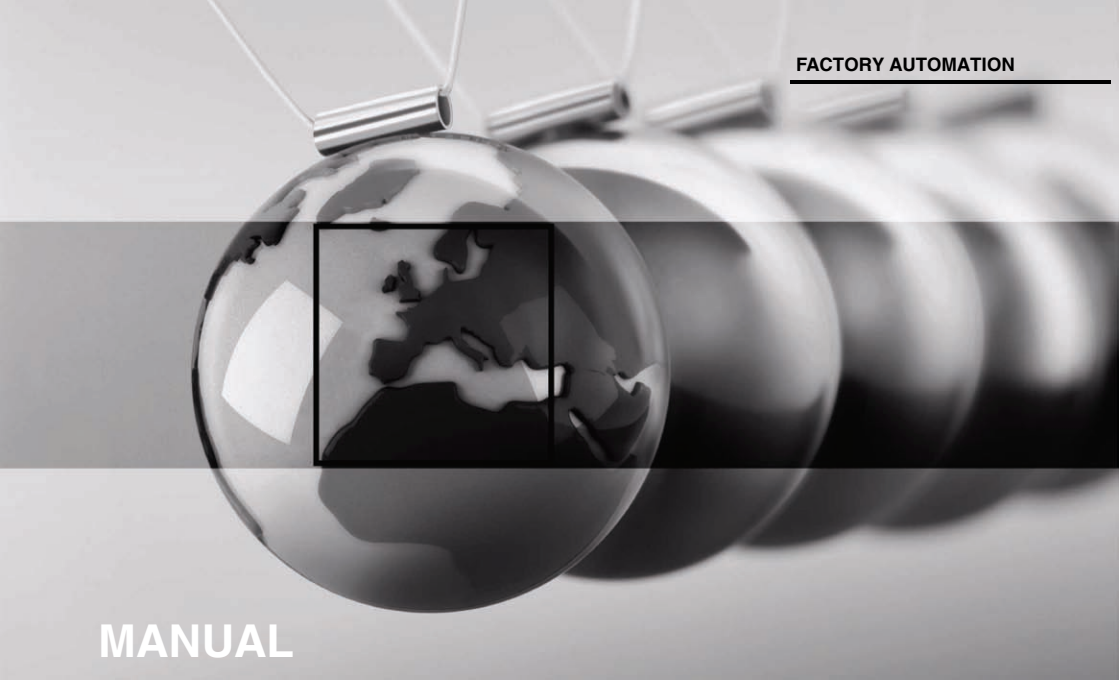

MANUAL

ODT-MAC40*-*-RD

Stationary reading device for Data Matrix Codes

CE

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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"

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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:

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

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2 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.

ISO**9001**

3 Safety

3.1 Used Symbols

Safety-relevant Symbols

Danger!
This symbol indicates a warning about an immediate possible danger.

In case of ignoring the consequences may range from personal injury to death.

Warning!
This symbol indicates a warning about a possible fault or danger.

In case of ignoring the consequences may cause personal injury or heaviest property damage.

Caution!
This symbol indicates a warning about a possible fault.

In case of ignoring the devices and any connected facilities or systems may be interrupted or fail completely.

Informative Symbols

Note!
This symbol brings important information to your attention.

Action

This symbol indicates a paragraph with instructions.

3.2 General safety instructions

Class 2 laser product

This device is a class 2 laser product:

Standards

IEC 60825-1:2007 certified. Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated 06-24-07.

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Warning!
Visible red class 2 laser light

The irradiation can lead to irritation especially in a dark environment. Do not point at people!

Caution: Do not look into the beam!

Maintenance and repairs should only be carried out by authorized service personnel!

Attach the device so that the warning is clearly visible and readable.

Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure..

Only use recommended original accessories.

The operating company bears responsibility for observing locally applicable safety regulations.

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.

3.3 Intended Use

The ODT-MAC40*-*-RD stationary read devices are intended to be used only for the identification of objects by means of Data Matrix codes.

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.

4 Product Description

4.1 Use and Application

The stationary read device is an optical identification system for the detection of Data Matrix codes. With its high-performance signal processor, a partial image capture function, and optimized decoding algorithms, the device features extremely high reading speeds. For optimum process integration, straight and angled housing designs are available.

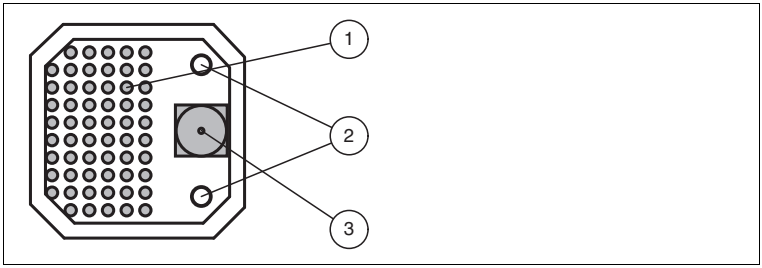
The stationary read device can be configured easily and quickly using a normal web browser, via the standard Ethernet interface or a series connection. Support is also provided for the mechanical alignment of the reader in the form of an integrated laser pointer and a connected VGA monitor. The reader also features an integrated fault pattern memory that can be expanded with commercially available MMC memory cards.

Typical application areas are:

- Document handling
- Printing machines
- Identification in the packaging and warehouse industry
- PCB detection

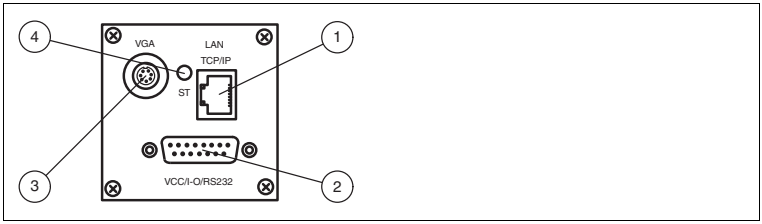
Figure 4.1 The two housing designs of the stationary read device: straight and angled

4.2 Displays and controls



1. Lightning unit
2. Laser diodes
3. CMOS camera

The stationary reader ODT-MAC403-* does not have laser diodes.



1 RJ45 Ethernet network socket

2 15-pin D-Sub connector

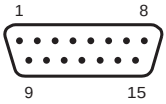
3 Video output VGA

4 Status LED

Status LED

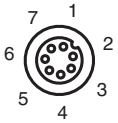
LED color	Description
Yellow	The LED briefly illuminates in yellow after switching on.
Green	The LED illuminates in green after a successful read (good read).
Red	The LED illuminates in red after an unsuccessful read (bad read).

4.3 Interfaces and Connections



15-Pin D-sub Plug

PIN	Signal	Description
1, 2	GND	GND for device
3	GND IO	GND for inputs/outputs
4, 5	+UB	24 VDC device supply
6	+ UB IO	Supply for inputs/outputs, 24 VDC
7	NC	Not connected
8	IN2	Input 2
9	OUT1	Good output
10	OUT2	Bad output
11	IN1	Trigger
12	NC	Not connected
13	TX RS232	Transmission line, RS232
14	RX RS232	Receive line, RS232
15	IN3	Input 3



Video Output, VGA 640x480 (7-Pin M9 Socket)

PIN	Signal	Description
1	OUT V_{sync}	Vertical synchronization output
2	GND	Ground
3	OUT R	Red signal output
4	OUT G	Green signal output
5	GND	Ground
6	OUT B	Blue signal output
7	OUT H_{sync}	Horizontal synchronization output

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Network connection

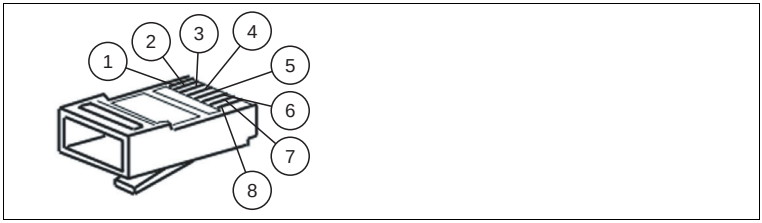

Figure 4.2 Network connection pin assignments

1 Transmit data (+)
2 Transmit data (-)
3 Receive data (+)
4 Not assigned
5 Not assigned
6 Receive data (-)
7 Not assigned
8 Not assigned

4.4 Scope of Delivery

- ODT-MAC40*-*-RD
- Quick start guide

4.5 Accessories

Various accessories are available.

4.5.1 Cables

The following cables are available as accessories.

Model number	Description
ODZ-MAC-CAB-VIDEO	Video connection cable, cylindrical connector, 7-pin on SUB-D socket, 15-pin VGA, 2 meters
ODZ-MAC-CAB-15POL-2,5M-FEMALE	Connection cable, Sub-D socket, 15-pin, 2.5 meters, can be pre-assembled
ODZ-MAC-CAB-15POL-5M-FEMALE	Connection cable, Sub-D socket, 15-pin, 5 meters, can be pre-assembled
ODZ-MAC-CAB-24V-R2-2M	Connection cable for power supply, RS 232
V45-G-10M-V45-G	Network cable RJ45, category 5, up to 100 MHz, 10 m

4.5.2 Other accessories

Other products are available as accessories.

Model number	Description
ODZ-MAC-PWR-24V	Desk top power supply 24 V DC, 1.88 A

5 Installation

5.1 Preparation

Unpacking the unit

1. Check that all package contents are present and undamaged.

   ↳ If anything is damaged, inform the shipper and contact the supplier.

2. Check that all items are present and correct based on your order and the shipping documents.

   ↳ If you have any questions, please contact Pepperl+Fuchs.

3. Keep the original packing material in case you need to store or ship the unit at a later time.

5.2 Mounting

Note!

Preventing reflection and glare

Reflection and glare from reflective surfaces can impair the captured image and therefore lead to incorrect readings. To prevent reflection and glare, install the stationary reading device at a slight angle.

The read distance differs according to the reader. The correct read distance can be found in the technical data for the reader to be installed.

The straight version is available only upon request.

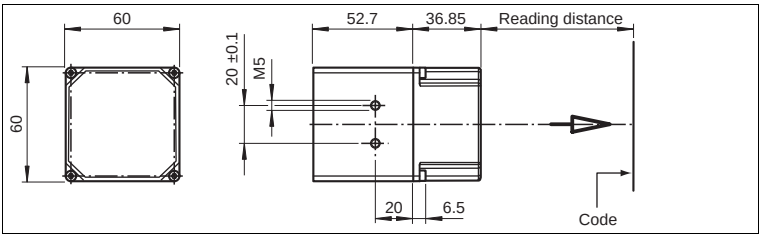

Figure 5.1 Dimensions of the **straight** housing

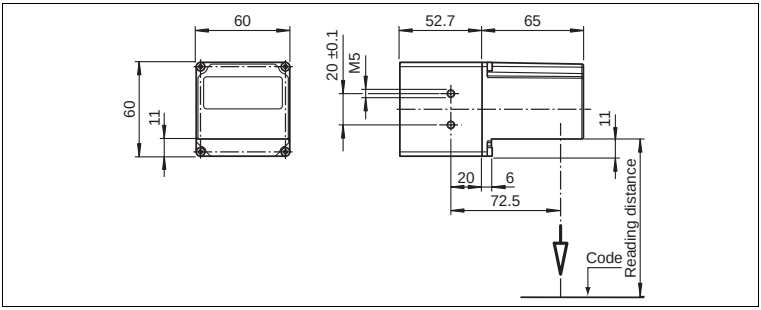

Figure 5.2 Dimensions of the **angle** housing

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Note!

Connection to ground

When installing the device, ensure that it is has a ground connection.

5.3 Connecting the device

Connecting the power supply

To connect a power supply to the device, proceed as follows.

1. Plug the 15-pin Sub-D socket into the connector provided for this purpose on the back of the housing.
2. Screw in the two mounting screws as far as possible.

   ↳ This ensures that the cable cannot be inadvertently pulled out.
3. Next connect the power supply to the appropriate pins on the Sub-D socket.

   ↳ The power supply has now been connected.

To connect the power supply to the device quicker, the pre-configured connection cable can also be used. Information can be found in the Accessories section.

Note!

Record the network configuration

The device communicates with the connected machine control system using the TCP/IP protocol. To ensure communication works correctly, you must note down all the changes you make to the network configuration.

Note!

Network cabling

Use a crossover network cable to connect the device directly to a PC. If the device is being operated within a network, use a twisted-pair network cable to connect it to the network.

Establishing a network connection

In order to establish a network connection, proceed as follows.

When delivered, the device has a fixed IP address (192.168.2.2). To facilitate communication within the network, you must configure your network. The configuration data can be found in the network configuration overview.

Connecting a trigger sensor

To connect a trigger sensor, proceed as follows.

Connect the trigger sensor to the cable previously connected for the power supply.

5.4 Network configuration overview

Communication with the sensor is carried out via a free Ethernet interface on the PC. It is usually an integrated LAN interface.

This interface must be assigned an address (IP address) so that it can establish a connection with the sensor.

The various stations in a TCP/IP network are identified via IP addresses. Each IP address must only be used once within a subnet. IP addresses are made up of 4 blocks, each with a three-digit number between 0 and 255 (8 bit), e.g. 192.168.2.65.

Example: IP address 192.168.2.2 with subnet mask 255.255.255.0

A device with these settings can establish direct communication with any IP address between 192.168.2.0 and 192.168.2.255. (The first 3 blocks must match.)

In TCP/IP networks, fixed IP addresses can be set on the device or they can be assigned dynamically by a DHCP server.

The sensor does not support DHCP, i.e. only fixed IP addresses can be used.

The Ethernet interface used on the PC to communicate with the sensor must be configured in line with the sensor settings. However, one must ensure that the sensor IP address is not entered in the PC.

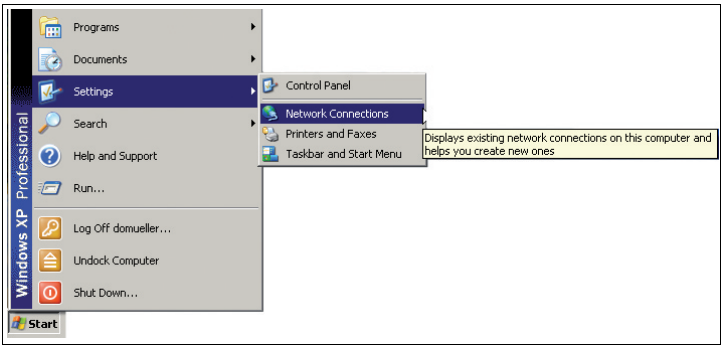
Example:

Sensor setting:	IP 192.168.2.2	Subnet mask 255.255.255.0
LAN interface on the PC:	IP 192.168.2.90	Subnet mask 255.255.255.0

5.5 Assigning an IP address to a network connection using Windows XP

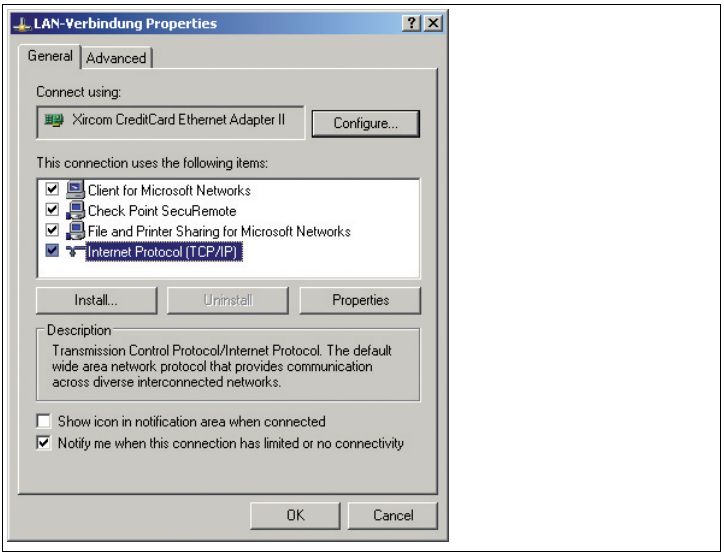
To assign an IP address to a network connection using Windows XP, proceed as follows.

1. First select "**Network Connections**".



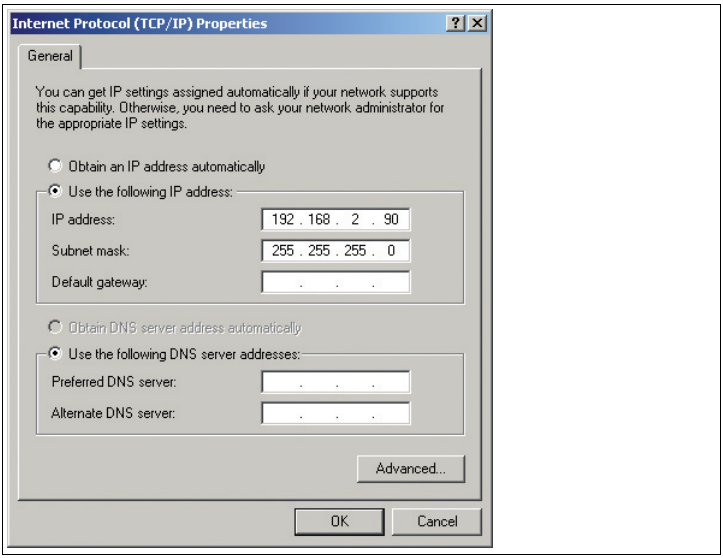
2. Then open the required connection by double clicking on it.

   ↳ The Properties dialog box for the relevant connection will open.



3. Select the "**Internet Protocol (TCP/IP)**" element from the Properties dialog box by double clicking on it.

   ↳ The TCP/IP properties dialog box will open.



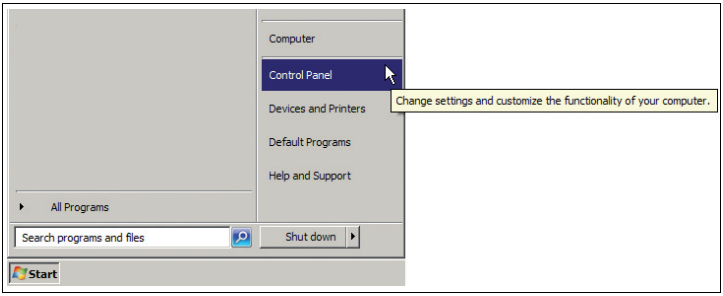
4. In the TCP/IP properties dialog box, activate "**Use the following IP address**".
5. Enter an IP address which only differs from the sensor IP address in the very last segment.
6. Enter 255.255.255.0 as the subnet mask.
7. Then confirm your entries on the TCP/IP properties page and the LAN connection properties page using "**OK**" and "**Close**".

   ↳ This completes the network configuration and the sensor can be used.

5.6 Assigning an IP address to a network connection under Windows 7

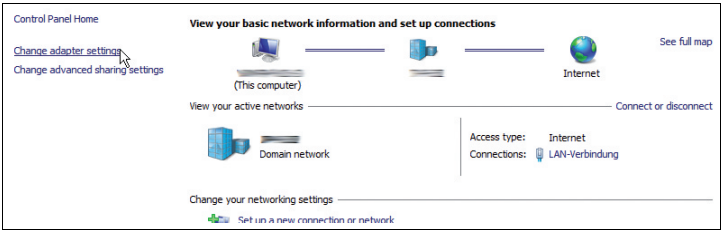
To assign an IP address to a network connection under Windows 7:

1. First, select "**Control Panel**" from the **Start** menu:



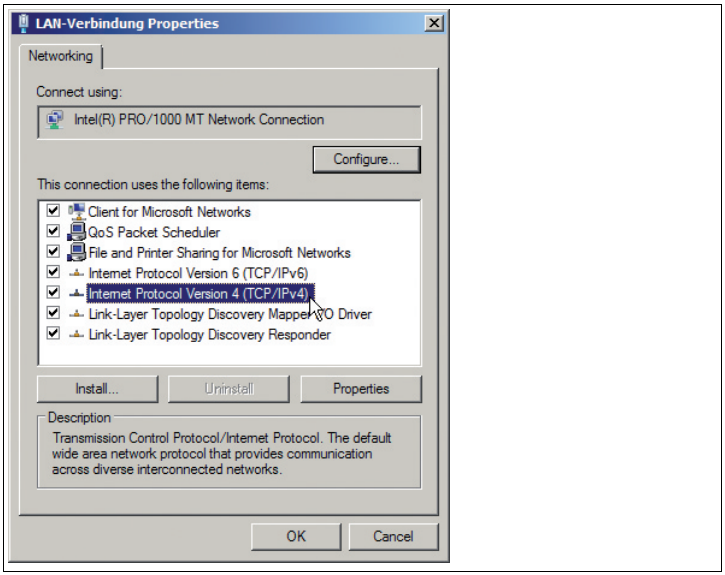
2. Select the **Network and Sharing Center** option:

3. In the Network and Sharing Center window, select **Change adapter settings**



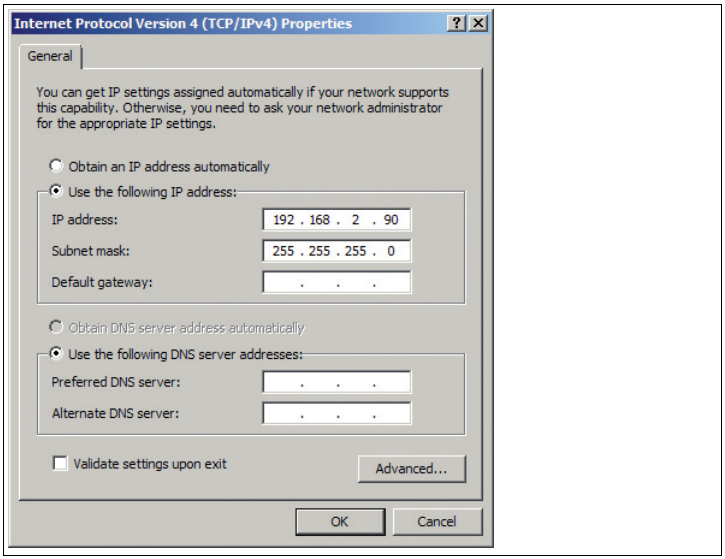
4. Then open the required connection by double-clicking on it.

   ↳ The Properties dialog box for the relevant connection will open.



5. Select the "**Internet Protocol Version 4 (TCP/IPv4)**" element from the Properties dialog box by double-clicking on it.

   ↳ The TCP/IP properties dialog box will open.



6. Activate "**Use the following IP address**" in the TCP/IP properties dialog box.

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7. Enter an IP address that differs from the sensor IP address in the very last segment only.
8. Enter 255.255.255.0 as the subnet mask.
9. Then click "**OK**" and "**Close**" on the TCP/IP properties page and the LAN connection properties page to confirm your entries.

   ↳ This completes the network configuration and the sensor can be used.

5.7 Storage and transport

For storage and transport purposes, package the unit using shockproof packaging material and protect it against moisture. The best method of protection is to package the unit using the original packaging. Furthermore, ensure that the ambient conditions are within allowable range.

6 Commissioning

6.1 Connecting the stationary reader

The reader has its own web server. You have the option of making settings on the stationary reader using a standard web browser.

Aligning the stationary reader

To find the ideal alignment for the device, use the two laser diodes in the stationary reader.

1. Supply power to the reader via the D-Sub connector.
2. Adjust the stationary reader so that both points generated by the laser diodes are positioned on top of each other on the code to be read.

   ↳ This sets the ideal reading distance between the stationary reader and the code to be read.

7 Operation

7.1 Web-based operator interface

You have the option of configuring and operating the stationary reader via a web-based operator interface, and using it to display information.

Starting the operator interface

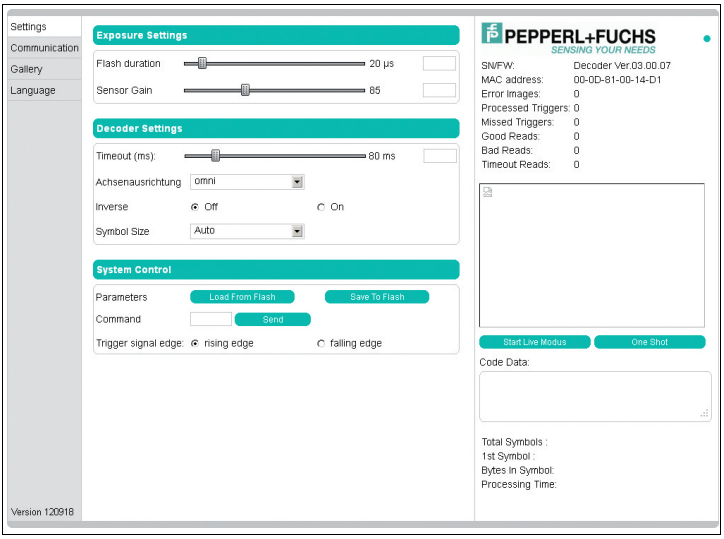
Note!

To start the operator interface of the stationary reader, you need a standard web browser (e.g. Windows Internet Explorer or Mozilla Firefox) and Java, version 1.6 or later.

To start the operator interface, proceed as follows:

In the input field of a standard web browser, enter the IP address of the stationary reading device (**192.168.2.2**) and confirm this using Return.

↳ The **Settings** tab opens as the start page.



The following four tabs can be found on the left-hand side of the display:

- Settings
- Communication
- Gallery
- Language

Various different information is displayed in the central section - depending on which tab is active.

On the right-hand side, various status information (such as the software/ firmware version, the MAC address, the number of reads, etc.) is displayed, as well as the last image captured and the decoded information. On the right of the Pepperl+Fuchs company logo there is a pictorial representation of a status LED. This status LED lights up green when a device is connected. Otherwise it is red.

Activating live image capture

Note!

By viewing the captured images on the operator interface during operation, the image refresh rate reduces significantly.

To activate live image capture, click the **Start Live Mode**button on the right-hand side of the display screen.

↳ The stationary reader starts to capture images. The captured images are displayed in the results window. The decoded information is displayed beneath it in a separate window.

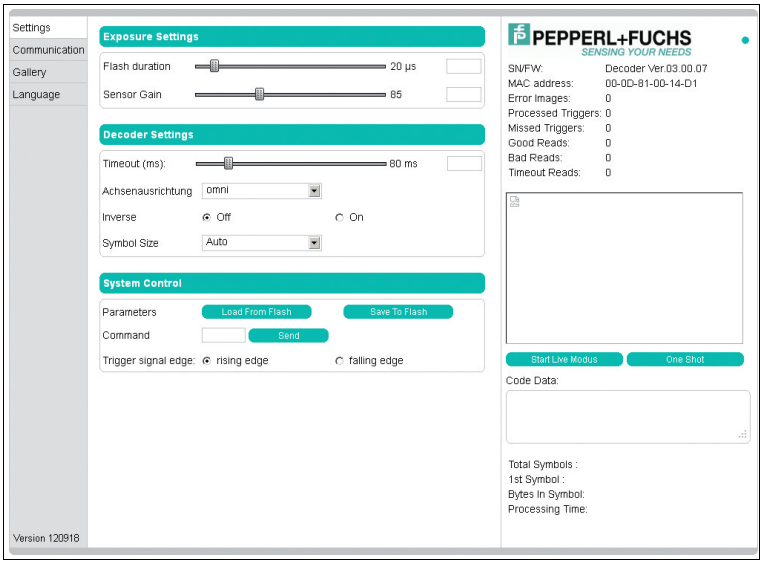
Starting single image capture

On the right-hand side of the display screen, click on the button **Single image**.

↳ Clicking the button triggers a single image capture.

7.1.1 **Settings** Tab

The **Settings** tab enables you to configure various parameters and send commands to the reader. Using the buttons on the left-hand section of the display, you can navigate to the other tabs, **Communication**, **Gallery**, and **Language**.



In the center of the display, the following functions are available in different areas:

Sensor Parameters & System Settings

Parameter	Explanation
Flash duration	This parameter is used to set the duration of the flash at intervals of 10 µs.
Gain	This parameter is used to set the electronic gain. A high value electronically increases the brightness of the captured image and can improve the readability of the code considerably in the event of poor ambient conditions.

Decoder Parameters

Parameter	Explanation
Timeout	This parameter is used to set the time limit after which the read operation is terminated.
Axis alignment	Use this parameter to set the alignment of the code to the object to be read. This improves the decoding results.
Inverse	Off: Select this option if you are using Data Matrix codes on a white background. On: Select this option if you are using inverse Data Matrix codes on a black background.
Symbol size	This parameter is used to set the symbol size of the Data Matrix codes used. Using constant symbol sizes improves decoding results.

System Settings

Setting	Explanation
Parameter set	Load from flash: Use this action to load parameter settings from the internal memory bank (flash EEPROM). Save to flash: Use this action to save your current parameter settings in the internal memory bank (flash EEPROM).
Command	Send individual commands to the reader
Trigger signal edge	Use this parameter to set the trigger edge, at which the sensor is to be triggered. Possible settings are the rising or falling edge.

Sending a command

You have the option of sending individual commands to the sensor. The commands are made up of 4-digit hexadecimal numbers (0 ... F). An overview of the available commands can be found in the appendix.

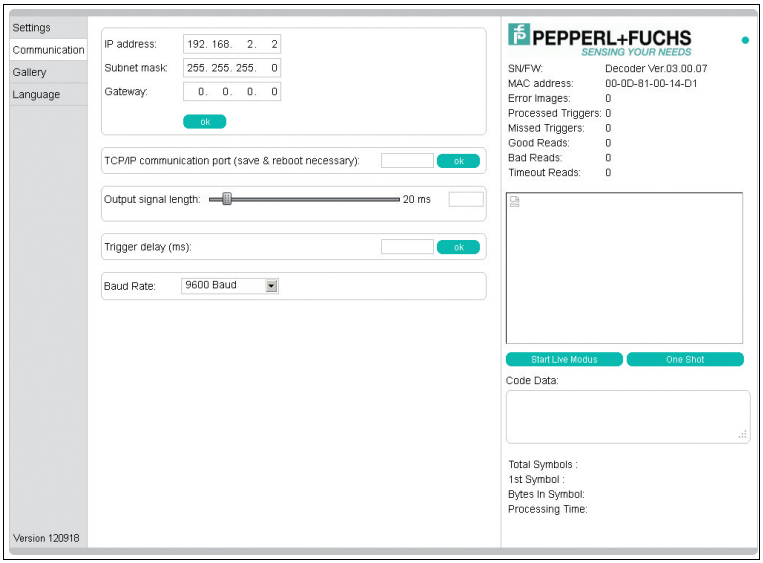
1. If you are not already on the **Settings** tab, navigate to it.
2. Enter a valid, 4-digit hexadecimal number for the required command in the **Command** field.

3. Click on **Send**.

   ↳ The relevant command will be sent to the sensor, where it will be executed.

7.1.2 **Communication** Tab

The **Communication** tab allows you to configure various network and transmission parameters. Using the buttons on the left-hand section of the display, you can navigate to the other tabs, **Settings**, **Gallery**, and **Language**.



In the center of the display, the following functions are available in different areas:

Parameter	Explanation
IP address	Assign a new IP address to the sensor using this field.
Subnet mask	Change the subnet mask using this field.
Gateway	Change the gateway using this field.
TCIP/IP port for process communication (save & reboot required)	Enter the desired port to be used for process communication.
Output signal length	Use this parameter to set the output signal length
Trigger delay	Use this parameter to set the trigger delay
Baud rate	Use this parameter to set the desired baud rate

Transferring Parameters

1. Implement the required settings (IP address, subnet mask, gateway).
2. Transfer the settings by clicking on **ok**.
3. Follow the instructions on the display.

   ↳ The sensor is set to the new address.

Note!

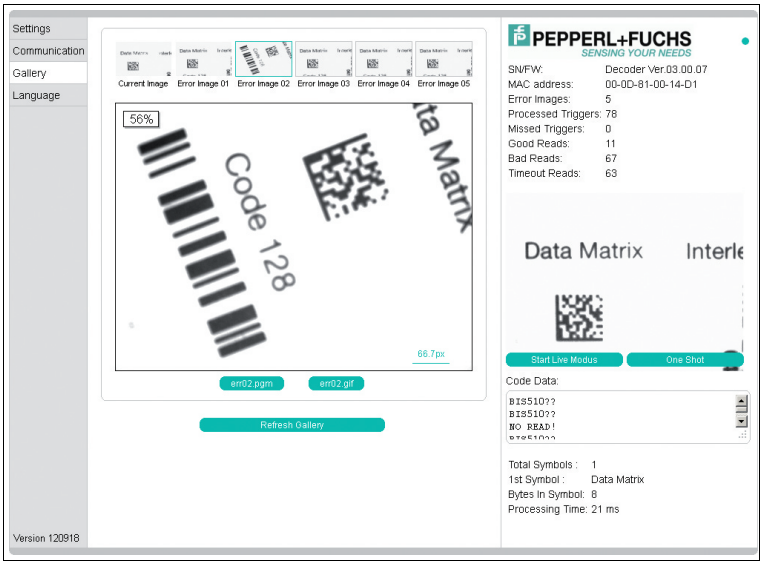
Make a note of the new IP address. If the new address is lost, the sensor can be reset only by Pepperl+Fuchs.

7.1.3 **Gallery** Tab

The **Gallery** tab allows you to view the saved fault patterns and save them locally on the PC if necessary. Using the buttons on the left-hand section of the display, you can navigate to the other tabs, **Settings**, **Communication**, and **Language**.

In the upper section of the display, the last five fault patterns saved in the stationary read device are shown as a preview.

You can save the patterns locally in pgm or gif format.



Saving a Pattern Locally

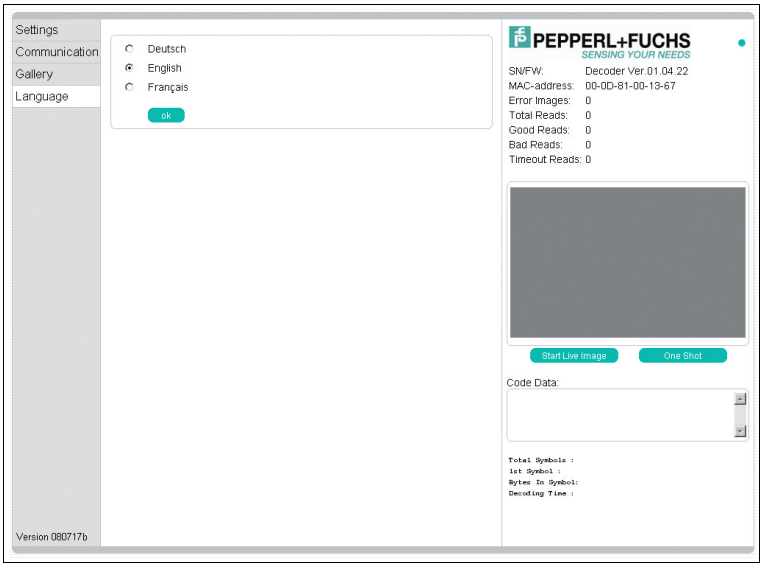
Note!

In the following instructions, the asterisk [*] stands for the file name of the pattern, since the button name varies depending on the preview selected.

1. Click on the ***.pgm** or ***.gif** button below the image display.
2. Select the saving location, change the file name if necessary, and click on **Save**.

7.1.4 **Language** dialogue box

The **Language** tab enables you to change the language for the entire operator interface. Using the buttons on the left-hand section of the display, you can navigate to the other tabs, **Settings**, **Communication** and **Gallery**.



Selecting/changing the language

1. Choose one of the options, **Deutsch**, **English** or **Français**.
2. To implement the selection, click on **ok**.

   ↳ The selected language will be adopted.

8 Troubleshooting

8.1 What to do in the event of an error

Before requesting a service call, please check that the following actions have been taken.

- Test the equipment according to the following checklists,
- Telephone assistance from the Service Center in order to isolate the problem.

Checkliste

Error	Cause	Remedy
"ST" LED not lit up	The power supply is switched off.	Check whether there is a reason for it being switched off (installation or maintenance work etc.). Switch the power supply on if appropriate.
"ST" LED not lit up	The Sub-D socket is not connected to the connector on the sensor.	Connect the Sub-D socket to the sensor and tighten the screws by hand.
"ST" LED not lit up	Wiring fault in the distributor or control cabinet.	Check the wiring carefully and repair any wiring faults.
"ST" LED not lit up	Supply line to the sensor is damaged.	Replace the damaged wire.
No connection to the device	Network cable not connected.	Connect the network cable.
No connection to the device	Wrong network cable used.	Direct connection between PC and device: Use a crossover network cable. Connection via an existing network: Use a twisted-pair network cable.

- If none of the above remedies have had the desired effect, please contact the Service Center. Please have the fault patterns and version number of the ODT-MAC4** system at hand. The version number can be found at the bottom left of the operator interface.

9 Appendix

9.1 Command Format

Commands
Each command consists of four ASCII coded hex digits ($CD_2D_1D_0$) without <CR> or <LF> .

Meaning of the Individual Digits

Syntax:	<C> <D_2> <D_1> <D_0>	
Description	C	Command
	D_2	Detail 2
	D_1	Detail 1
	D_0	Detail 0
Example	Command: Read (8) Detail none (000)	Complete command: 8000

Each hexadecimal character sent is echoed by the device. On receipt of the four valid characters, an <LF><CR> is sent. Other characters are interpreted as the next command.

V1 prompt

A command code, such as 0123 would create the following echo: C:0123<LF><CR>.

V1 aborted command

Using**"ESC"**, any command can be aborted at any point of the four ASCII characters. In this case, the device does not wait for the next character. If an ESC is sent as the first character, the device responds with C:<ESC><LF><CR>.

Timeout

Entering a V1 command character takes one second. If no character appears within this time, then <LF><CR> is sent and the device waits again for the first character.

V1 data information

All D commands trigger an output. At the beginning of this output, characters 2 and 3 of the sent command are always echoed.

Caution!
The echoed characters 2 and 3 are always echoed as uppercase letters, regardless of whether they were entered as lowercase or uppercase.

Example: Input: D100 => Output: D100<LF><CR>10Decoder Ver.4.01.0T<LF><CR>.

Status message

The status message comes automatically, after decoding has been triggered and once the decoding procedure has been completed.

Status Message

Syntax	<Command> <fOk> <Data> <LF> <CR>	
Description	**Command** (1 hex digit)	The first digit of the command is output
	fOk (1 decimal digit)	0: Ok, 1: Fault
	Data (unrestricted number)	Data enclosed in **uppercase/lowercase (>/<)** characters, if the data output is switched on
	LF	Final ASCII character: `0A`
	CR	Final ASCII character: `0D`
Example	Good read	`80>DataFromDataMatrix<`
	Bad read	`81FAIL` (FAIL is optional and can be freely selected)

9.2 Command Overview

This table contains a list of all the commands that you can send individually to the reader from the Settings tab page.

The following notation is used:

H: You can enter setting values as hexadecimal digits in this position.

X: You can enter any hexadecimal digits in this position.

Command 0 to 9

Command				Description
C	D_2	D_1	D_0	
0	H	H	X	Set flash duration in 10 µs increments. Example: 0120_H (18 decimal) sets the flash duration to 180 µs
2	H	H	X	Set the pulse length of the good outputs (D_2D_1) Example: 0120_H (18 decimal) sets the impulse length to 180 ms
4	H	H	X	Set the grayscale value difference for edge detection (D_2D_1) Version ≥ 3: Factory default setting = 0 (automatic search), value range 0 to 255 Version < 3: Factory default setting = 32_H (50 decimal), value range 1 to 255
5	H	H	X	Set gain, factory default setting = 50_H (80 decimal)
6	H	H	X	Start position of the formatted output. Transmit value in D_2D_1 (first position = 0)
7	H	H	X	End position for formatted output (first position = 0 !!!). Transmit value in D_2D_1. End position is not issued (1 is deducted from the set value)! For byte D_0 = 1, the formatted output is activated. **IMPORTANT:** If 001 is transmitted, the entire string is issued! If a value less than/equal to the start position is entered, then nothing is issued. However, the angle brackets are retained.

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Command				Description	
C	D_2	D_1	D_0		
8	H	H	H	**Read command:** HHH stands for a bitmask with the following meaning: **IMPORTANT:** After entry, the last decoding result in accordance with the new settings is displayed as the response.	
				Bitmask	**Description**
				0x001	Inverse
				0x004	Activate fault output (Another four ASCII characters, for example: 81FF00 instead of 81 or 810000 instead of 80) **Note:** From version 3 without information
				0x008	Switch on overlay
				0x100	ASCII output of the decoded code is activated
				0x200	If set, a measurement is triggered only after a trigger pulse, otherwise automatically! This flag also affects 0x400, as it switches off continuous reading.
				0x400	Continuous reading on, as long as 0x200 has not been set
9	0	0	H	Match code	
				Value	**Description**
				0	Match code inactive
				1	Match code active
9	1	X	H	Match code takeover	
				Value	**Description**
				1	This Data Matrix code will be transmitted as a reference code with the next good read

Command A

Command				Description
C	D_2	D_1	D_0	
A	H	H	X	Set shutter time (D_2D_1) Shutter time in 30 µs increments. If 00 is specified, the shutter time is adapted to the flash duration. (Factory default setting = 00)

Command B

Command				Description	
C	D_2	D_1	D_0		
B	X	X	H	Set video mode. The parameter D_0 has the following function:	
				Bitmask	**Description**
				0x07	5: Overlay on, otherwise: Overlay off
				0x08	1: Video-out on 0: Video-out off

Command C

Command				Description		
C	D_2	D_1	D_0			
C				**Advanced commands** Parameter D_2 indicates the advanced command		
	1	H	H	Set flash duration in 10 µs increments. Example: 12_H (18 decimal) sets the flash duration to 180 µs		
	3	H	H	Set reading timeout (D_1D_0) The input occurs in hex and is entered in 1 ms increments. Value for the timeout is half the value. If no time is set, it may take a few seconds on difficult codes for the software to output a result. Example: HH -> 28_H -> 40 decimal -> 80 ms		
	5	H	H	Set the filter parameters to be used when specifying the filter type using C6xx. The possible parameter values are entered using the command C6xx. **Important:** This command must be issued before the command C6xx! The entered values become invalid when the C6xx command is issued (can be used only once!)		
	6	0	H	Filter selection for preprocessing and debug **Important:** Set the filter parameters first using the command C5xx		
				Value	**Set**	**Function**
				0x00	All filters are disabled	
				0x01	**Increase areas** (erosion/dilatation) Possible parameterization using C5xx:	
					0x00	Filter off
					0xXY	Filter size in X and Y direction, possible values in each case: 0x1 to 0x6: Extend light areas. 0x9 to 0xE: Extend dark areas (0x1 to 0xE plus offset 0x8) (for both dimensions 1 to 6 or 9 to E, but areas not mixed)
				0x02	**Open or close areas** (opening/closing)	
					0x01	Filter off
					0x02	Filter size in X and Y direction, possible values 1 to 6 in each case: 0x1 to 0x6: Extend light areas. 0x9 to 0xE: Extend dark areas (0x1 to 0xE plus offset 0x8) (for both dimensions 1 to 6 or 9 to E, but areas not mixed)
				0x03	Use **Median Filter** (homogenization in the case of grainy codes/images) Possible parameterization using C5xx:	
					0x01	Filter off
					0x0X	Quadratic filter size 3, 5, 7, 9, and 11 (0x0B)
				0xFF	**Debug depictions:** After:	
					C500	Switch off all debug depictions
					C501	Switch on all debut flags
					C5FE	Depiction of filtering in VideoOut off
					C5FF	Depiction of filtering in VideoOut on

Command				Description	
C	D_2	D_1	D_0		
C	7	H	H	**Change baud rate**	
				Value	**Baud rate**
				0x00	9600 baud
				0x01	19,200 baud
				0x02	38,400 baud
				0x03	57,600 baud
				0x04	76,800 baud
				0x05	115,200 baud
				0x06	4800 baud
				0x07	2400 baud
	8	H	H	Set automatic gain sweep. The hysteresis relating to the gain value can be useful when the symbols to be scanned have a changing contrast. The hysteresis can be set in ± 1 increments up to an increment figure of ± 255 increments. This means that each increment is always two values, a +value and a -value. The increment width is fixed at 5. Example: The gain is set to 100, the automatic gain sweep is activated with ± 2 increments and the increment width is set to 5. Therefore, if a triggering now takes place of five images one after the other, the following gain values will be recorded: 100, 105, 95, 110, 90. The set gain value can be said to be the average of the hysteresis. (Comment: The value range of the gain lies between 0 and 255. If the hysteresis procedure were to lead to the upper or lower limit being exceeded, the relevant gain value will be limited to 0 or 255. The automatic gain sweep stops once decoding is successful.	
	A	X	0	Loading parameters from the flash memory.	
	A	X	1	Restore factory settings, apart from IP parameters	
	A	X	2	Reset IP / subnet / gateway to 192.168.2.2 / 255.255.255.0 / 0.0.0.0	
	B	X	X	Saving parameters in the flash	
	C	H	H	Deleting, setting, or reading image capture options	
				Value	**Function**
				0x02	**Trigger** active if fault pattern memory full
				0x12	**Trigger** disabled if fault pattern memory full
				0x01	**Fault patterns**: Store current fault patterns only, old patterns will be overwritten
				0x11	**Fault patterns**: If the fault pattern memory is full, retain old patterns and do not write new ones
				0x21	Output in which fault patterns are saved: "00": For continually saving the last fault patterns "01": For saving the fault patterns occurring first
				0x22	Output for whether the trigger is disabled if the fault pattern memory is full: "00": not disabled "01": disabled
	E	H	H	**Fault pattern processing** **Note:** Fault patterns are saved only if the system has sufficient resources. Decoding and image capture have top priority.	
				Value	**Output**
				00	Provides the number of saved fault patterns
				01 to 05	CE01 to CE05 display fault patterns 1 to 5
				09	Displays the last captured image
				10	Erases the fault pattern memory

Command D

Command				
C	D_2	D_1	D_0	Description
D				**Send information** Parameter D_2 specifies the type of information. First, D_2 is repeated in the output, followed by the values.
	1	0	0	Decoding software version (ends with <CR><LF>)
	3	X	X	Display gain Example: 12_H means 18 decimal
	6	X	X	**Additional information**
	6	1	X	Display flash duration in 10 µs increments Example: 12_H (18 decimal) means 180 µs
	7	X	X	Grayscale threshold
	A	X	X	Number of good reads (8-digit hexadecimal counter output)
	B	X	X	Number of bad reads (8-digit hexadecimal counter output)
	D	X	X	Display shutter time in 30 µs increments Example: 12_H (18 decimal) means 540 µs
	F	0	X	Horizontal Data Matrix grid
	F	1	X	Vertical Data Matrix grid

Command E

Command					
C	D_2	D_1	D_0	Description	
E				**Set decoding parameter.** Parameter D_2 specifies the parameter:	
	1	H	H	Set grayscale threshold (D_1D_0). Value range: 0 to 255; factory default setting: 32_H (50 decimal)	
	3	H	H	Set X grid to D_1D_0 Number of Data Matrix modules in horizontal direction (in relation to the code, not the image!)	
	4	H	H	Set Y grid to D_1D_0 Number of Data Matrix modules in horizontal direction (in relation to the code, not the image!)	
	6	X	H	Specify code orientation	
				Value	**Orientation**
				0	Code in normal position (the finder appears as "L") (from version 3) **Note:** The values 0 to 3 are used for the accelerated search. In this case, it is not possible to select certain rotations.
				1	Code rotated through 90 degrees clockwise (from version 3)
				2	Code rotated through 180 degrees clockwise (from version 3)
				3	Code rotated through 270 degrees clockwise (from version 3)
				4, 5, 6	Emergency axis align (all rotation angles, omnidirectional)

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Command					
C	D_2	D_1	D_0	Description	
E	9	F	0	Activates sequential mode (trigger -> image capture -> analysis -> trigger ->...) Switchover only when system is idle (no image capture/analysis active)	
	9	F	1	Activates live mode (analysis at the same time as next image capture, capture and result output not synchronized). Maximum image frequency here! Switchover only when system is idle (no image capture/analysis active)	
	A	H	H	Error correction	
				Value	**Effect**
				0x00	No erasure correction — off
				0x01	No erasure correction — on
				0x10	No error correction, only error detection — off
				0x11	No error correction, only error detection — on
	B	0	H	Mirror option to read mirrored codes	
				Value	**Effect**
				0	No mirroring
				1	Mirroring
				2	Code reading first not mirrored, then mirrored
				3	Code reading first mirrored, then not mirrored
	B	1	H	Inverse option to read inverse printed codes	
				Value	**Effect**
				0	Printed normally (code black, background white)
				1	Inverse printed (code white, background black)
				2	First tries to decode normally, then inverse
				3	First tries to decode inverse, then normally
	C	0	H	Activate/deactivate internal decoder features For each activated feature, the digit must be added (bit coded)	
				Value	**Effect**
				0	All features on (factory default setting)
				1	Learning methods OFF (a good idea for specified parameterization)
				2	Finder estimate OFF
				4	Finder estimate from previous read OFF
				8	Second hypothesis code position OFF

Command				Description	
C	D_2	D_1	D_0		
E	C	F	H	Set flash color (if supported)	
				Value	**Effect**
				0	No illumination
				1	Red illumination
				2	Green illumination
				3	Red and green illumination
	E	X	H	Stop with read error	
				Value	**Effect**
				0	Stop with read error switched off
				1	Stop with read error switched on
	F	0	H	Control laser pointer	
				Value	**Effect**
				0	Laser pointer off
				1	Laser pointer 1 off, laser pointer 2 on
				2	Laser pointer 1 on, laser pointer 2 off
				3	Laser pointer on

Command F

Command				Description		
C	D_2	D_1	D_0			
F	X	X	X	Exit decoder and change baud rate. It is then imperative that the following sequence is observed: **Alternative: Command C7xx**fulfills exactly the same function and is easier to set up! **Sequence:** 1.) bd<SPACE>HH<CR> HH take from baud rate table 2.) Change the baud rate accordingly at the terminal. 3.) autoexec<CR> This string returns you to the decoder.		
				Baud rate table	HH	Baud rate
					7F	9600
					3F	19,200
					29	2880
					1F	38,400
					14	57,600
					0C	115,200

FACTORY AUTOMATION – SENSING YOUR NEEDS

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