Erhardt+Leimer

ELGUIDE

Felt and wire guides for the paper industry

Felt and wire guiding systems

Contents

FOCUS ON CUSTOMER SATISFACTION

INTELLIGENT TECHNOLOGY · SMART PRODUCTS

INTERNATIONAL LOCATIONS · WORLDWIDE AVAILABILITY

CUTTING-EDGE TECHNOLOGY
AT HOME ALL OVER THE WORLD

Erhardt+Leimer
Global solutions for production of the future

Intelligent technologies and products in the highest quality designed to optimize the production processes of our customers all around the world. This is our claim as the internationally expanding Erhardt+Leimer group of companies.

With our global presence – from development to production and on to service – we are always close to the customer. We develop customer-specific solutions and provide our customers with excellent products either in digital or intelligent versions depending on their preference. Not only this, but we also set new standards for the production of tomorrow. In the process, it is not just our products that are increasingly becoming smart – our entire company is currently undergoing a digital transformation. One visible indication of this is the E+L online shop, which enables our customers to order products and spare parts quickly and easily from our website.

With more than 1,600 employees at sites across Europe, Asia, and America, we deliver cutting-edge technology on-time to any location in the world.

In everything we do, we aim to use all company resources responsibly to protect the environment and demonstrate our commitment to increased sustainability.

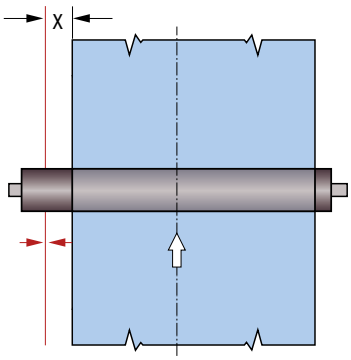
Improved quality through fabric position control systems

Today, users of paper machine clothing systems face ever increasing requirements.

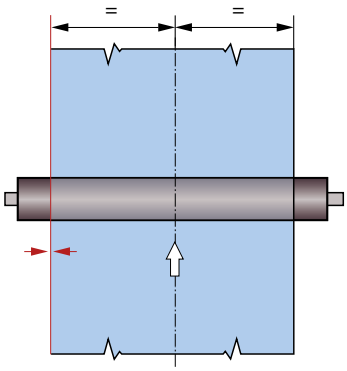
- Production processes need to be implemented not only more quickly, but at the same time also more precisely.
- The quality of the results is expected to improve, while personnel costs, scrap, and machine downtimes are to be reduced to a minimum.

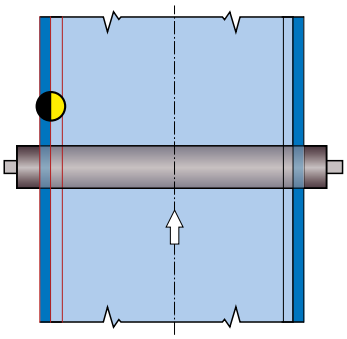
A significant contribution to meeting these requirements is made by the felt and wire guiding systems from E+L. We know from experience that felt and wire are affected by a large number of factors. Incorrect clothing positions impact significantly on paper production quality and quantities.

E+L felt and wire guiding systems eliminate these potential defects and ensure consistent clothing positioning during the production process.



x = deviation from the target position





Incorrect clothing position

- Reduces the service life of the clothing
- Leads to destruction of the clothing
- Can cause marks on the paper web
- Has a negative impact on fabric tension control

Correct clothing position

- Improves the quality and quantity of paper production
- Is a prerequisite for a long clothing service life
- Improves the fabric tension control of the clothing

Fabric oscillation

Fabric oscillation is the controlled offset of a fabric in a specified cycle time. Fabric oscillation is a feature offered by the electromagnetic edge sensor SH 8902 U.

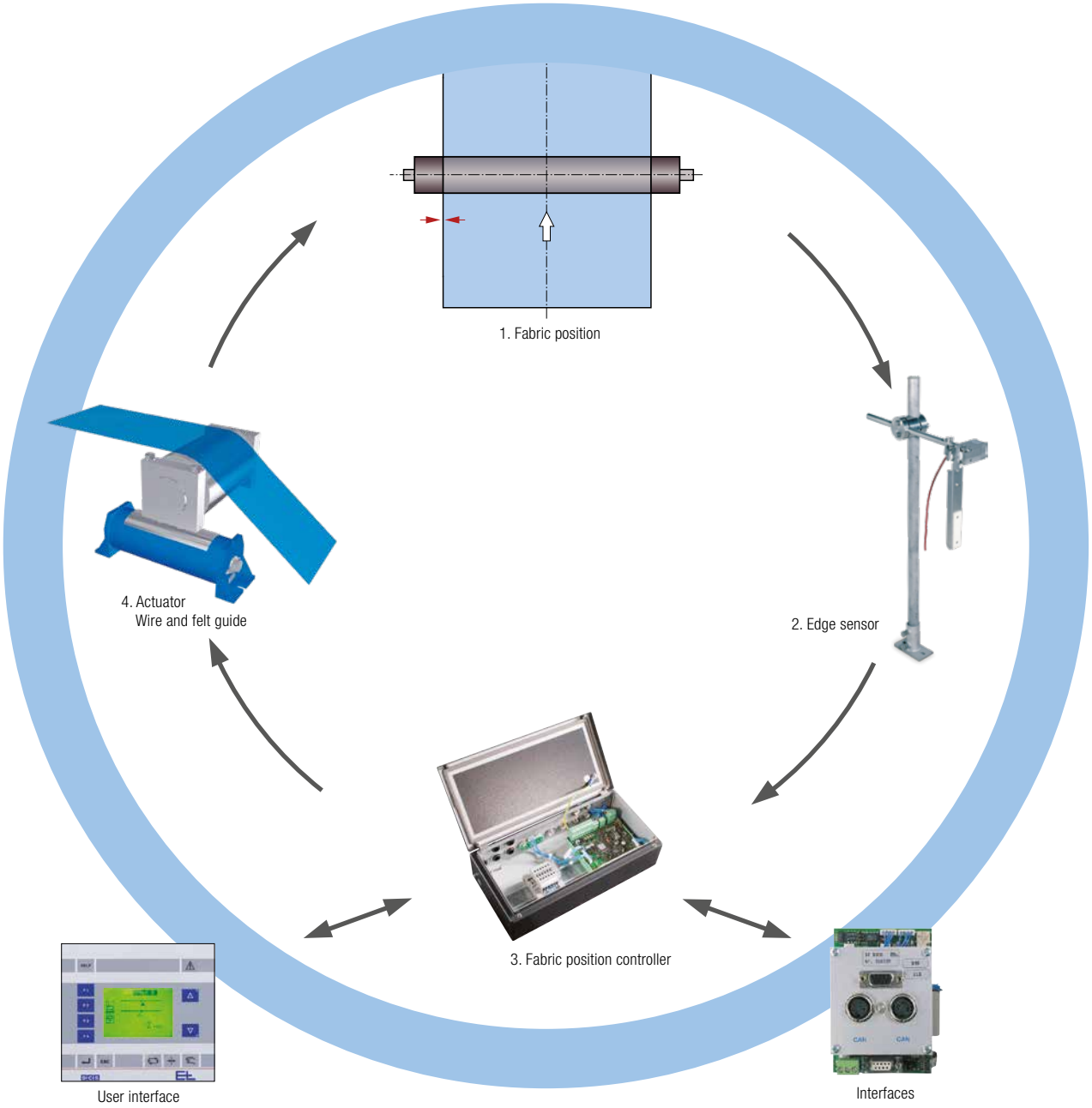
Fabric oscillation enables:

- Longer service life for the felt and wire
- Reduced wire abrasion in areas of increased wear
- Reduced edge bonding
- Support for felt conditioning
- Longer service life for the squeezing elements and suction cup coatings
- Reduced tendency of edges to curl on press felts

The control loop

The automation of any control system is based on the principles of a simple control loop. Even complicated tasks can be reduced to this control loop.

1. The starting point is the current position of the moving clothing.
2. Edge sensors continuously and precisely detect the position of the clothing.
3. The controller compares the actual position value with the defined target value and sends a corresponding correction signal to the actuator.
4. The actuator positions the control roller and in this way corrects the position of the clothing.



Felt and wire guide SK

- Flexible application thanks to position-independent mounting
- Pneumatic adjustment for harsh ambient conditions
- Control roller is either mounted in the bearing bracket or has a flat support for the pedestal bearing mounting
- Scraper attachment possible
- Precise edge detection via pneumatic or electrical edge sensors
- Integrated mechanical or electrical regulating variable feedback
- Optionally with a manual adjusting device
- Optionally with a pneumatically unlockable non-return valve (stop valve) for holding the control roller in its position in the event of failure of the compressed air supply
- Optionally with a supporting cylinder for compensation of the roller weight if the unit is installed in a tilted or vertical mounting position

Your benefits

- Stable control during running
- Exact positioning of the clothing
- Longer service life for the clothing
- Reduced consumption of compressed air
- Robust design
- Excellent long-term temperature resistance compared to air bellows
- Uniform contact pressure of the scraper against the control roller achieved through linear adjustment movement

Function

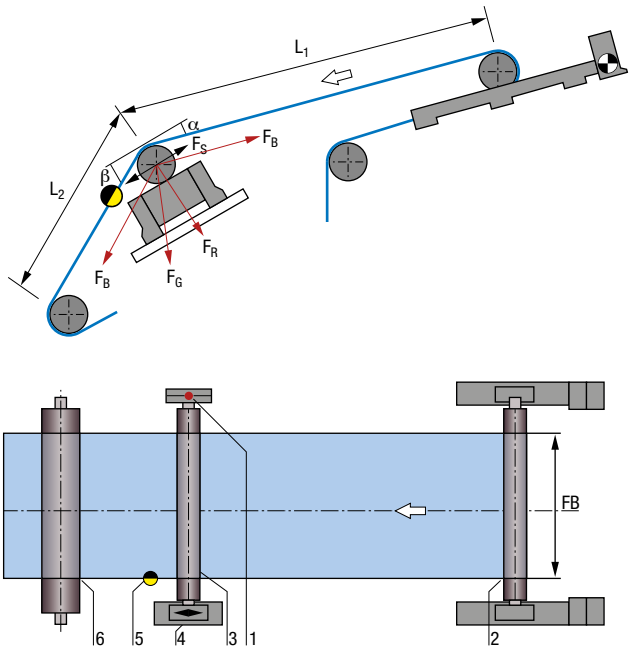
Rollers that are angled in relation to the direction of fabric travel cause the fabric to drift sideways. Felt and wire guiding systems exploit this principle.

Here, the pivot point for the control roller is one of the two bearings at the ends. The control roller is positioned at an angle around this point to suit the correction required. Mechanical or electrical regulating variable feedback delivers a stable control loop.

Application

The control roller requires an infeed path with a length corresponding to around 2/3 the width of the clothing. The length of the exit path should be around 1/3 the width of the clothing. The clothing must wrap 20° – 40° around the control roller, with the infeed angle being less than or equal to the outfeed angle.

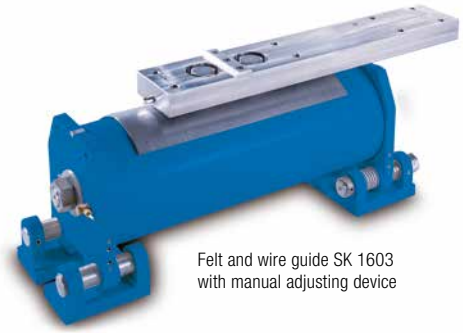
The edge sensor should be positioned in the exit path as close as possible after the control roller.



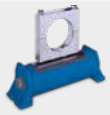
Legend

FB	Clothing width	1	Control roller pivot point with fixed bearing
α	Infeed angle	2	Infeed roller
β	Exit angle	3	Control roller
L_1	Infeed path	4	Actuator with floating bearing
L_2	Exit path	5	Edge sensor
F_B	Fabric tension	6	Outfeed roller
F_S	Actuating force		
F_G	Force due to weight of positioning roller		
F_R	Resulting fabric tension		

Felt and wire guide SK 1602



Felt and wire guide SK 1603
with manual adjusting device

Selection table			
Type	SK 0442 SK 0702 SK 1102 SK 1602	SK 0443 SK 0703 SK 1103 SK 1603	SK 0444 SK 0704
	■		
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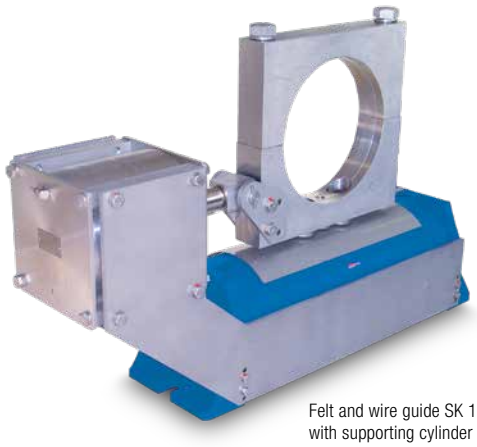


Felt and wire guide SK 1602
with supporting cylinder SK 1680

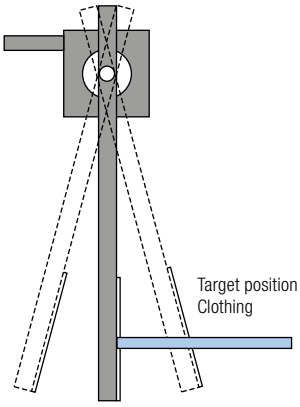
Technical data					
Type	**SK 02**	**SK 04**	**SK 07**	**SK 11**	**SK 16**
Nominal load	2500 N	13000 N	18000 N	30000 N	50000 N
Nominal actuating force at 3.5 bar	1300 N	3500 N	5400 N	9500 N	14100 N
Nominal actuating travel – automatic	±40 mm	±45 mm	±60 mm	±60 mm	±80 mm
Nominal actuating travel – manual (optional)	---	±25 mm	±30 mm	±30 mm	±40 mm
Cylinder diameter	70 mm	125 mm	150 mm	200 mm	250 mm
Ambient temperature	+10 °C to +150 °C	+10 °C to +150 °C	+10 °C to +150 °C	+10 °C to +150 °C	+10 °C to +150 °C
Material Wet area Dry area	 Stainless steel Painted steel	 Stainless steel Painted steel	 Stainless steel Painted steel	 Stainless steel Painted steel	 Stainless steel Painted steel
Nominal pressure	0 bar to 10 bar	0 bar to 10 bar	0 bar to 10 bar	0 bar to 10 bar	0 bar to 10 bar

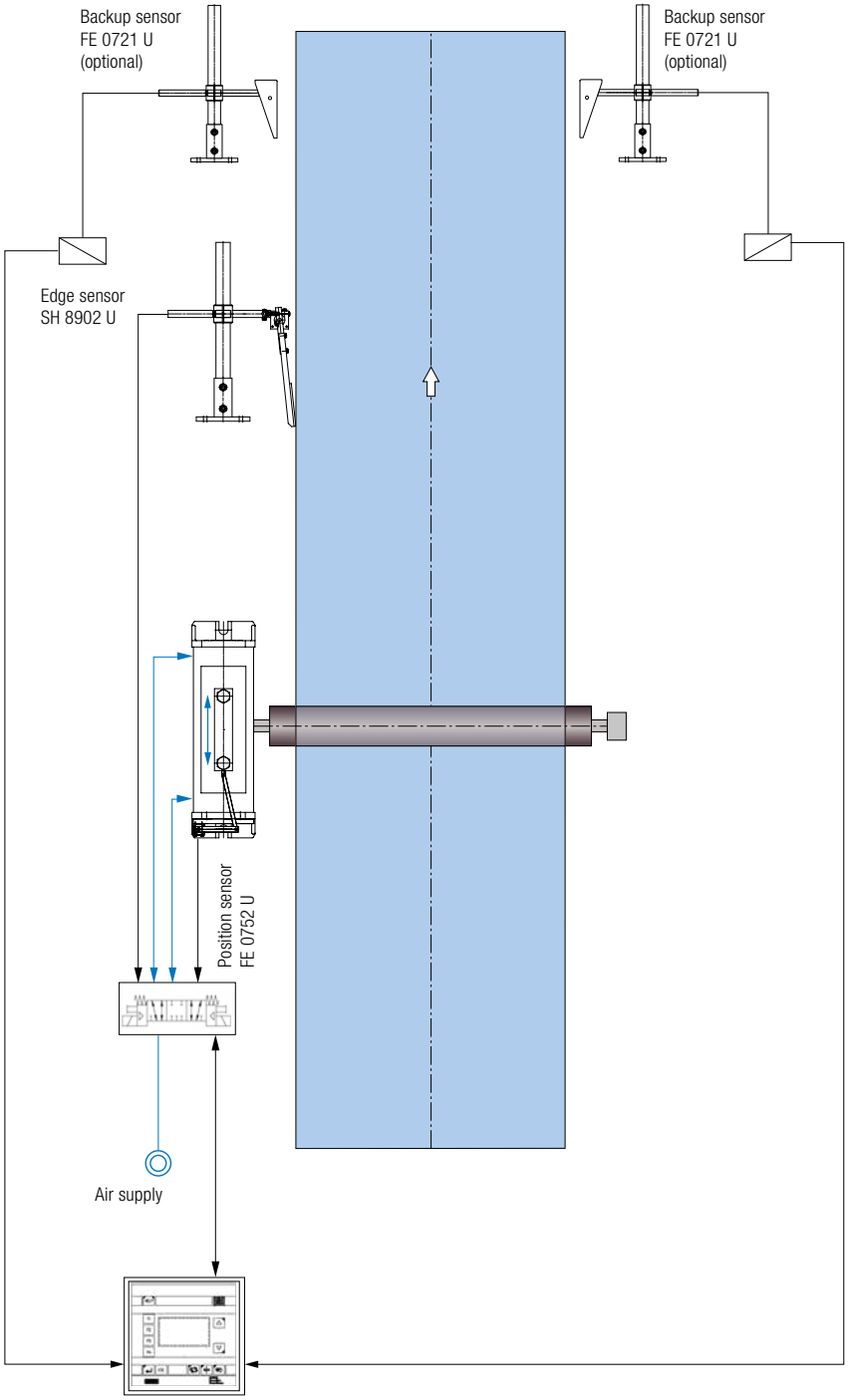
Electromechanical edge sensor SH 89

- Electromechanical edge sensor for exact detection of the clothing position in the wire, press, and dryer sections
- Electromechanical design with Hall sensors
- High temperature resistance up to +125 °C
- Robust design
- Suitable for clothing oscillation
- Can be retrofitted to all existing felt and wire guides
- Optional sensor plate with ceramic plate
- Optionally with a backup system for preventing damage to the clothing in the event of sudden mechanical impairment of the sensor

Function

The mechanism of the edge sensor transmits the position of the clothing edge to a permanent magnet. Depending on the position of the permanent magnet this causes a change in the magnetic field. This is converted contactlessly – and therefore with zero wear – by a Hall sensor into an analog electrical signal. Afterwards the signals are transmitted to the digital fabric position controller.





Electromechanical edge sensor SH 8902 U
(optional ceramic plate) with sensor stand ST 7005

Technical data	
Operating voltage, nominal value	10 V DC
Current consumption	0.1 A
Sensor plate contact force	Approx. 1.5 N, adjustable
Dead zone	±0.5 mm to ±25 mm, adjustable
Oscillation range	1 mm to 240 mm
Oscillation time	1 min to 250 min
Ambient temperature	+10 °C to +125 °C
Material	Stainless steel
Cable length	10 m
Protection rating	IP 67
Weight	2.8 kg
Dimensions (L x W x H)	Housing: 134 x 50 x 50 mm Sensor plate: 335 x 58 x 15 mm

Mechanical/pneumatic edge sensors FM 30 / SK 78

- Used in the wire, press, and dryer sections
- Low air consumption
- High temperature resistance up to +150 °C
- Robust design

Edge sensor FM 3081 / FM 3085

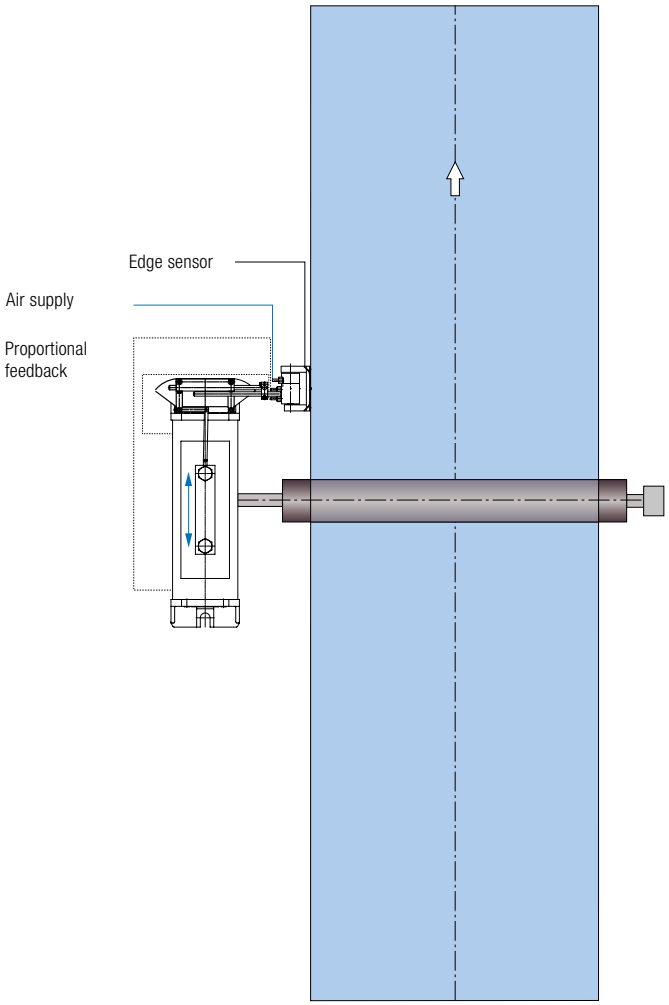
- Highest positional accuracy
- Low to very low contact force
- Pneumatic three-point controller (slide piston valve) integrated in the sensor
- Neutral position below 18° or in the center position, depending on the application
- Application-optimized valve design with option of small or large small dead zone
- Optional sensor plate with ceramic plate

Edge sensor SK 78

- High positional accuracy
- Low contact force
- Pneumatic three-point controller (rotary piston valve) integrated in the sensor
- Neutral position in the center position
- Optional sensor plate with ceramic or plastic plate

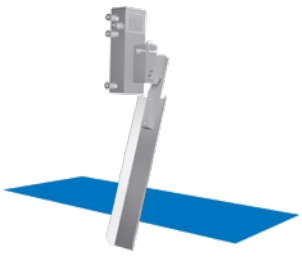
Function

The mechanism of the pneumatic edge sensor transmits the position of the clothing edge to a slide piston valve (FM 30) or to a rotary piston valve (SK 78). Depending on the position of the clothing, the relevant valve opens the air supply to the corresponding cylinder chamber of the adjusting device proportionally to the position of the sensor plate. The opposite cylinder chamber is vented at the same time. The valves are closed in the relevant neutral position. Air is only consumed if an actuating movement of the actuator is required.



Mechanical/pneumatic
Edge sensor FM 30
Optional ceramic plate

SK 78 mechanical/pneumatic edge sensor
Optional ceramic plate



Neutral position below 18°
(only for horizontal fabric running, without tension spring
for very low contact force)

Mechanical/pneumatic edge sensor FM 30

SK 78 mechanical/pneumatic edge sensor

Technical data

Mechanical/pneumatic edge sensor	FM 3081 / FM 3085	SK 7800
Measuring range	±65 mm	±50 mm
Pneumatic pressure	4 bar to 6 bar	2.5 bar to 3.5 bar
Compressed air preparation	Filtered compressed air with water removed, oil-free or lubricated	Filtered compressed air with water removed, lubricated
Sensor plate contact force	Approx. 1 N (neutral position below 18° approx. 0.6 N)	Approx. 2 N
Dead zone	FM 3081: ±0.5 mm FM 3085: ±2.5 mm	±7.5 mm
Ambient temperature	+10 °C to +150 °C	+10 °C to +150 °C
Material	Valve housing: stainless steel Sensor plate: stainless steel, optionally with ceramic plate	Valve housing: bronze Sensor plate: stainless steel, optionally with ceramic plate
Weight	Valve: 1.9 kg Sensor plate: 0.4 kg	2.4 kg
Dimensions (L x W x H)	Valve: 86 x 75 x 150 mm Sensor plate horizontal: 57 x 15 x 335 mm	110 x 120 x 322 mm

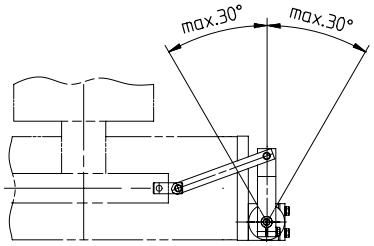
Position sensor FE 07

- Electric position sensor for accurate detection of the control roller position in the wire, press, and dryer sections
- Electromechanical design with Hall sensors
- High temperature resistance up to +125 °C
- Robust design
- Can be retrofitted to all existing felt and wire guides

Function

The mechanism of the sensor transmits the position of the control roller to a permanent magnet. Depending on the position of the permanent magnet this causes a change in the magnetic field. This is converted contactlessly – and there- fore with zero wear – by a Hall sensor into an analog electrical signal. Afterwards the signals are transmitted to the digital fabric po- sition controller.

Position sensor FE 0752 U with mounting attachment for felt and wire guide



Technical data	
Operating voltage, nominal value	10 V DC
Current consumption	0.1 A
Ambient temperature	+10 °C to +125 °C
Material	Housing: stainless steel
Cable length	10 m
Protection rating	IP 67
Weight	2.2 kg
Dimensions (L x W x H)	Housing: 114 x 50 x 50 mm

Mechanical proportional feedback PR

- Mechanical proportional feedback for improved positional accuracy
- Control roller movement proportional to size of error
- Stable control loop without tendency to oscillate
- Robust mechanical design
- For use on all ELGUIDE systems with mechanical/pneumatic edge sensors

Function

The proportional feedback mechanism transmits the actuating movement of the wire or felt guide to the position of the edge sensor. The displacement of the working position of the edge sensor enables the actuator to provide proportional error correction.

Mechanical proportional feedback PR with mechanical-pneumatic edge sensor SK 78

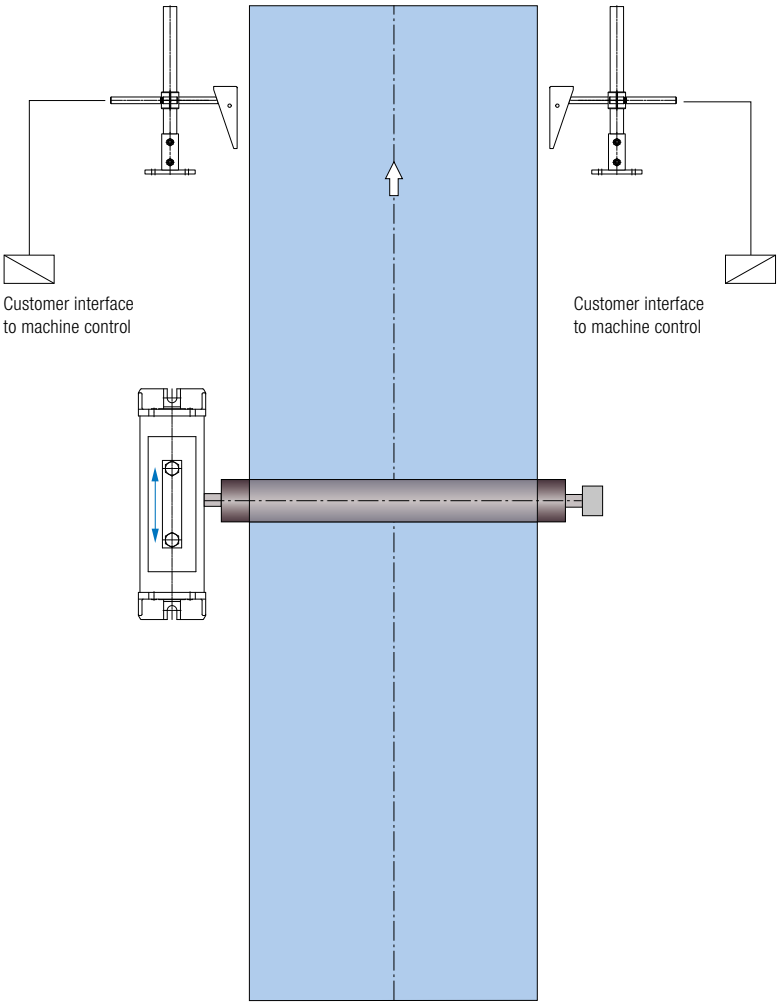
Technical data	
Material	Housing: stainless steel
Weight	Depends on the design of the actuator
Dimensions (L x W x H)	Depends on the design of the actuator

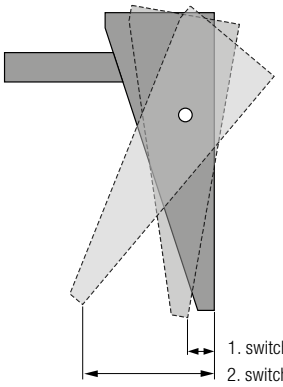
Alarm sensor FE 07

- Electric alarm sensor, suitable for the wire, press, and dryer section
- Reliable alarm triggering and/or machine shutdown if clothing runs off track
- Prevents clothing damage after failure or in the event of inadequate positioning control
- Spring-loaded sensor plate for avoiding false alarms
- Optionally with two switching points
- High temperature resistance up to +130 °C, optionally up to +180 °C
- Robust, maintenance-free design
- Can be retrofitted to all existing systems

Function

During the normal production process the alarm sensor is in a position next to the clothing where it is not in contact. When activated by the clothing, the mechanism of the sensor opens/closes the switching contact of inductive proximity switches. Then, depending on the selected alarm sensor, either an alarm is issued or first an alarm is issued and then the machine is stopped.

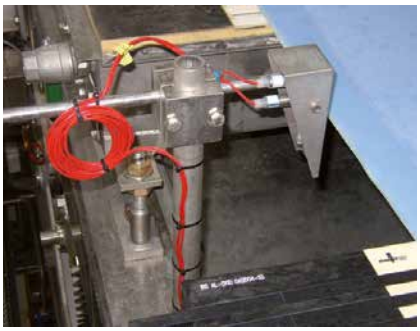




Alarm sensor FE 0722 U with sensor stand ST 7009

Technical data	
Operating voltage Nominal value Nominal range	 24 V DC 20 V to 30 V DC
Current consumption	4 mA
Ambient temperature	+10 °C to +130 °C, optionally to +180 °C
Material	Stainless steel
Cable length	10 m
Protection rating	IP 68
Switching point activation Sensor plate travel for 1st switching point Sensor plate travel for 2nd switching point	 10 mm 50 mm
Weight (FE 0721 U / FE 0722 U)	2.7 kg / 3.0 kg
Dimensions (L x W x H)	613 x 70 x 186 mm Sensor plate: 70 x 70 x 186 mm

Selection table	
FE 0721 U	1 switching point – alarm
FE 0722 U	2 switching points – alarm/stop



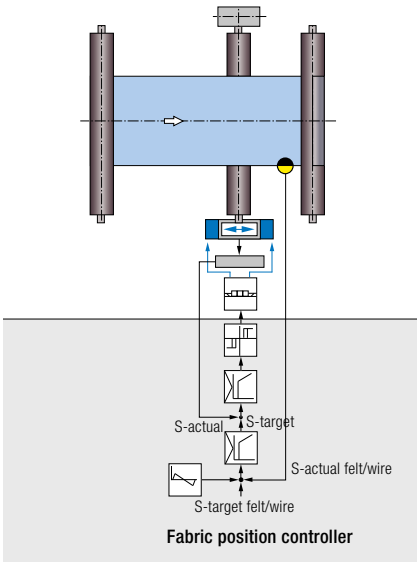
Fabric position controller DC 08/28

- Extremely compact digital fabric position controller with integrated digital inputs and outputs
- Three-point controller for actuation of a solenoid valve
- CAN bus technology makes complex cabling unnecessary, instead replacing it with simple plug connections.
- Software download via CAN bus or modem
- Analog output module can be connected via SPI bus
- Easy-touch calibration

Function modules

- Monitoring of the supply voltage
- Two digitally programmable alarm outputs
- Additional error display via error codes on a 7-segment display on the control card and on the DO 2000 command station

DC 08 fabric position controller



Control structure for fabric position controller
Three-point controller with adjustable window size

Selection table

Type	RK 4310	AK 4022	DO 2000
DC 0840	■		
DC 0870	■	■	
DC 2840	■		■
DC 2870	■	■	■
RK 4310	Control card		
AK 4022	Analog output module with four outputs from 0–10 V DC / 0–20 mA / 4–20 mA		
DO 2000	User interface with plain text display		

Technical data

Application	Electromechanical edge sensor SH 8902 U
Operating voltage Nominal value Nominal range	 24 V DC 20 to 30 V DC
Current consumption	0.5 A DC
Cycle time	10 ms
Ambient temperature	+10 °C to +50 °C
Digital inputs Input voltage for signal "1" Input voltage for signal "0" Input current	4 x potential-free 10 V to 30 V DC 0 V to 3 V DC Max. 10 mA per input
Digital outputs Output voltage at signal "1" Supply voltage Output current per output	4x potential-free and short-circuit proof Supply voltage 1 A
Analog inputs Resolution Input voltage Sensor supply	2x 12 bit 0 V to 10 V DC 4x 10 V ± 10 mV, 50 mA each
Serial interface CAN bus level CAN baud rate	 +5 V DC (potential-free) 250 kBaud
Protection rating / dimensions (L x W x H) / weight Top-hat rail mounting in acc. with DIN EN 50022 With housing	 IP 00 / 330 x 111 x 85 mm / 0.6 kg IP 54 / 300 x 150 x 80 mm / 2.1 kg

User interface DO 20

- User interface with user-friendly plain text display
- Structured depiction of the CAN network
- Simple "Setup Editor" for parameter setting during initial commissioning
- Display of the actual position of the edge sensor and actuator plus the deviation of the actuator from the mechanical center position
- Display of error messages
- Multiple operation of up to eight control systems
- As an option, operation can be completely locked via a keyswitch.
- The network including the parameters of all participants can be saved as a backup in the command station.

DO 20 command station

Selection table

Type	Panel mounted kit	With housing
DO 2000	■	
DO 2001		■

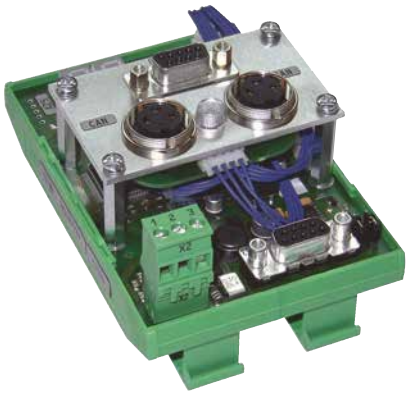
Technical data

Operating voltage Nominal value Nominal range	 24 V DC 20 V to 30 V DC
Current consumption	200 mA DC
Ambient temperature	+10 °C to +50 °C
Serial interface CAN bus level CAN baud rate	 +5 V DC (potential-free) 250 kBaud
Dimensions Front frame panel mounting kit Cut-out for panel mounting kit With housing for field use	 152 x 138.4 mm 121 x 111.5 mm 180 x 190 x 95 mm
Protection rating of panel mounting kit (installed) Protection rating with housing for field use	IP 54 IP 54
Weight DO 2000 Weight DO 2001	0.55 kg 1.3 kg
Operating languages	German, English, French, Italian, Spanish, Portuguese

Interfaces

Modern production facilities have a central control station or a control room. In this case the fabric tension measurement and control systems can be connected to different bus systems or to a PLC/IPC.

E+L offers a range of interfaces with standard protocols for this purpose. The interfaces contain a CAN connection with a corresponding bus driver module.



Interface DI B000

Technical data DI B000	
Interface	Profibus (DI B000) 2 x CAN at E+L system
Operating voltage Nominal value Nominal range	 24 V DC 20 V to 30 V DC
Current consumption	0.2 A DC
Ambient temperature	+10 °C to +50 °C
Protection rating	IP 00
Dimensions (L x W x H) / weight Top-hat rail mounting in acc. with DIN EN50022	 111 x 75 x 100 mm / 0.25 kg

Interface DG 0___

Technical data DG 0	
Interface	Ethernet/IP (DG 0201) ControlNet (DG 040) PROFINET (DG 0701) 2 x CAN at E+L system
Operating voltage Nominal value Nominal range	 24 V DC 20 V to 30 V DC (incl. ripple)
Current consumption	Max. 0.2 A DC
Ambient temperature	+10 °C to +60 °C
Storage temperature	-25 °C to +80 °C
Relative humidity	15 % to 95 % (non-condensing)
Protection rating	IP 20
Mounting	Top-hat rail mounting in acc. with EN 50022 (35 x 7.5 mm)
Dimensions (L x W x H)	125 x 76 x 133 mm
Weight	0.8 kg
Certification	CE conformity

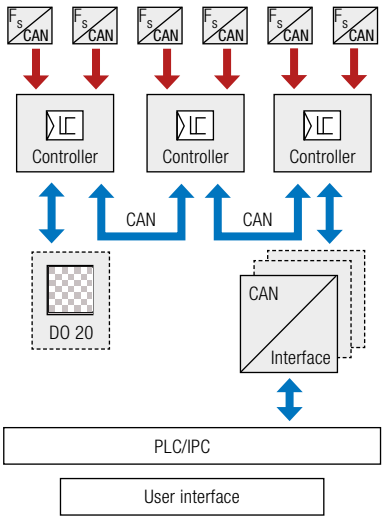
Networking

CAN bus

All the functional modules of the digital control system (DCS) feature a CAN bus interface via which they are networked with each other. This feature ensures not only flexible adjustment of the E+L control system to new tasks but also guarantees maximum immunity to interference and minimum wiring effort.

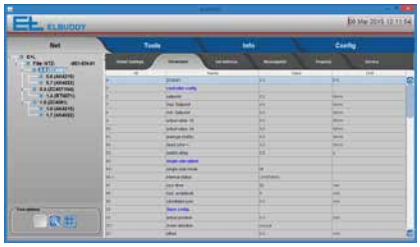
A controller group can contain up to 16 participants, including e.g. sensors, controllers, interfaces, or command stations. Up to eight controller groups can be implemented together in a shared CAN network with a length of up to 160 m. A CAN extension DI 0010 is available for lengths of 160 m and upwards; this is simply plugged in between two CAN networks.

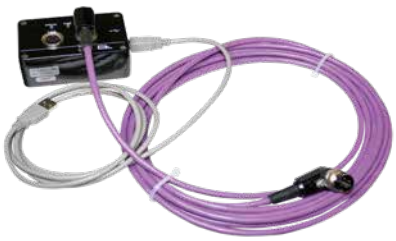
CAN extension DI 0010



User-friendly diagnostics with ELBUDDY diagnostic tool

Complex systems require a simple, clearly laid-out representation of the entire network. The ELBUDDY software tool for Windows computers depicts the CAN network in a structured form. At the same time, it also includes a convenient setup editor for adjusting all control parameters. In addition, ELBUDDY can also be used to both save and print out the entire CAN network.





CAN-USB adapter ZC 40

Accessories

Service unit

- Pressure reducer with pressure gauge, water separator, filter, and oiler
- For preparation of compressed air in accordance with the applicable regulations
- Ensures reliable and safe function of the mechanical/pneumatic sensors FM 30 and SK 78

Service unit NT 7003

Service unit NT 7004

Technical data		
Service unit	**NT 7003**	**NT 7004**
Ambient temperature	+10 °C to +150 °C	+10 °C to +60 °C
Oil container capacity	170 ml	50 ml
Input pressure	Max. 30 bar	Max. 16 bar
Output pressure	0.5 bar to 8 bar	0.5 bar to 10 bar
Weight	3.5 kg	0.9 kg
Dimensions (L x W x H)	229 x 107 x 169 mm	118 x 122 x 196 mm

Air hose set

- Prerequisite for operation of all wire and felt guides
- Pre-assembled length of 10 m
- Suitable for all connections of the ELGUIDE systems

Stop valve

- Holds the control roller in a fixed position in the event of loss of compressed air

Non-return throttle valve

- For adjustment of the actuator travel speed in conjunction with mechanical/pneumatic edge sensor FM 30

Questionnaire

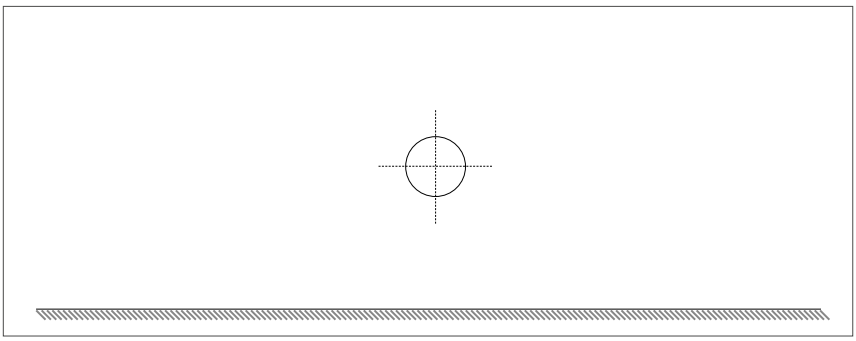
General data					
Customer					
Street					
Zip code				**City/town**	
Country				**Internet**	
Contact person					
Phone				**E-mail**	
Paper machine no.		**Project**		**Paper machine manufacturer**	

Technical data			
Installation point	❑ Wire section	❑ Press section	❑ Dryer section
Ambient temperature	°C	Machine speed	m/min
Max. felt/wire tension	N/mm	Felt/wire width	mm

Technical specifications – Actuator

Mounting position of the felt and wire guides

Machine drawing or sketch
(seen from the operator's side) with
- Installation angle
- Felt/wire running direction
- Infeed angle and exit angle



Third-party components	❑ Scraper _____ kg		❑ Other (description and weight) _____ kg
Weight	Control roller _____ kg		Roll bearing _____ kg
Roll bearing	❑ Cylindrical Ø _____ mm		❑ Spherical Ø _____ mm
Pedestal bearing	Weight _____ kg	Foot plate _____ mm	Center height _____ mm
Painting	❑ Brilliant Blue RAL 5007	❑ Silver Gray RAL 7001	❑ Special color RAL

Technical specifications – Fabric position control system

With electromechanical edge sensor	❑ Fabric position controller DC 08/28 with edge sensor SH 89 and position sensor FE 07 ❑ With backup sensors	❑ Profibus DI ❑ Ethernet/IP ❑ Ethernet UDP ❑ Analog output module AK 40
With mechanical-pneumatic edge sensor	❑ Edge sensor SK 78	❑ Edge sensor FM 30
Operating voltage	❑ 24 V DC	❑ With power supply unit _____V _____Hz

Sensor for detecting if fabric runs off track

Alarm sensor FE 07	❑ 1 switching point – alarm ❑ With sensor stand	❑ 2 switching points – alarm/stop ❑ With sensor stand

Date		Issuer	

Services from A – Z

We help from the very beginning

At the start with your new fabric position control system, a thorough analysis is undertaken by your personal E+L advisor. As a specialist for the complete product range from Erhardt+Leimer, your advisor will be pleased to advise you also about other topics related to your production.

Project planning with experience

The project planning team in our headquarters in Augsburg will prepare a bespoke solution for you, even for difficult applications. With the experience of numerous installations all over the world, our specialists do not view problems in the field of fabric position control in isolation, but always in the overall process-related context.

Complete solutions

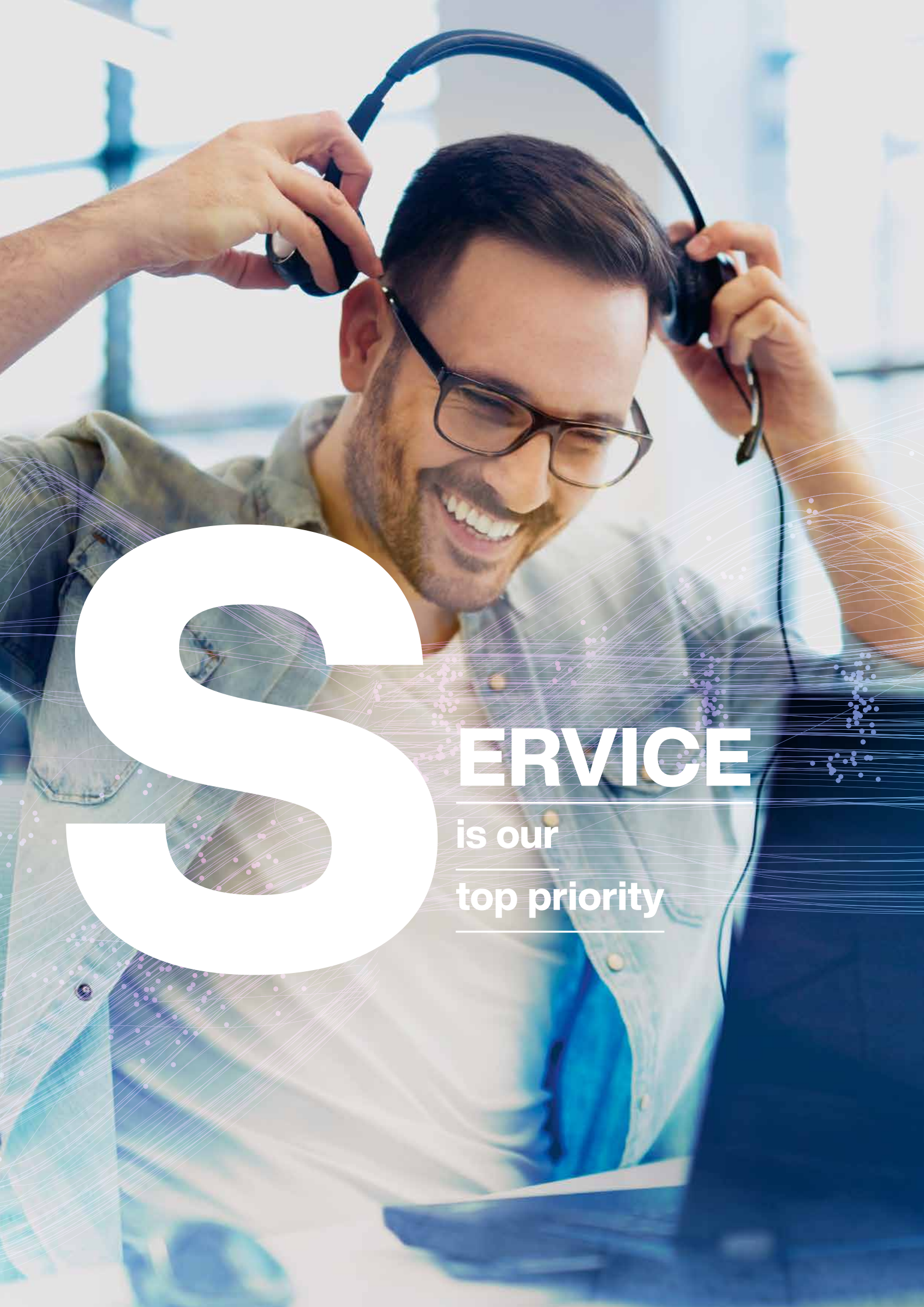
Erhardt+Leimer will provide you with a complete solution from a single source. On request, we can also supply the system complete with a controller installed inside the control cabinet. Our experts will be glad to help you make the necessary adjustments after installation to ensure that your new system is perfectly set up for the specific conditions on site.

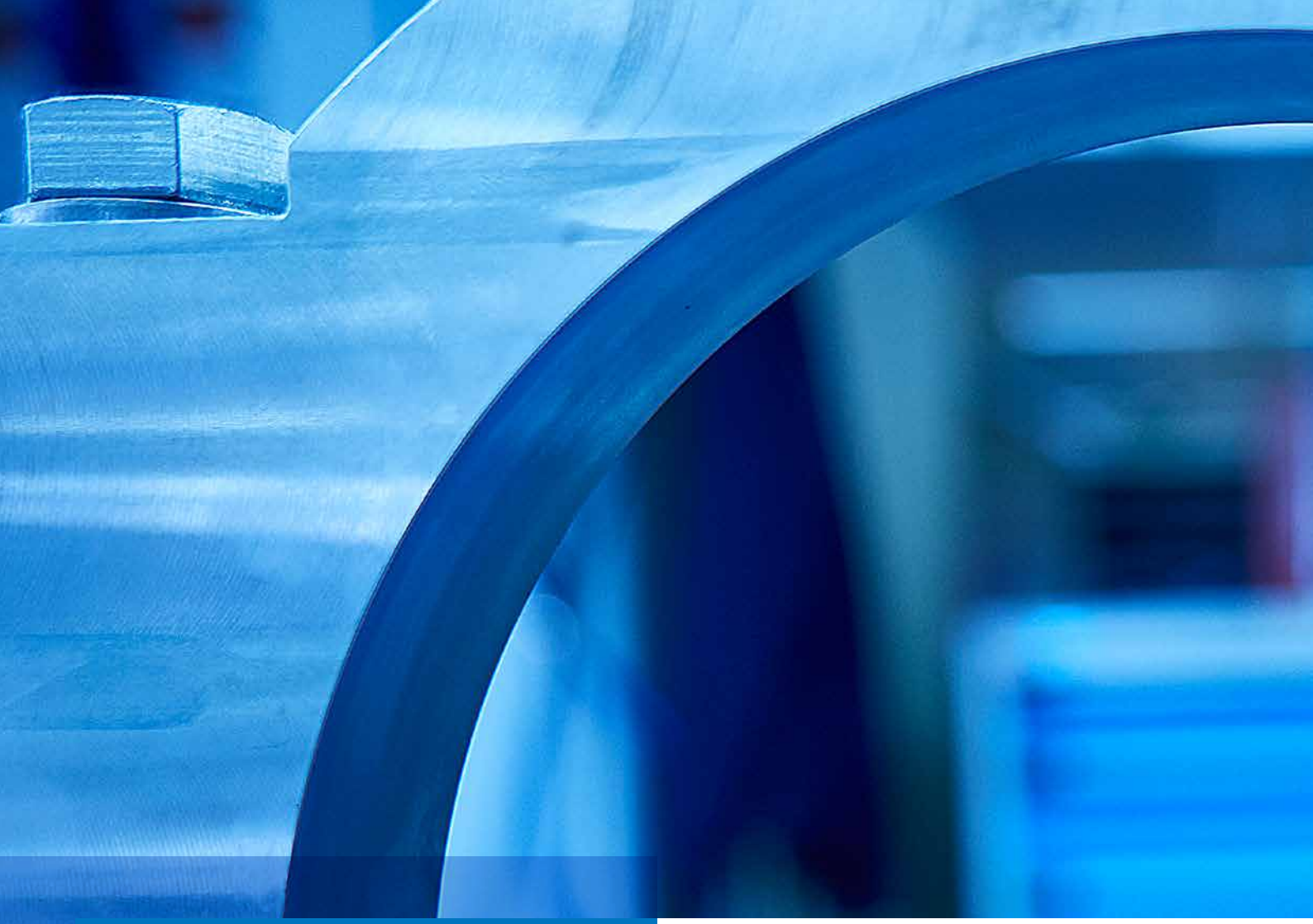
Worldwide service

After installation in your premises, our work is not yet complete, because for E+L, intensive customer service is a matter of course. Our close-knit, worldwide service network makes use of the latest diagnostic technology, such as teleservice or modem-controlled remote diagnostics. Whether complete installation and commissioning, repair or maintenance – just give us a call and we will address your requirements.

Training for every application area

For the full utilization of the high performance of your new systems from E+L, even in complex applications, we offer machine manufacturers and users of our products "help for self-help". We offer one-day or multi-day training courses for installation and service technicians in our Augsburg training center or on your premises.


SERVICE
is our
top priority



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