Encoders
Magnetic Encoders

Features:
64 to 1 024 Lines per revolution
2 Channels
Digital output

Series IE2 – 1 024

		IE2 – 64	IE2 – 128	IE2 – 256	IE2 – 512	IE2 – 1 024	
Lines per revolution	N	64	128	256	512	1 024	
Signal output, square wave		2					channels
Supply voltage	V_{DD}	4,5 … 5,5					V DC
Current consumption, typical (V_{DD} = 5 V DC)	I_{DD}	typ. 6, max. 12				typ. 8,5	mA
Output current, max. [1]	I_{OUT}	5					mA
Phase shift, channel A to B	Φ	90 ± 45					°e
Signal rise/fall time, max. (C_{LOAD} = 50 pF)	tr/tf	0,1 / 0,1					µs
Frequency range [2], up to	f	20	40	80	160	300	kHz
Inertia of code disc [3]	J	0,09					gcm²
Operating temperature range		– 25 … + 85					°C

[1] V_{DD} = 5 V DC: Low logic level < 0,5 V, high logic level > 4,5 V: CMOS and TTL compatible
[2] Velocity (rpm) = f (Hz) x 60/N
[3] For the brushless DC-Servomotors the inertia of code disc is J = 0,14 gcm²

Ordering information

Encoder	number of channels	lines per revolution	in combination with:
IE2 – 64	2	64	**DC-Micromotors**
IE2 – 128	2	128	1336 … CXR,
IE2 – 256	2	256	1516 … SR, 1524 … SR,
IE2 – 512	2	512	1717 … SR, 1724 … SR,
IE2 – 1 024	2	1024	1727 … C, 1741 … CXR
			2224 … SR, 2232 … SR, 2342 … CR,
			2642 … CR, 2657 … CR,
			3242 … CR, 3257 … CR, 3272 … CR
			3863 … C, 3863 … CR
			Brushless DC-Servomotors
			1628 … B, 2036 … B, 2057 … B,
			2444 … B

Features

These incremental shaft encoders in combination with the FAULHABER DC-Micromotors and Brushless DC-Servomotors are used for the indication and control of both shaft velocity and direction of rotation as well as for positioning.

The encoder is integrated in the DC-Micromotors SR-Series and extends the overall length by only 1,4 mm. Built-on option for DC-Micromotors and Brushless DC-Servomotors.

Hybrid circuits with sensors and a low inertia magnetic disc provide two channels with 90° phase shift.

The supply voltage for the encoder and the DC-Micromotor as well as the two channel output signals are interfaced through a ribbon cable with connector.

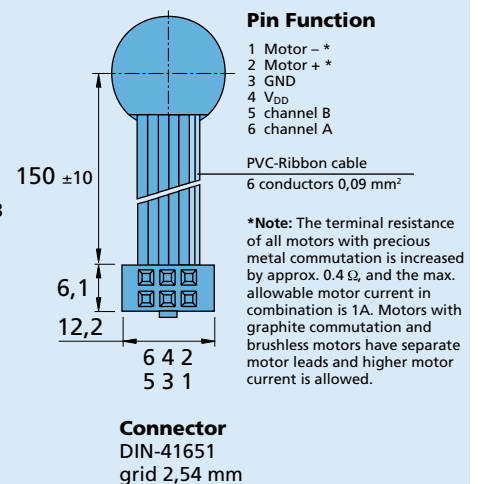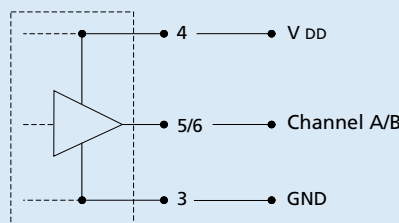Details for the DC-Micromotors and suitable reduction gearheads are on separate catalogue pages.

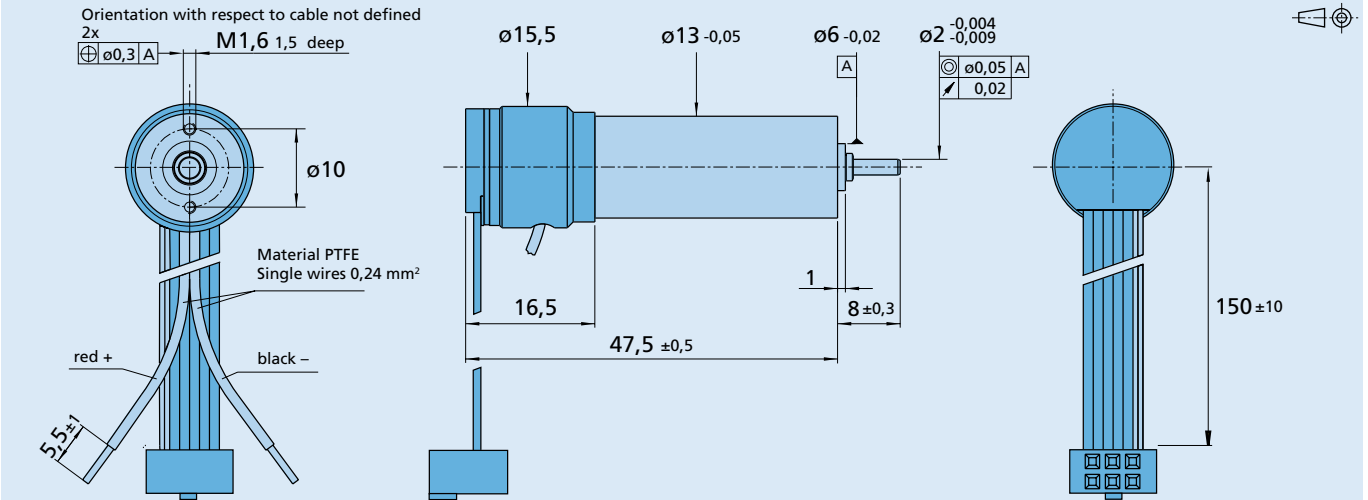### Output signals / Circuit diagram / Connector information

Output signals
with clockwise rotation as seen from the shaft end
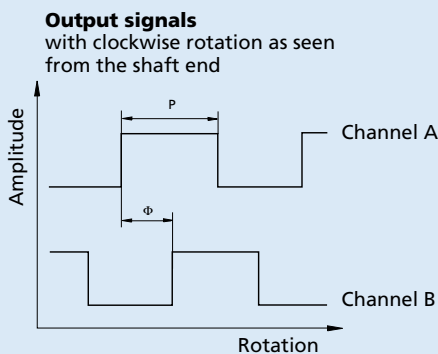
Admissible deviation of phase shift:

$$\Delta\Phi = \left| 90° - \frac{\Phi}{P} \; * \; 180° \right| \leq 45°$$

Output circuit

- 4 — V_{DD}
- 5/6 — Channel A/B
- 3 — GND

Pin Function

1 Motor – *
2 Motor + *
3 GND
4 V_{DD}
5 channel B
6 channel A

PVC-Ribbon cable
6 conductors 0,09 mm²

150 ±10
6,1
12,2
6 4 2
5 3 1

*Note: The terminal resistance of all motors with precious metal commutation is increased by approx. 0.4 Ω, and the max. allowable motor current in combination is 1A. Motors with graphite commutation and brushless motors have separate motor leads and higher motor current is allowed.

Connector
DIN-41651
grid 2,54 mm

DC-Micromotor 1336 U ... CXR - 123 with Encoder IE2 – 16 ... 1 024

Orientation with respect to cable not defined

2x
⊕ ø0,3 A   M1,6 1,5 deep

ø10

Material PTFE
Single wires 0,24 mm²

red +   black –

5,5 ±1

ø15,5   ø13 -0,05   ø6 -0,02   ø2 $^{-0,004}_{-0,009}$

A

◎ ø0,05 A
∠ 0,02

16,5

1

8 ±0,3

47,5 ±0,5

150 ±10

DC-Micromotor 1516 T ... SR with Encoder IE2 – 16 ... 1 024

Orientation with respect to cable not defined

6x
⊕ ø0,3 A   M1,6 1,4 deep

ø10

6x 60°

ø15 $^{0}_{-0,052}$ ø6 $^{0}_{-0,05}$ ø1,5 $^{-0,004}_{-0,009}$

A

◎ ø0,05 A
∠ 0,02

2,4   1

15,8   8,1 ±0,3

13,3

150 ±10
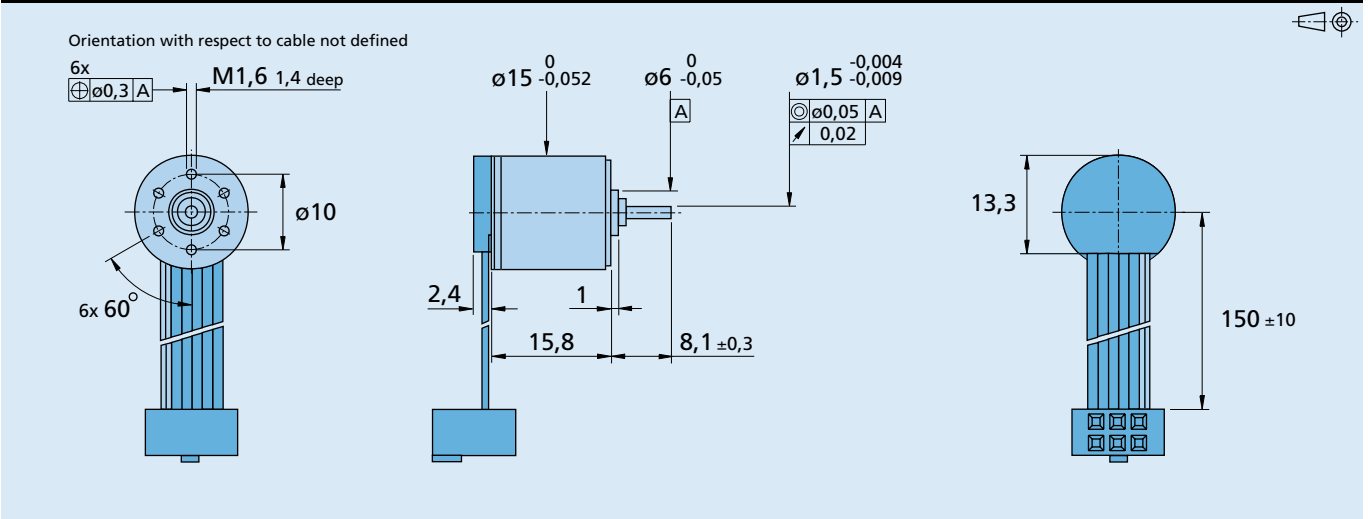
DC-Micromotor 1524 T ... SR with Encoder IE2 – 16 ... 1 024

Orientation with respect to cable not defined

6x
⊕ ø0,3 A   M1,6 1,4 deep

ø10

6x 60°

ø15 $^{0}_{-0,052}$ ø6 $^{0}_{-0,05}$ ø1,5 $^{-0,004}_{-0,009}$

A

◎ ø0,05 A
∠ 0,02

2,4   1

23,8   8,1 ±0,3

13,3

150 ±10
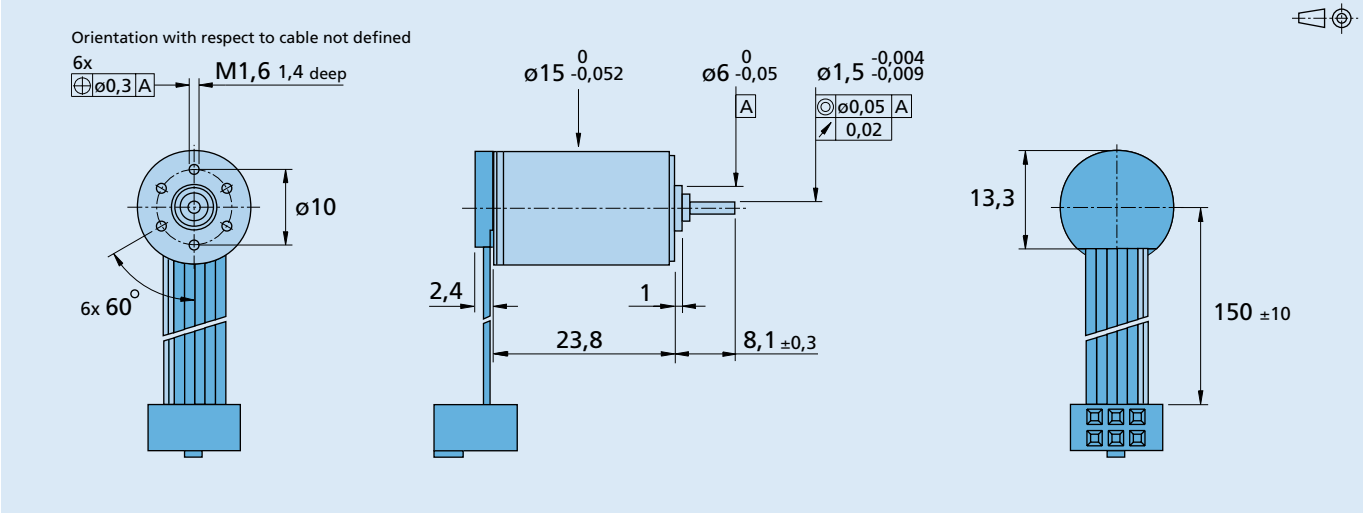
DC-Micromotor 1717 T ... SR with Encoder IE2 – 16 ... 1 024

Orientation with respect to cable not defined

6x
⊕ ø0,3 A
M1,6 1,6 deep
ø10
6x 60°

ø15,9 ø17 0 -0,052 ø6 0 -0,05 ø1,5 -0,004 -0,009
A
ø0,05 A
0,02
ø3,5
2,4
2
17
1
2,1
6 ±0,3
8,1 ±0,3

13,3
150 ±10
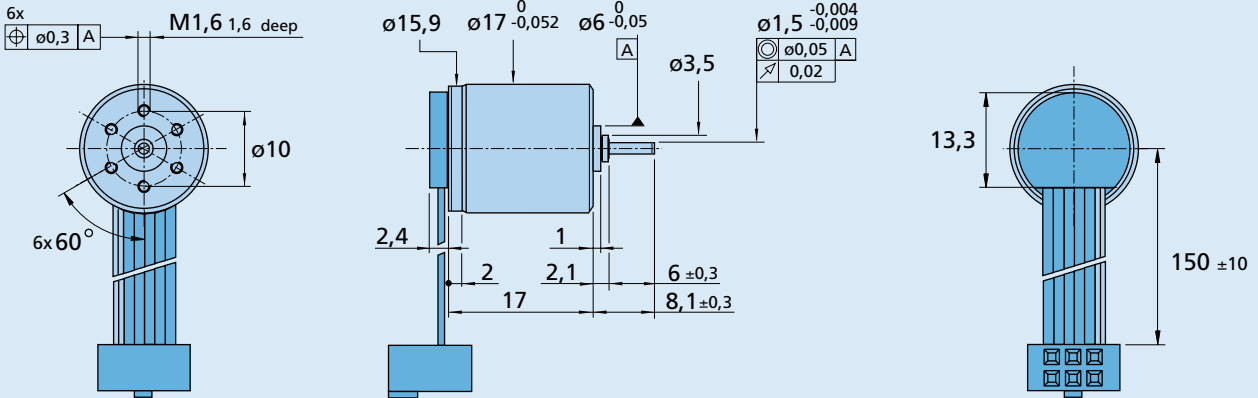
DC-Micromotor 1724 T ... SR with Encoder IE2 – 16 ... 1 024
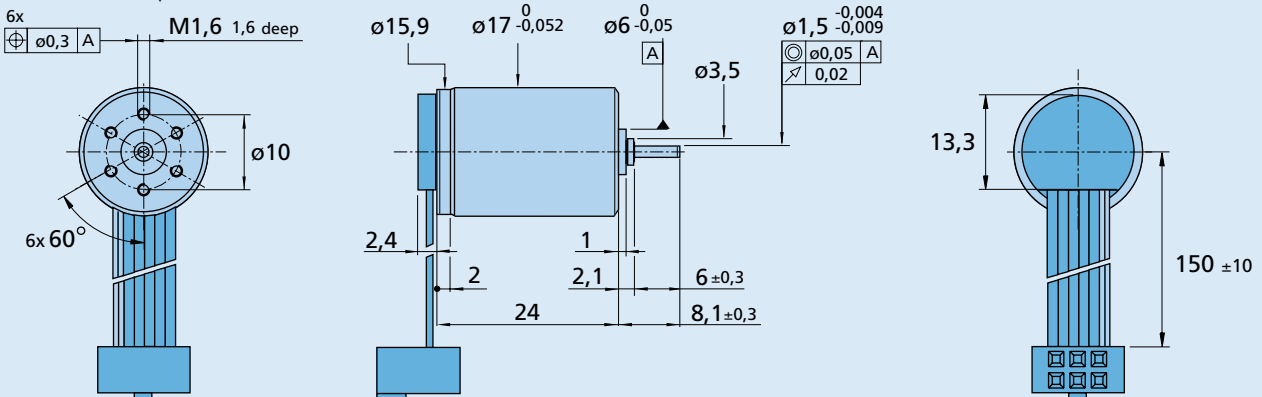
Orientation with respect to cable not defined

6x
⊕ ø0,3 A
M1,6 1,6 deep
ø10
6x 60°

ø15,9 ø17 0 -0,052 ø6 0 -0,05 ø1,5 -0,004 -0,009
A
ø0,05 A
0,02
ø3,5
2,4
2
24
1
2,1
6 ±0,3
8,1 ±0,3

13,3
150 ±10

DC-Micromotor 1727 U ... C - 123 with Encoder IE2 – 16 ... 1 024

Orientation with respect to cable not defined

6x
⊕ ø0,3 A
M1,6 2,5 deep
ø10
6x 60°

Material PTFE
Single wires 0,24 mm²
red +   black –
5,5 ±1

ø15,5 ø17 -0,1 ø6 -0,015 ø2 -0,004 -0,009
A
ø0,05 A
0,02
1
30 ±0,5
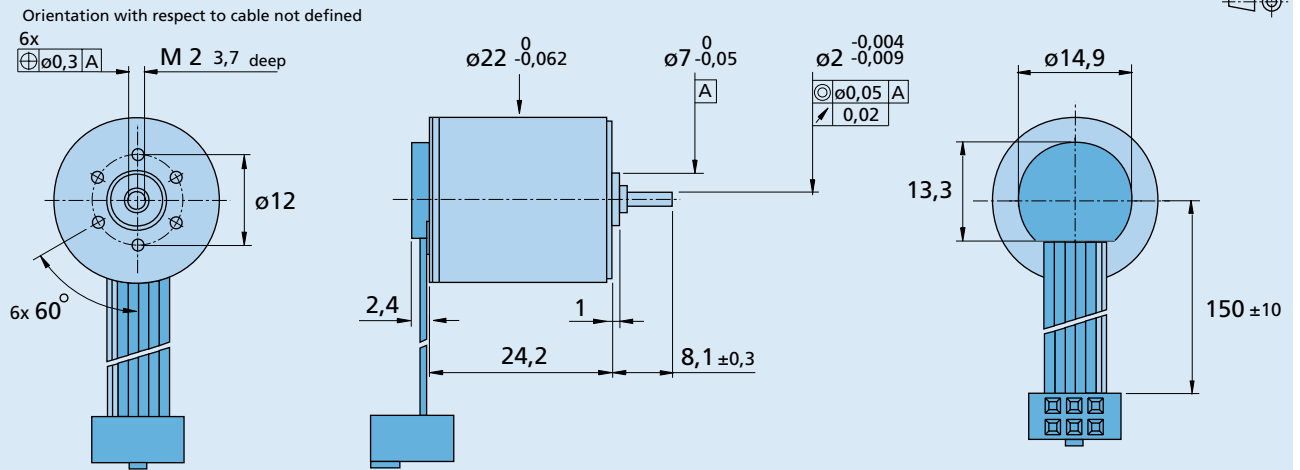8 ±0,4
38,2 ±1,3

150 ±10

DC-Micromotor 2224 U ... SR with Encoder IE2 – 16 ... 1 024

Orientation with respect to cable not defined

6x
⊕ ø0,3 | A

M 2 3,7 deep

ø12

6x 60°

ø22 0 / -0,062

ø7 0 / -0,05
A

ø2 -0,004 / -0,009
◎ ø0,05 | A
↗ 0,02

2,4

1

24,2

8,1 ±0,3

ø14,9

13,3

150 ±10
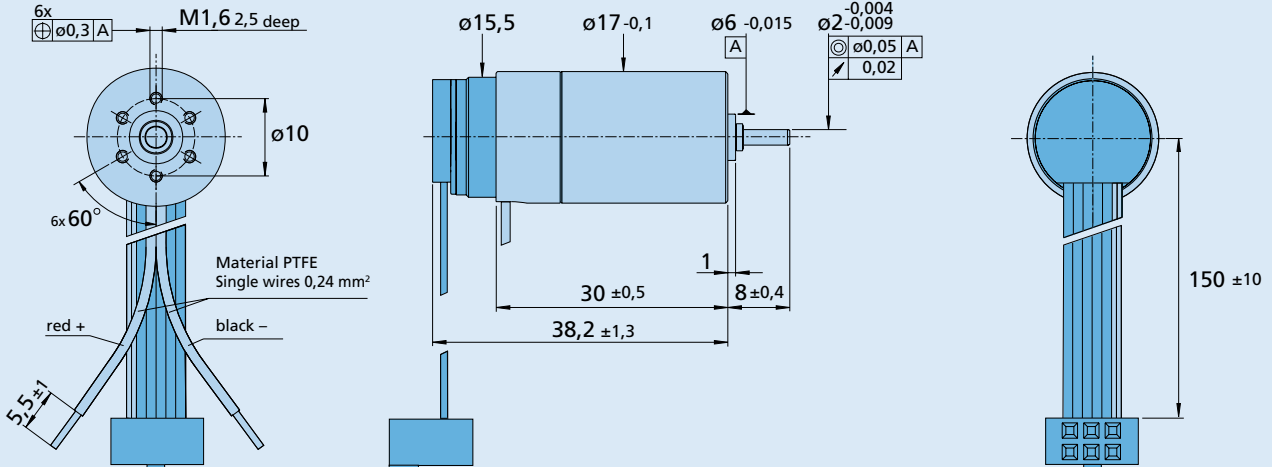
DC-Micromotor 2232 U ... SR with Encoder IE2 – 16 ... 1 024

Orientation with respect to cable not defined

6x
⊕ ø0,3 | A

M 2 3,7 deep

ø12

6x 60°

ø22 0 / -0,062

ø7 0 / -0,05
A

ø2 -0,004 / -0,009
◎ ø0,05 | A
↗ 0,02

2,4

1

32,2

8,1 ±0,3

ø14,9

13,3

150 ±10
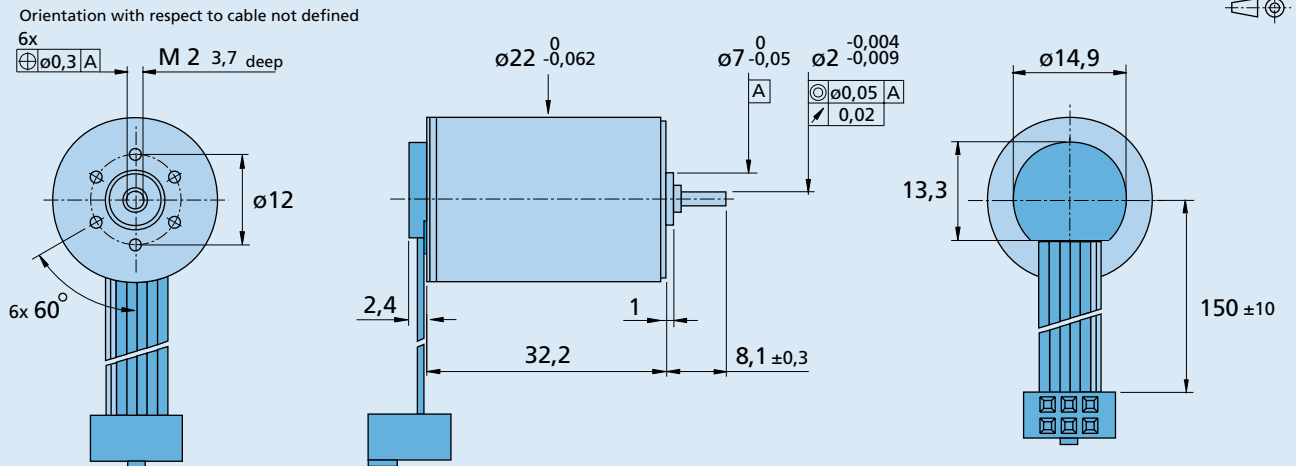
DC-Micromotor 2342 S ... CR with Encoder IE2 – 16 ... 1 024
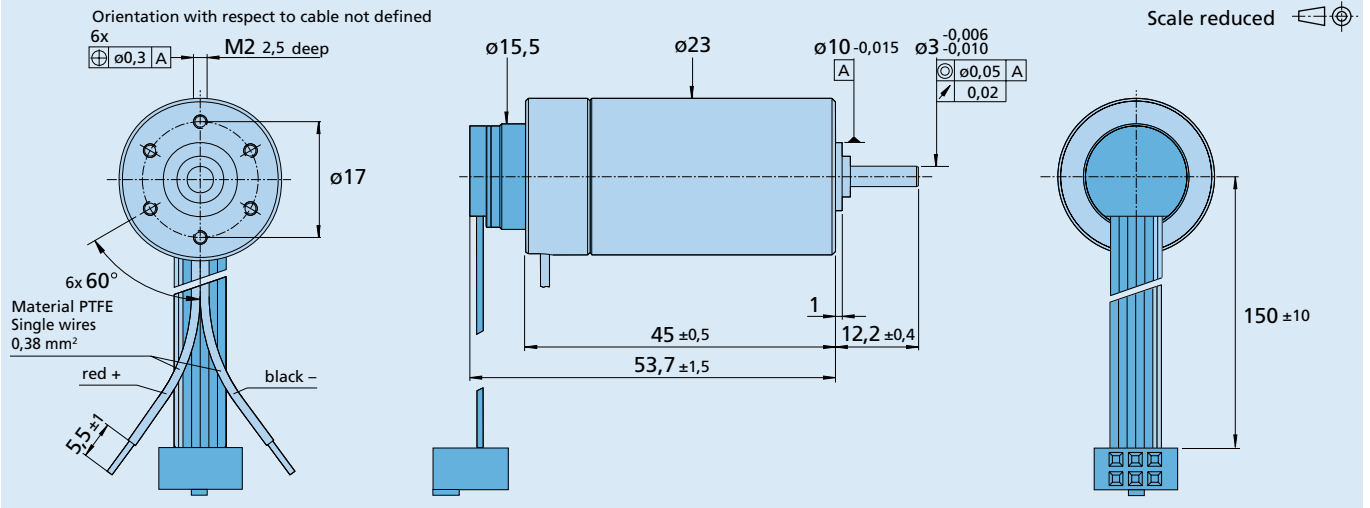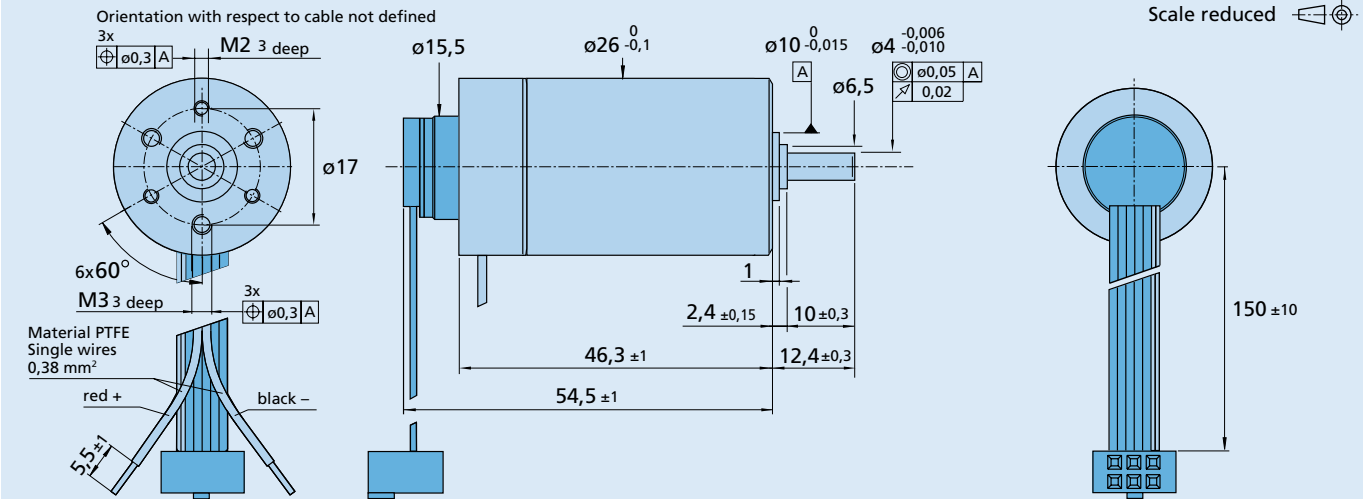
Orientation with respect to cable not defined

Scale reduced

6x
⊕ ø0,3 | A

M2 2,5 deep

ø17

6x 60°

Material PTFE
Single wires
0,38 mm²

red +   black –

5,5 ±1

ø15,5   ø23

ø10 -0,015

ø3 -0,006 / -0,010
◎ ø0,05 | A
↗ 0,02

1

45 ±0,5

12,2 ±0,4

53,7 ±1,5

150 ±10

For notes on technical data and lifetime performance
refer to "Technical Information".
Edition 2012 – 2013

DC-Micromotor 2642 W ... CR with Encoder IE2 16 – 1 024

Orientation with respect to cable not defined

Scale reduced

3x
⊕ ø0,3 A
M2 3 deep

ø15,5

ø26 0/-0,1

ø10 0/-0,015

ø4 -0,006/-0,010

ø6,5

⊕ ø0,05 A
∠ 0,02

A

ø17

6x60°

M3 3 deep

3x
⊕ ø0,3 A

Material PTFE
Single wires
0,38 mm²

red +   black –

5,5 ±1

1

2,4 ±0,15   10 ±0,3

46,3 ±1   12,4 ±0,3

54,5 ±1

150 ±10

DC-Micromotor 2657 W ... CR with Encoder IE2 16 – 1 024

Orientation with respect to cable not defined

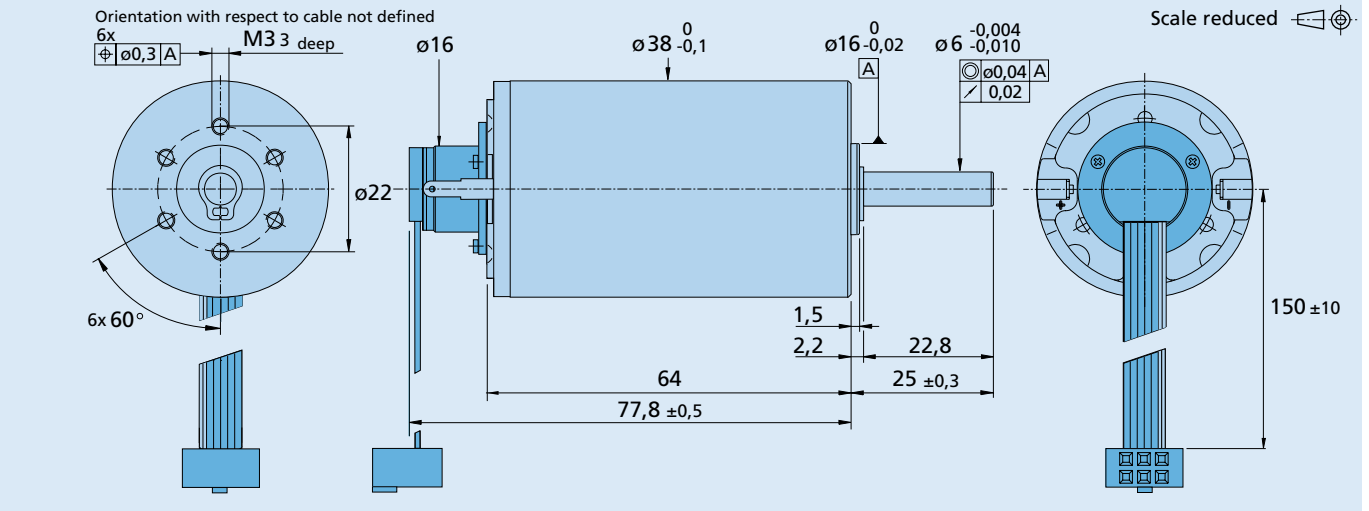Scale reduced

3x
⊕ ø0,3 A
M2 4 deep

ø15,5

ø26 0/-0,1

ø10 0/-0,015

ø4 -0,006/-0,010

A

ø6,5

⊕ ø0,05 A
∠ 0,02

ø17

6x60°

M3 4 deep

3x
⊕ ø0,3 A

Material PTFE
Single wires
0,38 mm²

red +   black –

5,5 ±1

1

2,4 ±0,15   10 ±0,3

61,3 ±1   12,4 ±0,3

69,5 ±1

150 ±10

For notes on technical data and lifetime performance
refer to "Technical Information".
Edition 2012 – 2013   Page 5/7
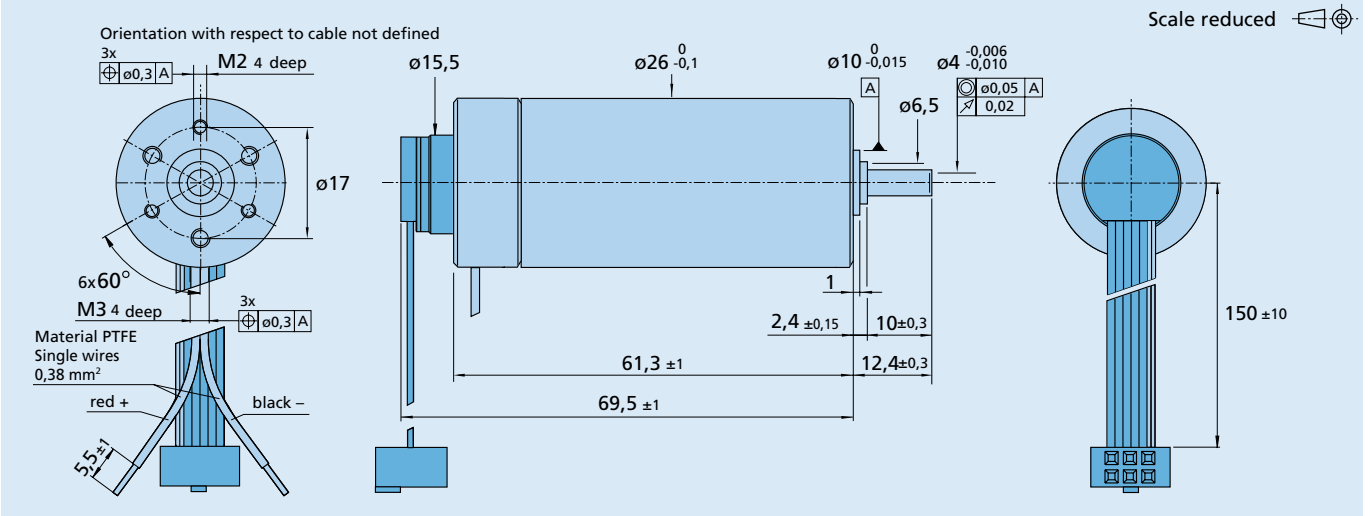
DC-Micromotor 3242 G ... CR with Encoder IE2 16 – 1 024

Scale reduced

Orientation with respect to cable not defined

6x
⌖ ø0,3 A   M3 3 deep

ø15,5   ø32 0 -0,1   ø16 0 -0,015   ø5 -0,006 -0,010   ø8
A   ⌀0,05 A   0,02

ø22

6x60°

Material PTFE
Single wires 0,38 mm²

black –   red +

5,5 ±1

1,5
3 ±0,15   10±0,3
46,3 ±1   13 ±0,3
55 ±1

150 ±10
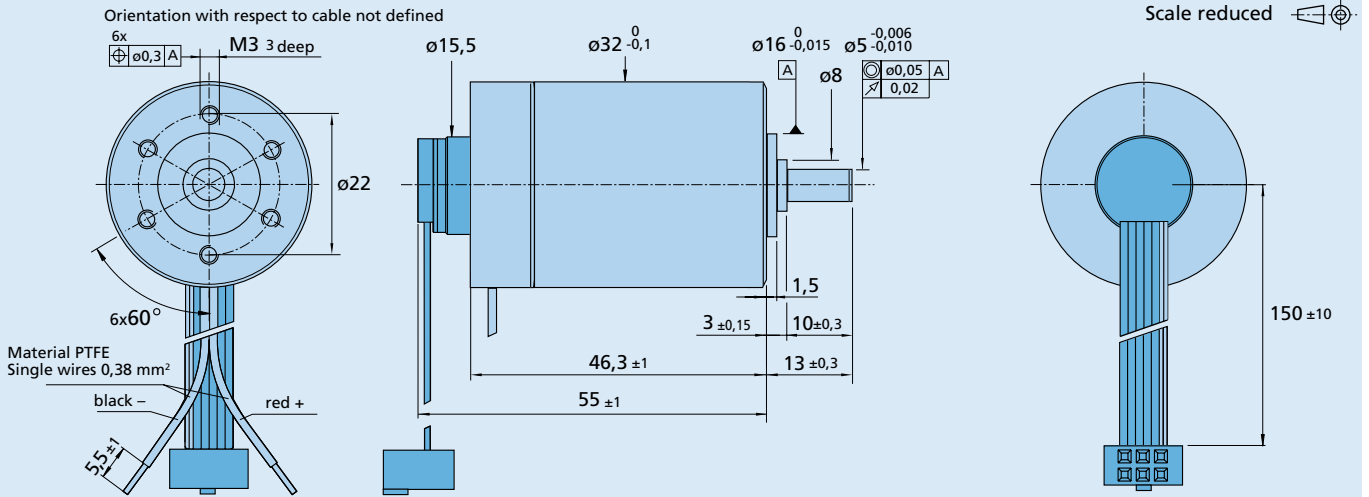
DC-Micromotor 3257 G ... CR with Encoder IE2 16 – 1 024

Scale reduced

Orientation with respect to cable not defined

6x
⌖ ø0,3 A   M3 3 deep

ø15,5   ø32 0 -0,1   ø16 0 -0,015   ø5 -0,006 -0,010   ø8
A   ⌀0,05 A   0,02

ø22

6x60°

Material PTFE
Single wires 0,38 mm²

black –   red +

5,5 ±1

1,5
3 ±0,15   10±0,3
61,3 ±1   13 ±0,3
70 ±1

150 ±10
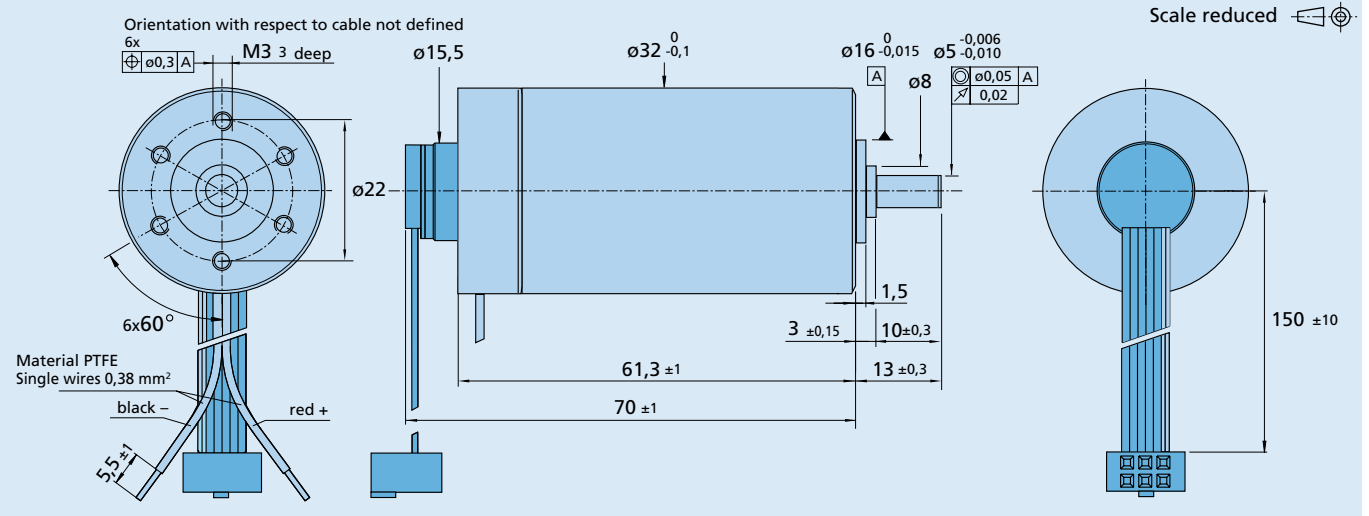
DC-Micromotor 3863 H ... C - 2016 with Encoder IE2 16 – 1 024

Scale reduced

Orientation with respect to cable not defined

6x
⌖ ø0,3 A   M3 3 deep

ø16   ø38 0 -0,1   ø16 0 -0,02   ø6 -0,004 -0,010
A   ⌀0,04 A   0,02

ø22

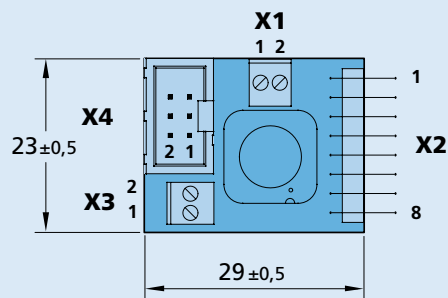6x 60°

1,5
2,2   22,8
64   25 ±0,3
77,8 ±0,5

150 ±10

Brushless DC-Servomotors 1628... B - K313 , 2036 ... B - K313 , 2057 ... B - K313 and 2444 S ... B - K313 with Encoder IE2 – 64 ... 1 024

M 1:1

Example of combination with 1628 ... B

<16

L1

150 ±10

6 4 2
5 3 1

Connector DIN-4651
Grid 2,54 mm

Motor type	< L1
1628	38,8
2036	46,8
2057	68,3
2444	54,8
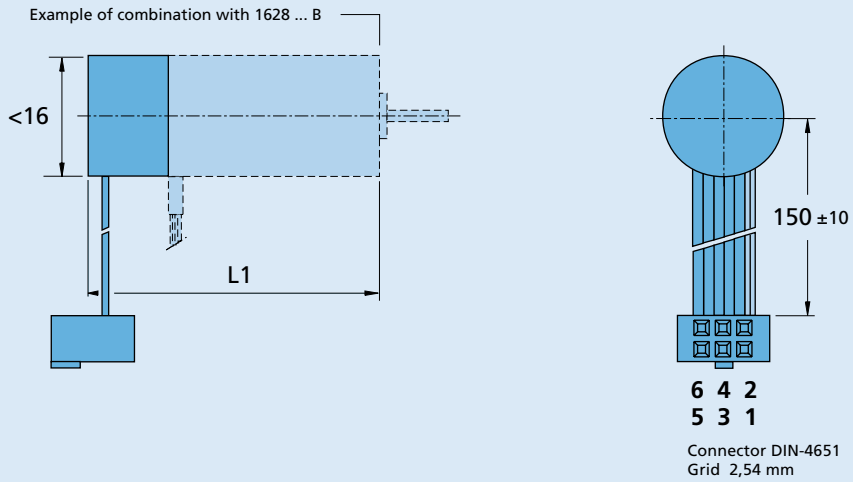
Interface board for MCDC 3002 S

X1
1 2

X4

23 ±0,5

2 1

X3

2
1

X2

1

8

29 ±0,5

Interface board IE2
Part No.: 6501.00143