



ELTENS

Web tension measuring and control systems

Continuous acquisition and control of the web tension

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Increased quality and productivity

Increased quality and productivity due to web tension controlling

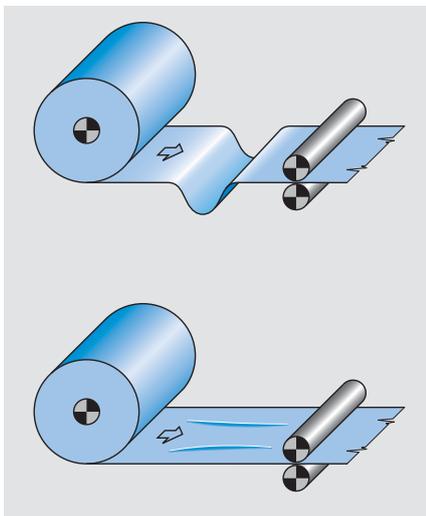
Today, the manufacturers and users of machines for processing web-type materials are confronted with ever increasing demands: production processes should be even faster, while at the same time performed with greater precision, the quality of the finished product further improved while personnel, waste and, above all, downtimes, should be reduced to a minimum. A decisive contribution to the fulfillment of these prerequisites is made by web tension control systems. Typically, web-type materials are fed from a coil to the machine,

finished and then rewound. At each stage, web tension errors may occur that may lead to malfunctions and quality impairments. The elimination of these sources of error and ensuring a constant web tension during the production process is the task of E+L web tension control systems. Depending on the material type, application and task, Erhardt+Leimer offers a variety of systems with the latest technology: For decisively more quality and productivity that pays off.

Typical web tension errors

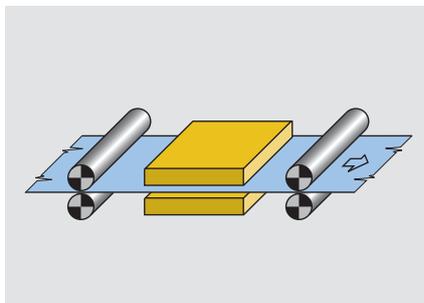
Web tension after the unwinder

- + Insufficient web tension causes slack in front of the transport drive
- + If the web tension is too high, longitudinal creasing and textile web deformation may be caused



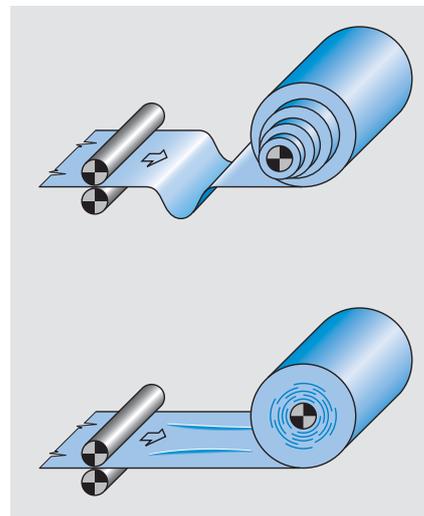
Web tension between clamping points

- + Crucial to the quality of the process is a constant web tension between clamping points



Web tension on the rewriter

- + If web tension on rewinding is insufficient, coil telescoping may occur
- + Excessively high tensile forces damage the inner windings

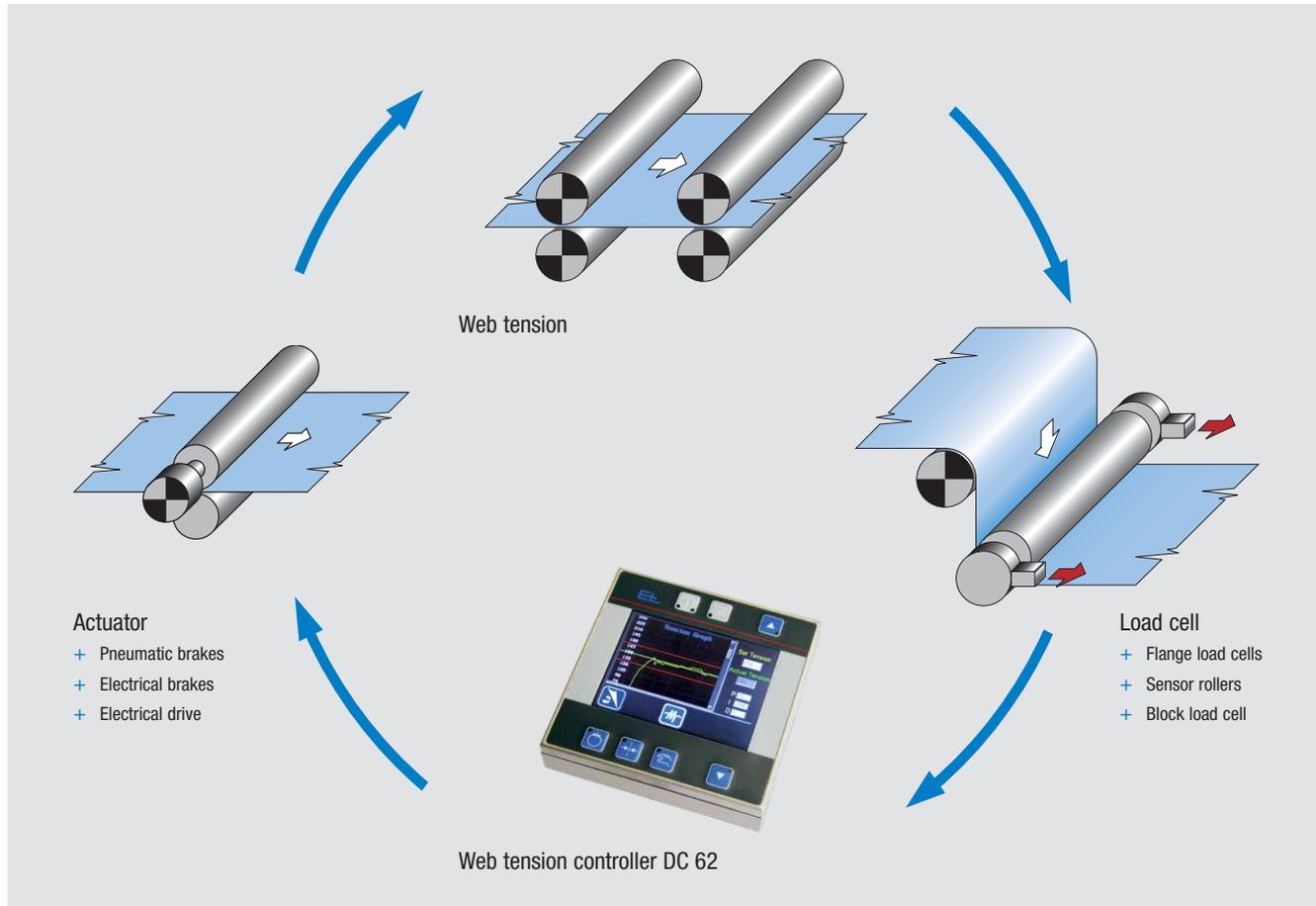


Closed loop

Any automation of a controller is based on the principle of a simple closed loop. Even the most complex of tasks may be reduced to this closed loop.

- + The starting point is the actual tensile force of the web
- + Load cells continuously and precisely detect the tensile force of the web
- + The controller compares the actual web tension value with the specified target value and transmits the relevant corrective signal to the actuator
- + The actuator converts the correction signal into the braking torque or the target speed value and, in this way, generates the web tension

The closed loop



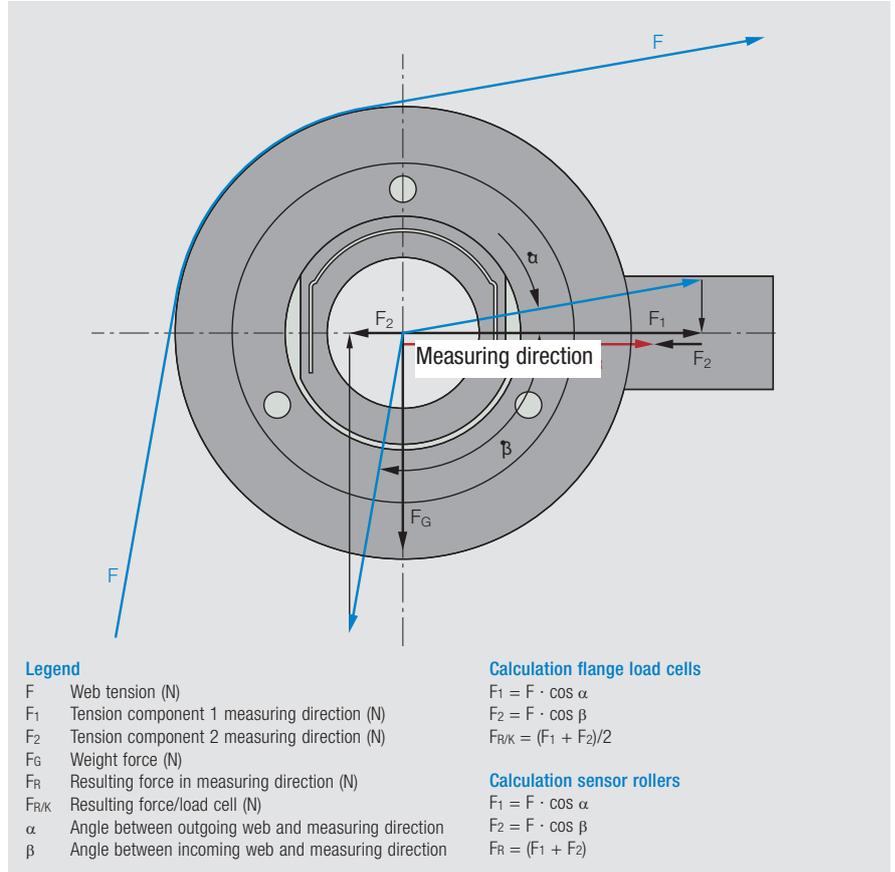
Flange load cells

Function

The load cell comprises a stable outer ring with flange cover and centering collar for precision assembly. The inner ring in the form of a bi-directional strip ensures the centered mounting of the ball bearing. The radial forces created by the web unbalance the strain gauges linked together to form a measuring bridge on the inner ring. This leads to an analogue output signal proportional to the web tension.

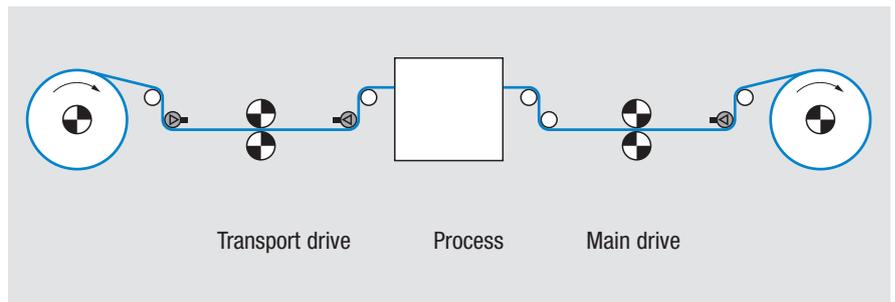
Area of use

Flange load cells are used in practically all processing plants where web-type materials are processed or finished. In front of processing stations, in particular, it is of fundamental importance that the textile web is transported with a continuous web tension.



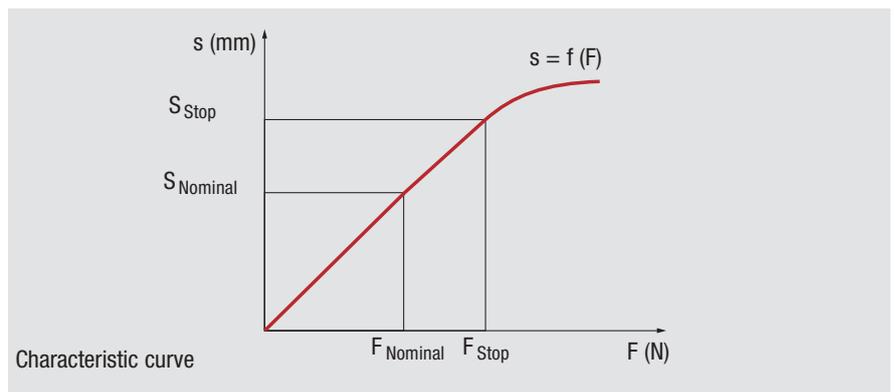
Application

With a 90° horizontal-vertical wrapping angle on the measuring roller and a horizontal measuring direction, optimum web tension measurement is assured. Only detection of the bearing forces on both sides can prevent incorrect measurements caused by the web moving sideways and asymmetrical web tension distribution. Load cells incorporated in a closed closed loop should be mounted as near to the actuator as possible.



Calibration

The tensile force – path characteristic curve forms a straight line to the mechanical stop. All load cells with the exception of the PD 25 series are calibrated to the nominal measuring force. Between the nominal measuring force and mechanical stop, a security factor of 50 to 100 % is taken into account to compensate for asymmetrical web tension distribution.



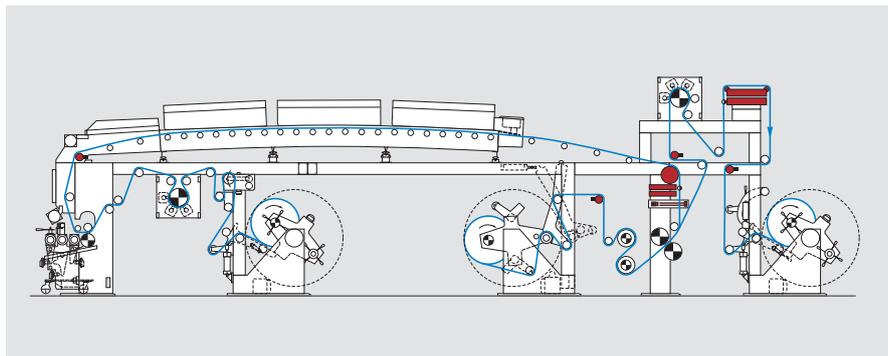
Flange load cells

Flange load cell PD 21/22

- + Position-independent installation due to various installation options such as flange bearings, pedestal bearings, inner or outer fastening
- + Maximum operational reliability due to overload protection up to 20 times the nominal measuring force
- + Different shaft diameters from 12 to 65 mm and nominal measuring forces from 0.05 to 10 kN ensure a high degree of flexibility
- + The roller weight does not influence the measuring result, assuming a horizontal direction of measuring
- + Good temperature behavior and a high degree of linearity of the measuring elements due to strain gauge application on a flat surface



Flange load cell PD 21 on re-rolling machine



Flange load cell PD 21 on laminating line

Technical data

Selection table

Flange load cell PD 21/22

Type bore on one side	Type bore on both sides	(mm)	Nominal measuring force (kN)					
PD 2112	PD 2212	12	0,05	0,1	0,2	0,5	1	
PD 2115	PD 2215	15	0,05	0,1	0,2	0,5	1	
PD 2117	PD 2217	17	0,05	0,1*	0,2	0,5*	1	
PD 2120	PD 2220	20		0,15	0,3	0,75	1,5	
PD 2125	PD 2225	25		0,15*	0,3	0,75*	1,5	
PD 2130	PD 2230	30		0,3	0,6	1,5	3	
PD 2135	PD 2235	35		0,3*	0,6	1,5*	3	
PD 2140	PD 2240	40		0,6	1,2	3	6	
PD 2145	PD 2245	45		0,6	1,2	3	6	
PD 2150	PD 2250	50		0,6*	1,2	3*	6	
PD 2155	PD 2255	55		1	2	5	10	
PD 2160	PD 2260	60		1	2	5	10	
PD 2165	PD 2265	65		1	2	5	10	

*Preferred sizes

Flange load cell PD 21/22

Accuracy class	0.5
Nominal characteristic value (sensitivity)	1 m V/V
Combined error	< 0.5 %
Characteristic value tolerance	0.2 %
Measuring principle	Full bridge strain gauge
Nominal resistance of the bridge strain gauge	700 Ohm
Bridge supply voltage nominal value	10 V
Max. permissible value	14 V
Mechanical stop	1.8 to 2.4 F _N dep. on type
Operating load	1.8 to 2.4 F _N
Limit load	20 x F _N
Nominal measuring travel	0.1 to 0.2 mm depending on type
Nominal temperature range	-10 to +60 °C
Operating temperature range	-10 to +90 °C
Temperature coefficient	±0.3 % / 10 K (characteristic value), ±0.3 % / 10 K (zero signal)
Protection class	IP 50
Max. permissible axial lateral force	1 x F _N
Weight	2.3 kg (d1 = 17 mm), 3.6 kg (d1 = 25 mm), 8.5 kg (d1 = 35 mm)

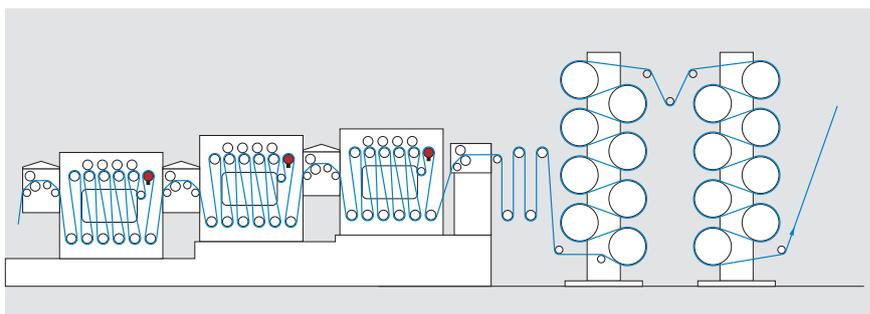
Flange load cells

Flange load cell PD 23/24

- + Flange load cell in stainless steel for difficult ambient conditions, e.g. washing machines and etching units
- + Multi-position, easy mounting due to various assembly options, e.g. flange bearings, pedestal bearings, inner or outer fastening
- + Maximum operational reliability due to overload protection up to 20 times the nominal measuring force
- + The roller weight does not influence the measuring result, assuming a horizontal direction of measuring
- + Good temperature behavior and a high degree of linearity of the measuring elements due to strain gauge application on a flat surface
- + High permissible operating speed of the measuring roller due to high web load cell spring constant



Flange load cell PD 23 on washing machine



Flange load cell PD 23 on dyeing line

Selection table

Flange load cell PD 23/24						
Type bore on one side	Type bore on both sides	(mm)	Nominal measuring force (kN)			
PD 2317	PD 2417	17	0.1	0.2	0.5	1
PD 2325	PD 2425	25	0.15	0.3	0.75	1.5
PD 2335	PD 2435	35	0.3	0.6	1.5	3

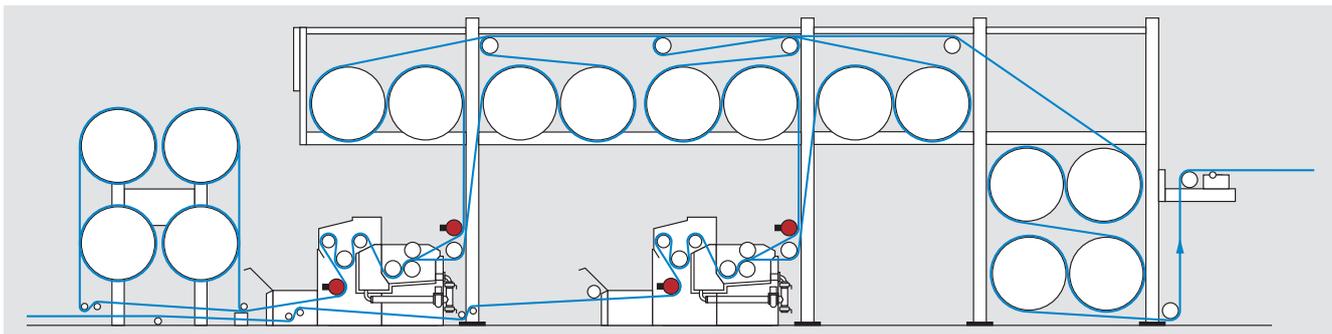
Technical data

Flange load cell PD 23/24	
Accuracy class	0.5
Nominal characteristic value (sensitivity)	1m V/V
Combined error	< 0.5 %
Characteristic value tolerance	0.2 %
Measuring principle	Full bridge strain gauge
Nominal resistance of the bridge strain gauge	700 Ohm
Bridge supply voltage nominal value	10 V
Max. permissible value	14 V
Mechanical stop	1.8 to 2.4 F _N dep. on type
Operating load	1.8 to 2.4 F _N
Limit load	20 x F _N
Nominal measuring travel	0.1 to 0.2 mm depending on type
Nominal temperature range	-10 to +60 °C
Operating temperature range	-10 to +90 °C
Temperature coefficient	±0.3 % / 10 K (characteristic value), ±0.3 % / 10 K (zero signal)
Protection class	IP 65
Max. permissible axial lateral force	1 x F _N
Weight	2.3 kg (d1 = 17 mm), 3.6 kg (d1 = 25 mm), 8.5 kg (d1 = 35 mm)

Flange load cells

Flange load cell PD 25

- + Economical aluminum flange load cell
 - + Compatible with the PD 21/22 standard series
 - + Multi-position, easy mounting due to various assembly options, e.g. flange bearings, pedestal bearings, inner or outer fastening
 - + Maximum operational reliability due to overload protection up to 10 times the nominal measuring force
 - + The roller weight does not influence the measuring result, assuming a horizontal direction of measuring
- + Good temperature behavior and a high degree of linearity of the measuring elements due to strain gauge application on a flat surface
 - + High permissible operating speed of the measuring roller due to high web load cell spring constant



Flange load cell PD 25 on sizing machine

Selection table

Flange load cell PD 25

Type bore on one side	(mm)	Nominal measuring force (kN)		
PD 2517	17	0.1	0.2	0.5
PD 2525	25	0.15	0.3	0.75
PD 2535	35	0.3	0.6	1.5

Technical data

Flange load cell PD 25	
Accuracy class	1
Nominal characteristic value (sensitivity)	1m V/V
Combined error	< 1 %
Characteristic value tolerance	0.2 %
Measuring principle	Full bridge strain gauge
Nominal resistance of the bridge strain gauge	700 Ohm
Bridge supply voltage nominal value	10 V
Max. permissible value	14 V
Mechanical stop	1.8 to 2.4 F _N dep. on type
Operating load	1.8 to 2.4 F _N
Limit load	10 x F _N
Nominal measuring travel	0.1 to 0.25 mm depending on type
Nominal temperature range	-10 to +60 °C
Operating temperature range	-10 to +90 °C
Temperature coefficient	±0.3 % / 10 K (characteristic value), ±0.3 % / 10 K (zero signal)
Protection class	IP 54
Max. permissible axial lateral force	1 x F _N
Weight	0.8 kg (d1 = 17 mm), 1.25 kg (d1 = 25 mm), 2.94 kg (d1 = 35 mm)

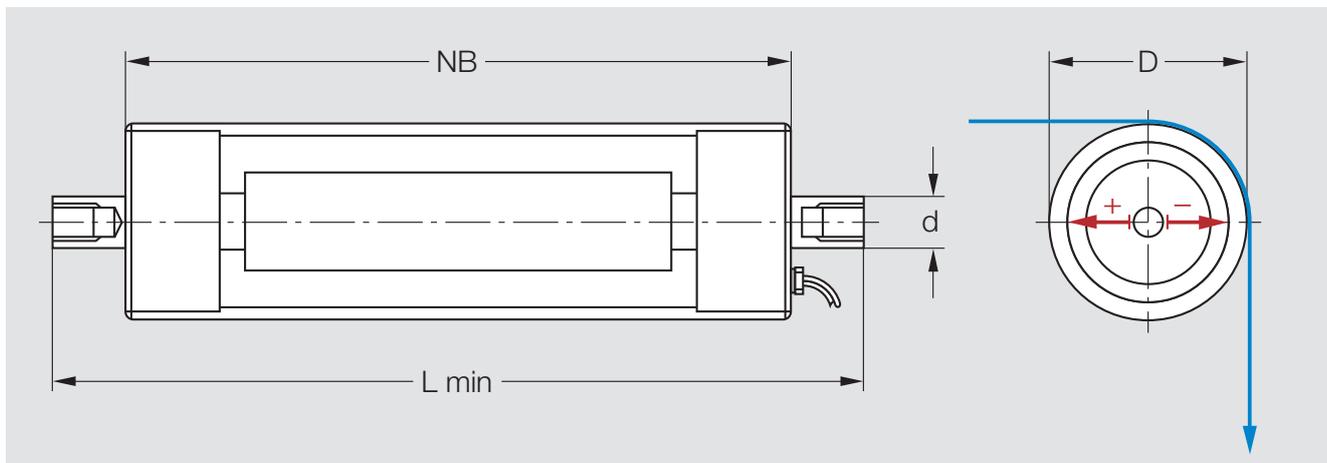


Flange load cell PD 25 on the infeed to a sizing bath

Sensor rollers

Sensor roller PD 30

- + Aluminum roller with fixed axle and 2 integrated load cells
- + For easy installation between side walls. Optionally with securing kit or snug-fit shoulder screws
- + Maximum operational reliability due to overload protection up to 10 times the nominal measuring force
- + Different roller diameters from 80 to 200 mm ensure maximum flexibility
- + The roller weight does not influence the measuring result, assuming a horizontal direction of measuring
- + Good temperature behavior and a high degree of linearity of the measuring elements due to strain gauge application on a flat surface
- + High permissible operating speed of the measuring roller due to high web load cell spring constant



Selection table

Roller surface PD 30	
Surface index	Surface
01	Bare RA 3.2 (standard)
02	Wound with rubber cork
03	Fine blasted with glass corundum RA 6.3, hard anodized, layer thickness 30 µm 450 HV
04	Hard anodized, layer thickness 30 µm 450 HV
05	Spiral groove left + right, pitch 40 mm, groove radius 6 mm, groove depth 0.25 mm
13	Rough blasted with glass corundum RA 11.5 – 15, hard anodized, layer thickness 30 µm 450 HV

Selection table

Sensor roller PD 30									
Type	ø D (mm)	NB min. (mm)	NB max. (mm)	L min. (mm)	ø d (mm)	Thread	Nominal measuring force F_N per roller (kN)		
PD 3008	80	300	1200	NB +10	20	M 12	0.2	0.4	1
PD 3010	100	300	1800	NB +10	20	M 12	0.3	0.6	1.5
PD 3012	120	400	2500	NB +10	20	M 12	0.3	0.6	1.5
PD 3016	160	600	3000	NB +10	40	M 16	0.6	1.2	3
PD 3020	200	600	3000	NB +10	40	M 16	0.6	1.2	3

Technical data

Sensor roller PD 30	
Roller tube basic material	AlMgSi 0.5
Bearing	Self-aligning ball bearings with fixed and moveable bearing, including labyrinth seal and lubrication for life
Balance quality PD 3008, PD 3010, PD 3012 PD 3016, PD 3020	Dynamically precision balanced in accordance with VDI 2060 Quality grade Q = 2.5 Quality grade Q = 6.3
Concentricity	< 50 µm for NB ≤ 1000 mm, < 100 µm for NB ≥ 1000 mm
Cylinder form	< 50 µm for NB ≤ 1000 mm, < 100 µm for NB ≥ 1000 mm
Max. speed	PD 3008 3600 revs/min, PD 3010 3000 revs/min, PD 3012 2400 revs/min, PD 3016 1800 revs/min, PD 3020 1500 revs/min
Roller weight	PD 3008 for NB 600 mm 7.5 kg per 100 mm step 0.85 kg PD 3010 for NB 600 mm 10.0 kg per 100 mm step 1.05 kg PD 3012 for NB 1100 mm 21.3 kg per 100 mm step 1.15 kg PD 3016 for NB 1100 mm 25 kg per 100 mm step 1.30 kg

Technical data



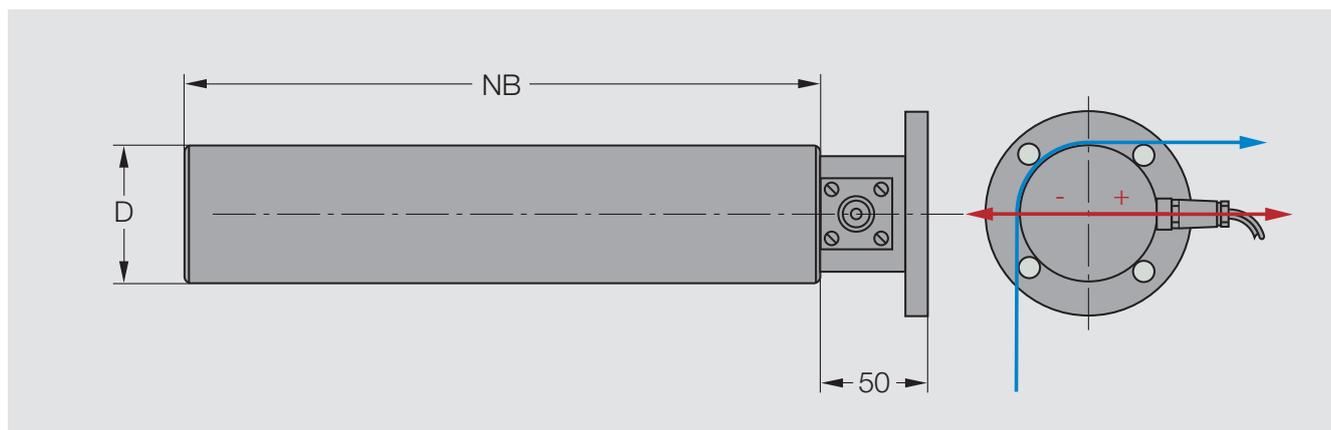
Sensor roller PD 30 on web offset printing press

Sensor roller PD 30	
Accuracy class	0.5
Nominal characteristic value (sensitivity)	1m V/V
Combined error	< 0.5 %
Characteristic value tolerance	0.2 %
Measuring principle	Full bridge strain gauge
Nominal resistance of the bridge strain gauge	700 Ohm
Bridge supply voltage	
Nominal value	10 V
Max. permissible value	14 V
Output voltage	
Nominal range	0 to 10 mV (with nominal force and a bridge supply voltage of 10 V)
Max. range	0 to 18 mV (with 1.8 x nominal force and a bridge supply voltage of 10 V)
Mechanical stop	1.2 to 1.8 F _N dep. on type
Operating load	1.2 to 1.8 F _N
Limit load	10 x F _N
Nominal measuring travel	0.15 to 0.25 mm depending on type
Nominal temperature range	-10 to +60 °C
Operating temperature range	-10 bis +70 °C
Temperature coefficient of characteristic value	±0.3 % / 10 K
of the zero signal	±0.3 % / 10 K
Protection class	IP 54
Max. permissible axial lateral force	1 x F _N
Connection cable	6 x 0.14 mm ² , 5/10 m long

Sensor rollers

Sensor roller PD 40

- + Aluminum roller with fixed axis and 2 integrated load cells
- + Assembly flange at one end for cantilever mounting
- + Maximum operational reliability due to overload protection up to 10 times the nominal measuring force
- + Different roller diameters from 60 to 120 mm ensure maximum flexibility
- + The roller weight does not influence the measuring result, assuming a horizontal direction of measuring
- + Good temperature behavior and a high degree of linearity of the measuring elements due to strain gauge application on a flat surface



Selection table

Roller surface PD 40	
Surface index	Surface
01	Bare RA 3.2 (standard)
02	Wound with rubber cork
03	Fine blasted with glass corundum RA 6.3, hard anodized, Layer thickness 30 µm 450 HV
04	Hard anodized, layer thickness 30 µm 450 HV

Sensor roller PD 40						
Type	ø D (mm)	NB min. (mm)	NB max. (mm)	Nominal measuring force F_N per roller (N)		
PD 4006	60	150	300	50	100	200
PD 4008	80	200	400	100	200	400
PD 4010	100	250	500	100	200	400
PD 4012	120	400	600	200	400	600

Technical data

Sensor roller PD 40		
Roller tube basic material	ENAW-6060T66 (AlMgSi 0.5)	
Bearing	Self-aligning ball bearings with fixed and moveable bearing including labyrinth seal and lubrication for life	
Balance quality (dynamic precision balancing to VDI 2060)	Quality grade Q = 2.5 (standard) Quality grade Q = 1 (option)	
Concentricity	< 50 µm	
Cylinder form	< 50 µm	
Max. web speed with balance quality Q 2.5	450 m/min	
Max. web speed with balance quality Q 1	600 m/min (900 m/min on PD 4012)	
Max. bend	At max. nominal measuring force	Per 100 mm nominal width
PD 4006	200 N	0.16 mm
PD 4008	400 N	0.21 mm
PD 4010	400 N	0.11 mm
PD 4012	600 N	0.08 mm
Roller weight		
PD 4006	At NW 150 mm 1.43 kg	per 50 mm step 0.23 kg
PD 4008	At NW 200 mm 3.80 kg	per 50 mm step 0.40 kg
PD 4010	At NW 250 mm 6.60 kg	per 50 mm step 0.72 kg
PD 4012	At NW 400 mm 17.30 kg	per 50 mm step 2.21 kg
Assembly of flange fastening (centering collar available)	With central thread With 4 bores	

Sensor roller PD 40	
Accuracy class	1
Nominal characteristic value (sensitivity)	1m V/V
Combined error	< 1 %
Characteristic value tolerance	0.2 %
Measuring principle	Full bridge strain gauge
Nominal resistance of the bridge strain gauge	700 Ohm
Bridge supply voltage	
Nominal value	10 V
Max. permissible value	14 V
Output voltage	
Nominal range	0 to 10 mV (with nominal force and a bridge supply voltage of 10 V)
Max. range	0 to 18 mV (with 1.8 x nominal force and a bridge supply voltage of 10 V)
Mechanical stop	1.2 to 1.8 F _N dep. on type
Operating load	1.2 to 1.8 F _N
Limit load	10 x F _N
Nominal measuring travel	0.15 to 0.25 mm depending on type
Nominal temperature range	-10 to +60 °C
Operating temperature range	-10 bis +70 °C
Temperature coefficient of characteristic value	±0.3 % / 10 K
of the zero signal	±0.3 % / 10 K
Protection class	IP 50
Max. permissible axial lateral force	1 x F _N
Connection cable	6 x 0.14 mm ² , 5/10 m long

Block load cell

Function

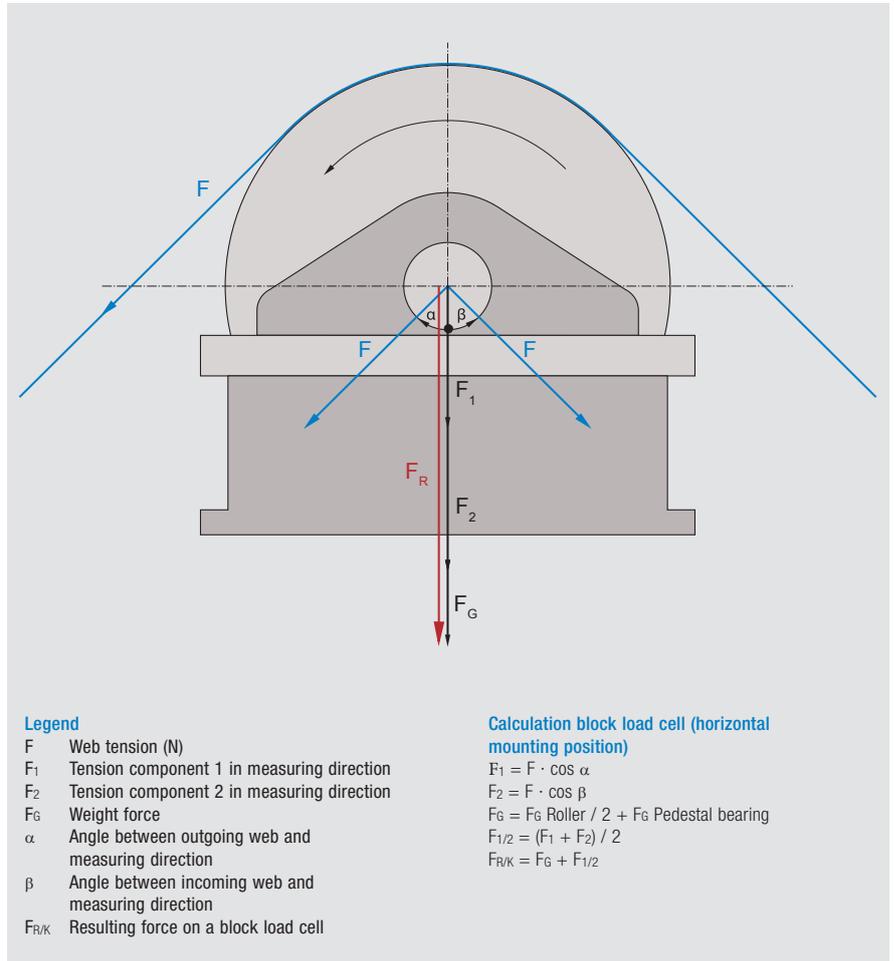
Block load cells comprise a cast housing for adaptation to the customer's machine and a mounting plate to accommodate the pedestal bearing. The measuring force is acquired via a bi-directional strip to which the strain gauges are applied and, in this way, an analogue measured signal proportional to the web tension output.

Area of use

Block load cells are used in practically all processing plants where web-type materials are processed or finished. Above all in the converting sector they offer significant advantages, as the rollers can always be replaced easily due to the very good access to the pedestal bearings.

Application

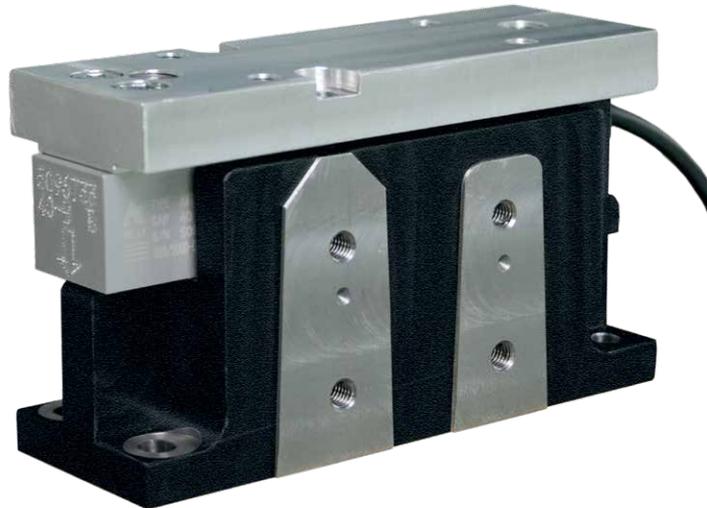
A horizontal mounting position is preferred with symmetrical wrapping between 60 – 180° to the vertical measuring direction. Measurement of the web tension on both sides prevents incorrect measurements caused by the web moving sideways and asymmetrical web tension distribution. Load cells incorporated in a closed control loop should be positioned as near to the actuator as possible.



Block load cell

Block load cell PD 50

- + Can be mounted on almost all common pedestal bearings in conjunction with standard guide rollers
- + Maximum operational reliability due to overload protection up to 10 times the nominal measuring force
- + Large measuring range through 1:25 resolution
- + Double bending section with strain gauges in full bridge configuration
- + Straightforward guide roller replacement due to good pedestal bearing access
- + Can be mounted both on and against the machine wall



Selection table

Block load cell PD 50						
Type	Size L x W x H (mm)	Through hole	Hole spacing for assembly (mm)	Nominal measuring force F_N per block load cell (kN)		
PD 5010	134 x 48 x 78	Ø 7	118 x 28	0.08	0.2	0.4
PD 5020	150 x 68 x 78	Ø 8,7	135 x 51	0.5	1.0	2.0

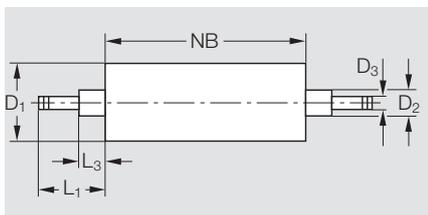
Technical data

Block load cell PD 50	
Accuracy class	0.5
Nominal characteristic value (sensitivity)	2 m V/V
Combined error	±0.5 %
Characteristic value tolerance	< ±0.2 %
Measuring principle	Full bridge strain gauge
Nominal resistance of the bridge strain gauge	700 Ohm
Bridge supply voltage	
Nominal value	10 V
Max. permissible value	14 V
Mechanical stop	1.2 x F_N
Operating load	1.2 x F_N
Limit load	10 x F_N
Nominal measuring travel	0.2 to 0.3 mm depending on type
Nominal temperature range	-10 to +60 °C
Operating temperature range	-10 to +90 °C
Temperature coefficient	
of characteristic value	0.3 % / 10 K
of the zero signal	0.3 % / 10 K
Protection class	IP 54
Axial transverse force	1 x F_N
Weight	1.5 kg

Accessories for flange load cells

Measuring roller BA 6

- + Aluminum roller mounted on outer bearings for PD 21/25 flange load cell assembly
- + Minimum concentricity tolerances and high balance quality
- + Roller diameter from 80 to 200 mm
- + Various surfaces for a wide range of implementation areas



Selection table

Measuring roller BA 6				
Type	Roller diameter D1 (mm)	Nominal width NB, min. (mm)	Nominal width, max. (mm)	Shaft diameter D3 (mm)
BA 6080	80	200	1200	17/25
BA 6100	100	200	1800	17/25
BA 6120	120	400	2700	25/35
BA 6160	160	600	2700	25/35
BA 6200	200	600	2700	35/45

Selection table

Measuring roller BA 6 surface	
Index	Surface
01	Bare RA 3.2 (standard)
02	Wound with rubber cork
03	Fine blasted with glass corundum RA 6.3, hard anodized, layer thickness 30 µm 450 HV
04	hard anodized, layer thickness 30 µm 450 HV

Selection table

Measuring roller BA 6 surface	
Roller tube basic material	ENAW-6060T66 (AlMgSi 0.5)
Balance quality	Dynamic precision balancing to VDI 2060
Quality grade	2.5 (80 mm); 6.3 (100/120/160/200 mm)
Concentricity	<50 mm for NB ≤1000 mm; <150 mm for NB ≥1000 mm
Cylindrical form	<50 mm für NB ≤1000 mm; <150 mm für NB ≥1000 mm

Accessory kits for flange load cells

- + Accessory kits with self-aligning ball bearing, securing ring and compensating sleeves for the different assembly variants



Selection table

Accessory kits for flange load cells				
Roller version	Shaft/axle version	for load cell	Moving bearing side accessory kit	Fixed bearing side accessory kit
	Stepped axle	PD 21, PD 25	1	3
	Continuous axle	PD 21, PD 25	2	4
	Stepped shaft	PD 21/23, PD 25	1	1
	Continuous shaft	PD 21, PD 25	2	2
	Stepped shaft	PD 22	5	5
	Continuous shaft	PD 22	6	6

Bearing blocks for flange load cells

+ Bearing block for precise assembly of flange load cells on machine frames

Selection table



Bearing blocks for flange load cells													
Material number	Shaft diameter (mm)												
	12	15	17	20	25	30	35	40	45	50	55	60	65
042594	x	x	x										
042595				x	x								
042596						x	x						
042597								x	x	x			
042598											x	x	x

Cable for load cell PD 21/22

Material	Name	Length (m)
045449	PDV0200 – G66	5
220397		10
045450		15
058131		20
058641		25
053769		30

Cable for load cell PD 25

Material	Name	Length (m)
208534	PD_2517 – 99	5
208533		10
211310		15
211309		20
211308		25
325971		30

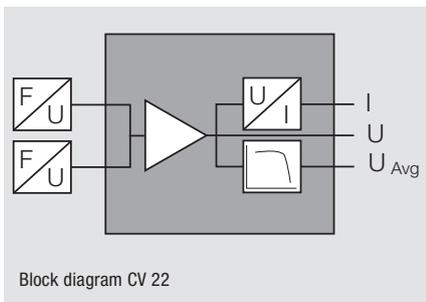
Cable for load cell PD 30/40/50

Material	Name	Length (m)
306962	PD_3000 – 96	5
311536		10
383595		15
316491		20
325522		25
325523		30

Measuring amplifiers

Measuring amplifier CV 22

- + Single-channel measuring amplifier for connecting 2 fabric tension sensors with a 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



Technical data

Measuring amplifier CV 22	
Accuracy class	0.1
Amplification range	990 to 3400 V/V
	400 to 1250 V/V
	600 to 2050 V/V
	300 to 1025 V/V
Input voltage	0 bis ± 20 mV
Output signals	
Voltage	0 to ± 10 V (rise time 5 ms)
Voltage filtered	0 to ± 10 V (rise time 2 s)
Electricity	0/4 mA to 20 mA
Nominal temperature	0 to 60 °C
Temperature coefficient	
of the nominal value	± 3 %/10 K
of the zero signal	± 3 %/10 K
of the bridge supply voltage	± 0.04 %/10 K
Operating voltage	
Nominal value	24 V DC
Nominal range	20 to 30 V DC
Current consumption	0.2 A
Bridge supply voltage	
Nominal value	10 V DC
Nominal range	9 to 13 V DC
Protection class	
Top-hat rail mounting to DIN EN 50022	IP 00
With housing	IP 54

Digital measuring amplifier with display

Digital measuring amplifier with display

PA 62*

Digital two-channel measuring amplifier for connection of 2 fabric tension sensors with a 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 the web tension
- + x-t writing process for long-time display of the web tension
- + Monitoring of the web tension for settable limit values with digital output (alarm)
- + Analog output of the measured values



Selection table

Measuring amplifier PA 62			
Type	Plug-in	Housing	Ethernet
PA 6200	x		x
PA 6201		x	x
PA 6210	x		
PA 6211		x	

Technical data

Measuring amplifier PA 62	
Operating voltage	24 V DC (20 to 30 V DC)
Current consumption	0.3 A
Nominal operating temperature	10 to 50 °C
Measuring cycle time	1 ms
Strain gauge amplifier	2 channels
Input voltage	±30 mV/14 Bit
Bridge supply voltage	10 V DC
Analog outputs	
Actual signal direct	1 x 0 to 10 V/1 x 0/4 to 20 mA
Actual signal filtered	1 x 0 to 10 V
Digital outputs	4 x channels
Output voltage	24 V/max. 500 mA
Interfaces	
CAN	250 kBaud
Ethernet (UDP)	RJ 45, 100 MBit
Dimensions (W x H x D) / protection class	
PA 6200 plug-in	100 x 100 x 8 (60) / IP 20
PA 6201 housing	120 x 120 x 80 / IP 54

* in preparation

Digital displays for web tension measurement

Digital display PA 0703

Digital display for indicating the current web tension on a bright, 3 1/2-digit LED display. The display, in assembly kit form, is available with 115/230 V AC and 24 V DC connection voltages.



Digital display PA 1401

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



Technical data

Digital display PA 0703

Operating voltage nominal value	115/230 V, 50/60 Hz
Power	1 VA
Nominal value	24 V DC
Current consumption	50 mA
Measuring inputs	0 to 10 V
Input resistance	Approx. 500 kOhm
Display	3 1/2 digits, 7 segments
Digit height	13.5 mm
Resolution	±1999
Measuring rate	Approx. 3 s
Overflow indication	Only the "1" in the first digit is illuminated
Accuracy	0.1 %
Nominal temperature range	0 to 50 °C
Protection class (when built-in)	IP 50
Dimensions	
Front frame	96 x 48 mm
- Mounting opening	92 x 45 mm
- Mounting depth	72.5 mm
Weight	Approx. 160 g

Technical data

Digital display PA 1401

Operating voltage nominal value	24 V DC
Current consumption	150 mA
Measuring inputs	0 to 10 V 0 to 20 mA 4 to 20 mA
Display	3 1/2 digits, 7 segments
Digit height	14 mm
Resolution	±1999
Measuring rate	Approx. 3 s
Overflow indication	Only the "1" in the first digit is illuminated
Accuracy	0.2 %
Nominal temperature range	0 to 50 °C
Protection class (when built-in)	IP 54
Dimensions front frame	
- Mounting opening	96 x 24 mm
- Mounting depth	92 x 22.2 mm 75 mm
Weight	110 g

Web tension controller

Web tension controller DC 62

The web tension controller has a variable controller structure to cover a wide variety of applications:

- + "Open-loop" with diameter signal
- + "Closed-loop" via load cell or dancer position: Unwinders with electrical and pneumatic brakes; rewinders, unwinders or transport drive with electrical drives

The integrated measuring amplifier, the analog inputs and outputs and the power output element for electrical brakes make a compact design possible. The menu-based, language-neutral commissioning wizard combined with the color touch display guarantee very straightforward, quick commissioning of the web tension control system. Integration in the customer's controller is ensured with the Ethernet interface.

Further functions:

- + Adaptive control
- + 30 recipes
- + Configurable winding characteristic (taper tension)
- + Alarm function

Area of use

The DC 62 is universally suitable for all web tension control tasks regardless of whether in the paper, film or textile industrial sectors.



Technical data

Web tension controller DC 62	
Operating voltage	24 V DC (20 to 30 V DC)
Current consumption (without el. brake)	0.3 A/2.3 A (el. brake)
Nominal operating temperature	10 to 50 °C
Control cycle time	1 ms
Strain gauge amplifier	2 channels
Input voltage	±30 mV / 14 Bit
Bridge supply voltage	10 V
Analog inputs	
Guide value/target value/dancer roller	2 x 0 to ±10 V / 14 Bit
Diameter	1 x 0 to 10 V / 12 Bit
Analog outputs	
Electrical brake / coupling	PWM power output 0 to 2 A/ 24 V
Controller actuating signal	1 x 0 to ±10 V / 14 Bit 1 x 0/4 to 20 mA
Monitor output	1 x 0 to 10 V / 12 Bit
Digital inputs	3 x floating Signal "0": -5 V to +2 V Signal "1": +8 V to +30 V
Digital outputs	2x floating / short-circuit proof
Output voltage	24 V / max. 0.5 A
Interfaces	
CAN	250 kBaud
Ethernet (UDP)	RJ 45, 100 MBit
Dimensions (W x H x D) /	
DC 6201 plug-in	100 x 100 x 8 (60) mm
DC 6202 housing	130 x 155 x 106 mm
Protection class	
Plug-in	IP 20
Housing	IP 54

Selection table

Web tension controller DC 62			
Type	Plug-in	Housing	Ethernet
DC 6200	x		x
DC 6201		x	x
DC 6210	x		
DC 6211		x	

Web tension controller

Function of unwinder with pneumatic brake

Two load cells measure the actual web tension value of the moving web. This value is compared with the target web tension value and transferred as a control difference to the PID controller. The PID controller forms the actuating signal for the following U/P converter. At its output, the converter provides a proportional actuating signal for operating a pneumatic brake.

Special features

- + Connection for diameter sensor
- + Mass inertia compensation for quick stop
- + Brake caliper rotation
- + Target torque value for unwinders

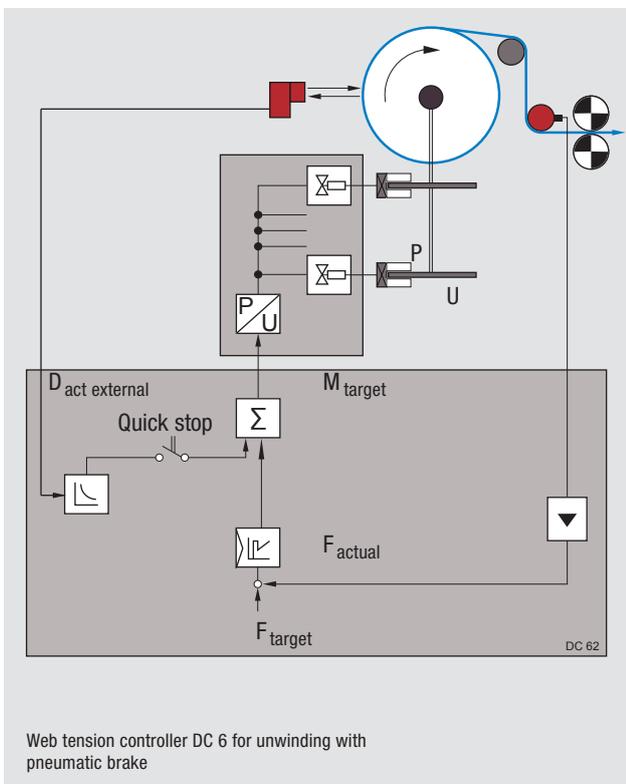
Function of unwinder with electric brake

Two load cells measure the actual web tension value of the moving web. This value is compared with the target web tension value and transferred as a control difference to the PID controller. The PID controller forms the actuating signal for the following U/I converter. The converter provides on its output a proportional actuating signal for operating an electrical brake.

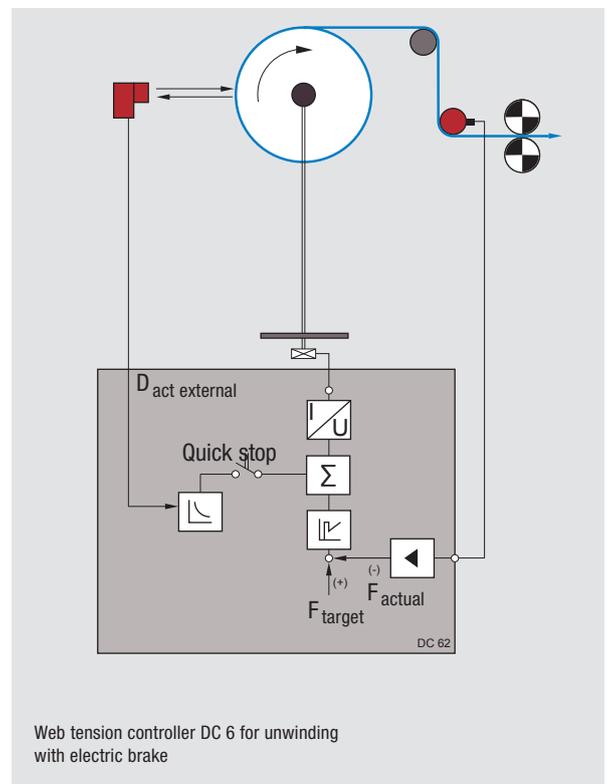
Special features

- + Target torque value for unwinders

Control structure for unwinding with pneumatic brake



Control structure for unwinding with electric brake



Web tension controller

Function of unwinder or rewinder with speed-controlled drive

Two load cells measure the actual web tension value of the moving web. This value is compared with the target web tension value and transferred as a control difference to the PID controller. The PID controller forms the speed correction signal $\pm \Delta v$ which is added to the web speed signal v web target. The v web target corresponds to the v web target from the main drive. For unwinders and rewinders, the superimposed speed target value is divided by the actual coil diameter. The result is a superimposed speed target value for the speed-controlled unwinder and rewriter.

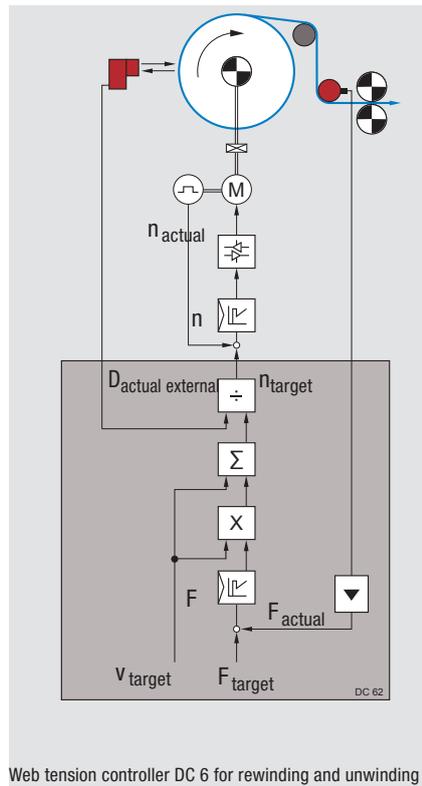
Function of transport drive

Two load cells measure the actual web tension value of the moving web. This value is compared with the target web tension value and transferred as a control difference to the PID controller. The PID controller forms the speed correction signal $\pm \Delta v$ which is added to the web speed signal. This signal is transferred to the next drive.

Special features

- + Connection for diameter sensor
- + Speed target value for rewinders and unwinders
- + Winding characteristic $F = f(D)$ can be selected as required

Control structure for rewriter and unwinder

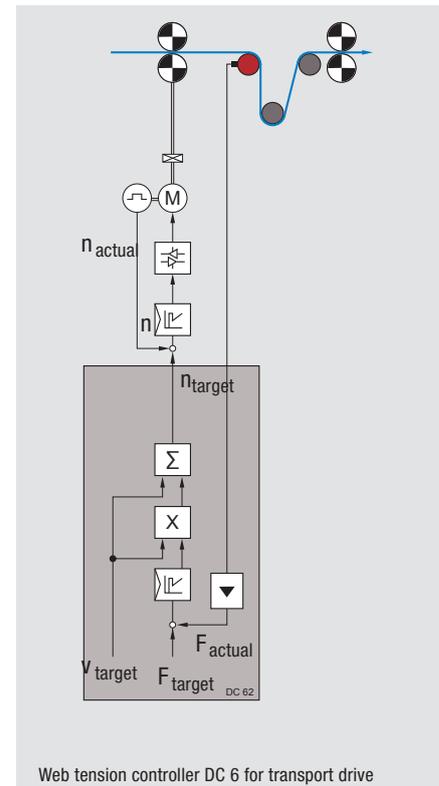


Web tension controller DC 6 for rewinding and unwinding

Special features

- + Speed target value for transport drive

Control structure for transport drive



Web tension controller DC 6 for transport drive

Dancer position controller

Function: Unwinder with pneumatic or electric brake

The dancer position is measured using an analog signal and compared with the settable target position. The difference is transferred to the PID controller and a corresponding actuating signal is calculated.

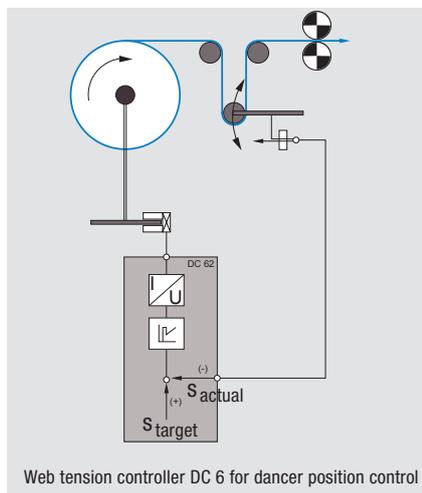
Braking torque control

Function: Unwinder with pneumatic or electric brake

During braking torque control, the torque is adjusted according to the current coil diameter. Overall, the torque can be defined via the target value.

Special features

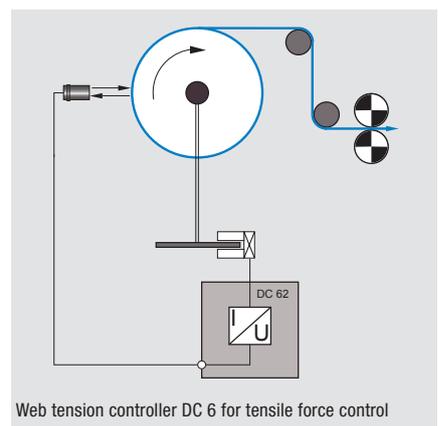
- + Connection for diameter sensor
- + Integrated output stage for electrical brake



Web tension controller DC 6 for dancer position control

Special features

- + Very easy adjustment of the braking torque, depending on the diameter
- + Connection for diameter sensor
- + Integrated output stage for electrical brake



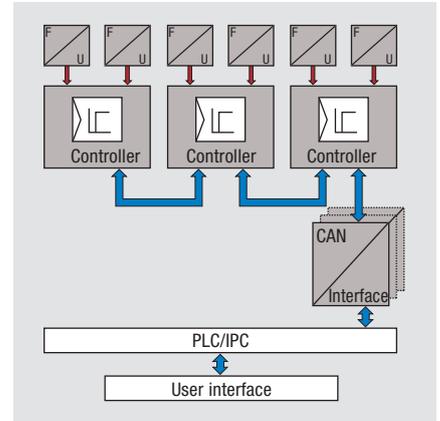
Web tension controller DC 6 for tensile force control

Networking

CAN bus

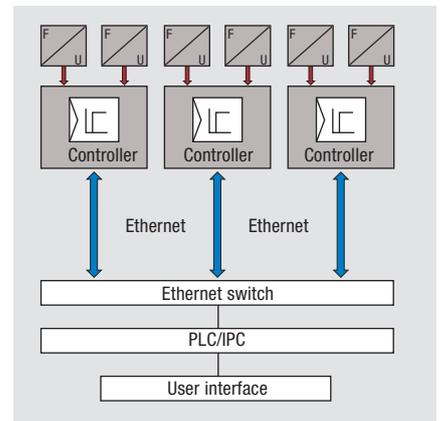
All the functional modules in the digital control system (DCS) feature a CAN bus interface and are also networked with one another. This feature ensures not only flexible adjustment of the E+L control system to new tasks but also guarantees maximum immunity to interference and a minimum wiring outlay.

A controller group may comprise up to 16 devices including, for example, sensors, support beams, 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. For lengths from 160 m a CAN extension DI 0010 is available; it is simply plugged in between two CAN networks.



Ethernet

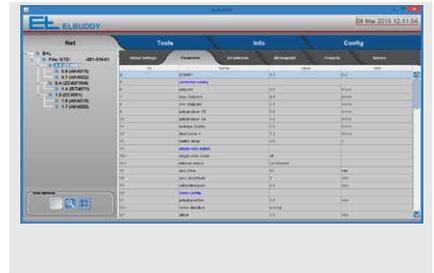
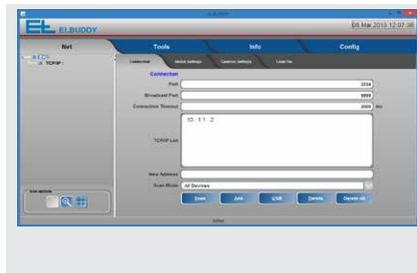
While networking via CAN bus, the limit is a maximum of 8 controller groups, networking via Ethernet is unlimited. Within a DCS control group, the functional modules communicate via the CAN bus system. Each controller group is integrated into the customer's control system via the Ethernet interface. Due to the support for protocols such as Ethernet/IP, UDP, integration in the most common control systems is possible.



Diagnostic tool ELBUDDY

Convenient diagnostics

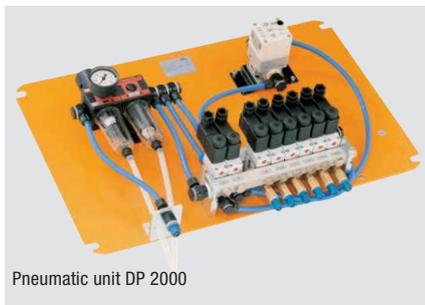
Sophisticated systems require a simple, comprehensive representation of the entire network. The ELBUDDY software tool for Windows computers depicts the CAN network in a structured form and, at the same time, comprises a convenient set-up editor for setting all control parameters. Furthermore, ELBUDDY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



Electro-pneumatic converter

Pneumatic unit DP 2000

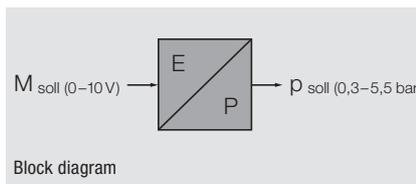
On web tension controllers with pneumatic brakes, the DP 2000 pneumatic unit is used between the web tension controller and brake. Depending on the version, 1, 2, 4 or 6 brake calipers are operated. In the interests of reliability, the unit is equipped with a double filter system. The pneumatic unit is modularly designed and as such may be easily extended in many respects. Operation is direct, via an on-site controller or E+L command station.



Pneumatic unit DP 2000

Selection table

Pneumatic unit DP				
Type	No. of brake valves	Pressure control valves for emerg. stop	Size of mounting plate (mm)	Size of housing (mm)
DP 2010	1	without	334x355x150	380x380x210
DP 2020	2	without	334x355x150	380x380x210
DP 2040	4	without	334x355x150	380x380x210
DP 2060	6	without	549x355x150	600x380x210
DP 2011	1	with	334x355x150	380x380x210
DP 2021	2	with	334x355x150	380x380x210
DP 2041	4	with	334x355x150	380x380x210
DP 2061	6	with	549x355x150	600x380x210



Terminal box SZ 2040



Command station RE 6030 for air supply On/Off and manual braking torque setting



Command station RE 6010 for air supply On/Off

Technical data

Pneumatic unit DP 20	
Operating voltage U/P converter	15 V DC
Operating voltage valves	24 V DC
Power consumption per valve	2.5 W
Input voltage	0 to 10 V DC
Operating pressure	6 to 10 bar (oil-free)
Output pressure	0.3 to 5.5 bar
Output pressure for emergency stop	5.5 bar
Ambient temperature	0 to 50 °C
Protection class	IP 54
Terminal box SZ 2040	
Housing dimensions (W x H x D)	200 x 150 x 80 mm
Protection class	IP 54
Command station RE 6010/30	
Display instrument	0 to 100 %
Braking torque	
Accuracy class	2.5
Input voltage	0 to 10 V DC
Housing dimensions (W x H x D)	150 x 150 x 80 mm
Protection class	IP 54

Questionnaire web tension control

General data

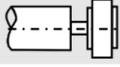
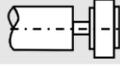
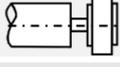
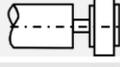
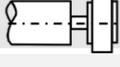
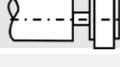
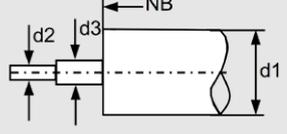
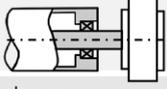
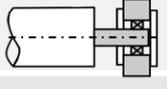
Customer			
Street			
Zip code		City/ town	
Country		Internet	
Phone		Fax	
Contact person			
Phone (direct)		e-mail	
Project			

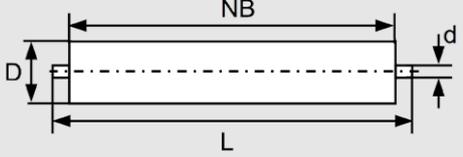
Technical data

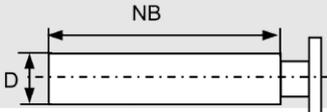
Machine type				
Make				
Position on the machine				
Web type	<input type="checkbox"/> Paper	<input type="checkbox"/> Card	<input type="checkbox"/> Plastic film	<input type="checkbox"/> Metal
	<input type="checkbox"/> Textiles	<input type="checkbox"/> Carpet	<input type="checkbox"/> Non-woven fabric	<input type="checkbox"/> Rubber
Web tension	Min.	N	Max.	N
Web weight	Min.	g/mm ²	Max.	g/mm ²
Web width	Min.	mm	Max.	mm
Web thickness	Min.	mm	Max.	mm
Web speed	Min.	m/min	Max.	m/min
Operation status	<input type="checkbox"/> Dry	<input type="checkbox"/> Moist	<input type="checkbox"/> Wet	<input type="checkbox"/>
Ambient temperature	°C			
Ambient conditions	<input type="checkbox"/> Dry	<input type="checkbox"/> Dusty	<input type="checkbox"/> Wet	<input type="checkbox"/>
Control voltage	<input type="checkbox"/> 24 V DC		<input type="checkbox"/> V	Hz
Operating voltage	<input type="checkbox"/> 3x	V	Hz	

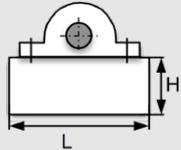
Application

Technical specification

<input type="checkbox"/> Flange load cell PD 21/22	Structure	<input type="checkbox"/> Open on one side 	<input type="checkbox"/> Double-sided 			
	Structure	<input type="checkbox"/> Open on one side 	<input type="checkbox"/> Double-sided 			
	Structure	<input type="checkbox"/> Open on one side 	<input type="checkbox"/> Double-sided 			
Assembly		<input type="checkbox"/> Flange	<input type="checkbox"/> Pedestal bearing			
Cable length		<input type="checkbox"/> 5 m	<input type="checkbox"/> 10 m	<input type="checkbox"/> 15 m	<input type="checkbox"/> 20 m	<input type="checkbox"/> 25 m
Sensor roller	<input type="checkbox"/> Provided by customer		<input type="checkbox"/> BA 6 provided by von E+L			
	Nominal width NB	mm				
	Diameter d1	mm				
	Shaft diameter d2	mm				
	Shaft diameter d3	mm				
	Roller weight	kg				
						
Bearing position	<input type="checkbox"/> In sensor roller 	<input type="checkbox"/> In load cell 				
	<input type="checkbox"/> Ball bearing provided by customer	<input type="checkbox"/> Ball bearing provided by E+L				

<input type="checkbox"/> Sensor roller PD 30	Diameter D	<input type="checkbox"/> 80 mm <input type="checkbox"/> 100 mm <input type="checkbox"/> 120 mm <input type="checkbox"/> 160 mm <input type="checkbox"/> 200 mm				
	Nominal width NB	mm				
	Axis length L	mm				
	Surface	<input type="checkbox"/> Bare RA 3.2 (standard) <input type="checkbox"/> Wound with rubber cork <input type="checkbox"/> Fine blasted with glass corundum RA 6.3, hard anodized, layer thickness 30 µm 450 HV <input type="checkbox"/> Hard anodized, layer thickness 30 µm 450 HV				
	Cable length	<input type="checkbox"/> 5 m	<input type="checkbox"/> 10 m	<input type="checkbox"/> 15 m	<input type="checkbox"/> 20 m	<input type="checkbox"/> 25 m

<input type="checkbox"/> Sensor roller PD 40	Diameter D	<input type="checkbox"/> 60 mm <input type="checkbox"/> 80 mm <input type="checkbox"/> 100 mm <input type="checkbox"/> 120 mm				
	Nominal width NB	mm				
	Surface	<input type="checkbox"/> Bare RA 3.2 (standard) <input type="checkbox"/> Wound with rubber cork <input type="checkbox"/> Fine blasted with glass corundum RA 6.3, hard anodized, layer thickness 30 µm 450 HV <input type="checkbox"/> Hard anodized, layer thickness 30 µm 450 HV				
	Cable length	<input type="checkbox"/> 5 m	<input type="checkbox"/> 10 m	<input type="checkbox"/> 15 m	<input type="checkbox"/> 20 m	<input type="checkbox"/> 25 m

<input type="checkbox"/> Block load cell PD 50	Size	<input type="checkbox"/> PD 5010 (L=134 x W=48 x H=78) <input type="checkbox"/> PD 5020 (L=150 x W=68 x H=78)				
	Cable length	<input type="checkbox"/> 5 m	<input type="checkbox"/> 10 m	<input type="checkbox"/> 15 m	<input type="checkbox"/> 20 m	

Web tension measurement

<input type="checkbox"/> Web tension measuring amplifier <input type="checkbox"/> Digital display	<input type="checkbox"/> Assembly of hat rail	<input type="checkbox"/> With housing
	<input type="checkbox"/> Front panel installation	

Web tension control

<input type="checkbox"/> Web tension controller	<input type="checkbox"/> Assembly kit	<input type="checkbox"/> With housing
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Version, actuator with brake

<input type="checkbox"/> Brake available to customer	<input type="checkbox"/> Unwinder		<input type="checkbox"/> Braking roller		
	<input type="checkbox"/> Electrical brake	<input type="checkbox"/> Friction-free		<input type="checkbox"/> Liable to friction	
	<input type="checkbox"/> Pneumatic brake		Number of brake calipers		
	Brake attachment		<input type="checkbox"/> One-sided	<input type="checkbox"/> Double-sided	
<input type="checkbox"/> Brake provided by E+L	<input type="checkbox"/> Unwinder		<input type="checkbox"/> Braking roller		
	<input type="checkbox"/> Electrical brake		<input type="checkbox"/> Pneumatic brake		
	Brake attachment		<input type="checkbox"/> One-sided possible	<input type="checkbox"/> Double-sided possible	
	Coil diameter		Min. mm	Max. mm	
	Brake roller diameter		mm		
	Hub diameter		mm		
	Emergency stop time			sec	
	Coil weight max.			kg	
	Operating pressure			bar	

Version, actuator with electric brake

<input type="checkbox"/> Electrical drive available to customer	<input type="checkbox"/> Unwinder	<input type="checkbox"/> Center winder	<input type="checkbox"/> Perimeter winder
	<input type="checkbox"/> Transport roller		
	<input type="checkbox"/> Rewinder	<input type="checkbox"/> Center winder	<input type="checkbox"/> Perimeter winder

<input type="checkbox"/> Electrical drive provided by E+L	<input type="checkbox"/> Unwinder	<input type="checkbox"/> Center winder	<input type="checkbox"/> Perimeter winder
	<input type="checkbox"/> Transport roller		
	<input type="checkbox"/> Rewinder	<input type="checkbox"/> Center winder	<input type="checkbox"/> Perimeter winder
	Coil diameter	Max. mm	Min. mm
	Transport roller diameter	mm	
	Coil weight max.	kg	
	Start-up time of the system from 0 to max. speed		sec
	Stop time of the system from max. speed to 0		sec
	Stop time of the system from max. speed to 0 in case of emergency stop		sec

Comments

Date		Issuer	
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