SEW
EURODRIVE

Manual

Data Matrix Positioning System PCV..A-F200-R4-V19-SEW

Contents

Contents

1 General information

1.1 About this documentation

This documentation is an integral part of the product. The documentation is intended for all employees who perform assembly, installation, startup, and service work on the product.

Make sure this documentation is accessible and legible. Ensure that persons responsible for the machinery and its operation as well as persons who work on the device independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation or require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the grading and meaning of the signal words for safety notes.

Signal word	Meaning	Consequences if disregarded
⚠ DANGER	Imminent hazard	Severe or fatal injuries.
⚠ WARNING	Possible dangerous situation	Severe or fatal injuries.
⚠ CAUTION	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the drive system or its environment.
INFORMATION	Useful information or tip: Simplifies handling of the drive system.	

1.2.2 Structure of section-related safety notes

Section-related safety notes do not apply to a specific action but to several actions pertaining to one subject. The hazard symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a safety note for a specific section:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

• Measure(s) to prevent the hazard.

Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
⚠	General hazard
⚡	Warning of dangerous electrical voltage
♨	Warning of hot surfaces
🔲	Warning of risk of crushing
📦	Warning of suspended load
◎	Warning of automatic restart

1.2.3 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

• **⚠ SIGNAL WORD** Type and source of hazard.

Possible consequence(s) if disregarded.

– Measure(s) to prevent the hazard.

1.3 Rights to claim under limited warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the documentation. Read the documentation before you start working with the product.

1.4 Content of the documentation

This document contains additional safety-relevant information and conditions for use in safety-related applications.

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1.5 Exclusion of liability

You must comply with the information contained in this documentation to ensure safe operation and to achieve the specified product characteristics and performance features. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

1.6 Product names and trademarks

The brands and product names in this documentation are trademarks or registered trademarks of their respective titleholders.

1.7 Copyright notice

2 Safety notes

2.1 Preliminary information

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The operator must ensure that the basic safety notes are read and observed. Ensure that persons responsible for the machinery and its operation as well as persons who work on the unit independently have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, please contact SEW-EURODRIVE.

The following safety notes are primarily concerned with the use of the PCV..A unit. If you use other SEW components, also refer to the safety notes for these particular components in the corresponding documentation.

Also observe the additional safety notes provided in the individual chapters of this document.

2.2 Target group

Any mechanical work may only be performed by adequately qualified personnel. Qualified personnel in the context of this documentation are persons familiar with the design, mechanical installation, troubleshooting and servicing of the product, who possess the following qualifications:

• Training in mechanical engineering, e.g. as a mechanic or mechatronics technician (final examinations must have been passed).

• They are familiar with this documentation.

Any electronic work may only be performed by adequately qualified electricians. Qualified electricians in the context of this documentation are persons familiar with electrical installation, startup, troubleshooting and servicing of the product, who possess the following qualifications:

• Training in electrical engineering, e.g. as an electrician or mechatronics technician (final examinations must have been passed).

• They are familiar with this documentation.

In addition to that, they must be familiar with the relevant safety regulations and laws, especially with the requirements of the performance levels according to DIN EN ISO 13849-1 and all other standards, directives and laws specified in this documentation. The above-mentioned persons must have the express authorization of the company to operate, program, configure, label and ground units, systems and circuits in accordance with the standards of safety technology.

All work in the areas of transportation, storage, operation and waste disposal must be carried out by persons who are trained appropriately.

2.3 Designated use

In combination with a code strip with data matrix codes printed on it, this device is a high-resolution positioning system. This system can be used in all applications where exact positioning is required along extremely long travel paths irrespective of whether the travel path is straight, curved or with inclines or declines.

Read this manually carefully. Familiarize yourself with the device before installing, mounting, and operating it.

Always operate this device as described in this manual to ensure proper functioning of the device and connected systems. Protection of operating personnel and the system is only guaranteed if the device is operated according to its designated use.

2.4 Other applicable documentation

Observe the corresponding documentation for all connected devices.

2.5 Functional safety technology

The unit may not perform safety functions without higher-level safety systems unless these functions are described and expressly permitted in the relevant documentation.

2.6 Transport

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If necessary, suspend startup.

Observe the information on climatic conditions in chapter "Technical data".

2.7 Installation/assembly

The following applications are prohibited unless explicitly permitted:

- Use in potentially explosive atmospheres
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.
- Use in applications that are subject to mechanical vibration and shock loads in excess of the requirements in EN61800-5-1.

3 Product description

3.1 Use and application

The PCV..A read head is part of the positioning system of the incident light method used by SEW-EURODRIVE. The positioning system is equipped, among others, with a camera module with integrated illumination unit. In this way, the read head can detect position marks printed on a self-adhesive code strip in the form of data matrix codes.

The code strip is usually mounted in a stationary manner to a fixed part of the system (such as elevator shaft, overhead conveyor mounting rail). The read head is mounted in parallel to a moving "vehicle" (such as elevator cab, overhead conveyor chassis).

Max. length of the code strip:

Parameterized resolution of the read head	Maximum length of the code strip
10 mm	10 km
1 mm	10 km
0.1 mm	1.5 km

With appropriate resolution, the positioning system can also be used without limitations for large-scale systems.

The extensive, user-friendly parameterization options and the freely configurable inputs and outputs of the read head allow for easily adapting the read head to the specific application.

3.2 RS485 interface

The read head is equipped with an RS485 interface for communication purposes, such as for parameterizing the read head functions or for reading out current process data during operation. This interface is operated in 8-E-1 mode and fitted with a terminating resistor that can be activated or deactivated by parameterizing the sensor head accordingly. The RS485 interface supports the following transmission rates:

- 38400 bit/s
- 57600 bit/s
- 76800 bit/s
- 115200 bit/s
- 230400 bit/s

Data structure of the RS485 interface:

	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Parity	
Start	LSB							MSB		
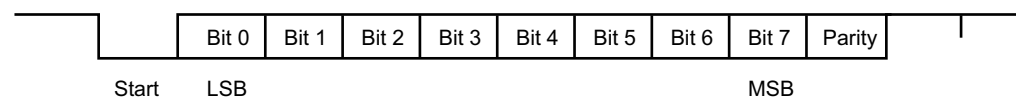
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3.3   LED indicators and control elements

The PCV..A read head is equipped with 7 indicator LEDs for visual function checks and fast diagnostics. Two buttons on the back of the read head are available for activating the alignment aid (see chapter "Aligning the read head") and parameter setting mode (see chapter "Parameter setting"). ADJUST appears next to button 1, and CONFIG next to button 2.
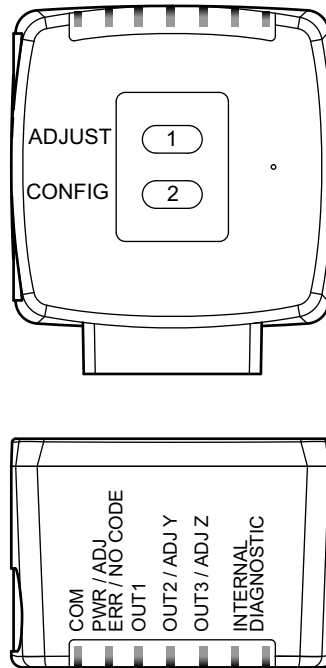
8068121483

LED (color)							
COM	**PWR/ADJ/ERR/NO CODE**	**OUT1**	**OUT2/ADJ Y**	**OUT3/ADJ Z**	**INTERNAL DIAGNOSTICS**		
(yellow)	(green/red)	(yellow)	(yellow)	(yellow)	(yellow)	(yellow)	**Description**
Off	Flashes green	Off	Off	Off	Off	Off	Alignment Y > setpoint f_{flash} = 2 Hz
Off	Flashes green	Off	On	Off	Off	Off	Alignment Y < setpoint f_{flash} = 2 Hz
Off	Flashes green	Off	Flashing	Off	Off	Off	Alignment Y = setpoint f_{flash} = 2 Hz
Off	Flashes green	Off	Off	Off	Off	Off	Alignment Z > setpoint f_{flash} = 2 Hz
Off	Flashes green	Off	Off	On	Off	Off	Alignment Z < setpoint f_{flash} = 2 Hz
Off	Flashes green	Off	Off	Flashing	Off	Off	Alignment Z = setpoint f_{flash} = 2 Hz

LED (color)							
COM	PWR/ADJ/ERR/NO CODE	OUT1	OUT2/ADJ Y	OUT3/ADJ Z	INTERNAL DIAGNOS-TICS		
(yel-low)	(green/red)	(yel-low)	(yellow)	(yellow)	(yel-low)	(yel-low)	Description
Off	Flashes red	Off	Off	Off	Off	Off	Alignment of code strip not within read range. f_{flash} = 2 Hz
Off	Lights up red	Off	Off	Off	Off	Off	System error
Off	Lights up green	x	x	x	Off	Off	Normal operation. No communication. LEDs marked with "x" indicate the state of the relevant output.
Flash-ing	Lights up green	x	x	x	Off	Off	Normal operation. Communication active (f_{flash} = 2 Hz). LEDs marked with "x" indicate the state of the relevant output.
Flash-ing	Flashes red	x	x	x	Off	Off	No code strip within read range. Communication active. (f_{flash} = 2 Hz) LEDs marked with "x" indicate the state of the relevant output.
Flash-ing	Flashes red	Flash-ing	Flashing	Flashing	Off	Off	Normal operation. Indication for 2 s if a button is pressed when the time lock is enabled.
Off	Off	Flash-ing	Off	Off	Off	Off	Preconfiguration/configuration mode active. f_{flash} = 2 Hz
Off	Lights up red	Flash-ing	Off	Off	Off	Off	Code card faulty. f_{flash} = 2 Hz for 3 s
Off	Green, 1 s	Flash-ing	Off	Off	Off	Off	Code card detected. f_{flash} = 2 Hz for 3 s
x	Off	x	x	x	Off	Off	Time lock for buttons disabled.

X = LED status has no meaning

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3.4 Accessories

Suitable accessories offer enormous savings potential. This lets you save a considerable amount of time and effort not only for initial startup but also for replacing and servicing our products.

The appropriate accessories from SEW-EURODRIVE can extend the service life of products used under harsh ambient conditions.

Order designation	Description
PCV-SC12	Grounding clip
PCV-USB-RS485 converter set	Interface converter USB – RS485
PCV-KBL-V19-STR-RS485	Cable unit with 24 V power supply and V19 connection cable to RS485 interface
Connection cable VG19-1.5M-PUR-ABG-V15B-G (length: 1.5 m, part number: 1950 0084)	M12, 4-pin connector (MOVISAFE® HM31) on M12, 8-pin socket (PCV..A)
Connection cable VG19-3M-PUR-ABG-V15B-G (length: 3 m, part number: 1950 0076)	M12, 4-pin connector (MOVISAFE® HM31) on M12, 8-pin socket (PCV..A)
Connection cable 0X01-F8AS-Sw-M5BS (variable length: 0.5 to 30 m, part number: 1814 5388)	M12, 4-pin connector (MOVISAFE® HM31) on M12, 8-pin socket (PCV..A)

4 Installation

4.1 Installing the code strip

The code strip is made of silicone-free polyester film. A position mark is printed every 100 mm along the lower edge of the code strip (see "Dimensions, code strip"). The position marks are used, among others, for the precise positioning of the code strip during assembly. The reverse side of the code strip carries a permanent modified acrylate-based adhesive. Affix the self-adhesive code strip along the required travel range.

To do so, proceed as follows:

1. Clean the surface to remove any greasy or oily deposits and dust.

2. Ensure that the surface is dry, clean, and stable.

3. Pull back the cover foil at the beginning of the code strip for a few centimeters. Place the code strip exactly at the required starting position on the underside, and press to attach it.

4. Affix the self-adhesive code strip along the required travel range. Remove the protective film gradually to prevent the code strip from adhering to the surface at an incorrect position. When affixing the code strip, ensure that the code strip does not crease or trap air bubbles.

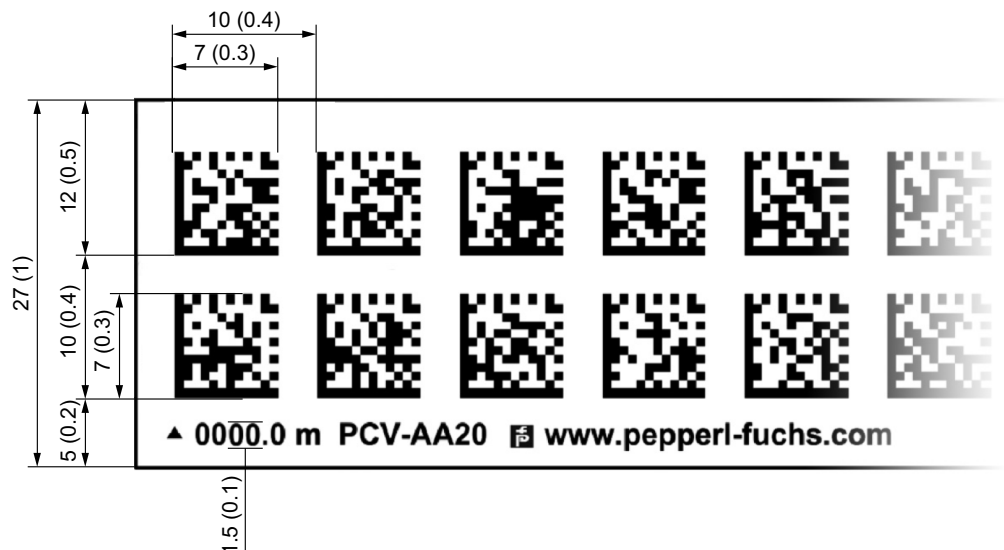The adhesive on the code strip hardens after 72 hours.

INFORMATION

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Thermal expansion of the code strip.

The heat expansion coefficient of the attached code strip corresponds to the heat expansion coefficient of the underside.
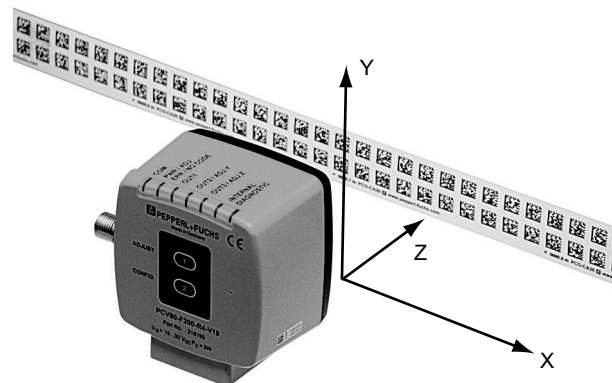
The following figure shows the dimensions of the code strip.

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All dimensions in mm (in).

Position the code strip in such a way that the www.pepperl-fuchs.com label and the position marks are below the data matrix code. The position values then increase in X direction.

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The figure shows the orientation of a read head in the default position of 0°. You can configure the read head for other mounting positions using the interface.

4.1.1 Code strips with a starting position of 0 m

Order designation	Description
PCV50M-AA20-0	Code strip 2-track, length: 50 m
...	....
PCV100M-AA20-0	Code strip 2-track, length: 100 m

4.1.2 Code strips with different starting positions

| Order designation	Description
PCV100M-AA20-0	Code strip 2-track, length: 100 m Starting position: 0 m
PCV100M-AA20-10000	Code strip 2-track, length: 100 m Starting position: 100 m
PCV100M-AA20-990000	Code strip 2-track, length: 100 m Starting position: 9900 m

Notes

- **Stop edges**

  Maintain a code pattern of 10 mm when attaching another code strip to the end of the previous one.

- **Expansion joints**

  If the system covers long distances, expansion joints are integrated in the system structure to compensate for temperature-dependent changes. We recommend to interrupt the code strip. After the interruption, continue the pasting process with a completely readable code strip. The gap [A] resulting from the interruption must not exceed the following values:

  – PCV80A: 10 mm (1 code grid)

– PCV100A: 20 mm (2 code grids)
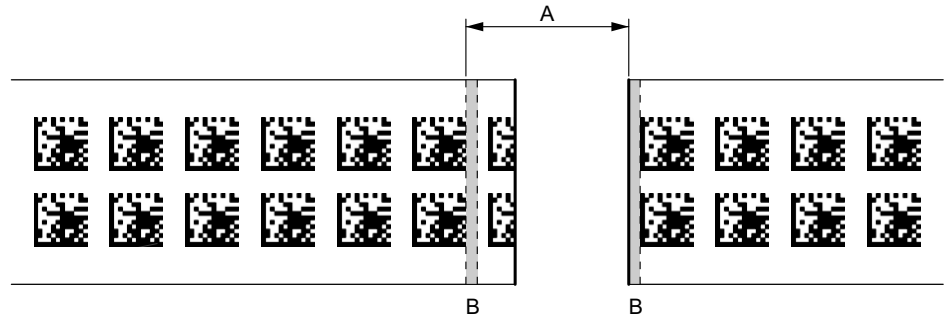
12690114955

If the maximum distance [A] cannot be maintained, reliable position detection can still be ensured with a design as shown in the figure below even in case of large variations in the length. For this purpose, cut the two code strip carrier profiles in "L" shape (L-cut) and apply the code strip onto the code strip carrier in such a way that always one of the two rows of code can be detected by the read head.
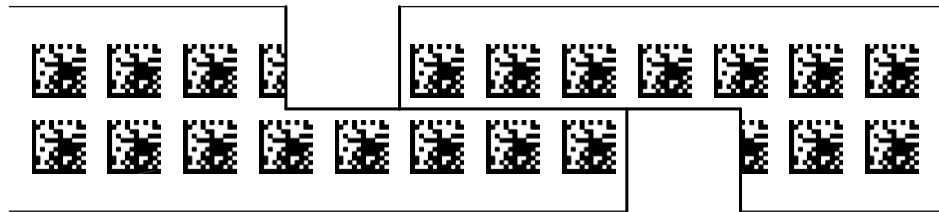

INFORMATION

- Make sure that the cut edges of the L-shaped cutout (L-cut) of the code strip are smooth and clean. Tearing off the code strip will damage the data matrix elements. Also the second row of code, which could be used to compensate for errors in the first row of code, will be missing at the position of the overlapping.

- Bear in mind that the data matrix elements must be surrounded by a white area of 1.5 mm without coding [B] so they can be read by the read head.

- Depending on the size of the L-shaped cutout (L-cut), only the upper or lower row of code is present in the read window of the read head. This results in a reduced y-tolerance for the read head alignment (see chapter "Vertical alignment of the read head"). Bear this fact in mind also for the remaining sections.

- **Inclines and declines**

    If you mount the code strip in inclines [1] or declines [2], cut the code strip several times at the transition point to the horizontal as shown below.

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[1]   [2]
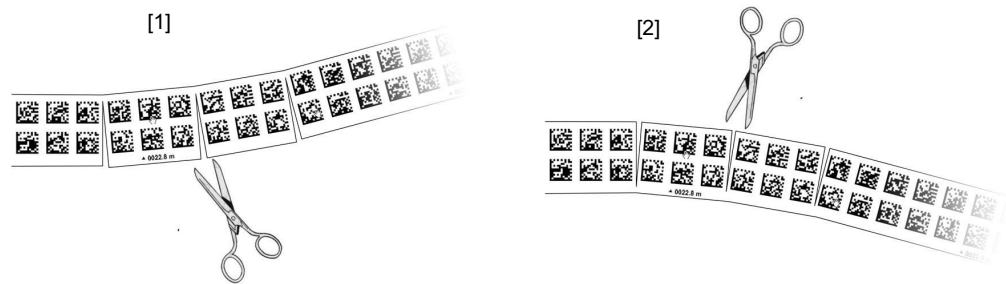
8069367307

- **Code strips with different numbers of tracks.**

  The PCV-AA20 code strip has two rows of codes to compensate for slight deviations in the travel range in Y direction. The code strip is also available with other numbers of rows. The order number for the code strip is PCV-AAx0. The letter "x" represents the number of rows of code, which can be 1 or 2. More rows are available on request. Contact us for more information.

Order designation	Description
PCV*M-AA10-*	Code strip, 1-track
PCV*M-AA20-*	Code strip, 2-track
PCV*M-AA40-*	Code strip, 4-track
...	...

- **Hysteresis y-axis**
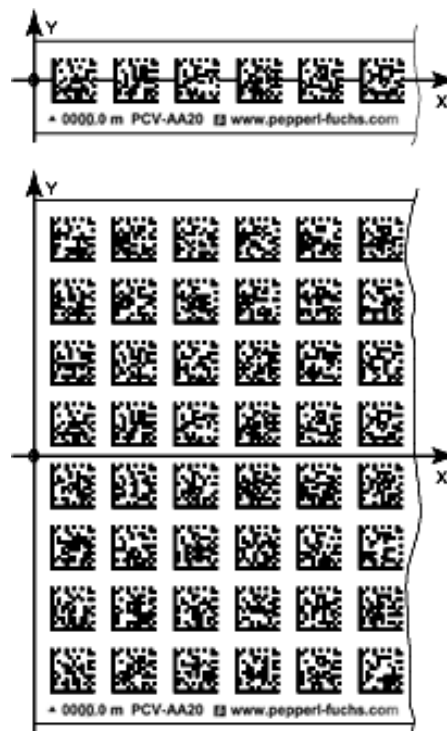
9007207324112523

When the read head leaves the zero line when traveling along 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.

4.2 Mounting the read head

Mount the PCV..A read head to the moving part of your system. To do so, use the 4 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 towards the code strip.
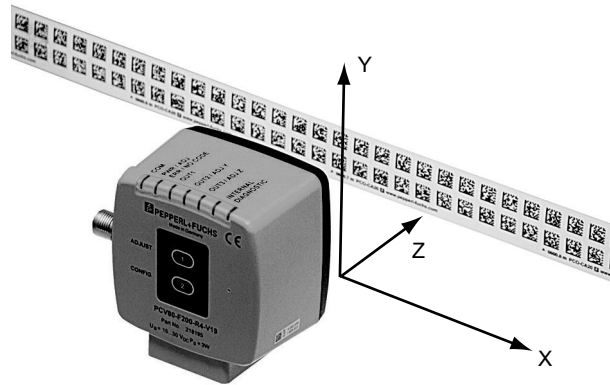
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The mounting and the guidance of the moving system component must be stable enough to prevent that the read head's depth of focus is lost during operation.

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

INFORMATION

The tolerances and deviations from the nominal values given in this chapter are individual values. These values cannot be combined.

4.2.1 Vertical alignment of the read head

Tolerance of the read head for the code strip in vertical alignment (y-axis):

Number of code rows	Width of code strip	Tolerance in vertical alignment (y tolerance)[1]
2	27 mm	• With continuous code strip (without L-cut): PCV80A: ±10 mm PCV100A: ±12 mm • With code strip with L-shaped cutout (L-cut): PCV80A: ±0.5 mm PCV100A: ±2 mm

1) The tolerance refers to the alignment of the center of the code strip
to the center of the read head

Tolerance of the read head in vertical direction.

| Read head type	Read field (L x H)	Tolerance[1]
PCV80A	33 x 20 mm	10°
PCV100A	40 x 25 mm	10 °

1) Installation at the center of the application

Example: Maximum tolerance of the read head along the x-axis opposite the code strip
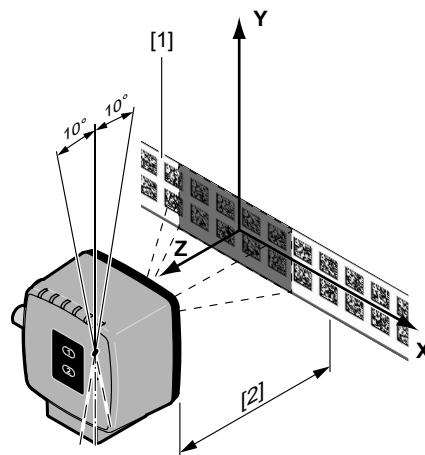

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[1]   Code strip
[2]   Read distance

If the **read head is installed outside the center of the application [1]**, the following situation can occur with **vertical curves**:
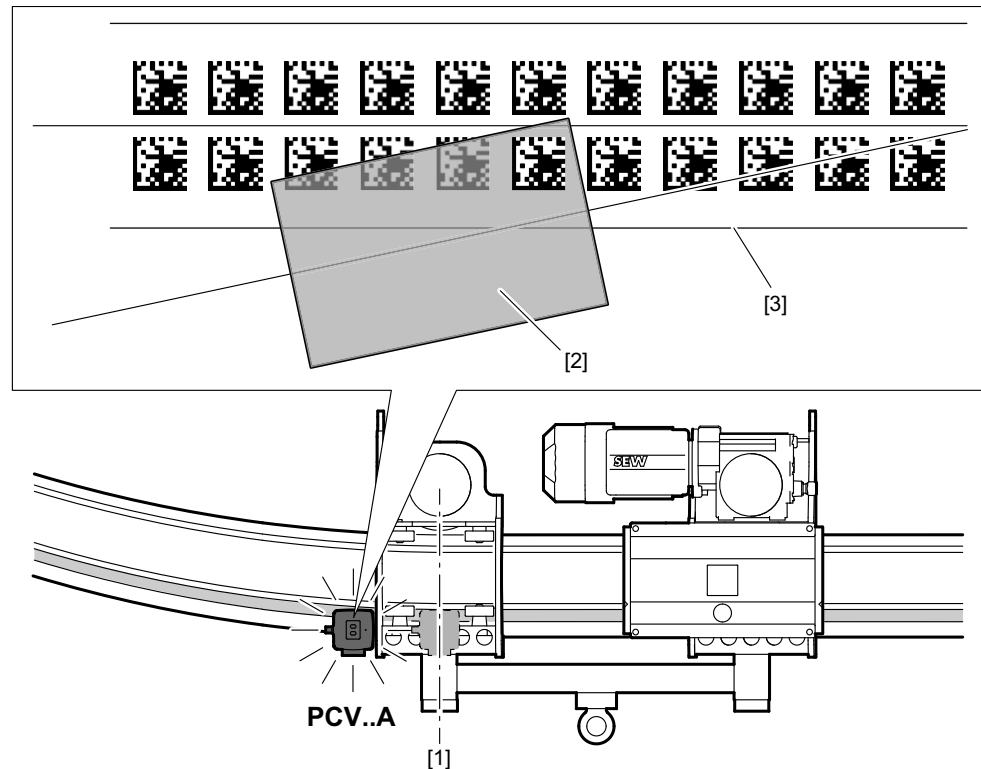
9007211954855179

- Depending on the curve profile, the read head moves toward the code strip [3] or away from the code strip [3].

- The read field [2] moves away from the read window of the read head. Safe position detection is only ensured if at least one data matrix code element can be read.

- Observe the information in chapter "Vertical alignment tolerance of the read head" as well as the chapter "Technical data".

4.2.2 Horizontal alignment of the read head

Tolerance of the read head in horizontal orientation (z-axis):

Read head type	Read distance	Depth of focus	Tolerance[1]
PCV80A	80 mm	± 10 mm	10 °
PCV100A	100 mm	± 15 mm	10 °

1) Installation at the center of the application

Example: Maximum tolerance of the read head along the y-axis opposite the code strip.
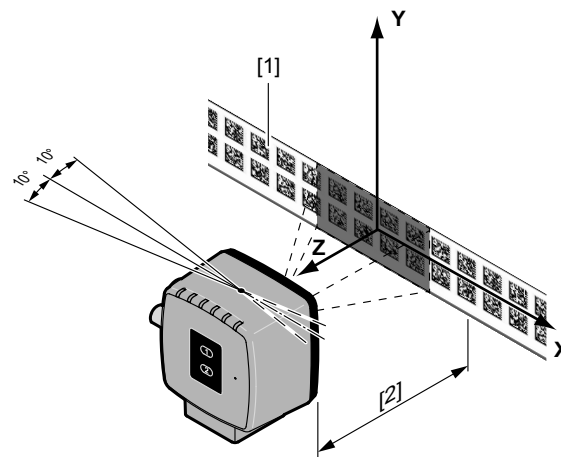
14122991883

[1]   Code strip
[2]   Read distance

Example: Maximum rotation of the read head along the z-axis opposite the code strip.
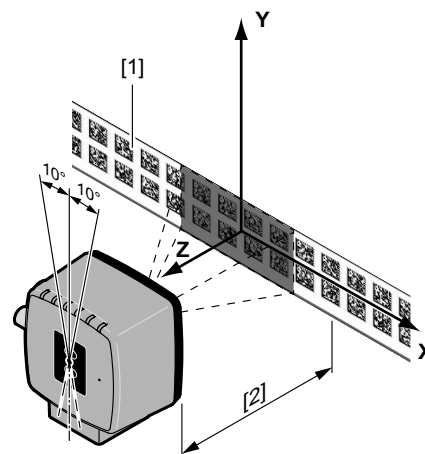
9007207324121739

[1]   Code strip
[2]   Read distance

If the **read head is installed outside the center of the application [1]**, the following situation can occur with **horizontal curves**:
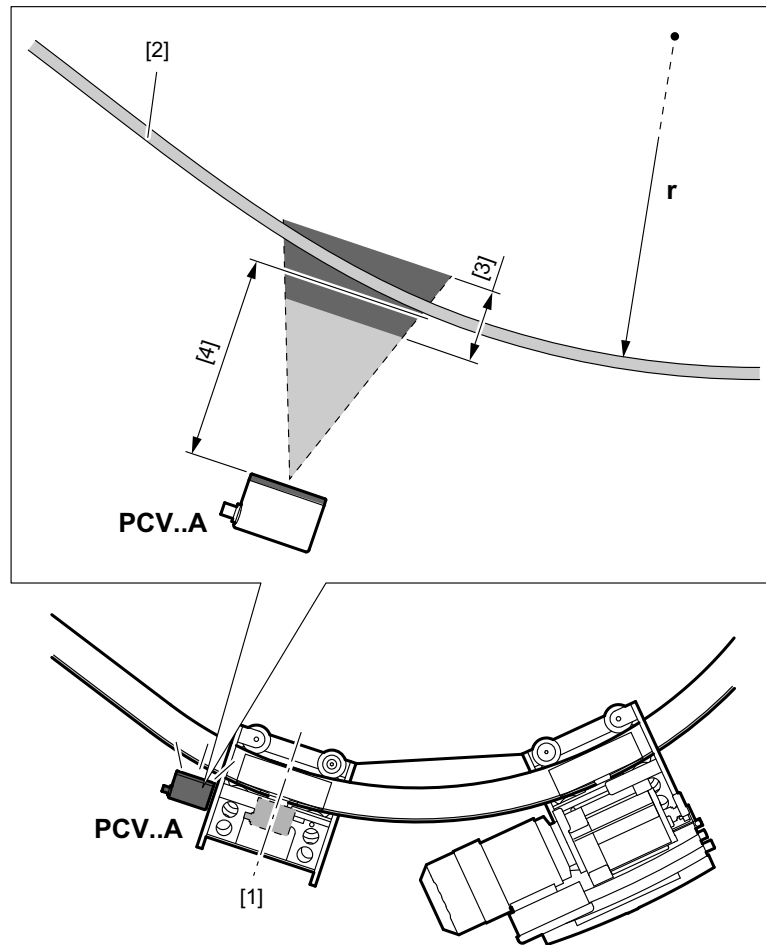
12700275595

- Depending on the curve profile (right-hand bend, left-hand bend), the read head moves toward the code strip [2] or away from the code strip [2].

- The read distance [4] moves away from the read area of the read head. If the read distance [4] becomes too large, the depth of focus [3] is no longer sufficient to ensure reliable position detection.

- Observe the information in chapter "Horizontal alignment tolerance of the read head" as well as the chapter "Technical data".

4.2.3 Dimension drawing for the read head
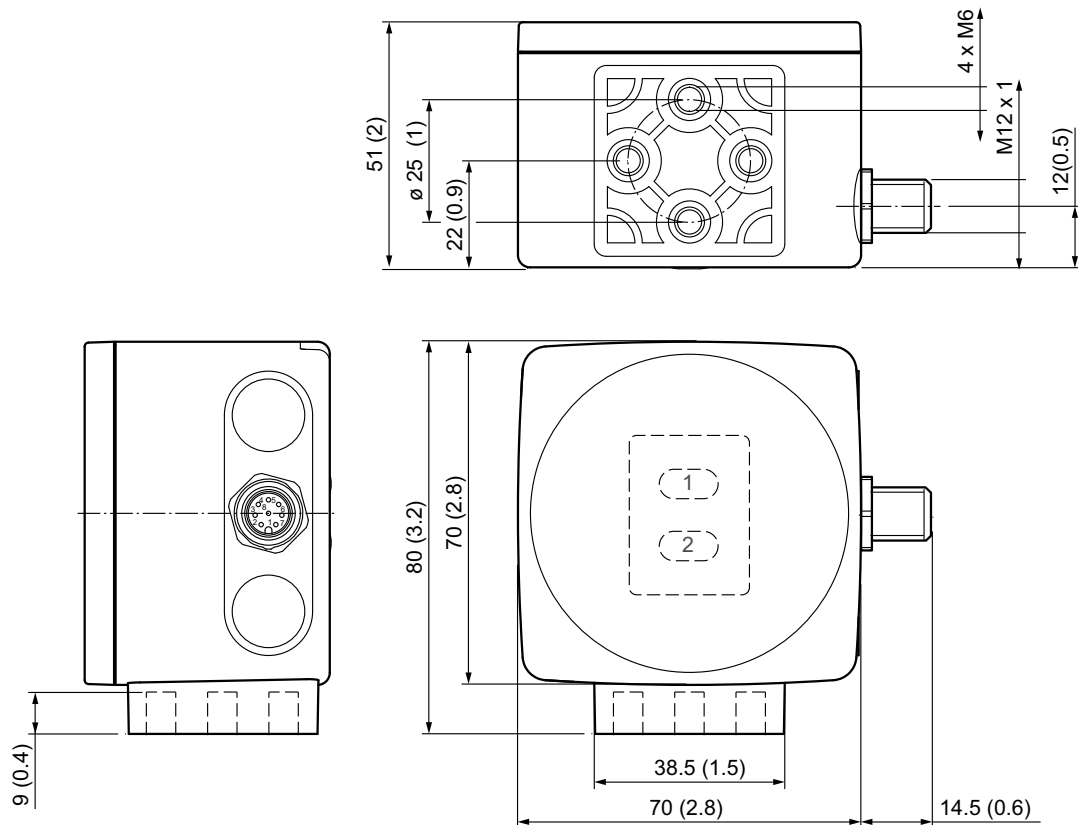
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All dimensions in mm (in)

NOTICE

Using longer retaining screws.

Damage to the read head.

- Select the length of the retaining screws in such a way that the maximum insertion depth of the screws in the threaded inserts of the read head is 8 mm (0.3 in).

NOTICE

Tightening the screws with excessively high torque.

Damage to the read head.

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

4.3 Electrical connection

The PCV..A read head is connected electrically using an 8-pin M12 x 1 connector on the side of the housing. Power supply as well as communication with peripheral devices is implemented using this connection. This connection also provides the configurable inputs and outputs of the read head.

For connecting the PCV..A read head to the MOVISAFE® HM31 safety controller, use the prefabricated connection cables listed in the "Accessories" chapter. Connect the 8-pin M12 x 1 connector (see chapter "Wiring diagram for the 8-pin connector of PCV..A") to the side of the housing of PCV..A. Connect the 4-pin M12 x 1 connector to terminal X4011 (see chapter "X4011: RS485 interface – MOVISAFE® HM31 (external)") of the safety controller.

4.3.1 Wiring diagram for the 8-pin device connector of PCV..A

1	OUT 2 / IN 2
2	+ UB
3	Data +
4	Data -
5	OUT 1
6	IN 1
7	GND
8	OUT 3 / IN 3
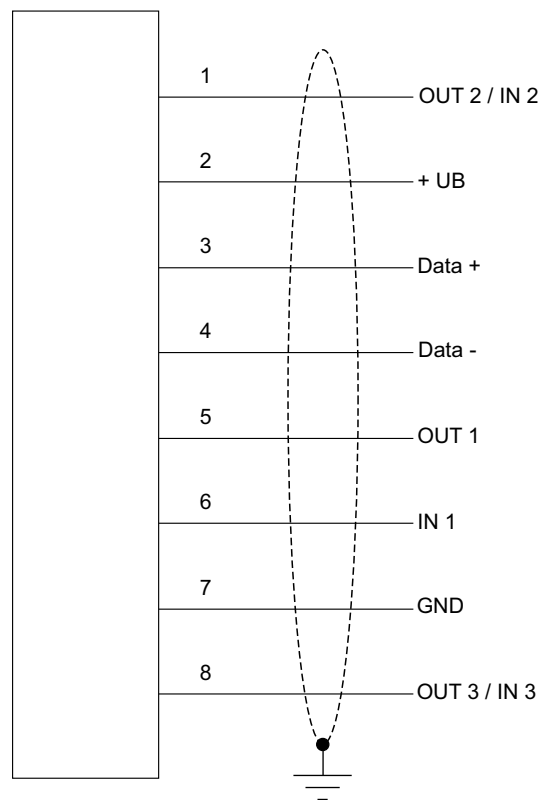
8069390987
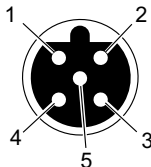
Connections 1 and 8 can be configured as inputs or outputs.

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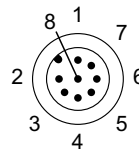
4.3.2 X4011: RS485 interface – MOVISAFE® HM31 safety controller (external)

The following table shows information about this connection:

Function
RS485 interface for external components
Connection type
M12, 5-pole, female, B-coded
Wiring diagram

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Assignment		
No.	Name	Function
1	+24V	DC 24 V output
2	RS-	RS485 data line (-)
3	GND	Reference potential
4	RS+	RS485 data line (+)
5	res.	Reserved

4.3.3 Shielding cables

The shielding of cables is required to suppress electromagnetic interference. Establishing a low resistance or low impedance connection with the conductor or equipotential bonding circuit is particularly important to ensure that these interference currents do not become a source of interference themselves. Always use cables with braided shield, never use cables with a foil shield. The shield is connected at both ends, which means on the MOVISAFE® HM31A controller **and** on the read head. Use the prefabricated connection cables as listed in chapter "Accessories". The grounding terminal available as an accessory (see chapter "Accessories") allows for easy integration into the equipotential bonding circuit.

In the following exceptional cases, the shielding of a connection at only one end might be more favorable:

- If an equipotential bonding cable is not laid or cannot be laid.
- If a film shield is used.

Also observe the following point for shielding cables:

- Use metal cable clips that cover large areas of the shield.
- Route protective grounding connections to a common point in a star configuration.
- The cross sections of cables used for grounding should be as large as possible.

NOTICE

Connecting the read head to alternating current or excessively high supply voltage, or incorrect electrical connection with reversed polarity.

Damage to the device, or malfunction.

- Connect the device to DC voltage.
- Ensure that the supply voltage rating is within the specified range of the sensor.
- Ensure that the connecting wires on the connection cables used are connected properly.

5 Startup

5.1 Aligning the read head

An integrated alignment aid is available to help you easily and accurately align the y and z coordinates of the read head in relation to the code strip.

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The alignment aid can only be activated within 10 minutes after switching on the read head.

To change from normal operation to parameter setting mode, press button 1 (ADJUST) on the back of the read head.

To activate the alignment aid of the read head:

1. Press button 1 (ADJUST) for longer than 2 seconds.

   The "PWR/ADJ/ERR/NO CODE" LED flashes green if a code strip was detected. If no code strip was detected, the "PWR/ADJ/ERR/NO CODE" LED flashes red.

2. Now align the z and y coordinates of the read head. The integrated LED indicators assist you in the process.
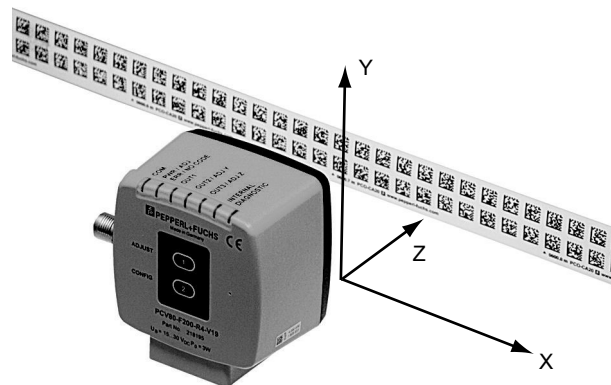
8069362699

- **z coordinate**

  If the distance of the camera to the code strip is too small, the "OUT3/ADJ Z" LED is lit yellow. If the distance is too great, the yellow "OUT3/ADJ Z" LED goes out. Within the target range, the yellow "OUT3/ADJ Z" LED and the green "PWR/ADJ/ERR/NO CODE" LED are flashing simultaneously. The optimal distance between read head and code strip is indicated by the yellow "OUT3/ADJ Z" LED flashing synchronously with the green "PWR/ADJ/ERR/NO CODE" LED.

- **y coordinate**

  If the optical axis of the read head is too low relative to the middle of the code strip, then the yellow "OUT2/ADJ Y" LED goes out. If the optical axis is too high, the yellow "OUT2/ADJ Y" LED goes out. Within the target range, the yellow "OUT2/ADJ Y" LED and the green "PWR/ADJ/ERR/NO CODE" LED are flashing simultaneously. Set the optimum height of the read head relative to the code strip so that the yellow "OUT2/ADJ Y" LED flashes in sync with the green "PWR/ADJ/ERR/NO CODE" LED. Briefly pressing button 1 (ADJUST) stops the alignment aid, and the read head returns to normal operation.

5.2 Parameter setting

The PCV..A read head can be optimally adapted to the specific requirements by setting its parameters accordingly. You can set the parameters for the read head either via the interface itself (internal parameterization) or by means of an optical parameterization code (external parameterization).

5.2.1 Internal parameterization using parameter setting software

You have to start internal parameterization of the read head via RS485 interface within the first 10 minutes after activation of the read head. A time lock disables the read head when this time has elapsed. The time lock remains inactive during the parameter setting process. The time lock only disables the read head if no parameters are set for more than 10 minutes.

The easy-to-use "PCV Parameterization Tool" lets you optimally configure the read head. This configuration software is available for your PC as a free download from www.pepperl-fuchs.com. To install the software, follow the instructions on your screen.

If your PC does not have a built-in RS485 interface, you need a USB – RS485 interface adapter (see chapter "Accessories").

How to parameterize the read read

1. Connect the read head to your PC using the interface adapter. For detailed information, refer to the manual for the interface adapter.

2. Connect the read head to a suitable power supply.

3. Switch on the power supply.

4. Start the parameterization tool.

5. Set the read head parameters with the aid of the manual for the parameterization tool.

6. Transfer the parameter list to the read head.

7. Save the parameter setting.

8. Switch off the power supply to the read head.

9. Disconnect the read head from the interface adapter and from the power supply.

   The read head is now parameterized according to your requirements and can be used in your application.

5.2.2 External parameterization using code cards

External parameterization means the read head optically scans the code cards and then sets the respective parameters. To do so, simply hold the corresponding code cards in front of the lens of the PCV..A read head at the proper distance (see chapter "Code cards for external parameterization").

You can set the following parameters using code cards:

- Read head address (0, 1, 2, 3)
- Read head resolution (0.1 mm, 1 mm, 10 mm).
- Read head orientation (0°, 180°, 0° or 180°, 0°, 90°, 180° or 270°)
- Trigger source (auto, hardware)
- Transfer rate (38400, 57600, 76800, 115200 or 230400 bit/s)
- Bus termination (on, off)

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Activating programming mode

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You have to start external parameterization of the read head using code cards within the first 10 minutes after activation of the read head. A time lock disables the read head when this time has elapsed. The time lock remains inactive during the parameter setting process. The time lock only disables the read head if no parameters are set for more than 10 minutes.

If you press a button when the time lock is enabled, then all LEDs flash for 2 seconds.

To change from normal operation to parameter setting mode, press button 2 (CONFIG) on the back of the read head.

To activate parameter setting mode:

1. Press button 2 (CONFIG) for longer than 2 seconds.

   The yellow "OUT1" LED flashes.

2. For final activation, hold the "ENABLE" code in front of the camera system of the read head.

   If the "ENABLE" activation code is detected, the green "PWR/ADJ/ERROR/NO CODE" LED flashes for 1 second. If the activation code is not detected, the "PWR/ADJ/ERROR/NO CODE" LED lights up red for 2 seconds.

Parameter setting

Place the parameterization code in the field of view of the camera module.

If the parameterization code is detected, the green "PWR/ADJ/ERROR/NO CODE" LED lights up for 1 second. If the parameterization code is not detected, the "PWR/ADJ/ERROR/NO CODE" LED lights up red for 2 seconds.

Exiting parameter setting mode

To save the configuration, hold the "STORE" code in front of the camera system of the read head.

If the "STORE" memory code is detected, the green "PWR/ADJ/ERROR/NO CODE" LED lights up for 1 second. The parameters are stored in the non-volatile memory of the read head, and parameter setting mode is terminated. You have now successfully set the parameters for the read head. If the memory code is not detected, the "PWR/ADJ/ERROR/NO CODE" LED lights up red for 2 seconds.

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Briefly pressing button 2 (CONFIG) in parameter setting mode immediately exits this mode. Any parameter changes you made but have not saved will be discarded. The read head continues to operate with the last valid parameters that were saved.

The code cards "CANCEL", "USE" and "DEFAULT"

Holding one of these cards in front of the read head exits parameter setting mode with the following consequences:

- **CANCEL**

  Any parameter changes you made but have not saved will be discarded. The read head continues to operate with the last valid parameters that were saved.

- **USE**

  For test purposes, the read head continues to operate with the parameters you have just changed. These parameters are not saved, however. Switching the read head off and on again has it operate with the last valid parameters that were saved.

- **DEFAULT**

  All parameters in the read head are overwritten with the original default settings. This reset is saved in the non-volatile memory of the read head.

5.3   Operation with repair tape

The repair tape is a short code strip with a length of 1 meter. It is used to bridge defective or damaged areas of an existing code strip.

1. Cut the repair tape to the required length.

2. Cover the defective area of the code strip with the repair tape.

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When adhering the repair tape to the code strip, make sure that the repair tape continues the grid of the code strip as accurately as possible.

If repair is required, you can use the code strip generator at http://codegenerator.sew-eurodrive.com/englisch/ as interim solution. The code strip generator lets you generate code strip segments online, which you can print out.

To do so, enter the start value in meters and the code strip length of the segment to be replaced in meters. The generator then creates a printable pdf file with the required code strip segment.

Use the printout only as temporary solution. The durability of the paper strip is very limited depending on the application. Immediately order a new code strip of the required length. For placing the order, use the order designation as given in chapter "Code strips with different starting positions".

6 Technical data

General technical data	
Travel speed v	• PCV80A: ≤ 8 m/s • PCV100A: ≤ 5 m/s
Measured length	Max. 10000 m
Light type	Integrated LED flash (red)
Read distance	• PCV80A: 80 mm • PCV100A: 100 mm
Depth of focus	• PCV80A: ±10 mm • PCV100A: ±15 mm
Reading field	• PCV80A: 33 mm × 20 mm • PCV100A: 40 mm × 25 mm
Radius	≥ 0.1 m (horizontal)
Ambient light limit	100000 lux
Resolution	±0.1 mm
Camera data	
Type	CMOS, global shutter
Processor data	
Clock rate	600 MHz
Computation speed	4800 MIPS
Functional safety related data	
$MTTF_d$	20 years
Service life (T_M)	10 years
Diagnostic coverage (DC)	0%
Indicators/control elements	
LED display	7 LEDs (communication, alignment aid, status information)
Electrical data	
Operating voltage V_O	DC 15 to 30 V, PELV
No-load current I_0	Max. 200 mA
Power consumption P_0	3 W
Interface	
Type	RS485 interface
Output code	Binary code
Transfer rate	38400 to 230400 bit/s
Termination	Switchable terminating resistor
Query cycle time	≥ 10 ms
Input	
Input type	1 to 3 function inputs, programmable

General technical data	
Output	
Output type	1 to 3 switch outputs, PNP, programmable, short-circuit protected
Switching voltage	Operating voltage
Switching current	150 mA each output
Standard conformity	
Interference emission	EN 61000-6-4:2007 + A1:2011
Interference immunity	EN 61000-6-2:2005
Shock resistance	EN 60068-2-27:2009
Vibration resistance	EN 60068-2-6:2008
Ambient conditions	
Operating temperature	0 to 60 °C (32 to 140 °F)
	−20 to 60 °C (−4 to 140 °F) non-condensing; prevent icing on the lens
Relative humidity	90%, non-condensing
Storage temperature	−20 to 85 °C (−4 to 185 °F)
Mechanical data	
Connection type	M12×1 connector, 8-pin
Degree of protection	IP67
Housing material	PC/ABS
Weight	Approx. 160 g
Approvals and certifications	
UL approval	cULus listed, general purpose, class 2 power source, type 1 enclosure
CCC approval	Approval not required

7 Appendix

7.1 Declaration of conformity

INFORMATION

i This product has been developed and produced in accordance with applicable European standards and guidelines. The declaration of conformity is available for download from the SEW website at www.sew-eurodrive.com under "Documentation".

7.2 Code cards for external parameterization

Here you find the code cards you can use for setting the parameters for some of the basic functions of the read head step by step. Refer to chapter "External parameterization using code cards" for a detailed description.

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i When performing external parameterization with code cards, we recommend that you copy and print the relevant pages of this manual and cut out the required code cards. Doing so prevents the read head from detecting another code card on the same page by mistake. If you use this manual directly for setting the parameters, then do not cover unused code cards (with a sheet of paper for example).

7.2.1 Code cards with special functions

The following code cards have special functions:

- ENABLE
- STORE
- CANCEL
- USE
- DEFAULT

ENABLE code card

The ENABLE code card is used to activate external parameterization mode.

8090482955

STORE code card

The STORE code card stores the modified parameter setting in the non-volatile memory of the read head and terminates external parameterization mode.
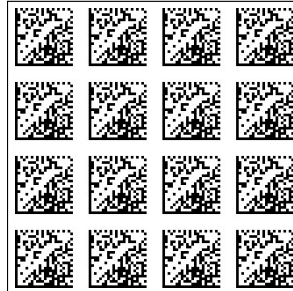
8090486411

CANCEL code card

The CANCEL code card discards the modified parameter setting and terminates external parameterization mode. The read head switches to normal mode and adopts the last valid configuration that was saved.
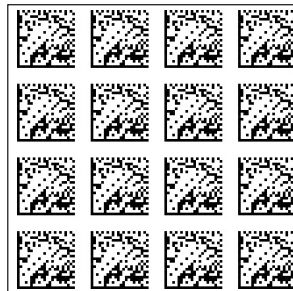
8099729931

USE code card

The USE code card stores the modified parameter setting in the volatile memory (RAM) of the read head and terminates external parameterization mode. The read head then operates with this configuration. However, when switching the read head off and on again, the configuration is lost and the read head operates with the last valid configuration that was saved. This is primarily used for test purposes.

8099733387

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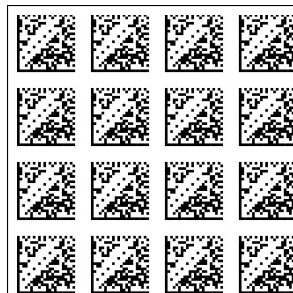
DEFAULT code card

The DEFAULT code card restores the factory setting of the read head and terminates external parameterization mode.
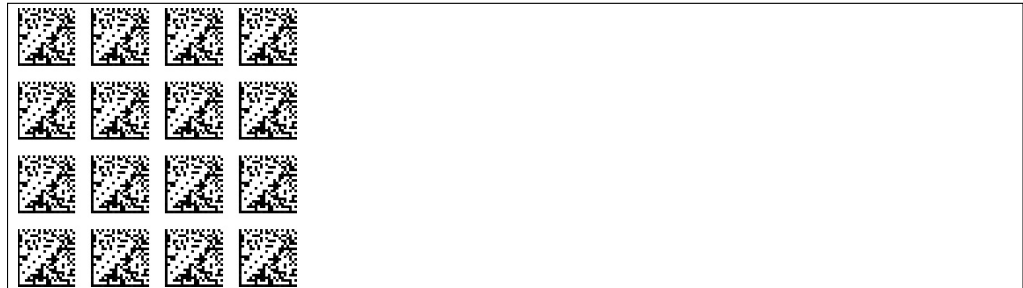
8099920267

7.2.2 Code cards for setting the read head address

A unique address must be assigned to the read head so that it can be activated via the interface. The address range extends from 0 to 3.

Read head address 0

The code card assigns address 0 to the read head.

8099957003

Read head address 1

The code card assigns address 1 to the read head.

8100066827

Read head address 2

The code card assigns address 2 to the read head.
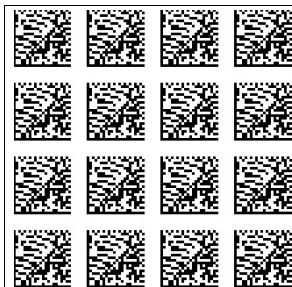
8100099979

Read head address 3

The code card assigns address 3 to the read head.
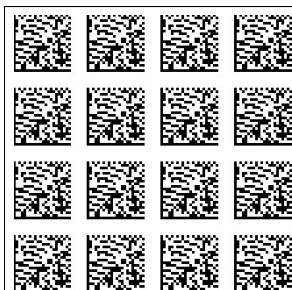
8193697931

7.2.3   Code cards for adjusting the resolution

You can assign the following position data resolutions to the read head by setting the parameters accordingly

- 0.1 mm
- 1 mm
- 10 mm

0.1 mm resolution

The code card assigns a position data resolution of 0.1 mm to the read head.

8193701387

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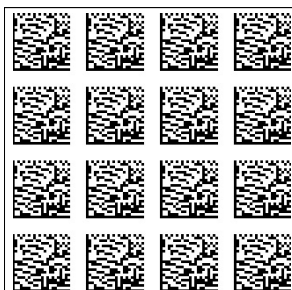
1 mm resolution

The code card assigns a position data resolution of 1 mm to the read head.
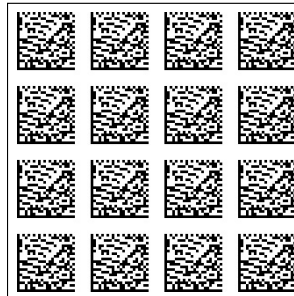
8194176395

10 mm resolution

The code card assigns a position data resolution of 10 mm to the read head.
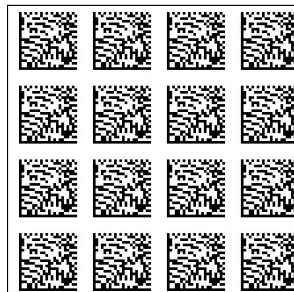
8194191371

Max. length of the code strip:

Resolution of the read head	Max. length of the code strip
10 mm	10 km
1 mm	10 km
0.1 mm	1.5 km

7.2.4 Code cards for setting the orientation

If the direction of the read head does not correspond to the default, you have to adjust the orientation. You can set the orientation at an angle of 0°, 180°, or to automatic detection in increments of 90°.

0° orientation

The code card assigns orientation 0° to the read head.
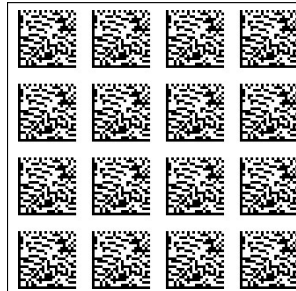
8194235019

180° orientation

The code card assigns orientation 180° to the read head.
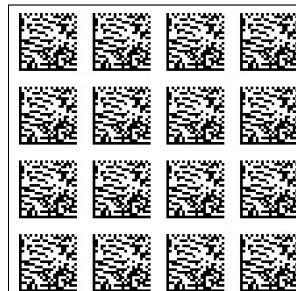
8194238859

0° or 180° orientation

The code card automatically assigns orientation 0° or 180° to the read head.

8194242315

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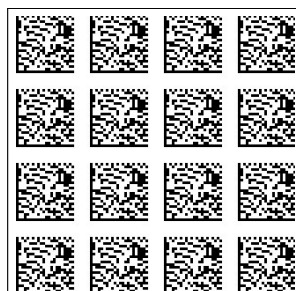
0°, 90°, 180° or 270° orientation

The code card automatically assigns orientation 0°, 90°, 180° or 270° to the read head.
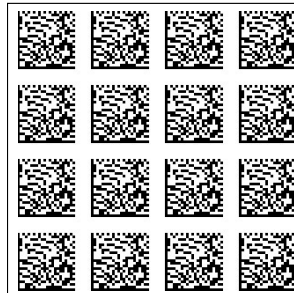
8195935115

7.2.5 Code cards for controlling image capture

Parameterization lets you assign various methods for controlling image capture.

Trigger source: auto

Image capture is controlled automatically by a pulse generated in the read head.
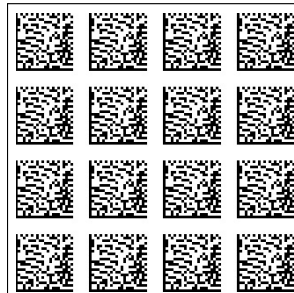
8195938571

Trigger source: Hardware

Image capture is controlled by a trigger signal at one of the read head inputs. The trigger signal can be an electrical signal from a controller or an external sensor, for example. The image is captured immediately.
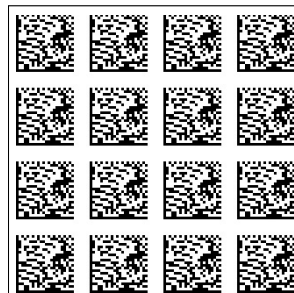
8196731787

7.2.6 Code cards for setting the transfer rate

Parameterization lets you assign various transfer rates to the read head for communication via the interfaces. You can set the following transfer rates:

• 38400 bit/s

- 57600 bit/s

- 76800 bit/s

- 115200 bit/s

- 230400 bit/s

Transfer rate: 38400 bit/s

> The transfer rate of the read head for communication across the interface is set to 38400 bit/s.
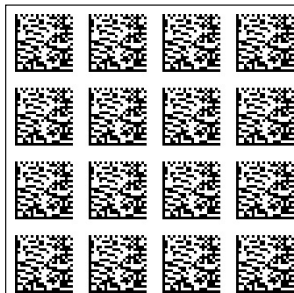
8196735243

Transfer rate: 57600 bit/s

> The transfer rate of the read head for communication across the interface is set to 57600 bit/s.
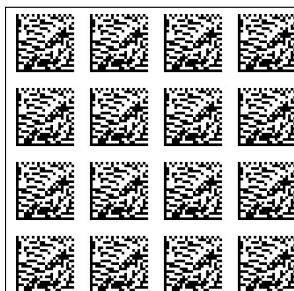
8196957323

Transfer rate: 76800 bit/s

> The transfer rate of the read head for communication across the interface is set to 76800 bit/s.
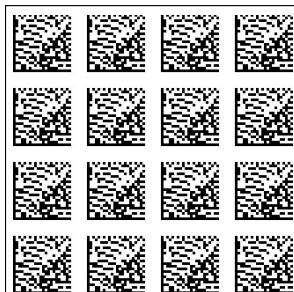
8197069963

Transfer rate: 115200 bit/s

The transfer rate of the read head for communication across the interface is set to 115200 bit/s.
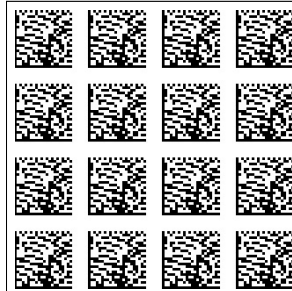
8215312651

Transfer rate: 230400 bit/s

The transfer rate of the read head for communication via the interface is set to 230 400 bit/s.
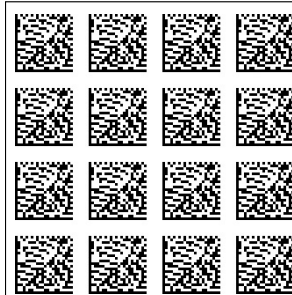
8215316107

7.2.7 Code cards for adjusting the bus termination

Parameterization lets you switch a bus terminating resistor on and off in the read head.

Bus termination: OFF

The bus terminating resistor is deactivated.

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Bus termination: ON

The bus terminating resistor is connected.

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