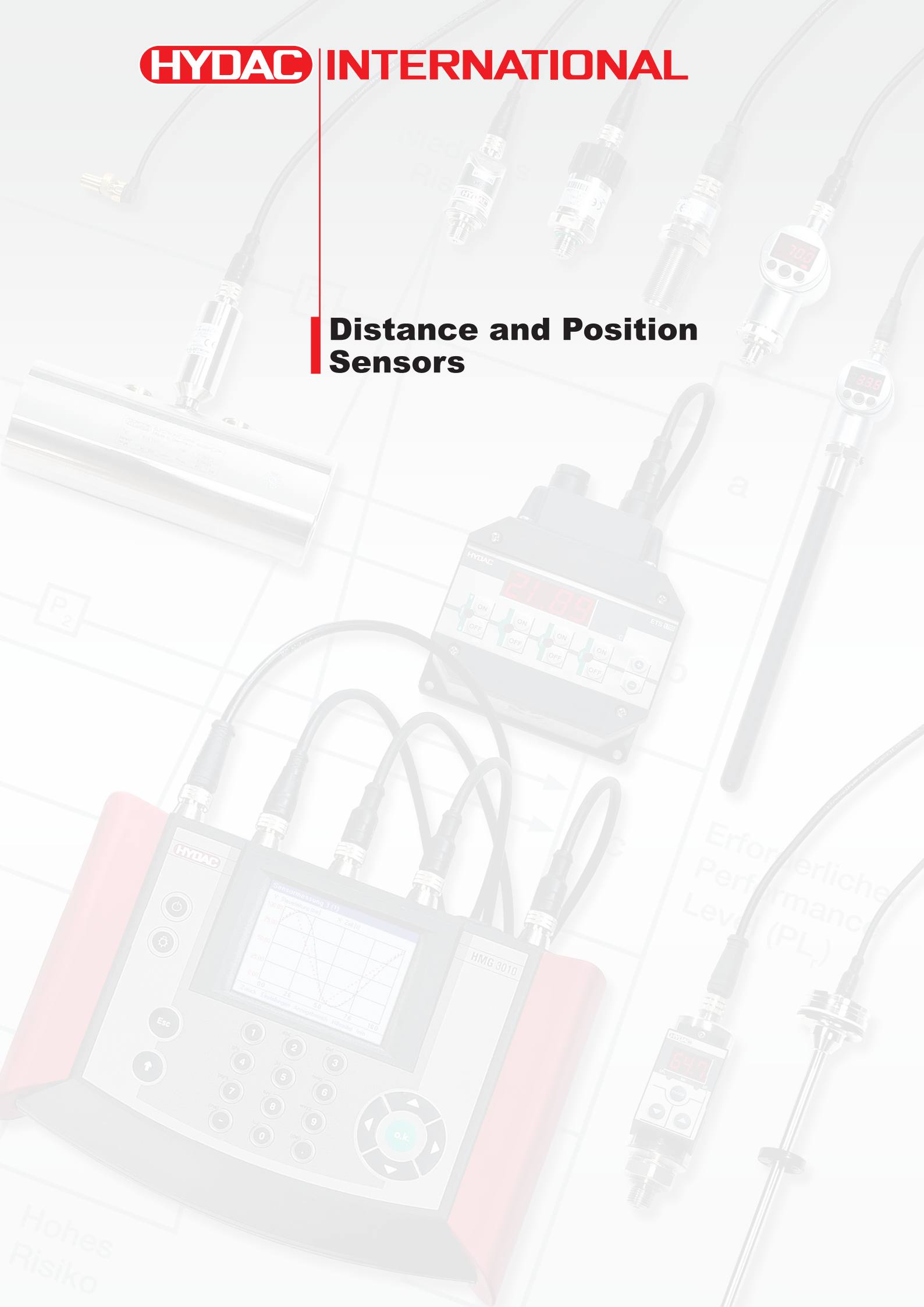


Distance and Position Sensors



SENSORS FOR DISTANCE AND POSITION

Using various measuring techniques, HYDAC offers different distance and position sensors for a wide array of mobile and stationary applications. Linear position sensors operate on the physical principle of magnetostriction.

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

Utilizing this non-contact and wear-free measuring technique, HYDAC offers different versions in a pressure-resistant stainless steel housing for part or full integration in hydraulic cylinders.

Linear position transducers:

HLT 1000-R2

HLT 2100-R1

HLT 2150

HLT 2500-R1

HLT 2500-F1

HLT 2500-L2

HLT 2550

The ultrasonic distance sensor is a non-contact, highly compact sensor for measuring the distance to fluids and objects.

By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and measurement rate.

Electronic ultrasonic distance sensor:

HLS 528

Further distance and position sensors for special applications can be found in the Chapter "OEM Products for High Volume Production".

| Sensors for distance and position | HLT 1000-R2 | HLT 2150-R1 | HLT 2100-R1 | HLT 2500-F1 | HLT 2500-L2 | HLT 2550-L2 | HLS 528 |
|-----------------------------------|------------------|------------------|-------------|-------------|-------------|-------------|-------------|
| Measurement range (in mm) | 50 to 2,500 | 50 to 2,500 | 50 to 4,000 | 50 to 4,000 | 50 to 4,000 | 50 to 3,000 | up to 6,000 |
| For cylinder installation | ✓ | ✓ | ✓ | | | | |
| Number of switching outputs | | | | | | | 2 |
| Analog output | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CANopen Version | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Device Net | | | ✓ | ✓ | ✓ | | |
| Profibus | | | ✓ | ✓ | ✓ | | |
| EtherCAT | | | ✓ | ✓ | ✓ | | |
| SSI | | | ✓ | ✓ | ✓ | ✓ | |
| Available as individual units | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| OEM product for large volume | | | | | | | |
| Increased functional safety | ✓ | | | | | | |
| Target Applications | Industry, mobile | Industry, mobile | Industry | Industry | Industry | Industry | Industry |

Note: Not all feature combinations are possible. For precise information, please consult the relevant data sheet.



Linear Position Transducer HLT 1000-R2

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.

On the basis of this non-contact and wear-free measurement system, HYDAC offers a version in pressure-resistant stainless steel housing for complete integration in hydraulic cylinders.

The different output signals (analog/ CANopen) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls).

The main areas of application are in mobile hydraulics.

Special features:

- High accuracy, e.g. $\leq \pm 0.05\%$ FS for CANopen
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- Persuasive price / performance ratio

Technical data:

| Input data | | | |
|---|---|--|--|
| Measuring ranges | 50 .. 2500 mm | | |
| Measured variable | Distance, position, speed | | |
| Mechanical connection | Cylinder-integrated | | |
| Housing | Stainl. steel: pressure resistance 6527 psi | | |
| Output data | | | |
| Signal output | Current: | 4 .. 20 mA or 20 .. 4 mA | |
| | Voltage: | 0 .. 10 V or 10 .. 0 V 0.25 .. 4.75 V or 4.75 .. 0.25 V | |
| | | CANopen | |
| | | | |
| | | | |
| Measuring accuracy | | | |
| | Analog | CANopen | |
| Resolution | 12 bit min. 0.1 mm | 0.1 mm | |
| Non-linearity | $\leq \pm 0.05\%$ FS | $\leq \pm 0.05\%$ FS | |
| Hysteresis | $\leq \pm 0.1$ mm | $\leq \pm 0.1$ mm | |
| Repeatability | $\leq \pm 0.1$ mm | $\leq \pm 0.1$ mm | |
| Temperature coefficient | $\leq \pm 0.006\%$ FS / °F | $\leq \pm 0.0018\%$ FS / °F | |
| Installation position and travel speed | | | |
| | Optional | | |
| Environmental conditions | | | |
| Operating temperature range | -40 .. +185 °F | | |
| Relative humidity | 90 %, non-condensing | | |
| Storage temperature range | -40 .. +185 °F, dry | | |
| Vibration resistance to | | | |
| DIN EN 60068-2-6 at 10 .. 500 Hz | ≤ 20 g | | |
| at 5 kHz | ≤ 15 g | | |
| Shock resistance to | ≤ 50 g | | |
| DIN EN 60068-2-2 (11 ms) | | | |
| CE mark | EN 61000-6-1 / 2 / 3 / 4 | | |
| EMC | | | |
| - Emitted interference | DIN EN 61000-6-3 | | |
| - Interference resistance | DIN EN 61000-6-2 | | |
| Housing / | Stainless steel, pressure-resistant | | |
| Protection class to IEC 60529 ¹⁾ | IP 67 | | |
| Other data | | | |
| Electrical connection ¹⁾ | Flying leads | | |
| | Separate male panel mount connection | | |
| | M12x1 | | |
| Supply voltage | 12 .. 30 V DC | | |
| Current consumption without load | max. 100 mA | | |
| Weight | Depends on length | | |

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

FS (Full Scale) = relative to the complete measuring range

¹⁾ Other versions are possible.

Model code:

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

Design/Geometry type

1 = Rod

Mechanical connection

R2 = Cylinder-integrated

Electrical connection

Cable output

K01 = Flying lead, length 1 m

K02 = Flying lead, length 2 m

K05 = Flying lead, length 5 m

K10 = Flying lead, length 10 m

Separate male panel mount connection M12x1

(4 pole for signal output analog

5 pole for signal output CANopen)

L06 = 60 mm cable length

L18 = 180 mm cable length

L24 = 240 mm cable length

Signal output

C01 = Analog 4 .. 20 mA, 3 conductor

C02 = Analog 20 .. 4 mA, 3 conductor

B01 = Analog 0 .. 10 V

B02 = Analog 10 .. 0 V

G01 = Analog 0.25 .. 4.75 V

G02 = Analog 4.75 .. 0.25 V

CAN = CANopen

Measuring range in mm (50 to 2500 mm)

Example

0150 = 150 mm

Modification

000 = Standard

Items supplied:

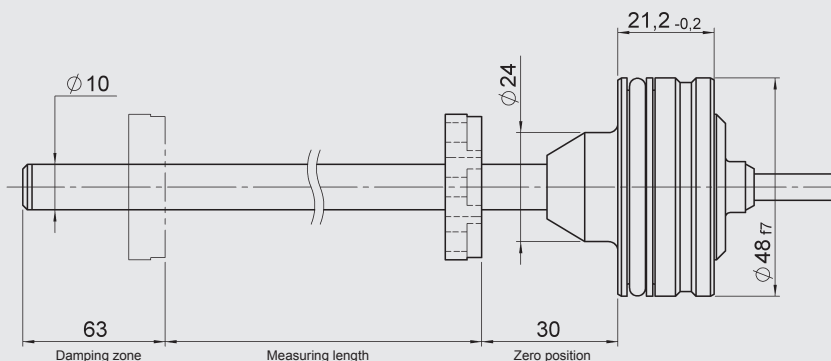
- HLT 1100-R2
- Installation instructions German/English
- HLT 1100 CD incl. case

Accessories:

Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure.

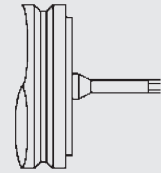
The recommended position magnet ZBL MR33, part no. 6084207, must be ordered separately.

Dimensions:



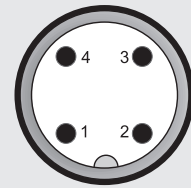
Pin connections:

Cable outlet



| Core | Analog | CANopen |
|--------|-----------------|-----------------|
| brown | +U _B | +U _B |
| white | 0 V | 0 V |
| green | Analog | CAN_L |
| yellow | n.c. | CAN_H |

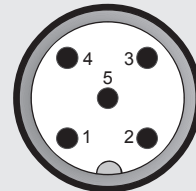
M12x1, 4 pole



Pin

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

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:

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Subject to technical modifications.

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Linear Position Transducer Rod Version HLT 2100-R1

Description:

The sensor works on the principle of magnetostriction.

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

Utilizing 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 (analog/digital) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls).

The HLT 2100-R1 is primarily used in stationary applications as a semi-integrated solution in hydraulic cylinders.

Special features:

- Accuracy $\leq \pm 0.05\%$ FS B.F.S.L.
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- Persuasive price / performance ratio

Technical data:

| Input data | |
|---|---|
| Measuring ranges | 50 .. 4000 mm |
| Measured variable | Distance, position, speed |
| Mechanical connection | Threaded flange M18x1.5 |
| Housing | Aluminum |
| Hydraulic tube | Stainless steel Pressure resist. 6526 psi, 10877 psi |
| Output data | |
| Signal output analog | Current: 4 .. 20 mA or 20 ... 4 mA Voltage: 0 .. 10 V or 10 .. 0 V |
| Signal output digital | Profibus, CANopen, Device Net, SSI, EtherCAT |
| Measuring accuracy | |
| Resolution | max. 0.005 mm, 16 bit |
| Non-linearity | ± 0.1 mm to 1,500 mm ± 0.15 mm > 1,500 mm |
| Repeatability | ≤ 0.005 mm - ≤ 0.05 mm (length-dependent) |
| Temperature coefficient | < 0.0024 % FS / °F (analog) < 0.0009 % FS / °F (digital) |
| Installation position and travel speed | |
| No restrictions | |
| Environmental conditions | |
| Operating temperature range | 32 .. +158°F |
| Relative humidity | 98 %, non-condensing |
| Storage temperature range | -22 .. +185 °F, dry |
| Vibration resistance to DIN EN 60068-2-6 at 50 .. 2000 Hz | ≤ 10 g |
| Shock resistance to DIN EN 60068-2-27 | ≤ 100 g / 11 ms / half sine |
| CE mark | EN 61000-6-1 / 2 / 3 / 4 |
| EMC | |
| - Emitted interference | DIN EN 61000-6-3 |
| - Interference resistance | DIN EN 61000-6-2 |
| Housing / Protection class to IEC 60529 | Aluminum / IP 65 ¹⁾ |
| Other data | |
| Electrical connection | |
| - Analog | - Flying lead, length 1 m ¹⁾ - Male M16, 6 pole - Male M16, 8 pole |
| - CANopen, Device Net | Female M12x1, 5 pole + male M12x1, 5 pole |
| - Profibus | Female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole |
| - Synchronous Serial Interface | CONTACT male, 12 pole |
| - EtherCAT | 2 female M12x1, 4 pole + male M8, 4 pole |
| Supply voltage | 24 V DC $\pm 10\%$ |
| Current consumption without load | < 250 mA |
| Weight | Depends on length |

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

FS (Full Scale) = relative to the complete measuring range

¹⁾ Other versions are possible.

Model code:

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

Design/Geometry type

1 = Rod

Mechanical connection

R1 = Threaded flange M18x1.5

Electrical connection

Signal output analog

K01 = Flying lead, length 1 m

M06 = Male M16, 6 pole

M08 = Male M16, 8 pole

Signal output CANopen, Device Net

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

Signal output Profibus

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

Signal output Synchronous Serial Interface

S01 = CONTACT male, 12 pole

Signal output EtherCAT

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

Signal output

C01 = Analog 4 .. 20 mA, 3 conductor

C02 = Analog 20 .. 4 mA, 3 conductor

B01 = Analog 0 .. 10 V

B02 = Analog 10 .. 0 V

ETC = EtherCAT

SSI = Synchronous Serial Interface

CAN = CANopen

PRO = Profibus

DVN = Device Net

Measuring range in mm (50 to 4000 mm)

Example

0150 = 150 mm

Modification

000 = Standard

Items supplied:

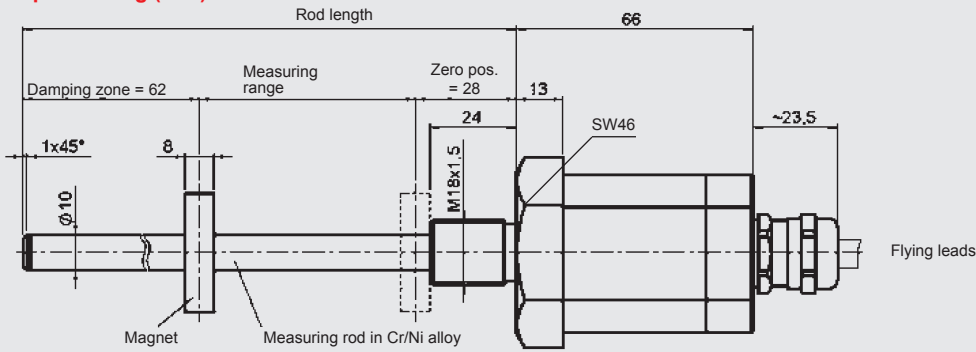
- HLT 2100-R1
- Installation instructions German/English
- HLT 2000 CD incl. case

Accessories:

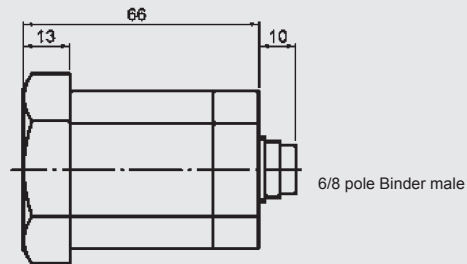
Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure. The recommended position magnet ZBL MR33, part no. 6084207, must be ordered separately.

Dimensions:

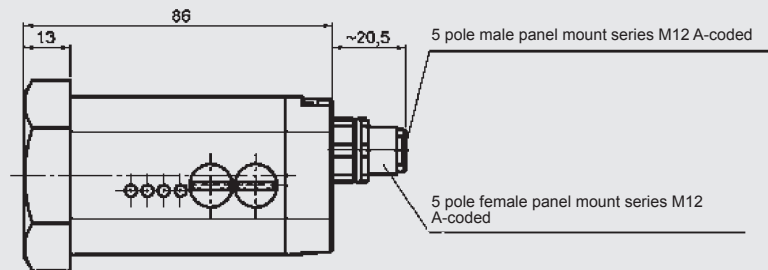
Signal output: analog (K01)



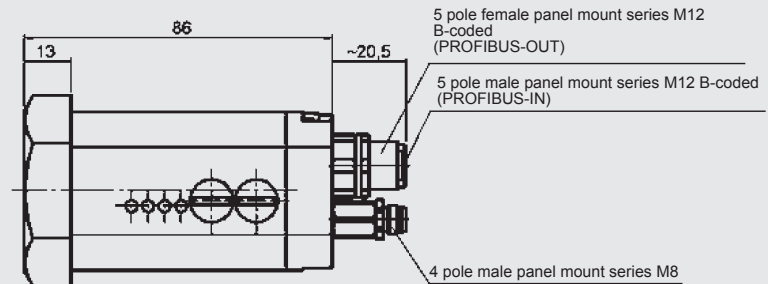
Signal output: analog (M06, M08)



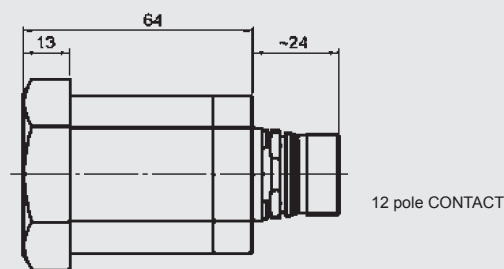
Signal output: CANopen Device Net (C61)



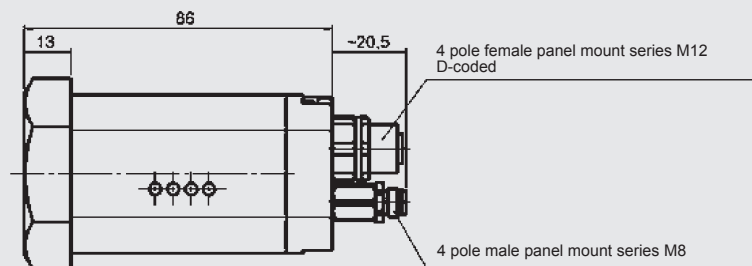
Signal output: Profibus (P61)



Signal output: Synchronous Serial Interface (S01):



Signal output: EtherCAT (E51)



Note:

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Linear Position Transmitter HLT 2150

Rod Version,
Partly-Integrated

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 available for measuring ranges up to 2.5 m. The different output signals (analog, CANopen) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also 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 industrial hydraulics, as a partly-integrated solution in hydraulic cylinders.

Special features:

- Compact design
- High resistance to shock and vibration
- Excellent EMC characteristics
- For measuring ranges up to 2.5 m
- Non-contact and wear-free
- Persuasive price / performance ratio

Technical data:

| Input data | | |
|---|--|----------------------------------|
| Measuring ranges | 50 .. 2500 mm | |
| Pressure resistance | 450 bar | |
| Peak pressure | 630 bar | |
| Housing | Stainless steel (1.4301 / 1.4571) | |
| Output data | | |
| Signal output | Current: | 4 .. 20 mA or 20 .. 4 mA |
| | Voltage: | 0 .. 10 V or 10 .. 0 V |
| | | 0.25 .. 4.75 V or 4.75 .. 0.25 V |
| | | 0.5 .. 9.5 V |
| | CANopen | |
| Measuring accuracy | | |
| | Analog | CANopen |
| Resolution | 12 bit, ≥ 0.1 mm | 0.1 mm |
| Ohmic resistance to GND | Current: 200 ... 500 Ω Voltage: > 2 k Ω | |
| Non-linearity | $\leq \pm 0.05$ % FS | $\leq \pm 0.02$ % FS |
| Hysteresis | $\leq \pm 0.1$ % FS | $\leq \pm 0.1$ mm |
| Repeatability | $\leq \pm 0.1$ % FS | $\leq \pm 0.1$ mm |
| Temperature coefficient | $\leq \pm 0.006$ % FS / °F | $\leq \pm 0.0018$ % FS / °F |
| Sampling rate (internal) | 2 ms | 2 ms |
| Installation position and travel speed | No restrictions | |
| Environmental conditions | | |
| Operating temperature range | -40 .. +185°F | |
| Storage temperature range | -40 .. 212°F, dry | |
| Fluid temperature range | -40 .. 248°F | |
| Relative humidity | 90 %, non-condensing | |
| CE mark | EN 61000-6-1 / 2 / 3 / 4 | |
| Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz at 5 kHz | ≤ 20 g ≤ 15 g | |
| Shock resistance to DIN EN 60068-2-27 (11 ms) | ≤ 50 g | |
| Protection class to IEC 60529 | IP 67 | |
| Other data | | |
| Electrical connection | M12x1 plug | |
| Supply voltage | 12 .. 30 V DC | |
| Residual ripple of supply voltage | ≤ 250 mVpp | |
| Current consumption without output | max. 100 mA | |
| Weight | Depends on length | |

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

Model Code:

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

Design/Geometry type

1 = Rod

Model

R1 = Threaded flange M18x1.5

Electrical connection

Signal output analog

M04 = Male M12x1, 4 pole

Signal output CANopen

M05 = Male M12x1, 5 pole

Signal output

C01 = Analog 4 .. 20 mA, 3 conductor

C02 = Analog 20 .. 4 mA, 3 conductor

B01 = Analog 0 .. 10 V

B02 = Analog 10 .. 0 V

F11 = CANopen

G01 = Analog 0.25 .. 4.75 V

G02 = Analog 4.75 .. 0.25 V

G03 = Analog 0.5 .. 9.5 V

G04 = Analog 0.5 .. 4.5 V

Measuring range in mm (50 to 2500 mm)

Example

0150 = 150 mm

Modification

000 = Standard

Notes:

Special models on request.

The position magnet must be ordered separately.

Items supplied:

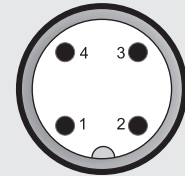
- HLT 2150
- Operating instructions

Accessories:

Appropriate accessories, such as position magnets, etc., can be found in the Accessories section of the Electronics brochure.

Pin connections:

M12x1, 4 pole



Pin

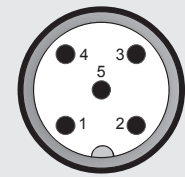
1 +U_B

2 n.c.

3 0 V

4 Signal

M12x1, 5 pole



Pin Signal Description

1 n.c.

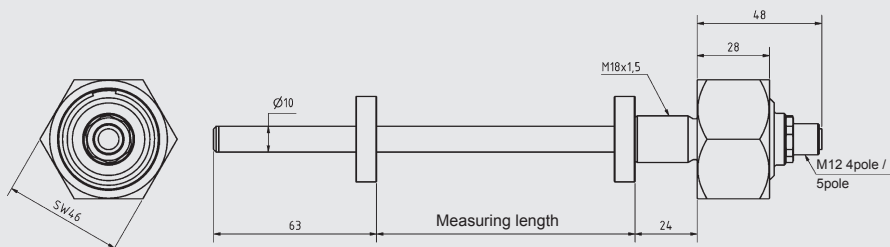
2 +U_B supply +

3 0 V supply -

4 CAN_H bus line dominant high

5 CAN_L bus line dominant low

Dimensions:



Note:

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

Subject to technical modifications.

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Linear Position Transducer Flat Housing Design HLT 2500-F1

Description:

The sensor works on the principle of magnetostriction.

The measuring principle determines the position, distance and/or a velocity signal based on elapsed time.

Utilizing this non-contact and wear-free measuring system, HYDAC offers a flat housing version in aluminum.

The different output signals (analog/digital) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls).

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

Special features:

- Accuracy $\leq \pm 0.05\%$ FS B.F.S.L.
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- Persuasive price / performance ratio

Technical data:

| Input data | |
|---|---|
| Measuring ranges | 50 .. 4000 mm |
| Measured variable | Distance, position, speed |
| Mechanical connection | Flat housing |
| Housing | Aluminum |
| Output data | |
| Signal output analog | Current: 4 .. 20 mA or 20 ... 4 mA Voltage: 0 .. 10 V or 10 .. 0 V |
| Signal output digital | Profibus, CANopen, Device Net, SSI, EtherCAT |
| Measuring accuracy | |
| Resolution | max. 0.005 mm, 16 bit |
| Non-linearity | ± 0.1 mm to 1,500 mm ± 0.15 mm > 1,500 mm |
| Repeatability | ≤ 0.005 mm - ≤ 0.05 mm (length-dependent) |
| Temperature coefficient | < 0.0024 % FS / °F (analog) < 0.0009 % FS / °F (digital) |
| Installation position and travel speed | |
| No restrictions | |
| Environmental conditions | |
| Operating temperature range | 32 .. +158 °F |
| Relative humidity | 98 %, non-condensing |
| Storage temperature range | -22 .. +185 °F, dry |
| Vibration resistance to DIN EN 60068-2-6 at 50 .. 2000 Hz | ≤ 10 g |
| Shock resistance to DIN EN 60068-2-27 | ≤ 100 g / 11 ms / half sine |
| CE mark | EN 61000-6-1 / 2 / 3 / 4 |
| EMC | |
| - Emitted interference | DIN EN 61000-6-3 |
| - Interference resistance | DIN EN 61000-6-2 |
| Housing / Protection class to IEC 60529 | Aluminum / IP 65 ¹⁾ |
| Other data | |
| Electrical connection | |
| - Analog | - Flying lead, length 1 m ¹⁾ - Male M16, 6 pole - Male M16, 8 pole |
| - CANopen, Device Net | Female M12x1, 5 pole + male M12x1, 5 pole |
| - Profibus | Female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole |
| - Synchronous Serial Interface | CONTACT male, 12 pole |
| - EtherCAT | 2 female M12x1, 4 pole + male M8, 4 pole. |
| Supply voltage | 24 V DC $\pm 10\%$ |
| Current consumption without load | < 250 mA |
| Weight | Depends on length |

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

FS (Full Scale) = relative to the complete measuring range

¹⁾ Other versions are possible.

Model code:

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

Design/Geometry type

5 = Profile

Mechanical connection

F1 = Flat housing

Electrical connection

Signal output analog

K01 = Flying lead, length 1 m

M06 = Male M16, 6 pole

M08 = Male M16, 8 pole

Signal output CANopen, Device Net

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

Signal output Profibus

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

Signal output Synchronous Serial Interface

S01 = CONTACT male, 12 pole

Signal output EtherCAT

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

Signal output

C01 = Analog 4 .. 20 mA, 3 conductor

C02 = Analog 20 .. 4 mA, 3 conductor

B01 = Analog 0 .. 10 V

B02 = Analog 10 .. 0 V

ETC = EtherCAT

SSI = Synchronous Serial Interface

CAN = CANopen

PRO = Profibus

DVN = Device Net

Measuring range in mm (50 to 4000 mm)

Example

0150 = 150 mm

Modification

000 = Standard

Items supplied:

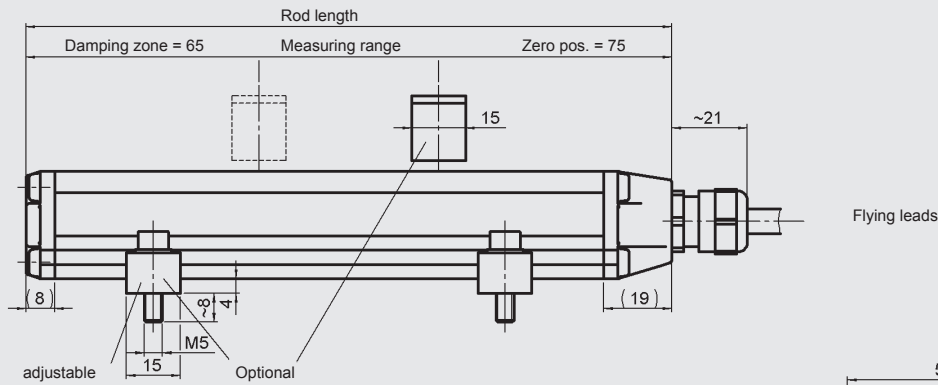
- HLT 2500-F1
- Installation instructions German/English
- HLT 2000 CD incl. case

Accessories:

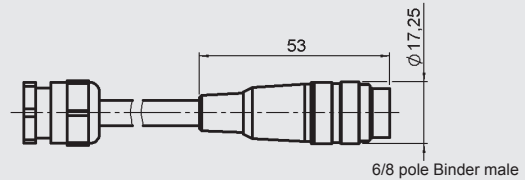
Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure. The recommended position magnet ZBL MF 38-18, part no. 6084456, must be ordered separately.

Dimensions:

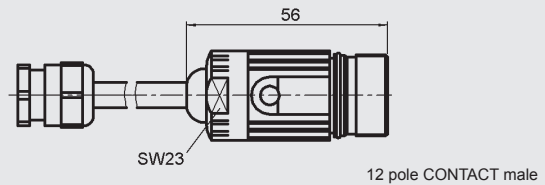
Signal output: analog (K01)



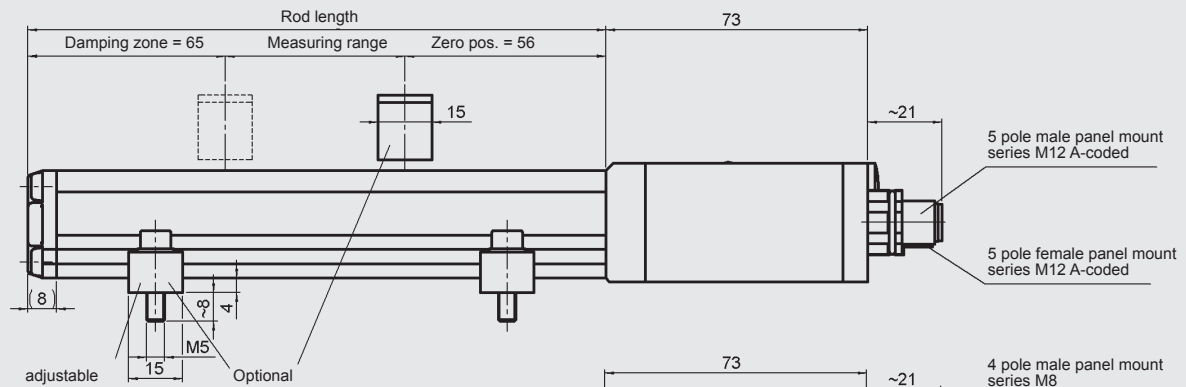
Signal output: analog (M06, M08)



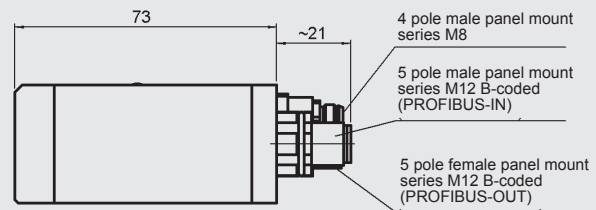
Signal output: Synchronous Serial Interface (S01):



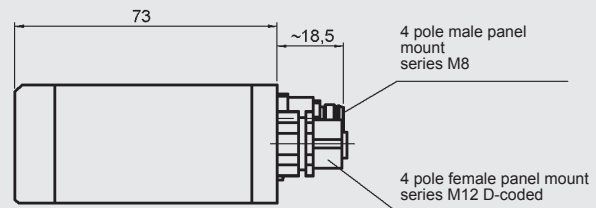
Signal output: CANopen Device Net (C61)



Signal output: Profibus (P61)



Signal output: EtherCAT (E51)



Note:

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Linear Position Transducer Profile Design HLT 2500-L2

Description:

The sensor works on the principle of magnetostriction.

The measuring principle determines with a high degree of accuracy the position, distance and/or a velocity signal based on elapsed time.

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

The different output signals (analog/digital) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls).

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

Special features:

- Accuracy $\leq \pm 0.05\%$ FS B.F.S.L.
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Contact-free and wear-free
- Persuasive price / performance ratio

Technical data:

| Input data | |
|---|---|
| Measuring ranges | 50 .. 4000 mm |
| Measured variable | Distance, position, speed |
| Mechanical connection | With magnet in position slide V |
| Housing | Aluminum |
| Output data | |
| Signal output analog | Current: 4 .. 20 mA or 20 .. 4 mA Voltage: 0 .. 10 V or 10 .. 0 V |
| Signal output digital | Profibus, CANopen, Device Net, SSI, EtherCAT |
| Measuring accuracy | |
| Resolution | max. 0.005 mm, 16 bit |
| Non-linearity | ± 0.1 mm to 1,500 mm ± 0.15 mm > 1,500 mm |
| Repeatability | ≤ 0.005 mm - ≤ 0.05 mm (length-dependent) |
| Temperature coefficient | < 0.0024 % FS / °F (analog) < 0.0009 % FS / °F (digital) |
| Installation position and travel speed | |
| No restrictions | |
| Environmental conditions | |
| Operating temperature range | 32 .. +158 °F |
| Relative humidity | 98 %, non-condensing |
| Storage temperature range | -22 .. +185 °F, dry |
| Vibration resistance to DIN EN 60068-2-6 at 50 .. 2000 Hz | ≤ 10 g |
| Shock resistance to DIN EN 60068-2-27 | ≤ 100 g / 11 ms / half sine |
| CE mark | EN 61000-6-1 / 2 / 3 / 4 |
| EMC | |
| - Emitted interference | DIN EN 61000-6-3 |
| - Interference resistance | DIN EN 61000-6-2 |
| Housing / Protection class to IEC 60529 | Aluminum / IP 65 ¹⁾ |
| Other data | |
| Electrical connection | |
| - Analog | - Flying lead, length 1 m ¹⁾ - Male M16, 6 pole - Male M16, 8 pole |
| - CANopen, Device Net | Female M12x1, 5 pole + male M12x1, 5 pole |
| - Profibus | Female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole |
| - Synchronous Serial Interface | CONTACT male, 12 pole |
| - EtherCAT | 2 female M12x1, 4 pole + male M8, 4 pole |
| Supply voltage | 24 V DC $\pm 10\%$ |
| Current consumption without load | < 250 mA |
| Weight | Depends on length |

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

FS (Full Scale) = relative to the complete measuring range

¹⁾ Other versions are possible.

Model code:

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

Design/Geometry type

5 = Profile

Mechanical connection

L2 = With magnet in position slide V

Electrical connection

Signal output analog

K01 = Flying lead, length 1 m

M06 = Male M16, 6 pole

M08 = Male M16, 8 pole

Signal output CANopen, Device Net

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

Signal output Profibus

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

Signal output Synchronous Serial Interface

S01 = CONTACT male, 12 pole

Signal output EtherCAT

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

Signal output

C01 = Analog 4 .. 20 mA, 3 conductor

C02 = Analog 20 .. 4 mA, 3 conductor

B01 = Analog 0 .. 10 V

B02 = Analog 10 .. 0 V

ETC = EtherCAT

SSI = Synchronous Serial Interface

CAN = CANopen

PRO = Profibus

DVN = Device Net

Measuring range in mm (50 to 4000 mm)

Example

0150 = 150 mm

Modification

000 = Standard

Items supplied:

- HLT 2500-L2
- ZBL MS35-39, position magnet
- Installation instructions German/English
- HLT 2000 CD incl. case

Accessories:

Appropriate accessories, such as position magnets and mounting material can be found in the Accessories section of the Electronics brochure.



Linear Position Transmitter HLT 2550

Flat Profile Design,
with Magnetic Guidance

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 available for measuring ranges up to 3 m and in various signal output versions (analog, CANopen, SSI) with a resolution of 50 μm and a non-linearity of $\leq 0.02\%$ FS.

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

Special features:

- Compact design
- Used in applications where space is very limited
- Individual adaptation to various mounting conditions
- For measuring ranges up to 3 m
- Non-contact and wear-free
- Persuasive price / performance ratio

Technical data:

| Input data | |
|---|--|
| Measuring ranges ¹⁾ | 30 .. 3000 mm in steps of 50 mm |
| Housing | Measuring body: aluminium |
| Output data | |
| Signal output | Analog: Current: 4 .. 20 mA or 20 .. 4 mA Voltage: 0 .. 10 V or 10 .. 0 V |
| | CANopen |
| | SSI |
| Resolution | 12 bit, ≥ 0.05 mm |
| Ohmic resistance to GND (only for signal output analogue) | Current: 200 .. 500 Ω Voltage: > 2 k Ω |
| Non-linearity | $\leq \pm 0.02\%$ FS, ≥ 0.06 mm |
| Hysteresis | ≤ 0.1 mm |
| Repeatability | $\leq \pm 0.005\%$ FS, ≥ 0.05 mm |
| Temperature coefficient | $\leq \pm 0.006\%$ FS / $^{\circ}\text{F}$ |
| Sampling rate | 0.5 ms up to 1,200 mm 1.0 ms up to 2,400 mm 2.0 ms up to 3,000 mm |
| Installation position and travel speed | No restrictions |
| Environmental conditions | |
| Operating temperature range | -4 .. +167 $^{\circ}\text{C}$, optionally -40 .. +167 $^{\circ}\text{F}$ |
| Storage temperature range | -22 .. +185 $^{\circ}\text{F}$, dry |
| Relative humidity | 98 %, non-condensing |
| CE mark | EN 61000-6-1 / 2 / 3 / 4 |
| Vibration resistance to DIN EN 60068-2-6 at 50 .. 2000 Hz | ≤ 10 g |
| Shock resistance to DIN EN 60068-2-27 | ≤ 100 g / 11 ms / half sine |
| Protection class to IEC 60529 | IP 67 |
| Other data | |
| Electrical connection | M12x1 plug |
| Supply voltage | 24 V DC $\pm 20\%$ |
| Residual ripple of supply voltage | ≤ 250 mVpp |
| Current consumption without output | max. 100 mA |
| Weight | Depends on length |

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

FS (Full Scale) = relative to the complete measuring range

¹⁾ Other measuring ranges on request.

Model code:

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

Design/Geometry type

5 = Profile

Model

L2 = Flat profile, with magnetic guidance

Electrical connection

Signal output analog

M04 = Male M12x1, 4 pole

Signal output CANopen

M05 = Male M12x1, 5 pole

Signal output SSI

M08 = Male M12x1, 8 pole

Signal output

C01 = Analog 4 .. 20 mA, 3 conductor

C02 = Analog 20 .. 4 mA, 3 conductor

B01 = Analog 0 .. 10 V

B02 = Analog 10 .. 0 V

F11 = CANopen

SSI = SSI

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

Example

0150 = 150 mm

Modification

000 = Standard

Notes:

Special models on request.

The position magnet must be ordered separately.

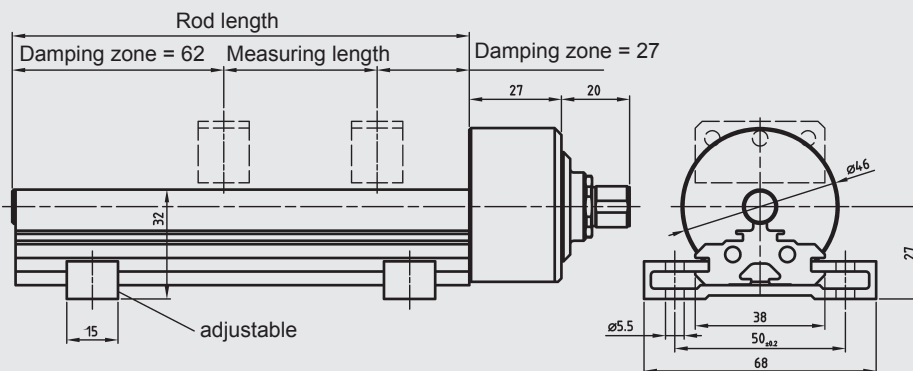
Items supplied:

- HLT 2550
- Operating instructions

Accessories:

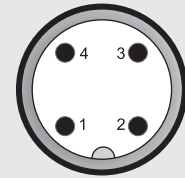
Appropriate accessories, such as position magnets, magnet slides or spacers, can be found in the Accessories section of the Electronics brochure.

Dimensions:



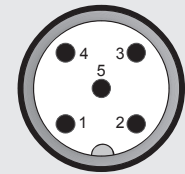
Pin connections:

M12x1, 4 pole



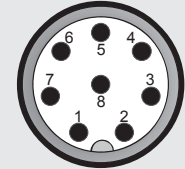
| Pin | Signal |
|-----|-----------------|
| 1 | +U _B |
| 2 | n.c. |
| 3 | 0 V |
| 4 | Signal |

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 |

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 |

Note:

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

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

Subject to technical modifications.

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Electronic Distance Sensor HLS 528

Description:

The distance sensor HLS 528 is a non-contact, highly compact sensor for measuring distances to fluids and objects.

By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and measurement rate.

The HLS 528 is available for measuring ranges up to 6000 mm and is available in three signal output versions (2 switching outputs; 1 analog output, either 4 .. 20 mA or 0 .. 10 V, plus 1 or 2 switching outputs).

The sensor can be adjusted simply and conveniently using two push-buttons and a self-explanatory menu structure. A 3-digit display indicates the latest distance and 2 three-color LEDs also show the operating condition.

Special features:

- Contact-free distance measurement
- Measurement range up to 6000 mm
- Various signal output versions available
- Very high resolution and measurement rate
- Integrated temperature compensation
- 3-digit display to show the latest distance
- 2 three-color LEDs to display the operating status
- Switching and switch-back points can be adjusted independently
- Selectable analog output (optional)
- Only for use in depressurized applications

Technical data:

| Input data | | | | | |
|---|--|----------|--|-----------|-------------|
| Operating range | 250; | 350; | 1300; | 3400; | 6000 mm |
| Blind zone | 0 .. 30; | 0 .. 85; | 0 .. 200; | 0 .. 350; | 0 .. 600 mm |
| Maximum range | 350; | 600; | 2000; | 5000; | 8000 mm |
| Resolution | ≤ 0.18 mm | | | | |
| Output data | | | | | |
| Accuracy | ≤ ± 1 % of the latest measured value | | | | |
| Repeatability | ± 0.15 % of the latest measured value | | | | |
| Versions | 2 switch outputs | | 1 switch outp. + 1 analog. outp. / 2 switch outputs + 1 analog output | | |
| Analog output (optional) | | | | | |
| Signal; selectable (short-circuit resistant, invertible) | | | 4 .. 20 mA, $R_{Lmax} = 100 \Omega (U_B \leq 20 V)$ $R_{Lmax} = 500 \Omega (U_B > 20 V)$ 0 .. 10 V, $R_{Lmin} = 100 k\Omega (U_B \geq 18 V)$ | | |
| Switch outputs | | | | | |
| Switching output (short-circuit resistant) | 2 x PNP $I_{max} = 2 \times 200 \text{ mA}$ | | 1 x PNP $I_{max} = 200 \text{ mA}$ 2 x PNP $I_{max} = 2 \times 200 \text{ mA}$ | | |
| Switching direction | N/O or N/C, adjustable | | | | |
| Reaction time | 50; | 70; | 110; | 180; | 240 ms |
| Environmental conditions | | | | | |
| Operating temperature | -13 .. +158 °F | | | | |
| Storage temperature range | -40 °F .. +185 °F | | | | |
| CE mark | DIN EN 60947-5-2 DIN EN 60947-5-7 | | | | |
| Protection class to EN 60529 | IP 67 | | | | |
| Other data | | | | | |
| Supply voltage | 9 .. 30 V DC without analog output 18 .. 30 V DC with analog output | | | | |
| Time delay before availability | < 300 ms | | | | |
| Residual ripple | ± 10% | | | | |
| No-load current consumption | ≤ 80 mA | | | | |
| Electrical connection | Male M12x1, 5 pole | | | | |
| Housing | Brass, nickel-plated; Ultrasonic transducer with PEEK film | | | | |
| Controls | 2 push-buttons | | | | |
| Display | 3-digit, LED-display, 2 three-color-LEDs | | | | |
| Weight | 150; | 150; | 150; | 210; | 270 g |

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

Setting options:

All the settings available on the HLS 528 are grouped in two easy-to-navigate menus. In order to prevent unauthorized adjustment of the instrument, a key-lock can be set.

Setting ranges of the switching points and switch-back hysteresis:

Switching point function distance

| Oper. scanning range | Switching point* | Hysteresis* |
|----------------------|--------------------------------|------------------------------|
| 250 mm | 30 .. 350 mm | 1 .. 320 mm |
| 350 mm | 85 .. 600 mm | 1 .. 515 mm |
| 1300 mm | 200 .. 999 mm 100 .. 200 cm | 1 .. 999 mm 100 .. 180 cm |
| 3400 mm | 350 .. 999 mm 100 .. 500 cm | 1 .. 999 mm 100 .. 465 cm |
| 6000 mm | 600 .. 999 mm 100 .. 800 cm | 1 .. 999 mm 100 .. 740 cm |

Window function distance

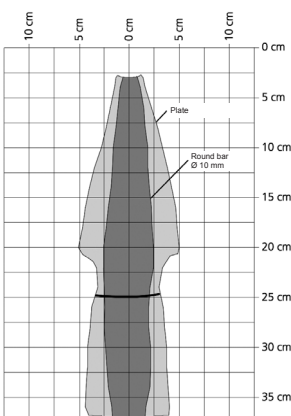
| Oper. scanning range | Lower switch value* | Upper switch value* |
|----------------------|--------------------------------|--------------------------------|
| 250 mm | 30 .. 348 mm | 32 .. 350 mm |
| 350 mm | 85 .. 598 mm | 87 .. 600 mm |
| 1300 mm | 200 .. 999 mm 100 .. 198 cm | 202 .. 999 mm 100 .. 200 cm |
| 3400 mm | 350 .. 999 mm 100 .. 498 cm | 352 .. 999 mm 100 .. 500 cm |
| 6000 mm | 600 .. 999 mm 100 .. 798 cm | 602 .. 999 mm 100 .. 800 cm |

* The increment for all units is 1 mm or cm.

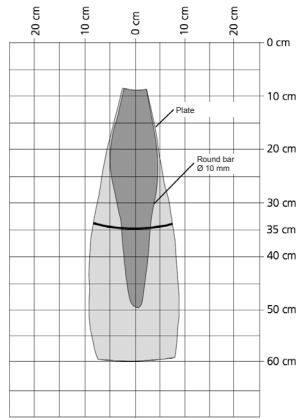
Recording ranges (for different objects):

The dark-grey areas specify the range in which the normal reflector (round bar) is detected safely. This is the typical working range of the sensors. The light grey areas illustrate the range in which a very large reflector, e.g. a very large plate, is still detected, provided it is aligned optimally to the sensor. Ultrasonic reflections cannot be evaluated outside the light grey area.

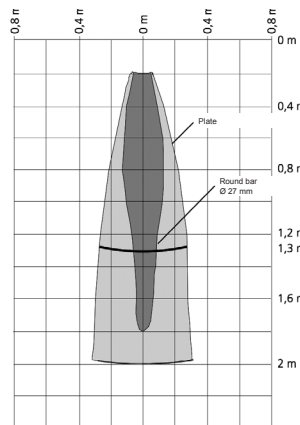
Operational scanning range 250 mm:



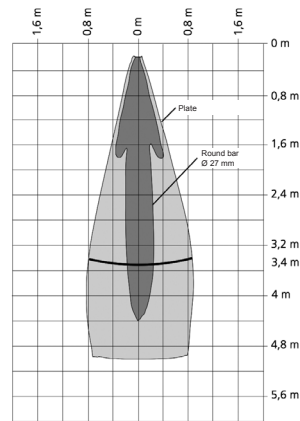
Operational scanning range 350 mm:



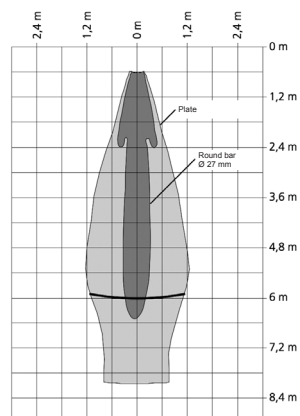
Operational scanning range 1300 mm:



Operational scanning range 3400 mm:



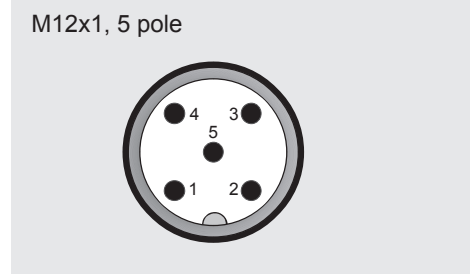
Operational scanning range 6000 mm:



Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on delay adjustable from 0 to 20 seconds
- Energy saving mode

Pin connections:



| Pin | HLS 528-2 |
|-----|-------------------------|
| 1 | +U _B |
| 2 | D1 (switching output 1) |
| 3 | -U _B (0 V) |
| 4 | D2 (switching output 2) |
| 5 | Synchronization |

| Pin | HLS 528-3 |
|-----|-----------------------|
| 1 | +U _B |
| 2 | Analog |
| 3 | -U _B (0 V) |
| 4 | D (switching output) |
| 5 | Synchronization |

| Pin | HLS 528-5 |
|-----|-------------------------|
| 1 | +U _B |
| 2 | Analog |
| 3 | -U _B (0 V) |
| 4 | D2 (switching output 2) |
| 5 | D1 (switching output 1) |

Model code:

HLS 5 2 8 - X - XXXX - 000 - F

Mechanical connection

2 = M30x1.5

Electrical connection

8 = Male M12x1, 5 pole
(connector not supplied)

Output

2 = 2 switching outputs
3 = 1 switching output and 1 analog output
5 = 2 switching outputs and 1 analog output

Operational scanning range in mm

0250; 0350; 1300, 3400, 6000

Modification number

000 = Standard

Type of protection, front face of sensor

F = Foil

Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

Note:

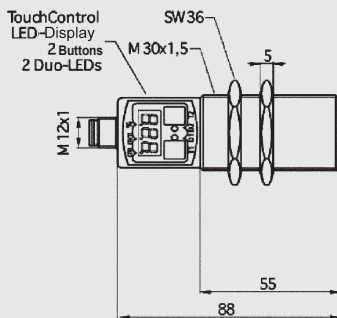
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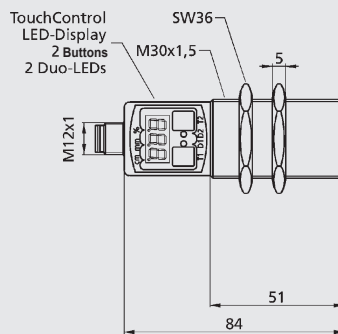
Subject to technical modifications.

Dimensions:

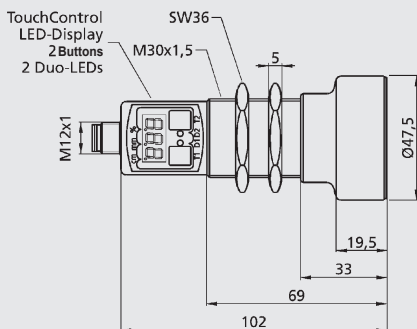
Operational scanning range:
250 mm



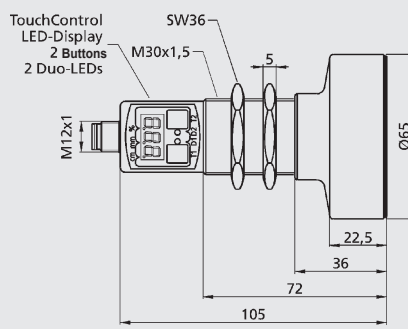
350 mm, 1300mm



Operational scanning range:
3400 mm



6000 mm



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