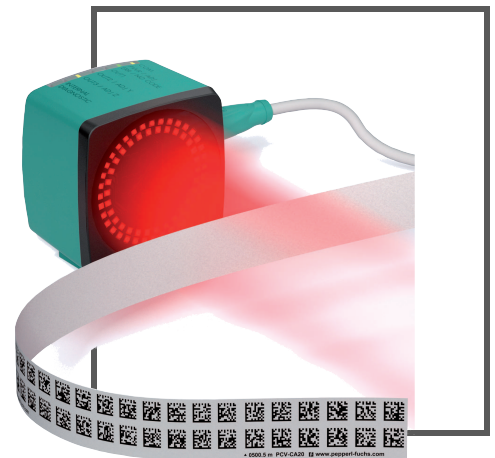


MANUAL

PCV...-F200-B6-V15B Data Matrix Positioning System



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:

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



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

3.3 General safety instructions

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

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

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



Note!

Disposal

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

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
1	10
0.1	10

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 7 indicator LEDs for carrying out visual function checks and rapid diagnoses. The read head is equipped with 2 buttons for activating the alignment aid (see chapter 6.1) and the parameterization mode (); these buttons are located on the back of the device. Button 1 is labeled ADJUST and button 2 is labeled CONFIG.

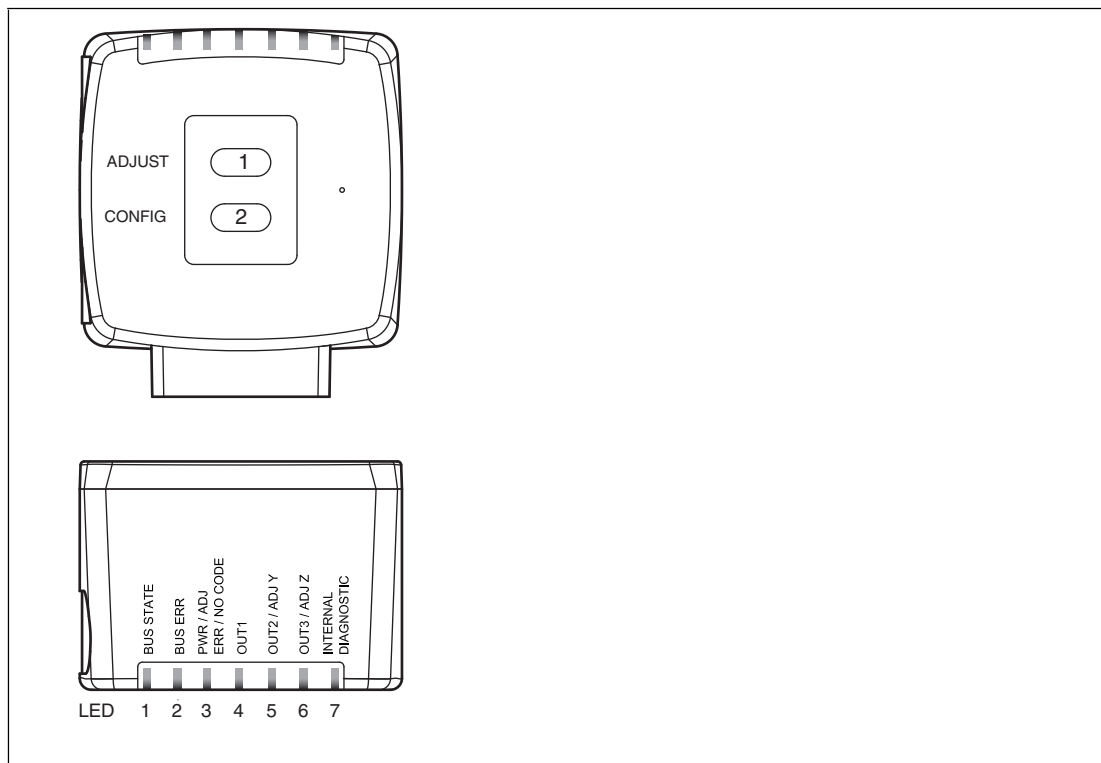


Figure 4.1

LED	[#1] BUS STATE	[#2] BUS ERR	[#3] PWR/ADJ ERR/NO CODE	[#4] OUT 1	[#5] OUT 2/ADJ Y	[#6] OUT 3/ADJ Z	INTERNAL DIAGNOSTICS		Description	
Color	yellow	red	green/ red	yellow	yellow	yellow	yellow	yellow		
Status	Off	Off	Flashes green	Off	Off	Off	Off	Off	Alignment Y > setpoint value f _{flash} = 2 Hz	
	Off	Off	Flashes green	Off	On	Off	Off	Off	Alignment Y < setpoint value f _{flash} = 2 Hz	
	Off	Off	Flashes green	Off	Flashes	Off	Off	Off	Alignment Y = setpoint value f _{flash} = 2 Hz	
	Off	Off	Flashes green	Off	Off	Off	Off	Off	Alignment Z > setpoint value f _{flash} = 2 Hz	
	Off	Off	Flashes green	Off	Off	On	Off	Off	Alignment Z < setpoint value f _{flash} = 2 Hz	
	Off	Off	Flashes green	Off	Off	Flashes	Off	Off	Alignment Z = setpoint value f _{flash} = 2 Hz	
	Off	Off	Flashes red	Off	Off	Off	Off	Off	Alignment Code reel outside read range f _{flash} = 2 Hz	
	Off	Off	Lights up red	Off	Off	Off	Off	Off	System error	
	x	x	Lights up green	x	x	x	x	Off	Off	Normal operation, code reel detected
	Lights up	Off	x	x	x	x	x	Off	Off	PROFIBUS data transfer LEDs marked with x indicate the status of the relevant output.
	Off	Flashes	x	x	x	x	x	Off	Off	PROFIBUS error f _{flash} = 1 Hz LEDs marked with x indicate the status of the relevant output.
	x	x	Flashes red	Flashes	Flashes	Flashes	Flashes	Off	Off	Normal operation. Indication for 2 s if a button is pressed when the time lock is enabled.
	x	x	Off	Flashes	Off	Off	Off	Off	Off	Pre-config./config. mode active f _{flash} = 2 Hz
	x	x	Lights up red	Flashes	Off	Off	Off	Off	Off	Code card faulty f _{flash} = 2 Hz for 3 sec
	x	x	Green, 1 s	Flashes	Off	Off	Off	Off	Off	Code card detected f _{flash} = 2 Hz for 3 sec
x	x	Off	x	x	x	x	Off	Off	Time lock for buttons disabled	
x	x	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 lives of these products.

Model Number	Description
V19-G-ABG-PG9-FE	Grounding terminal and plug (set)
PCV-SC12 PCV-SC12A	Grounding clip
PCV-KBL-V19-STR-USB	USB cable unit with power supply, for service interface
V15B-G-*M-PUR ABG-V15B-G	PROFIBUS bus cable, M12 to M12, available in several different lengths
VAZ-V1S-B	Blind plug for M12 socketsr
ICZ-TR-V15B	Terminator for PROFIBUS
V19-G-*M-*	Configurable connection cable ¹⁾
PCV-CM20-0*	Event marker
PCV-CR20	Repair strip

¹⁾: Ask your contact partner 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

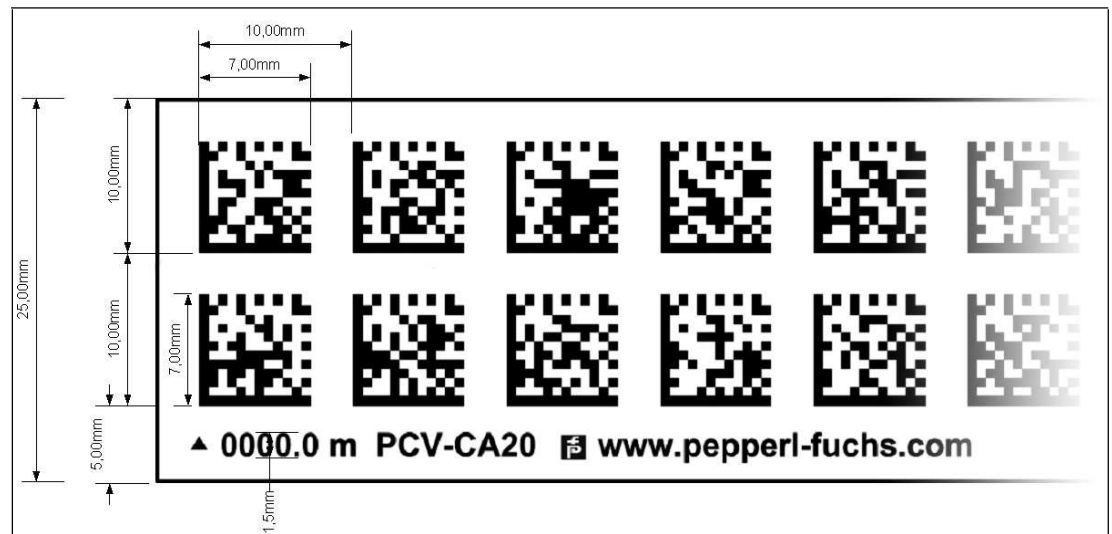


Figure 5.1

Orientation of the Code Reel and Read Head

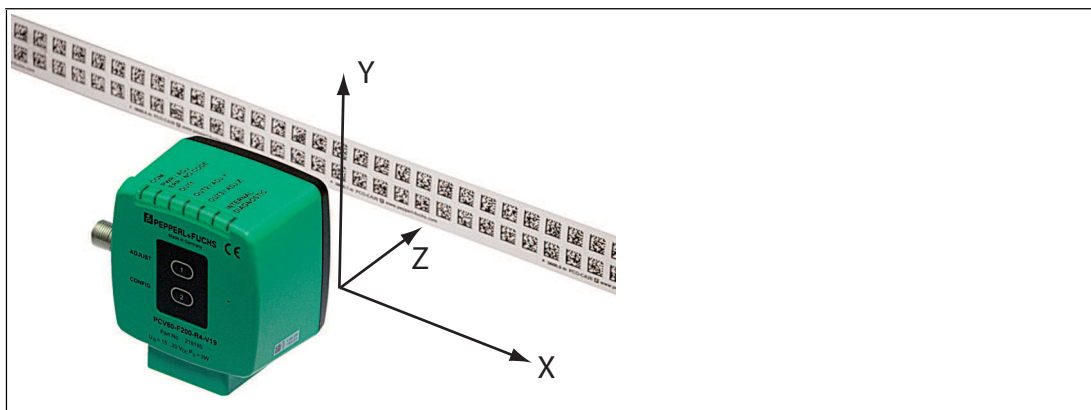


Figure 5.2

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

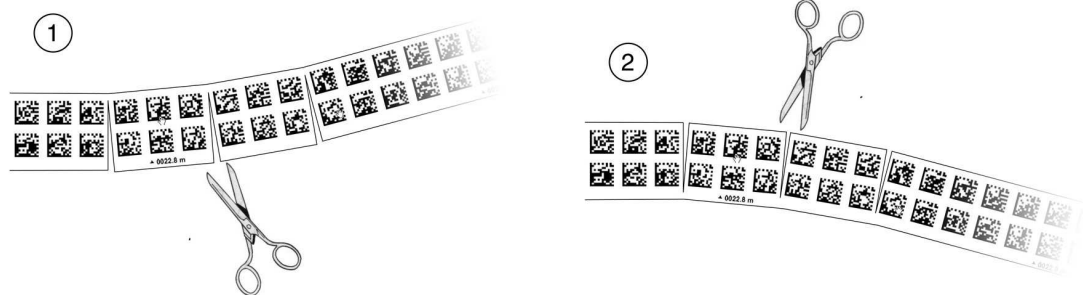
If the system covers longer distances, expansion joints are integrated in the system structure. We recommend creating breaks along the code reel. The resulting gaps should be 20 mm (2 code grids).



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

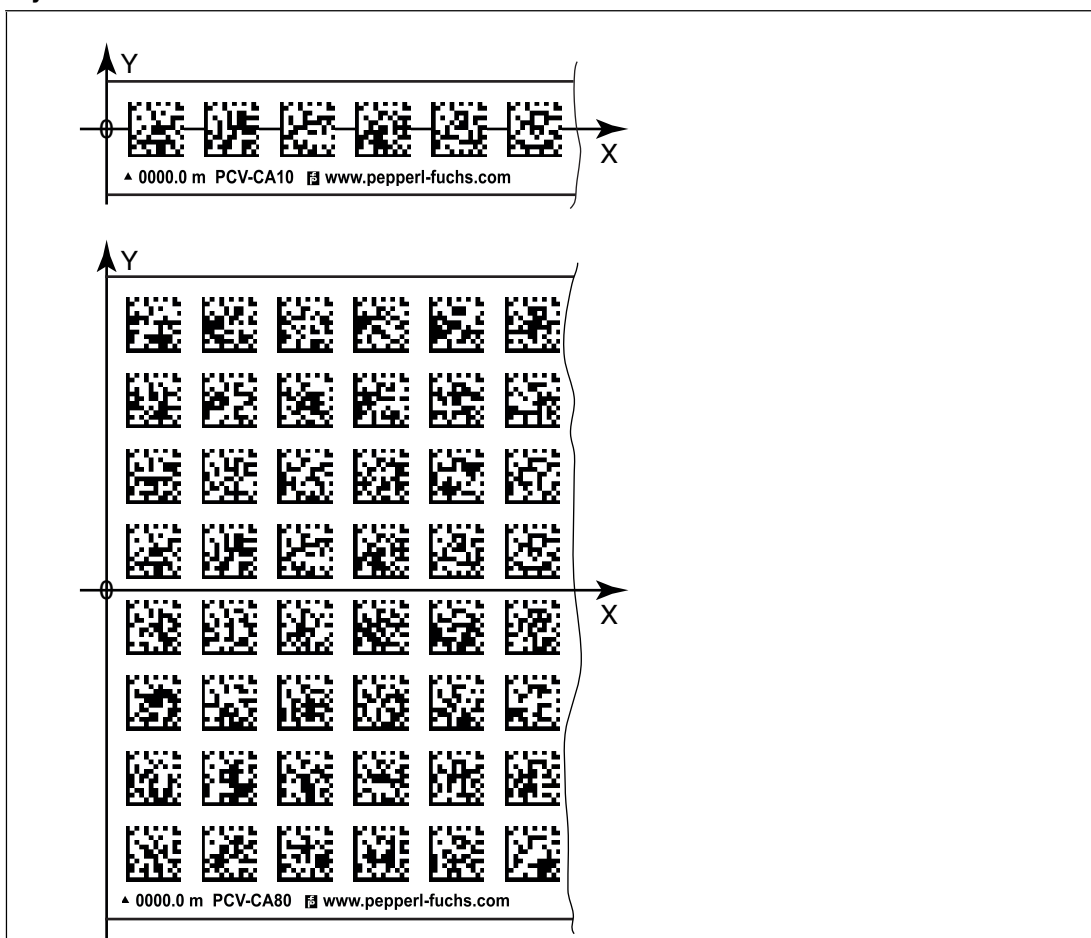


Figure 5.3 Zero line for code reels

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.

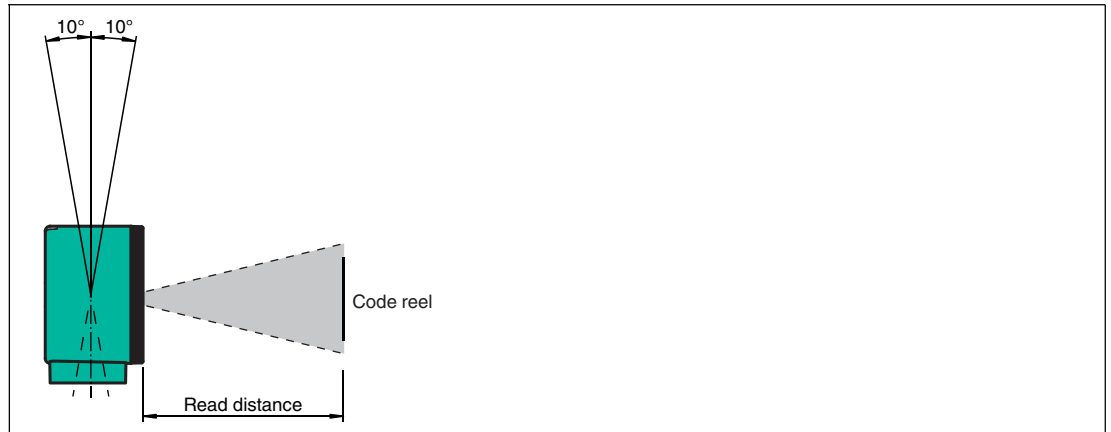


Figure 5.4 Vertical alignment tolerance

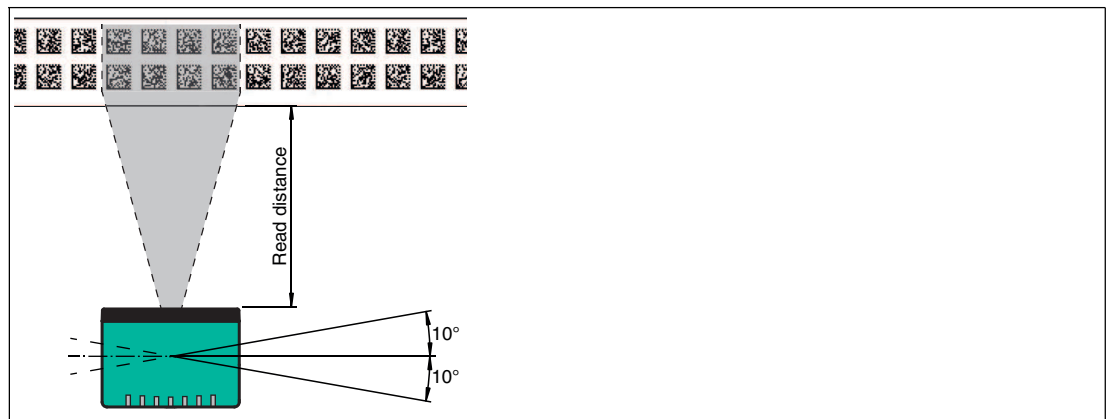


Figure 5.5 Horizontal alignment tolerance

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

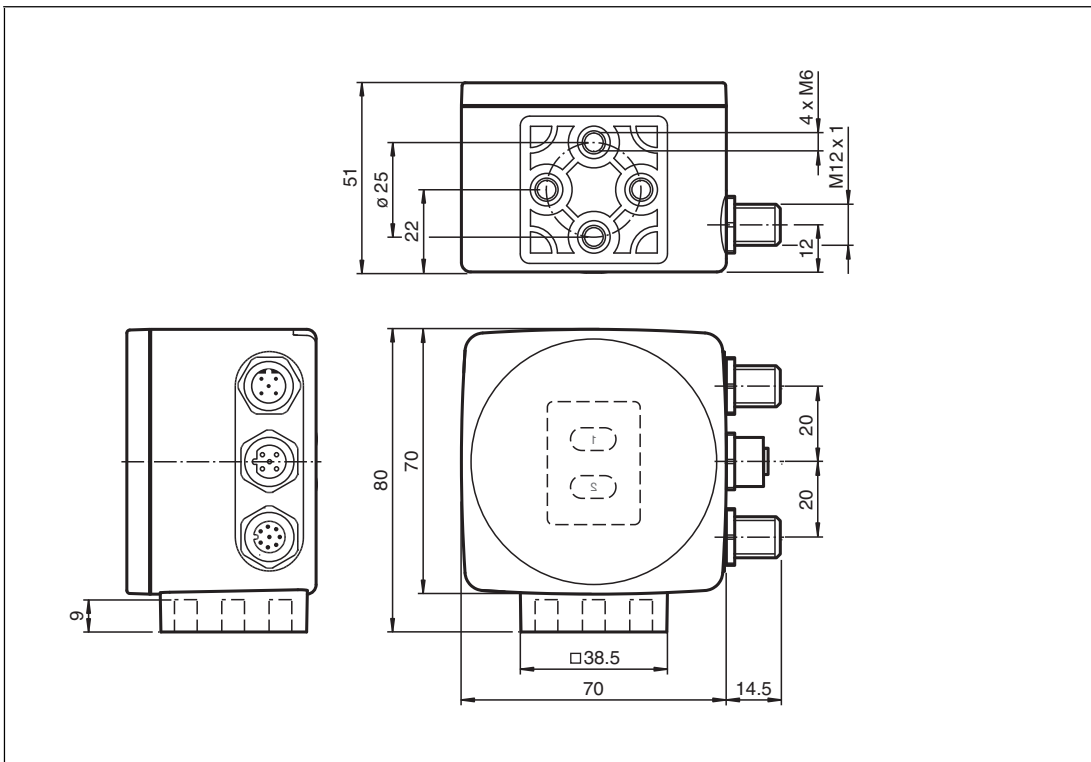


Figure 5.6



Caution!

When selecting the length of the mounting screws to be used, make sure that the insertion depth of the screws into the threaded inserts on the read head does not exceed 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 electrically connected 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

2015-09

Connector Assignment



Figure 5.8

Color Assignment

Pepperl+Fuchs female cordsets 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 following color assignment applies:

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 conductor or equipotential bonding circuit is a particularly important factor in ensuring that these interference currents do not become a source of interference themselves. Always use connection lines with braided shield; never use connection lines with a film shield. The shield is integrated at both ends, i.e., in the switch cabinet or on the controller **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 also be noted:

- Use metal cable clips that cover large areas of the shield.
- After installing the cable shield in the control cabinet, place it directly on the equipotential bonding rail.
- 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 PROFIBUS Connection

The PCV... read head is connected to PROFIBUS via a 5-pin M12 x 1 connector (**Bus in**) and a 5-pin M12 x 1 socket (**Bus out**), located on the side of the housing.

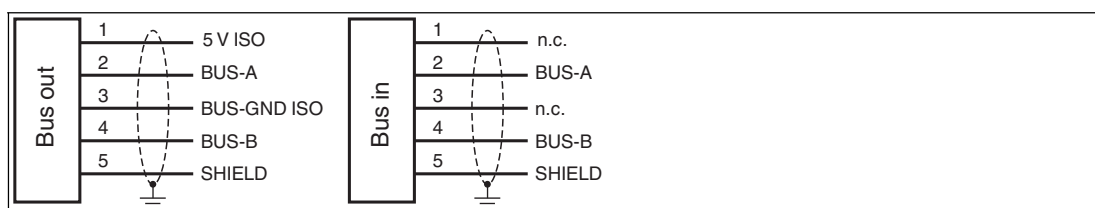


Figure 5.9

Connector Assignment



Figure 5.10

For details of suitable PROFIBUS cables, see chapter 4.3.

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!

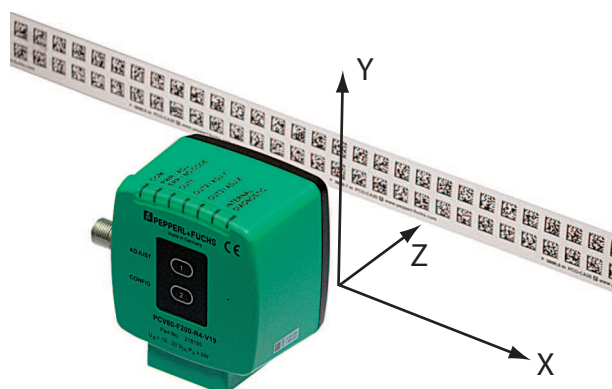
The activation of the alignment aid is possible only within 10 minutes of switching on the read head.

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.

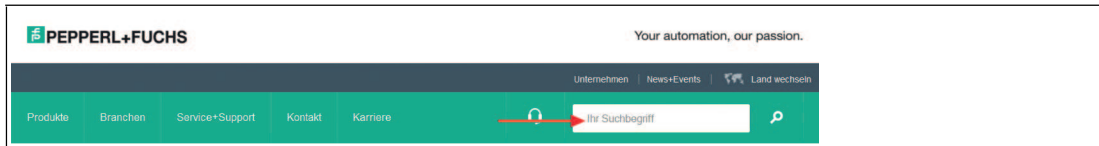
6.2 External Parameterization of the Fieldbus Address Using Code Cards

During external parameterization of the fieldbus address, the reader scans the special code cards optically and configures the relevant fieldbus address. Simply hold the corresponding code cards at the correct distance in front of the lens on the reader.

You can find the manual for the code cards for configuring the fieldbus address at www.pepperl-fuchs.com. See chapter 6.2.1.

6.2.1 Product documentation on the internet

You can view all the relevant documentation and additional information on your product at <http://www.pepperl-fuchs.com>. Simply enter the product name or model number in the **Product/Key word search** box and click **Search**.



Select your product from the list of search results. Click on the information you require in the product information list, e.g., **Technical documents**.



A list of all available documents is displayed.

7 Operation and communication

7.1 Communication via PROFIBUS

7.1.1 General information on PROFIBUS DP

The PROFIBUS DP is a standardized, open fieldbus, which enables data exchange between PLCs, PCs, operating and observation devices, and also sensors and actuators.

For more detailed information on the PROFIBUS DP, refer to the PROFIBUS standard EN 50170 and to the current literature on the subject (e.g. M. Popp, "The New Rapid Way to PROFIBUS DP" available (in German) from the PROFIBUS user organization).



Note!

The PROFIBUS User Organization e.V. Haid- and Neu-Str. (PNO) publishes informational brochures and a PROFIBUS product catalog (www.PROFIBUS.com).

7.1.2 PROFIBUS DP Communication Parameters

The communication parameters can be taken from the GSD file. The GSD file name is **pf0d7b.gsd**.

7.1.3 PROFIBUS DP features

The following is a list of the most important performance features of PROFIBUS DP:

- DP slave functionality with functions Data_Exchange, RD_Inp, RD_Outp, Slave_Diag, Set_Prm, Chk_Cfg, Get_Cfg, Global_Control, Set_Slave_Address.
- Modular DP slave device with one module each for writing and reading data.
- Transfer rates of 9.6 kbit/s, 19.2 kbit/s, 93.75 kbit/s, 187.5 kbit/s, 500 kbit/s, 1.5 Mbit/s, 3 Mbit/s, 6 Mbit/s and 12 Mbit/s auto-synchronizing.
- Adjustable device address 00h ... 7Eh.

7.1.4 PROFIBUS DP functions

Function	Description	Master
Set_Prm	Transfers parameter data to a DP slave	Class 1
Chk_Cfg	Transfers the configuration data for testing to a DP slave	Class 1
Get_Cfg	Reads out the configuration data of a DP slave	Class 2
Data_Exchange	Sends output data to a DP slave device and requests input data from a DP slave	Class 1
RD_Inp	Reads the input data of a DP slave	Class 2
RD_Outp	Reads the output data of a DP slave	Class 2
Global_Control	Sends special commands to one or more DP slaves	Class 1
Slave_Diag	Reads the diagnostic information of a DP slave	Class 1
Set_Slave_Address	Modifies the device address	Class 2

7.1.5 PROFIBUS Modules

The PROFIBUS address for the read head can be modified in a nonvolatile manner via the "Change Station Address" (Set_Slave_Add) PROFIBUS function when switching on in a point-to-point connection.

The default address for the read head is 3

1 word = 16-bit value

1 byte = 8-bit value

Meaning of Bits

Module 1:

- **Position output XP00–XP26:**

Resolution: 0,1 mm, 1 mm, 10 mm, binary coded
MSB first

At a resolution of 1 mm and 10 mm: $L_{\max} = 10.00 \text{ km} = 10,000,000 \text{ mm}$

Module 2:

- **Y position YP0–YP31**

Resolution: 0,1 mm, 1 mm, 10 mm, binary coded in two's complement

Module 3:

- **Speed output SP0–SP16:**

Resolution: 0,1 m/s, 0,01 m/s, 0,001 m/s, binary coded
Speed of between 0 and 12.5 m/s

Example: speed = 4.7 m/s --> speed output = 47 at resolution 0,1 m/s
65535 at unknown speeds

Meaning of Status Bits in Module 4

EV	NP	ERR	WRN	Function
x	x	x	1	Warnings present See Warning Codes
x	x	1	x	Error message (error code in XP00–XP15); remaining bits = 0
x	1	x	x	No position information/OUT (XP = 0, YP = 0, SP = 0)
1	x	x	x	EVENT present

Warning Codes

Bit No.	Content	Description
	Word 1	
1	WRN01	A code with non-PCV content was found
2	WRN02	Read head too close to code reel
3	WRN03	Distance between read head and code reel too great
4	WRN04	Y position too large. The sensor is just before OUT
5	WRN05	Y position too small. The sensor is just before OUT
6	WRN06	The read head is rotated or tilted in relation to the code reel
7	WRN07	Low level of code contrast
8	WRN08	Repair strip detected
9	WRN09	Temperature too high
10	WRN10	reserved
11	WRN11	reserved
12	WRN12	reserved
13	WRN13	reserved
14	WRN14	reserved
15	WRN15	reserved

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

Error Codes

Error Code	Description	Priority
1	Read head 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

Modules with Response Telegram

The following modules enable read head data to be called up via PROFIBUS.

Position Data X

Module

Module No.	Size	Type	Content
1	2 words, consistent	Input data	32-bit X data MSB first (MSB = M ost S ignificant B it)

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	0	XP11
12	0	XP12
13	0	XP13
14	0	XP14
15	0	XP15



Position Data Y

Module

Module No.	Size	Type	Content
2	2 words, consistent	Input data	32-bit Y data MSB first 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

Module No.	Size	Type	Content
3	1 word, consistent	Input data	16-bit speed data [m/s] MSB first

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

Status

Module

Module No.	Size	Type	Content
4	1 word	Input data	16-bit status

Response

Bit No.	Content
	Byte 1 Status
0	ERR
1	NP
2	WRN
3	EV
4	0
5	0
6	0
7	0

Event Marker No.

Module

Module No.	Size	Type	Content
5	1 word, consistent	Input data	Last event marker MSB first Last event no.

Response

Bit No.	Content
	Word 1 Last Event Marker Data
0	EV00
1	EV01
2	EV02
3	EV03
4	EV04
5	EV05
6	EV06
7	EV07
8	EV08
9	EV09
10	0
...	...
15	0

Warning

Module

Module No.	Size	Type	Content
6	1 word, consistent	Input data	Last warning MSB first Last warning no.

Response

Bit No.	Content
	Word 1 Last Warning Data
0	WRN00
1	WRN01
2	WRN02
3	WRN03
4	WRN04
5	WRN05
6	WRN06
7	WRN07
8	WRN08
9	WRN09
10	WRN10
11	WRN11
12	WRN12
13	WRN13
14	WRN14
15	WRN15

Global Primary Data

With the global primary data you can parameterize the read head via PROFIBUS. The global primary data is always transferred completely to the read head.

Designation	Function	Parameter Data	Primary Data
Orientation	Orientation of read head in relation to code reel	Orientation	0° 180° 0°/180° 0°/90°/180°/270°
Code reel type	Configuration of code reel width	Code reel 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

Designation	Function	Parameter Data	Primary Data
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 speed 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 – ±10 000 000 mm
Input Function	Function with input signal	Function input	No Function External Trigger
Output1 Function	Meaning of output signal at output 1	Function output	No Function Overspeed Warning Error Event No Position Repairstrip
Output2 Function	Meaning of output signal at output 2	Function output	No Function Overspeed Warning Error Event No Position Repairstrip
Output3 Function	Meaning of output signal at output 3	Function output	No Function Overspeed Warning Error Event No Position Repairstrip
Output1 Overspeed Value	Speed at which output 1 is activated	Speed	0 – 65534 mm/s 12500 mm/s
Output2 Overspeed Value	Speed at which output 2 is activated	Speed	0 – 65534 mm/s 12500 mm/s
Output3 Overspeed Value	Speed at which output 3 is activated	Speed	0 – 65534 mm/s 12500 mm/s
No Position Value X	X-Wert, wenn kein Codeband sichtbar ist	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 reel 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 reel is visible	Speed data at "No Position"	Last Valid Speed Specified Speed (0 mm/s - 65534 mm/s)

Table 7.2 **Bold** = Default value

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 parameterization software description). 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:

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

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:

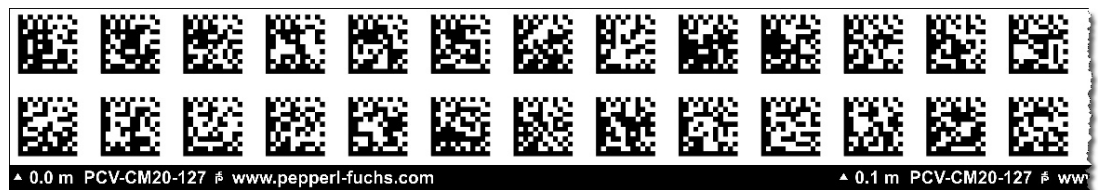
$$L_{\text{Event marker}} = 30 \text{ mm} + 3 \text{ m/s} * 0.025 \text{ s} * 2 = \mathbf{180 \text{ mm}}$$



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 parameterization software description). 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	|
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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