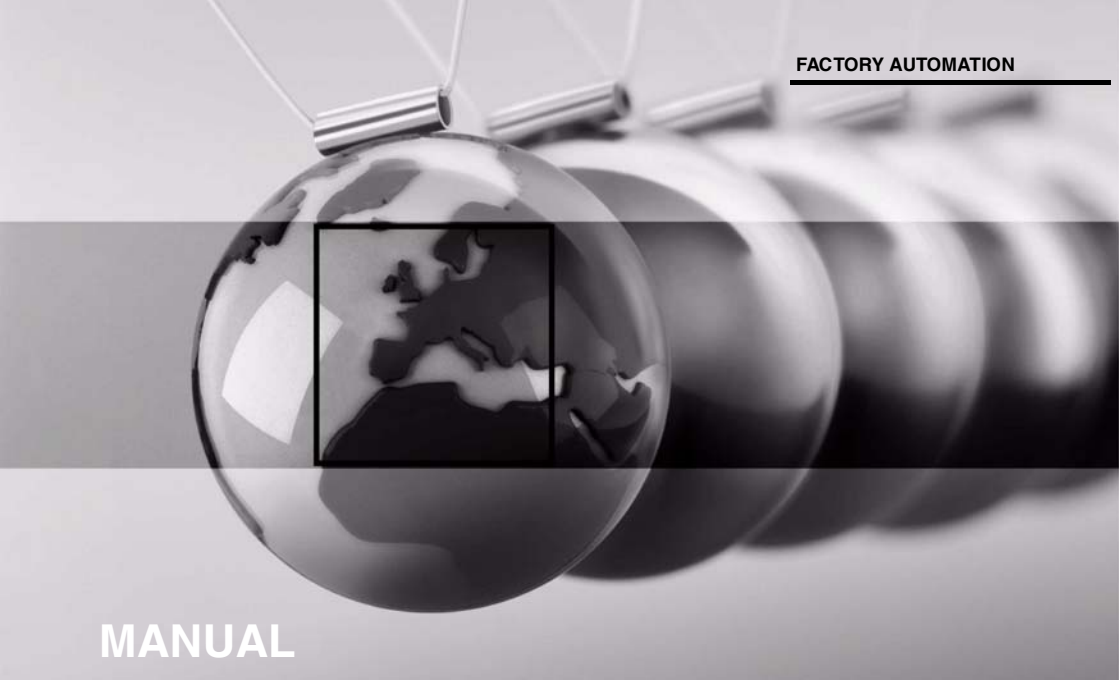

MANUAL

INX...D-F99-B16-V15
INY...D-F99-B16-V15
Inclination Sensor

PEPPERL+FUCHS
SENSING YOUR NEEDS

With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

2013-04

1 Introduction

Congratulations

You have chosen a device manufactured by Pepperl+Fuchs. Pepperl+Fuchs develops, produces and distributes electronic sensors and interface modules for the market of automation technology on a worldwide scale.

Symbols used

The following symbols are used in this manual:

Note!

This symbol draws your attention to important information.

Handling instructions

You will find handling instructions beside this symbol

Contact

If you have any questions about the device, its functions, or accessories, please contact us at:

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Lilienthalstraße 200
68307 Mannheim
Telephone: +49 621 776-4411
Fax: +49 621 776-274411
E-Mail: fa-info@pepperl-fuchs.com

2013-04

2 Declaration of conformity

2.1 CE conformity

This product was developed and manufactured under observance of the applicable European standards and guidelines.

Note!

A declaration of conformity can be requested from the manufacturer.

3 Safety

3.1 Symbols relevant to safety

Danger!
This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.

Warning!
This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.

Caution!
This symbol indicates a possible fault.

Non-observance could interrupt devices and any connected facilities or systems, or result in their complete failure.

3.2 Intended use

Inclination sensors INX...-F99-... and INY...-F99-... are used to monitor the inclination angle of the sensor from horizontal on one or two axes.

Read through these instructions thoroughly. Familiarize yourself with the device before installing, mounting, or operating.

Always operate the device as described in these instructions to ensure that the device and connected systems function correctly. The protection of operating personnel and plant is only guaranteed if the device is operated in accordance with its intended use.

3.3 General safety instructions

The plant owner is responsible for its planning, installation, commissioning, operation, maintenance and disassembly.

Installation and commissioning of all devices must be performed by a trained professional only.

User modification and or repair are dangerous and will void the warranty and exclude the manufacturer from any liability. If serious faults occur, stop using the device. Secure the device against inadvertent operation. In the event of repairs, return the device to your local Pepperl+Fuchs representative or sales office.

Note!

Disposal

Electronic waste is hazardous waste. When disposing of the equipment, observe the current statutory requirements in the respective country of use, as well as local regulations.

2013-04

4 Product Description

4.1 Use and application

Type INX...-F99-B16-V15 and INY...-F99-B16-V15 inclination sensors are used to measure the inclination angle from horizontal up to a full angle range of 360°, depending on the particular version. Type INX... inclination sensors are single-axis measuring systems and type INY... sensors are twin-axis measuring systems. Parameterization and data transfer take place via the integrated CANopen interface.

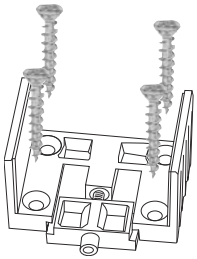
5 Installation

5.1 Mounting

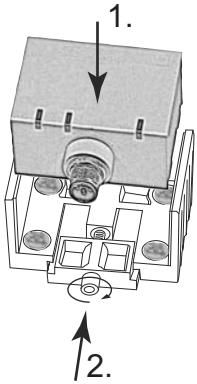
Inclination sensors from the -F99 series consist of a sensor module and accompanying cast aluminum housing. Select a flat surface with minimum dimensions of 70 mm x 50 mm to mount the sensor.

Mount the sensor as follows:

1. Loosen the central screw under the sensor connection.
2. Slide back the clamping element until you are able to remove the sensor module from the housing.
3. Remove the sensor module from the housing.
4. Position the housing at the required mounting location and secure using four countersunk screws. Make sure that the heads of the screws do not protrude.



5. Place the sensor module in the housing (1.). Slide the clamping element flush into the housing. Check that the sensor element is seated correctly.



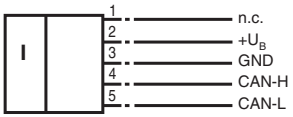
6. Then tighten the central screw under the sensor connection (2.).

   ↳ The inclination sensor INX(Y)...-F99... is now mounted correctly.

2013-04

5.2 Electrical connection

The power supply to the inclination sensor INX(Y)...D-F99-B16-V15 is connected via the 5-pin plug connector, M12 x 1. If a terminator is required, it must be attached externally using a T-piece see chapter 9.1.



Pin	Wire color	Designation
1	-	Not used
2	red	+UB
3	black	GND
4	white	CAN-H
5	blue	CAN-L

Table 5.1 Connector assignment

Note!

The wire colors listed above apply when one of the bus cables from the Pepperl+Fuchs accessories range see chapter 9.1 is used.

Caution!

Damage to the device

Connecting an alternating current or excessive supply voltage can damage the device or cause the device to malfunction.

Electrical connections with reversed polarity can damage the device or cause the device to malfunction.

Connect inclination sensor to direct current (DC). Ensure that the supply voltage rating is within the specified sensor range. Ensure that the connecting wires on the cordset in use are connected correctly.

Connecting the inclination sensor to the voltage

Connect the operating voltage to pins 2 and 3 of the 5-pin connector.

↳ The "Power" LED lights up green.

5.3 LED displays

The inclination sensor has three indicator LEDs that allow rapid visual monitoring.

- The green **power** LED indicates the state of the power supply
- The yellow **run** LED indicates the bus and sensor status
- The red **err** LED indicates an error

power (green)	run (yellow)	err (red)	Meaning
Off	Off	Off	No power supply
On	Flashing constantly	Off	Pre-operational
On	1x flashing	Off	Stopped
On	On	Off	Operational
On	Off	On	CAN bus off
On	depending on bus status	1x flashing	Warning, e.g., outside measuring range
On	depending on bus status	2x flashing	Error, e.g., EEPROM checksum incorrect
Flashing constantly	Off	On	Undervoltage

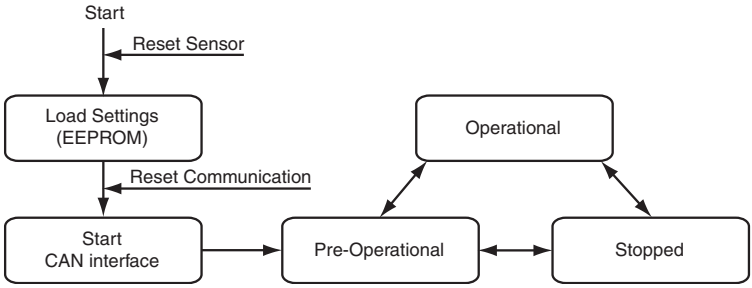
6 Commissioning

6.1 NMT Manager

The CANopen standard CiA301 specifies three possible states for the sensor node.

- Pre-operational
- Operational
- Stopped

The node can be set to any of these states as required. When activated, a sensor always starts in pre-operational state and issues a startup message.



Example of a startup message sent by the sensor:

709h	00h	xxh	xxh	xxh	xxh	xxh	xxh	xxh
CAN-ID	Status	not used						
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 709h, status message of node with node number 9
Status: 00h, sensor started

Pre-operational
PDO messages (process data) cannot be sent in pre-operational state, which is why it is used to parameterize the sensor or indicate a standby state.
Operational
Operational state is used to perform all communication services as well as replace process data during operation.
Stopped
In stopped state, only NMT messages (network management) can be issued. Redundant or defective sensors can be isolated from the bus almost completely in this state.

The master or network manager can issue NMT messages to prompt the sensor to change from one state to another. Other NMT functions include two reset commands for resetting the entire sensor or bus communication only.

Example of a NMT message sent by the master:

000h	80h	09h	xxh	xxh	xxh	xxh	xxh	xxh
CAN-ID	Command	Node	not used					
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 000h, NMT message from the master
Command: 80h, switch to pre-operational state
Command: 02h, switch to stopped state
Command: 01h, switch to operational state
Command: 82h, reset communication
Command: 81h, reset sensor
Node: 01h - 7Fh, to activate nodes 1…127 individually
Node: 00h, to activate all nodes in the network simultaneously

6.2 Node ID setting

Inclination sensors by Pepperl+Fuchs are supplied with node ID 1. To change the node ID, write the new node ID to object 2000h “Node ID.” If a “Reset sensor” command is issued via an NMT message or the power supply is interrupted, the sensor operates with the new node ID. Node ID values between 1 and 127 can be sent in hexadecimal format (01h ... 7Fh). Invalid values are not adopted. In this case, the current setting is retained.

Example of modifying node ID from 1 to 15:

601h	2Fh	00h	20h	00h	0Fh	xxh	xxh	xxh
CAN-ID	Com-mand	Object index		Sub-index	New ID	not used		
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 601h, SDO1 channel of node 1
Command: 2Fh, write object, 1 byte of usable data
Object index: 2000h, note: low byte first, then high byte!
Subindex: 00h
New ID: 0Fh, only values between 01h ... 7Fh (1 ... 127) permitted

2013-04

6.3 Baud rate setting

Inclination sensors by Pepperl+Fuchs are supplied with a baud rate of 250 kbit/s. To change the baud rate, write the new baud rate to object 2001h “Baud rate.” If a “Reset sensor” command is issued via an NMT message or the power supply is interrupted, the sensor operates at the new baud rate. The inclination sensor supports various baud rates. Invalid values are not adopted. In this case, the current setting is retained.

Example of modifying the baud rate from 250 kbit/s to 1 Mbit/s:

601h	2Fh	01h	20h	00h	08h	xxh	xxh	xxh
CAN-ID	Com-mand	Object index		Sub-index	New baud rate	not used		
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 601h, SDO1 channel of node 1
Command: 2Fh, write object, 1 byte of usable data
Object index: 2001h, note: low byte first, then high byte!
Subindex: 00h
New baud rate: 08h, for 1 Mbit/s
New baud rate: 07h, for 800 kbit/s
New baud rate: 06h, for 500 kbit/s
New baud rate: 05h, for 250 kbit/s
New baud rate: 04h, for 125 kbit/s
New baud rate: 03h, for 100 kbit/s
New baud rate: 02h, for 50 kbit/s
New baud rate: 01h, for 20 kbit/s
New baud rate: 00h, for 10 kbit/s

7 Operation and communication

Inclination sensors from Pepperl+Fuchs use the CANopen profile for CiA410 inclination sensors.

7.1 CANopen standard functions

7.1.1 The process data object (PDO)

A maximum of 8 bytes of useable data can be sent in each message using the process data object (PDO). This feature is only available in operational state and can be activated in different modes that were set using the objects 1800h “PDO 1 parameter” and 1A00h “PDO 1 mapping.” The PDO message can be sent automatically with each new value, each nth SYNC message or via RTR message on request. It is also possible to define a minimum time between two PDO messages. The CAN identifier for this feature, which is defined as 180h + node ID by default, can also be modified.

Example of a PDO1 message for a type INY360D-F99-B16-V15 inclination sensor:

185h	25h	05h	08h	09h	xxh	xxh	xxh	xxh
CAN-ID	Angle in X direction		Angle in Y direction		not used			
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 185h, PDO1 channel for node 5
Angle in X direction: 0525h, corresponds to 131.7°, note: low byte first, then high byte!
Angle in Y direction: 0908h, corresponds to 231.2°, note: low byte first, then high byte!

Example of modifying the transfer method for the PDO1 message:

601h	2Fh	00h	18h	02h	FDh	xxh	xxh	xxh
CAN-ID	Command	Object index		Subindex	New value	not used		
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 601h, SDO1 channel of node 1
Command: 2Fh, write object, 1 byte of usable data
Object index: 1800h, note: low byte first, then high byte!
Subindex: 02h, transfer method
New value: 01h ... F0h, send for each 1st ... 240th SYNC message
New value: FDh, send to RTR message only
New value: FFh, send after each calculation

2013-04

Note!

A change of the transmission type with object 1800, Sub02h causes a change in the current operation. If the change shall be retained even after a reset, the transmission type selection has to be carried out in the object 2002.

Example of modifying minimum time between two PDO1 messages:

601h	2Bh	00h	18h	03h	10h	27h	xxh	xxh
CAN-ID	Com-mand	Object index		Sub-index	New value		not used	
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 601h, SDO1 channel of node 1
Command: 2Bh, write object, 2 bytes of usable data
Object index: 1800h, note: low byte first, then high byte!
Subindex: 03h, disable time between two PDO1 messages
New value: 2710h, disable time in 100 µs, 1 second here

7.1.2 The service data object (SDO)

Pepperl+Fuchs inclination sensors are supplied with service data channel 1 as required by CiA301. The channel is preset permanently to CAN IDs 580h + node ID for sending and 600h + node ID for receiving. A maximum of four bytes of usable data can be transmitted in a single message. Larger quantities of data are divided among several messages.

Example of writing an object with max. 4 bytes of data:

601h	2Bh	xxh	xxh	xxh	xxh	xxh	xxh	xxh
CAN-ID	Com-mand	Object index		Sub-index	Usable data			
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 601h, SDO1 channel of node 1
Command: 2Fh, write object, 1 byte of usable data
Command: 2Bh, write object, 2 bytes of usable data
Command: 27h, write object, 3 bytes of usable data
Command: 23h, write object, 4 bytes of usable data

Example of reading an object with max. 4 bytes of data:

601h	40h	xxh	xxh	xxh	xxh	xxh	xxh	xxh
CAN-ID	Com-mand	Object index		Sub-index	not used			
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 601h, SDO1 channel of node 1
Command: 40h, read object, 1 ... 4 bytes of usable data

Note!

If larger packets are to be transmitted, then the SDO may also be transmitted as a sequence of blocks. See CiA 301, "block transfer" or "segmented transfer".

7.2 CANopen fault and safety functions

The inclination sensor includes heartbeat and node guarding safety functions along with standard emergency messages. With the heartbeat function, the sensor sends status messages automatically at definable intervals. Other nodes or the master can identify a node error immediately by detecting that status messages are missing. The heartbeat function can also be used in networks without masters. With node guarding, however, the master sends a Remote Transmission Request (RTR) to individual nodes asking for the provision of a status message and is, therefore, indispensable. If a status message exceeds a specified time period or remains completely deactivated, it can be assumed that a node error has occurred similar to those that occur with the heartbeat function. The node also expects to receive RTR messages from the master at regular intervals and can identify errors in the master as a result.

7.2.1 Error messages

Error messages are sent via the CAN identifier 080h+ node number as standard. This setting can be modified using object 1014h “COB-ID emergency” in the object directory of the sensor.

Example of an error message sent by the inclination sensor:

089h	10h	50h	11h	xxh	xxh	xxh	xxh	xxh
CAN-ID	Error code		Error field	not used				
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 089h, error message of node with node number 9
Error code: 5010h, error code from CiA410, measurement range of X level exceeded
Error field: 11h, corresponds with the error code stored in the object 1000h

Table of supported error codes:

Error code	Meaning
3081h	Node guarding master error
3100h	Undervoltage detection
5010h	Measurement over range, X level (CiA410)
5020h	Measurement over range, Y level (CiA410)
61xxh	Software error, second byte contains further details
6300h	EEPROM checksum error

2013-04

7.2.2 The heartbeat function

The interval after which status messages are sent can be preset via the object 1017h “Producer heartbeat time”. The function is deactivated if the entry is 0. Every other 32-bit value determines the heartbeat interval in milliseconds.

Example of writing an object with max. 4 bytes of data:

709h	04h	xxh	xxh	xxh	xxh	xxh	xxh	xxh
CAN-ID	Status	not used						
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 709h, status message of node with node number 9
Status: 7Fh, sensor in “pre-operational” state
Status: 04h, sensor in “stopped” state
Status: 05h, sensor in “operational” state

7.2.3 The node guarding function

The objects 100Ch "Guarding time" and 100Dh "Life time factor" are available in the object directory to control the node guarding function. The guarding time indicates the maximum response time of the sensor after the Remote Transmit Request (RTR) message is received. If this time is exceeded, the master detects a sensor error. To calculate the interval time during which the sensor waits for the RTR messages, multiply the guard time by the life time factor. If the sensor detects a master error, it issues an error message with the error code 3081h and switches to "pre-operational" state. For additional safety, the system toggles to the highest bit in the "status" byte for every status message.

Example of a RTR message sent by the master:

709h	xxh	xxh	xxh	xxh	xxh	xxh	xxh	xxh
CAN-ID	not used							
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 709h, RTR message to the node with node number 9

Note!

The RTR bit must be set in the header of the CAN telegram!

Example of a node guard status message sent by the inclination sensor:

709h	04h	xxh	xxh	xxh	xxh	xxh	xxh	xxh
CAN-ID	Status	not used						
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 709h, status message of node with node number 9
Status: 7Fh ... FFh, sensor in “pre-operational” state
Status: 04h ... 84h, sensor in “stopped” state
Status: 05h ... 85h, sensor in “operational” state

7.3 CANopen profile-specific functions

Inclination sensors from Pepperl+Fuchs use the CANopen profile for CiA410 inclination sensors. In addition to the defined object directory tree from address 6000h, this profile offers alternative methods of specifying the zero point, direction of rotation and offset. The inclination angle is stored in the respective objects 6010h and 6020h as a 16-bit value with one decimal point and sent via PDO message.
Sequence of calculation steps, if used:
Change in direction of rotation through 360-x
Zero point shift by adding the offset [6013 or 6023]
Addition of extra offset [6014 or 6024]

7.3.1 Direction of rotation and scaling

The relevant direction of rotation and scaling are controlled via bits in object 6011h "Operating mode X" for the X value and object 6021h "Operating mode Y" for the Y value. Bit 0 represents the direction of rotation and bit 1 the activation of scaling functions such as zero point and additional offset.

Example of modifying the direction of rotation and scaling:

601h	2Fh	11h	60h	00h	02h	xxh	xxh	xxh
CAN-ID	Com-mand	Object index		Sub-index	New value	not used		
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 601h, SDO1 channel of node 1
Command: 2Fh, write object, 1 byte of usable data
Object index: 6011h, operating mode X, note: low byte before high byte!
Subindex: 00h, operating mode X, note: low byte before high byte!
New value: 00h, original direction of rotation and scaling deactivated
New value: 01h, reverse direction of rotation and scaling deactivated
New value: 02h, original direction of rotation and scaling activated
New value: 03h, reverse direction of rotation and scaling activated

7.3.2 Zero point

To set the zero point, the sensor must be turned to the required position and the zero value written to the object 6012h "Zero point X" or 6022h "Zero point Y". The sensor calculates the required zero point offset and transfers this value to object 6013h or 6023h. If bit 1 for activating the scaling is set in object 6011h or 6021h, the offset is added to the respective angle. This process can also be performed using target values that deviate from zero and fall within the range 0…359.9°.

Example of modifying the zero point:

601h	2Bh	12h	60h	00h	00h	00h	xxh	xxh
CAN-ID	Com-mand	Object index		Sub-index	New target value		not used	
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 601h, SDO1 channel of node 1
Command: 2Bh, write object, 2 bytes of usable data
Object index: 6012h, zero point X, note: low byte before high byte!
Subindex: 00h, operating mode X, note: low byte before high byte!
New target value: 00h, target angle in current position 0…359.9°

7.3.3 Additional offset

Another feature is that an additional offset from object 6014h "Additional offset X" or object 6024h "Additional offset Y" can be added to the angle value. A prerequisite is the activation of scaling in object 6011h or 6021h. The applicable value range here is -359.9°…359.9°.

Note!

Negative values according to 65536 - x

Example of modifying an additional offset:

601h	2Bh	14h	60h	00h	38h	FFh	xxh	xxh
CAN-ID	Com-mand	Object index		Sub-index	New offset		not used	
	Data byte 1	Data byte 2	Data byte 3	Data byte 4	Data byte 5	Data byte 6	Data byte 7	Data byte 8

CAN ID: 601h, SDO1 channel of node 1
Command: 2Bh, write object, 2 bytes of usable data
Object index: 6014h, additional offset X, note: low byte before high byte!
Subindex: 00h
new target value: FF38h, corresponds to -20.0°, valid range -359.9°…359.9°

8 Object directory

8.1 Standard network objects

Index	Sub-index	Parameter	Data type	Access[1)]	Default value	Description
1000h	00h	Device profile and type	unsigned 32	ro	0001019Ah	Byte 0/1: Device profile 410 Byte 2/3: Device type corr. profile
1001h	00h	Error register	unsigned 8	ro	0	
1005h	00h	COB-ID SYNC message	unsigned 32	r/w	80h	Address of SYNC message
1008h	00h	Manufacturer product name	string	Const.	P+F inclination	max. 15 characters
1009h	00h	Manufacturer hardware version	string	Const.	Hard rev. V1.0	
100Ah	00h	Manufacturer software version	string	Const.	Soft rev. V1.0	
100Ch	00h	Guard time	unsigned 16	r/w	0	Multiple of 1ms master query interval
100Dh	00h	Lifetime factor	unsigned 8	r/w	0	max. response time of the slaves Guard time * lifetime factor
1014h	00h	COB-ID emergency	unsigned 32	r/w	80h + NID	Address of error message
1017h	00h	Producer heartbeat time	unsigned 16	r/w	0	Interval time, multiple of 1ms 0 deactivated
1018h	Identity object					
	00h	Highest subindex	-	ro	4	
	01h	Manufacturer ID	unsigned 32	ro	000000ADh	P+F, listed with the CiA
	02h	Product code	unsigned 32	ro	Article number	#212421 (INY), #212422 (INX)
	03h	Revision number	unsigned 32	ro	1	
	04h	Series number	unsigned 32	ro	xxxxxx	individual
1200h	Server SDO					
	00h	Highest subindex	-	ro	2	
	01h	Server SDO (receive)	unsigned 32	ro	600 + NID	
	02h	Server SDO (send)	unsigned 32	ro	580 + NID	

Index	Sub-index	Parameter	Data type	Access[1]	Default value	Description
1800h	Send PDO 1 communication parameters					
	00h	Highest subindex	-	ro	5	
	01h	COB-ID	unsigned 32	r/w	180 + NID	
	02h	Transfer method	unsigned 8	r/w	1	1…240: every nth SYNC message 253: RTR 255: event-related transmission
	03h	Disable time between two PDOs	unsigned 16	r/w	0	Multiple of 100 µs
	04h	Reserved	-	-	-	-
	05h	Interval time cyclic transmissio n	unsigned 16	r/w	0	Multiple of 1 ms
1A00h	Send PDO 1 mapping					
	00h	Highest subindex	unsigned 8	r/w	1 or 2	INX or INY
	01h	Inclination value X	unsigned 32	r/w	60 10 00 10h	
	02h	Inclination value Y	unsigned 32	r/w	60 20 00 10h	only with INY

[1] ro: read only, r/w: read/write, const: constant value

8.2 Manufacturer-specific objects

Index	Sub-index	Parameter	Data type	Access[1]	Default value	Description
2000h[2]	00h	Node ID (NID)	unsigned 8	r/w	1	1 ... 127
2001h[2]	00h	Baud rate	unsigned 8	r/w	2	1: 125kBit/s 2: 250kBit/s 4: 500kBit/s 8: 1MBit/s
2002h[2]	00h	Transmissio n type, start setting	unsigned 8	unsigned 8	1	Sets the value of Index 1800, Subindex 02h for device start-up.
5FFDh	00h	Manufactur er input	area [36]	r/w	0	for firmware update
5FFFh	00h	Manufactur er input	area [4]	r/w	0	for test purposes

[1] ro: read only, r/w: read/write, const: constant value

[2] Object is stored permanently

8.3 Profile-specific objects

Index	Sub-index	Parameter	Data type	Access[1)]	Default value	Description
6000h	00h	Angle resolution	unsigned 16	ro	100	Multiple of 0.001°
6010h	00h	Inclination value X	int 16	ro	-	
6011h[2)]	00h	Operating mode X	unsigned 8	r/w	00h	Bit0: Direction of rotation reversal Bit 1: Activate zero point shift
6012h	00h	Zero point shift X	int 16	r/w	00h	Target value for current position
6013h[2)]	00h	Calculated offset value X	int 16	ro	00h	Offset for zero point shift
6014h[2)]	00h	Additional offset value X	int 16	r/w	00h	
6020h	00h	Inclination value Y	int 16	ro	-	INY only:
6021h[2)]	00h	Operating mode Y	unsigned 8	r/w	00h	INY only: Bit0: Direction of rotation reversal Bit 1: Activate zero point shift
6022h	00h	Zero point shift Y	int 16	r/w	00h	INY only: Target value for current position
6023h[2)]	00h	Calculated offset value Y	int 16	ro	00h	INY only: Offset for zero point shift
6024h[2)]	00h	Additional offset value Y	int 16	r/w	00h	INY only:

[1)] ro: read only, r/w: read/write, const: constant value

[2)] Object is stored permanently

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9 Appendix

9.1 Accessories

Compatible accessories offer enormous savings potential. Not only do you save a great deal of time and work when commissioning, but also when replacing and servicing the sensors.

If harsh external environmental conditions prevail, appropriate Pepperl+Fuchs accessories can extend the service life of the products used.

Connection accessories

Order code	Article number	Description
V15-G-2M-PUR-CAN-V15-G	194114	Bus cable CANOpen, M12 x 1 to M12 x 1, 5-pin PUR cable, length: 2 m
V15-G-5M-PUR-CAN-V15-G	194115	Bus cable CANOpen, M12 x 1 to M12 x 1, 5-pin PUR cable, length: 5 m
V15-G-10M-PUR-CAN-V15-G	194116	Bus cable CANOpen, M12 x 1 to M12 x 1, 5-pin PUR cable, length: 10 m
V15S-T-CAN/DN-V15	191661	T-distributor, M12 connector to M12 plug/connector
ICZ-TR-CAN/DN-V15	191662	Terminator for CANopen

FACTORY AUTOMATION – SENSING YOUR NEEDS

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