Encoders

optical Encoder, digital outputs,
2 channels, 50 lines per revolution

For combination with
DC-Micromotors
Brushless DC-Motors

Series PA2-50

		PA2-50	
Lines per revolution	*N*	50	
Frequency range, up to [1]	*f*	35	kHz
Signal output, square wave		2	Channels
Supply voltage	U_{DD}	2,7 ... 3,3	V
Current consumption, typical [2]	I_{DD}	8,5	mA
Output current, max.	I_{OUT}	8	mA
Pulse width	*P*	180 ± 50	°e
Phase shift, channel A to B	*Φ*	90 ± 45	°e
Logic state width	*S*	90 ± 50	°e
Cycle	*C*	360 ± 36	°e
Signal rise/fall time, max. (C_{LOAD} = 25 pF)	*tr*/*tf*	0,3 / 0,1	µs
Inertia of code disc	*J*	0,02	gcm²
Operating temperature range		-30 ... +85	°C

[1] Velocity (min⁻¹) = *f* (Hz) x 60/*N*
[2] *UDD*= 3 V: with unloaded outputs

For combination with Motor	
Dimensional drawing A	**<L1 [mm]**
0615 ... S - K1655	19,2
Dimensional drawing B	**<L1 [mm]**
0620 ... B - K1719	24,0
Dimensional drawing C	**<L1 [mm]**
0816 ... SR - K2565	24,0

Characteristics

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

An all-in-one emitter and detector chip transmits and receives LED light reflected off a low inertia reflective disc providing two channels with 90° phase shift.

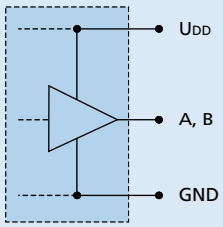
The supply voltage for the encoder and the Micromotor as well as the output signals are interfaced with a flexible printed circuit (FPC).

Details for the DC-Micromotors and Brushless DC-Servomotors and suitable reduction gearheads are on separate catalog pages.

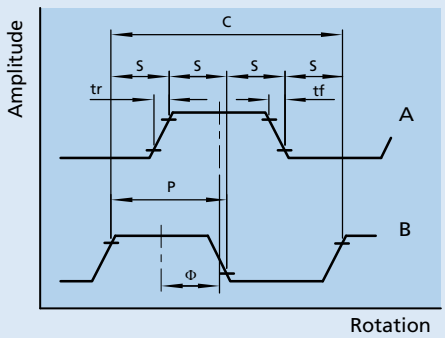
An optional interface board with suitable connector is also available on request.

Circuit diagram / Output signals

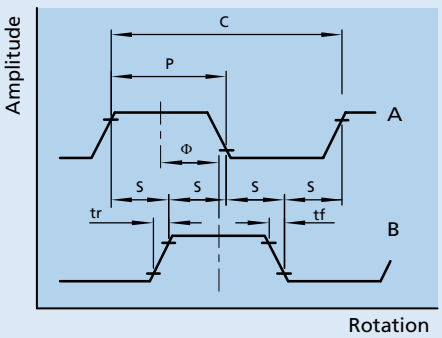
Output circuit



Output signals
with clockwise rotation as seen from the shaft end



0615 ... S / 0620 ... B
Channel B Leads channel A



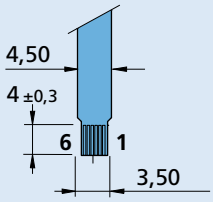
0816 ... S

Connector information / Variants

No.	Function
1	Motor + *
2	U_{DD}
3	Channel A
4	Channel B
5	GND
6	Motor – *

* **Note:** Brushless motors have separate motor leads.

Connection Encoder

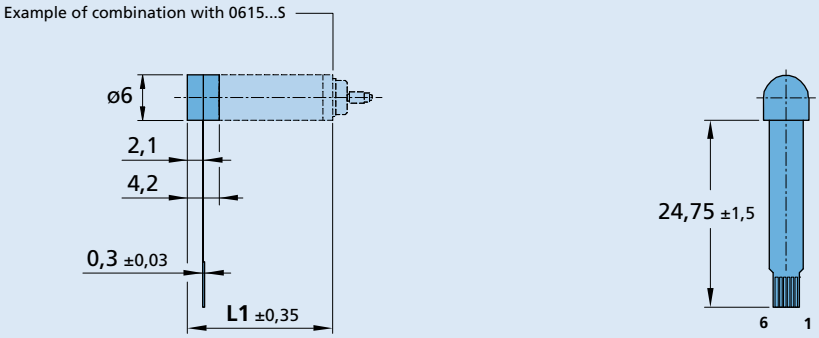


Recommended connector
Molex 52745
grid 0,5 mm
FPC / FFC, 6-conductors

Full product description

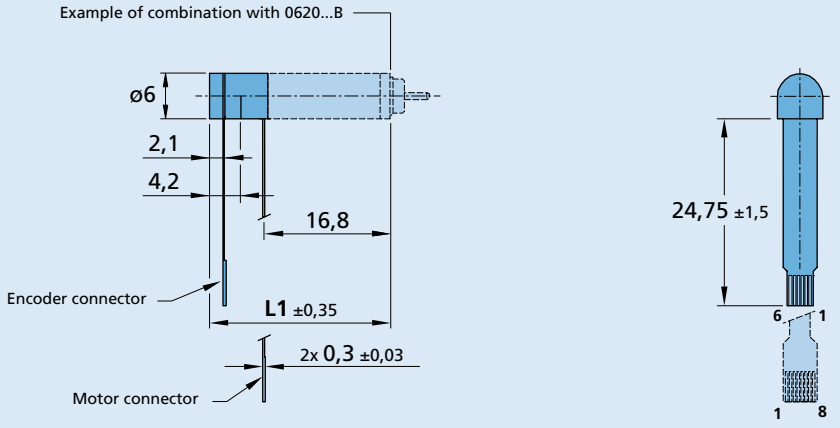
Examples:
0615N003S-K1655 PA2-50
0620K012B-K1719 PA2-50

Dimensional drawing A



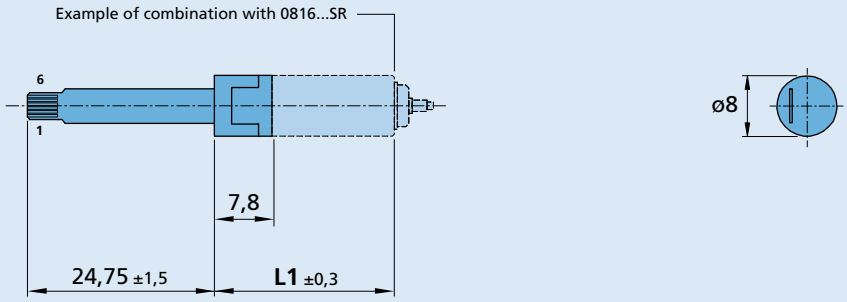
PA2-50

Dimensional drawing B



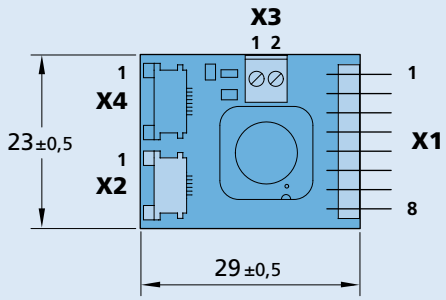
PA2-50

Dimensional drawing C



PA2-50

Adapter board



Interface Board PA2-50
for Motion Controller MCDC 3002 S
Part. No.: 6501.00144

Connection

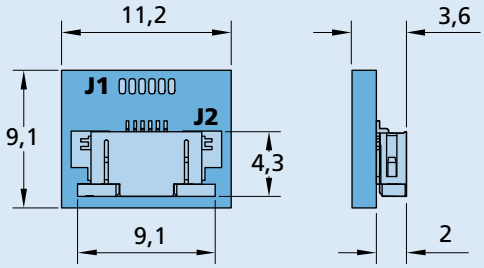
Pin	Connection X1
1	4. In
2	Channel A
3	Channel B
4	U_{DD} = 5V
5	SGND
6	Motor +
7	Motor -
8	5. In

Pin	Connection X2
1	Motor +
2	U_{DD} = 3,3V
3	Channel A
4	Channel B
5	SGND
6	Motor -

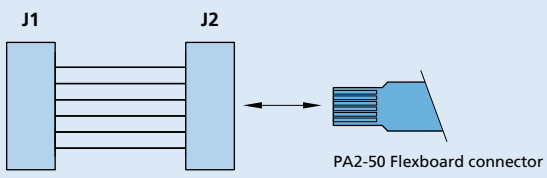
Pin	Connection X3
1	5. In
2	4. In

Pin	Connection X4
1	Motor +
2	Motor +
3	U_{DD} = 3,3V
4	Channel A
5	Channel B
6	SGND
7	Motor -
8	Motor -

Adapter board



Interface board PA2-50
Part No.: D100315100



Connector
J1 - Solder Pads
J2 - Molex 52745-0696

For notes on technical data and lifetime performance refer to “Technical Information”.
Edition 2016

Encoders

optical Encoder, digital outputs,
2 channels, 100 lines per revolution

For combination with
DC-Micromotors

Series PA2-100

		PA2-100	
Lines per revolution	*N*	100	
Frequency range, up to [1]	*f*	35	kHz
Signal output, square wave		2	Channels
Supply voltage	U_{DD}	2,7 ... 3,3	V
Current consumption, typical [2]	I_{DD}	8	mA
Pulse width	*P*	180 ± 45	°e
Phase shift, channel A to B	*Φ*	90 ± 45	°e
Logic state width	*S*	90 ± 45	°e
Cycle	*C*	360 ± 30	°e
Signal rise/fall time, max. (C_{LOAD} = 50 pF)	*tr*/*tf*	0,1 / 0,1	µs
Inertia of code disc	*J*	0,02	gcm²
Operating temperature range		-25 ... +85	°C

[1] Velocity (min⁻¹) = *f* (Hz) x 60/*N*
[2] *UDD*= 3 V: with unloaded outputs

For combination with Motor	
Dimensional drawing A	**<L1 [mm]**
1016 ... G - K1752	23,5
1024 ... S - K1752	31,5
Dimensional drawing B	**<L1 [mm]**
1224 ... SR - K1752	31,1

Characteristics

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

An all-in-one emitter and detector chip transmits and receives LED light reflected off a low inertia reflective disc providing two channels with 90° phase shift.

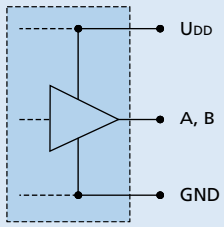
The supply voltage for the encoder and the Micromotor as well as the output signals are interfaced with a flexible printed circuit (FPC).

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

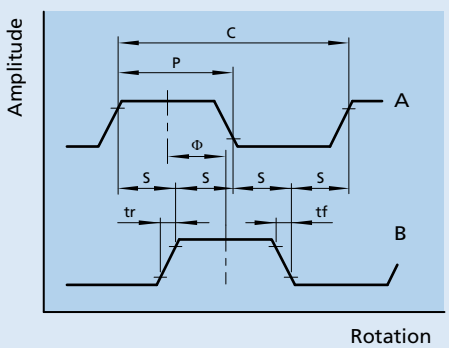
An optional interface board with suitable connector is also available on request.

Circuit diagram / Output signals

Output circuit



Output signals
with clockwise rotation as seen from the shaft end



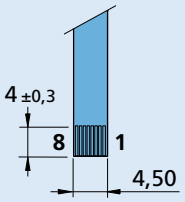
For notes on technical data and lifetime performance refer to “Technical Information”.
Edition 2016

www.faulhaber.com

Connector information / Variants

No.	Function
1	Motor +
2	Motor +
3	U_{DD}
4	Channel A
5	Channel B
6	GND
7	Motor –
8	Motor –

Connection Encoder



Recommended connector
Molex 52745
grid 0,5 mm
FPC / FFC, 8-conductors

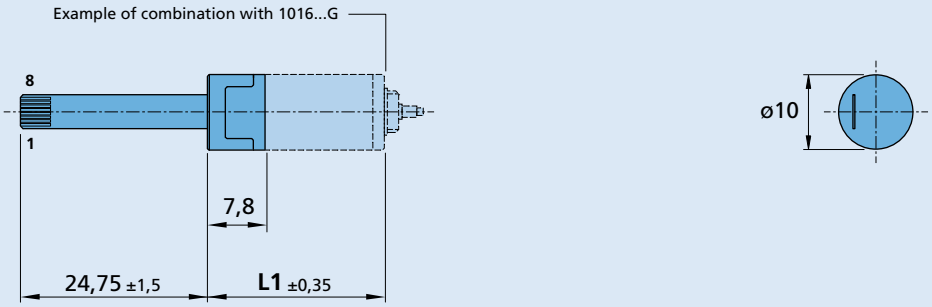
Full product description

Examples:

1016N006G-K1752 PA2-100

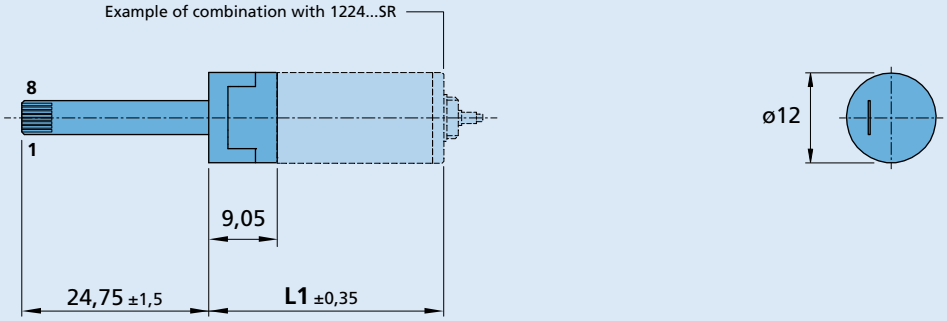
1224N012SR-K1752 PA2-100

Dimensional drawing A



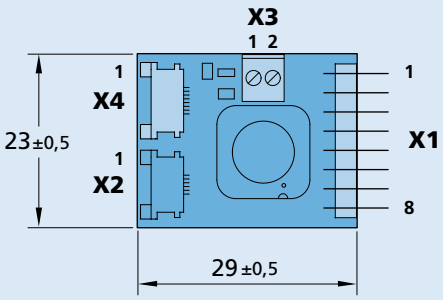
PA2-100

Dimensional drawing B



PA2-100

Adapter board



Interface Board PA2-100
for Motion Controller MCDC 3002 S
Part. No.: 6501.00144

Connection

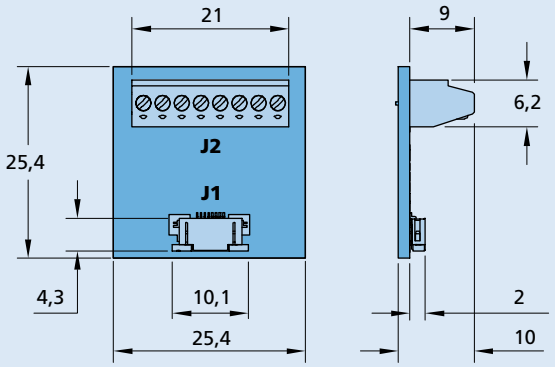
Pin	Connection X1
1	4. In
2	Channel A
3	Channel B
4	U_{DD} = 5V
5	SGND
6	Motor +
7	Motor -
8	5. In

Pin	Connection X2
1	Motor +
2	U_{DD} = 3,3V
3	Channel A
4	Channel B
5	SGND
6	Motor -

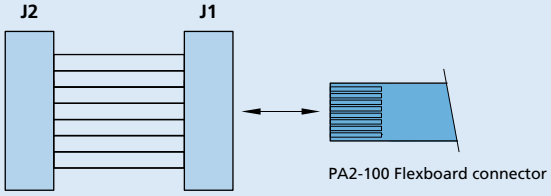
Pin	Connection X3
1	5. In
2	4. In

Pin	Connection X4
1	Motor +
2	Motor +
3	U_{DD} = 3,3V
4	Channel A
5	Channel B
6	SGND
7	Motor -
8	Motor -

Adapter board



Interface board PA2-100
Part No.: D100308900



Connector
J1 - Molex 52745-0896
J2 - Phoenix 1725711

For notes on technical data and lifetime performance refer to “Technical Information”.
Edition 2016

www.faulhaber.com

Encoders

magnetic Encoder, digital outputs,
2 channels, 16 lines per revolution

For combination with
DC-Micromotors

Series IE2-16

		IE2-16	
Lines per revolution	*N*	16	
Frequency range, up to [1]	*f*	7	kHz
Signal output, square wave		2	Channels
Supply voltage	U_{DD}	4 ... 18	V
Current consumption, typical [2]	I_{DD}	typ. 6, max. 12	mA
Output current, max. [3]	I_{OUT}	15	mA
Phase shift, channel A to B	Φ	90 ± 45	°e
Signal rise/fall time, max. (C_{LOAD} = 100 pF)	*tr*/*tf*	2,5 / 0,3	µs
Inertia of code disc	*J*	0,11	gcm²
Operating temperature range		-25 ... +85	°C

[1] Velocity (min⁻¹) = *f* (Hz) x 60/*N*
[2] U_{DD} = 5 V: with unloaded outputs
[3] Tested at 2 kHz

For combination with Motor

Dimensional drawing A	<L1 [mm]	Dimensional drawing C	<L1 [mm]
1336 ... CXR - 123	47,5	1727 ... CXR - 123	38,2
		1741 ... CXR - 123	52,2
Dimensional drawing B	**<L1 [mm]**		
1516 ... SR	18,2		
1524 ... SR	26,2		
1717 ... SR	19,4		
1724 ... SR	26,4		
2224 ... SR	26,6		
2232 ... SR	34,6		

Characteristics

These incremental shaft encoders 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.

The encoder is integrated in the DC-Micromotors SR-Series and extends the overall length by only 1,4 mm!

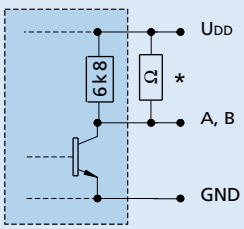
Solid state Hall sensors and a low inertia magnetic disc provide two channels with 90° phase shift.

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.

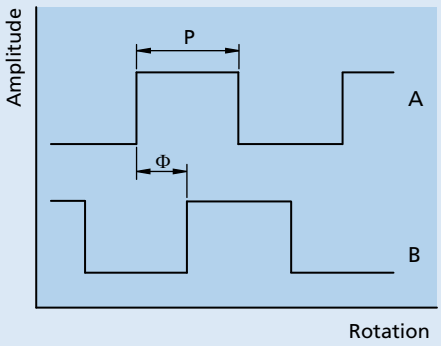
Circuit diagram / Output signals

Output circuit



* An additional external pull-up resistor can be added to improve the rise time. Caution: I_{OUT} max. 15 mA must not be exceeded!

Output signals
with clockwise rotation as seen from the shaft end



Admissible deviation of phase shift:

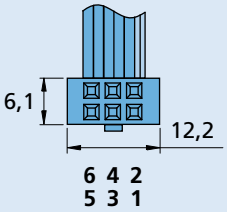
$$\Delta\Phi = \left| 90° - \frac{\Phi}{P} * 180° \right| \leq 45°$$

For notes on technical data and lifetime performance refer to "Technical Information".
Edition 2016

Connector information / Variants

No.	Function
1	Motor –
2	Motor +
3	GND
4	U_{DD}
5	Channel B
6	Channel A

Connection Encoder



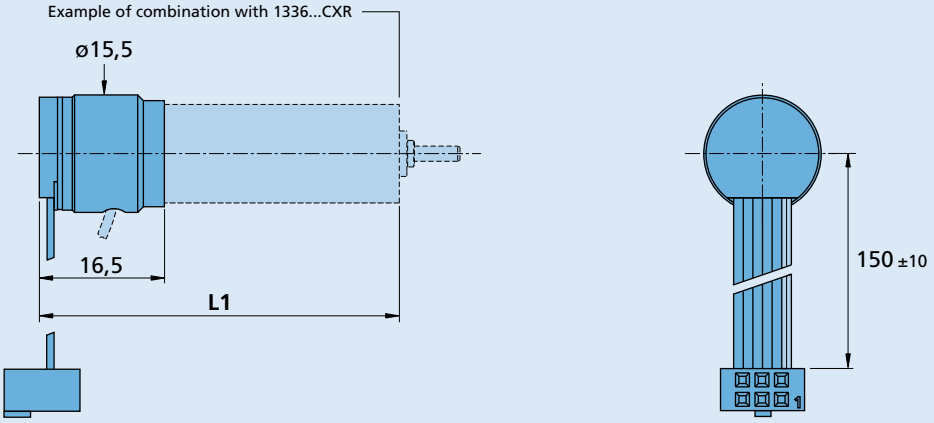
Cable
PVC-ribbon cable
6-conductors, 0,09 mm²

Connector
DIN-41651
grid 2,54 mm

Full product description

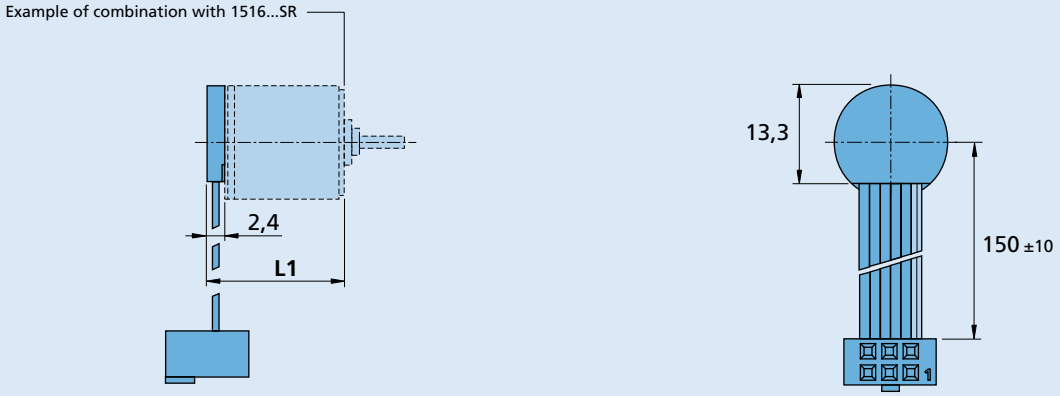
Example:
1336U012C-123 IE2-16
1516T006SR IE2-16

Dimensional drawing A



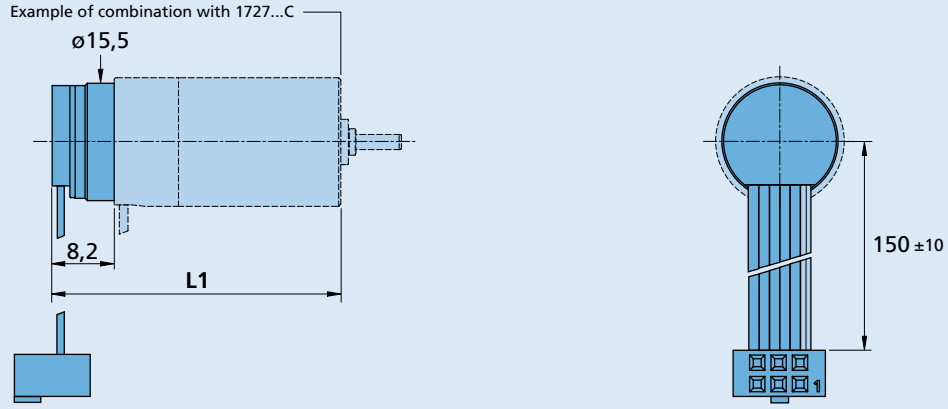
IE2-16

Dimensional drawing B



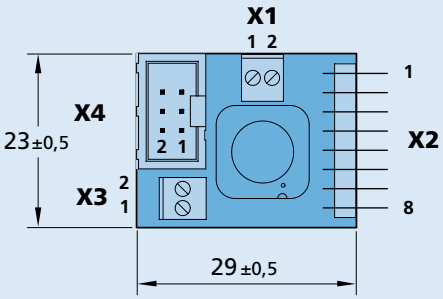
IE2-16

Dimensional drawing C



IE2-16

Adapter board



Interface Board IE2-16
for Motion Controller MCDC 3002 S
Part. No.: 6501.00143

Connection

Pin	Connection X1
1	5. In
2	4. In

Pin	Connection X3
1	Motor -
2	Motor +

Pin	Connection X2
1	4. In
2	Channel A
3	Channel B
4	U_{DD}
5	SGND
6	Motor +
7	Motor -
8	5. In

Pin	Connection X4
1	Motor -
2	Motor +
3	SGND
4	U_{DD}
5	Channel B
6	Channel A

Encoders

magnetic Encoder, digital outputs,
2 channels, 50 - 400 lines per revolution

For combination with
DC-Micromotors

Series IE2-400

		IE2-50	IE2-100	IE2-200	IE2-400	
Lines per revolution	*N*	50	100	200	400	
Frequency range, up to [1]	*f*	20	40	80	160	kHz
Signal output, square wave		2				Channels
Supply voltage	U_{DD}	4,5 ... 5,5				V
Current consumption, typical [2]	I_{DD}	typ. 9,5, max. 13				mA
Output current, max. [3]	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
Inertia of code disc	*J*	0,05				gcm²
Operating temperature range		-25 ... +85				°C

[1] Velocity (min⁻¹) = *f* (Hz) x 60/*N*
[2] U_{DD} = 5 V: with unloaded outputs
[3] U_{DD} = 5 V: low logic level < 0,5 V, high logic level > 4,5 V: CMOS- and TTL compatible

For combination with Motor	
Dimensional drawing A	**<L1 [mm]**
1319 ... SR	21,9
1331 ... SR	33,9

Characteristics

These incremental shaft encoders 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.

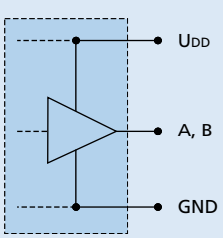
The encoder is integrated in the DC-Micromotors SR-Series and extends the overall length by only 1,7 mm!
Hybrid circuits with sensors and a low inertia magnetic disc provide two channels with 90° phase shift.

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.

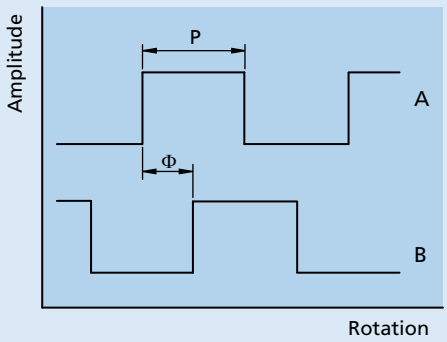
Details for the DC-Micromotors and suitable reduction gearheads are on separate catalogue pages.

Circuit diagram / Output signals

Output circuit



Output signals
with clockwise rotation as seen from the shaft end



Admissible deviation of phase shift:

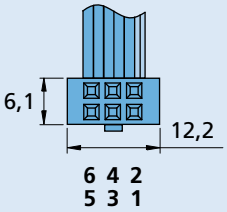
$$\Delta\Phi = \left| 90° - \frac{\Phi}{P} * 180° \right| \leq 45°$$

Connector information / Variants

No.	Function
1	Motor – *
2	Motor + *
3	GND
4	U_{DD}
5	Channel B
6	Channel A

***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, depending on the motor can also be lower.

Connection Encoder



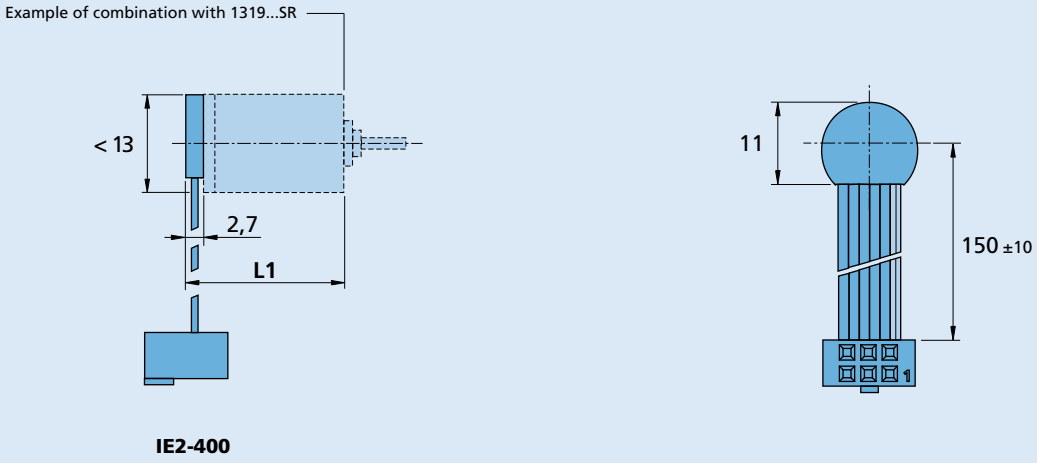
Cable
PVC-ribbon cable
6-conductors, 0,09 mm²

Connector
DIN-41651
grid 2,54 mm

Full product description

- Example:
  1319T012SR IE2-50
  1331T012SR IE2-400

Dimensional drawing A



IE2-400

Encoders

magnetic Encoder, digital outputs,
2 channels, 64 - 1024 lines per revolution

For combination with
DC-Micromotors
Brushless DC-Motors

Series IE2-1024

		IE2-64	IE2-128	IE2-256	IE2-512	IE2-1024	
Lines per revolution	*N*	64	128	256	512	1 024	
Frequency range, up to [1]	*f*	20	40	80	160	300	kHz
Signal output, square wave		2					Channels
Supply voltage	U_{DD}	4,5 ... 5,5					V
Current consumption, typical [2]	I_{DD}	typ. 9,5, max. 13					mA
Output current, max. [3]	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
Inertia of code disc [4]	*J*	0,09					gcm²
Operating temperature range		-25 ... +85					°C

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

For combination with Motor

Dimensional drawing A	<L1 [mm]
1336 ... CXR - 123	47,5

Dimensional drawing B	<L1 [mm]
1516 ... SR	18,2
1524 ... SR	26,2
1717 ... SR	19,4
1724 ... SR	26,4
2224 ... SR	26,6
2232 ... SR	34,6

Dimensional drawing C	<L1 [mm]
1727 ... CXR - 123	38,2
1741 ... CXR - 123	52,2

Dimensional drawing D	<L1 [mm]
1628 ... B - K313	38,8
2036 ... B - K313	46,8
2057 ... B - K313	68,3
2057 ... BHS - K313	68,3

Characteristics

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.

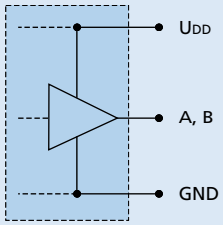
Hybrid circuits with sensors and a low inertia magnetic disc provide two channels with 90° phase shift.

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.

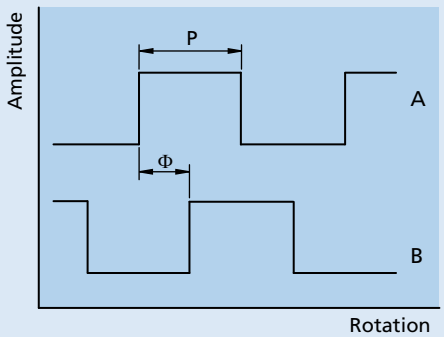
Details for the DC-Micromotors and suitable reduction gearheads are on separate catalogue pages.

Circuit diagram / Output signals

Output circuit



Output signals
with clockwise rotation as seen from the shaft end



Admissible deviation of phase shift:

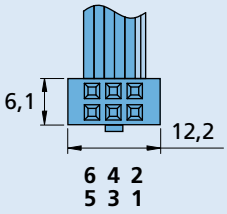
$$\Delta\Phi = \left| 90° - \frac{\Phi}{P} * 180° \right| \leq 45°$$

Connector information / Variants

No.	Function
1	Motor – *
2	Motor + *
3	GND
4	U_{DD}
5	Channel B
6	Channel A

***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, depending on the motor can also be lower. Motors with graphite commutation have separate motor leads and higher motor current is allowed.

Connection Encoder



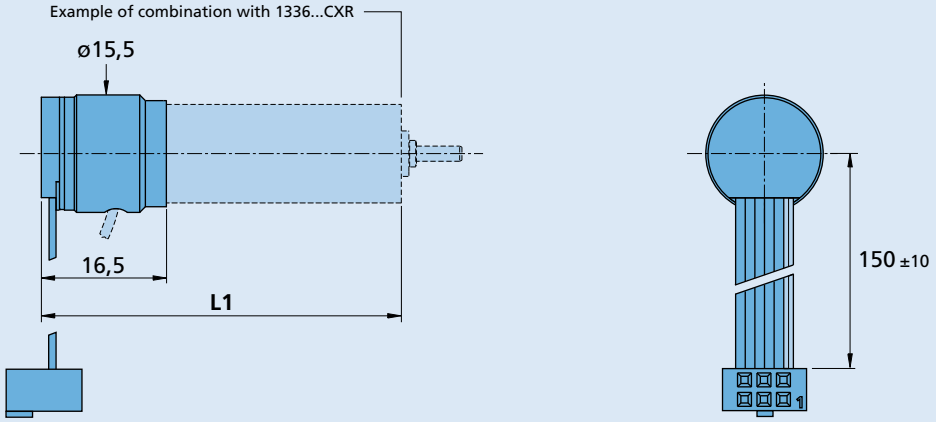
Cable
PVC-ribbon cable
6-conductors, 0,09 mm²

Connector
DIN-41651
grid 2,54 mm

Full product description

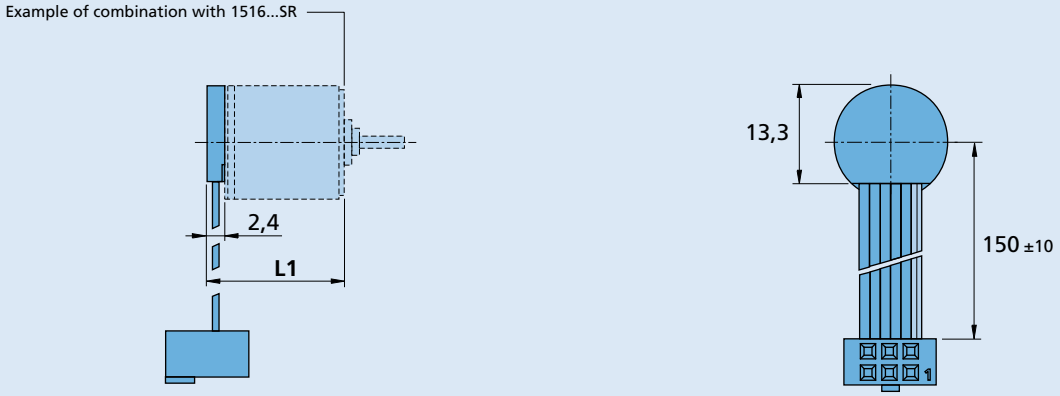
Example:
1336U012C-123 IE2-1024
1516T006SR IE2-256

Dimensional drawing A



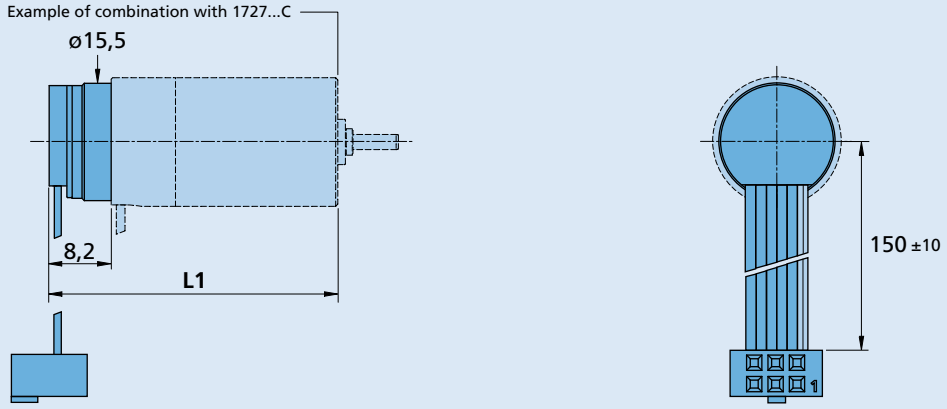
IE2-1024

Dimensional drawing B



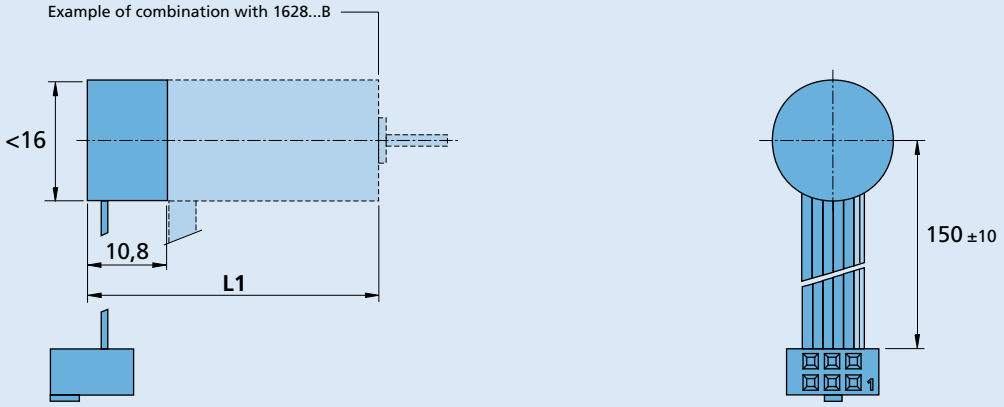
IE2-1024

Dimensional drawing C



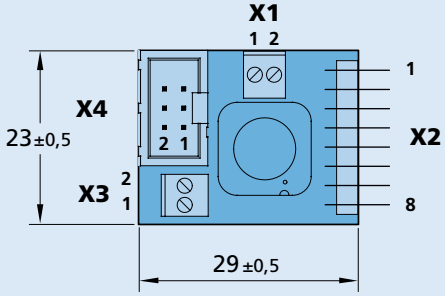
IE2-1024

Dimensional drawing D



IE2-1024

Adapter board



Interface Board IE2-1024
for Motion Controller MCDC 3002 S
Part. No.: 6501.00143

Connection

Pin	Connection X1
1	5. In
2	4. In

Pin	Connection X3
1	Motor -
2	Motor +

Pin	Connection X2
1	4. In
2	Channel A
3	Channel B
4	U_{DD}
5	SGND
6	Motor +
7	Motor -
8	5. In

Pin	Connection X4
1	Motor -
2	Motor +
3	SGND
4	U_{DD}
5	Channel B
6	Channel A

Encoders

magnetic Encoder, digital outputs,
2 channels, 16 - 4096 lines per revolution

For combination with
DC-Micromotors

Series IEH2-4096

	IEH2	- 16	- 32	- 64	- 128	- 256	- 512	- 1024	- 2048	- 4096	
Lines per revolution	*N*	16	32	64	128	256	512	1 024	2 048	4 096	
Frequency range, up to [1]	*f*	5	10	20	40	80	160	320	640	875	kHz
Signal output, square wave		2									Channels
Supply voltage	U_{DD}	4,5 ... 5,5									V
Current consumption, typical [2]	I_{DD}	typ. 15, max. 25									mA
Output current, max. [3]	I_{OUT}	2,5									mA
Phase shift, channel A to B [4]	Φ	90 ± 45						90 ± 65	90 ± 75		°e
Signal rise/fall time, max. (C_{LOAD} = 50 pF)	*tr*/*tf*	0,05 / 0,05									µs
Inertia of code disc	*J*	0,11									gcm²
Operating temperature range		-40 ... +100									°C

[1] Velocity (min^{-1}) = *f* (Hz) x 60/*N*
[2] U_{DD} = 5 V: with unloaded outputs
[3] U_{DD} = 5 V: low logic level < 0,4 V, high logic level > 4,6 V: CMOS- and TTL compatible
[4] At 5 000 min^{-1}

For combination with Motor	
Dimensional drawing A	**<L1 [mm]**
1516 ... SR	18,2
1524 ... SR	26,2
1717 ... SR	19,4
1724 ... SR	26,4
2224 ... SR	26,6
2232 ... SR	34,6

Characteristics

These incremental shaft encoders 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.

The encoder is integrated in the DC-Micromotors SR-Series and extends the overall length by only 1,4 mm.

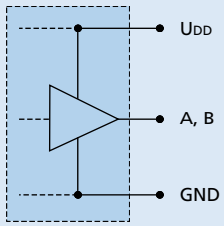
A segmented magnetic disc provides a magnetic field which is detected and further processed by a single chip angle sensor.
The output signals of both channels consist of a square wave signal with 90° phase shift and up to 4096 impulses per motor revolution.

The encoder is available with different standard resolutions. 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.

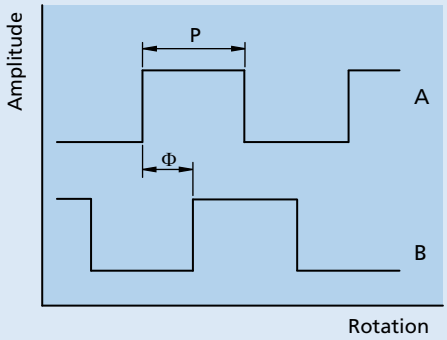
Details for the DC-Micromotors and suitable reduction gearheads are on separate catalogue pages.

Circuit diagram / Output signals

Output circuit



Output signals
with clockwise rotation as seen from the shaft end



Admissible deviation of phase shift:

$$\Delta\Phi = \left| 90° - \frac{\Phi}{P} * 180° \right| \leq \text{see above}$$

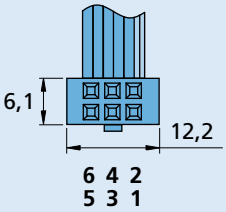
For notes on technical data and lifetime performance refer to “Technical Information”.
Edition 2016

www.faulhaber.com

Connector information / Variants

No.	Function
1	Motor –
2	Motor +
3	GND
4	U_{DD}
5	Channel B
6	Channel A

Connection Encoder

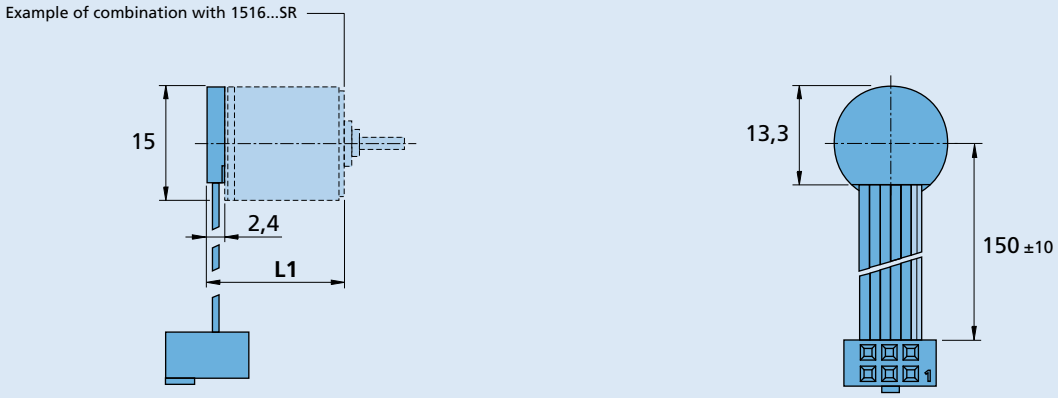


Cable
PVC-ribbon cable
6-conductors, 0,09 mm²

Connector
DIN-41651
grid 2,54 mm

Full product description
- Example:
  1516T006SR IEH2-256

Dimensional drawing A



IEH2-4096

Encoders

optical Encoder, digital outputs,
2 channels, 120 lines per revolution

For combination with
Stepper Motors

Series PE22-120

		PE22-120	
Lines per revolution	*N*	120	
Frequency range, up to [1]	*f*	30	kHz
Signal output, square wave		2	Channels
Supply voltage	U_{DD}	4,5 ... 5,5	V
Current consumption, typical [2]	I_{DD}	20	mA
Pulse width	*P*	180 ± 45	°e
Phase shift, channel A to B	*Φ*	90 ± 45	°e
Logic state width	*S*	90 ± 45	°e
Cycle	*C*	360 ± 30	°e
Signal rise/fall time, max. (C_{LOAD} = pF)	*tr*/*tf*	0,5 / 0,1	µs
Inertia of code disc	*J*	0,24	gcm²
Operating temperature range		-20 ... +85	°C

[1] Velocity (min^{-1}) = *f* (Hz) x 60/*N*
[2] U_{DD} = 5 V: with unloaded outputs

For combination with Motor	
Dimensional drawing A	**<L1 [mm]**
AM2224-ww-ee	38,0
AM2224-R3-ww-ee	40,9

Characteristics

These incremental shaft encoders in combination with two phases stepper motors are designed for indication and control of both, shaft velocity and direction of rotation as well as for position verification.

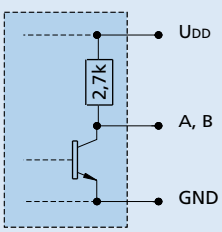
The encoder is integrated in the Stepper Motors and extends the overall length by only 11 mm.

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

Details for the stepper motors and suitable reduction gearheads are on the corresponding data sheets.

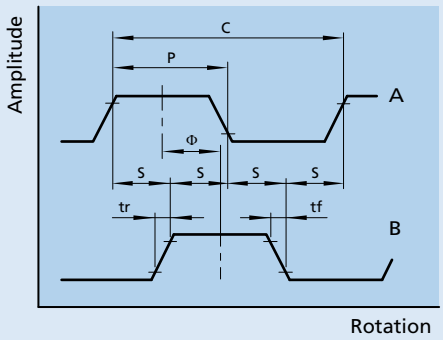
Circuit diagram / Output signals

Output circuit



Recommendation:
Please use a latch to capture the outputs.

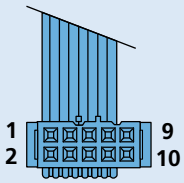
Output signals
with clockwise rotation as seen from the shaft end



Connector information / Variants

No.	Function
1	Motor Phase A +
2	Motor Phase A –
3	Motor Phase B +
4	Motor Phase B –
5	$U_{DD\ ENC}$
6	GND
7	Channel A
8	Channel B
9	N.C.
10	N.C.

Connection Encoder and Motor

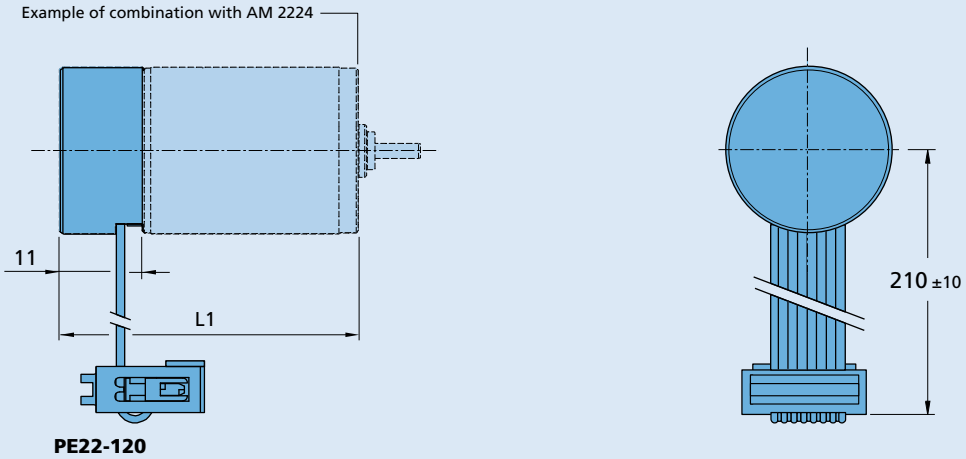


Connector
Serie 71600-010LF
PVC-ribbon cable

Full product description

- Example:
  AM2224-AV-18-16 PE22-120
  AM2224-R3-V-12-75-86 PE22-120

Dimensional drawing A



PE22-120

Encoders

optical Encoder, digital outputs,
2 channels, 100 - 500 lines per revolution

For combination with
DC-Micromotors
Brushless DC-Motors

Series HEDS 5500

		HEDS 5500 C	HEDS 5500 A	
Lines per revolution	*N*	100	500	
Frequency range, up to [1]	*f*	100	100	kHz
Signal output, square wave		2		Channels
Supply voltage	U_{DD}	4,5 ... 5,5		V
Current consumption, typical [2]	I_{DD}	17		mA
Pulse width	*P*	180 ± 45		°e
Phase shift, channel A to B	*Φ*	90 ± 20		°e
Logic state width	*S*	90 ± 45		°e
Cycle	*C*	360 ± 5,5		°e
Signal rise/fall time, max. (C_{LOAD} = pF)	*tr*/*tf*	0,25 / 0,25		µs
Inertia of code disc	*J*	0,6		gcm²
Operating temperature range		-40 ... +100		°C

[1] Velocity (min⁻¹) = *f* (Hz) x 60/*N*
[2] U_{DD} = 5 V: with unloaded outputs

For combination with Motor

Dimensional drawing A	<L1 [mm]		
2230 ... S	52,8	3863 ... CR	86,1
2233 ... S	55,6	3890 ... CR	112,1
2342 ... CR	63,8	2036 ... B - K312	56,8
2642 ... CXR	64,8	2057 ... B - K312	75,8
2642 ... CR	64,8	2057 ... BHS - K312	75,8
2657 ... CXR	79,8	2444 ... B - K312	64,9
2657 ... CR	79,8	3056 ... B - K312	76,1
2668 ... CR	90,8	3274 ... BP4	94,0
3242 ... CR	65,3	3564 ... B - K312	84,1
3257 ... CR	80,3	4490 ... B - K312	116,3
3272 ... CR	95,3	4490 ... BS - K312	116,3

Characteristics

These incremental shaft encoders in combination with the DC-Motors are designed for the indication and control of both shaft velocity and direction of rotation as well as for positioning.

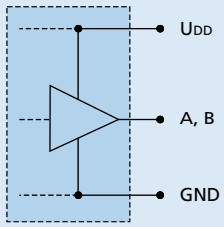
A LED source and lens system transmits collimated light through a low inertia metal disc to give two channels with 90° phase shift.
The single 5 volt supply and the two or three channel digital output signals are interfaced with a 5-pin connector.

Motors with ball bearings are recommended for continuous operation at low and high speeds and for elevated radial shaft load.

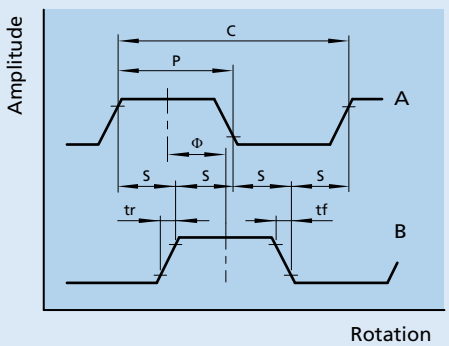
Details for the Motors and suitable reduction gearheads are on separate catalogue pages.

Circuit diagram / Output signals

Output circuit



Output signals
with clockwise rotation as seen from the shaft end

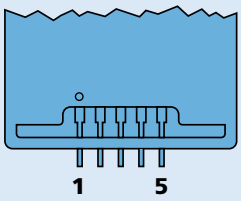


For notes on technical data and lifetime performance refer to "Technical Information".
Edition 2016

Connection information

No.	Function
1	GND
2	N.C.
3	Channel A
4	U_{DD}
5	Channel B

Connection Encoder



Recommended connector
AMP 103686-4/640442-5,
Molex 2695/2759
FCI 65039-032/4825x-000

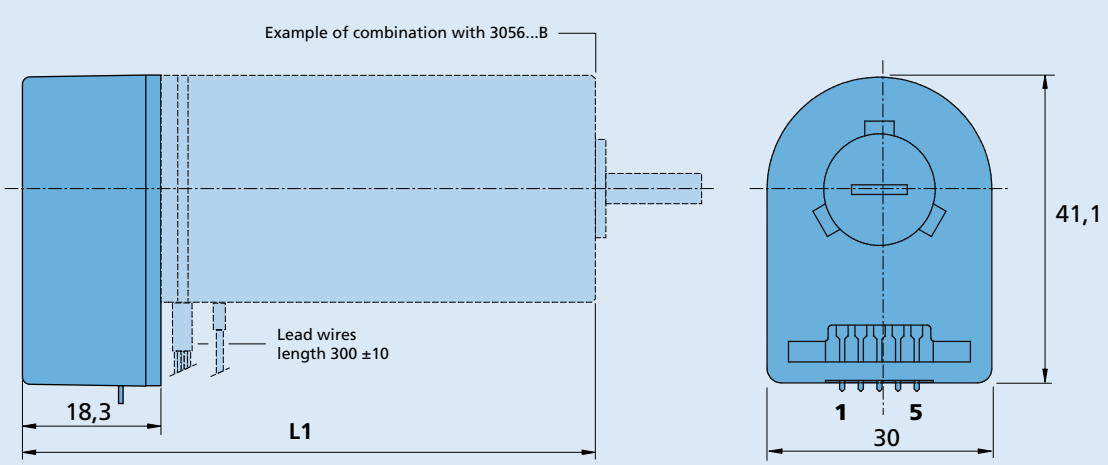
Option

- **HEDS 5500** Interlocking connector, extension cables 300 mm length (Part No.: K798)

Full product description

- Example:
  2444S024B K312 HEDS5500C
  3863H048CR HEDS5500A

Dimensional drawing A



HEDS 5500

Encoders

optical Encoder, digital outputs,
2 channels, 1000 - 1024 lines per revolution

For combination with
DC-Micromotors
Brushless DC-Motors

Series HEDM 5500

		HEDM 5500 B	HEDM 5500 J	
Lines per revolution	*N*	1 000	1 024	
Frequency range, up to [1]	*f*	100	100	kHz
Signal output, square wave		2		Channels
Supply voltage	U_{DD}	4,5 ... 5,5		V
Current consumption, typical [2]	I_{DD}	57		mA
Pulse width	*P*	180 ± 45		°e
Phase shift, channel A to B	*Φ*	90 ± 15		°e
Logic state width	*S*	90 ± 45		°e
Cycle	*C*	360 ± 7,5		°e
Signal rise/fall time, max. (C_{LOAD} = pF)	*tr*/*tf*	0,25 / 0,25		µs
Inertia of code disc	*J*	0,6		gcm²
Operating temperature range		-40 ... +70		°C

[1] Velocity (min⁻¹) = *f* (Hz) x 60/*N*
[2] U_{DD} = 5 V: with unloaded outputs

For combination with Motor

Dimensional drawing A	<L1 [mm]		
2230 ... S	52,8	3863 ... CR	86,1
2233 ... S	55,6	3890 ... CR	112,1
2342 ... CR	63,8	2036 ... B - K312	56,8
2642 ... CXR	64,8	2057 ... B - K312	75,8
2642 ... CR	64,8	2057 ... BHS - K312	75,8
2657 ... CXR	79,8	2444 ... B - K312	64,9
2657 ... CR	79,8	3056 ... B - K312	76,1
2668 ... CR	90,8	3274 ... BP4	94,0
3242 ... CR	65,3	3564 ... B - K312	84,1
3257 ... CR	80,3	4490 ... B - K312	116,3
3272 ... CR	95,3	4490 ... BS - K312	116,3

Characteristics

These incremental shaft encoders in combination with the DC-Motors are designed for the indication and control of both shaft velocity and direction of rotation as well as for positioning.

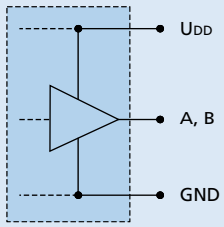
A LED source and lens system transmits collimated light through a low inertia metal disc to give two channels with 90° phase shift.
The single 5 volt supply and the two or three channel digital output signals are interfaced with a 5-pin connector.

Motors with ball bearings are recommended for continuous operation at low and high speeds and for elevated radial shaft load.

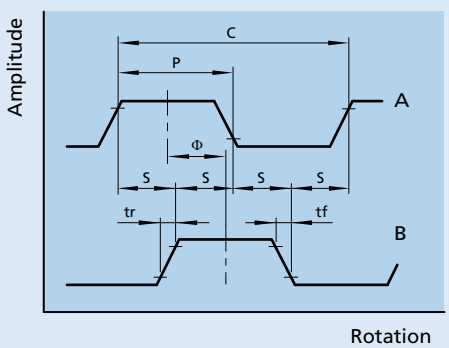
Details for the Motors and suitable reduction gearheads are on separate catalogue pages.

Circuit diagram / Output signals

Output circuit



Output signals
with clockwise rotation as seen from the shaft end

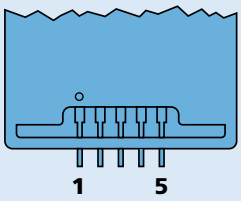


For notes on technical data and lifetime performance refer to "Technical Information".
Edition 2016

Connection information

No.	Function
1	GND
2	N.C.
3	Channel A
4	U_{DD}
5	Channel B

Connection Encoder



Recommended connector
AMP 103686-4/640442-5,
Molex 2695/2759
FCI 65039-032/4825x-000

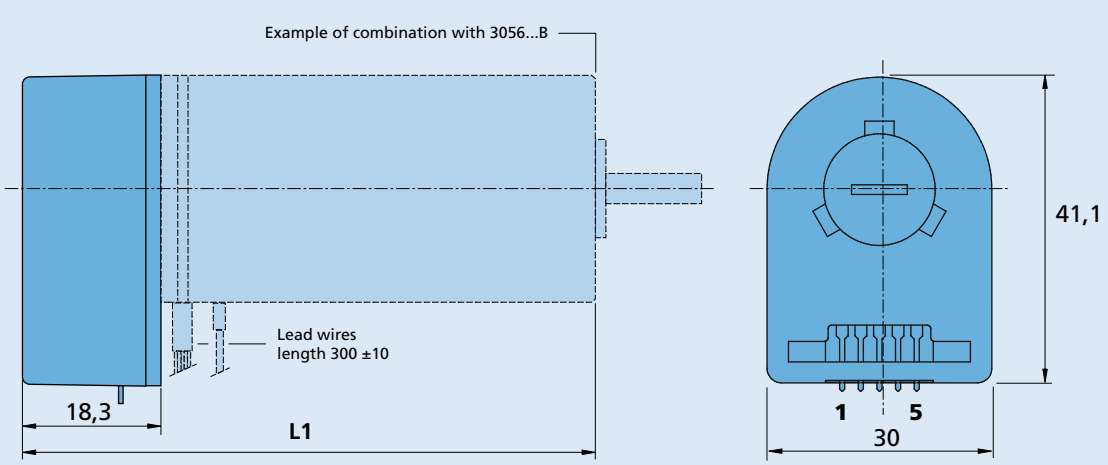
Option

- **HEDM 5500** Interlocking connector, extension cables 300 mm length (Part No.: K798)

Full product description

- Example:
  2444S024B K312 HEDM5500B
  3863H048CR HEDM5500J

Dimensional drawing A



HEDM 5500