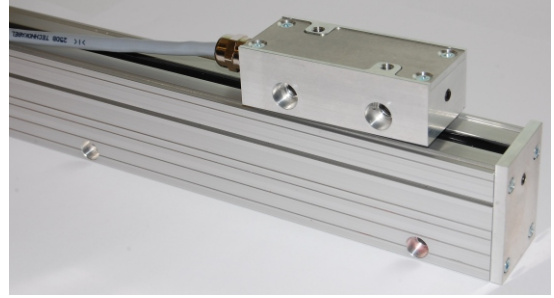


# L35 PHOTOELECTRIC LINEAR ENCODER

(L35-A, L35-AV, L35-F)



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. The photoelectric unit of the reading head generates sinusoidal micro-current or square-wave output signals.

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  $\mu$ A<sub>pp</sub>, require an external subdividing electronics.

**L35-AV** - sinusoidal signals, with amplitude approx. 1 V<sub>pp</sub>, require an external subdividing electronics.

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

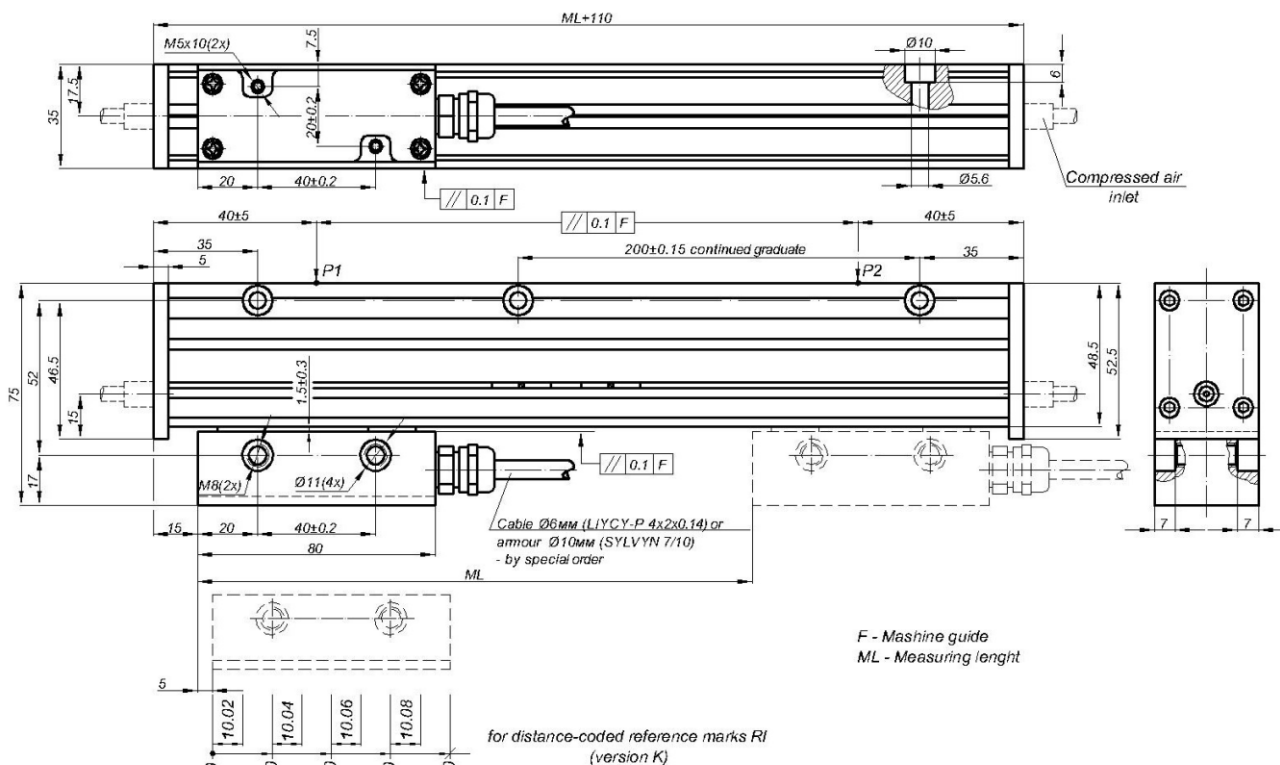
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ISO 9001:2008

## •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
- Accuracy grades to any metre within the ML (at 20°C):
    - for ML from 170 up to 2040 mm  $\pm 5$ ;  $\pm 3$ ;  $\pm 2$   $\mu$ m (optional)
    - or ML from 2040 up to 3240 mm  $\pm 10$   $\mu$ m
  - Grating period 20  $\mu$ m; 40  $\mu$ m
  - Reference marks (RI)
    - standard for ML  $\leq 1020$  mm 35 from both ends of ML;
    - standard for ML  $> 1140$  mm 45 from both ends of ML;
    - optional one RI at any location, or two or more RI's separated by distances of (n x 50 mm); or distance-coded; or selection by magnets (every 50 mm)

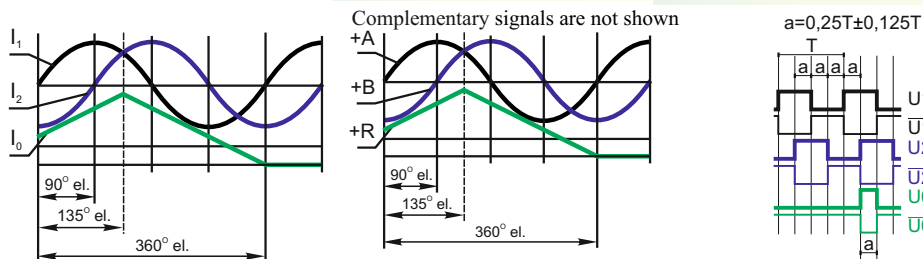
- Max. traversing speed (v):
  - when interpolation factor is 1, 2, 5, 10 1 m/s (shortly 2 m/s)
  - when interpolation factor is 25 0.5 m/s
  - when interpolation factor is 50 0.4 m/s
- Required moving force with sealing lips  $< 5$  N
- Protection: (IEC 529)
  - without compressed air IP54
  - with compressed air IP64
- Weight 0.4 kg + 2.8 kg/m
- Operating temperature 0...+50°C
- Storage temperature -20...+70°C
- Permissible vibration (40...2000 Hz)  $\leq 150$  m/s<sup>2</sup>
- Permissible shock (8 ms)  $\leq 300$  m/s<sup>2</sup>



## Electrical Data

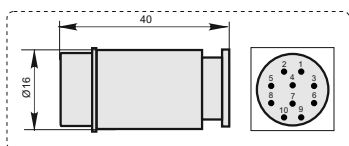
Version	L35-A $\sim 11 \mu A_{pp}$	L35-AV $\sim 1 V_{pp}$	L35-F $\square$ TTL; $\square$ HTL
• Power supply	+5 V $\pm 5\%$ / < 90 mA	+5 V $\pm 5\%$ < 120 mA	+5 V $\pm 5\%$ / < 120 mA; +12V $\pm 5\%$ / < 130 mA
• Light source	LED	LED	LED
• Resolution	Depends on external subdividing electronics	Depends on external subdividing electronics	5; 2.5; 1; 0.5; 0.2; 0.1 $\mu m$ (after 4-fold dividing in subsequent electronics)
• Incremental signals	Two sinusoidal $I_1$ and $I_2$ . Amplitude at 1 k $\Omega$ load: $I_1 = 7-16 \mu A$ $I_2 = 7-16 \mu A$	Differential sine +A/-A and +B/-B Amplitude at load 120 $\Omega$ : 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 load current 20 mA: low (logic "0") $\leq 0,5$ V at $U_p = +5V$ high (logic "1") $\geq 2,4$ V at $U_p = +5V$ low (logic "0") $\leq 1,5$ V at $U_p = +12V$ (HTL) high (logic "1") $\geq (U_p - 2)$ V at $U_p = +12V$ (HTL)
• Reference signal	One quasi-triangular $I_0$ . Signal magnitude at 1 k $\Omega$ load: $I_0 = 2-8 \mu A$ (usable component)	One quasi-triangular +R and its complementary -R Signal magnitude at 120 $\Omega$ load: R = 0.2-0.8 V (usable component)	One differential square-wave $U0/\overline{U0}$ . Signal levels at 20 mA load current: low (logic "0") $\leq 0.5$ V at $U_p = +5V$ high (logic "1") $\geq 2.4$ V at $U_p = +5V$ low (logic "0") $\leq 1,5$ V at $U_p = +12V$ (HTL) high (logic "1") $\geq (U_p - 2)V$ at $U_p = +12V$ (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 and head position down respective glass scale)	$I_2$ 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

Note: If cable extension is used the power supply conductor section should not be smaller than 0.5 mm<sup>2</sup>.

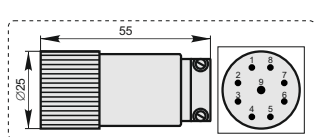


## Accessories

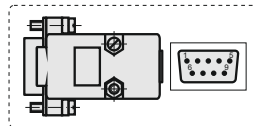
**RS10**  
Round 10-pins  
connectors  
for all L35 types



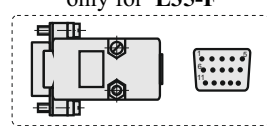
**C9**  
9-pin flat connector only for  
L35-A



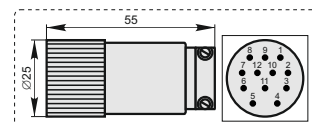
**D9**  
9-pin flat connector for all L35  
types



**D15**  
15-pins flat connector for  
connection to DRO  
CS3000 and CS5000  
only for L35-F



**C12**  
12-pin round connector  
only for L35-F, L35-AV



## Accessories

Accessories							
L35 - X - XXX - X/XXX - XX - XX - XX/X							
Output signals and resolution versions: <b>A, AV</b> - Sinusoidal <b>F01</b> - TTL 0.1 $\mu\text{m}$ <b>F05</b> - TTL 0.5 $\mu\text{m}$ <b>F10</b> - TTL 1.0 $\mu\text{m}$ <b>F25</b> - TTL 2.5 $\mu\text{m}$ <b>F50</b> - TTL 5.0 $\mu\text{m}$	Measuring length: <b>007</b> - 70 mm <b>052</b> - 520 mm ..... <b>244</b> - 2440 mm	Reference marks: <b>N</b> - none RI <b>S</b> - standard <b>M</b> - every 50 mm <b>K</b> - distance-coded <b>Ln/XXX</b> - n $\times$ RI with 50-fold steps /XXX distance of the first RI from the beginning of ML, mm <b>O</b> - selection by magnets (every 50 mm)	Supply voltage: <b>05V</b> - +5V <b>12V</b> - +12V *only for L35-F	Accuracy: <b>03</b> - $\pm 3 \mu\text{m}$ <b>05</b> - $\pm 5 \mu\text{m}$ <b>10</b> - $\pm 10 \mu\text{m}$	Cable length: <b>01</b> - 1m <b>02</b> - 2m <b>03</b> - 3m Cable armour dia 10 mm is available on option	Connector type: <b>W</b> - without connector <b>RS10</b> - round, 10 pins <b>C12</b> - round, 12 pins <b>C9</b> - round, 9 pins <b>D9</b> - flat, 9 pins <b>D15</b> - flat, 15 pins	