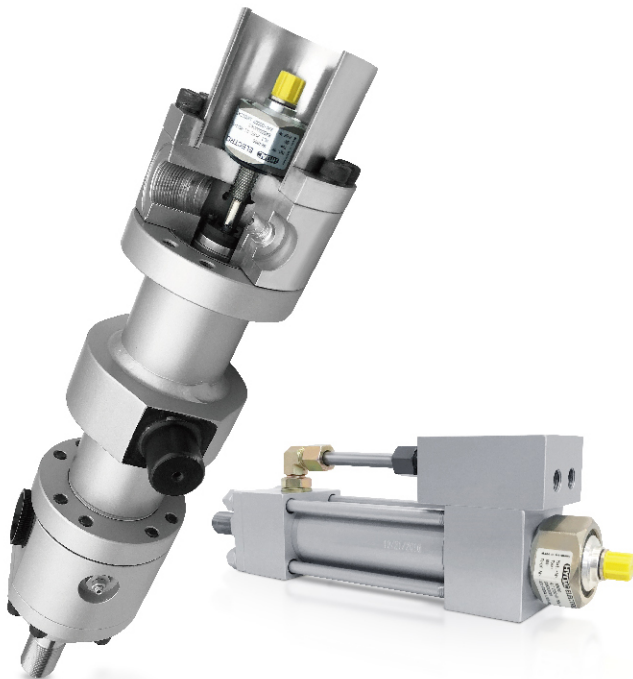


# ASHUN

## Heavy Duty Metric Mill Types |

- AH series ( ISO 6022 )
- AK series ( ISO 6020-1 )
- AT series ( ISO 6020-2 )



Jan. 2017

油順精密股份有限公司  
ASHUN FLUID POWER CO., LTD.

[www.ashun.com](http://www.ashun.com)

## Linear Position Transmitter Series

The selection of a transducer for a specific application depends on accuracy, cost and durability. ASHUN uses 2 basic types of devices shown below but it is possible to use other types, especially when integrated solution in hydraulic cylinders is not possible.

### Mounting Parts List And Types

| NO | Description                             |
|----|-----------------------------------------|
| 1  | Cylinder Tube                           |
| 2  | Piston                                  |
| 3  | Cushion Sleeve                          |
| 4  | End Cap                                 |
| 5  | Set Screw                               |
| 6  | Linear Position Transmitter HLT 1000-R2 |
| 7  | Linear Position Transmitter HLT 2150-R1 |
| 8  | End Plate                               |
| 9  | Non Ferrous Distance Ring               |
| 10 | Position magnets                        |
| 11 | Hex Socket Screws                       |
| 12 | Protective Case                         |

### Design Data

**1. Stroke Length Range** 50 ~ 2500 mm

**2. ISO 6022 AH Series**

Bore Design Restrictions - Piston Ø 50 ~ Ø 320 mm

Type restrictions - **MF4 + MP3 + MP5** → B

**3. ISO 6020-1 AK Series**

Bore Design Restrictions - Piston Ø 50 ~ Ø 320 mm

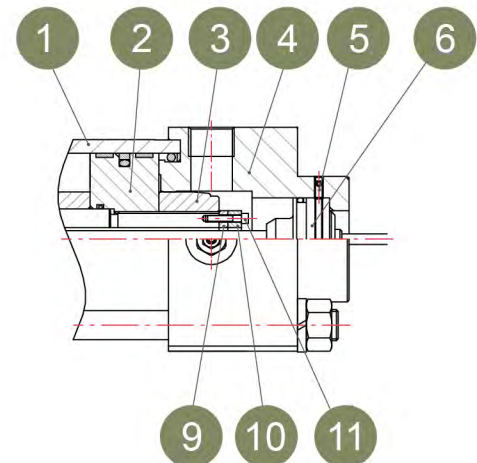
Type restrictions - **MF2 + MF4 + MP3 + MP5** → B

**4. ISO 6020-2 AT Series**

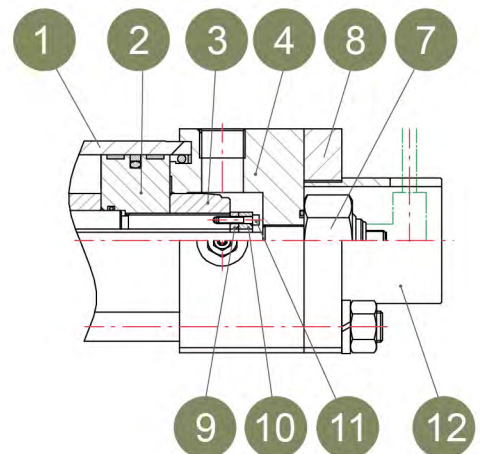
Bore Design Restrictions - Piston Ø 63 ~ Ø 200 mm

Type restrictions - **ME6 + MP1 + MP3 + MP5** → B

**5. Signal Output And Pin Connections Please Refer To Model Code**



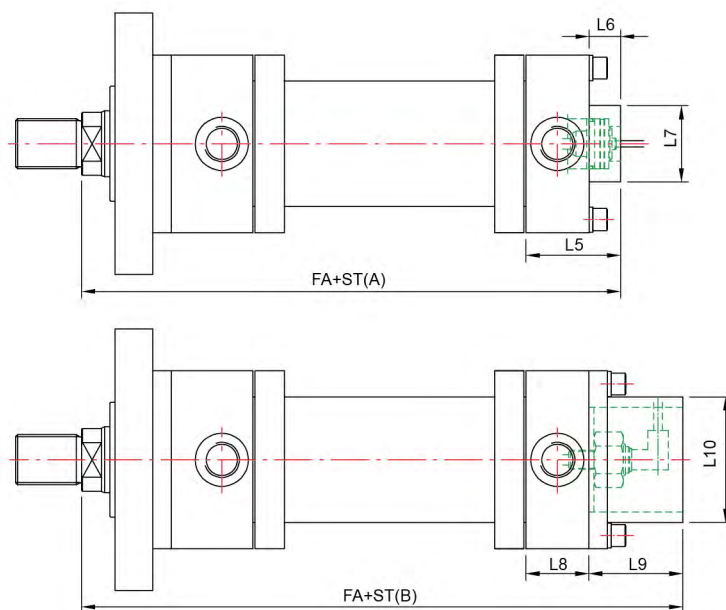
A - Cylinder Integrated



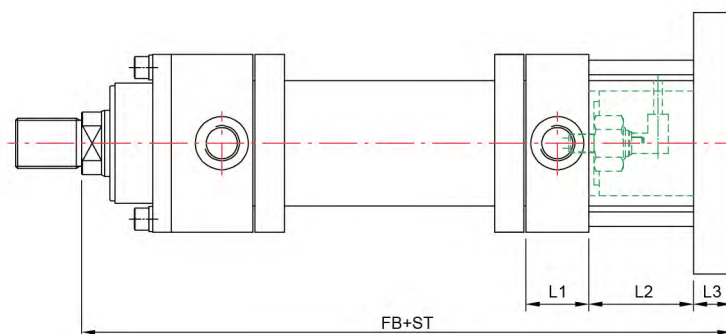
B - Cylinder Semi-Integrated

# Linear Position Transmitter series

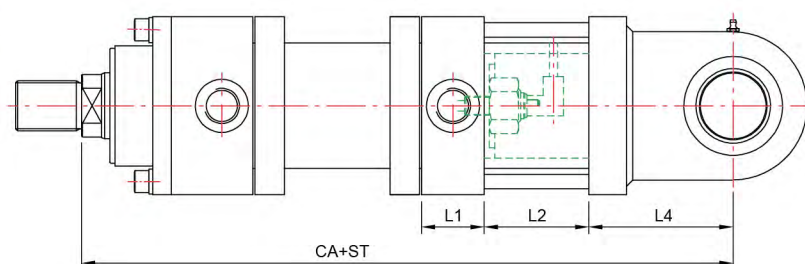
## AHS-MF3



## AHS-MF4



## AHS-MP3/5

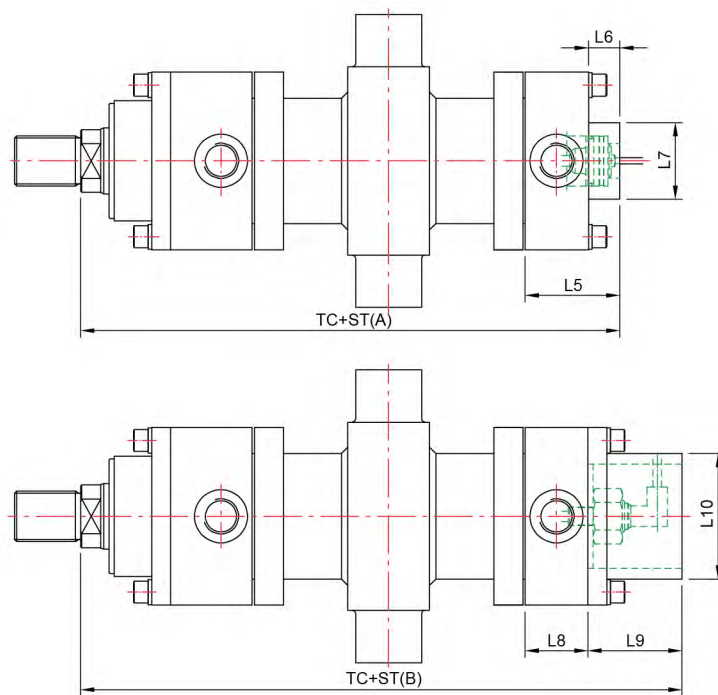


### DIMENSION

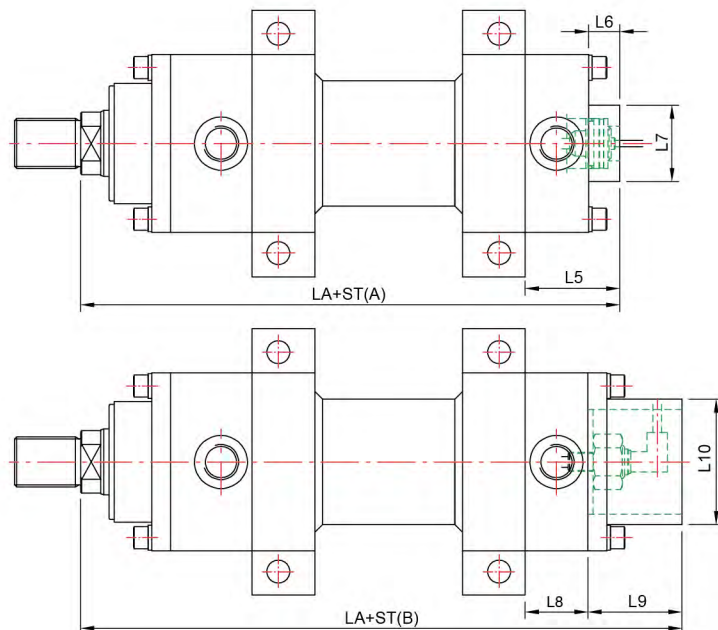
| BORE | FA (A/B)    | FB  | CA   | LA (A/B)    | TC (A/B)    | L1  | L2  | L3 | L4  | L5    | L6   | L7   | L8  | L9 | L10  |
|------|-------------|-----|------|-------------|-------------|-----|-----|----|-----|-------|------|------|-----|----|------|
| Ø50  | 281.5 / 340 | -   | -    | 281.5 / 340 | 281.5 / 340 | -   | -   | -  | -   | 85.5  | 31.5 | Ø68  | 54  | 90 | Ø68  |
| Ø63  | 310.5 / 364 | 398 | 472  | 310.5 / 364 | 310.5 / 364 | 50  | 100 | 28 | 102 | 90.5  | 36.5 | Ø76  | 54  | 90 | Ø76  |
| Ø80  | 339.5 / 397 | 434 | 524  | 339.5 / 397 | 339.5 / 397 | 53  | 100 | 32 | 122 | 90.5  | 30   | Ø73  | 58  | 90 | Ø100 |
| Ø100 | 365.5 / 425 | 471 | 573  | 365.5 / 425 | 365.5 / 425 | 60  | 100 | 36 | 138 | 90.5  | 30   | Ø73  | 60  | 90 | Ø120 |
| Ø125 | 421.5 / 480 | 540 | 664  | 421.5 / 480 | 421.5 / 480 | 64  | 110 | 40 | 164 | 95.5  | 30   | Ø73  | 64  | 90 | Ø120 |
| Ø140 | 450.5 / 515 | 575 | 724  | 450.5 / 515 | 450.5 / 515 | 80  | 110 | 40 | 189 | 105.5 | 25.5 | Ø73  | 80  | 90 | Ø120 |
| Ø160 | 485.5 / 550 | 615 | 765  | 485.5 / 550 | 485.5 / 550 | 80  | 110 | 45 | 195 | 105.5 | 25.5 | Ø73  | 80  | 90 | Ø120 |
| Ø180 | 526.5 / 590 | 660 | 840  | 526.5 / 590 | 526.5 / 590 | 89  | 110 | 50 | 230 | 115.5 | 26.5 | Ø73  | 89  | 90 | Ø120 |
| Ø200 | 564.5 / 630 | 706 | 912  | 564.5 / 630 | 564.5 / 630 | 91  | 110 | 56 | 262 | 115.5 | 24.5 | Ø73  | 91  | 90 | Ø120 |
| Ø220 | 637 / 712   | 795 | 1046 | 637 / 712   | 637 / 712   | 112 | 110 | 63 | 314 | 127   | 25   | Ø73  | 112 | 90 | Ø120 |
| Ø250 | 652 / 727   | 810 | 1061 | 652 / 727   | 652 / 727   | 111 | 110 | 63 | 314 | 126   | 25   | Ø73  | 111 | 90 | Ø120 |
| Ø320 | 764 / 764   | 939 | 1255 | 764 / 764   | 764 / 764   | 149 | 110 | 80 | 396 | 154   | -    | Ø120 | 150 | -  | Ø120 |



## AHS-MT4



## AHS-MS2



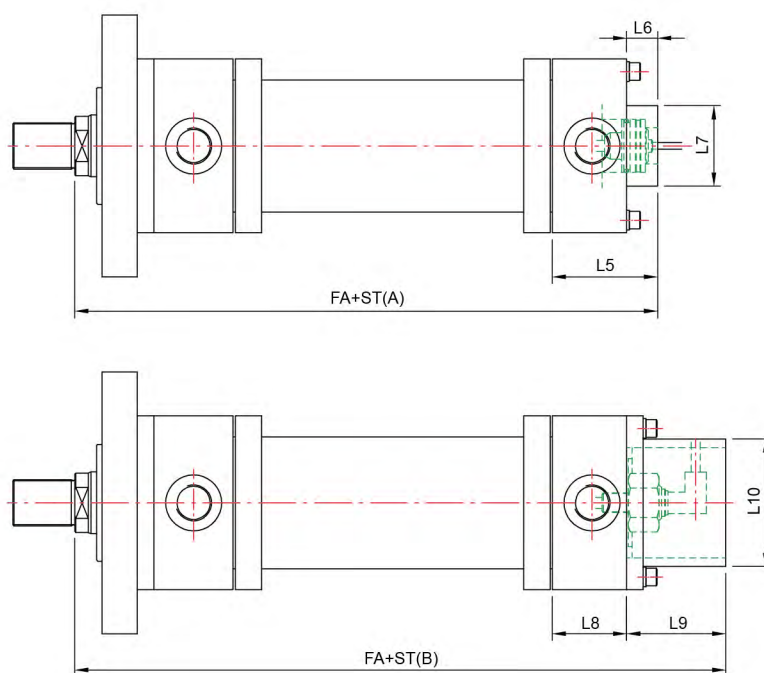
### DIMENSION

| BORE | FA (A/B)    | FB  | CA   | LA (A/B)    | TC (A/B)    | L1  | L2  | L3 | L4  | L5    | L6   | L7   | L8  | L9 | L10  |
|------|-------------|-----|------|-------------|-------------|-----|-----|----|-----|-------|------|------|-----|----|------|
| Ø50  | 281.5 / 340 | -   | -    | 281.5 / 340 | 281.5 / 340 | -   | -   | -  | -   | 85.5  | 31.5 | Ø68  | 54  | 90 | Ø68  |
| Ø63  | 310.5 / 364 | 398 | 472  | 310.5 / 364 | 310.5 / 364 | 50  | 100 | 28 | 102 | 90.5  | 36.5 | Ø76  | 54  | 90 | Ø76  |
| Ø80  | 339.5 / 397 | 434 | 524  | 339.5 / 397 | 339.5 / 397 | 53  | 100 | 32 | 122 | 90.5  | 30   | Ø73  | 58  | 90 | Ø100 |
| Ø100 | 365.5 / 425 | 471 | 573  | 365.5 / 425 | 365.5 / 425 | 60  | 100 | 36 | 138 | 90.5  | 30   | Ø73  | 60  | 90 | Ø120 |
| Ø125 | 421.5 / 480 | 540 | 664  | 421.5 / 480 | 421.5 / 480 | 64  | 110 | 40 | 164 | 95.5  | 30   | Ø73  | 64  | 90 | Ø120 |
| Ø140 | 450.5 / 515 | 575 | 724  | 450.5 / 515 | 450.5 / 515 | 80  | 110 | 40 | 189 | 105.5 | 25.5 | Ø73  | 80  | 90 | Ø120 |
| Ø160 | 485.5 / 550 | 615 | 765  | 485.5 / 550 | 485.5 / 550 | 80  | 110 | 45 | 195 | 105.5 | 25.5 | Ø73  | 80  | 90 | Ø120 |
| Ø180 | 526.5 / 590 | 660 | 840  | 526.5 / 590 | 526.5 / 590 | 89  | 110 | 50 | 230 | 115.5 | 26.5 | Ø73  | 89  | 90 | Ø120 |
| Ø200 | 564.5 / 630 | 706 | 912  | 564.5 / 630 | 564.5 / 630 | 91  | 110 | 56 | 262 | 115.5 | 24.5 | Ø73  | 91  | 90 | Ø120 |
| Ø220 | 637 / 712   | 795 | 1046 | 637 / 712   | 637 / 712   | 112 | 110 | 63 | 314 | 127   | 25   | Ø73  | 112 | 90 | Ø120 |
| Ø250 | 652 / 727   | 810 | 1061 | 652 / 727   | 652 / 727   | 111 | 110 | 63 | 314 | 126   | 25   | Ø73  | 111 | 90 | Ø120 |
| Ø320 | 764 / 764   | 939 | 1255 | 764 / 764   | 764 / 764   | 149 | 110 | 80 | 396 | 154   | -    | Ø120 | 150 | -  | Ø120 |

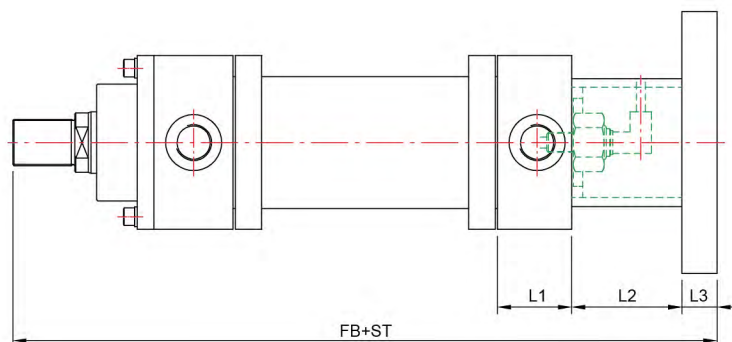


# Linear Position Transmitter series

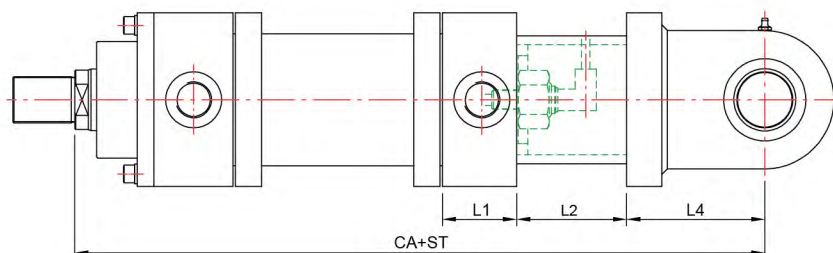
## AKS-MF1/3



## AKS-MF2/4



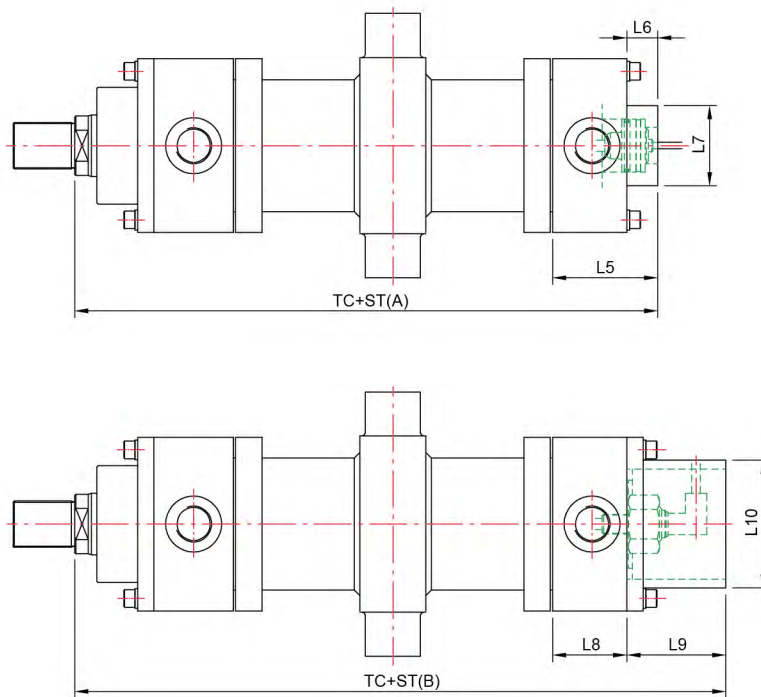
## AKS-MP3/5



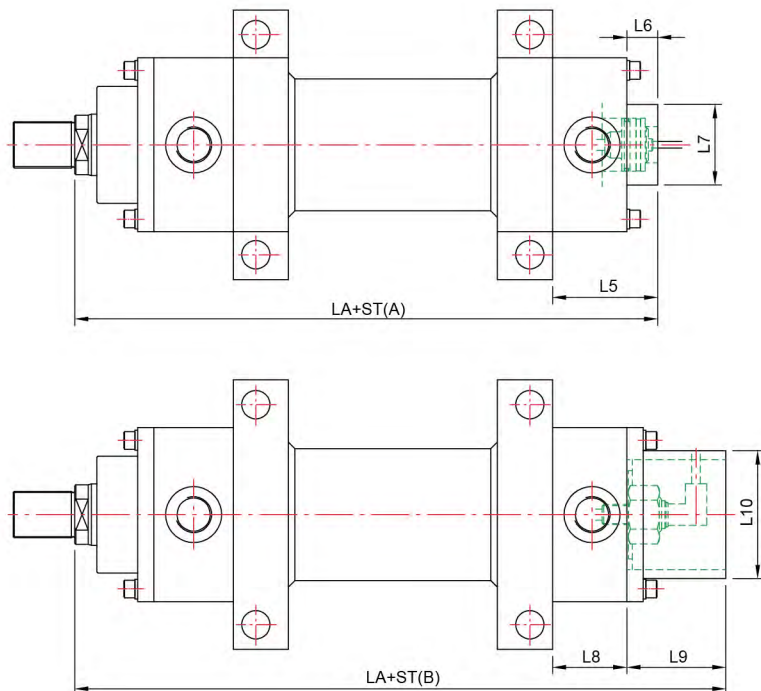
### DIMENSION

| BORE | FA (A/B)      | FB    | CA   | LA (A/B)      | TC (A/B)      | L1   | L2  | L3 | L4    | L5    | L6   | L7   | L8   | L9 | L10  |
|------|---------------|-------|------|---------------|---------------|------|-----|----|-------|-------|------|------|------|----|------|
| Ø50  | 241 / 299.5   | -     | -    | 241 / 299.5   | 241 / 299.5   | -    | -   | -  | -     | 80.5  | 31.5 | Ø65  | 49   | 90 | Ø65  |
| Ø63  | 259.5 / 318   | 353   | 418  | 259.5 / 318   | 259.5 / 318   | 54   | 100 | 25 | 90    | 85.5  | 31.5 | Ø76  | 54   | 90 | Ø76  |
| Ø80  | 282.5 / 340   | 382   | 464  | 282.5 / 340   | 282.5 / 340   | 53   | 100 | 32 | 114   | 85.5  | 32.5 | Ø73  | 53   | 90 | Ø90  |
| Ø100 | 329.5 / 391.5 | 433.5 | 527  | 329.5 / 391.5 | 329.5 / 391.5 | 67.5 | 100 | 32 | 125.5 | 95.5  | 28   | Ø73  | 67.5 | 90 | Ø116 |
| Ø125 | 356.5 / 417   | 469   | 570  | 356.5 / 417   | 356.5 / 417   | 66   | 110 | 32 | 133   | 95.5  | 29.5 | Ø73  | 66   | 90 | Ø120 |
| Ø160 | 399.5 / 462.5 | 518.5 | 651  | 399.5 / 462.5 | 399.5 / 462.5 | 78.5 | 110 | 36 | 168.5 | 105.5 | 27   | Ø73  | 78.5 | 90 | Ø120 |
| Ø200 | 477.5 / 544   | 604   | 765  | 477.5 / 544   | 477.5 / 544   | 87   | 110 | 40 | 201   | 110.5 | 23.5 | Ø73  | 87   | 90 | Ø120 |
| Ø250 | 571.5 / 634   | 710   | 929  | 571.5 / 634   | 571.5 / 634   | 98   | 110 | 56 | 275   | 125.5 | 27.5 | Ø73  | 98   | 90 | Ø120 |
| Ø320 | 688 / 750     | 824   | 1088 | 688 / 750     | 688 / 750     | 107  | 110 | 63 | 327   | 144   | 22   | Ø120 | 116  | 90 | Ø120 |

## AKS-MT4



## AKS-MS2

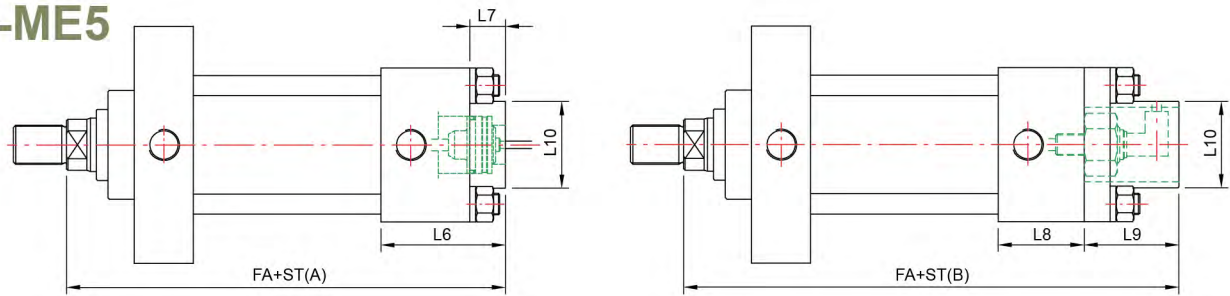


### DIMENSION

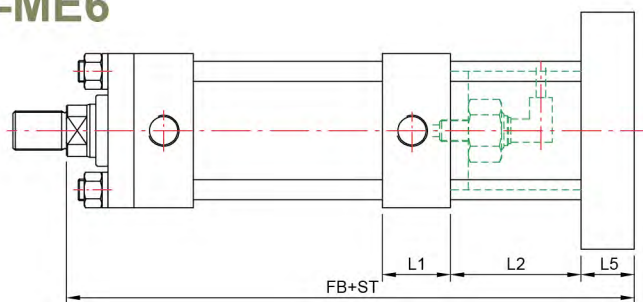
| BORE | FA (A/B)      | FB    | CA   | LA (A/B)      | TC (A/B)      | L1   | L2  | L3 | L4    | L5    | L6   | L7   | L8   | L9 | L10  |
|------|---------------|-------|------|---------------|---------------|------|-----|----|-------|-------|------|------|------|----|------|
| Ø50  | 241 / 299.5   | -     | -    | 241 / 299.5   | 241 / 299.5   | -    | -   | -  | -     | 80.5  | 31.5 | Ø65  | 49   | 90 | Ø65  |
| Ø63  | 259.5 / 318   | 353   | 418  | 259.5 / 318   | 259.5 / 318   | 54   | 100 | 25 | 90    | 85.5  | 31.5 | Ø76  | 54   | 90 | Ø76  |
| Ø80  | 282.5 / 340   | 382   | 464  | 282.5 / 340   | 282.5 / 340   | 53   | 100 | 32 | 114   | 85.5  | 32.5 | Ø73  | 53   | 90 | Ø90  |
| Ø100 | 329.5 / 391.5 | 433.5 | 527  | 329.5 / 391.5 | 329.5 / 391.5 | 67.5 | 100 | 32 | 125.5 | 95.5  | 28   | Ø73  | 67.5 | 90 | Ø116 |
| Ø125 | 356.5 / 417   | 469   | 570  | 356.5 / 417   | 356.5 / 417   | 66   | 110 | 32 | 133   | 95.5  | 29.5 | Ø73  | 66   | 90 | Ø120 |
| Ø160 | 399.5 / 462.5 | 518.5 | 651  | 399.5 / 462.5 | 399.5 / 462.5 | 78.5 | 110 | 36 | 168.5 | 105.5 | 27   | Ø73  | 78.5 | 90 | Ø120 |
| Ø200 | 477.5 / 544   | 604   | 765  | 477.5 / 544   | 477.5 / 544   | 87   | 110 | 40 | 201   | 110.5 | 23.5 | Ø73  | 87   | 90 | Ø120 |
| Ø250 | 571.5 / 634   | 710   | 929  | 571.5 / 634   | 571.5 / 634   | 98   | 110 | 56 | 275   | 125.5 | 27.5 | Ø73  | 98   | 90 | Ø120 |
| Ø320 | 688 / 750     | 824   | 1088 | 688 / 750     | 688 / 750     | 107  | 110 | 63 | 327   | 144   | 22   | Ø120 | 116  | 90 | Ø120 |

# Linear Position Transmitter series

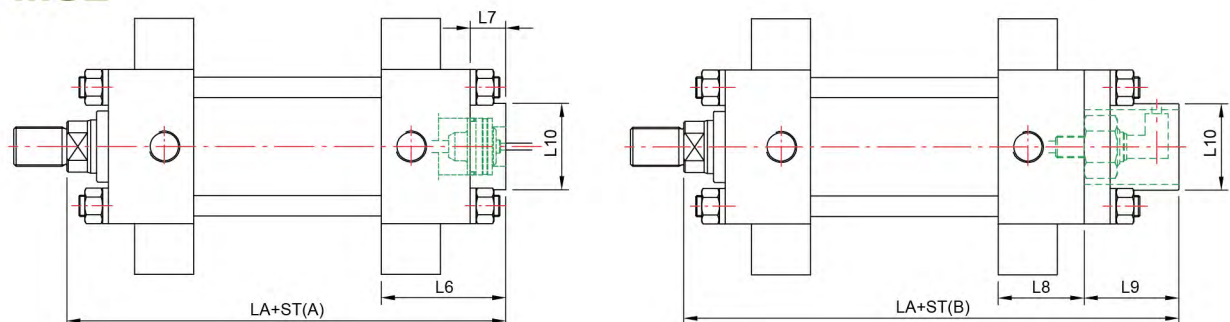
## ATS-ME5



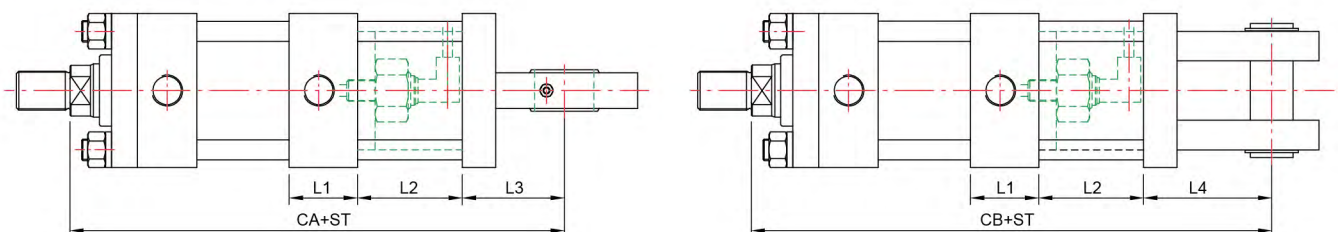
## ATS-ME6



## ATS-MS2



## ATS-MP1/3/5

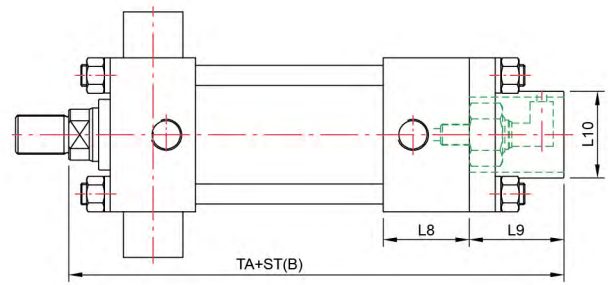
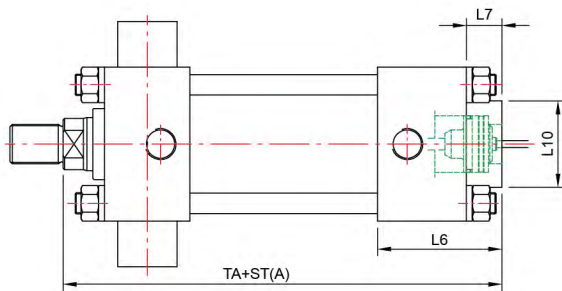


### DIMENSION

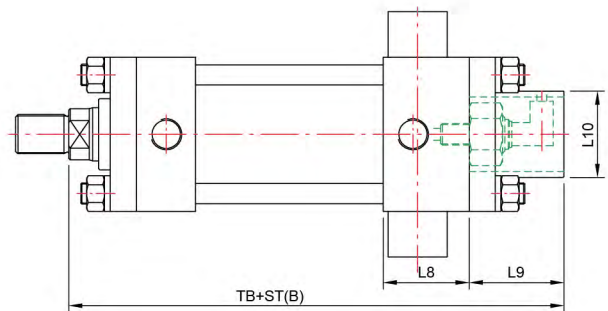
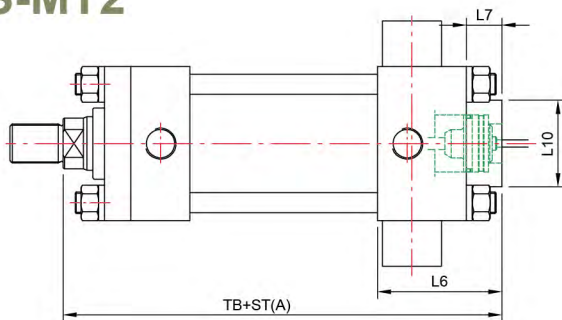
| BORE | FA (A/B)    | FB    | CB    | CA    | LA (A/B)    | TC (A/B)    | TA (A/B)    | TB (A/B)    | L1   | L2  | L3  | L4  | L5 | L6    | L7   | L8   | L9 | L10 |
|------|-------------|-------|-------|-------|-------------|-------------|-------------|-------------|------|-----|-----|-----|----|-------|------|------|----|-----|
| Ø63  | 222 / 269.5 | 317.5 | 333.5 | 339.5 | 222 / 269.5 | 222 / 269.5 | 222 / 269.5 | 222 / 269.5 | 49.5 | 100 | 60  | 54  | 38 | 92    | 16   | 59.5 | 80 | Ø63 |
| Ø80  | 243.5 / 291 | 348.5 | 366.5 | 375.5 | 243.5 / 291 | 243.5 / 291 | 243.5 / 291 | 243.5 / 291 | 52.5 | 105 | 72  | 63  | 45 | 98.5  | 20   | 66   | 80 | Ø73 |
| Ø100 | 263 / 310.5 | 370.5 | 407.5 | 411.5 | 263 / 310.5 | 263 / 310.5 | 263 / 310.5 | 263 / 310.5 | 57.5 | 110 | 86  | 82  | 45 | 105   | 30   | 72.5 | 80 | Ø73 |
| Ø125 | 285 / 332.5 | 405.5 | 438.5 | 453.5 | 285 / 332.5 | 285 / 332.5 | 285 / 332.5 | 285 / 332.5 | 63.5 | 110 | 106 | 91  | 58 | 111   | 35   | 78.5 | 80 | Ø73 |
| Ø160 | 296.5 / 344 | 417   | 460   | 489   | 296.5 / 344 | 296.5 / 344 | 301.5 / 349 | 296.5 / 344 | 62   | 110 | 130 | 101 | 58 | 109.5 | 40   | 77   | 80 | Ø73 |
| Ø200 | 338.5 / 386 | 417   | 528   | 562   | 338.5 / 386 | 338.5 / 386 | 345.5 / 393 | 338.5 / 386 | 68   | 110 | 161 | 127 | 76 | 115.5 | 42.5 | 83   | 80 | Ø73 |



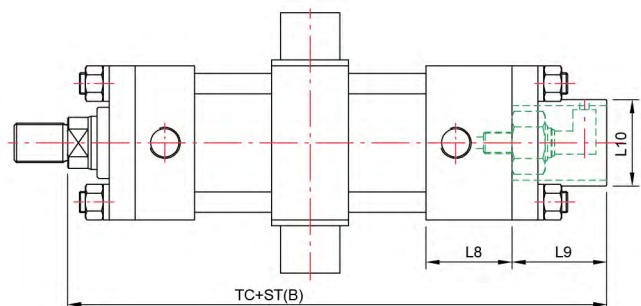
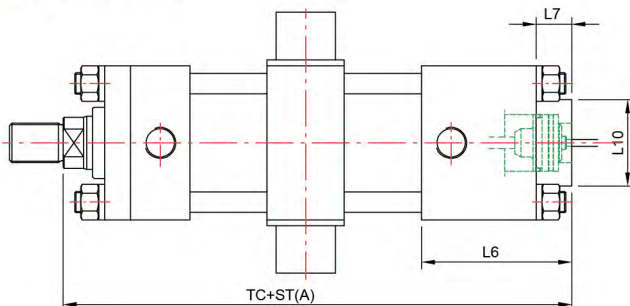
## ATS-MT1



## ATS-MT2



## ATS-MT4



### DIMENSION

| BORE | FA (A/B)    | FB    | CB    | CA    | LA (A/B)    | TC (A/B)    | TA (A/B)    | TB (A/B)    | L1   | L2  | L3  | L4  | L5 | L6    | L7   | L8   | L9 | L10 |
|------|-------------|-------|-------|-------|-------------|-------------|-------------|-------------|------|-----|-----|-----|----|-------|------|------|----|-----|
| Ø63  | 222 / 269.5 | 317.5 | 333.5 | 339.5 | 222 / 269.5 | 222 / 269.5 | 222 / 269.5 | 222 / 269.5 | 49.5 | 100 | 60  | 54  | 38 | 92    | 16   | 59.5 | 80 | Ø63 |
| Ø80  | 243.5 / 291 | 348.5 | 366.5 | 375.5 | 243.5 / 291 | 243.5 / 291 | 243.5 / 291 | 243.5 / 291 | 52.5 | 105 | 72  | 63  | 45 | 98.5  | 20   | 66   | 80 | Ø73 |
| Ø100 | 263 / 310.5 | 370.5 | 407.5 | 411.5 | 263 / 310.5 | 263 / 310.5 | 263 / 310.5 | 263 / 310.5 | 57.5 | 110 | 86  | 82  | 45 | 105   | 30   | 72.5 | 80 | Ø73 |
| Ø125 | 285 / 332.5 | 405.5 | 438.5 | 453.5 | 285 / 332.5 | 285 / 332.5 | 285 / 332.5 | 285 / 332.5 | 63.5 | 110 | 106 | 91  | 58 | 111   | 35   | 78.5 | 80 | Ø73 |
| Ø160 | 296.5 / 344 | 417   | 460   | 489   | 296.5 / 344 | 296.5 / 344 | 301.5 / 349 | 296.5 / 344 | 62   | 110 | 130 | 101 | 58 | 109.5 | 40   | 77   | 80 | Ø73 |
| Ø200 | 338.5 / 386 | 417   | 528   | 562   | 338.5 / 386 | 338.5 / 386 | 345.5 / 393 | 338.5 / 386 | 68   | 110 | 161 | 127 | 76 | 115.5 | 42.5 | 83   | 80 | Ø73 |



## HLT 1000-R2

|                  |                  |                    |
|------------------|------------------|--------------------|
| Magnetostrictive | fully integrated | Resolution 1000 µm |
|------------------|------------------|--------------------|

Analogue and digital interfaces

**CANopen**

### Description:

The sensor works on the principle of magnetostriction.

The measuring principle determines the position, distance and / or speed with great precision, if required, and is based on transit time measurement.

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

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

Primary applications are in mobile hydraulics.

### Technical Data:

| Input data                                                               |                                                                                                                                       |                            |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Measurement ranges                                                       | 50 .. 2500 mm                                                                                                                         |                            |
| Measured variable                                                        | Position / distance                                                                                                                   |                            |
| Type                                                                     | Cylinder integrated                                                                                                                   |                            |
| Hydraulic pipe                                                           | Stainless steel 1.4571                                                                                                                |                            |
| Pressure resistance                                                      | 450 bar                                                                                                                               |                            |
| Peak pressure                                                            | 630 bar                                                                                                                               |                            |
| Housing                                                                  | Stainless steel 1.4301                                                                                                                |                            |
| Output data                                                              |                                                                                                                                       |                            |
| Output signal                                                            | Current: 4 ..20 mA or 20 ..4 mA<br>Voltage: 0 ..10 V or 10 .. 0 V<br>0.25 .. 4.75 V or 4.75 .. 0.25 V<br>0.5 .. 9.5 V<br>0.5 .. 4.5 V |                            |
| Output signal Digital                                                    | CANopen                                                                                                                               |                            |
| Measuring accuracy                                                       | Analogue                                                                                                                              | CANopen                    |
| Resolution                                                               | 12 Bit, min. 0.1 mm                                                                                                                   | 0.1 mm                     |
| Ohmic resistance to GND                                                  | Current: 200 .. 500Ω<br>Spannung:>2 kΩ                                                                                                |                            |
| CAN Interface                                                            |                                                                                                                                       | ISO/DIS 11898              |
| Accuracy in accordance with DIN 16086 $\leq \pm 0.5\%$ FS typ.           |                                                                                                                                       | $\leq \pm 0.2\%$ FS typ.   |
| Non linearity                                                            | $\leq \pm 0.05\%$ FS                                                                                                                  | $\leq \pm 0.02\%$ FS       |
| Hysteresis                                                               | $\leq \pm 0.1\%$ FS                                                                                                                   | $\leq \pm 0.1\%$ FS        |
| Repeatability                                                            | $\leq \pm 0.1\%$ FS                                                                                                                   | $\leq \pm 0.1\%$ FS        |
| Temperature coefficient                                                  | $\leq \pm 0.01\%$ FS / °C                                                                                                             | $\leq \pm 0.003\%$ FS / °C |
| Sampling rate (internal)                                                 | 2 ms                                                                                                                                  | 2 ms                       |
| Installation position and movement speed No restrictions                 |                                                                                                                                       |                            |
| Ambient conditions                                                       |                                                                                                                                       |                            |
| Operating temperature range                                              | -40 .. +85 °C                                                                                                                         |                            |
| Storage temperature range                                                | -40 .. +100 °C, dry                                                                                                                   |                            |
| Fluid temperature range                                                  | -40 .. +120°C                                                                                                                         |                            |
| Relative humidity                                                        | 90 %, non-condensing                                                                                                                  |                            |
| CE - mark                                                                | EN 61000-6-1 / 2 / 3 / 4                                                                                                              |                            |
| Vibration resistance per<br>DIN EN 60068-2-6 at 10 .. 500 Hz<br>at 5 kHz | $\leq 20\text{ g}$<br>$\leq 15\text{ g}$                                                                                              |                            |
| Shock resistance to<br>DIN EN 60068-2-27 (11 ms)                         | $\leq 50\text{ g}$                                                                                                                    |                            |
| Protection class to IEC 60529 <sup>1)</sup>                              | IP 67                                                                                                                                 |                            |
| Other data                                                               |                                                                                                                                       |                            |
| Electrical connection <sup>1)</sup>                                      | Jacketed cable (PUR)<br>Shouldered flange connector M12x1                                                                             |                            |
| Supply voltage                                                           | 9 .. 36 V DC                                                                                                                          |                            |
| Residual ripple of supply voltage                                        | $\leq 250\text{ mVPP}$                                                                                                                |                            |
| Current consumption without output                                       | < 100 mA                                                                                                                              |                            |
| Weight                                                                   | 1000 g, 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 versions are possible.

## HOW TO ORDER

**Model Code:** HLT 1 0 00 - R2 - XXX - XXX - XXXX - 000

### Design/Geometry type

1 = rod

### Type

R2 = Cylinder integrated

### Electrical connection

#### Cable outlet

K01 = single lead, length 1 m

K02 = single lead, length 2 m

K05 = single lead, length 5 m

K10 = single lead, length 10 m

#### Shouldered flange connector M12x1

(4 pole for Signal output analogue, 5 pole for Signal Output: CANopen)

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

F11 = CANopen

### Measuring range in mm (50 to 2500 mm)

Example

0150 = 150 mm

### Modification

000 = Standard

003 = special assigned plug (only in conjunction with analogue output signal)

004 = special assigned plug (only in conjunction with analogue output signal)

### Notes:

Special models on request.

### Accessories available: (not supplied with instrument)

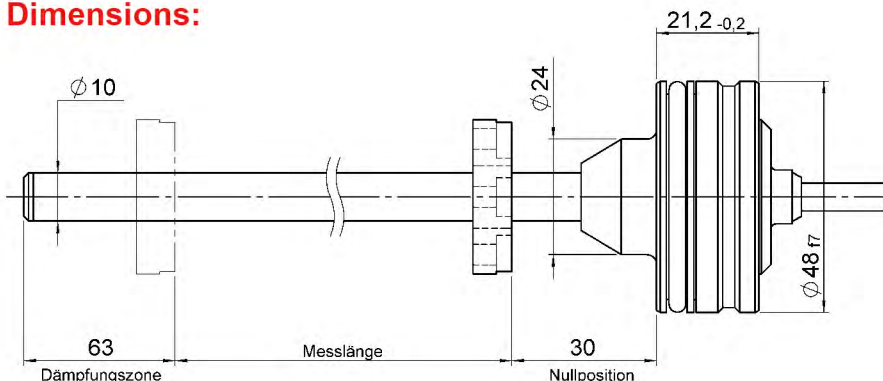
ZBL MR 17.4 Position magnet Part no.: 6119372

ZBL MR22 Position magnet Part no.: 6084453

ZBL MR33 Position magnet Part no.: 6084207

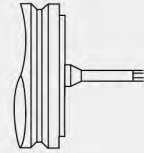
More detailed information on accessories as well as on further accessories, such as female connectors, etc. can be found in the accessories brochure.

## Dimensions:



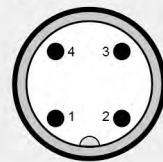
## Steckerbelegung:

Cable outlet



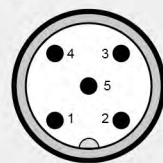
| Ader  | Analog          | CANopen         |
|-------|-----------------|-----------------|
| braun | +U <sub>B</sub> | +U <sub>B</sub> |
| weiß  | 0 V             | 0V              |
| grün  | Analog          | CAN_L           |
| gelb  | n.c.            | CAN_H           |

M12x1, 4-polig



| Pin | Mod. 000        | Mod. 003        | Mod. 004        |
|-----|-----------------|-----------------|-----------------|
| 1   | +U <sub>B</sub> | +U <sub>B</sub> | n.c.            |
| 2   | n.c.            | Signal          | +U <sub>B</sub> |
| 3   | Analog          | 0 V             | 0 V             |
| 4   | Signal          | n.c.            | Signal          |

M12x1, 5-polig



| Pin | Signal          | Beschreibung           |
|-----|-----------------|------------------------|
| 1   | n.c.            |                        |
| 2   | +U <sub>B</sub> | 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. For applications or operating conditions not described, please contact the relevant technical department.

**Subject to technical modifications.**



# Linear Position Transmitter series



## Description:

The sensor works on the principle of magnetostriction.

The measurement principle for high-precision determination of the position, of the distance and/or also of a velocity signal is based on a runtime asurement.

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

The different output signals (analogue/digital) facilitate the connection of all measurement and control instruments as well as standard evaluation systems (e.g. PLC controls)

HLT 2100-R1 is primarily used in stationary applications as partly integrated solutions in hydraulic cylinders.

## HLT 2100-R1

|                  |                   |                 |
|------------------|-------------------|-----------------|
| Magnetostrictive | partly integrated | Resolution 5 µm |
|------------------|-------------------|-----------------|

Analogue and digital interfaces

Logos :  
Profibus, CANopen,  
DeviceNet,  
SSI, EtherCAT

## Technical Data:

| Input data                                                 |                                                                                        |
|------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Measurement ranges                                         | 50 .. 4000 mm                                                                          |
| Measured variable                                          | Distance, position, speed                                                              |
| Mechanical connection                                      | Threaded flange M18x1.5                                                                |
| Hydraulic pipe                                             | Stainless steel                                                                        |
| Pressure resistance                                        | 450 bar                                                                                |
| Peak pressure                                              | 750 bar                                                                                |
| Housing                                                    | Aluminium                                                                              |
| Output data                                                |                                                                                        |
| Output signal Analogue                                     | Current: 4 .. 20 mA or 20 .. 4 mA<br>Voltage: 0 .. 10 V or 10 .. 0 V                   |
| Output signal Digital                                      | Profibus, CANopen, DeviceNet, SSI, EtherCAT                                            |
| Resolution                                                 | Analogue: 16 Bit; $\geq 0.005$ mm<br>Digital: $0.005$ mm <sup>1)</sup>                 |
| Ohmic resistance to GND (only with analogue signal output) | Current: 200 .. 500 $\Omega$<br>voltage: $> 2$ k $\Omega$                              |
| Accuracy                                                   | $\leq \pm 0.5$ % FS typ.                                                               |
| Non linearity                                              | $\pm 0.1$ mm to 1,500 mm<br>$\pm 0.15$ mm $> 1,500$ mm                                 |
| Hysteresis                                                 | $\leq \pm 0.1$ % FS                                                                    |
| Repeatability                                              | $\leq 0.005$ mm - $\leq 0.05$ mm (depends on length)                                   |
| Temperature coefficient                                    | $\leq \pm 0.004$ % FS / °C (analogue)<br>$\leq \pm 0.0015$ % FS / °C (digital)         |
| Sampling rate                                              | 2 ms                                                                                   |
| Installation position and movement speed                   | No orientation restrictions                                                            |
| Ambient conditions                                         |                                                                                        |
| Operating temperature range                                | 0 .. +70 °C                                                                            |
| Storage temperature range                                  | -30 .. +85 °C, dry                                                                     |
| Relative humidity                                          | 98 %, non-condensing                                                                   |
| CE - mark                                                  | EN 61000-6-1 / 2 / 3 / 4                                                               |
| Vibration resistance per DIN EN 60068-2-6 at 50 .. 2000 Hz | $\leq 10$ g                                                                            |
| Shock resistance according to DIN EN 60068-2-27            | C100 g / 11 ms / half sine                                                             |
| Protection class to IEC 60529 <sup>1)</sup>                | IP 65                                                                                  |
| Other data                                                 |                                                                                        |
| Electrical connection                                      |                                                                                        |
| - Analogue                                                 | - Jacketed cable, length 1 m <sup>1)</sup><br>- Male M16, 6 pole<br>- 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 connector, 12 pole                                                        |
| - EtherCAT                                                 | 2 female M12x1, 4 pole<br>+ male M8, 4 pole                                            |
| Supply voltage                                             | 24 V DC $\pm 10$ %                                                                     |
| Residual ripple of supply voltage                          | $\leq 250$ mVPP                                                                        |
| Current consumption without output                         | $< 250$ 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) further variants on request

## HOW TO ORDER

### Model Code:

HLT 2 1 00 - R1 - XXX - XXX - XXXX - 000

#### Design/Geometry type

1 = rod

#### Type

R1 = threaded flange M18 x 1.5

#### Electrical connection

##### Signal Analogue

K01 = Jacketed cable, length 1 m

M06 = male M16, 6 pole

M08 = Male M16, 8 pole

Signal CANopen, DeviceNet

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

Signal Profibus

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

Signal Synchronous Serial Interface

S01 = CONTACT male connector, 12 pole

Signal 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 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

ETC = EtherCAT

SSI = Synchronous serial interface

F11 = CANopen

F41 = Profibus

DVN = Device Net

#### Measuring range in mm (50 to 4000 mm)

Example

0150 = 150 mm

#### Modification

000 = Standard

#### Notes:

Special models on request.

#### Accessories available: (not supplied with instrument)

|               |                     |                   |
|---------------|---------------------|-------------------|
| ZBL MR 17.4   | Position magnet     | Part no.: 6119372 |
| ZBL MR22      | Position magnet     | Part no.: 6084453 |
| ZBL MR33      | Position magnet     | Part no.: 6084207 |
| Distance ring | AD 17.4 x ID 13.5x5 | Part No.: 3903233 |
| Distance ring | AD 33 x ID 13.5x5   | Part No.: 3887829 |
| ZBL MV 63     | Position magnet     | Part no.: 6084454 |
| ZBL MU 38-20  | Position magnet     | Part no.: 6084455 |

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

### Pin connections: Analogue:

Male M16, 6 pole



Pin

|   |                       |
|---|-----------------------|
| 1 | Signal                |
| 2 | 0 V (analogue output) |
| 3 | n.c.                  |
| 4 | n.c.                  |
| 5 | 0 V                   |
| 6 | +U <sub>B</sub>       |

Male M16, 8 pole



Pin

|   |                       |
|---|-----------------------|
| 1 | n.c.                  |
| 2 | 0 V (analogue output) |
| 3 | n.c.                  |
| 4 | n.c.                  |
| 5 | Signal                |
| 6 | 0 V                   |
| 7 | +U <sub>B</sub>       |
| 8 | n.c.                  |

#### Cable outlet

Lead

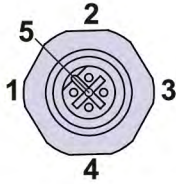
|            |                       |
|------------|-----------------------|
| braunbrown | 0 V (analogue output) |
| Green      | n.c.                  |
| yellow     | n.c.                  |
| grey       | Signal                |
| pink       | 0 V                   |
| Blue       | +U <sub>B</sub>       |



# Linear Position Transmitter

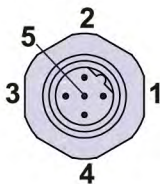
## CANopen / DeviceNet:

Female M12x1, 5 pole, A encoded



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

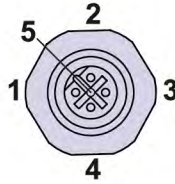
Female M12x1, 5 pole, A encoded



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

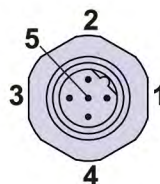
## Profibus:

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   |  |

Female 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   |  |

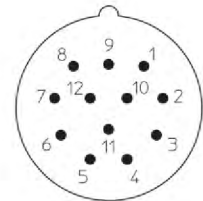
Male M 8x1, 4 pole



| Pin | Profibus_IN     |  |
|-----|-----------------|--|
| 1   | +U <sub>B</sub> |  |
| 2   | n.c.            |  |
| 3   | 0 V             |  |
| 4   | n.c.            |  |

## Synchronous Serial Interface:

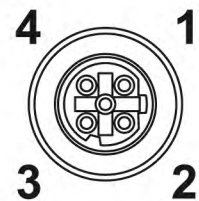
CONTACT male connector, 12 pole



| 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 <sub>B</sub> IN |  |
| 12  | 0 V IN             |  |

## EtherCAT:

Female M12x1, 4 pole, D encoded



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

Female M8x1, 4 pole, A encoded

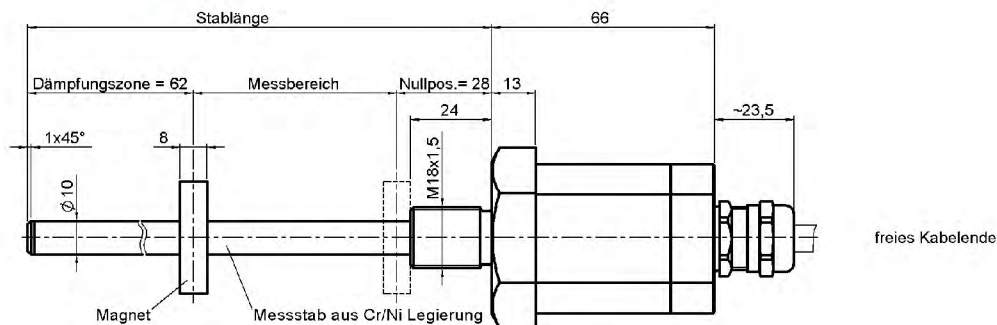


| Pin |                 |  |
|-----|-----------------|--|
| 1   | +U <sub>B</sub> |  |
| 2   | n.c.            |  |
| 3   | 0 V             |  |
| 4   | n.c.            |  |

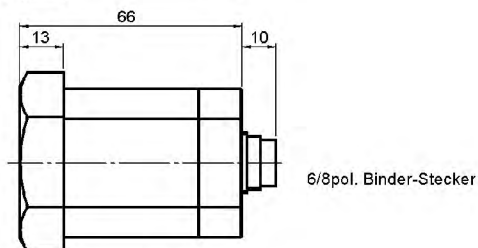


## Dimensions:

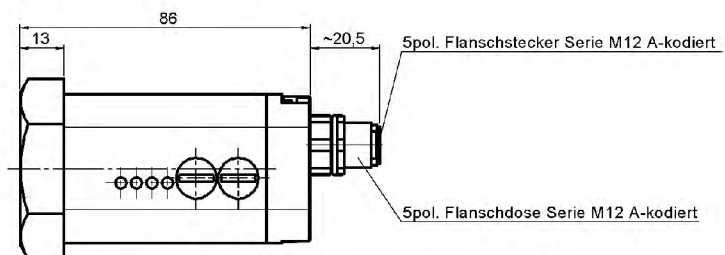
Signal output: analogue (K01)



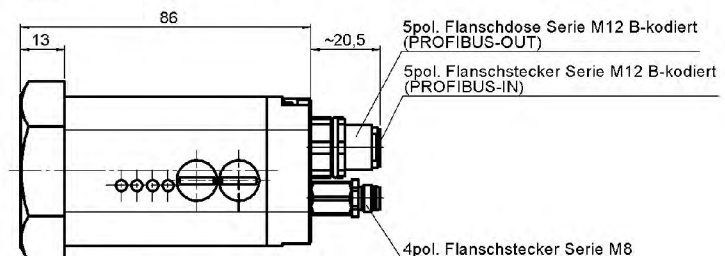
Signal output: analogue (M06, M08)



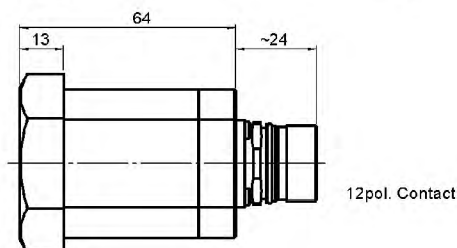
Signal output CANopen,  
Device Net (C61)



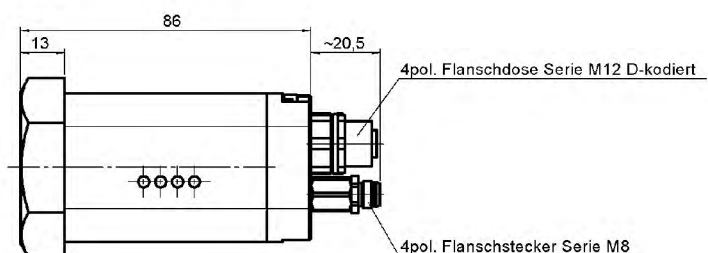
Signal output: Profibus (P61)



Signal output: synchronous serial  
interface (S01)



Signal output t: EtherCAT (E51)



### 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.**

# Linear Position Transmitter



## HLT 2500-F1

Magnetostrictive

Flat profile

Resolution 5  $\mu$ m

Analogue and digital interfaces

Logos :  
Profibus, CANopen,  
DeviceNet,  
SSI, EtherCAT

### Description:

The sensor works on the principle of magnetostriction.  
The measurement principle for high-precision determination of the position, of the distance and/or also of a velocity signal is based on a runtime measurement.

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

The different output signals (analogue/digital) facilitate the connection of all measurement and control instruments as well as standard evaluation systems (e.g. PLC controls)

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

### Technical Data:

| Input data                                                 |                                                                                       |
|------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Measurement ranges                                         | 50 .. 4000 mm                                                                         |
| Measured variable                                          | Distance, position, speed                                                             |
| Mechanical Connection                                      | Flat profile, without magnetic guidance                                               |
| Housing                                                    | Aluminium                                                                             |
| Output data                                                |                                                                                       |
| Output signal Analogue                                     | Current: 4 .. 20 mA or 20 .. 4 mA<br>Voltage: 0 .. 10 V or 10 .. 0 V                  |
| Output signal Digital                                      | Profibus, CANopen, Device Net, SSI, EtherCAT                                          |
| Resolution                                                 | Analogue: 16 Bit; $\geq 0.005$ mm<br>Digital: $0.005$ mm <sup>1)</sup>                |
| Ohmic resistance to GND (only with analogue signal output) | Current: 200 .. 500 $\Omega$<br>voltage: $> 2$ k $\Omega$                             |
| Accuracy                                                   | $\leq \pm 0.5$ % FS typ.                                                              |
| Non linearity                                              | $\pm 0.1$ mm to 1,500 mm<br>$\pm 0.15$ mm $> 1,500$ mm                                |
| Hysteresis                                                 | $\leq \pm 0.1$ % FS                                                                   |
| Repeatability                                              | $\leq 0.005$ mm - $\leq 0.05$ mm (depends on length)                                  |
| Temperature coefficient                                    | $\leq \pm 0.004$ % FS / °C (analogue)<br>$\leq \pm 0.0015$ % FS / °C (digital)        |
| Sampling rate                                              | 2 ms                                                                                  |
| Installation position and movement speed                   | No orientation restrictions                                                           |
| Ambient conditions                                         |                                                                                       |
| Operating temperature range                                | 0 .. +70 °C                                                                           |
| Storage temperature range                                  | -30 .. +85 °C, dry                                                                    |
| Relative humidity                                          | 98 %, non-condensing                                                                  |
| CE - mark                                                  | EN 61000-6-1 / 2 / 3 / 4                                                              |
| Vibration resistance per DIN EN 60068-2-6 at 50 .. 2000 Hz | $\leq 10$ g                                                                           |
| Shock resistance according to DIN EN 60068-2-27            | $\leq 100$ g / 11 ms / half sine                                                      |
| Protection class to IEC 60529 <sup>1)</sup>                | IP 65                                                                                 |
| Other data                                                 |                                                                                       |
| Electrical connection                                      |                                                                                       |
| - Analogue                                                 | - Jacketed cable, length 1 m <sup>1)</sup><br>- Male M16, 6 pole<br>VMale M16, 8 pole |
| - CANopen, Device Net                                      | Female M1 2x1, 5 pole + Male M12x1, 5 pole                                            |
| - Profibus                                                 | Female M12x1, 5 pole + Male M12x1, 5 pole + Male M8, 4 pole                           |
| - Synchronous Serial Interface                             | CONTACT male connector, 12 pole                                                       |
| - EtherCAT                                                 | 2 female M12x1, 4 pole<br>+ male M8, 4 pole                                           |
| Supply voltage                                             | 24 V DC $\pm 10$ %                                                                    |
| Residual ripple of supply voltage                          | $\leq 250$ mVPP                                                                       |
| Current consumption without output                         | $< 250$ 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) further variants on request

## HOW TO ORDER

### Model Code:

HLT 2 5 00 - F1 - XXX - XXX - XXXX - 000

#### Design/Geometry type

5 = profile

#### Type

F1 = Flat profile, without magnetic guidance

#### Electrical connection

##### Signal Analogue

K01 = Jacketed cable, length 1 m

M06 = male M16, 6 pole

M08 = Male M16, 8 pole

Signal CANopen, DeviceNet

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

Signal Profibus

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

Signal Synchronous Serial Interface

S01 = CONTACT male connector, 12 pole

Signal 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 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

ETC = EtherCAT

SSI = Synchronous serial interface

F11 = CANopen

F41 = Profibus

DVN = Device Net

#### Measuring range in mm (50 to 4000 mm)

Example

0150 = 150 mm

#### Modification

000 = Standard

#### Notes:

Special models on request.

#### Accessories available: (not supplied with instrument)

##### ZBL Mounting kit

ZBL MU 38-18 Position magnet Part No.: 6105653

ZBL MF 55-20 Position magnet Part no.: 6084456

ZBL MF 55-20 Position magnet Part no.: 6084457

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

Male M16, 6 pole



Pin

|   |                       |
|---|-----------------------|
| 1 | Signal                |
| 2 | 0 V (analogue output) |
| 3 | n.c.                  |
| 4 | n.c.                  |
| 5 | 0 V                   |
| 6 | +U <sub>B</sub>       |

Male M16, 8 pole



Pin

|   |                       |
|---|-----------------------|
| 1 | n.c.                  |
| 2 | 0 V (analogue output) |
| 3 | n.c.                  |
| 4 | n.c.                  |
| 5 | Signal                |
| 6 | 0 V                   |
| 7 | +U <sub>B</sub>       |
| 8 | n.c.                  |

#### Cable outlet

Lead

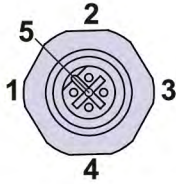
|            |                       |
|------------|-----------------------|
| braunbrown | 0 V (analogue output) |
| Green      | n.c.                  |
| yellow     | n.c.                  |
| grey       | Signal                |
| pink       | 0 V                   |
| Blue       | +U <sub>B</sub>       |



# Linear Position Transmitter

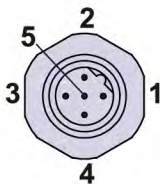
## CANopen / DeviceNet:

Female M12x1, 5 pole, A encoded



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

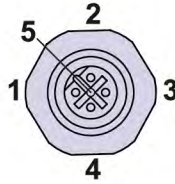
Female M12x1, 5 pole, A encoded



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

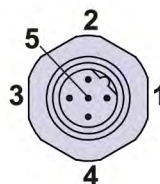
## Profibus:

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   |  |

Female 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   |  |

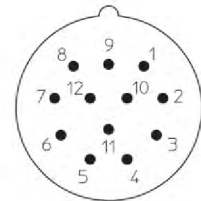
Male M 8x1, 4 pole



| Pin | Profibus_IN     |  |
|-----|-----------------|--|
| 1   | +U <sub>B</sub> |  |
| 2   | n.c.            |  |
| 3   | 0 V             |  |
| 4   | n.c.            |  |

## Synchronous Serial Interface:

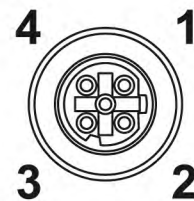
CONTACT male connector, 12 pole



| 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 <sub>B</sub> IN |  |
| 12  | 0 V IN             |  |

## EtherCAT:

Female M12x1, 4 pole, D encoded



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

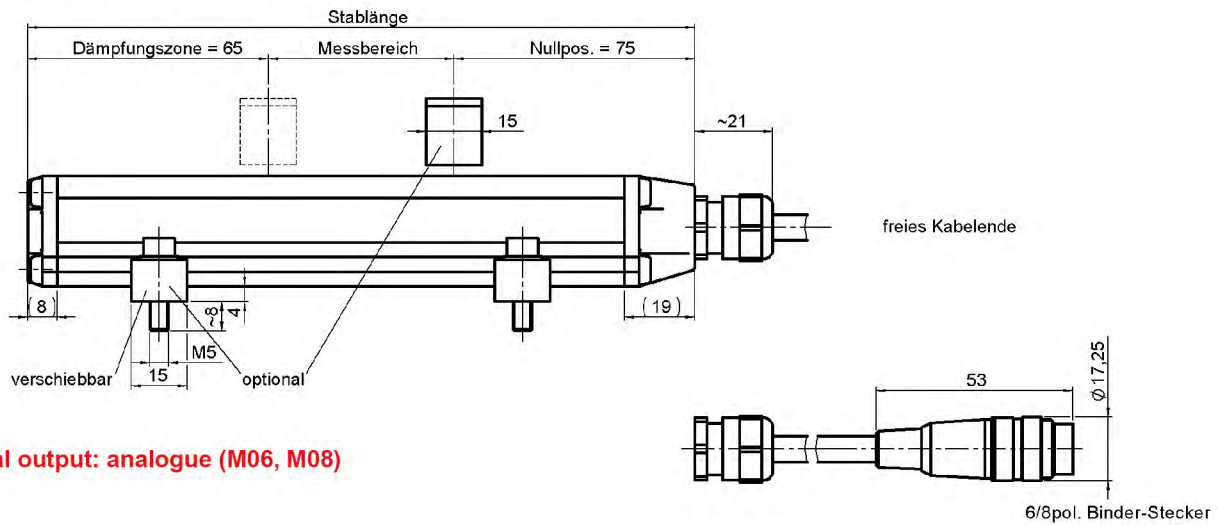
Female M8x1, 4 pole, A encoded



| Pin |                 |  |
|-----|-----------------|--|
| 1   | +U <sub>B</sub> |  |
| 2   | n.c.            |  |
| 3   | 0 V             |  |
| 4   | n.c.            |  |

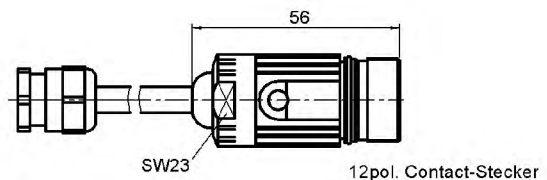
## Dimensions:

### Signal output: analogue (K01)

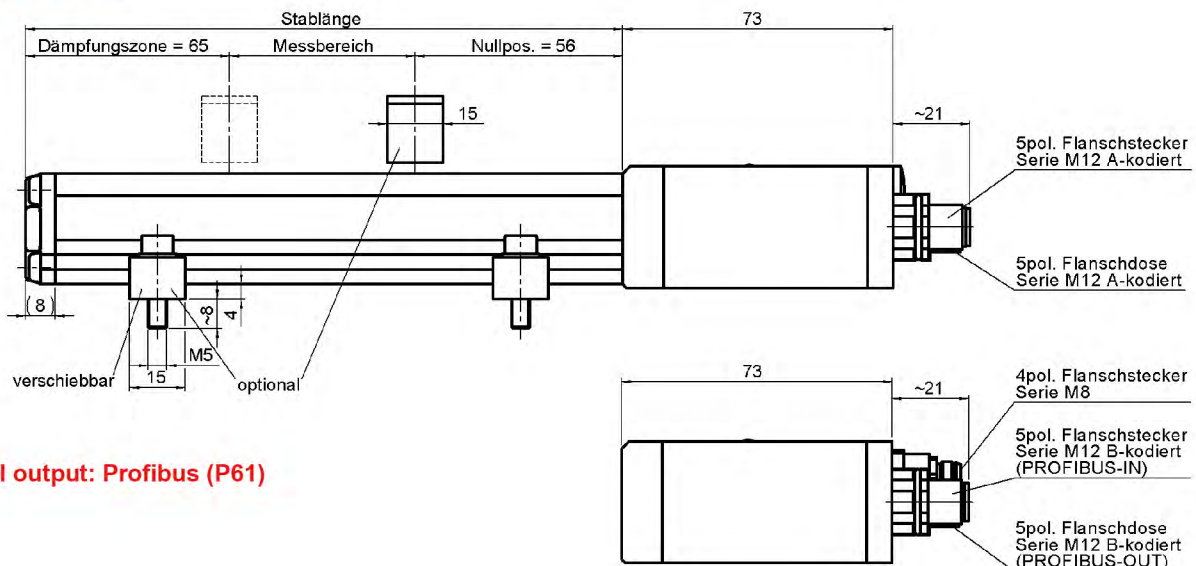


### Signal output: analogue (M06, M08)

### Signal output: synchronous serial interface (S01)

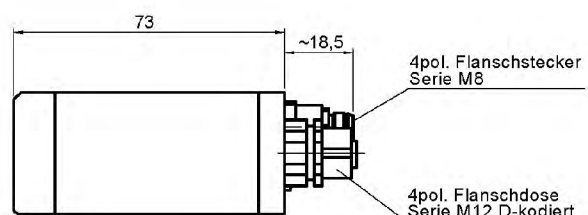


### Signal output CANopen, Device Net (C61)



### Signal output: Profibus (P61)

### Signal output: EtherCAT (E51)



### 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.**

# Linear Position Transmitter



## HLT 2500-L2

Magnetostrictive

Flat profile

Resolution 5  $\mu\text{m}$

Analogue and digital interfaces

Logos :  
Profibus, CANopen,  
DeviceNet,  
SSI, EtherCAT

### Description:

The sensor works on the principle of magnetostriction. The measurement principle for high-precision determination of the position, of the distance and/or also of a velocity signal is based on a runtime measurement.

Utilizing this non-contact and wear-free measuring system, We 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/digital) facilitate the connection of all measurement and control instruments as well as standard evaluation systems (e.g. PLC controls)

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

### Technical Data:

| Input data                                                 |                                                                                       |
|------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Measurement ranges                                         | 50 .. 4000 mm                                                                         |
| Measured variable                                          | Distance, position, speed                                                             |
| Mechanical Connection                                      | Flat profile, without magnetic guidance                                               |
| Housing                                                    | Aluminium                                                                             |
| Output data                                                |                                                                                       |
| Output signal Analogue                                     | Current: 4 .. 20 mA or 20 .. 4 mA<br>Voltage: 0 .. 10 V or 10 .. 0 V                  |
| Output signal Digital                                      | Profibus, CANopen, Device Net, SSI, EtherCAT                                          |
| Resolution                                                 | Analogue: 16 Bit; $\geq 0.005$ mm<br>Digital: $0.005$ mm <sup>1)</sup>                |
| Ohmic resistance to GND (only with analogue signal output) | Current: 200 .. 500 $\Omega$<br>voltage: $> 2$ k $\Omega$                             |
| Accuracy                                                   | $\leq \pm 0.5$ % FS typ.                                                              |
| Non linearity                                              | $\pm 0.1$ mm to 1,500 mm<br>$\pm 0.15$ mm $> 1,500$ mm                                |
| Hysteresis                                                 | $\leq \pm 0.1$ % FS                                                                   |
| Repeatability                                              | $\leq 0.005$ mm - $\leq 0.05$ mm (depends on length)                                  |
| Temperature coefficient                                    | $\leq \pm 0.004$ % FS / °C (analogue)<br>$\leq \pm 0.0015$ % FS / °C (digital)        |
| Sampling rate                                              | 2 ms                                                                                  |
| Installation position and movement speed                   | No orientation restrictions                                                           |
| Ambient conditions                                         |                                                                                       |
| Operating temperature range                                | 0 .. +70 °C                                                                           |
| Storage temperature range                                  | -30 .. +85 °C, dry                                                                    |
| Relative humidity                                          | 98 %, non-condensing                                                                  |
| CE - mark                                                  | EN 61000-6-1 / 2 / 3 / 4                                                              |
| Vibration resistance per DIN EN 60068-2-6 at 50 .. 2000 Hz | $\leq 10$ g                                                                           |
| Shock resistance according to DIN EN 60068-2-27            | $\leq 100$ g / 11 ms / half sine                                                      |
| Protection class to IEC 60529 <sup>1)</sup>                | IP 65                                                                                 |
| Other data                                                 |                                                                                       |
| Electrical connection                                      |                                                                                       |
| - Analogue                                                 | - Jacketed cable, length 1 m <sup>1)</sup><br>- Male M16, 6 pole<br>VMale 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 connector, 12 pole                                                       |
| - EtherCAT                                                 | 2 female M12x1, 4 pole<br>+ male M8, 4 pole                                           |
| Supply voltage                                             | 24 V DC $\pm 10$ %                                                                    |
| Residual ripple of supply voltage                          | $\leq 250$ mVPP                                                                       |
| Current consumption without output                         | $< 250$ 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) further variants on request



## HOW TO ORDER

### Model Code:

HLT 2 5 00 - L2 - XXX - XXX - XXXX - 000

#### Design/Geometry type

5 = profile

#### Type

L2 = Flat profile, with magnetic guidance

#### Electrical connection

##### Signal Analogue

K01 = Jacketed cable, length 1 m

M06 = male M16, 6 pole

M08 = Male M16, 8 pole

Signal CANopen, DeviceNet

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

Signal Profibus

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

Signal Synchronous Serial Interface

S01 = CONTACT male connector, 12 pole

Signal 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 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

ETC = EtherCAT

SSI = Synchronous serial interface

F11 = CANopen

F41 = Profibus

DVN = Device Net

#### Measuring range in mm (50 to 4000 mm)

Example

0150 = 150 mm

#### Modification

000 = Standard

#### Notes:

Special models on request.

#### Accessories available: (supplied with the instrument)

ZBL MS35-39 Magnet slide Part No.: 6105654

#### Accessories available: (not supplied with instrument)

ZBL MV 63 Position magnet Part no.: 6084454

ZBL Mounting kit Part No.: 6105653

ZBL MU 38-20 Position magnet Part no.: 6084454

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

Male M16, 6 pole



Pin

|   |                       |
|---|-----------------------|
| 1 | Signal                |
| 2 | 0 V (analogue output) |
| 3 | n.c.                  |
| 4 | n.c.                  |
| 5 | 0 V                   |
| 6 | +U <sub>B</sub>       |

Male M16, 8 pole



Pin

|   |                       |
|---|-----------------------|
| 1 | n.c.                  |
| 2 | 0 V (analogue output) |
| 3 | n.c.                  |
| 4 | n.c.                  |
| 5 | Signal                |
| 6 | 0 V                   |
| 7 | +U <sub>B</sub>       |
| 8 | n.c.                  |

#### Cable outlet

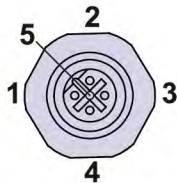
Lead

|            |                       |
|------------|-----------------------|
| braunbrown | 0 V (analogue output) |
| Green      | n.c.                  |
| yellow     | n.c.                  |
| grey       | Signal                |
| pink       | 0 V                   |
| Blue       | +U <sub>B</sub>       |

# Linear Position Transmitter

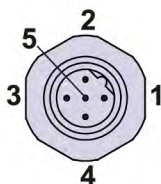
## CANopen / DeviceNet:

Female M12x1, 5 pole, A encoded



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

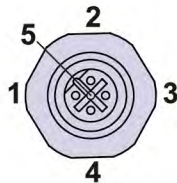
Female M12x1, 5 pole, A encoded



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

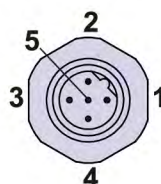
## Profibus:

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   |

Female 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   |

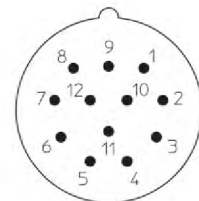
Male M 8x1, 4 pole



| Pin | Profibus_IN     |
|-----|-----------------|
| 1   | +U <sub>B</sub> |
| 2   | n.c.            |
| 3   | 0 V             |
| 4   | n.c.            |

## Synchronous Serial Interface:

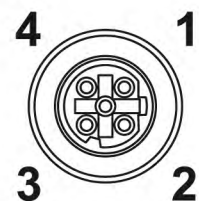
CONTACT male connector, 12 pole



| 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 <sub>B</sub> IN |
| 12  | 0 V IN             |

## EtherCAT:

Female M12x1, 4 pole, D encoded



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

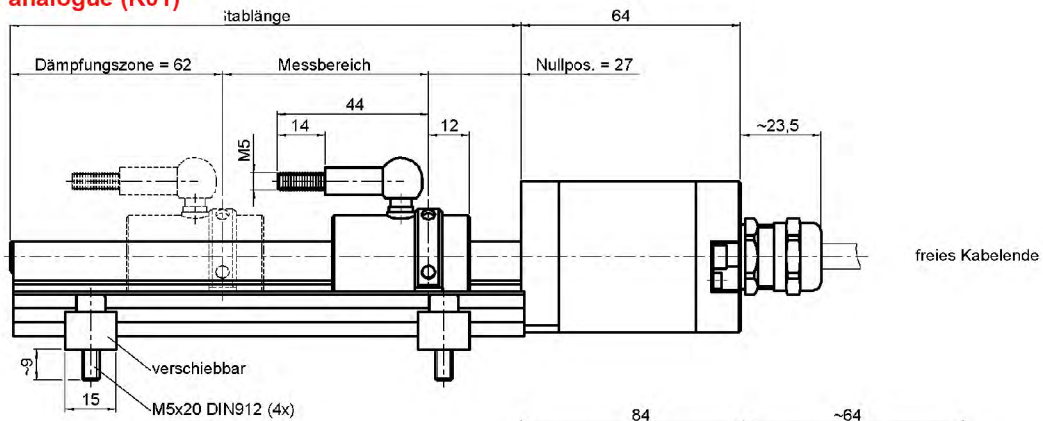
Female M8x1, 4 pole, A encoded



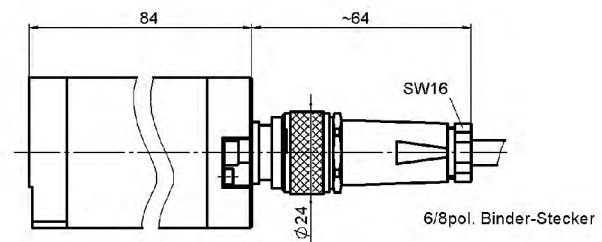
| Pin |                 |
|-----|-----------------|
| 1   | +U <sub>B</sub> |
| 2   | n.c.            |
| 3   | 0 V             |
| 4   | n.c.            |

## Dimensions:

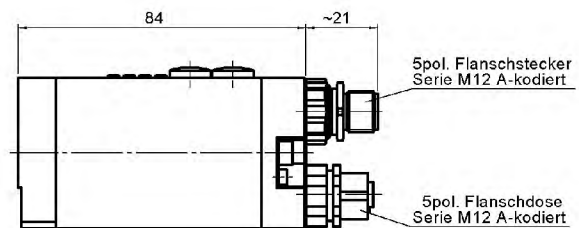
### Signal output: analogue (K01)



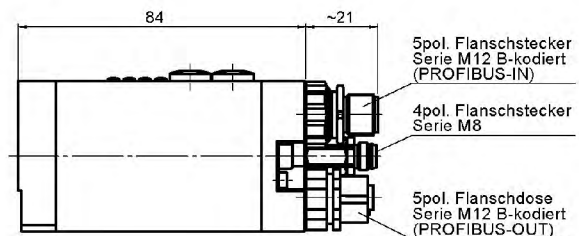
### Signal output: analogue (M06, M08)



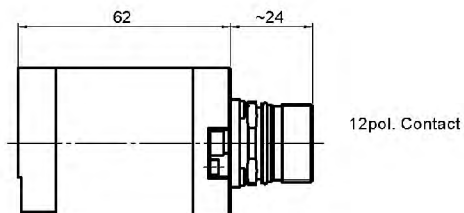
### Signal output CANopen, Device Net (C61)



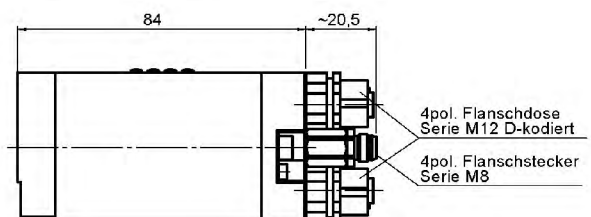
### Signal output: Profibus (P61)



### Signal output: synchronous serial interface (S01)



### Signal output: EtherCAT (E51)



### 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.**



# Linear Position Transmitter



## HLT 2550-L2

|                  |              |                  |
|------------------|--------------|------------------|
| Magnetostrictive | Flat profile | Resolution 50 µm |
|------------------|--------------|------------------|

Analogue and digital interfaces

Logos :  
CANopen  
SSI

### Description:

The HLT 2550-L2 is a linear position sensor 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-L2 is available for measuring ranges up to 3 m and in various signal output versions (analogue, CANopen, SSI) with a resolution of 50 µm and a non-linearity of  $\leq 0.02\%$  FS.

The main areas of application for the HLT 2550-L2 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
- Convincing price / performance ratio

### Technical Data:

| Input data                                                    |                                                                      |
|---------------------------------------------------------------|----------------------------------------------------------------------|
| Measuring ranges <sup>1)</sup>                                | 30 .. 3000 mm in steps of 50 mm                                      |
| Housing                                                       | Measuring body: aluminium                                            |
| Output data                                                   |                                                                      |
| Output Signal Analogue                                        | Current: 4 .. 20 mA or 20 .. 4 mA<br>Voltage: 0 .. 10 V or 10 .. 0 V |
| Output Signal Digital                                         | CANopen<br>SSI                                                       |
| Resolution                                                    | 12 bit, $\geq 0.05$ mm                                               |
| Ohmic resistance to GND<br>(only with analogue signal output) | Current: 200 ... 500 $\Omega$<br>Voltage: $> 2$ k $\Omega$           |
| Non linearity                                                 | $\leq \pm 0.02\%$ FS, $\geq 0.06$ mm                                 |
| Hysteresis                                                    | $\leq \pm 0.1$ mm                                                    |
| Repeatability                                                 | $\leq \pm 0.005\%$ FS, $\geq 0.05$ mm                                |
| Temperature coefficient                                       | $\pm 0.01\%$ FS / °C typ.                                            |
| Sampling rate (internal)                                      | 0.5 ms to 1,200 mm<br>1.0 ms to 2,400 mm<br>2.0 ms to 3,000 mm       |
| Installation position and movement speed                      |                                                                      |
| No restrictions                                               |                                                                      |
| Ambient conditions                                            |                                                                      |
| Operating temperature range                                   | -20 .. +75 °C, optionally -40 .. +75 °C                              |
| Storage temperature range                                     | -30 .. +85 °C, dry                                                   |
| Relative humidity                                             | 98 %, non -condensing                                                |
| CE - mark                                                     | EN 61000 -6-1 / 2 / 3 / 4                                            |
| Vibration resistance to<br>DIN EN 60068 -2-6 at 50 .. 2000 Hz | $\leq 10$ g                                                          |
| Shock resistance to<br>DIN EN 60068 -2-27                     | $\leq 100$ 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                             | $\leq 250$ 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

<sup>1)</sup> further variants on request

## HOW TO ORDER

### Model Code:

HLT 2 5 50 - L2 - XXX - XXX - XXXX - 000

#### Design/Geometry type

5 = profile

#### Type

L2 = Flat profile, with magnetic guidance

#### Electrical connection

Signal output analogue

M04 = Male connector M 12x1, 4 pole

Signal Output CANopen

M05 = Male connector M 12x1, 5 pole

Signal output SSI

M08 = Male connector M 12x1, 8 pole

#### Signal output

C01 = Analog 4 .. 20 mA, 3 conductor

C02 = Analog 20 .. 4 mA, 3 conductor

B01 = analogue 0 .. 10 V

B02 = analogue 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.

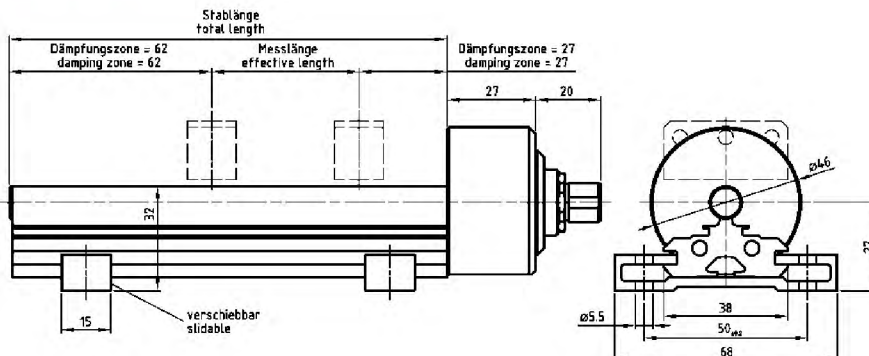
#### Items supplied:

- HLT 2550
- Operating Instructions

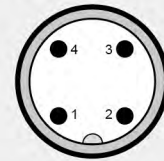
#### Accessories:

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

### Dimensions:



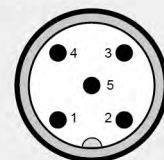
M12x1, 4-polig



Pin

|   |                 |
|---|-----------------|
| 1 | +U <sub>B</sub> |
| 2 | n.c.            |
| 3 | 0 V             |
| 4 | Signal          |

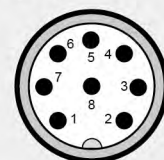
M12x1, 5-polig



Pin Signal Beschreibung

|   |                 |                        |
|---|-----------------|------------------------|
| 1 | n.c.            |                        |
| 2 | +U <sub>B</sub> | Supply +               |
| 3 | 0 V             | Supply -               |
| 4 | CAN_H           | bus line dominant high |
| 5 | CAN_L           | bus line dominant low  |

M12x1, 8-polig



Pin

|   |                 |
|---|-----------------|
| 1 | Clock input +   |
| 2 | Clock input -   |
| 3 | Data output +   |
| 4 | Data output -   |
| 5 | n.c.            |
| 6 | n.c.            |
| 7 | +U <sub>B</sub> |
| 8 | 0 V             |

#### 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.**



# Linear Position Transmitter



## HLT 2150-R1

|                  |                   |                   |
|------------------|-------------------|-------------------|
| Magnetostrictive | partly integrated | Resolution 100 µm |
|------------------|-------------------|-------------------|

Analogue and digital interfaces

**CANopen**

### Description:

The HLT 2150-R1 is a linear position sensor 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-R1 is suited for measuring ranges up to 2.5 m

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

The main areas of application for the HLT 2150 are, for example, general positioning tasks in mechanical engineering and in mobile and industrial hydraulics, as a semi-integrated solution in hydraulic cylinders.

### Special features:

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

### Technical Data:

| Inp ut data                                                   |                                                                                                                                                         |                     |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| Measurement 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<br>Voltage: 0 .. 10 V or 10 .. 0 V<br>0.25 .. 4.75 V or 4.75 .. 0.25 V<br>0.5 .. 9.5 V<br>0.5 .. 4.5 V<br><br>CANopen |                     |
| Measuring accuracy                                            | Analogue                                                                                                                                                | CANopen             |
| Resolution                                                    | 12 bit, ≥ 0.1 mm                                                                                                                                        | 0.1 mm              |
| Ohmic resistance to GND                                       | Current: 200 .. 500Ω<br>Spannung:> 2 kΩ                                                                                                                 |                     |
| Non linearity                                                 | ≤ ± 0.05 % FS                                                                                                                                           | ≤ ± 0.02 % FS       |
| Hysteresis                                                    | ≤ ± 0.1 % FS                                                                                                                                            | ≤ ± 0.1 mm          |
| Repeatability                                                 | ≤ ± 0.1 % FS                                                                                                                                            | ≤ ± 0.1 mm          |
| Temperature coefficient                                       | ≤ ± 0.01 % FS / °C                                                                                                                                      | ≤ ± 0.003 % FS / °C |
| Sampling rate (internal)                                      | 2 ms                                                                                                                                                    | 2 ms                |
| Installation position and movement speed                      | No restrictions                                                                                                                                         |                     |
| Ambient conditions                                            |                                                                                                                                                         |                     |
| Operating temperature range                                   | -40 .. +85 °C                                                                                                                                           |                     |
| Storage temperature range                                     | -40 .. +100 °C, dry                                                                                                                                     |                     |
| Fluid temperature range                                       | -40 .. +1 20°C                                                                                                                                          |                     |
| Relative humidity                                             | 90 %, non - condensing                                                                                                                                  |                     |
| CE - mark                                                     | EN 61000 - 6-1 / 2 / 3 / 4                                                                                                                              |                     |
| Vibration resistance per<br>DIN EN 60068 -2-6 at 10 .. 500 Hz | ≤ 20 g                                                                                                                                                  |                     |
| at 5 kHz                                                      | ≤ 15 g                                                                                                                                                  |                     |
| Shock resistance to<br>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



## HOW TO ORDER

### Model Code:

HLT 2 1 50 - R1 - XXX - XXX - XXXX - 000

#### Design/Geometry type

1 = rod

#### Type

R1 = threaded flange M18 x 1.5

#### Electrical connection

Signal output analogue

M04 = Male connector M 12x1, 4 pole

Signal Output CANopen

M05 = Male connector M 12x1, 5 pole

#### Signal output

C01 = Analogue 4 .. 20 mA, 3 conductor

C02 = Analogue 20 .. 4 mA, 3 conductor

B01 = Analogue 0 .. 10 V

B02 = Analogue 10 .. 0 V

F11 = CANopen

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 to 2500 mm)

Example

0150 = 150 mm

#### Modification

000 = Standard

#### Notes:

Special models on request.

The position magnet must be ordered separately.

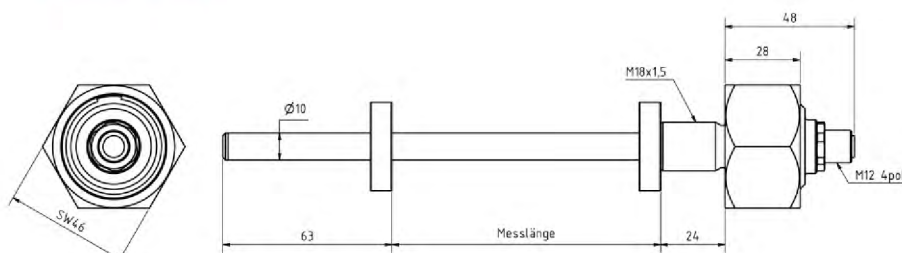
#### Items supplied:

- HLT 2150
- Operating Instructions

#### Accessories:

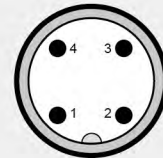
Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure.

### Dimensions:



### Pin connections:

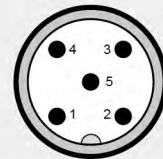
M12x1, 4-polig



Pin

|   |                 |
|---|-----------------|
| 1 | +U <sub>B</sub> |
| 2 | n.c.            |
| 3 | 0 V             |
| 4 | Signal          |

M12x1, 5-polig



| Pin | Signal          | Beschreibung           |
|-----|-----------------|------------------------|
| 1   | n.c.            |                        |
| 2   | +U <sub>B</sub> | 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. For applications or operating conditions not described, please contact the relevant technical department.

**Subject to technical modifications.**

# ASHUN

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