

OPERATING INSTRUCTIONS

V200 Work Station/V300 Work Station



Safety Camera System



GB

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Contents

Contents

1	About this document.....	5
1.1	Function of this document.....	5
1.2	Target group	5
1.3	Depth of information.....	5
1.4	Scope	6
1.5	Abbreviations.....	6
1.6	Symbols used	6
2	On safety.....	7
2.1	Qualified safety personnel.....	7
2.2	Applications of the device.....	8
2.3	Correct use	8
2.4	General safety notes and protective measures	9
2.5	Environmental protection	10
2.5.1	Disposal	10
2.5.2	Separation of materials	10
3	Product description.....	11
3.1	Special features	11
3.2	Operating principle of the device	11
3.3	Application examples.....	12
3.4	Configurable functions.....	13
3.4.1	Restart interlock.....	13
3.4.2	External device monitoring (EDM).....	15
3.5	Status indicators.....	15
3.5.1	Status LEDs of the V200 WS/V300 WS	15
3.5.2	Diagnostics LEDs of the V200 WS/V300 WS.....	16
4	Mounting.....	17
4.1	Checking the dimensions of the protective field.....	17
4.2	Determining the safety distance	18
4.2.1	Safety distance according to EN 999 and EN 294	19
4.2.2	Safety distance if OSHA and ANSI are applicable.....	20
4.3	Avoiding unmonitored areas	21
4.4	Steps for mounting the safety camera system.....	24
4.4.1	Mounting on a frame	25
4.4.2	Mounting in a frame.....	26
4.4.3	Mounting the reflective tape	27
5	Electrical installation.....	29
5.1	System connection M12 × 8	30
5.2	Connecting the V200 WS/V300 WS without external device monitoring (EDM), without internal restart interlock and without external key-operated pushbutton for teach-in.....	31
5.3	Connecting the V200 WS/V300 WS with external device monitoring (EDM), with internal restart interlock and with external key-operated pushbutton for teach-in	31
5.4	Two V200 WS/V300 WS with synchronisation.....	33

5.5	Connection diagrams	34
5.5.1	V200 WS/V300 WS on UE410 Flexi with external device monitoring (EDM) and with restart interlock both for V200 WS/V300 WS as well as for emergency switching off.....	34
5.5.2	V200 WS/V300 WS on UE10-30S with external device monitoring (EDM) and internal restart interlock	35
6	Application examples	36
6.1.1	Application with small protective field (1 × V200 WS/V300 WS).....	36
6.1.2	Application with large protective field (2 × V200 WS/V300 WS).....	37
6.1.3	Application with safe access on three sides (ergonomic workplace design).....	38
6.1.4	Application with automatic material transport to the workstation	39
7	Commissioning.....	40
7.1	Test notes.....	40
7.2	Pre-commissioning tests	40
7.3	Regular inspection of the protective device by qualified safety personnel	40
7.4	Tests of the protective device by a specialist or authorised personnel	41
8	Configuration.....	42
8.1	Teach-in.....	42
8.2	Internal restart interlock.....	43
8.3	External device monitoring.....	44
8.4	Locking the internal teach-in key.....	44
9	Care and maintenance	46
10	Fault diagnosis	47
10.1	In the event of faults or errors	47
10.2	SICK support	47
10.3	Displays of the diagnostics LEDs.....	48
11	Technical specifications	49
11.1	Data sheet.....	49
11.2	Dimensional drawing.....	53
11.2.1	Dimensional drawing V200 WS/V300 WS.....	53
11.2.2	Dimensional drawing mounting kit.....	54
12	Ordering information	55
12.1	Delivery.....	55
12.2	Available systems	55
12.3	Accessories	55
13	Annex.....	57
13.1	EC declaration of conformity.....	57
13.2	Manufacturer's checklist	58
13.3	List of tables	59
13.4	List of illustrations	60

1 About this document

Please read this chapter carefully before working with the documentation and the V200 Work Station/V300 Work Station safety camera system, referred to in the following as V200 WS/V300 WS for short.

1.1 Function of this document

These operating instructions are designed to address the *technical personnel of the machine manufacturer* or the *machine operator* in regards to safe mounting, installation, configuration, electrical installation, commissioning, operation and maintenance of the V200 WS/V300 WS safety camera system.

These operating instructions do not provide instructions for operating machines on which the safety camera system is, or will be, integrated. Information on this is to be found in the appropriate operating instructions for the machine.

1.2 Target group

These operating instructions are addressed to *planning engineers, machine designers and operators* of plants and systems which are to be protected by one or several V200 WS/V300 WS safety camera systems. It also addresses people who integrate the V200 WS/V300 WS into a machine, initialise its use, or who are in charge of servicing and maintaining the device.

1.3 Depth of information

These operating instructions contain the following information on the V200 WS/V300 WS safety camera system:

- mounting
- electrical installation
- commissioning
- care and maintenance
- fault, error diagnosis and troubleshooting
- part numbers
- conformity and approval

Planning and using protective devices such as the V200 WS/V300 WS also require specific technical skills which are not detailed in this documentation.

When operating the V200 WS/V300 WS, the national, local and statutory rules and regulations must be observed.

General information on accident prevention using opto-electronic protective devices can be found in the brochure "Safe Machines with opto-electronic protective devices".

Note We also refer you to the SICK homepage on the Internet at

www.sick.com

Here you will find information on:

- sample applications
- a list of frequently asked questions regarding the V200 WS/V300 WS
- these operating instructions in different languages for viewing and printing
- certificates on the prototype test, the EC declaration of conformity and other documents

1.4 Scope

Note These operating instructions are only applicable to the V200 WS/V300 WS safety camera system with the following entry on the type label in the field *Operating Instructions*: 8012225.

This document is part of SICK part number 8012225 (operating instructions “V200 WS/V300 WS – Safety Camera System” in all available languages). You will find this number on the type label of the system in the field *Operating Instructions*.

1.5 Abbreviations

ANSI American National Standards Institute

EDM External device monitoring

ESPE Electro-sensitive protective equipment (e.g. V200 WS/V300 WS)

LED Light Emitting Diode

OSSD Output signal switching device = signal output from the protective device to the controller that is used to stop the dangerous movement.

V200 WS/V300 WS Short code for the V200 Work Station/V300 Work Station safety camera system

1.6 Symbols used

Recommendation Recommendations are designed to give you some assistance in your decision-making process with respect to a certain function or a technical measure.

Note Refer to notes for special features of the device.

● **Red**, ● **Yellow**,
○ **Green** LED symbols describe the status of an LED. Examples:

● **Red** The red LED is constantly illuminated.

● **Yellow** The yellow LED is flashing.

○ **Green** The green LED is off.



In combination with the LED symbols, these symbols identify which LED is described:

⊘ ● The “OSSDs deactivated” LED is constantly illuminated.

⚠ ● The “Warning” LED is flashing.

⊘ ○ The “OSSDs activated” LED is off.

➤ **Take action ...** Instructions for taking action are shown by an arrow. Read carefully and follow the instructions for action.



WARNING

Warning!

A warning indicates an actual or potential risk or health hazard. They are designed to help you to prevent accidents.

Read carefully and follow the warning notices!

The term “dangerous state”

The dangerous state (standard term) of the machine is always shown in the drawings and diagrams of this document as a movement of a machine part. In practical operation, there may be a number of different dangerous states:

- machine movements
- electrical conductors
- visible or invisible radiation
- a combination of several risks and hazards

2 On safety

This chapter deals with your own safety and the safety of the equipment operators.

- Please read this chapter carefully before working with the V200 WS/V300 WS or with the machine protected by the V200 WS/V300 WS.

2.1 Qualified safety personnel

The V200 WS/V300 WS safety camera system must only be installed, commissioned and serviced by qualified safety personnel. Qualified safety personnel are defined as persons who

- due to their specialist training and experience have adequate knowledge of the power-driven equipment to be checked

and

- who have been instructed by the responsible machine operator in the operation of the machine and the current valid safety guidelines

and

- are sufficiently familiar with the applicable official health and safety regulations, directives and generally recognized engineering practice (e.g. DIN standards, VDE stipulations, engineering regulations from other EC member states) that they can assess the work safety aspects of the power-driven equipment

and

- who have access to these operating instructions and who have read them.

As a rule these are qualified safety personnel from the ESPE manufacturer or also persons who have been appropriately trained at the ESPE manufacturer, are primarily involved in checking ESPE and are allocated the task by the organisation operating the ESPE.

2.2 Applications of the device

The V200 WS/V300 WS safety camera system is an item of electro-sensitive protective equipment (ESPE). The physical resolution is 20 mm at a maximum protective field width of 1000 mm, and at a maximum protective field height of also 1000 mm.

The device is a *Type 3 ESPE* (V300 WS) or *type 2* (V200 WS) according to IEC 61496-1 and IEC/TR 61496-4 and is therefore allowed for use with controls in category 3 according to EN 954-1¹⁾. The device is suitable for hazardous point protection (hand protection).

Access to the hazardous point must be allowed only through the protective field. As long as the hazardous point is occupied, the system must not start. Refer to section 3.3 “Application examples” on page 12 for an illustration of the protection modes.



WARNING

Only use the safety camera system as an indirect protective measure!

An opto-electronic protective device provides indirect protection, e.g. by switching off the power at the source of the hazard. It cannot provide protection from parts thrown out, nor from emitted radiation. Transparent objects are not detected.

Depending on the application, mechanical guards may be required in addition to the safety camera system.

The safety camera system is only intended for use in industrial environments. When used in residential areas it can cause radio interferences.

2.3 Correct use

The V200 WS/V300 WS safety camera system must be used only as defined in section 2.2 “Applications of the device”. It must be used only by qualified personnel and only on the machine where it has been installed and initialised by qualified safety personnel in accordance with these operating instructions.

If the device is used for any other purposes or modified in any way – also during mounting and installation – any warranty claim against SICK AG shall become void.

¹⁾ Only valid for the assumption of conformity until 29.11.2009. From then on it will only be allowed to use the successor EN ISO 13849-1:2006.

2.4 General safety notes and protective measures



WARNING

Pay attention to the safety notes!

Please observe the following procedures in order to ensure the correct and safe use of the V200 WS/V300 WS safety camera system.

- The national/international rules and regulations apply to the installation, use and periodic technical inspections of the safety camera system, in particular
 - Machinery Directive 98/37/EC
 - Work Equipment Directive 89/655/EEC
 - the work safety regulations/safety rules
 - other relevant safety regulations

Manufacturers and operators of the machine on which the safety camera system is used are responsible for obtaining and observing all applicable safety regulations and rules.

- The notices, in particular the test regulations (see section 7.1 “Test notes” on page 40) of these operating instructions (e.g. on use, mounting, installation or integration into the existing machine controller) must be observed.
- The tests must be carried out by qualified safety personnel or specially qualified and authorised personnel and must be recorded and documented to ensure that the tests can be reconstructed and retraced at any time.
- Changes to the configuration of the devices can degrade the protective function. After every change to the configuration you must therefore check the effectiveness of the protective device. The person who makes the change is also responsible for the correct protective function of the device.
- The light beams from the camera may be deflected by reflective surfaces. This can result in failure to identify an object. For this reason reflective surfaces on the reflective tape or in the protective field are not allowed.
- The operating instructions must be made available to the operator of the machine where the V200 WS/V300 WS safety camera system is fitted. The machine operator is to be instructed in the use of the device by qualified safety personnel and must be instructed to read the operating instructions.
- The external voltage supply of the devices (SELV) must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60204-1. Suitable power supplies are available as accessories from SICK (see section 12.3 “Accessories” on page 55).

2.5 Environmental protection

The V200 WS/V300 WS safety camera system has been designed to minimise environmental impact. It uses only a minimum of power and natural resources.

- At work, always act in an environmentally responsible manner.

2.5.1 Disposal

- Always dispose of unserviceable or irreparable devices in compliance with local/national rules and regulations with respect to waste disposal (e.g. European waste code 16 02 14).

Note We would be pleased to be of assistance on the disposal of these devices. Contact your local SICK representative.

2.5.2 Separation of materials



WARNING

Only qualified safety personnel are allowed to separate materials!

Caution is required when dismantling devices. There is a risk of injuries.

Before you send the devices for appropriate recycling, it is necessary to separate the different materials in the V200 WS/V300 WS.

- Separate the housing from the rest of the parts (in particular the circuit board).
- Send the separated parts for recycling as appropriate (see Tab. 1).

Tab. 1: Overview on disposal by components

Components	Disposal
Product	
Housing	Metal recycling (aluminium)
Circuit boards, cable, connector and electrical connecting pieces	Electronic recycling
Packaging	
Cardboard, paper	Paper/cardboard recycling
Polyethylene packaging	Plastic recycling

3 Product description

This chapter provides information on the special features and properties of the V200 WS/V300 WS safety camera system. It describes the construction and the operating principle of the device, in particular the different operating modes.

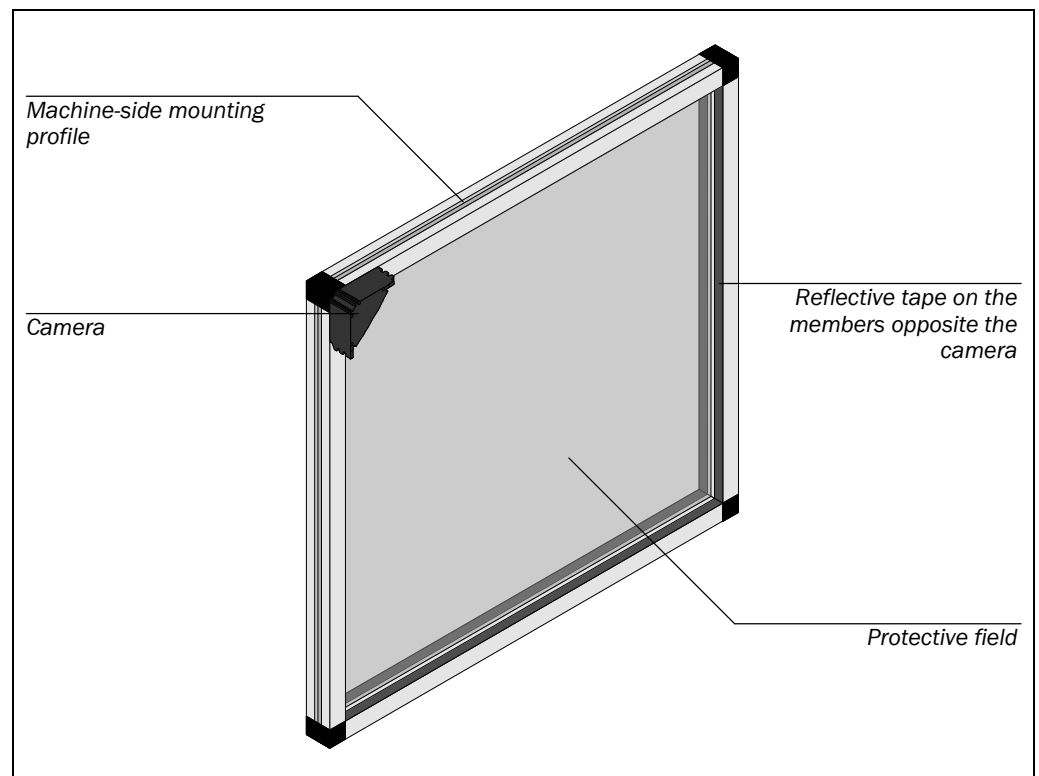
➤ Please read this chapter before mounting, installing and commissioning the device.

3.1 Special features

- V200 WS: ESPE **Type 2** according to IEC 61496-1
- V300 WS:
 - ESPE **Type 3** according to IEC 61496-1
 - complies with the requirements for the “Control reliable” safety level
- protective operation with either internal or external (realised on the machine) restart interlock
- facility for connecting a reset button
- facility for connecting an external device monitoring (EDM)
- status indication by LED

3.2 Operating principle of the device

Fig. 1: Operating principle of the V200 WS/V300 WS



The V200 WS/V300 WS safety camera system comprises a camera as well as a reflective tape with which the contour to be monitored is defined.

The camera monitors the area bounded by its field of view and the reflective tape – the protective field – for interruptions. If the V200 WS/V300 WS detects an interruption in the shape of the protective field, the camera shuts down its safe outputs.

Please refer to chapter 11 “Technical specifications” on page 49 for the data sheet.

Please refer to pages 53ff. for the dimensional drawings.

3.3 Application examples

Note The mounting of the device is only shown schematically in the following figures for reasons of simplicity.

- For correct mounting, pay attention to the notes in chapter 4 “Mounting” from page 17ff.

Fig. 2: Hazardous point protection with one V200 WS/V300 WS, mounting in a frame (left figure)

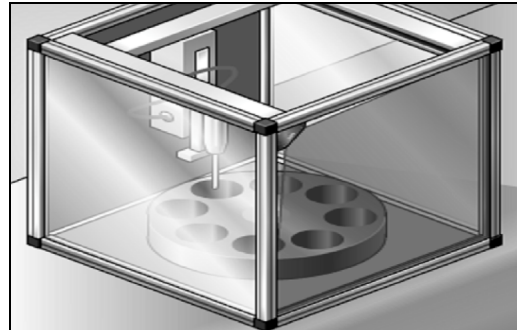


Fig. 3: Hazardous point protection with one V200 WS/V300 WS, mounting on a frame (right figure)

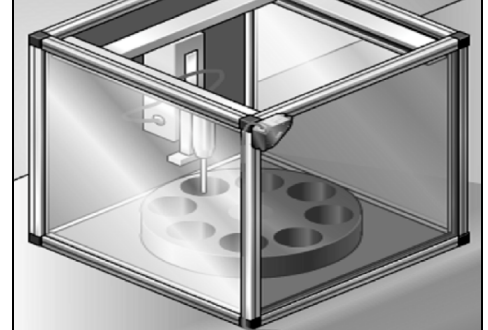


Fig. 4: Hazardous point protection with two V200 WS/V300 WS, placement in opposite directions (left figure)

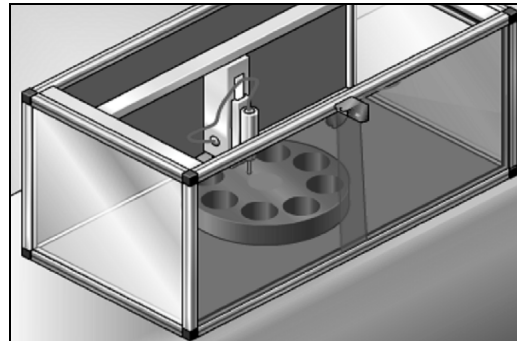
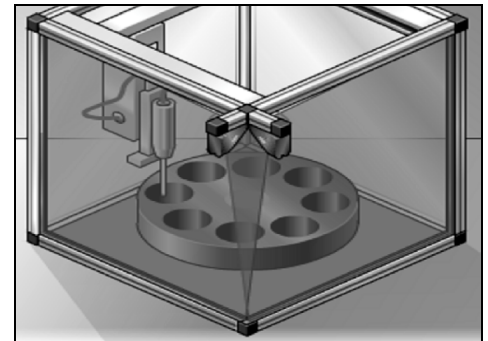


Fig. 5: Hazardous point protection with two V200 WS/V300 WS, placement at corner (right figure)



The V200 WS/V300 WS safety camera system operates correctly as a protective device only if the following conditions are met:

- The control of the machine must be electrical.
- It must be possible to achieve a safe state on the machine at any time.
- Camera and reflective tape must be so mounted that objects penetrating into the hazardous area are safely identified by the V200 WS/V300 WS.
- The reset button must be fitted outside the hazardous area such that it cannot be operated by a person working inside the hazardous area. When operating the reset button, the operator must have full visual command of the hazardous area.
- The statutory and local rules and regulations must be observed when installing and using the device.
- The necessary protective field dimensions must not exceed the permitted ratio for the lengths of the sides (see section 4.1 “Checking the dimensions of the protective field” on page 17).

3.4 Configurable functions

This section describes the functions of the V200 WS/V300 WS safety camera system that can be configured.



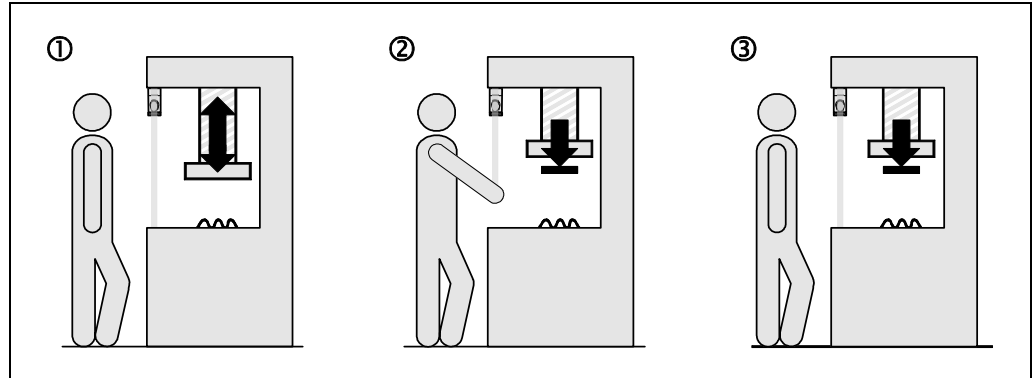
WARNING

Test the protective device after any changes!

After each modification to the protective device or its connection, you must check the whole protective device for effectiveness (see section 7.1 “Test notes” on page 40).

3.4.1 Restart interlock

Fig. 6: Outline drawing of the protective operation



The V200 WS/V300 WS has an internal restart interlock. The dangerous state of the machine (①) is interrupted on a protective field interruption (②), and is not re-enabled (③) until the operator presses the reset button.

Notes

- If you use the V200 WS/V300 WS without internal restart interlock, then you must implement the restart interlock externally, i.e. machine-side.
- Do not confuse the restart interlock with the starting interlock on the machine. The start interlock prevents the machine starting after switching on. The restart interlock prevents the machine starting again after an error or an interruption in the light path.

When using the V200 WS/V300 WS, you can implement the restart interlock in two different ways:

- With the internal restart interlock of the V200 WS/V300 WS:
The V200 WS/V300 WS controls the restart.
- With the restart interlock of the machine (external):
The V200 WS/V300 WS has no control over the restart.

The possible combinations are shown in the following table:

Tab. 2: Permissible restart interlock configurations on the V200 WS/V300 WS

Restart interlock of the V200 WS/V300 WS	Restart interlock of the machine	Permissible application
Deactivated	Deactivated	Only if ... <ul style="list-style-type: none"> the safety camera system cannot be stood behind. Observe EN 60 204-1! it is ensured no work clothing with reflectors is used.
Deactivated	Activated	All
Activated	Deactivated	Only if the safety camera system cannot be stood behind. Observe EN 60 204-1!
Activated	Activated	All. Restart interlock of the V200 WS/V300 WS handles the reset function (see "Reset" below).



WARNING

Always configure the application with restart interlock!

Ensure that there is always a restart interlock. The V200 WS/V300 WS is unable to verify if the restart interlock of the machine is connected. If you deactivate both the internal and the external restart interlock, the users and operators of the machine will be at acute risk of injury.

Reset

If you activate the restart interlock on the V200 WS/V300 WS (internal) and also realise a restart interlock on the machine (external), then each restart interlock gets its own button.

When actuating the reset button (for the internal restart interlock) ...

- the V200 WS/V300 WS activates the output signal switching devices.
- switches the V200 WS/V300 WS to green.

Only the external restart interlock prevents the machine from restarting. After pressing the reset button for the V200 WS/V300 WS, the operator must also press the restart button for the machine. If the reset button and the restart button are not pressed in the specified sequence, the dangerous state must remain disrupted.




Recommendation

The reset button prevents the accidental and inadvertent operation of the external restart button. The operator must first acknowledge the safe state with the reset button.

The electrical connection of the reset button is described in section 5.3 on page 31. The configuration of the internal restart interlock is described in section 8.2 "Internal restart interlock" on page 43.

3.4.2 External device monitoring (EDM)

The V200 WS/V300 WS has external device monitoring. If you activate the external device monitoring, then the V200 WS/V300 WS checks whether the contactors are actually de-energized when the protective device triggers. If, after an attempted Reset/Restart, the EDM does not detect a response from the switched device within 300 ms, the EDM will deactivate the output signal switching devices again. In this case the safety camera system signals as follows:

- The system remains at red. The status LED  illuminates.
- The status LED  flashes continuously (short on/long off).
- The diagnostics LED  flashes.

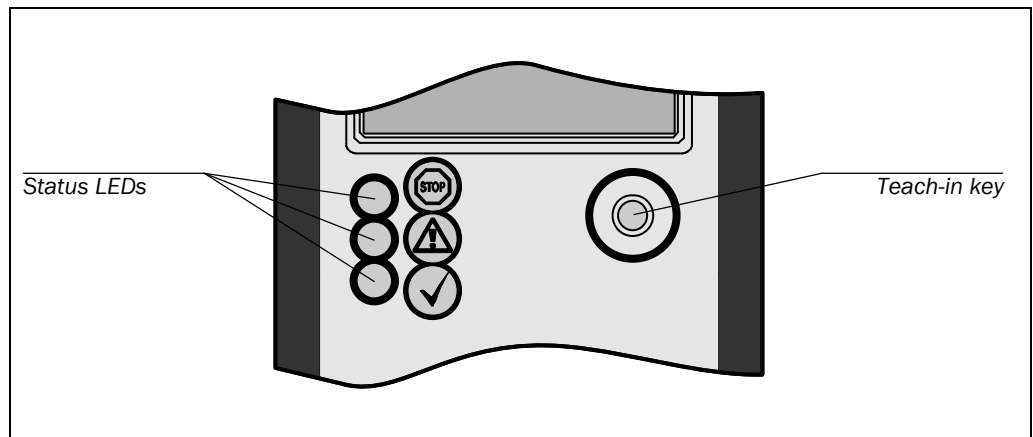
Note If the system is unable to change to a safe operational state (e.g. after contactor failure), the system locks and shuts down completely (“lock-out”, see page 47). The electrical connection for the external device monitoring is described in section 5.3 on page 31. The configuration of the external device monitoring is described in chapter 8 “Configuration” on page 42ff.

3.5 Status indicators








The light emitting diodes (LEDs) on the V200 WS/V300 WS signal its operating status.

3.5.1 Status LEDs of the V200 WS/V300 WS

Fig. 7: Status LEDs of the V200 WS/V300 WS



Tab. 3: Meaning of the status LEDs of the V200 WS/V300 WS

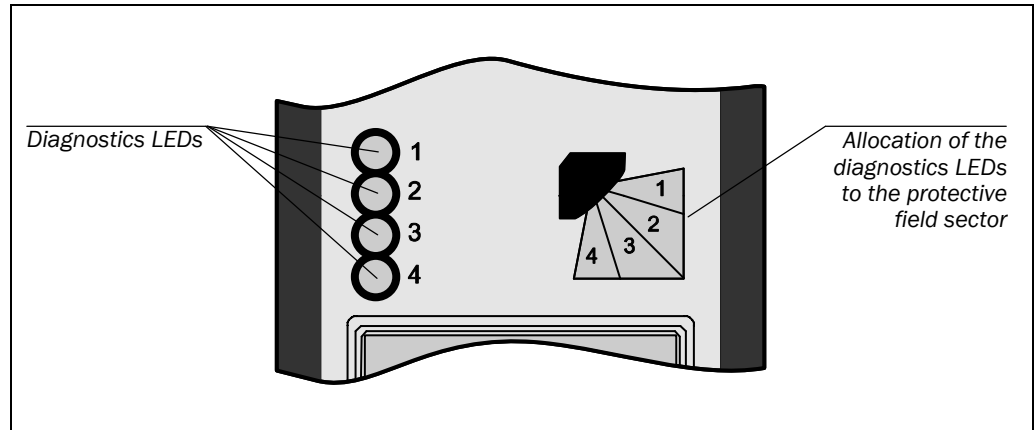
Display	Meaning
 ●	OSSDs shut down (e.g. if object in protective field or “lock-out”)
 ●	No valid configuration taught-in (default delivery status) ➤ Perform the teach-in procedure (see section 8.1 “Teach-in” on page 42).
 ●	Even flashing of  : Reset required. ➤ Press the reset button.
 ●	Even flashing of  (short on/long off): Device error. ➤ Refer to chapter 10 “Fault diagnosis” on page 47.
 ●	Protective field free. OSSDs activated.

3.5.2 Diagnostics LEDs of the V200 WS/V300 WS

The camera indicates diagnostic information with the aid of four LEDs. In protective operation, each LED is allocated to a protective field sector (see Fig. 8). A protective field sector represents one quarter of the field of view of the V200 WS/V300 WS.

The camera signals an interruption of the protective field by the illumination of the related diagnostics LED. During teaching-in or in the event of an error, the diagnostics LEDs flash (see section 10.3 “Displays of the diagnostics LEDs” on page 48).

Fig. 8: Diagnostics LEDs of the V200 WS/V300 WS



Tab. 4: Meaning of the diagnostics LEDs of the V200 WS/V300 WS

Display	Meaning
○	Protective field sector free
●	Interruption of the protective field in the allocated protective field sector
<ul style="list-style-type: none"> ● 1 ● 2 ● 3 ● 4 	A few seconds after switching on, all four diagnostics LEDs flash simultaneously (power up sequence).
Other displays	All other displays are error messages. Please refer to chapter 10 “Fault diagnosis” on page 47.

4 Mounting

This chapter describes the preparation and completion of the mounting of the V200 WS/V300 WS safety camera system. Mounting requires the following steps:

- checking the dimensions of the protective field (see below)
- determination of the safety distance (see page 18ff.)
- mounting of the camera (see page 21ff.)
- mounting of the reflective tape (see page 27)

The following steps are necessary after mounting and installation:

- completion of the electrical connections (see chapter 5 on page 29ff.)
- testing the installation (see section 7.1 on page 40)

4.1 Checking the dimensions of the protective field



WARNING

Only use the V200 WS/V300 WS safety camera system if the ratio allowed for the lengths of the sides of the protective field can be met!

If the maximum ratio of the lengths of the sides is exceeded, the safety camera system may not operate correctly. This would mean that the operator is at risk.

- The lengths of the sides of a protective field monitored by a V200 WS/V300 WS must not be shorter than 0.40 m and not longer than 1 m.
- The ratio of the lengths of the sides of a protective field monitored by a V200 WS/V300 WS must not exceed 2:1.
- If you need a larger protective field, you can mount two V200 WS/V300 WS facing in opposite directions. In this way you can generate two overlapping protective fields (see 6.1.2 “Application with large protective field (2 × V200 WS/V300 WS)” on page 37).

Tab. 5: Protective field dimensions allowed for a rectangular protective field (intermediate values are allowed)

Shorter side a of the protective field (example values)	Longer side of the protective field	
	Minimum (= 1 × a)	Maximum (= 2 × a, but ≤ 1 m)
0.40 m	0.40 m	0.80 m
0.45 m	0.45 m	0.90 m
0.50 m	0.50 m	1.00 m
0.60 m	0.60 m	1.00 m
0.70 m	0.70 m	1.00 m
0.80 m	0.80 m	1.00 m
0.90 m	0.90 m	1.00 m
1.00 m	1.00 m	1.00 m

4.2 Determining the safety distance

The safety camera system must be mounted with an adequate safety distance between the protective field and the hazardous point. This ensures that the hazardous point can only be reached after the dangerous state of the machine has been completely stopped.



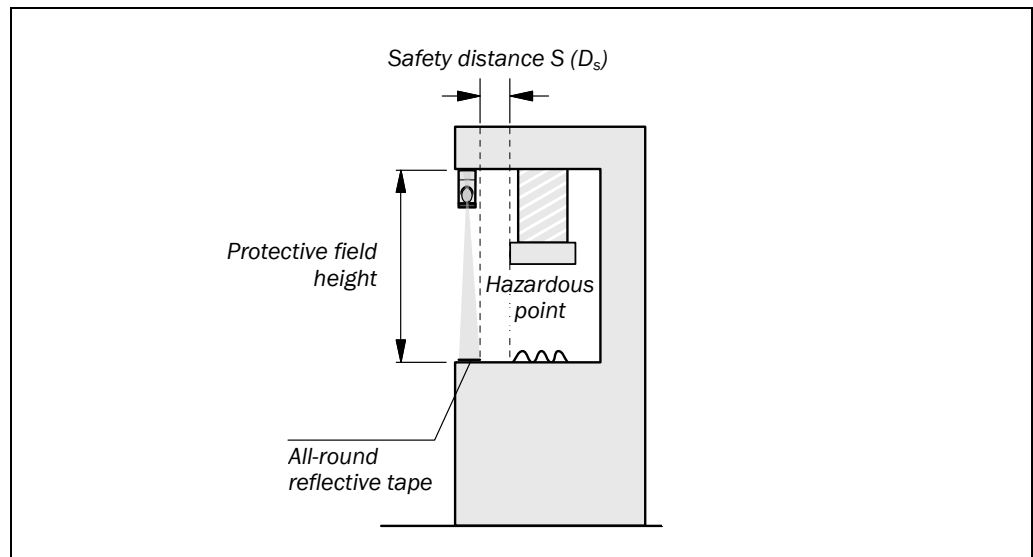
WARNING

No protective function without sufficient safety distance!

The reliable protective effect of the safety camera system depends on the safety camera system being mounted with the correct safety distance from the hazardous point.

Note If mounted vertically, the protective field is from the centre of the camera lens to the edge of the reflective tape that is closest to the hazardous point. (The reference point for the safety distance S is therefore **not** the middle of the reflective tape. Cf. Fig. 9.)

Fig. 9: Safety distance from the hazardous point

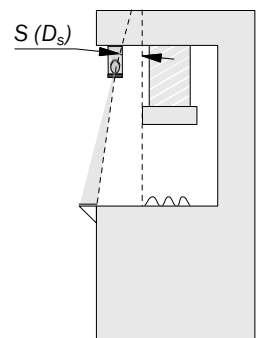


WARNING

If the protective field is at an angle, pay special attention to the safety distance!

SICK recommends only mounting the V200 WS/V300 WS with the protective field vertical (protective field parallel to the front face of the hazardous area).

- Ensure the necessary safety distance between the access point and the hazardous point is met at all parts of the protective field at an angle.
- Note that different rules may apply to the calculation of the safety distance for protective fields at an angle.
- Your SICK-subsiary will be pleased to assist you with the implementation of special applications.



4.2.1 Safety distance according to EN 999 and EN 294

The safety distance as defined in EN 999 and EN 294 depends on:

- stopping/run-down time of the machine or system
(The stopping/run-down time is shown in the machine documentation or must be determined by taking a measurement.)
- response time of the entire protective device (V200 WS/V300 WS: 20 ms)
- reach or approach speed
- other parameters that are stipulated by the standard depending on the application

How to calculate the safety distance S according to EN 999 and EN 294:

Note The following calculation shows an example calculation of the safety distance. Depending on the application and the ambient conditions, a different calculation may be necessary.

➤ First, calculate S using the following formula:

$$S = 2000 \times T + 48 \text{ [mm]}$$

Where ...

T = Stopping/run-down time of the machine
+ response time of the protective device after light path interruption [s]

S = Safety distance [mm]

The reach/approach speed is already included in the formula.

- If the result S is ≤ 500 mm, then use the determined value as the safety distance.
- If the result S is > 500 mm, then recalculate S as follows:
 $S = 1600 \times T + 48 \text{ [mm]}$
- If the new value S is > 500 mm, then use the newly determined value as the minimum safety distance.
- If the new value S is ≤ 500 mm, then use 500 mm as the minimum safety distance.

Example:

Stopping/run-down time of the machine = 290 ms

Response time after light path interruption = 20 ms

$$T = 290 \text{ ms} + 20 \text{ ms} = 310 \text{ ms} = 0.31 \text{ s}$$

$$S = 2000 \times 0.31 + 48 = 668 \text{ mm}$$

$S > 500$ mm, therefore:

$$S = 1600 \times 0.31 + 48 = \underline{\underline{544 \text{ mm}}}$$

4.2.2 Safety distance if OSHA and ANSI are applicable

Under the authority of OSHA and ANSI the safety distance as specified by ANSI B11.19-1990 E.4.2.3.3.5 and Code of Federal Regulations, Volume 29, Part 1910.217 ... (h) (9) (v) depends on:

- stopping/run-down time of the machine or system
(The stopping/run-down time is shown in the machine documentation or must be determined by taking a measurement.)
- response time of the entire protective device (V200 WS/V300 WS: 20 ms)
- reach or approach speed
- other parameters that are stipulated by the standard depending on the application

How to calculate the safety distance D_s according to ANSI B11.19-1990 E.4.2.3.3.5 and Code of Federal Regulations, Volume 29, Part 1910.217 ... (h) (9) (v):

Note The following calculation shows an example calculation of the safety distance. Depending on the application and the ambient conditions, a different calculation may be necessary.

➤ Calculate D_s using the following formula:

$$D_s = H_s \times (T_s + T_c + T_r + T_{bm}) + D_{pf}$$

Where ...

D_s = The minimum distance in inches (or millimetres) between the hazardous point and the protective device.

H_s = A parameter in inches/second or millimetres/second, derived from data on approach speeds of the body or parts of the body. Often 63 inches/second (1600 mm/second) is used for H_s .

T_s = Stopping/run down time of the machine tool measured at the final control element

T_c = Stopping/run-down time of the control system

T_r = Response time of the entire protective device after light path interruption (V200 WS/V300 WS: 20 ms)

T_{bm} = Additional response time allowed for brake monitor to compensate for wear

Note Any additional response times must be accounted for in this calculation.

D_{pf} = An additional distance added to the overall safety distance required. This value is based on intrusion toward the hazardous point prior to actuation of the electro-sensitive protective equipment (ESPE). Values range from 0.25 inches to 48 inches (6 to 1220 millimetres) or more depending on application.

Example:

For vertical protection with an opto-electronic protective device with an effective resolution finer than 2.5 inches (64 millimetres), D_{pf} can be determined approximately using the following formula:

$$D_{pf} \text{ (inches)} = 3.4 \times (\text{Effective resolution} - 0.276), \text{ but not less than } 0.$$

4.3 Avoiding unmonitored areas

The V200 WS/V300 WS can be integrated into the system in a widely varying manner. During this process unmonitored areas may result due to incorrect mounting or mutual interference between several systems. During this process pay attention to the following warnings and precautions!



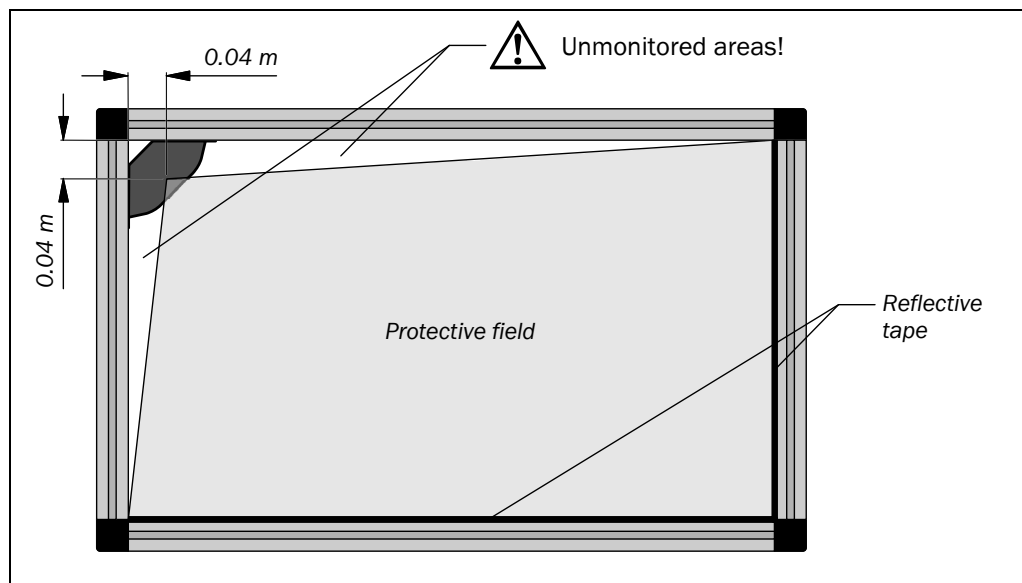
WARNING

Provide separate protection for unmonitored areas!

When mounting the V200 WS/V300 WS safety camera system, unmonitored areas can be produced through which an operator may be able to reach the hazardous point.

- Mount the camera on the frame instead of in the frame to avoid unmonitored areas from the start (see section 4.4.1 “Mounting on a frame” on page 25).
- Protect unmonitored areas using mechanical guards.

Fig. 10: Unmonitored areas on the V200 WS/V300 WS



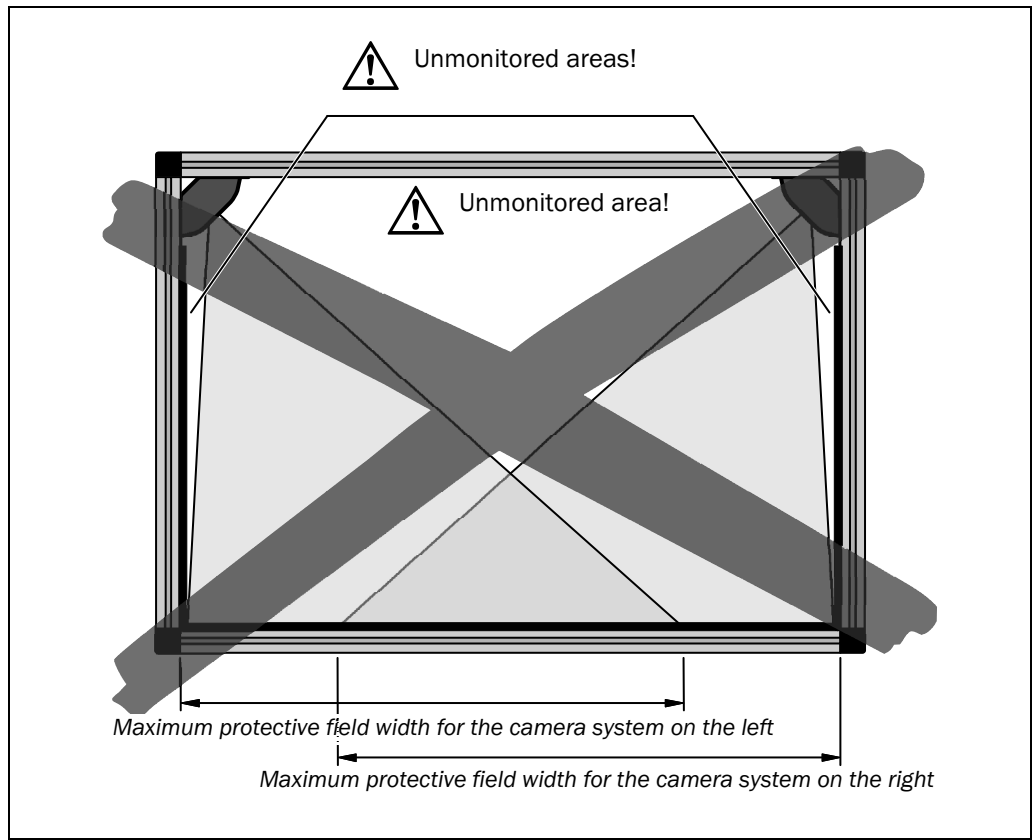


WARNING

During mounting, please observe the maximum protective field width!

If, during mounting, the maximum protective field width for one or two camera systems is exceeded, the camera will not see the reflective tape opposite. As a result an unmonitored area will be produced. The operator is at risk!

Fig. 11: Dangerous mounting mistake: maximum protective field width exceeded. The mounting shown here is expressly **not recommended** by SICK.



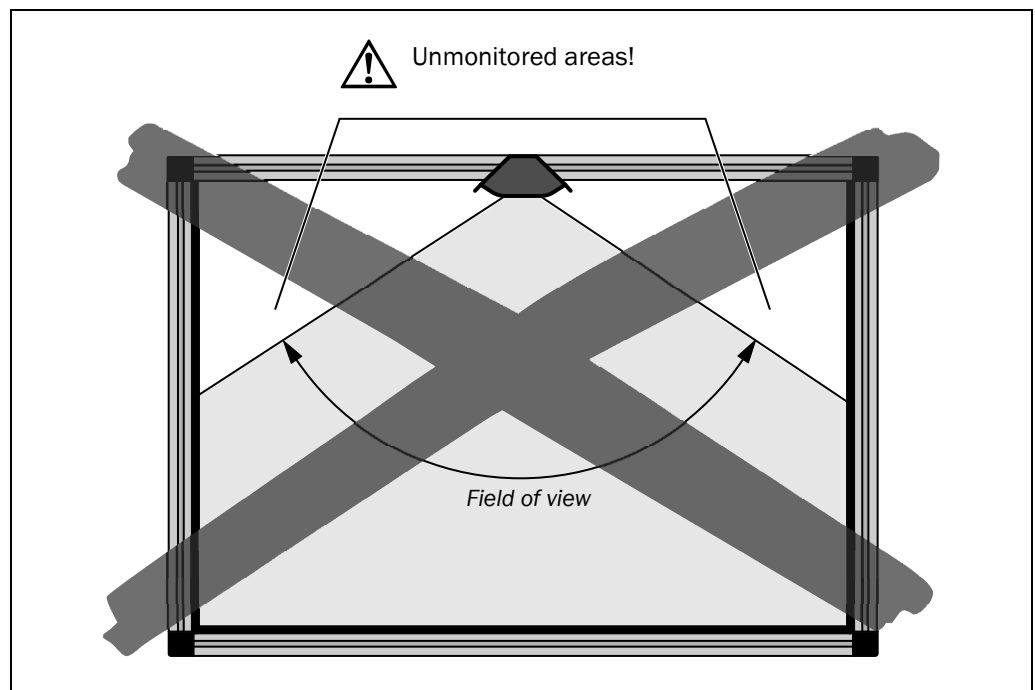


WARNING

Fig. 12: Dangerous mounting mistake: field of view of the camera exceeded.
The mounting shown here is expressly **not recommended** by SICK.

Pay attention to the field of view of the camera during mounting!

If the maximum field of view of the camera is exceeded during mounting, the camera will not monitor the reflective tape outside its field of view. The operator is at risk!



WARNING

Prevent the mutual interference of systems mounted in close proximity!

If two V200 WS/V300 WS are so arranged that they entirely or partially look at the same reflective tape, the two cameras may interfere with each other. This can disrupt the protective function of the system. This would mean that the operator is at risk.

➤ Take suitable measures to prevent mutual interference:

- If the two cameras are used in different applications:
 - Reverse the direction in which one of the systems looks.
 - Choose a different mounting method (see section 4.4 “Steps for mounting the safety camera system” on page 24).
 - Mount non-reflective field of view guards.
- If the two cameras are used in the same application, then synchronise the two systems (see section 5.4 “Two V200 WS/V300 WS with synchronisation” on page 33).

4.4 Steps for mounting the safety camera system

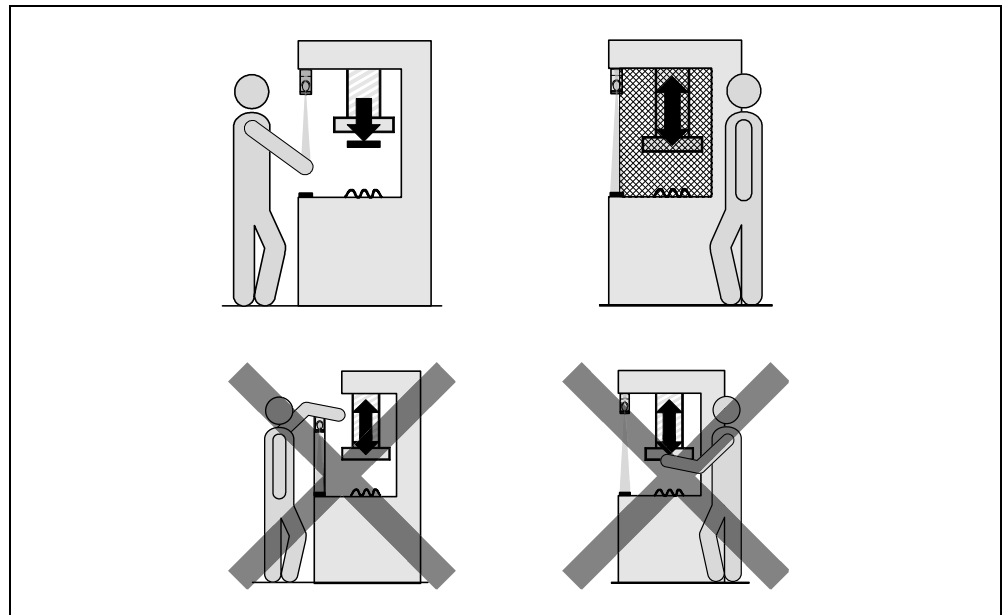


WARNING

Special features to note during mounting:

- Avoid unmonitored areas as described in the previous section.
- Always mount the camera on a flat surface.
- Always mount the camera on a metal surface and ensure good mechanical contact. In this way you will ensure adequate heat dissipation from the device.
- During mounting, ensure that camera and reflective tape are aligned correctly. The V200 WS/V300 WS accepts a defined lateral tolerance (see section 4.4.3 “Mounting the reflective tape” on page 27).
- Take suitable measures to attenuate vibration if the shock requirements are above the values given in section 11.1 “Data sheet” on page 49.
- Observe the safety distance of the system during mounting. On this subject read section 4.2 “Determining the safety distance” on page 18.
- Mount the safety camera system such that it is not possible reaching under, reaching over or standing behind the camera and that the camera cannot be repositioned.

Fig. 13: The correct installation (above) must eliminate the errors (below) reaching over, reaching under and standing behind



- Secure the two fixing screws against unintentional loosening.
- Once the system is mounted, one or several of the enclosed self-adhesive safety information labels must be affixed:
 - Use only information labels in the language which the operators of the machine understand.
 - Affix the information labels such that they are easily visible by the operators during operation. After attaching additional objects and equipment, the information labels must not be concealed from view.
 - Affix the information label “Important Information” to the system in close proximity to the safety camera system.

The safety camera system can be mounted in two different ways:

- mounting on a frame
- mounting in a frame

4.4.1 Mounting on a frame

- Notes**
- Always mount the camera with at least two screws and use the fastening openings on two opposite sides of the housing.
 - Secure the two fixing screws against unintentional loosening.
 - Always use washers under the screws (cf. figure).
 - To mount the camera use sliding nuts suitable for the profile system used or the clamping lugs available as accessories (see section 12.3 “Accessories” on page 55)
 - Pay attention to the thickness of the flange on the camera when selecting a suitable screw length (see section 11.2 “Dimensional drawing” on page 53).

Fig. 14: Example: Mounting with sliding nuts on different thickness profiles

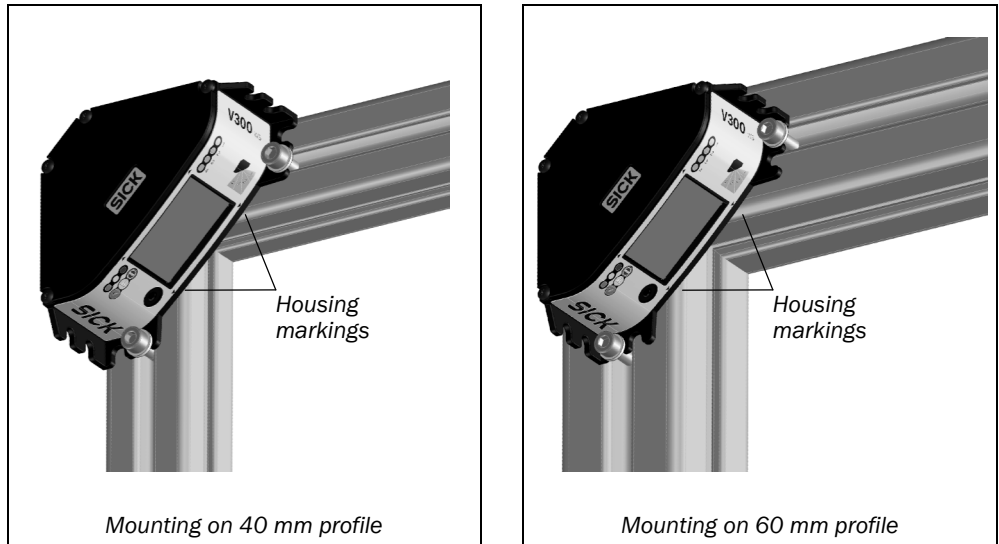
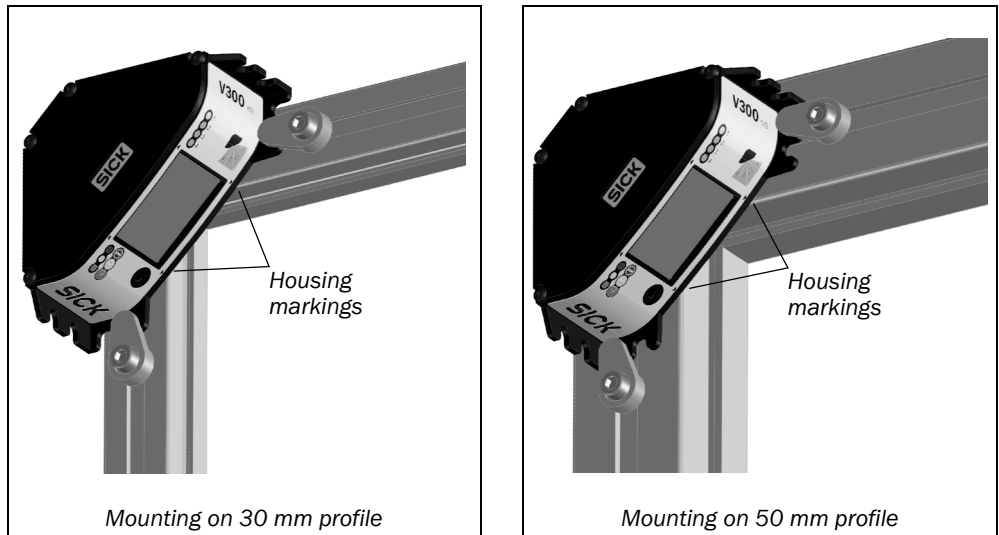


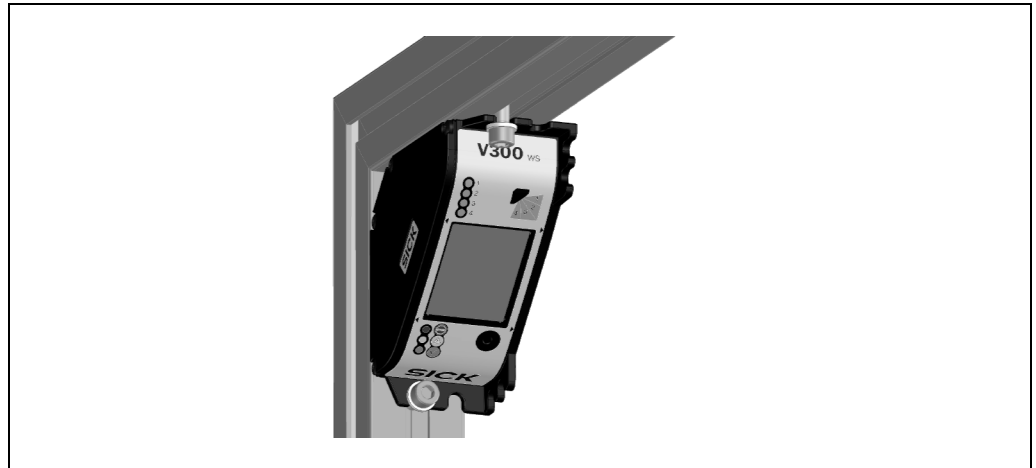
Fig. 15: Example: Mounting with clamping lugs on different thickness profiles



- The protective field stretches between the housing markings and the ends of the reflective tape. When aligning the sensor, pay attention to ensuring the housing markings are aligned with the frame profile. In this way you will ensure there are no un-monitored zones.

4.4.2 Mounting in a frame

Fig. 16: Mounting in a frame



- Notes**
- Always mount the camera with at least two screws and use the fastening openings on two opposite sides of the housing.
 - Secure the two fixing screws against unintentional loosening.
 - Always use washers under the screws (cf. figure).
 - Use sliding nuts suitable for the profile system employed for mounting the camera.
 - Pay attention to the thickness of the flange on the camera when selecting a suitable screw length (see section 11.2 “Dimensional drawing” on page 53).
 - Take organisational measures to protect the un-monitored areas.

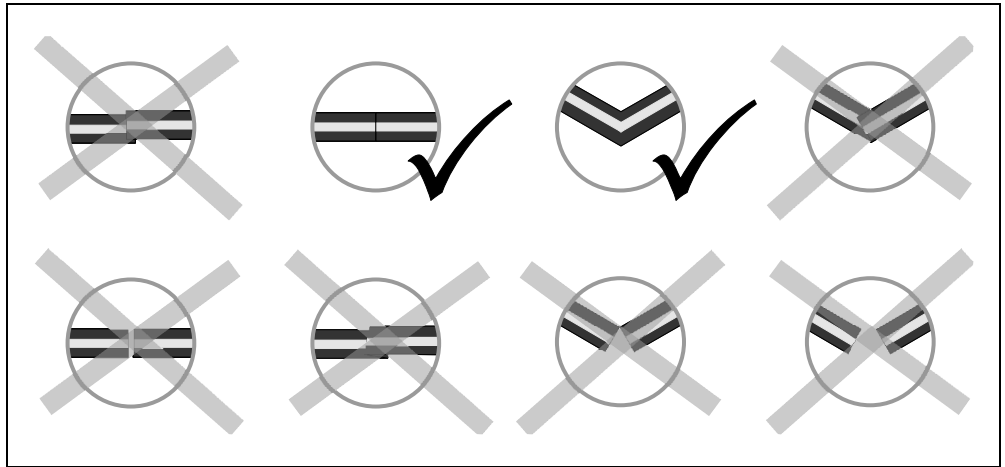
4.4.3 Mounting the reflective tape

Prior to mounting the reflective tape, pay attention to the following notes:

- Notes**
- Plan the attachment of the reflective tape exactly prior to bonding it in place. The adhesive on the reflective tape is very resilient. It is not possible to remove the tape again without destroying it. You will need a suitable solvent to remove the reflective tape (see 12.3 “Accessories” on page 55).
 - If you must bond the reflective tape in several sections, then ensure there are no gaps, folds or offset at the joints. The reflective tape must run seamlessly along the contour to be monitored.

Only the longest contiguous section of the reflective tape is taught-in by the V200 WS/V300 WS. If there are gaps in the reflection, the safety camera system will ignore the shorter section of the reflective tape.

Fig. 17: Correct arrangement of the reflective tapes at joints



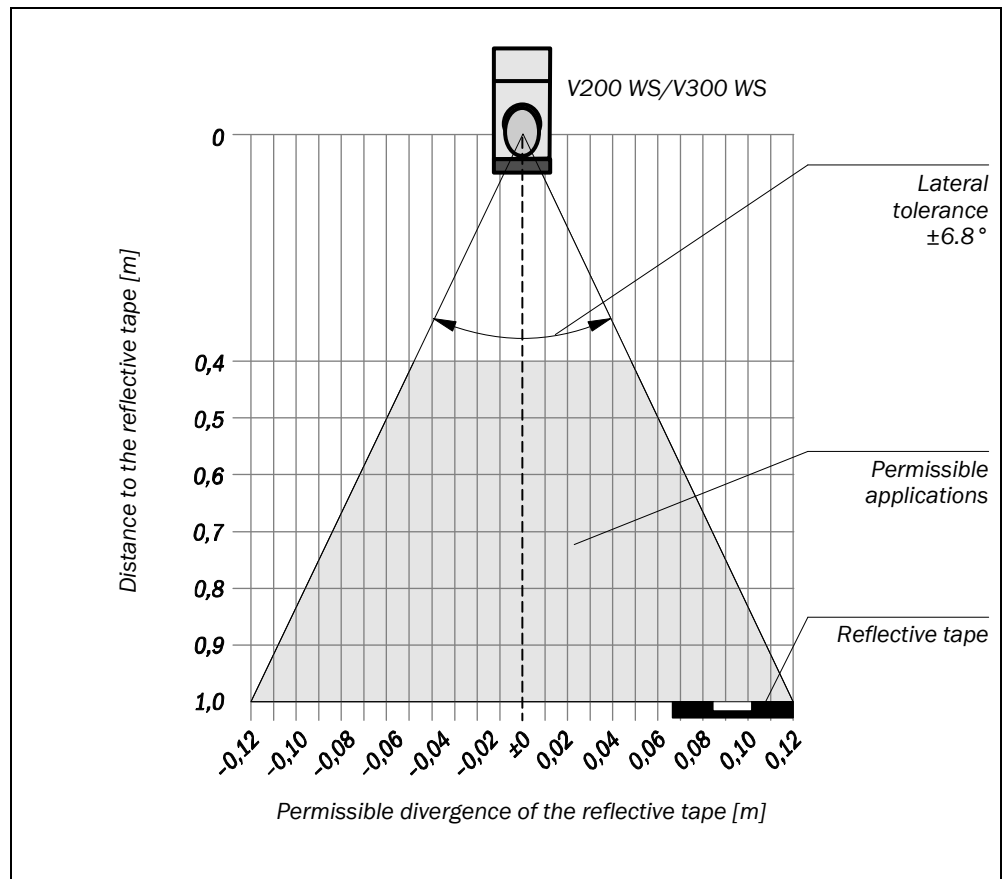
- If damage to the reflective tape is to be expected due to the application, e. g. because heavy or sharp-edged objects are to be pushed over the working area, you should use one of the following possible mounting methods:
 - Mount the camera on the bottom of the frame or mount it lower than the contact surface in front of the frame.
 - Use “Heavy-Duty” reflective tape instead of the reflective tape provided (see section 12.3 “Accessories” on page 55).

How to mount the reflective tape:

The reflective tape is attached by simply bonding it in place.

- Clean the surface where the tape is to be attached so that it is clean of residue.
- Remove the protective film on the rear of the reflective tape and apply the tape perpendicular to the camera's optical axis. The camera will tolerate a small divergence from the optical axis (cf. Fig. 18).

Fig. 18: Permissible divergence of the reflective tape from the optical axis of the camera as a function of the distance
(illustration of divergence not to scale)



- Press the reflective tape firmly and ensure the edges are firmly sealed. In this way you will prevent dirt and liquids getting under the reflective tape.

5 Electrical installation



WARNING

Switch the entire machine/system off line!

The machine/system could inadvertently start up while you are connecting the devices.

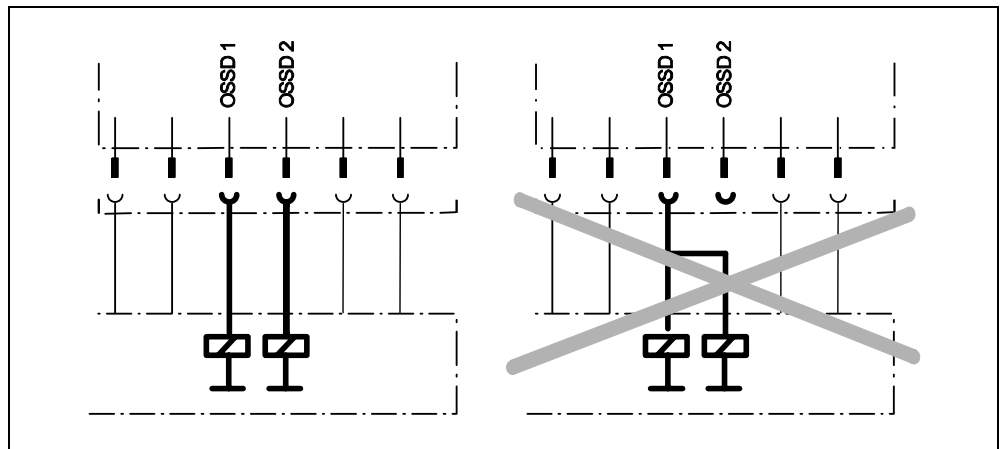
- Ensure that the entire machine/system is disconnected during the electrical installation.

Connect OSSD1 and OSSD2 separately!

You are not allowed to connect OSSD1 and OSSD2 together, otherwise signal safety will not be ensured.

- Ensure that the machine controller processes the two signals separately.

Contactors connected in series must be positively guided and monitored (see section 5.3 in “External device monitoring (EDM)” on page 32).



Only connect the OSSDs to a single subsequent switching element!

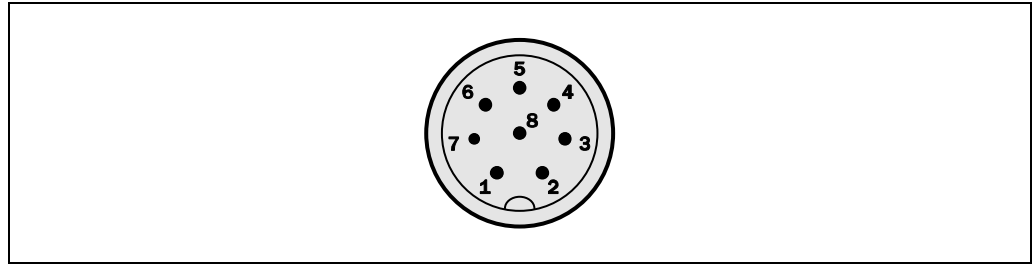
Each output signal switching device (OSSD) is only allowed to be connected to one switching element (e.g. relay or contactor). If several switching elements are required, then you must choose a suitable form of contact duplication.

Notes

- The two outputs are protected against short-circuits to 24 V DC and 0 V. When the light path is clear, the signal level on the outputs is HIGH DC (at potential), when the light path is interrupted or there is a device fault the outputs are LOW DC.
- The V200 WS/V300 WS safety camera system meets the interference suppression requirements (EMC) for industrial use (interference suppression class A). When used in residential areas it can cause radio interferences.
- To ensure full electromagnetic compatibility (EMC), functional earth (FE) must be connected.
- The external voltage supply of the devices must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60 204-1. Suitable power supplies are available as accessories from SICK (see section 12.3 “Accessories” on page 55).
- Dimension the electrical protection for the camera to suit the information in section 11.1 “Data sheet” from page 49ff.

5.1 System connection M12 × 8

Fig. 19: System connection
V200 WS/V300 WS



The V200 WS/V300 WS has a hard-wired connector cable (length: approx. 30 cm) with a cable plug M12 × 8.

Tab. 6: Pin assignment
system connection
V200 WS/V300 WS

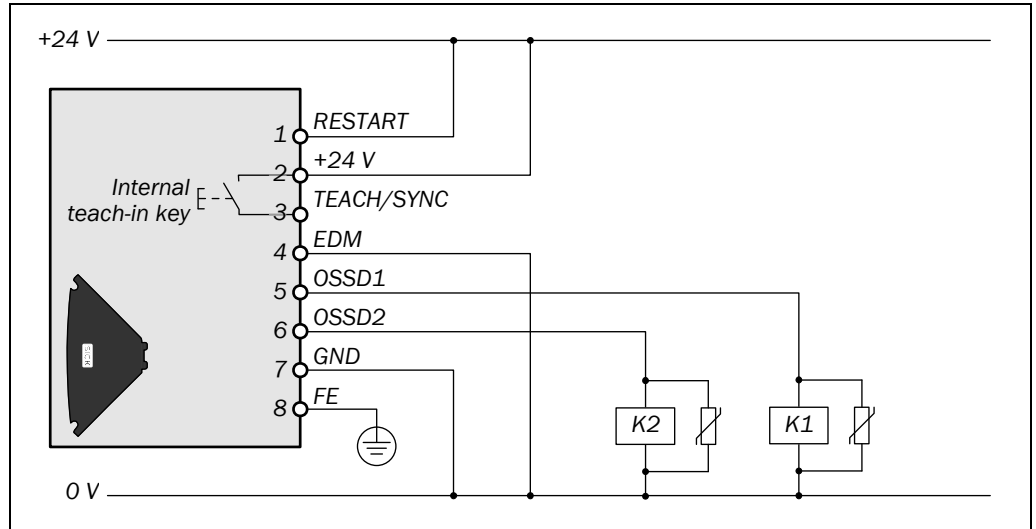
Pin	Colour	Signal	Function
1	White	RESTART	Reset/Restart (optional)
2	Brown	+24 V DC	24 V DC (voltage supply)
3	Green	TEACH/SYNC	Teach-in/synchronisation
4	Yellow	EDM	External device monitoring (EDM) (optional)
5	Grey	OSSD1	OSSD1 (safe output signal switching device 1)
6	Pink	OSSD2	OSSD2 (safe output signal switching device 2)
7	Blue	GND	0 V DC (voltage supply)
8	–	FE	Functional earth

Note Connecting cables of different length are available as accessories from SICK (see section 12.3 “Accessories” on page 55). If you use connecting cables you have assembled yourself, ensure the functional earth (pin 8) is connected.

5.2 Connecting the V200 WS/V300 WS without external device monitoring (EDM), without internal restart interlock and without external key-operated pushbutton for teach-in

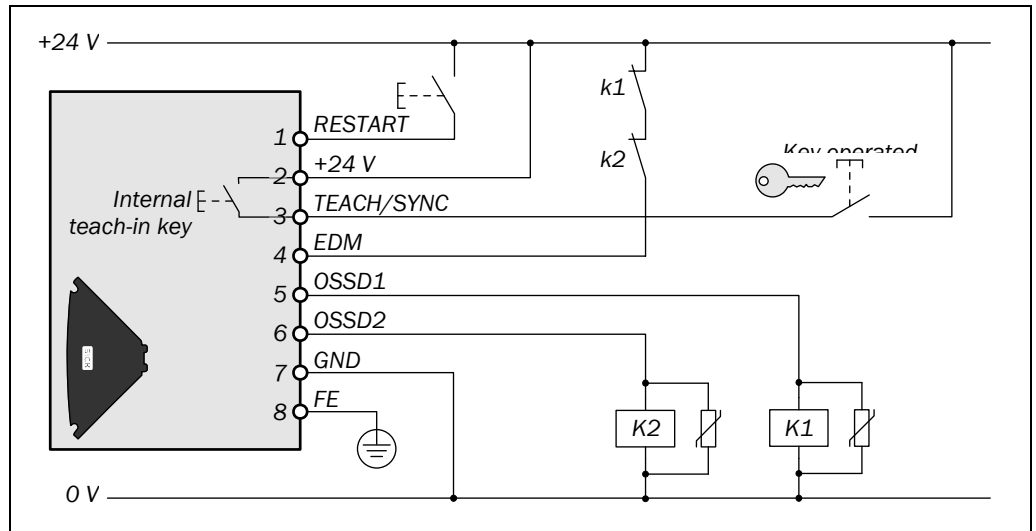
Note If you use the V200 WS/V300 WS without the internal restart interlock, then you must implement the restart interlock externally, i.e. machine-side.

Fig. 20: Connecting the V200 WS/V300 WS without external device monitoring (EDM), without internal restart interlock and without external key-operated pushbutton for teach-in



5.3 Connecting the V200 WS/V300 WS with external device monitoring (EDM), with internal restart interlock and with external key-operated pushbutton for teach-in

Fig. 21: Connecting the V200 WS/V300 WS with external device monitoring (EDM), with internal restart interlock and with external key-operated pushbutton for teach-in



Reset button/Restart

When using the V200 WS/V300 WS with internal restart interlock (see section 3.4.1 “Restart interlock” on page 13), the operator must press the reset button prior to restart.



WARNING

Select the correct installation site for the reset button!

Install the reset button outside the hazardous area such that it cannot be operated from inside the hazardous area. When operating the reset button, the operator must have full visual command of the hazardous area.

Perform a teach-in procedure after any change to the connection!

The V200 WS/V300 WS activates the internal restart interlock only after the next teach-in procedure. Otherwise the system will not switch to green.

The configuration of the internal restart interlock is described in section 8.2 “Internal restart interlock” on page 43.

External device monitoring (EDM)

You must implement external device monitoring electrically via a positively guided closing action of both N/C contacts (k1, k2) when the contact elements (K1, K2) reach their de-energized position after the protective device has responded. 24 V is then applied at the input of the EDM. If 24 V is not present after the response of the protective device, then one of the contact elements is faulty and the external device monitoring prevents the machine starting up again.



WARNING

Perform a teach-in procedure after any change to the connection!

The V200 WS/V300 WS activates the external device monitoring only after the next teach-in procedure. If you place the system in operation after connecting the contacts to the *external device monitoring (EDM)* input without teaching-in, then the external device monitoring will remain deactivated. The system can therefore switch to green despite faulty contactors.

The configuration of the external device monitoring is described in section 8.3 “External device monitoring” on page 44.

External key-operated pushbutton for teach-in

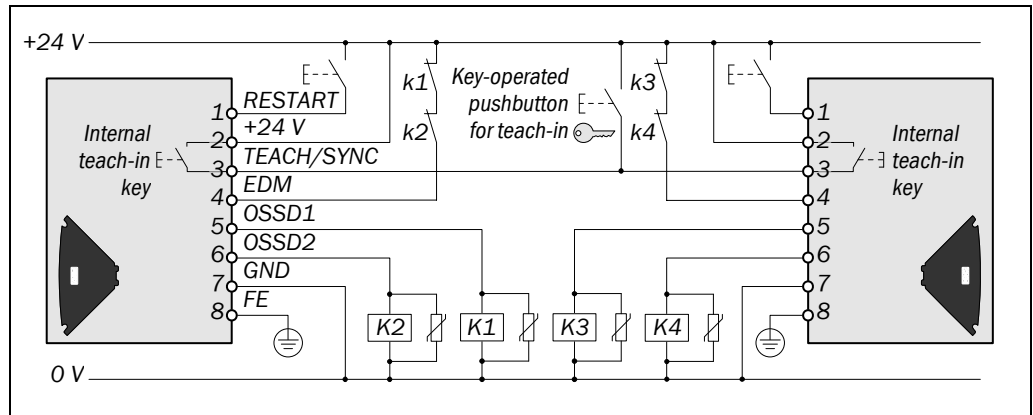
To permit remote teaching-in and/or to protect the configuration, you can connect an external key-operated pushbutton for teach-in and lock the internal teach-in key.

- Notes**
- Once the key-operated pushbutton for teach-in has been operated, the V200 WS/V300 WS locks the internal teach-in key and saves this configuration in the device. Teaching-in can only be performed using the external key-operated pushbutton for teach-in (see section 8.4 “Locking the internal teach-in key” on page 44).
 - If you use two V200 WS/V300 WS in an application, then both systems use the same external key-operated pushbutton for teach-in (see Fig. 22 on page 33).

V200 WS/V300 WS

5.4 Two V200 WS/V300 WS with synchronisation

Fig. 22: Connection of two V200 WS/V300 WS with synchronisation



If two V200 WS/V300 WS are so arranged that they entirely or partially look at the same reflective tape, the two cameras may interfere with each other. To prevent this situation occurring, you must synchronise the two cameras.

How to synchronise two V200 WS/V300 WS:

- Connect pin 3 on the two cameras together. The cameras will synchronise automatically each time after switch on and after every teach-in procedure.

Notes

- If you actuate the external key-operated pushbutton for teach-in or one of the two internal teach-in keys, both devices will learn their protective fields at the same time.
- If you use the internal restart interlock, then you must connect a separate reset button for each camera.
- If you use the external device monitoring, then must connect separate normally closed contacts (k1, k2) for both cameras.

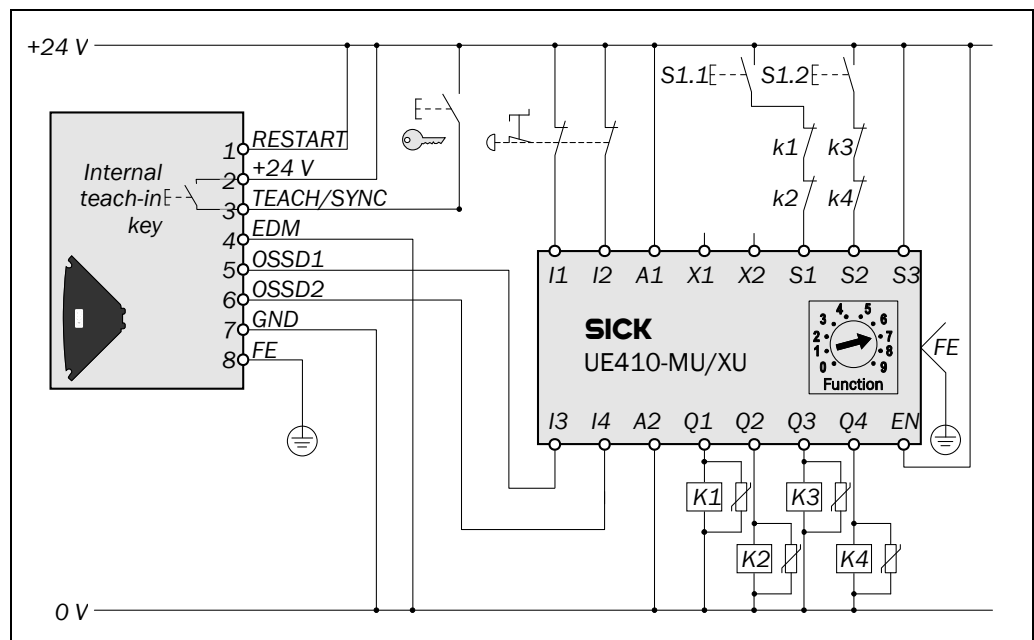
5.5 Connection diagrams

Note Take note of the related operating instructions of the integrated devices!

5.5.1 V200 WS/V300 WS on UE410 Flexi with external device monitoring (EDM) and with restart interlock both for V200 WS/V300 WS as well as for emergency switching off

The V200 WS/V300 WS safety camera system can be integrated into a relay controller/contactor controller with the aid of the modular UE410 Flexi (UE410-MU with expansion UE410-XU) safety controller. Operation is with external device monitoring and internal restart interlock on the V200 WS/V300 WS as well as restart interlock for the emergency switching off button.

Fig. 23: Connection diagram V200 WS/V300 WS at UE410 Flexi



Principle of operation

When the light path on the V200 WS/V300 WS is clear and the input conditions on the UE410 are valid, the system is ready for switch on and waits for an input signal/switch on signal. The system's corresponding logic path is enabled by pressing and releasing the related button S1. The related output on the UE410 carries power. If the input conditions are no longer met, then the related outputs on the UE410 shut down.

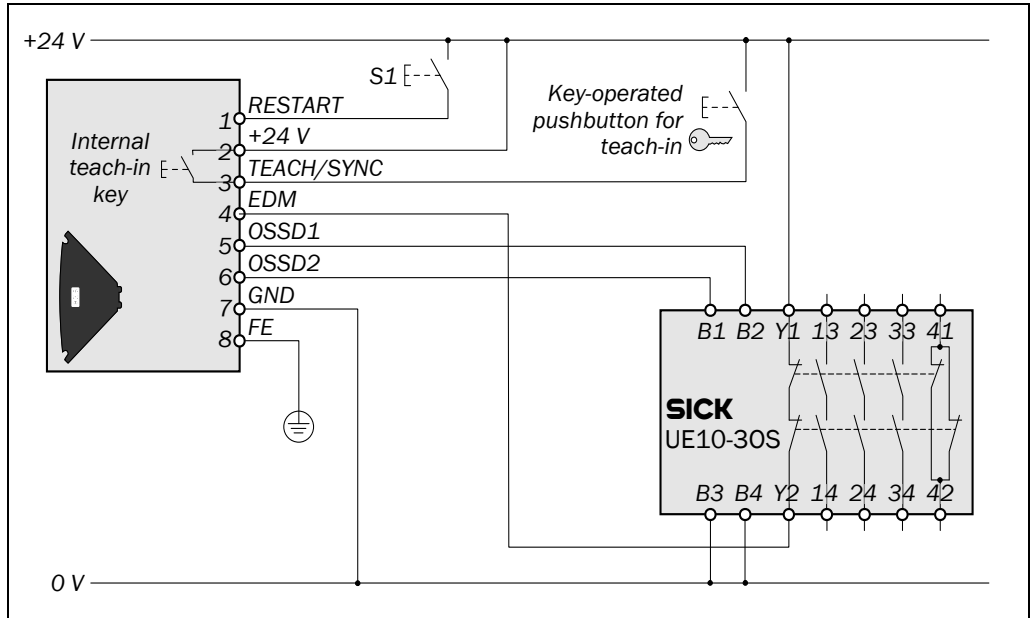
Possible errors

Cross-circuits and short-circuits on the connection cable for the V200 WS/V300 WS are detected and result in "lock-out" (see page 47). Malfunctions on the contactors K1 to K4 are detected. The shutdown function is retained. If the button S1.x is tampered with (e.g. by jamming) the system will not re-enable the output circuits.

5.5.2 V200 WS/V300 WS on UE10-30S with external device monitoring (EDM) and internal restart interlock

The V200 WS/V300 WS safety camera system can be integrated into a relay controller/contactor controller with the aid of the UE10-30S safety relay. Operation is with external device monitoring (EDM) and internal restart interlock.

Fig. 24: Connection diagram V200 WS/V300 WS at UE10-30S



Principle of operation

If the light path is clear and there are no errors in the quiescent state of the UE10-30S, the status LED (A) on the V200 WS/V300 WS flashes (Reset required). The system is ready for switch on and waits for an input signal/switch on signal. The system is enabled by pressing and releasing the button S1. The outputs OSSD1 and OSSD2 carry power. The UE10-30S is switched on. On interruption of the light path, the UE10-30S is de-energized by the OSSD1 and OSSD2 outputs.

Possible errors

Cross-circuits and short-circuits on the outputs OSSD1 and OSSD2 are detected and will result in “lock-out” (see page 47). Malfunctions on the UE10-30S are detected. The shutdown function is retained. If the button S1 is tampered with (e.g. by jamming) the system will not re-enable the output circuits.

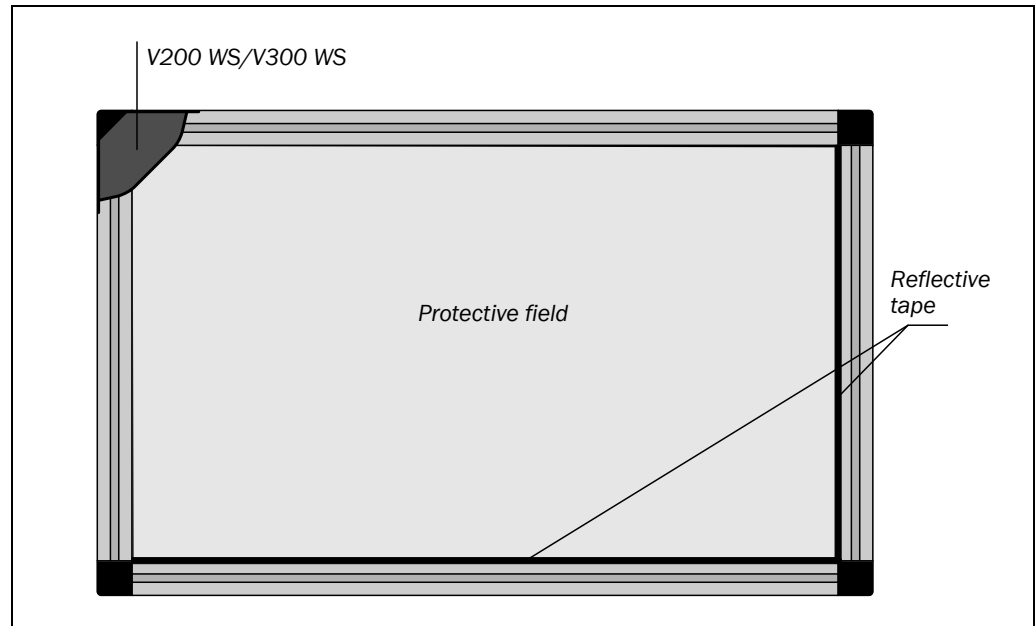
6 Application examples

Note The examples shown are only provided as an aid for your planning. You may need to consider additional protection measures for your application.

6.1.1 Application with small protective field (1 × V200 WS/V300 WS)

If the necessary protective field dimensions can be realised using a single V200 WS/V300 WS, then mount the camera on a corner of the frame or in a corner of the frame. Apply the reflective tape to the opposite sides.

Fig. 25: Application with small protective field (1 × V200 WS/V300 WS)



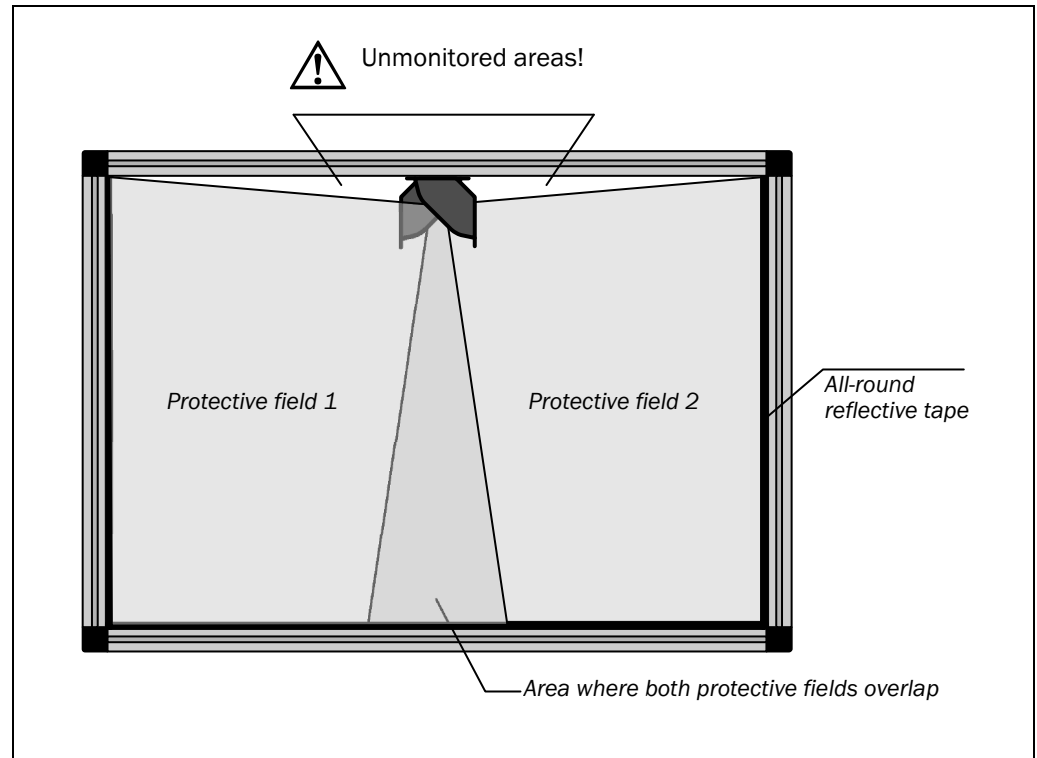
V200 WS/V300 WS

6.1.2 Application with large protective field (2 × V200 WS/V300 WS)

If the application requires a protective field width greater than 1 m or the hazardous point is to be protected in an ergonomically advantageous manner, you can mount two V200 WS/V300 WS in parallel facing in opposite directions (see Fig. 26) or diagonally (see Fig. 27). In this way you can realise two overlapping protective fields.

- Notes**
- Mount the devices overlapping as shown in the figure (i.e. **not** back to back). Otherwise un-monitored areas may be produced.
 - Ensure the housing markings on the two cameras are aligned.
 - You must synchronise the two V200 WS/V300 WS with each other so that they do not interfere with each other (see section 5.4 on page 33).

Fig. 26: Application with large protective field (2 × V200 WS/V300 WS)

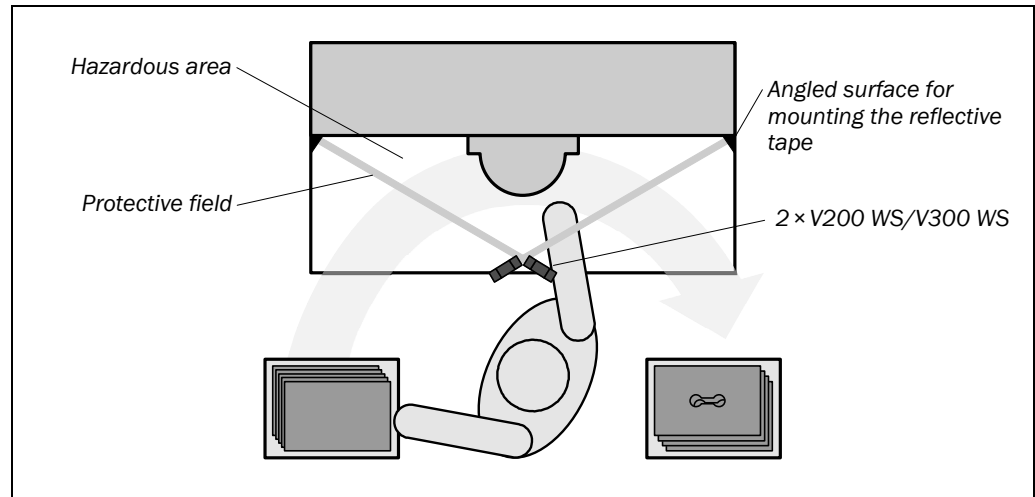


6.1.3 Application with safe access on three sides (ergonomic workplace design)

To realise an equally ergonomic and effective workplace, you can mount two safety camera systems diagonally. In this way the hazardous point can be safely accessed from three sides.

Note Due to the diagonal arrangement of the protective fields and the necessary safety distance, the working distance for the operator may be larger in this application.

Fig. 27: Ergonomic workplace design due to the use of two V200 WS/V300 WS (view from above)



- Notes**
- In this application pay special attention to the correct mounting of the reflective tapes as shown in the diagram. The reflective tapes must always be perpendicular to the protective field area.
 - In this application the monitored area is mostly smaller than the working area available. For this reason mark the contour of the monitored area on the working area if this marking is not already provided by the reflective tape.

6.1.4 Application with automatic material transport to the workstation

If the application requires automatic material transport into the workstation, you can mount the safety camera system such that only the area above the material transport is monitored.



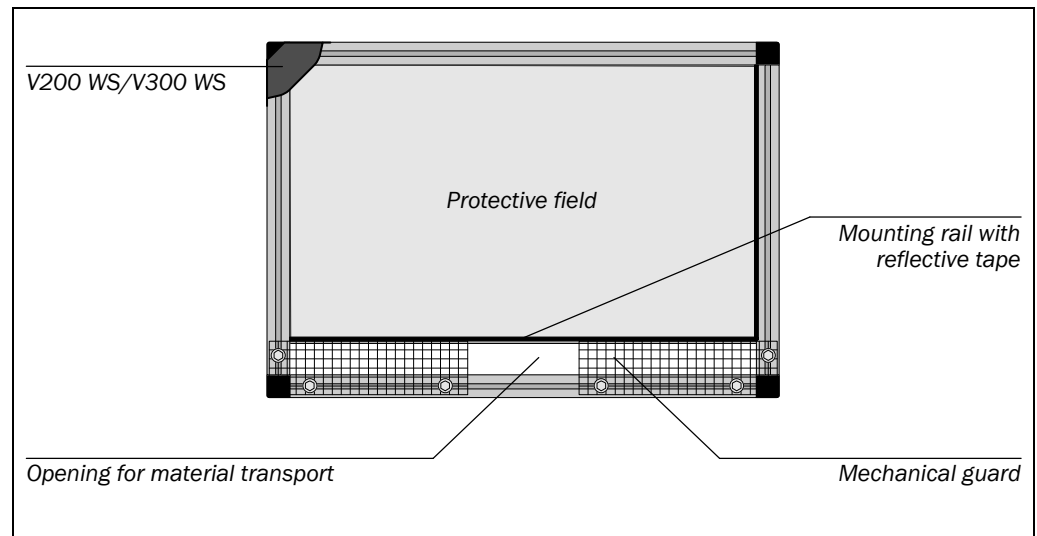
WARNING

Protect the material transport using other measures!

The V200 WS/V300 WS does not monitor the material transportation with this mounting method.

- Protect the unmonitored areas on both sides of the material transport using mechanical guards.
- Prevent people from being able to reach through the material transport to the hazardous point using organisational measures (e.g. by increasing the safety distance).

Fig. 28: Mounting with automatic material transport into the workstation



7 Commissioning



WARNING

Commissioning requires a thorough check by qualified safety personnel!

Before you operate a system protected by the V200 WS/V300 WS safety camera system for the first time, make sure that the system is first checked and released by qualified safety personnel. Please read the notes in chapter 2 “On safety” on page 7.

7.1 Test notes

The purpose of the tests described in the following is to confirm the safety requirements specified in the national/international rules and regulations, especially the safety requirements in the Machine and Work Equipment Directive (EU Conformity).

These tests are also used to identify if the protection is affected by external light sources or other unusual ambient effects.

These tests must therefore always be performed.

7.2 Pre-commissioning tests

- Check the effectiveness of the protective device mounted to the machine, using all selectable operating modes as specified in the checklist in the annex (see 13.2 “Manufacturer’s checklist” on page 58).
- Ensure that the operating personnel of the machine protected by the safety camera system are correctly instructed by qualified safety personnel before being allowed to operate the machine. Instructing the operating personnel is the responsibility of the machine owner.

7.3 Regular inspection of the protective device by qualified safety personnel

- Check the system, following the inspection intervals specified in the national rules and regulations. This procedure ensures that any changes on the machine or manipulations of the protective device after the first commissioning are detected.
- If any modifications have been made to the machine or the protective device, or if the safety camera system has been changed or repaired, the system must be checked again as specified in the checklist in the annex.

7.4 Tests of the protective device by a specialist or authorised personnel

When must the protective device be checked?

- The protective device must be checked **daily** by a specialist or by authorised personnel.
- The protective device must be checked **each time the operator changes**.

How to check the protective device:

- Check the protective device for correct seating and for damage, in particular the mounting, the electrical connection, the front screen and the reflective tape.
- Check that personnel or body parts can only intrude into the hazardous area through the protective field of the V200 WS/V300 WS (e.g. if a mechanical guard has been removed).
- Check whether the protective device is effective for the set operating mode.
- Guide the test rod supplied slowly along the outer edge of the protective field as shown in Fig. 29.



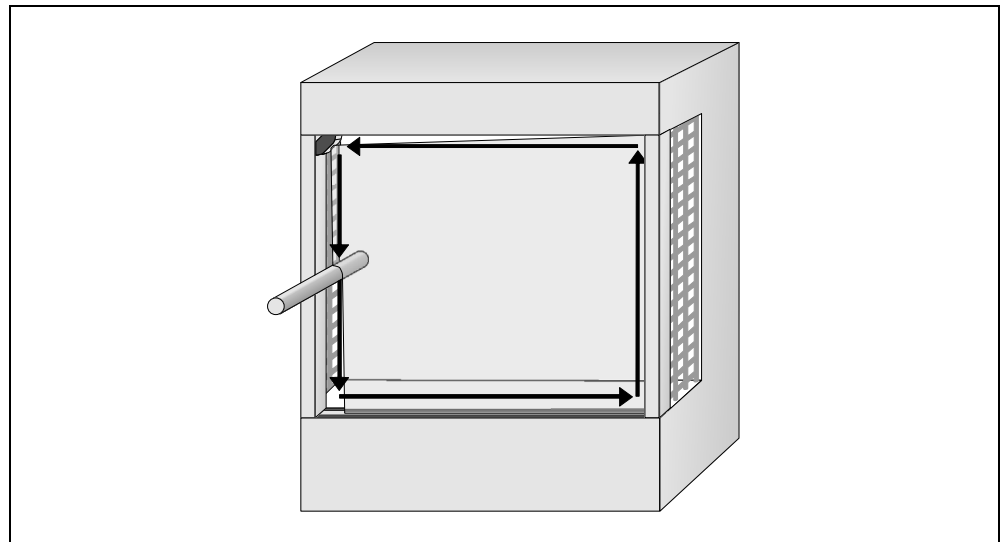
WARNING

Do not operate the machine if the green or yellow LED is lit during the test!

During the check only the ☹️ LED is allowed to illuminate red.

If the LED 😊 Green or ⚠️ Yellow lights up *during the test* even for a short period, work must stop at the machine. In this case the installation of the safety camera system must be checked by qualified safety personnel.

Fig. 29: Daily checks of the protective device



8 Configuration



WARNING

Ensure the machine is in a safe condition!

While you configure the safety camera system, the machine could start unintentionally.


- Ensure that the whole system is in a safe condition during the configuration process.

8.1 Teach-in

Prior to initial commissioning, you must perform a new teach-in procedure. The following occurs during teach-in:

- The V200 WS/V300 WS detects the current connection configuration and configures the internal restart interlock, the external device monitoring and the locking of the internal teach-in key to suit. In the default delivery status, these functions are deactivated.
- The V200 WS/V300 WS detects the protective field based on the reflective tape. In the default delivery status, the V200 WS/V300 WS has no protective field configured.

How to teach-in the current configuration and shape of the protective field:

- Ensure camera and reflective tape are correctly mounted and the electrical connections have been made.
- Switch on the V200 WS/V300 WS. The  LED is constantly illuminated.



WARNING

Ensure there are no objects in the protective field during teach-in!

Only the longest contiguous section of the reflective tape is taught-in by the V200 WS/V300 WS. If there are gaps in the reflection, e.g. because the reflective tape has been damaged or because there is an object in the protective field, the safety camera system will ignore the shorter section of the reflective tape.

- Actuate the internal teach-in key using the teach-in pin as follows:
 - Actuate for approx. 5 seconds
 - Wait approx. 2 seconds
 - Actuate for approx. 5 seconds

Or:

Press the external key-operated pushbutton for teach-in for at least 0.5 seconds.

The system now starts the teach-in. The process takes approx. 15 seconds. During teach-in the four diagnostics LEDs flash at the same time.

- After teach-in it is imperative you check the protective field (see section 7.4 “Tests of the protective device by a specialist or authorised personnel” on page 41).

Notes

- The system is active immediately after teaching-in. If the protective field is free, the V200 WS/V300 WS switches to green.
- If the system continues to indicate red after the teach-in process, the teach-in process has failed (for measures see below).
- You can lock the internal teach-in key (see section 8.4 “Locking the internal teach-in key” on page 44).

If the teach-in fails:

- Check and rectify as necessary the following causes:
 - Is the reflector fitted and clean?
 - Is the reflector perpendicular to the area of the protective field?
 - Is the reflective tape or are sub-segments of the tape very short?
 - Are there other reflective objects in the immediate vicinity that could interfere with the system (e.g. reflective strips on safety clothing, packaging film, etc.)?
- Remove the cause.
- Perform teaching-in again.

8.2 Internal restart interlock

The configuration of the restart interlock is defined by the wiring that is in place during the first or last teach-in process performed.

How to activate the internal restart interlock:

- Make the electrical connections for the reset button (see section 5.3 on page 31).
- Switch on the V200 WS/V300 WS.
- Perform a teach-in procedure.

If there is no signal on the *Reset/restart* input, then the safety camera system will activate the internal restart interlock and save this configuration in the device. The device is now waiting for the reset button to be pressed.
- Verify the effectiveness of the protective device as described in section 7.1 “Test notes” on page 40.

How to deactivate the internal restart interlock:

- Permanently connect the *Reset/restart* input to 24 V (see section 5.2 on page 31).
- Switch on the V200 WS/V300 WS.
- Perform a teach-in procedure.

If 24 V are present on the *Reset/restart* input, the safety camera system will deactivate the internal restart interlock and save this configuration in the device.
- Verify the effectiveness of the protective device as described in section 7.1 “Test notes” on page 40.

8.3 External device monitoring

In the default delivery status, the external device monitoring is deactivated.

How to activate the external device monitoring:

- Make the electrical connections (see section 5.3 on page 31).
- Switch on the V200 WS/V300 WS.
- Perform a teach-in procedure.

If the contacts to be monitored are connected to the *external device monitoring (EDM)* input, then the safety camera system will activate the external device monitoring and save this configuration in the device.



WARNING

The external device monitoring will remain deactivated without teaching-in!

If you place the system in operation after connecting the contacts to the *external device monitoring (EDM)* input without teaching-in, then the external device monitoring will remain deactivated. The system can therefore switch to green despite faulty contactors.

- Verify the effectiveness of the protective device as described in section 7.1 “Test notes” on page 40.

How to deactivate the external device monitoring:

- Permanently connect the *external device monitoring (EDM)* input to 0 V (see section 5.2 on page 31).
- Switch on the V200 WS/V300 WS.
- Perform a teach-in procedure.

If there is no signal or 0 V on the *external device monitoring (EDM)* input, the safety camera system will deactivate the external device monitoring and save this configuration in the device.

- Verify the effectiveness of the protective device as described in section 7.1 “Test notes” on page 40.

8.4 Locking the internal teach-in key

In the default delivery status the internal teach-in key is unlocked, i.e. it can be used. To permit remote teaching-in and/or to protect the configuration, you can connect an external key-operated pushbutton for teach-in and lock the internal teach-in key.

How to lock the internal teach-in key:

- Connect an external key-operated pushbutton for teach-in (see section 5.3 on page 31).
- Switch on the V200 WS/V300 WS.
- Perform a teach-in procedure **using the key-operated pushbutton for teach-in.**

The V200 WS/V300 WS locks the internal teach-in key and saves this configuration in the device. Teach-in can now only be performed using the key-operated pushbutton for teach-in.

- Verify the effectiveness of the protective device as described in section 7.1 “Test notes” on page 40.

V200 WS/V300 WS**How to unlock the internal teach-in key:**

- Switch on the V200 WS/V300 WS.
- Press the key-operated pushbutton for teach-in for at least 60 seconds.
The V200 WS/V300 WS unlocks the internal teach-in key and saves this configuration in the device.
- If you no longer need the key-operated pushbutton for teach-in, remove it from the electrical installation. Otherwise the V200 WS/V300 WS will again lock the internal teach-in key the next time the key-operated pushbutton for teach-in is actuated.
- Verify the effectiveness of the protective device as described in section 7.1 “Test notes” on page 40.

9 Care and maintenance

The V200 WS/V300 WS safety camera system is maintenance-free in operation. The front screen of the V200 WS/V300 WS as well as the reflective tape should be cleaned regularly and it should also be cleaned immediately in case of soiling.

- Do not use aggressive cleaning agents.
- Do not use abrasive cleaning agents.

Note Static charges cause dust particles to be attracted to the front screen and the reflective tape. You can prevent this effect by using the antistatic plastic cleaner (SICK part number 5600006) and the SICK lens cloth (part number 4003353).

How to clean the front screen and the reflective tape:

- Use a clean and soft brush to remove dust from the front screen and the reflective tape.
- Then wipe the front screen and the reflective tape with a clean and damp cloth.

Note

- After cleaning, check the position of the camera and check the reflective tape for good condition to ensure it is not possible to reach over, reach under or stand behind the protective device.
- Verify the effectiveness of the protective device as described in section 7.1 "Test notes" on page 40.

10 Fault diagnosis

This chapter describes how to identify and rectify errors and malfunctions during the operation of the safety camera system.

10.1 In the event of faults or errors




WARNING

Cease operation if the cause of the malfunction has not been clearly identified!

- Stop the machine if you cannot clearly identify or allocate the error and if you cannot safely rectify the malfunction.

The system state lock-out


In case of certain faults or an erroneous configuration, the system can go into the lock-out state. The status LED  flashes continuously (short on/long off). To place the device back in operation:

- Rectify the cause of the fault following the information given in this chapter.
- Switch the power supply for the V200 WS/V300 WS off and on again (e.g. by unplugging the system plug and reinserting it).

























10.2 SICK support

- If you cannot rectify an error with the help of the information provided in this chapter, please contact your local SICK representative.

10.3 Displays of the diagnostics LEDs

If the status LED  (see section 3.5.1 on page 15) signals an error by continuous flashing (short on/long off), the diagnostics LEDs will indicate the type of error. This chapter explains the meaning of the LED displays and how to respond.

Tab. 7: Displays of the diagnostics LEDs

Diagnostics LED				Possible cause	Rectification of the error
1	2	3	4		
				No operating voltage, or voltage too low	<ul style="list-style-type: none"> ➤ Check the voltage supply and activate, if necessary.
				Short-circuit or overcurrent on an output signal switching device	<ul style="list-style-type: none"> ➤ Check the contactor. Replace, if necessary. ➤ Check the wiring for short-circuits or cross-circuits.
				EDM error	<ul style="list-style-type: none"> ➤ Check the contactors and their wiring, eliminate any wiring errors, if necessary. ➤ Switch the device off and back on again. Check the configuration of the external device monitoring (see page 15).
				Reset button fault	<ul style="list-style-type: none"> ➤ Check the reset button for correct function. The button may be defective or stuck. ➤ Check the wiring of the reset button for any short-circuit to 24 V .
				Reflective tape not detected	<ul style="list-style-type: none"> ➤ Perform teaching-in again. ➤ Check the configuration of the external device monitoring (see page 15). ➤ Check the reflective tape for damage. Replace, if necessary. ➤ Check the connection of the synchronisation signal if two systems are used (see page 33).
				System error	<ul style="list-style-type: none"> ➤ Disconnect the supply voltage to the V200 WS/V300 WS for at least 3 s econds. ➤ If the problem persists, replace the unit.

11 Technical specifications

11.1 Data sheet

Tab. 8: Data sheet
V200 WS/V300 WS

	Minimum	Typical	Maximum
General system data			
Protective field dimensions	See section 4.1 "Checking the dimensions of the protective field" on page 17.		
Resolution	20 mm		
Field of view	103° ± 3°		
Protection class according to EN 50 178:1997-10	III		
Enclosure rating according to IEC 60 529	IP 54		
Category according to EN 954-1 ²⁾ V200 WS V300 WS	2 3		
Can be used as per ISO 13 849-1:2006 up to category/performance level V200 WS V300 WS Mission time as per ISO 13 849-1:2006	2/PL c 3/PL d 20 years		
Type as per IEC 61 496-1 and IEC/TR 61 496-4 V200 WS V300 WS	2 3		
Can be used as per IEC 61 508 and IEC 62 061 up to SIL V200 WS V300 WS	1 2		
Probability of dangerous failure per hour (PFH _D)	8.5 × 10 ⁻⁹ 1/h		
Ambient operating temperature	0 °C		+50 °C
Storage temperature	-25 °C		+70 °C (≤24 h)
Humidity, taking into account the operating temperature range	Complies with IEC 61 496-1, section 5.1.2 and section 5.4.2 as well as IEC 61 496-4, section 5.4.2		
Air humidity (non-dewing)	15 %		95 %
Vibration resistance according to IEC 60 068-2-6	5 g, 10-55 Hz		
Shock resistance according to IEC 60 068-2-29	10 g, 16 ms		

²⁾ Only valid for the assumption of conformity until 29.11.2009. From then on it will only be allowed to use the successor EN ISO 13 849-1:2006. For detailed information on the exact design of your machine/system, please contact your local SICK representative.

	Minimum	Typical	Maximum
Lighting			
Wavelength	850 nm		
Occular safety as per IEC 62 471:2006-7	Photobiologically harmless		
Housing			
Material	Aluminium die-cast		
Dimensions	See section 11.2 "Dimensional drawing" on page 53.		
Total weight		0.355 kg	
Reflective tape			
Length	2 pieces of 1 metre		
Width	36 mm		
Power-up delay after connecting the supply voltage			6 s

Electrical data

Supply voltage U_v at the device (SELV) ³⁾	19.2 V	24 V	28.8 V
Permissible cable resistance on the supply cable			1 Ω
Residual ripple ⁴⁾			$\pm 5\%$
Operating current			
At 24 V without output load			165 mA
With maximum output load			690 mA
Power consumption			
At 24 V without output load			4 W
With maximum output load			19 W
Electrical connection	M12 \times 8 (see section 5.1 on page 30)		
Cable length for wire cross-section 0.25 mm ²			7.5 m
Synchronisation	Electrical (see section 5.1 on page 30)		

³⁾ The external voltage supply of the devices (SELV) must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60204-1. Suitable power supplies are available as accessories from SICK (see section 12.3 "Accessories" on page 55).

⁴⁾ Within the limits of U_v .

	Minimum	Typical	Maximum
<i>External device monitoring (EDM) input</i>			
Resistance HIGH		2 kΩ	
Capacitance		15 nF	
Voltage ⁵⁾ HIGH	11 V	24 V	30 V
Voltage ⁵⁾ LOW	-3 V	0 V	5 V
Static current	6 mA		15 mA
<i>Reset/restart input (RESTART)</i>			
Resistance HIGH		2 kΩ	
Capacitance		15 nF	
Voltage ⁵⁾ HIGH	11 V	24 V	30 V
Voltage ⁵⁾ LOW	-3 V	0 V	5 V
Static current	6 mA		15 mA
Operation time control switch input	120 ms		
<i>Teach-in/synchronisation (TEACH/SYNCH) input</i>			
Resistance HIGH		2 kΩ	
Capacitance		15 nF	
Voltage ⁵⁾ HIGH	11 V	24 V	30 V
Voltage ⁵⁾ LOW	-3 V	0 V	5 V
Static current	6 mA		15 mA

⁵⁾ As per IEC 61131-2.

	Minimum	Typical	Maximum
Output signal switching devices (OSSDs)	2 PNP semiconductors, short-circuit protected ⁶⁾ , cross-circuit monitored		
Switching voltage HIGH (active, U_{eff}) at 250 mA	$U_V - 2.7 V$		U_V
Switching voltage LOW (inactive)	0 V	0 V	3.5 V
Source switching current	6 mA		250 mA ⁷⁾
Leakage current ⁸⁾			250 μA
Load inductance			2.2 H
Load capacity at 50 Ω			2.2 μF
Permissible line resistance between device and load ⁹⁾			2.5 Ω
Test pulse data ¹⁰⁾			
Test pulse width		230 μs	300 μs
Test frequency		120 ms	
Response time			20 ms
Switch off time	100 ms		
Switching time of the OSSDs from red to green			30 ms
Contactors			
Permissible dropout time			300 ms
Permissible pick-up time			300 ms

⁶⁾ Applies to the voltage range between U_V and 0 V.

⁷⁾ Switching currents ≤ 500 mA are allowed briefly (≤ 100 ms).

⁸⁾ In the case of a fault (0 V cable open circuit) maximally the leakage current flows in the OSSD cable. The downstream controller must detect this status as LOW. A safe PLC (Programmable Logic Controller) must be able to identify this status.

⁹⁾ Make sure to limit the individual cable resistance to the downstream controller to this value to ensure that a cross-circuit between the outputs is safely detected. (Also note EN 60204 Electrical Machine Equipment, Part 1: General Requirements.)

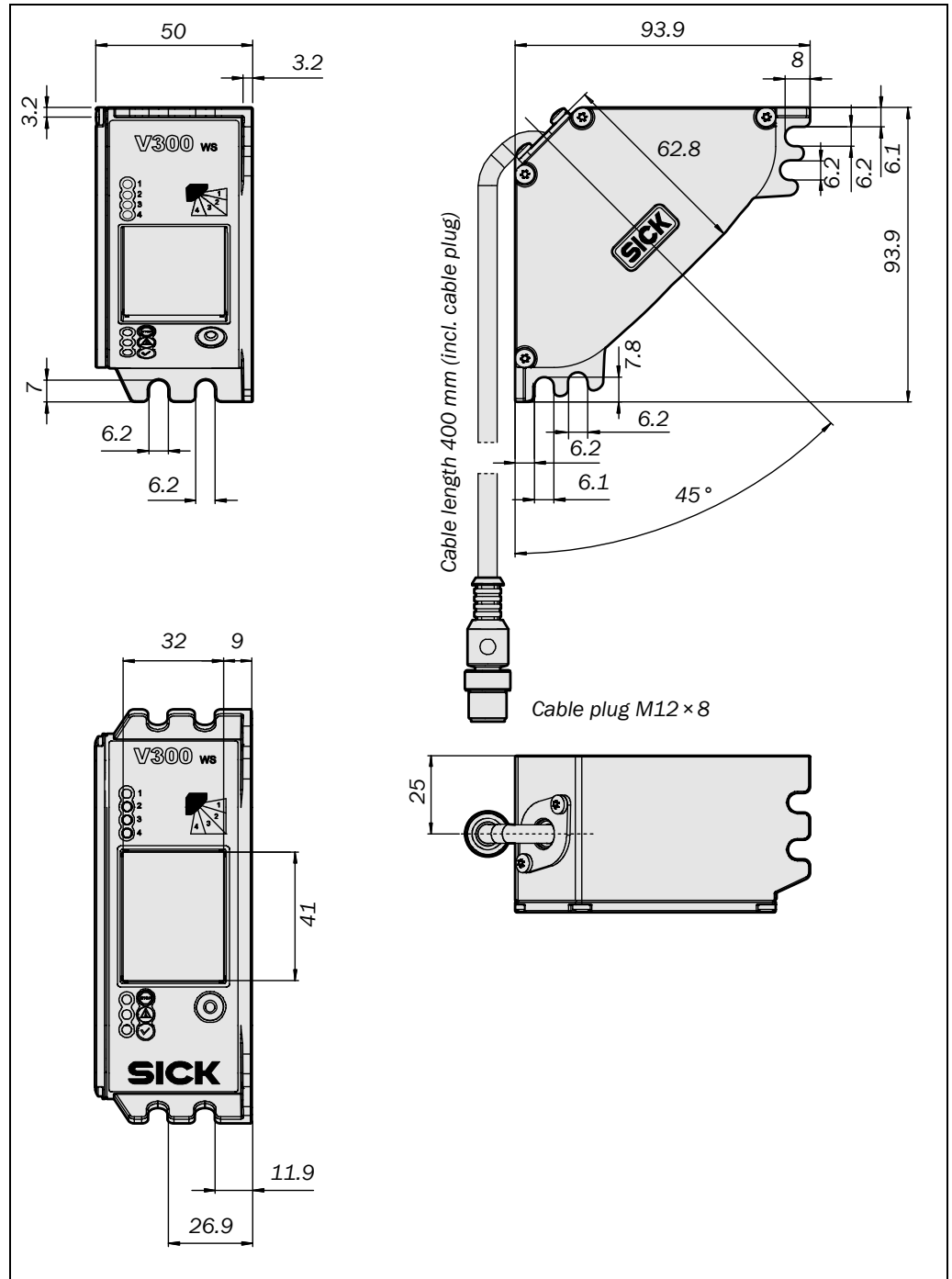
¹⁰⁾ When active, the outputs are tested cyclically (brief LOW). When selecting the downstream controllers, make sure that the test pulses do not result in deactivation when using the above parameters.

V200 WS/V300 WS

11.2 Dimensional drawing

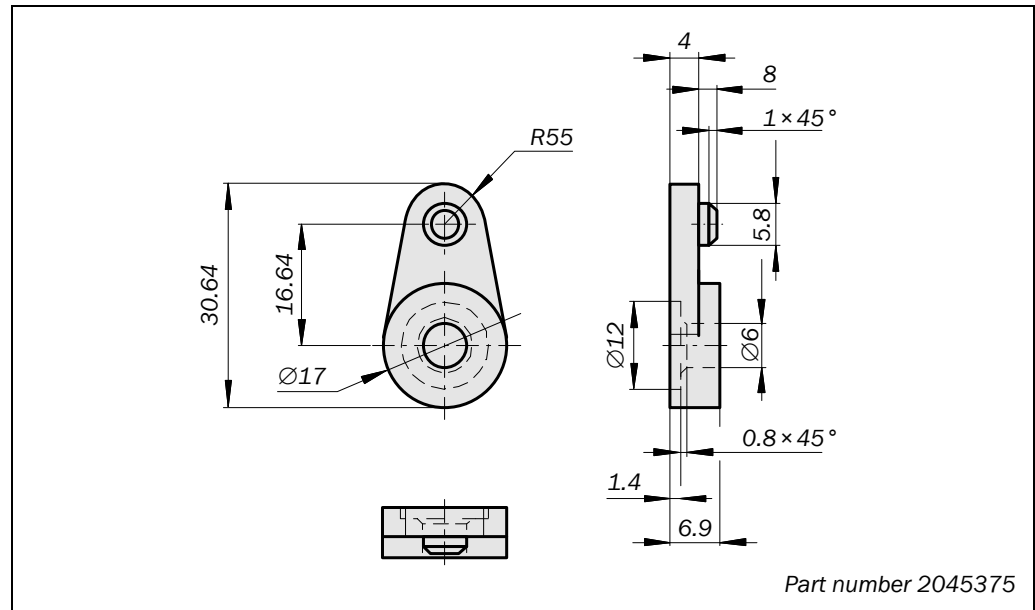
11.2.1 Dimensional drawing V200 WS/V300 WS

Fig. 30: Dimensional drawing V200 WS/V300 WS



11.2.2 Dimensional drawing mounting kit

Fig. 31: Dimensional drawing mounting kit



12 Ordering information

12.1 Delivery

- camera
- self-adhesive reflective tape, 2 pieces of 1 metre
- teach-in pin
- test rod (20 mm)
- label “Important Information”
- operating instructions on CD-ROM
- Easy Installation Guide (instructions for quick commissioning), in several languages

12.2 Available systems

Tab. 9: Part numbers systems

Description	Part number
V200 Workstation (category 2 according to EN 954-1)	1042027
V300 Workstation (category 3 according to EN 954-1)	1041542

12.3 Accessories


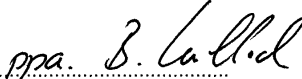
Tab. 10: Part numbers accessories

Description	Part number
Reflective tapes	
Reflective tape, 2 pieces of 1 metre	2046004
“Heavy-Duty” reflective tape, 2 pieces of 1 metre, robust version. Suitable for applications in which the reflective tape is subject to friction or weight.	2046005
Mounting kit	
For mounting the sensor on profile frame	2045375
Power supply	
Power supply 24 V DC, 100/240 V AC, 50 W	7028789
Power supply 24 V DC, 100/240 V AC, 95 W	7028790
Connection cable	
with cable socket M12 × 8, straight socket/stripped	
2.5 m	6020537
5 m	6020354
7.5 m	6020353

Description	Part number
Miscellaneous	
Teach-in pin	4052939
Test rod	2043725
Operating instructions on CD-ROM	2044268
Anti-static plastic cleaner	5600006
Lens cloth	4003353
Solvent for adhesive, spray bottle, 200 ml	5602135
Suitable for removing the reflective tape	

13 Annex

13.1 EC declaration of conformity

<h1>SICK</h1>	
EC Declaration of conformity	
en	Ident-No. : 9113075
The undersigned, representing the following manufacturer	
SICK AG Industrial Safety Systems Erwin-Sick-Straße 1 79183 Waldkirch Germany	
herewith declares that the product	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">V200 / V300</div>	
is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the standards and/or technical specifications referenced overleaf have been applied.	
Waldkirch, 02.04.2008	
 ppa. Dr. Plasberg Management Board (Industrial Safety Systems)	 ppa. Knobloch Manager Produktion (Industrial Safety Systems)

Note You can obtain the complete EC declaration of conformity via the SICK homepage on the Internet at: www.sick.com

13.2 Manufacturer's checklist

SICK

Checklist for the manufacturer/installer for the installation of electro-sensitive protective equipment (ESPE)

Details about the points listed below must be present at least during initial commissioning – they are, however, dependent on the respective application, the specifications of which are to be controlled by the manufacturer/installer.

This checklist should be retained and kept with the machine documentation to serve as reference during recurring tests.

- | | |
|---|--|
| 1. Have the safety rules and regulations been observed in compliance with the directives/standards applicable to the machine? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 2. Are the applied directives and standards listed in the declaration of conformity? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 3. Does the protective device comply with the required category according to EN 954-1 ¹¹⁾ ? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 4. Is the access to the hazardous point only possible through the protective field of the ESPE? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 5. In the case of hazardous point protection, have appropriate measures been taken to prevent (mechanical point-of-operation guarding) or monitor unprotected presence in the hazardous area and have these been secured against removal? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 6. Are additional mechanical protective measures fitted and secured against manipulation which prevent reaching under, over or around the ESPE? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 7. Has the maximum stopping and/or stopping/run-down time of the machine been measured, specified and documented (at the machine and/or in the machine documentation)? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 8. Has the ESPE been mounted such that the required safety distance from the nearest hazardous point has been achieved? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 9. Are the ESPE devices correctly mounted and secured against manipulation after adjustment? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 10. Are the required protective measures against electric shock in effect (protection class)? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 11. Is the control switch for resetting the protective device (ESPE) or restarting the machine present and correctly installed? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 12. Are the outputs of the ESPE (OSSDs) integrated in compliance with the required category according to EN 954-1 ¹¹⁾ and does the integration comply with the circuit diagrams? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 13. Has the protective function been checked in compliance with the test notes of this documentation? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 14. Are the given protective functions effective at every setting of the operating mode selector switch? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 15. Are the switching elements activated by the ESPE, e.g. contactors, valves, monitored? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 16. Is the ESPE effective over the entire period of the dangerous state? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 17. Once initiated, will a dangerous state be stopped when switching the ESPE on or off and when changing the operating mode, or when switching to another protective device? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 18. Has the information label for the daily check been attached so that it is easily visible for the operator? | Yes <input type="checkbox"/> No <input type="checkbox"/> |

This checklist does not replace the initial commissioning, nor regular inspections by qualified safety personnel.

¹¹⁾ Only valid for the assumption of conformity until 29.11.2009. From then on it will only be allowed to use the successor EN ISO 13849-1:2006.

13.3 List of tables

Tab. 1:	Overview on disposal by components	10
Tab. 2:	Permissible restart interlock configurations on the V200 WS/V300 WS	14
Tab. 3:	Meaning of the status LEDs of the V200 WS/V300 WS	15
Tab. 4:	Meaning of the diagnostics LEDs of the V200 WS/V300 WS	16
Tab. 5:	Protective field dimensions allowed for a rectangular protective field	17
Tab. 6:	Pin assignment system connection V200 WS/V300 WS.....	30
Tab. 7:	Displays of the diagnostics LEDs.....	48
Tab. 8:	Data sheet V200 WS/V300 WS	49
Tab. 9:	Part numbers systems	55
Tab. 10:	Part numbers accessories	55

13.4 List of illustrations

Fig. 1:	Operating principle of the V200 WS/V300 WS	11
Fig. 2:	Hazardous point protection with one V200 WS/V300 WS, mounting in a frame.....	12
Fig. 3:	Hazardous point protection with one V200 WS/V300 WS, mounting on a frame.....	12
Fig. 4:	Hazardous point protection with two V200 WS/V300 WS, placement in opposite directions.....	12
Fig. 5:	Hazardous point protection with two V200 WS/V300 WS, placement at corner.....	12
Fig. 6:	Outline drawing of the protective operation	13
Fig. 7:	Status LEDs of the V200 WS/V300 WS	15
Fig. 8:	Diagnostics LEDs of the V200 WS/V300 WS.....	16
Fig. 9:	Safety distance from the hazardous point	18
Fig. 10:	Unmonitored areas on the V200 WS/V300 WS.....	21
Fig. 11:	Dangerous mounting mistake: maximum protective field width exceeded.....	22
Fig. 12:	Dangerous mounting mistake: field of view of the camera exceeded.....	23
Fig. 13:	The correct installation (above) must eliminate the errors (below) reaching over, reaching under and standing behind.....	24
Fig. 14:	Example: Mounting with sliding nuts on different thickness profiles	25
Fig. 15:	Example: Mounting with clamping lugs on different thickness profiles.....	25
Fig. 16:	Mounting in a frame.....	26
Fig. 17:	Correct arrangement of the reflective tapes at joints.....	27
Fig. 18:	Permissible divergence of the reflective tape from the optical axis of the camera as a function of the distance	28
Fig. 19:	System connection V200 WS/V300 WS.....	30
Fig. 20:	Connecting the V200 WS/V300 WS without external device monitoring (EDM), without internal restart interlock and without external key-operated pushbutton for teach-in	31
Fig. 21:	Connecting the V200 WS/V300 WS with external device monitoring (EDM), with internal restart interlock and with external key-operated pushbutton for teach-in	31
Fig. 22:	Connection of two V200 WS/V300 WS with synchronisation	33
Fig. 23:	Connection diagram V200 WS/V300 WS at UE410 F lexi	34
Fig. 24:	Connection diagram V200 WS/V300 WS at UE10-30S	35
Fig. 25:	Application with small protective field (1 × V200 WS/V300 WS)	36
Fig. 26:	Application with large protective field (2 × V200 WS/V300 WS).....	37
Fig. 27:	Ergonomic workplace design due to the use of two V200 WS/V300 WS	38
Fig. 28:	Mounting with automatic material transport into the workstation	39
Fig. 29:	Daily checks of the protective device	41
Fig. 30:	Dimensional drawing V200 WS/V300 WS	53
Fig. 31:	Dimensional drawing mounting kit	54

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