

DISTANCE

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CYLINDER-INTEGRATED INSTALLATION

Magnetostrictive

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EXTERNALLY MOUNTED

Magnetostrictive

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Linear Position Transmitter HLT 1100-R2

Magnetostrictive

For full integration

Resolution min. 0.1 mm

Analogue

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant stainless steel housing For full integration in hydraulic cylinders.

The different output signals (analogue) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as connection to standard evaluation systems (e.g. to PLC controls).

The main fields of application are in mobile hydraulics.

Technical data:

Input data	
Measuring ranges	50 .. 2500 mm
Model	Rod Ø 10 mm for cylinder full integration ¹⁾ Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Seal	O-ring: NBR Backup ring: PTFE
Output data	
Output signal, permitted load resistance	Current: 4 .. 20 mA or 20 .. 4 mA, Load resist.: 200 .. 500 Ω Voltage: 0 .. 10 V or 10 .. 0 V 0.25 .. 4.75 V or 4.75 .. 0.25 V 0.5 .. 9.5 V 0.5 .. 4.5 V Load resist.: min. 2 kΩ
Resolution	12 bit, min. 0.1 mm
Non-linearity	≤ ± 0.05 % FS
Hysteresis	≤ ± 0.1 % FS
Repeatability	≤ ± 0.1 % FS
Temperature coefficient	≤ ± 0.01 % FS / °C
Sampling rate	2 ms
Environmental conditions	
Operating temperature range	-40 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-40 .. +120 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 10 .. 500 Hz at 5 kHz	≤ 20 g ≤ 15 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529	IP 67 (cable outlet) IP 6K9K ²⁾ (separate male flange connector M12x1)
Installation position	No restrictions
Other data	
Supply voltage	9 .. 36 V DC
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	< 100 mA
Weight	Depending on length: 100 mm (with 1 m cable): ~310 g 2500 mm (with 1 m cable): ~1030 g

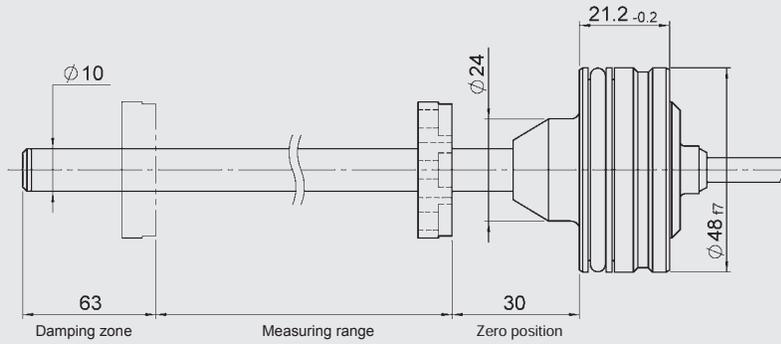
Note: Reverse polarity protection of the supply voltage, overvoltage, and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other variants available on request.

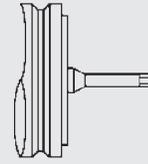
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

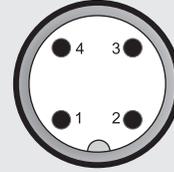
Cable outlet



Lead

brown +U_B
white 0 V
green Signal

M12x1, 4 pole



Pin	Mod. 000	Mod. 003	Mod. 004
1	+U _B	+U _B	n.c.
2	n.c.	Signal	+U _B
3	0 V	0 V	0 V
4	Signal	n.c.	Signal

5

Model code:

HLT 1 1 0 0 - R2 - XXX - XXX - XXXX - 000

Design / geometry type

1 = rod

Model

R2 = rod for cylinder full integration

Electrical connection

Cable output

K01 = jacketed cable, length 1 m
K02 = jacketed cable, length 2 m
K05 = jacketed cable, length 5 m
K10 = jacketed cable, length 10 m

Separate male flange connector M12x1, 4 pole

L06 = 60 mm lead length
L18 = 180 mm lead length
L24 = 240 mm lead length

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor
C02 = analogue 20 .. 4 mA, 3-conductor
B01 = analogue 0 .. 10 V
B02 = analogue 10 .. 0 V
G01 = analogue 0.25 .. 4.75 V
G02 = analogue 4.75 .. 0.25 V
G03 = analogue 0.5 .. 9.5 V
G04 = analogue 0.5 .. 4.5 V

Measuring range in mm (50 .. 2500 mm)

Example
0150 = 150 mm

Modification

000 = standard
003 = modified pin assignment
004 = modified pin assignment

Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.: 6119372
ZBL MR22	position magnet	part no.: 6084453
ZBL MR33	position magnet	part no.: 6084207

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 1100-R2

Magnetostrictive

For full integration

Resolution min. 0.1 mm



CANopen

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant stainless steel housing For full integration in hydraulic cylinders.

In the CANopen version, the measured value is digitized and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The main fields of application are in mobile hydraulics.

Technical data:

Input data	
Measuring ranges	50 .. 2500 mm
Model	Rod Ø 10 mm for cylinder full integration ¹⁾ Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Seal	O-ring: NBR Backup ring: PTFE
Output data	
Output signal	CANopen
Resolution	0.1 mm
Non-linearity	≤ ± 0.02 % FS
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.1 mm
Temperature coefficient	≤ ± 0.003 % FS / °C
Sampling rate	2 ms
Environmental conditions	
Operating temperature range	-40 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-40 .. +120 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 10 .. 500 Hz at 5 kHz	≤ 20 g ≤ 15 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529	IP 67 (cable outlet) IP 6K9K ²⁾ (separate male flange connector M12x1)
Installation position	No restrictions
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s .. 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO	Measured value as 32 bit and float
- Transfer	synchronous, asynchronous, cyclical
Node ID/baud rate	Adjustable via LSS
Other data	
Supply voltage	9 .. 36 V DC
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 100 mA
Weight	Depending on length: 100 mm (with 1 m cable): ~310 g 2500 mm (with 1 m cable): ~1030 g

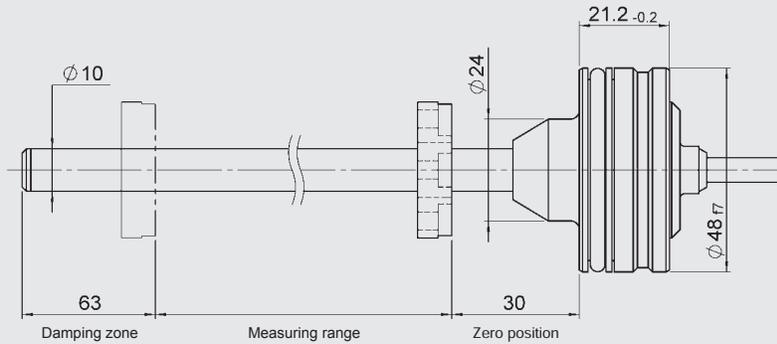
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other variants available on request.

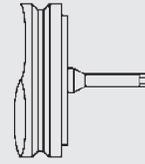
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

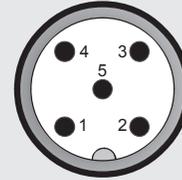
Cable outlet



Lead

brown	+U _B
white	0 V
green	CAN_L
yellow	CAN_H

M12x1, 5 pole



Pin	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	0 V	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

5

Model code:

HLT 1 1 0 0 - R2 - XXX - F11 - XXXX - 000

Design / geometry type

1 = rod

Model

R2 = rod for cylinder full integration

Electrical connection

Cable output

K01 = jacketed cable, length 1 m
 K02 = jacketed cable, length 2 m
 K05 = jacketed cable, length 5 m
 K10 = jacketed cable, length 10 m

Separate male flange connector M12x1, 5 pole

L06 = 60 mm lead length
 L18 = 180 mm lead length
 L24 = 240 mm lead length

Output signal

F11 = CANopen

Measuring range in mm (50 .. 2500 mm)

Example
 0150 = 150 mm

Modification

000 = standard

Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.: 6119372
ZBL MR22	position magnet	part no.: 6084453
ZBL MR33	position magnet	part no.: 6084207

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

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Linear Position Transmitter HLT 2100-R1

Magnetostrictive

For partial integration

Resolution 5 µm

Analogue

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

The different output signals (analogue current / voltage) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as connection to standard evaluation systems (e.g. to PLC controls).

External set inputs for the analogue start point and end point offer an additional possibility of a customised adjustment.

HLT 2100 is primarily used in stationary applications as partially integrated solutions in hydraulic cylinders.

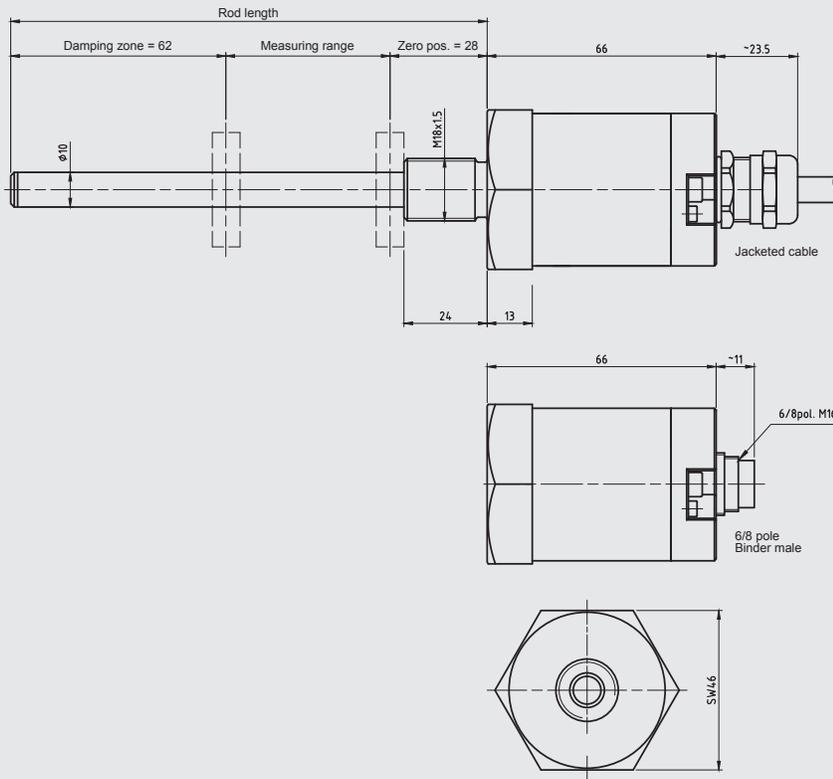
Technical data:

Input data	
Measuring ranges	50 .. 4000 mm
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 750 bar
Tightening torque, recommended	≤ 50 Nm
Material	Rod: Stainless steel 1.4571 Housing: Aluminium
Output data	
Output signal, permitted load resistance	Current: 4 .. 20 mA or 20 .. 4 mA, Load resist.: 200 .. 500 Ω Voltage: 0 .. 10 V or 10 .. 0 V, Load resist.: min. 2 kΩ
Resolution	16 bit; min. 0.005 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.004 % FS / °C
Sampling rate	Depending on length: ≤ 1 m: 0.5 ms ≤ 2 m: 1.0 ms ≤ 4 m: 2.0 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 65
Installation position	No restrictions
Other data	
Supply voltage	24 V DC ± 10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	≤ 100 mA
Weight	Depending on length: 50 mm: 500 g 4000 mm: 1400 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.
FS (Full Scale) = relative to complete measuring range

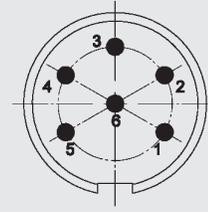
¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

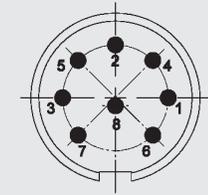
Male M16, 6 pole



Pin

1	Signal
2	0 V (analogue output)
3	Start point
4	End point
5	0 V
6	+U _B

Male M16, 8 pole



Pin

1	n.c.
2	0 V (analogue output)
3	Start point
4	End point
5	Signal
6	0 V
7	+U _B
8	n.c.

Cable outlet

Lead

brown	0 V (analogue output)
green	Start point
yellow	End point
grey	Signal
pink	0 V
blue	+U _B

Model code:

HLT 2 1 0 0 - R1 - XXX - XXX - XXXX - 000

Design / geometry type

1 = rod

Model

R1 = rod with M18x1.5 screw-in flange

Electrical connection

K01 = jacketed cable, length 1 m

M06 = male M16, 6 pole

M08 = male M16, 8 pole

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor

C02 = analogue 20 .. 4 mA, 3-conductor

B01 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.: 6119372
ZBL MR22	position magnet	part no.: 6084453
ZBL MR33	position magnet	part no.: 6084207
ZBL MV63	position magnet	part no.: 6084454
ZBL MU38-20	position magnet	part no.: 6084455
Intermediate ring	AD17.4xID13.5x5	part no.: 3903233
Intermediate ring	AD33xID13.5x5	part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

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Linear Position Transmitter HLT 2100-R1

Magnetostrictive

For partial integration

Resolution 5 µm



CANopen

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

HLT 2100 is primarily used in stationary applications as partially integrated solutions in hydraulic cylinders.

Technical data:

Input data	
Measuring ranges	50 .. 4000 mm
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 750 bar
Tightening torque, recommended	≤ 50 Nm
Material	Rod: Stainless steel 1.4571 Housing: Aluminium
Output data	
Output signal	CANopen
Resolution	16 bit; 0.005 mm ¹⁾
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1 m: 1.0 ms ≤ 2 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms
Environmental conditions	
Operating temperature range	0 .. +70°C
Storage temperature range	-30 .. +85°C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ²⁾	IP 65
Installation position	No restrictions
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s .. 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO	Measured value as 32 bit and float
- Transfer	synchronous, asynchronous, cyclical
Node ID/baud rate	Adjustable via LSS
Other data	
Supply voltage	24 V DC ± 10 %
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	≤ 150 mA
Weight	Depending on length: 50 mm: 500 g 4000 mm: 1500 g

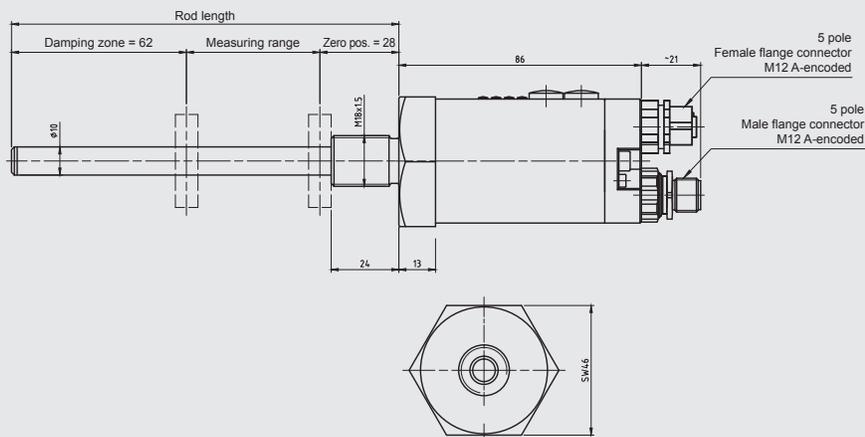
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other models on request

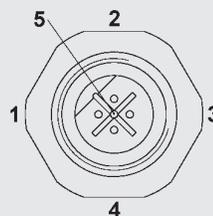
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



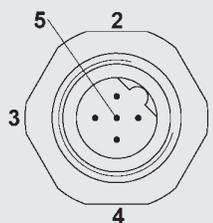
Pin connections:

Female M12x1, 5 pole, A-encoded



Pin	CANopen_OUT	
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Male M12x1, 5 pole, A-encoded



Pin	CANopen_IN	
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

5

Model code:

HLT 2 1 0 0 - R1 - C61 - F11 - XXXX - 000

Design / geometry type

1 = rod

Model

R1 = rod with M18x1.5 screw-in flange

Electrical connection

C61 = female M12x1, 5 pole + male M12x1, 5 pole

Output signal

F11 = CANopen

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.: 6119372
ZBL MR22	position magnet	part no.: 6084453
ZBL MR33	position magnet	part no.: 6084207
ZBL MV63	position magnet	part no.: 6084454
ZBL MU38-20	position magnet	part no.: 6084455
Intermediate ring	AD17.4xID13.5x5	part no.: 3903233
Intermediate ring	AD33xID13.5x5	part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

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Subject to technical modifications.

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Linear Position Transmitter HLT 2100-R1

Magnetostrictive

For partial integration

Resolution 1 µm



Profibus

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

In the Profibus version, the measured value is digitised and made available to the field bus system via the Profibus protocol.

HLT 2100 is primarily used in stationary applications as partially integrated solutions in hydraulic cylinders.

Technical data:

Input data	
Measuring ranges	50 .. 4000 mm
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 750 bar
Tightening torque, recommended	≤ 50 Nm
Material	Rod: Stainless steel 1.4571 Housing: Aluminium
Output data	
Output signal	Profibus
Resolution	0.001 mm ¹⁾
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1 m: 1.0 ms ≤ 1.5 m: 1.5 ms ≤ 2 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ²⁾	IP 65
Installation position	No restrictions
Protocol data for Profibus	
Profibus DP V0	IEC 61158, IEC 61784
PNO encoder profile	Class 1 and 2
Transmission rate parameter	9.6 .. 12000 kbit/s
Other data	
Supply voltage	24 V DC ± 10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	≤ 150 mA
Weight	Depending on length: 50 mm: 600 g 4000 mm: 1500 g

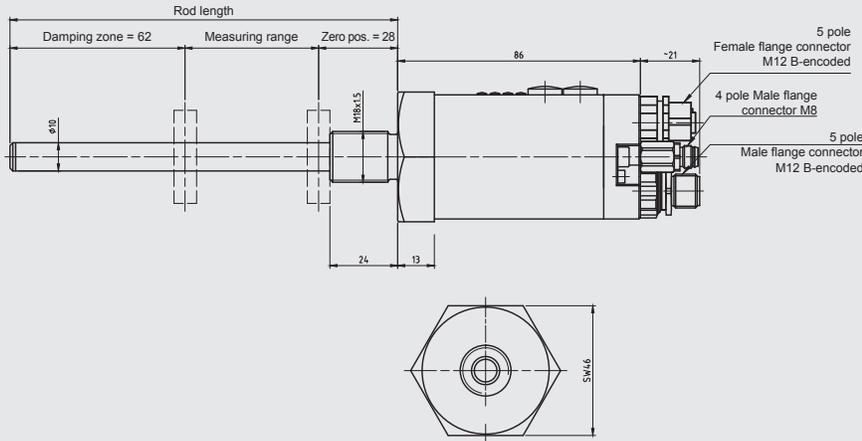
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other models on request

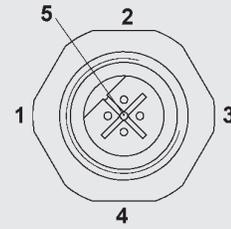
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



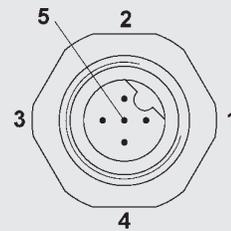
Pin connections:

Female M12x1, 5 pole, B-encoded



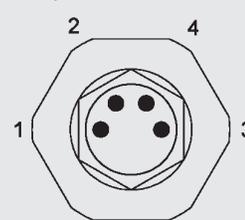
Pin	Profibus_OUT
1	VP, +5 V DC
2	Profibus, Data A
3	0 V
4	Profibus, Data B
5	n.c.
screw connection	Shield/housing

Male M12x1, 5 pole, B-encoded



Pin	Profibus_IN
1	n.c.
2	Profibus, Data A
3	n.c.
4	Profibus, Data B
5	n.c.
screw connection	Shield/housing

Male M8x1, 4 pole



Pin	Profibus_IN
1	+U _B
2	n.c.
3	0 V
4	n.c.

5

Model code:

HLT 2 1 0 0 - R1 - P61 - F41 - XXXX - 000

Design / geometry type

1 = rod

Model

R1 = rod with M18x1.5 screw-in flange

Electrical connection

P61 = female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole

Output signal

F41 = Profibus

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.: 6119372
ZBL MR22	position magnet	part no.: 6084453
ZBL MR33	position magnet	part no.: 6084207
ZBL MV63	position magnet	part no.: 6084454
ZBL MU38-20	position magnet	part no.: 6084455
Intermediate ring	AD17.4xD13.5x5	part no.: 3903233
Intermediate ring	AD33xD13.5x5	part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2100-R1

Magnetostrictive

For partial integration

Resolution 1 µm



Synchronous serial interface

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

In the version with synchronous serial interface, the measured value is made available via synchronous and symmetrical clock and data signals.

HLT 2100 is primarily used in stationary applications as partially integrated solutions in hydraulic cylinders.

Technical data:

Input data	
Measuring ranges	50 .. 4000 mm
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 750 bar
Tightening torque, recommended	≤ 50 Nm
Material	Rod: Stainless steel 1.4571 Housing: Aluminium
Output data	
Output signal	SSI
Resolution	0.001 mm ¹⁾
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 0.5 ms ≤ 2.0 m: 1.0 ms ≤ 4.0 m: 2.0 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ²⁾	IP 65
Installation position	No restrictions
Relevant data for SSI	
SSI clock input	Optocoupler
SSI data output	RS-422, 2-wire
SSI clock frequency	95 .. 1000 kHz
SSI monotime, typical	20 µs
Other data	
Supply voltage	24 V DC ± 10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	≤ 100 mA
Weight	Depending on length: 50 mm: 500 g 4000 mm: 1400 g

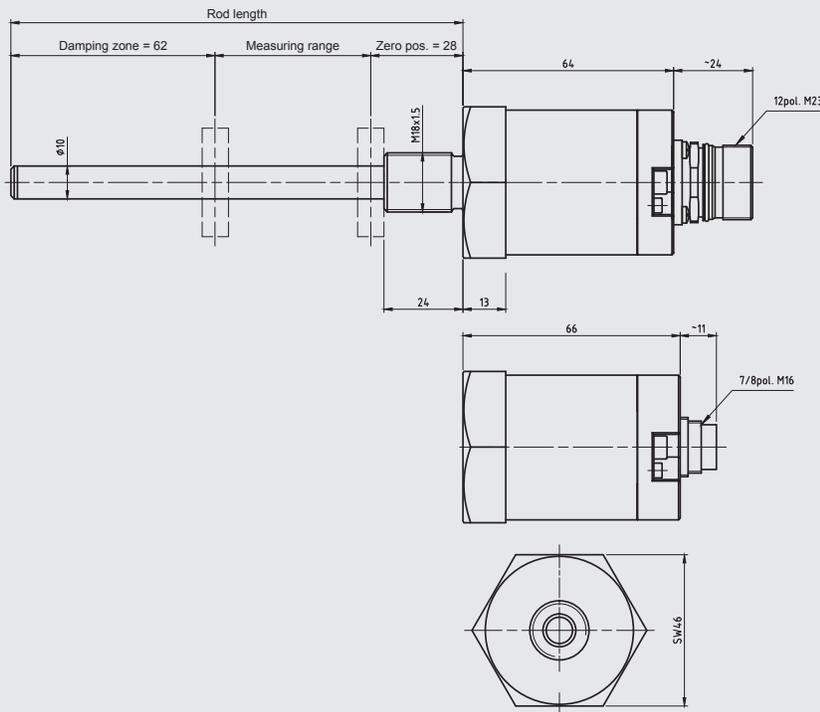
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other models on request

²⁾ With mounted mating connector in corresponding protection class

Dimensions:



Model code:

HLT 2 1 0 0 - R1 - XXX - S16 - XXXX - XXX - XXX - 000

Design / geometry type

1 = rod

Model

R1 = rod with
M18x1.5 screw-in flange

Electrical connection

S00 = CONTACT male, 12 pole
M07 = male M16, 7 pole
M08 = male M16, 8 pole

Output signal

S16 = SSI

Measuring range in mm (50 .. 4000 mm)

Example
0150 = 150 mm

Code

B24 = binary code 24 bit
B25 = binary code 25 bit
G24 = Gray code 24 bit
G25 = Gray code 25 bit

System resolution

001 = 1 µm
002 = 2 µm
005 = 5 µm
010 = 10 µm
100 = 100 µm

Modification

000 = standard

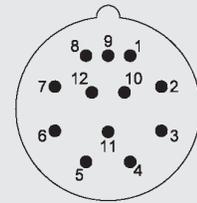
Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.:	6119372
ZBL MR22	position magnet	part no.:	6084453
ZBL MR33	position magnet	part no.:	6084207
ZBL MV63	position magnet	part no.:	6084454
ZBL MU38-20	position magnet	part no.:	6084455
Intermediate ring	AD17.4xID13.5x5	part no.:	3903233
Intermediate ring	AD33xID13.5x5	part no.:	3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

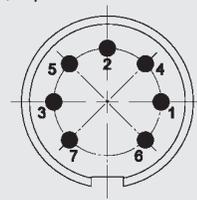
CONTACT male, 12 pole



Pin

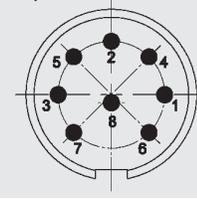
1	SSI_Clock- IN
2	SSI_Clock+ IN
3	SSI_DATA+ OUT
4	SSI_DATA- OUT
5	RS 485 + IN/OUT
6	RS 485 - IN/OUT
7	n.c.
8	Direction IN
9	Preset1 IN
10	n.c.
11	+U _b IN
12	0 V IN

Male M16x1, 7 pole



Pin	Signal	Description
1	SSI_DATA- OUT	Data output -
2	SSI_DATA+ OUT	Data output +
3	SSI_Clock+ IN	Clock input +
4	SSI_Clock- IN	Clock input -
5	Supply Voltage IN	Supply voltage
6	Ground IN	Ground
7	not connected	

Male M16x1, 8 pole



Pin	Signal	Description
1	SSI_Clock+ IN	Clock input +
2	SSI_DATA+ OUT	Data output +
3	SSI_Clock- IN	Clock input -
4	Ser.Program+ _IN/OUT	Ser. programming interface RS485
5	SSI_DATA- OUT	Data output -
6	Ground IN	Ground
7	Supply Voltage IN	Supply voltage
8	Ser.Program- _IN/OUT	Ser. programming interface RS485

Note:

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Linear Position Transmitter HLT 2100-R1

Magnetostrictive

For partial integration

Resolution 1 µm



EtherCAT

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

In the EtherCAT version, the measured value is digitised and made available to the field bus system via the EtherCAT protocol.

HLT 2100 is primarily used in stationary applications as partially integrated solutions in hydraulic cylinders.

Technical data:

Input data	
Measuring ranges	50 .. 4000 mm
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 750 bar
Tightening torque, recommended	≤ 50 Nm
Material	Rod: Stainless steel 1.4571 Housing: Aluminium
Output data	
Output signal	EtherCAT
Resolution	0.001 mm ¹⁾
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ²⁾	IP 65
Installation position	No restrictions
Protocol data for EtherCAT	
EtherCAT	IEC 61158-1-6, IEC 61784-2
Physical Layer	Fast Ethernet, ISO/IEC 8802-3
Device profile	CoE, CiA DS-406
Transmission rate parameter	100 Mbit/s
Cycle time	100 .. 20000 µs
Other data	
Supply voltage	24 V DC ± 10 %
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	≤ 300 mA
Weight	Depending on length: 50 mm: 600 g 4000 mm: 1500 g

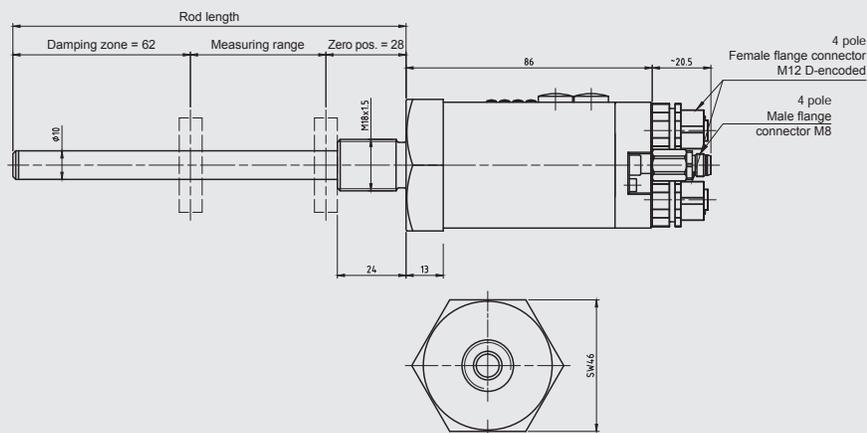
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other models on request

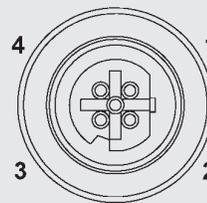
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



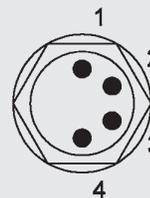
Pin connections:

Female M12x1, 4 pole, D-encoded



Pin	Port IN / Port OUT
1	Transmission data +
2	Receive data +
3	Transmission data -
4	Receive data -

Male M8x1, 4 pole



Pin	
1	+U _B
2	n.c.
3	0 V
4	n.c.

5

Model code:

HLT 2 1 0 0 - R1 - E51 - F51 - XXXX - 000

Design / geometry type

1 = rod

Model

R1 = rod with M18x1.5 screw-in flange

Electrical connection

E51 = 2 female M12x1, 4 pole + male M8, 4 pole

Output signal

F51 = EtherCAT

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.: 6119372
ZBL MR22	position magnet	part no.: 6084453
ZBL MR33	position magnet	part no.: 6084207
ZBL MV63	position magnet	part no.: 6084454
ZBL MU38-20	position magnet	part no.: 6084455
Intermediate ring	AD17.4xID13.5x5	part no.: 3903233
Intermediate ring	AD33xID13.5x5	part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

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Linear Position Transmitter HLT 2150-R1

Magnetostrictive

For partial integration

Resolution 0.1 mm

Analogue

Description:

The HLT 2150 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. A wide range of accessories such as magnets is available for individual adaptation to the particular application.

The HLT 2150 is suited for measuring ranges up to 2.5 m.

The different output signals (analogue current / voltage) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as connection to standard evaluation systems (e.g. to PLC controls).

The main fields of application for the HLT 2150 are, for example, general positioning tasks in mechanical engineering and in mobile and stationary hydraulics, as a partially integrated solution in hydraulic cylinders.

Technical data:

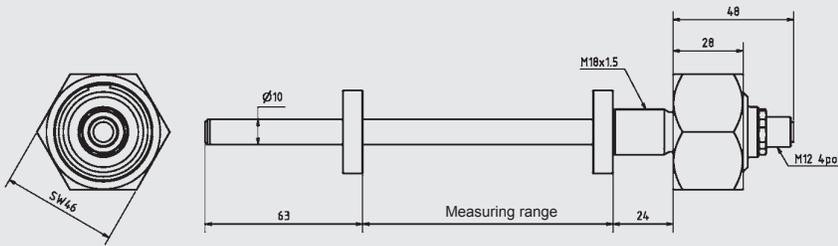
Input data	
Measuring ranges	50 .. 2500 mm
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar
Tightening torque, recommended	50 Nm
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Output data	
Output signal, permitted load resistance	Current: 4 .. 20 mA or 20 .. 4 mA Load resist.: 200 .. 500 Ω Voltage: 0 .. 10 V or 10 .. 0 V 0.25 .. 4.75 V or 4.75 .. 0.25 V 0.5 .. 9.5 V 0.5 .. 4.5 V Load resist.: min 2 kΩ
Resolution	12 bit, ≥ 0.1 mm
Non-linearity	≤ ± 0.05 % FS
Hysteresis	≤ ± 0.1 % FS
Repeatability	≤ ± 0.1 % FS
Temperature coefficient	≤ ± 0.01 % FS / °C
Sampling rate	2 ms
Environmental conditions	
Operating temperature range	-40 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-40 .. +120 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 10 .. 500 Hz at 5 kHz	≤ 20 g ≤ 15 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 67
Installation position	No restrictions
Other data	
Supply voltage	9 .. 30 V DC
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	< 100 mA
Weight	Depending on length: 50 mm: ~ 400 g 2500 mm: ~ 1100 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

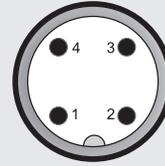
¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

M12x1, 4 pole



Pin

1	+U _B
2	n.c.
3	0 V
4	Signal

Model code:

HLT 2 1 5 0 - R1 - 006 - XXX - XXXX - 000

Design / geometry type

1 = rod

Model

R1 = rod with M18x1.5 screw-in flange

Electrical connection

006 = male M12x1, 4 pole

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor

C02 = analogue 20 .. 4 mA, 3-conductor

B01 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

G01 = analogue 0.25 .. 4.75 V

G02 = analogue 4.75 .. 0.25 V

G03 = analogue 0.5 .. 9.5 V

G04 = analogue 0.5 .. 4.5 V

Measuring range in mm (50 .. 2500 mm)

Example

0150 = 150 mm

Modification

000 = standard

Notes:

The position magnet must be ordered separately.

Scope of delivery:

- HLT 2150
- Operating manual

Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.: 6119372
ZBL MR22	position magnet	part no.: 6084453
ZBL MR33	position magnet	part no.: 6084207
ZBL MV63	position magnet	part no.: 6084454
Intermediate ring	AD33xID13.5x5	part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2150-R1

Magnetostrictive

For partial integration

Resolution 0.1 mm



CANopen

Description:

The HLT 2150 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. A wide range of accessories such as magnets is available for individual adaptation to the particular application.

The HLT 2150 is suited for measuring ranges up to 2.5 m.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The main fields of application for the HLT 2150 are, for example, general positioning tasks in mechanical engineering and in mobile and stationary hydraulics, as a partially integrated solution in hydraulic cylinders.

Technical data:

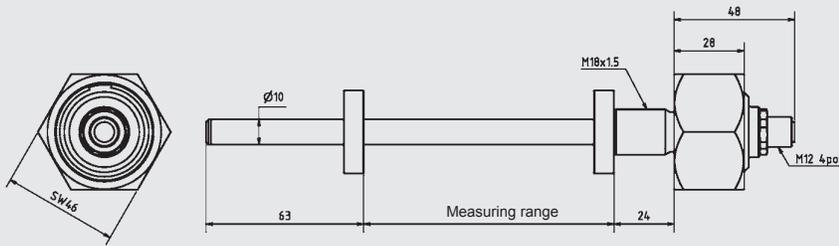
Input data	
Measuring ranges	50 .. 2500 mm
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar
Tightening torque, recommended	50 Nm
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Output data	
Output signal	CANopen
Resolution	0.1 mm
Non-linearity	≤ ± 0.02 % FS
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.1 mm
Temperature coefficient	≤ ± 0.003 % FS / °C
Sampling rate	2 ms
Environmental conditions	
Operating temperature range	-40 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-40 .. +120 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 10 .. 500 Hz at 5 kHz	≤ 20 g ≤ 15 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 67
Installation position	No restrictions
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s .. 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO	Measured value as 32 bit and float
- Transfer	synchronous, asynchronous, cyclical
Node ID/ baud rate	Adjustable via LSS
Other data	
Supply voltage	12 .. 30 V DC
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	< 100 mA
Weight	Depending on length: 50 mm: ~ 400 g 2500 mm: ~ 1100 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



Model code:

HLT 2 1 5 0 - R1 - 008 - F11 - XXXX - 000

Design / geometry type

1 = rod

Model

R1 = rod with M18x1.5 screw-in flange

Electrical connection

008 = male M12x1, 5 pole

Output signal

F11 = CANopen

Measuring range in mm (50 .. 2500 mm)

Example

0150 = 150 mm

Modification

000 = standard

Notes:

The position magnet must be ordered separately.

Scope of delivery:

- HLT 2150
- Operating manual

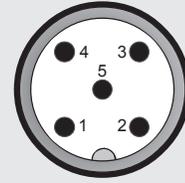
Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.: 6119372
ZBL MR22	position magnet	part no.: 6084453
ZBL MR33	position magnet	part no.: 6084207
ZBL MV63	position magnet	part no.: 6084454
Intermediate ring	AD33xID13.5x5	part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

M12x1, 5 pole



Pin	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	0 V	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

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Linear Position Transmitter HLT 2150-R1

Magnetostrictive

For partial integration

Resolution 0.1 mm



Synchronous serial interface

Description:

The HLT 2150 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. A wide range of accessories such as magnets is available for individual adaptation to the particular application.

The HLT 2150 is suited for measuring ranges up to 2.5 m.

In the version with synchronous serial interface, the measured value is made available via synchronous and symmetrical clock and data signals.

The main fields of application for the HLT 2150 are, for example, general positioning tasks in mechanical engineering and in mobile and stationary hydraulics, as a partially integrated solution in hydraulic cylinders.

Technical data:

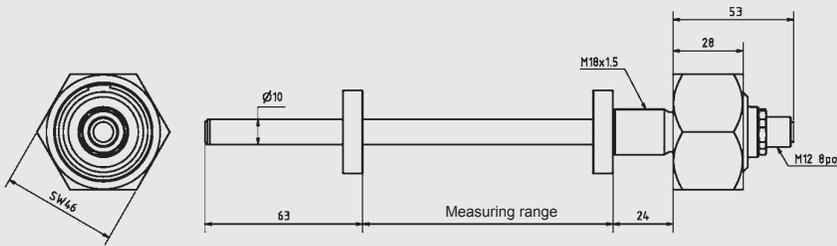
Input data	
Measuring ranges	50 .. 2500 mm
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar
Tightening torque, recommended	50 Nm
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Output data	
Output signal	SSI
Resolution	0.1 mm
Non-linearity	≤ ± 0.02 % FS
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.1 mm
Temperature coefficient	≤ ± 0.003 % FS / °C
Sampling rate	2 ms
Environmental conditions	
Operating temperature range	-40 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-40 .. +120 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 10 .. 500 Hz at 5 kHz	≤ 20 g ≤ 15 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 67
Installation position	No restrictions
Relevant data for SSI	
SSI clock input	Optocoupler
SSI data output	RS 422, 2-wire
SSI clock frequency	95 .. 1000 kHz
SSI monotime, typical	20 µs
Other data	
Supply voltage	12 .. 30 V DC
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	< 100 mA
Weight	Depending on length: 50 mm: ~ 400 g 2500 mm: ~ 1100 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



Model code:

HLT 2 1 5 0 - R1 - 00P - S16 - XXXX - XXX - XXX - 000

Design / geometry type

1 = rod

Model

R1 = rod with
M18x1.5 screw-in flange

Electrical connection

00P = male M12x1, 8 pole

Output signal

S16 = SSI

Measuring range in mm (50 .. 2500 mm)

Example

0150 = 150 mm

Code

B24 = binary code 24 bit
B25 = binary code 25 bit
G24 = Gray code 24 bit
G25 = Gray code 25 bit

System resolution

100 = 100 µm
200 = 200 µm
300 = 300 µm

Modification

000 = standard

Notes:

The position magnet must be ordered separately.

Scope of delivery:

- HLT 2150
- Operating manual

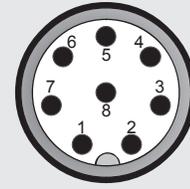
Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.: 6119372
ZBL MR22	position magnet	part no.: 6084453
ZBL MR33	position magnet	part no.: 6084207
ZBL MV63	position magnet	part no.: 6084454
Intermediate ring	AD33xID13.5x5	part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

M12x1, 8 pole



Pin	Signal	Description
1	Ground IN	Ground
2	Supply Voltage IN	Supply voltage
3	SSI_Clock- _IN	Clock input -
4	SSI_Clock+ _IN	Clock input +
5	SSI_DATA- _OUT	Data output -
6	SSI_DATA+ _OUT	Data output +
7	not connected	
8	not connected	

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2102 / HLT 2103

Magnetostrictive

For partial integration

Resolution 0.04 mm

Double or triple redundancy
Analogue

Description:

The linear position transmitters with a multi-redundant measuring system HLT 2102 (double redundancy) and HLT 2103 (triple redundancy) were particularly designed for applications where access to the built-in measuring systems is extremely difficult, which increases the requirements for the availability and the safety of the system.

The measuring systems HLT 2102 and HLT 2103 are designed with 2 or 3 independent sensor elements which enables separate utilisation of each element or use in safety circuits, for example as a system with double or triple redundancy.

The linear position sensors are available for measuring ranges up to 2 m. The measured values are given out via an analogue output signal. External set inputs for the analogue start point and end point offer an additional possibility of a customised adjustment.

The main fields of application for the HLT 2102 and HLT 2103 are, for example, general positioning tasks in stationary hydraulics, as a partially integrated solution in hydraulic cylinders.

Technical data:

Input data	
Measuring ranges ¹⁾	50 .. 2000 mm
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 600 bar Peak pressure acc. to DIN EN ISO 19879: 750 bar
Tightening torque, recommended	50 Nm
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Output data	
Output signal, permitted load resistance	4 .. 20 mA or 0 .. 20 mA, load resist.: 200 .. 500 Ω
Resolution	16 bit; 0.04 mm
Non-linearity	± 0.10 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	± 0.02 mm (measuring range ≤ 1500 mm) ± 0.1 mm (measuring range > 1500 mm)
Repeatability	0.04 mm
Temperature coefficient	≤ ± 0.004 % FS / °C
Sampling rate	Depending on length: 1.5 ms (measuring range ≤ 500 mm) 3.0 ms (measuring range 500 .. 2000 mm) 4.5 ms (measuring range > 2000 mm)
Environmental conditions	
Operating temperature range	0 .. +70 °C, optionally -20 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 100 g
Protection class acc. to DIN EN 60529 ²⁾	IP 65
Installation position	No restrictions
Other data	
Supply voltage	24 V DC ± 10 %
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	≤ 100 mA per channel
Weight	Depending on length: 50 mm: ~ 800 g 2000 mm: ~1400 g

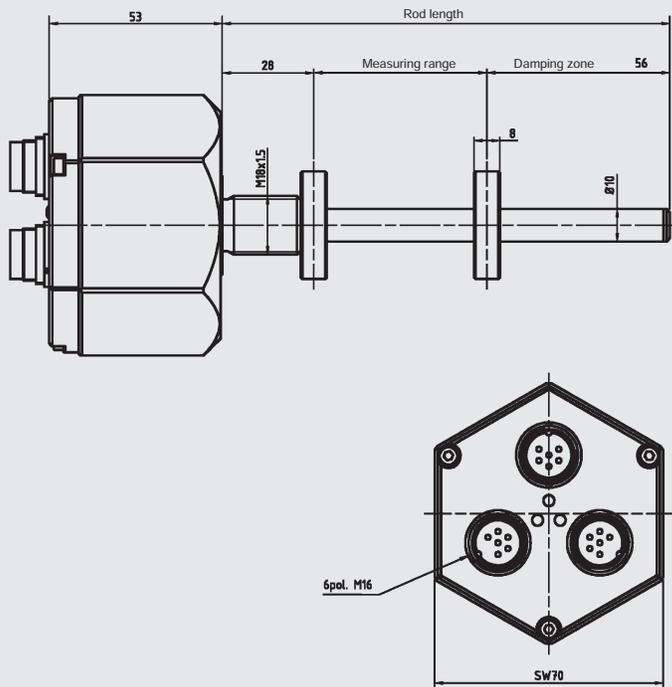
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other measuring lengths on request.

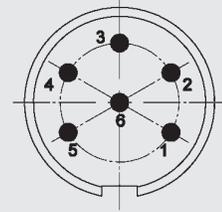
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

M16x1, 6 pole



Pin	(each connector)
1	Signal
2	0 V (analogue output)
3	Set input start point
4	Set input end point
5	+U _B
6	0 V

5

Model code:

HLT 2 1 0 X - R1 - M06 - XXX - XXXX - 000

Design / geometry type

1 = rod

Output variants

2 = double redundancy
3 = triple redundancy

Model

R1 = rod with M18x1.5 screw-in flange

Electrical connection

M06 = male M16, 6 pole

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor
E01 = analogue 0 .. 20 mA, 3-conductor

Measuring range in mm (50 .. 2000 mm in steps of 50 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories available: (not supplied with instrument)

ZBL MR33	position magnet	part no.: 6084207
ZBL MR22	position magnet	part no.: 6084453
ZBL MR17.4	position magnet	part no.: 6119372

More detailed information on accessories as well as on further accessories, such as intermediate rings and mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 1100-R2

Magnetostrictive

For full integration

Resolution min. 0.1 mm

Analogue
Increased Functional Safety

Functional Safety
PL d
SIL 2

Description:

This version of the linear position sensor HLT 1100 has been developed specifically for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to SIL 2 (IEC 61508) or PL d (ISO 13849).

The sensor works on the principle of magnetostriction. This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers this version in a pressure-resistant stainless steel housing For full integration in hydraulic cylinders.

Technical data:

Input data	
Measuring ranges	200 .. 2500 mm
Model	Rod Ø 10 mm for cylinder full integration ¹⁾ Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Seal	O-ring: NBR Backup ring: PTFE
Output data	
Output signal, permitted load resistance	4 .. 20 mA, load resist.: 200 .. 500 Ω
Resolution	12 bit, min. 0.1 mm
Non-linearity	≤ ± 0.05 % FS
Hysteresis	≤ ± 0.1 % FS
Repeatability	≤ ± 0.1 % FS
Temperature coefficient	≤ ± 0.01 % FS / °C
Sampling rate	≤ 30 ms (10 .. 90 %)
Environmental conditions	
Operating temperature range	-40 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-40 .. +120 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 5 .. 8.2 Hz at 8.2 .. 150 Hz	≤ 7.5 mm ≤ 2.0 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 20 g
Protection class acc. to DIN EN 60529	IP 67 (cable outlet) IP 6K9K ²⁾ (separate male flange connector M12x1)
Installation position	No restrictions
Safety-related data	
Performance level	
Based on	DIN EN ISO 13849-1:2008
PL	d
Architecture	Category 2
Safety Integrity Level	
Based on	DIN EN 61508:2002
SIL	2
Other data	
Supply voltage	9 .. 36 V DC
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	< 100 mA
Weight	Depending on length: 100 mm (with 1 m cable): ~310 g 2500 mm (with 1 m cable): ~1030 g

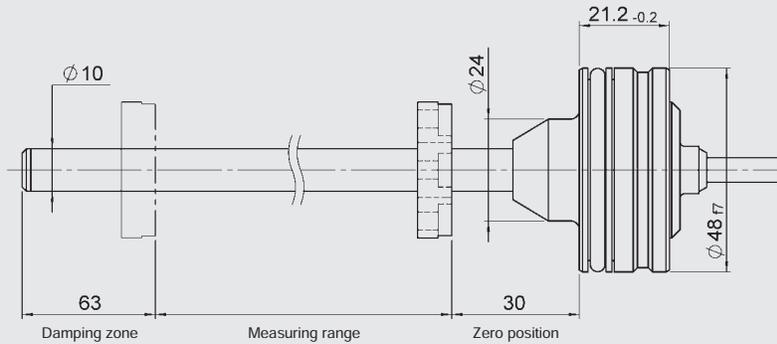
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other variants available on request.

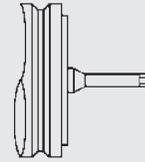
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

Cable outlet



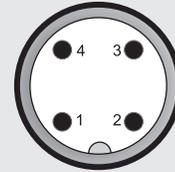
Lead

brown +U_B

white 0 V

green Signal

M12x1, 4 pole



Pin	Mod. 000	Mod. 003	Mod. 004
1	+U _B	+U _B	n.c.
2	n.c.	Signal	+U _B
3	0 V	0 V	0 V
4	Signal	n.c.	Signal

5

Model code:

HLT 1 1 0 0 - R2 - XXX - C01 - XXXX - S2PD - 000

Design / geometry type

1 = rod

Model

R2 = rod for cylinder full integration

Electrical connection

Cable output

K01 = jacketed cable, length 1 m
 K02 = jacketed cable, length 2 m
 K05 = jacketed cable, length 5 m
 K10 = jacketed cable, length 10 m

Separate male flange connector M12x1, 4 pole

L06 = 60 mm lead length
 L18 = 180 mm lead length
 L24 = 240 mm lead length

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor

Measuring range in mm (200 .. 2500 mm)

Example
 0250 = 250 mm

Functional safety

S2PD = SIL 2 acc. to IEC 61508
 and PLd – Cat 2 acc. to DIN EN 13849-1

Modification

000 = standard
 003 = modified pin assignment
 004 = modified pin assignment

Accessories available: (not supplied with instrument)

ZBL MR17.4 position magnet part no.: 6119372
 ZBL MR22 position magnet part no.: 6084453
 ZBL MR33 position magnet part no.: 6084207

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 1100-R2

Magnetostrictive

For full integration

Resolution min. 0.1 mm



CANopen Safety
Increased Functional Safety

Description:

This version of the linear position sensor HLT 1100 has been developed specifically for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to SIL 2 (IEC 61508) or PL d (ISO 13849).

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers this version in a pressure-resistant stainless steel housing For full integration in hydraulic cylinders.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

Technical data:

Input data	
Measuring ranges	200 .. 2500 mm
Model	Rod Ø 10 mm for cylinder full integration ¹⁾ Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Seal	O-ring: NBR Backup ring: PTFE
Output data	
Output signal	CANopen Safety
Resolution	0.1 mm
Non-linearity	≤ ± 0.02 % FS
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.1 mm
Temperature coefficient	≤ ± 0.003 % FS / °C
Sampling rate	≤ 10 ms (0 .. 100 %)
Environmental conditions	
Operating temperature range	-40 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-40 .. +120 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 5 .. 8.2 Hz	≤ 7.5 mm
at 8.2 .. 150 Hz	≤ 2.0 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529	IP 67 (cable outlet) IP 6K9K ²⁾ (separate male flange connector M12x1)
Installation position	No restrictions
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2 / DS 304 V1.0.1
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s .. 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO	Measured value as 32 bit and float
- Transfer	synchronous, asynchronous, cyclical
Node ID/baud rate	Adjustable via LSS
Safety-related data	
Performance level	
Based on	DIN EN ISO 13849-1:2008
PL	d
Architecture	Category 2
Safety Integrity Level	
Based on	DIN EN 61508:2002
SIL	2
Other data	
Supply voltage	9 .. 36 V DC
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	< 100 mA
Weight	Depending on length: 100 mm (with 1 m cable): ~310 g 2500 mm (with 1 m cable): ~1030 g

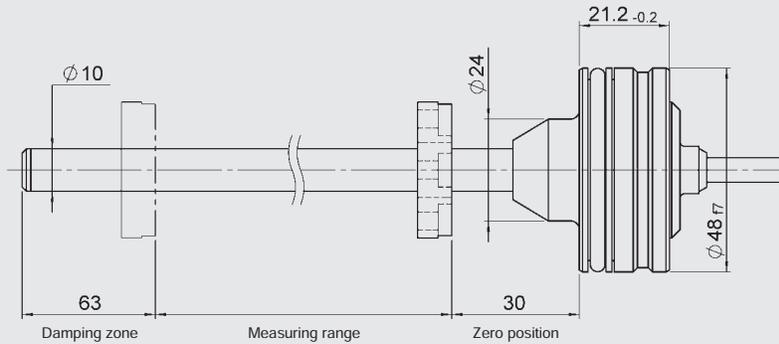
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other variants available on request.

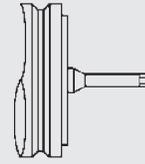
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

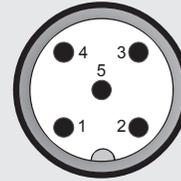
Cable outlet



Lead

brown	+U _B
white	0 V
green	CAN_L
yellow	CAN_H

M12x1, 5 pole



Pin	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	0 V	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

5

Model code:

HLT 1 1 0 0 - R2 - XXX - F13 - XXXX - S2PD - 000

Design / geometry type

1 = rod

Model

R2 = rod for cylinder full integration

Electrical connection

Cable output

K01 = jacketed cable, length 1 m
 K02 = jacketed cable, length 2 m
 K05 = jacketed cable, length 5 m
 K10 = jacketed cable, length 10 m

Separate male flange connector M12x1, 5 pole

L06 = 60 mm lead length
 L18 = 180 mm lead length
 L24 = 240 mm lead length

Output signal

F13 = CANopen Safety

Measuring range in mm (200 .. 2500 mm)

Example
 0250 = 250 mm

Functional safety

S2PD = SIL 2 acc. to IEC 61508
 and PLd – Cat 2 acc. to DIN EN 13849-1

Modification

000 = standard

Accessories available: (not supplied with instrument)

ZBL MR17.4	position magnet	part no.: 6119372
ZBL MR22	position magnet	part no.: 6084453
ZBL MR33	position magnet	part no.: 6084207

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 724 for series applications

Magnetic-inductive

For full integration

Resolution 0.1 %

Customised designs thanks to diverse electrical connections
Analogue

Description:

The sensor's measuring principle for determination of position or distance is based on magnetic-inductive measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant housing For full integration in hydraulic cylinders.

The different output signals (analogue) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as connection to standard evaluation systems (e.g. to PLC controls).

The main fields of application are in mobile hydraulics.

Technical data:

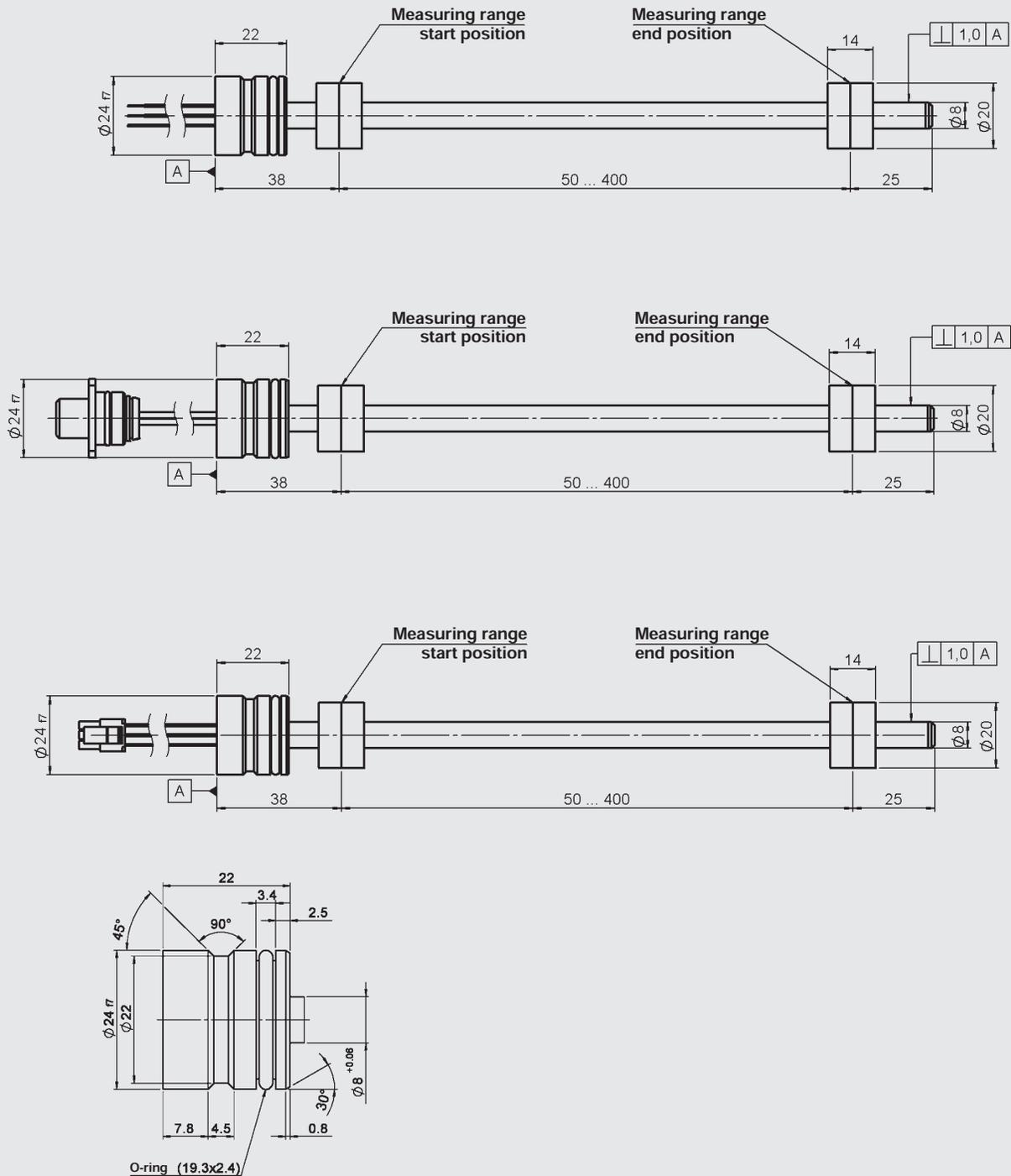
Input data	
Measuring ranges	50 .. 400 mm
Model	Rod Ø 8 mm, sensor head Ø 24 mm ¹⁾ for cylinder full integration Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4057
Seal	O-ring: PU P5008
Output data	
Output signal, permitted load resistance	Current: 4 .. 20 mA, 3-conductor 20 .. 4 mA, 3-conductor Load resist.: 200 .. 500 Ω Voltage: 0.25 .. 4.75 V, 4.75 .. 0.25 V 0.5 .. 4.5 V, 4.5 .. 0.5 V Load resist.: min. 2 kΩ
Resolution	0.1 % FS
Non-linearity	≤ ± 1 % FS
Hysteresis	≤ ± 0.25 % FS
Repeatability	≤ ± 0.125 % FS
Sampling rate	≤ 20 ms (10 .. 90 %)
Environmental conditions	
Operating temperature range	-40 .. +85 °C
Storage temperature range	-55 .. +105 °C
Fluid temperature range	-40 .. +120 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 10 .. 90 Hz at 91 .. 2000 Hz	≤ 1.5 mm ≤ 17 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529	IP 67 (single leads) IP 6K9K (separate male flange connector M12x1; separate male connector Molex in conjunction with ZBE 50 (accessory male flange connector DT04-3p Molex))
Installation position	No restrictions
Other data	
Electrical connection	Single leads 3 x 0.25 mm ² Separate male flange connector M12x1, 4 pole Separate male connector Molex, 3 pole
Supply voltage (V _{in}) nominal	9 .. 32 V DC
Residual ripple of supply voltage	≤ 5 %
Power consumption without output	≤ 320 mW
Weight	(dependent on measuring range and lead lengths) 50 mm: ~50 g 400 mm: ~130 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Further head diameters available on request.

Dimensions:



Order details:

The linear position transmitter HLT 724 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type.

For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2500-L2

Magnetostrictive

For external mount

Resolution 5 µm

Analogue

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slides or with a sliding magnet for positioning by the operator.

The different output signals (analogue current / voltage) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as standard evaluation systems (e.g. PLC controls)

External set inputs for the analogue start point and end point offer an additional possibility of a customised adjustment.

The HLT 2500-L2 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

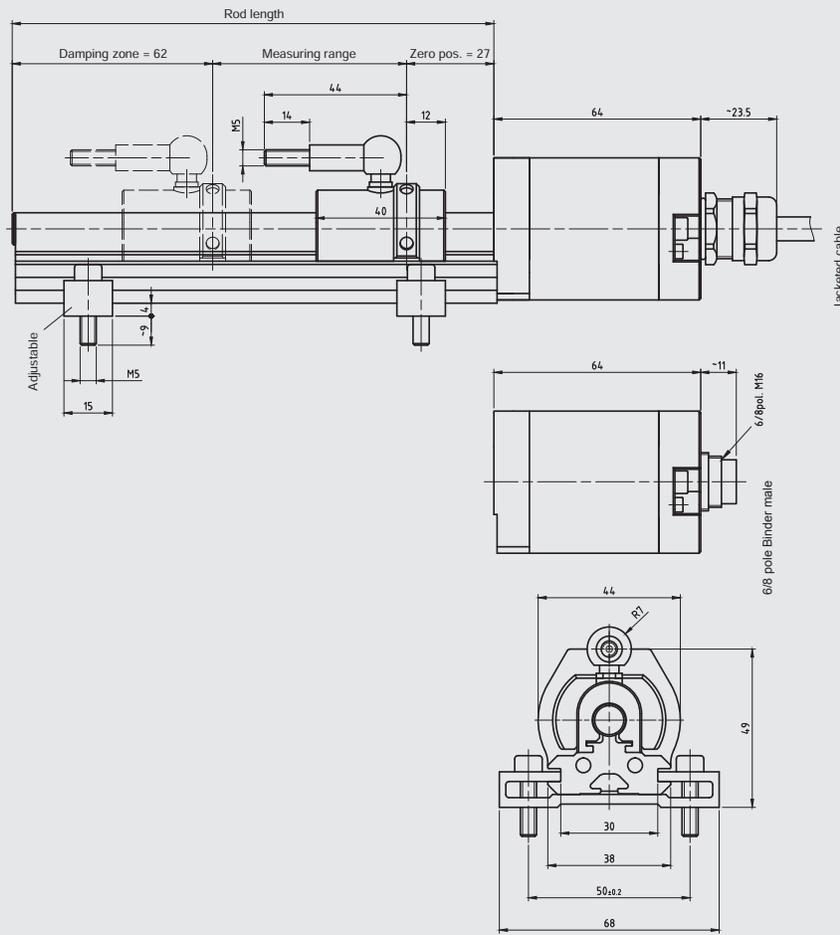
Input data	
Measuring ranges	50 .. 4000 mm
Model	Profile, with top magnet guidance joint
Housing	Measuring body: Aluminium
Output data	
Output signal, permitted load resistance	Current: 4 .. 20 mA or 20 .. 4 mA Load resist. 200 .. 500 Ω
	Voltage: 0 .. 10 V or 10 .. 0 V Load resist.: min. 2 kΩ
Resolution	16 bit; ≥ 0.005 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm)
	0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.004 % FS / °C
Sampling rate	Depending on length: ≤ 1 m: 0.5 ms ≤ 2 m: 1.0 ms > 2 m: 1.5 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C; optionally -20 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 65
Installation position	No restrictions
Other data	
Supply voltage	24 V DC ± 10 %
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	< 100 mA
Weight	Depending on length: 50 mm: 450 g 4000 mm: 4050 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



5

Model code:

HLT 2 5 0 0 - L2 - XXX - XXX - XXXX - 000

Design / geometry type

5 = profile

Model

L2 = profile, with top magnet guidance joint

Electrical connection

K01 = jacketed cable, length 1 m

M06 = male M16, 6 pole

M08 = male M16, 8 pole

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor

C02 = analogue 20 .. 4 mA, 3-conductor

B01 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories: (supplied with instrument)

ZBL MS35-39 magnet slide part no.: 6105654

Accessories: (not supplied with instrument)

ZBL MV63 position magnet part no.: 6084454

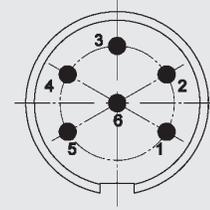
ZBL MU38-20 position magnet part no.: 6084455

ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

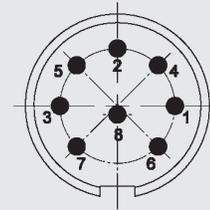
Male M16, 6 pole



Pin

1	Signal
2	0 V (analogue output)
3	Start point
4	End point
5	0 V
6	+U _B

Male M16, 8 pole



Pin

1	n.c.
2	0 V (analogue output)
3	Start point
4	End point
5	Signal
6	0 V
7	+U _B
8	n.c.

Cable outlet

Lead

brown 0 V (analogue output)

green Start point

yellow End point

grey Signal

pink 0 V

blue +U_B

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2500-L2

Magnetostrictive

For external mount

Resolution 1 µm



CANopen

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slide or with a sliding magnet for positioning by the operator.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The HLT 2500-L2 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

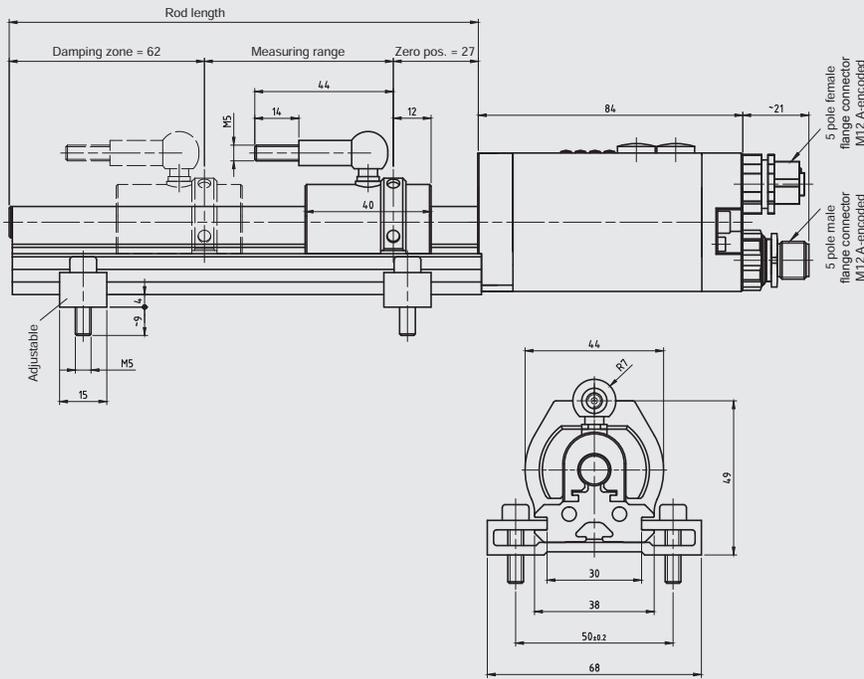
Input data	
Measuring ranges	50 .. 4000 mm
Model	Profile, with top magnet guidance joint
Housing	Measuring body: Aluminium
Output data	
Output signal	CANopen
Resolution	0.001 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 1.0 ms ≤ 1.5 m: 1.5 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C; optionally -20 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 65
Installation position	No restrictions
Protocol data for CANopen	
CANopen	EN 50325-4
Bus connection	ISO 11898-1, ISO 11898-2
CAN Specification 2.0 A	11-bit identifier
Device profile for encoder	CiA DS406
Layer Setting Services, LSS	CiA DS305
Layer Management Services, LMT	CiA DS205-1, DS205-2
Transmission rate parameter	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbit/s Default: 500 kbit/s
Adjustability	via DIP switch via LS service, LMT service
Other data	
Supply voltage	24 V DC -20 .. +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 150 mA
Weight	Depending on length: 50 mm: 450 g 4000 mm: 4150 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

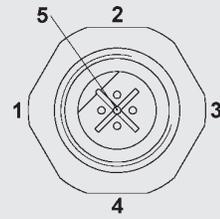
¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



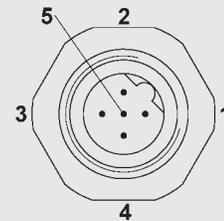
Pin connections:

Female M12x1, 5 pole, A-encoded



Pin	CANopen_OUT	
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Male M12x1, 5 pole, A-encoded



Pin	CANopen_IN	
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Model code:

HLT 2 5 0 0 - L2 - C61 - F11 - XXXX - 000

Design / geometry type

5 = profile

Model

L2 = profile, with top magnet guidance joint

Electrical connection

C61 = female M12x1, 5 pole + male M12x1, 5 pole

Output signal

F11 = CANopen

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories: (supplied with instrument)

ZBL MS35-39 magnet slide part no.: 6105654

Accessories: (not supplied with instrument)

ZBL MV63 position magnet part no.: 6084454

ZBL MU38-20 position magnet part no.: 6084455

ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2500-L2

Magnetostrictive

For external mount

Resolution 1 µm



Profibus

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slide or with a sliding magnet for positioning by the operator.

In the Profibus version, the measured value is digitised and made available to the field bus system via the Profibus protocol.

The HLT 2500-L2 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

Input data	
Measuring ranges	50 .. 4000 mm
Model	Profile, with top magnet guidance joint
Housing	Measuring body: Aluminium
Output data	
Output signal	Profibus
Resolution	0.001 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 1.0 ms ≤ 1.5 m: 1.5 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C; optionally -20 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 65
Installation position	No restrictions
Protocol data for Profibus	
Profibus DP V0	IEC 61158, IEC 61784
PNO encoder profile	Class 1 and 2
Transmission rate parameter	9.6 .. 12000 kbit/s
Other data	
Supply voltage	24 V DC -20 .. +10 %
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	< 150 mA
Weight	Depending on length: 50 mm: 450 g 4000 mm: 4150 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class



Linear Position Transmitter HLT 2500-L2

Magnetostrictive

For external mount

Resolution 1 µm



Synchronous serial interface

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slide or with a sliding magnet for positioning by the operator.

In the version with synchronous serial interface, the measured value is made available via synchronous and symmetrical clock and data signals.

The HLT 2500-L2 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

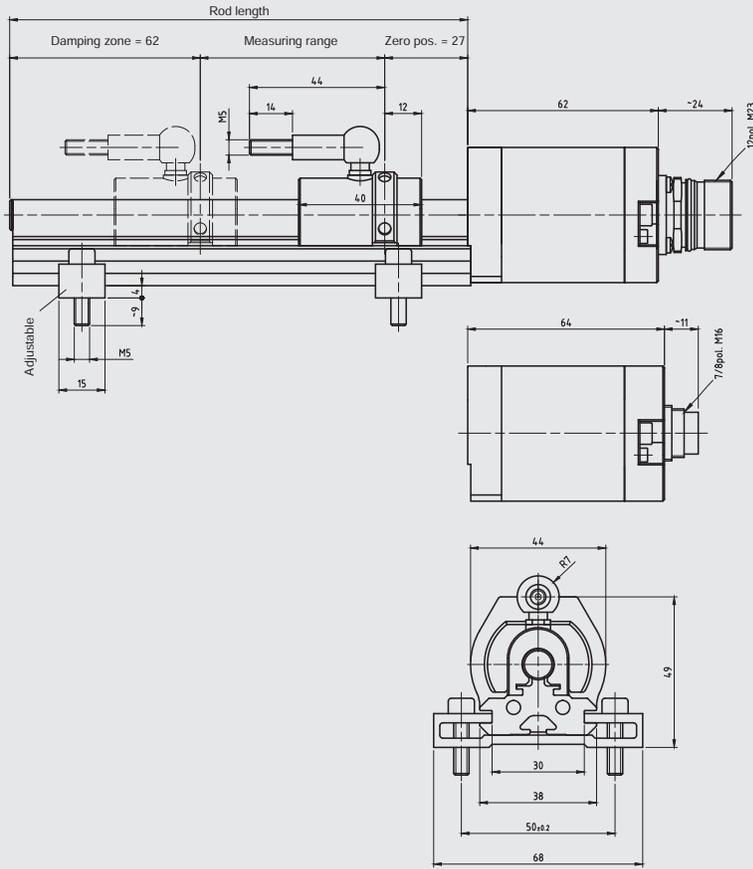
Input data	
Measuring ranges	50 .. 4000 mm
Model	Profile, with top magnet guidance joint
Housing	Measuring body: Aluminium
Output data	
Output signal	SSI
Resolution	0.001 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 0.50 ms ≤ 1.5 m: 0.75 ms ≤ 2.0 m: 1.00 ms > 2.0 m: 2.00 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C; optionally -20 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 65
Installation position	No restrictions
Relevant data for SSI	
SSI clock input	Optocoupler
SSI data output	RS-422, 2-wire
SSI clock frequency	95 .. 1000 kHz
SSI monotime, typical	20 µs
Other data	
Supply voltage	24 V DC -20 .. + 10 %
Residual ripple of supply voltage	≤ 250 mV _{pp}
Current consumption without output	< 250 mA
Weight	Depending on length: 50 mm: 450 g 4000 mm: 4150 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



Model code:

HLT 2 5 0 0 - L2 - XXX - S16 - XXXX - XXX - XXX - 000

Design / geometry type

5 = profile

Model

L2 = profile, with top magnet guidance joint

Electrical connection

S00 = CONTACT male, 12 pole

M07 = male M16, 7 pole

M08 = male M16, 8 pole

Output signal

S16 = SSI

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Code

B24 = binary code 24 bit

B25 = binary code 25 bit

G24 = Gray code 24 bit

G25 = Gray code 25 bit

System resolution

001 = 1 µm

002 = 2 µm

005 = 5 µm

010 = 10 µm

100 = 100 µm

Modification

000 = standard

Accessories: (supplied with instrument)

ZBL MS35-39 magnet slide part no.: 6105654

Accessories: (not supplied with instrument)

ZBL MV63 position magnet part no.: 6084454

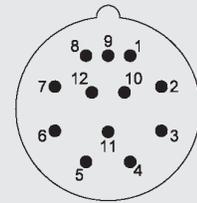
ZBL MU38-20 position magnet part no.: 6084455

ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

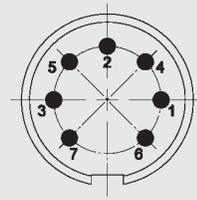
CONTACT male, 12 pole



Pin

1	SSI_Clock- IN
2	SSI_Clock+ IN
3	SSI_DATA+ OUT
4	SSI_DATA- OUT
5	RS 485 + IN/OUT
6	RS 485 - IN/OUT
7	n.c.
8	Direction IN
9	Preset1_IN
10	n.c.
11	+U _B _IN
12	0 V_IN

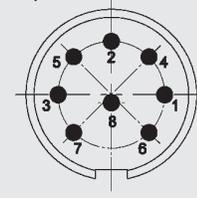
Male M16x1, 7 pole



Pin

1	SSI_DATA- OUT	Data output -
2	SSI_DATA+ OUT	Data output +
3	SSI_Clock+ IN	Clock input +
4	SSI_Clock- IN	Clock input -
5	Supply Voltage IN	Supply voltage
6	Ground IN	Ground
7	not connected	

Male M16x1, 8 pole



Pin

1	SSI_Clock+ IN	Clock input +
2	SSI_DATA+ OUT	Data output +
3	SSI_Clock- IN	Clock input -
4	Ser.Program+_IN/OUT	Ser. programming interface RS485
5	SSI_DATA- OUT	Data output -
6	Ground IN	Ground
7	Supply Voltage IN	Supply voltage
8	Ser.Program-_IN/OUT	Ser. programming interface RS485

Note:

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Linear Position Transmitter HLT 2500-L2

Magnetostrictive

For external mount

Resolution 1 µm



EtherCAT

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slide or with a sliding magnet for positioning by the operator.

In the EtherCAT version, the measured value is digitised and made available to the field bus system via the EtherCAT protocol.

The HLT 2500-L2 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

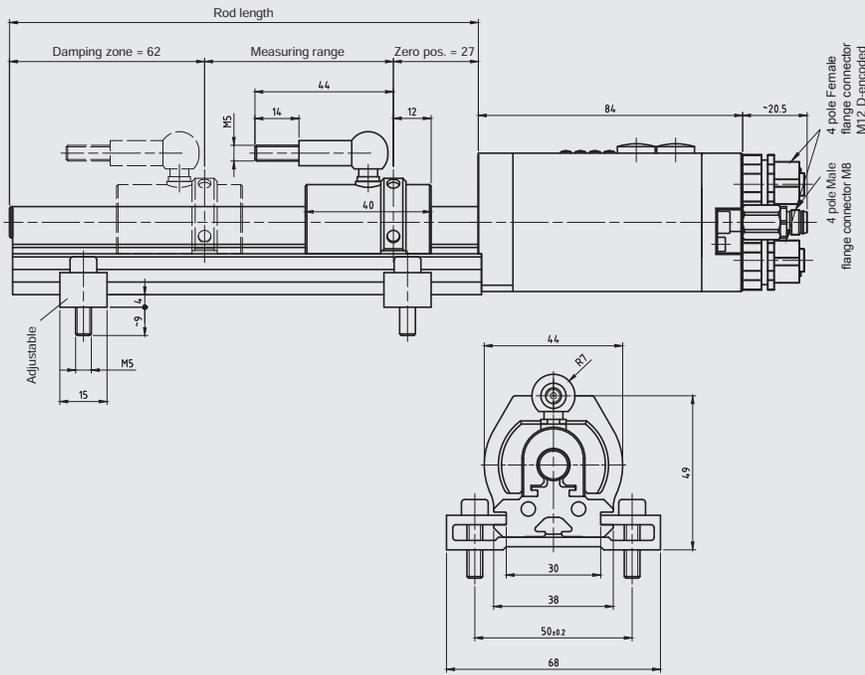
Input data	
Measuring ranges	50 .. 4000 mm
Model	Profile, with top magnet guidance joint
Housing	Measuring body: Aluminium
Output data	
Output signal	EtherCAT
Resolution	0.001 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C; optionally -20 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 65
Installation position	No restrictions
Protocol data for EtherCAT	
EtherCAT	IEC 61158-1-6, IEC 61784-2
Physical Layer	Fast Ethernet, ISO/IEC 8802-3
Device profile	CoE, CiA DS-406
Transmission rate parameter	100 Mbit/s
Cycle time	100 .. 20000 µs
Other data	
Supply voltage	24 V DC -20 .. +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 300 mA
Weight	Depending on length: 50 mm: 450 g 4000 mm: 4150 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

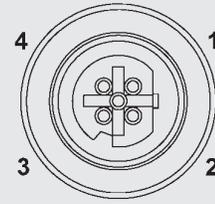
¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



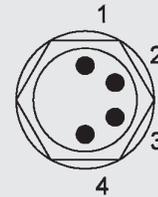
Pin connections:

Female M12x1, 4 pole, D-encoded



Pin	Port IN / Port OUT
1	Transmission data +
2	Receive data +
3	Transmission data -
4	Receive data -

Male M8x1, 4 pole



Pin	
1	+U _B
2	n.c.
3	0 V
4	n.c.

Model code:

HLT 2 5 0 0 - L2 - E51 - F51 - XXXX - 000

Design / geometry type

5 = profile

Model

L2 = profile, with top magnet guidance joint

Electrical connection

E51 = 2 female M12x1, 4 pole + male M8, 4 pole

Output signal

F51 = EtherCAT

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories: (supplied with instrument)

ZBL MS35-39 magnet slide part no.: 6105654

Accessories: (not supplied with instrument)

ZBL MV63 position magnet part no.: 6084454

ZBL MU38-20 position magnet part no.: 6084455

ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

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For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2550-L2

Magnetostrictive

For external mount

Resolution 0.05 mm

Description:

The HLT 2550 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. The measuring profile can be individually adapted to various mounting conditions by means of spacers.

The HLT 2550 is suited for measuring ranges up to 3 m.

The different output signals (analogue current / voltage) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as connection to standard evaluation systems (e.g. to PLC controls).

The main fields of application for the HLT 2550 are, for example, general positioning tasks in mechanical engineering and in stationary hydraulics, or as a wear-free alternative for existing measuring equipment such as potentiometers.

Analogue

Technical data:

Input data									
Measuring ranges ¹⁾	30 .. 3000 mm in steps of 50 mm								
Model	Profile, with top magnet guidance joint								
Material	Measuring body: Aluminium								
Output data									
Output signal, permitted load resistance	<table border="0"> <tr> <td>Current:</td> <td>4 .. 20 mA or 20 .. 4 mA</td> </tr> <tr> <td></td> <td>Load resist.: 200 .. 500 Ω</td> </tr> <tr> <td>Voltage:</td> <td>0 .. 10 V or 10 .. 0 V</td> </tr> <tr> <td></td> <td>Load resist.: min. 2 kΩ</td> </tr> </table>	Current:	4 .. 20 mA or 20 .. 4 mA		Load resist.: 200 .. 500 Ω	Voltage:	0 .. 10 V or 10 .. 0 V		Load resist.: min. 2 kΩ
Current:	4 .. 20 mA or 20 .. 4 mA								
	Load resist.: 200 .. 500 Ω								
Voltage:	0 .. 10 V or 10 .. 0 V								
	Load resist.: min. 2 kΩ								
Resolution	12 bit, ≥ 0.05 mm								
Non-linearity	≤ ± 0.01 % FS, ≥ 0.06 mm								
Hysteresis	≤ ± 0.1 mm								
Repeatability	≤ ± 0.005 % FS, ≥ 0.05 mm								
Temperature coefficient	≤ ± 0.01 % FS / °C typ.								
Sampling rate	Depending on length: 0.5 ms (measuring range ≤ 1200 mm) 1.0 ms (measuring range ≤ 2400 mm) 2.0 ms (measuring range ≤ 3000 mm)								
Environmental conditions									
Operating temperature range	-20 .. +75 °C, optionally -40 .. +75 °C								
Storage temperature range	-30 .. +85 °C								
CE mark	EN 61000-6-1 / 2 / 3 / 4								
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g								
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g								
Protection class acc. to DIN EN 60529 ²⁾	IP 67								
Installation position	No restrictions								
Other data									
Supply voltage	24 V DC ± 20 %								
Residual ripple of supply voltage	≤ 250 mVpp								
Current consumption without output	< 100 mA								
Weight	Depending on length: 30 mm: ~ 300 g 3000 mm: ~ 3900 g								

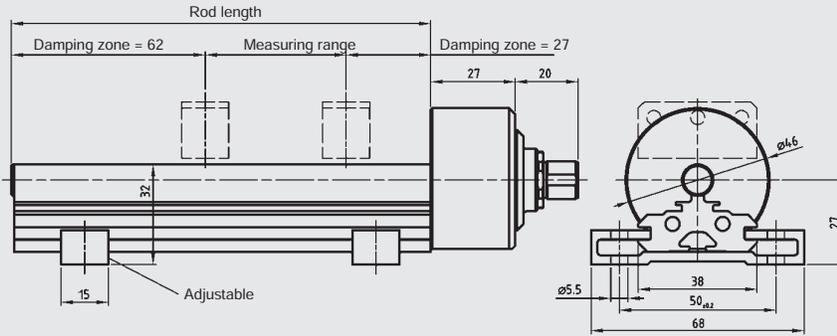
Note: Reverse polarity protection of the supply voltage, excess voltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other measuring ranges on request.

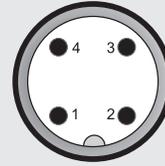
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

M12x1, 4 pole



Pin

1	+U _B
2	n.c.
3	0 V
4	Signal

5

Model code:

HLT 2 5 5 0 - L2 - 006 - XXX - XXXX - 000

Design / geometry type

5 = profile

Model

L2 = profile, with top magnet guidance joint

Electrical connection

006 = male M12x1, 4 pole

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor

C02 = analogue 20 .. 4 mA, 3-conductor

B01 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

Measuring range in mm (30 .. 3000 mm in steps of 50 mm)

Example

0130 = 130 mm

Modification

000 = standard

Notes:

The position magnet must be ordered separately.

Scope of delivery:

- HLT 2550
- Operating manual

Accessories: (not supplied with instrument)

ZBL MVS35-39	magnet slide	part no.: 6105654
ZBL MV63	position magnet	part no.: 6084454
ZBL MF38-18	position magnet	part no.: 6084456
ZBL MU38-20	position magnet	part no.: 6084455
Mounting kit		part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

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Linear Position Transmitter HLT 2550-L2

Magnetostrictive

For external mount

Resolution 0.05 mm



CANopen

Description:

The HLT 2550 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. The measuring profile can be individually adapted to various mounting conditions by means of spacers.

The HLT 2550 is suited for measuring ranges up to 3 m.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The main fields of application for the HLT 2550 are, for example, general positioning tasks in mechanical engineering and in stationary hydraulics, or as a wear-free alternative for existing measuring equipment such as potentiometers.

Technical data:

Input data	
Measuring ranges ¹⁾	30 .. 3000 mm in steps of 50 mm
Model	Profile, with top magnet guidance joint
Material	Measuring body: Aluminium
Output data	
Output signal	CANopen
Resolution	0.05 mm
Non-linearity	≤ ± 0.01 % FS, ≥ 0.06 mm
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.005 % FS, ≥ 0.05 mm
Temperature coefficient	≤ ± 0.01 % FS / °C typ.
Sampling rate	Depending on length: 0.5 ms (measuring range ≤ 1200 mm) 1.0 ms (measuring range ≤ 2400 mm) 2.0 ms (measuring range ≤ 3000 mm)
Environmental conditions	
Operating temperature range	-20 .. +75 °C, optionally -40 .. +75 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ²⁾	IP 67
Installation position	No restrictions
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s .. 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO	Measured value as 32 bit and float
- Transfer	synchronous, asynchronous, cyclical
Node ID/baud rate	Adjustable via LSS
Other data	
Supply voltage	12 .. 24 V DC ± 10 %
Residual ripple of supply voltage	≤ 100 mA
Current consumption without output	< 100 mA
Weight	Depending on length: 30 mm: ~ 300 g 3000 mm: ~ 3900 g

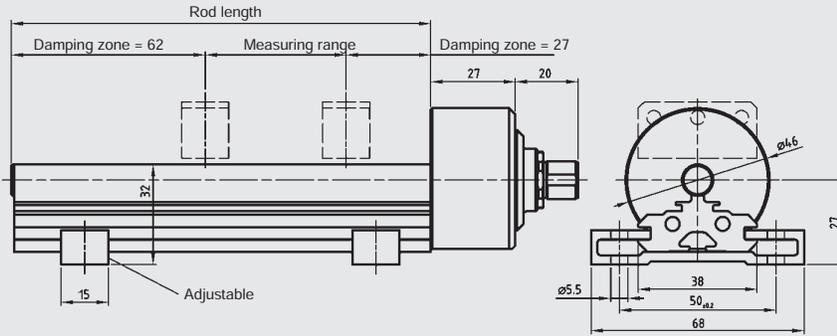
Note: Reverse polarity protection of the supply voltage, excess voltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other measuring ranges on request.

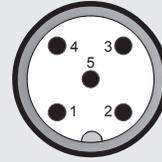
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

M12x1, 5 pole



Pin	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	0 V	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

5

Model code:

HLT 2 5 5 0 - L2 - 008 - F11 - XXXX - 000

Design / geometry type

5 = profile

Model

L2 = profile, with top magnet guidance joint

Electrical connection

008 = male M12x1, 5 pole

Output signal

F11 = CANopen

Measuring range in mm (30 .. 3000 mm in steps of 50 mm)

Example

0130 = 130 mm

Modification

000 = standard

Notes:

The position magnet must be ordered separately.

Scope of delivery:

- HLT 2550
- Operating manual

Accessories: (not supplied with instrument)

ZBL MVS35-39	magnet slide	part no.: 6105654
ZBL MV63	position magnet	part no.: 6084454
ZBL MF38-18	position magnet	part no.: 6084456
ZBL MU38-20	position magnet	part no.: 6084455
Mounting kit		part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2550-L2

Magnetostrictive

For external mount

Resolution 0.05 mm



Synchronous serial interface

Description:

The HLT 2550 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. The measuring profile can be individually adapted to various mounting conditions by means of spacers.

The HLT 2550 is suited for measuring ranges up to 3 m.

In the version with synchronous serial interface, the measured value is made available via synchronous and symmetrical clock and data signals.

The main fields of application for the HLT 2550 are, for example, general positioning tasks in mechanical engineering and in stationary hydraulics, or as a wear-free alternative for existing measuring equipment such as potentiometers.

Technical data:

Input data	
Measuring ranges ¹⁾	30 .. 3000 mm in steps of 50 mm
Model	Profile, with top magnet guidance joint
Material	Measuring body: Aluminium
Output data	
Output signal	SSI
Resolution	0.05 mm
Non-linearity	≤ ± 0.01 % FS, ≥ 0.06 mm
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.005 % FS, ≥ 0.05 mm
Temperature coefficient	≤ ± 0.01 % FS / °C typ.
Sampling rate	Depending on length: 0.5 ms (measuring range ≤ 1200 mm) 1.0 ms (measuring range ≤ 2400 mm) 2.0 ms (measuring range ≤ 3000 mm)
Environmental conditions	
Operating temperature range	-20 .. +75 °C, optionally -40 .. +75 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ²⁾	IP 67
Installation position	No restrictions
Relevant data for SSI	
SSI clock input	Optocoupler
SSI data output	RS-422, 2-wire
SSI clock frequency	95 .. 1000 kHz
SSI monotime, typical	20 µs
Other data	
Supply voltage	24 V DC ± 20 %
Residual ripple of supply voltage	≤ 100 mA
Current consumption without output	< 100 mA
Weight	Depending on length: 30 mm: ~ 300 g 3000 mm: ~ 3900 g

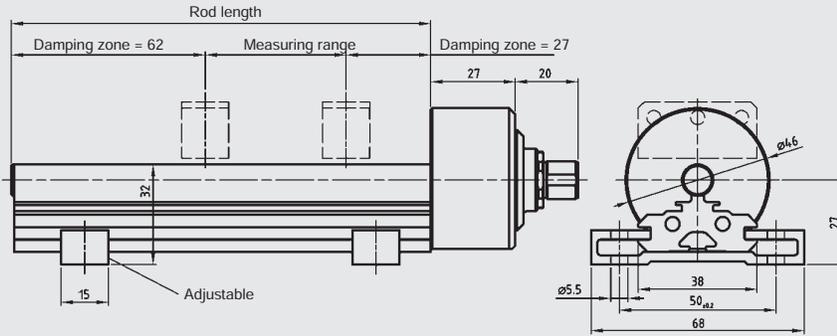
Note: Reverse polarity protection of the supply voltage, excess voltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other measuring ranges on request.

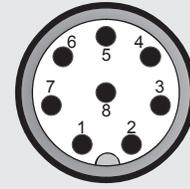
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

M12x1, 8 pole



Pin	Description
1	Clock input +
2	Clock input -
3	Data output +
4	Data output -
5	n.c.
6	n.c.
7	+ U _B
8	0 V

5

Model code:

HLT 2 5 5 0 - L2 - 00P - S16 - XXXX - XXX - XXX - 000

Design / geometry type

5 = profile

Model

L2 = profile, with top magnet guidance joint

Electrical connection

00P = male M12x1, 8 pole

Output signal

S16 = SSI

Measuring range in mm (30 .. 3000 mm in steps of 50 mm)

Example
0130 = 130 mm

Code

B24 = binary code 24 bit
B25 = binary code 25 bit
G24 = Gray code 24 bit
G25 = Gray code 25 bit

System resolution

050 = 50 µm
100 = 100 µm
150 = 150 µm
200 = 200 µm

Modification

000 = standard

Notes:

The position magnet must be ordered separately.

Scope of delivery:

- HLT 2550
- Operating manual

Accessories: (not supplied with instrument)

ZBL MVS35-39	magnet slide	part no.: 6105654
ZBL MV63	position magnet	part no.: 6084454
ZBL MF38-18	position magnet	part no.: 6084456
ZBL MU38-20	position magnet	part no.: 6084455
Mounting kit		part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

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Linear Position Transmitter HLT 2500-F1

Magnetostrictive

For external mount

Resolution 50 μ m

Analogue

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a flat profile housing version in aluminium.

The different output signals (analogue current / voltage) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as standard evaluation systems (e.g. PLC controls)

External set inputs for the analogue start point and end point offer an additional possibility of a customised adjustment.

The HLT 2500-F1 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

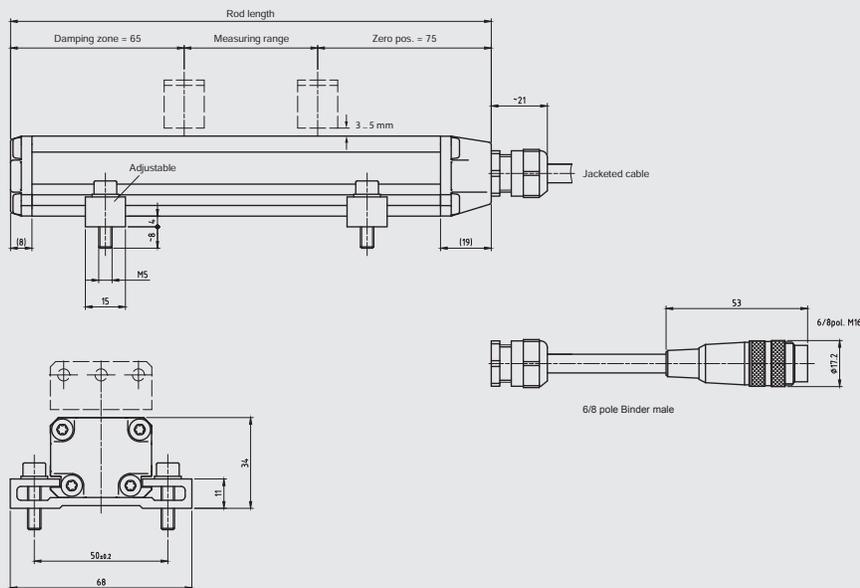
Input data	
Measuring ranges	50 .. 4000 mm
Model	Flat profile, without magnet guidance
Housing	Aluminium
Output data	
Output signal, permitted load resistance	Current: 4 .. 20 mA or 20 .. 4 mA Load resist. 200 .. 500 Ω
	Voltage: 0 .. 10 V or 10 .. 0 V Load resist.: min. 2 k Ω
Resolution	12 bit; \geq 0.05 mm
Non-linearity	\pm 0.15 mm (measuring range \leq 1500 mm) \pm 0.2 mm (measuring range > 1500 mm)
Hysteresis	0.1 mm
Repeatability	\leq 0.05 mm - \leq 0.5 mm (depends on length)
Temperature coefficient	$\leq \pm$ 0.004 % FS / $^{\circ}$ C
Sampling rate	Depending on length: \leq 1 m: 1.0 ms \leq 2 m: 2.0 ms \leq 3 m: 3.0 ms > 3 m: 3.5 ms
Environmental conditions	
Operating temperature range	0 .. +70 $^{\circ}$ C; optionally -20 .. +70 $^{\circ}$ C
Storage temperature range	-30 .. +85 $^{\circ}$ C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	\leq 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	\leq 100 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 65
Installation position	No restrictions
Other data	
Supply voltage	24 V DC \pm 10 %
Residual ripple of supply voltage	\leq 250 mV _{PP}
Current consumption without output	< 100 mA
Weight	Depending on length: 100 mm: 450 g 4000 mm: 3900 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



Model code:

HLT 2 5 0 0 - F1 - XXX - XXX - XXXX - 000

Design / geometry type

5 = profile

Model

F1 = flat profile, without magnet guidance

Electrical connection

K01 = jacketed cable, length 1 m

M06 = male M16, 6 pole

M08 = male M16, 8 pole

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor

C02 = analogue 20 .. 4 mA, 3-conductor

B01 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories: (not supplied with instrument)

ZBL MU38-18 position magnet

part no.: 6084456

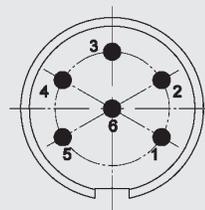
ZBL mounting kit

part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

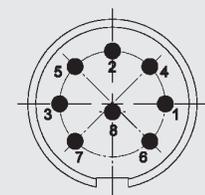
Male M16, 6 pole



Pin

1	Signal
2	0 V (analogue output)
3	Start point
4	End point
5	0 V
6	+U _B

Male M16, 8 pole



Pin

1	n.c.
2	0 V (analogue output)
3	Start point
4	End point
5	Signal
6	0 V
7	+U _B
8	n.c.

Cable outlet

Lead

brown	0 V (analogue output)
green	Start point
yellow	End point
grey	Signal
pink	0 V
blue	+U _B

Note:

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Linear Position Transmitter HLT 2500-F1

Magnetostrictive

For external mount

Resolution 1 µm



CANopen

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a flat profile housing version in aluminium.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The HLT 2500-F1 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

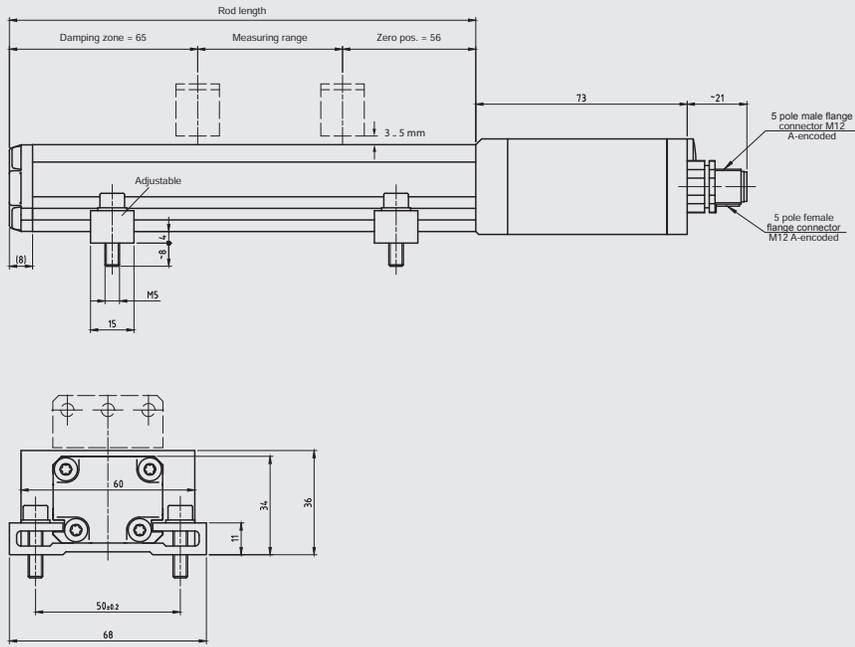
Input data	
Measuring ranges	50 .. 4000 mm
Model	Flat profile, without magnet guidance
Housing	Aluminium
Output data	
Output signal	CANopen
Resolution	0.001 mm
Non-linearity	± 0.15 mm (measuring range ≤ 1500 mm) ± 0.2 mm (measuring range > 1500 mm)
Hysteresis	≤ 0.1 mm
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C; optionally -20 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 65
Installation position	No restrictions
Protocol data for CANopen	
Bus connection	ISO 11898-1, ISO 11898-2
CAN Specification 2.0 A	11-bit identifier
Device profile for encoder	CiA DS406
Layer Setting Services, LSS	CiA DS305
Layer Management Services, LMT	CiA DS205-1, DS205-2
Baud rates	800, 1000 kbit/s
Transmission services - PDO - Transfer	Measured value as 32 bit and float synchronous, asynchronous, cyclical
Node ID/baud rate	Adjustable via LSS
Other data	
Supply voltage	24 V DC -20 .. +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	≤ 150 mA
Weight	Depending on length: 100 mm: 550 g 4000 mm: 4000 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



Model code:

HLT 2 5 0 0 - F1 - C61 - F11 - XXXX - 000

Design / geometry type

5 = profile

Model

F1 = flat profile, without magnet guidance

Electrical connection

C61 = female M12x1, 5 pole + male M12x1, 5 pole

Output signal

F11 = CANopen

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

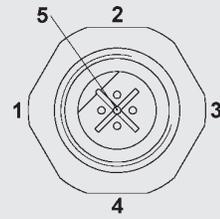
Accessories: (not supplied with instrument)

ZBL MU38-18 position magnet part no.: 6084456
 ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

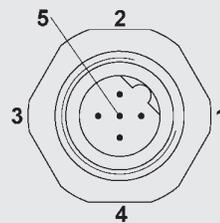
Pin connections:

Female M12x1, 5 pole, A-encoded



Pin	CANopen	OUT
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Male M12x1, 5 pole, A-encoded



Pin	CANopen	IN
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

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Linear Position Transmitter HLT 2500-F1

Magnetostrictive

For external mount

Resolution 1 µm



Profibus

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a flat profile housing version in aluminium.

In the Profibus version, the measured value is digitised and made available to the field bus system via the Profibus protocol.

The HLT 2500-F1 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

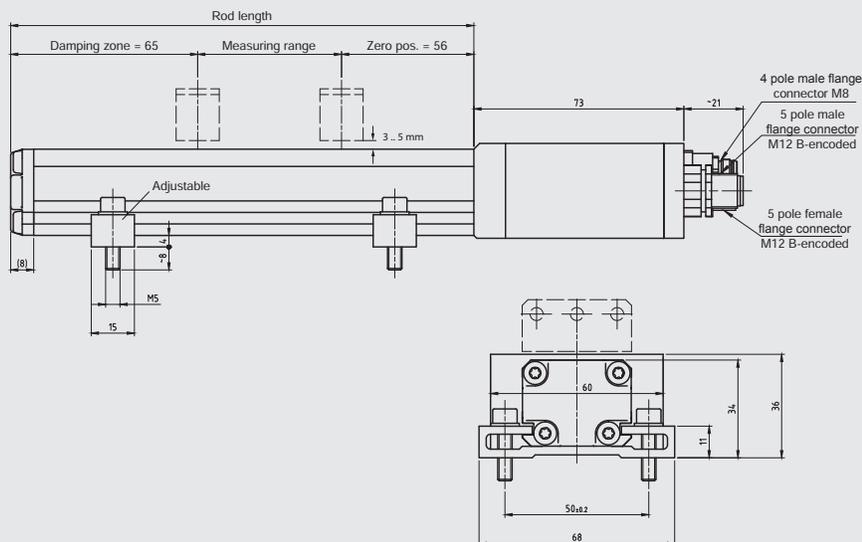
Input data	
Measuring ranges	50 .. 4000 mm
Model	Flat profile, without magnet guidance
Housing	Aluminium
Output data	
Output signal	Profibus
Resolution	0.001 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C; optionally -20 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 65
Installation position	No restrictions
Protocol data for Profibus	
Profibus DP V0	IEC 61158, IEC 61784
PNO encoder profile	Class 1 and 2
Transmission rate parameter	9.6 .. 12000 kbit/s
Other data	
Supply voltage	24 V DC -20 .. +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 150 mA
Weight	Depending on length: 100 mm: 550 g 4000 mm: 4000 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



Model code:

HLT 2 5 0 0 - F1 - P61 - F41 - XXXX - 000

Design / geometry type

5 = profile

Model

F1 = flat profile, without magnet guidance

Electrical connection

P61 = female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole

Output signal

F41 = Profibus

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories: (not supplied with instrument)

ZBL MU38-18 position magnet

part no.: 6084456

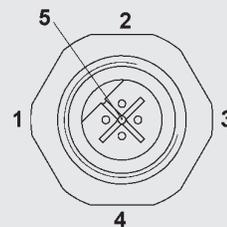
ZBL mounting kit

part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

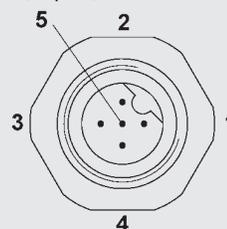
Pin connections:

Female M12x1, 5 pole, B-encoded



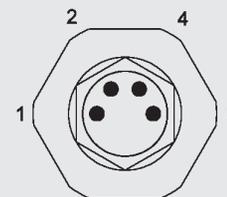
Pin	Profibus_OUT
1	VP, +5 V DC
2	Profibus, Data A
3	0 V
4	Profibus, Data B
5	n.c.
screw connection	Shield/housing

Male M12x1, 5 pole, B-encoded



Pin	Profibus_IN
1	n.c.
2	Profibus, Data A
3	n.c.
4	Profibus, Data B
5	n.c.
screw connection	Shield/housing

Male M8x1, 4 pole



Pin	Profibus_IN
1	+U _B
2	n.c.
3	0 V
4	n.c.

Note:

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Subject to technical modifications.

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Linear Position Transmitter HLT 2500-F1

Magnetostrictive

For external mount

Resolution 50 µm



Synchronous serial interface

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a flat profile housing version in aluminium.

In the version with synchronous serial interface, the measured value is made available via synchronous and symmetrical clock and data signals.

The HLT 2500-F1 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

Input data	
Measuring ranges	50 .. 4000 mm
Model	Flat profile, without magnet guidance
Housing	Aluminium
Output data	
Output signal	SSI
Resolution	0.05 mm ¹⁾
Non-linearity	± 0.15 mm (measuring range ≤ 1500 mm) ± 0.2 mm (measuring range > 1500 mm)
Hysteresis	≤ 0.1 mm
Repeatability	≤ 0.05 mm - ≤ 0.5 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms ≤ 3.0 m: 2.0 ms > 3.0 m: 2.5 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C; optionally -20 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ²⁾	IP 65
Installation position	No restrictions
Relevant data for SSI	
SSI clock input	Optocoupler
SSI data output	RS-422, 2-wire
SSI clock frequency	95 .. 1000 kHz
SSI monotime, typical	20 µs
Other data	
Supply voltage	24 V DC -20 .. +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	≤ 250 mA
Weight	Depending on length: 100 mm: 550 g 4000 mm: 4000 g

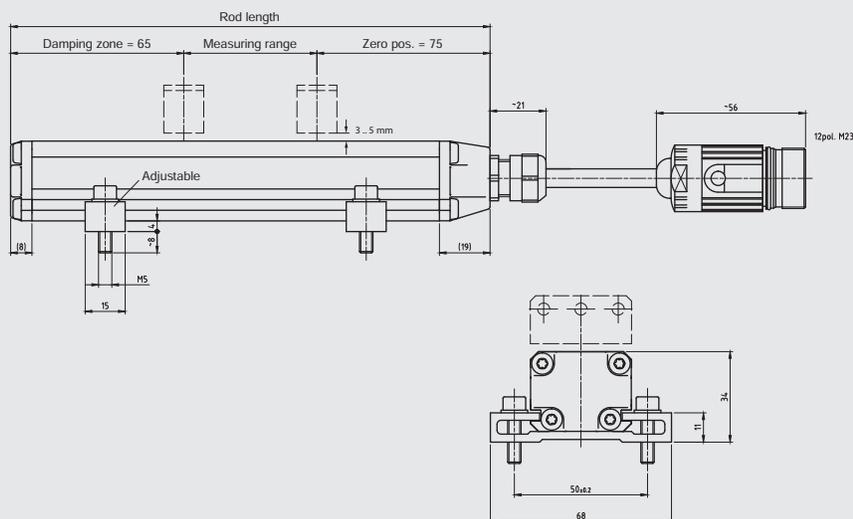
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Other models on request.

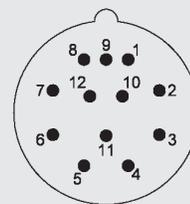
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



Pin connections:

CONTACT male, 12 pole



Pin

1	SSI_Clock-_IN
2	SSI_Clock+_IN
3	SSI_DATA+_OUT
4	SSI_DATA-_OUT
5	RS 485 +_IN/OUT
6	RS 485 -_IN/OUT
7	n.c.
8	Direction IN
9	Preset1_IN
10	n.c.
11	+U _B _IN
12	0 V _IN

5

Model code:

HLT 2 5 0 0 - F1 - S01 - S16 - XXXX - XXX - XXX - 000

Design / geometry type

5 = profile

Model

F1 = flat profile, without magnet guidance

Electrical connection

S01 = separate CONTACT male,
12 pole with 1 m cable

Output signal

S16 = SSI

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Code

B24 = binary code 24 bit

B25 = binary code 25 bit

G24 = Gray code 24 bit

G25 = Gray code 25 bit

System resolution

050 = 50 µm

100 = 100 µm

150 = 150 µm

200 = 200 µm

Modification

000 = standard

Accessories: (not supplied with instrument)

ZBL MU38-18 position magnet

part no.: 6084456

ZBL mounting kit

part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

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Linear Position Transmitter HLT 2500-F1

Magnetostrictive

For external mount

Resolution 1 µm



EtherCAT

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a flat profile housing version in aluminium.

In the EtherCAT version, the measured value is digitised and made available to the field bus system via the EtherCAT protocol.

The HLT 2500-F1 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

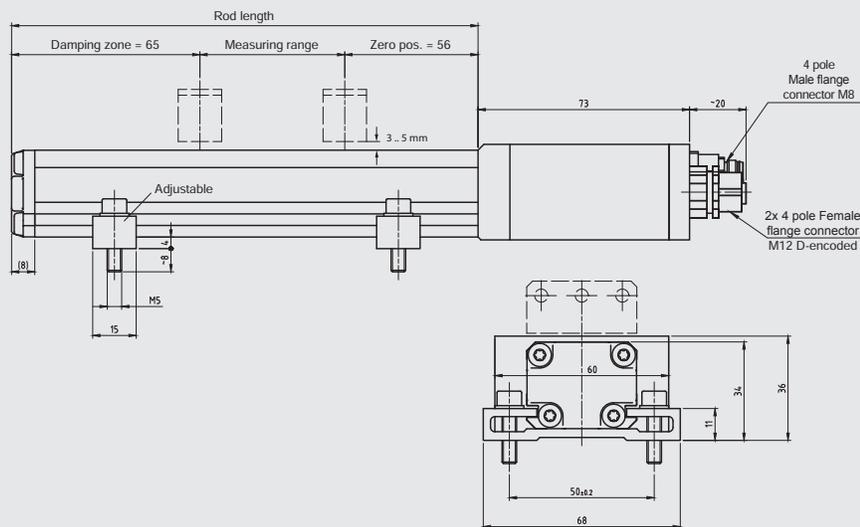
Input data	
Measuring ranges	50 .. 4000 mm
Model	Flat profile, without magnet guidance
Housing	Aluminium
Output data	
Output signal	EtherCAT
Resolution	0.001 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
Environmental conditions	
Operating temperature range	0 .. +70 °C; optionally -20 .. +70 °C
Storage temperature range	-30 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 .. 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 ¹⁾	IP 65
Installation position	No restrictions
Protocol data for EtherCAT	
EtherCAT	IEC 61158-1-6, IEC 61784-2
Physical Layer	Fast Ethernet, ISO/IEC 8802-3
Device profile	CoE, CiA DS-406
Transmission rate parameter	100 Mbit/s
Cycle time	100 .. 20000 µs
Other data	
Supply voltage	24 V DC -20 .. +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	≤ 300 mA
Weight	Depending on length: 100 mm: 550 g 4000 mm: 4000 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

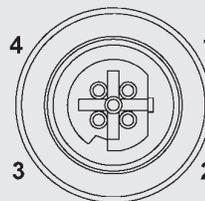
¹⁾ With mounted mating connector in corresponding protection class

Dimensions:



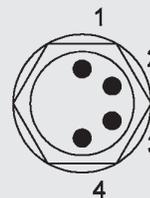
Pin connections:

Female M12x1, 4 pole, D-encoded



Pin	Port IN / Port OUT
1	Transmission data +
2	Receive data +
3	Transmission data -
4	Receive data -

Male M8x1, 4 pole



Pin	
1	+U _B
2	n.c.
3	0 V
4	n.c.

Model code:

HLT 2 5 0 0 - F1 - E51 - F51 - XXXX - 000

Design / geometry type

5 = profile

Model

F1 = flat profile, without magnet guidance

Electrical connection

E51 = 2 female M12x1, 4 pole + male M8, 4 pole

Output signal

F51 = EtherCAT

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories: (not supplied with instrument)

ZBL MU38-18 position magnet part no.: 6084456
 ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

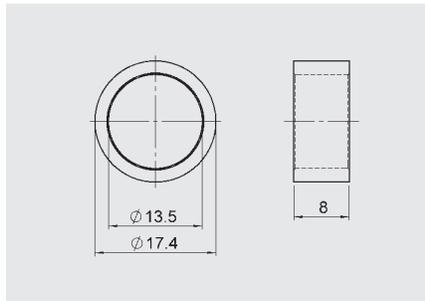
For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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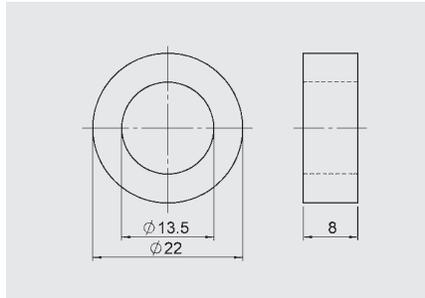
Distance and position sensor accessories
Magnets for HLT 700, HLT 1000 and HLT 2000:

Distance sensors	Magnets								
	ZBL MR17.4	ZBL MR22	ZBL MR 25.4	ZBL MR 33	ZBL MR-HLT700	ZBL MF38-18	ZBL MU38-20	ZBL MV63	ZBL MVS35-39
HLT 1100	✓	✓	✓	✓			✓	✓	
HLT 2100	✓	✓	✓	✓			✓	✓	
HLT 2102/3	✓	✓	✓	✓			✓	✓	
HLT 2150	✓	✓	✓	✓			✓	✓	
HLT 2500-F1						✓			
HLT 2500-L2							✓	✓	✓
HLT 2550							✓	✓	✓
HLT 700					✓				



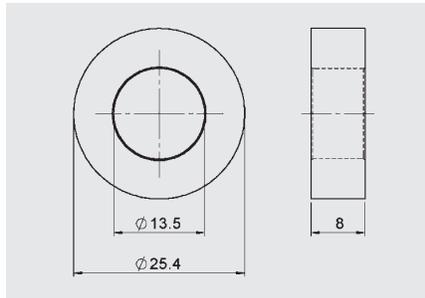
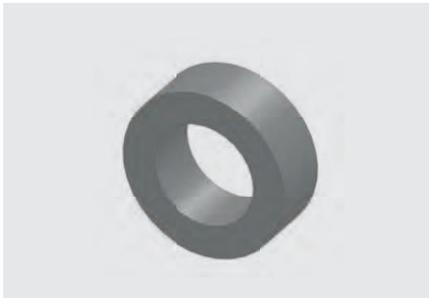
ZBL MR17.4

Position magnet for HLT 1x00 and HLT 21xx
 Part no.: 6119372



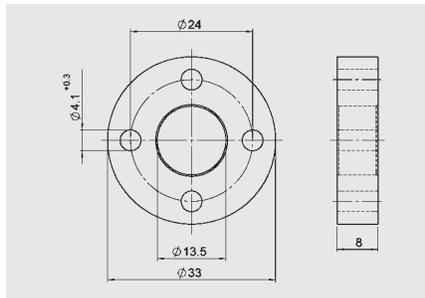
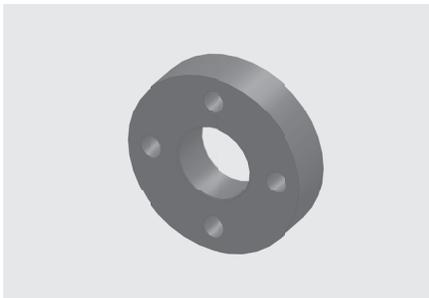
ZBL MR22

Position magnet for HLT 1x00 and HLT 21xx
 Part no.: 6084453



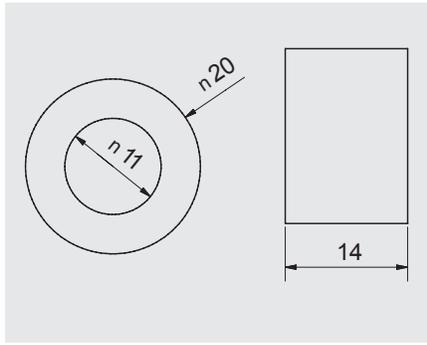
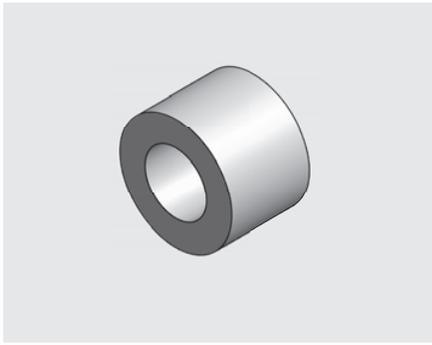
ZBL MR25.4

Position magnet for HLT 1x00 and HLT 21xx
 Part no.: 6141689

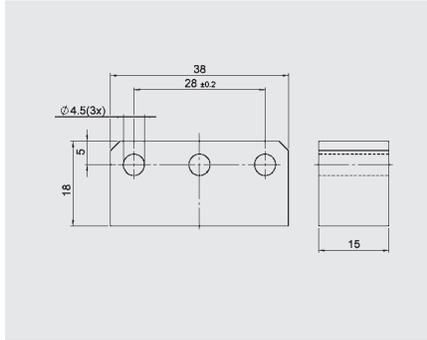
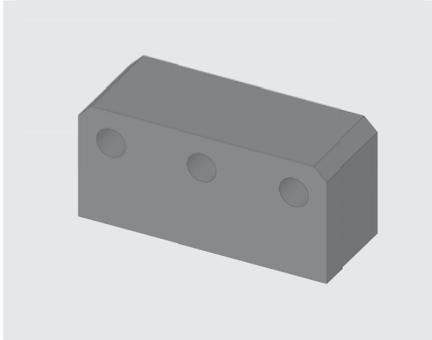


ZBL MR33

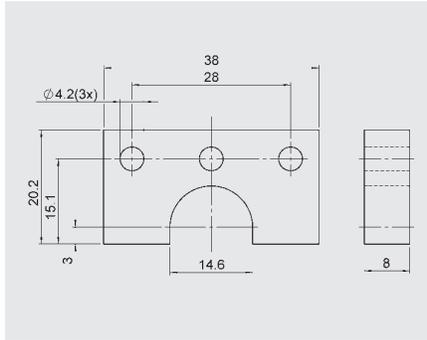
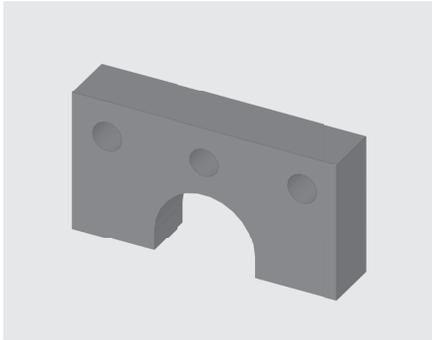
Position magnet for HLT 1x00 and HLT 21xx
 Part no.: 6084207



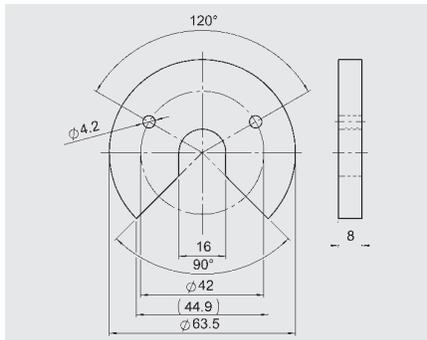
ZBL MR-HLT700
Position magnet for HLT 700
Part no.: 4105026



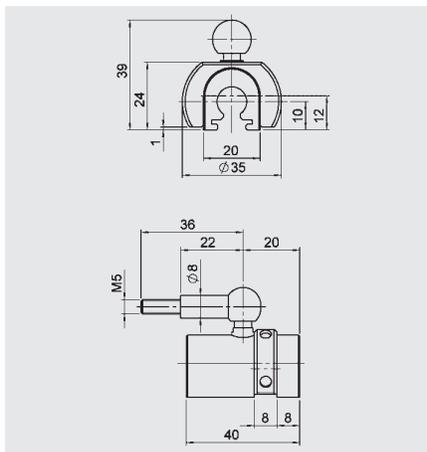
ZBL MF38-18
Position magnet for HLT 2500-F1
Part no.: 6084456



ZBL MU38-20
Position magnet for HLT 1x00, HLT 21xx and HLT 25xx-L2
Part no.: 6084455

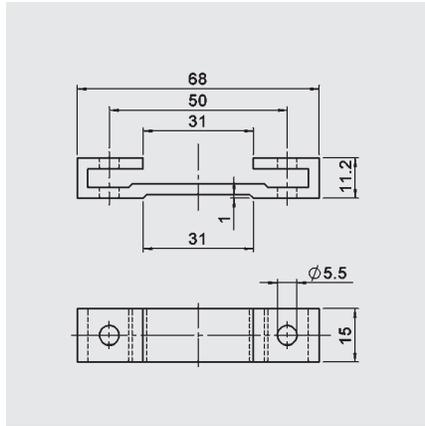
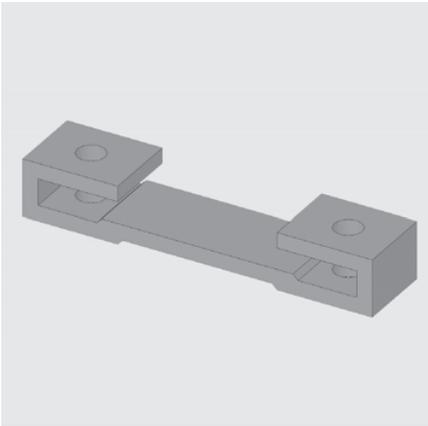


ZBL MV63
Position magnet for HLT 1x00, HLT 21xx and HLT 25xx-L2
Part no.: 6084454

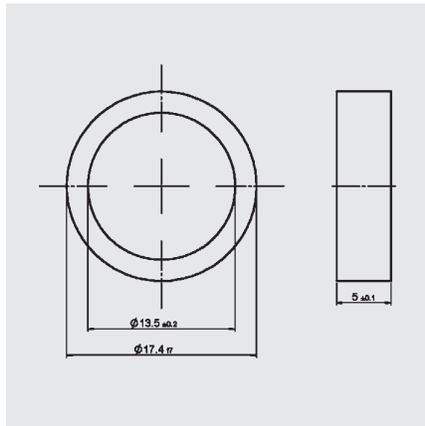


ZBL MVS35-39
Magnet slide for HLT 25xx-L2
Part no.: 6105654

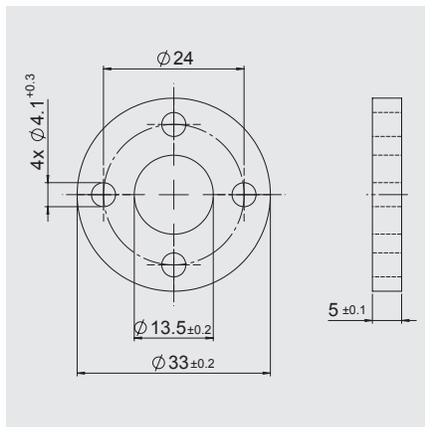
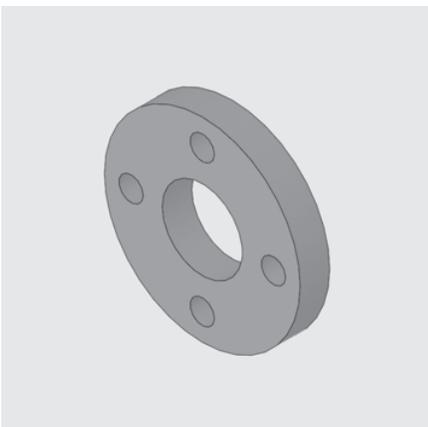
**Mounting and installation accessories for
HLT 2000:**



Mounting kit
for HLT 25xx
Part no.: 6105653



Intermediate ring AD17.4xID13.5x5
for HLT 21xx
Part no.: 3903233



Intermediate ring AD33xID13.5x5
for HLT 25xx
Part no.: 3887829