

## PROGRAMMING SOLUTIONS

ENCODERS, INERTIAL SENSORS AND NON-CONTACT MOTION SENSORS

Configuration using a handheld device, computer, control unit, web server or DIP switch



# FOR THE SPECIFIC ADAPTATION AND EVALUATION OF ENCODERS, INERTIAL SENSORS AND NON-CONTACT MOTION SENSORS

SICK offers a variety of solutions for custom adaptation of encoders, inertial sensors and non-contact motion sensors to user-specific and application-specific circumstances. The programming options range from a compact, light display unit to computer-based tools and integration into control units and web-based interfaces. This means that suitable solutions are available for every user and every application — for developers or service staff, for small batch series, spare parts sales, or highly automated systems. The available product portfolio of incremental, absolute and wire-draw encoders as well as inertial sensors and non-contact motion sensors offers the right product for every application with specific programming options.

## PROGRAMMING FROM A-Z

## PGT-10-Pro

Pocket-sized programming unit for self-contained programming in the workplace or at a building site.

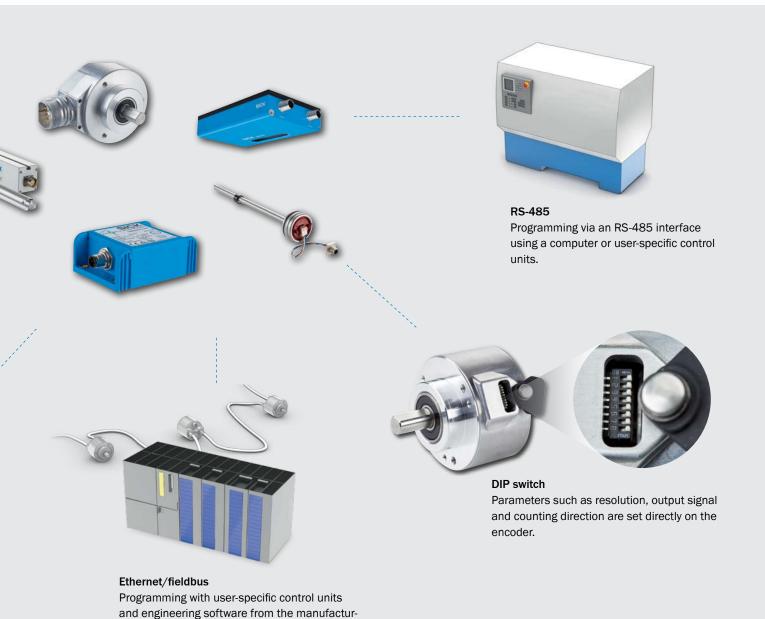
## PGT-08-S PGT-14 SiLink2 Master

Computer-based programming unit for convenient programming at the workstation or in production.



## Benefits for you

- The sensor properties can be quickly adapted to specific requirements
- Solutions tailored to the target group in question, from service and maintenance to large-scale production
- Option to save and clone sensor settings enables fast programming and good traceability
- Cost savings for storage and data management due to reduced variant diversity
- Fast spare parts supply if service is required



er of the PLC using fieldbus/Ethernet.





## ENCODER HANDHELD PROGRAMMING UNIT FOR UNIVERSAL MOBILE USE

The PGT-10-Pro is a light and compact programming unit for incremental and absolute encoders from SICK. Because it has an integrated voltage supply, it is able to work in a fully self-contained manner and is thus particularly suitable for mobile use in customer service. Various encoder parameters can be saved in the internal memory or on an SD card. Through firmware updates, the user can supplement the PGT-10-Pro with new sensor variants and functions. For this reason, the programming unit can be used for a very long time, thereby offering an optimal price/performance ratio.

#### At a glance

- Programms incremental and absolute encoders from SICK
- Various menu languages can be selected
- Can be operated intuitively using four buttons
- Large four-line display with backlighting
- · Simple encoder parameter cloning
- Exchange of configurations with PGT-08-S using an SD card
- Capable of updating to new encoder variants and functions

#### Your benefits

- Less costs, because of fewer encoder variants have to be stored thanks to the programming
- · Fast exchange of encoders
- Programming unit with low weight and compact dimensions for mobile use
- Large, intuitive display, making extra training for operating personnel unnecessary
- Can be used worldwide thanks to the availability of various menu languages and is easy to operate
- Cloning function saves time and reduces programming errors

- Programming of the DFS60, DFS60 Inox, DFS20, DFS21, DFS22 and DFS25 incremental encoders as well as the DFV60 measuring wheel encoders
- Programming of the AHS/AHM36 SSI, AHS/AHM36 SSI Inox, AFS/AFM60 SSI and AFS/AFM60 Inox absolute encoders
- Ideal for device manufacturers, customer service, developers and distributors
- Ideal for mobile use, particularly for applications that are difficult to access

Programmable sensors	Description
DFS60	Incremental encoder
DFV60	Measuring wheel encoder
DFS60 Inox	Incremental encoder
DFS2x	Incremental encoder
AHS/AHM36 SSI	Absolute encoder
AHS/AHM36 SSI Inox	Absolute encoder
AFS/AFM60 SSI	Absolute encoder
AFS/AFM60 Inox	Absolute encoder





## HANDHELD PROGRAMMING UNIT FOR MOBILE APPLICATIONS

The PGT-12-Pro is a light and compact programming unit for absolute encoders with CANopen and SAE J1939 interface as well as inclination sensors with CANopen, SAE J1939 and analog interface from SICK. Because it has an integrated voltage supply, it is able to work in a fully self-contained manner and is thus particularly suitable for mobile use in customer service. Various parameters for encoders and inclination sensors can be saved in the internal memory or on an SD card. Through firmware updates the PGT-12-Pro can be supplemented with new sensor variants and functions. That is why the PGT-12-Pro has a long operational lifetime, therefore offering an optimal price/performance ratio.

### At a glance

- Compact programming unit with large display for absolute encoders with CANopen and SAE J1939 interface and Inclination sensors with CANopen, SAE J1939 and analog interface
- · Simple sensor parameter cloning
- · Storage of configurations on SD card
- Firmware update via SD card for adding new functions and sensor families
- Intuitive menu structure and menu language options

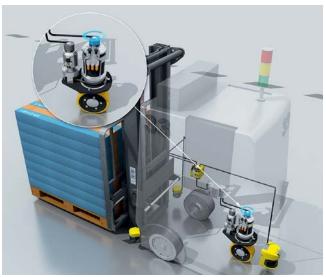
#### Your benefits

- Programming of the product families mentioned with just one device
- Easy modification of node ID, baud rate and sensor parameters without PLC software
- Fast exchange of encoders and inclination sensors
- Low weight and compact dimensions for mobile use
- Can be used immediately without installing software or hardware
- Large, intuitive display, making extra training for operating personnel unnecessary

- Programming the AHS36/AHM36 CANopen and AHS/AHM36 SAE J1939 absolute encoders
- Programming the inclination sensors TMS/TMM61 CANopen, TMS/TMM88 CANopen, TMS/TMM88 SAE J1939 and TMS/TMM88 analog
- Ideal for device manufacturers, customer service, developers and distributors
- Ideal for mobile use, particularly for applications that are difficult to access

Programmable sensors	Description
AHS/AHM36 CANopen	Absolute encoder
AHS/AHM36 CANopen Inox	Absolute encoder
AHS/AHM36 SAE J1939	Absolute encoder
AHS/AHM36 SAE J1939 Inox	Absolute encoder
TMS/TMM61 CANopen	Inclination sensors
TMS/TMM88 CANopen	Inclination sensors
TMS/TMM88 Analog	Inclination sensors
TMS/TMM88D SAE J1939	Dynamic inclination sensors





## THE CONVENIENT AND CLEAR DEVICE THAT DOES IT ALL

The PGT-08-S is a computer-based programming unit for all programmable incremental and SSI absolute encoders. Its versatility makes it a convenient option, even for machine facilities.

## At a glance

- Programming unit with SOPAS software for commercially available computers
- Clear graphical user interface for simple operation
- Programming settings can be saved and loaded
- Can be updated for future products and programming functions by performing a software update
- Modular product concept consisting of programming unit, adapter cables and software
- Connection to the encoders using encoder-specific adapter cables

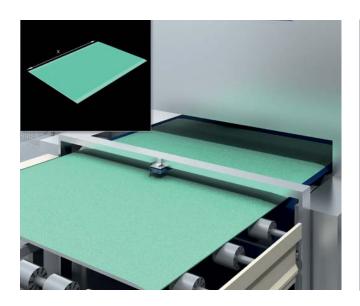
## Your benefits

- Free driver and software updates via SOPAS
- Graphical user interface clearly displayed on the computer monitor and ergonomic operation using mouse and keyboard
- Programming settings can be saved and loaded to/from the computer memory, which enables fast duplication and traceability
- Encoder position information via the display enables diagnosis without disassembly
- Programming lowers storage costs due to reduced variant diversity

## Fields of application

 Ideal for device manufacturers, development divisions, small batch series, prototype construction, and distribution

Programmable sensors	Description
DFS60	Incremental encoder
DFV60	Measuring wheel encoder
DFS60 Inox	Incremental encoder
DFS2x	Incremental encoder
AHS/AHM36 SSI	Absolute encoder
AHS/AHM36 SSI Inox	Absolute encoder
AFS/AFM60 SSI	Absolute encoder
AFS/AFM60 Inox	Absolute encoder





## PARAMETERIZATION AND DIAGNOSTICS FOR NON-CONTACT MOTION SENSORS

The PGT-14 compact programming device was specially designed for use with SPEETEC 1D programmable non-contact motion sensors. It is used for connecting the sensors to the SOPAS ET configuration software from SICK using a laptop or PC. Thanks to the intuitive user interface in the tool, the basic functions of the sensors can be easily parameterized. The digital inputs and outputs are also configurable, which means that, among other things, the length of piece goods can be measured directly in the sensor. The integrated diagnostic options also allow for condition monitoring of the SPEETEC 1D. The result: Maximum transparency of sensor data and complete monitoring of the application.

#### At a glance

- Monitoring of measurement quality in applications
- Monitoring of sensor condition concerning temperature and operating hours
- Parameterization of digital inputs and output and logic functions
- Parameterization of electric interface, resolution and direction of movement
- Use with the SOPAS Engineering Tool from SICK

#### Your benefits

- Application data diagnostics result in reliable measurement accuracy and transparency for the application and the production process
- Monitoring of sensor condition prevents unplanned failures and ensures high product availability
- Parameterization of digital inputs and outputs enables length measurement with trigger sensors and control of follow-up actions without controller knowledge
- Parameterization of sensor properties reduces required stock, shortens delivery times and increases flexibility
- SOPAS ET, a powerful and standardized software, is available

- Parameterization and diagnostics of SPEETEC 1D in the programmable variant
- Development: Sensor evaluation
- Sales: Customer consultation and sensor demonstration
- OEMs and distributors: Adjustment to specific application requirements

Programmable sensors	Description				
SPEETEC 1D	Laser-Oberflächenbewegungssensoren				





## PC CONNECTION FOR IO-LINK SENSORS

The SiLink2 master enables the connection of IO-Link sensors V1.0 and V1.1 to a Windows-based PC via USB. Sensors can be powered directly via USB or the enclosed power supply unit. With PC-based software such as SOPAS or FDT, sensor data can be visually displayed and parameters configured.

## At a glance

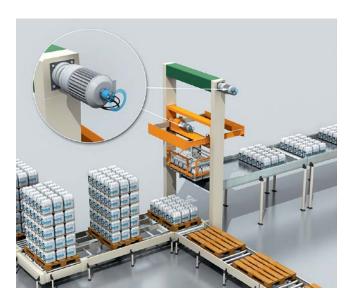
- IO-Link USB gateway for connecting to a PC
- IO-Link versions V1.0 and V1.1 are supported
- Connection to SOPAS and FDT software
- Sensor power supply via USB interface and external power supply unit
- Small housing with operation and status displays

#### Your benefits

- Quick and easy configuration of IO-Link sensors without a PLC
- Immediate visual display of measured values and output states
- Easy parameter backup and restoration
- Easy analysis of sensor data directly on a PC

- Commissioning and configuration of IO-Link sensors from your desk using a PC
- Setting and visually displaying sensor data without a PLC
- Copying parameters to several sensors

Programmable sensors	Description
AHS/AHM36 IO-Link	Absolut-Encoder
AHS/AHM36 IO-Link Inox	Absolut-Encoder
MAS	Bearingless encoders





## INTEGRATED AND SIMPLE REMOTE ACCESS

The encoders can be programmed easily over the integrated web server. To do this, a device capable of running a browser, such as a computer, laptop, tablet or HMI (human machine interface) is required for visualization. No interface-specific technical knowledge is required. The encoders can be programmed directly on the control unit via the interface or via the web browser. Combined access is also possible. The device can be replaced easily using plug and play as the encoder data is mirrored on the control unit side and can be downloaded onto the new device. The encoders also have an integrated FTP server which makes it possible to update firmware directly in the application. The new option for programming via a web browser allows people with varying levels of interface knowledge to access the encoder data, which allows for flexible implementation, service, and maintenance.

#### At a glance

- Active web server installed as a programming tool
- · Integrated FTP server
- Easy device replacement, plug and play
- No programming software required
- · Comprehensive diagnostic functions

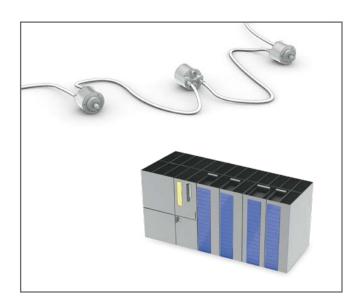
### Your benefits

- No interface-specific technical knowledge is required
- Less work required for programming and reduced frequency of errors due to simple operation
- Reduction of service and maintenance required due to preventive diagnostic evaluation
- Cost savings for storage and data management due to reduced variant diversity because it can be programmed freely

## Fields of application

 Programming absolute encoders with Ethernet-based interfaces and integrated web server functionality

Programmable sensors	Description
AFS/AFM60 EtherNet/IP	Absolute encoder





## DIRECT ACCESS VIA FIELDBUS/ETHERNET

SICK absolute encoders and inclination sensors can be programmed using the relevant engineering software and the customer control unit through the fieldbus / Ethernet / IO-Link interface without a programming unit or any additional software. It is possible to change the sensor values during the process without disconnecting the electrical connection. This means that a new sensor setting can be programmed in seconds and rapid changeover of machine properties is guaranteed. On Ethernet-based encoders and encoders with IO-Link interface, there are function blocks available which make even complex programming tasks much simpler. As a result, the work required for programming and the error rate are significantly reduced. The encoders also have various diagnostics options. An office computer, industrial computer or control unit can be used as the user interface.

## At a glance

- Flexible programming options: in the workplace or directly in assembled state
- Supports function blocks and makes complex programming tasks easier
- · Comprehensive diagnostic functions
- No programming software required, programming via control commands
- Save the sensor settings in the control unit or the industrial computer

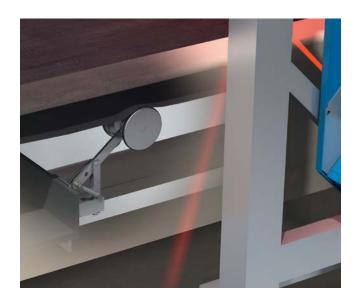
## Your benefits

- Programming without electrical and mechanical disassembly
- Less work required for programming and reduced frequency of errors due to pre-assembled function blocks
- Reduction in service and maintenance required due to preventive diagnostic evaluation
- Customer-specific programming and evaluation functions
- Cost savings for storage and data management thanks to reduced variant diversity because it can be programmed freely

#### Fields of application

 Programming encoders and inclination sensors with fieldbus and Ethernet interfaces

Programmable sensors	Description
AHS/AHM36 CANopen	Absolute encoder
AHS/AHM36 CANopen Inox	Absolute encoder
AHS/AHM36 SAE J1939	Absolute encoder
AHS/AHM36 SAE J1939 Inox	Absolute encoder
AHS/AHM36 IO-Link	Absolute encoder
AHS/AHM36 IO-Link Inox	Absolute encoder
AFS/AFM60 EtherNet/IP	Absolute encoder
AFS/AFM60 PROFINET	Absolute encoder
AFS/AFM60 EtherCAT®	Absolute encoder
A3M60 PROFIBUS	Absolute encoder
MAX® CANopen	Linear encoder
KH53 PROFIBUS	Linear encoder
TMS/TMM61 CANopen	Inclination sensors
TMS/TMM88 CANopen	Inclination sensors
TMS/TMM88 SAE J1939	Inclination sensors





## VERSATILE CONFIGURATION RIGHT AT THE ENCODER

Integrated DIP switches on SICK encoders allow for fast and direct configuration. There is no need for additional software or hardware tools to get your encoder configured and running.

## At a glance

- Encoder configuration built directly into the encoder
- Changes to the configuration will happen in real-time during operation

#### Your benefits

- Quick configuration by direct access
- No additional programming software or hardware required
- Real-time changes to the encoder during operation without idle time
- Configuration lowers storage costs due to reduced variant diversity

## Fields of application

• Ideal for fast configuration on the machine and for distributors

Programmable sensors	Description
DUS60	Incremental encoder
DUV60	Measuring wheel encoder





## **DIRECT ACCESS VIA RS-485**

SICK incremental and SSI absolute encoders can be programmed using a computer, industrial computer or a control unit supplied by the customer via the RS-485 interface. An RS-485 interface is required for communication with the encoder. It is possible to change the encoder values during the process and without disconnecting the electrical connection. This means that a new encoder setting can be programmed within seconds and rapid changeover of machine properties is guaranteed.

## At a glance

- · Programming in assembled state
- No programming software required, programming via control commands
- Save the encoder settings in the control unit or the industrial computer
- Functions are independent of the control unit manufacturer
- Switch between write mode and read mode using digital I/O card
- Connection to encoder over signal lines provided by the customer and RS-485 or RS-232 card

### Your benefits

- Programming without electrical and mechanical disassembly
- Real-time changes to the encoder properties during operation
- Optimal integration into customer-specific control environment
- Customer-specific programming and evaluation functions

## Fields of application

 Ideal for fast programming directly in the production line while processes are running, or during format adjustment

Programmable sensors	Description				
DFS60	Incremental encoder				
DFV60	Measuring wheel encoder				
DFS60 Inox	Incremental encoder				
DFS2x	Incremental encoder				
AHS/AHM36 SSI	Absolute encoder				
AHS/AHM36 SSI Inox	Absolute encoder				
AFS/AFM60 SSI	Absolute encoder				
AFS/AFM60 Inox	Absolute encoder				

SICK encoders and inclination sensors provide a wide range of programmable properties to meet your individual requirements and streamline your processes—these include resolution, electrical interfaces, offset/zero-set, and round axis functionality. The table below gives an overview of the type-specific programmable parameters.

## **ENCODER**

Encoder	Programming functions	DFS2x	DFS60	DFS60 Inox	DFV60	DUS/DUV60	AFS/AFM60 SSI	AFS/AFM60 Inox	AHS/AHM36 10-Link	AHS/AHM36 SSI	AHS/AHM36 CANopen	AHS/AHM36 SAE J1939	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 CANopen	ATM60 DeviceNet	ATM90 PROFIBUS	KH53 PROFIBUS	MAX® CANopen	MAS
	Number of lines	х	х	Х	х	Х																	
	TTL/HTL electrical interface	х	х	х	Х	Χ																	
	Zero pulse width, electrical	х	х	х	Х																		
Incremental	Zero pulse width, mechanical	х	х	х	Х																		
encoder	Signal sequence / direction of rotation	х	х	Х	Х	Х																	
	Reset to factory settings	х	Х	Х	Х																		
	Set zero pulse	х	х	х	х																		
	Singleturn scaling						Х	Х	Х	Х	х	Х	х	х	Х	х	х	Х	х	Х			
	Multiturn scaling								х	х	х	х	х	х	х	х	х	Х	х	х			
	Counting direction CW/CCW						х	Х	х	х	х	х	х	Х	х	х	Х	Х	х	х			
	Set preset value						х	Х	х	х	х	х	х	х	х	х	Х	Х	х	х			
Absolute	Speed format								Х		х	Х	х	х	Х	х	х	Х	х	Х			
encoder	Round axis functionality								х	х	х		х	х	х	х	х						
	Diagnostics								х		х		х	х	х	х							
	Reset to factory settings						х	х	х	х	Х	х	Х	х	х	х	Х	х	х	X			
	Configurable inputs and outputs								Х														
	Set preset value																				Х	х	
Linear	Counting direction																				х		
encoders	Speed format																				Х	х	
	Diagnostics																					х	
	Angle window																						х
	Pin configuration																						х
Bearingless	Diagnostics																						Х
encoders	Set preset position																						х
	Reset to factory settings																						х
	Counting direction CW/CCW																						X

## **INCLINATION SENSORS**

	Programming functions	TMS/TMM61 CANopen	TMS/TMM88 CANopen	TMS/TMM88 Analog
	Measuring range scaling			X
	Output signal scaling			X
	Axis assignment			X
	Output limitation			X
Inertial sensors	Set zero point	X	X	Х
	Digital filter settings	Х	X	Х
	Counting direction	Х	X	Х
	Reset to factory settings	x	x	x

## **NON-CONTACT MOTION SENSORS**

	Programming functions	SPEETEC 1D NCV50B programmable
	Setting resolution / length measuring step	X
	Electrical interface TTL/HTL	x
Laser surface motion sensors	Direction of movement	X
	Configurable inputs and outputs	x
	Diagnostics	x

## Description of programming functions

Number of lines Number of pulses emitted by the encoder per mechanical rotation.

TTL/HTL electrical interface Choice between TTL-compatible or HTL-compatible signal output.

Zero pulse width, electrical Width of the zero pulse (= length of the high signal) in relation to an impulse period.

Zero pulse width, mechanical Width of the zero pulse in relation to a mechanical revolution of the shaft.

Signal sequence / direction of

rotation

This function can be used to change the signal sequence:

A leads B - A comes before B when rotating in a clockwise direction and looking at the

shaft.

B leads A - B comes before A when rotating in a clockwise direction and looking at the

shaft.

Reset to factory settings All programmable values are reset to the values

that the sensor had when leaving the production plant.

Set zero pulse This function can be used to change the position of the zero pulse on a mechanical rotation

of the encoder. The zero point is assigned to the current position of the encoder. The rotary

encoder should not be rotated while the function is being executed.

Singleturn scaling Adjustability of the resolution output by the encoder per rotation.

Multiturn scaling Adjustability of the resolution output by the encoder via the number of rotations.

Counting direction CW/CCW Counting direction rising/falling.

Set preset value Sets the position value to zero or to a preset value.

Speed format Selects the appropriate speed format (e.g. rpm, rps, etc.).

The round axis functionality permits resolutions for non-integer numbers of rotations (e.g. Round axis functionality

3,600 steps at 2.75 rotations).

Diagnostics Additional data provided by the sensor (such as temperature monitoring, operating hour

counter, speed monitoring, etc.).

Set preset position Setzen des Positionswerts auf Null.

Angle window Range between two angle values (switch point 1 and switch point 2) that can be defined by

the user.

Measuring range scaling To increase the resolution, the measuring range of the inclination sensors can be individual-

ly adapted to the application within the maximum measuring range.

Output signal scaling The output signal of the analog inclination sensors is set at the factory to 4 to 20 mA or 0 to

10 V, but can also be freely programmed (value range is type-dependent).

Axis assignment The analog inclination sensors have two output channels, to which a measuring axis can be

assigned.

**Output limitation** This function can be used to define whether the output value rises further when the config-

ured limit value is reached or remains at the limit value.

The zero point of the inclination sensors can also be set as desired after the installation. In Set zero point

addition, it is possible to allocate a defined angle value to the current position.

A low-pass filter is used to stabilize the output value. The characteristic and the limit fre-Digital filter settings

quency can be configured.

Counting direction Adjustability of the plus/minus sign of the angle values.

## **Overview** PROGRAMMING FUNCTIONS AND PRODUCTS

Setting resolution / length measuring step	The resolution is defined as a measuring step in $\mu m$ between 2 edges of the 2 channels A and B and corresponds to 90 $^\circ$ electrically.
Direction of movement	If the material movement is like the arrow direction of the product description, then set forward for counting direction. If the material movement is opposite to the arrow direction, then set counting direction backwards.
Configurable inputs and outputs	Configuration of switching inputs and outputs to implement logic functions in the sensor

Technologies	Handheld		Software + computer tool				RS-485		Bus		Web server
Products	PGT-10-Pro	PGT-12-Pro	PGT-08-S	PGT-14	PGT-15	SiLink2 Master	RS-485 using a computer	RS-485 via drive/control system	Fieldbus	Ethernet	Web server
DFS2x 1)	Х		X				х	Х			
DFS60 1)	х		X				х	Х			
DFS60 Inox1)	Х		Х				х	X			
DFV60 1)	Х		Х				х	Х			
AFS/AFM60 SSI 1)	х		Х				х	х			
AFS/AFM60 Inox 1)	х		Х				х	х			
AHS/AHM36 IO-Link						х					
AHS/AHM36 SSI 1)	х		Х				х	х			
AHS/AHM36 CANopen		х							х		
AHS/AHM36 SAE J1939		х							х		
AFS/AFM60 EtherNet/IP										x	x
AFS/AFM60 PROFINET										х	
AFS/AFM60 EtherCAT®										х	
A3M60 PROFIBUS									х		
ATM60 PROFIBUS									х		
ATM60 CANopen									х		
ATM60 DeviceNet									х		
ATM90 PROFIBUS									х		
KH53 PROFIBUS									х		
MAX® CANopen									х		
MAS						х					
TMS/TMM22											
TMS/TMM61 CANopen		x							х		
TMS/TMM88 CANopen		x							Х		
TMS/TMM88 SAE J1939		Х							х		
TMS/TMM88 Analog		Х									
NCV50											

 $<sup>^{\</sup>mbox{\tiny 1)}}$  Only applies to programmable versions.

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## SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 10,400 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:

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Detailed addresses and further locations → www.sick.com

