FAULHABER

Encoders

Magnetic Encoders with Line Driver

Features:
32 to 1 024 Lines per revolution
3 Channels + complementary outputs
Digital output

Series IE3 – 1 024 L

		IE3 – 32 L	IE3 – 64 L	IE3 – 128 L	IE3 – 256 L	IE3 – 512 L	IE3 – 1 024 L	
Lines per revolution	N	32	64	128	256	512	1 024	
Frequency range [1], up to	f	15	30	60	120	240	430	kHz
Signal output, square wave		2+1 index and complementary outputs						channels
Supply voltage	U_{DD}	4,5 … 5,5						V DC
Current consumption, typical [2]	I_{DD}	typ. 17, max. 25						mA
Index Pulse width [3]	P_0	90 ± 45				90 ± 75		°e
Phase shift, channel A to B [3]	Φ	90 ± 45				90 ± 75		°e
Inertia of encoder magnet	J	0,08						gcm^2
Operating temperature range		– 40 ... + 85				– 40 ... + 100		°C

[1] speed (rpm) = f (Hz) x 60/N
[2] $U_{DD\ Enc}$ = 5 V: with unloaded outputs
[3] at 5 000 rpm

Notes: The output signals are TIA-422 compatible.
Examples of Line driver Receivers: ST26C32ABD (STM), ST26C32IP16 (EXAR), DS26C32AT (NSC).

Ordering information

Encoder	number of channels	lines per revolution	in combination with:
IE3 – 32 L	2+1	32	**DC-Micromotors**
IE3 – 64 L	2+1	64	**2342 ... CR, 2642 ... CR, 2657 ... CR,**
IE3 – 128 L	2+1	128	**3242 ... CR, 3257 ... CR,**
IE3 – 256 L	2+1	256	**2237 ... CXR, 2642 ... CXR, 2657 ... CXR**
IE3 – 512 L	2+1	512	**3272 ... CR, 3863 ... CR**
IE3 – 1 024 L	2+1	1 024	
			Brushless DC-Servomotors
			2444 ... B, 3056 ... B, 3564 ... B,
			4490 ... B, 4490 ... BS

Features

These incremental encoders have 3 output channels, in combination with the FAULHABER DC-Micromotors are used for the indication and control of both shaft velocity and direction of rotation as well as for positioning.

A permanent magnet on the shaft creates a moving magnetic field which is captured using a single-chip angular sensor and further processed. At the encoder outputs, two 90° phase-shifted rectangular signals are available with up to 1 024 impulses and an index impulse per motor revolution.

The Line Driver version has differential signal outputs (TIA-422). Differential signals reduce ambient interference and are suitable for applications with high ambient interference.
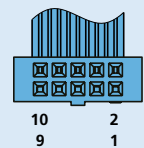
The line driver amplifies the encoder signal which means that long cables can be used without signal degradation.

Differential signal outputs must be decoded by the appropriate receiver module.

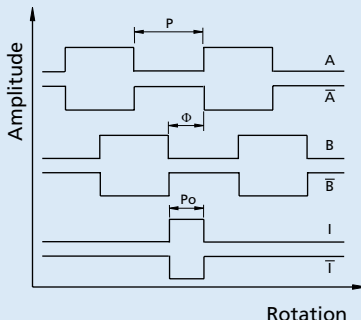The motor and encoder are connected via separate ribbon cables.

Options

- Connector variants (Option no.: 3806)
  AWG 28 / PVC ribbon cable (10-conductors), with connector DIN-41651 (pitch 2,54 mm)
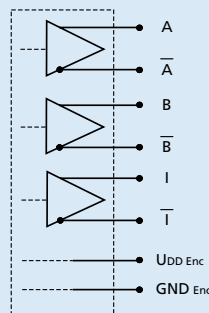- Resolutions from 1 - 127 lines per revolution are available by request.

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10    2
 9    1
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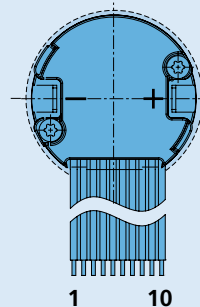### Output signals / Circuit diagram / Connector information

Output signals
with clockwise rotation as seen from the shaft end

Admissible deviation of phase shift / Index pulse:

$$\Delta\Phi = \left| 90° - \frac{\Phi}{P} * 180° \right| \le 75° \qquad \Delta P_0 = \left| 90° - \frac{P_0}{P} * 180° \right| \le 75°$$

Output circuit

Connection Encoder

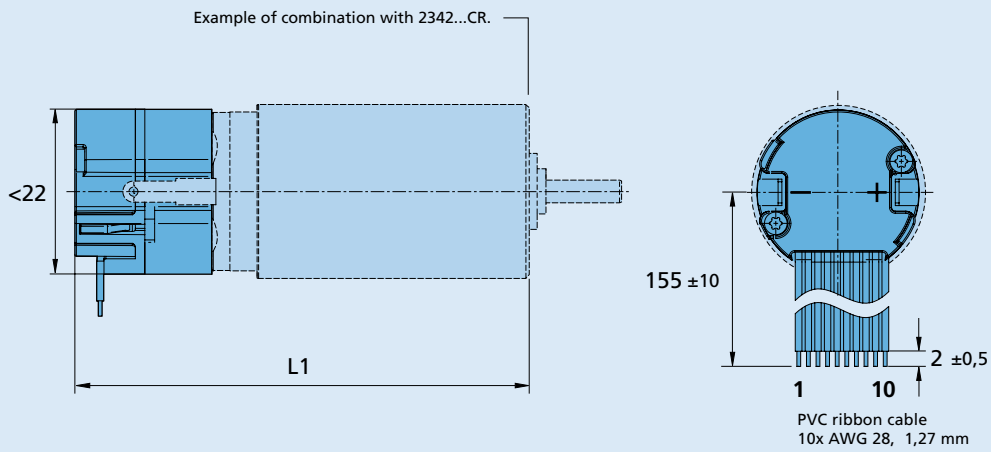| No.	Function
1	n.c.
2	$U_{DD\ Enc}$
3	GND Enc
4	n.c.
5	Channel $\overline{A}$
6	Channel A
7	Channel $\overline{B}$
8	Channel B
9	Channel $\overline{I}$ (Index)
10	Channel I (Index)

Caution:
Incorrect lead connection will damage the motor electronics!
When using the encoder at low temperature it is important to keep the cable unmoved.

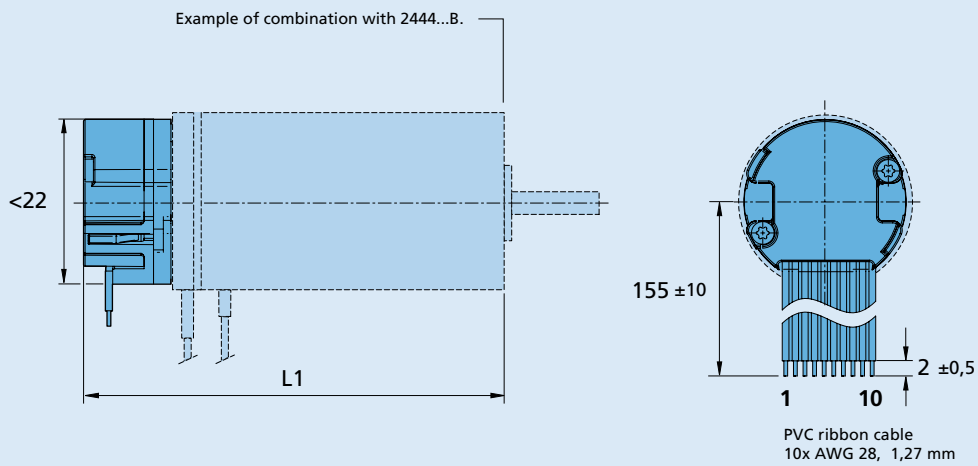## DC-Micromotors 23xx ... CR up to 32xx ... CR and 22xx up to 26xx ... CXR with encoder IE3 – 32 ... 1 024 L

M 1:1

Example of combination with 2342...CR.

<22

L1

155 ±10

2 ±0,5

1   10

PVC ribbon cable
10x AWG 28, 1,27 mm

Motor Type	< L1
2237	52,5
2342	60,5
2642	60,5
2657	75,5
3242	60,5
3257	75,5

Brushless DC-Servomotors 2444 ... B -K1838, 3056 ... B -K1838, 3564 ... B -K1838 and 4490 ... B/BS -K1838 with encoder IE3 – 32 ... 1 024 L

M 1:1

Example of combination with 2444...B.

<22

L1

155 ±10

2 ±0,5

1   10

PVC ribbon cable
10x AWG 28, 1,27 mm

Motor Type	< L1
2444	55,2
3056	67,2
3564	75,2
4490	100,2