressure fluctuations in the air line system.

It may be necessary to reduce the air pressure even more if your air-line system is unstable due to much pressure fluctuations.

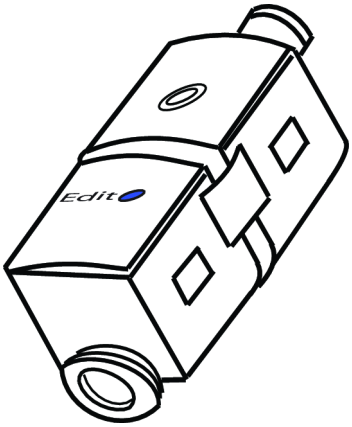
Programming sensor B1 for free-speed (P1)

1. Press the trigger and run the tool in free speed, i.e. not in contact with the work piece.
2. Press the **Edit** button (>2 sec) on sensor B1 until the LED starts to blink. When the button is released, the sensor stores the value.



Programming sensor B2 for clutch-release (P2)

1. Perform a tightening operation with the tool on the work piece.
2. Keep the trigger pressed after the tool has shut off and press the **Edit** button (>2 sec) on sensor B2 until the LED starts to blink. When the button is released the sensor stores the value.



3. Restore the pressure in the air supply to normal value 6.3 bar.

The sensors are correctly programmed when the B1 sensor lights up if the trigger is pressed and the B2 sensor lights up when the correct tightening torque is achieved and the clutch releases. If needed, perform a number of test-runs to evaluate the rundown time of the actual screw. The rundown time can be seen in the TPS controller display and can be used when setting the air option parameters described in *Parameters>Air option parameters [Page 000]*.

When programming of the sensors is done, make sure to connect the magnetic valve to the TPS pneumatic system again.

Troubleshooting

If the tightening is rated NOK, one of the error messages in the table below appears in the TPS control display.

Check that the air option parameters are adjusted in accordance with the actual work piece.

Error messages	Possible reasons	Actions
Clutch too early	The screw is too short	1. Replace with a screw with the correct length.
	Blind hole	1. Replace the component.
	Damaged threads or debris	1. Replace the component. 2. Clean the hole from any debris.

Error messages	Possible reasons	Actions
Clutch too late	The screw is too long	1. Replace with a screw with the correct length.
	Damaged or worn threads	1. Replace faulty screw or component.
	Missing joint components, such as a washer	1. Add the missing component
No clutch operation	Trigger pressed twice unintentionally	1. Release trigger. 2. In TPS Control, press Reset to end operation
	Trigger is released before correct tightening torque is achieved	1. In TPS Control, press Reset to end operation

Barcode function

Licensed function

The barcode function is an optional licensed function. To activate the licence for air tools, see section **Licence handling**.

Description

The barcode function extends the TPS Control by connecting a barcode scanner to a second serial interface and carrying out the job selection with the read-in barcode.

The TPS Control has two RS-232 serial ports to connect the unit to a PC and a barcode reader. Since both RS-232 interfaces are available on the same Sub-D 9-pin connector, a Y-cable adapter must be used if the barcode scanner and the PC connection are to be used at the same time. For more information about cables, see the TPS instructions.

The barcode function allows TPS to read a barcode string with up to 255 characters using the scanner. To ensure secure identification of the start and end of a code, there are different parameters to set up the used label format. The system can handle labels with a fixed length or a variable length.

The actual label characters can be prefixed or suffixed by additional STX or ETX character sequences. The prefix can contain up to 4 characters (STX1-STX4). The postfix can also contain up to 4 characters (ETX1- ETX4). Prefix and postfix can both be omitted. The individual characters should be entered with their ASCII code. In case of a variable control length, an ETX sequence must be defined, so that the end of the label data can be detected.

With many scanners, the STX sequence is empty and the ETX sequence consists of a CR-LF (Carriage Return, Line Feed) sequence. The CR, for example, has the ASCII code 13 and the LF the ASCII code 10.

The connected barcode scanner sends the read-in label automatically to the TPS Control.

For example, suppose you scan a label with variable length, no prefix and one postfix character (CR, carriage return = 13 decimal).

This will be transmitted by the scanner as

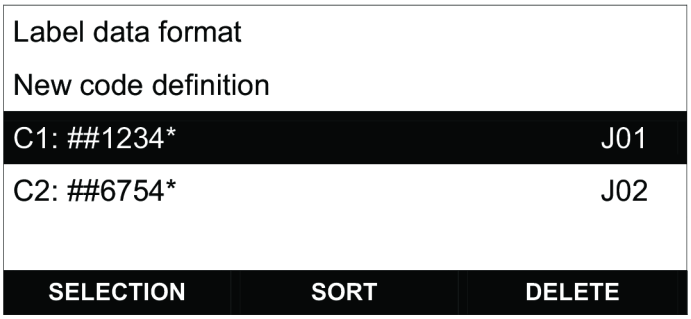
6159326580:10D1762186<CR>

The CR character is not part of the barcode, but is instead generated by the scanner. Typically, the scanner can be set up to have specific prefix and/or postfix characters.

If the first part of the barcode string (6159326580) is the part type, this could be used for selecting a specific job. To specify jobs to different barcodes you will have to setup a barcode definition in the TPS system.

Barcode definition parameters

The system must be told which labels initiate a particular job. The entry of these numbers is carried out in the parameter menu under the menu item **Barcode input**. Upon selecting this menu, the following window appears:



The menu item **Label data format** is used to open a submenu that allows you to specify the control length and the STX or ETX sequence.

If you select **New code definition**, a submenu is opened where you can enter the label parameters for a new label. This is followed by list of all existing barcode definitions and their corresponding job selections. The display of the already-existing codes takes place with the following characters:

is a wildcard for any individual character.

* is a wildcard for one or more individual characters, and can only be used at the beginning or end.

Characters permitted in the comparison string are as follows: A - Z, a - z, and 0 - 9.This menu also includes a code deletion function and allows you to choose how codes are sorted(by the codes themselves or by their assigned jobs).

The system can process labels containing up to 54 characters. From the 54 possible characters of a label, the user can define a range of relevant characters with a maximum length of 10; these characters will then be saved as the comparison value for this label.

The start position of this comparison string can be defined by the user, either in relation to the start or the end of the label data.

Start position:	1-53
Counting from:	Head or Tail
Code (10 characters)	1234567890
Job number	1-63

Parameter examples (control length = variable)

Start position 1, counting from head Code: 123 Job number: 10

With these parameters, all labels starting with the characters 123 would select Job 10. Display in overview menu: Cx: 123*

Start position 4, counting from head, Code: 78, Job number: 3

With these parameters, all labels with a 7 as the 4th character and an 8 as the 5th character would select Job 3.

Display in overview menu: Cx: ###78*

Depending on whether the system is equipped with or uses Start/end sequence processing, the label must either be read in before the start (without Start sequence use), or at the end of the start sequence so that the system can select the assigned job.

By setting the parameter **Label** in the menu **Sequence** it can be determined whether a new label must be read in for every start, or if the previous job selection will continue when starting without a new label.

A read-in label will be shown in the display of the TPS Control if it cannot be processed. A total of 200 labels can be used in TPS Control.

All label data can also be printed out with the Print function.

Reporting function

Licensed function

The result reporting function is an optional licensed function and is activated with an activation code. Section *Licence handling [Page 000]* describes how to activate licensed functions.

Description

You can select between the following result reports:

- Position report

  Gives a result for every tightening position. If a Job has five tightening positions, a separate report for each position is generated as well as a result report for the complete job.

- Job report

  Gives one result report for the complete job.

Procedure

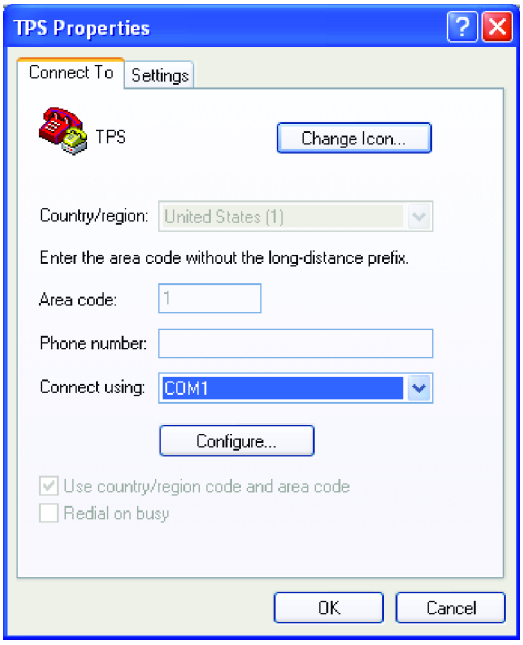
To activate result reporting, perform the following procedure:

1. Press **Setup>Sequence**.
2. Select parameter Result Report and press **OK**.
3. Select if to activate a position report or job report. To deactivate function, select option Off.
4. Press **VAL** to confirm the selected option.

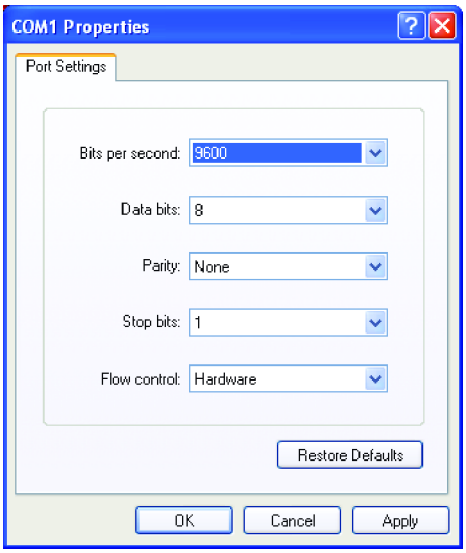
Printout

1. Connect TPS Control to a PC using the RS-232 interface.
2. In TPS Control, go to **RS-232 setup** and set parameter C1:baudrate.

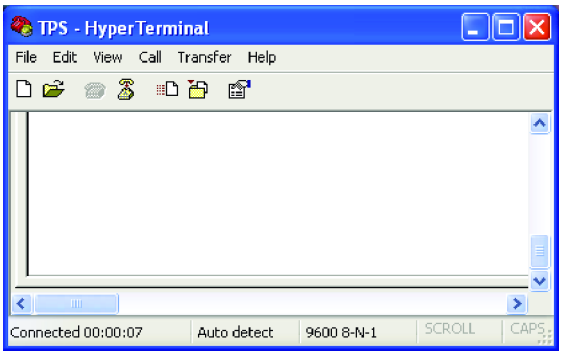
   Note! The same baud rate must be used in TPS Control and the PC.
3. On the PC, select **All programs>Accessories>Communications>HyperTerminal** from the start menu. A new window will appear.
4. Enter a name for the communication with TPS and click **OK**. A new window will appear.
5. Click **Cancel**. The HyperTerminal window will appear.
6. Click **Call** in the HyperTerminal window. A new window will appear.



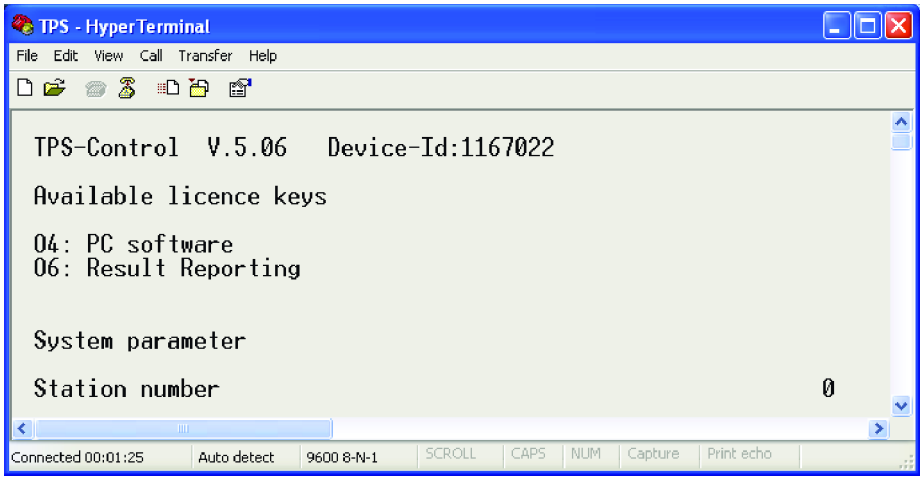
7. Select the applicable COM port in the drop-down menu **Connect using**. A new window will appear.



8. Select the same rate as used in the TPS from the drop-down menu **Bits per second**. Click **Apply** and then **OK**.



9. In TPS Control, go to the submenu **Print-out** in **Service**.
10. Choose whether you want to print parameters, jobs or all collected information.
11. The selected option triggers a printout in the HyperTerminal window.



It is possible to save a printout as a file on the PC. This function is activated before you trigger the print-out.

1. In PC, select **Transfer>Capture Text**. A new window will appear.
2. Name the text file and choose a location in which to store it. Click **Start**.
3. In TPS Control, go to the submenu **Print-out** in **Service**.
4. Determine whether you want to print parameters, jobs or all collected information.
5. The selected option triggers a printout in the HyperTerminal window.
6. In PC, select **Transfer>Capture Text** and click **Stop**.

Original instructions

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