# L35

## PHOTOELECTRIC LINEAR ENCODER

The precision sealed linear encoder L35 is used to convert linear displacements of key machine components into electrical signals containing information about the value and direction of the displacements.

The encoder consists of a glass scale installed into a rigid hollow housing and a ball-bearing-guided reading head. To be able to work in harsh environments (cooling liquid, lubricants and chips), the encoder has two rows of sealing lips. Filtered air can be supplied into the housing of the encoder for extra protection from dust.

Characteristic feature of encoder is a rigid housing that provides better resistance to vibration and higher protection grade due two pairs of sealing lips.

Reference mark can be selected by magnet, which moves in horizontal groove on the front side of encoder (optional).

Three versions of output signals are available:

- L35-A - sinusoidal signals, with amplitude approx. 11 µApp.

- L35-AV- sinusoidal signals, with amplitude approx. 1 Vpp.

- L35-F - square-wave signals, type TTL or HTL (standard RS422) with integrated subdividing electronics for interpolation x1, x2, x5, x10, x25, x50.

## MECHANICAL DATA

| | |
|---|---|
| Measuring lengths (ML), mm | 170; 220; 270; 320; 370; 420; 470; 520; 620; 720; 820; 920; 1020; 1140; 1240; 1340; 1440; 1540; 1640; 1740; 1840; 1940; 2040; 2140; 2240; 2340; 2440; 2540; 2640; 2740; 2840; 2940; 3040; 3140; 3240 (other intermediate lengths on request) |
| Accuracy grades to any metre within the ML (at 20°C): - for ML from 170 up to 2040 mm - for ML from 2040 up to 3240 mm | ±5; ±3; ±2 µm (optional) ±10 µm |
| Grating period | 20 µm; 40 µm |
| Reference marks (RI): -standard for ML ≤ 1020 mm -standard for ML > 1140 mm -optional | 35mm from both ends of ML 45mm from both ends of ML one RI at any location, two or more RI's separated by distances of (n x 50 mm) |

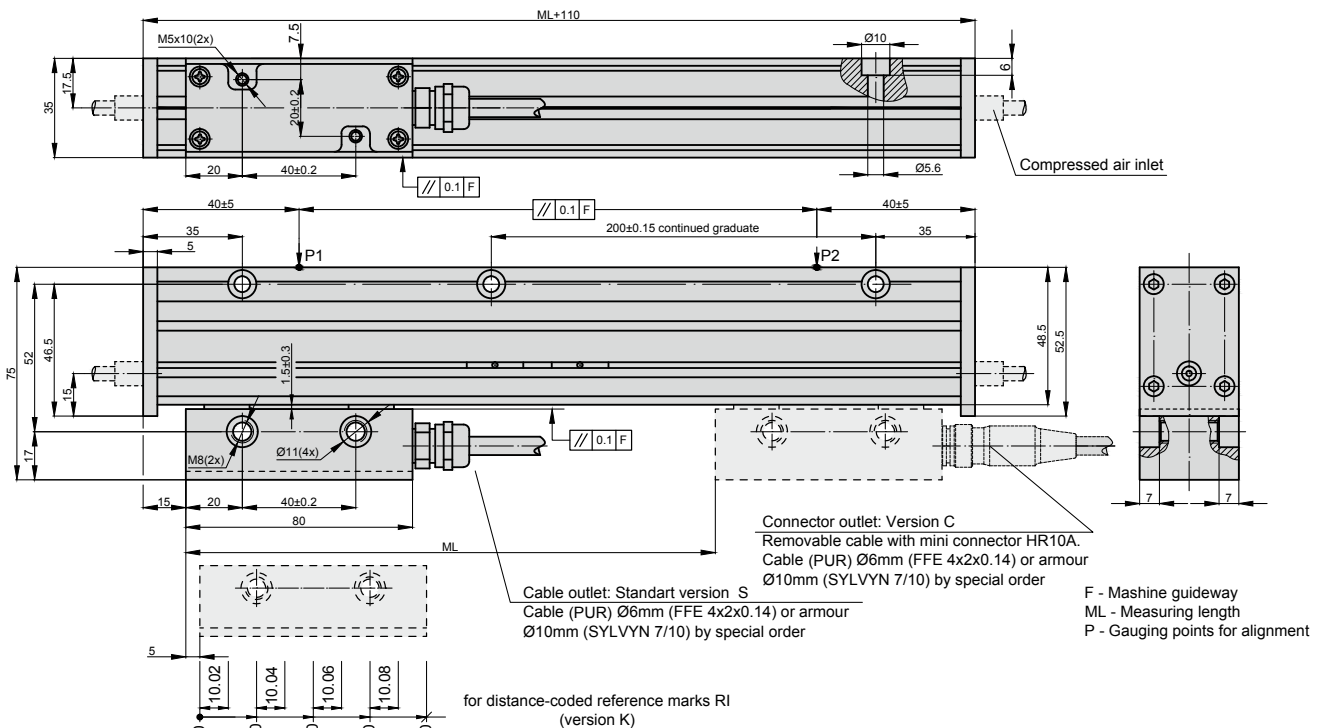| | |
|---|---|
| - distance-coded - selection by magnets | see drawing standard - one magnet (RI) in ML middle |
| Max. traversing speed: -when interpolation factor is 1,2,5,10 -when interpolation factor is 25 -when interpolation factor is 50 | 1 m/s (shortly 2 m/s) 0.5 m/s 0.4 m/s |
| Required moving force with sealing lips | < 5 N |
| Protection (IEC 529): -without compressed air -with compressed air (optional) | IP54 IP64 |
| Weight | 0.4 kg + 2.8 kg/m |
| Operating temperature | 0...+50°C |
| Storage temperature | -20...+70°C |
| Permissible vibration (40 to 2000 Hz) | ≤ 150 m/s² |
| Permissible shock (11 ms) | ≤ 300 m/s² |



ML+110
M5x10(2x)
Ø10
Compressed air inlet
Ø5.6

200±0.15 continued graduate
P1  P2

Connector outlet: Version C
Removable cable with mini connector HR10A.
Cable (PUR) Ø6mm (FFE 4x2x0.14) or armour
Ø10mm (SYLVYN 7/10) by special order

Cable outlet: Standart version S
Cable (PUR) Ø6mm (FFE 4x2x0.14) or armour
Ø10mm (SYLVYN 7/10) by special order

F - Mashine guideway
ML - Measuring length
P - Gauging points for alignment

for distance-coded reference marks RI
(version K)

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## ELECTRICAL DATA

| VERSION | L35-A 〜 11 µApp | L35-AV 〜 1 Vpp | L35-F ⊓⊔ TTL; ⊓⊔ HTL |
|---|---|---|---|
| Power supply | +5 V ± 5% / < 90 mA | +5 V ± 5% < 90 mA | +5 V ± 5%/ < 120 mA;+12V±5%/ < 130mA |
| Light source | LED | LED | LED |
| Resolution | Depends on external subdividing electronics | Depends on external subdividing electronics | 5; 2.5; 1; 0.5; 0.2; 0.1 µm (after 4-fold dividing in subsequent electronics) |
| Incremental signals | Two sinusoidal I1 and I2 Amplitude at 1 kΩ load: - I1 = 7-16 µA - I2 = 7-16 µA | Differential sine +A/-A and +B/-B Amplitude at 120 Ω load: - A = 0.6-1.2 V - B = 0.6-1.2 V | Differential square-wave U1/$\overline{U1}$ and U2/$\overline{U2}$. Signal levels at 20 mA load current: - low (logic "0") $\leq$ 0,5 V at Up=+5V - high (logic "1") $\geq$ 2,4 V at Up=+5V - low (logic "0") $\leq$ 1,5 V at Up=+12V (HTL) - high (logic "1")$\geq$(Up-2) V at Up=+12V (HTL) |
| Reference signal | One quasi-triangular $I_0$. Signal magnitude at 1 kΩ load: - $I_0$ = 2-8 µA (usable component) | One quasi-triangular +R and its complementary -R per revolution. Signals magnitude at 120Ω load - R = 0.2-0.8 V (usable component) | One differential square-wave U0/$\overline{U0}$ per revolution. Signal levels at 20 mA load current: - low (logic "0") $\leq$ 0.5 V at Up=+5V - high (logic "1") $\geq$ 2.4 V at Up=+5V - low (logic "0") $\leq$ 1,5 V at Up=+12V (HTL) - high (logic "1") $\geq$ (Up-2)V at Up=+12V(HTL) |
| Maximum operating frequency | 50 kHz (v=1 m/s) 100 kHz (v=2 m/s shortly) | 50 kHz (v=1 m/s) 100 kHz (v=2 m/s shortly) | (50 x k) kHz for k =1, 2, 5, 10 1000 kHz for k = 25, 50, where k- interpolation factor |
| Direction of signals (displacement from left to right) | $I_2$ lags $I_1$ | B+ lags A+ | $U_2$ lags $U_1$ |
| Standard cable length | 3 m, without connector | 3 m, without connector | 3 m, without connector |
| Maximum cable length | 5 m | 25 m | 25 m |
| Output signals |  |  |  |

*Note: If cable extension is used the power supply conductor section should not be smaller than 0.5 mm².*

## ACCESSORIES

| CONNECTORS FOR CABLE | B12 12-pin round connector | C9 9-pin round connector | C12 12-pin round connector | D9 9-pin flat connector | D15 15-pin flat connector | RS10 10-pin round connector | ONC 10-pin round connector | HR10A 12-pins round mini connector |
|---|---|---|---|---|---|---|---|---|
| DIGITAL READOUT DEVICES | CS3000 | | | | CS5000 | | | |
| EXTERNAL INTERPOLATOR | NK | | | | | | | |

## ORDER FORM

L35 - XXX - XXXX - X / XXX - XX - XX - X - X - XXX / X

| OUTPUT SIGNALS AND RESOLUTION: | MEASURING LENGTH: | REFERENCE MARKS: | ACCURACY: | SUPPLY VOLTAGE: | COMPRESSED AIR: | CABLE OR CONNECTOR OUTLET: | CABLE LENGTH: | CONNECTOR TYPE: |
|---|---|---|---|---|---|---|---|---|
| A - Sinusoidal AV - Sinusoidal F01 - TTL / HTL 0.1µm F02 - TTL / HTL 0.2µm F05 - TTL / HTL 0.5µm F10 - TTL / HTL 1.0µm F25 - TTL / HTL 2.5µm F50 - TTL / HTL 5.0µm | 0070 - 70mm 0520 - 520mm ... 3240 - 3240mm | N - none RI S - standard M - every 50mm K - distance-coded Ln/XXX - n'RI with 50-fold steps /XXX distance of the first RI from the beginning of ML, mm O - selection by magnets (standard - one magnet (RI) in ML middle) | 10 - ±10µm 05 - ±5µm 03 - ±3µm (optional) | 05V - +5V 12V - +12V* *only for HTL | 0 - without compressed air 1 - with compressed air | S - version S (cable outlet) C - version C (connector outlet) | 01 - 1m 02 - 2m 03 - 3m ... CP01- 1m armoured CP02 - 2m armoured CP03 - 3m armoured ... | W - without connector B12 - round, 12 pins C9 -round, 9 pins C12 - round, 12 pins D9 - flat, 9 pins D15 - flat, 15 pins RS10 - round, 10 pins ONC - round, 10 pins |
| ORDER EXAMPLE: | | 1) L35-F05-2040-O-10-05V-1-C-CP03/C12 | | | | | | |