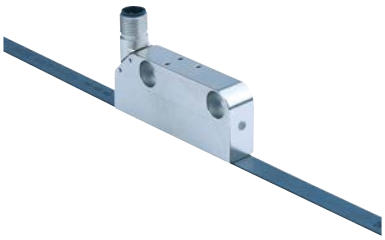
PRODUCT INFORMATION

STL/ETL70

ULTRA HIGH SPEED MEASUREMENT FOR LINEAR DIRECT DRIVES

Linear motor feedback system

ULTRA HIGH SPEED MEASUREMENT FOR LINEAR DIRECT DRIVES



Additional information

Product description

Precision, speed, dynamics, and high stiffness – it is exactly these properties that play a significant role in modern applications in drive technology. The STL/ETL70 motor feedback system fulfills all these properties with the help of the HIPERFACE® or HIPERFACE DSL® interface. The magnetic principle of operation, the long measuring length of up to 16 m, and the high resolution open up a broad range of application possibilities for absolute position detection. Integrated into the motor feedback system are the latest sensor and analysis technology. Thanks to HIPERFACE DSL®, the ETL70 is the world's first linear motor feedback system with one cable technology.

At a glance

- Absolute measurement system for linear direct drives
- Measuring lengths: up to 16,384 mm
- High traversing speeds: up to 10 m/s
- Status LED
- Non-contact measurement system; reading distance to the magnetic tape: up to 0.8 mm
- Electronic type label
- ETL70 with one cable technology thanks to the HIPERFACE DSL® interface
- STL70 with HIPERFACE® interface

Your benefits

- STL/ETL70 requires no reference run and is therefore immediately ready for operation again after being switched off
- Easy to mount thanks to a status LED that indicates the optimal mounting position of the motor feedback system
- Can be installed in almost any orientation by rotating the M12 male connector
- Maintenance-free due to non-contact measurement principle, therefore no machine downtimes due to wear and tear
- Simple integration of the system thanks to the HIPERFACE® or HIPERFACE DSL® interface
- High availability compared to optical systems – even with dust, contamination and moisture

→ www.sick.com/STL_ETL70

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.

8026128/2021-07-13
Subject to change without notice

Fields of application

- Linear direct drives
- Linear axis systems
- Pick-and-place applications
- Robotics (handling applications)

Detailed technical data

Performance

	HIPERFACE®	HIPERFACE DSL®
Measuring length	≤ 16,384 mm	
Resolution	0.448 µm, with interpolation of the sine/cosine signals with e.g. 12 bit	1 µm
Length of period	2 mm	
Traversing speed	4.5 m/s ... 10 m/s, up to which the absolute position can be reliably produced	≤ 4.5 m/s, maximum movement speed when switching on
Repeatability	< 1 µm	
System accuracy	± 10 µm	
Max. reading distance	0.8 mm	

Interfaces

Communication interface	HIPERFACE® HIPERFACE DSL®

Electrical data

HIPERFACE®

Supply voltage	7 V DC ... 12 V DC
Current consumption	< 200 mA
Connection type	Male connector, M12, 8-pin, universal [1]
Status display	RGB LED

[1] The universal connection is rotatable so that it is possible to position the conector in the radial or axial direction.

HIPERFACE DSL®

Supply voltage	7 V DC ... 12 V DC
Current consumption	< 200 mA
Connection type	Male connector, M12, 4-pin, universal [1]
Status display	RGB LED

[1] The universal connection is rotatable so that it is possible to position the conector in the radial or axial direction.

Mechanical data

Dimensions	See dimensional drawing
Scope of delivery	Magnetic tape not included with delivery
Magnetic strip length	See ordering information
Read head material	Zinc diecast

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3 [1]
Enclosure rating	IP67, with mating connector inserted (according to IEC 60529)
Operating temperature range	–30 °C ... +85 °C
Storage temperature range	–40 °C ... +85 °C, without package

[1] According to the listed standards, EMC is guaranteed if the motor feedback system is connected to the central grounding point of the motor controller via a cable shield and the encoder housing lays over a large area of the motor potential. If other shielding concepts are used, users must perform their own test.

Permissible relative humidity	100 %, condensation permitted
Resistance to shocks	500 m/s², 11 ms (EN 60068-2-27)
Resistance to vibration	100 m/s², 10 Hz ... 2,000 Hz (EN 60068-2-6)

[1] According to the listed standards, EMC is guaranteed if the motor feedback system is connected to the central grounding point of the motor controller via a cable shield and the encoder housing lays over a large area of the motor potential. If other shielding concepts are used, users must perform their own test.

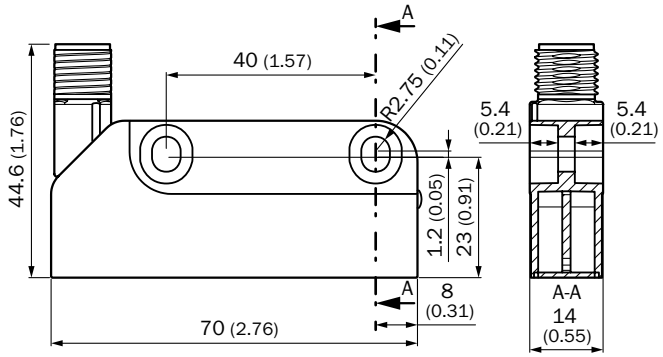
Ordering information

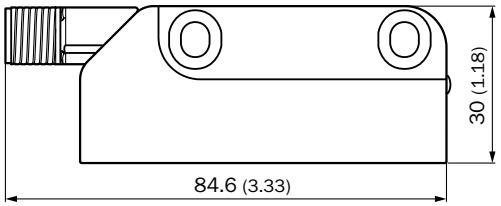
System part	Connection type	Communication interface	Type	Part no.
Read head	Male connector, M12, 4-pin, universal [1]	HIPERFACE DSL®	ETL70-0KA4	1116913
	Male connector, M12, 8-pin, universal [1]	HIPERFACE®	STL70-0HA8	1116912

[1] The universal connection is rotatable so that it is possible to position the conector in the radial or axial direction.

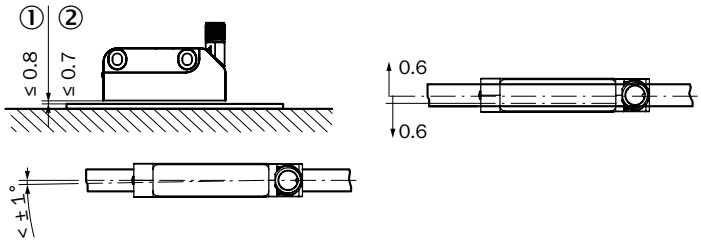
8026128/2021-07-13

Dimensional drawings (Dimensions in mm (inch))



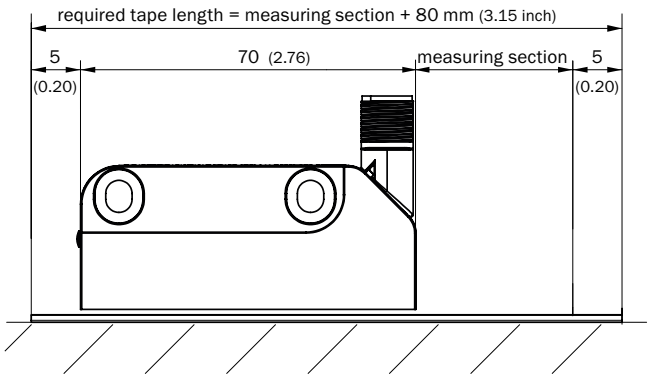


Attachment specifications



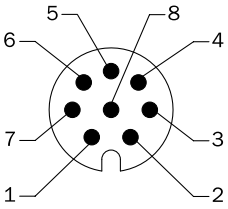
① Without cover strip
② With cover strip

Order note for magnetic tape length



PIN assignment

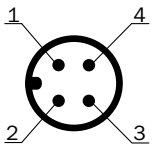
HIPERFACE®



M12 male connector, 8-pin

PIN	Signal	Explanation
1	REFSIN	Process data channel
2	+ SIN	Process data channel
3	REFCOS	Process data channel
4	+ COS	Process data channel
5	Data +	Parameter channel RS 485
6	Data -	Parameter channel RS 485
7	GND	Ground connection
8	U_S	Supply voltage
		Housing

HIPERFACE DSL®

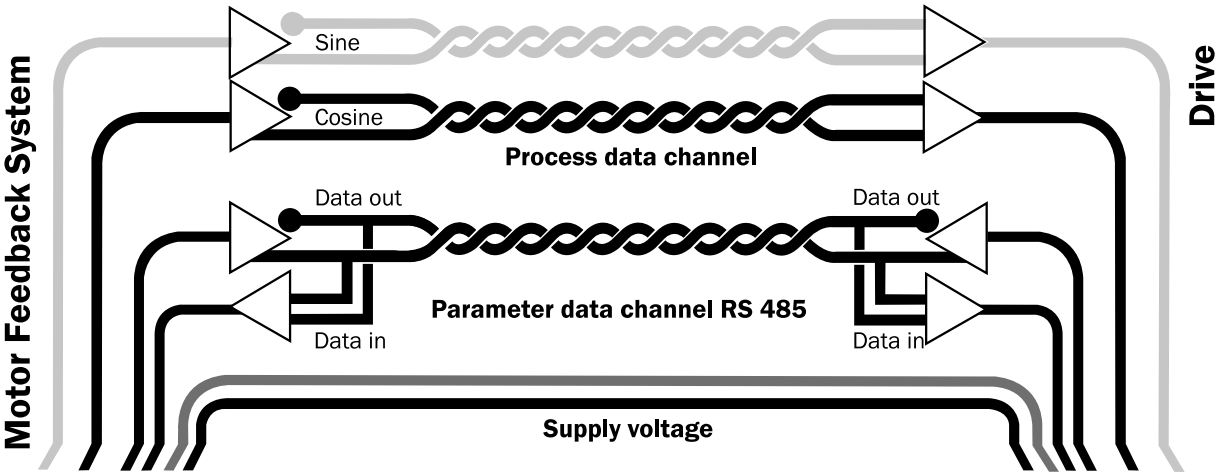


M12 male connector, 4-pin

Signal	PIN
DSL+ / 12V	1
DSL- / GND	2
Temperature	3
Temperature	4

Communication interface

Notes on the diagrams



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

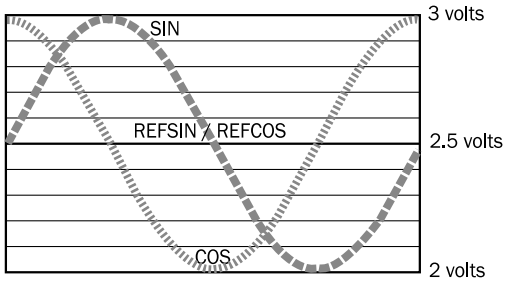
Technische Beschreibung

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 analog signals across all specific environmental 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



Characteristics applicable to all stated ambient conditions for HIPERFACE®

Signal	Values/unit
Signal peak, peak V_{SS} of SIN, COS	0.9 V ... 1.1 V
Signal offset REFSIN, REFCOS	2.2 V ... 2.8 V

Type-specific settings for HIPERFACE®

	STL70
Model ID (command 52h)	FFh
Free E^2PROM [bytes]	1,792

	STL70
Address	40h
Mode_485 [1]	E4h
Codes 0 to 3	55h
Counter	0
[1] The linear length measuring system STL/ETL70 supports the following baud rates: 600, 1200, 2400, 4800, 9600, 19200, 38400.	

Overview of supported commands for HIPERFACE®

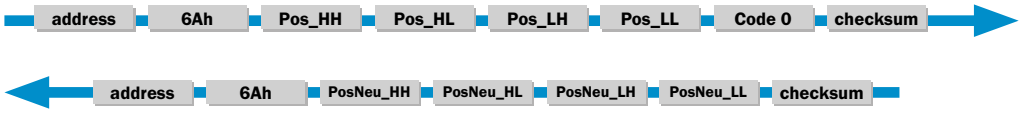
			STL70
Command byte	**Function**	**Code 0 [1]**	**Comment**
42h	Read position (5 bits per sine/cosine period)		62.5 µm (2 mm system)
43h	Set position	■	
44h	Read analog value		Channel number 48h
			Temperature [°C] [2]
46h	Read counter		
47h	Increase counter		
49h	Reset counter	■	
4Ah	Read data		
4Bh	Save 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 name plate		Encoder type = FFh
53h	Encoder reset		
55h	Allocate encoder address	■	
56h	Read serial number and program version		
57h	Configure serial interface	■	
67h	Change serial interface temporary		
6Ah	Set position with interanal synchronization	■	See page 17
6Bh	Sensor adjustment (during commissioning)	■	
[1] The commands thus marked include the parameter 'Code 0'. Code 0 is a byte inserted into the protocol to provide additional protection of vital system parameters against accidental overwriting. When the device is supplied, 'Code 0' = 55h.			
[2] The temperature value will be reliably formed approx. 2 s after power on/reset or at command.			

Overview of status messages for HIPERFACE®

Error type	Status code	Description	STL70
	00h	The encoder has recognized no error	■
Initialization	01h	Adjustment data faulty	■
	02h	Faulty internal angular offset	■
	03h	Data field partitioning table destroyed	■
	04h	Analog limit values not available	■
	05h	Internal I^2C bus not operational	■
	06h	Internal checksum error	■

Error type	Status code	Description	STL70
Protocols	09h	Parity error	■
	0Ah	Checksum of the data transmitted data is incorrect	■
	0Bh	Unknown command code	■
	0Ch	Number of data transmitted is incorrect	■
	0Dh	Command argument transmitted is not allowed	■
Data	0Eh	The selected data field may not be written to	■
	0Fh	Incorrect access code	■
	10h	Size of data field stated cannot be changed	■
	11h	Word address states, is outside data field	■
	12h	Access to non-existent data field	■
Position	20h	Sensor is not adjusted or is in adjustment mode	■
	21h	Distance magnetic tape/sensor too high	■
	23h	Positional error	■
Other	1Ch	Monitoring the value of analog signals (process data)	■
	1Eh	Encoder temperature critical	■
	08h	Counter overflow	■
For more information on the interface see HIPERFACE® - description, part no. 8010701			

Additional information for HIPERFACE®



Set position with internal synchronization 6Ah

This command is used to set the encoder position so that the desired position value points to the beginning of a period of the SIN signal.

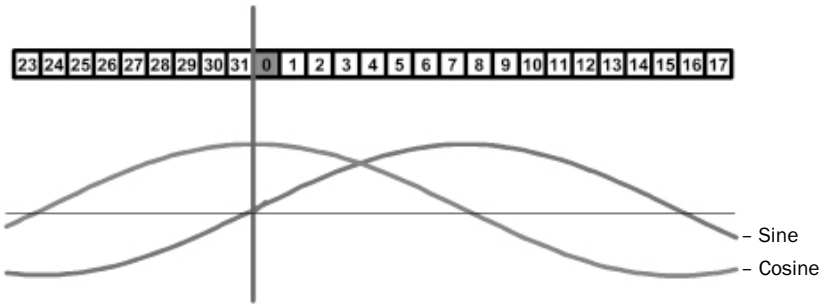
This is achieved by the fact that, in contrast to the “Set position” command (43h), the lower 5 bits of the position value are not changed, because these are responsible for the interpolation within a period.

The position value specified in the command is transmitted in the “unsigned long” format with the LSB aligned to the right and stored in non-volatile memory.

The value range lies between 0 .. 262143 and is to be interpreted as a multiple of 2/32mm. The following events trigger an error message:

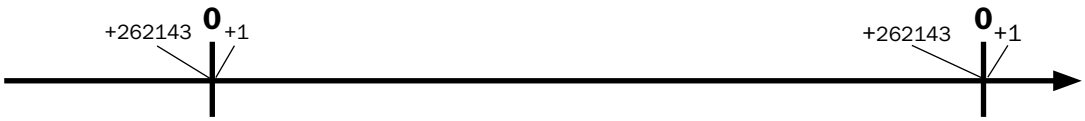
- Number of transmitted command bytes incorrect (WRONG_COMMAND_LENGTH, 0Ch)
- Incorrect access code entered (ERR_ACCESS_CODE, 0Fh)
- Internal error occurred which would lead to an invalid position value (ERR_INT_ANGLE_OFFSET, 02h)
- Encoder is not calibrated (ERR_NOT_CALIBRATED, 20h)
- Transmitted command argument is not allowed (WRONG_ARGUMENT, 0Dh)
- Internal checksum error (ERR_CHKSUM, 06h)

5 LSB
of the digital
absolute position



Codification magnetic tape STL70

The absolute coding of the magnetic tape allows a maximum measuring range of 16,384.00 mm. As the resolution of the position data is 2/32 mm, the resulting numeric value for the maximum measuring range is 0 ... 262,143.



Internal position calculation STL70

Position value = 0 ... 262,143

Supported resources for HIPERFACE DSL®

Resource Index	Function	Size (max. Offset)	Read access	Write access	Time overrun [ms]	Name
000h	Root node		0	-	10	ROOT
001h	Identification note		0	-	10	IDENT
002h	Monitoring node		0	-	10	MONITOR
003h	Administration node		0	-	10	ADMIN
005h	Data storage node		0	-	10	DATA
006h	Sensor hub nodes		0	-	10	SENSHUB
080h	Type of encoder	2	0	-	10	ENCTYPE
081h	Resolution	4	0	-	10	RESOLUTN
082h	Measurement range	4	0	-	10	RANGE
083h	Type name	18	0	-	10	TYPECODE
084h	Serial number	10	0	-	10	SERIALNO
085h	Device version	20	0	-	10	FWREVNO
086h	Firmware date	8	0	-	10	FWDATE
087h	EEPROM size	2	0	-	10	EESIZE
0C0h	Temperature range	4	0	-	10	TEMPRNG
0C1h	Temperature	2	0	-	10	TEMPRTUR
100h	Reset/shut down	0	-	0	250	RESET
101h	Set position	8	0	4	100	SETPOS
104h	Set access level	8	0	0	30	SETACCCES
105h	Change access key	8	-	0	40	CHNGEKEY
109h	Encoder index	2	0	3	20	ENCIDENT
130h	Load file	8	-	0	160	LOADFILE
131h	Read/write file	8	0	0	60	RWFILE
132h	File status	4	0	-	30	FILESTAT
133h	Create/delete/change file	8	-	0	160	MAKEFILE
134h	Directory	8	0	-	40	DIR
200h	Access simple I/O	4	0	0	70	ACCESSIO

Supported access levels for HIPERFACE DSL®

Access level	User	Standard access key
0	Execute (default setting)	- (no key required)
1	Operator	1111 (31 31 31 31h)
2	Maintenance	2222 (32 32 32 32h)
3	Authorized client	3333 (33 33 33 33h)
4	User service	4444 (34 34 34 34h)

8026128/2021-07-13
Subject to change without notice

Overview of warnings and fault indications for HIPERFACE DSL®

Error type	Error register	Error bit	Description
Position (incremental)	ENC_ST0	0	A Protocol reset was executed
		1	Acceleration overflow, invalid position
		5	Internal error in vector length, invalid position
Position (absolute)	ENC_ST1	0	Error in absolute position in a rotation
Initialization	ENC_ST2	0	
Checking	ENC_ST3	0	Critical encoder temperature
Access to resources	ENC_ST4	0	Invalid argument given during resource access procedure
		1	Resource access refused due to incorrect access level
		2	Internal error during resoure access
		3	Error when accessing a user file

Recommended accessories

Mounting systems

Nuts and screws

Screws

Figure	Brief description	Type	Part no.
	Mounting kit for SIL2 applications for safe and easy mounting of the TTK70S; 2x titan cylinder screws, 2x galvanized steel lock washers, 2x washers, 2x female connectors	BEF-MK-S12	2105618

Further accessories

Magnets

Figure	Brief description	Type	Part no.
	Magnetic tape length: 1.08 m, magnetic tape width: 10 mm, magnetic tape material: 17410 hard ferrite 9/28 P, substrate tape material: steel, period length 2 mm, operating temperature range: –20 °C ... 100 °C, storage temperature range: –30 °C ... 100 °C, temperature coefficient: (11 ± 1) µm/K/m	BTL70-01000	6078482
	Magnetic tape length: 2.08 m, magnetic tape width: 10 mm, magnetic tape material: 17410 hard ferrite 9/28 P, substrate tape material: steel, period length 2 mm, operating temperature range: –20 °C ... 100 °C, storage temperature range: –30 °C ... 100 °C, temperature coefficient: (11 ± 1) µm/K/m	BTL70-02000	6078484
	Magnetic tape length: 3.08 m, magnetic tape width: 10 mm, magnetic tape material: 17410 hard ferrite 9/28 P, substrate tape material: steel, period length 2 mm, operating temperature range: –20 °C ... 100 °C, storage temperature range: –30 °C ... 100 °C, temperature coefficient: (11 ± 1) µm/K/m	BTL70-03000	6078485
	Magnetic tape length: 4.08 m, magnetic tape width: 10 mm, magnetic tape material: 17410 hard ferrite 9/28 P, substrate tape material: steel, period length 2 mm, operating temperature range: –20 °C ... 100 °C, storage temperature range: –30 °C ... 100 °C, temperature coefficient: (11 ± 1) µm/K/m	BTL70-04000	6078486
	Magnetic tape length: 6.08 m, magnetic tape width: 10 mm, magnetic tape material: 17410 hard ferrite 9/28 P, substrate tape material: steel, period length 2 mm, operating temperature range: –20 °C ... 100 °C, storage temperature range: –30 °C ... 100 °C, temperature coefficient: (11 ± 1) µm/K/m	BTL70-06000	6078487
	Magnetic tape length: 8.08 m, magnetic tape width: 10 mm, magnetic tape material: 17410 hard ferrite 9/28 P, substrate tape material: steel, period length 2 mm, operating temperature range: –20 °C ... 100 °C, storage temperature range: –30 °C ... 100 °C, temperature coefficient: (11 ± 1) µm/K/m	BTL70-08000	6078488
	Magnetic tape length: 10.08 m, magnetic tape width: 10 mm, magnetic tape material: 17410 hard ferrite 9/28 P, substrate tape material: steel, period length 2 mm, operating temperature range: –20 °C ... 100 °C, storage temperature range: –30 °C ... 100 °C, temperature coefficient: (11 ± 1) µm/K/m	BTL70-10000	6078489
	Magnetic tape length: 12.08 m, magnetic tape width: 10 mm, magnetic tape material: 17410 hard ferrite 9/28 P, substrate tape material: steel, period length 2 mm, operating temperature range: –20 °C ... 100 °C, storage temperature range: –30 °C ... 100 °C, temperature coefficient: (11 ± 1) µm/K/m	BTL70-12000	6078490
	Magnetic tape length: 14.08 m, magnetic tape width: 10 mm, magnetic tape material: 17410 hard ferrite 9/28 P, substrate tape material: steel, period length 2 mm, operating temperature range: –20 °C ... 100 °C, storage temperature range: –30 °C ... 100 °C, temperature coefficient: (11 ± 1) µm/K/m	BTL70-14000	6078491
	Magnetic tape length: 16.5 m, magnetic tape width: 10 mm, magnetic tape material: 17410 hard ferrite 9/28 P, substrate tape material: steel, period length 2 mm, operating temperature range: –20 °C ... 100 °C, storage temperature range: –30 °C ... 100 °C, temperature coefficient: (11 ± 1) µm/K/m	BTL70-16300	6078492

Dimensional drawings ➜ page 13

8026128/2021-07-13
Subject to change without notice

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 14

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

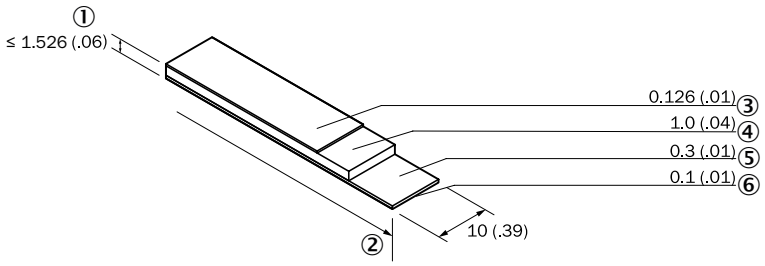
Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: Flying leads Cable: Incremental, SSI, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm², 7 mm Signalart: Incremental, SSI	2 m	DOL-1208-G02MAC1	6032866
		5 m	DOL-1208-G05MAC1	6032867
		10 m	DOL-1208-G10MAC1	6032868
		20 m	DOL-1208-G20MAC1	6032869
		25 m	DOL-1208-G25MAC1	6067859
	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: HIPERFACE®, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm², 7 mm Signalart: HIPERFACE®	2 m	DOL-1208-W02MAC1	6037724
		5 m	DOL-1208-W05MAC1	6037725
		10 m	DOL-1208-W10MAC1	6037726
	Head A: female connector, M12, 8-pin, angled Head B: Flying leads Cable: HIPERFACE®, PUR, shielded, 4 x 2 x 0.25 mm², 7 mm Signalart: HIPERFACE®	20 m	DOL-1208-W20MAC1	6037727

Dimensional drawings ➜ page 14

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

Magnets

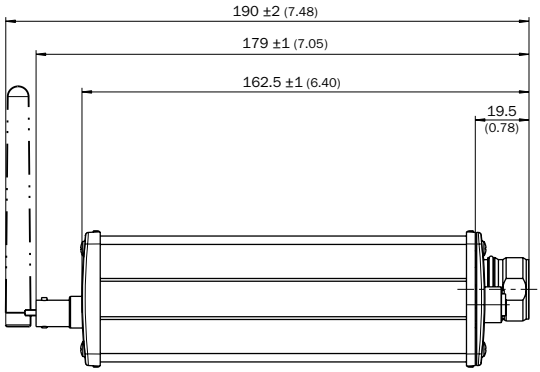
Magnetic tape

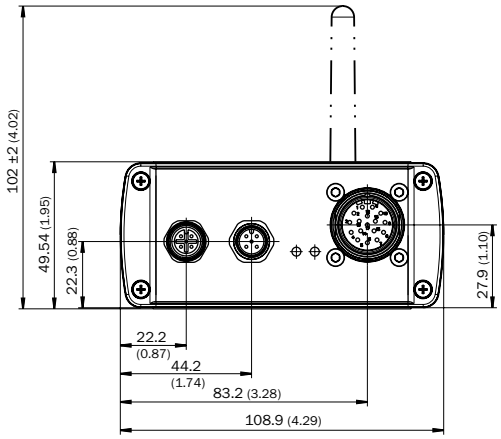


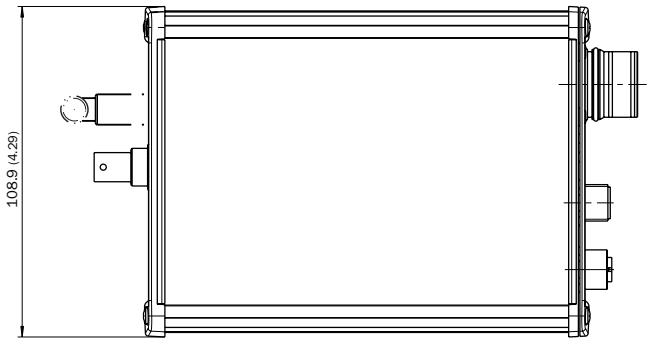
① Thickness
② Length
③ Minimum distance
④ Magnetic tape
⑤ Substrate tape
⑥ Adhesive tape

Programming and configuration tools

PGT-11-S LAN

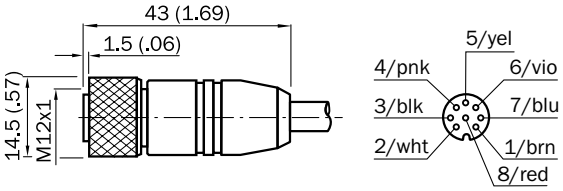






Plug connectors and cables

DOL-1208-GxxMAC1



All dimensions in mm (inch)

8026128/2021-07-13

WORKING WITH SICK IN A DIGITAL WORLD

Making your digital business environment comfortable

Find a suitable solution in next to no time

Often we know best what we need – but not necessarily where to find it right away. SICK will support you with its in-depth expertise.

- Online product catalog – our digital flagship ➜ www.sick.com/products
- Application Solver – the right sensor for selected applications ➜ www.sick.com/applicationBased
- Online configurators and selectors – exactly the right sensor for your needs

My SICK is your personal self-service portal

My SICK is your personal self-service portal with lots of helpful information and your own individual access to the web shop. Take advantage of the wide variety of exclusive advantages on offer:

Your benefits

- Open around the clock
- Clear product information
- Company-specific price conditions
- Convenience during the ordering process
- Document overview
- Availability and delivery times

Register now:
➜ www.sick.com/myBenefits

Get ahead with digital knowledge transfer and digital services

- Digital Customer Trainings ➜ www.sick.com/c/g300887
- Digital Service Catalog ➜ cloud.sick.com
- SICK AppPool ➜ apppool.cloud.sick.com

8026128/2021-07-13 · AB_07 · Pre USmod en50

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 10,000 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents, and preventing damage to the environment.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the customers need. In application centers in Europe, Asia, and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes SICK a reliable supplier and development partner.

Comprehensive services round out the offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

That is "Sensor Intelligence."

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations → www.sick.com

SICK
Sensor Intelligence.