

sensors
rotativ
linear

motion

systems

controls

TR-Electronic
Laser distance measuring system
Barcode positioning system
Product information
LE-200, LE-300, LLB-65, LLB-500, BE-90



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TR-Electronic – Your Partner in Automation

TR-Electronic can look back on more than 25 years of success, and is represented worldwide with an export share of more than 40 %. The core business comprises the development and manufacture of industrial angular and position measuring technology, as well as compact drive technology with integrated position control and measurement. The company is divided into three Business Units (BU) and is thus well positioned for further growth in the future.

Products in the **Rotary Encoder Business Unit** with optical or magnetic scanning precisely acquire position in steel production, wind power plants, cranes and ships as well as in explosion-proof versions in painting lines. Miniature versions ensure the correct position in medical technology. SIL3 approved absolute rotary encoders ensure the necessary safety.

In the **Linear Encoders Business Unit** magnetostrictive position sensors position injection molding machines, for example, or are directly integrated into hydraulic cylinders. Cascadable distance measurement sensors position parting units. With their high precision, glass scales on machine tools ensure precise position. Laser sensors based on phase difference measuring techniques position aisle stackers in warehousing and materials handling technology.

In the **Drives Business Unit** angle sensors are combined with compact drives: no external electronics are required, position, speed and torque controllers, power electronics and absolute rotary encoders are compactly integrated into the drive and thus bring intelligence directly to the drive shaft via the field bus. Compact drives are used for diverse applications in the printing and packaging industry and on palletizers.

The portfolio is supplemented by the affiliated **TRsystems** with customized controls, industrial PCs, hydraulic controls as well as control units and sensors for punching and forming.

An essential factor for the success of TR-Electronic are the now more than **300 employees** who actively help to shape the product portfolio with innovations and successfully implement customer projects. Through its commitment to the regional colleges, TR-Electronic supports the high quality training of young employees and thus guarantees the highest level of innovation and quality at its Trossingen location.

A high degree of vertical integration allows customer-specific requirements to be responded to very quickly. The constantly new requirements on the mechanical design of sensors, on innovative new operating interfaces and new plug connectors result in a rapidly increasing product diversity. With TR-Electronic you have a partner who can fulfil these requirements.

Laser reference measuring distance – absolute and linear up to the last position

Laser reference measuring distance

We at TR want to know exactly what's going on. For this reason, we have built a trial facility for the configuration and testing of our laser distance measuring systems, which is unique in the commercial sector. In our laser reference measuring distances, we can compare our (and other) measuring systems over a distance of 200 m with a reference system, which provides us with an absolute reproducibility of ± 1 mm. And this all takes place at speeds that occur in real operations, e.g. in high-bay storage facilities.

This not only helps our development-oriented tests of new device families, but also assists in the linearization of serial devices.

Linearization

The underlying measuring technique in LE devices provides reproducibility of ± 2 mm. This means that a mechanical position of up to ± 2 mm precision can be attained in a series of moves. This is absolutely sufficient, particularly in applications in which the positions are determined through teach-in processes. (This means that in an LE-200 with a measuring range of 170 m, a reproducibility of 0.003 % can be attained in relation to the overall measuring range). Divergences can be incurred between the devices, meaning that



positions have to be retought when devices are replaced. Divergences are also incurred with comparisons are made with a reference measuring system.

To counter this problem, we offer linearization across the whole measuring range.

Universal TA mini display

Display of actual values from SSI measuring systems (from TR-Electronic and other manufacturers).



- + convenient display functions
- + scaling
- + zero point adjustment
- + decimal, hexadecimal, binary
- + leading zero, leading sign ...

The existing SSI connection between the measuring system and the control unit can be monitored and the position can be displayed. This does not affect the existing connection.

Display of actual values and additional encode parameters (linear sensor from TR-Electronic with any process interface and programming interface). The process interface remains available.

_Programming module

The display itself can be programmed via USB from the computer (TRWinProg).

Measuring systems (that are connected via the programming interface) can be programmed via the display. The TA-Mini takes over the functions of the PC adapter.

_Signal converter

Parameters that have been imported via the programming interface can be output as SSI values.

In the LLB-65, for example, this means that an SSI interface can be easily upgraded for an analog interface, or speeds that have been exported via the programming interface can be transmitted further by SSI.

_Linked display

Display values can be forwarded to other TA-Minis (display to machine, display in control unit). Scaling can either be adopted or set independently here.

_Difference display

In two linked displays, each with their own SSI measuring systems, you can select for each display whether they should display the position of their own measuring system, the other measuring system, or the difference between the two.

LE-200 – measure up to 240 m contact-free

Absolute. Touch-free. Closed-loop control.

The laser measurement devices of the LE series are optical sensors that can capture larger distance touch-free and under appliance of closed-loop control.

The laser-position detection system consists of the actual measuring device plus source of laser light, electronic evaluation, data interface and reflector. The device sends a modulated laser beam, which is

reflected by the reflector. The distance 1000/second is detected absolutely from the phase difference between the light beam that is sent and the beam that is received. It is output at a physical resolution of 0.1 mm.

LE-200 with cooling system/heating

The LE-200 has to cope with extreme climate conditions particularly when used in storage and logistics applications. In order to minimize the effects of extreme temperatures on the functionality and life cycle of the device, TR has developed a number of options. The aim of each selected measure is to keep the temperature inside the housing within the permitted temperature range. Please coordinate all cooling measures with our sales department in order to insure that the selected measure is suitable for your application.

A particularly effective technique consists of a pre-fitted unit which has an active cooling effect when connected to a (customer-side) liquid-cooling system. This enables the LE-200 to be used continuously in temperatures over +50 °C. The temperature range that is actually attained depends largely on the capacity and throughput of the re-cooling system that is in use. Please coordinate details with our technical sales department.

The standard adjustment available for laser control in relation to temperature ensures that measurement values are stable, guarantees compliance with the maximum permitted laser capacity and the life cycle of the laser within the permitted range of temperature (0 ... 50 °C). In addition, warning signals can be generated when thresholds are exceeded, in order to trigger cooling processes or to halt the affected system parts whenever necessary.

The optional heating system extends the temperature range to -30 °C. This heats not just the inner housing but also the front screen in accordance with a temperature regulation control, preventing condensation and hoar frost formation in both optical components and in the electric system. The connection capacity increases in the process to max. 60 W when the heating is operated at 100 %.

Possible area of application – warehousing and logistics

Particularly in the area of modern warehouse setups, such as shelf-stacking devices, transfer belts and crane systems, a powerful, decentralized measuring and control system for simple project processing and quick configuration makes all the difference.

Movements up to 240 m are recorded with the LE-200 laser distance measuring device. The visible red light laser facilitates commissioning and adjustment of the measuring system. A continuous light beam is used during operation. With just 1 millisecond of measuring cycle time, the LE-200 can be directly used for position control.

The key to this is phase delay measurement. The intensity of the laser light is modulated over time. The frequencies used generate several superimposed waves, which form wavelengths between 3 and 250 m in space.

The reflector is an important part of the measuring distance. As a result of the geometry, comparable to a reflector on a bicycle, the light beam is always reflected in the direction from which it came. This means that fluctuations in the angular position of the reflector are not a problem, even at maximum range. The laser beam hits the reflector and the intensity wave is reflected.

Depending on the distance between LE-200 and reflector, a phase shift results between emitted and received light. Back in the device, the modulation frequencies are reconstructed and the phase shift determined. The position value can then be determined from the various frequencies.

An important production step: each laser measuring system is linearized with the maximum measuring range and tested at 100 %. This technology achieves a reproducibility of ± 2 mm at a maximum distance of 240 m - at the high speeds required in an automatic storage system.

With regard to control, the LE-200 communicates via field buses or directly with position controllers via SSI. In addition to the actual position, the speed is also available as measured value, and information on the status of the measuring system is transferred. The intensity monitor allows slowly developing contamination to be detected early on, so that cleaning can be planned into normal



maintenance cycles.

The actual measuring process is non-contacting and therefore wear-free. This makes the LE-200 optimally suited to the requirements of automated logistics applications.

LE-200 PROFIBUS-DP + SSI

- + recording linear movement patterns
- + particularly suitable for storage and transport technology
- + programmable
- + optionally with pre-fitted connection for a cooling water circuit
- + robust design
- + distance measurements up to 240 m



Supply

Operating voltage	18 to 27 V DC, $\pm 5\%$
with heating	24 V DC, $\pm 5\%$
Power consumption without load	< 0.35 A
with heating	< 2.5 A

Recording of readings

Measuring principle	phase delay measurement
Measurement length - measurement of reflector foil	0.2 to 125 m, 170 m, 195 m, 240 m
Resolution can be selected ¹	physical resolution 0.1 mm
Linearization	
up to 12 m, standard	abs. linearity error ± 3 mm
complete measuring length	abs. linearity error ± 5 mm
Reproducibility	± 2 mm
Measurement output/refresh cycle	programmable 1 – 500 ms
Integration time	1 ms

Additional characteristics

Laser diode, red light	laser protection class 2 according to DIN EN 60825-1
wavelength λ	670 nm
laser performance	$P_{\max} \leq 1$ mW
lifetime, 25 °C	50,000 h
Programming via RS 485	Windows® compatible (TRWin Prog)/PROFIBUS-DP

Environmental conditions

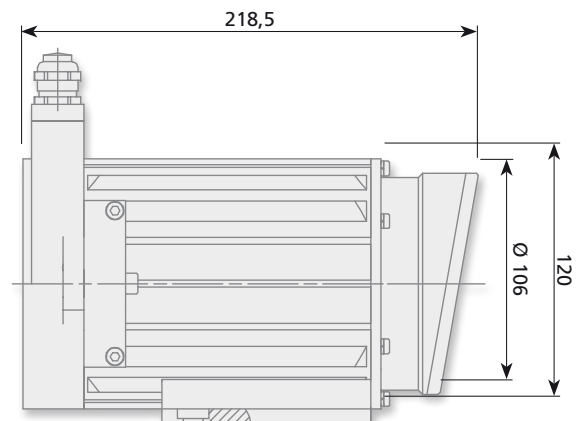
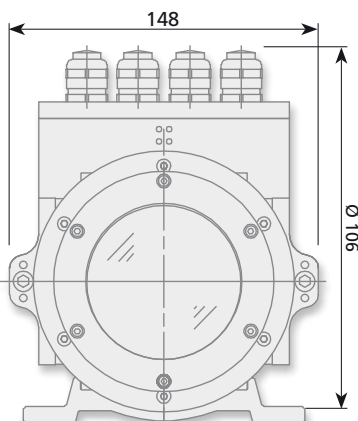
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50 – 2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
disturbing emission	DIN EN 61000-6-3
immunity to disturbance	DIN EN 61000-6-2
Working temperature	0 °C to +50 °C
with heating	-30 °C to +50 °C
Storage temperature	-20 °C to +75 °C, dry
Temperature drift, related to maximum measured length	1 ppm/ °C at 125 m, 170 m, 195 m
Relative humidity, DIN EN 60068-3-4	98 %, non-condensing
Protection class DIN EN 60529 ²	IP 65

Interface

PROFIBUS-DP	DIN 19245 part 1 – 3
Output code/ baud rate	binary/9.6 kBaud to a maximum of 12 MBaud
Station address	3 – 99
SSI interface	clock input: opto coupler/ clock frequency: 80 kHz – 820 kHz
Output code ¹	binary, gray
Data transmission length	dependent on the cable cross-section, shielding, clock frequency, etc.
Data output	RS 485 (2-wire)
Number of data bits ¹	12 – 32, with error-bit transmission
Gate input	preset, laser on/off
Gate output	temperature, speed, plausibility, position, etc.

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

LE-200 SSI

- + recording linear movement patterns
- + particularly suitable for storage and transport technology
- + programmable
- + optionally with pre-fitted connection for a cooling water circuit
- + contact-free and wear-free distance measurement
- + robust design
- + distance measurements up to 240 m



Supply

Operating voltage	18 to 27 V DC, ±5 %
with heating	24 V DC, ±5 %
Power consumption without load	< 0.35 A
with heating	< 2.5 A

Recording of readings

Measuring principle	phase delay measurement
Measurement length - measurement of reflector foil	0.2 to 125 m, 170 m, 195 m, 240 m
Resolution can be selected ¹	physical resolution 0.1 mm
Linearization	
up to 12 m, standard	abs. linearity error ±3 mm
complete measuring length	abs. linearity error ±5 mm
Reproducibility	±2 mm
Measurement output/refresh cycle	programmable 1 – 500 ms
Integration time	1 ms

Additional characteristics

Laser diode, red light	laser protection class 2 according to DIN EN 60825-1
wavelength λ	670 Nm
laser performance	$P_{max} \leq 1$ mW
lifetime, 25 °C	50,000 h
Programming via RS 485	Windows® compatible (TRWin Prog)

Environmental conditions

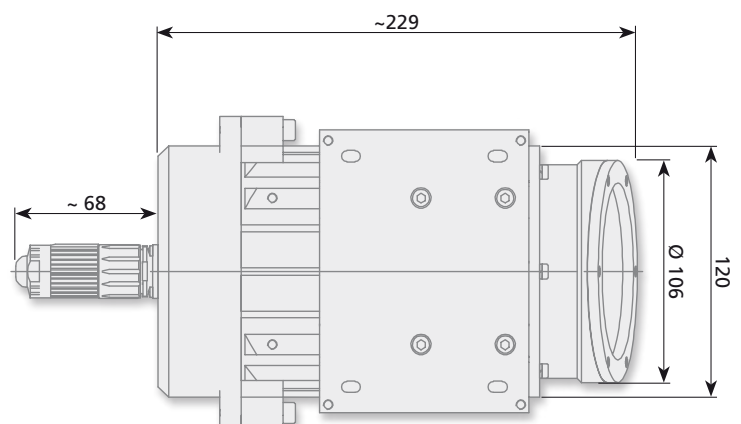
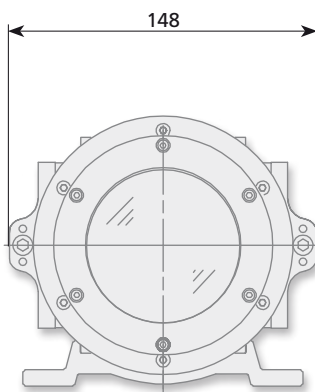
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50 – 2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
disturbing emission	DIN EN 61000-6-3
immunity to disturbance	DIN EN 61000-6-2
Working temperature	0 °C to +50 °C
with heating	-30 °C to +50 °C
Storage temperature	-20 °C to +75 °C, dry
Temperature drift, related to maximum measured length	1 ppm/°C at 125 m, 170 m, 195 m
Relative humidity, DIN EN 60068-3-4	98 %, non-condensing
Protection class DIN EN 60529 ²	IP 65

Interface

SSI	clock input: opto coupler / clock frequency: 80 kHz – 820 kHz
Output code ¹	binary, gray
SSI output value ¹	position, intensity, speed
Data transmission length	dependent on the cable cross-section, shielding, clock frequency, etc.
Data output	RS 485 (2-wire)
Number of data bits ¹	12 – 32, with error-bit transmission
Gate input	preset, laser on/off
Gate output	temperature, speed, plausibility, position, etc.

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

LE-200 CANopen

- + recording linear movement patterns
- + particularly suitable for storage and transport technology
- + can be parameterized via CAN bus
- + optionally with pre-fitted connection for a cooling water circuit
- + robust design
- + distance measurements up to 240 m



Supply

Operating voltage	18 to 27 V DC, $\pm 5\%$
with heating	24 V DC, $\pm 5\%$
Power consumption without load	< 0.35 A
with heating	< 2.5 A

Recording of readings

Measuring principle	phase delay measurement
Measurement length - measurement of reflector foil	0.2 to 125 m, 170 m, 195 m, 240 m
Resolution can be selected ¹	physical resolution 0.1 mm
Linearization	
up to 12 m, standard	abs. linearity error ± 3 mm
complete measuring length	abs. linearity error ± 5 mm
Reproducibility	± 2 mm
Measurement output / refresh cycle	programmable 1–500 ms
Integration time	1 ms

Additional characteristics

Laser diode, red light	laser protection class 2 according to DIN EN 60825-1
wavelength λ	670 Nm
laser performance	$P_{\max} \leq 1$ mW
lifetime, 25 °C	50,000 h
Programming via RS 485	Windows® compatible (TRWin Prog) / CANopen

Environmental conditions

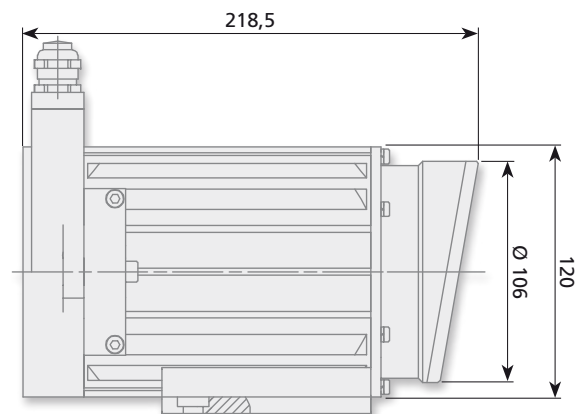
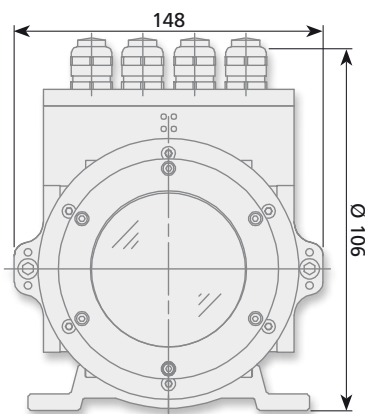
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
disturbing emission	DIN EN 61000-6-3
immunity to disturbance	DIN EN 61000-6-2
Working temperature	0 °C to +50 °C
with heating	-30 °C to +50 °C
Storage temperature	-20 °C to +75 °C, dry
Temperature drift, related to maximum measured length	1 ppm/°C at 125 m, 170 m, 195 m
Relative humidity, DIN EN 60068-3-4	98 %, non-condensing
Protection class DIN EN 60529 ²	IP 65

Interface

CANopen	CAN-Bus interface in accordance with ISO/DIS 11898
Data protocol	CAN 2.0 A, CANopen Device Profil for encoder CiA DS-406 V2.0
Output code	binary
Baud rate (adjustable) - cable length	20 kBaud to 2500 m 125 kBaud to 500 m 500 kBaud to 100 m 1 MBaud to 25 m
Gate input	preset, laser on/off
Gate output	temperature, speed, plausibility, position, etc.

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

LE-200 CAN DeviceNet

- + recording linear movement patterns
- + particularly suitable for storage and transport technology
- + can be parameterized via CAN bus
- + optionally with pre-fitted connection for a cooling water circuit
- + robust design
- + distance measurements up to 240 m



Supply

Operating voltage	18 to 27 V DC, ±5 %
with heating	24 V DC, ±5 %
Power consumption without load	< 0.35 A
with heating	< 2.5 A

Recording of readings

Measuring principle	phase delay measurement
Measurement length - measurement of reflector foil	0.2 to 125 m, 170 m, 195 m, 240 m
Resolution can be selected ¹	physical resolution 0.1 mm
Linearization	
up to 12 m, standard	abs. linearity error ±3 mm
complete measuring length	abs. linearity error ±5 mm
Reproducibility	±2 mm
Measurement output/refresh cycle	programmable 1 – 500 ms
Integration time	1 ms

Additional characteristics

Laser diode, red light	laser protection class 2 according to DIN EN 60825-1
wavelength λ	670 Nm
laser performance	P _{max} ≤ 1 mW
lifetime, 25 °C	50,000 h
Programming via RS 485	Windows® compatible (TRWin Prog)/CAN DeviceNet

Environmental conditions

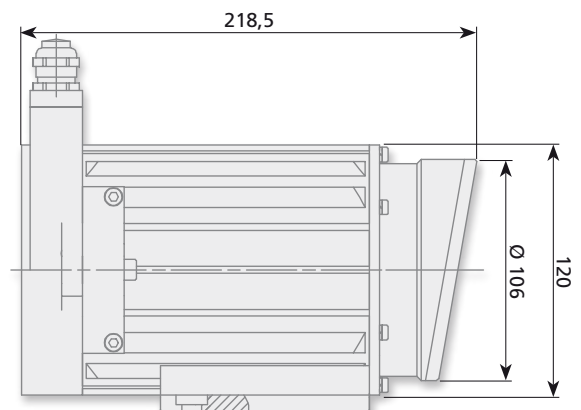
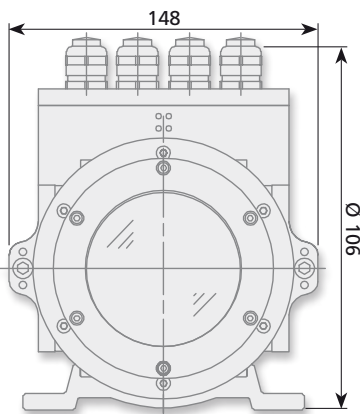
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
disturbing emission	DIN EN 61000-6-3
immunity to disturbance	DIN EN 61000-6-2
Working temperature	0 °C to +50 °C
with heating	-30 °C to +50 °C
Storage temperature	-20 °C to +75 °C, dry
Temperature drift, related to maximum measured length	1 ppm/°C at 125 m, 170 m, 195 m
Relative humidity, DIN EN 60068-3-4	98 %, non-condensing
Protection class DIN EN 60529 ²	IP 65

Interface

CAN DeviceNet	CAN-field bus interface - opto-decoupled CAN-BUS-driver - ISO/DIS 11898
Output code	binary
Baudrate (adjustable) - cable length	125 kBaud to 500 m 250 kBaud to 250 m 500 kBaud to 100 m
Gate input	preset, laser on/off
Gate output	temperature, speed, plausibility, position, etc.

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

General/Definitions
Laser distance measuring
Barcode positioning system
with SSI

LE-200 INTERBUS-S

- + recording linear movement patterns
- + particularly suitable for storage and transport technology
- + can be parameterized via INTERBUS-S
- + optionally with pre-fitted connection for a cooling water circuit
- + robust design
- + distance measurements up to 240 m



Supply

Operating voltage	18 to 27 V DC, $\pm 5\%$
with heating	24 V DC, $\pm 5\%$
Power consumption without load	< 0.35 A
with heating	< 2.5 A

Recording of readings

Measuring principle	phase delay measurement
Measurement length - measurement of reflector foil	0.2 to 125 m, 170 m, 195 m, 240 m
Resolution can be selected ¹	physical resolution 0.1 mm
Linearization	
up to 12 m, standard	abs. linearity error ± 3
complete measuring length	abs. linearity error ± 5
Reproducibility	± 2 mm
Measurement output/refresh cycle	programmable 1–500 ms
Integration time	1 ms

Additional characteristics

Laser diode, red light	Laser protection class 2 according to DIN EN 60825-1
wavelength λ	670 Nm
laser performance	$P_{\max} \leq 1$ mW
lifetime, 25 °C	50,000 h
Programming via RS 485	Windows® compatible (TRWin Prog)/INTERBUS_S

Environmental conditions

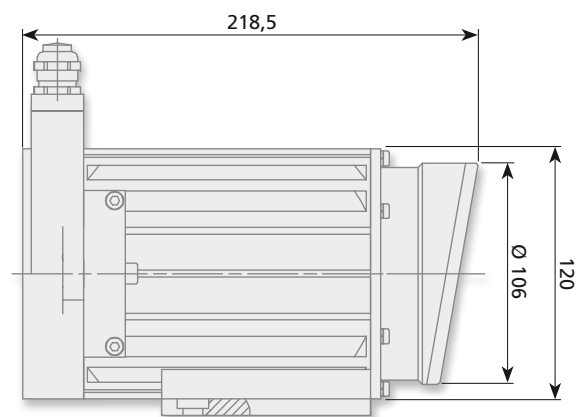
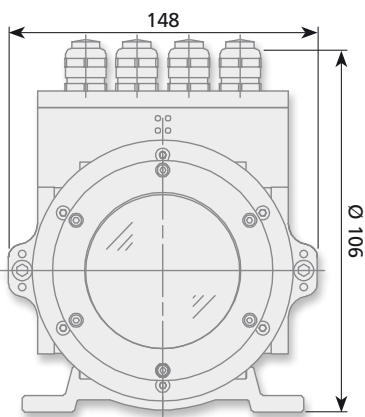
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
disturbing emission	DIN EN 61000-6-3
immunity to disturbance	DIN EN 61000-6-2
Working temperature	0 °C to +50 °C
with heating	-30 °C to +50 °C
Storage temperature	-20 °C to +75 °C, dry
Temperature drift, related to maximum measured length	1 ppm/°C at 125 m, 170 m, 195 m
Relative humidity, DIN EN 60068-3-4: 2002	98 %, non-condensing
Protection class DIN EN 60529 ²	IP 65

Interface

INTERBUS-S	DIN 19258, 2-wire remote bus for sending and receiving directions, RS 422 with galvanic separation
Profile	K3
ID no.	55 dec.
Baud rate	300 kBaud net, 500 kBaud gross or 2 MBaud (incl. control and status bytes)
Refresh data	0.5 ms
Output code	binary
Gate input	preset, laser on/off
Gate output	temperature, speed, plausibility, position, etc.

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

LE-200 PROFINET IO

- + recording linear movement patterns
- + particularly suitable for storage and transport technology
- + programmable
- + can be parameterized via PROFINET/IO
- + optionally with pre-fitted connection for a cooling water circuit
- + robust design
- + distance measurements up to 240 m



Supply

Operating voltage	18 to 27 V DC, $\pm 5\%$
with heating	24 V DC, $\pm 5\%$
Power consumption without load	< 0.35 A
with heating	< 2.5 A

Recording of readings

Measuring principle	phase delay measurement
Measurement length - measurement of reflector foil	0.2 to 125 m, 170 m, 195 m, 240 m
Resolution can be selected ¹	physical resolution 0.1 mm
Linearization	
up to 12 m, standard	abs. linearity error ± 3 mm
complete measuring length	abs. linearity error ± 5 mm
Reproducibility	± 2 mm
Measurement output/refresh cycle	programmable 1 – 500 ms
Integration time	1 ms

Additional characteristics

Laser diode, red light	laser protection class 2 according to DIN EN 60825-1
wavelength λ	670 Nm
laser performance	$P_{\max} \leq 1$ mW
lifetime, 25 °C	50,000 h
Programming via RS 485	WINDOWS® compatible (TRWin Prog)/PROFINET IO

Environmental conditions

Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms

EMC

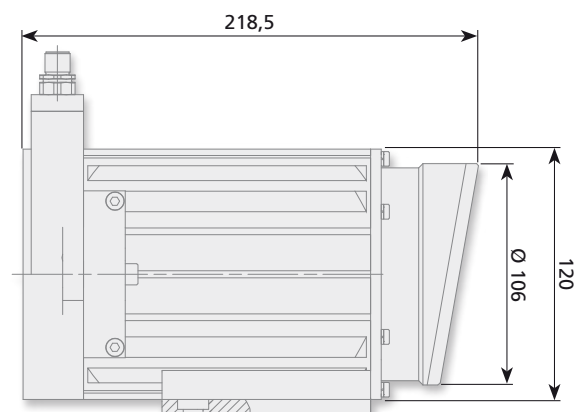
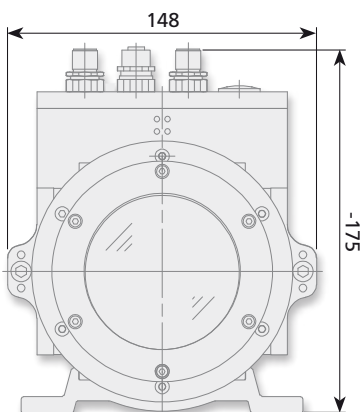
disturbing emission	DIN EN 61000-6-3
immunity to disturbance	DIN EN 61000-6-2
Working temperature	0 °C to +50 °C
with heating	-30 °C to +50 °C
Storage temperature	-20 °C to +75 °C, dry
Temperature drift, related to maximum measured length	1 ppm/°C at 125 m, 170 m, 195 m
Relative humidity, DIN EN 60068-3-4	98 %, non-condensing
Protection class DIN EN 60529 ²	IP 65

Interface

PROFINET IO	IEC 61158, IEC 61784-1
PROFINET specification	V2.2
Conformance Class	Conformance Class B
Physical Layer	PROFINET 100Base-TX, Fast Ethernet, ISO/IEC 8802-3
Output code	binary
Cycle time	≥ 1 ms (IRT/RT)
Transmission rate	10 MBit/s, 100 MBit/s
Addressing ¹	per Name, allocation Name - MAC takes place at full speed
Real-time classes	RT Class 1, 2 Frames (RT), RT Class 3 Frames (IRT)
Gate input	preset, laser on/off
Gate output	temperature, speed, plausibility, position, etc.

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

General/Definitions
Laser distance measuring
Barcode positioning system
with SSI

LE-200 EtherNet/IP

- + recording linear movement patterns
- + particularly suitable for storage and transport technology
- + programmable
- + can be parameterized via EtherNet/IP in accordance with the Encoder Device Profile
- + optionally with pre-fitted connection for a cooling water circuit
- + robust design for distance measurements up to 240 m



Supply

Operating voltage	18 to 27 V DC, $\pm 5\%$
with heating	24 V DC, $\pm 5\%$
Power consumption without load	< 0.35 A
with heating	< 2.5 A

Recording of readings

Measuring principle	phase delay measurement
Measurement length - measurement of reflector foil	0.2 to 125 m, 170 m, 195 m, 240 m
Resolution can be selected ¹	physical resolution 0.1 mm
Linearization	
up to 12 m, standard	abs. linearity error ± 3 mm
complete measuring length	abs. linearity error ± 5 mm
Reproducibility	± 2 mm
Measurement output/refresh cycle	programmable 1–500 ms
Integration time	1 ms

Additional characteristics

Laser diode, red light	laser protection class 2 according to DIN EN 60825-1
wavelength λ	670 Nm
laser performance	$P_{\max} \leq 1$ mW
lifetime, 25 °C	50,000 h
Programming via RS 485	WINDOWS® compatible (TRWin Prog)/EtherNet/IP

Environmental conditions

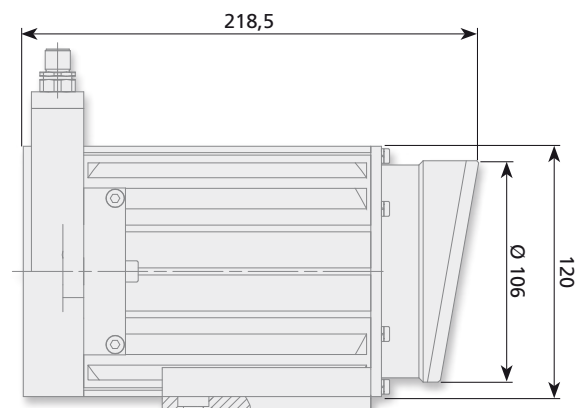
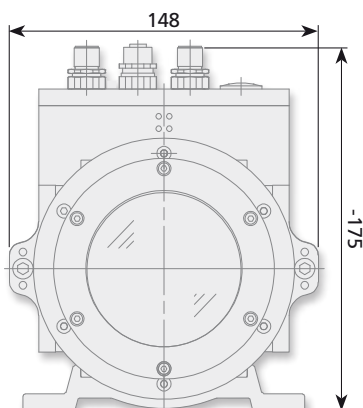
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
disturbing emission	DIN EN 61000-6-3
immunity to disturbance	DIN EN 61000-6-2
Working temperature	0 °C to +50 °C
with heating	-30 °C to +50 °C
Storage temperature	-20 °C to +75 °C, dry
Temperature drift, related to maximum measured length	1 ppm/°C at 125 m, 170 m, 195 m
Relative humidity, DIN EN 60068-3-4	98 %, non-condensing
Protection class DIN EN 60529 ²	IP 65

Interface

EtherNet/IP	IEC 61784-1 CP 2/2 Type 2, IEC 61158-2
Physical Layer	EtherNet/IP 100Base-TX, Fast Ethernet, ISOm/IEC 8802-3
Output code	binary
Device profile	Encoder Device Profile 0x22, ODVA specification
Transmission rate	100 MBit/s
Transmission	CAT-5 cable, shielded (STP), ISO/IEC 11801
Gate input	preset, laser on/off
Gate output	temperature, speed, plausibility, position, etc.

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

LE-200 EtherCAT

- + recording linear movement patterns
- + particularly suitable for storage and transport technology
- + can be parameterized via EtherCAR in accordance with the CiA DS-406 device profile
- + optionally with pre-fitted connection for a cooling water circuit
- + robust design
- + distance measurements up to 240 m



Supply

Operating voltage	18 to 27 V DC, ±5 %
with heating	24 V DC, ±5 %
Power consumption without load	< 0.35 A
with heating	< 2.5 A

Recording of readings

Measuring principle	phase delay measurement
Measurement length - measurement of reflector foil	0.2 to 125 m, 170 m, 195 m, 240 m
Resolution can be selected ¹	physical resolution 0.1 mm
Linearization	
up to 12 m, standard	abs. linearity error ±3 mm
complete measuring length	abs. linearity error ±5 mm
Reproducibility	±2 mm
Measurement output/refresh cycle	programmable 1 – 500 ms
Integration time	1 ms

Additional characteristics

Laser diode, red light	laser protection class 2 according to DIN EN 60825-1
wavelength λ	670 Nm
laser performance	$P_{max} \leq 1 \text{ mW}$
lifetime, 25 °C	50,000 h
Programming via RS 485	WINDOWS® compatible (TRWin Prog)/EtherCAT

Environmental conditions

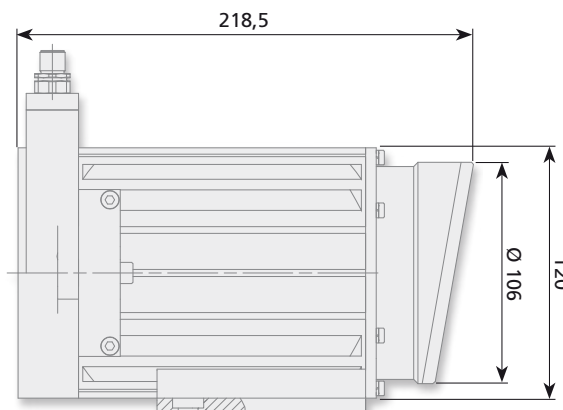
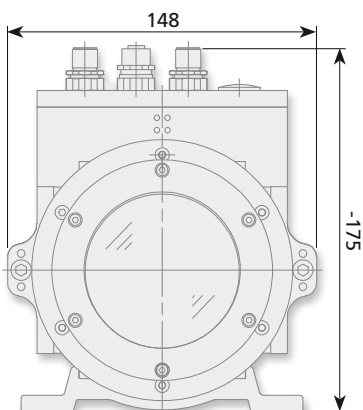
Vibration DIN EN 60068-2-6	$\leq 50 \text{ m/s}^2$, sine 50–2,000 Hz
Shock DIN EN 60068-2-27	$\leq 300 \text{ m/s}^2$, half sine, 11 ms
EMC	
disturbing emission	DIN EN 61000-6-3
immunity to disturbance	DIN EN 61000-6-2
Working temperature	0 °C to +50 °C
with heating	-30 °C to +50 °C
Storage temperature	-20 °C to +75 °C, dry
Temperature drift, related to maximum measured length	1 ppm/°C at 125 m, 170 m, 195 m
Relative humidity, DIN EN 60068-3-4	98 %, non-condensing
Protection class DIN EN 60529 ²	IP 65

Interface

EtherCAT	IEC 61158-1, IEC 61784-2
Physical Layer	EtherCAT 100Base-TX, Fast Ethernet, ISO/IEC 8802-3
Output code	binary
Device profile	CANopen over EtherCAT (CoE), CiA DS-406
Distributed clocks	in accordance with the IEE 1588 standard
Transmission rate	100 MBit/s
Bus cycle times	100 μs ... ≤ 20 ms
Transmission	CAT-5 cable, shielded (STP), ISO/IEC 11801
Gate input	preset, laser on/off
Gate output	temperature, speed, plausibility, position, etc.

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

LE-200 POWERLINK

- + recording linear movement patterns
- + particularly suitable for storage and transport technology
- + can be parameterized via Ethernet-POWERLINK in accordance with the device profile CiA DS-406
- + optionally with pre-fitted connection for a cooling water circuit
- + robust design
- + distance measurements up to 240 m



Supply

Operating voltage	18 to 27 V DC, $\pm 5\%$
with heating	24 V DC, $\pm 5\%$
Power consumption without load	< 0.35 A
with heating	< 2.5 A

Recording of readings

Measuring principle	phase delay measurement
Measurement length - measurement of reflector foil	0.2 to 125 m, 170 m, 195 m, 240 m
reflector film	physical resolution 0.1 mm
Resolution can be selected ¹	
Linearization up to 12 m, standard	abs. linearity error ± 3 mm
complete measuring length	abs. linearity error ± 5 mm
Reproducibility	programmable 1–500 ms
Measurement output/refresh cycle	1 ms
Integration time	

Additional characteristics

Laser diode, red light	laser protection class 2 according to DIN EN 60825-1
wavelength λ	670 Nm
laser performance	$P_{\max} \leq 1$ mW
lifetime, 25 °C	50,000 h
Programming via RS 485	WINDOWS® compatible (TRWin Prog)/POWERLINK

Environmental conditions

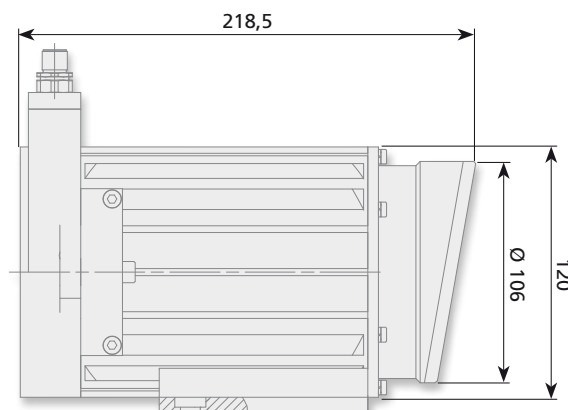
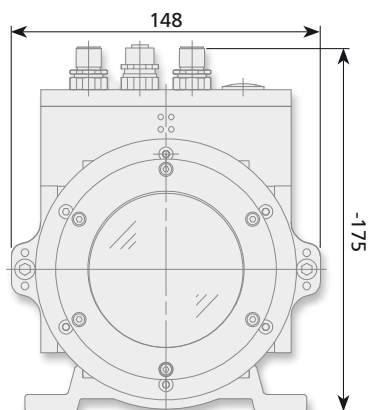
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
disturbing emission	DIN EN 61000-6-3
immunity to disturbance	DIN EN 61000-6-2
Working temperature	0 °C to +50 °C
with heating	-30 °C to +50 °C
Storage temperature	-20 °C to +75 °C, dry
Temperature drift, related to maximum measured length	1 ppm/°C at 125 m, 170 m, 195 m
Relative humidity, DIN EN 60068-3-4	98 %, non-condensing
Protection class DIN EN 60529 ²	IP 65

Interface

PROFIBUS-DP	IEC 61784-2, IEC 61158 ff
Physical Layer	POWERLINK 100Base-TX, Fast Ethernet, ISO/IEC 8802-3
Output code	binary
Device profile	CANopen over Ethernet, CiA DS-406
Transmission rate	100 MBit/s
Bus cycle times	≥ 400 μ s
Transmission	CAT-5 cable, shielded (STP), ISO/IEC 11801
Gate input	preset, laser on/off
Gate output	temperature, speed, plausibility, position, etc.

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

LE-300 PROFIBUS-DP/SSI

- + recording linear movement patterns
- + particularly suitable for storage and transport technology
- + small housing to best utilize space
- + optionally with pre-fitted connection for a cooling water circuit
- + robust design
- + distance measurements up to 240 m



Supply

Operating voltage	18 to 27 V DC, $\pm 5\%$
with heating	24 V DC, $\pm 5\%$
Power consumption without load	< 0.35 A
with heating	< 2.5 A

Recording of readings

Measuring principle	phase delay measurement
Measurement length -	0.2 to 125 m,
measurement of reflector foil	170 m, 195 m, 240 m
Resolution can be selected ¹	physical resolution 0.1 mm
Linearization	abs. linearity error ± 2 mm
Reproducibility	± 2 mm
Measurement output/refresh cycle	programmable 1 – 500 ms
Integration time	1 ms

Additional characteristics

Laser diode, red light	laser protection class 2 according to DIN EN 60825-1
wavelength λ	670 Nm
laser performance	$P_{\max} \leq 1$ mW
lifetime, 25 °C	50,000 h
Programming, alternatively via USB	WINDOWS® compatible (TRWin Prog)

Environmental conditions

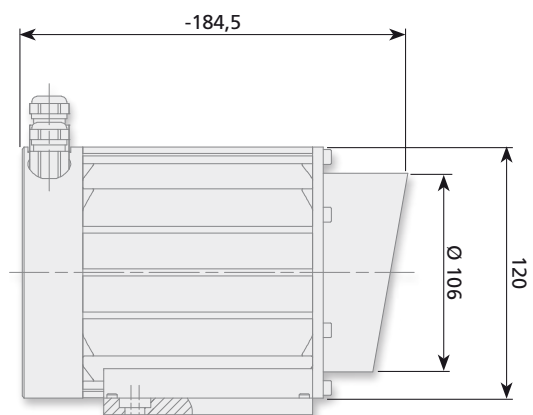
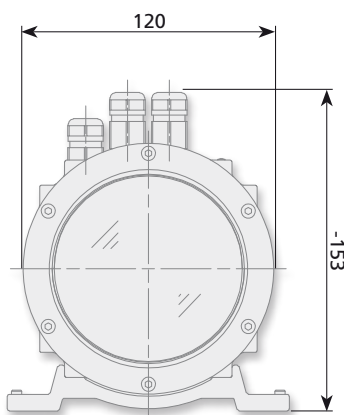
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
disturbing emission	DIN EN 61000-6-3
immunity to disturbance	DIN EN 61000-6-2
Working temperature	0 °C to +50 °C
with heating	-30 °C to +50 °C
Storage temperature	-20 °C to +75 °C, dry
Relative humidity, DIN EN 60068-3-4	98 %, non-condensing
Protection class DIN EN 60529 ²	IP 65

Interface

PROFIBUS-DP	IEC 61158, IEC 61784
Output code/ baud rate	binary/9.6 kBaud to a maximum of 12 MBaud
Station address	3 – 99
SSI interface	clock input: opto coupler / clock frequency: 80 kHz – 820 kHz
Output code ¹	binary, gray
Data transmission length	dependent on the cable cross-section, shielding, clock frequency, etc.
Data output	RS 485 (2-wire)
Number of data bits ¹	12 – 32, with error-bit transmission
Gate input	preset, laser on / off
4 gate outputs	programmable cam, temperature, speed, plausibility, position, etc.

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

General/Definitions
Laser distance measuring
Barcode positioning system
with SSI

LLB-65 PROFIBUS-DP + Analog

- + position detection
- + distance measurement on natural surfaces: 0.05 to approx. 65 m
- + programmable



Supply

Operating voltage	13 to 30 V DC
Power consumption without load	< 0.6 A

Recording of readings

Measurement range	0.05 to 65
Resolution	0,1 mm
Measuring accuracy	
LLB-65-00100	typically ± 1.5 mm at 2δ
LLB-65-00101	typically ± 3.0 mm at 2δ
Measuring time	
single measurement	typically 0.3 to 4 s
continuous measuring	typically 0.15 to 4 s

Additional characteristics

Laser diode, red light	laser protection class 2 in accordance with IEC 60825-1 / FDA 21 CFR 1040.10 and 1040.11
wavelength λ	620 to 690 nm
beam divergence	0.16×0.6 mrad
pulse duration	$0,45 \times 10^{-9}$ s
output of radiation	< 0,95 MW
lifetime, 20 °C	> 50.000 h

Environmental conditions

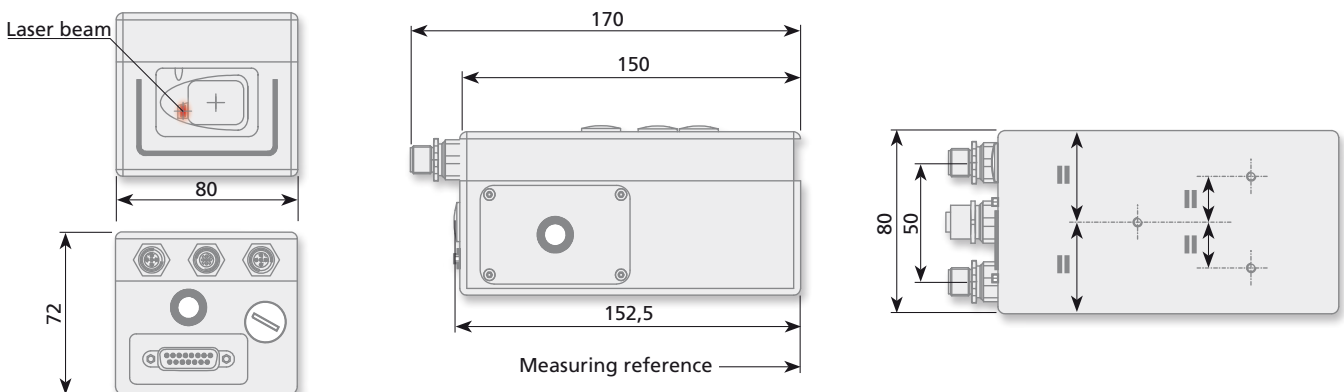
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , Sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , Half sine, 11 ms
EMC	
discharging of static electricity	DIN EN 61000-4-2
disturbing emission	DIN EN 61000-6-4
immunity to disturbance	DIN EN 61000-6-2
Working temperature	-10 °C to +50 °C,
continuous measuring mode	max. +45 °C
Storage temperature	-40 °C to +70 °C, dry
Protection class DIN EN 60529 ²	IP 65

Interface

PROFIBUS-DP ¹	IEC 61158, IEC 61784 9.6 kbit/s to 12 MBit/s
Analog interface ¹	0 to 20 mA, 4 to 20 mA, ≤ 500 ohm
Digital switch outputs	open drain, 30 V DC, 200 mA
2 digital outputs to filling level monitoring ¹	programmable
1 digital output	Device error
Digital input ¹	external trigger

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

General/Definitions
Laser distance measuring
Barcode positioning system
with SSI

LLB-65 Analog

- + position detection
- + distance measurement on natural surfaces: 0.05 to approx. 65 m
- + programmable
- + optionally with heating



Supply

Operating voltage	9 to 30 V DC
with heating option	24 to 30 V DC
Power consumption without load	< 0.6 A
with heating option	< 2.5 A

Recording of readings

Measurement range	typically 0.05 to 65 m
Resolution	0,1 mm
Measuring accuracy	
LLB-65-00600	typically ± 1.5 mm at 2 δ
LLB-65-00601	typically ± 3.0 mm at 2 δ
Measuring time	
single measurement	typically 0.3 to 4 s
continuous measuring	typically 0.15 to 4 s

Additional characteristics

Laser diode, red light	laser protection class 2 in accordance with IEC 60825-1:2001 / FDA 21 CFR 1040.10 and 1040.11
wavelength λ	620 to 690 nm
beam divergence	0.16×0.6 mrad
pulse duration	$0,45 \times 10^{-9}$ s
output of radiation	< 0,95 MW
lifetime, 20 °C	> 50.000 h

Environmental conditions

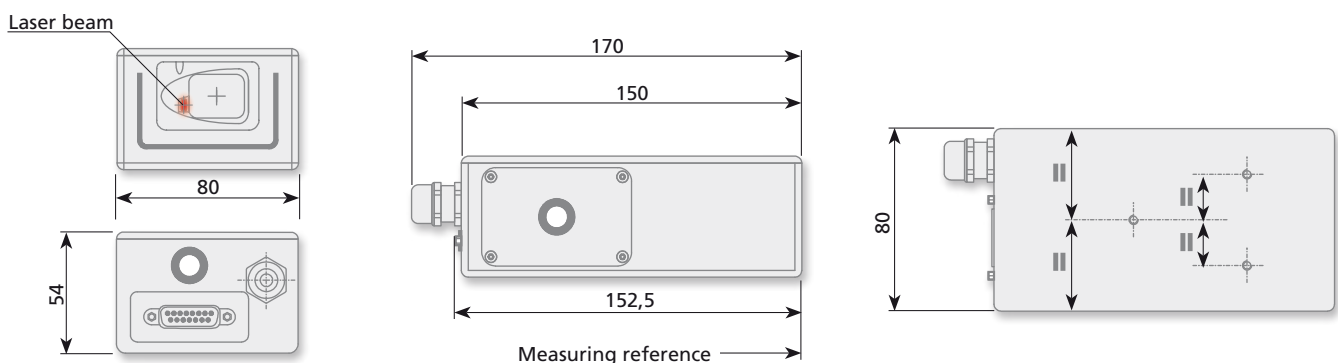
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
discharging of static electricity	DIN EN 61000-4-2
disturbing emission	DIN EN 61000-6-4
immunity to disturbance	DIN EN 61000-6-2
Working temperature	-10 °C to +50 °C,
continuous measuring mode	max. +45 °C
Working temperature with heating	-40 °C to +50 °C,
Permanent operation	max. +45 °C
Storage temperature	-40 °C to +70 °C, dry
Protection class DIN EN 60529 ²	IP 65

Interface

Analog ¹	0 to 20 mA, 4 to 20 mA, ≤ 500 ohm
Configuration interface	RS 232 point to point, RS 422 master - slave, max. 10 devices
Digital switch outputs	open drain, 30 V DC, 200 mA
2 digital outputs to filling level monitoring ¹	programmable
1 digital output	device error
Digital input ¹	external trigger

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

LLB-500 PROFIBUS-DP + Analog + SSI

- + position detection
- + distance measuring on
 - natural surfaces: 0.05 to approx. 65 m
 - reflecting target plate 0.5 to approx. 500 m
- + programmable



Supply

Operating voltage	13 to 30 V DC
Power consumption without load	< 0.6 A

Recording of readings

Measurement range	0.05 to 65 m
	0.5 to 500 m
Resolution	0,1 mm
Measuring accuracy	
LLB-500-00100	typically ± 1.5 mm at 2 δ
LLB-500-00101	typically ± 3.0 mm at 2 δ
Measuring time	
single measurement	typically 0.3 to 4 s
continuous measuring	typically 0.15 to 4 s

Additional characteristics

Laser diode, red light	laser protection class 2 in accordance with IEC 60825-1 / FDA 21 CFR 1040.10 and 1040.11
wavelength λ	620 to 690 nm
beam divergence	0.16×0.6 mrad
pulse duration	$0,45 \times 10^{-9}$ s
output of radiation	< 0,95 MW
lifetime, 20 °C	> 50.000 h

Environmental conditions

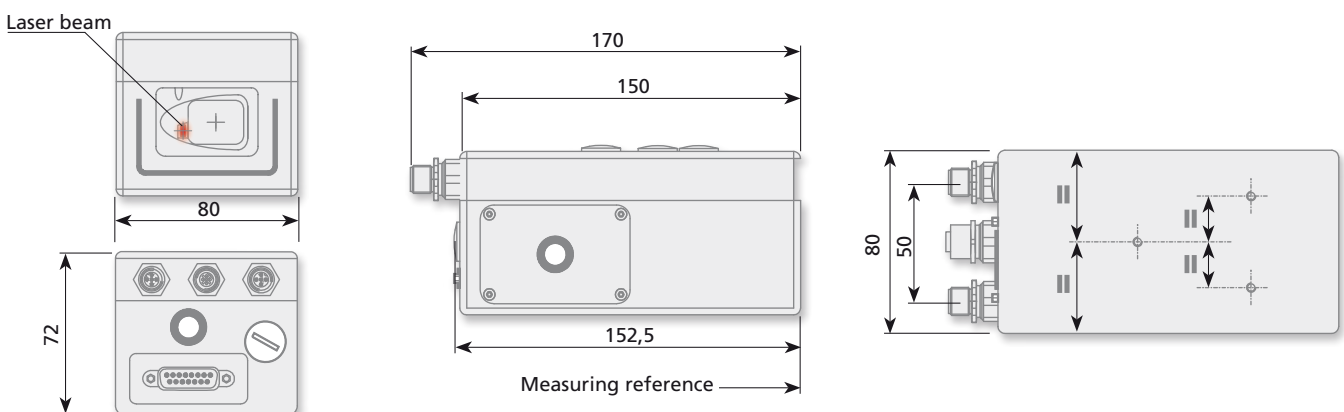
Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
discharging of static electricity	DIN EN 61000-4-2
disturbing emission	DIN EN 61000-6-4
immunity to disturbance	DIN EN 61000-6-2
Working temperature	-10 °C to +50 °C,
continuous measuring mode	max. +45 °C
Storage temperature	-40 °C to +70 °C, dry
Protection class DIN EN 60529 ²	IP 65

Interface

PROFIBUS-DP ¹	IEC 61158, IEC 61784 9.6 kbit/s to 12 MBit/s
Analog interface ¹	0 to 20 mA, 4 to 20 mA, ≤ 500 ohm
SSI	RS 232 point to point, RS 422 master - slave, max. 10 devices
Digital switch outputs	open drain, 30 V DC, 200 mA
2 digital outputs to filling level monitoring ¹	programmable
1 digital output	device error
Digital input ¹	external trigger

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland



Please request detailed drawings for your configuration.

General/Definitions
Laser distance measuring
Barcode positioning system
with SSI

LLB-500 analog + SSI

- + position detection
- + distance measuring on
 - natural surfaces: 0.05 to approx. 65 m
 - reflecting target plate 0.5 to approx. 500 m
- + programmable
- + optionally with heating



Supply

Operating voltage	9 to 30 V DC
with heating option	24 to 30 V DC
Power consumption without load	< 0.6 A
with heating option	< 2.5 A

Recording of readings

Measurement range	0.05 to 65 m
	0.5 to 500 m
Resolution	0.1 mm
Measuring accuracy	
LLB-500-00600	typically ± 1.5 mm at 2 σ
LLB-500-00601	typically ± 3.0 mm at 2 σ
Measuring time	
single measurement	typically 0.3 to 4 s
continuous measuring	typically 0.15 to 4 s

Additional characteristics

Laser diode, red light	Laser protection class 2 in accordance with IEC 60825-1 / FDA 21 CFR 1040.10 and 1040.11
wavelength λ	620 to 690 nm
beam divergence	0.16×0.6 mrad
pulse duration	0.45×10^{-9} s
output of radiation	< 0,95 MW
lifetime, 20 °C	> 50.000 h

Environmental conditions

Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	
discharging of static electricity	DIN EN 61000-4-2
disturbing emission	DIN EN 61000-6-4
immunity to disturbance	DIN EN 61000-6-2
Working temperature	-10 °C to +50 °C,
continuous measuring mode	max. +45 °C
Working temperature with heating	-40 °C to +50 °C,
permanent operation	max. +45 °C
Storage temperature	-40 °C to +70 °C, dry
Protection class DIN EN 60529 ²	IP 65

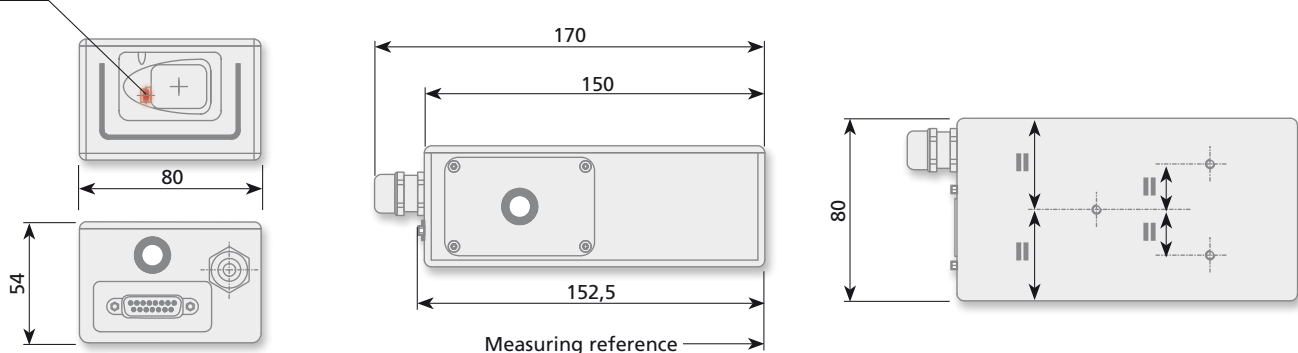
Interface

Analog ¹	0 to 20 mA, 4 to 20 mA, ≤ 500 ohm
SSI	RS 232 point to point, RS 422 master - slave, max. 10 devices
Digital switch outputs	open drain, 30 V DC, 200 mA
2 digital outputs to filling level monitoring ¹	programmable
1 digital output	device error
Digital input ¹	external trigger

¹programmable parameters

²valid with screwed-on mating connector and/or screwed-on cable gland

Laser beam



Please request detailed drawings for your configuration.

BE-90 PROFIBUS-DP

- + recording of linear and curved movement patterns
- + particularly suitable systems of suspended conveyings, and for storage and transport technology
- + absolute measuring up to 10,000 m
- + can be parameterized via PROFIBUS-DP
- + simple assembly and configuration
- + touch-free and low on wear and tear



Supply

Operating voltage	10 to 30 V DC
Current consumption	0.3 A
Power consumption	5 W

Recording of readings

Measurement length	10,000 m
Scan depth	90 to 170 mm
Measuring accuracy	±1 (2) mm
Integration time	16 (8)
measurement output	500 valuescans/s
Refresh time	2 ms

Additional characteristics

Laser diode, red light	
wavelength λ	650 Nm
scan rate	1000 scans/s

Environmental conditions

Vibration DIN EN 60068-2-6	≤ 50 m/s ² , sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine, 11 ms
EMC	IEC 60947-5-2
Working temperature	-0 °C to +40 °C,
working temperature with heating	-30 °C to +40 °C
Storage temperature	-20 °C to +60 °C, dry
Relative humidity	90 %, non-condensing
Protection class	IP 65

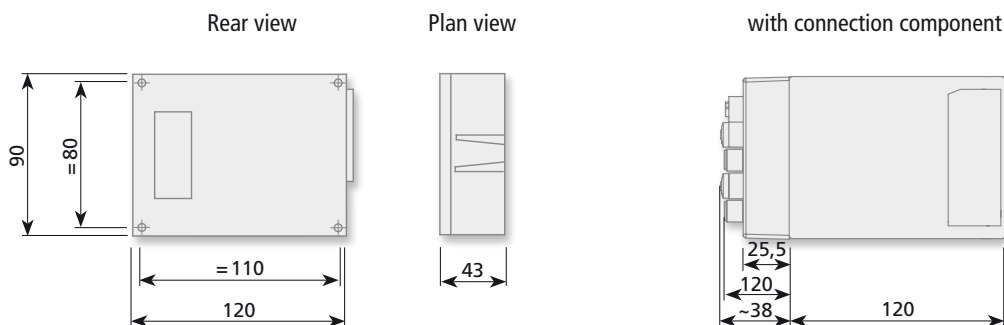
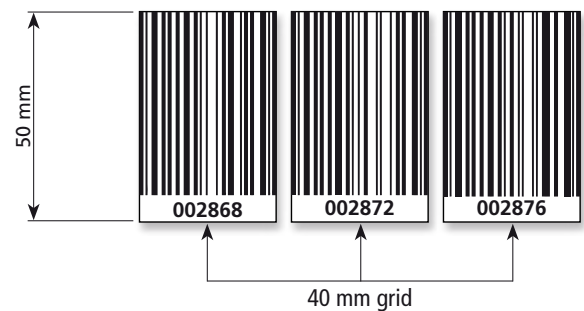
Interface

PROFIBUS-DP	
Service interface	RS 232 with set data format, 9600 baud, 8 data bits, no parity, 1 stop bit

Functionality

The BE-90 detects its position in relation to the barcode tape with a visible red light laser. The main procedure here follows these steps:

1. a code is scanned on the barcode tape
2. the position of the scanned code is detected in the scanning range of the laser beam
3. precise calculation of the position from code information and the position of the code
4. position value output via the PROFIBUS-DP



Please request detailed drawings for your configuration.

General/Definitions
Laser distance measuring
Barcode positioning system
with SSI

BE-90 SSI

- + recording of linear and curved movement patterns
- + particularly suitable in systems of suspended conveyings, and for storage and transport technology
- + absolute measuring up to 10,000 m
- + can be programmed via the BE-90 configuration tool
- + simple assembly and configuration
- + touch-free and low on wear and tear



Supply

operating voltage	10 to 30 V DC
Current consumption	0.3 A
Power consumption	5 W

recording of readings

measurement length	10,000 m
Scan depth	90 to 170 mm
Measuring accuracy	±1 (2) mm
Integration time	16 (8)
measurement output	500 valuescans / s

Additional characteristics

Laser diode, red light	
wavelength λ	650 Nm
scan rate	1000 scans/s

Environmental conditions

Vibration DIN EN 60068-2-6	≤ 50 m/s ² , Sine 50–2,000 Hz
Shock DIN EN 60068-2-27	≤ 300 m/s ² , half sine 11 ms
EMC	IEC 60947-5-2
Working temperature	-0 °C to +40 °C,
working temperature with heating	-30 °C to +40 °C
Storage temperature	-20 °C to +60 °C, dry
Relative humidity	90 %, non-condensing
Protection class	IP 65

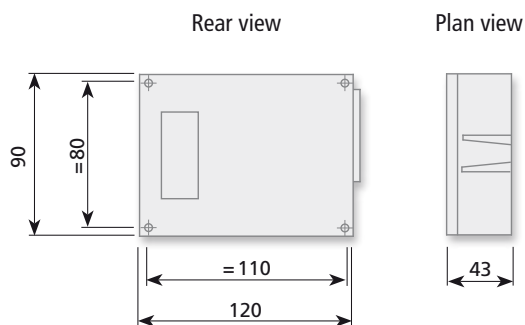
Interface

SSI	RS 422, galvanically separated 16 to 32 data bits 800 kHz max. clock frequency
Output code	binary or gray
Service interface	RS 232 with set data format, 9600 baud, 8 data bits, no parity, 1 stop bit

Functionality

The BE-90 detects its position in relation to the barcode tape with a visible red light laser. The main procedure here follows these steps:

1. a code is scanned on the barcode tape
2. the position of the scanned code is detected in the scanning range of the laser beam
3. precise calculation of the position from code information and the position of the code
4. position value output via standardized SSI interface (synchronous serial interface)



Please request detailed drawings for your configuration.

Electrical and mechanical accessory

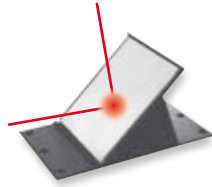
Programming adapter

Connects the encoder with the PC. Converter USB to the encoder programming interface, with galvanic separation. We recommend using it with one of our switch cabinet modules. Optionally also with PC-side RS 232 interface.



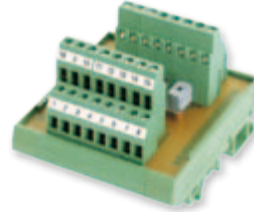
Deflecting mirror

To deflect the path of the beam from LE 10 and LE-200. Inclination: 45°, glass mirror (95.8 × 79 mm) on an aluminum continuous profile. TR-No. 49-500033



Switch cabinet module

Accessories to clarify encoder wiring. Correct grounding of signal lines, as well as the simple connecting our of programming adapter.



Configuration software

TR-WINProg (for the LE) can be purchased from us. The software is completely compatible with WINDOWS® and communicates with the devices via the PC adapter, IrDA; USB or directly via the serial RS 232.



Optical data transmission ID 200

- + optical data transmission
- + range 120 m, 200 m
- + PROFIBUS / RS 485
- + Interbus-S 500 kbit/s / RS 422
- + Interbus-S 2 MBit/s / LWL

Range	0,2 ... 200 m
Transmitting diode	infrared light, wavelength 880 m
Protection class	IP 65
Housing	aluminum die casting light entry and exit glass
Working temperature	-30 °C ... +70 °C
Weight	approx. 1200 g
Supply voltage	18 ... 30 V DC
Angle of aperture	±0.5° to the optical axis



TR-Electronic – Your Partner in Automation

General/Definitions

Laser distance measuring

Barcode positioning system

with SSI



Programmable rotary encoder

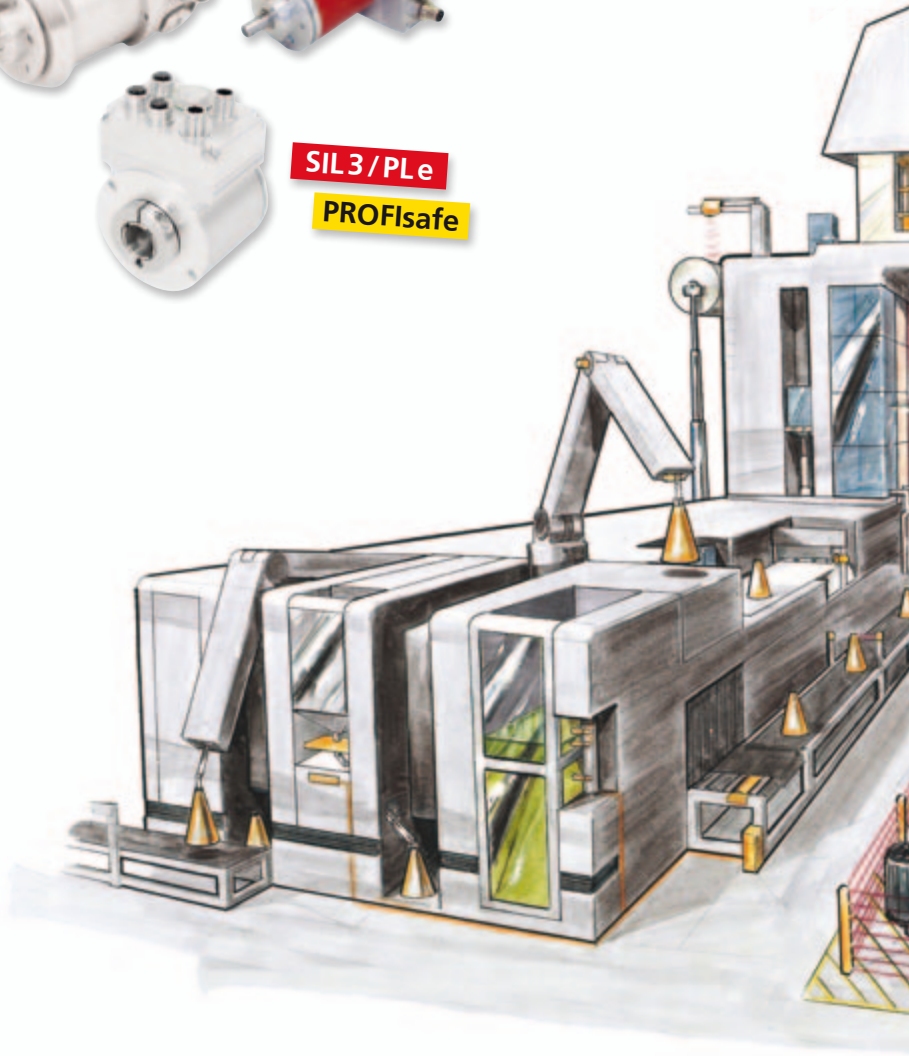
The standard of automation technology, available with all current fieldbus systems: PROFIBUS, Interbus, CANopen, DeviceNet and Industrial Ethernet. Including TR-Electronic's variety of mechanics, interfaces and functions.



SIL3/PLe
PROFIsafe

Incremental rotary encoder

From 24 mm external diameter up to 55 mm hollow shaft – we always have a solution!



Motor feedback systems

Feedback encoder for modern positioning drives. Optional integrated or directly mounted on the drive shaft via hollow shaft.



Linear absolute displacement sensors

The compact class for linear absolute measurement. Directly bus-ready, suitable for harsh environmental conditions and for installation in hydraulic cylinders.



Absolute high resolution linear measurement systems

Linear measurement with absolute sub-micron resolution without referencing.



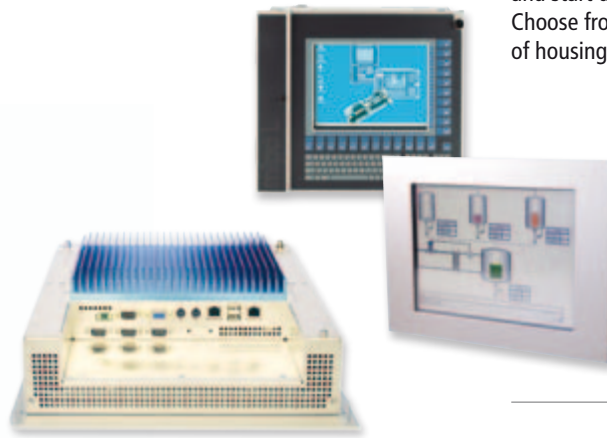
Intelligent positioning drive

Absolute positioning directly via fieldbus. Integrated motor, power electronics, closed loop controller, absolute encoder, PLC functions and fieldbus interface.



Heavy-duty industrial PC

Double shock proof mounted housing isolates the electronics from vibration, while front access (MIPC) simplifies configuration and start up. Choose from our wide selection of housings.



SPC – the PLC for PC

Turns every PC into an efficient PLC under S5/S7 or IEC 1131 protocols. Combines the comfort of PC control with the safety of a separate processor for PLC tasks.



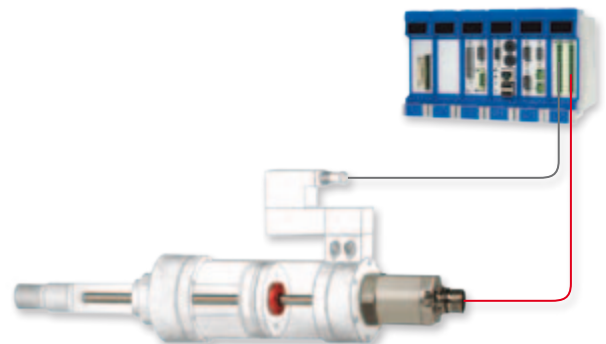
@ctivelO – more than fieldbus modules

Modular, rugged fieldbus node system I/O-node, small-scale PLC, decentralized axis controller, high performance cam controller, DIN-rail mounted industrial PC, servo controller for the hydraulic ... with commercial fieldbus systems, such as Profibus-DP, CANopen, DeviceNet, LightBus ... and ETH-ERNET as option!



Laser distance measuring systems

Absolute and wear-free measurement of distances up to 200 m via SSI, fieldbus and Ethernet.



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