

## Light Duty Types

If you are looking for a compact, but high-resolution incremental encoder, then our light duty encoder line offers a broad selection to you.

With up to 3600 pulses per turn Hengstler's light duty encoder line is one of the most compact and ones in its class.

Despite its small frame size the encoders have two integrated precision ball bearings, which stand for a long life at high speed (up to 10.0000 rpm). The electrical features are in no way inferior to the mechanical ones: The encoders are equipped with state-of-the-art optoasic technology, which increases the encoder's reliability by its high immunity to interference. It is also provided with monitoring electronics which in the event of failure fires an alarm output. If, for example, over temperature prevails, or the voltage range is fallen below the specified minimum, the alarm output will return a signal.

### Examples of applications for Light Duty Encoders:

- laboratory equipment
- crimping machines
- tampon printing machines
- miniature grinding machines
- FHP motors
- labelling machines
- plotters
- graphic machines
- textile machinery

## Incremental



- Provides digital control inputs from operators's panel
- Bidirectional squarewave signal outputs
- Up to 512 increments
- Continuous and reversible rotation
- Non-contacting
- Operating temperature -40 ... 100 °C



### NUMBER OF PULSES

100 ... 512

### TECHNICAL DATA mechanical

Housing diameter	PC 9: 22 mm PC 9S: 22.86 mm
Shaft diameter	1 1/8" / 0.25
Shaft load axial / radial	1/8" shaft: 4 N / 27 N 1/4" shaft: 4 N / 4 N
Moment of inertia	approx. 0.2 gcm <sup>2</sup>
Operating temperature	-40 °C ... +100 °C
Storage temperature	-50 °C ... +125 °C
Relative humidity	90 %, non-condensing
Connection	PC 9: 10 pole header (Accessory: 30 cm ribbon cable with connector, ordering code CA0040012) PC 9S: 5 pole header (Accessory: 30 cm ribbon cable with connector, ordering code CA0050012)
Recommended mating connector	PC 9: Thomas & Betts, ordering code 622-1030 (on request) PC 9S: AMP, ordering code 103675-4 (on request)

### TECHNICAL DATA electrical

Standby current	50 µA
Code	Incremental, optical
Max. pulse frequency	200 kHz
Index pulse width (N)	90° ± 36° electrical
Phasing	90° ± 18° electrical
Symmetry	180° ± 18° electrical
Number of pulses	100 ... 512
Output signals	min. 2.5 V high (VOH), max. 0.5 V low (VOL)
Output current	PC 9: 3 mA sink/source (25 °C), 2 mA (100 °C) PC 9S: 6 mA sink/source (25 °C), 4 mA (100 °C)
Pulse shape	Square wave
Pulse duty factor	1:1

Incremental

OUTPUT WAVEFORMS (only PC 9)

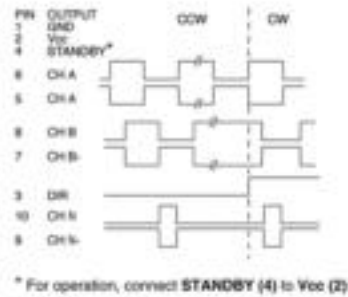


Figure 1: Code 2 (Output) = 01

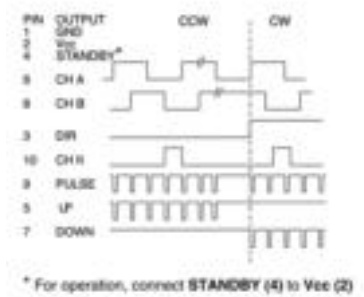
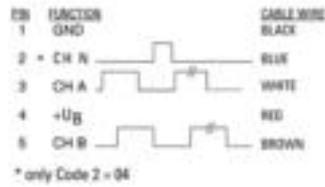


Figure 2: Code 2 (Output) = 02

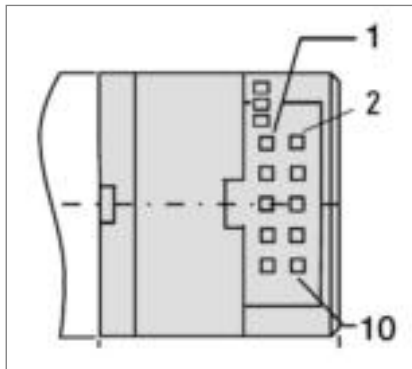
ELECTRICAL CONNECTIONS  
OUTPUT WAVEFORMS (only PC 9S)



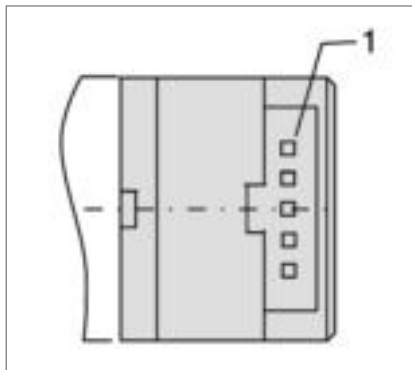
\* only code 2 (output) = 04

Figure 3: Code 2 (Output) = 03/04

CONNECTION (only PC 9)

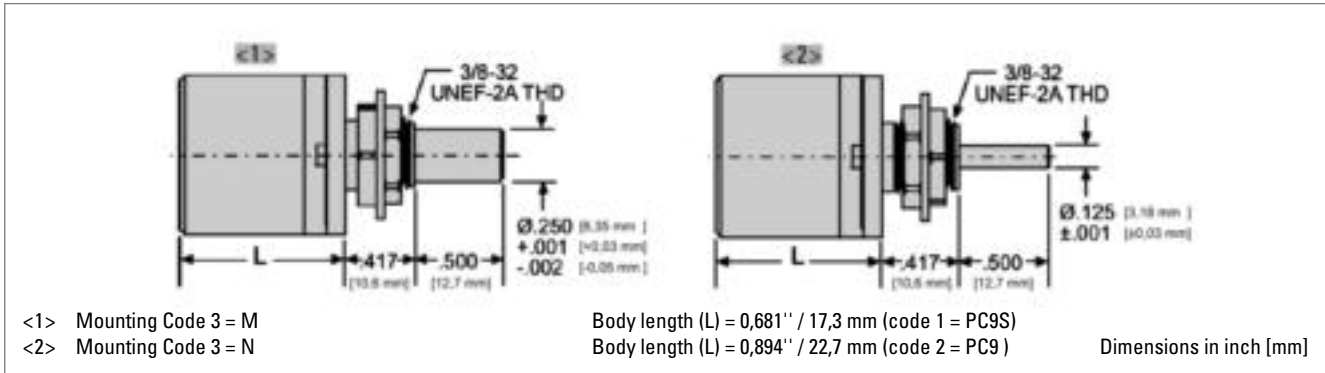


CONNECTION (only PC 9S)



## Incremental

### DIMENSIONED DRAWINGS



### ORDERING INFORMATION

Type	Number of pulses	Code 2: Output	Mounting
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>PC9</b> <b>PC9S</b>	<b>0100</b> <b>0144</b> <b>0200</b> <b>0256</b> <b>0300</b> <b>0360</b> <b>0500</b> <b>0512</b>	<b>01</b> see Fig. 1 (PC 9) <b>02</b> see Fig. 2 (PC 9) <b>03</b> see Fig. 3 (without index) (PC 9S) <b>04</b> see Fig. 3 (PC 9S)	<b>M</b> 1/4" shaft, sleeve bearings <b>N</b> 1/8" shaft, ball bearings

## Incremental



## NUMBER OF PULSES

- Replacement for type Typ RIS and RI 31
- The economical encoder for small appliances
- High efficiency by means of ball bearing
- Small torque
- Applications: laboratory equipment, training equipment, crimping machines, tampon printing machines, miniature grinding machines



5 / 10 / 20 / 25 / 30 / 50 / 60 / 100 / 120 / 128 / 200 / 250 / 256 / 288 / 300 / 360 / 400 / 500 / 512 / 600 / 720 / 900 / 1000 / 1024 / 1250 / 1500

Other number of pulses on request

TECHNICAL DATA  
mechanical

Housing diameter	30 mm
Shaft diameter	5 mm / 6 mm (Solid shaft)
Flange (Mounting of housing)	Pilot flange
Protection class shaft input (EN 60529)	IP40
Protection class housing (EN 60529)	IP50
Shaft load axial / radial	5 N / 10 N
Max. speed	max. 6000 rpm
Torque	≤ 0.05 Ncm
Vibration resistance (DIN EN 60068-2-6)	100 m/s <sup>2</sup> (10 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	1000 m/s <sup>2</sup> (6 ms)
Operating temperature	-10 °C ... +60 °C
Storage temperature	-25 °C ... +85 °C
Material shaft	Aluminum
Material housing	Plastic
Weight	approx. 50 g
Connection	Cable, axial or radial

TECHNICAL DATA  
electrical

General design	as per DIN VDE 0160, protection class III, contamination level 2, overvoltage class II
Supply voltage <sup>1</sup>	Push-pull (D): DC 5 V ±10 % Push-pull (K): ± 10% DC 5 V or DC 10 - 30 V
Max. current w/o load	40 mA (DC 5 V), 60 mA (DC 10 V), 30 mA (DC 24 V)
Max. pulse frequency	DC 5 V: 300 kHz DC 10 - 30 V: 200 kHz
Standard output versions <sup>2,3</sup>	Push-pull (K): A, B, N, $\overline{\text{Alarm}}$ Push-pull 5V, ± 30 mA (D): A, B, N, $\overline{\text{Alarm}}$
Pulse width error	± max. 25° electrical
Number of pulses	5 ... 1500
Alarm output	NPN-O.C., max. 5 mA
Pulse shape	Square wave
Pulse duty factor	1:1

## Incremental

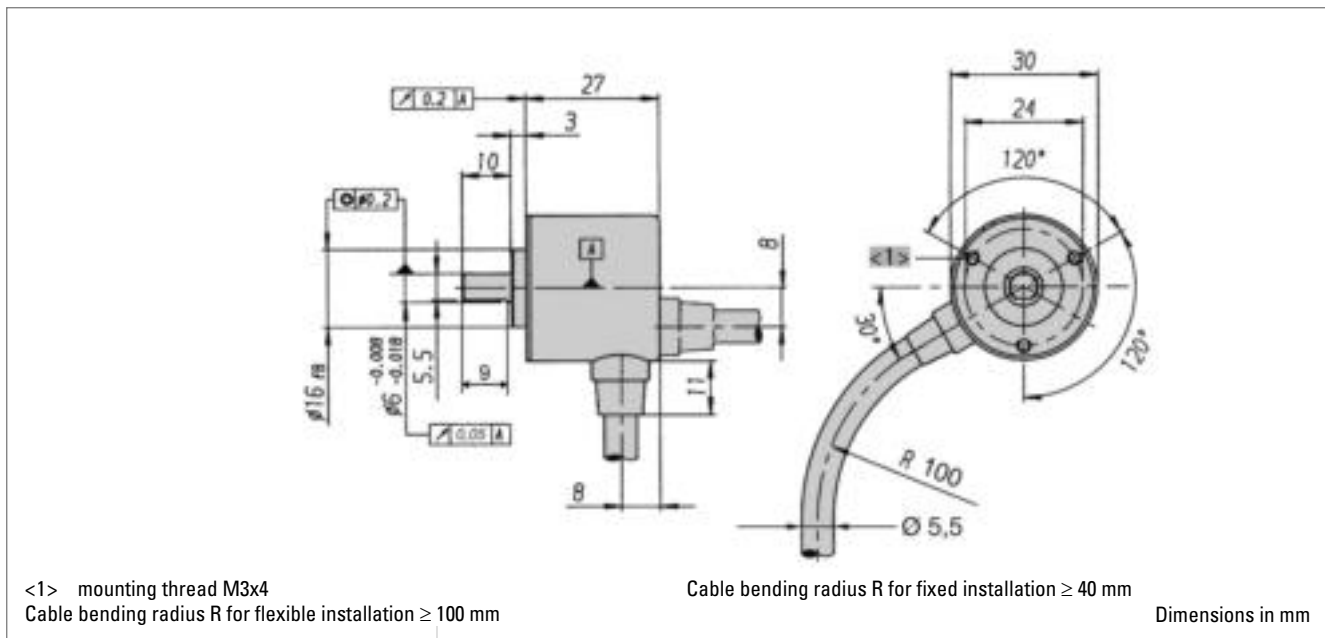
### TECHNICAL DATA electrical (continued)

- <sup>1</sup> With push-pull (K): pole protection
- <sup>2</sup> Output code "K": short-circuit-proof
- <sup>3</sup> Output description and technical data see chapter "Technical basics"

### ELECTRICAL CONNECTIONS Cable

Description (push-pull)	Lead Ø mm <sup>2</sup>	Colour
DC 5 V/ 10 - 30 V	0.5	red
Channel A	0.14	white
Channel B	0.14	green
Channel N	0.14	yellow
GND	0.5	black
Alarm	0.14	yellow/black

### DIMENSIONED DRAWINGS



### ORDERING INFORMATION

Type	Number of pulses	Supply voltage <sup>1</sup>	Flange, Protection, Shaft <sup>2,3</sup>	Output <sup>4,5</sup>	Connection
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>RI32</b>	<b>5 ... 1500</b>	<b>A</b> DC 5 V <b>E</b> DC 10 - 30 V	<b>R.14</b> Pilot, IP40, 5 mm <b>R.11</b> Pilot, IP40, 6 mm	<b>K</b> Push-pull <b>D</b> Push-pull 5V, ± 30 mA	<b>A</b> Cable, axial <b>B</b> Cable, radial

- <sup>1</sup> DC 10 - 30 V: only with output "K" available
- <sup>2</sup> R.11: flattened, see dimensional drawing
- <sup>3</sup> R.14: not flattened
- <sup>4</sup> Output code "K": ±10 mA at DC 5 V, ±30 mA at DC 10 - 30 V
- <sup>5</sup> Output code "K": short-circuit-proof

## Incremental

### ORDERING INFORMATION

Selection of cable length

Versions with cable outlet (connection A, B, E or F) are available with various lengths of cable. To order your desired cable length, please add the respective code to the end of your ordering code. Further cable lengths on request.

Code	Cable length
without code	1.5 m
-D0	3 m
-F0	5 m
-K0	10 m
-P0	15 m
-U0	20 m
-V0	25 m

### ACCESSORIES

see chapter "Accessories", starting page 322

## Incremental



### NUMBER OF PULSES

- Replacement for type RI 39
- Encoder for universal installation by means of front/back panel mounting
- High efficiency by means of ball bearing
- Small torque
- Applications: FHP motors, laboratory equipment, labelling machines, plotters, length measuring machines



5 / 10 / 20 / 25 / 28 / 32 / 50 / 60 / 72 / 100 / 128 / 144 / 200 / 250 / 256 / 288 / 300 / 360 / 400 / 500 / 512 / 600 / 720 / 900 / 1000 / 1024  
 Other number of pulses on request

### TECHNICAL DATA mechanical

Housing diameter	39 mm
Shaft diameter	6 mm (Solid shaft)
Flange (Mounting of housing)	Square flange
Protection class shaft input (EN 60529)	IP40
Protection class housing (EN 60529)	IP50
Shaft load axial / radial	5 N / 10 N
Max. speed	max. 10 000 rpm
Torque	≤ 0.2 Ncm
Vibration resistance (DIN EN 60068-2-6)	100 m/s <sup>2</sup> (10 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	1000 m/s <sup>2</sup> (6 ms)
Operating temperature	-10 °C ... +60 °C
Storage temperature	-25 °C ... +85 °C
Material housing	Glass fiber-reinforced plastic
Weight	approx. 60 g
Connection	Cable, radial

### TECHNICAL DATA electrical

General design	as per DIN VDE 0160, protection class III, contamination level 2, overvoltage class II
Supply voltage <sup>1</sup>	Push-pull (D): DC 5 V ± 10 % Push-pull (K): ± 10% DC 5 V or DC 10 - 30 V
Max. current w/o load	40 mA (DC 5 V), 60 mA (DC 10 V), 30 mA (DC 24 V)
Max. pulse frequency	DC 5 V: 300 kHz DC 10 - 30 V: 200 kHz
Standard output versions <sup>2,3</sup>	Push-pull (K): A, B, N, $\overline{\text{Alarm}}$ Push-pull 5V, ± 30 mA (D): A, B, N, $\overline{\text{Alarm}}$
Pulse width error	± max. 25° electrical
Number of pulses	5 ... 1024
Alarm output	NPN-O.C., max. 5 mA
Pulse shape	Square wave
Pulse duty factor	1:1

## Incremental

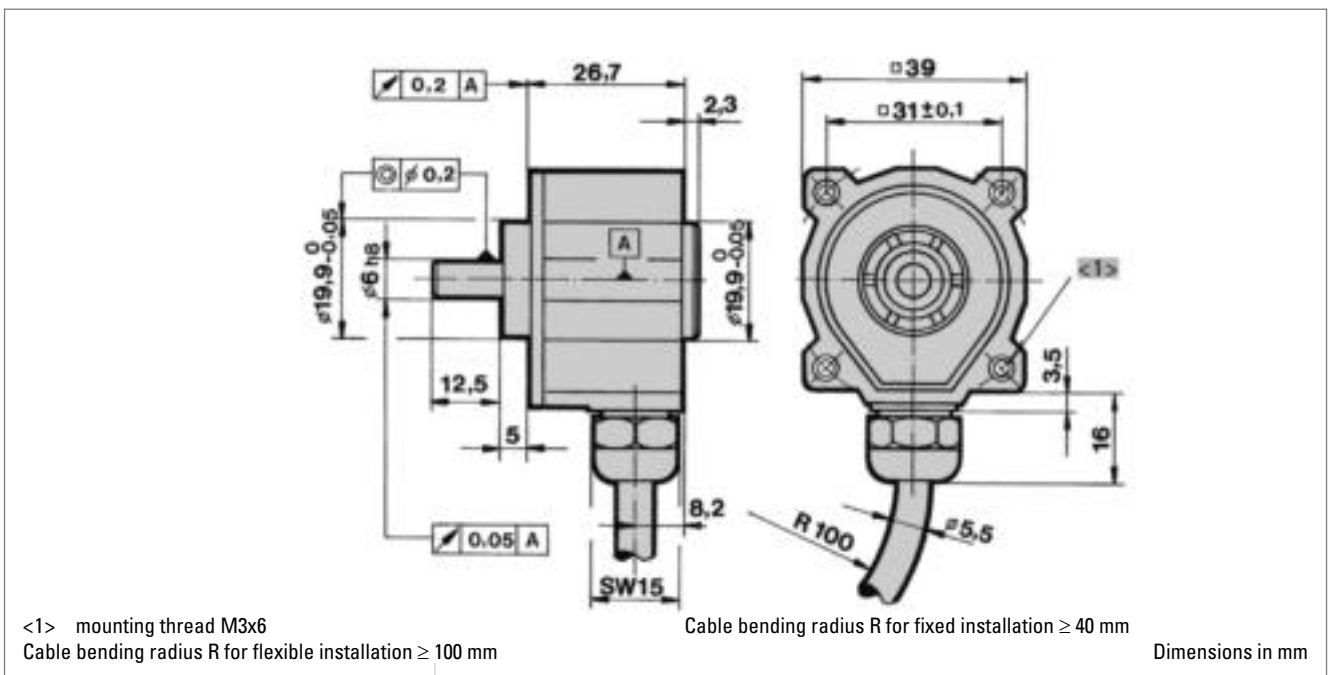
### TECHNICAL DATA electrical (continued)

- <sup>1</sup> With push-pull (K): pole protection
- <sup>2</sup> Output code "K": short-circuit-proof
- <sup>3</sup> Output description and technical data see chapter "Technical basics"

### ELECTRICAL CONNECTIONS Cable

Description (push-pull)	Lead Ø mm <sup>2</sup>	Colour
DC 5 V/ 10 - 30 V	0.5	red
Channel A	0.14	white
Channel B	0.14	green
Channel N	0.14	yellow
GND	0.5	black
Alarm	0.14	yellow/black

### DIMENSIONED DRAWINGS



### ORDERING INFORMATION

Type	Number of pulses	Supply voltage <sup>1</sup>	Flange, Protection, Shaft	Output <sup>2,3</sup>	Connection
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>RI38</b>	<b>5 ... 1024</b>	<b>A DC 5 V</b> <b>E DC 10 - 30 V</b>	<b>0.11</b> Square, IP40, 6 mm	<b>K</b> Push-pull <b>D</b> Push-pull 5V, $\pm 30$ mA	<b>B</b> Cable, radial

<sup>1</sup> DC 10 - 30 V: only with output "K" available

<sup>2</sup> Output code "K":  $\pm 10$  mA at DC 5 V,  $\pm 30$  mA at DC 10 - 30 V

<sup>3</sup> Output code "K": short-circuit-proof

**ORDERING INFORMATION**  
**Selection of cable length****Incremental**

Versions with cable outlet (connection A, B, E or F) are available with various lengths of cable. To order your desired cable length, please add the respective code to the end of your ordering code. Further cable lengths on request.

<b>Code</b>	<b>Cable length</b>
without code	1.5 m
-D0	3 m
-F0	5 m
-K0	10 m
-P0	15 m
-U0	20 m
-V0	25 m

**ACCESSORIES**

see chapter "Accessories", starting page 322

## Incremental



## NUMBER OF PULSES

- Replacement for type RIM
- Economical miniature encoder
- Up to 14,400 steps with 3,600 pulses
- High mechanical efficiency
- Applications: wood working machines, FHP motors, graphic machines, table robots



5 / 10 / 20 / 25 / 28 / 32 / 50 / 60 / 72 / 100 / 128 / 144 / 200 / 250 / 256 / 288 / 300 / 360 / 400 / 500 / 512 / 600 / 720 / 900 / 1000 / 1024 / 1250 / 1500 / 2000 / 2048 / 2500 / 3000 / 3600  
Other number of pulses on request

TECHNICAL DATA  
mechanical

Housing diameter	40 mm
Shaft diameter	6 mm (Solid shaft)
Flange (Mounting of housing)	Pilot flange
Protection class shaft input (EN 60529)	IP40
Protection class housing (EN 60529)	IP50
Shaft load axial / radial	5 N / 10 N
Max. speed	max. 10 000 rpm
Torque	≤ 0.2 Ncm
Vibration resistance (DIN EN 60068-2-6)	100 m/s <sup>2</sup> (10 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	1000 m/s <sup>2</sup> (6 ms)
Operating temperature	-10 °C ... +70 °C
Storage temperature	-25 °C ... +85 °C
Material housing	Aluminum
Weight	approx. 60 g
Connection	Cable, radial

TECHNICAL DATA  
electrical

General design	as per DIN VDE 0160, protection class III, contamination level 2, overvoltage class II
Supply voltage <sup>1</sup>	Push-pull (D): DC 5 V ±10 % Push-pull (K): ± 10% DC 5 V or DC 10 - 30 V
Max. current w/o load	40 mA (DC 5 V), 60 mA (DC 10 V), 30 mA (DC 24 V)
Max. pulse frequency	DC 5 V: 300 kHz DC 10 - 30 V: 200 kHz
Standard output versions <sup>2,3</sup>	Push-pull (K): A, B, N, $\overline{\text{Alarm}}$ Push-pull 5V, ± 30 mA (D): A, B, N, $\overline{\text{Alarm}}$
Pulse width error	± max. 25° electrical
Number of pulses	5 ... 3600
Alarm output	NPN-O.C., max. 5 mA
Pulse shape	Square wave
Pulse duty factor	1:1

## Incremental

### TECHNICAL DATA electrical (continued)

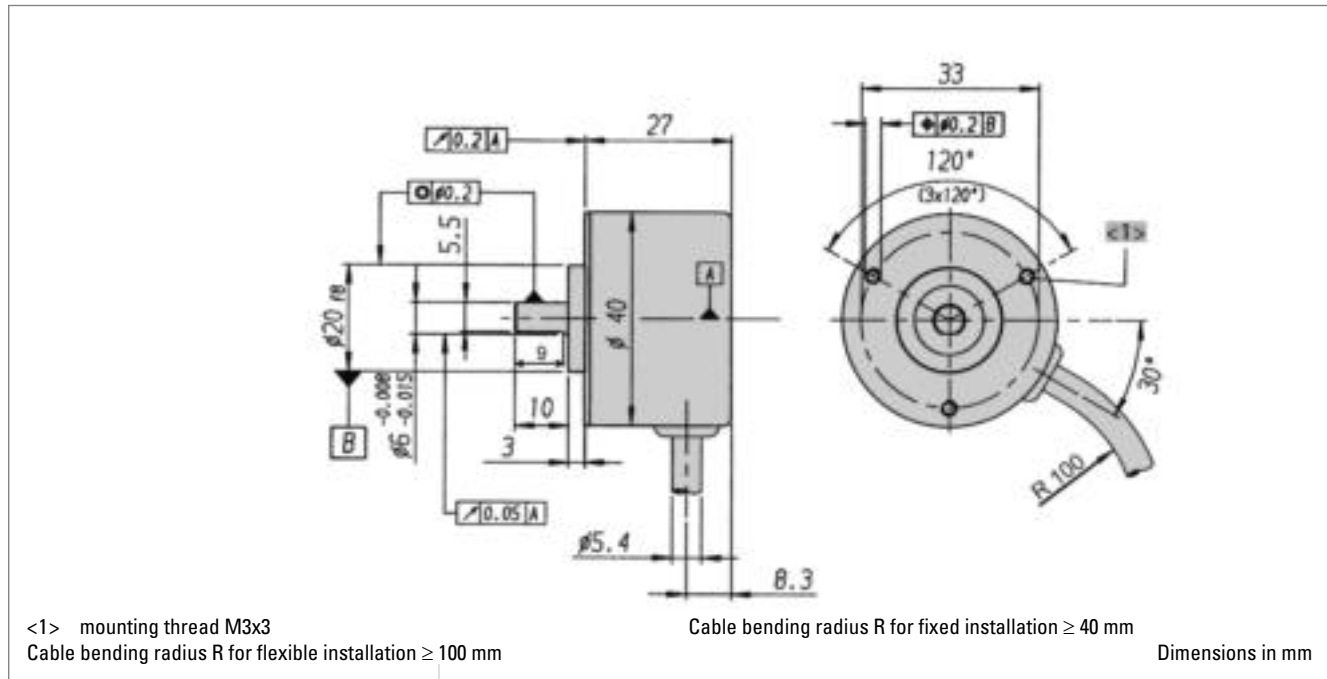
- <sup>1</sup> With push-pull (K): pole protection
- <sup>2</sup> Output code "K": short-circuit-proof
- <sup>3</sup> Output description and technical data see chapter "Technical basics"

### ELECTRICAL CONNECTIONS Cable

Description (push-pull)	Lead Ø mm <sup>2</sup>	Colour
DC 5 V/10 - 30 V	0.5	red
Channel A	0.14	white
Channel B	0.14	green
Channel N	0.14	yellow
GND	0.5	black
Alarm	0.14	yellow/black
screen <sup>1</sup>		screen <sup>1</sup>

<sup>1</sup> not connected with encoder housing

### DIMENSIONED DRAWINGS



### ORDERING INFORMATION

Type	Number of pulses	Supply voltage <sup>1</sup>	Flange, Protection, Shaft	Output <sup>2,3</sup>	Connection
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>RI41</b>	<b>5 ... 3600</b>	<b>A DC 5 V</b> <b>E DC 10 - 30 V</b>	<b>R.11</b> Pilot, IP40, 6 mm	<b>K</b> Push-pull <b>D</b> Push-pull 5V, $\pm 30$ mA	<b>B</b> PVC cable, radial

<sup>1</sup> DC 10 - 30 V: only with output "K" available

<sup>2</sup> Output code "K":  $\pm 10$  mA at DC 5 V,  $\pm 30$  mA at DC 10 - 30 V

<sup>3</sup> Output code "K": short-circuit-proof

## Incremental

### ORDERING INFORMATION

Selection of cable length

Versions with cable outlet (connection A, B, E or F) are available with various lengths of cable. To order your desired cable length, please add the respective code to the end of your ordering code. Further cable lengths on request.

Code	Cable length
without code	1.5 m
-D0	3 m
-F0	5 m
-K0	10 m
-P0	15 m
-U0	20 m
-V0	25 m

### ACCESSORIES

see chapter "Accessories", starting page 322

## Incremental



## NUMBER OF PULSES

- Economical miniature encoder
- High protection IP65
- Output Push-pull or NPN-O.C.
- High mechanical efficiency
- Applications: textile machinery



5 / 10 / 20 / 25 / 28 / 32 / 50 / 60 / 72 / 100 / 128 / 144 / 200 / 250 / 256 / 288 / 300 / 360 / 400 / 500  
 / 512 / 600 / 720 / 900 / 1000 / 1024  
 Other number of pulses on request

**TECHNICAL DATA**  
 mechanical

Housing diameter	40 mm
Shaft diameter	6 mm (Solid shaft)
Flange (Mounting of housing)	Pilot flange
Protection class shaft input (EN 60529)	IP64
Protection class housing (EN 60529)	IP65
Shaft load axial / radial	5 N / 10 N
Max. speed	max. 10 000 rpm
Torque	≤ 1 Ncm
Vibration resistance (DIN EN 60068-2-6)	100 m/s <sup>2</sup> (10 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	1000 m/s <sup>2</sup> (6 ms)
Operating temperature	0 °C ... +60 °C
Storage temperature	-25 °C ... +85 °C
Material shaft	Aluminum
Material housing	Plastic
Weight	approx. 75 g
Connection	Cable, axial

**TECHNICAL DATA**  
 electrical

General design	as per DIN VDE 0160, protection class III, contamination level 2, overvoltage class II
Supply voltage <sup>1</sup>	Push-pull (D): DC 5 V ±10 % Push-pull (K): ± 10% DC 5 V or DC 10 - 30 V Push-pull antivalent (I): DC 10-30 V Open Collector NPN (S): DC 10-24 V
Max. current w/o load	40 mA (DC 5 V), 30 mA (DC 24 V, with push-pull K, I), 40 mA (DC 24 V, NPN-O.C.)
Max. pulse frequency	DC 5 V: 300 kHz DC 10 - 30 V: 200 kHz DC 10 - 24 V: 50 kHz
Standard output versions <sup>2,3,4</sup>	Push-pull (K): A, B, N, $\overline{A}$ alarm Push-pull 5V, ± 30 mA (D): A, B, N, $\overline{A}$ alarm Push-pull complementary (I): A, B, N, $\overline{A}$ , $\overline{B}$ , $\overline{N}$ , $\overline{A}$ alarm NPN-O.C. (S): A, B, N

## Incremental

### TECHNICAL DATA electrical (continued)

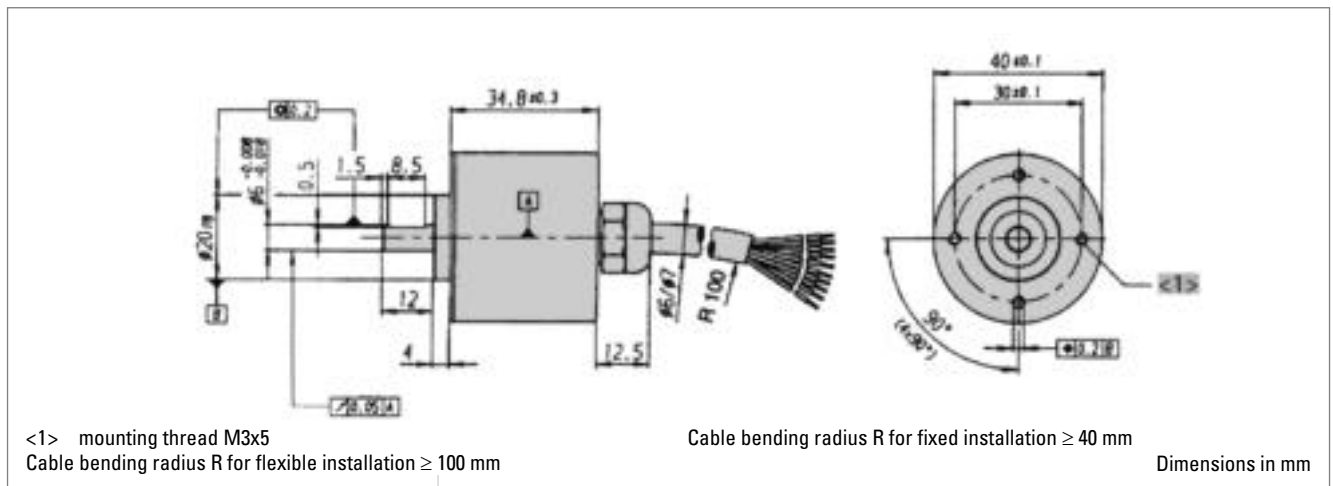
Pulse width error	± max. 25° electrical
Number of pulses	5 ... 1024
Alarm output	NPN-O.C., max. 5 mA
Pulse shape	Square wave
Pulse duty factor	1:1

- <sup>1</sup> With push-pull (K): pole protection
- <sup>2</sup> Output code "K": short-circuit-proof
- <sup>3</sup> NPN-O.C. with internal pull-up resistor = 10 KΩ, max. pulse frequency = 50 KHz, max. output lead = ± 30 mA, tolerance ≤ ± 30° electrical, delay time ≤ 4μs
- <sup>4</sup> Output description and technical data see chapter "Technical basics"

### ELECTRICAL CONNECTIONS Cable

Colour (PVC)	Output circuit	
	push-pull (K, D), Open Collector (S)	push-pull complementary (I)
white	Channel A	Channel A
white/brown		Channel $\bar{A}$
green	Channel B	Channel B
green/brown		Channel $\bar{B}$
yellow	Channel N	Channel N
yellow/brown		Channel $\bar{N}$
yellow/black	Alarm	Alarm
yellow/red		Sense V <sub>CC</sub>
red	DC 5/ 10 - 30/ 10 - 24 V	DC 10 - 30 V
black	GND	GND

### DIMENSIONED DRAWINGS



## Incremental

### ORDERING INFORMATION

Type	Number of pulses	Supply voltage <sup>1,2,3</sup>	Flange, Protection, Shaft	Output <sup>4,5</sup>	Connection
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>RI42</b>	<b>5 ... 1024</b>	<b>A</b> DC 5 V <b>C</b> DC 10 - 24 V <b>E</b> DC 10 - 30 V	<b>R.41</b> Pilot, IP64, 6 mm	<b>K</b> Push-pull <b>I</b> Push-pull complementary <b>D</b> Push-pull 5V, ± 30 mA <b>S</b> Open Collector NPN	<b>A</b> Cable, axial

<sup>1</sup> DC 5 V: only with output "K", "D" available

<sup>2</sup> DC 10 - 30 V: only with output "K", "I" available

<sup>3</sup> DC 10 - 24 V: only with output "S" available

<sup>4</sup> Output code "K": ±10 mA at DC 5 V, ±30 mA at DC 10 - 30 V

<sup>5</sup> Output code "K" and "I": short-circuit-proof

### ORDERING INFORMATION

#### Selection of cable length

Versions with cable outlet (connection A, B, E or F) are available with various lengths of cable. To order your desired cable length, please add the respective code to the end of your ordering code. Further cable lengths on request.

Code	Cable length
without code	1.5 m
-D0	3 m
-F0	5 m
-K0	10 m
-P0	15 m
-U0	20 m
-V0	25 m

### ACCESSORIES

see chapter "Accessories", starting page 322