ELSTRETCHER

**Felt and wire stretchers
for the paper industry**

Fabric tension measuring and control systems

Content

# Higher quality due to fabric tension control

Users of paper machine clothing are confronted with ever higher requirements these days:

» It must be possible to realize production processes more quickly, however also with greater precision.

» The quality of the result must increase while personnel costs, scrap and machine downtimes are to be reduced to a minimum.

Fabric tension control systems make a crucial contribution to meeting these requirements. Experience tells us that felt and wire are affected by a large number of factors. Excessively high or excessively low fabric tension has a significant effect on the quality and volume of paper production. E+L fabric tension control systems eliminate these error variables and ensure constant fabric tension during the production process.
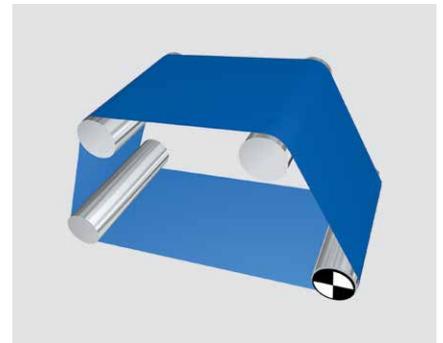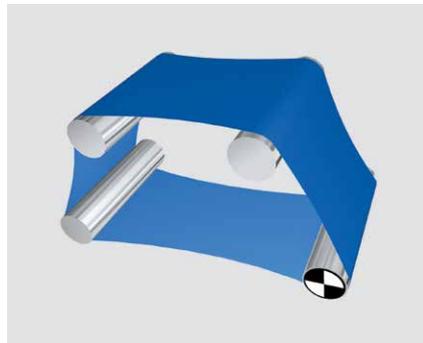
Excessively low fabric tension

+ Reduced drainage capacity in the wire section
+ Increased re-moistening in the press section
+ High steam consumption in the dryer section
+ Tearing due to sheet fluttering in the dryer section
+ Clothing abrasion due to slip between clothing and rollers
+ Differences in drive/speed
+ Negative effect on the fabric guiding

Excessively high fabric tension

+ Roller and bearing damage
+ Marks on the paper web
+ Contraction in the width of the clothing
+ Reduced clothing service life
+ Clothing tearing
+ Poor formation
+ Lower drainage capacity

Constant fabric tension

+ Increased quality and paper production volume
+ Prerequisite for a long clothing service life
+ Improved clothing travel

The control loop

All control automation is based on the principle of the simple control loop. Even complex tasks can be reduced to the control loop.

1. The starting point is the actual tension in the moving wire or felt.
2. Fabric tension sensors constantly and precisely acquire the tension in the wire or felt.
3. The controller compares the actual tension with the pre-defined target value and sends a corresponding correction signal to the actuator.
4. The actuator/stretcher positions the stretch roller and in this way corrects the tension in the wire or felt.

1. Fabric tension

2. Fabric tension sensor

3. Fabric tension controller

4. Actuator
   + Lever-arm type stretcher
   + Spindle-type stretcher
   + Chain-type stretcher

User interface

Interfaces
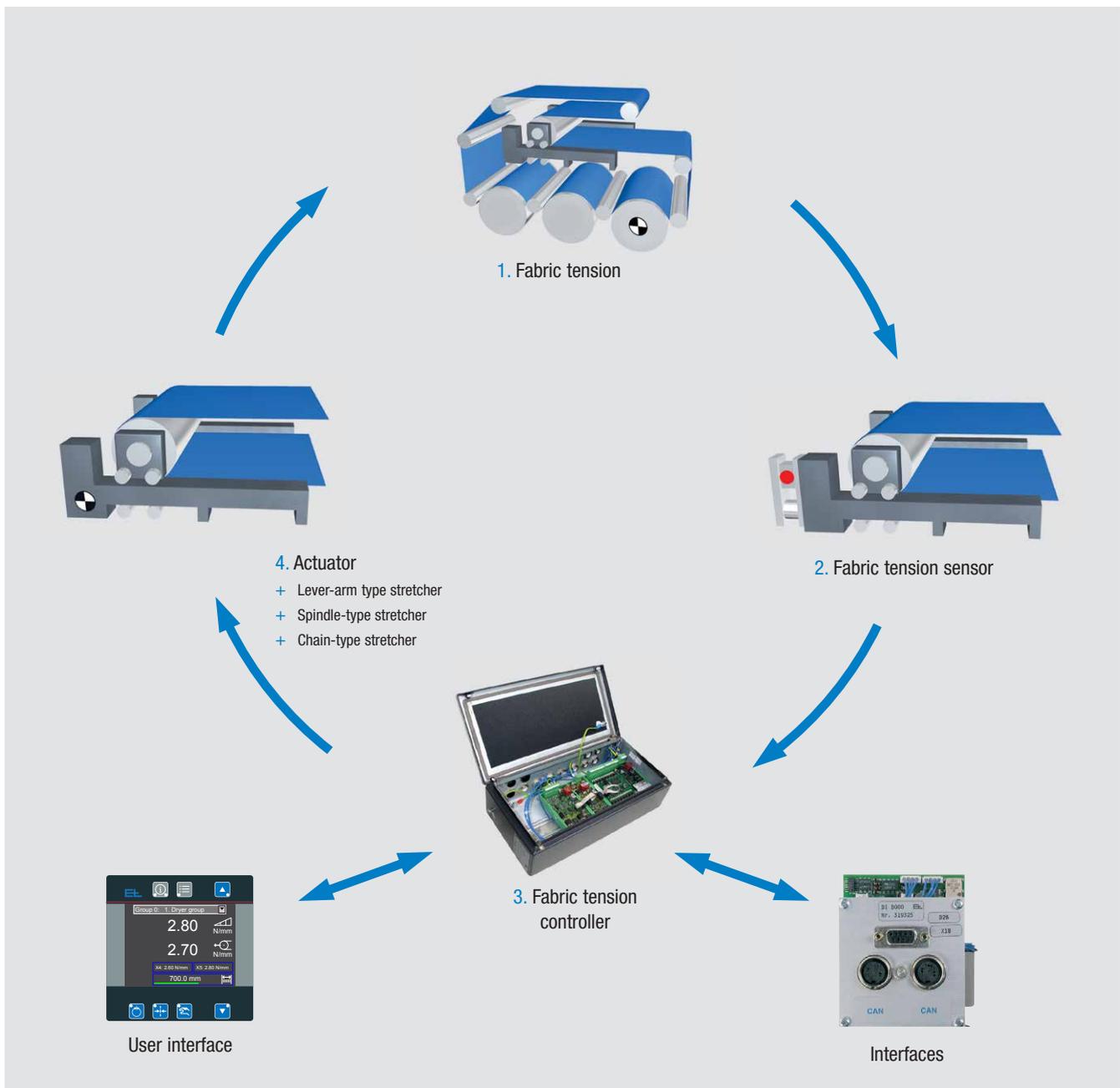
Fabric tension sensor

Fabric tension sensor PD 80
+ External measurement on separate guide roller for pedestal bearing mounting
+ Stainless steel version for wire and press section
+ Steel version for dryer section
+ Encapsulated pivot point lubricated for life
+ Maximum operational reliability due to mechanical overload protection
+ Different sizes and nominal measuring forces from 1–90 kN ensure a high degree of flexibility
+ Integrated damping element prevents zero point drift due to impacts and machine vibration
+ Measuring unit easily accessible and easy to replace

Fabric tension sensor PD 80

Fabric tension sensor PD 77

Fabric tension sensor PD 77
+ Web tension sensor for external measurement on separate guide roller with bearing bracket
+ Pivot point bearing that can be lubricated
+ Design tailored specifically to customer requirements

Function
Fabric tension sensors PD 77/80 comprise a baseplate and a component mounted on a pivot for mounting the measuring roller in bearing brackets or a version with a low profile support for pedestal bearing mounting. The tensile forces caused by the fabric act as a moment on the pivot point and generate a measuring force on the measuring unit.

Area of use
Fabric tension sensors PD 77/80 are used for mounting on separate guide rollers (e.g. for lever-arm type stretchers in the wire section).

Application
The wrapping and the installation must be selected such that the fabric tension sensor is always under pressure. The fabric tension sensor is to be installed in the direction of travel as close as possible to the stretch roller. Optionally, fabric tension sensors can also be mounted on both sides.

Legend

F_B	Fabric tension	L_1	Vertical distance pivot point-middle of roller
F_R	Resulting fabric tension	L_2	Horizontal distance pivot point-middle of roller
F_G	Force due to gravity on measuring roller	L_3	Distance pivot point-measuring unit
F_{MD}	Resulting fabric tension per fabric tension sensor	1	Pivot point
		2	Measuring unit
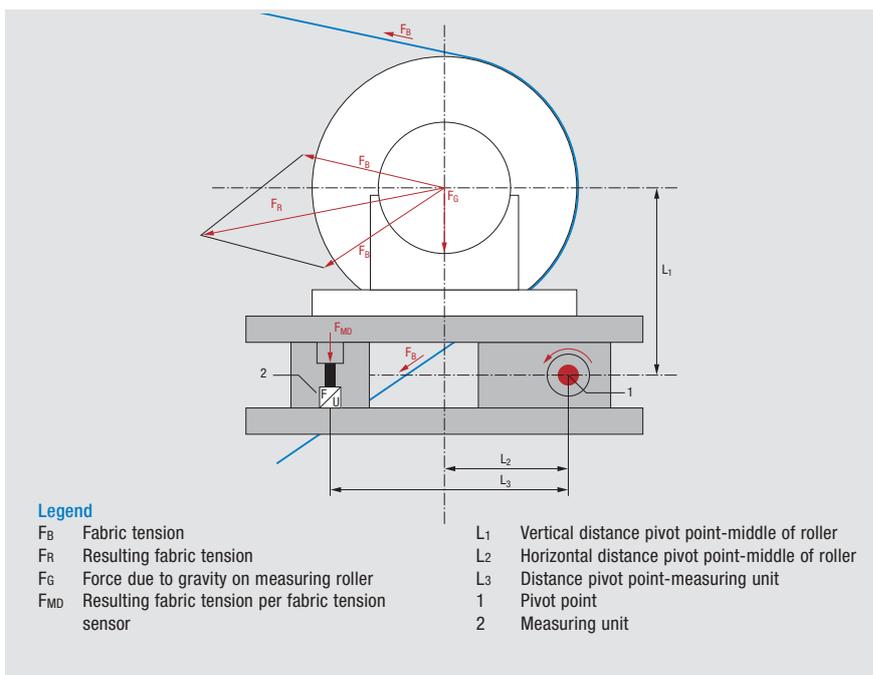
Selection Table

Type	Dry	Wet	Dimensions LxWxH	Nominal measuring force F_N (kN)								
PD 8001T	■		300x250x120 mm	1	2	5	10	20	30			
PD 8001N		■	300x250x120 mm	1	2	5	10	20	30			
PD 8003T	■		500x250x120 mm	1	2	5	10	20	30			
PD 8003N		■	500x250x120 mm	1	2	5	10	20	30			
PD 8005T	■		800x410x190 mm					20	30	40	60	90
PD 8005N		■	800x410x190 mm					20	30	40	60	90
PD 809_T	■		Customer-specific	1	2	5	10	20	30	40	60	90
PD 809_N		■	Customer-specific	1	2	5	10	20	30	40	60	90
PD 77__T	■		Customer-specific	1	2	5	10	20	30	40	60	90
PD 77__N		■	Customer-specific	1	2	5	10	20	30	40	60	90

Fabric tension sensor for spindle-type stretcher

Fabric tension sensor EM 08

+ Integrated measurement in spindle-type stretchers
+ Pivot point bearing in the tension carriage can be lubricated
+ Stainless steel version for press section (optional steel version for dryer section)
+ Maximum operational reliability due to mechanical overload protection
+ Different sizes and nominal measuring forces from 1–30 kN ensure a high degree of flexibility
+ Integrated damping element prevents zero point drift due to impacts and machine vibration
+ Includes cable carrier for fabric tension sensor
+ Measuring unit easily accessible and easy to replace


Fabric tension sensor EM 08
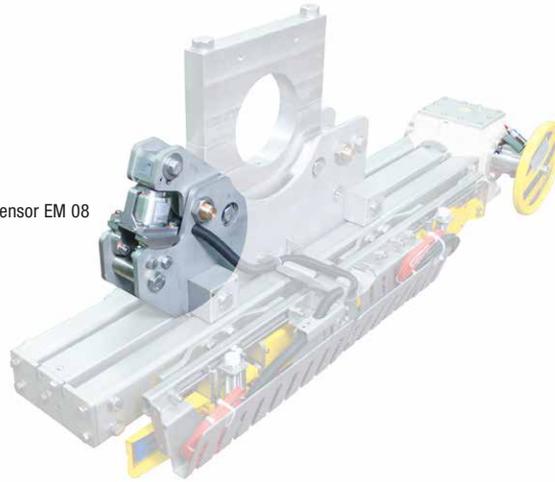
Function

The tensile forces caused by the fabric act as a moment on the bearing bracket's pivot point and generate a measuring force on the measuring unit.

Area of use

The fabric tension sensors on the EM 08 series are used in spindle-type stretchers.

Application

Wrapping of 180° is desirable for the stretch roller. With total wrapping around the stretch roller <150°, wrapping angle compensation is necessary. Optionally the fabric tension sensors can also be mounted on both sides.

Legend

F_B	Fabric tension	L_1	Vertical distance pivot point-middle of roller
F_R	Resulting fabric tension	L_2	Horizontal distance pivot point-middle of roller
F_G	Force due to gravity on stretch roller	L_3	Distance pivot point-measuring unit
F_{MD}	Resulting fabric tension per fabric tension sensor	1	Pivot point
		2	Measuring unit
		3	Spindle adjustment
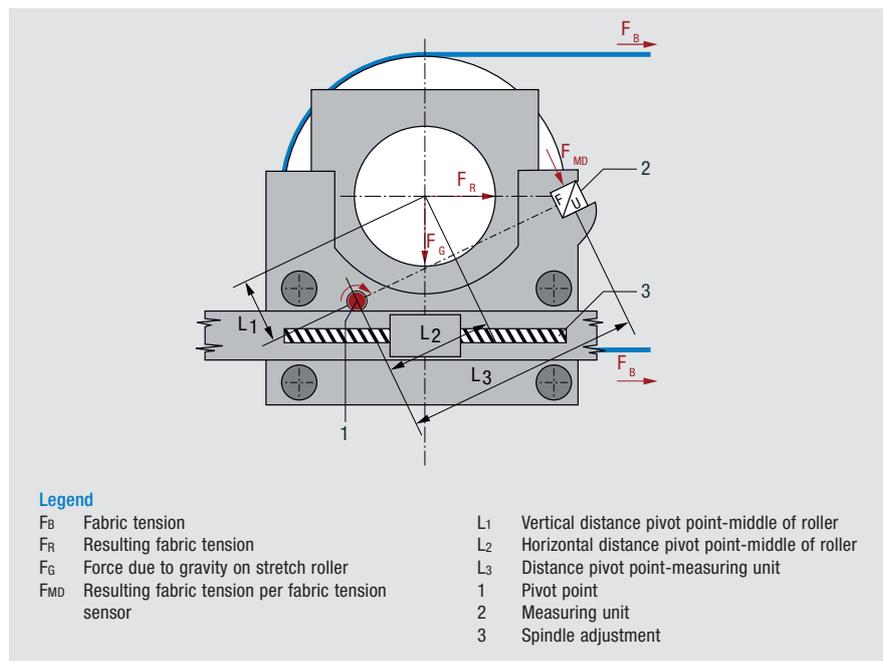
Selection Table

Type	Application	Dry	Wet	Nominal measuring force F_N (kN)					
EM 08__T	SP 08	■		1	2	5	10	20	30
EM 08__N	SP 08		■	1	2	5	10	20	30

Fabric tension sensor for chain-type stretcher

Fabric tension sensor EM 10/15

+ Integrated measurement in chain-type stretchers
+ Pivot point bearing in the tension carriage can be lubricated
+ Steel version for dryer section (optional stainless steel version for press section)
+ Maximum operational reliability due to mechanical overload protection
+ Different sizes and nominal measuring forces from 1–30 kN ensure a high degree of flexibility
+ Integrated damping element prevents zero point drift due to impacts and machine vibration
+ Includes cable carrier for fabric tension sensor
+ Measuring unit easily accessible and easy to replace

Function

Fabric tension sensor in the tension carriage
The tensile forces caused by the fabric act as a moment on the bearing bracket's pivot point and generate a measuring force on the measuring unit.

Fabric tension sensor on gearbox housing
The tensile forces caused by the fabric generate via the chain and a lever a measuring force on the measuring unit.

Area of use

The fabric tension sensors in the EM 10/15 series are used in chain-type stretchers.

Application

Wrapping of 180° is desirable for the stretch roller. With total wrapping around the stretch roller <150°, wrapping angle compensation is necessary. Optionally the fabric tension sensors can also be mounted on both sides.

Legend

F_B	Fabric tension	L_1	Vertical distance pivot point-middle of roller
F_R	Resulting fabric tension	L_2	Horizontal distance pivot point-middle of roller
F_G	Force due to gravity on stretch roller	L_3	Distance pivot point measuring unit
F_{MD}	Resulting fabric tension per fabric tension sensor	1	Pivot point
		2	Measuring unit
		3	Chain adjustment

Legend

F_B	Fabric tension	L_1	Distance pivot point-chain fastening
F_R	Resulting fabric tension	L_2	Distance chain fastening-measuring unit
F_G	Force due to gravity on stretch roller	L_3	Distance pivot point-measuring unit
F_{MD}	Resulting fabric tension per fabric tension sensor	1	Pivot point
F_K	Tensile force on chain	2	Measuring unit
		3	Chain adjustment

Fabric tension sensor EM 10 in the tension carriage
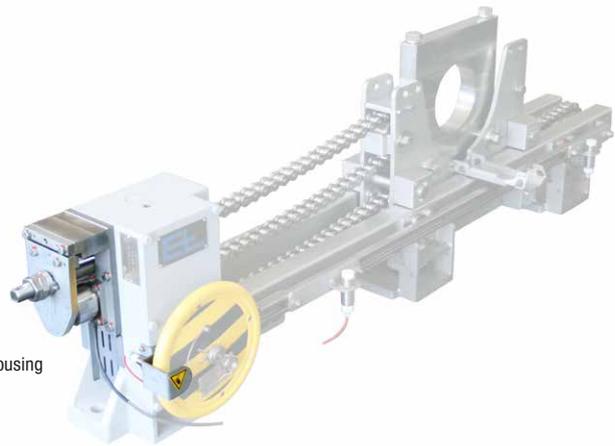
Fabric tension sensor EM 10 on the gearbox housing

Selection Table

Type	Application	Dry	Wet	Nominal measuring force F_N (kN)					
EM 10__T	SP 10	■		1	2	5	10	20	30
EM 10__N	SP 10		■	1	2	5	10	20	30
EM 15__T	SP 15	■		1	2	5	10	20	30
EM 15__N	SP 15		■	1	2	5	10	20	30

Technical Data

Fabric tension sensor PD 77/80, EM 08 and EM 10/15	
Accuracy class	1
Hysteresis	±0,15 %
Non-linearity	±0,15 %
Reproducibility	±0,1 %
Temperature coefficient	±0,05 %/10 K
Measuring principle	Full bridge strain gauge
Nominal resistance strain gauge bridge	4x350 Ohm
Nominal characteristic	2 mV/V
Output voltage nominal range	0 to 20 mV (at F_N and U_B 10 V)
Mechanical stop	1.1xF_N (0 to 22 mV and U_B 10 V)
Nominal measuring travel	0.2 to 2 mm depending on type
Axial transverse force	Not allowed
Bridge voltage Nominal value	10 V DC
Ambient temperature	+20 to +160 °C
Protection class	IP 67

Measuring amplifiers

Measuring amplifier CV 22

+ Single-channel measuring amplifier for connecting max. 2 fabric tension sensors with strain gauge bridge
+ Precision instrument amplifier with low temperature drift, high long-term stability and excellent linearity
+ With potentiometer for zero point and tare adjustment as well as amplification setting
+ Internal reference voltage for measuring amplifier calibration without reference weights given exact knowledge of the wrapping angle and mounting position
+ Optionally with housing and digital display PA
+ Optionally with housing, digital display PA and command device NT

Measuring amplifier CV 22

Control structure for measuring amplifier
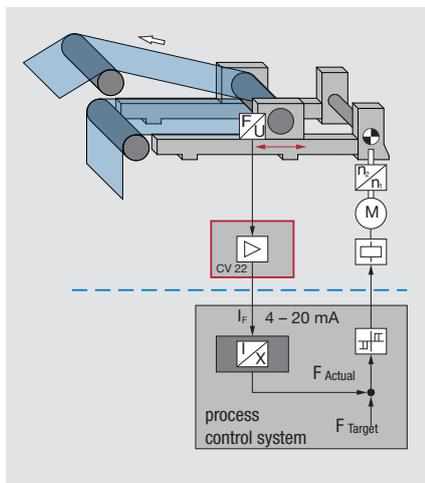
Technical Data

Measuring amplifier CV 22	
Accuracy class	0,1
Temperature coefficient of the nominal value of the zero signal of the bridge supply voltage	±0,3 %/10 K ±0,3 %/10 K ±0,04 %/10 K
Amplification range	990 to 3400 V/V 400 to 1250 V/V 600 to 2050 V/V 300 to 1025 V/V
Strain gauge amplifier Input voltage	1 channel 0 to ±20 mV
Bridge supply voltage Nominal value Nominal range	10 V DC 9 to 13 V DC
Output signals Voltage Filtered voltage Current	1x 0 to ±10 V (rise time 5 ms) 1x 0 to ±10 V (rise time 2 s) 1x 0/4 to 20 mA (rise time 5 ms)
Operating voltage Nominal value Nominal range	24 V DC 20 to 30 V DC
Current consumption	0,2 A
Ambient temperature	0 to +60 °C
Protection class Top-hat rail mounting to DIN EN 50022 with housing optional	IP 00 IP 54 IP 65
Dimensions (LxWxH)/Weight Top-hat rail mounting to DIN EN 50022 with housing	121x22,5x110 mm/0,14 kg 150x150x150 mm/2,1 kg

Digital measuring amplifier with display

Digital measuring amplifier with display PA 62*
Digital two-channel measuring amplifier for connecting max. 2 fabric tension sensors with strain gauge bridge.

The menu-based, language-neutral commissioning wizard guarantees very straightforward, quick commissioning of the measuring amplifier and the display.

Functionality:
+ Measurement and display of fabric tension
+ x-t plotter for long-term indication of the fabric tension
+ Monitoring of the web tension for configurable limits with digital output (alarm)
+ Analog output of the measured values

Measuring amplifier PA 62

Selection Table

Type	Version
PA 62_0	Panel mounted kit
PA 62_1	Housing
PA 62_2	DIN rail
PA 620_	Ethernet

Technical Data

Measuring amplifier PA 62	
Measuring cycle time	1 ms
Strain gauge amplifier Input voltage	2 channels 0 to ±30 mV/14 Bit
Bridge supply voltage Nominal value	10 V DC
Analog outputs Voltage Filtered voltage Current	1x 0 to 10 V 1x 0 to 10 V 1x 0/4 to 20 mA
Digital inputs Input voltage for signal "0" Input voltage for signal "1"	3x floating 0 to 2 V DC 8 to 30 V DC
Digital outputs Output voltage Output current	1x floating and short-circuit proof Supply voltage max. 500 mA
Ethernet connection Data transmission Network protocol	RJ 45 100 MBit UDP (Ethernet/IP)
Operating voltage Nominal value Nominal range	24 V DC 20 to 30 V DC
Current consumption	0,3 A
Ambient temperature	+10 to +50° C
Protection class/Dimensions (LxWxH) Top-hat rail mounting to DIN EN 50022 Panel mounted kit with housing	IP 20/90x90x55 mm IP 20/100x100x50 mm IP 54/130x130x106 mm

* in preparation

Fabric tension controller

Fabric tension controller DC 04/24

+ Highly compact fabric tension controller with integrated, digital inputs and outputs
+ Three-point controller for the actuation of a three-phase motor/solenoid valve
+ CAN bus technology makes time-consuming wiring effort unnecessary, instead there are simple connectors
+ Software download via CAN bus
+ Set-up operation integrated onto the control card
+ Digital and analog input and output modules can be connected via SPI bus (Serial Peripheral Interface)

Fabric tension controller DC 04

Control structure for fabric tension controller
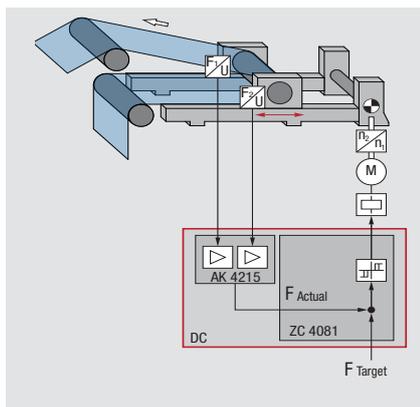
Function modules

+ Inputs for control unit „Slacken" and „Tension" for clothing change, commissioning and service purposes
+ Separate entry of 2 fabric tension target values for run-up time and production
+ Digital inputs for monitoring system switches for overload, tension carriage limit positions, motor protection and hand-wheel monitoring
+ Monitoring of the supply voltage
+ Digital alarm outputs for maximum control time, actual value exceeding threshold, hardware fault on the measuring amplifier, direction of rotation position sensor or felt cocking unit, position monitoring, manual mode, system switches and general alarm
+ Additional error display via error codes on a 7-segment display on the control card and on the command station DO 44
+ Correction of the actual fabric tension on changing wrapping on measuring roller
+ Optional output of the current target value and actual value of the fabric tension and the tension carriage position as analog signals with 0–10 V DC / 0–20 mA / 4–20 mA

Selection Table

Type	ZC 4081	AK 4215	AK 4022	DO 4402
DC 0420	■	■		
DC 0430	■	■	■	
DC 2420	■	■		■
DC 2430	■	■	■	■

ZC 4081	Fabric tension controller
AK 4215	Precision measuring amplifier for 2 fabric tension sensors from 0 to 20 mV (12 bits)
AK 4022	Analog output module with 4 outputs 0–10 V DC/0–20 mA/ 4–20 mA
DO 4402	User interface with plain text display

Technical Data

| Fabric tension controller DC 04/24	
Cycle time	10 ms
Digital inputs Input voltage for signal "0" Input voltage for signal "1" Input current	16x floating 0 to 3 V DC 10 to 30 V DC max. 10 mA per input
Digital outputs Output voltage for signal "1" Output current per output	16x floating and short-circuit proof Supply voltage 1 A
CAN bus level CAN baud rate	+5 V (floating) 250 kBaud
Operating voltage Nominal value Nominal range	 24 V DC 20 to 30 V DC
Current consumption	0,5 A
Ambient temperature	+10 to +50 °C
Protection class/Dimensions (LxWxH)/Weight Top-hat rail mounting to DIN EN 50022 with housing	 IP 00/410x111x70 mm/0,8 kg IP 54/300x150x80 mm/2,8 kg

User interface

Command station DO 44*

+ User interface with user-friendly plain text display
+ Color LC display 1/4 VGA with touch control unit
+ Structured depiction of the CAN network
+ Simple „Setup Editor" for configuring parameters during initial commissioning
+ Display of target and actual fabric tension
+ With fabric tension measurement on both sides, separate actual value display
+ Display of tension carriage position (optional with position sensor)
+ Display of error messages
+ Multiple operation of up to 8 control systems
+ Operation can be inhibited via interface
+ Selection of the country-specific language

Command station DO 44

Selection Table

Type	Panel mounted kit	Housing
DO 4403		■
DO 4402	■	

Block diagram DO 44

* in preparation

Technical Data

Command station DO 44

Display	1/4 VGA (320x240), 16 colors
Background lighting	LED
Operation	Touchscreen and buttons
Language of operation	German, English, French, Italian, Spanish, Portuguese
CAN bus level	+5 V (floating)
CAN baud rate	250 kBaud
Operating voltage	
Nominal value	24 V DC
Nominal range	20 to 30 V DC
Current consumption	200 mA
Ambient temperature	+10 to +50° C
Protection class	
Panel mounted kit (when built-in)	IP 54
with housing	IP 54
Dimensions (LxWxH)	
Panel mounted kit	110x110x90 mm
Cut-out for panel mounted kit	91x91 mm (Mounting depth 80 mm)
with housing	200x180x95 mm
Weight	
Panel mounted kit	0,5 kg
with housing	2 kg

Interfaces

DI 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.

For this purpose, E+L offers a very wide range of interfaces with standard protocols. Each interface contains a CAN connection with a corresponding bus driver module.
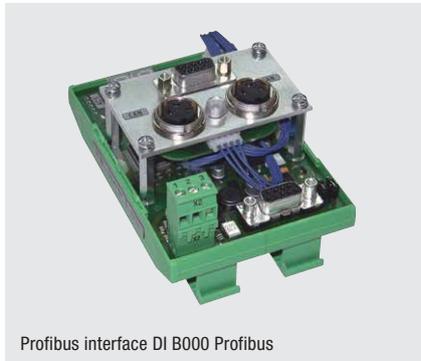
Profibus interface DI B000 Profibus
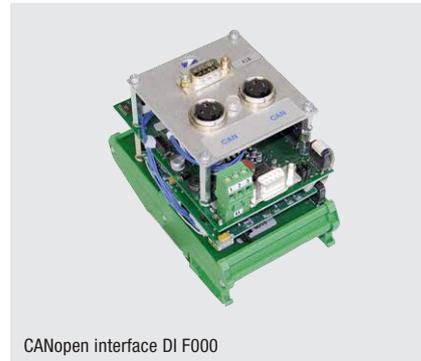
CANopen interface DI F000
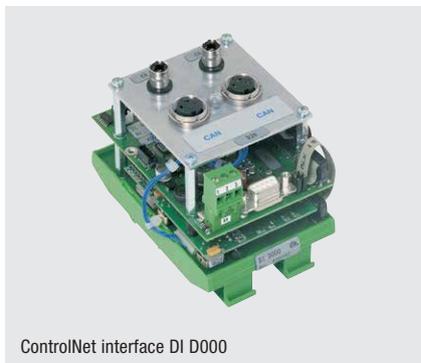
ControlNet interface DI D000
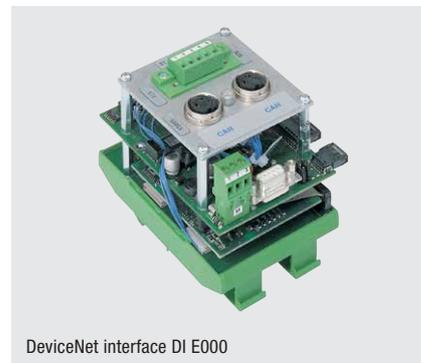
DeviceNet interface DI E000

DI G000 Ethernet interfaces

Ethernet offers a multifunctional platform for the connection of a very wide range of customer computers using flexible protocols.

Function module Ethernet/IP:
+ Ethernet/IP based on the application layer „CIP" (Common Industrial Protocol) for the exchange of data between E+L CAN network and Allen Bradley controllers (CompactLogix and ControlLogix series)

Function module File Transfer:
+ Convenient software download with diagnostic tool ELBUDDY

Function module CAN server:
+ CAN server already integrated for direct access to E+L CAN network using ELBUDDY
  » Diagnostics
  » Configuration
  » Data backup for the parameters
  » Restoration of the device configuration
  » Program download for CAN devices

Ethernet interface DI G000 Ethernet


Principle of operation Ethernet
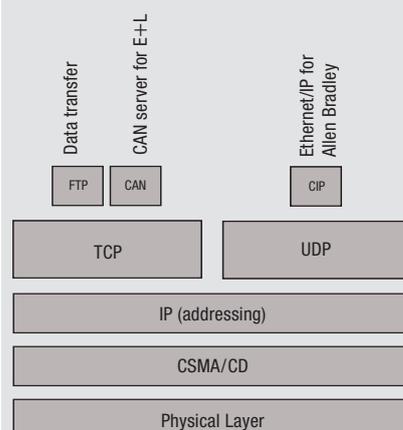
Networking

CAN bus

All functional modules in the digital control system DCS feature a CAN bus interface and are also networked with one another. 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 may comprise up to 16 devices including, for example, sensors, controllers, interfaces or operating panels. Up to 8 controller groups may be implemented together in a common CAN network up to a length of 160 m. A CAN extension DI 0010 is available for lengths of 160 m and upwards. It is simply plugged in between 2 CAN networks.
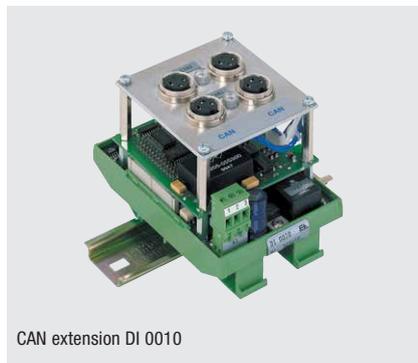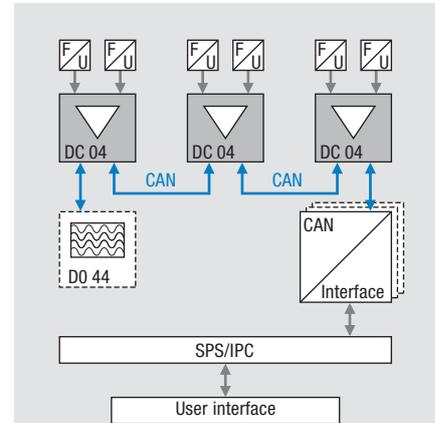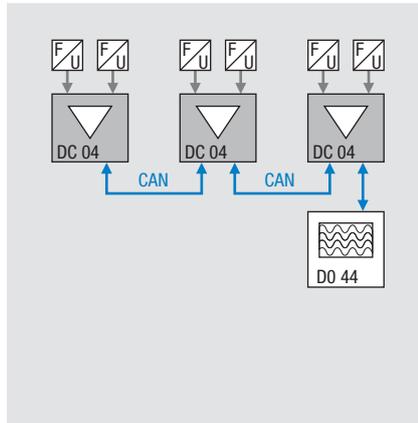
CAN extension DI 0010

Diagnostic tool ELBUDDY

Convenient diagnostics

Sophisticated systems require a simple, comprehensive representation of the entire network. The ELBUDDY software tool for Windows computers depicts the CAN network in a structured form and, at the same time, comprises a convenient set-up editor for setting all control parameters. Furthermore, ELBUDDY permits both saving and printing out of the entire CAN network.
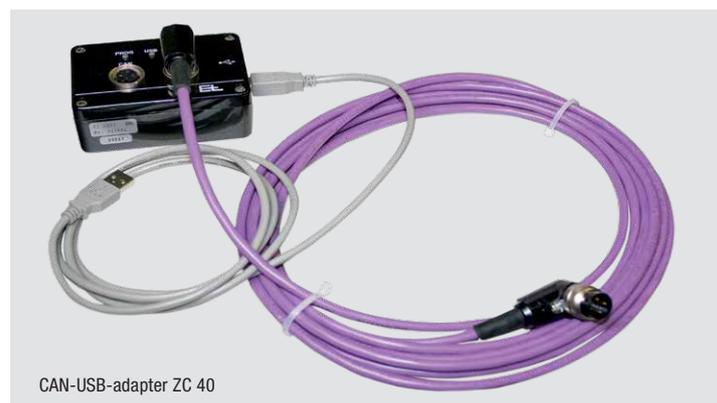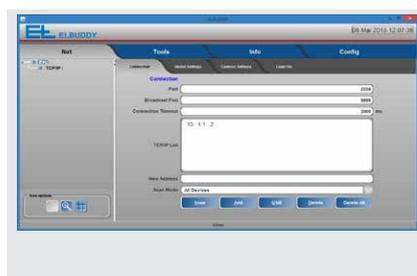
CAN-USB-adapter ZC 40

Lever-arm type stretcher

ELSTRETCHER SP 09
+ Compact design for wire section
+ Parallel adjustment of the stretch roller via self-locking Acme spindle (vibration-free)
+ Flexible application due to position-independent installation (standing upright/hanging)
+ Stainless steel version
+ Adjustable positioning stroke by means of inductive proximity switch
+ Optionally with bearing bracket for stretch roller
+ Drive with three-phase motor (optionally with air motor)
+ Doctor mounting on customer request
+ Optionally with cover for cross shaft

Your benefits
+ Increased drainage capacity
+ Improved sheet forming (formation+ retention)
+ Increased service life of the wire
+ Reduced wire abrasion thanks to reduced slip between the wire and the rollers
+ Improved wire guiding due to constant tension
+ No wire width contraction
+ Avoidance of wire breakage
+ In comparison to air bellows, vibration-free adjustment via spindle positioning elements
+ Robust design
+ Maintenance-free lifting element

Function
Lever-arm type stretcher systems control and regulate the tension in wires. Fabric tension sensors that are mounted externally or that are integrated in the lever-arm type stretcher (together with mechanical wrap angle compensation) continuously measure the fabric tension. A digital three-point controller continuously compares the actual value with the set target value and sends a correction value to the actuating drive of the lever-arm type stretcher. The tension on the wire is increased or decreased via the lever-arm type stretcher.

Application
Lever-arm type stretchers can be freely mounted in terms of position. The stretcher stroke should be dimensioned for a 1-2% change in length of the wire and the necessary length required for changing the wire. The fabric tension sensor is to be installed in the direction of travel of the wire as close as possible to the stretch roller. Only one lever-arm type stretcher can be operated in automatic mode per wire. Additional lever-arm type stretchers are to be positioned „manually".

Legend

SB	Wire width	1	Lever-arm type stretcher
LE	Distance between bearing centers	2	Infeed roller
α, β	Infeed and outfeed angle	3	Stretch roller
F_B	Fabric tension	4	Fabric tension sensor
F_S	Actuating force	5	Outfeed roller
F_G	Force due to gravity on stretch roller	A-A	Fabric tension distribution
F_R	Resulting fabric tension	S	Stretcher stroke

ELSTRETCHER SP 09 in the wire section

Lever-arm type stretcher SP 0902 N

Bearing bracket (optional)

Lever-arm type stretcher SP 0901 N

Technical Data

Type	SP 0901 N*	SP 0902 N*
Max. actuating force	35 kN (position dependent)	100 kN (position dependent)
Max. travel	600 mm (without bearing bracket)	750 mm (without bearing bracket)
Actuating speed	min. 85 mm/min (upper end position) max. 147 mm/min (lower end position)	min. 89,5 mm/min (upper end position) max. 174 mm/min (lower end position)
End position limiting	Inductive proximity switches	Inductive proximity switches
Diameter of bearing bracket (optional)	80 to 250 mm	180 to 340 mm
Spindle size	TR 50x8 mm	TR 65x10 mm
Basic material	Stainless steel	Stainless steel
Area of use	wet	wet
Power	0,75 kW	2,2 kW
Operating voltage Range 1 Range 2/3	360–480/207–280 V 50/60 Hz on request	360–480/207–280 V 50/60 Hz on request
Current consumption Range 1 Range 2/3	3,3/1,9 A 50 Hz 2,9/1,7 A 60 Hz on request	9,0/5,6 A 50 Hz 9,0/5,2 A 60 Hz on request
Ambient temperature	+10 to +60 °C	+10 to +60 °C
Protection class standard optional	IP 66 IP 68	IP 66 IP 68

* N = wet

Spindle-type stretcher

ELSTRETCHER SP 08

+ Spindle-type stretcher for press section (or dryer section)
+ Parallel adjustment of the stretch roller using self-locking Acme spindle
+ Precise fabric tension measurement by fabric tension sensor on one side integrated in the tension carriage (optionally possible on both sides)
+ Drive with three-phase motor (optionally with air motor)
+ Spindle can be subjected to tensile and compressive load
+ Flexible application due to position-independent mounting (standing upright/ hanging)
+ Stretch roller mounting in bearing bracket or pedestal bearing
+ Bearing bracket cover can be removed
+ Optionally with hinged bearing bracket cover
+ Seam correction by means of spindle adjustment on one side using handwheel
+ Optionally with acquisition of the position of the stretch roller for wrap angle compensation
+ Optionally with cover for cross shaft
+ Optionally with pre-wiring
+ Optionally with handwheel monitoring
+ Optionally with protective plate

Your benefits

+ Maximum drainage capacity due to optimized water absorption and reduced re-moistening
+ Reduced felt markings on the paper
+ Increased felt service life
+ Ideal solution for applications where space is limited thanks to the Acme spindle that withstands compressive loads
+ Reduced felt abrasion due to reduced slip between felt and guide rollers
+ Improved felt guiding due to constant tension
+ Avoidance of roller and bearing damage during machine standstill (felt drying)
+ Reduced felt width contraction
+ Avoidance of felt tears

Function

Spindle-type stretcher systems control and regulate the tension in felt. Integrated fabric tension sensors continuously acquire the fabric tension without delay. A digital three-point controller continuously compares the actual value with the set target value and sends a correction value to the actuating drive. The tension on the felt is increased or decreased via the spindle-type stretcher.

Application

Spindle-type stretcher systems can be freely mounted in terms of position. Wrapping of 180° is desirable for the stretch roller. The adjusting plane of the spindle-type stretcher should be positioned in the bisecting line between the infeed and outfeed. Wrap angle compensation needs to be incorporated if the overall wrapping around the stretch roller is <150°.

Legend
FB	Felt width	FG	Gravitational force on stretch roller	4	Fabric tension sensor
LE	Distance between bearing centers	FR	Resulting fabric tension	5	Outfeed roller
α, β	Infeed and outfeed angle	1	Spindle-type stretcher	A-A	Fabric tension distribution
FB	Fabric tension	2	Infeed roller	S	Stretcher stroke
FS	Actuating force	3	Stretch roller		

ELSTRETCHER SP 08 in the press section

Spindle-type stretcher SP 0801 N

Position sensor FE 07 (optional)

Pre-wiring (optional)

Protective plate (optional)
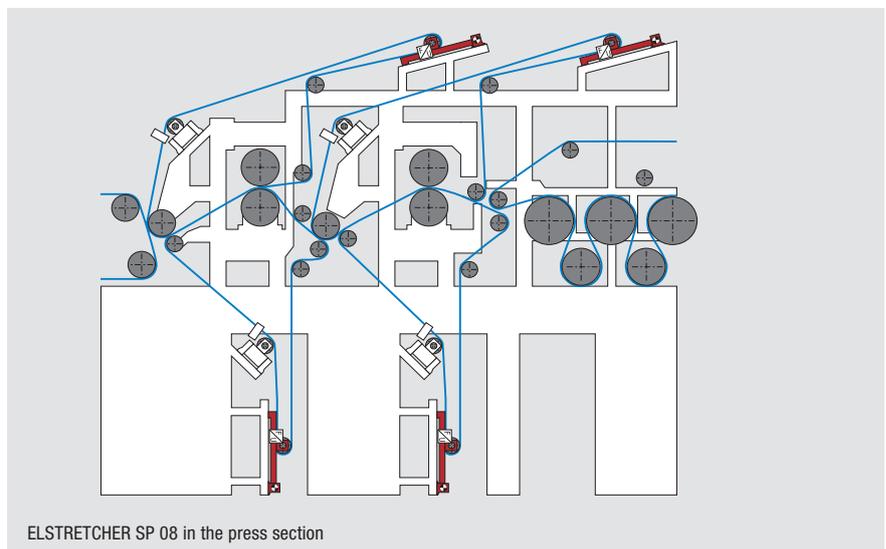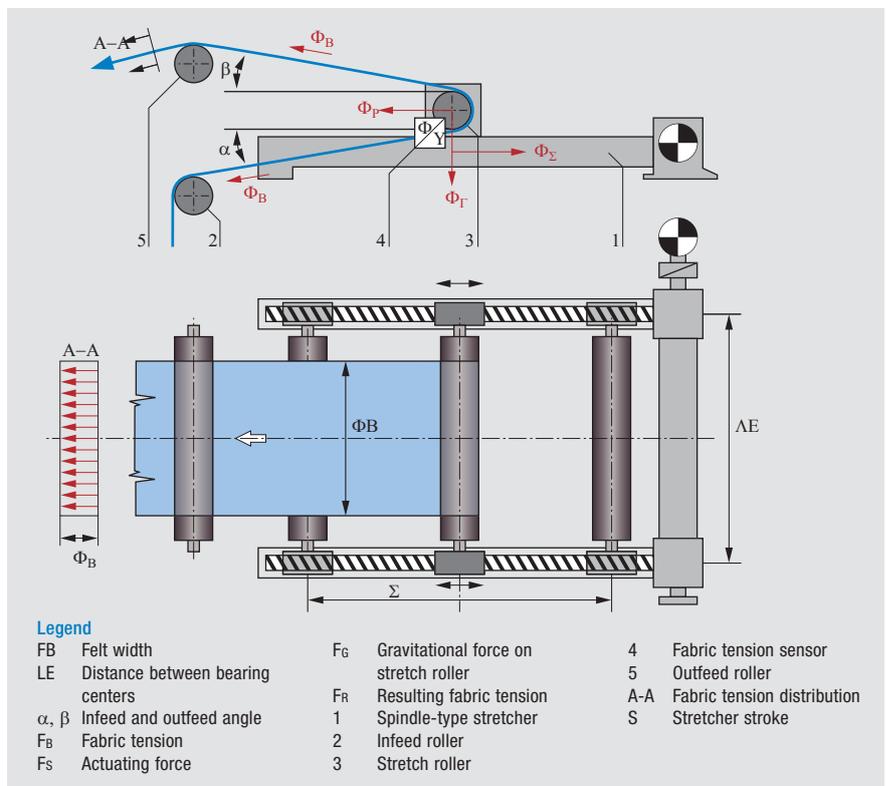
Spindle-type stretcher SP 0803 N
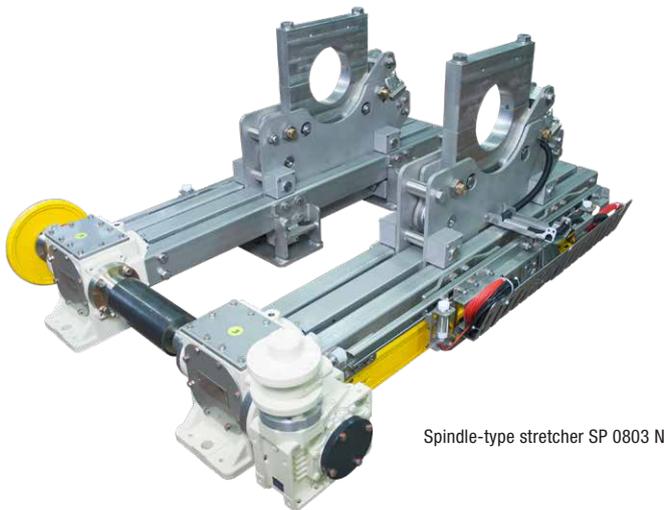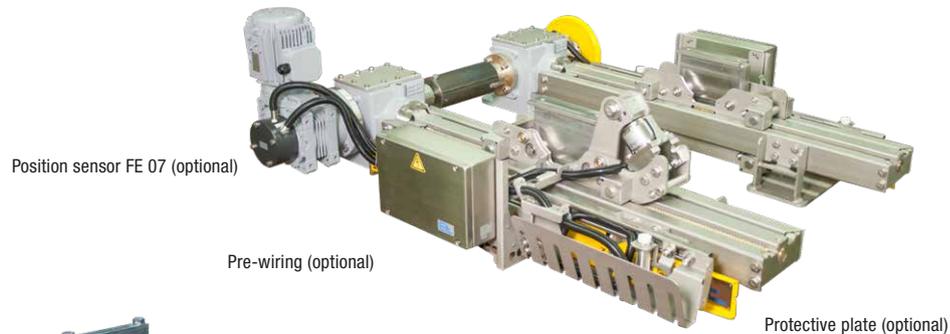
Technical Data

Type	SP 0801 N*	SP 0801 T*	SP 0803 N*	SP 0803 T*
Max. actuating force	45 kN	45 kN	90 kN	90 kN
Max. stretcher stroke	2500 mm	2500 mm	3500 mm	3500 mm
Actuating speed	250 mm/min	250 mm/min	285 mm/min	285 mm/min
End position limiting	Ind. proximity switch	Limit switch	Ind. proximity switch	Limit switch
Diameter of bearing bracket	80 to 260 mm	80 to 260 mm	80 to 350 mm	80 to 350 mm
Spindle size	TR 40x7 mm	TR 40x7 mm	TR 50x8 mm	TR 50x8 mm
Basic material	Stainless steel	Painted steel	Stainless steel	Painted steel
Area of use	wet	dry	wet	dry
Power	0,75 kW	0,75 kW	1,5 kW	1,5 kW
Operating voltage Range 1 Range 2 Range 3	346–420/200–240 V 50/60 Hz 400–500/230–290 V 50/60 Hz 500–575/290–330 V 50/60 Hz		346–420/200–240 V 50/60 Hz 400–500/230–290 V 50/60 Hz 500–575/290–330 V 50/60 Hz	
Current consumption Range 1 Range 2 Range 3	2,2/3,8 A 50 Hz 1,9/3,3 60 Hz 1,9/3,3 A 50 Hz 1,6/2,8 60 Hz 1,5/2,7 A 50 Hz 1,3/2,3 60 Hz		3,2/5,5 A 50 Hz 2,9/5,0 60 Hz 2,8/4,8 A 50 Hz 2,5/4,3 60 Hz 2,5/4,3 A 50 Hz 2,0/4,0 60 Hz	
Ambient temperature standard optional	+10 to +60 °C	+10 to +130 °C +10 to +150 °C	+10 to +60 °C	+10 to +130 °C +10 to +150 °C
Protection class	IP 66	IP 65	IP 66	IP 65

* N = wet, T = dry

Chain-type stretcher

ELSTRETCHER SP 10/15

+ Chain-type stretcher for dryer section (or press section)
+ Parallel adjustment of stretch roller using chain
+ Precise fabric tension measurement by fabric tension sensor on one side integrated in the tension carriage or on the gearbox housing (optionally possible on both sides)
+ Drive with three-phase motor (optionally with air motor)
+ Mechanical locking of the stretch roller by self-locking worm gear
+ Flexible application due to position-independent mounting (standing upright/hanging)
+ Stretch roller mounting in bearing bracket or pedestal bearing
+ Bearing bracket cover can be removed
+ Optionally with hinged bearing bracket cover
+ Seam correction by means of chain adjustment on one side using handwheel
+ Optionally with acquisition of the position of the stretch roller for wrap angle compensation
+ Optionally with cover for cross shaft
+ Optionally with pre-wiring
+ Optionally with handwheel monitoring
+ Optionally with protective plate
+ Optionally with motor and handwheel on one side

Your benefits

+ Increased performance of the dryer section (machine speed)
+ Reduced steam consumption in the dryer section due to optimized contact drying
+ Reduced paper web tears due to the slip-free drive of the drying cylinder (silent drive)
+ No web flutter
+ Increased drying fabric service life
+ No clothing abrasion due to slip between clothing and rollers
+ Improved dryer wire guiding due to constant tension
+ Avoidance of roller and bearing damage
+ No marking of the paper web due to excess web tension
+ No tearing of the clothing due to excessively high clothing tension

Function

Chain-type stretcher systems control and regulate the tension in dryer wires. Integrated fabric tension sensors continuously acquire the fabric tension without delay. A digital three-point controller continuously compares the actual value with the set target value and sends a correction value to the actuating drive. The tension on the dry wire is increased or decreased via the chain-type stretcher.

Application

Chain-type stretchers can be freely mounted in terms of position. Wrapping of 180° is desirable for the stretch roller. The adjusting plane of the chain-type stretcher should be positioned in the bisecting line between the infeed and outfeed. Wrap angle compensation needs to be incorporated if the overall wrapping around the stretch roller is <150°.

Legend

SB	Wire width	F_G	Gravitational force on stretch roller	4	Fabric tension sensor
LE	Distance between bearing centers	F_R	Resulting fabric tension	5	Outfeed roller
α, β	Infeed and outfeed angle	1	Chain-type stretcher	A-A	Fabric tension distribution
F_B	Fabric tension	2	Infeed roller	S	Stretcher stroke
F_S	Actuating force	3	Stretch roller		
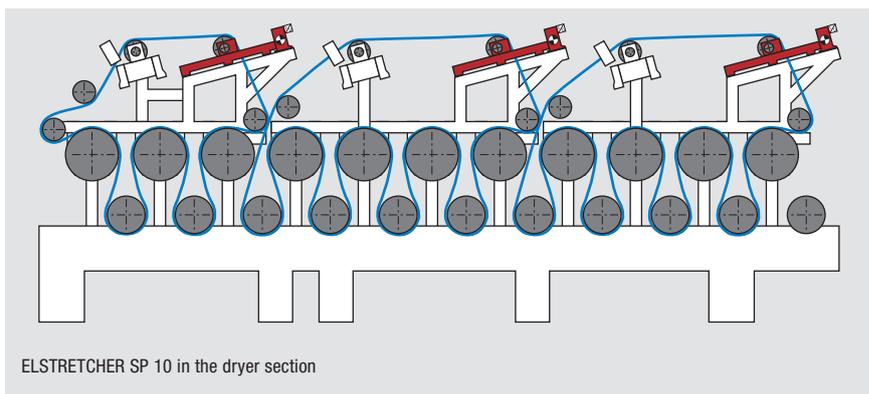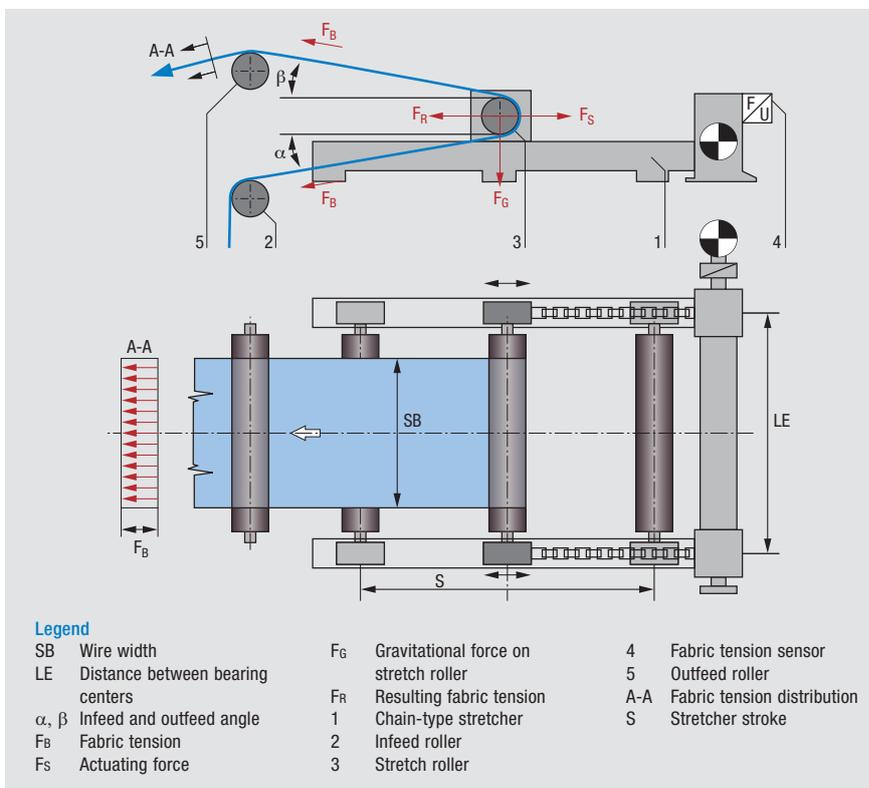
ELSTRETCHER SP 10 in the dryer section
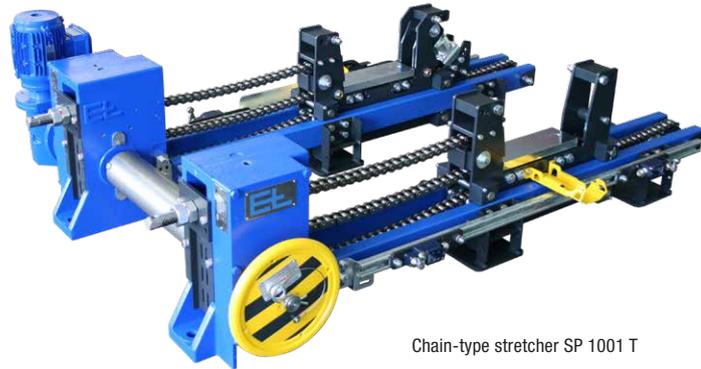
Chain-type stretcher SP 1001 T
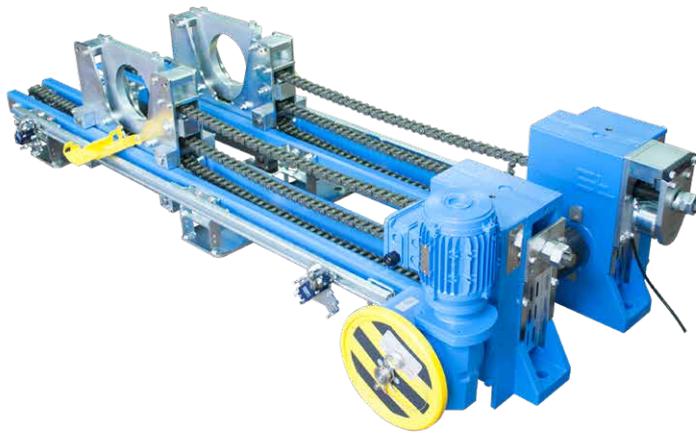
Chain-type stretcher SP 1001 T

Technical Data

Type	SP 1001 N*	SP 1001 T*	SP 1003 N*	SP 1003 T*	SP 1502 N*	SP 1502 T*
Max. actuating force	26 kN	45 kN	45 kN	65 kN	90 kN	140 kN
Max. stretcher stroke	2500 mm	2500 mm	3500 mm	3500 mm	3500 mm	3500 mm
Actuating speed	280 mm/min	280 mm/min	280 mm/min	280 mm/min	250 mm/min	250 mm/min
End position limiting	Proximity switch	Limit switch	Proximity switch	Limit switch	Proximity switch	Limit switch
Diameter of bearing bracket	80 to 260 mm	80 to 260 mm	80 to 350 mm	80 to 350 mm	235 to 360 mm	235 to 360 mm
Chain size	1"	1"	1 1/4"	1 1/4"	2"	2"
Basic material	Stainless steel	Painted steel	Stainless steel	Painted steel	Stainless steel	Painted steel
Area of use	wet	dry	wet	dry	wet	dry
Power	0,75 kW	0,75 kW	0,75 kW	0,75 kW	1,5 kW	1,5 kW
Operating voltage Range 1 Range 2 Range 3	346–420/200–240 V 50/60 Hz 400–500/230–290 V 50/60 Hz 500–575/290–330 V 50/60 Hz		346–420/200–240 V 50/60 Hz 400–500/230–290 V 50/60 Hz 500–575/290–330 V 50/60 Hz		346–420/200–240 V 50/60 Hz 400–500/230–290 V 50/60 Hz 500–575/290–330 V 50/60 Hz	
Current consumption Range 1 Range 2 Range 3	2,2/3,8 A 50 Hz 1,9/3,3 A 50 Hz 1,5/2,7 A 50 Hz	1,9/3,3 A 60 Hz 1,6/2,8 A 60 Hz 1,3/2,3 A 60 Hz	2,2/3,8 A 50 Hz 1,9/3,3 A 50 Hz 1,5/2,7 A 50 Hz	1,9/3,3 A 60 Hz 1,6/2,8 A 60 Hz 1,3/2,3 A 60 Hz	3,2/5,5 A 50 Hz 2,8/4,8 A 50 Hz 2,5/4,3 A 50 Hz	2,9/5,0 A 60 Hz 2,5/4,3 A 60 Hz 2,0/4,0 A 60 Hz
Ambient temperature standard optional	+10 to +60 °C	+10 to +130 °C +10 to +150 °C	+10 to +60 °C	+10 to +130 °C +10 to +150 °C	+10 to +60 °C	+10 to +130 °C +10 to +150 °C
Protection class	IP 66	IP 65	IP 66	IP 65	IP 66	IP 65

* N = wet, T = dry

With process control system

System requirements

+ Cycle times in the PLC of < 50 ms required
+ Additional wiring effort for analog fabric tension sensors
+ Additional analog inputs necessary for the fabric tension sensors
+ Additional space required in the program memory

Wire section		Press section		Dryer section	
SP 09	PD 77/80	SP 08	EM 08	SP 10/15	EM 10/15
	CV 22		CV 22		CV 22

Field level

Process level

Process control system

Control station
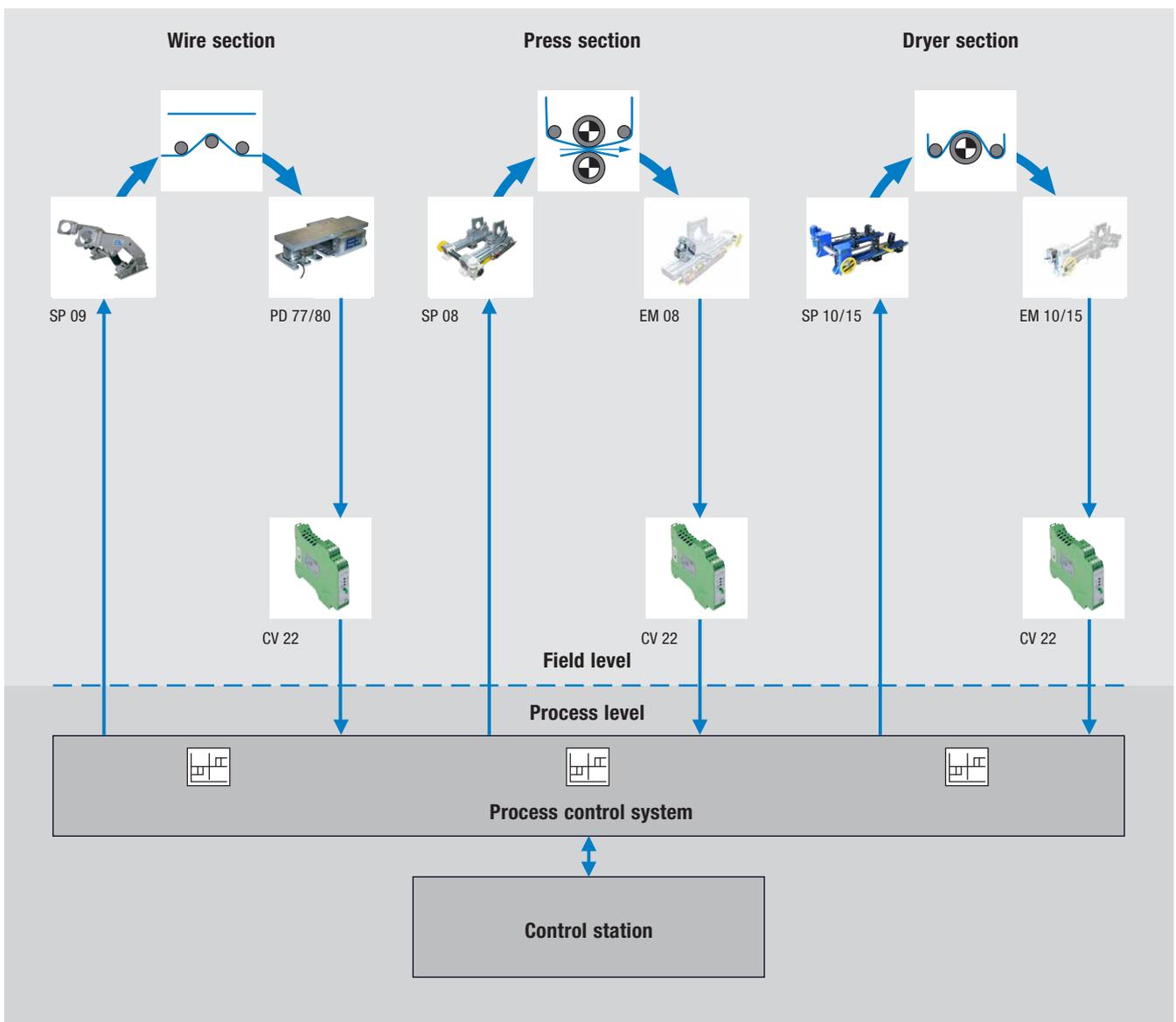
With E+L fabric tension control system

Benefits

+ Stabile fabric tension control due to independent, fast control loops
+ No additional programming effort for fabric tension control necessary
+ CAN bus technology ensures reliable data exchange and reduces the wiring effort
+ Control loops closed by E+L components ensure high process stability

Wire section

Press section

Dryer section

SP 09

PD 77/80

SP 08

EM 08

SP 10/15

EM 10/15

DC 04

DC 04

DC 04

CAN bus

CAN bus up to 8 groups

2.80
2.70

700.0 mm

Command station DO 44

Interface DI

Field level

Process level

Process control system

Control station
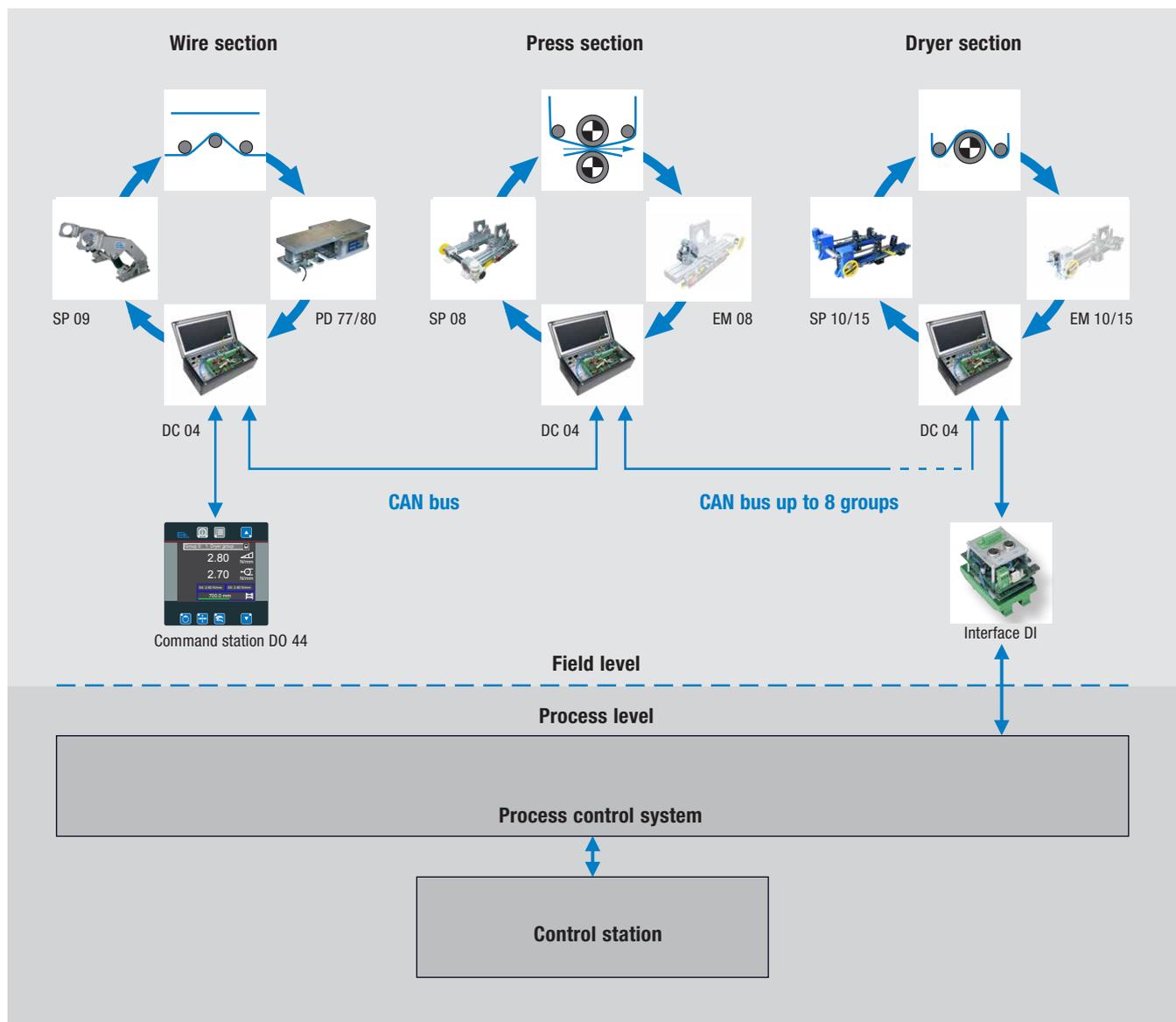
Wrap angle compensation

Wrap angle compensation
+ Stretch roller is used as the measuring roller for the fabric tension measurement with changing wrapping

Your benefits
+ Optimal control concept for dryer groups without external rollers
+ Due to high wrapping on the stretch roller optimal measuring signal for fabric tension acquisition
+ No dead time between measuring roller and stretcher roller
+ Reduced installation costs
+ No fabric tension measurement on the roller for the wire/felt guider

Electronic compensation
+ Acquisition of the stretch roller position using a position sensor FE 07
+ The actual fabric tension is adjusted to suit the position of the stretch roller
+ The calculation is already included in the fabric tension controller DC 04/24
+ Can be used in spindle and chain-type stretcher
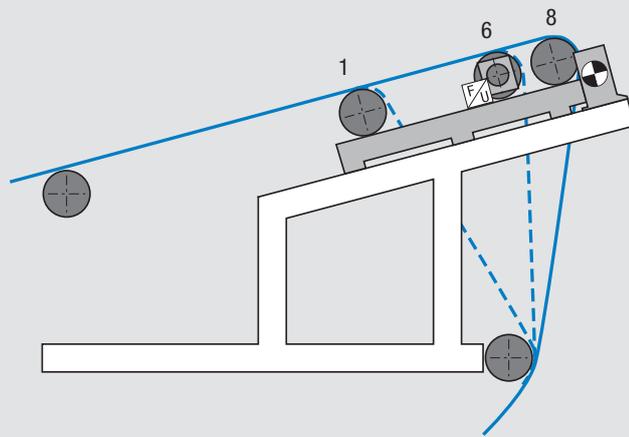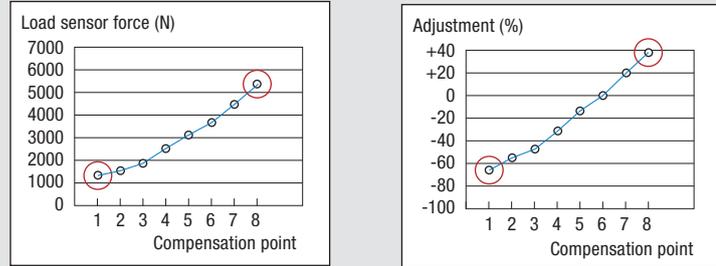

Function – electronic wrap angle compensation

### Mechanical compensation
+ No additional electronics required
+ Due to clever positioning of the pivot point and measuring unit, the measuring signal remains constant over a defined stretcher stroke
+ Can be used with asymmetrical roller arrangement
+ Can be used on lever-arm, spindle and chain-type stretcher
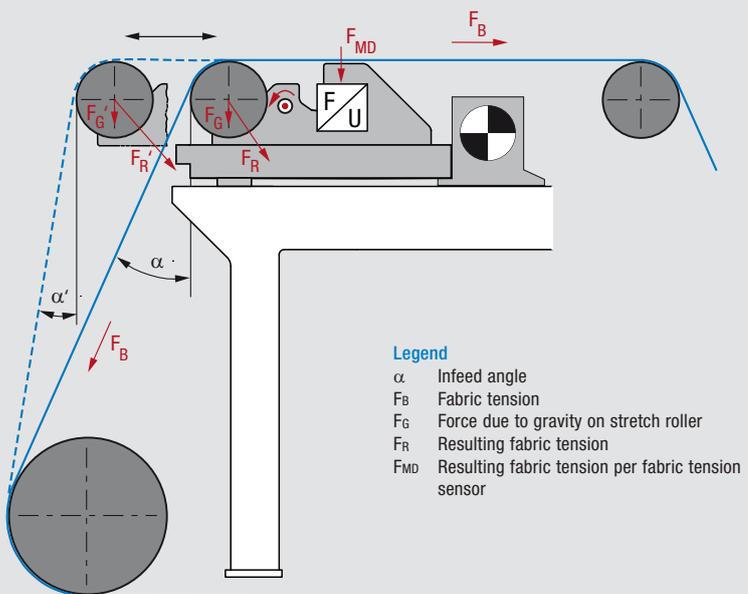
Legend
α Infeed angle
F_B Fabric tension
F_G Force due to gravity on stretch roller
F_R Resulting fabric tension
F_{MD} Resulting fabric tension per fabric tension sensor

Function – mechanical wrap angle compensation

Control structure for electronic wrap angle compensation
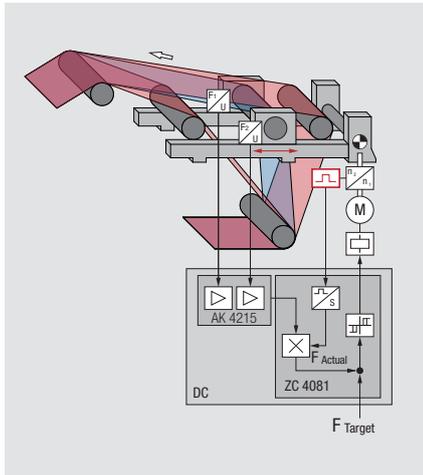
Fabric tension sensor EM 10
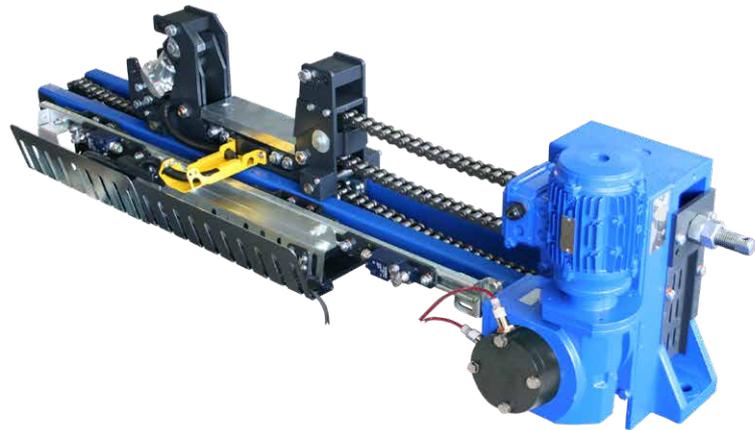
Electronic wrap angle compensation

Position sensor FE 07

Technical Data

Position sensor FE 07	
Operating voltage Nominal value Nominal range	24 V DC 10 to 33 V DC
Ambient temperature	+10 to +130 °C
Protection class	IP 68

Control structure for mechanical wrap angle compensation
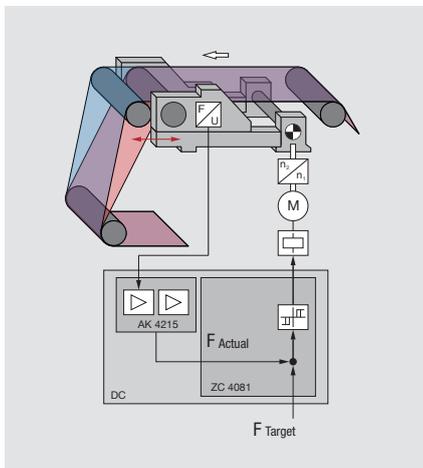
Fabric tension sensor EM 08
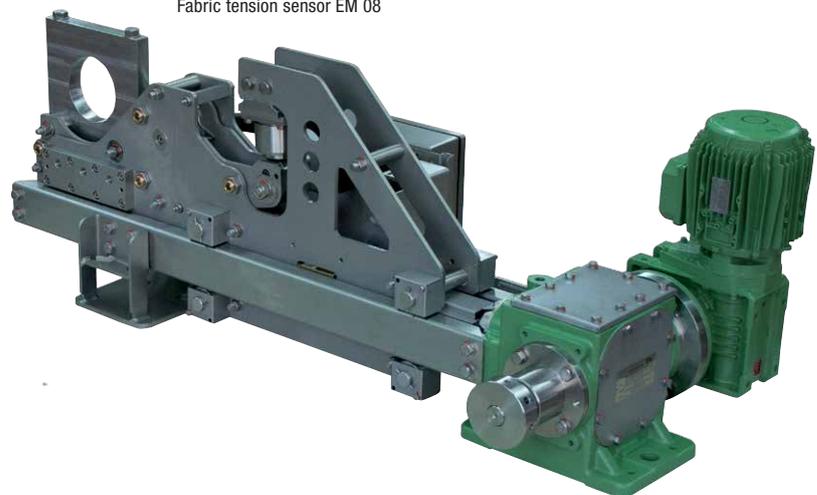
Mechanical wrap angle compensation

Felt cocking unit

Felt cocking unit VM 08/10
+ Automatic felt cocking of press felts
+ Continuously adjustable for stroke and time
+ One-sided adjustment of the stretch roller
+ Replaces classic handwheel
+ System enhancement with all necessary components
+ Optional for spindle and chain-type stretcher

### Your benefits
+ Reduced vibration with increasing production speed
+ Increased service life of the press felt and roller bearings
+ Improved paper quality
+ Increase in the machine productivity
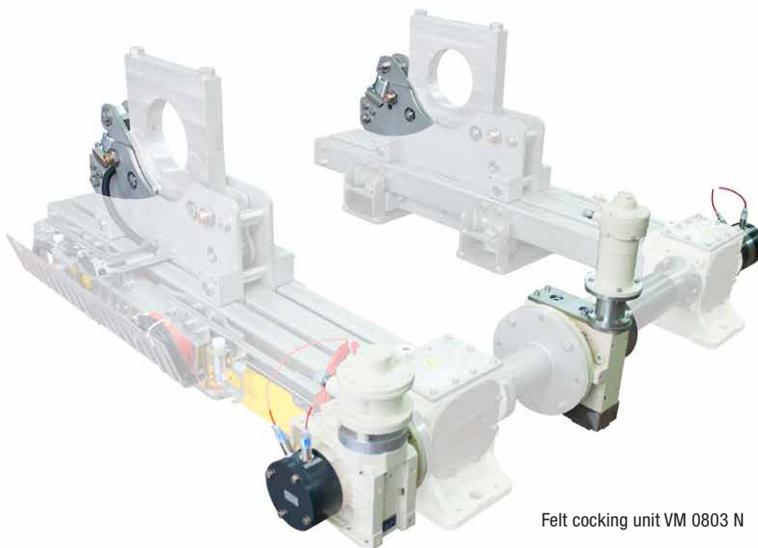
Felt cocking unit VM 0803 N
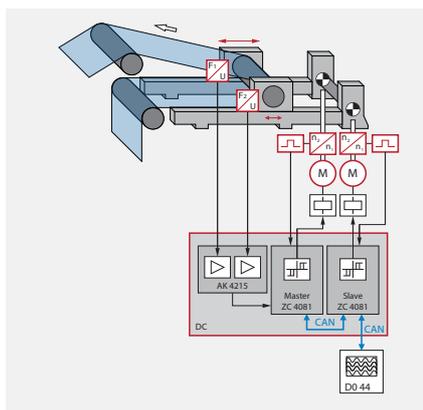
Block diagram for felt cocking unit VM 08/10

Fabric tension controller DC 04_8

Technical Data

Type	VM 10__T*	VM 08__N*
Actuating accuracy	1 mm	1 mm
Actuating travel max.	70 mm	70 mm
Actuating speed max.	22,8 mm/min	22,8 mm/min
Basic material	Steel/cast iron, painted	Stainless steel/cast iron, painted
Area of use	dry	wet
Power	0,25 kW	0,25 kW
Operating voltage Range 1 Range 2 Range 3	346-420/200-240 V 50/60 Hz 400-500/230-290 V 50/60 Hz 500-575/290-330 V 50/60 Hz	346-420/200-240 V 50/60 Hz 400-500/230-290 V 50/60 Hz 500-575/290-330 V 50/60 Hz
Current consumption Range 1 Range 2 Range 3	1,0/1,7 A 50 Hz 0,8/1,2 A 60 Hz on request on request	1,0/1,7 A 50 Hz 0,8/1,2 A 60 Hz on request on request
Ambient temperature	+10 to +130 °C	+10 to +60 °C
Protection class	IP 66	IP 66
Weight	approx. 32 kg	approx. 90 kg

* N = wet, T = dry

Accessories

Command device NT 52/53
+ Simple local operation
+ For fixed installation or portable usage

Your benefits
+ Optimal for clothing change, commissioning and service purposes

Command device NT 5385

Command device NT 5226

Technical Data

| Type	NT 5385	NT 5226
Basic material	Plastic	Stainless steel
Operating voltage Nominal value	24 V DC	24 V DC
Ambient temperature	+10 to +60 °C (Housing) +10 to +120 °C (Socket)	+10 to +60 °C
Protection class	IP 65	IP 67
Dimensions (LxWxH)	314x80x90 mm	150x150x80 mm
Weight	0,8 kg	1,5 kg

Digital display PA 1401

Digital display for indicating the current fabric tension on a bright, 3 1/2-digit LED display. The compact, space-saving mounted kit is available with 24 V DC connection voltage.

+ Optionally with housing and command device NT
+ Optionally with housing and measuring amplifier CV
+ Optionally with housing, measuring amplifier CV and command device NT

Technical Data

Digital display PA 1401	
Display	3 1/2 digits, 7 segments
Digit height	14 mm
Resolution	±1999
Overflow indication	only the "1" in the first digit illuminates
Accuracy	0,2 %
Measuring rate	approx. 3 s
Measuring inputs	0 bis 10 V 0 bis 20 mA 4 bis 20 mA
Operating voltage Nominal value	24 V DC
Current consumption	150 mA
Ambient temperature	0 to +50 °C
Protection class Panel mounted kit (when built-in) optional	IP 54 IP 65
Dimensions (LxWxH) Panel mounted kit Cut-out for panel mounted kit	96x85x24 mm 92x22,2 mm (Mounting depth 75 mm)
Weight	110 g

Further products for paper industry
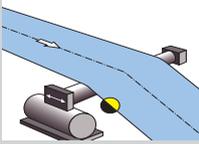
ELGUIDE – Fabric position control systems
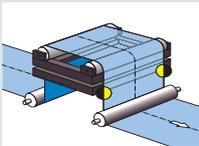
ELGUIDER – Web guiding systems
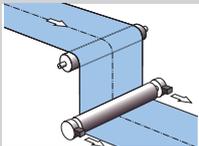
ELTENS – Web tension control systems

Questionnaire

General data

Customer					
Contact person					
Zip code		City/town		Country	
Telephone		Fax		E-mail	

Technical Data

Paper machine no./project		Machine speed (m/min)	
Make of paper machine		Max. felt/wire tension (N/mm)	
Felt/wire width (mm)		Weight, stretch roller (kg)	
Stretcher stroke (mm)		Max. ambient temperature in place of use (°C)	

Spezifikation

Selection of installation point	❑ wire section	❑ press section	❑ Dryer section
Position of tensioner	❑ horizontal standing upright, quantity:	❑ horizontal hanging, quantity:	$= _____°$ ❑ horizontal inclined, quantity:
	❑ vertical downwards, quantity:	❑ vertical upwards, quantity:	$= _____°$ ❑ vertical inclined, quantity:
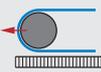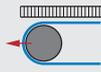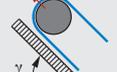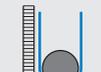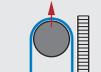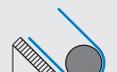
Type of actuating drive	❑ Air motor	❑ Three-phase motor 3 x _____ V _____ Hz
Electrical data	❑ Control voltage 24 V DC	❑ With power supply unit for control voltage _____ V _____ Hz
Fabric tension measurement	❑ one-sided	❑ constant wrapping on stretch roller (180°)
	❑ two-sided	❑ changing wrapping on stretch roller (<150°)
Fabric tension control	❑ without control (manual)	
	❑ with E+L fabric tension controller	
	❑ with measuring amplifier for control via process control system	

Date:	Issuer:

Notes

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