



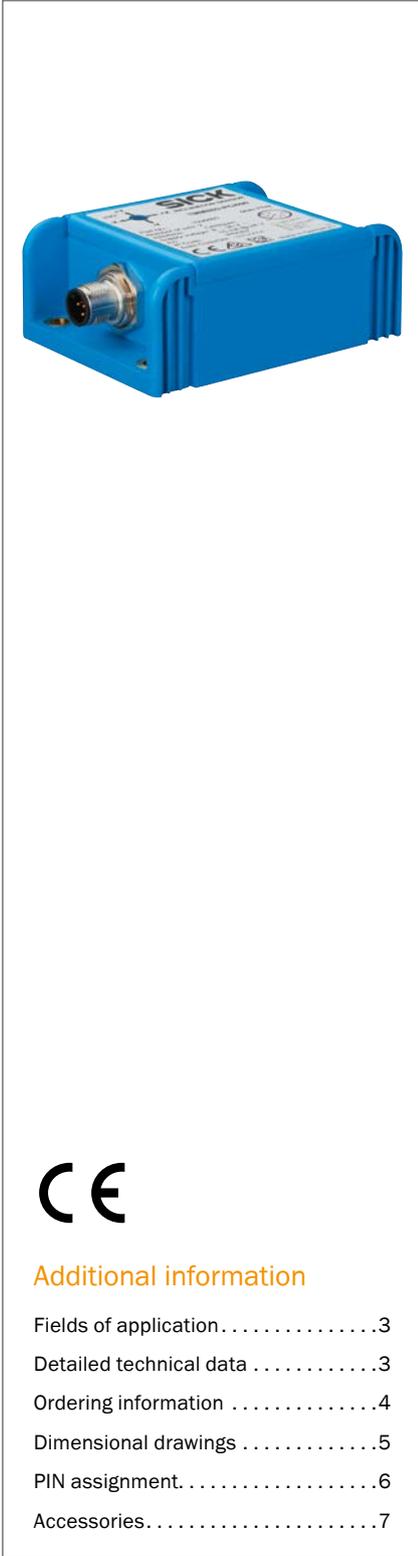
# TMS/TMM88 Dynamic

MAXIMUM PRECISION IN DYNAMIC APPLICATIONS.

Dynamic inclination sensors

**SICK**  
Sensor Intelligence.

# MAXIMUM PRECISION IN DYNAMIC APPLICATIONS



### Product description

The inclination sensors from the TMS/TMM Dynamic product family are setting new standards with respect to signal quality and response time. Thanks to an intelligent sensor fusion filter, not only are they extremely quick to respond – they are also highly precise, even when influenced by external accelerations. The foundation for this is a six-axis iner-

tial measurement unit (IMU), consisting of an acceleration sensor and a gyroscope that is based on MEMS technology. Various configuration options enable the dynamic inclination sensors to be flexibly adapted to the application. The rugged design with enclosure ratings up to IP69 is able to withstand even the harshest ambient conditions.

### At a glance

- Single-axis (360°) and two-axis (+/- 90°) inclination sensors based on a six-axis IMU
- Intelligent sensor fusion filter
- Highly accurate even with dynamic movements
- Interfaces: CANopen, SAE J1939
- Programmable with the PGT-12-Pro
- Temperature range: -40 °C to +80 °C
- Shock resistance: 100 g
- Enclosure rating: IP67/69

### Your benefits

- Inclination measurement in two axes without mutual interference
- Single-axis angle measurement over the full 360° with configurable zero point
- High signal quality and quick response time thanks to innovative and powerful sensor fusion algorithm
- Access to raw data of the acceleration sensor and gyroscope opens up additional application possibilities
- Use under the harshest conditions possible thanks to completely encapsulated electronics and high enclosure rating
- Flexible configuration via CANopen or SAE J1939 as well with the PGT-12-Pro



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→ [www.sick.com/TMS\\_TMM88\\_Dynamic](http://www.sick.com/TMS_TMM88_Dynamic)

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.



## Fields of application

- Agricultural and forestry machinery
- Construction machinery
- Special vehicles
- Automated guided vehicle systems
- Crane and lifting technology

## Detailed technical data

### Performance

<b>Number of axis</b>	1 2
<b>Measuring range</b>	
1-dimensional	360°
2-dimensional	± 90°
<b>Resolution</b>	0.01°
<b>Static accuracy</b>	± 0.3°
<b>Dynamic accuracy</b>	± 0.5°
<b>Temperature coefficient (zero point)</b>	Typ. ±0,01°/K <sup>1)</sup>
<b>Limit frequency</b>	0.1 Hz ... 25 Hz, 8. range (with digital filter)
<b>Interference suppression time for sensor fusion filter</b>	100 ms ... 10,000 ms
<b>Sampling rate</b>	200 Hz
<b>Initialization time</b>	120 ms
<b>Additional information</b>	
Pitch (Euler angle)	± 90° (Pitch) ± 180° (Roll)
Pitch (quaternion)	Scalar parts w, vector parts x, y, z
Acceleration	± 8 g (x-, y-, z-axis)
Turning rate	± 250 °/s (x-, y-, z-axis)

<sup>1)</sup> Referring to the temperature of 25 °C.

## Interfaces

	CANopen	SAE J1939
<b>Communication interface</b>	CANopen	SAE J1939
<b>Device profile</b>	CiA DSP-410	-
<b>Address setting</b>	0...127, default: 10	0...253 (Address Claiming: 0...240), default: 128
<b>Data transmission rate (baud rate)</b>	10 kbit/s ... 1,000 kbit/s, Default: automatic baud rate detection	250 kbit/s ... 500 kbit/s, default: 250 kbit/s
<b>Status information</b>	Via status LED	
<b>Bus termination</b>	Via external terminator	
<b>Parameterising data</b>	Zeroset Limit frequency Interference suppression time Sensor fusion Preset value Inverting of counting direction	
<b>Programmable/configurable</b>	Over PGT-12-Pro	

Electrical data

Connection type	Male connector, 1 x M12, 5-pin Female connector, 1 x M12, 5-pin
Operating voltage range	8 V DC ... 36 V DC
Current consumption	< 15 mA @ 24 V
Reverse polarity protection	✓
Short-circuit protection of the outputs	✓
MTTFd: mean time to dangerous failure	619 years (EN ISO 13849-1)

Mechanical data

Dimensions	Plastic PBT	66 mm x 90 mm x 36 mm
	Aluminum	58 mm x 90 mm x 31 mm
Mass		200 g
Housing material	Plastic PBT	
	Aluminum	

Ambient data

EMC	EN 61326-1, EN ISO 14982, EN ISO 13309
Enclosure rating	IP67/IP69 (according to IEC 60529)
Working temperature range	-40 °C ... +80 °C
Storage temperature range	-40 °C ... +85 °C
Resistance to shocks	100 g, 6 ms (according to EN 60068-2-27)
Resistance to vibration	10 g, 10 Hz ... 2,000 Hz (according to EN 60068-2-6)

Ordering information

CANopen

- **Resolution:** 0.01°

Number of axis	Measuring range	Type	Part no.
1-dimensional	360°	TMS88D-ACI360	1098668
		TMS88D-PCI360	1094483
2-dimensional	± 90°	TMM88D-ACI090	1098669
		TMM88D-PCI090	1094485

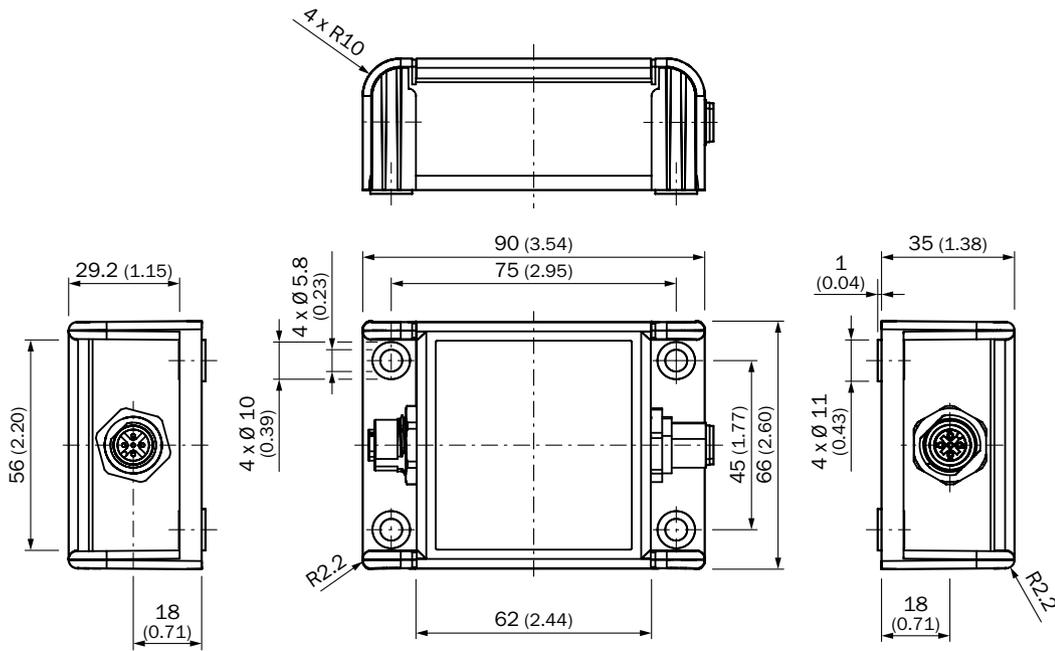
SAE J1939

- **Resolution:** 0.01°

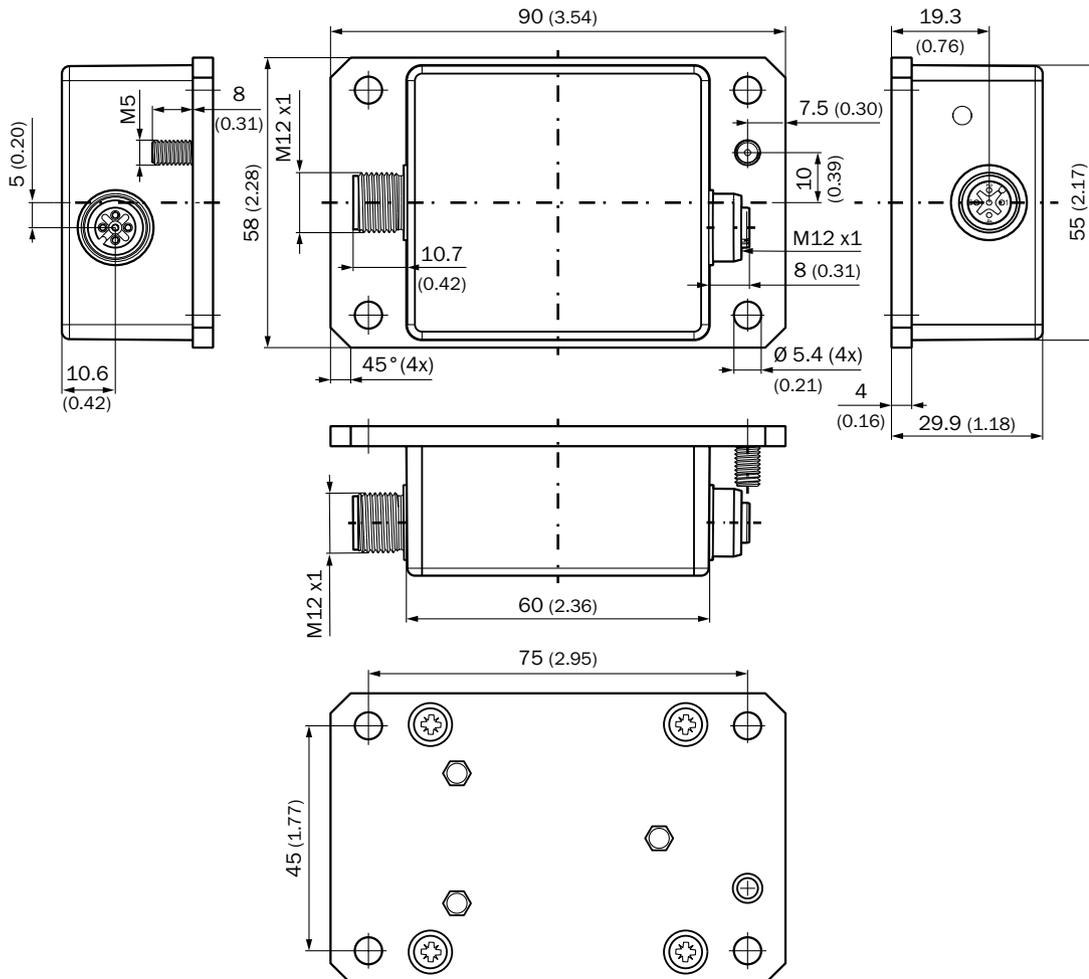
Number of axis	Measuring range	Type	Part no.
1-dimensional	360°	TMS88D-AJI360	1098670
		TMS88D-PJI360	1094486
2-dimensional	± 90°	TMM88D-AJI090	1098671
		TMM88D-PJI090	1094488

Dimensional drawings (Dimensions in mm (inch))

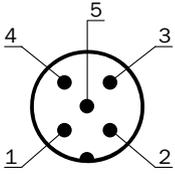
TMx88x-Pxl



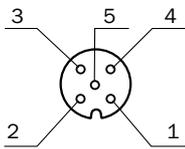
TMx88D-Axl



PIN assignment



PIN Male connector M12, 5-pin	Signal	Function
1	CAN Shield	Shielding
2	VDC	Supply voltage
3	GND/CAN GND	0V (GND)
4	CAN high	CAN signal
5	CAN low	CAN signal



PIN Female connector M12, 5-pin	Signal	Function
1	CAN Shield	Shielding
2	VDC	Supply voltage
3	GND/CAN GND	0V (GND)
4	CAN high	CAN signal
5	CAN low	CAN signal

Accessories

Connection systems

Adapters and distributors

T-junctions

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 5-pin, A-coded Head B: male connector, M12, 5-pin, A-coded	DSC-1205T000025KM0	6030664

Dimensional drawings → [page 9](#)

Y-junctions

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, straight, A-coded Head B: female connector, M12, 5-pin, straight, A-coded Male connector, M12, 5-pin, straight, A-coded Cable: CAN, Power	0.5 m	Y-CAN cable	6027647

Dimensional drawings → [page 9](#)

Plug connectors and cables

Connecting cables

Figure	Brief description	Length of cable	Type	Part no.
 Illustration may differ	Head A: female connector, M12, 5-pin, straight Head B: Flying leads Cable: CANopen, DeviceNet™, shielded, 2 x 0,34 mm <sup>2</sup> + 2 x 0,25 mm <sup>2</sup> + 1 x 0,34 mm <sup>2</sup> , 6.7 mm	2 m	DOL-1205-G02MY	6053041
		5 m	DOL-1205-G05MY	6053042
		10 m	DOL-1205-G10MY	6053043

Dimensional drawings → [page 9](#)

Connection cables

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, straight Head B: female connector, D-Sub, 9-pin, straight Cable: CANopen, shielded, 5 x 0.34 mm <sup>2</sup> , 5.9 mm	-	DDL-2D05-G0M-5BC9	2083805
 Illustration may differ	Head A: female connector, M12, 5-pin, straight Head B: male connector, M12, 5-pin, straight Cable: CANopen, DeviceNet™, PUR, halogen-free, shielded, 2 x 0,34 mm <sup>2</sup> + 2 x 0,25 mm <sup>2</sup> + 1 x 0,34 mm <sup>2</sup> , 6.7 mm	2 m	DSL-1205-G02MY	6053044
		5 m	DSL-1205-G05MY	6053045
		10 m	DSL-1205-G10MY	6053046

Dimensional drawings → [page 9](#)

Field-attachable connectors

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 5-pin, straight Cable: CANopen, DeviceNet™, shielded	DOS-1205-GA	6027534
	Head A: male connector, M12, 5-pin, straight, A-coded Cable: CANopen, DeviceNet™, shielded	STE-1205-GA	6027533

Dimensional drawings → [page 9](#)

Other connectors and cables

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight Cable: CANopen, unshielded	CAN male connector	6021167

Dimensional drawings → [page 9](#)

Further accessories

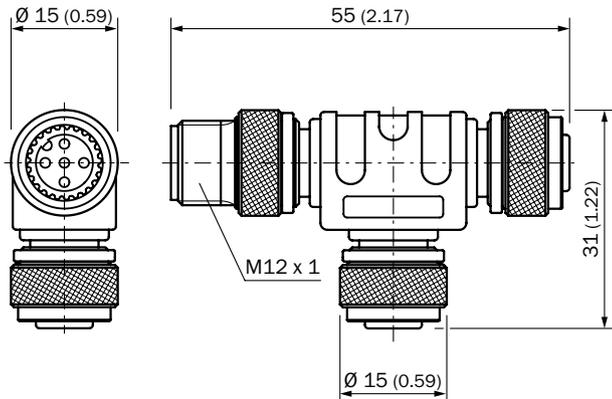
Programming and configuration tools

Figure	Brief description	Type	Part no.
	Hand-held programming device for the programmable SICK AHS/AHM36 CANopen encoders, TMS/TMM61 CANopen inclination sensors, TMS/TMM88 CANopen, TMS/TMM88 Analog, and wire draw encoders with AHS/AHM36 CANopen. Compact dimensions, low weight, and intuitive operation.	PGT-12-Pro	1076313

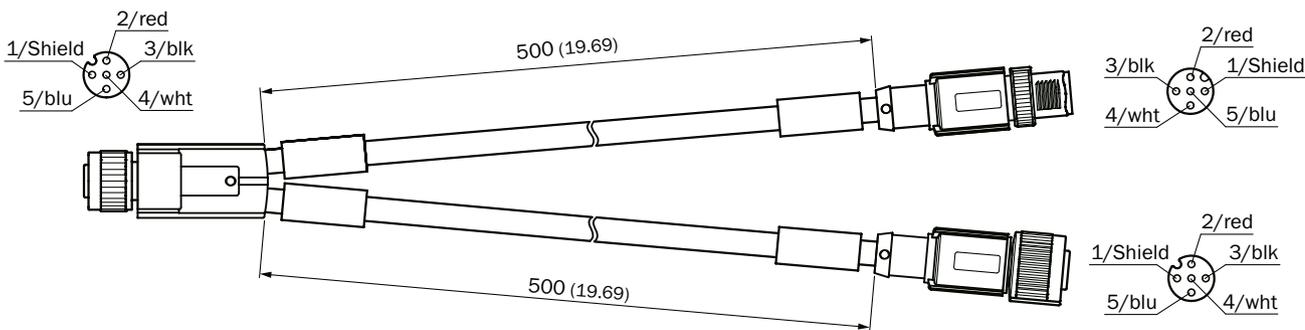
Dimensional drawings for accessories (Dimensions in mm (inch))

Adapters and distributors

DSC-1205T000025KM0

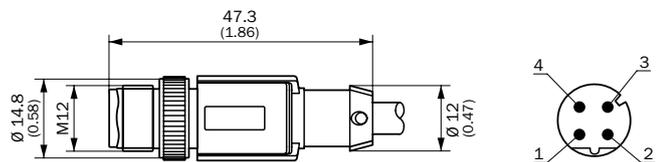


Y-CAN cable



Plug connectors and cables

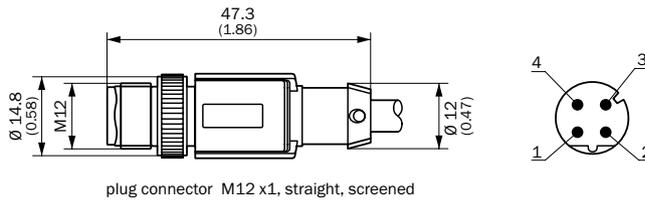
DOL-1205-GxxMY



plug connector M12 x1, straight, screened

- ① Shield wire
- ② Red
- ③ Black
- ④ White
- ⑤ Blue

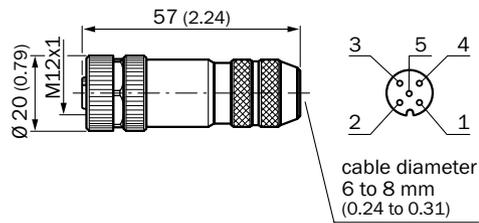
DSL-1205-GxxMY



plug connector M12 x1, straight, screened

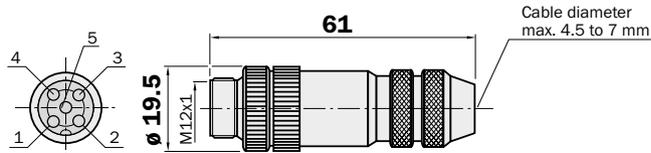
- ① Shield wire
- ② Red
- ③ Black
- ④ White
- ⑤ Blue

DOS-1205-GA



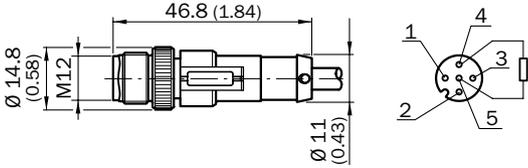
cable diameter  
6 to 8 mm  
(0.24 to 0.31)

STE-1205-GA



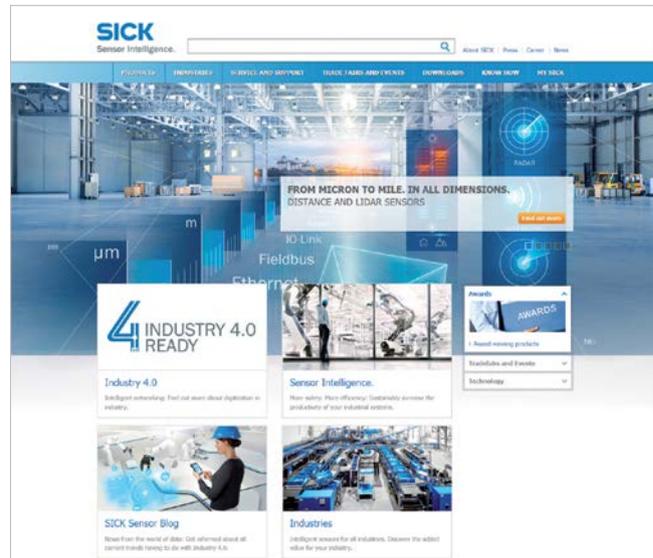
Cable diameter  
max. 4.5 to 7 mm

CAN male connector



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