## Encoder

optical Encoder, digital outputs, 3 channels, 250 - 500 lines per revolution, Line Driver

### Series IERS3-500 L

<table>
<thead>
<tr>
<th></th>
<th>IERS3-250 L</th>
<th>IERS3-500 L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lines per revolution</td>
<td>N</td>
<td>250</td>
</tr>
<tr>
<td>Frequency range, up to 1)</td>
<td>f</td>
<td>55</td>
</tr>
<tr>
<td>Signal output, square wave</td>
<td></td>
<td>2+1 index and complementary outputs</td>
</tr>
<tr>
<td>Supply voltage U_ds</td>
<td></td>
<td>4.5 - 5.5 V</td>
</tr>
<tr>
<td>Current consumption, typical 2)</td>
<td>I_ds</td>
<td>mA</td>
</tr>
<tr>
<td>Index Pulse width</td>
<td>P_i</td>
<td>90 ± 15 °e</td>
</tr>
<tr>
<td>Phase shift, channel A to B</td>
<td>Φ</td>
<td>90 ± 20 °e</td>
</tr>
<tr>
<td>Inertia of code disc</td>
<td>J</td>
<td>g cm²</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td></td>
<td>– 20 ... + 85 °C</td>
</tr>
<tr>
<td>Accuracy</td>
<td></td>
<td>typ. 0.3 °m</td>
</tr>
<tr>
<td>Repeatability</td>
<td></td>
<td>typ. 0.05 °m</td>
</tr>
<tr>
<td>Hysteresis</td>
<td></td>
<td>&lt; 0.05 °m</td>
</tr>
<tr>
<td>Edge spacing, min.</td>
<td></td>
<td>600 ns</td>
</tr>
<tr>
<td>Mass</td>
<td></td>
<td>0.14 g cm²</td>
</tr>
</tbody>
</table>

1) Velocity (min⁻¹) = f (Hz) x 60/N
2) U_ds = 5 V: with unloaded outputs

### Characteristics

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

With a reflective code disc two square wave signals with 90° phase shift with up to 500 lines per revolution and one index impulse per motor revolution are generated.

The optical measurement principle allows high accuracy and repeatability for positioning applications.

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. In addition, a suitable line termination resistance (100 ohm) is possibly useful.

The encoder is connected via a ribbon cable. The pins are compatible to the FAULHABER Encoder IE3 L.

To view our large range of accessory parts, please refer to the “Accessories” chapter.

### Product combination

**Dimensional drawing A <L1 [mm]**
- 2237 ... CXR 52,5
- 3274 ... BP4 90,5

**Dimensional drawing B <L1 [mm]**
- 2342 ... CR 60,5
- 2642 ... CR 60,5
- 2657 ... CR 75,5
- 2668 ... CR 86,5
- 3242 ... CR 60,5
- 3257 ... CR 75,5
- 3272 ... CR 90,5

**Dimensional drawing C <L1 [mm]**
- 3863 ... CR - 2016 82,6
- 3890 ... CR - 2016 108,6

### Note:
The output signals are TIA-422 compatible. Examples of Line Driver Receivers: ST26C32ABD (STM), ST26C32IP16 (EXAR), DS26C32AT (NSC).
**Circuit diagram / Output signals**

**Output circuit**

```
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
```

**Output signals**

with clockwise rotation as seen from the shaft end

```
Amplitude

P
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
```

**Connector information / Variants**

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N.C.</td>
</tr>
<tr>
<td>2</td>
<td>UDD</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
</tr>
<tr>
<td>4</td>
<td>N.C.</td>
</tr>
<tr>
<td>5</td>
<td>Channel A</td>
</tr>
<tr>
<td>6</td>
<td>Channel B</td>
</tr>
<tr>
<td>7</td>
<td>Channel C</td>
</tr>
<tr>
<td>8</td>
<td>Channel D</td>
</tr>
<tr>
<td>9</td>
<td>Channel E</td>
</tr>
<tr>
<td>10</td>
<td>Channel F</td>
</tr>
</tbody>
</table>

**Connection Encoder**

```
1 10
```

**Cable**

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

**Caution:**
Incorrect lead connection will damage the motor electronics!

**Option**


**Full product description**

- Example:
  - 22375012CXR IERS3-500L
  - 3863H024CR IERS3-250L 3806

**Dimensional drawing A**

Example of combination with 2237...CXR

```
<22
155±10
≤15,5
L1
```

**Example:**

```
IERS3-500 L
```
Example of combination with 2342...CR

Example of combination with 3863...CR

Dimensions:
- L1 ≤ 18.5 mm
- ±0.5 mm
- ±10 mm
- < 22 mm

Specifications subject to change without notice.

For notes on technical data and lifetime performance refer to “Technical Information”.

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