

## MANUAL

**INX\*\*\*DH-F199-B30-\*\*\***  
**INY\*\*\*DH-F199-B30-\*\*\***  
with MODBUS RTU Interface



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"

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# 1 Introduction

## 1.1 Content of this Document

This document contains information required to use the product in the relevant phases of the product life cycle. This may include information on the following:

- Product identification
- Delivery, transport, and storage
- Mounting and installation
- Commissioning and operation
- Maintenance and repair
- Troubleshooting
- Dismounting
- Disposal



**Note!**

For full information on the product, refer to the further documentation on the Internet at [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).

The documentation comprises the following parts:

- This document
- Datasheet

In addition, the documentation may comprise the following parts, if applicable:

- EU-type examination certificate
- EU declaration of conformity
- Attestation of conformity
- Certificates
- Control drawings
- Instruction manual
- Other documents

## 1.2 Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismounting lies with the plant operator.

Only appropriately trained and qualified personnel may carry out mounting, installation, commissioning, operation, maintenance, and dismounting of the product. The personnel must have read and understood the instruction manual and the further documentation.

Prior to using the product make yourself familiar with it. Read the document carefully.

### 1.3 Symbols Used

This document contains symbols for the identification of warning messages and of informative messages.

#### Warning Messages

You will find warning messages, whenever dangers may arise from your actions. It is mandatory that you observe these warning messages for your personal safety and in order to avoid property damage.

Depending on the risk level, the warning messages are displayed in descending order as follows:



***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 the device and any connected systems and plants, or result in their complete failure.

#### Informative Symbols



***Note!***

This symbol brings important information to your attention.



**Action**

This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.

### 1.4 Intended Use

INX\*\*\*DH-F199-B30-\*\*\* and INY\*\*\*DH-F199-B30-\*\*\* series inclination sensors detect and measure the tilt angle of an object in relation to the force of gravity and provide inclination data via a MODBUS RTU interface.

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.

## 1.5 General Safety Notes

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismantling lies with the plant operator.

Installation and commissioning of all devices may only be performed by trained and qualified personnel.

The device is only approved for appropriate and intended use. Ignoring these instructions will void any warranty and absolve 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.

## 1.6 Declaration of 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.

The product manufacturer, Pepperl+Fuchs GmbH, D-68307 Mannheim, has a certified quality assurance system that conforms to ISO 9001.



## 2 Product Description

### 2.1 Use and Application

INX\*\*\*DH-F199-B30-\*\*\* and INY\*\*\*DH-F199-B30-\*\*\* series inclination sensors detect and measure the tilt angle (inclination/slope/elevation) of an object in relation to the force of gravity. The basic principle behind these inclination sensors is a microelectromechanical systems (MEMS) sensor cell that is embedded in a fully molded application-specific integrated circuit (ASIC). The angle is measured by the relative change in electrical capacitance in the MEMS cell.

INX\*\*\*DH-F199-B30-\*\*\* sensors are 1-axis sensors that detect and measure the tilt around the x-axis.

INY\*\*\*DH-F199-B30-\*\*\* sensors are 2-axis sensors that detect and measure the tilt around the x-axis and the y-axis.

Communication with the inclination sensors, such as configuration and data output, occurs via a MODBUS RTU interface.

#### MODBUS RTU Interface

MODBUS RTU is an open serial (RS-232 or RS-485) protocol that is based on master/slave architecture. It is a widely accepted protocol due to its ease of use and reliability. MODBUS RTU messages are simple and, therefore, reliable. Due to this simplicity, the basic 16-bit MODBUS RTU register structure can be used to pack in floating point, tables, ASCII text, queues, and other unrelated data.

The MODBUS application protocol defines a simple protocol data unit (PDU) independent of the underlying communication layers: The mapping of MODBUS protocol on a specific bus or network introduces some additional fields on the PDU. The client that initiates a MODBUS transaction builds the MODBUS PDU and then adds fields to build the appropriate communication PDU.

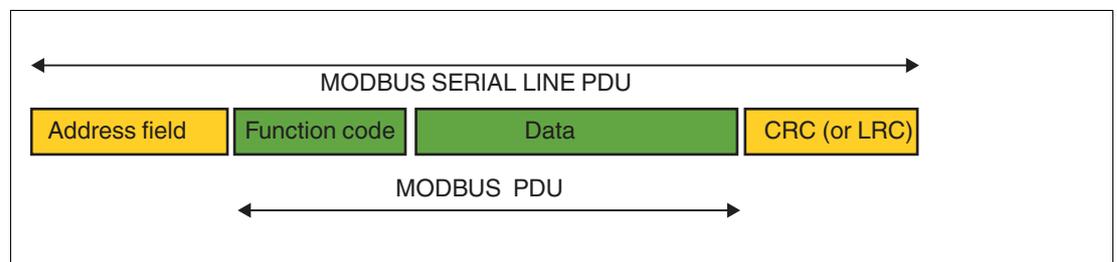


Figure 2.1

On the MODBUS serial line, the address field only contains the slave address. The valid slave node addresses are in the range of 0 ... 247 decimal. The individual slave devices are assigned addresses in the range of 1 ... 247. A master addresses a slave by placing the slave address in the address field of the message. When the slave returns its response, it places its own address in the response address field to let the master know which slave is responding

### 2.2 Accessories

Various accessories are available. See datasheet or relevant product page on the Internet [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com).



## 3 Installation

### 3.1 Instructions for Mechanical and Electrical Installation

Observe the following instructions to ensure safe operation of the inclination sensor:

**Warning!**

Work must only be performed by trained and qualified personnel.

Commissioning and operation of this electrical equipment must only be performed by trained and qualified personnel. This means individuals who are qualified to commission (in accordance with safety technology), connect to ground, and label devices, systems, and circuits.

**Warning!**

Only perform work when the system is in a de-energized state.

De-energize your device before performing work on the electrical connections. Short circuits, voltage peaks, and similar events can lead to faults and undefined statuses. This presents a significant risk of personal injury and property damage.

**Warning!**

Check electrical connections before switching on the system.

Check all electrical connections before switching on the system. Incorrect connections present a significant risk of personal injury and property damage. Incorrect connections can lead to malfunctions.

**Caution!**

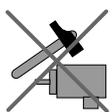
Do not remove the housing.

Do not remove the sensor housing under any circumstances, as damage and contamination can occur as a result of taking improper action.

**Caution!**

Do not perform any electrical modifications.

It is not permitted to perform electrical modifications on the inclination sensor. If you open or modify the device yourself, not only are you endangering yourself and others but you will also void any warranty and absolve the manufacturer of any liability.



Do not allow the inclination sensor to fall or be exposed to mechanical load.



Do not make any alterations to the housing of the inclination sensor.

### 3.2 Mounting Instructions

The inclination sensors are pre-calibrated devices that can be put into immediate operation following easy installation with a three point mount. The mounting surface must be flat and free of dust and grease.

Depending on the sensor model, pay attention to the correct orientation of the sensor for inclination measurement when mounting.

The following figures show the correct axis orientation for each model.

#### INX\*\*\*DH-F199-B30-\*\*\*



Figure 3.1 1-axis sensor

The figure shows the correct axis orientation for a 1-axis sensor with one connector. There are also models with two connectors.

#### INY\*\*\*DH-F199-B30-\*\*\*

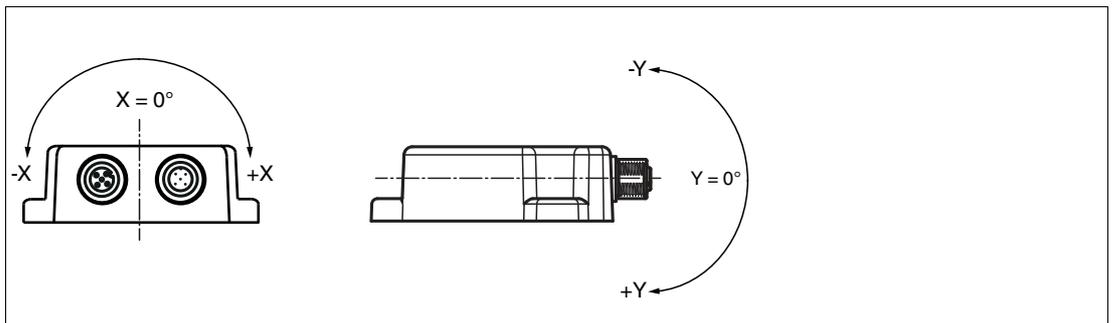


Figure 3.2 2-axis sensor

The figure shows the correct axis orientation for a 2-axis sensor with two connectors. There are also models with one connector.

#### Fastening with Screws

We recommend hexagon head screws with M6 or UNC 1/4 for the best possible and most secure mounting. Use all three screws for mounting. Restrict the tightening torque to the range of 10 Nm  $\pm$  10 % for the screws. The M12 connectors are to be perfectly aligned and screwed to the end with a tightening torque in the range of 0.4 ... 0.6 Nm. Use all three screws for mounting, and use the same tightening torque for all the screws.

### 3.3 Electrical Connection

The sensors are connected via M12 x 1, 5-pin connectors with MODBUS RTU. There are sensor models with one connector (V15) or two connectors (2V15).

One-connector sensors have a male connector.

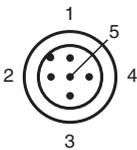
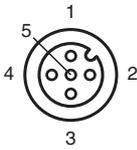
Signal	Bus In Pin	Bus Out Pin
n. c.	1	1
+ U <sub>b</sub>	2	2
GND	3	3
RS485 A +	4	4
RS485 B -	5	5
Pinout		

Table 3.1



**Warning!**

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 the 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 sensor to voltage**

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

### 3.4 Configuring/Connecting the Terminator

To ensure a secure signal transfer, both ends within a MODBUS RTU segment must be closed with a 120 Ω terminator. If the inclination sensor is installed at the beginning or the end of the MODBUS RTU, a terminator must be used. The inclination sensor is equipped with a built-in terminator to be activated/deactivated by setting the correct register (See chapter 4.4). It is also possible to use an external terminator, which can be more suitable in some cases.

The bus wires can be routed in parallel or twisted, with or without shielding, in accordance with the electromagnetic compatibility requirements. A single-line structure minimizes reflection.

## 4 MODBUS RTU Device Registers and Codes

INX\*\*\*DH-F199-B30-\*\*\* and INY\*\*\*DH-F199-B30-\*\*\* series sensors are flexible devices. All parameters are programmable via a MODBUS master. This enables remote configuration.

This chapter consists of 2 major parts. One describing the methodology for putting an inclination sensor into operation and the other for programming an inclination sensor.

### 4.1 Communication Settings for Setup

Description	Value
Baud Rate	19200
Device Address	7Fh (127d)
Parity/Stop Bits	Even/1 Stop-Bit
Data Format	8 Bit Binary

Table 4.1

### 4.2 Function Codes

Function codes are used to access the various registers. The codes supported by the inclination sensors are as follows:

Function	Type	Hex Value	Error Code (Exception Codes)
Read Holding Register	Public	03h	83h (01/02/03/04)
Write Multiple Register	Public	10h	90h (01/02/03/04)
Write (Manufacturer Specific)	User Defined	44h	C4h (01/02/03/04)
Read (Manufacturer Specific)	User Defined	45h	C5h (01/02/03/04)
Read Device ID	Diagnostic	2Bh/0Eh	ABh (01/02/03/04)

Table 4.2

### 4.3 Device-Specific Registers



**Note!**

The following table describes the device-specific registers. Note that INX\*\*\*DH-F199-B30-\*\*\* is a 1-axis measuring inclination sensor (x-axis) and INY\*\*\*DH-F199-B30-\*\*\* is a 2-axis measuring inclination sensor (x-axis, y-axis)

Note that data format of register "Current Position Value Lower/Higher Register (x-Axis)" depends on the sensor type. INX\*\*\* sensors have data format "unsigned" and INY\*\*\* sensors have data type format "signed".

Register Name	Register Offset	Access	Function Code	Data Byte	Description and Values	Default
Current Position Value Higher Register (x-Axis)	0000h	RO	03h	16 bits signed (only INY***) 16 bits unsigned (only INX***)	You can read this value as current the position value	–
Current Position Value Lower Register (x-Axis)	0001h	RO	03h	16 bits signed (only INY***) 16 bits unsigned (only INX***)	You can read this value as current the position value	–
Current Position Value Higher Register (y-Axis)	0002h	RO	03h	16 bits signed	You can read this value as current the position value	–
Current Position Value Lower Register (y-Axis)	0003h	RO	03h	16 bits signed	You can read this value as current the position value	–
Preset Value Higher Register (x-Axis)	0004h	R/W	03h/ 10h	16 bits signed	You can write a 0 or current value here to make the current value your preset point	0000h
Preset Value Lower Register (x-Axis)	0005h	R/W	03h/ 10h	16 bits signed	You can write a 0 or current value here to make the current value your preset point	0000h
Preset Value Higher Register (y-Axis)	0006h	R/W	03h/ 10h	16 bits signed	You can write a 0 or current value here to make the current value your preset point	0000h
Preset Value Lower Register (y-Axis)	0007h	R/W	03h/ 10h	16 bits signed	You can write a 0 or current value here to make the current value your preset point	0000h
Resolution	0008h	R/W	03h/10h	16 bits	Resolution of Position Value Values 0 = 0.001°, 1 = 0.01°, 2 = 0.1°, 3 = 1°	0001h
Measurement Direction	0009h	R/W	03h/ 10h	16 bits	Using this you can invert the counting direction <ul style="list-style-type: none"> <li>■ both axis CW: 0</li> <li>■ x-axis CCW: 1</li> <li>■ y-axis CCW: 2</li> <li>■ both axis CCW: 3</li> </ul>	0000h

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Register Name	Register Offset	Access	Function Code	Data Byte	Description and Values	Default
Offset Value Higher Register (x-Axis)	000Ah	RO	03h	16 bits signed	Read the offset value = Physical position - set position	–
Offset Value Lower Register (x-Axis)	000Bh	RO	03h	16 bits signed	Read the offset value = Physical position - set position	–
Offset Value Higher Register (y-Axis)	000Ch	RO	03h	16 bits signed	Read the offset value = Physical position - set position	–
Offset Value Lower Register (y -Axis)	000Dh	RO	03h	16 bits signed	Read the offset value = Physical position - set position	–
Moving Average Filter Length	000Eh	R/W	03h/ 10h	16 bits	The Moving Average Filter length accepts only 2n values. E.g. 4, 8, 16, 32, 64, 128, 256. If the input number isn't a 2n number, the next lower 2n number will be taken	0040h (64d)

Table 4.3

### Example of Write Process

Write preset value for x– and y–axis

Request ( Command)		Response	
Name	Value	Name	Value
Device Address	7Fh	Device Address	7Fh
Function Code	10h	Function Code	10h
Starting Register Address	0004h	Starting Register Address	0004h
Number of Register	0004h	Number of Register	0004h
Number of Bytes	0008h	CRC	xxxxh
Data to be Written reg 1	0000h		
Data to be Written reg 2	0500h		
Data to be Written reg 3	0000h		
Data to be Written reg 4	0000h		
CRC	xxxxh		

Table 4.4

### Example of Read Process

Position value for 2-axis inclination sensor

Request (Command)		Response	
Name	Value	Name	Value
Device Address	7Fh	Device Address	7Fh
Function Code	03h	Function Code	03h
Starting Register Address	0000h	Byte Count	8h
Number of Register	0004h	Register 0 Value	0004h
CRC	xxxxh	Register 1 Value	1234h
		Register 2 Value	0005h
		Register 3 Value	1234h
		CRC	xxxxh

Table 4.5

#### 4.4 Manufacturer-Specific Registers and Function Codes

The following paragraph describes the user-defined function codes 0x44h (write) and 0x45h (read). User-defined function code 44h/45h is for less commonly used, off-line functions such as setting serial port parameters and changing the device address. Some MODBUS hosts cannot support this function code, but the frames can still be sent using a serial terminal program on a PC that can send binary data on the serial port. Changes to the serial port parameters and device address are stored in flash memory, so these settings are retained when power is off. A soft power cycle (command AAh) or a manual power cycle is needed to activate the new values.

Register Name	Command	Access	Function Code	Data type	Description and Values	Default
Baud Rate	20h	R/W	45h/44h	8 bits	Baud Rate values in Baud ( 0 = 2400 ; 1 = 4800 ; 2 = 9600; 3 = 19200; 4 = 38400; 5 = 57600; 6 = 115200)	03h
Parity	21h	R/W	45h/44h	8 bits	<ul style="list-style-type: none"> <li>■ 0: no parity</li> <li>■ 1: odd parity</li> <li>■ 2: even parity</li> </ul>	02h
Device Address	22h	R/W	45h/44h	8 bits	Used to set the device address; Valid range from 1 to 247	7Fh (127d)
Activate Terminator	23h	R/W	45h/44h	8 bits	Used to set the internal terminating resistor of 120 ohms <ul style="list-style-type: none"> <li>■ 0 = inactive</li> <li>■ 1 = active</li> </ul>	00h
Read device HW version	30h	R	45h	16 bits	HW version read as a BCD value ( e.g.: 0110 means 1.10)	
Read device SW version	31h	R	45h	16 bits	SW version read as a BCD value ( e.g.: 0110 means 1.10)	
Restore to Factory Setting	55h	W	44h	8 bits	No data ( command length smaller)	
Software Power cycle	AAh	W	44h	8 bits	No data ( command length smaller)	

Table 4.6

#### Example of Write Process

Set Device Address

Request (Command)		Response	
Name	Value	Name	Value
Device Address	7Fh	Device Address	7Fh
Function Code	44h	Command	44h
Command	22h	Command	22h
Number of Bytes	01h	Number of Bytes	01h
New Address	05h	CRC	xxxxh
CRC	xxxxh		

Table 4.7

### Example of Read Process

Read Baud Rate

Request (Command)		Response	
Name	Value	Name	Value
Device Address	7Fh	Device Address	7Fh
Function Code	45h	Function Code	45h
Command	20h	Command	20h
Number of Bytes	01h	Number of Bytes	01h
CRC	xxxxh	Response	03h
		CRC	xxxxh

Table 4.8

### Example of Write Process

Software power cycle

Request ( Command)		Response	
Name	Value	Name	Value
Device Address	7Fh	Device Address	7Fh
Function Code	44h	Function Code	44h
Command	AAh	Command	AAh
Number of Bytes	00h	CRC	xxxxh
CRC	00h		

Table 4.9

## 4.5 Device Identity

This function code is used to get information regarding the device identity like manufacturer name, software and hardware versions, product name, and serial number. We support the basic type of object ID. The serial number is included as part of the product code. For example INY F199 Modbus S# 00202336.

Name	Object ID	Access	Data type	Value	Object length
Vendor Name	00h	R	8 bits (ASCII)	Pepperl+Fuchs	0Dh
Product Code (Includes Serial Number)	01h	R	8 bits (ASCII)	IN* F199 Modbus S#xxxxxxx	1Bh
Major Minor Rev	02h	R	8 bits (ASCII)	SW-V01.00 HW-V01.00	013h

Table 4.10

### Example

Request (Command)		Response	
Name	Value	Name	Value
Device Address	7Fh	Device Address	7Fh
Function Code	2Bh	Function Code	2Bh
MEI Type	0Eh	MEI Type	0Eh
Read Dev id Code	01h	Read Dev id Code	01h
Object ID	00h	Conformity Level	01h
CRC	xxxxh	More Follows	00h
		Next Object ID	00h
		Number of Objects	03h
		Object ID	00h
		Object Length	0Dh
		Object Value	Pepperl+Fuchs
		Object ID	01h
		Object Length	1Bh
		Object Value	IN* F199 Modbus S#xxxxxxx
		Object ID	02h
		Object Length	13h
		Object Value	SW-V01.00 HW- V01.00

Table 4.11

## 5 MODBUS Communication Examples

### 5.1 Modbus Master Simulator Modbus Poll

In the following chapters, the MODBUS master simulator "Modbus Poll" of "Witte Software Company" is used to display the command sequences and to establish MODBUS communication.

"Modbus Poll" is a popular MODBUS simulator for testing and debugging slave devices. The software supports MODBUS RTU/ASCII and MODBUS TCP/IP.

For detailed information, see the "Witte Software Company" web page:  
<http://www.modbustools.com/index.html>



**Note!**

The MODBUS address of the INX\*\*\*DH-F199-B30-\*\*\* and INY\*\*\*DH-F199-B30-\*\*\* series sensors is 127d (7Fh).

### Modbus Poll

To have a general description of the command creation, the so-called "Test Center" of the MODBUS master simulator is used. With this, the individual parameters and any function codes can be freely entered as a hexadecimal byte sequence.



### Setup of Modbus Poll for slave communication

1. Start Modbus Poll.
2. Check if communication parameters are correct for your device. Click the "Connect..." command in the "Connection" menu.

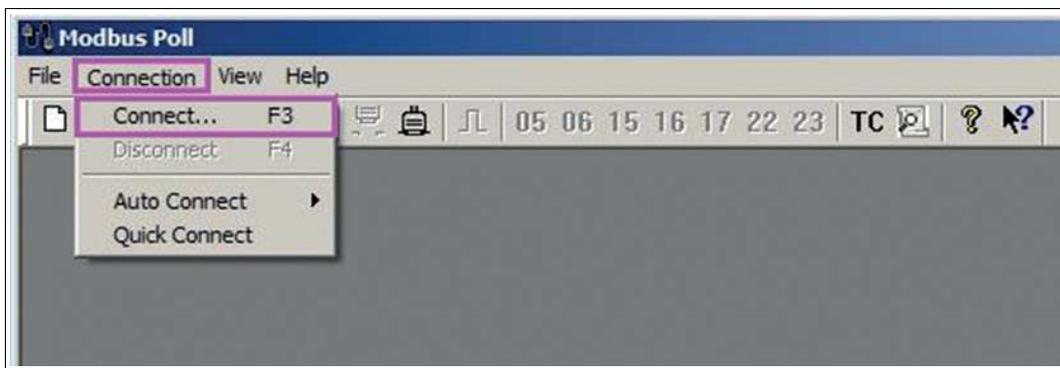


Figure 5.1



**Note!**

The following communication settings (Connection, Serial Settings) are only an example and have to be adapted to the existing hardware.

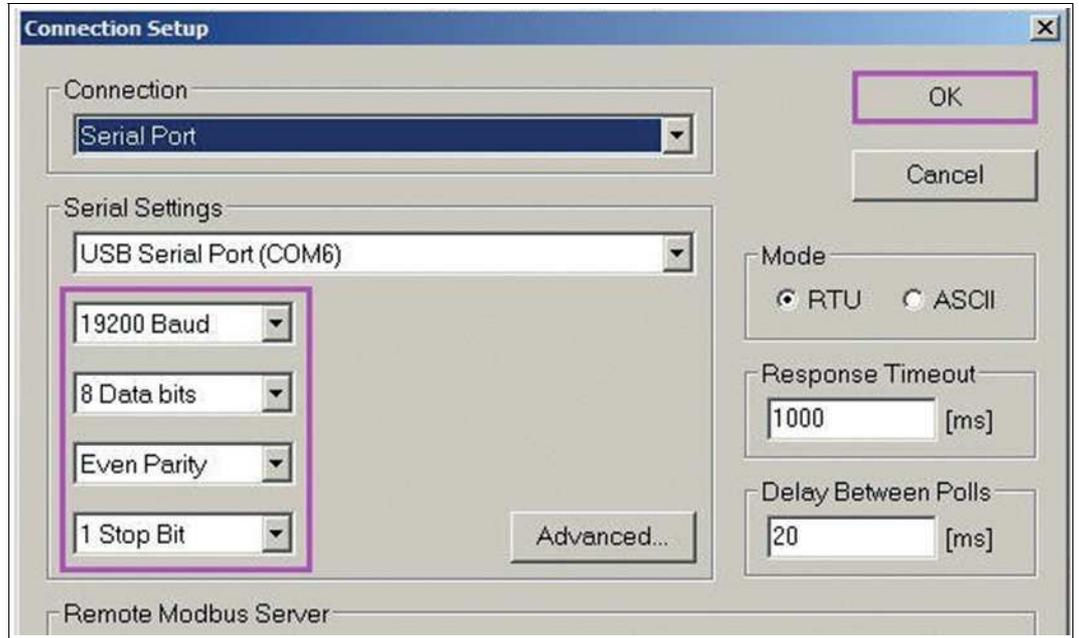


Figure 5.2



### Select the Test Center

Click the "TC" symbol to open the "Test Center."



Figure 5.3

↳ The "Test Center" window with a command line opens.

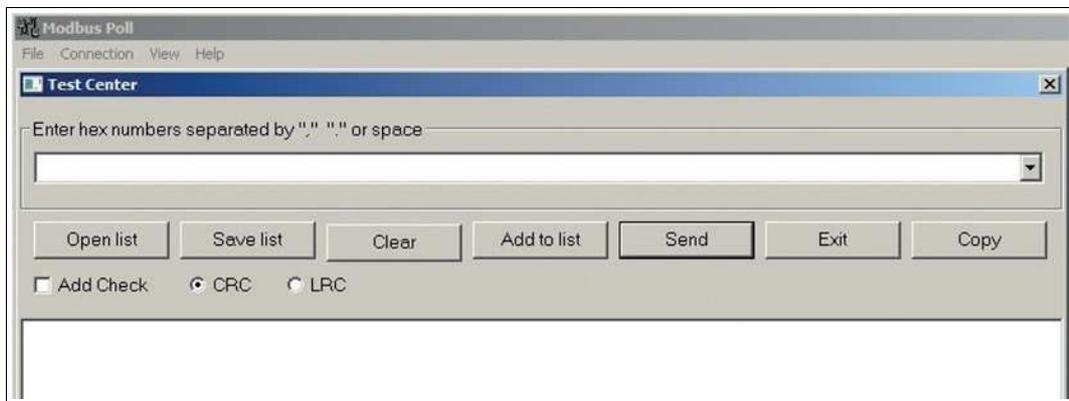


Figure 5.4

↳ In the upper window, you can enter individually composed command sequences in the editor line in hexadecimal notation and send them to the MODBUS slave.

↳ In the lower window, the communication flow is displayed line by line. The communication flow consists of the commands sent to the MODBUS slave and the corresponding responses.

## 5.2 Reading the Position Values of a 2-Axis Inclination Sensor



### Note!

The following description explains how to read the position values of a 2-axis sensor. If you use a 1-axis sensor, you only have to read the x-axis registers.

### Device Registers Containing Position Values

For device-specific registers See chapter 4.3. The position value registers have the offsets 0...3. Thus, 4 registers have to be read in total.

Register Name	Register Offset	Access	Function Code	Data Type	Description and Values	Default
Current Position Value Higher Register (x-Axis)	0000h	RO	03h	16 bits signed	You read this value as current position value	
Current Position Value Lower Register (x-Axis)	0001h	RO	03h	16 bits signed	You read this value as current position value	
Current Position Value Higher Register (y-Axis)	0002h	RO	03h	16 bits signed	You read this value as current position value	
Current Position Value Lower Register (y-Axis)	0003h	RO	03h	16 bits signed	You read this value as current position value	

Table 5.1

### Input Parameters for Reading the Position Values

The following input parameters have to be entered into the Test Center to read the 4 position registers:

- Slave ID: 7Fh (address 127d of the inclination sensor)
- Function Code: 03h (reading holding registers, 4 x register)
- Address: 0 (beginning with register offset 0)
- Number: 4 (number of registers to be read)



### Entering the Input Parameters

1. Enter the previous input parameters in hexadecimal form as a byte sequence in the command-line window. Ensure that the "Add Check" and "CRC" options are activated so that the checksum CRC will be added automatically.

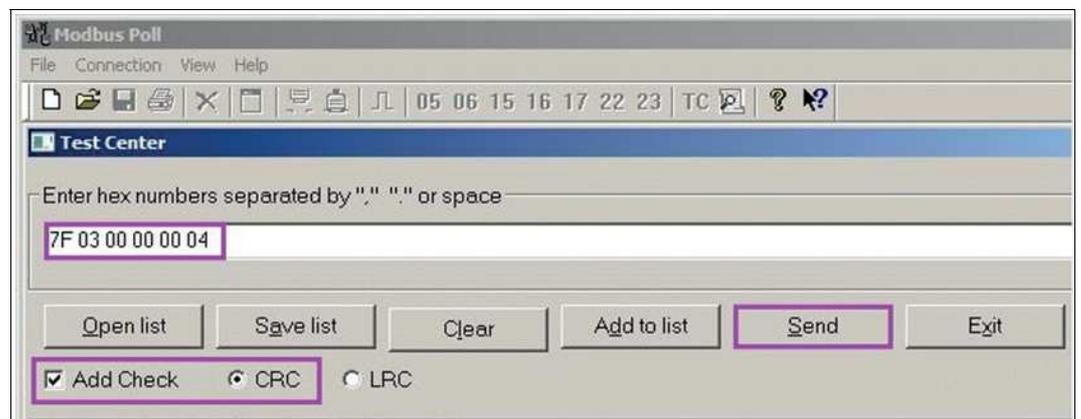


Figure 5.5

2. Click on the "Send" button to transmit the command including CRC to the inclination sensor.  
 ↳ After receiving the command, the inclination sensor responds to the request.

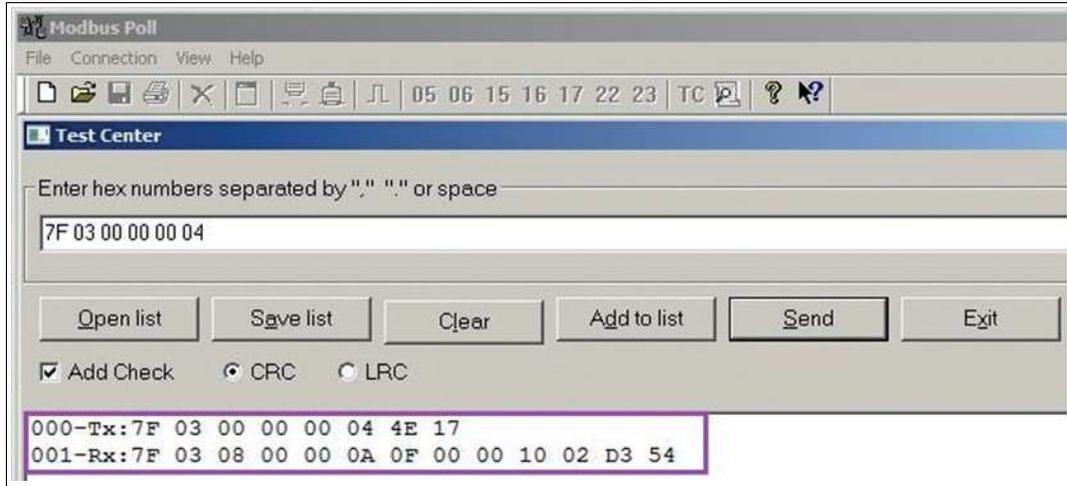


Figure 5.6

- ↳ 000-Tx: 7F 03 00 00 00 04 4E 17 >> command line with 2 byte CRC (4E 17)
- ↳ 001-Rx: 7F 03 08 00 00 0A 0F 00 00 10 02 D3 54 >> response of the inclination sensor

### Response of the Inclination Sensor

001-Rx: 7F 03 08 **00 00 0A 0F** 00 00 10 02 **D3 54** >> response of the inclination sensor

Meaning of the response:

7Fh = address 127

03h = function code

08h = 8 byte data

00 00 0A 0Fh = x-position output value 0A0Fh = 2575d = 25.75°

00 00 10 02h = y-position output value 1002h = 4098d = 40.98°

D3 54h = CRC checksum

### 5.3 Setting the Preset Values of a 2-Axis Inclination Sensor



**Note!**

The following description explains how to set the preset values of a 2-axis sensor. If you use a 1-axis sensor, you only have to set the x-axis registers.

#### Device Registers Containing Preset Values

For device-specific registers See chapter 4.3. The preset value registers have the offsets 4... 7. Thus, 4 registers have to be written in total.

Register Name	Register Offset	Access	Function Code	Data Type	Description and Values	Default
Preset Value Higher Register (x-Axis)	0004h	R/W	03h/ 10h	16 bits signed	You can write a 0 or current value here to make the current value your preset point	
Preset Value Lower Register (x-Axis)	0005h	R/W	03h/ 10h	16 bits signed	You can write a 0 or current value here to make the current value your preset point	
Preset Value Higher Register (y-Axis)	0006h	R/W	03h/10h	16 bits signed	You can write a 0 or current value here to make the current value your preset point	
Preset Value Lower Register (y-Axis)	0007h	R/W	03h/ 10h	16 bits signed	You can write a 0 or current value here to make the current value your preset point	

Table 5.2

#### Input Parameters for Writing the Preset Values

The following input parameters have to be entered into the Test Center to write the 4 preset registers:

- Slave ID: 7Fh (address 127d of the inclination sensor)
- Function Code: 10h (preset multiple registers, 4 x register)
- Start Address: High Byte 00h
- Start Address: Low Byte 04h
- Number of Words: High Byte 00h
- Number of Words: Low Byte 04h
- Number of Bytes: 8
- X-Preset: High Word 00
- X-Preset: Low Word 00
- Y-Preset: High Word 00
- Y-Preset: Low Word 00



## Entering the Input Parameters

1. Enter the previous input parameters in hexadecimal form as a byte sequence in the command-line window. Ensure that the "Add Check" and "CRC" options are activated so that the checksum CRC will be added automatically.

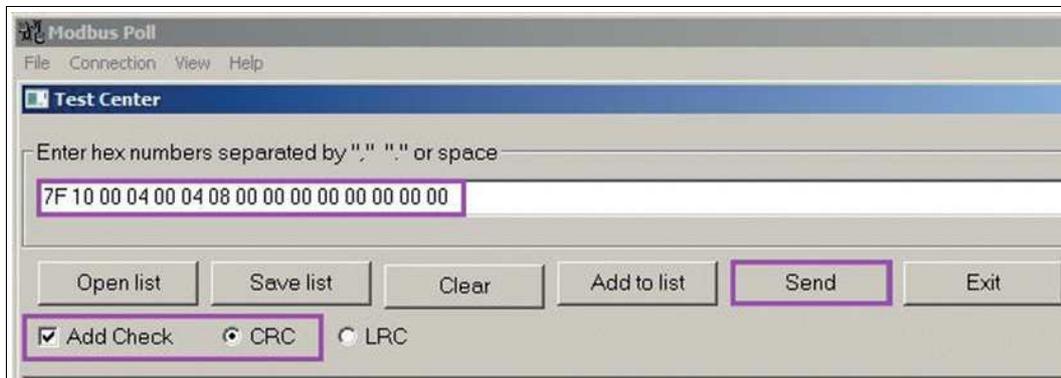


Figure 5.7

2. Click on the "Send" button to transmit the command including CRC to the inclination sensor.

↳ After receiving the command, the inclination sensor responds to the request.

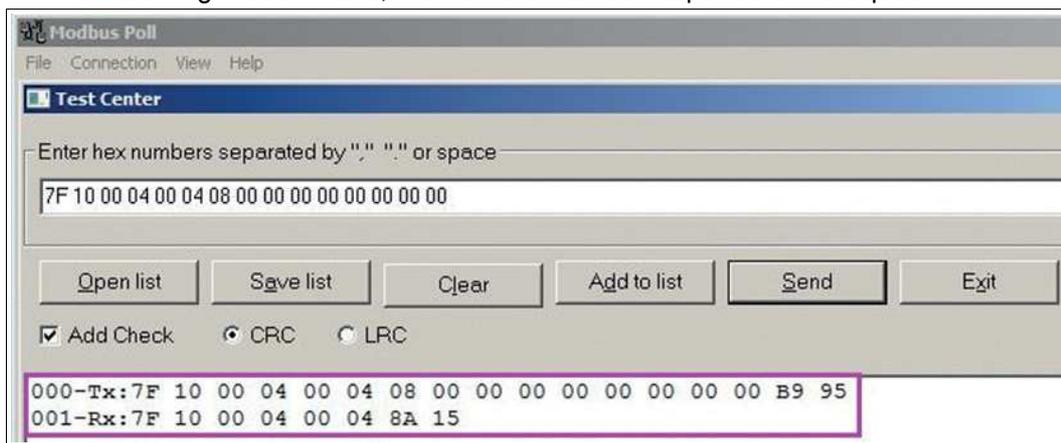


Figure 5.8

↳ 000-Tx: 7F 10 00 04 00 04 08 00 00 00 00 00 00 00 00 B9 95 >> command line with 2 byte CRC (B9 95)

↳ 001-Rx: 7F 10 00 04 00 04 8A 15 >> response of the inclination sensor

## Response of the Inclination Sensor

001-Rx: 7F 10 00 04 00 04 8A 15 >> response of the inclination sensor

Meaning of the response:

7Fh = address 127

10h = function code

0004h = start address

0004h = number of words

8A15h = CRC checksum

## 5.4 Reading the Set Baud Rate

The MODBUS inclination sensor also supports manufacturer-specific registers and function codes as described in See chapter 4.4. However, not every MODBUS master supports these function codes. The following example to read the set baud rates shows how to use these function codes if possible.

### Input Parameters for Reading the Baud Rate

The following input parameters have to be entered into the Test Center to read the baud rate:

- Slave ID: 7Fh (address 127d of the inclination sensor)
- Function Code: 45h (read)
- Command: 20h (baud rate)
- Number of Bytes: 1



### Entering the Input Parameters

1. Enter the previous input parameters in hexadecimal form as a byte sequence in the command-line window. Ensure that the "Add Check" and "CRC" options are activated so that the checksum CRC will be added automatically.

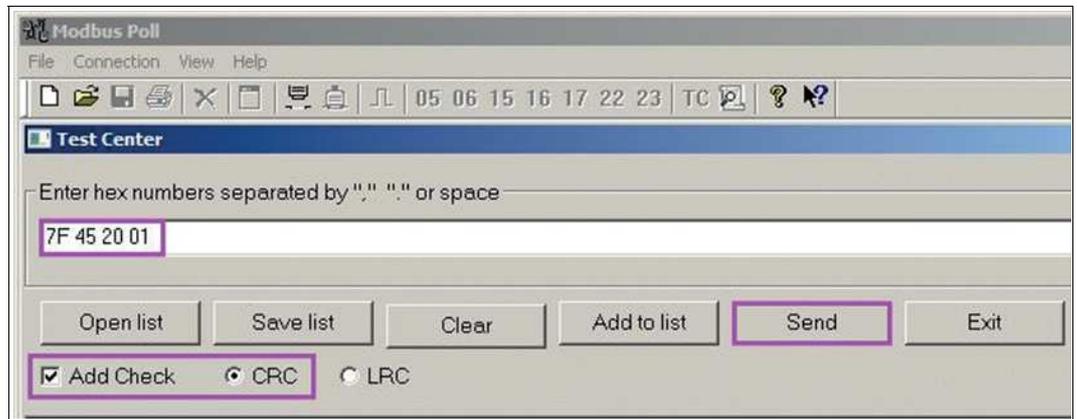


Figure 5.9

2. Click on the "Send" button to transmit the command including CRC to the inclination sensor.  
 ↳ After receiving the command, the inclination sensor responds to the request.

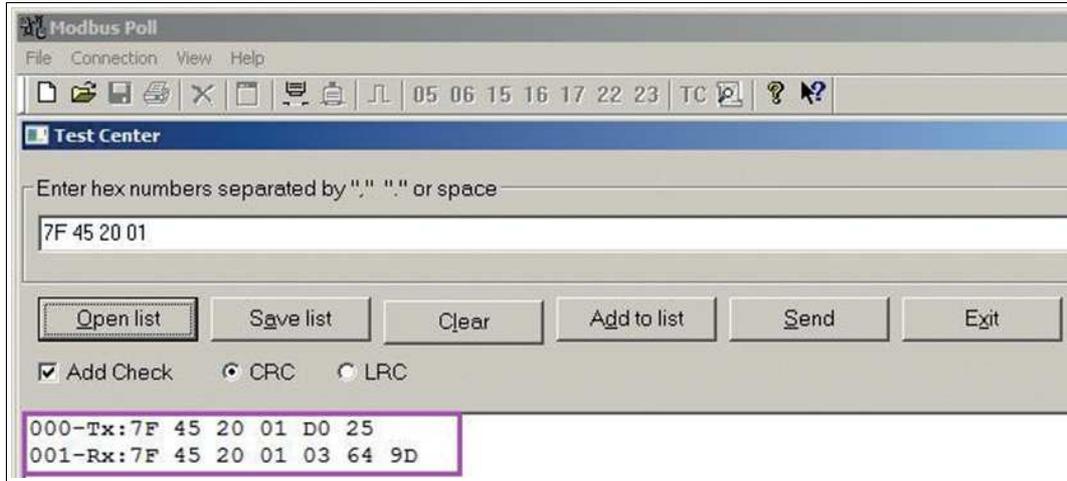


Figure 5.10

- ↳ 000-Tx: 7F 45 20 01 D0 25 >> command line with 2 byte CRC (D0 25)
- ↳ 001-Rx: 7F 45 20 01 03 64 9D >> response of the inclination sensor

### Response of the Inclination Sensor

001-Rx: 7F 45 20 01 03 64 9D >> response of the inclination sensor

Meaning of the response:

7Fh = address 127

45h = function code

20h = command

01h = 1 byte

03h = 19200 Bd

649Dh = CRC checksum

# FACTORY AUTOMATION – SENSING YOUR NEEDS



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