PCV...-F200-B17-V1D

Data Matrix Positioning System

Manual

PROFINET®

Your automation, our passion.

PEPPERL+FUCHS

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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:

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

3.2 Intended use

Combined with a code strip with printed Data Matrix codes, this device represents a high-resolution positioning system that can be used in all applications where precision positioning is required along extremely long travel paths, irrespective of whether the travel path is straight, curved or with inclines or declines.

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 guaranteed only if the device is operated in accordance with its intended use.

3.3 General safety instructions

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

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

It is dangerous for the user to carry out modifications and/or repairs and doing so will void the warranty and exclude the manufacturer from any liability. In the event of any serious errors, stop using the device. Secure the device against unintended operation. To have the device repaired, return it to your local Pepperl+Fuchs representative or your sales center.

Note

Disposal

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

4 Product Description

4.1 Use and Application

The PCV… read head is part of the positioning system in the Pepperl+Fuchs incident light process. Its features include a camera module and an integrated illumination unit, enabling it to detect position markers printed onto an adhesive code reel in the form of Data Matrix codes.

The code reel is usually mounted to a fixed part of the equipment in a stationary manner (e.g., elevator shaft, overhead conveyor mounting rails) and the read head is then mounted in parallel to a moving "vehicle" (e.g., elevator car, overhead conveyor chassis).

Maximum Length of the Code Tape

Resolution of the read head [mm]	Maximum length of the code tape [km]
10	10 (100[1])
1	10 (100[2])
0.1	1,5

1. Version PCV100-F200-B17-V1D-6011-8203 up to 100km measuring length

2. Version PCV100-F200-B17-V1D-6011-8203 up to 100km measuring length

This positioning system can be used with an appropriate resolution in equipment with extremely large layouts without restrictions.

The extensive yet user-friendly parameterization options as well as the freely configurable inputs and outputs mean that the read head can easily be adapted to suit each application.

4.2 LED Indicators and Controls

The PCV... read head is equipped with seven indicator LEDs for carrying out visual function checks and rapid diagnostics. The read head is equipped with two buttons on the back of the device for activating the alignment aid (see chapter 6.1) and the parameterization mode. Button 1 is labeled ADJUST. Button 2 is labeled CONFIG.

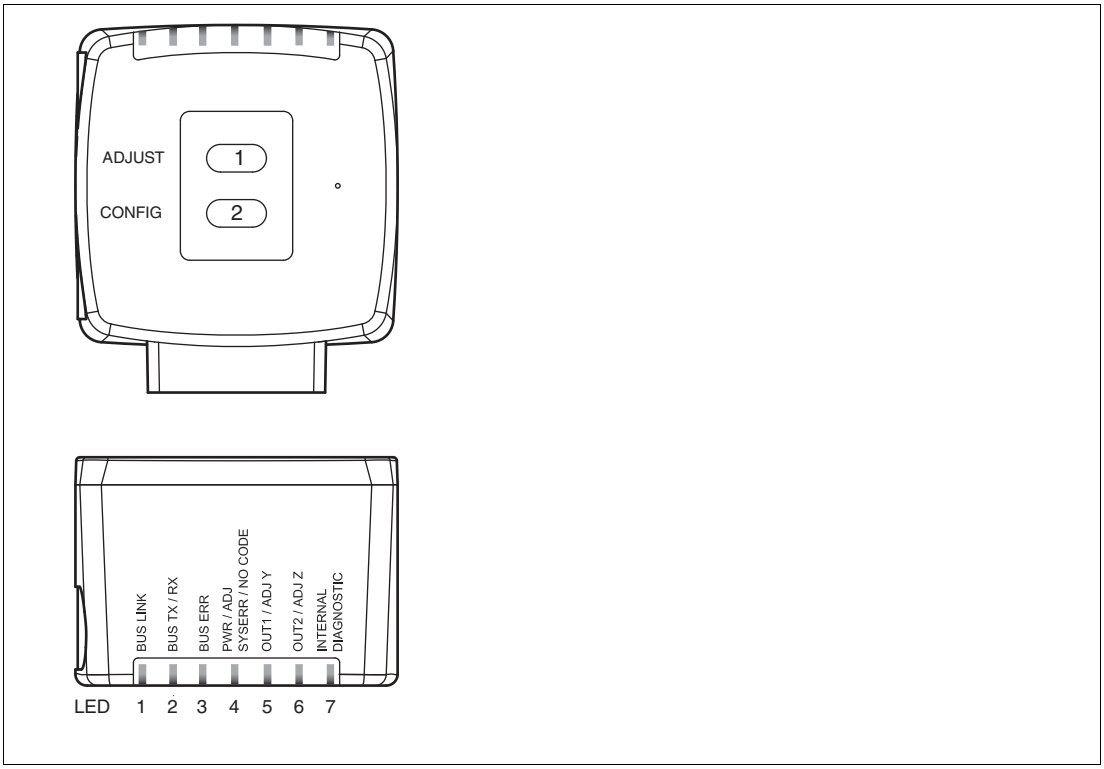


Figure 4.1

LED	[#1] BUS LINK	[#2] BUS TX/RX	[#3] BUS ERR	[#4] PWR/ADJ SYSERR/NO CODE	[#5] OUT 1/ADJ Y	[#6] OUT 2/ADJ Z	[#7] INTERNAL DIAGNOSTIC	
Color	**Green**	**Yellow**	**Red**	**Red/green**	**Yellow**	**Yellow**	**Red/green /yellow**	**Description**
Status	Off	Off	Off	Flashes green	Off	Off	Off	Alignment Y > setpoint value f_{flash} = 2 Hz
	Off	Off	Off	Flashes green	Lights up	Off	Off	Alignment Y < setpoint value f_{flash} = 2 Hz
	Off	Off	Off	Flashes green	Flashes	Off	Off	Alignment Y = setpoint value f_{flash} = 2 Hz
	Off	Off	Off	Flashes green	Off	Off	Off	Alignment Z > setpoint value f_{flash} = 2 Hz
	Off	Off	Off	Flashes green	Off	Lights up	Off	Alignment Z < setpoint value f_{flash} = 2 Hz
	Off	Off	Off	Flashes green	Off	Flashes	Off	Alignment Z = setpoint value f_{flash} = 2 Hz
	Off	Off	Off	Flashes red	Off	Off	Off	Alignment Code tape outside read range f_{flash} = 2 Hz
	x	x	x	Lights up red	x	x	x	System error
	x	x	x	Lights up green	x	x	x	Normal operation, code tape detected
	Lights up	x	x	x	x	x	x	PROFINET connection activated
	x	Flashes	x	x	x	x	x	PROFINET TX/RX data transfer
	x	x	Lights up	x	x	x	x	PROFINET communication error
	x	x	x	Flashes red	x	x	x	Code not recognized f_{flash} = 2 Hz
	x	x	x	x	x	On	On	Internal error Return to Pepperl+Fuchs

x = LED status has no meaning

4.3 Accessories

Compatible accessories offer enormous potential for cost savings. Not only do you save a great deal of time and effort when commissioning for the first time, but also when replacing and servicing our products.

If products are used in harsh ambient conditions, appropriate Pepperl+Fuchs accessories can be used to extend the service life of these products.

Model number	Description
V19-G-ABG-PG9-FE	Grounding terminal and plug (set)
PCV-SC12 PCV-SC12A	Grounding clip
V1SD-G-*M-PUR-ABG-V1SD-G	PROFINET bus cable, M12 to M12, available in several different lengths
VAZ-V1S-B	Stopping plug for M12 connector
V19-G-*M-*	Configurable connection cable[1)]
PCV-CM20-0*	Event marker
PCV-CR20	Repair strip

[1)]: Ask your contact person at Pepperl+Fuchs

5 Installation

5.1 Installing the Code Reel

The code reel is made of silicone-free polyester film. A position marker appears every 100 mm along the lower edge of the code reel (see "Dimensions, Code Reel"). This position marker is used for various functions including precise positioning of the code reel during assembly.
The reverse side of the code reel carries a permanent modified acrylate-based adhesive. Affix the self-adhesive code reel along the desired travel range. Proceed as follows:

Installing the Code Reel

1. Clean the surface of any greasy or oily deposits and dust.
2. Ensure that the surface is dry, clean, and stable.
3. Pull the protective foil at the beginning of the code reel a few centimeters forward. Place the code reel at the precise point of the required starting position on the underside, and press to attach.
4. Then affix the code reel along the desired travel range. Remove the protective film gradually so that the code reel does not accidentally adhere to the surface in the incorrect position. When affixing, ensure that the code reel does not crease or trap air bubbles.

↳ The adhesive on the code reel hardens after 72 hours.

Note

Thermal Expansion of the Code Reel

The heat expansion coefficient of the attached code reel corresponds to the heat expansion coefficient of the underside.

Dimensions, Code Reel

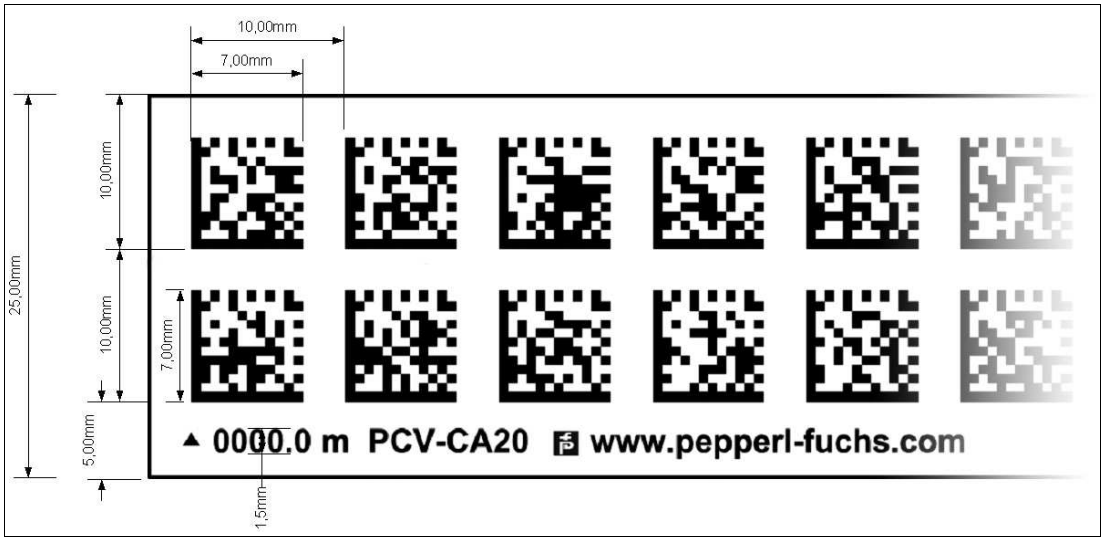


Figure 5.1

Orientation of the Code Reel and Read Head

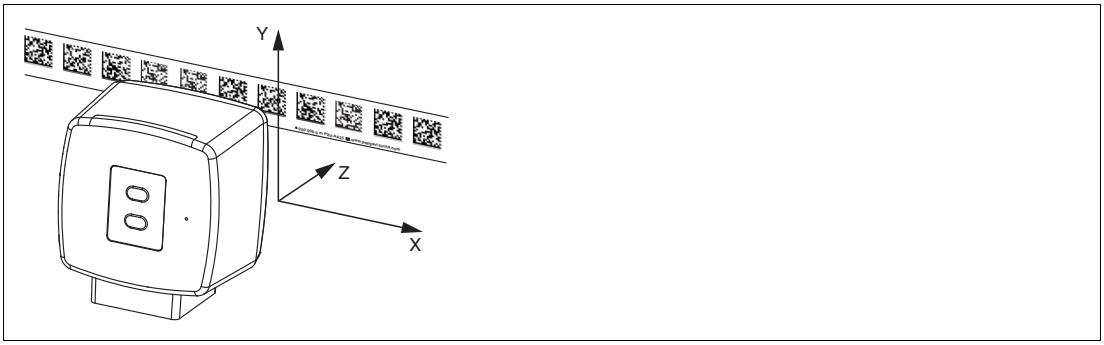


Figure 5.2

Position the code reel so that the **www.pepperl-fuchs.com** label and the position markings are below the data matrix code. The position values then increase along the X-direction. The diagram shows the orientation of a read head in the default position of 0°. The read head can be configured in the interface for other installation situations.

Code Reels with a Starting Position of 0 m

Model Number	Description
PCV6M-CA20-0	Code reel, 2-track, length: 6 m
...	...
PCV100M-CA20-0	Code reel, 2-track, length: 100 m

Code Reels with Different Starting Positions

Model Number	Description
PCV100M-CA20-0	Code reel, 2-track, length: 100 m, starting position: 0 m
PCV100M-CA20-10000	Code reel, 2-track, length: 100 m, starting position: 100 m
...	...
PCV100M-CA20-990000	Code reel, 2-track, length: 100 m, starting position: 9,900 m

Caution!

Stop Edges

If you attach another code reel at the end of a previous code reel, the code pattern of 10 mm must be retained.

Note

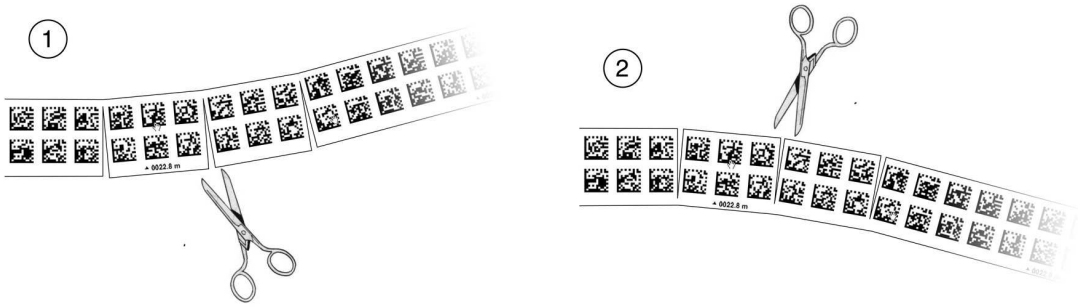
Expansion Joints

If the system covers longer distances, expansion joints are integrated in the system structure. We recommend creating breaks along the code reel. The resulting gaps should be 20 mm (2 code grids).

Note

Inclines and Declines

If you mount the code reel on inclines or declines, cut the code reel several times at the transition point to the horizontal as shown.



1. Incline
2. Decline

Note

Code Reels with Different Row Numbers

The PCV-CA20 code reel has two rows of code to compensate for slight deviations in the travel range in the Y-direction. The code reel is also available with other row numbers. The order code for the code reel is PCV-CAx0, whereby x represents the number of rows of code, which can be either 1 or 2. More rows are available on request–contact us for more information.

Code Reels with Different Numbers of Tracks

Model Number	Description
PCV*M-CA10-*	Code reel, 1-track
PCV*M-CA20-*	Code reel, 2-track
PCV*M-CA40-*	Code reel, 4-track
...	...

Hysteresis Y-Axis

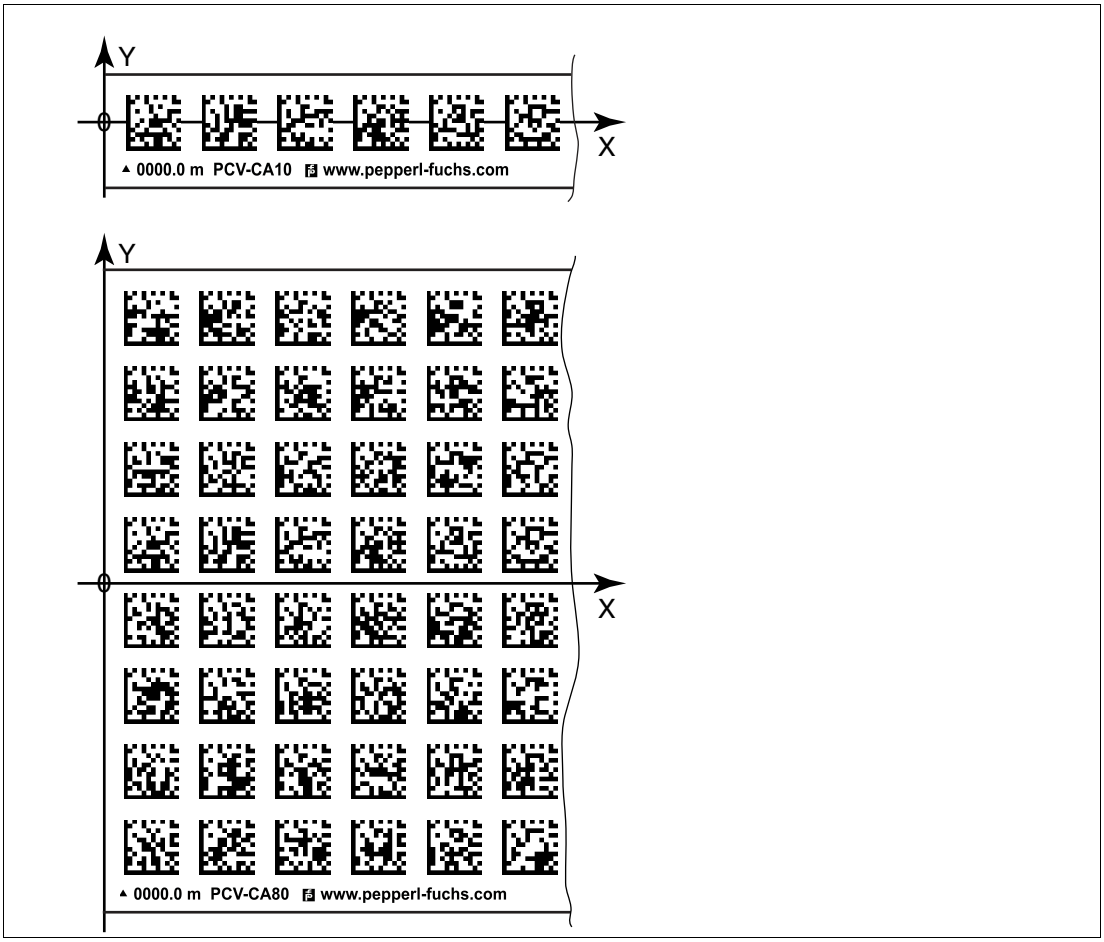


Figure 5.3 Zero line for code reels

If the read head leaves the zero line when traveling the X-axis, different threshold values will result depending on the number of tracks. If the deviation exceeds this threshold, a warning code is issued.

Y-Axis Deviation Thresholds

Code reel		Threshold	
Number of tracks	Width	Exit	Entry
1	15 mm	± 10 mm	± 6 mm
2	25 mm	± 15 mm	± 11 mm
4	45 mm	± 25 mm	± 21 mm
6	65 mm	± 35 mm	± 31 mm
8	85 mm	± 45 mm	± 41 mm

5.2 Mounting the Read Head

Mount the PCV... read head on the moving part of your equipment using the four screws on the mounting adapter of the read head. Mount the read head in such a way that the lens with ring light and camera module are aligned toward the code tape.

The stability of the mounting and the guidance of the moving system component must be such that the field of the depth of focus of the read head is not exited during operation.

The distance between the read head and the code tape should be the same as the read distance of the read head.

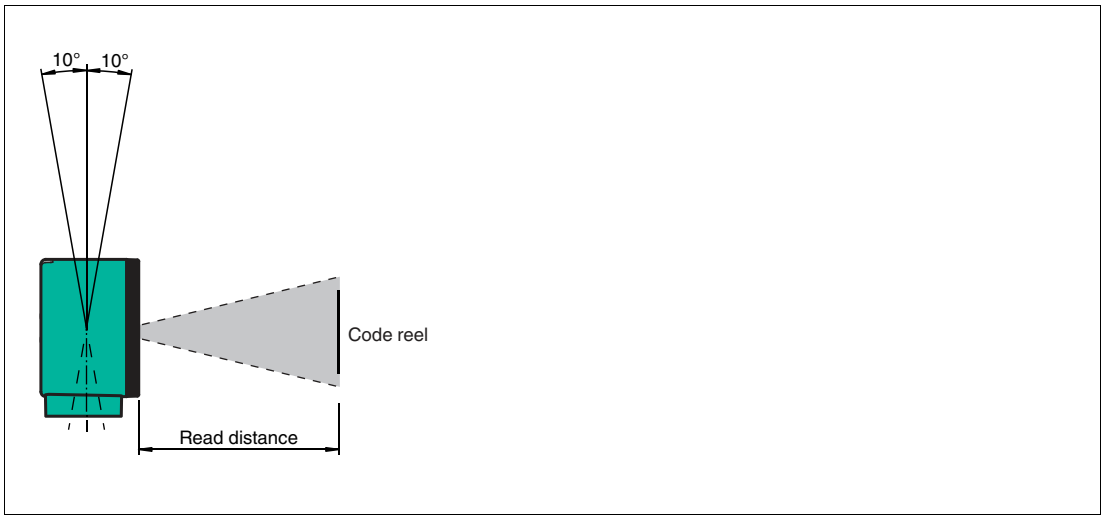


Figure 5.4 Vertical alignment tolerance

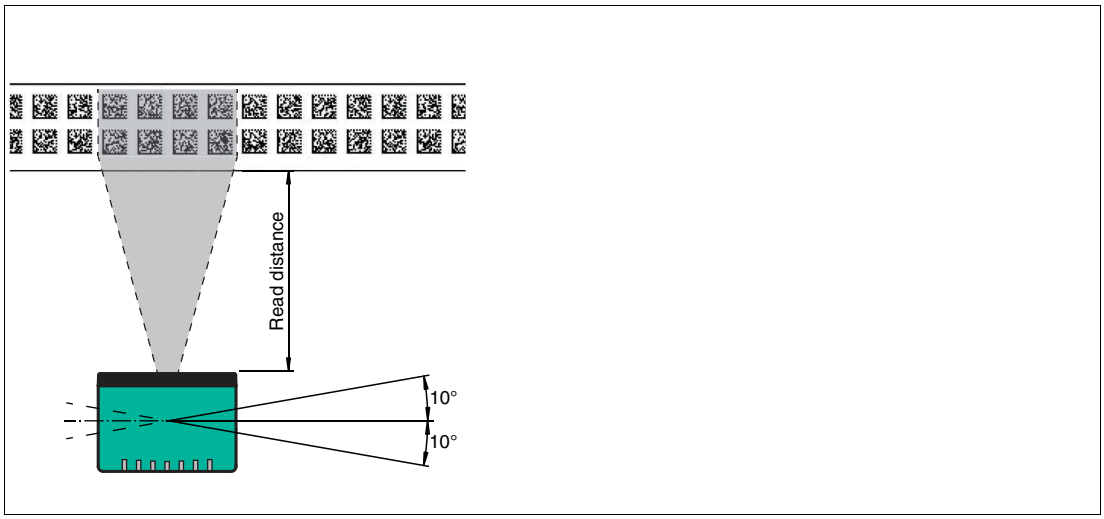


Figure 5.5 Horizontal alignment tolerance

Optimum Read Distance (Z-Axis)

Model Number	Read Distance [mm]	Depth of Focus [mm]
PCV50*	50	± 25
PCV80*	80	± 15
PCV100*	100	± 20
PCV100*-...-6011	100	± 40

Read Head Dimensions

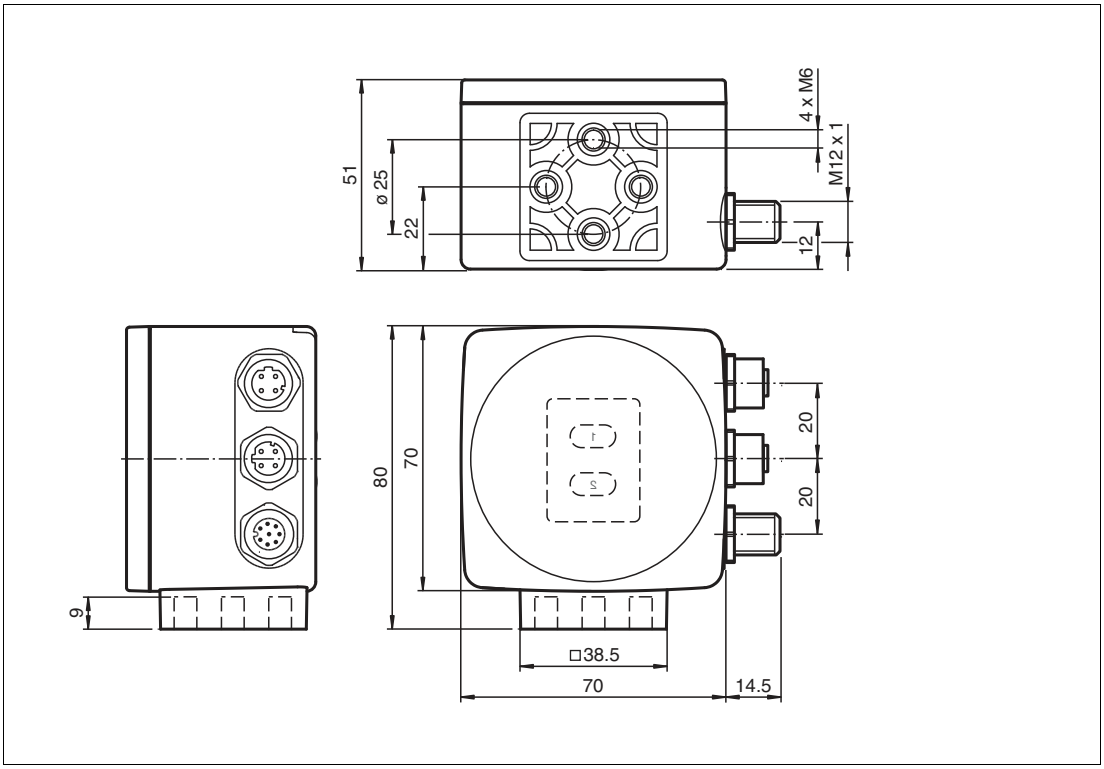


Figure 5.6

Caution!

When selecting mounting screws, ensure that the maximum insertion depth of the screws in the threaded inserts on the read head is 8 mm.

Using longer screws can damage the read head.

Caution!

The maximum torque of the mounting screws must not exceed 9 Nm.

Tightening the screws to a higher torque can damage the read head.

5.3 Electrical Connection

The PCV... read head is connected electrically via an 8-pin M12 x 1 connector on the side of the housing. The power supply and communication with peripheral devices are established via this connection. The configurable inputs and outputs of the read head are located at this connection.

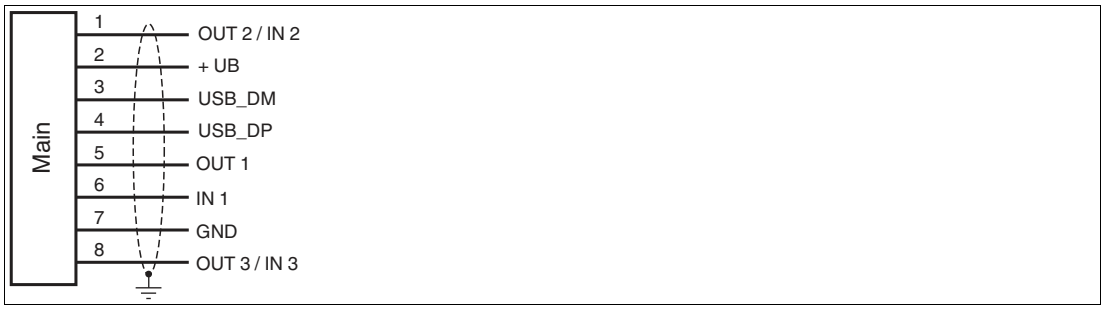


Figure 5.7

Connector Assignment

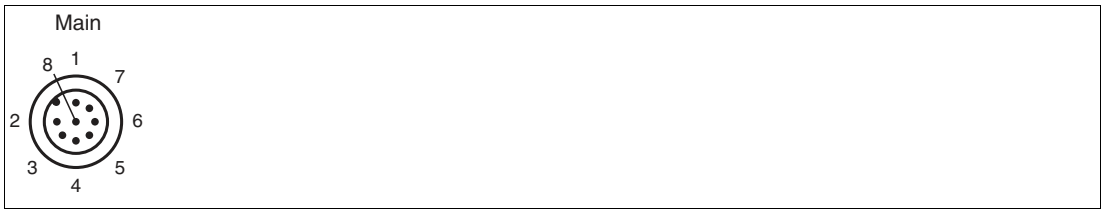


Figure 5.8

Color Assignment

Pepperl+Fuchs single-ended cordsets (female) are manufactured in accordance with EN60947-5-2. When using a type V19-... (see chapter 4.3) female cordset with an open cable end on the **Main** connection, the colors are assigned as follows:

Connection pin	Strand color	Color abbreviation
1	White	WH
2	Brown	BN
3	Green	GN
4	Yellow	YE
5	Gray	GY
6	Pink	PK
7	Blue	BU
8	Red	RD

Shielding Cables

The shielding of connection lines is required to suppress electromagnetic interference. Establishing a low resistance or low impedance connection with the protective conductor or equipotential bonding circuit is a particularly important factor in ensuring that these interference currents do not become a source of interference themselves. Only use connection lines with braid. Avoid connection lines with foil shield because this would increase the line capacities. The shielding is integrated at both ends, i.e., in the switch cabinet or on the PLC, **and** on the read head. The grounding terminal available as an accessory allows easy integration in the equipotential bonding circuit.

In exceptional cases, the shielding of a connection at one end may be more favorable if:

- An equipotential bonding cable is not laid or cannot be laid.
- A film shield is used.

The following points relating to shielding must be noted:

- Use metal cable clips that cover large areas of the shielding.
- Place the cable shield onto the equipotential bonding rail immediately on entering the switch cabinet.
- Direct the protective grounding connections to a common point in a star configuration.
- The cross-section of the cables used for grounding should be as large as possible.

Additional Ground Connection

Model number	Description
PCV-SC12	Clip for mounting an additional ground connection.
PCV-SC12A	

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 the device to direct current (DC). Ensure that the supply voltage rating is within the specified device range. Ensure that the connecting wires on the female cordset are connected correctly.

5.4 PROFINET Connection

The reader is connected to PROFINET via two 4-pin, D-coded connector sockets, M12 x 1, **Profinet 1** and **Profinet 2**, on the side of the housing.

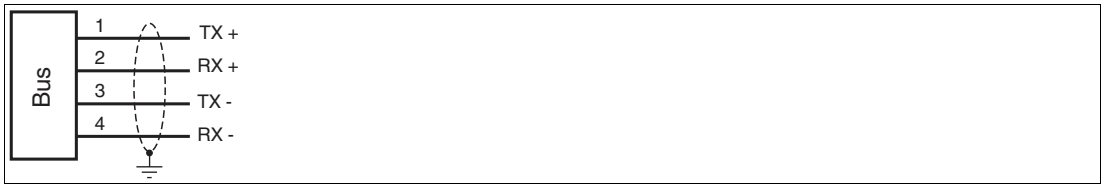


Figure 5.9 PROFINET connection diagram

Connector Assignment

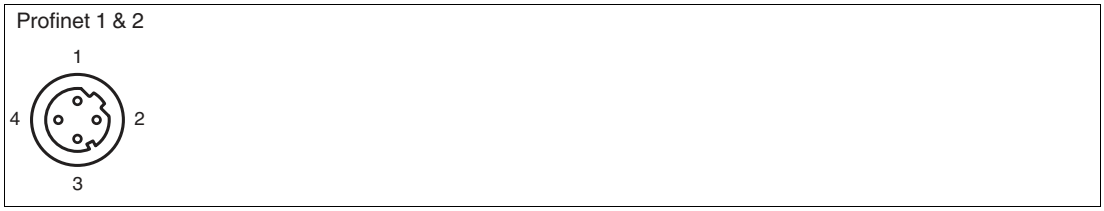


Figure 5.10 PROFINET connector assignment

Suitable PROFINET cables can be found in the accessories section of the reader datasheet at www.pepperl-fuchs.com.

6 Commissioning

6.1 Aligning the Read Head

An integrated alignment aid is available to help you align the Y and Z coordinates of the read head easily and precisely with respect to the code reel.

Note

The activation of the alignment aid is possible only within 10 minutes of switching on the read head.

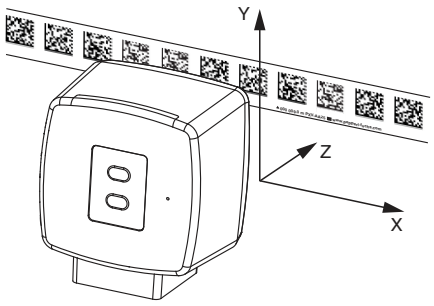
The switchover from normal operation to parameterization mode is via button 1 on the back of the read head.

Activating the Alignment Aid

1. Press button 1 for longer than 2 seconds.

   ↳ LED2 flashes green for a recognized code reel. LED2 flashes red for an unrecognized code reel. .

2. Align the Z and Y coordinates of the read head. The integral LED indicators provide assistance here.



Z coordinate: If the distance of the camera to the code reel is too small, the yellow LED5 lights up. If the distance is too great, the yellow LED5 goes out. The yellow LED5 flashes at the same time as the green LED2 when within the target range. .
Set the distance between the read head and the code reel so that the yellow LED5 and the green LED2 flash synchronously.

Y coordinate: If the optical axis of the read head is too low relative to the middle of the code reel, the yellow LED4 lights up, . If the optical axis is too high, the yellow LED4 goes out. Within the target range, the yellow LED4 flashes at the same time as the green LED2.
Set the optimal height of the read head relative to the code reel so that the yellow LED4 flashes in rhythm with the green LED2.
Briefly pressing button 1 ends the alignment aid, and the read head returns to normal operation.

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7 Operation and communication

7.1 Communication via PROFINET

7.1.1 General Information on Communication via PROFINET

PROFINET is an open standard for industrial automation based on industrial Ethernet. PROFINET integrates information technology with established standards such as TCP/IP and XML in automation technology.

Within PROFINET, PROFINET IO is the communication concept for the construction of decentralized applications. This means that decentralized field devices are integrated through PROFINET IO. The familiar IO view of PROFIBUS DP is used where the usable data of the field devices is transferred to the controller process image in cycles. PROFINET IO is a device model consisting of slots and channels, which is based on the main features of PROFIBUS DP. The field device properties are written in a Generic Station Description Markup Language (GSDML) based on XML. PROFINET IO is engineered in the same way as has long been the case for system integrators of PROFIBUS DP. The decentralized field devices are assigned in the design of a controller.

PROFINET IO distinguishes between the following three device types:

- IO controller: Controller that executes the automation program.
- IO device: Decentrally assigned field device that is assigned to an IO controller.
- IO supervisor: Programming unit/PC with commissioning and diagnostic functions.

7.1.2 PROFINET I/O Interface

The reader functions as a PROFINET I/O device that communicates cyclically with the assigned PROFINET I/O controller during operation.

The PROFINET interface of the reader supports the following features:

- 100 Mbits/s transfer rate
- Real-time category (RT)
- The range of functions in accordance with **Conformance Class B**
- Identification and maintenance functions (I&M) IM0 ... IM4

7.1.2.1 Identification & Maintenance (I&M) Data

Identification and maintenance data (I&M data) is information stored in a device. I&M data uniquely identifies a device within a plant. The identification data (I data) includes information about the device, for example the item number and device name. Identification data cannot be changed.

Maintenance data (M data) includes information about the device within the plant, for example the installation location and installation date. Maintenance data is initially stored in the device during installation. Maintenance data can be changed.

Accessing and Editing I&M Data

The Step7 software from Siemens can be used to display and change the I&M data.

1. To do so, open the hardware configuration **HW Config** and call up the "Target system" menu.
2. Open one of the following functions:
   - "Download module identification"
   - "Download module identification in PG"

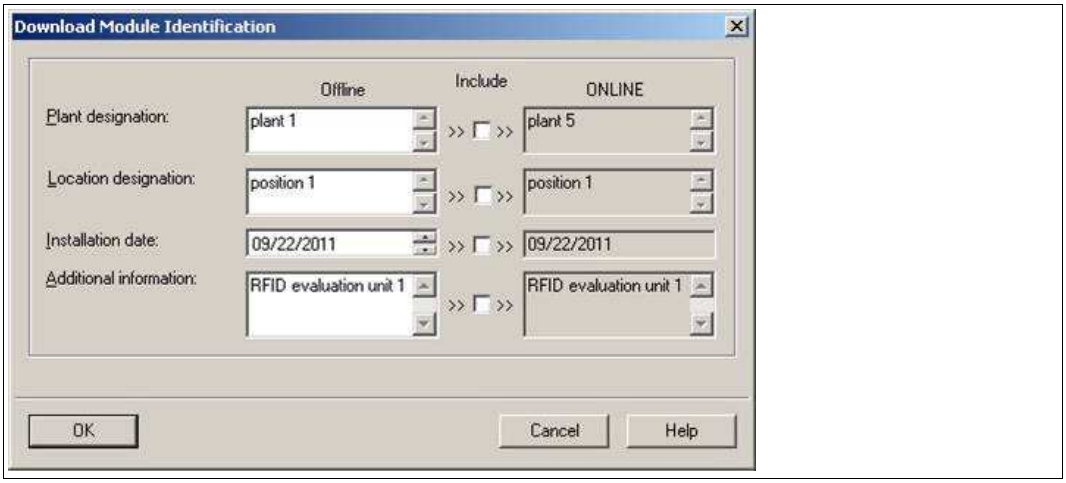

Figure 7.1

3. Depending on the requirement, read or edit the following I&M data:
   - I&M data 1: higher-level assignment, location designation
   - I&M data 2: installation date
   - I&M data 3: additional information

7.1.3 Project Planning Using Device Description

As with PROFIBUS DP, a field device is integrated into the project planning tool by way of a device description. The field device properties are described in the GSD file. The GSD file contains the field device data (technical features and information for communication) that you need to operate the device in a PROFINET network.

Import the GSD file into a project planning tool. Peripheral addresses are assigned to the individual channels of the field devices. The peripheral input addresses incorporate the received data. The user program evaluates and processes this data. The user program generates the peripheral output values and sends them to the control interface.

Once project planning is complete, the I/O controller receives the planning and configuration data. The I/O controller parameterizes and configures the field devices automatically.

Downloading the GSD File

You can find the relevant GSD file in the **Software** section of the product detail page for the device.

To access the product detail page for the device, go to http://www.pepperl-fuchs.com and type information about the device (e.g., the product description or the item number) into the search function.

7.1.4 PROFINET Address and Identifying a Device

Every PROFINET IO has a unique device identification. This device identification consists of the following:

- A unique **MAC address**. This MAC address is printed on the back of the device.
- A **device name**. The default device name is `pcv-f200`.
- An **IP address**. The default IP address is `192.168.2.2`.

7.1.5 PROFINET Modules

1 word = 16 bit value

1 byte = 8 bit value

7.1.5.1 Modules with response telegram

The following modules enable reader data to be retrieved using PROFINET.

Position Data X Module

Size	Type	Content
2 words, consistent	Input data	32-bit X data MSB first MSB = **m**ost **s**ignificant **b**yte Resolution: 0.1 mm, 1 mm, 10 mm, binary coded At a resolution of 1 mm and 10 mm: L_{max} = 10 km = 10,000,000 mm At a resolution of 1 mm and 10 mm: L_{max} = 100 km[1] = 100,000,000 mm

1. Version PCV100-F200-B17-V1D-6011-8203 up to 100 km measuring length

Response

Bit No.	Content	
	Word 1 X Data	Word 2 X Data
0	XP16	XP00
1	XP17	XP01
2	XP18	XP02
3	XP19	XP03
4	XP20	XP04
5	XP21	XP05
6	XP22	XP06
7	XP23	XP07
8	XP24	XP08
9	XP25	XP09
10	XP26	XP10
11	XP27	XP11
12	XP28	XP12
13	XP29	XP13
14	XP30	XP14
15	XP31	XP15

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Position Data Y Module

Size	Type	Content
2 words, consistent	Input data	32-bit Y data MSB first Resolution: 0.1 mm, 1 mm, 10 mm, binary coded in two's complement

Response

Bit No.	Content	
	Word 1 Y Data	Word 2 Y Data
0	YP16	YP00
1	YP17	YP01
2	YP18	YP02
3	YP19	YP03
4	YP20	YP04
5	YP21	YP05
6	YP22	YP06
7	YP23	YP07
8	YP24	YP08
9	YP25	YP09
10	YP26	YP10
11	YP27	YP11
12	YP28	YP12
13	YP29	YP13
14	YP30	YP14
15	YP31	YP15

Speed Data Module

Size	Type	Content
1 word, consis-tent	Input data	16-bit speed data Resolution: 0.1 m/s, 0.01 m/s, 0.001 m/s, binary coded Speed of 0 ... 12.5 m/s **Example:** Speed = 4.7 m/s --> speed output = 47 at a resolution of 0.1 m/s 65535 for unknown speed

Response

Bit No.	Content Word 1 Speed
0	SP00
1	SP01
2	SP02
3	SP03
4	SP04
5	SP05
6	SP06
7	SP07
8	SP08
9	SP09
10	SP10
11	SP11
12	SP12
13	SP13
14	SP14
15	SP15

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Status Module

Size	Type	Content
1 word	Input data	16-bit status

Response

Bit No.	Content Byte 1 Status	Function
0	ERR	Error message (error code in XP00–XP15); remaining bits = 0, see **Error Codes**
1	NP	No position information/OUT (XP = 0, YP = 0, SP = 0)
2	WRN	Warnings present, see **Warning Module**
3	EV	EVENT present
4	posdetected	Valid position information available
...	...	-
15	0	-

Error Codes

Error code	Description	Priority
1	Reader tilted 180°	2
2	No clear position can be determined (difference between codes is too great, code distance incorrect, etc.)	3
> 1000	Internal error	1

Event Marker No. Module

Size	Type	Content
1 words, consistent	Input data	Last event marker Last event no.

Response

Bit No.	Content Word 1 Last event marker data
0	EV01
1	EV02
2	EV03
3	EV04
4	EV05
5	EV06
6	EV07
7	EV08
8	EV09
9	0
...	...
15	0

Warning Module

Size	Type	Content
1 word, consistent	Input data	Last warnings Last warning no.

Response

Bit No.	Content Word 1 Last warning data
0	WRN01
1	WRN02
2	WRN03
3	WRN04
4	WRN05
5	WRN06
6	WRN07
7	WRN08
8	WRN09
9	WRN10
10	WRN11
11	WRN12
12	WRN13
13	WRN14
14	WRN15
15	WRN16

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Warning Data Set

Bit No.	Content Word 1	Description
0	WRN01	A code with non-PXV content was found
1	WRN02	Reader too close to code tape
2	WRN03	Reader too far from code tape
3	WRN04	Y position too large. The sensor is just before OUT
4	WRN05	Y position too small. The sensor is just before OUT
5	WRN06	The reader is rotated or tilted in relation to the code tape
6	WRN07	Low level of code contrast
7	WRN08	Repair tape detected
8	WRN09	Temperature too high
9	WRN10	Reserved
10	WRN11	Reserved
11	WRN12	Reserved
12	WRN13	Reserved
13	WRN14	Reserved
14	WRN15	Reserved
15	WRN16	Reserved

Table 7.1 If no warnings are present, all bits in the warning data set are set to 0.

7.1.5.2 Global Primary Data

The global primary data allows you to parameterize the read head using PROFINET. The global primary data is always transferred to the read head in full.

Designation	Function	Parameter data	Primary data
Orientation	Orientation of read head in relation to code tape	Orientation	**0°** 0/180° 180°
Code Tape Type	Configuration of code tape width	Code tape width	1 row **2 rows** 3 rows 4 rows 5 rows 6 rows 7 rows 8 rows
X-Resolution	Multiplier for the length in the direction of the X coordinate	Resolution	0.1 mm **1 mm** 10 mm
Y-Resolution	Multiplier for the length in the direction of the Y coordinate	Resolution	0.1 mm **1 mm** 10 mm
Speed-Resolution	Multiplier for the velocity output	Resolution	**0.1 m/s** 0.01 m/s 0.001 m/s
Horizontal Offset	Offset in the direction of the X coordinate	Length	**0 mm** – ±10,000,000 mm
Input Function	Function at input signal	Function of input	**No Function**
Output1 Function	Meaning of the output signal at output 1	Function of output	**No Function** Overspeed Warning Error Event No Position Repair Strip
Output2 Function	Meaning of the output signal at output 2	Function of output	**No Function** Overspeed Warning Error Event No Position Repair Strip
Output3 Function	Meaning of the output signal at output 3	Function of output	**No Function** Overspeed Warning Error Event No Position Repair Strip
Output1 Overspeed Value	Speed at which output 1 is activated	Speed	0 mm/s – 65,534 mm/s **12,500 mm/s**
Output2 Overspeed Value	Speed at which output 2 is activated	Speed	0 mm/s – 65,534 mm/s **12,500 mm/s**
Output3 Overspeed Value	Speed at which output 3 is activated	Speed	0 mm/s – 65,534 mm/s **12,500 mm/s**

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Designation	Function	Parameter data	Primary data
No Position Value X	X value if no code tape is visible	X data at "No Position"	Last Valid Position **Specified Position** (**0 mm** – 10,000,000 mm)
No Position Value Y	Y value if no code tape is visible	Y data at "No Position"	Last Valid Position **Specified Position** (**0 mm** – 10,000,000 mm)
No Position Value Speed	Speed value if no code tape is visible	Speed data at "No Position"	Last Valid Speed **Specified Speed** (**0 mm/s** – 65,534 mm/s)

Table 7.2 **Bold** = default values

7.2 Operating with event markers

In numerous position coding system applications, defined processes must be started at specific positions so that the controller can evaluate the position data measured by the reading head. However, this means that the exact positions for triggering events of this kind must be defined as early as the system planning stage and can no longer be modified during the construction phase or commissioning. If modifications are made, the position data stored in the control software must be adapted accordingly, which involves a great deal of time and effort.

Activating a process through the detection of so-called event markers is a much more flexible method. Only a specific event and the process linked with the event have to be programmed into the system controller. The position in which the corresponding event marker is placed along the code strip can be decided immediately before final commissioning of the system. Even if subsequent changes are made to the layout of a system, the relevant event marker is simply moved to the new position without requiring program modifications.

Event markers are short code strips one meter in length. The event marker bears the encoded event number and position information in incremental form. Event markers are available with event numbers from 001 to 999. To transfer the exact position data, the reading head calculates the last absolute position of the code strip before it entered the event range and adds the incremental offset from the codes of the event markers.

When the reading head enters the range of an event marker, it sets an event flag in the output data. You also have the option of triggering a defined action when an event occurs by parameterizing one of the outputs accordingly (see chapter 7.1). Actions of this type can be initiated when a certain event, all events or events from an event list occur.

The 1 meter long event marker can be shortened. However, the minimum length should be 30 mm (3 codes). If the travel speed of the reading head increases, a longer event marker is required. If the reading head travels at maximum speed, a full length event marker of 1 meter must be positioned over the code strip.

The minimum length of an event marker can be calculated according to the following formula depending on the travel speed and the trigger period:

$L_{Event\ marker} = 30\ mm + V_{max}\ [m/s] * T_{trigger}\ [s] \times 2$

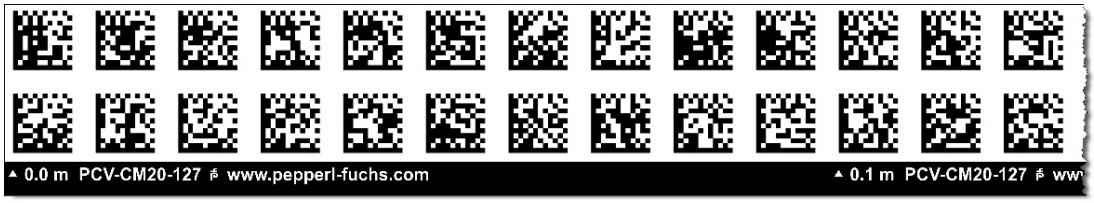
With auto trigger, the trigger period is 0.025 s.

Example calculation
At a speed of 3 m/s and with a trigger period of 25 ms, the minimum length of the event marker is therefore:
$L_{Event\ marker} = 30\ mm + 3\ m/s * 0.025\ s * 2 =$ **180 mm**

Note

When placing an event marker on the code strip, make sure that the event marker represents an accurate continuation of the grid on the code strip where possible.

The printed event number and the inverted text identify event markers in contrast to the identification on code strips (white text on a black background).



The illustration shows part of the event marker #127

Refer to the Accessories chapter for order information relating to event markers.

7.3 Operation with Repair Tape

The repair tape is a short code reel with a length of one meter. The repair tape is used to bridge defective or damaged areas of an existing code reel.

1. Cut the repair tape to the required length
2. Cover the defective area of the code reel with the repair tape

Note

When placing a repair tape on the code reel, make sure that the repair tape represents as accurate a continuation of the grid on the code reel as possible.

When the read head enters the range of a repair tape, it sets an event flag in the output data. You also have the option of triggering a defined action when an event occurs by parameterizing one of the outputs accordingly (see chapter 7.1). Actions of this type can be initiated when a certain event, all events, or events from an event list occur.

Note

The repair tape works incrementally. In so doing, it adds one value to the previous read position on the code reel. If the read head starts on a repair tape, the read head reports an error. Move the read head to a position on the code reel away from the repair tape to read the absolute value.

Tip

If repairs are required, the **Code Reel Generator** at www.pepperl-fuchs.com can be used as a short-term workaround. This allows code reel segments to be generated and printed out online.

Enter the start value in meters and the code reel length of the section to be replaced in meters. This produces a printable PDF file with the required segment of the code reel.

Only use the printout as an emergency solution. The durability of the paper strip varies greatly depending on the application!

Refer to the Accessories chapter for order information relating to repair tape.

8 Appendix

8.1 ASCII table

hex	dec	ASCII	hex	dec	ASCII	hex	dec	ASCII	hex	dec	ASCII
00	0	NUL	**20**	**32**	**Space**	40	64	@	**60**	**96**	'
01	1	SOH	**21**	**33**	**!**	41	65	A	**61**	**97**	**a**
02	2	STX	**22**	**34**	**"**	42	66	B	**62**	**98**	**b**
03	3	ETX	**23**	**35**	**#**	43	67	C	**63**	**99**	**c**
04	4	EOT	**24**	**36**	**$**	44	68	D	**64**	**100**	**d**
05	5	ENQ	**25**	**37**	**%**	45	69	E	**65**	**101**	**e**
06	6	ACK	**26**	**38**	**&**	46	70	F	**66**	**102**	**f**
07	7	BEL	**27**	**39**	**'**	47	71	G	**67**	**103**	**g**
08	8	BS	**28**	**40**	**(**	48	72	H	**68**	**104**	**h**
09	9	HT	**29**	**41**	**)**	49	73	I	**69**	**105**	**I**
0A	10	LF	**2A**	**42**	*****	4A	74	J	**6A**	**106**	**j**
0B	11	VT	**2B**	**43**	**+**	4B	75	K	**6B**	**107**	**k**
0C	12	FF	**2C**	**44**	**,**	4C	76	L	**6C**	**108**	**l**
0D	13	CR	**2D**	**45**	**-**	4D	77	M	**6D**	**109**	**m**
0E	14	SO	**2E**	**46**	**.**	4E	78	N	**6E**	**110**	**n**
0F	15	SI	**2F**	**47**	**/**	4F	79	O	**6F**	**111**	**o**
10	16	DLE	**30**	**48**	**0**	50	80	P	**70**	**112**	**p**
11	17	DC1	**31**	**49**	**1**	51	81	Q	**71**	**113**	**q**
12	18	DC2	**32**	**50**	**2**	52	82	R	**72**	**114**	**r**
13	19	DC3	**33**	**51**	**3**	53	83	S	**73**	**115**	**s**
14	20	DC4	**34**	**52**	**4**	54	84	T	**74**	**116**	**t**
15	21	NAK	**35**	**53**	**5**	55	85	U	**75**	**117**	**u**
16	22	SYN	**36**	**54**	**6**	56	86	V	**76**	**118**	**v**
17	23	ETB	**37**	**55**	**7**	57	87	W	**77**	**119**	**w**
18	24	CAN	**38**	**56**	**8**	58	88	X	**78**	**120**	**x**
19	25	EM	**39**	**57**	**9**	59	89	Y	**79**	**121**	**y**
1A	26	SUB	**3A**	**58**	**:**	5A	90	Z	**7A**	**122**	**z**
1B	27	ESC	**3B**	**59**	**;**	5B	91	[	**7B**	**123**	**{**
1C	28	FS	**3C**	**60**	**<**	5C	92	\	**7C**	**124**	**I**
1D	29	GS	**3D**	**61**	**=**	5D	93	]	**7D**	**125**	**}**
1E	30	RS	**3E**	**62**	**>**	5E	94	^	**7E**	**126**	**~**
1F	31	US	**3F**	**63**	**?**	5F	95	_	**7F**	**127**	**DEL**

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