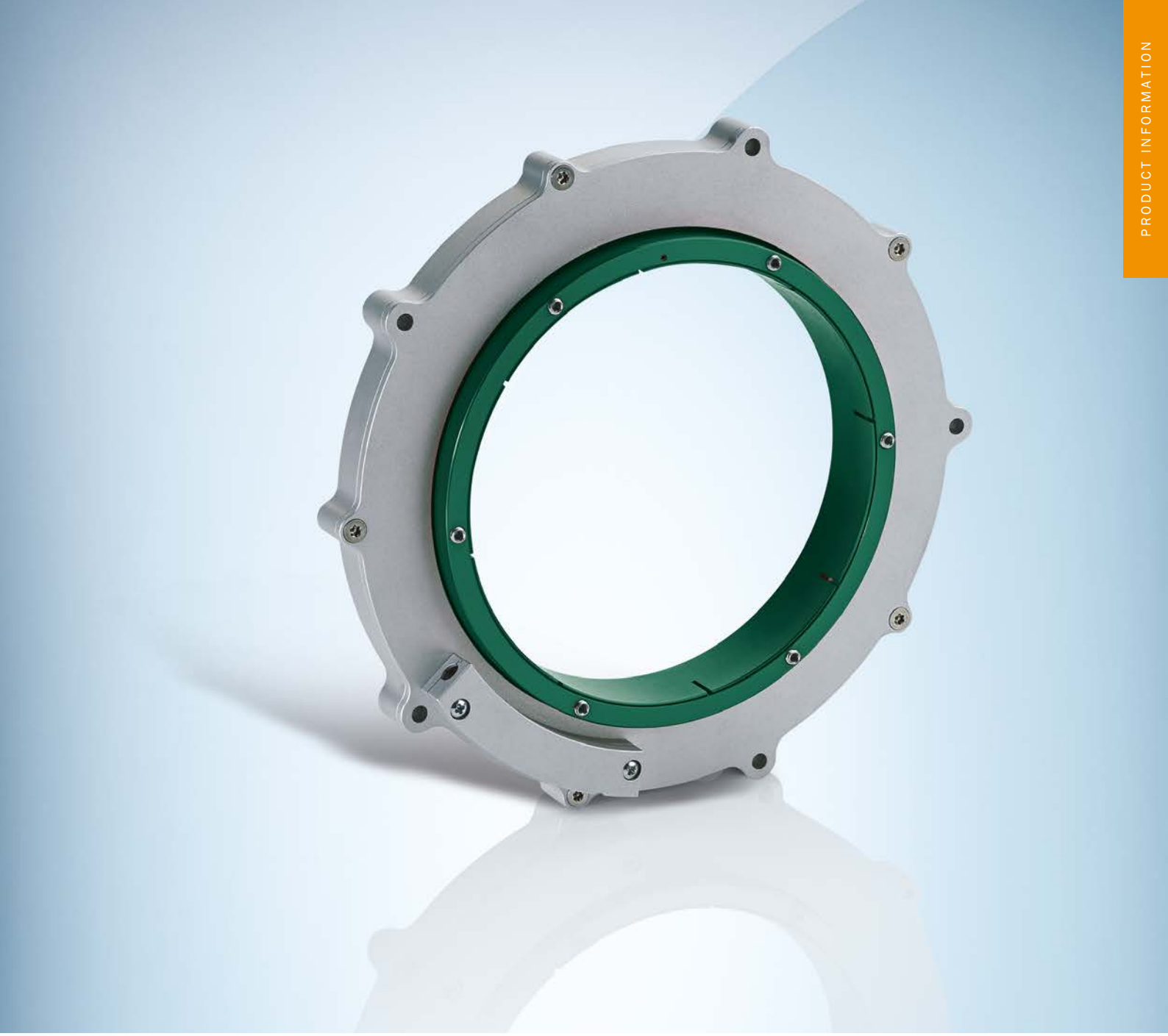
PRODUCT INFORMATION



SEK160

THE ROBUST TURN & PLAY SOLUTION FOR DIRECT DRIVES WITH HIPERFACE® INTERFACE

Motor feedback system rotary HIPERFACE®

THE ROBUST TURN & PLAY SOLUTION FOR DIRECT DRIVES WITH HIPERFACE® INTERFACE

Product description

The trend is clear: the future belongs to compact and robust direct drives. With the SEK160 hollow-shaft motor feedback systems SICK has perfected the concept of the direct drive. The SEK160 with holistic scanning can be mounted directly onto the drive shaft without any mounting tools. A toothed belt and transmission elements such as gearbox or coupling are no longer necessary. The simplified, compact design is wear-free and hence helps to reduce maintenance costs. Since no ball bearings are used either, heat generation is drastically reduced. The minimal dimensions allow for reduced space requirements and also make the device lighter, thus allowing for efficient space utilization. The SEK160 motor feedback systems were developed specifically for direct drives and support the advantages of direct drives all along the line.

At a glance

- HIPERFACE® motor feedback systems for large hollow shaft and torque motors
- 128 sine/cosine periods per revolution
- Absolute position with a resolution of 4,096 increments per revolution
- Programming of the position value and electronic type label
- HIPERFACE® interface
- Turn & play – for simple assembly without tools
- High resistance to shock and vibration due to holistic scanning
- Bearingless motor feedback system

Your benefits

- Direct seat on the drive shaft renders transmission elements such as toothed belt or coupling superfluous
- The simplified, compact design is wear-free, thus helping to reduce maintenance costs
- Measuring accuracy is no longer affected by magnetic fields thanks to the capacitive measuring principle
- Time-saving mounting, since no mounting tools are required: simply fit it on, turn it and start
- The minimal dimensions enable you to save space and weight, allowing for a more efficient use of space.

Additional information

→ www.sick.com/SEK160

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

8013577/2021-04-21
Subject to change without notice

Detailed technical data

Performance

Sine/cosine periods per revolution	128
Number of the absolute ascertainable revolutions	1
Total number of steps	4,096 via RS485
Measuring step	2.5 ″ For interpolation of the sine/cosine signals with, e. g., 12 bits
Integral non-linearity	± 72 ″, Error limits for evaluating sine/cosine period, typical values at nominal position ± 0.1 mm und +20 °C
Differential non-linearity	± 21 ″, Non-linearity within a sine/cosine period, typical values at nominal position ± 0.1 mm und +20 °C
Operating speed	≤ 1,500 min^{-1}, up to which the absolute position can be reliably produced
Latency period	100 µs
Available memory area	1,792 Byte

Interfaces

Type of code for the absolute value	Binary
Code sequence	Increasing, when turning the shaft For clockwise rotation, looking in direction “A” (see dimensional drawing), For clockwise shaft rotation, looking in direction “A” (see dimensional drawing)
Communication interface	HIPERFACE®

Electrical data

Connection type	Male connector, 8-pin
Supply voltage	7 V DC ... 12 V DC
Recommended supply voltage	8 V DC
Power consumption	150 mA [1]
$MTTF_d$: mean time to dangerous failure	147.7 years (EN ISO 13849) [2]

[1] Without load.

[2] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperature 60°C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

Shaft version	Through hollow shaft
Dimensions	See dimensional drawing
Weight	≤ 0.27 kg
Moment of inertia of the rotor	2,860 gcm^2
Operating speed	3,000 min^{-1}
Angular acceleration	≤ 28,000 rad/s^2
Permissible radial shaft movement	± 0.2 mm
Permissible axial shaft movement	± 0.5 mm [1]

[1] Relative to the installation position, as described in the assembly instructions (order nr. 8013609) and in the proposed customer fitting.

Ambient data

Operating temperature range	–30 °C ... +115 °C
Storage temperature range	–50 °C ... +125 °C, without package
Relative humidity/condensation	90 %, Condensation not permitted
Resistance to shocks	100 g, 10 ms, 10 ms (according to EN 60068-2-27)

[1] The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. If other shielding concepts are used, users must perform their own tests.

Frequency range of resistance to vibrations	30 g, 10 Hz ... 2,000 Hz (according to EN 60068-2-6)
EMC	According to EN 61000-6-2 and EN 61000-6-3 [1]
Enclosure rating	IP40, with mating connector inserted and closed cover (according to IEC 60529)

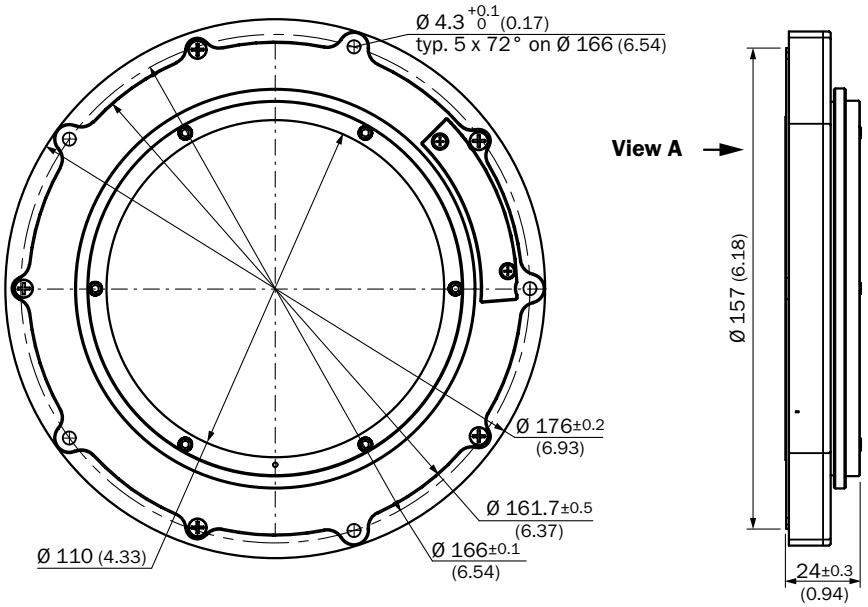
[1] The EMC according to the standards quoted is achieved when the motor feedback system is mounted in an electrically conductive housing, which is connected to the central earthing point of the motor controller via a cable screen. If other shielding concepts are used, users must perform their own tests.

Ordering information

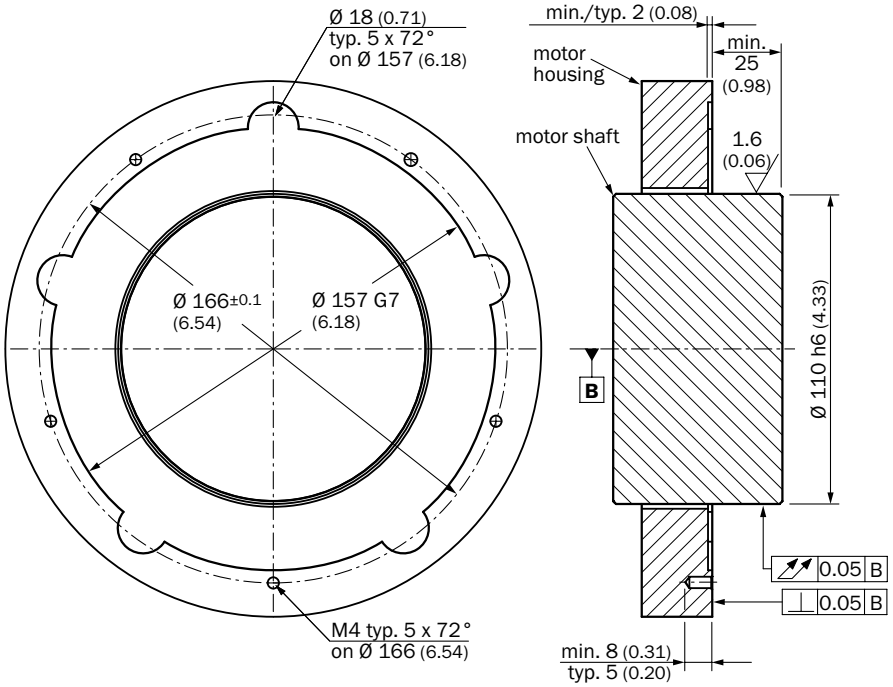
Absolute Singleturn

Shaft version	Shaft diameter	Type	Communication interface	Type	Part no.
Through hollow shaft	110 mm	For integration	HIPERFACE®	SEK160-HN110AK02	1038272

Dimensional drawings (Dimensions in mm (inch))



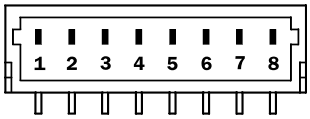
Attachment specifications



All dimensions in mm (inch)

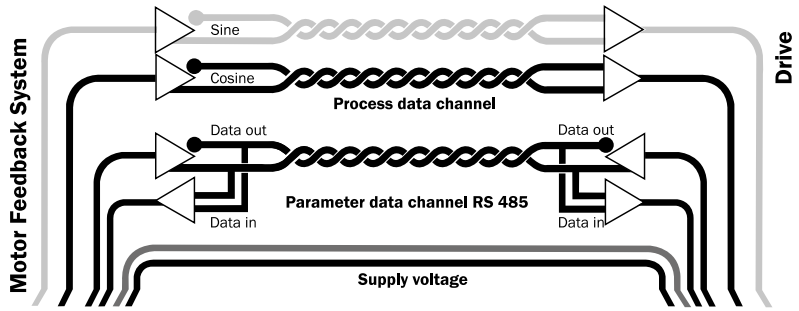
PIN assignment

View of the plug-in face



PIN	Signal	Wire colors (cable connection)	Explanation
1	U_S	Red	Supply voltage
2	+ SIN	White	Process data channel
3	REFSIN	Brown	Process data channel
4	+ COS	Pink	Process data channel
5	REFCOS	Black	Process data channel
6	GND	Blue	Ground connection
7	Data +	Gray or yellow	Parameter channel RS 485
8	Data -	Green or purple	Parameter channel RS 485
The GND connection (0 V) of the supply voltage is not connected to the housing			

Communication interface



① Secure data transmission
② High information content
③ Electronic type label
④ Only 8 cables
⑤ Bus-compatible parameter channel
⑥ Process channel in real time

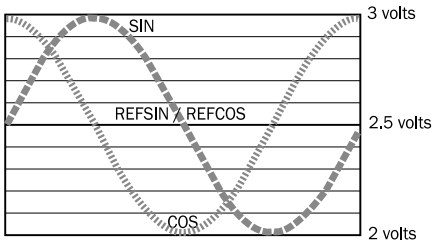
Technical Description

Notes on the diagrams

Access to the process data used for speed control, i.e. to the sine and cosine signals, is practically always “online”. When the supply voltage is applied, the speed controller has access to this information at any time. Sophisticated technology guarantees stable amplitudes of the analogue signals across all specified ambient conditions, with a maximum variation of only 20%.

Diagrams

Signal diagram for clockwise shaft rotation, looking in direction “A” (see dimensional drawing) 1 period = 360° : 64/128/256



Characersitics applicable to all permissible environmental conditions

Signal	Values/unit
Signal peak, peak V_{ss} of SIN, COS	0.8 V ... 1.2 V
Signal offset REFSIN, REFCOS	2.2 V ... 2.8 V

Model-specific settings

Type-specific settings	SEK160
Model ID (command 52h)	FFh
Free E²PROM [bytes]	1,792
Address	40h
Mode_485[1) 2)]	E4h
Codes 0 to 3	55h
Counter	0
[1)] Default interface settings can not be changed (e.g. baudrate, timeout or parity bit).	
[2)] When using the motor feedback systems SEK160, please ensure that the controller’s auto-baud function is not enabled, since these motor feedback systems compensate for minor variations when transmitting at a baud rate of 9600.variations when transmitting at a baud rate of 9600.overwriting. When shipped, “Code 0” = 55h.	

Overview of supported commands

Command byte	Function	Code 0 [3]	Comments
42h	Read position		12 Bit
43h	Set position	■	
44h	Read analog value		Channel number F0H [4] 48h
			Temperature [°C]
46h	Read counter		
47h	Increment Counter		
49h	Delete counter	■	
4Ah	Read data		
4Bh	Store data		
4Ch	Determine status of a data field		
4Dh	Create data field		
4Eh	Determine available memory area		
4Fh	Change access code		
50h	Read encoder status		
52h	Read out type label		Encoder type = FFh
53h	Encoder reset		
55h	Allocate encoder address	■	
56h	Read serial number and program version		

[3] The commands thus labelled include the parameter “Code 0”. Code 0 is a byte inserted into the protocol, for additional safeguarding of vital system parameters against accidentaloverwriting. When shipped, “Code 0” = 55h.

[4] Temperature compatible with SCx (encoder temperature [°C] *2.048 – 40).

Overview of status messages

	Status code	Description	SEK160
Error type	00h	The encoder has not detected any faults	■
Initialization	01h	Incorrect alignment data	■
	02h	Incorrect internal angular offset	■
	03h	Data field partitioning table destroyed	■
	04h	Analog limit values not available	■
	05h	Internal I2C bus inoperative	■
	06h	Internal checksum error	■
Protocol	07h	Encoder reset occurred as a result of program monitoring	■
	09h	Parity error	■
	0Ah	Checksum of transmitted data is incorrect	■
	0Bh	Unknown command code	■
	0Ch	Number of transmitted data is incorrect	■
	0Dh	Transmitted command argument is not allowed	■
Data	0Eh	The selected data field may not be written to	■
	0Fh	Incorrect access code	■
	10h	Size of specified data field cannot be changed	■
	11h	Specified word address lies outside the data field	■
	12h	Access to non-existent data field	■

	Status code	Description	SEK160
Position	01h	Analog signals outside specification	■
	1Fh	Speed too high, no position formation possible	■
	20h	Singleturn position unreliable	■
	21h	Multiturn position error	
	22h	Multiturn position error	
	23h	Multiturn position error	
Other	1Ch	Value monitoring of the analog signals (process data)	■
	1Dh	Transmitter current critical or P2RAM-Error	■
	1Eh	Encoder temperature critical	■
	08h	Counter overflow	■
For more information on the interface see HIPERFACE® - description, part no. 8010701			

Accessories

Further accessories

Programming and configuration tools

Figure	Brief description	Type	Part no.
	SVip® LAN programming tool for all motor feedback systems	PGT-11-S LAN	1057324

Dimensional drawings ➜ page 9

Plug connectors and cables

Plug connectors and cables

Cables (ready to assemble)

Brief description	Type	Part no.
Head A: cable Head B: Flying leads Cable: HIPERFACE®, HIPERFACE®, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², 5.3 mm Signalart: HIPERFACE®, HIPERFACE®	LTG-2708-MW	6028361

Connecting cables

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, JST, 8-pin, straight Head B: Flying leads Cable: HIPERFACE®, unshielded Signalart: HIPERFACE®	0.2 m	DOL-0J08-G0M2XB6	2031086
	Head A: female connector, JST, 8-pin, straight Head B: Flying leads Cable: HIPERFACE®, shielded, 4 x 2 x 0.15 mm² Signalart: HIPERFACE®	0.5 m	DOL-0J08-G0M5XB6	2056250

Dimensional drawings ➜ page 10

Connection cables

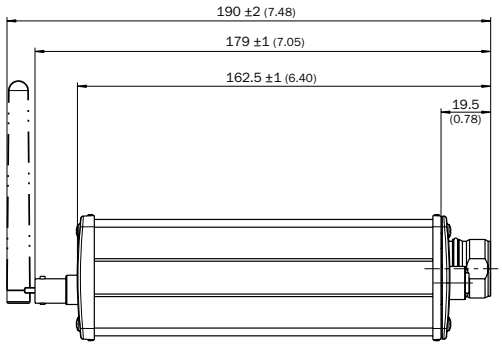
Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, JST, 8-pin, straight Head B: male connector, M23, 17-pin, straight Cable: HIPERFACE®, unshielded, 5.6 mm Signalart: HIPERFACE®	1 m	DSL-2317-G01MJB6	2071327

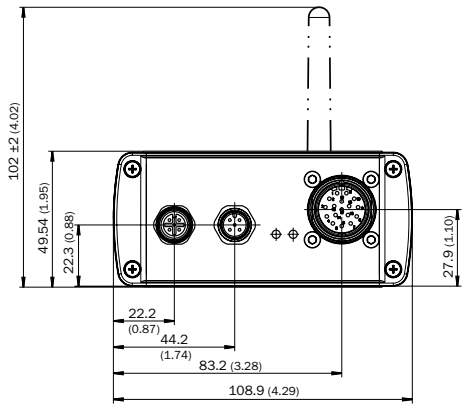
Dimensional drawings ➜ page 10

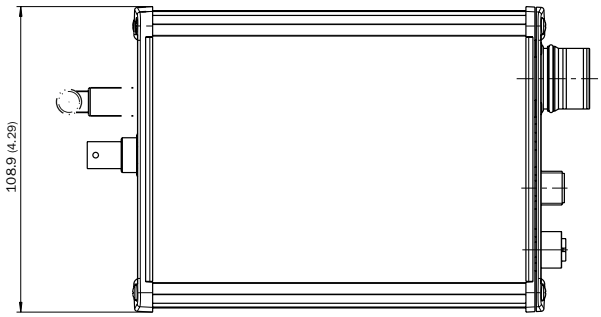
Dimensional drawings for accessories (Dimensions in mm (inch))

Programming and configuration tools

PGT-11-S LAN

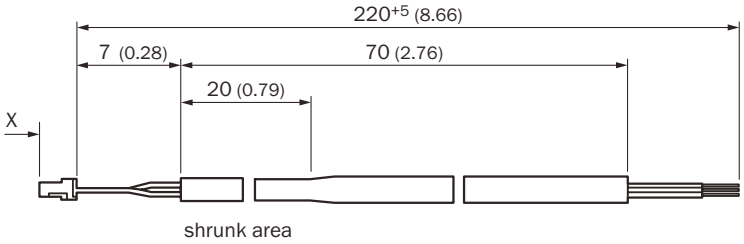




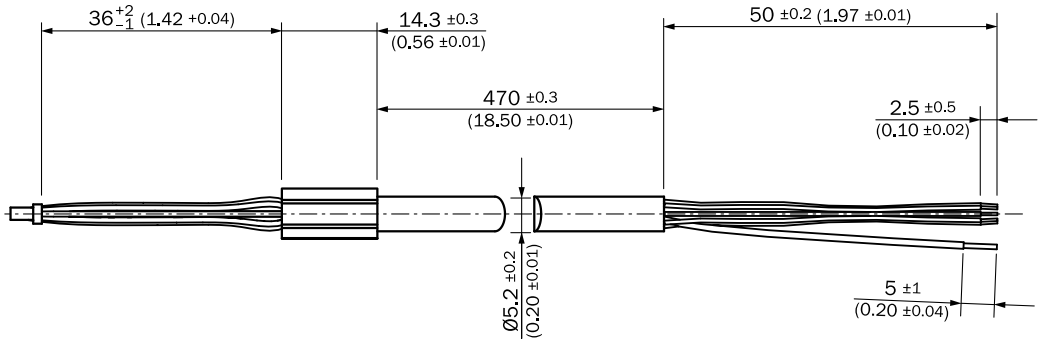


Plug connectors and cables

DOL-0J08-G0M2XB6

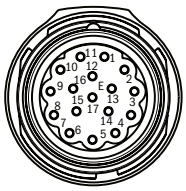


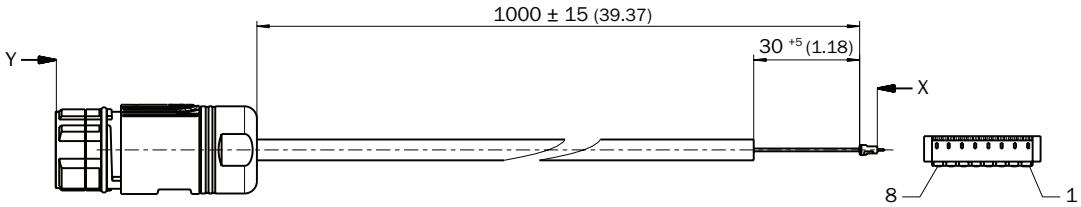
DOL-0J08-G0M5XB6



① Red
② White
③ Brown
④ Pink
⑤ Black
⑥ Blue
⑦ Gray
⑧ Green

DSL-2317-G01MJB6





② blu
③ red
⑦ blk
⑪ pnk
⑫ vi
⑭ yel
⑮ brn
⑯ wht

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