ELFEED®

Tenter guider

Continuous acquisition and control of the rail position

Contents

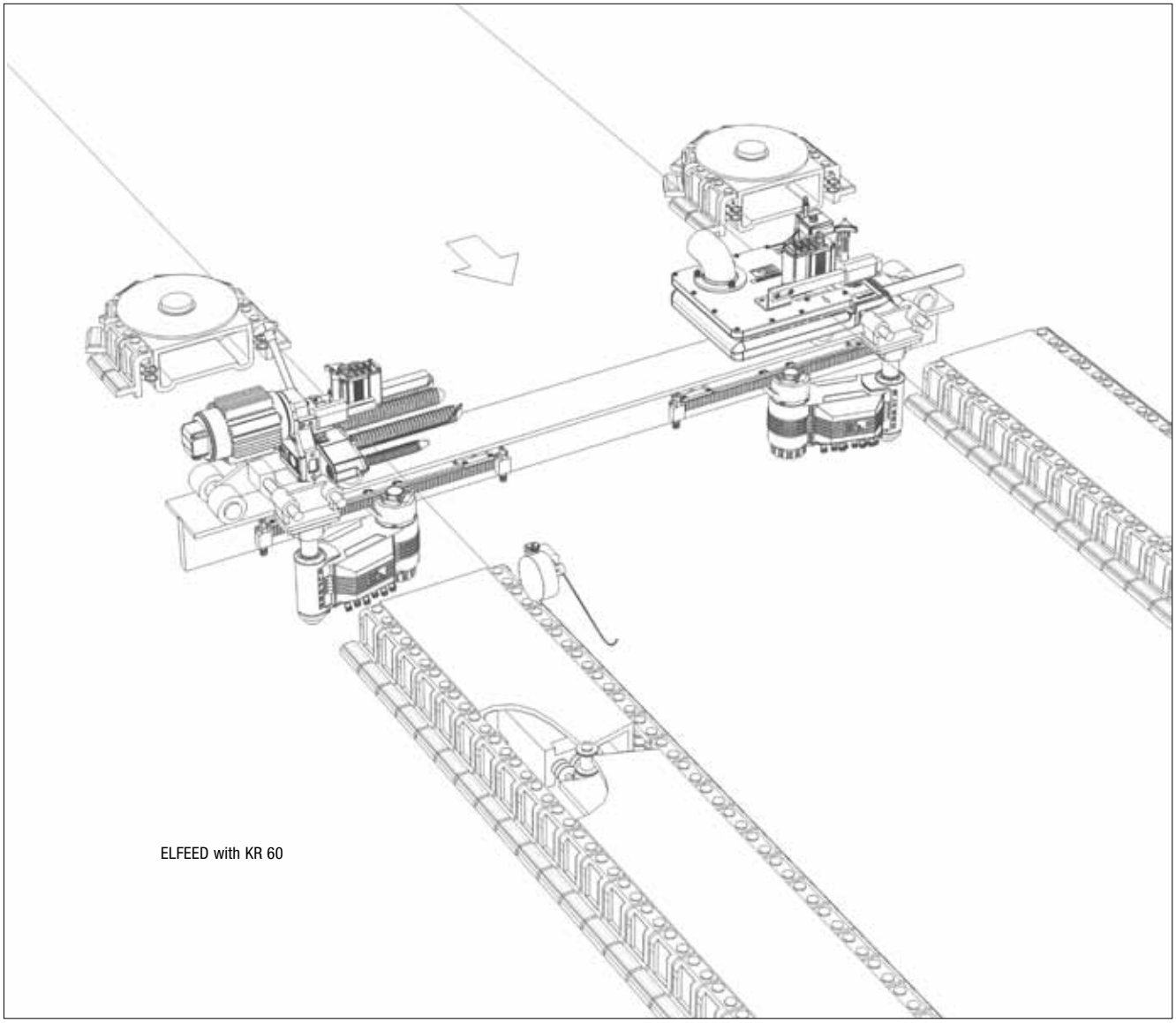
Task and function

Task
The effectiveness of a tenter is defined already at the infeed, as here the edges of the web must be reliably acquired by pins or nippers on the transportation chain.

A continuously changing web position makes a tenter guider for correction imperative. Fully unrolled edges on knitted fabrics are
crucial for minimizing the cut waste. Only optimal web guiding will ensure high machine utilization and therefore the high production performance of the drier.

Function
On a tenter guider an infrared edge sensor detects the edge of the web. A position controller ensures that the rail is always precisely adjusted to the continuously changing web.

Digital technology
Digital control combined with a high-resolution infrared edge sensor always ensures exact pining with very low overpinning . The system solution with - all in one - AC/EC (alternating current - electronic commutation) compact actuators is technologically unique with its integrated controller and direct line operation and is maintenance-free.

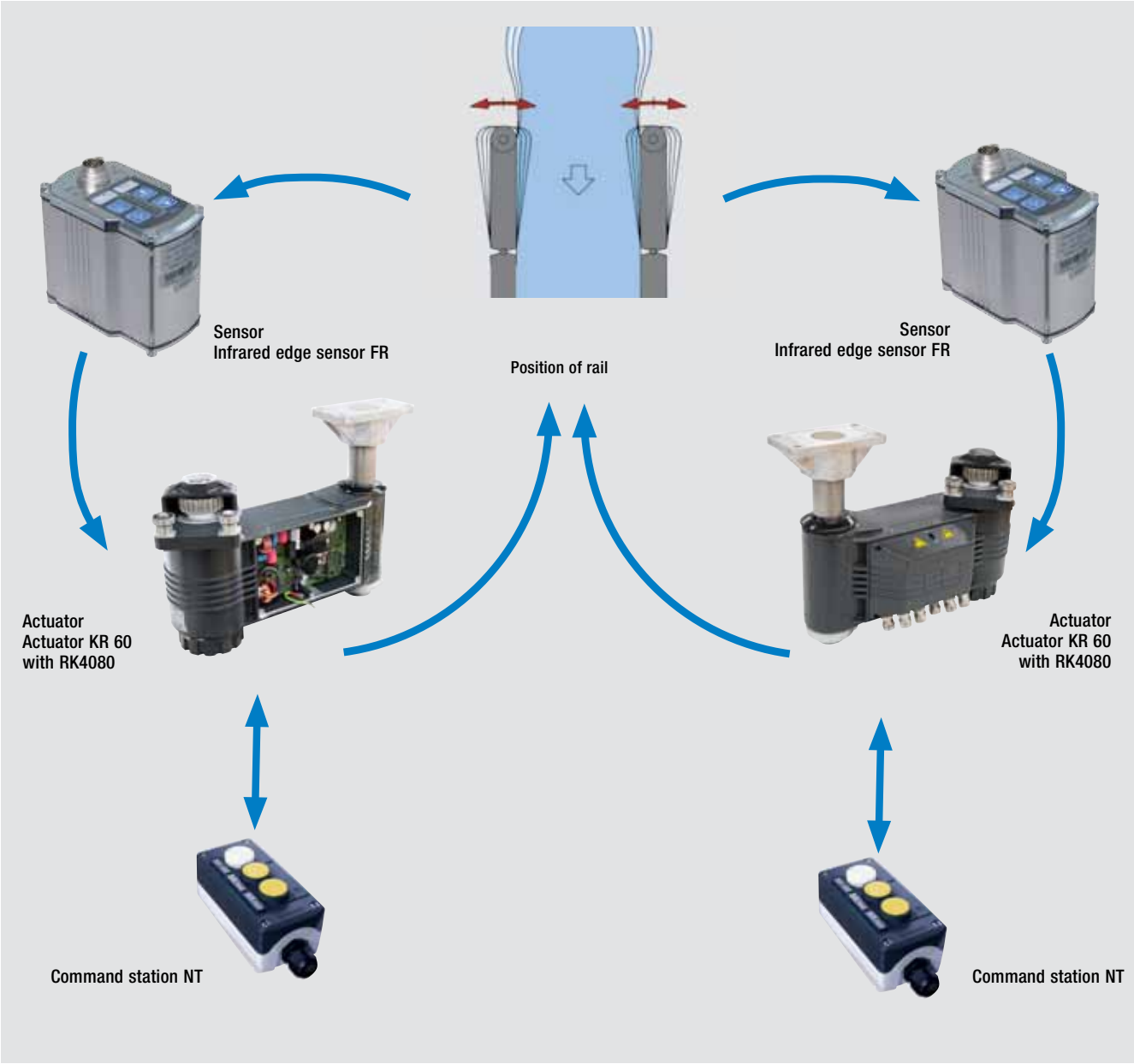


ELFEED with KR 60

The control loops

All automated control systems are based on the principle of a simple control loop. Even the most complex of tasks may be reduced to this control loop.

+ The starting point is the actual position of the web which changes continuously
+ An infrared sensor contactlessly acquires the actual position of the rail
+ The controller compares the actual position (actual web position) with the set position for the rail and outputs a corresponding correction signal to the actuator
+ The actuator corrects the position of the rail and in this way ensures correct web acquisition



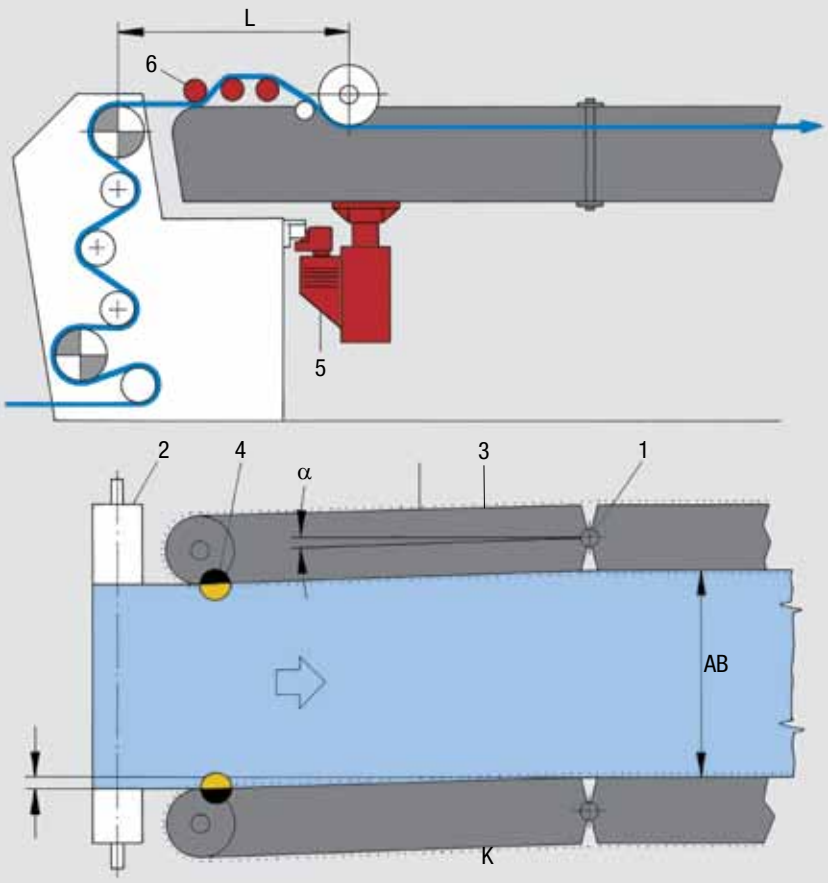
Rail position control

Function
The task is always to bring the infeed rails to a defined position over either the pins or the nippers on the tenter chain.

Application
The rail position control is used on all normal tenters, coating and leveling frames for woven and knitted fabrics, as well as for carpets.

Design
Nowadays the infeed rails are operated either via a rack drive or a spindle drive. The rack solution covers almost all applications. The trapezoid spindle is used if self-locking is required at machine standstill with high cross tension.

Application
The compactness of the KRS 60 is not achieved by any other system. For optimal control behavior, as far as possible sensor and KR 60 should be arranged in a vertical line.



Legend

K Correction path for rail	α Correction angle	L Infeed path	AB Operating width
1 Pivot points	2 Infeed roller	3 Rails	4 Sensors
5 Actuator	6 Spreading device		

Tenter guider ELFEED KRS 60

The - all in one - AC/EC compact actuators with integrated controller are maintenance-free and highly dynamic, an aspect that permits machine speeds of up to 150 m/min without problems. Together with the infrared sensor
FR 55 each side of the machine forms a dedicated control loop.

Design

Transfer of the rail adjustment either via rack (more than 98 %) or via spindle for special applications.

Application

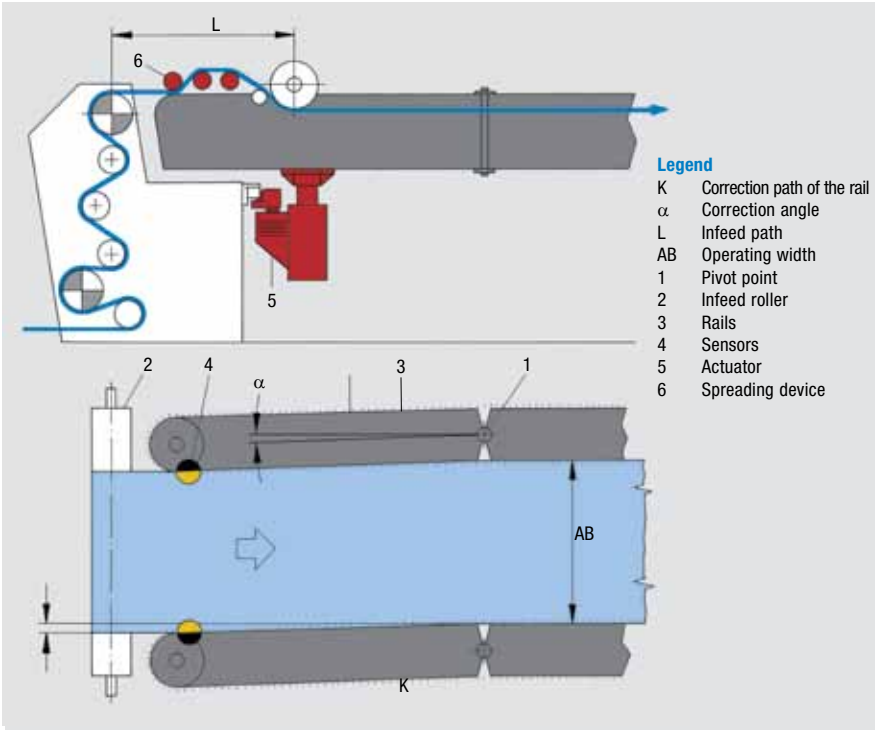
The actuators must be fitted as close as possible to the infeed roller on the tenter's infeed. Ideally the sensor and the actuator are arranged on a common vertical line so that optimal control precision is achieved.

ELFEED KRS60

The tenter guider ELFEED KRS60 sets new standards for precise pinning at high production speeds. The KRS60 is the world's first tenter guider to use an "all in one" compact actuator with integrated controller for direct line operation (100 V to 250 V).

The combination of a CCD infrared sensor with a resolution of 0.1 mm and dynamic control ensures the webs are always pinned with precision.

The actuator KR 60 is a maintenance-free, brushless motor. Combined with a planetary gearbox, it impresses with very high dynamic performance and excellent efficiency. The power is transmitted to the feed rail via a pinion on a rack. This simple, robust system has been proven over decades, also in adverse ambient conditions. In addition, the sensitivity of the controller can be adjusted at the sensor.



Legend

K	Correction path of the rail
α	Correction angle
L	Infeed path
AB	Operating width
1	Pivot point
2	Infeed roller
3	Rails
4	Sensors
5	Actuator
6	Spreading device

Technical data

Nominal voltage	100 to 240 V AC, 50/60 Hz
Maximum current consumption (110 V)	4 A
Nominal power	350 W
Nominal actuating force	1300 N
Actuating speed max.	120 mm/s
Protection class	IP 54
Ambient temperature	+10 to +60°C
Storage temperature	-10 to +80°C
Installation altitude max.	2000 m above sea level
VDE test	in acc. DIN EN 61010-1
Weight	
Without flange column	16 kg
With flange column	23 kg

Actuator KRS60

Tenter guider ELFEED KRS 47

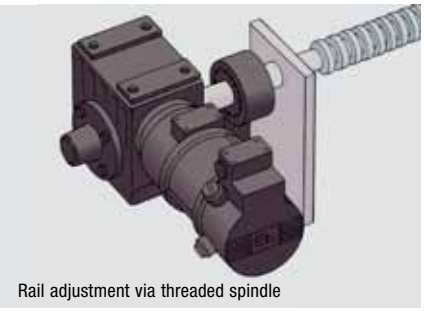
Actuator KR 47 in the system ELFEED KRS 47

This actuator is particularly suitable for slowly moving tenters and coating machines in which high adjustment forces are required and self-locking is required. If used on machines on which corrosive media are used, the actuators can be mounted outside the area affected by the chemicals.

The digital controller DC 55 has two output stages that are used for the 2 actuators in a KRS 47

Actuator KR 47 - KRS 49

The higher power for a KRS 49 is achieved by using two digital controllers 55. Each actuator KR 47 is then switched using 10 Ampere instead of 6 Ampere.



Rail adjustment via threaded spindle

Actuator KR 47

DC 55

The transistor controller, which operates in all four quadrants, is available in two power levels. The pulse-modulated end stage provides a continuous current of 8 or 12 Ampere at an operating voltage of 34 V DC. The exceptionally high efficiency of the end stage means the user can accommodate the components in a minimum of space.

Controller DC 5501

Overview of tenter guiders

	Rail adjustment via threaded spindle	
Type	**KRS 47**	**KRS 49**
Actuator	2 x KR 47	2 x KR 47
Sensor	2 x FR 55	2 x FR 55
Rail limit switch	2 x ATL	2 x ATL
Controller	1 x DC 55	2 x DC 55
Web speed	Up to 50 m/min	Up to 80 m/min
Nominal adjustment velocity	-	-
Nominal speed	160 1/min	240 1/min
Nominal actuating force	-	-
Nominal torque	8.5 Nm	13 Nm

Infrared edge sensor FR 55.3

The digital infrared edge sensor FR 55 completes the control loop for the digital tenter guider. The FR 55 permits optical or mechanical scanning of the edge of the web; in accordance with the reflection principle the web is used as a reflector. The infrared light transmitter and also the receiving elements are mounted inside the sensor housing. Infrared light also guarantees reliable scanning of the web edge with both high contrast printed colors and poorly reflecting colors.

In case of very uneven web edges (e.g. protruding threads) mechanical scanning by using the scanning lever (also possible during production) will dampen the response of the control.
The mechanical scanning lever is optional and can be added at any time.
The contact pressure on the scanning lever can be adjusted.

Usage

The web edge is indicated and the address is set manually on the top of the housing using a membrane keypad. In addition it is possible to set at the sensor the sensitivity characteristic for the control of the actuator KR 60. as well as the sensitivity of the sensor.

The correct distance to the web of 36 mm is always ensured by E+ L in conjunction with a selvedge opening device and the related sensor adjustment. In other cases a web guide bar is required.

Technical data

Supply voltage	
Nominal voltage	24 V DC
Permissible range	20 to 30 V DC (ripple included)
Current consumption	100 mA
Power consumption	2.4 W
Scanning frequency	100 Hz
Measuring range	+/- 10 mm
Distance edge sensor - web	36 mm
Protection class	Max. IP 65 with suitable connector inserted
Ambient temperature	10 to 60°C
Storage temperature	-10 to +80°C
Weight	
Without scanning lever	0.37 kg
With scanning lever	0.46 kg

Selection table

Type FR 55..	**..03**	**..13**
Measuring range +/- 10 mm	■	■
With scanning lever	■	
Without scanning lever		■

Rail limit switch ATL 0103

Limit the correction angle of the rail and therefore protect the transportation chain against damage.

ATL 0103

Pinning/depinning monitors FM 05

Monitor reliable pinning and depinning in the transportation chain.

FM 05

Selvedge opening devices ELSPREADER

Pneumatic selvedge opener LPA 03

The pneumatic selvedge opener, ELSPREADER LPA 03, is used for spreading and smoothing out very delicate knitted and woven fabrics that are particularly susceptible to curling. Depending on the characteristics of the curled edge or sometimes even fringed edges, jets can be used on one side or both sides. Furthermore, the air outlet angle on each jet can be adjusted to suit the requirements. The air flow, very carefully directed via the optimally adjusted jets, reliably spreads any curled or folded web edges.

The ELSPREADER LPA 03 is the only system in the world that functions efficiently without mechanical contact with the surface of the web.

LP 0301

LP 0303

Motorized selvedge opener LA 82/83/84

Only the usage of motorized, pivoting opening spindles guarantees reliable acquisition of web to be fed in the transportation chain. Selvedge openers with two or three spindles ensure reliable spreading of woven fabrics. With a further, fourth spindle even knitted fabrics are reliably spread.

LA 82

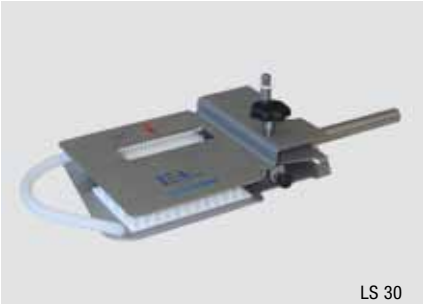
LA 84

Mechanical selvedge spreader LS 30/31

The mechanical plate spreaders LS 30/31 supplement our extensive range of the spreading devices for the infeed on tenters. The plastic spreading plates with angled profile reliably spread the rolled edges on knitted fabrics. The plastic profiles have high resistance to wear. The spacing between the plates is adjusted using a handwheel, the spacing setting is dynamic. When thick seams pass through, the two plates move apart to prevent damage to the web or the plates.

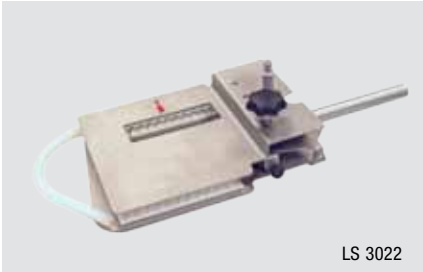
Mechanical selvedge spreader LS 50

The LS 50 is used, e.g., on the foulard ahead of the tenter. The complete operating width range is covered with a pair of LS 50. It is not necessary to adapt the spreading device to the related operating width required.



LS 30

LS 31



LS 3022

LS 50

Selection table ELSPREADER

Type	Woven fabric	Knitted fabric	Dry	Damp	Wet	Application notes
LP 03	■	■	■	■		For delicate web, for heavily curled edges
LA 82	■		■	■		For folded or slightly curled edges
LA 83	■	■	■	■		For normally curled edges
LA 84	■	■	■	■		For heavily curled edges
LS 30	■	■	■	■	■	For normally curled edges, for pin chains
LS 31	■	■	■	■	■	For folded or slightly curled edges, for clip or combined chains

Stainless steel spreader rollers BG

The spreader rollers spread the web over the entire width without creases. Due to the specially developed profiles the web is spread as gently as possible.

E+L expertise in the tenter sector

Edge cutter ELCUT BTA 77

BTA 77 is an easy to use cutting tool. The cut is made at the depinning wheel. As the web is still fixed to the pins on cutting, it is also suitable in case of high cross tension on the web.

BT 7713

Edge cutter ELCUT BTA 80

The edge cutter ELCUT BTA 80 is used in pairs on the tenter's outfeed for cutting the glued edges of the web.

Features

- Shear cut
- Continuous blade lubrication
- Front and rear of blades can be used
- Cutting force adjustment at the bottom blade
- Motorized lateral adjustment for waste strip setting or automatic blade follow-up
- Nozzles for pneumatic selvedge opening or mechanical selvedge opening device
- Adjustment of the cutting speed to the web speed using frequency inverter (optional)
- Loss of the web by infeed and outfeed roller in cutting plane not possible
- Minimum edge material cutting setting possible

BT 8013

Usage

Outfeed on tenters for woven fabrics, knitted fabrics, technical textiles

Web tension measuring and control ELTENS

Processes with controlled web tension are reliable due to reproducible operation and therefore contribute efficiently to increasing quality. The load cell has almost no moment of inertia like a dancer roller and therefore controls more dynamically and with greater precision. This statement applies both to cutting and to winding processes. The optimal tension to suit the web is always used. As a result the material is protected to the maximum. A constant web tension during the cutting process minimizes malfunctions and in this way increases the performance of the complete system.

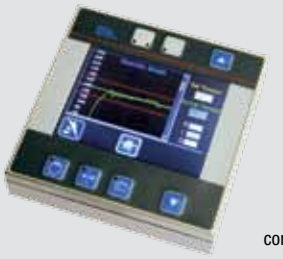
Flange load cells

These cells are available in aluminum, steel or stainless steel to suit the required application. Path rollers with spigots and their ball bearings are fitted in the load cell.

Block load cell PD 50

Load cell PD 25

Load cell PD 21



Web tension controller DC 62

Web tension measuring amplifier CV 22

Sensor roller PD 30

This roller is particularly suitable for upgrades. This sensor is delivered in the necessary length. Installation is complete with just two screws.

Sensor roller PD 30

Web width measurement with broadband sensor FE 45

The digital broadband sensor operates with infrared light, is self-supporting and detects the edges of the web using a scanning process. The web width can be output via a separate command station. Alternatively it is possible to output the width via interfaces (analogue, digital or serial e.g. to a PLC).

This broadband sensor is also ideal for the trouble-free upgrading of an existing web guiding solution and for use on a new, customer web guiding solution.

Broadband sensor FE 45

Versions

Web guiding by web center:

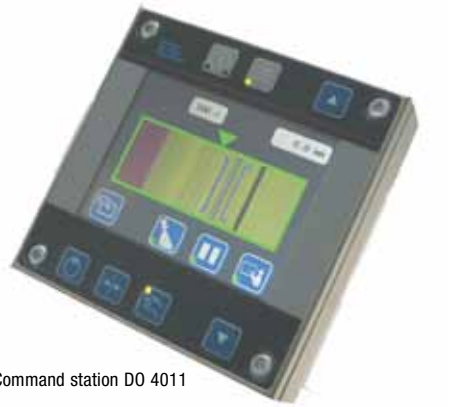
Type	Measuring range	Accuracy
FE 451.	3400 mm	+/- 5 mm
FE 452.	3400 mm	+/- 3 mm
FE 453.	1800 mm	+/- 1 mm

Web guiding by web edge:

Type	Measuring range	Accuracy
FE 457.	1700 mm	+/- 5 mm
FE 458.	1700 mm	+/- 3 mm
FE 459.	900 mm	+/- 1 mm

Measurement of the web width:

Type	Measuring range	Accuracy
FES457.	3400 mm	+/- 10 mm
FES458.	3400 mm	+/- 6 mm
FES459.	1800 mm	+/- 2 mm



Command station DO 4011

Weft straightener ELSTRAIGHT

Weft straightener for woven and knitted fabrics. CCD matrix technology is used in the weft straightener ELSTRAIGHT.
Intelligent cameras evaluate the distortion across the width; the controller then adjusts the integrated skew and bow rollers proportionally to the angle. Highly dynamic AC motors combined with frequency converters guarantee fast and accurate adjustment of the correction rollers. Due to the usage of intelligent evaluation algorithms, ELSTRAIGHT is able to automatically adjust to a very wide range of fabric structures.

The heart of the system is formed by a camera bridge that supports 4 to 8 CCD matrix cameras depending on the operating width.
Key advantages of the matrix camera are
+ A single-sided measurement,
+ The large two-dimensional measuring area and
+ The large measuring distance to the web.

Along with the standard ELSTRAIGHT, Erhardt+Leimer also offers weft straightening systems, e.g., for the printing/carpet/denim and automotive industry.

ELSTRAIGHT camera

Headquarters
Erhardt+Leimer GmbH
Albert-Leimer-Platz 1 · 86391 Stadtbergen
Tel.: +49(0)821/2435-0
info@erhardt-leimer.com · www.erhardt-leimer.com

Subsidiaries
E+L Elektroanlagen Augsburg, Germany · E+L Automatisierungstechnik Augsburg, Germany
E+L Corrugated Bielefeld, Germany · E+L Bradford, England · E+L Mulhouse, France
E+L Stezzano, Italy · E+L Bucharest, Rumania · E+L Burlington, Canada · E+L Duncan, S.C., USA
E+L Mexico D.F., Mexico · E+L Guarulhos-São Paulo, Brazil · E+L Ahmedabad, India
E+L Hangzhou, China · E+L Tao Yuan, Taiwan · E+L Tokyo/Ishikawa, Japan

Subject to technical change without notice · GRU--054392-EN-05 · 04/2013 · 363835

CM