ELPOSER

Positioning and follow-up control systems

Permanent, accurate
alignment of tools

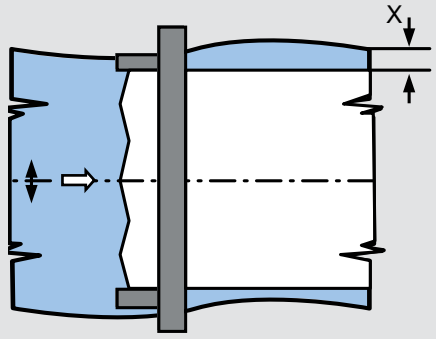
CONTENTS

Higher quality and productivity through positioning and follow-up control

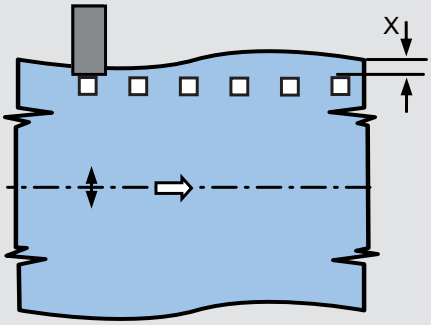
Today, the manufacturers and users of machines for processing web-type materials are confronted with ever increasing demands: Production processes should be even faster, while at the same time performed with greater precision, the quality of the finished product further improved while personnel, waste and, above all, downtimes, should be reduced to a minimum.

A decisive contribution to the fulfillment of these prerequisites is made by positioning and run-on control systems. Typically, tools such as suction nozzles, spreaders etc follow up the web edge. In this phase, position errors can occur through lateral drift of the web, as shown here. Eliminating the causes of the error and guaranteeing a permanent, accurate alignment of the tool is the task of the E+L positioning and follow-up controller. Depending on the type of material, application and task, E+L offers a wide variety of systems with the latest networking technology: For decisively more quality and productivity that pays off!

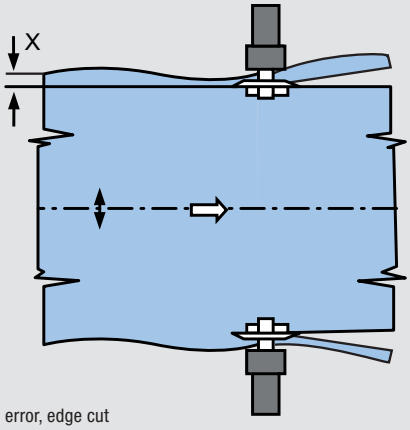
Typical position errors



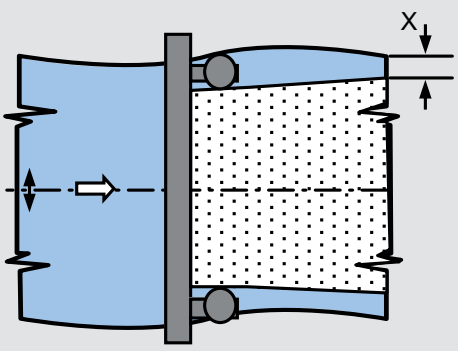
Position error, coating



Position error, marking



Position error, edge cut

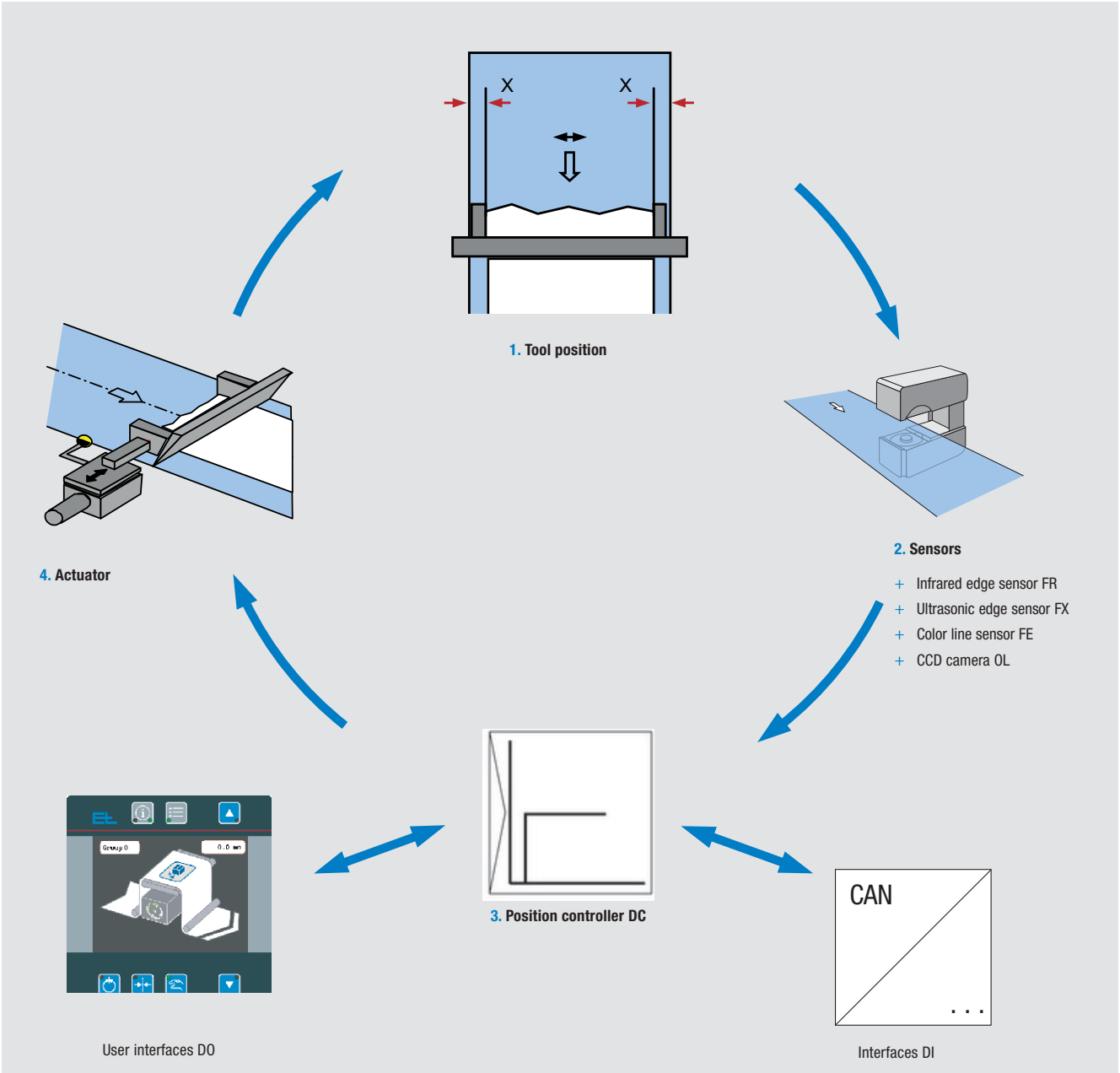


Position error, extraction

The 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.

1. The starting point is the current position of the guiding criterion
2. A sensor detects the current position of the guiding criterion without contact. Depending on the task and type of the material, this may be an infra-red, ultrasonic or line sensor.
3. The controller compares the actual value with the target value and sends a corresponding correction signal to the actuator.
4. The actuator corrects the position of the tool. Depending on the application, the actuator can be a linear guide or an actuating drive.



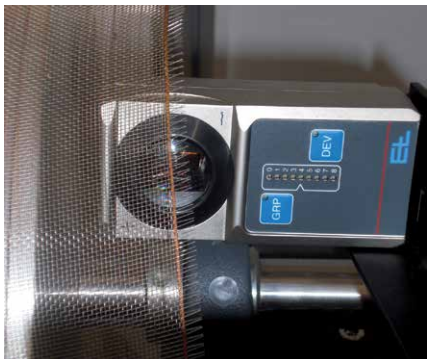
Infrared edge sensor FR 52

Infrared edge sensor FR 52

+ Infrared edge sensor based on the principle of retroreflection
+ Field of view ±10 mm with a resolution of 0.02 mm
+ Distance-independent edge evaluation based on parallel light beams
+ Acquisition of edges and threads
+ Scanning with CCD array guarantees a stable operating point independent of the material transparency
+ Exposure controller for the compensation of soiling
+ Optional integrated clearing device in case of extreme dust conditions
+ Bar display for the indication of the current edge position or diagnostic information

Infrared edge sensor FR 52

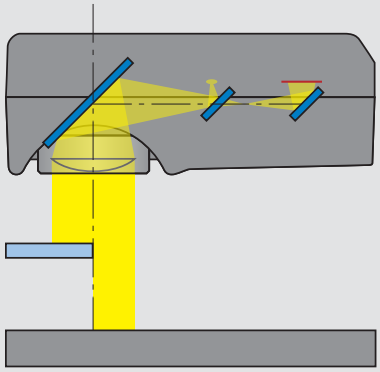
FR 52 with reflector bar



Infrared edge sensor FR 52 for mesh acquisition

Selection table

Reflector bar	
Type	Fork width (mm)
FR_5000-95	30
FR_5000-97	75
FR_5000-98	160



Principle of operation FR 52

Technical data

Infrared edge sensor FR 52	
Operating voltage	
Nominal value	24 V DC
Nominal range (ripple included)	20 to 30 V DC
Current consumption	80 mA DC
Ambient temperature	10 to 50 °C
Measuring range	±10 mm
Resolution	0.02 mm
Linearity	±0.1 mm
Wavelength	850 nm
Scan rate	200 Hz
Cable length	Max. 10 m
Protection class	IP 54
Weight	0.3 kg
Air purge system operating pressure	Min. 0.1 bar; max. 0.2 bar
Service unit filter	5 µm
Service unit residual oil content	< 0.01 mg/m³
Fork width	See selection table
Dimensions (L x W x H)	105 x 50 x 40 mm

Ultrasonic edge sensor FX 42/FX 52

Ultrasonic edge sensor FX 42/FX 52

+ Ultrasonic edge sensor with digital evaluation
+ Field of view ±3 mm or ±10 mm
+ Fork widths 30, 60 and 124 mm
+ Insensitive to soiling due to dust
+ Scanning of materials opaque to sound such as paper, plastic and metal films independent of the material transparency
+ Internal temperature compensation for stable operating point
+ Bar display for the indication of the actual edge position or diagnostic information

Ultrasonic edge sensor FX 52

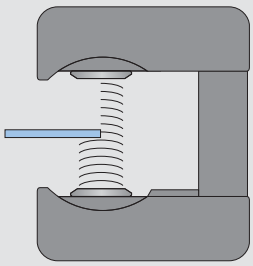
Ultrasonic edge sensor FX 42

Ultrasonic edge sensor FX 5 in film manufacturing machine

Selection table

Ultrasonic edge sensors FX 4/5

Type	Measuring range ±(mm)	Fork width LW (mm)
FX 4230	3	30
FX 4260	3	60
FX 4200	3	124
FX 5230	10	30
FX 5260	10	60
FX 5200	10	124



Principle of operation FX 42

Technical data

Ultrasonic edge sensor FX 4/5	
Operating voltage Nominal value Nominal range (ripple included)	 24 V DC 20 to 30 V DC
Current consumption	170 mA DC
Ambient temperature	10 to 50 °C
Measuring range	See selection table
Linearity deviation (measuring range 10 – 90 %)	±1 %
Ultrasonic frequency	~ 200 kHz
Resolution	0.02 mm
Scan rate	200 Hz
Cable length	Max. 10 m
Protection class	IP 54
Installation altitude	0 to 3000 m above sea level
Weight	0.7 kg
Fork width	See selection table
Dimensions (L x W x H)	105 x 50 x (LW + 80 mm)

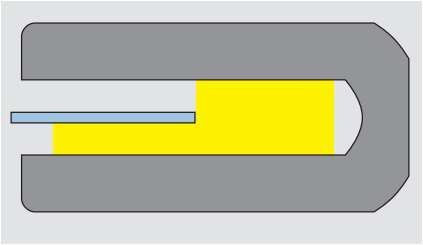
Broadband sensor FR 60

Infrared broadband sensor FR 60

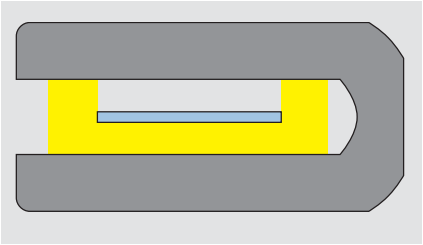
+ Infrared transmitted light transmitter with large field of view of 150 mm
+ Electronic web offset in the sensor field of view without manual adjustment of the sensor
+ Scanning of homogeneous materials such as non-woven fabric, woven and knitted fabrics with a transparency of up to 70 %
+ Simultaneous evaluation of up to four edges
+ Insensitive to external light
+ Stable operating point independent of the material transparency
+ Exposure controller for the compensation of soiling
+ Optional integrated clearing device in case of extreme dust conditions
+ Bar display for the indication of the current edge position or diagnostic information

Broadband sensor FR 60

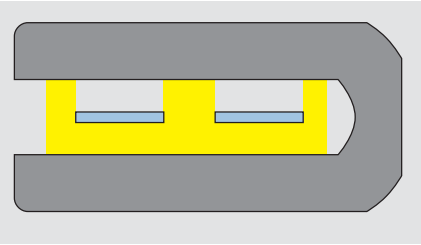
Edge configurations



+ Acquisition and evaluation of a web edge

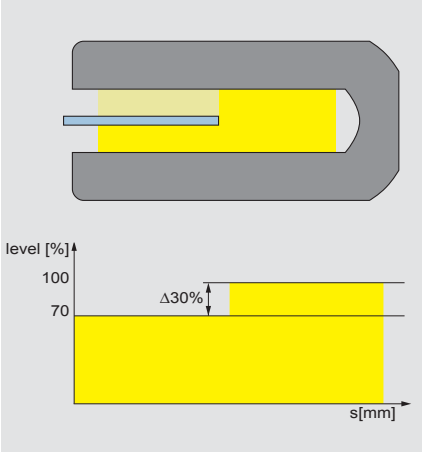


+ Acquisition and evaluation of two web edges
+ Application for narrow webs from 10 to 130 mm



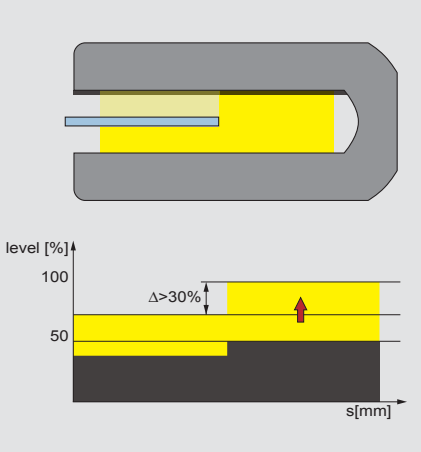
+ Acquisition and evaluation of four web edges
+ Application for two narrow webs from 10 to 55 mm

Edge acquisition on transparent webs



+ Reliable edge detection at max. 70 % transparency of the material webs

Edge acquisition on transparent webs in case of soiling



+ Integrated exposure controller ensures constant light intensity even in case of soiling
+ Reliable acquisition of transparent webs even in case of heavy dust deposits

Selection table

Broadband sensor FR 60	
Type	Air purge system
FR 6001	Yes
FR 6011	No

BT 80 with FR 60

Technical data

Infrared broadband sensor FR 60	
Measuring range	±79 mm
Operating voltage Nominal value Nominal range (ripple included)	 24 V DC 20 to 30 V DC
Current consumption	150 mA DC
Ambient temperature	10 to 50 °C
Resolution	0.1 mm
Linearity	±0.2 mm
Scan rate	200 Hz
Cable length	Max. 10 m
Protection class	IP 54
Weight	1.25 kg
Number of edges evaluated	Max. 4 edges (= 2 narrow strips)
Air purge system operating pressure	2.0 bar
Air purge system air consumption	1.55 m^3/h (at 2.0 bar)
Service unit filter	5 µm
Service unit residual oil content	< 0.01 mg/m^3
Fork width	40 mm
Dimensions (L x W x H) FR 6001 FR 6011	 232 x 106 x 31 mm 221 x 106 x 31 mm

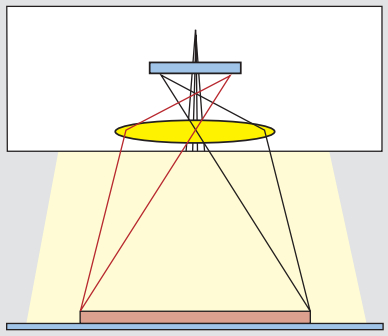
Color line sensor FE 52 with ELPAD

Color line sensor FE 52

+ Digital color matrix sensor for the acquisition of color lines and color contrasts
+ Exposure controller for the compensation of soiling
+ Integrated light source with automatic adaptation to matt and gloss surfaces
+ Adjustable search range for masking interfering contours

Command station DO 4021

+ Intuitive operation with color touch display
+ Real 2D depiction of the guiding criterion
+ Straightforward teach-in of the guiding reference using color touch display
+ Display of scanning quality
+ Operation of line sensor and web guider
+ Connection to the FE 52 via PoE (PowerOverEthernet)



Principle of operation FE 52

Technical data

Color line sensor FE 52	
Operating voltage Nominal value Nominal range	 24 V DC 20 to 30 V DC
Current consumption	300 mA DC
Ambient temperature	10 to 50 °C
Measuring range	±10 mm
Resolution	0.02 mm
Sensor/web spacing	24 mm, ±2 mm
Scan rate	200 Hz
Cable length to the controller	Max. 10 m
Protection class	IP 45
Weight	0.75 kg
Dimensions (L x W x H)	126 x 80 x 46 mm
Command station DO 4021	
Operating voltage is supplied with power by the FE 52 color line sensor via PoE (PowerOverEthernet)	
Current consumption	200 mA DC
Ambient temperature	10 to 50 °C
Display resolution	320 x 240 pixels
Length of cable to FE 52	max. 20 m
Protection class	IP 54
Weight	0.5 kg
Dimensions (L x W x H)	100 x 100 x 29 mm

Guiding criteria

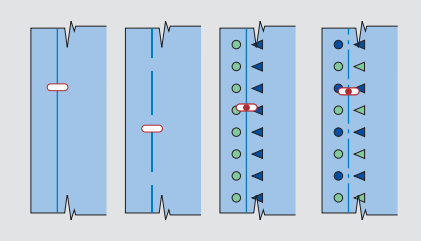
+ Line scanning, light line on dark background
+ Line scanning, dark line on light background
+ Contrast scanning

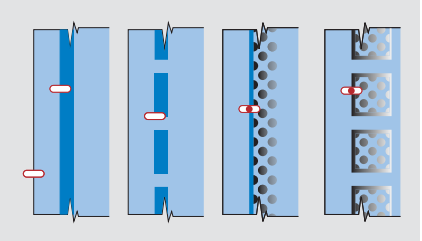
Line scanning

+ Continuous line with even background
+ Broken line with even background
+ Continuous line with uneven background
+ Broken line with uneven background
+ Line width 0.5 – 8 mm (nominal width 2 – 3 mm)
+ Background width on both sides minimum 1 mm
+ Field of view can be restricted to double line width

Contrast scanning

+ Web edge scanning
+ Contrast edge with even background
+ Broken contrast edge with even background
+ Contrast edge with uneven background
+ Broken contrasting edge with uneven background
+ Color contrast edge on both sides minimum 1 mm
+ Field of view can be restricted to 2 mm





Sensor mounting bracket VA 6

A stable sensor mounting bracket is a decisive factor in precision, vibration-free scanning of the line/color edge. This feature makes it possible to change the scanning angle quickly and straightforwardly without affecting the installation distance. Different versions are available depending on the application.

Variable sensor mounting bracket

Fixed sensor mounting bracket

Sensor mounting bracket VA 6

Type	Fastening square (mm)	Assembly
VA 6007	20 x 20	Fixed
VA 6027	20 x 20	Variable
VA 6107	40 x 40	Fixed
VA 6127	40 x 40	Variable

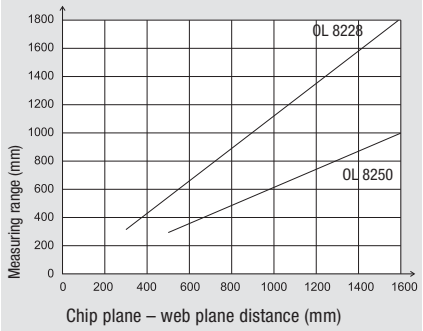
CCD camera OL 82

CCD camera OL 82

+ CCD line scan camera for the acquisition of guiding criteria on moving webs. Can be used for position acquisition, web guiding and width measurement
+ Interference-free detection of web edges, ribs, printed lines or watermarks in the field of view of the camera
+ Wide range of applications, as up to 32 events can be detected in the measuring range at the same time
+ High degree of flexibility due to choice of lenses with a focal length of 28 or 50 mm
+ Monochrome CCD array chip with 5150 pixels; plus 8-fold sub-pixel evaluation referred to the measuring range
+ Mechanically precise CCD array chip adjustment; as a result straightforward replacement of the camera electronics possible without additional re-calibration
+ Precise position output in 1/100 mm

CCD camera OL 82

Measuring range and CCD camera – web distance

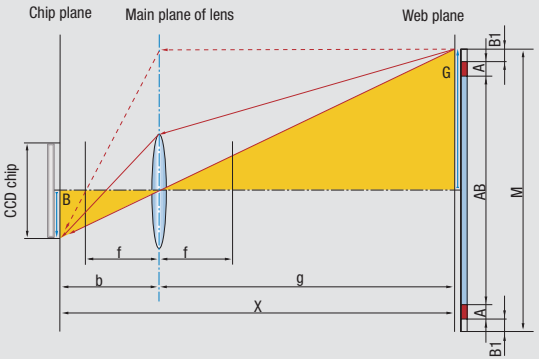


Calculation of distance to the web

$$x = \left(\frac{M}{36.05} + 2\right) \times \left(\frac{f^2}{f\text{-}2}\right)$$

Legend

b	Image distance
f	Focal length
g	Object distance
A	Web run
AB	Operating width
B	Image size (Chip length 36.05 mm)
B1	Safety distance (Standard 25 mm)
G	Object size
M	Measuring range CCD camera
X	Chip plane-web plane distance



Technical data

CCD camera OL 82	
Number of pixels Resolution in sub-pixels	5150 8-fold sub-pixeling
Lens	f = 28/50 mm
Minimum distance to web	300 mm (lens f = 28 mm), 500 mm (lens f = 50 mm)
Relative measuring accuracy of edge position with lens correction 10 to 90 % of the measuring range	±0.02 %
Cycle time	0.6 ms, 1 camera 1 ms, 2 cameras
Active chip length	36.05 mm
Spectral range, spectral maximum	400 to 850 nm, 500 nm
Interface to the camera computer	APIX
Distance between camera and camera computer	max. 20 m
Weight	1.0 kg
Protection class	IP 54
Ambient temperature	10 to 50 °C
Dimensions	Ø 88 x 141 mm

Camera computer DO 82

Camera computer DO 82

+ Up to 2 cameras can be connected to the camera computer via an APIX interface with a transmission speed of 500 Mbit/s
+ Clear depiction of the commissioning parameters by graphic display

Software function module

+ Precise position determination by means of optionally available calibration template for the linearization of the mounting and lens error
+ Constant sensitivity over the entire measuring range by means of automatic equalization of the reduction in brightness in the edge area of the optics
+ Straightforward integration in customer networks, for example using Ethernet IP and Ethernet EGD protocol
+ Straightforward commissioning for standard applications using configuration wizard

DO 82 Camera Computer

Technical data

Camera computer DO 82	
Operating system	Linux Kernel 2.6.26.8 RT 16
Operating voltage Nominal value Nominal range	 24 V DC 20 to 30 V DC
Current consumption	600 mA with 2 cameras
Interface	APIX Bus for 2 cameras CAN Bus (CAN in, CAN out) SD card for software update and logging function 2 x Ethernet sockets M12
Weight	1.5 kg
Protection class	IP 43
Ambient temperature	10 to 50 °C
Dimensions (L x W x H)	244 x 171 x 88 mm

Light transmitter

Light transmitter FS 41/42

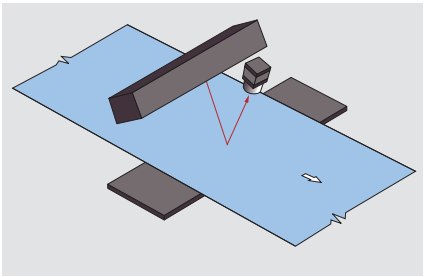
+ Compact LED light transmitter for the acquisition of material webs in conjunction with CCD line scan cameras
+ With matt glass cover for transmitted light mode and clear glass cover for incident light mode
+ Even light distribution and increased light intensity due to upstream cylindrical lens
+ Straightforward assembly by means of integrated slots in the aluminum profile
+ Flexible application due to graduation into 15 length variants

LED light transmitter FS 41/42 (red light)

LED light transmitter FS 41/42 (white light)

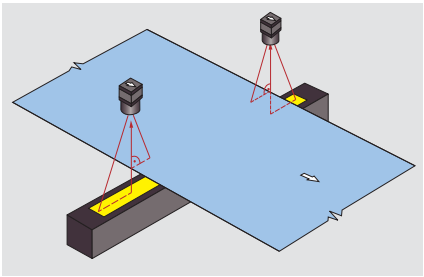
Incident light method

With the incident light method, the FS 41 light transmitter with clear glass cover is located in front of the web. The light is reflected by the web. Besides the detection of outer edges, this principle also permits the recording of lines, ribs or grooves on the web surface.



Transmitted light method

With the transmitted light method, the FS 42 light transmitter with matt glass cover is located behind the web to be scanned. Only the outer edges of non-transparent webs are acquired here.



Technical data

	FS 41/42 (red light)	FS 4105 (white light)
Operating voltage nominal range	24 V DC 22 – 28 V DC	24 V DC 22 – 28 V DC
Current consumption	See table	0.7 A
Wavelength of LEDs	610 nm	529 nm (440 – 580)
Luminance with transmitted light	1550 cd/m²	700 cd/m²
Light field width incident light	12 mm at a distance of 100 mm	12 mm at a distance of 100 mm
Light field width transmitted light	11 mm at the light transmitter	
Service life	> 50,000 hrs (at an ambient temperature < 40 °C and nominal operating voltage 24 V DC)	
Ambient temperature	0 to 50 °C (at an ambient temperature > 40 °C, additional cooling is required)	
Protection class	Max. IP 54 with suitable connector inserted	
Weight	270 g (for base module, length 166.5 mm) 230 g (for each additional length step)	
Dimensions	35 x 49.5 x L	35 x 49.5 x 650/800

Selection table FS 41/42

Light transmitter length L (mm)	Type FS 4101 Clear cover Active light field length (mm)	Type FS 4201 Matt cover Active light field length (mm)	Current consumption (A)
166.5	81	117	0.17
294.5	209	245	0.34
422.5	337	373	0.51
550.5	465	501	0.68
678.5	593	629	0.85
806.5	721	757	1.02
934.5	849	885	1.19
1062.5	977	1013	1.36
1190.5	1105	1141	1.53
1318.5	1233	1269	1.70
1446.5	1361	1397	1.87
1574.5	1489	1525	2.04
1702.5	1617	1653	2.21
1830.5	1745	1781	2.38
1958.5	1873	1909	2.55

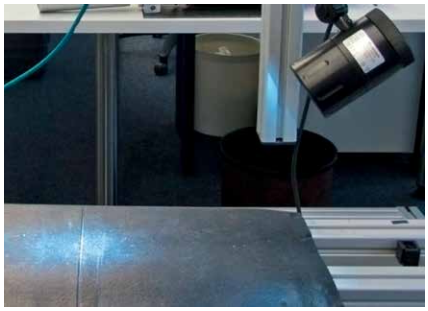
LED light transmitter FS 46

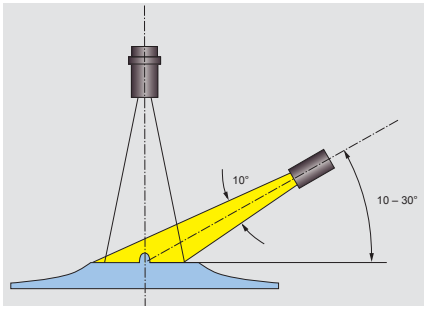
+ Compact LED light transmitter for the acquisition of material webs in conjunction with CCD line scan cameras
+ For selective illumination of grooves or ridges in rubber materials
+ Flexible adjustment in 3 axes using joint head

Function

The light transmitter is used for the selective illumination of grooves or ridges in a web/an object.
The web reflects the light in the incident light mode. This principle makes it possible to detect ridges and grooves on a rubber profiles by utilizing light and shadow.

LED light transmitter FS 46





Technical data

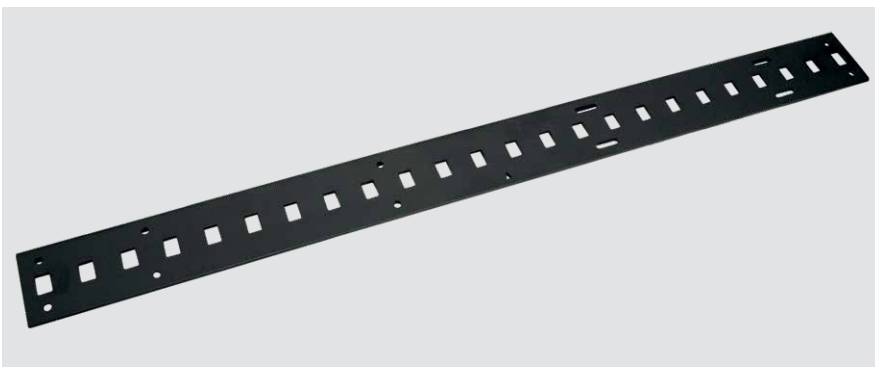
Operating voltage	24 V DC
Current consumption	1.7 A
Configuration	1 LED module 10 W
Beam angle	10° spot
Illuminance E (lux) Min. Average Max.	 58 1604 13406
Ambient temperature	0 – 50 °C
Protection class	IP 67
Weight	0.7 kg

Sensor mounting bracket VA 5538

A stable sensor mounting bracket is a decisive factor in precision, vibration-free web edge scanning. The sensor mounting bracket may be precisely adjusted on three axes for the initial commissioning of the camera.

Calibrating template for OL 82

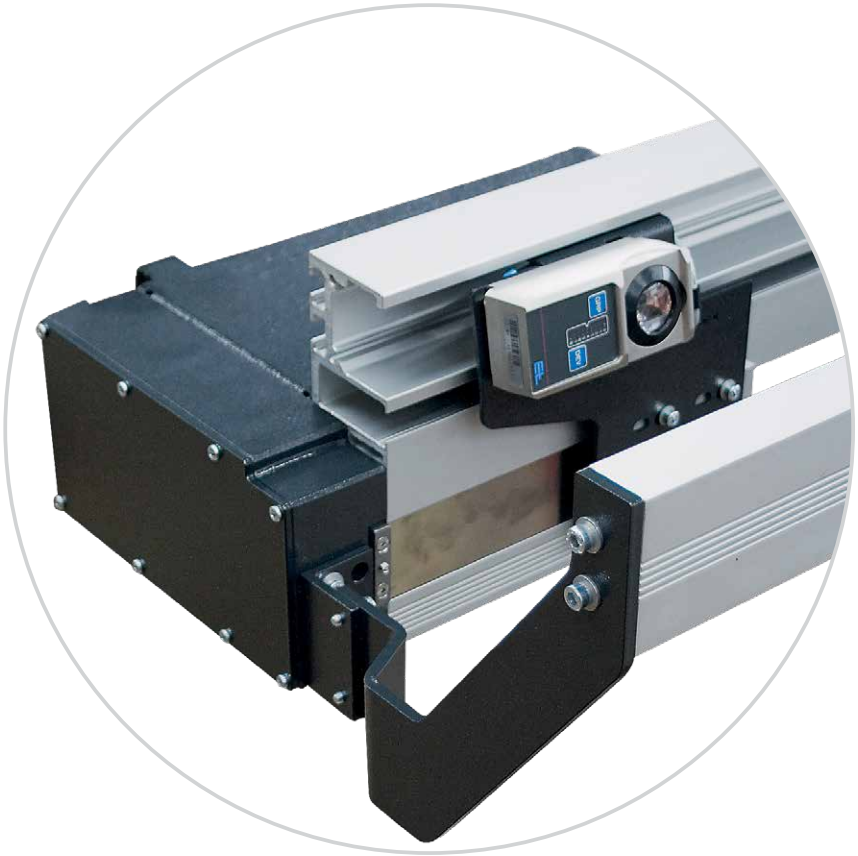
+ Calibrating template for the linearization of the measuring range and setting the zero point for the measurement
+ Lengths: 270, 360, 540, 720, 900, 1080, 1260, 1440, 1620, 1800 and 1980 mm



Sensor positioning

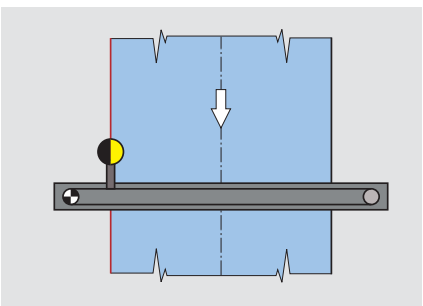
Support beam VS 45

+ Motorized linear position adjustment for ultrasonic, infrared and color line sensors
+ Versions with 1 and 2 motors
+ Compact design with integrated, temperature-monitored, short circuit-proof motor and control electronics
+ CAN bus connection for straightforward connection to the web guider
+ Functions such as sensor pre-positioning, edge search, move clear and width measurement possible
+ Integrated wiring harness



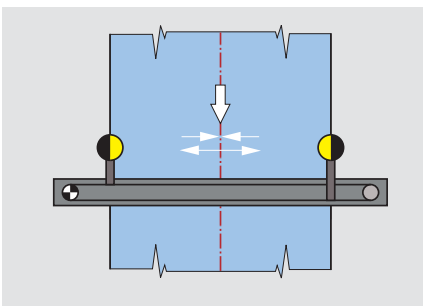
Motorized sensor positioning
Support beam VS 4515

This basic version features a carriage and a drive unit to position the sensor at the required position.



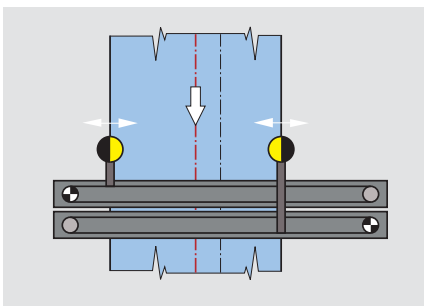
Motorized sensor positioning
Support beam VS 4525

This version comprises two carriages that are coupled together via a toothed belt moved in or out together by a drive unit.

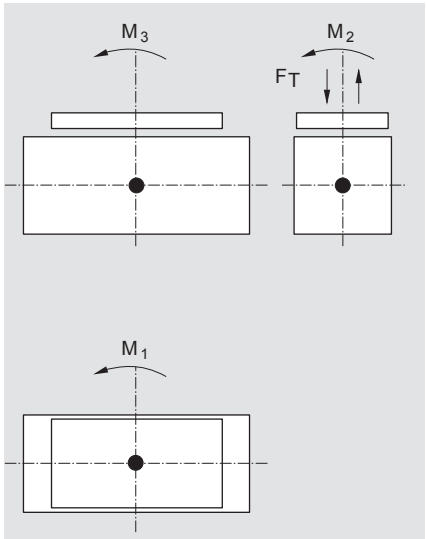


Motorized sensor positioning
Support beam VS 4535

This support beam possesses two carriages, each with its own independent drive unit. This means that it is possible to position the two sensors independently of each other. By synchronously controlling the drives, it is possible to offset the web over the full width of the area.



Support beam VS 45 with infrared edge sensor FR 52



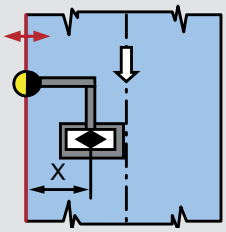
Technical data

Support beam VS 45			
Operating voltage			
Nominal value		24 V DC	
Nominal range		20 to 30 V DC	
Current consumption		1.4 A DC (1 positioning drive) 2.8 A DC (2 positioning drives)	
Nominal operating width	VS 4515		max. 5850 mm
	VS 4525	min. 250 mm	max. 5850 mm
	VS 4535	min. 250 mm	max. 5850 mm
Nominal actuating speed		1 to 70 mm/s (adjustable)	
Nominal actuating force		20 N	
Centered load per carriage		Max. 50 N	
Torque M1, M2, M3		Max. 2 Nm	
Reproducibility		≤ ±0.1 mm (per positioning drive)	
Ambient temperature		10 to 50 °C	
Ambient conditions		Dry	
Protection class		IP 54	
Weight	VS 4515	At NW 1000 mm 15.7 kg	Per 100 mm step 1 kg
	VS 4525	At NW 1000 mm 16.2 kg	Per 100 mm step 1 kg
	VS 4535	At NW 1000 mm 16.7 kg	Per 100 mm step 1 kg

Position control methods

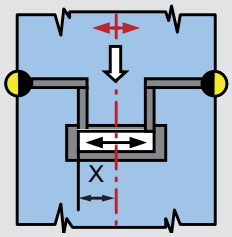
Web guiding is initially defined by the type of web processed. Unfinished fabric webs may only be guided by the edge as no other regular contrasting characteristics are featured. Finished webs offer a further field of possible guiding criteria. They may be controlled by a printed characteristic line, water marks, notching or in addition to the web edge, by a freely selected contrast.

Manual sensor positioning by web edge



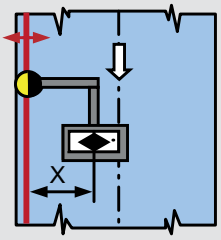
Guiding by the left or right web edge

Manual sensor positioning by web center



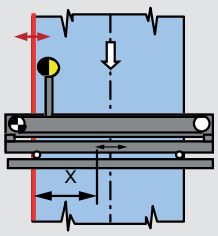
Guiding by the web center/machine center

Manual sensor positioning by web contrast



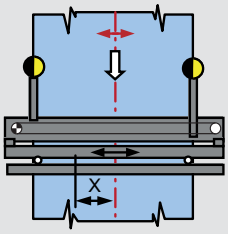
Guiding by a printed line or existing contrasts

Motorized sensor positioning by web edge



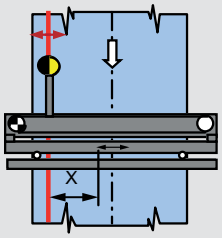
Guiding by the left or right web edge

Motorized sensor positioning by web center



Guiding by the web center/machine center

Motorized sensor positioning by web contrast



Guiding by a printed line or existing contrasts

Position controller

Position controller DC 33

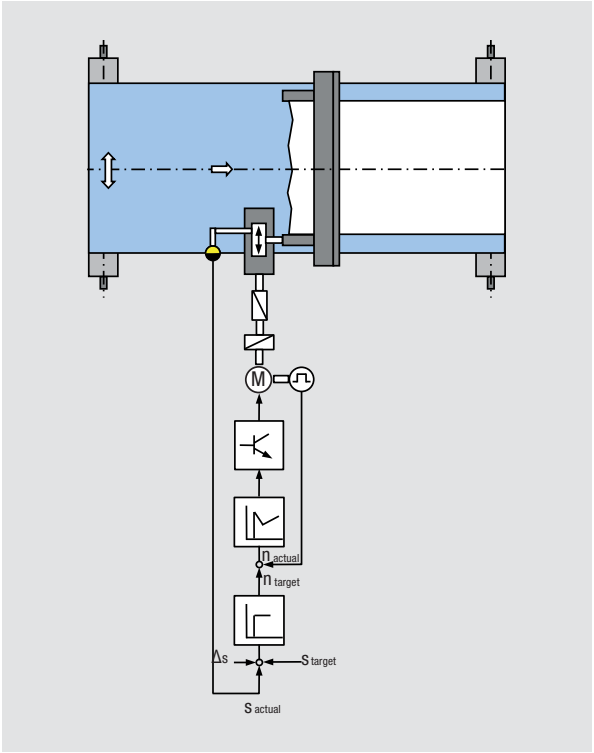
+ Digital position controller with integrated output stage for the operation of DC geared motors
+ Color LC display 1/4 VGA with touch control unit
+ Visualization of the application
+ User-friendly commissioning due to configuration wizard
+ Multiple operation possible
+ Cascaded control structure for the precise control of proportional and integral actuators
+ Integrated CAN bus, optional Ethernet interface
+ Extension possible by means of analog input and output modules
+ Selection of the country-specific language
+ Integrated backup features for saving the device settings
+ Language-neutral error messages

Position controller DC 3340

Control card RK 4004

Control structure for run-on controller

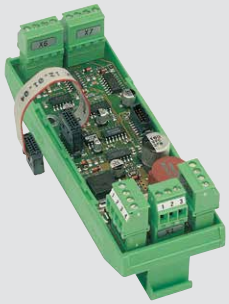
Besides a positioning controller for the web, the cascaded control structure for proportional actuators also features a speed and current controller for the actuator.



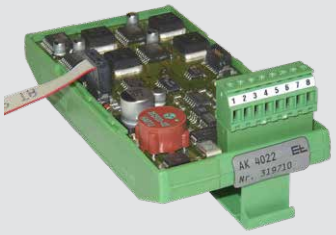
Controller function modules

+ Automatic sensor addressing
+ Web offset possible in 1/10 mm and 1/100 mm steps
+ Web offset and web tear monitoring: Automatic reduction of the actuating speed if guiding deviation too high
+ Emergency guiding: Automatic switch-over to edge sensor in the event of line loss
+ Improved dynamic behavior due to brief motor current increase
+ Adaptation of the control loop to changing process variables, e.g. web speed
+ Adjustable dead zone for uneven web edges
+ Cycle and path-dependent oscillation of the web position target value possible
+ Adjustable end position limiting

Input/output modules



Input module AK 4014 with 4 inputs from 0 – 10 V (12 bits) and +10 V DC sensor supply voltage. Sensors or position sensors can therefore be used with the digital controller.



Output module AK 4022 with 4 analog outputs 0 – 10 V/4 – 20 mA/0 – 20 mA (12 bits) that can be selected for the output of sensor signals, motor actual position, web speed, controller actuating signal, actual width, width deviation, target width

Input and output module LK 4203 with 8 digital inputs and outputs each. For all binary signals for the operation of the positioning controller.

Technical data

Position controller DC		
Operating voltage Nominal value Nominal range		 24 V DC 20 to 30 V DC
Current consumption	Without motor With motor (maximum)	0.2 A DC 5.2 A DC
Output voltage	at motor terminal	Operating voltage -2 V (pulse-width modulated)
Output current		max. 5 A
Cycle time		6 ms
Ambient temperature		10 to 50 °C
Protection class		IP 54
Dimensions (L x W x H)		300 x 150 x 80 mm
CAN bus data rate		250 kbit/s
Ethernet data rate		100 Mbit/s
Connection		RJ45
Digital inputs RK 4004		5
Switching level		Low = 0 to 3 V DC, High = 10 to 30 V DC
Digital status output		1
Switching level		max. 0.5 A

Selection table

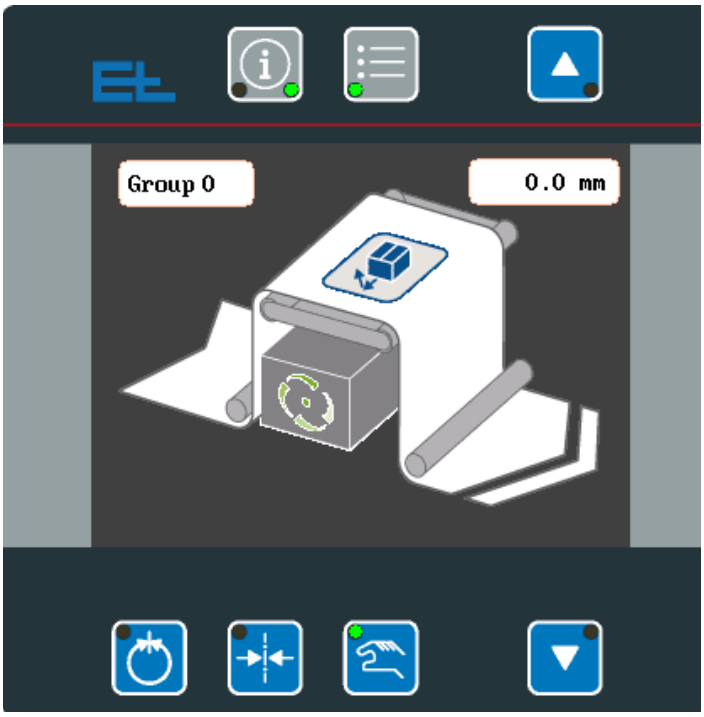
Position controller DC 03/23/33

Type	RK 4004	DO 2000	DO 4000	AK 4002	AK 4014	LK 4203	Ethernet
DC 0340	■						
DC 0341	■					■	
DC 0310	■			■			
DC 0311	■			■		■	
DC 0360	■				■		
DC 0361	■				■	■	
DC 2340	■	■					
DC 2341	■	■				■	
DC 3340	■		■				
DC 0344	■						■
DC 3341	■		■			■	
DC 3344	■		■				■

Command stations

Command station DO 40

+ Man-machine interface with intuitive user prompts
+ Visualization and operation of web guiding systems
+ Multiple operation of up to 8 web closed loops
+ Selection of the country-specific language
+ Integrated backup features for saving the device settings
+ Color LC display 1/4 VGA with touch control unit
+ User-friendly commissioning due to configuration wizard
+ Language-neutral error messages
+ Integrated CAN bus, optional Ethernet interface



Command station DO 40

Selection table

Command station DO 40		
Type	Assembly kit	Console housing
DO 4003		■
DO 4002	■	

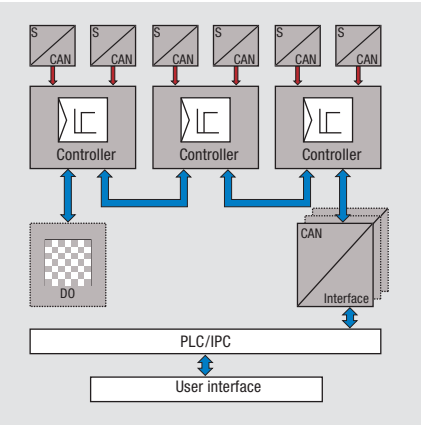
Technical data

Command stations DO 40	
Operating voltage	
Nominal value	24 V DC
Nominal range	20 to 30 V DC
Current consumption	200 mA DC
Ambient temperature	10 to 50 °C
CAN interface	250 kBit/s
Ethernet interface	100 MBit/s
Dimensions	
Front panel assembly kit	100 x 100 x 8 mm
Installation penetration for assembly kit	90 x 90 mm
with housing for field installation	130 x 130 x 105 mm
Protection class, assembly kit (front-side)	IP 54 (when built-in)
Protection class with housing (for field mounting)	IP 54
Weight	
Assembly kit	0.5 kg
with housing	1.3 kg
Operation language	German, English, French, Italian, Spanish, Portuguese, Polish, Russian, Hindi, Japanese, Chinese, Korean, Taiwanese

Networking

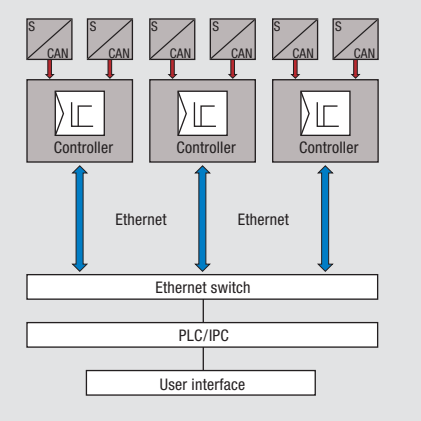
CAN bus

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 adaptation 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 eight 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 two CAN networks.



Ethernet

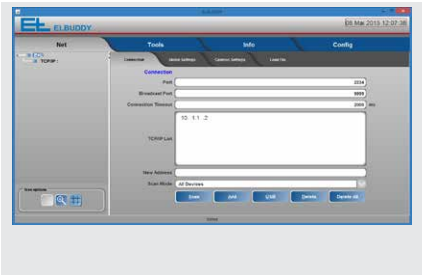
While networking via CAN bus, the limit is a maximum of 8 controller groups, networking via Ethernet is unlimited. Within a DCS controller group, the functional modules communicate via the CAN bus system. Each controller group is integrated into the customer's control system via the Ethernet interface.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



Interfaces

Interfaces DI

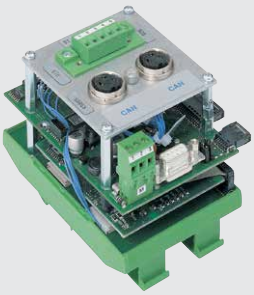
Modern production facilities have a central control station or a control room. In this case, the web guiding systems can be connected to different bus systems or to a PLC/IPC.

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

ControlNet interface DI D000

CANopen interface DI F000



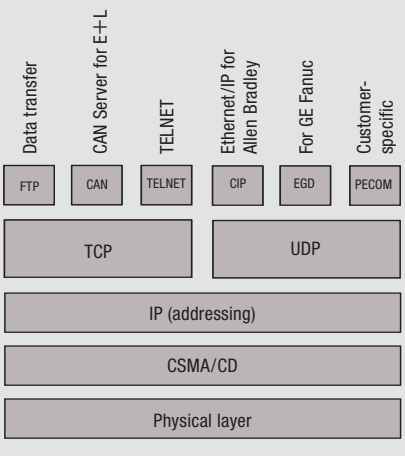
DeviceNet interface DI E000

DI G000 Ethernet interfaces

+ Function module Ethernet/IP:
  Ethernet/IP based on the application layer "CIP" (Common Industrial Protocol) for usage for data exchange between E+L CAN network and Allen Bradley control systems (CompactLogix and ControlLogix series)
+ EGD function module:
  EGD (Ethernet Global Data) protocol for the exchange of data between E+L CAN network and GE Fanuc control systems
+ PECOM function module:
  Customer-specific protocol for PECOM controllers
+ File Transfer function module :
  Convenient software download with ELBUDDY
+ CAN Server function module:
  Ready-integrated CAN Server for direct access to the E+L CAN network with ELBUDDY Diagnostics, configuration, data backup of the parameters, recovery of the device configuration, program download for CAN subscribers

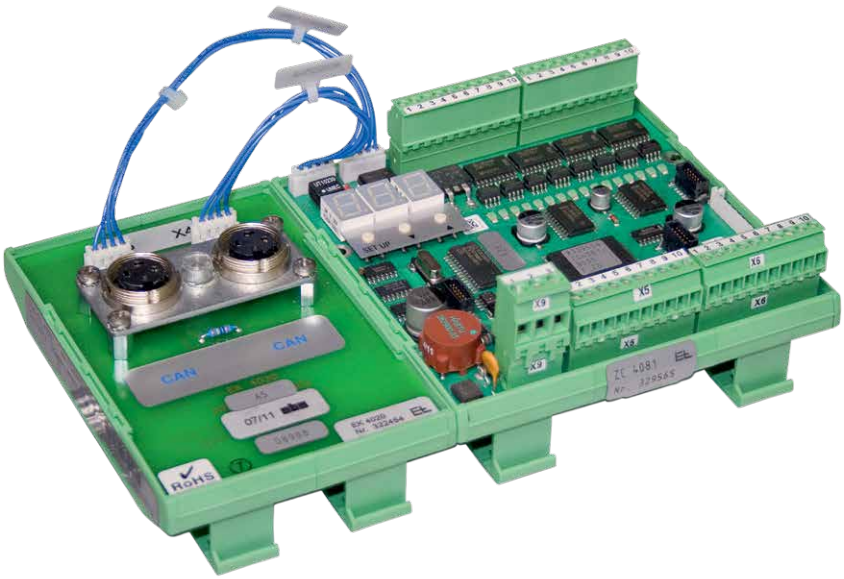
Ethernet interface DI G000 Ethernet

Principle of operation Ethernet



Interface DI A

+ Interface with 16 digital inputs and outputs
+ Floating inputs and outputs
+ Short circuit-proof



Selection table

Type	Type of interface	PC/IPC	PLC Siemens	PLC Allen Bradley
DI B000	Profibus DP	■	■	
DI D000	ControlNet	■		■
DI E000	DeviceNet	■		■
DI F000	CANopen	■		
DI G000	Ethernet	■	■	■
DI A020	I/O	■	■	■

Technical data

	DI A020	DI B000	DI D000	DI E000	DI F000	DI G000
Operating voltage Nominal value Nominal range				24 V DC 20 to 30 V DC		
Current consumption	200 mA	200 mA	200 mA	200 mA	200 mA	500 mA
Ambient temperature				10 to 50 °C		
Dimensions Top hat rail mounting				in acc. with EN 50022		
L x W x H in mm	185 x 111 x 70	75 x 111 x 90	76 x 126 x 131	76 x 126 x 131	76 x 126 x 131	45 x 105 x 185
Protection class top hat rail mounting				IP 00		
Weight	0.2 kg	0.2 kg	0.2 kg	0.2 kg	0.2 kg	0.53 kg

Follow-up control systems

Function

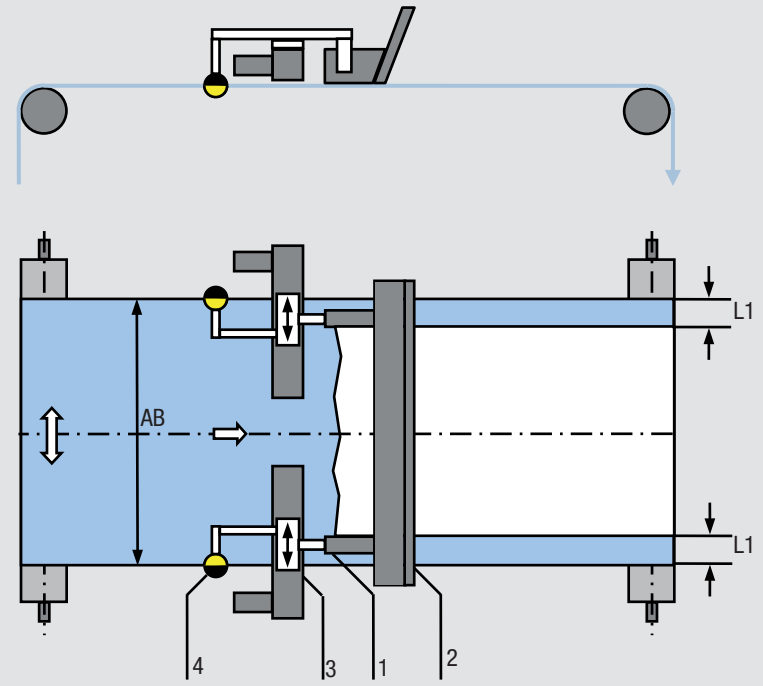
With follow-up control, the sensor and tool are mounted jointly on a linear guide. Here, the sensor detects the position of the web and thus determines the target position value of the tool. This is compared with the actual value and a correction signal is output to the actuator. As a result, the tool is always followed up with a constant distance to the guide reference.

Area of use

Follow-up control systems are used when processes such as coating or cutting must be executed with a constant distance to the web edge or a guide reference to the web.

Application

The highest control accuracy is reached when the sensor and tool (doctor blade limitation) can be assembled in compact form on a linear unit. Edge detection takes place in the direction of web travel, always in front of the tool.

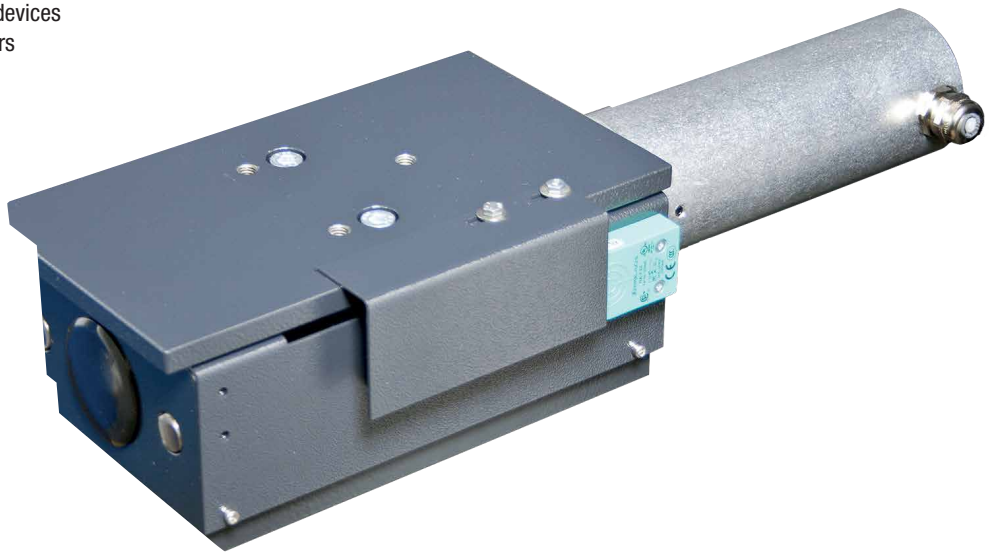


Legend

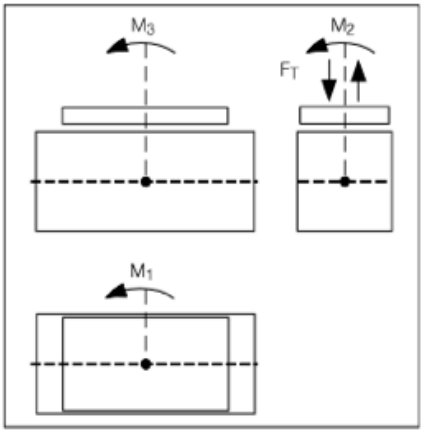
1	Doctor blade edge limitation
2	Doctor blade
3	Linear unit
4	Edge sensor
AB	Operating width
L1	Distance from web edge to coating

Linear guide VG 14

+ Compact linear guide with DC geared motor and incremental encoder
+ Optimized for follow-up and positioning of
  - Spreaders
  - Suction nozzles
  - Marking devices
  - Edge lifters



Loads and load torques



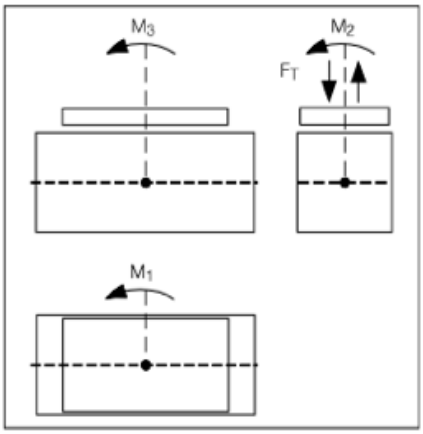
Technical data

Linear guide VG 14	
Positional accuracy	±0.1 mm (material-dependent)
Nominal actuating travel	±25/50/75/100 mm
Nominal actuating speed	25 mm/s adjustable
Nominal support load FT	1000 N
Nominal actuating force	350 N
Nominal torque	
M1	45 Nm
M2	45 Nm
M3	15 Nm
Ambient temperature	10 to 50 °C
Operating voltage	
Nominal value	24 V DC
Nominal range	20 – 30 V DC
Nominal range with power supply	115 – 460 V 50/60 Hz
Current consumption	
Linear guide	0.9 A DC
Follow-up control system	1.6 A DC
Incremental encoder resolution	0.02 mm/increment
Weight	
actuating travel ±25 mm	9.8 kg
actuating travel ±50 mm	11.4 kg
actuating travel ±75 mm	13.0 kg
actuating travel ±100 mm	15.1 kg
Protection class	IP 54

Linear guide VS 50

+ Precise linear guide with DC geared motor and incremental encoder
+ Optimized for follow-up and positioning of
  - Spreaders
  - Suction nozzles
  - Cutting devices
  - Marking devices
  - Edge lifters

Loads and load torques



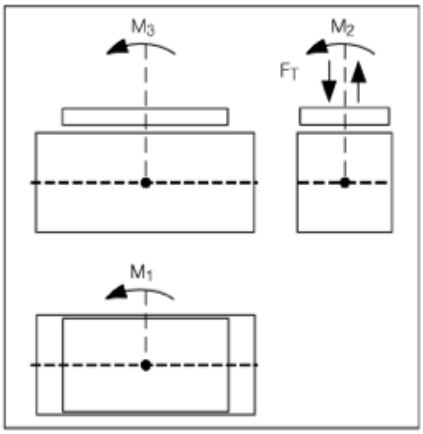
Technical data

Linear guide VS 50	
Positional accuracy	±0.2 mm (material-dependent)
Nominal actuating travel	200 – 3000 mm (gradation 100 mm)
Nominal actuating speed	1-100 mm/s (adjustable)
Nominal support load FT	250 N
Nominal actuating force	300 N
Nominal torque	
M1	40 Nm
M2	35 Nm
M3	120 Nm
Ambient temperature	10 to 50 °C
Operating voltage	
Nominal value	24 V DC
Nominal range	20 – 30 V DC
Nominal range with power supply	115 – 460 V 50/60 Hz
Current consumption	3.4 A DC (per positioning drive)
Incremental encoder resolution	0.06 mm/increment
Weight	
Basic element with 200 mm actuating travel	7.5 kg
Per 100 mm	0.45 kg
Protection class	IP 54

Linear guide VS 60

+ Precise linear guide with DC geared motor and incremental encoder
+ Optimized for follow-up and positioning of
  - Spreaders
  - Suction nozzles
  - Cutting devices
  - Marking devices
  - Edge lifters

Loads and load torques

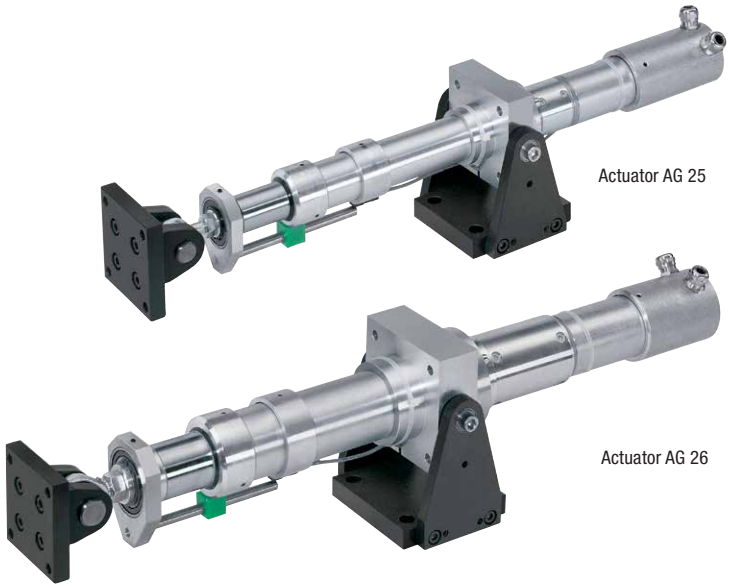


Technical data

Linear guide VS 60	
Positional accuracy	±0.5 mm (material-dependent)
Nominal actuating travel	200 – 3000 mm (gradation 100 mm)
Nominal actuating speed	1-55 mm/s (adjustable)
Nominal support load FT	500 N
Nominal actuating force	500 N
Nominal torque	
M1	200 Nm
M2	120 Nm
M3	300 Nm
Ambient temperature	10 to 50 °C
Operating voltage	
Nominal value	24 V DC
Nominal range	20 – 30 V DC
Nominal range with power supply	115 – 460 V 50/60 Hz
Current consumption	3.4 A DC (per positioning drive)
Incremental encoder resolution	0.03 mm/increment
Weight	
Basic element with 200 mm actuating travel	9.7 kg
Per 100 mm	0.7 kg
Protection class	IP 54

Electrical actuating drives AG 25/26

+ Electrical actuating drive with powerful DC motor, low play planetary gear and precise ball screw
+ Pivoting construction with stable stand and flange mounting
+ Integrated incremental encoder for speed and position acquisition
+ Integrated reference encoder for the calibration of the position



Actuator AG 25

Actuator AG 26

Selection table

Actuating drive AG straight

Type	v (mm/s)	F (N)	s ± (mm)				
			25	50	75	100	150
AG 2571	24	1000	■	■	■	■	
AG 2571	10	2500	■	■	■	■	
AG 2671	15	3000	■	■	■	■	■
AG 2671	7.5	5300	■	■	■	■	■

v Max. actuating speed (mm/s)
F Max. actuating force (N)
s Max. actuating travel (mm)

ELWINDER WSS 52 on slitter rewinder

Technical data

WSS 51 with actuating drive	AG 257		AG 267	
Operating voltage				
Nominal value	24 V DC			
Nominal range	20 to 30 V DC			
Nominal range with power supply	115 to 460 V, 50/60 Hz			
Current consumption				
(manual sensor positioning)	3.8 A DC		5.8 A DC	
(motorized sensor positioning)	5.3 A DC		7.3 A DC	
Nominal actuating travel, mechanical max.	±25/50/75/100 mm		±25/50/75/100/150 mm	
Nominal actuating travel, electrically limited	±23/48/73/98 mm		±23/48/73/98/148 mm	
Nominal actuating speed, actuating drive	24 mm/s	10 mm/s	15 mm/s	7.5 mm/s
Nominal actuating force, actuating drive	1000 N	2500 N	3000 N	5300 N
Positional accuracy (material-dependent)	< ±0.2 mm			
Error frequency	Max. 0.5 Hz			
Ambient temperature	10 to 50 °C			
Protection class actuating drive	IP 54			
Weight, actuator	7.9 kg		13.4 kg	

Questionnaire

General data

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

Technical data

Machine type				
Make				
Position on the machine				
Web type	❑ Paper ❑ Rubber ❑ Other	❑ Card ❑ Textiles	❑ Foil ❑ Carpet	❑ Metal ❑ Non-woven fabric
Web width	Min. _____ mm		Max. _____ mm	
Web thickness	Min. _____ mm		Max. _____ mm	
Web speed	Min. _____ m / min		Max. _____ m / min	
Operation status	❑ Dry	❑ Moist	❑ Wet	❑
Ambient temperature	_____ °			
Ambient conditions	❑ Dry	❑ Moist	❑ Wet	❑
Control voltage	❑ 24 V DC		❑ V	❑ Hz
Operating voltage	❑ 3x V	❑ Hz		

Mechanical design, tool

Tool	❑ Doctor blade	❑ Suction nozzle	❑ Marking unit	❑ Cutting unit
Weight force	kg			
Necessary actuating force	N (only for doctor blades)			
Position control	❑ One-sided		❑ Double-sided	

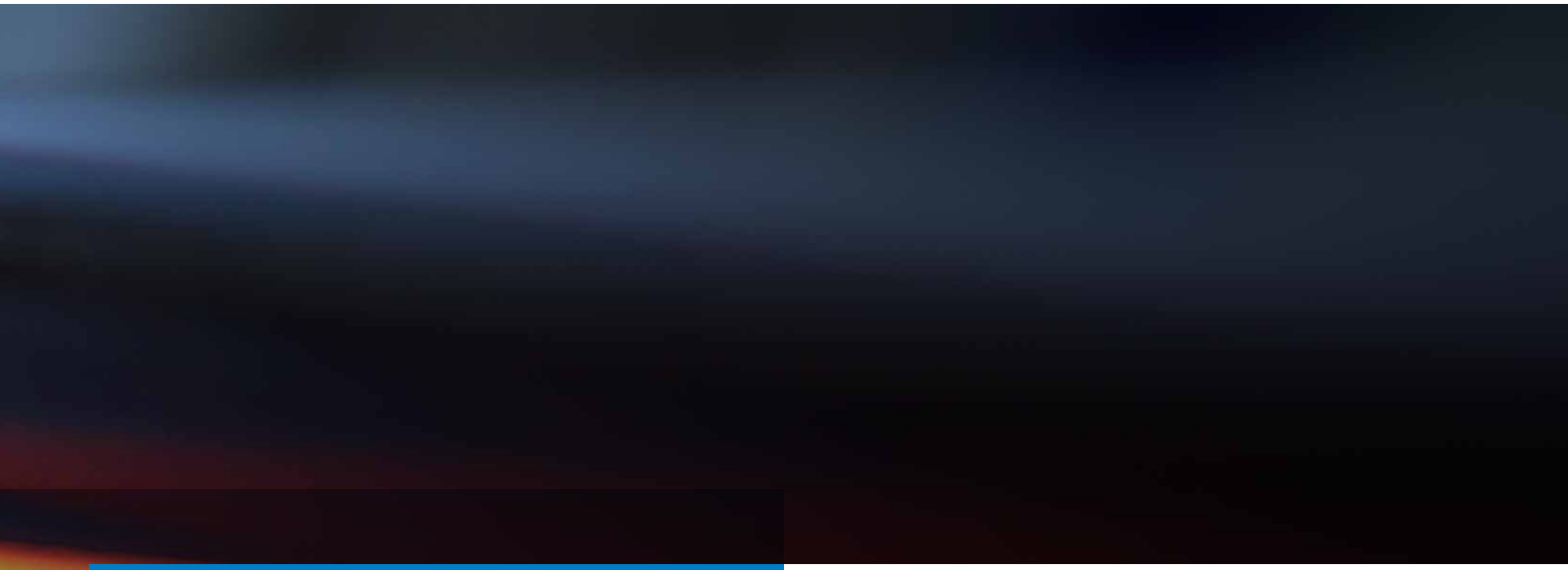
Application

Technical specification

Type of control	❑ By web edge			❑ Manual positioning ❑ Motorized positioning			
	❑ By line			❑ Manual positioning ❑ Motorized positioning			
	❑ By web center			❑ Manual sensor positioning ❑ Motorized symmetrical sensor positioning			
Sensor	❑ Ultrasonic	❑ Infrared		❑ Line		❑ CCD camera	
Controller	❑ Assembled on actuator			❑ Not assembled on actuator			
Operation	Command station	❑ Integrated in the controller		❑ as assembly kit		❑ as housing	
	Cable length Operation – controller	❑ 5 m	❑ 10 m	❑ 15 m	❑ 20 m	❑ m	
Networking	CAN bus			❑ Yes		❑ No	
Interface	❑ Parallel I/O ❑ DeviceNet	❑ Profibus DP		❑ Ethernet IP		❑ ControlNet	
	Cable length Operation – interface	❑ 5 m	❑ 10 m	❑ 15 m	❑ 20 m	❑ m	
Actuator	Actuating travel	mm					
	Fastening dimension	M mm					

Comments

Date		Issuer	



Head Office
Erhardt+Leimer GmbH
Albert-Leimer-Platz 1 · 86391 Stadtbergen, Germany
Phone: +49(0)821/2435-0
info@erhardt-leimer.com · www.erhardt-leimer.com

Subsidiaries
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