

Electrical Control Unit Type ELKE 24/2F with RSS Assembly and Operating Manual



Dear Customer,

Congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.

Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase. You can reach us directly at the mentioned addresses in the last chapter of these instructions.

Kindest Regards,

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1 About this manual

1.1 Purpose/validity

This manual is part of the module and describes the safe and proper use during all phases of operation.

This manual is valid only for the module specified on the front page.

1.2 Target groups

Target group	Task
Manufacturer, operator	<ul style="list-style-type: none"> ➔ Keep this manual available for the personnel at all times. ➔ Require personnel to read and observe this manual and the applicable documents, especially the safety notes and warnings.
Skilled personnel, fitter	<ul style="list-style-type: none"> ➔ Read, observe and follow this manual and the applicable documents, especially the safety notes and warnings.

Tab. 1

1.3 Applicable documents





You can find the following documents on our homepage:

Document	Purpose
Catalog	Technical data or application parameters of the module and information on accessories. The last version is always valid.
General terms of business	Including notes on the warranty.

Tab. 2

1.4 Symbols in this manual

To give you quick access to information, the following symbols will be used in this guide:

Symbol	Meaning
 WARNING	Dangers for persons. Nonobservance can cause death or serious injuries.
 NOTICE	Information on avoiding material damage.
✓	Prerequisite for a handling instruction.
➔	Handling instruction, also measures in a warning or note.
1. 2. 3. ...	Step-by-step handling instruction. ➔ Observe the order.
	Component/spare part represented in a graphic.
	Part/detail shown in a graphic which is part of a spare part or which must be provided by the customer.
(10), (/10/)	Reference in the text or in a handling instruction to a part that is represented in a graphic.

Tab. 3

2 Basic safety notes

2.1 Intended use

The (ELKE 24-2F) electrical control unit is not a safety component. The electrical control unit is used to control max. two pneumatic chucks for lathes.

The module is intended for installation in a machine. The requirements of the applicable guidelines must be observed and complied with.

The module may be used only in the context of its defined application parameters.

Any other use or use exceeding that specified is an infringement of use for intended purpose. The manufacturer bears no liability for damage resulting from such use.

2.2 Environmental and operating conditions

- ➔ The module may be used only in the context of its defined application parameters (see chapter 5, page 10 and catalog).
- ➔ Make sure that the environment is clean and the ambient temperature corresponds to the specifications per the catalog. Maintenance and lubrication intervals (see chapter 10.1, page 44).
- ➔ Make sure that the environment is free from splash water and vapors as well as from abrasion or processing dust. Excepted are modules that are designed specially for contaminated environments.

2.3 Controlled production

The module represents the state of the art and the recognized safety rules at the time of delivery. However, it can present risks if, for example:

- The module is not used in accordance with its intended purpose.
- The module is not installed or maintained properly.
- The EC Machinery Directive, the VDE directives, the safety and accident-prevention regulations valid at the usage site, or the safety and installation notes are not observed.

2.3.1 Constructional changes, attachments, or modifications

Additional drill holes, threads, or attachments that are not offered as accessories by SCHUNK may be attached only with permission of SCHUNK.

2.4 Personal qualification

The assembly, initial commissioning, maintenance, and repair of the module may be performed only by trained specialist personnel.

Every person called upon by the operator to work on the module must have read and understood the complete Assembly and Operating Manual, especially chapter 2 "Basic safety". This applies particularly to occasional personnel such as maintenance personnel.

2.5 Safety-conscious working

- ➔ Avoid any manner of working that may interfere with the function and operational safety of the module.
- ➔ Observe the safety and accident-prevention regulations valid at the usage site.

3 Warranty

The warranty is valid for 24 months from the delivery date to the production facility under the following conditions:

- Intended use in 1-shift operation
- Observation of the maintenance and lubrication intervals (see chapter 10.1, page 44)
- Observation of the ambient conditions and operating conditions (see chapter 2.2, page 7)

Parts touching the workpiece and wearing parts are not part of the warranty. Also observe our general terms of business.

4 Scope of delivery

The scope of delivery includes:

- Electrical Control Unit ELKE 24/2F with RSS

The following accessories are required for the module:

- Connection cable with Harting plug in the version ordered:
 - Ölflex Classic 110 cy 18 G 0.75, length 5 m
 - Ölflex Classic 110 cy 18 G 0.75, length 10 m
 - Ölflex Classic 110 cy 18 G 0.75, length 15 m
 - Ölflex Classic 110 cy 18 G 0.75, length 20 m

The following accessories are available for the module:

- 2 WEH maintenance units
- 2 FSC foot switches with Harting plugs

➔ Order accessories separately.

➔ For additional accessories, see catalog.

5 Technical Data

Further technical data can be found in our catalog. The most recent version applies.

Type	ELKE 24/2F with RSS
weight [kg]	20
dimension	see chapter 12 page 46
power supply [V DC]	24 (stabilized) $\pm 10\%$
Current input during idle running [mA]	2.30
Current input (rated value) [mA] without digital outputs	700
Digital outputs max. permissible output current for each output I_{\max} [mA] Resistance R_L [Ω]	25 ≥ 1000
Digital inputs 1 signal input current I_{\max} [mA]	25
pressure medium	compressed air, standard for quality of the compressed air according to ISO 8573-1: 6 4 4
Maximal pressure [bar]	8
IP rating	42
interface	digital control inputs and outputs
External protection for power supply (provided by the customer)	Electronic circuit breaker with rated current 1 A (e.g.: ETA, type ESX10T)

Tab. 4

6 Description of the unit

6.1 Configuration

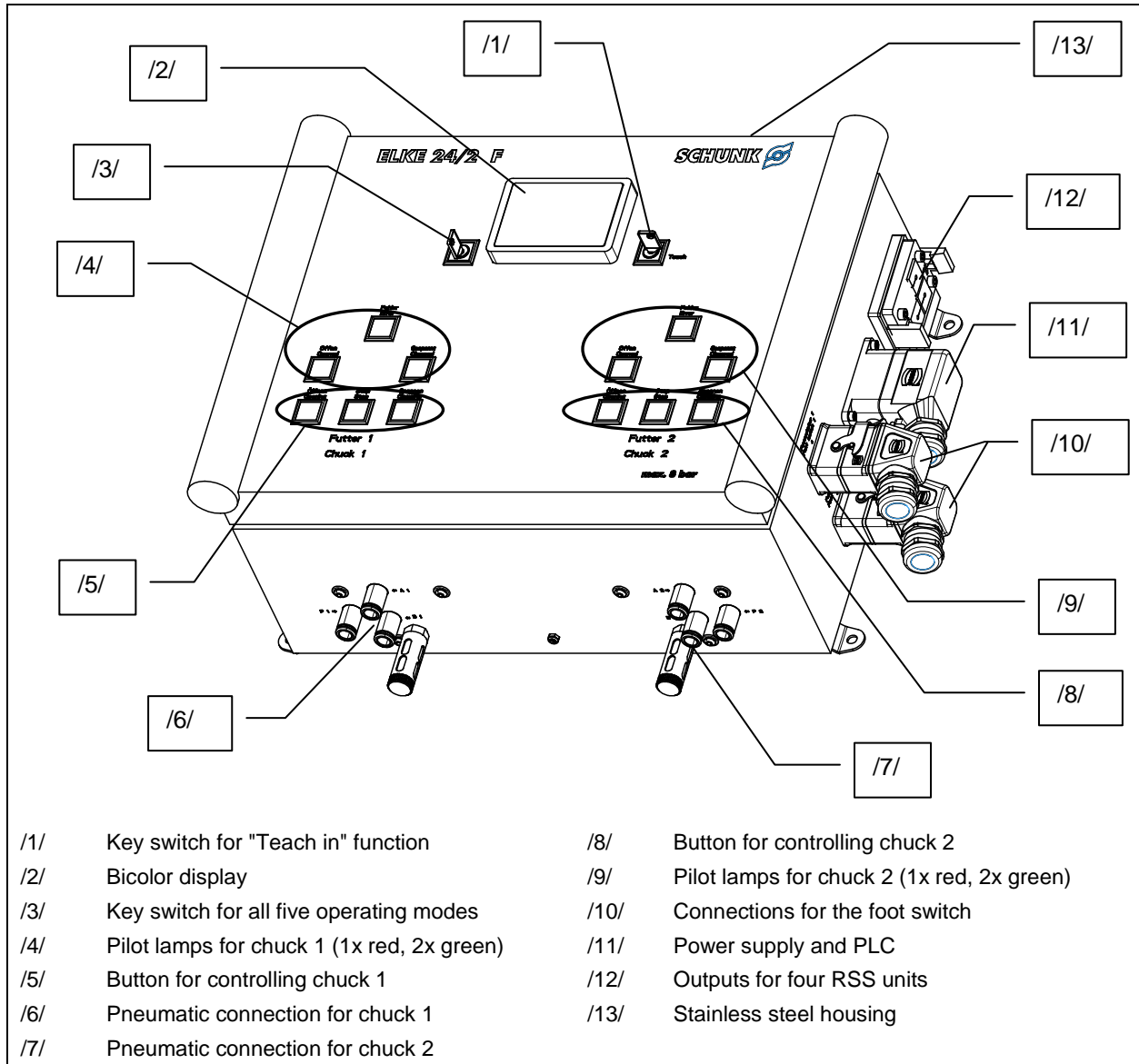


Figure 1 Connections and operating devices of the module

6.2 Function

ELKE 24/2F is an electrical control unit for controlling pneumatic chucks for lathes. The control unit can be used for all chuck sizes. A maximum of two chucks can be controlled.

There are five possible operating modes:

- Synchronous clamping
- Separate O.D. clamping
- Separate I.D. clamping
- Sequential clamping chuck 1, chuck 2
- Sequential clamping chuck 2, chuck 1

Synchronous clamping

This operating mode is used for the simultaneous control of the two chucks, irrespective of which button or foot switch is currently being actuated.

Separate O.D. clamping

This operating mode is used for the O.D. clamping of workpieces in the lathe. The chucks are controlled independently of each other.

Separate I.D. clamping

This operating mode is used for the I.D. clamping of workpieces in the lathe. The chucks are controlled independently of each other.

Sequential clamping chuck 1, chuck 2

In this operating mode, the chucks are controlled one after the other. For the clamping procedure, chuck 1 is tightened first and then chuck 2. The opening procedure takes place in the reverse sequence, i.e. chuck 2 opens first and then chuck 1.

Sequential clamping chuck 2, chuck 1

In this operating mode, the chucks are controlled one after the other. For the clamping procedure, chuck 2 is tightened first and then chuck 1. The opening procedure takes place in the reverse sequence, i.e. chuck 1 opens first and then chuck 2.

7 Assembly

7.1 Mechanical connection

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!

➔ Switch off power supply.

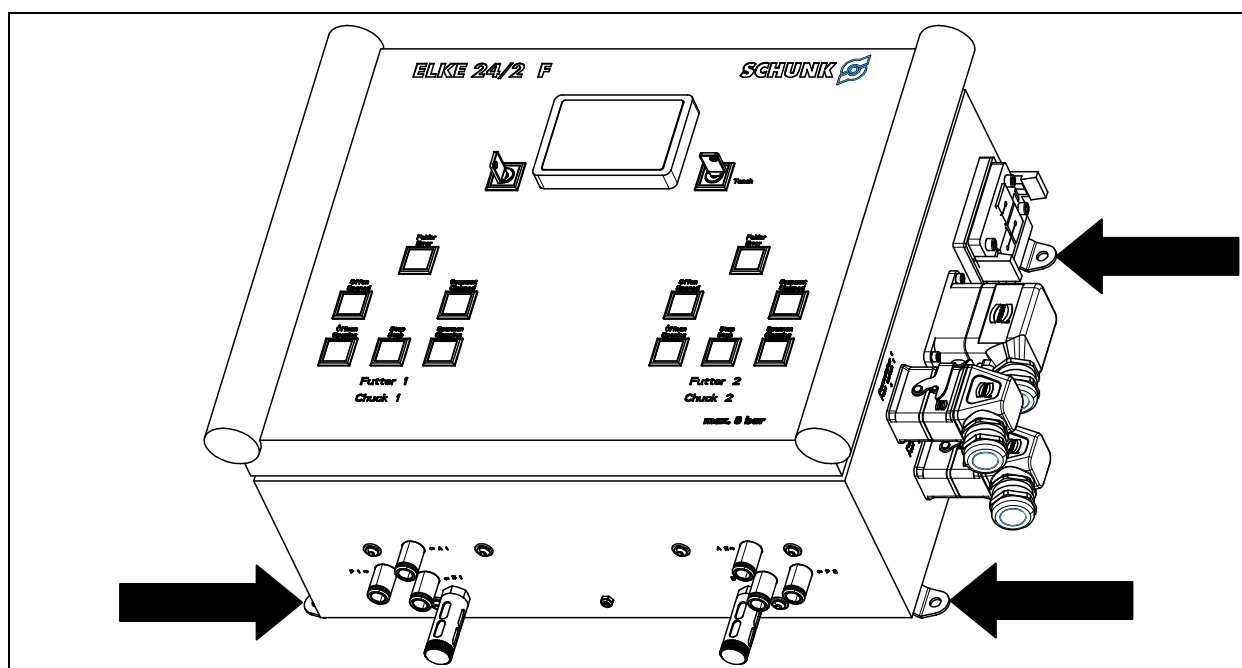


Figure 2

Mounting ➔ Install the module onto the lathe using the four fixing brackets.

The customer must provide the following mounting material:

- 4 x M8 mounting screws and applicable washers

7.2 Electrical connection

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!

➔ Switch off power supply.

Note

- Observe the requirements for the power supply (see chapter 5, page 10).
- ➔ Observe the pin assignment.

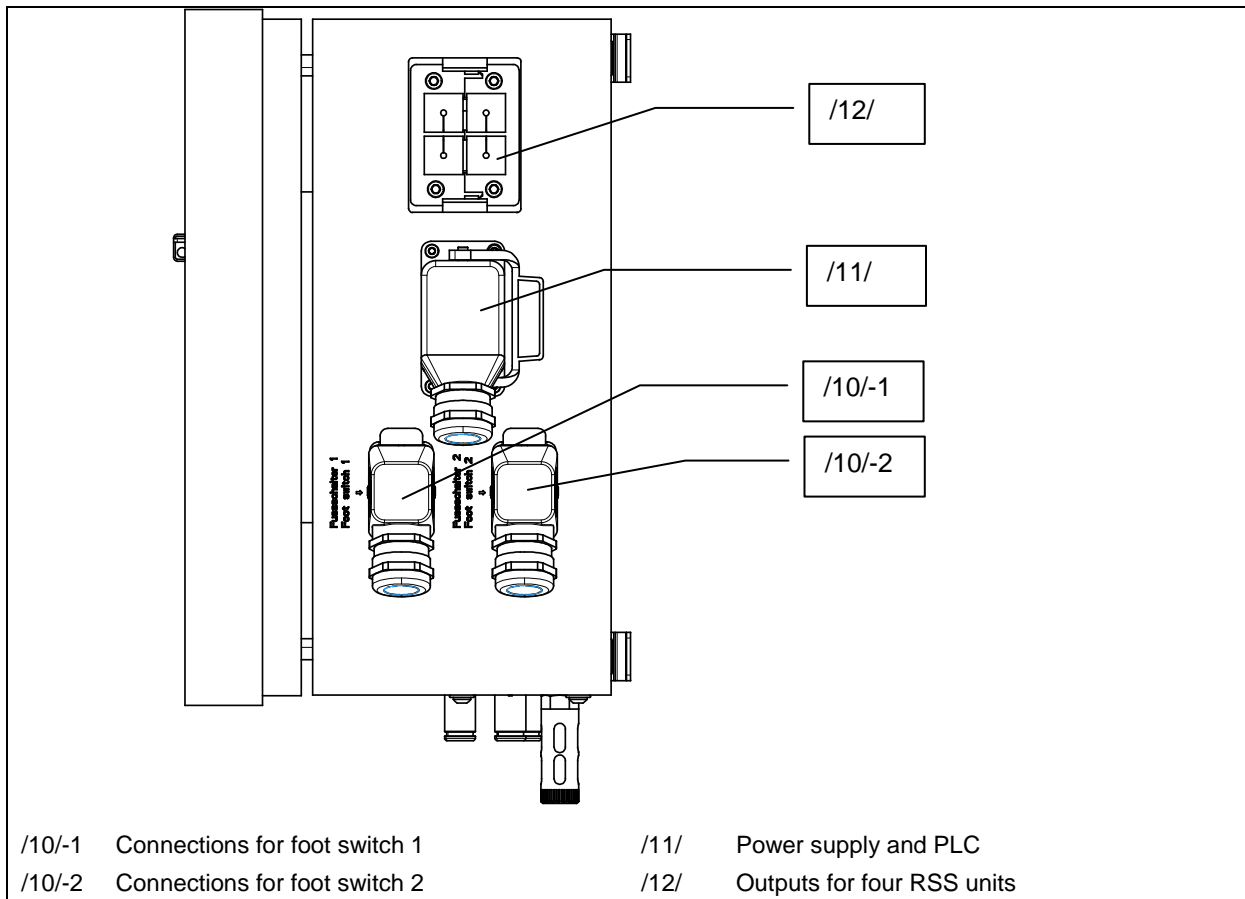
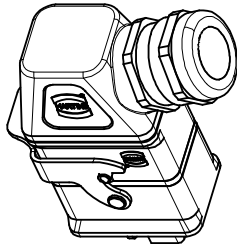


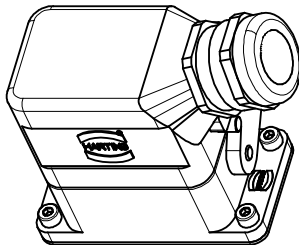
Figure 3 Electrical interfaces



**Pin allocation for the simple Harting plug connectors
(Han-Modular® Compact)**

Pin	Allocation
1	+24 V
2	+24 V
3	"Foot switch connected" signal
4	"Foot switch stop / open" signal
5	"Foot switch stop / closed" signal

Table 1 Allocation terminal block A for the foot switch



**Pin allocation for the double Harting plug connectors
(Han-Modular® Series with two Han® EE modules)**

Pin	Allocation
1	+24 V
2	0 V
3	n.c.
4	Signal for "Emergency stop" ("active low")
5	Signal for "Spindle has stopped"
6	0 V
7	n.c.
8	n.c.

Table 2 Allocation for terminal block A

Pin	Allocation
1	"Clamping procedure for chuck 1 active" signal
2	"Clamping procedure for chuck 1 ended" signal
3	"Clamping procedure for chuck 2 active" signal
4	0 V
5	"Clamping procedure for chuck 2 ended" signal
6	"Clamping procedure for chucks 1 and 2 active"
7	"Clamping procedure for chucks 1 and 2 ended"
8	0 V

Table 3 Allocation for terminal block B

7.3 Air connection

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!

➔ Switch off power supply.

Note

- Observe the requirements for the air supply (see chapter 5, page 10).
- ➔ Use separate compressed air lines for each chuck.

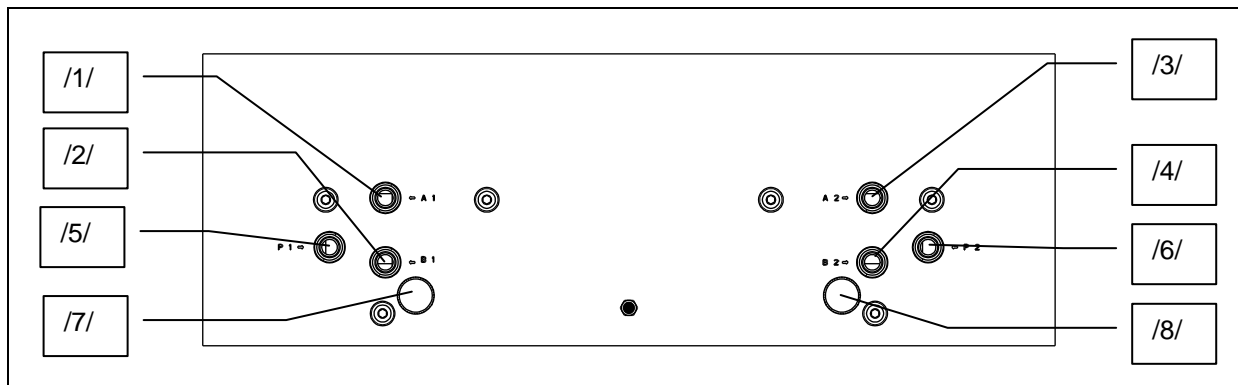


Figure 4 Air connection chuck 1 and chuck 2

Item	Designation	Function
/1/	Line A C1	Connection A for chuck 1 (pressure chamber for closing together)
/2/	Line B C1	Connection B for chuck 1 (pressure chamber for opening out)
/3/	Line A C2	Connection A for chuck 2 (pressure chamber for closing together)
/4/	Line B C2	Connection B for chuck 2 (pressure chamber for opening out)
/5/	Feed line C1	Compressed air supply (2 - 8 bar) for chuck 1
/6/	Feed line C2	Compressed air supply (2 - 8 bar) for chuck 2
/7/	Exhaust air C1	A sound absorber, for example, can be connected here.
/8/	Exhaust air C2	

Table 4 Allocation for the compressed air lines

7.4 Assembly example

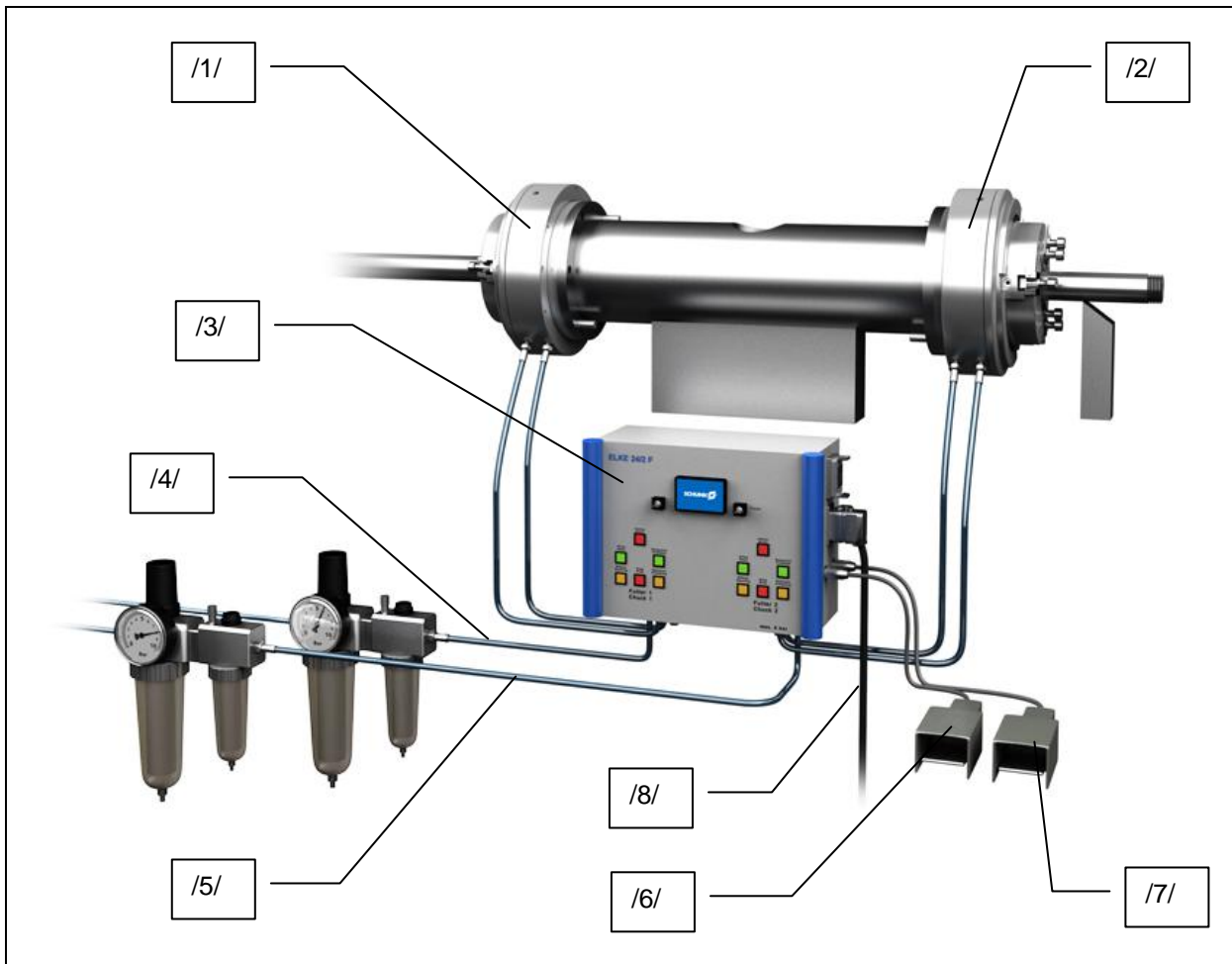


Figure 5

Item	Designation
/1/	Chuck 1
/2/	Chuck 2
/3/	ELKE 24/2F electrical control unit
/4/	Feed line with pressure control for chuck 1
/5/	Feed line with pressure control for chuck 2
/6/	Foot switch for chuck 1
/7/	Foot switch for chuck 2
/8/	Connection to machine control system 24 V

Table 5 Compressed air lines

8 Commissioning and operation

8.1 Overview of operation

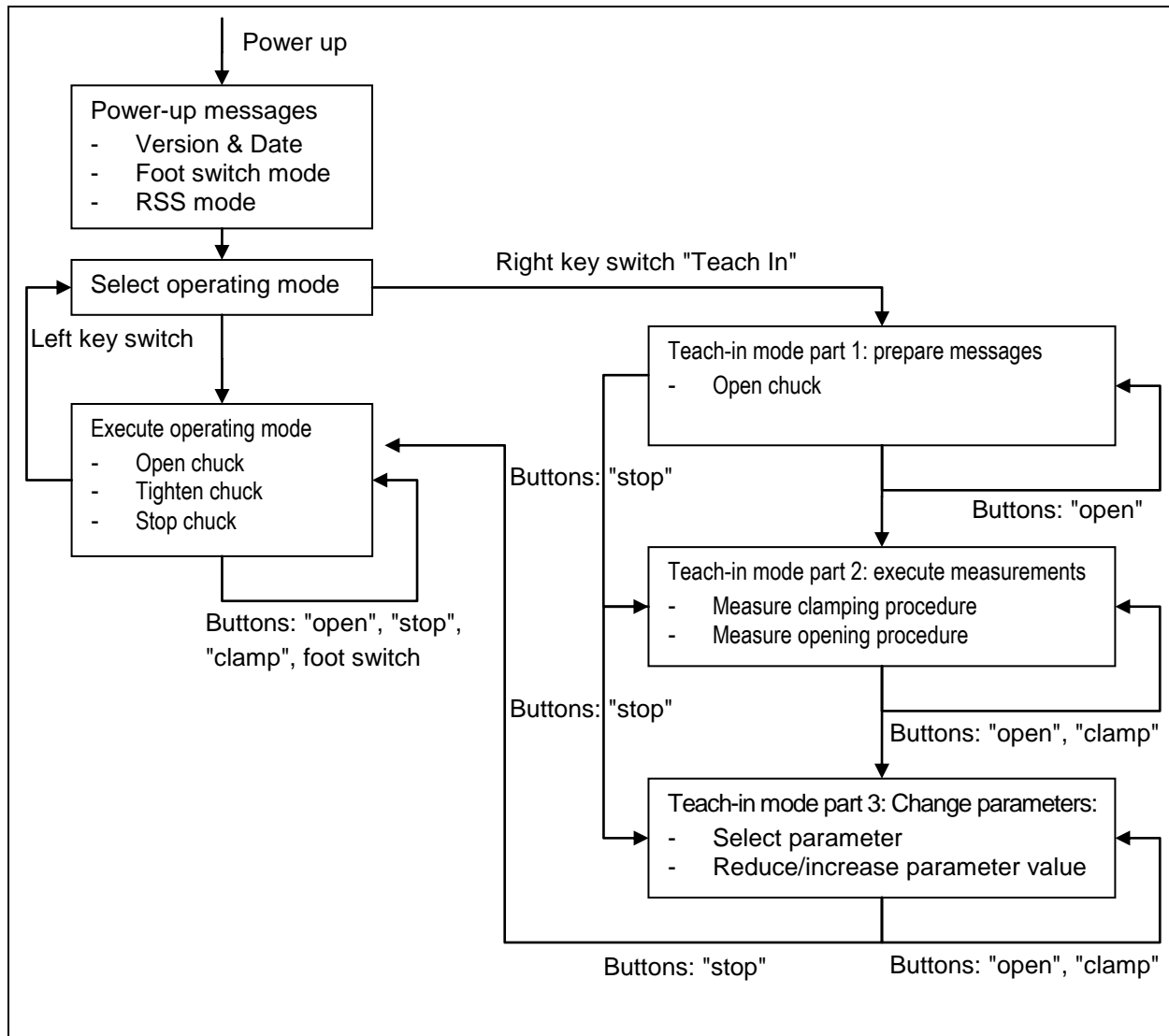


Figure 6 Sequence of operation diagram

8.2 Power-up messages

Power-up messages are shown on the LCD display of the ELKE 24/2F when the power supply is switched on.

Power-up message 1 displays information on the firmware for three seconds:

- Version number (release)
- Date of the firmware
- Serial number of the device

Power-up message 1 Module version

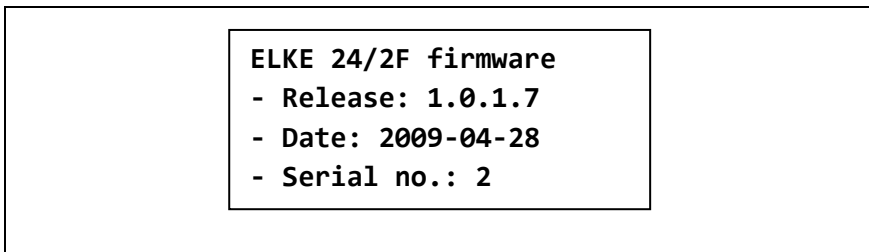


Figure 7 Example for power-up message 1

Power-up message 1 can be displayed for longer, e.g. so that the version information can be noted down:

➔ Keep one of the "stop" keys pressed down.

If the "stop" key is released, then the next power-up message follows in the LCD display.

Power-up message 2 displays the status of the foot switch for three seconds:

- Status of the connection (connected "yes" or "no") of the foot switch for the respective chuck (1 = chuck 1; 2 = chuck 2)
- Current status (not connected "-", left switch actuated "L", or right switch actuated "R") of the foot switch
- Mode ("stay" or "tap") of the foot switch

Power-up message 2 Status of the foot switches

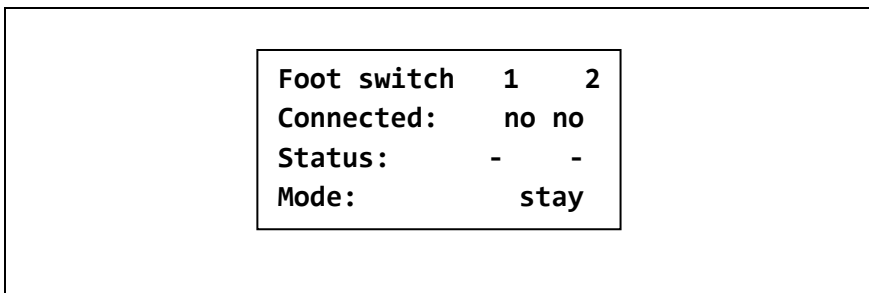


Figure 8 Example for power-up message 2

In the "stay" mode, the operator has to remain stood on the foot switch for as long as it takes for the ELKE 24/2F to recognize the end of the movement.

In the "tap" mode, the operator only has to actuate the foot switch once to release the movement.

Power-up message 2 can be displayed for longer, e.g. so that the function of the connected foot switches can be checked:

➔ Keep one of the "stop" keys pressed down, the displayed information in the second and third lines is constantly updated.

If the "stop" key is released, then the next power-up message follows in the LCD display.

Power-up message 3 displays the status of the four RSS (1-4) for three seconds:

- Status of the watchdog output (WD)
- Current status of the level control output (LC)
- Actual data output Data Out 2 (DO2)

**Power-up message 3
Status of the RSS**

RSS	1:-	2:-	3:-	4:-
WD:	0	0	0	0
LC:	0	0	0	0
DO2:	0	0	0	0

Figure 9 Example for power-up message 3

Power-up message 3 can be displayed for longer, e.g. so that the function of the outputs can be checked:

➔ Keep one of the "stop" keys pressed down, the displayed information is constantly updated.

If the "stop" key is released, then the message for the teach-in mode follows in the LCD display (for initial commissioning) or the "general readiness for operation display" (for reconnection).

8.3 Selecting the operating mode

Initial commissioning

Valid parameters for controlling the chucks are not yet available for the initial commissioning. Therefore, the teach-in mode (see section 8.4, page 28) is activated directly after the power-up messages.

Reconnection

Otherwise, a readiness for operation display is shown as in Figure 10.

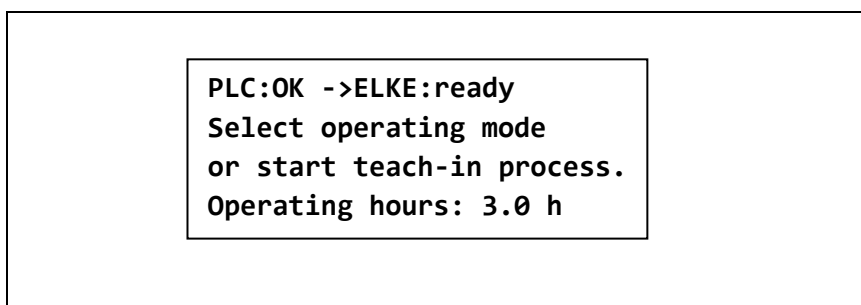


Figure 10 General readiness for operation display

Note

For a reconnection, the last operating mode activated is automatically called up. If an operating mode is not yet selected, then the general readiness for operation display is shown as in Figure 10 and Figure 11.

General readiness display

- ✓ No operating mode selected lately.
- ✓ There is no error on the PLC inputs ("Emergency stop" and "Spindle has stopped").

The general readiness for operation of ELKE 24/2F is shown in the LCD display:

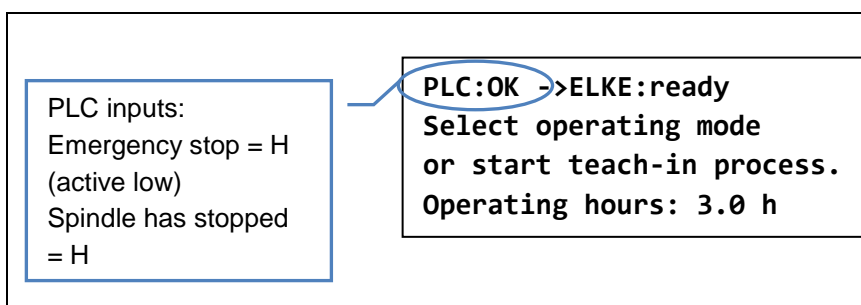


Figure 11 General readiness for operation display

The ELKE 24/2F is ready to select the operating mode or to teach in (again).

Spindle turns display

- ✓ There is no error on the PLC input "Emergency stop".
- ✓ A low signal is active on the PLC input "Spindle has stopped".

The signal from the PLC is shown in the connected LCD display:

- The spindle turns!
- The chucks must not be closed together or opened out ("ELKE disabled").

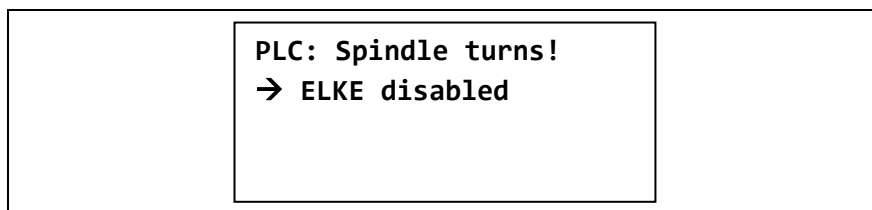


Figure 12 Spindle turns display

The ELKE 24/2F is disabled and does not react to any key inputs until the "Spindle has stopped" signal from the PLC is set to High again. In this status, the internal states of ELKE 24/2F (chuck tightened/open) and the output signals to the PLC are retained.

Emergency stop display

- ✓ There is an error on the PLC input "Emergency stop".

The signal from the PLC is shown in the connected LCD display:

- Emergency stop!
- The chucks must not be closed together or opened out ("ELKE disabled").

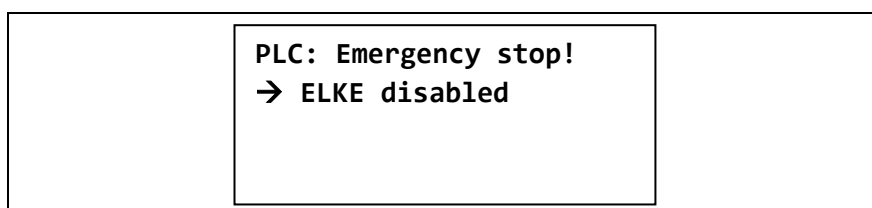


Figure 13 Emergency stop display

The ELKE 24/2F is disabled and does not react to any key inputs until the "Emergency stop" signal from the PLC no longer registers an error. In this status, the internal states of ELKE 24/2F (chuck tightened/open) and the output signals to the PLC are deleted and not reestablished even after the Emergency stop.

Selecting the operating mode

- ✓ There is no error on the PLC inputs ("Emergency stop" and "Spindle has stopped").

Select an operating mode:

➔ Turn the left key switch into one of the three positions:

- a) Neutral position (key vertical)
The current operating mode is retained here.
- b) Right (key turned 45° clockwise)
The previous operating mode is selected here.
- c) Left (key turned 45° counterclockwise)
The next operating mode is selected here.

The sequence of the selectable operating modes takes place cyclically according to the following procedure:
Gen. readiness for operation → Synchronous clamping → Separate O.D. clamping → Separate I.D. clamping → Sequential clamping chuck 1, chuck 2 → Sequential clamping chuck 2, chuck 1 → Teach-in/check RSS → Gen. readiness for operation → ..., or in the reverse order.

Selecting movement

If an operating mode is selected, then the name of the operating mode is displayed in the first line of the LCD display. Refer, for example, to Figure 14 for the Synchronous clamping operating mode. For reasons of lack of space, the designation is shown in a shortened form where required:

Display	Meaning
"Synchronous clamping"	Synchronous clamping
"Sep. O.D. clamping"	Separate O.D. clamping
"Sep. I.D. clamping"	Separate I.D. clamping
"Seq. clamping C1, C2"	Sequential clamping chuck 1, chuck 2
"Seq. clamping C2, C1"	Sequential clamping chuck 2, chuck 1

Table 6 Operating modes

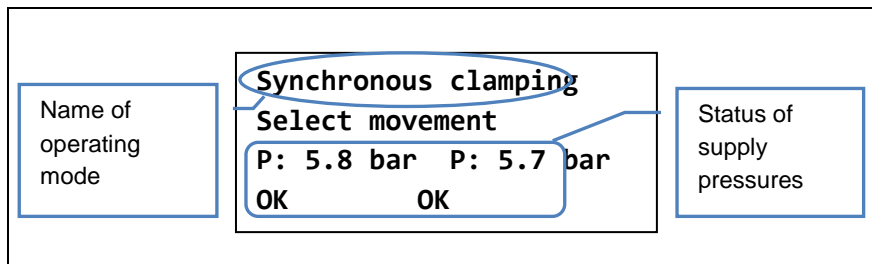


Figure 14 "Synchronous clamping" operating mode is set

The "Select movement" text is initially displayed in the second line. Displayed in the third line is the respective current air pressure in supply line P in the selected unit of pressure (bar or psi).

After a clamping or opening procedure has been triggered via the "clamp" or "open" buttons or via the foot switch connected, the LCD display now shows the air pressure in the relevant control line in the second line, see Figure 15 or Figure 16.

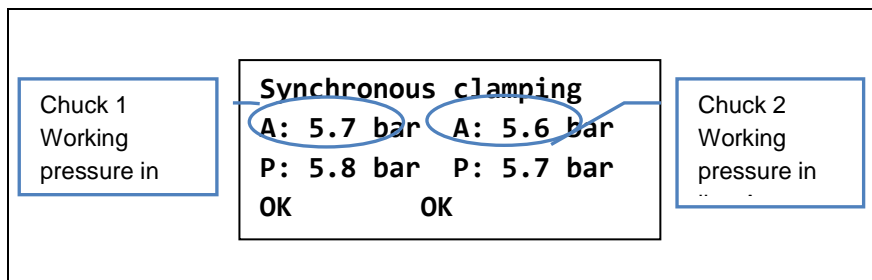


Figure 15 Working pressure display for "Synchronous clamping" during or after a clamping procedure.

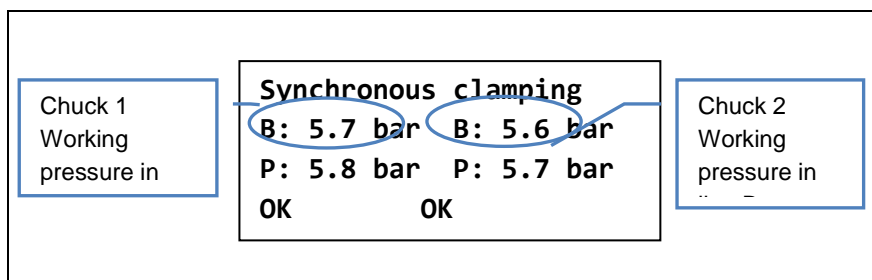


Figure 16 Working pressure display for "Synchronous clamping" during or after an opening procedure.

Just as it is for the supply pressure display, the display for the pressure in the control line (line A when closing together, line B when opening out) is constantly updated during the clamping or opening procedure.

After the clamping or opening procedure has finished, the reading for the working pressure is, however, maintained permanently until the next procedure and is not updated further. This allows the previously reached clamping or opening pressure to be controlled. (The actual pressure in the control line drops to 0 bar after the procedure has ended).

Erroneous supply pressure

The status of the supply air pressure is shown in the last line of the LCD display. If the supply air pressure is not "OK", then here the cause of the error is displayed as follows:

If the supply pressure P ("P supply" parameter) was taught in to 5.9 bar, for example, and the permitted supply pressure deviation (" $\pm\%$ supply" parameter) was set to 10%, then there are four respective options for the display of the cause of the error:

- ➔ "<5.9-10%"
Supply pressure is smaller than 5.9 bar minus 10%, see Figure 17, for example
- ➔ "< MIN P"
Supply pressure is smaller than the minimum permissible operating pressure (2 bar)
- ➔ ">5.9+10%"
Supply pressure is greater than 5.9 bar plus 10%
- ➔ "> MAX P"
Supply pressure is greater than the maximum permissible operating pressure (10 bar)

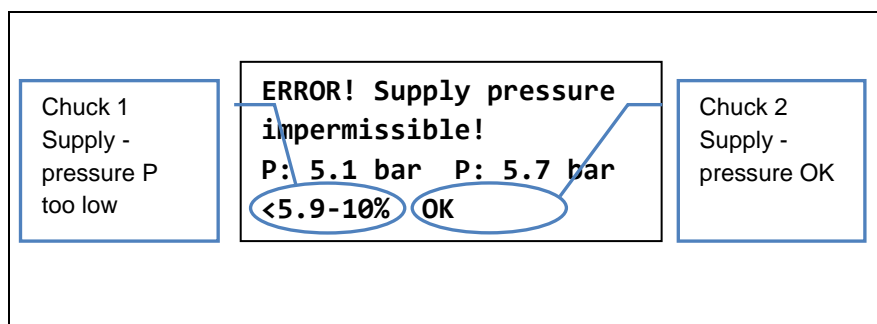


Figure 17 Error in the supply pressure, here: pressure P1 too low

RSS mode

The RSS mode is not an operating mode in the truest sense, but rather is merely used for support during teaching in or for diagnosing the RSS sensors connected wirelessly.

To teach in the RSS receivers in ELKE to the RSS transmitters in the chuck, proceed in accordance with the instructions for RSS-R1 and in accordance with the RSS-P1 or RSS-W1 to be taught in. The RSS mode for ELKE only supports this procedure through the visual depiction of the RSS outputs in the LCD display on the one hand and through the option of targeted, manual operation of the chuck jaws on the other, see the following sections.

The RSS system is comprised of the following components:

- ➔ RSS R1 receiver in the ELKE 24/2F
- ➔ RSS W1 or RSS P1 transmitter in the chuck, with a path sensor (for RSS W1) or a pressure sensor (for RSS P1) in the chuck

For a chuck with fast stroke, an RSS W1 measures whether the chuck jaws are in the clamping stroke range or in the fast stroke range. In contrast, an RSS P1 measures the working pressure in a piston chamber of the chuck. There are two installation options for this: a pressure sensor in the "opening chamber" or a pressure sensor in the "closing chamber".

As described above, the RSS mode is activated just like the "normal" operating modes via the left key switch. The LCD display then shows the status of the outputs of the RSS receivers in the ELKE, see Figure 18.

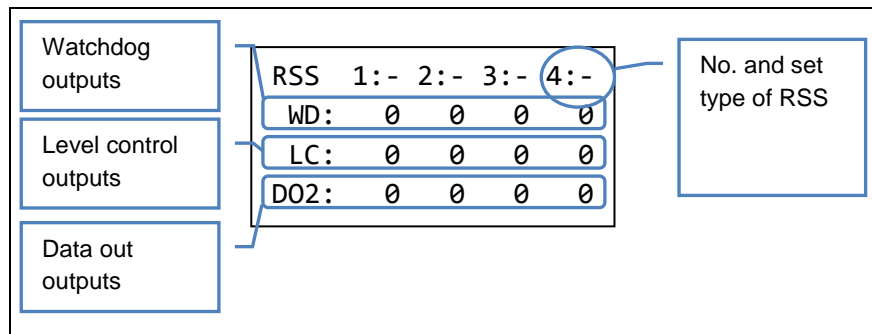


Figure 18 LCD display in the RSS mode

In the first line, the number of the RSS (1-4) and the respective set type of RSS is displayed next to the "RSS" text. The RSS type can be changed in the teach-in mode when the parameters are set manually, see section 8.4, Description of the RSS1-4 parameters. The following types are available:

- ➔ "-" : RSS is not connected
- ➔ "P" : The signals received by the RSS receiver are interpreted as signals of an RSS P1 pressure sensor
- ➔ "W" : The signals received by the RSS receiver are interpreted as signals of an RSS W1 path sensor

The watchdog (WD) outputs are displayed in line 2, the level control (LC) outputs in line 3, and the actual data out outputs in line 4.

The chuck jaws of chucks 1 and 2 can be directly moved manually in RSS mode via the "open" or "clamp" buttons or the foot switches. The valves each stay energized for as long as the button or switch is pressed. The movement stops immediately after the button/switch is released, which is why the Stop buttons here light up permanently as well.

 **DANGER**

CAUTION: The RSS mode is **NOT** for clamping and processing workpieces. Since in this mode the pressure is not monitored and the chuck jaws can only be moved manually, ELKE 24/2F cannot define the end of the clamping procedure here.

8.4 Teach-in mode

To be able to automatically recognize the end of a chuck's clamping or opening procedure, the ELKE 24/2F initially has to be taught into the connected chuck. In the process, the pressure sequences are measured and suitable parameters are determined. The parameters are stored permanently in the device and are thus still available after the machine is powered down and back up again. Teaching in again is only required if the ambient conditions have changed, if, for example, another chuck is going to be controlled, or if work is going to be performed with a supply pressure that has changed greatly.

The teach-in mode is performed in three steps:

1. Preparation: The chucks' jaws have to be completely opened out so that a defined original state can be achieved.
2. Recording and automatic evaluation of the pressure sequences during the closing together process or during the opening out process.
3. Manual fine adjustment of the taught-in parameters and the storing of the taught-in/set parameters.

To execute these steps, activate the teach-in mode and follow the instructions on the LCD display, see also Figure 6.

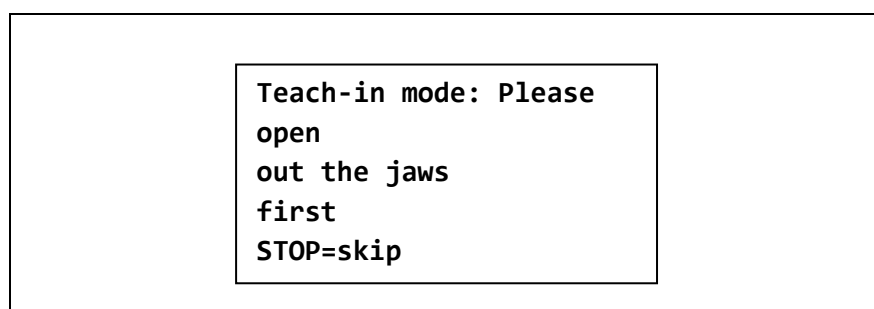


Figure 19 LCD display at the start of the teach-in mode

Activating the teach-in mode, preparing the measurement

To activate the teach-in mode:

1. Actuate the right key switch button briefly (min 0.4 s). On the LCD display, the instruction as shown in Figure 19 appears. The left and right "open" buttons flash.

2. Keep the left and right "open" buttons pressed down together or one after the other until the jaws of both chucks have opened out completely. Important: The buttons have to stay pressed down by hand for as long as it takes to open out the jaws completely. The buttons also have to be pressed down even if the chucks have already been opened out completely.

The preparation step can be completely or partially skipped by pressing one of the "stop" buttons. If the described preparation was not carried out for a chuck, then there will be no measurements carried out for that chuck. This results in the following options:

- If a chuck was not prepared, then pressing one of the "stop" buttons leads directly to the manual fine adjustment of the (already) taught-in parameters, without having to carry out further measurements.
- If only one chuck was prepared, then pressing one of the "stop" buttons results in the measurements just being carried out for that chuck and the corresponding parameters will be deduced. The other chuck retains its own, existing parameters.
- If both chucks were prepared, then the measurements will be carried out for both chucks and the corresponding parameters deduced.

Executing the measurement

At the start of the actual measurements, the message shown in Figure 20 is displayed for 3 s.

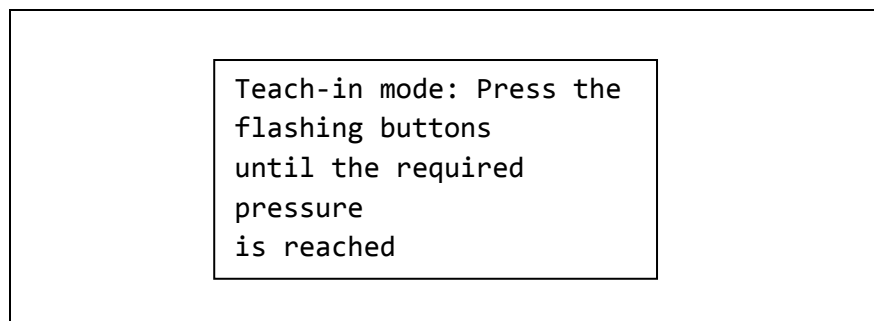


Figure 20 Initiating the measurement

The left "clamp" button then begins to flash and the message as shown in Figure 21 is displayed on the LCD display. For an explanation, see also Table 5.

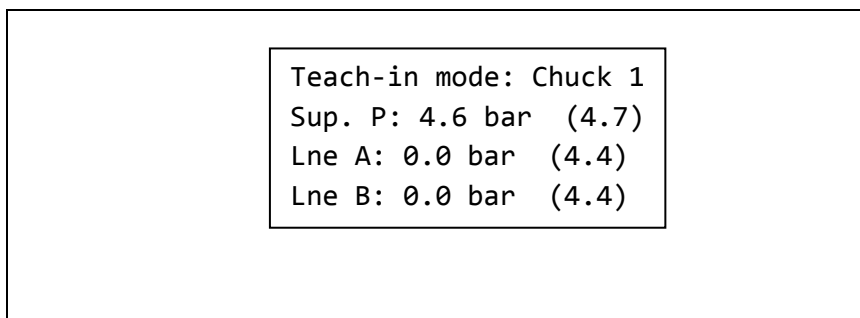


Figure 21 Starting the measurement

The value in brackets shows the last taught-in reference pressure/pressure of the respective line.

Line	Designation	Unit
1	Shows in which chuck the measurement is being carried out. (Chuck 1 or Chuck 2)	-
2	Shows the current, measured pressure of the supply line (Sup.)	bar / psi
3	Shows the current, measured pressure for line A (Lne A)	bar / psi
4	Shows the current, measured pressure for line B (Lne B)	bar / psi

Table5 Parameters for the LCD display in the "Start measurement" mode

Carrying out the clamping procedure for chuck 1

The clamping procedure (closing together of the jaws) is measured. For this, the pressure of the supply line must firstly be taught in as the new reference pressure. Consequently, the pressure sequences can be measured for the closing together process.

- ✓ The "clamp" button flashes.
- 1. Press the flashing "clamp" button and keep it pressed down. When pressing, the currently measured pressure of supply line P is taught in as the new reference pressure and buffered.
- 2. The pressure sequences of line P and line A are measured for as long as the "clamp" button stays pressed down.
- 3. If the required pressure in line A is reached, then the "clamp" button must be released.

The LCD display is constantly updated. The currently applied pressure can thus be read off constantly, see Figure 22. The currently measured pressure in line A is taught in as

the new pressure to be reached for the clamping procedure and buffered.

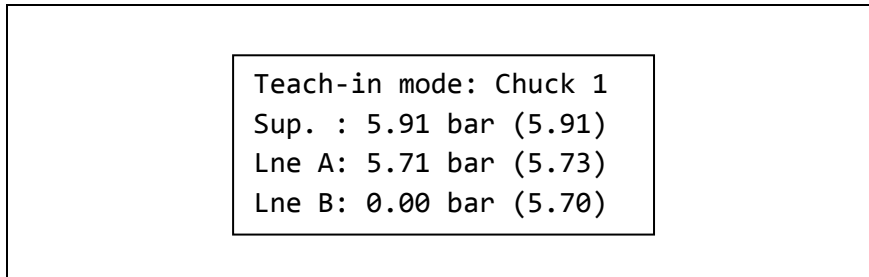


Figure 22 Teaching in the clamping procedure

Carrying out the opening procedure for chuck 1

The pressure sequences must now also be measured for the closing together process.

- ✓ The "open" button starts to flash.
- 1. Press the flashing "open" button and keep it pressed down.
- 2. The pressure sequences of line P and line B are measured for as long as the "open" button stays pressed down.
- 3. Release the "open" button when the required pressure in line B is reached.

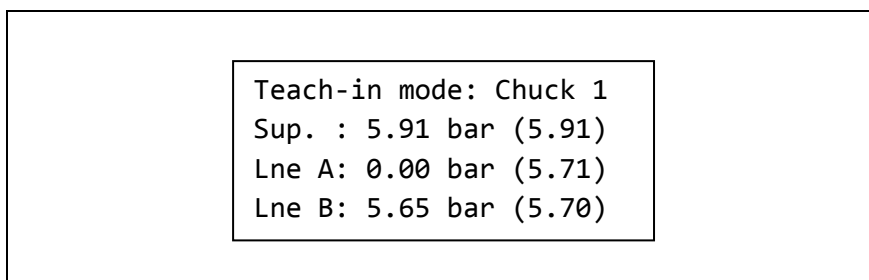


Figure 23 Teaching in the opening procedure

Line B to the chuck is pressurized for as long as the "open" button is pressed.

The currently applied pressure can be read off constantly by the LCD display, see Figure 23. The currently measured pressure in line B is taught in as the new pressure to be reached for the opening procedure and buffered.

After the measurements are finished, the new taught-in values for P, A and B are displayed in brackets for three seconds in the LCD display in the last column.

Carrying out the measurement for chuck 2

Chuck 2 is taught in analogously to chuck 1:

✓ The "clamp" button (for chuck 2) starts to flash.

1. Press the flashing "clamp" button and keep it pressed down.
2. Release the "clamp" button when the required pressure in line A is reached.

✓ The "open" button (for chuck 2) starts to flash.

1. Press the flashing "open" button and keep it pressed down.
2. Release the "open" button when the required pressure in line B is reached.

After the measurements are finished, the new taught-in values for P, A and B are displayed in brackets for three seconds in the LCD display in the last column.

Ending the measurement

Upon conclusion of the measurements, the "Measurements ended" message is shown for a further three seconds, see Figure 24:

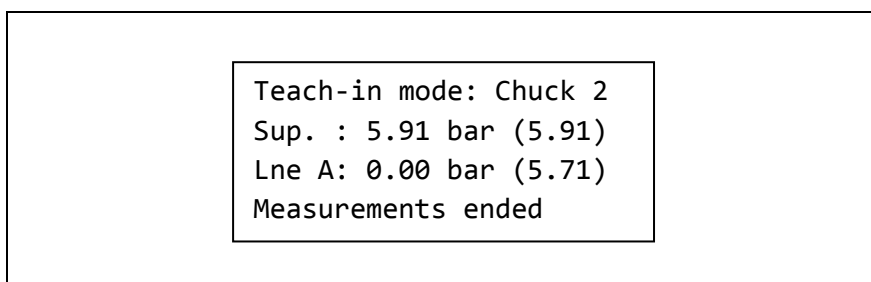


Figure 24 Measurement ended

The taught-in parameters can be manually readjusted and changed after the measurements.

Changing the parameters manually:

- ✓ The LCD display shows the button assignment for changing parameters manually:

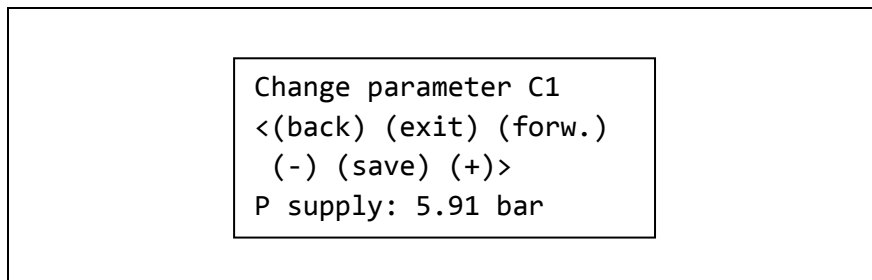


Figure 25 Display for changing parameters

Line	Designation
1	Displays for which chuck the parameters are being readjusted. (C1 = chuck 1; C2 = chuck 2)
2	Displays the current assignment of the chuck 1 operator buttons. (back = back to the last parameter; exit = exit mode; forw. = forward to the next parameter)
3	Displays the current assignment of the chuck 2 operator buttons. (- = decrease parameter setting; save = save parameter settings; + = increase parameter setting)
4	Displays the currently set supply pressure.

Table6 Parameters for the LCD display in the "Start measurement" mode

1. Use the relevant operator button to set the respective parameters.
2. Save the settings using the "save" button, or discard using "exit".

Note

If the "exit" button is pressed during the setting, then the teach-in mode will be exited. The parameters that have just been set will be discarded. The previously saved parameters remain valid.

The following parameters can be set separately for chuck 1 or chuck 2:

Parameter	Description
P supply	Reference pressure for the chuck's supply line in bar or psi
P clamped	Required clamping pressure for the chuck in bar or psi. (In operating mode "Separate I.D. clamping", this pressure is used as the pressure required for opening).
P open	Required opening pressure for the chuck in bar or psi. (In operating mode "Separate I.D. clamping", this pressure is used as the pressure required for I.D. clamping).
P min	Required minimum pressure for the chuck in bar or psi. Falling below this pressure in the supply line P leads to an error.
dP clamped	Permitted pressure difference (flow) between the supply line and line A (clamping) in bar or psi. A clamping procedure is only detected as ended if the currently measured pressure difference is smaller than the value stored here. (In operating mode "Separate I.D. clamping", this pressure difference is used as the pressure difference permitted for opening).
dP open	Permitted pressure difference (flow) between the supply line and line B (opening) in bar or psi. An opening procedure is only detected as ended if the currently measured pressure difference is smaller than the value stored here. (In operating mode "Separate I.D. clamping", this pressure difference is used as the pressure difference permitted for I.D. clamping).
±% supply	Maximum permitted deviation of the supply pressure in percent. If the supply pressure in the selected operating mode deviates by more than the value stored here in % from the reference value stored in P supply, then an error in the supply pressure is displayed, see also section 8.3
±% clamped	Maximum permitted deviation of the clamping pressure in percent. A clamping procedure is only detected as ended if the measured clamping pressure deviates by less than the value stored here in % from the taught-in clamping pressure for P clamped. (In operating mode "Separate I.D. clamping", this deviation is used as the deviation permitted for opening).
±% open	Maximum permitted deviation of the opening pressure in percent. An opening procedure is only detected as ended if the measured

Parameter	Description
	opening pressure deviates by less than the value stored here in % from the taught-in opening pressure for P open. (In operating mode "Separate I.D. clamping", this deviation is used as the deviation permitted for I.D. clamping).
+t clamped	Additional time in milliseconds in which the clamping line is still pressurized with compressed air after the clamped conditions have been detected.
+t open	Additional time in milliseconds in which the opening line is still pressurized with compressed air after the open conditions have been detected.
Timeout	Maximum time in milliseconds in which a clamping or opening procedure can take. If a clamping or opening procedure takes longer than that time, for example, due to a leakage in the chuck or in the control line, then an error will be displayed.
RSS1-4	<p>Selection of the type of RSS transmitter in the chuck related to the RSS receiver in the ELKE. RSS1 and RSS2 are for chuck 1, while RSS3 and RSS4 can be used for chuck 2.</p> <p>Available for selection are:</p> <ul style="list-style-type: none"> • "Not used": The RSS receiver is not used • "P1 p open": The RSS receiver is connected with an RSS-P1 transmitter which monitors the pressure in the opening chamber • "P1 p close": The RSS receiver is connected with an RSS-P1 transmitter which monitors the pressure in the closing chamber • "W1 clamping stroke": The RSS receiver is connected with an RSS-W1 transmitter which monitors whether the chuck jaws in a chuck with fast stroke are in the clamping stroke range or in the fast stroke range

Table7 Chuck-specific parameters for manual readjustment

General parameters can also be displayed or set:

Parameter	Description
Unit of pressure	Either "bar" or "psi" can be selected for the display of the unit of pressure. Internally, all pressures are processed in millibars, which means that there could be roundoff errors if the display is shown in psi.
Foot switch	The foot switch mode is capable of changeover between "stay" and "tap" (see section 8.2 for the description of power-up message 2).
Language	English and German are available for selection as the language for LCD messages.
Serial no.	The device's serial number can be displayed but not changed.
Operating hours	The operating hours counter can be displayed but not changed.

Table 8 General parameters

Changing the parameters can be ended at any time by pressing the right "stop" button ("save") . The manually readjusted, measured up to that point parameters are stored permanently. The old parameters are irretrievably overwritten in the process. The message "Parameters saved" appears briefly in the LCD display (in line 4).

Changing the parameters can also be ended when the left "stop" button ("exit") is pressed. However, the manually readjusted, measured up to that point parameters will be discarded and the previously set values are retained.

Parameters in the pressure sequence

To make understanding clearer, the most important clamping procedure parameters to be taught in are shown in Figure 26. The diagram shows the pressure sequences in supply line P and control line A as well as their differential P-A over time. The parameters are marked at the relevant positions in the diagram and explained in Table 9.

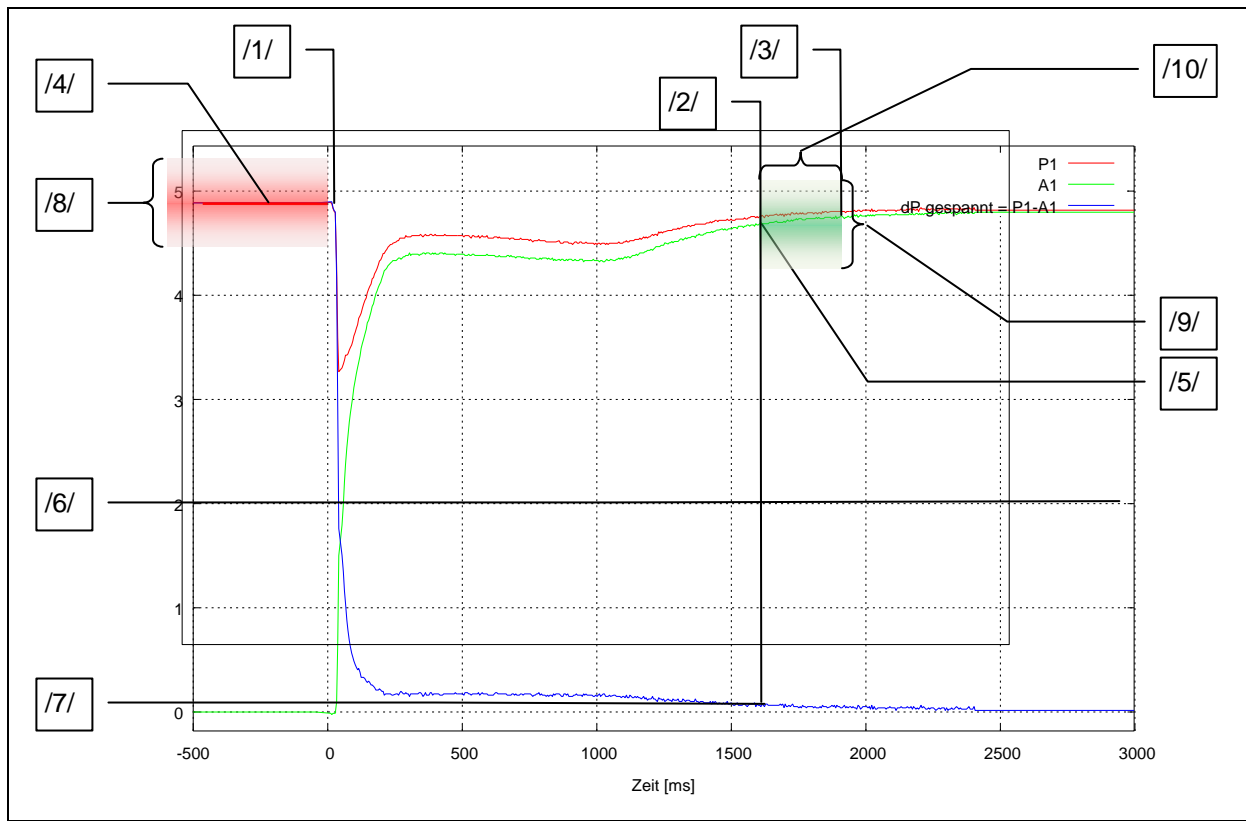


Figure 26 Significance of the chuck-specific configuration parameters illustrated with the support of pressure sequences during clamping

Item	Designation
/1/	Point in time of "start": A clamping procedure is initiated by pressing the Clamp button
/2/	Point in time of "clamping pressure reached": The pressure differential of supply line P and the control line (here A) falls below the taught-in threshold for "dP clamped"
/3/	Point in time of "clamping pressure ended": The clamping procedure is ended when the additional clamping time "+t clamped" has expired
/4/	"P supply" parameter: The taught-in reference pressure for the supply line
/5/	"P clamped" parameter: The taught-in pressure in the control line for clamping
/6/	"P min" parameter: The set, minimum required supply pressure.
/7/	"dP clamped" parameter: Threshold for the pressure difference between compressed air lines P and A
/8/	"±% supply" parameter: The permitted range of the supply pressure

Item	Designation
/9/	"±% clamped" parameter: The permitted range of the clamping pressure
/10/	"+t clamped" parameter: Additional clamping time

Table 9 Legend for Figure 26

For an opening procedure (without figure), the aforementioned applies with the following counterparts:

Parameter name for "clamping"	Parameter name for "opening"
P clamped	P open
dP clamped	dP open
±% clamped	±% open
+t clamped	+t open

Table 10 Legend for Figure 26

9 Troubleshooting

9.1 Electric signals are not transmitted

Possible cause	Corrective action
Interruption in the supply lines	<ul style="list-style-type: none"> ➔ Check the supply lines for defects; exchange if needed. ➔ Check the electrical connections (see chapter 7.2, page 14)

Table 11 Possible causes of error and appropriate measures to be taken

9.2 Compressed air is not conveyed

Possible cause	Remedial measures
Interruption in the supply lines	<ul style="list-style-type: none"> ➔ Check the supply lines for defects; exchange if needed. ➔ Check the compressed air supply.

Table 12 Possible causes of error and appropriate measures to be taken

9.3 End of the clamping or opening procedure is not correctly detected

The correct end of a clamping or opening procedure is detected by the ELKE24/2F via internal pressure sensors. The values to be monitored are determined during teach in (see section 8.4) and stored permanently. If the ambient conditions change greatly, however, then a teach in may be required again.

Possible cause	Remedial measures
Changed ambient conditions, e.g.: <ul style="list-style-type: none"> • Change in pressure of the compressed air supply • Changes to the toolholder 	<ul style="list-style-type: none"> ➔ Check the supply lines for defects; exchange if needed. ➔ Check the compressed air supply. ➔ Teaching in again (see section 8.4)

Table 13 Possible causes of error and appropriate measures to be taken

If the end of a clamping or opening procedure cannot be detected despite teaching in again, then the relevant parameters can be adapted manually if necessary. The tables in the following subsections describe appropriate measures to be taken.

9.4 End of the clamping procedure is detected too early

Possible cause	Remedial measures
The supply pressure deviates strongly from the supply pressure during teach in	→ Teach in the parameters again
The device already reacts to a too great a pressure differential for "dP clamped"	→ Reduce "dP clamped" parameter
The device already reacts to a too small a clamping pressure for "P clamped"	→ Reduce "±% supply" parameter → Increase "P clamped" parameter

Table 14 Possible causes of error and appropriate measures to be taken

9.5 End of the clamping procedure is detected too late or not at all

Possible cause	Remedial measures
The supply pressure deviates strongly from the supply pressure during teach in	→ Teach in the parameters again
The device is waiting for a too small a pressure differential for "dP clamped"	→ Increase "dP clamped" parameter → Increase "Timeout" parameter
The device is waiting for a too great a clamping pressure for "P clamped"	→ Reduce "P clamped" parameter → Increase "Timeout" parameter

Table 15 Possible causes of error and appropriate measures to be taken

9.6 End of the opening procedure is detected too early

Possible cause	Remedial measures
The supply pressure deviates strongly from the supply pressure during teach in	→ Teach in the parameters again
The device already reacts to a too great a pressure differential for "dP open"	→ Reduce "dP open" parameter
The device already reacts to a too small an opening pressure for "P open"	→ Reduce "±% supply" parameter → Increase "P open" parameter

Table 16

9.7 End of the opening procedure is detected too late or not at all

Possible cause	Remedial measures
The supply pressure deviates strongly from the supply pressure during teach in	→ Teach in the parameters again
The device is waiting for a too small a pressure differential for "dP open"	→ Increase "dP open" parameter → Increase "Timeout" parameter
The device is waiting for a too great an opening pressure for "P open"	→ Reduce "P open" parameter → Increase "Timeout" parameter

Table 17 Possible causes of error and appropriate measures to be taken

9.8 Error messages

The device detects various errors independently and shows these in the second line of the LCD display as follows:

Message	Meaning	Remedial measures
Timeout!	The clamping or opening procedure exceeds the set time threshold	<ul style="list-style-type: none"> ➔ Check the chuck (distributor ring) and control line for leakage ➔ Increase "Timeout" parameter
RSSx P!	RSS number x is configured as "RSS-P1 closing" and thus measures the pressure during clamping; but when the end of the clamping procedure has been detected, the RSS-P1 sensor signals that there is not enough pressure in the closing chamber of the chuck	<ul style="list-style-type: none"> ➔ Rectify the RSSx configuration, if necessary ➔ Check the chuck (distributor ring) and control line A for leakage ➔ Increase "+t clamped" parameter
RSSx P!	RSS number x is configured as "RSS-P1 opening" and thus measures the pressure during opening; but when the end of the opening procedure has been detected, the RSS-P1 sensor signals that there is not enough pressure in the opening chamber of the chuck	<ul style="list-style-type: none"> ➔ Rectify the RSSx configuration, if necessary ➔ Check the chuck (distributor ring) and control line B for leakage ➔ Increase "+t open" parameter
RSSx WD!	RSS number x signals a watchdog error	<ul style="list-style-type: none"> ➔ Rectify the RSSx configuration, if necessary ➔ Check the RSSx radio communication
RSSx LC!	RSS number x signals a level control error	<ul style="list-style-type: none"> ➔ Rectify the RSSx configuration, if necessary ➔ The transmission battery allocated for RSSx must be checked and replaced, if necessary

Message	Meaning	Remedial measures
P error!	<p>Compressed air supply P is outside the permissible range:</p> <ul style="list-style-type: none"> • During a clamping or opening procedure, the pressure for compressed air supply P must be greater than the set "P min" parameter. • Otherwise, the pressure for compressed air supply P must be around the taught-in pressure for "P supply" within the range of "±% supply". 	<ul style="list-style-type: none"> ➔ Check the supply lines for defects; exchange if needed. ➔ Check the compressed air supply. ➔ Teach in the parameters again ➔ Increase "±% supply" parameter ➔ Reduce "P min" parameter

Table 18 Meaning of error messages in the LCD and appropriate measures to be taken

10 Maintenance and care

10.1 Maintenance intervals

We recommend that you have SCHUNK carry out all repair work.

Maintenance intervals	Type	ELKE 24/2F with RSS
	Visual inspection	Regularly along with machine or system maintenance
	Cleaning	As required

Tab. 19

This information refers to the use of the module under normal operating and ambient conditions:

- Clean workshop atmosphere
- No splashing water
- Small amounts of abrasive and process dust

10.2 Dismantling the module

The module may only be dismantled and repaired by SCHUNK. Non-compliance will invalidate the warranty.

10.3 Maintaining the module

For repair work, send the complete module along with a repair order to SCHUNK.

Visual inspection

The regular visual inspection of all supply lines is the prerequisite for the perfect operation of the module.

- ➔ If supply lines are defective, put the machine out of operation immediately.
- ➔ Replace damaged connection cables.

Cleaning

Clean the module dry at regular intervals to remove all dirt. If the housing is soiled, please only rub it dry, e.g. with a cloth. Do not immerse or spray.

11 Transport, storage and disposal

11.1 Transport

- The packaging must protect the module from all external effects (e.g. humidity).
- Protect the module from shocks and damage.
- Transport temperature -5 to +60° C, with maximum fluctuations of 20 K/hour.
- Transport air humidity: relative humidity of 5%-95%, non-condensing.
- The module contains components that are sensitive to electrostatic charge. Avoid any electrostatic charging.

11.2 Packaging

- Cardboard packaging with paper foaming.
- The maximum stacking height is two packaging units.

11.3 Storage

- Protect the module from the effects of moisture.
- The stocking temperature should be between +5° C and +60° C.
- The storage location must be clean, dry, and well ventilated. Outdoor storage is not permissible.
- Observe the maximum stacking height of two packaged modules.

11.4 Disposal

- ➔ Observe the locally valid legal disposal regulations.
- ➔ Environmentally sound disposal via the corresponding recycling or workshop centers.

Schunk GmbH & Co. KG accepts no liability for the consequences of incorrect disposal.

12 Assembly drawing

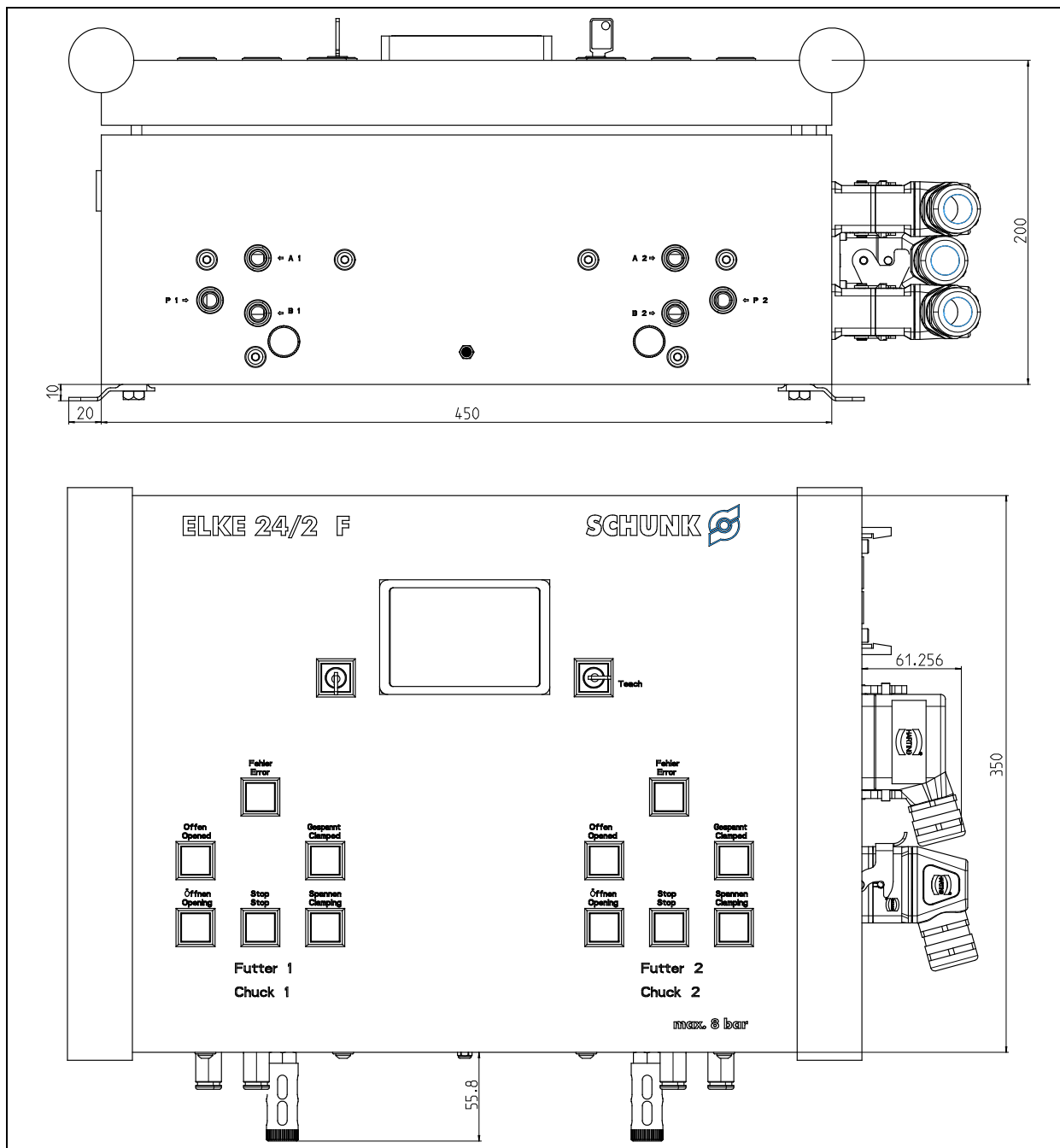


Figure 27 dimension of ELKE 24/2F with RSS

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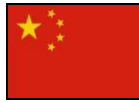
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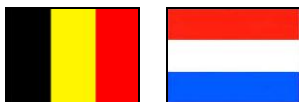
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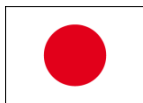
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