OPERATING INSTRUCTION

VML Prime
Track and trace systems

EN

SICK
Sensor Intelligence.

Contents

Contents

1 About these operating instructions

Please read through this chapter carefully before you use the documentation and work with the VML Prime measurement system.

NOTE

Legal-for-trade mode

Please use the supplements to operating instructions (8021098) when operating the VML Prime in the calibrated mode as VML520 MID or VML520 MID-s.

1.1 Purpose of this document

These operating instructions are designed to give **technical personnel** instructions on the safe mounting, configuration, electrical installation, commissioning, operation, and maintenance of the VML Prime measurement system.

1.2 Target group

These operating instructions are intended for people who install, connect, commission, operate, and service the VML Prime measurement system.

Tasks	Target group
Mounting, electrical installation, maintenance, and replacement of system components	Qualified personnel, such as service technicians or industrial electricians
Commissioning and configuration	Qualified personnel, such as technicians or engineers
Operation of the conveying system	Personnel qualified in running and operating the conveying system

Tab. 1:Target group

1.3 Information depth

Note

These operating instructions contain information about the VML Prime measurement system on the following topics:

- Product description
- Mounting
- Electrical installation
- Commissioning and configuration
- Maintenance
- Fault diagnosis and troubleshooting
- Technical data and dimensional drawings

When planning and using measurement systems such as the VML Prime, technical skills are required that are not covered by this document.

The official and legal regulations for operating the VML Prime measurement system must always be complied with.

The SOPAS configuration software is used to configure (parameterize) the measurement system for the respective application on site.

1.4 Abbreviations used

CAN Controller Area Network = standardized fieldbus system that uses a message-based data exchange protocol

LED Light emitting diode

LFT Legal-for-trade = operating mode for calibratable measurement systems

MLG Modular light grid

MSC **M**odular **s**ystem **c**ontroller (MSC800)

SD Secure Digital card = digital, replaceable memory card

SOPAS SICK Engineering Tool = software for configuring and diagnosing SICK sensors and VML Prime

1.5 Symbols used

Recommendation Recommendations are designed to assist you in the decision-making process with respect to the use of a certain function or technical measure.

Note Notes provide information about the features of a device, application tips, or other useful information.

1. / 2. ... Instructions that must be carried out in the described order are referred to as step-by-step instructions and are indicated by numbered lists. Carefully read and follow the instructions for action.

➢ Instructions for taking action are indicated by an arrow. Carefully read and follow the instructions for action.

● ☀ , ○ LED symbols describe the status of a diagnostics LED. Examples:

- ● The LED is illuminated continuously.
- ☀ The LED is flashing.
- ○ The LED is off.

Sender and receiver

In figures and connection diagrams, the symbol indicates the sender and indicates the receiver.

2 Safety

This chapter concerns your own safety and the safety of the system operator.

➢ Please read this chapter carefully before you begin working with VML Prime.

2.1 Qualified safety personnel

The VML Prime must only be mounted, commissioned, and maintained by adequately qualified personnel.

The following qualifications are necessary for the various tasks:

Tasks	Qualification
Mounting and maintenance	• Practical technical training • Knowledge of the current safety regulations in the workplace
Electrical installation and device replacement	• Practical electrical training • Knowledge of current electrical safety regulations • Knowledge of device control and operation in the particular application concerned (e.g., conveying system, mounting system, crane)
Commissioning, operation, and configuration	• Knowledge concerning device control and operation in the particular application concerned (e.g., conveying system, mounting system, crane, etc.) • Knowledge concerning the software and hardware environment of the particular application concerned (e.g., conveying system, mounting system, crane etc.) • Basic knowledge of the Windows operating system used • Basic knowledge of data transmission • Basic knowledge of the design and setup (addressing) of Ethernet connections when connecting the MSC800 to the network • Basic knowledge of how to use an HTML browser (e.g. Internet Explorer) to access the online help

Tab. 2 Qualified safety personnel

2.2 Applications of the device

The VML Prime measurement system is used to determine object dimensions on flat belt conveying systems with the help of light grids. Light grids are non-contact optical measurement systems which detect the object contour using the principle of shadowing. The use of light grids means it is even possible to recognize reflective, transparent, or very dark objects, such as PET containers wrapped in film.

On the basis of the number of interrupted light beams, the evaluation unit simulates an object model and derives the individual object dimensions from this. All information is output to downstream systems via a central data interface for further processing.

VML Prime is available in different system variants.

- **VML Prime 3D** is made up of two light grid pairs which span the conveyor belt vertically and horizontally. With this system variant, it is possible to determine the length, width, and height of objects as well as the rotation of the object and the box volume.
- **VML Prime 2D V** is made up of a vertical light grid pair. With this system variant, it is possible to determine the object height. If the objects are aligned on the belt, it is also possible to determine the object length.
- **VML Prime 2D H** is made up of a horizontal light grid pair. With this system variant, it is possible to determine the width and length of objects as well as the rotation of the object. If the objects are aligned on the belt, it is also possible to determine the object length.

Legal-for-trade mode

If VML Prime is used for billing purposes on the basis of the dimensions determined, the measurement system must be operated with the VML520 MID or VML520 MID-s calibratable system variant (in legal-for-trade mode, abbrev.: LFT mode). You can find more information in the supplement to operating instructions (8021098).

Note Customized extensions such as SICK identification solutions and weighing systems can be easily integrated.

2.3 Intended use

The VML measurement system may only be used as described in section *2.2 Applications of the* device. It may only be used by qualified personnel in the environment in which it was mounted and initially commissioned by qualified safety personnel in accordance with these operating instructions.

The equipment may be operated in an industrial environment. The system can be used for the dimensioning of objects of any kind, before they are forwarded to downstream systems.

For example, by way of the classification of objects into automated high bays, smooth operation of the entire system, and of the conveying and sorter systems and storage and retrieval systems in particular, can be ensured. Downtimes are reduced.

The VML Prime measurement system must not be used outdoors or in an explosion-protected environment.

If used in any other way or if alterations are made to the system or the devices are opened – including in the context of mounting and installation – this will void any warranty claims directed to SICK AG.

2.4 General safety notes and protective measures

2.4.1 Safety notes and symbols

The following safety and hazard symbols are used for your own protection, for the protection of third parties, and for the protection of the machine. You must therefore observe these symbols at all times.

HAZARD

Denotes an immediate hazard that may result in severe to fatal injuries.

The symbol shown on the left-hand side of the note refers to the type of hazard in question (the example here shows a risk of injury resulting from electrical current).

WARNING

Denotes a potentially dangerous situation that may result in severe to fatal injuries.

The symbol shown on the left-hand side of the note refers to the type of hazard in question (the example here shows a risk of injury resulting from falling components).

CAUTION

Caution note

Denotes a potentially dangerous situation that may result in minor personal injury or possible material damage.

The symbol shown on the left-hand side of the note refers to the type of hazard in question (the example here shows a risk of damage to the eye by laser beams).

NOTE

Denotes a potential risk of damage or functional impairment of the device or the devices connected to it.

This symbol refers to supplementary technical documentation.

2.4.2 General safety notes

General, recognized safety-related rules and regulations were taken into account in the design and manufacture of the measurement system. However, risks for the cresulting from the measurement system cannot be completely ruled out. The safety notes below must therefore be observed.

⚠ *WARNING*

Safety notes

Observe the following to ensure the safe use of the system as intended.

- The notes in these operating instructions (e.g., regarding use, mounting, installation, or integration into the machine controller) must be observed.
- All official and statutory regulations governing the operation of the system must be complied with.
- The national and international legal specifications apply to the installation and use of the system, to its commissioning, and to recurring technical inspections, in particular:
  - The accident prevention regulations and work safety regulations
  - Any other relevant safety regulations
- The manufacturer and user of the system are responsible for coordinating and complying with all applicable safety specifications and regulations in cooperation with the relevant authorities.
- The checks must be carried out by qualified safety personnel or specially qualified and authorized personnel and must be recorded and documented to ensure that the tests can be reconstructed and retraced at any time.
- These operating instructions must be made available to the operator of the system. The system operator must be instructed by qualified safety personnel and must read the operating instructions.

⚠ *WARNING*

VML Prime is not a safety device for human protection and it therefore does not comply with any safety standards.

- MLG-2 light grids may not be used for personal protection applications.
- MLG-2 light grids may not be used as a safety device to prevent access for persons, their hands, or other body parts to hazardous areas for safety purposes.
- For safety applications, please contact SICK.

⚠ *WARNING*

The light grids must not be used outdoors or in explosion-hazardous areas.

2.4.3 Potential sources of danger

The measurement system has been designed in a way that allows for safe operation. Protective devices reduce potential risks to the maximum possible extent. However, a certain level of risk will always remain.

Awareness of potential sources of danger in the measurement system will help you to work in a safer manner and thus prevent accidents.

To avoid risks, please also observe the special warnings in each of the individual chapters.

Risks during transport and mounting

WARNING

Risk of injury due to components tipping over

If profiles of the mounting frame have been upended, they could possibly tip over during disassembly.

- Do **not** perform mounting work alone unless it is absolutely safe to do so.
- Where applicable, ask a second person to assist you with the component replacement process.
- Wear safety shoes.

WARNING

Risk of injury due to falling components when mounting the steel frame

The steel frame components weigh up to 25 kg.

- Do not perform any mounting work alone.
- Ask a second person to hold the components during mounting.
- Wear safety shoes.

WARNING

Risk of injury due to falling components when mounting the controller

Heavy devices such as the controller cabinet may fall over during mounting:

The controller cabinet weighs approx. 15 kg.

- Do **not** perform mounting work alone unless it is absolutely safe to do so.
- Where applicable, ask a second person to assist you with the component replacement process.
- Wear safety shoes.

WARNING

Risk of injury during mounting and installation

- Mounting and installation work may only be performed when the conveyor is not in operation.

Risks during electrical installation

HAZARD

Risk of injury due to electrical current

The central control unit of the system is connected to the power supply (AC 100 ... 264 V / 50 ... 60 Hz).

- Standard safety requirements must be met when working on electrical systems.
- The power supply must be disconnected when attaching and detaching electrical connections.
- Select and implement wire cross-sections and their correct fuse protection in accordance with the applicable standards.

HAZARD

Risk of injury and damage due to electrical current

Improper handling of live devices may lead to severe personal injury or death by electric shock.

- Electrical installation and maintenance work must always be carried out by personnel authorized to do so.
- Do not touch any live parts.
- In the event of danger, immediately disconnect the system from the power supply.
- Always use original fuses with the specified current rating.
- The controller cabinet must be securely closed during operation.
- Report any damaged cables to the maintenance team without delay.

WARNING

Risk of tripping due to cables! Risk of damage to cables!

Exposed cables on the floor in areas used by people can pose a risk.

- Lay all cables so that there is no risk of tripping and all cables are protected against damage.

Risks during commissioning and configuration

WARNING

Risk resulting from incorrect commissioning and configuration!

Do not commission without testing by qualified personnel!

Before you operate the system or a device for the first time, you must have it checked and approved by qualified safety personnel.

NOTE

Do not switch off the voltage supply during the configuration!

If you switch off the voltage supply during the configuration, you will lose all parameters that have already been configured.

Risks during maintenance and repair work

HAZARD

Disconnect the power to the system

➢ Make sure the power supply for the entire system is disconnected throughout the entire time that you are carrying out maintenance and repair work.

HAZARD

Risk of injury due to electrical current

Only a qualified electrician or trained person working under the guidance and supervision of a qualified electrician is permitted to work on electrical systems or equipment, and they must comply with the electrical regulations.

NOTE

Claims under the warranty rendered void

Do not open the device housing. The devices are sealed.

If the device is opened, any warranty claims against SICK AG will be void.

Dangers in the event of faults

WARNING

Danger due to malfunction!

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

➢ Immediately put the machine/system out of operation if you cannot clearly identify or allocate the fault and if you cannot safely remedy the fault.

2.4.4 Operating entity responsibilities

The operating entity or system manufacturer must execute the electrical installation in compliance with the respective provisions of the local EVU as well as applicable standards.

2.5 Protecting the environment

The VML Prime measurement system has been designed to minimize its impact on the environment. It consumes very little energy.

Always act in an environmentally responsible manner at work. For this reason, please note the following information regarding disposal.

2.5.1 Power consumption

Including its components, the VML Prime measurement system consumes no more than 100 W.

2.5.2 Disposal after final decommissioning

- Always dispose of unusable or irreparable devices in an environmentally safe manner in accordance with the relevant national waste disposal regulations.
- Dispose of all electronic assemblies as hazardous waste. The electronic assemblies are easy to dismantle.
-

Also see chapter **7.3 Disposal**.

Note SICK AG does not take back devices that are unusable or irreparable.

3 Product description

This chapter provides information on the special features of the VML Prime measurement system. It describes the design and operating principle of the system solution.

NOTE

Legal-for-trade mode

Please use the supplements to operating instructions (8021098) when operating the VML Prime in the calibrated mode as VML520 MID or VML520 MID-s.

3.1 Scope of delivery

NOTE

- ➢ It is recommended that you carefully check for and report transport damage of any kind as soon as possible after receiving the system.
- ➢ Also verify that the delivery includes all components listed on the delivery note.

3.1.1 System variants

VML Prime is available in the **VML Prime 3D**, **VML Prime 2D V**, and **VML Prime 2D H** -system variants.

- **VML Prime 3D** is made up of two light grid pairs which span the conveyor belt vertically and horizontally.
- **VML Prime 2D V** is made up of a vertical light grid pair.
- **VML Prime 2D H** is made up of a horizontal light grid pair.

VML Prime 3D components and cables

- 1 controller cabinet with MSC800-1100 and power supply module
- 2 MLG-2 light grid pairs for horizontal and vertical installation
- 1 measuring wheel encoder
- 2 cables to connect sender and receiver (5-pin)
- 2 tee connectors (8-pin, 8-pin, 5-pin)
- 2 connecting cables to connect the tee connector to the MSC800 (8-pin shielded, open-ended)
- 1 connecting cable for measuring wheel encoder – shielded (black with green male connector)

VML Prime 2D V system variant components and cables

- 1 controller cabinet with MSC800-1100 and power supply module
- 1 MLG-2 light grid pair for vertical installation
- 1 measuring wheel encoder
- 1 cable to connect sender and receiver (5-pin)
- Tee connector (8-pin, 8-pin, 5-pin)
- 1 connecting cable to connect the tee connector to the MSC800 (8-pin shielded, open-ended)
- 1 connecting cable for measuring wheel encoder – shielded (black with green male connector)

VML Prime 2D H system variant components and cables

- 1 controller cabinet with MSC800-1100 and power supply module
- 1 MLG-2 light grid pair for horizontal installation
- 1 measuring wheel encoder
- 1 photoelectric retro-reflective sensor
- 1 cable to connect sender and receiver (5-pin)
- Tee connector (8-pin, 8-pin, 5-pin)
- Connecting cable to connect the tee connector to the MSC800 (8-pin shielded, open-ended)
- 1 connecting cable for measuring wheel encoder – shielded (black with green male connector)
- 1 connecting cable for the photoelectric retro-reflective sensor (black with green male connector)

3.1.2 Measuring range and measurement accuracy

NOTE

Legal-for-trade mode

Special operating points apply to the operation of a calibrated VML520 MID or VML520 MID-s. You can find these in the supplement to operating instructions.

Component	Explanation
Min. object size (L x W x H)	Up to 50 mm x 50 mm x 5 mm The minimum detectable object size depends on the beam separation and the conditions of the conveyor. The minimum object length depends on the diameter of the roll at the belt gap. It is calculated using the following formula: *L (min.) = 2.5 * Ø (roll)*
Max. object size (L x W x H)	2,600 mm x 1,000 mm x 1,000 mm Higher object sizes on request.
Conveying system	• Flat conveying surface • Both belts synchronized at the same speed • On one level, not misaligned • Singulated objects (see minimum distance)
Dimensioning accuracy (L x W x H)	Up to ± 5 mm x 5 mm x 2 mm up to 1.0 m/s Up to ± 5 mm x 5 mm x 5 mm up to 2.0 m/s The values depend on the beam separation and the belt speed. Higher speeds on request.
Minimum distance between objects	200 mm
Minimum distance between the vertical light grid and the first data output point	Data output typically occurs 300 ms (milliseconds) after the measuring range at the earliest (measured from the back edge of the object* and depending on the maximum object size and conveyor speed). * Assumed max. object dimensions 650 mm x 650 mm x 450 mm (L x W x H)

Tab. 3:Naming convention of the system variants (examples)

3.1.3 Accessories (optional)

The following accessories are recommended for mounting and commissioning:

Mounting frame

- Aluminum profiles for setting up the frame (as per the order)
- Universal connection sets, L-brackets, and angled feet for mounting profiles
- Mounting kits for the controller and the light grids

Steel frame

Steel frame construction as an alternative to the item profiles

System teach-in accessories (optional)

- SICK reference box (order no. SICK PN 4040035)

3.2 Specific features

3.2.1 The system components

Depending on the system variant, the VML Prime measurement system consists of one horizontal and/or one vertical pair of light grids, the MSC800 control unit, and a measuring wheel encoder.

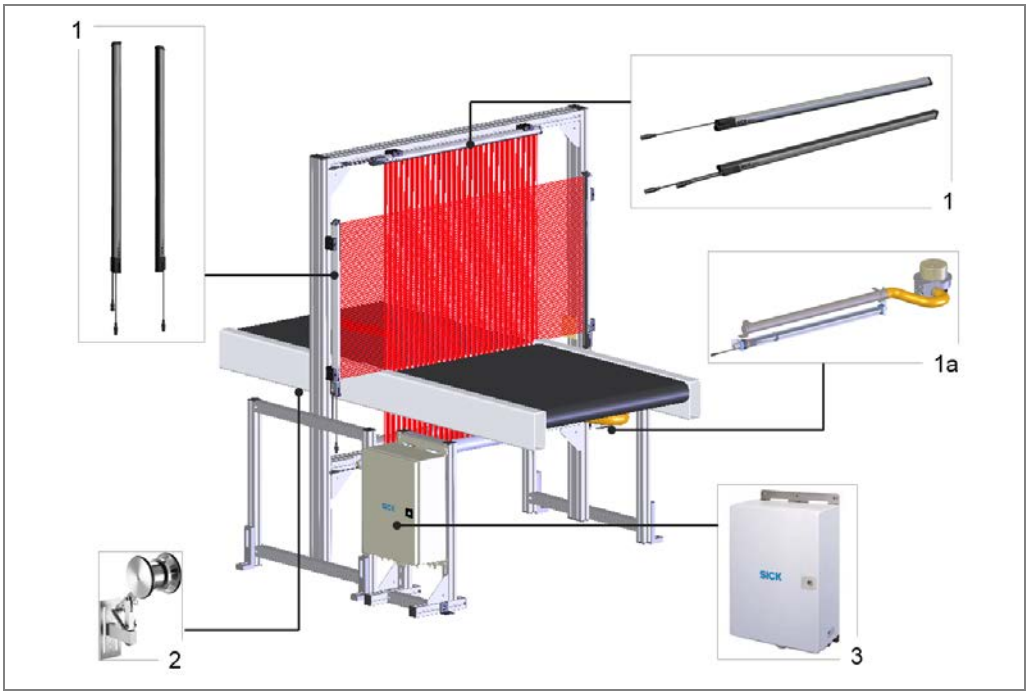


Fig. 1: VML Prime 3D structure

The **VML Prime 2D H** system variant also requires a separate photoelectric retro-reflective sensor for triggering the system.

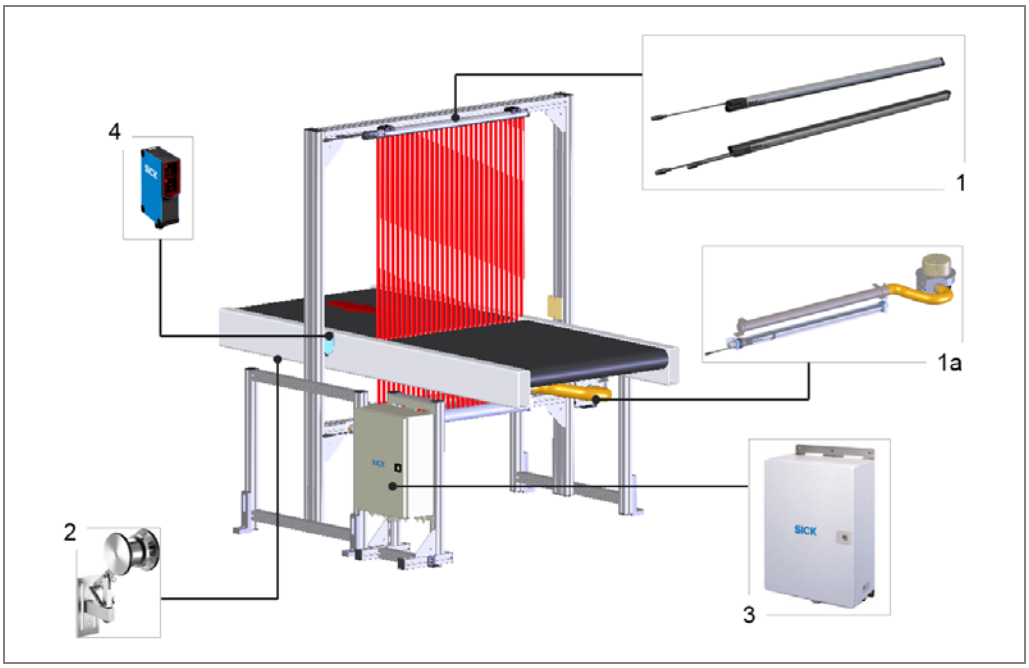


Fig. 2: Structure of VML Prime 2D H with separate photoelectric retro-reflective sensor

To facilitate mounting of the system components on the customer's conveying system, aluminum profiles can be provided for constructing the frame.

In all system variants, the light grids are mounted between two conveyor belts. In the **VML Prime 3D** system variant, the light grids are mounted at right angles for volume detection.

1 – The light grids

An MLG-2 light grid pair determines the object contour using the principle of shadowing. It consists of a sender unit with emitting diodes and a receiver unit with receiving diodes. The resulting field of measurement is determined by the beam separation and the number of beams.

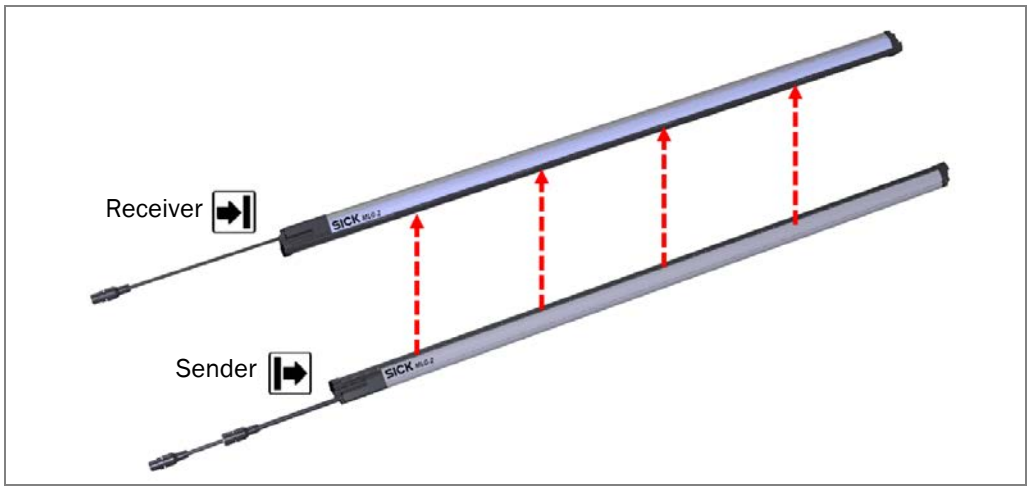


Fig. 3: MLG-2 sender and receiver unit

In the **VML Prime 3D** and **VML Prime 2D V** system variants, the vertical light grid pair also provides information about when exactly an object enters the detection range (trigger). The controller requires this information, together with the signals from the measuring wheel encoder, to identify the exact position of the object on the conveyor belt. In the **VML Prime 2D H** system variant, a separate photoelectric retro-reflective sensor is used as a trigger (see below).

In all system variants, the sender of the horizontal light grid is mounted underneath the conveyor system (1), and the receiver on top (2). This minimizes ambient light interference.

In all system variants, the sender of the vertical light grid is mounted on the left-hand side of the belt (3) when viewed in the conveying direction, and the receiver on the right-hand side (4).

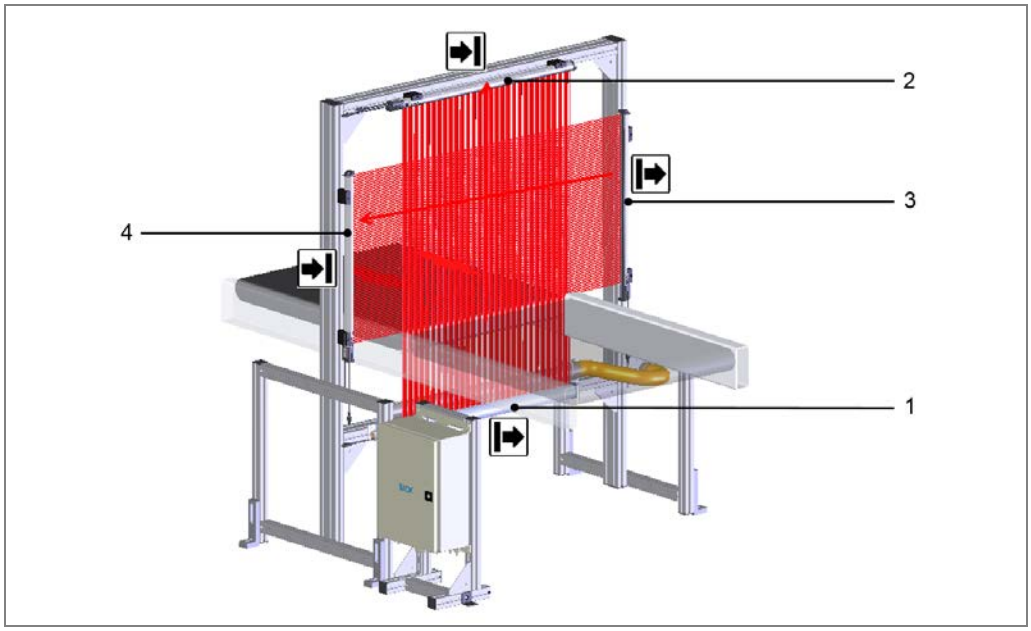


Fig. 4: Layout of the light grids

The light beams are directed through the **transition point** between two conveyor belts. The belt gap must be 10 mm wide.

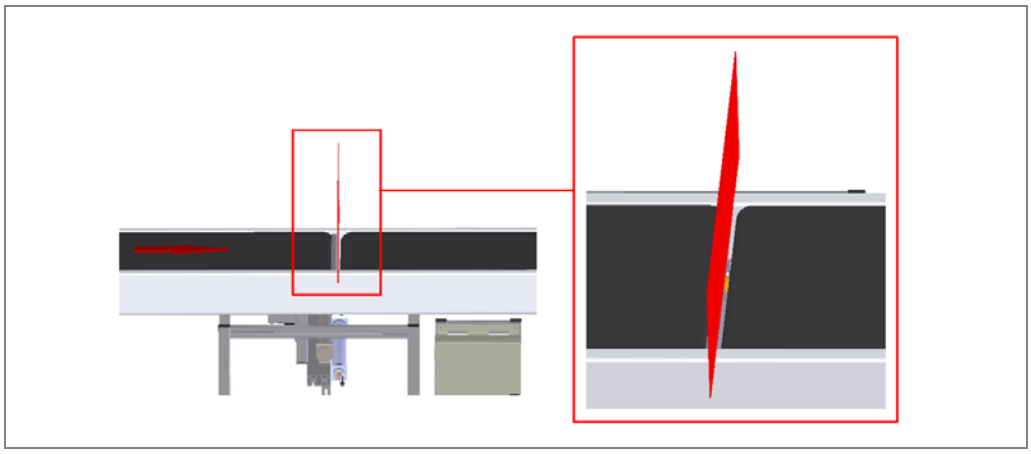


Fig. 5: Joint between the conveyor belts

Important The light grids must be mounted in such a way so as that the path of the beam of the vertical light grid and that of the horizontal light grid are aligned.

1a – Protective pipe and cleaning unit (recommended)

We recommend fitting the **VML Prime 3D** and **VML Prime 2D H** system variants with a cleaning set for the sender unit of the light grid mounted underneath the conveyor belt. This prevents an increased risk of contamination of the emitting diodes due to the horizontal mounting position of the sender below the belt.

Variant 1

The sender module (1) is mounted in a closed protective pipe made of plastic (2). The light beams are directed vertically upward through the Plexiglas to the receiver diodes.

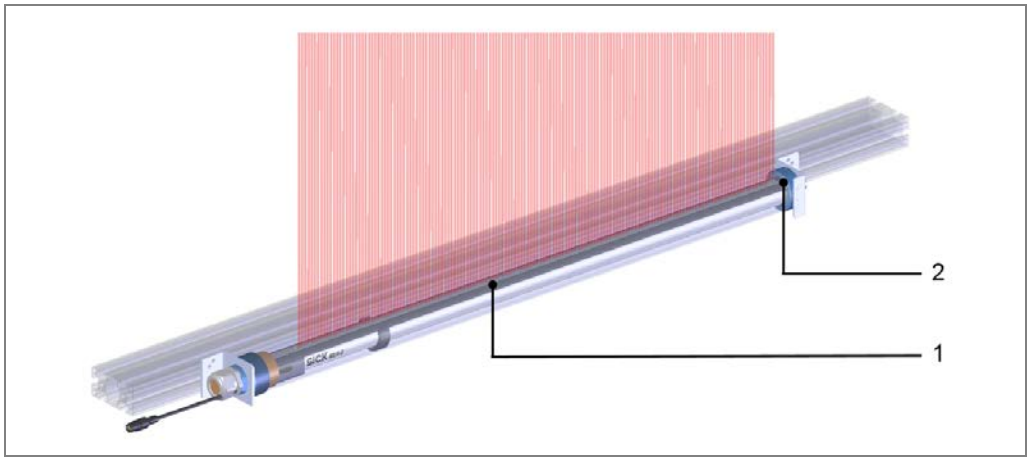


Fig. 6: IPG2 protective pipe with sender

Variant 2

As in variant 1, the sender module (1) is pre-mounted in a closed protective pipe (2). In addition, there is a vent duct with vent slot (3) mounted parallel to the plastic pipes, as well as a fan with hose (4).

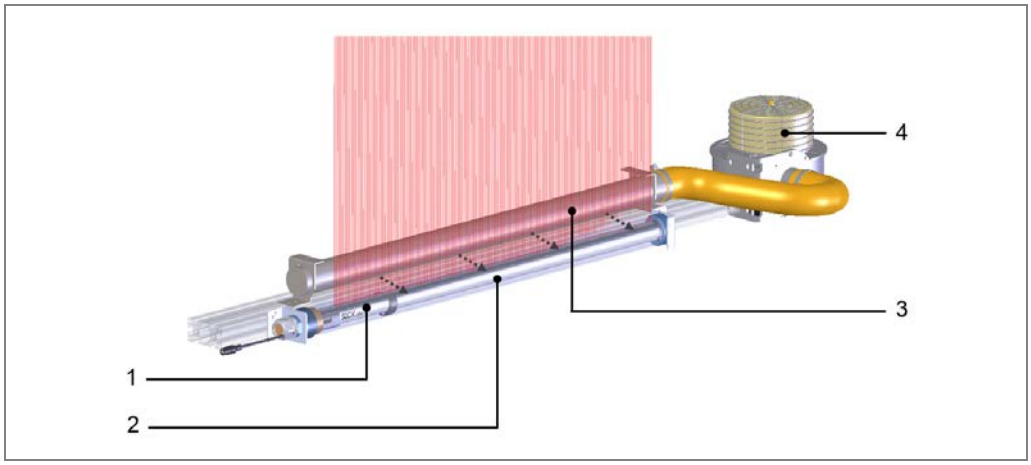


Fig. 7: IPG2 protective pipe with sender and cleaning unit

The light beams are directed vertically upward through the Plexiglas to the receiver diodes (1). The air is blown into the vent duct and exits via the vent slot transversely over the surface of the protective pipe (2), thereby blowing off any dirt particles on the surface of the protective pipe.

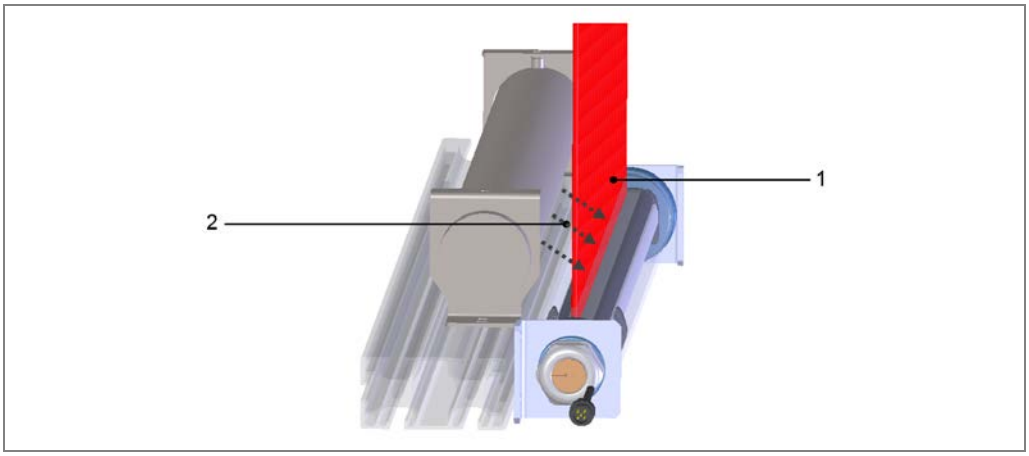


Fig. 8: Principle of operation of the cleaning unit

2 – Measuring wheel encoder

A measuring wheel encoder below the conveyor belt provides the exact position of the object on the conveyor belt once it has passed through the photoelectric sensor.

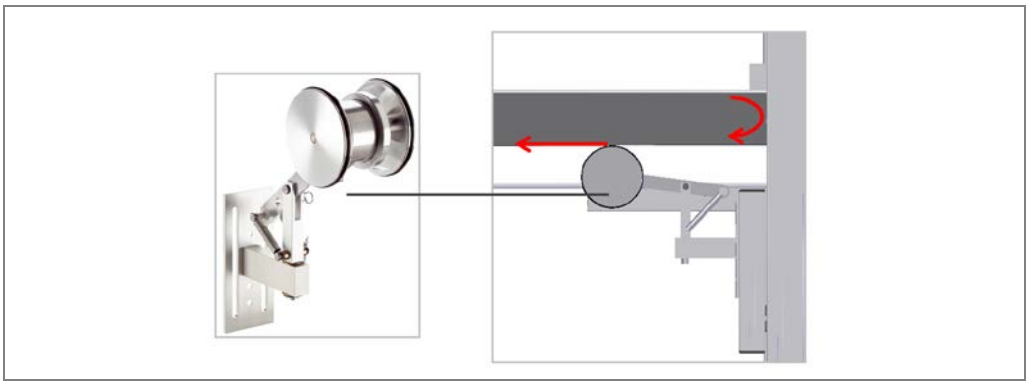


Fig. 9: Measuring wheel encoder

As part of this process, the measuring wheel encoder sends two incremental signals to the controller – there is a 90-degree phase shift between the signals. Based on these signals, it is possible to determine the speed and path of the object directly on the conveyor belt.

Measurement is performed directly on the running surface of the conveyor belt using a precise measuring wheel, which is mounted on a spring-loaded arm.

The following operating instructions describe the DFV60 measuring wheel encoder. Another incremental encoder, which has a minimum resolution of 1 mm, can be used.

2nd photoelectric retro-reflective sensor (VML Prime 2D H only)

The **VML Prime 2D H** system variant also uses a separate photoelectric retro-reflective sensor as a trigger. The emitted light is reflected back by a reflector. The sender and receiver are located in a single housing, where they are arranged parallel to one another.

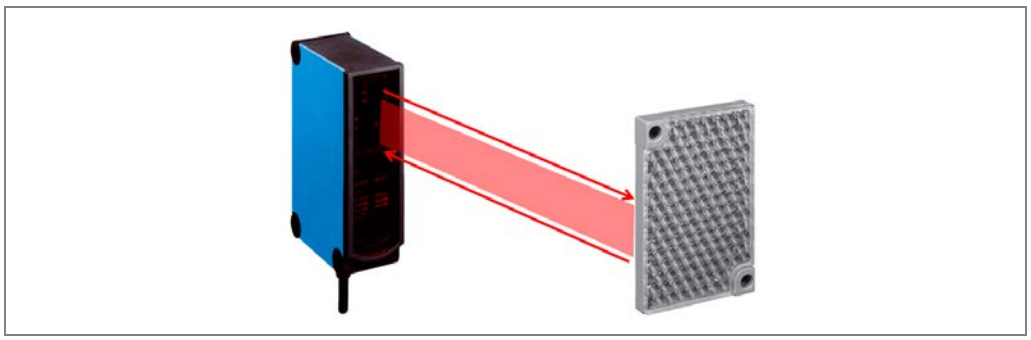


Fig. 10: Photoelectric retro-reflective sensor

The photoelectric sensor provides information about when exactly an object enters the measurement system via the CAN bus. The MSC800 requires this information, together with the signals from the measuring wheel encoder, to identify the exact position of the object on the conveyor belt.

Alternatively, the system can be triggered via the **PLC** of the conveying system.

The following operating instructions describe the WL-27 photoelectric retro-reflective sensor. Another photoelectric retro-reflective sensor (e.g., WL18-3) can also be used.

4 – Controller cabinet with MSC800-1100

The controller cabinet contains the MSC800 controller (1) and the power supply unit for the central voltage supply (2).

The MSC800 processes all signals from the system components and delivers the measurement results to the higher-level system control. The data is delivered via a customer-specific interface.

All the components are pre-mounted and pre-wired inside the controller cabinet.

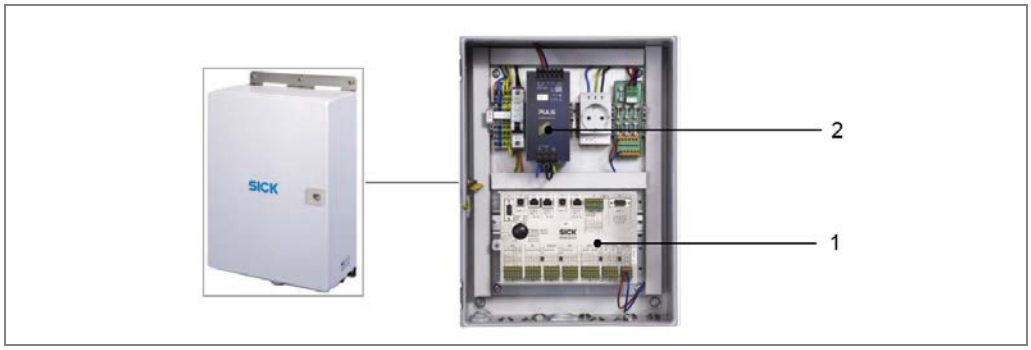


Fig. 11: Controller cabinet with MSC800-1100

Note With the VML520 MID or VML520 MID-s calibratable system, the MSC800 is connected to a second controller. Data is stored in the alibi memory and all additional sensors are connected via this controller (see also chapter **3.2.4 Calibratable operation**).

Supplementary system components

In principle, **AutoIdent systems** or **scales** can also be added to the VML Prime measurement system.

- **AutoIdent systems**: Laser scanners and camera-based systems allow the automatic identification of the object using its bar code, thereby accelerating process automation.

  The LTR data for focusing the camera systems is provided by VML Prime.
- **Scales**: The in-motion scales determine the weight of the passing object. The weight, together with the bar code and the calculated volume, can be transmitted for the purpose of controlling the goods and material flow.

3.2.2 VML Prime operating principle

The VML Prime measurement system dimensions **individual objects** on flat conveying systems. The objects must not be placed side by side and there must be a minimum distance of 200 mm (measured from the rear edge of the object to the front edge of the subsequent object) between them as they are being transported.

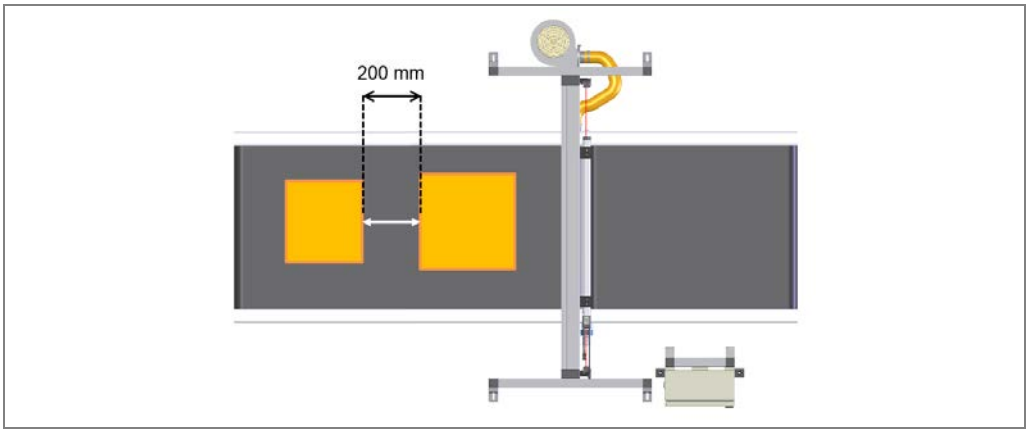


Fig. 12: Correct minimum distance between objects

Objects that are touching or lying side-by-side cannot be measured using the VML Prime.

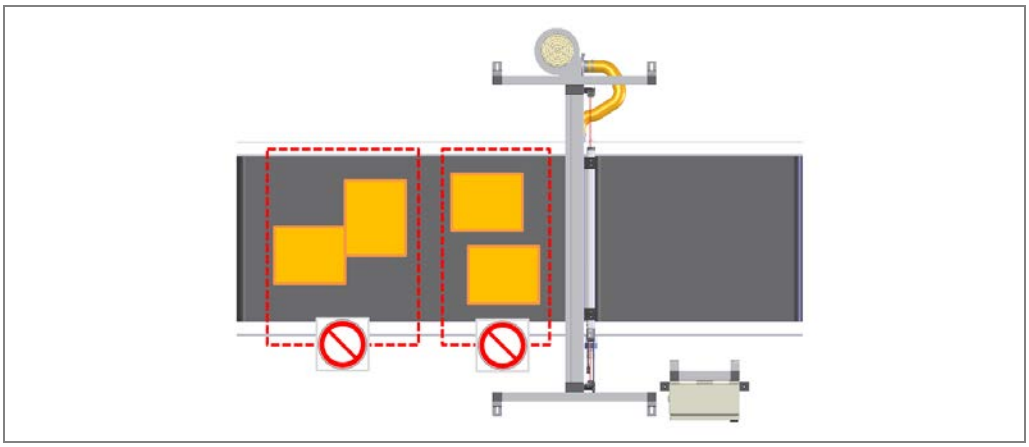


Fig. 13: Non-permissible object positions (touching and side-by-side)

Recording the measured values

The light grids span one horizontal and/or one vertical monitoring field. Providing no object is located within this field, the light beams from the sender lines will hit the diodes of the receiver lines.

If the monitoring field is interrupted by an object, the shadowing and the resulting number of light beams prevented from reaching the receiver lines can be used to detect the profile of the object.

The change in the number of beams at the receiver lines resulting from this shadowing is transmitted to the MSC800 via the light grid interfaces in the form of a digital signal.

Calculating volume with VML Prime 3D

The motion of the object generates two-dimensional sections in the **VML Prime 3D** system variant.

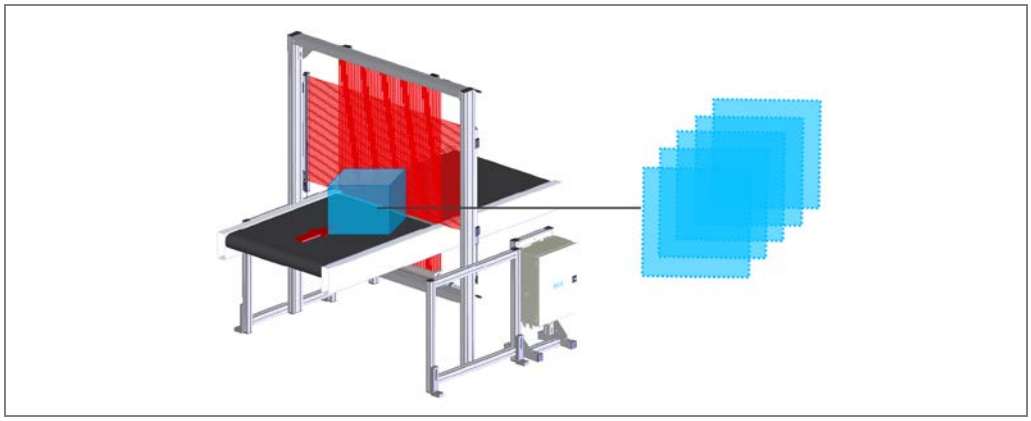


Fig. 14: VML Prime 3D operating principle

The individual 2D sections of the object are merged together in the MSC800. When the transport speed and the position of the object on the belt are also taken into account, a three-dimensional image can be rendered. The smallest enveloping cuboid and volume of this image can then be determined from this.

To calculate the length, the system needs to know the position of the object on the conveyor belt after it has passed in front of the trigger. This is provided by the measuring wheel encoder in the form of incremental signals.

Calculating height and length* with VML Prime 2D V

In the **VML Prime 2D V** system variant, the vertical light grid pair provides one-dimensional rows of dots of the respective object side.

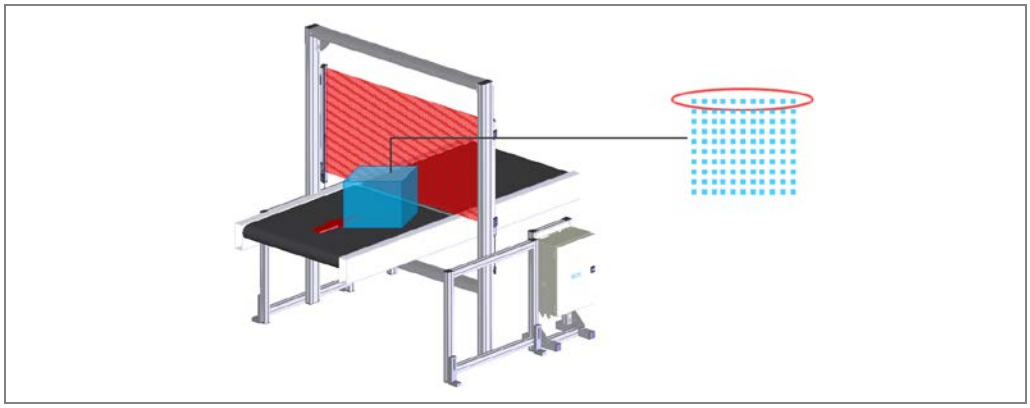


Fig. 15: VML Prime 2D V operating principle

The individual 2D rows of dots of the object are merged together in the MSC800. To calculate the side contour, the most extreme/highest point of the incoming data is always evaluated. When the transport speed and the position of the object on the belt are also taken into account, a two-dimensional image can be rendered, from which the object height is detected.

* VML Prime 2D V can also output the trigger length, which corresponds to the object length with aligned objects.

Calculating the width, length, and angle of rotation with VML Prime 2D H

In the **VML Prime 2D H** system variant, the horizontal light grid pair provides one-dimensional rows of dots of the object or profile width.

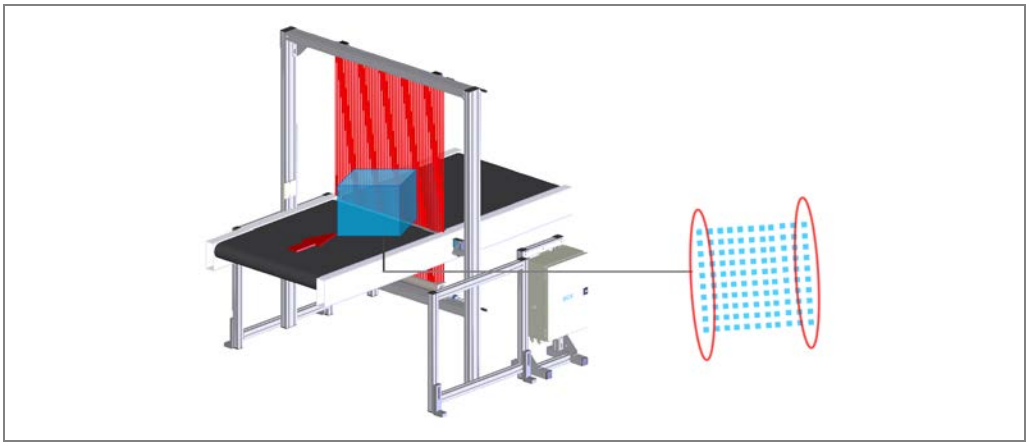


Fig. 16: VML Prime 2D H operating principle

The individual 2D rows of dots of the object are merged together in the MSC800. To calculate the object contour, only the outer points in the row of dots are evaluated. When the transport speed and the position of the object on the belt are also taken into account, a two-dimensional image can be rendered. The object length, the object width, and the rotation of the object on the conveyor belt can then be determined from this.

3.2.3 Data output

All information converges in the MSC800 central control unit. The MSC800 processes the trigger signal and forwards the object's position so that the length can be calculated.

The data of all measurement results is output to the higher-level system control by the host data interface. Alternatively, the digital switching outputs of the MSC800 are available for further processing of the deformation result.

In addition to the measured values, the LTR data for camera focusing can also be transmitted if desired.

The calculated measured values are typically transmitted to downstream systems 350 ms after the measuring range (1) at the earliest, measured from the back edge of the object (3). The time of the data output can be configured at will (see chapter **6.4.6 Configuring the** data output).

The object release time (2) refers to the point in time by which the calculation of the measurement data must have finished. The object release time (also measured from the back edge of the object) must be before the data output time.

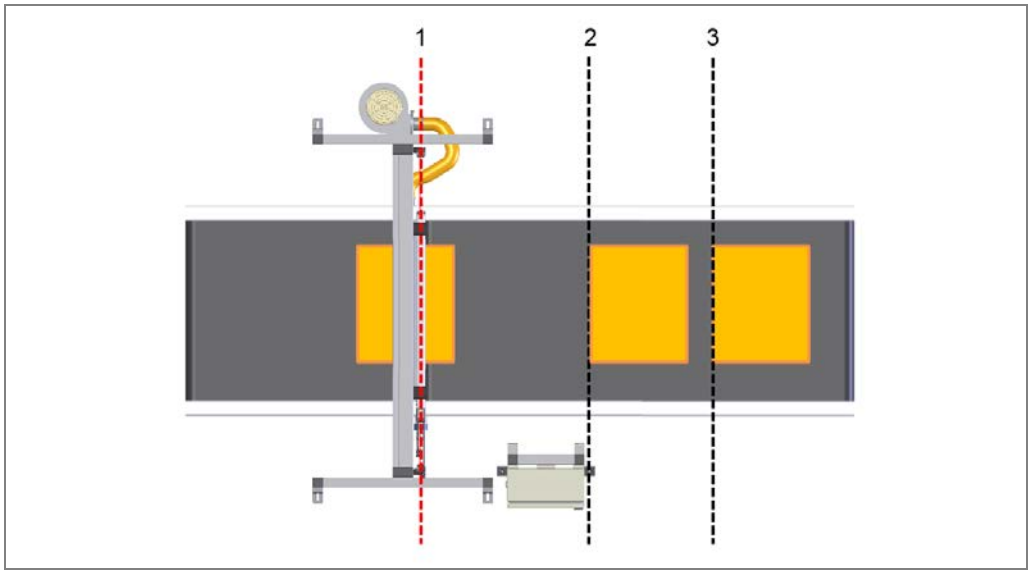


Fig. 17: Distances: trigger and data forwarding

3.2.4 Calibratable operation

Legal-for-trade mode

You can find information about operating the VML Prime as VML520 MID or VML520 MID-s in the supplement to operating instructions.

3.3 Project planning

3.3.1 Conveying system requirements

The following requirements apply to the conveying system and the objects that are being transported:

- The two adjacent conveyor belts must run at the same speed, and must be horizontally aligned.

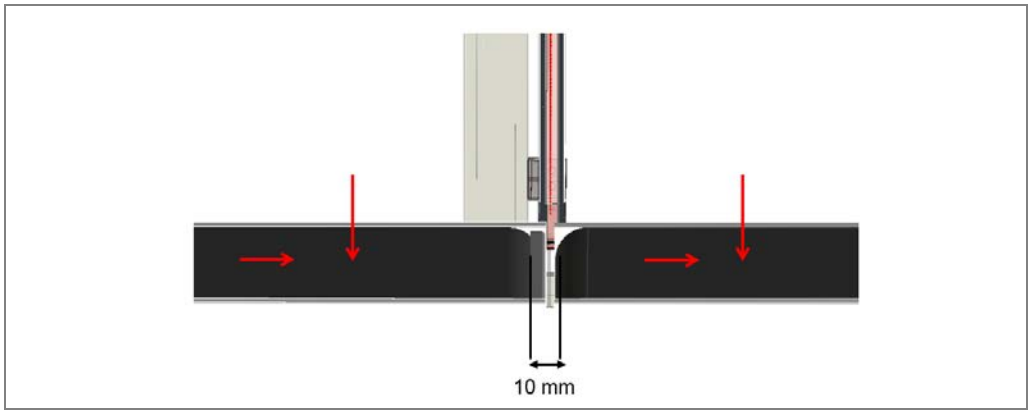


Fig. 18: Conveying system requirements

- An ideal measurement result is achieved when the width of the belt gap is 10 mm.
- It must be ensured that the objects travel along the conveyor belt one by one.
- If the objects rotate, vibrate, roll, or slip on the conveyor belt and on uneven conveying surfaces, the accuracy may be reduced, and this may influence the measuring behavior of the VML Prime measurement system.

The measuring range of the horizontal light grid must cover the full width of the conveyor. Here, the points of reference are

- the edges of the conveyor (in the case of conveying systems without guiding plates); or
- the inner edge of the guiding plates.

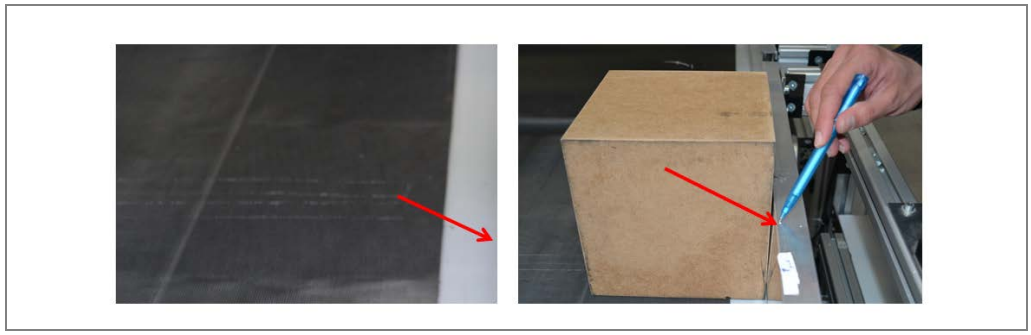


Fig. 19: Point of reference for conveyor system width

3.3.2 Mounting requirements

Frame

The VML Prime measurement system requires both a stable, secure frame to prevent rotation and a sufficient load bearing capacity to support the light grids and the controller cabinet, where applicable.

- The frame must be assembled in such a way that it is free of vibrations and oscillations.
- The frame must be rectangular, and must be positioned at right angles to the conveying direction.
- The frame must be firmly anchored in the ground.

To achieve a high level of measurement accuracy, use the optional **item aluminum profiles** or a **steel frame construction** in the defined dimensions.

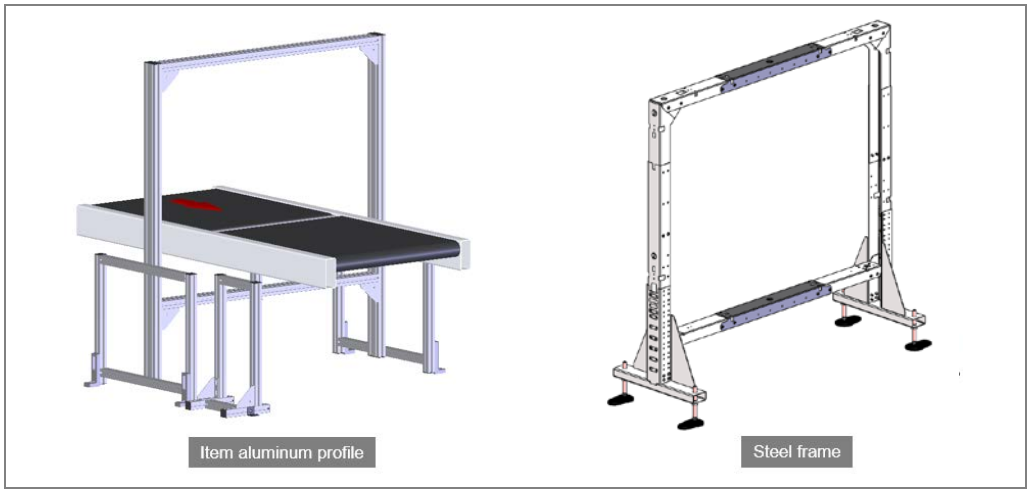


Fig. 20: item aluminum frame and steel frame

The mounting kits for the devices are geared toward both frame variants.

The following operating instructions describe the design and mounting using the item aluminum profiles.

If you use the steel frame, please also consult the description included with delivery.

Mounting the light grids

The light grids are mounted on the frame in such a way that both light grid pairs form a rectangular detection field in the middle of the point of transition between the two conveyor belts.

The light beams of the vertical and horizontal light grids must be aligned. The beams are offset by 2 mm, meaning that the senders and receivers must be aligned with each other exactly.

Fig. 21: Misaligned light beams

Optimizing the measurement results

To achieve an **optimum** measurement result, observe the following:

- The light grids must be far enough away from bends, induction lines, start/stop areas, areas with upward and downward slopes, and breaks in the conveying system.
- The conveyor speed must be constant from the measurement start point up until leaving the reading field. Both conveyor belts must run at the same speed.
- The measuring wheel encoder should be mounted on the belt element in such a way that a good connection is formed between the encoder and the belt. At this point, the belt should run with as little vibration as possible

3.4 Status indicators

The accessible LEDs of the VML Prime measurement system are located on the sender and receiver units of the light grids and in the controller cabinet.

The light grids are fully automatic in normal operation and require no operator intervention.

3.4.1 MLG-2 light grids

The receivers of the MLG-2 have three LEDs on the connection side. These provide a visual indication of the operational status and any occurring faults.

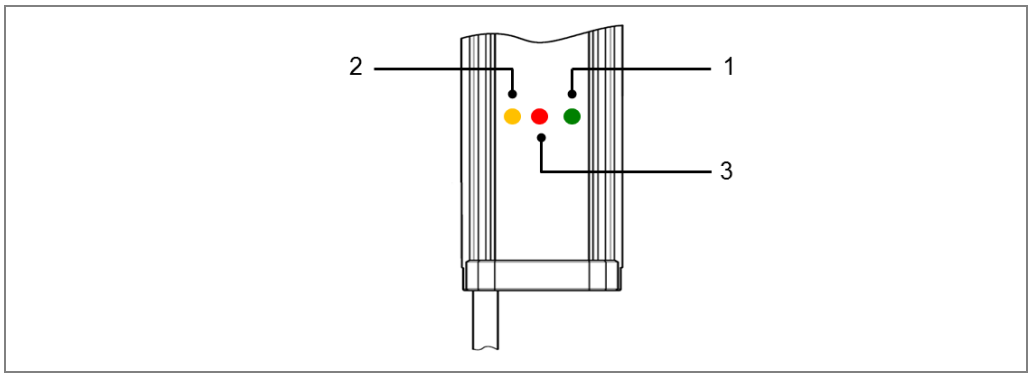


Fig. 22: Status indicators on the MLG-2 (receiver unit)

LEDs on the MLG-2 receiver

No.	LED indicator	Description
1	● **Green**	Green LED permanently illuminated Supply voltage on
	○ **Green**	Green LED off Supply voltage off or too low
2	● **Yellow**	Yellow LED permanently illuminated Light path interrupted (at least one beam interrupted)
	○ **Yellow**	Yellow LED off Light path is free
	☀ **Yellow (3 Hz)**	Yellow LED flashing rapidly Contamination warning or alignment mode is active (the signal arriving at the receiver is too weak) The alignment mode is not permanently deactivated until after teach-in
	☀ **Yellow (1 Hz)**	Yellow LED flashing slowly Teach-in active
3	● **Red**	Red LED permanently illuminated A fault has occurred. The type of fault will be indicated by a combination of the yellow and the green LEDs.
	☀ **Red (10 Hz)**	Red LED flashing rapidly An error has occurred during teach-in.

Tab. 4: Status indicators – light grid (receiver)

LEDs on the MLG-2 sender

No.	LED indicator	Description
1	**Green**	Green LED permanently illuminated Supply voltage on
1	**Red**	Red LED permanently illuminated Hardware fault

Tab. 5: Status indicators – light grid (sender)

3.4.2 LED of the separate photoelectric retro-reflective sensor

The photoelectric retro-reflective sensor in the VHL Prime 2D H features a yellow LED receive indicator (1) and a green LED function indicator (2).

The yellow LED lights up when the emitted light signal is reflected by the reflector and received correctly. If the light beam is interrupted by an object, the LED must go out. If the LED flashes, the reflector is only being detected in the fringe range. The green LED lights up if the supply voltage has been connected. The light sensitivity is configured via the teach-in pushbutton (3).

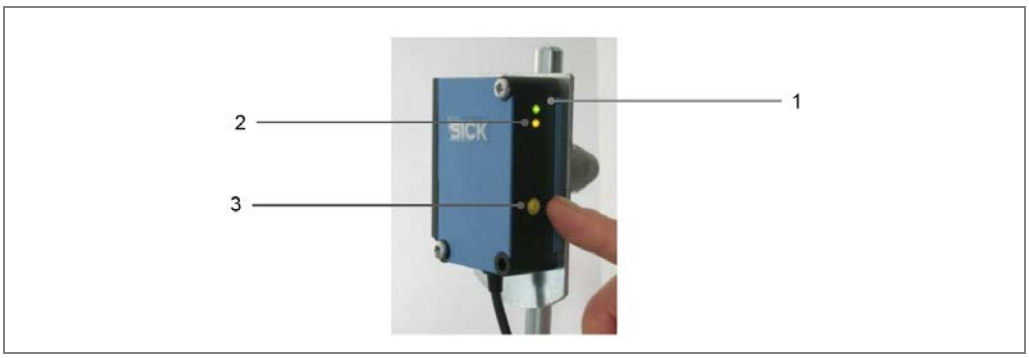


Fig. 23: Status indicators on the photoelectric retro-reflective sensor

3.4.3 LEDs on the controller

Fig. 24: Status indicators on the MSC800 controller

LED	Color	Meaning
READY	Green	ON: Controller is ready for operation OFF: Controller is not ready for operation
SYSTEM READY	Green	ON: Complete system consisting of MSC800 and all connected devices is ready for operation OFF: Complete system is not ready for operation
RESULT	Green	ON: There is a valid read result OFF: No valid read result
RUN FIELDBUS	Green	ON: Fieldbus communication is active OFF: No fieldbus communication
READY FIELDBUS	Green	ON: Fieldbus application is ready OFF: Fieldbus application is not ready
OUT	Green	ON: Switching output is active OFF: Switching output is deactivated
IN, TRIGGER, INC	Green	ON: Switching input is active OFF: Switching input is deactivated
POWER (1/2)	Green	ON: Supply voltage is on OFF: No supply voltage
microSD ACT	Green	ON: MSC800 reading data from / writing data to microSD card OFF: Deactivated
PROFIBUS STA ERR	Green Green	ON: Data interface is ready for communication ON: Bus or communication error
ETHERNET LNK ACT 100	Green Green Green	ON: Data interface is connected to Ethernet ON: Data transmission ON: Data transmission rate 100 Mbit/s OFF: Data transmission rate 10 Mbit/s
HOST (1/2) AUX (1/2) Tx 232	 Green Green	 ON: Data interface is sending data ON: Interface is operating as an RS-232 interface OFF: Interface is operating as an RS-422/485 interface
CAN 1/2 Rx		 ON: Data interface is receiving data

Tab. 6:Status indicators on the MSC800 controller

3.5 Interfaces

Various data interfaces are available on the MSC800 controller inside the controller cabinet for outputting measurement results to a further system.

Interface	For component	Function
CAN network	Option: AutoIdent systems (CLV bar code scanner, ICR, Lector camera)	Internal data interfaces
Ethernet #1	Customer interface	Transmits the summarized data to a host
Ethernet #2	Switch, auxiliary interface	Available for maintenance, service, and commissioning by a technician
Ethernet #3	Auxiliary interface	Available for maintenance, service, and commissioning by a technician
Digital I/Os	Photoelectric sensor Measuring wheel encoder	Object trigger Measuring wheel encoder
PROFIBUS DP Ethernet	Host	Transmits the summarized data to a host
Serial connection #2 or Ethernet	SICK Visualization Platform 600	Sends all analysis and diagnostic information

Tab. 7:Function of data interfaces

The SOPAS configuration software can be used to configure the data interfaces.

4 Mounting

NOTE

Legal-for-trade mode

Please use the supplements to operating instructions (8021098) when operating the VML Prime in the calibrated mode as VML520 MID or VML520 MID-s.

4.1 Preparation for mounting

4.1.1 Getting the frame components ready

item aluminum frame

- Aluminum profiles for setting up the frame (application-specific as per the order)
- Universal connection sets, L-brackets, and angled feet for mounting profiles
- Cable channels for mounting on sides of profiles

Steel frame

- 2 feet
- 2 vertical columns
- 2 horizontal bars (top/bottom)
- Screws, etc.

4.1.2 Getting the devices ready

- Controller cabinet with MSC800-1100 and power supply module
- Light grid sender and receiver units
- Measuring wheel encoder
- Photoelectric retro-reflective sensor and reflector (**VML Prime 2D H** only)

4.1.3 Getting the accessories ready

- Mounting brackets and device mounting kits
- Cable(s) to connect sender and receiver (5-pin)
- Tee connector (8-pin, 5-pin, 8-pin)
- Connecting cable(s) to connect the tee connector to the MSC800 (8-pin shielded, open-ended)
- Connecting cable for measuring wheel encoder – shielded (black with green male connector)
- 1 connecting cable for the photoelectric retro-reflective sensor (black with green male connector)

4.2 Assembling the item aluminum frame

4.2.1 Frame components

The frame that holds the device components is constructed in the form of a gate around the conveying system. The gate must be mounted at the gap between two conveyor belts so the light beams from the light grid fall on the center of the gap.

The gate frame is usually made up of individual aluminum profiles. The height and width of the profiles are customer-specific. More detail can be found in the delivery specification.

The frame consists of the following components:

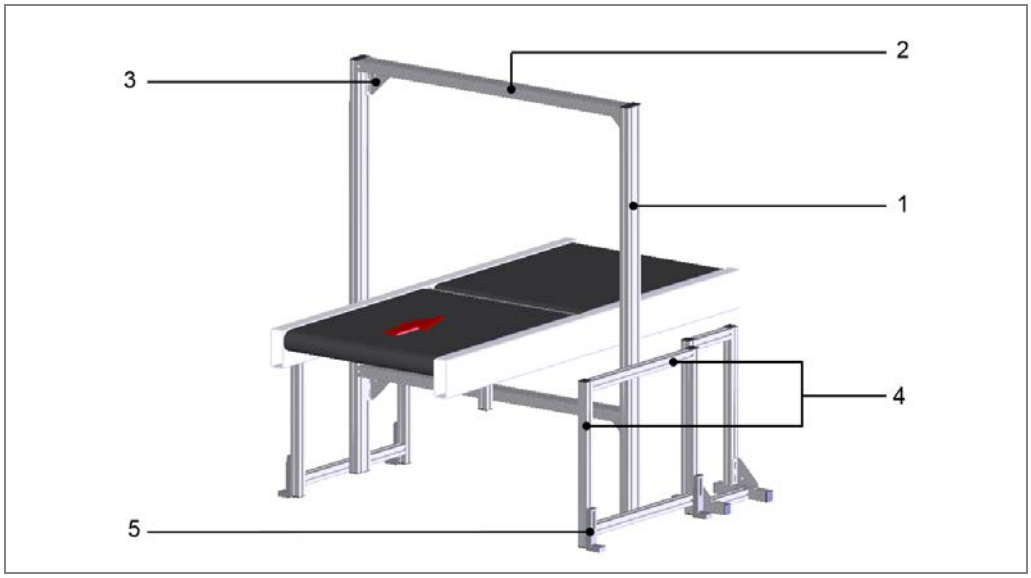


Fig. 25: item mounting frame: components

Number	Designation
1	Carrier profiles
2	Transverse profiles for connecting the two carrier profiles
3	Brackets for stabilizing the frame
4	Longitudinal and transverse profiles for constructing the foot and for mounting the devices
5	Angled feet for leveling and anchoring the frame to the floor

Tab. 8:item mounting frame: components

The aluminum profiles are mounted using the universal connector for extruded aluminum profiles that is included with delivery. Universal connectors for extruded aluminum profiles are rectangular friction-fitted aluminum profile connectors that can be adjusted.

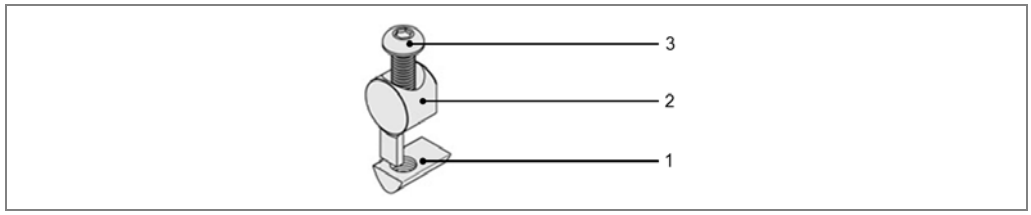


Fig. 26: item mounting frame: universal connector for mounting the item profiles

Mounting

- Separate the profiles.
- Slide the sliding nut (1) into the slot.
- Insert the universal connector (2) into the profile of the carrier.
- Insert the screw (3) into the universal connector.
- Use the ball head screwdriver to tighten the universal connector.

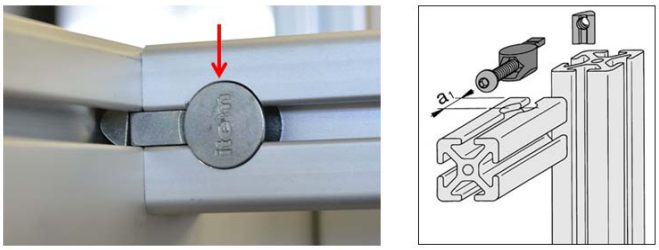


Fig. 27: item mounting frame: screwing the item profiles in place

WARNING

Risk of injury due to falling components

If profiles have been upended, it is possible that they could tip over during mounting.

- Do **not** perform mounting work alone unless it is absolutely safe to do so.
- Where applicable, ask a second person to assist you with the component replacement process.
- Wear safety shoes.

4.2.2 Screwing on the bracket

Use the L-bracket to stabilize the right-angled connection between two profiles. Use M8x16 Allen screws and the M8 sliding nut to screw the brackets in place.

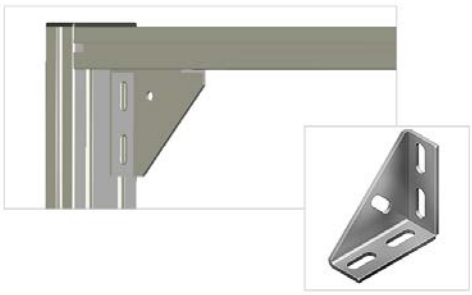


Fig. 28: item mounting frame: screwing on the L-brackets

4.2.3 Aligning the frame

The frame must be aligned at a right angle to itself and at a right angle to the conveyor belt. The transverse profiles must run parallel to the conveying system.

The distances from the belt must be equidistant, i.e., the same on both sides.

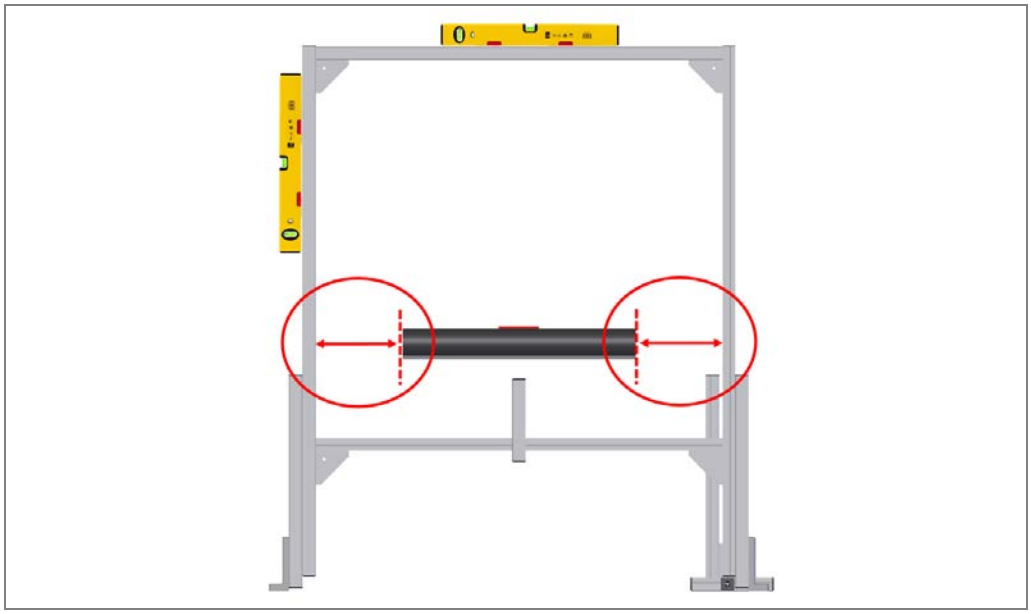


Fig. 29: item mounting frame: aligning the frame

4.2.4 Leveling the frame

Adjusting the angled foot enables uneven floors to be compensated for simply by adjusting the height. This allows the frame to be aligned horizontally and vertically.

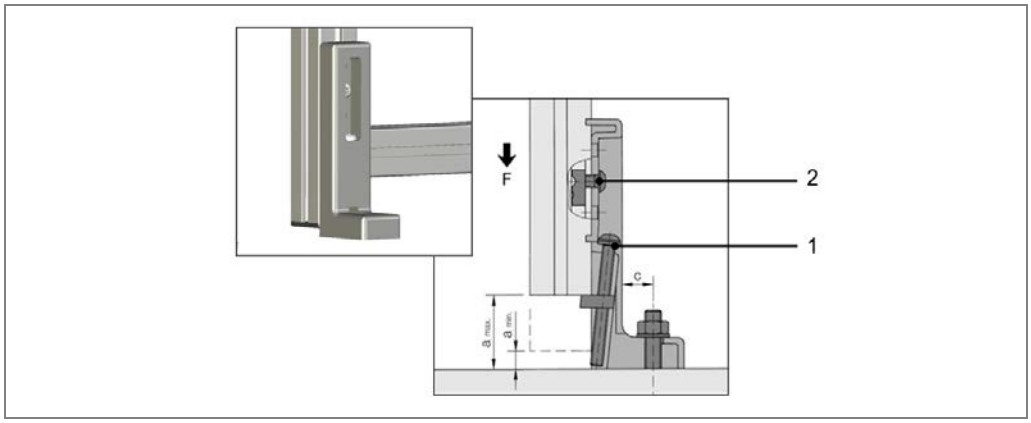


Fig. 30: item mounting frame: using the angled adjustable feet to level the frame

1. Turn the setting screw (1) of the adjustable feet to raise or lower the carrier profiles until the entire frame is perpendicular to the conveying direction.
2. Fix the selected height by tightening the side fixing screw (2).

4.2.5 Anchoring the frame to the floor

The frame must be screwed to the floor via the angled adjustable feet.

- ➢ Use the 10 mm high-load dowels and concrete screws included with delivery.
- ➢ Screw down the frame at all angled adjustable feet.

Note If the frame is standing on a grate, use hook bolts instead of the high-load dowels.

4.2.6 Attaching the cable holders

Use the universal cable tie block supplied to attach the connecting cables to the profile. It enables cables to be easily mounted on a profile.

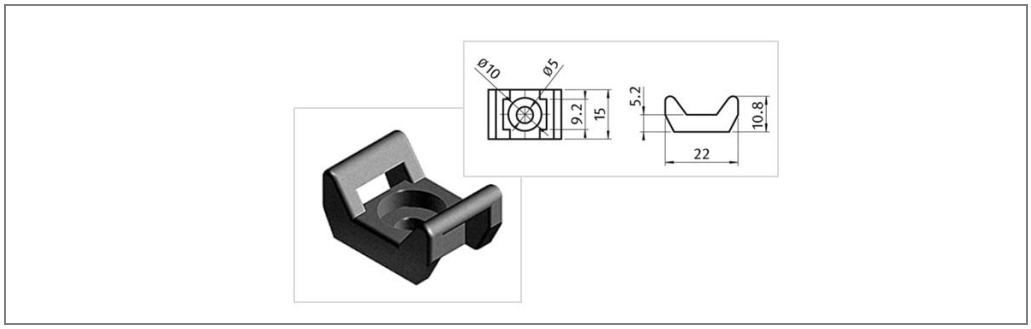


Fig. 31: Universal cable tie block

Check how the cables are to be routed at the site. Typically the connection cable and connecting cable for the vertical components are mounted on the lower transverse profile and lead to the controller cabinet. The connection cable for the vertical components is taken to the right-hand longitudinal profile due to the mounting position (viewed in conveying direction).

Mounting

- ➢ Mount the universal cable tie block in the profile slot with a hammer head nut.
- ➢ Cable ties for bundling cables and tubes are mounted on the universal cable tie block.

4.3 Mounting the light grids

4.3.1 Overview

Mount the vertical and horizontal light grid components on the frame in the order described:

1. Horizontal receiver at the top
2. Horizontal sender (in the protective pipe if necessary)
3. Vertical receiver on the right (in conveying direction)
4. Vertical sender on the left (in conveying direction)

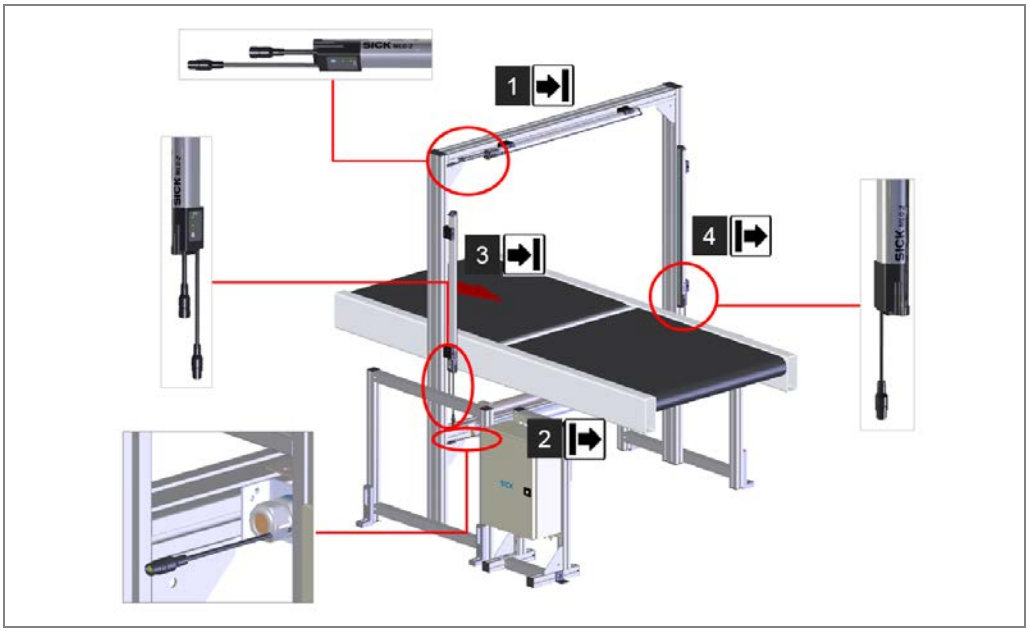
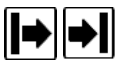


Fig. 32: Mounting the components (overview)

Notes

- The end with the cable connection on the associated sender and receiver units must always point in the same direction. Due to the beam offset of 2 mm, the cable connections for the horizontal light grid (in conveying direction) must point to the right and the cable connections for the vertical light grid must point downward.

  If they are mounted inversely, the monitored areas will not be in a single plane.
- The light grid is mounted (in conveying direction) **behind** the frame.
- Sender and receiver must not be installed at 180° rotated relative to each other. The sender and receiver must be mounted in the same orientation.



- Sender and receiver can each be recognized via an icon on the type label.

Icon	Designation
	Sender unit
	Receiver unit

Alignment

All light grid beams must lie exactly on a single plane. The light beams sent must fall exactly on and at a right angle to the relevant receiver unit diode. To achieve this, the components must be aligned on the frame.

The frame must ensure that the vertical light grids are orthogonal to the conveying system and the horizontal ones are parallel to it.

4.3.2 Mounting the light grids using QuickFix

4.3.2.1 Assembling QuickFix brackets

Sender and receiver are each mounted on the aluminum profiles of the frame using two QuickFix brackets.

QuickFix brackets are supplied in four individual parts that must be assembled before mounting.

Fig. 33: Assembling QuickFix brackets

1. Push both parts of the clamping housing into one another (1, 2).
2. Connect both individual parts using an M5 screw.
3. Screw the sliding nut onto the screw. The sliding nut is used to mount the QuickFix bracket on the aluminum profile of the mounting frame.

Note If you use a different frame, a screw-nut is required instead of a sliding nut.

4. Get the brackets ready for mounting in a disconnected state.

4.3.2.2 Pre-mounting sender and receiver on the QuickFix bracket

Before mounting, attach two QuickFix brackets to each of the two senders and receivers.

Note If the horizontal sender is installed in the protective pipe, other brackets are used for mounting (see chapter **4.3.3 Mounting the protective pipe** with sender).

1. Pull the QuickFix brackets apart and insert the light grid.
2. Make sure that the head of the QuickFix bracket is placed exactly in the MLG-2 housing slot.

Fig. 34: QuickFix bracket head in the MLG-2 housing slot

3. Attach the two QuickFix brackets to the component housing. Push the two parts of the bracket together until you hear a click.

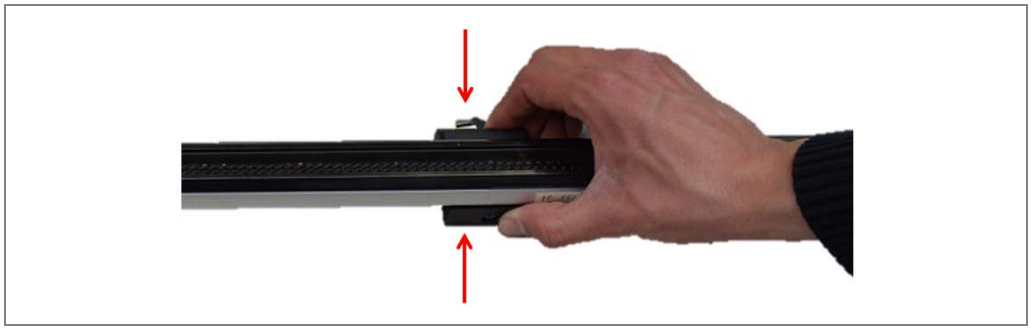


Fig. 35: Attaching the QuickFix bracket to the MLG-2 housing

4.3.2.3 Attaching sender and receiver to the mounting frame

Mount the sender and receiver on the mounting frame in the described order using the QuickFix brackets. They are mounted behind the frame (viewed in conveying direction).

The process for mounting on the aluminum profile is the same for horizontal and vertical components.

Note Make sure that the sliding nuts are unscrewed far enough out of the bracket before mounting so they can grip into the profile of the mounting frame.

1. Hold the components on the mounting frame and insert the two sliding nuts that are screwed onto the Allen screw into the profile.

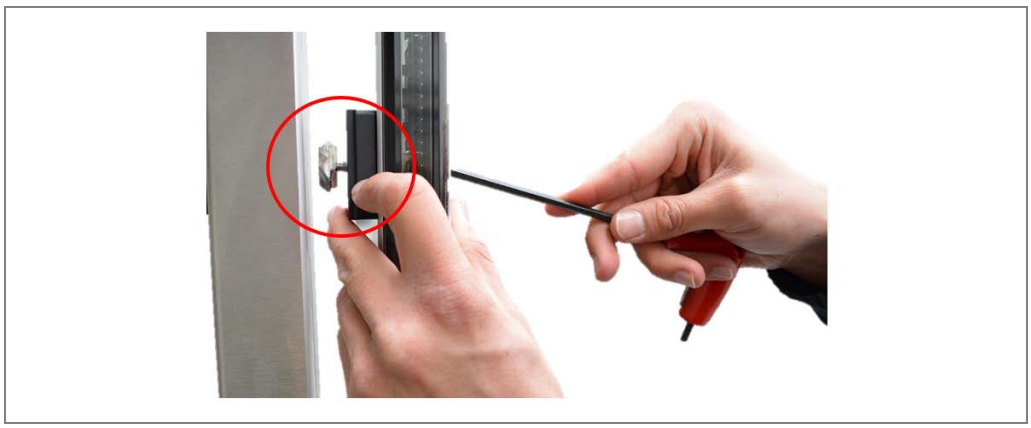


Fig. 36: Insert MLG-2 into the mounting frame profile

Note When mounting the vertical components on it, ensure that the MLG-2 does not slip downwards.

2. Screw the Allen screw into the sliding nut.
3. Screw the two brackets so the components can still be moved in the profile slot.

Fig. 37: Screwing MLG-2 into the profile

4. Align the components in the aluminum profile. An approximate alignment is sufficient at this stage. They are aligned more precisely in a subsequent step.
5. Locate the horizontal components along the y-axis so that they are midway above or beneath the conveyor belt.

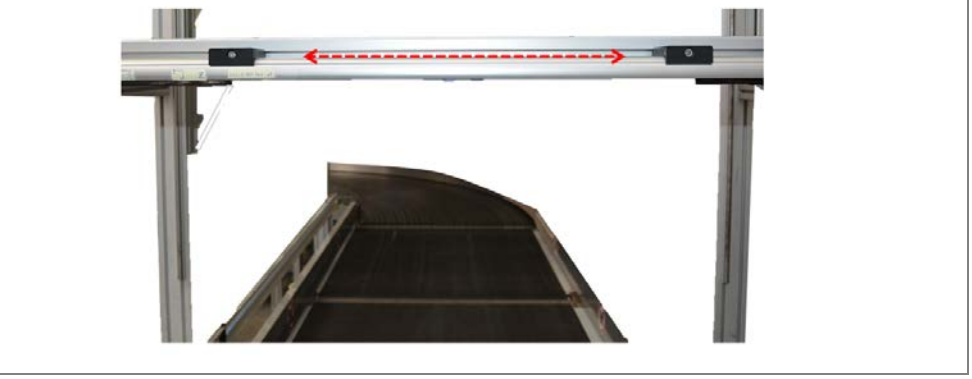


Fig. 38: Locating the horizontal receiver unit in the MLG-2 in the profile

6. In the case of the vertical components, the first diode should be approx. 2 mm above the conveyor belt.

Important

➢ Use a water level to level the horizontal sender and receiver units.

4.3.3 Mounting the protective pipe with sender

The horizontal sender is installed in the IPG2 protective pipe before mounting. The protective pipe is fixed to the mounting frame with two mounting brackets.

4.3.3.1 Installing the MLG in the protective pipe

The IPG2 protective pipe consists of the following components:

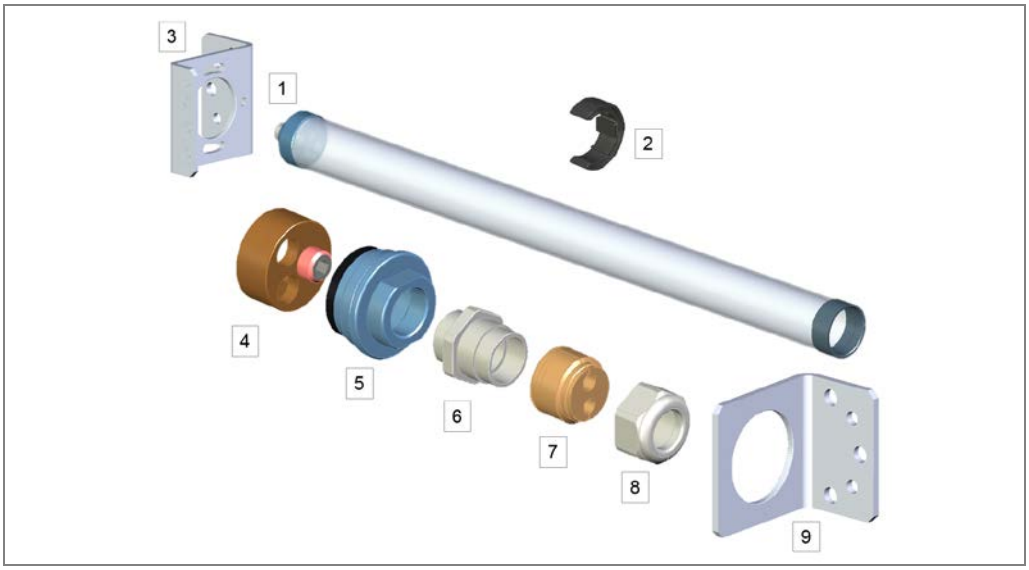


Fig. 39: IPG2 protective pipe components

No.	Designation
1	IPG2 protective pipe
2	MLG-2 spacer
3	Mounting bracket (on the cable side), including fixing screws
4	Centering device with setscrew
5	End cap
6	Cable gland
7	Seal insert
8	Nut
9	Mounting bracket (top), including fixing screws and mounting screws

Tab. 9:IPG2 protective pipe components

Preparatory work

1. Remove the protective foil from the IPG2 protective pipe.
2. Clean the protective pipe.

NOTE

Damage to the Plexiglas

The pipe is made of plastic. The optical output is weakened by scratches and streaks on the Plexiglas.

- ➢ Do not use aggressive cleaning agents.
- ➢ Do not use abrasive cleaning agents.
- ➢ Avoid scratching and chafing motion on the surface.

Pushing the light grid into the protective pipe

1. Mount the spacer centered on the light grid.

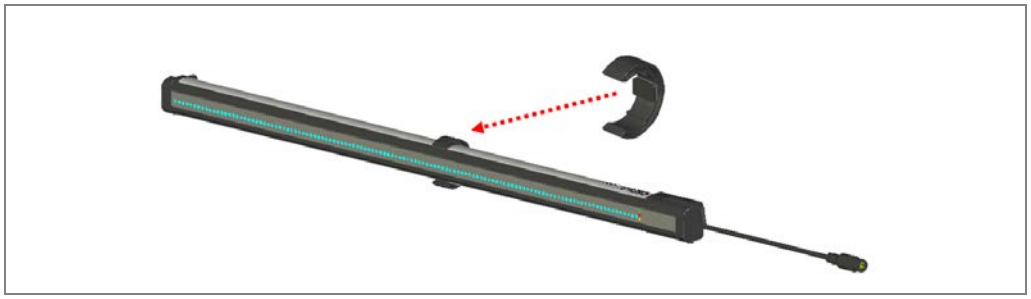


Fig. 40: IPG2: mounting the spacer

2. Carefully push the light grid with the mounted spacer into the protective pipe.

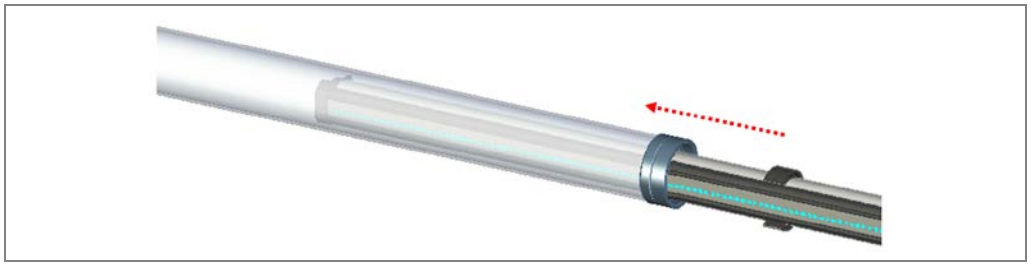


Fig. 41: IPG2: pushing the light grid into the protective pipe

Positioning and fixing the light grid in the protective pipe

1. Push the centering device onto the connecting cables.

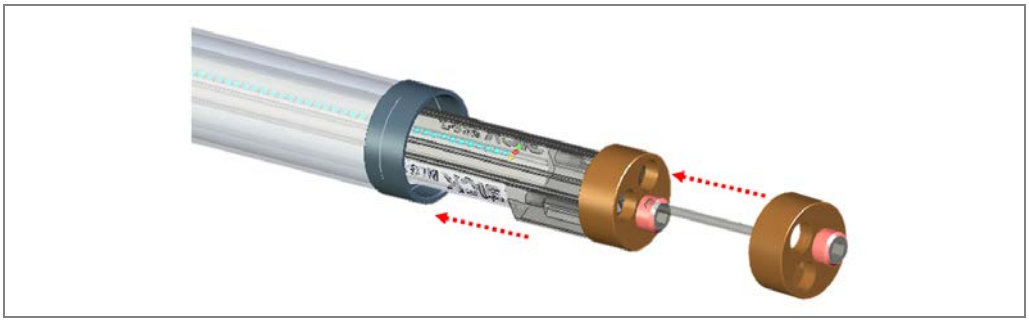


Fig. 42: IPG2: mounting the centering device

2. Push the light grid into the protective pipe until the light grid clicks into place in the upper flange.

Fig. 43: IPG2: clicking the light grid into place in the upper flange

3. Screw the end cap into the protective pipe.

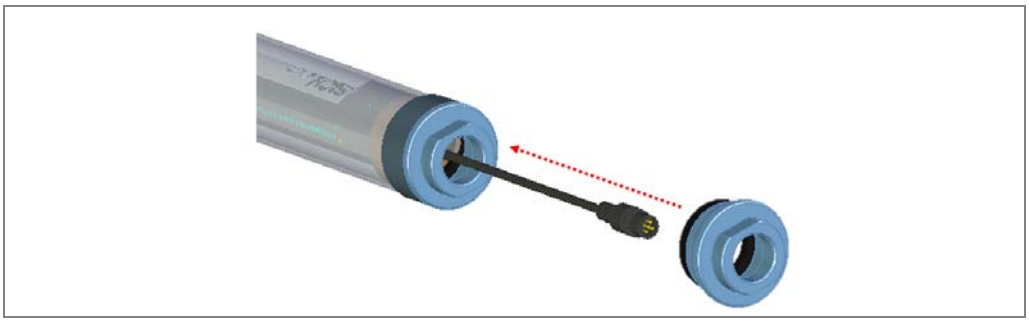


Fig. 44: IPG2: screwing in the end cap

4. Position and fix the light grid in the protective pipe using the setscrew of the centering device.

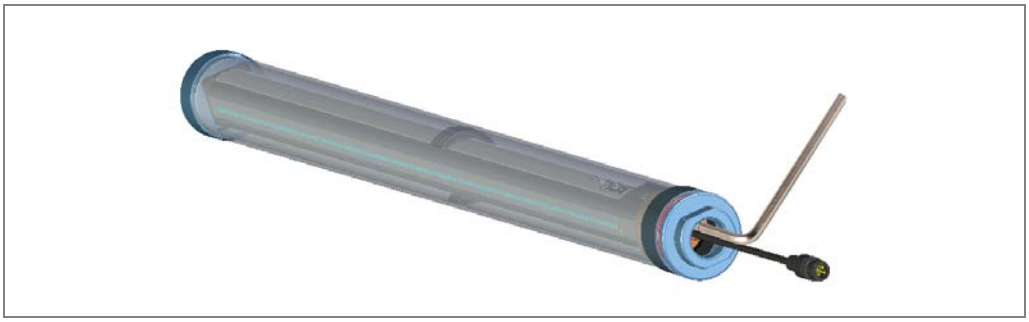


Fig. 45: IPG2: positioning and fixing the light grid in the protective pipe

Final steps

1. Screw the cable gland to the end piece.
2. Push the seal insert into the cable gland.

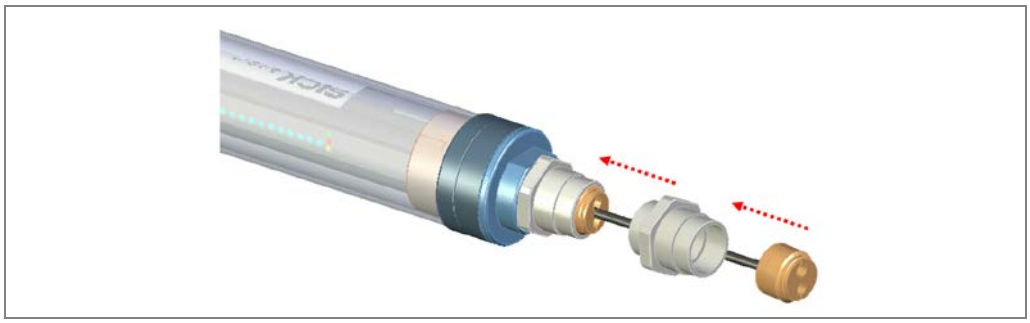


Fig. 46: IPG2: mounting the cable gland and seal insert

3. Screw the nut onto the cable gland.

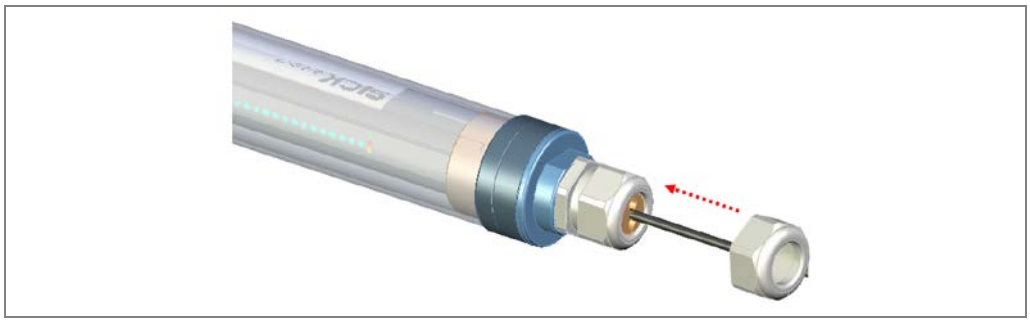


Fig. 47: IPG2: screwing the nut onto the cable gland

4.3.3.2 Attaching the protective pipe to the mounting frame

Special brackets are provided for mounting the protective pipe and light grid. The brackets are mounted with a screw in each profile slot.

Attaching the cable-side bracket (floating bearing) to the profile.

1. Insert the sliding nut into the side slot on the lower mounting frame.
2. Place the bracket at the side on the profile.
3. Screw the bracket in place with the fixing screw.

Note Do not tighten the screw yet.

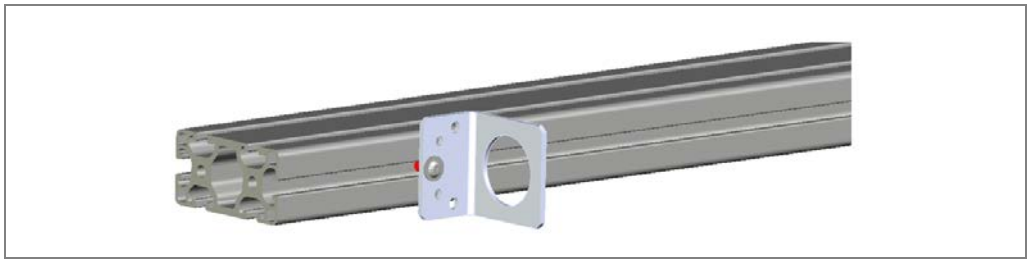


Fig. 48: IPG2: attaching the lower bracket to the profile

Inserting the protective pipe

1. Insert the protective pipe with the light grid into the lower bracket. Carefully pull the connecting cable through the cutout.
2. Hold the protective pipe at the top end with one hand.

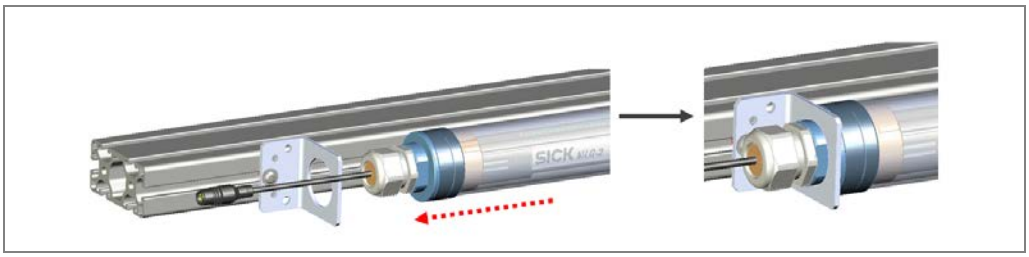


Fig. 49: IPG2: placing the protective pipe on the cable-side bracket

Mounting the upper bracket on the protective pipe

1. Put the bracket on the upper end of the protective pipe.
1. Align the protective pipe with the MLG in the brackets in such a way that the diodes of the MLG point vertically upward.
2. Fix this position. To do this, screw both fixing screws into the two through holes. Tighten the screws.
3. Screw the bracket in place on the mounting frame with the fixing screw. Do not tighten this screw yet.

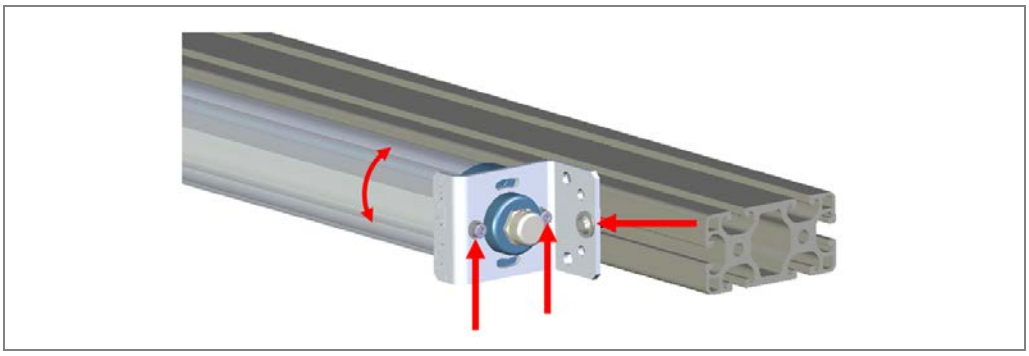


Fig. 50: IPG2: aligning the protective pipe and fixing the position

4.3.4 Fine adjustment of the light grids

4.3.4.1 Making sure the light beams fall on the center of the gap

Firstly, make sure that the light grid beams fall on the **center** of the **gap**.

1. Move the frame with the mounted light grids in the x-axis until the component diodes fall on the center of the gap. Use the upper horizontal grid as a reference.

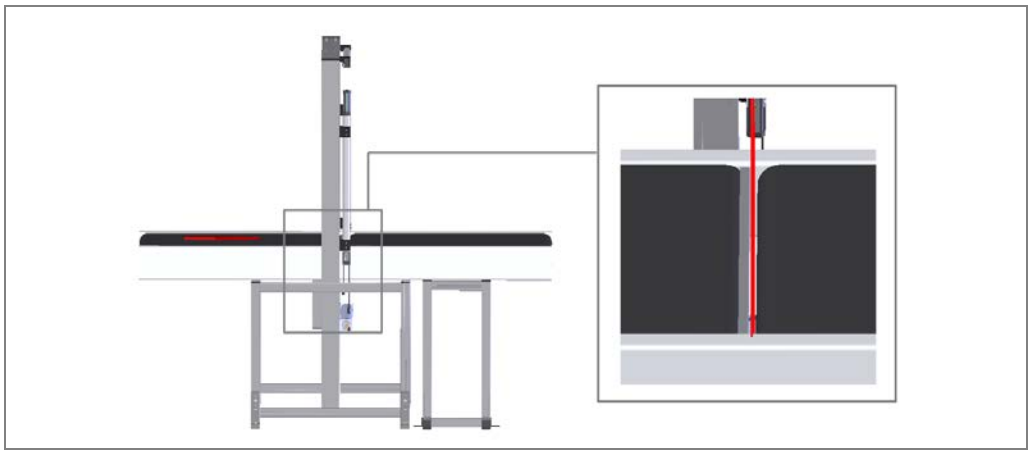


Fig. 51: Making sure the light beams fall on the center of the gap

2. Check they are centered using a plumbline. To do this, first place the plumbline on the first diode of the horizontal receiver.

Tip In order to be able to identify the diodes better behind the blackened glass of the receiver, it is best to illuminate them with a flashlight.

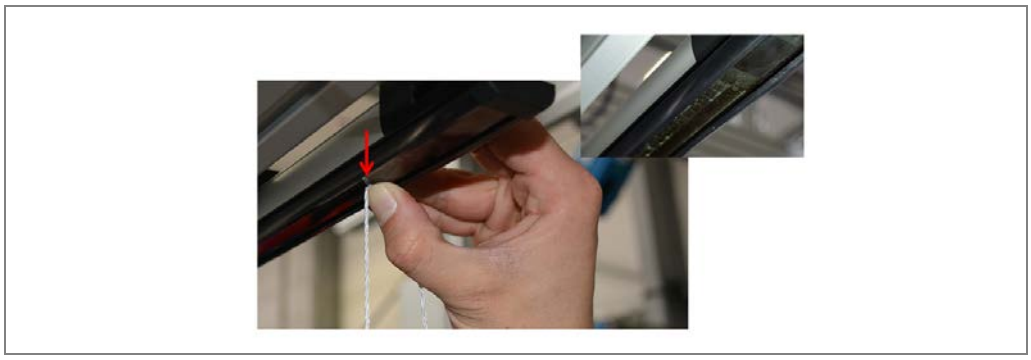


Fig. 52: Using a plumbline to check that the light beams are centered

3. The plumbline should settle in the center of the gap.

Fig. 53: Plumbline in the center of the gap

4. Repeat this thorough check for the last diode.

4.3.4.2 Adjusting the horizontal light grids

The sender and receiver of the horizontal unit must be in the same plane and aligned vertically to the conveying system.

Adjusting the sender

If the (lower) horizontal sender is attached without the protective pipe using the QuickFix brackets, this generally ensures that the sender and receiver are positioned at a right angle to the conveying system due to the orthogonal alignment of the mounting frame.

By screwing the two fixing screws into the upper bracket, the sender located in the protective pipe is already aligned correctly.

Adjusting the position of the first horizontal receiver diode

Align the components of the horizontal light grid so the diodes cover the entire monitored area. The first diode (the right-hand one viewed in the conveying direction) must be at least 2 mm away from the edge of the conveyor or from the lateral boundary when the measuring range is the same as the belt width. If the light grid covers more than the monitored area, it should project to the right and left above the conveyor.

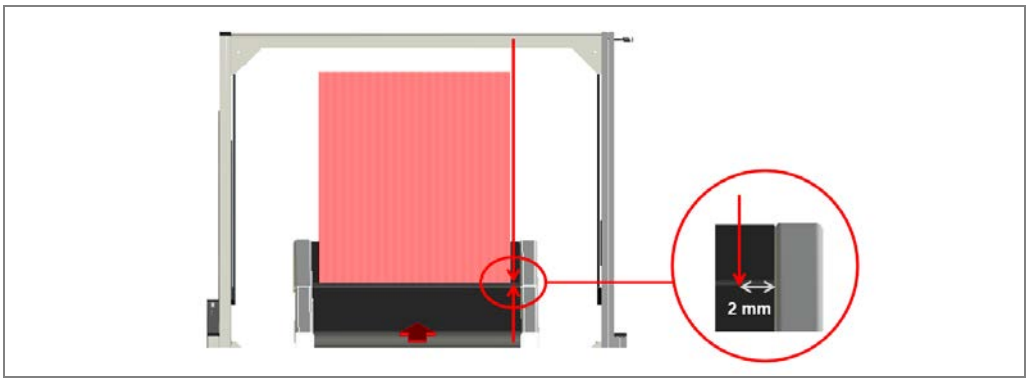


Fig. 54: Adjusting the position of the first horizontal receiver diode

1. Check the distance of the first diode using a plumbline. As described previously, place the string of the plumbline on the horizontal receiver diode.
2. Move the receiver until the plumbline meets the right-hand edge of the conveyor. That is either the inner edge of the lateral boundary or the outermost point where an object could be as it passes through.
3. Then move the receiver in the profile slot to the edge or 2 mm away from the edge respectively.
4. Then tighten up the Allen screw on the QuickFix bracket.

Adjusting the position of the first horizontal sender diode

Adjust the position of the first sender diode.

- **Without protective pipe**: Move the QuickFix brackets on the horizontal sender in the profile slot.
- **With protective pipe**: If the measuring range is the same as the belt width, move the two protective pipe brackets in the profile slot until the first diode is 2 mm away from the right-hand edge of the conveyor. Otherwise, align the first diode with the lateral boundary.

Checking the correct position of the first diode

The alignment must ensure that the light grid beams fall exactly in **a single plane** and that each emitting diode meets the opposite receiver diode vertically.

Check the correct position of the first two diodes using a plumbline.

- **Without protective pipe**: Place the string of the plumbline on the first receiver diode. The plumb must fall exactly on the first sender diode.
- **With protective pipe**: When the light grid is mounted in the protective pipe, the plumb needs to fall from the (in conveying direction) **left** mechanical end of the upper light grid on the upper bracket of the protective pipe (top of MLG).

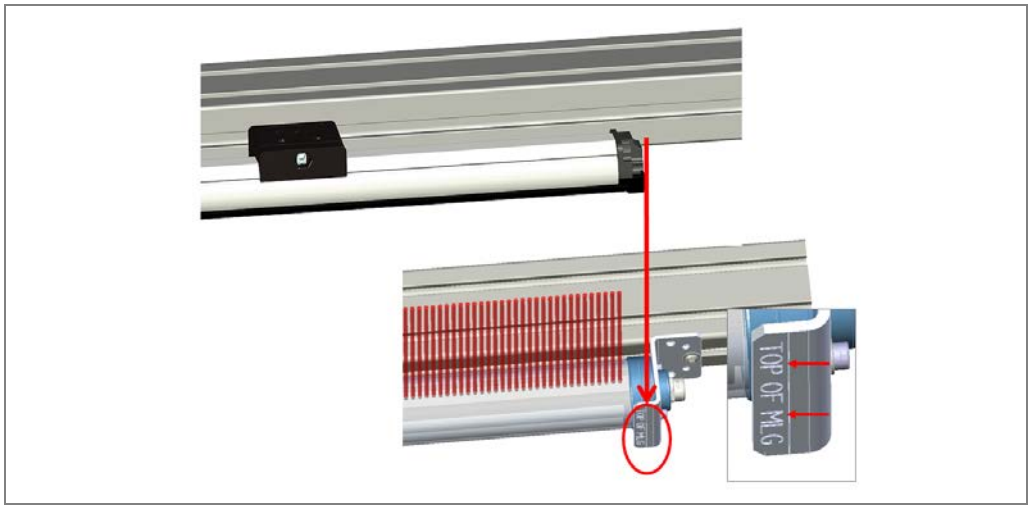


Fig. 55: Checking the correct position of the first diodes

4.3.4.3 Adjusting the vertical light grid

Align the two components of the vertical light grid on the mounting frame so that the first diode (viewed from below) is approx. 2 mm above the conveyor belt.

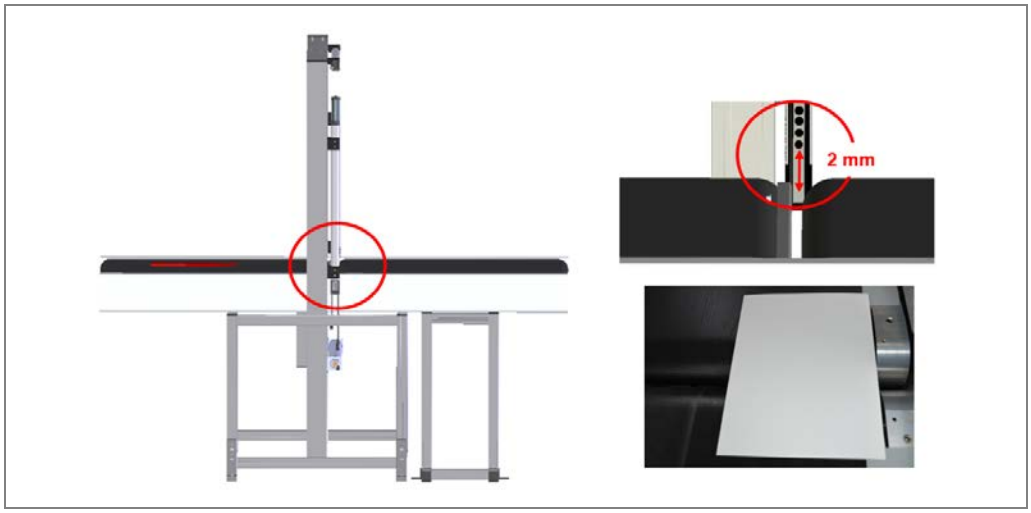


Fig. 56: Aligning the vertical light grid

1. First move the **vertical** receiver in the z-direction until you have achieved the required distance between the first diode and the belt.

Tip In order to determine the required distance more precisely, place a sheet of paper on the gap. This provides a clearly defined zero point for measuring the height.

2. Take the sender to the same height.
3. Place a board or a profile on the two components.
4. Place a spirit level on the board and make sure that the two components are level.

Fig. 57: Checking the alignment of the vertical light grid

4.3.5 Mounting and connecting the cleaning unit

4.3.5.1 Mounting the vent duct

If the cleaning unit with vent duct and fan unit is used in addition to the protective pipe, the vent duct with vent slot and hose connection is mounted parallel to the plastic pipe on the profile so that the escaping air is directed over the surface of the protective pipe.

Fastening the brackets on the vent duct

1. Place one of the two brackets on the end without hose connection.
2. Fix the bracket on the vent duct using the clamping screw. Do not tighten the clamping screw yet.

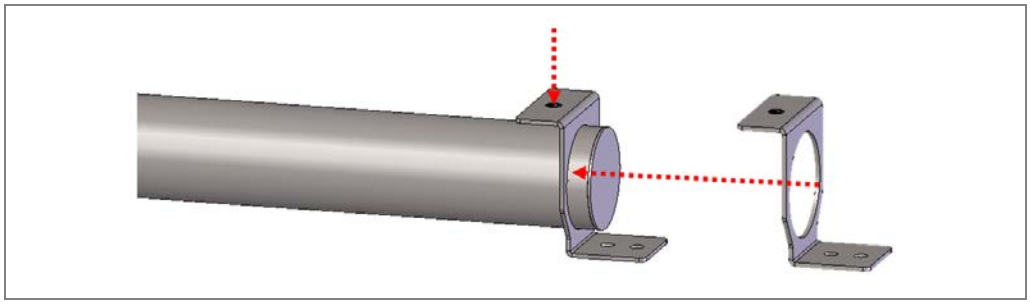


Fig. 58: Vent duct: fixing the bracket

3. Mount and fix the bracket on the other end of the vent duct in the same way.

Attaching brackets with vent duct to the mounting frame

1. Insert the sliding nuts into the upper slot on the lower mounting frame.
2. Place the brackets in the desired mounting location on the profile.

Note

Ensure that the side with the hose connection for connecting the fan is located on the left-hand side (viewed in conveying direction).

3. Screw each of the brackets in place with two fixing screws. Do not tighten the screws yet.

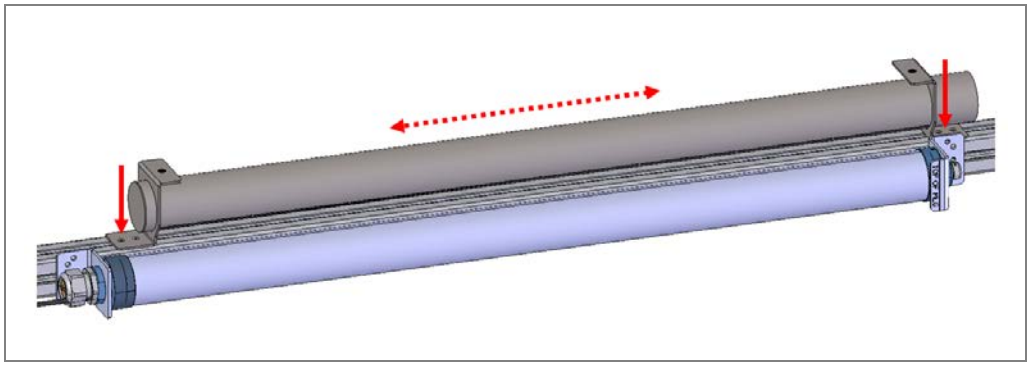


Fig. 59: Vent duct: attaching and aligning on the mounting frame

4. Move both brackets in the profile slot in the y-direction until the vent duct hangs centrally to the protective pipe.

Aligning the vent duct in the bracket

1. Turn the vent duct in the brackets until the vent slot points just over the plastic pipe.

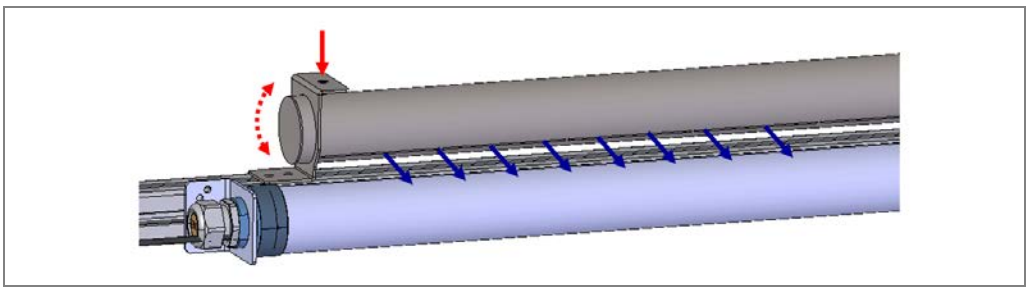


Fig. 60: Vent duct: aligning in the bracket

2. Tighten the clamping screws.

4.3.5.2 Mounting and connecting the fan

The cleaning unit fan is supplied with pre-mounted brackets.

⚠ *WARNING*

Risk of injury due to falling components

The fan weighs approximately 2.5 kg.

- Do **not** perform any mounting work alone.
- Ask a second person to hold the components during mounting.
- Wear safety shoes.

Mounting the fan

- Screw the fan to the **left-hand** side (viewed in conveying direction) of the mounting frame.

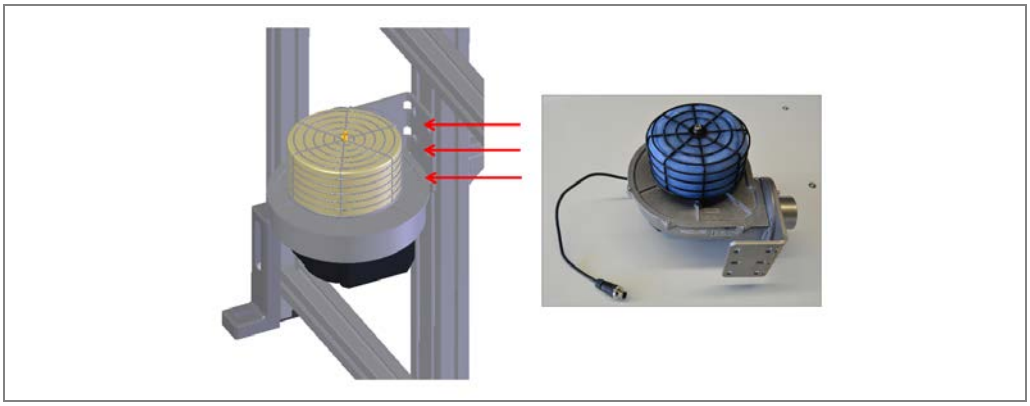


Fig. 61: Fan: mounting on the item frame

Connecting the hose

The flexible hose connection is supplied with two attached brackets for fixing to the relevant couplings.

➢ Connect the fan and vent duct using the flexible hose connection and fix the hose connection using the pre-mounted brackets.

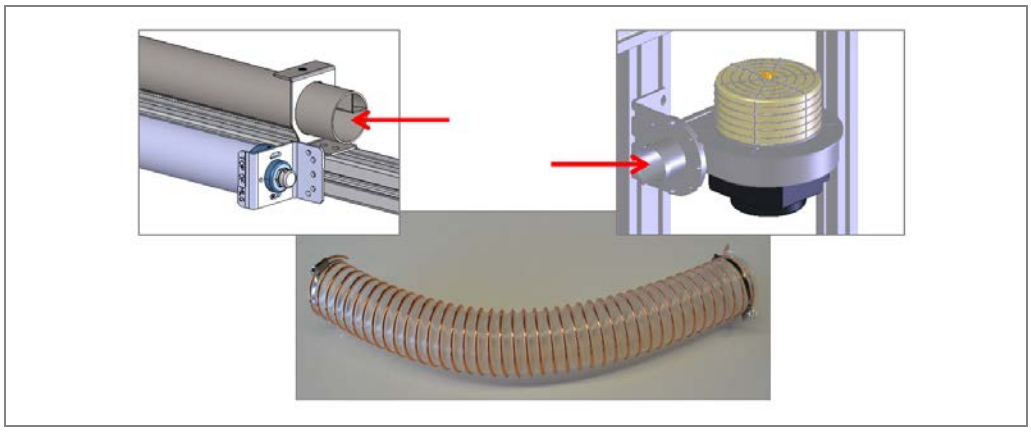


Fig. 62: Attaching the hose connection to the fan

Note

➢ Make sure you do not bend the flexible hose connection too sharply.

➢ Attach the hose as straight as possible to the fan couplings and the couplings on the vent duct.

4.4 Mounting the measuring wheel encoder

The DFV60 measuring wheel encoder can be used to determine the position and speed of objects directly the conveyor belt. Measurement is performed directly on the running surface of the conveyor belt (1) using a precise measuring wheel (2) that is mounted on a sprung attachment arm (3). This arm compensates for mechanical errors in different directions on the conveyor belt.

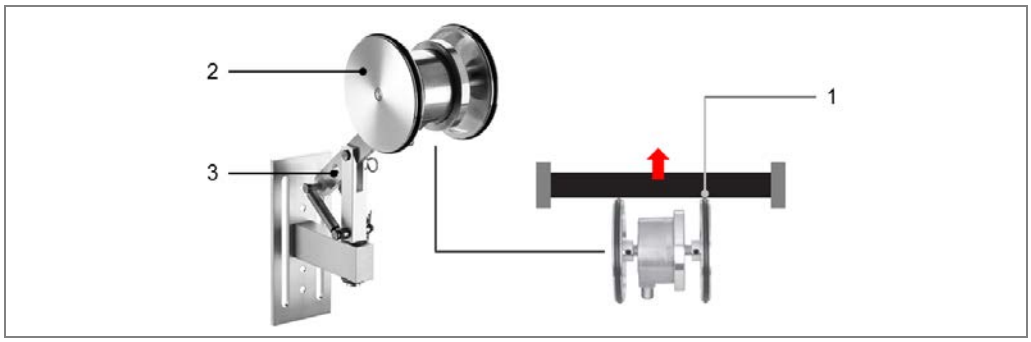


Fig. 63: Measuring wheel encoder components

Mounting

The DFV60 measuring wheel encoder is typically attached midway below the feed conveyor belt.

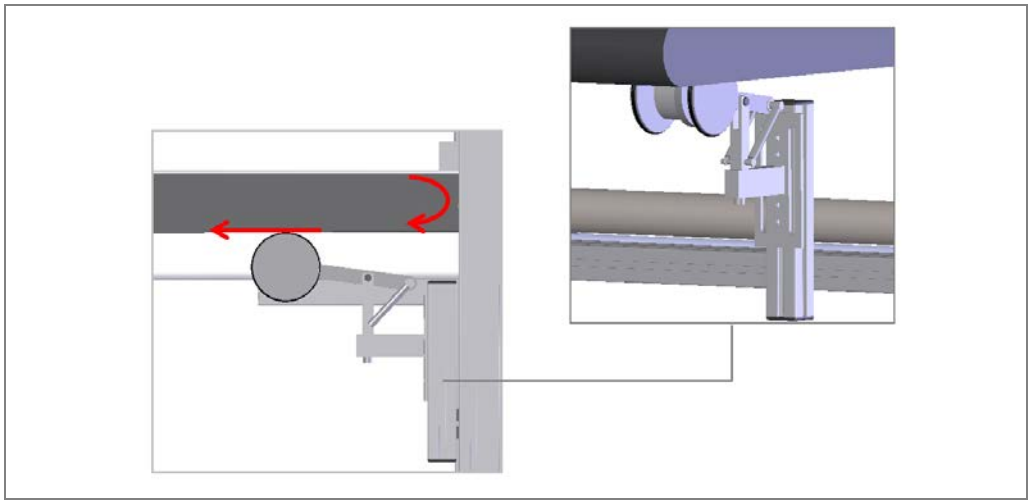


Fig. 64: Attaching the measuring wheel encoder to the conveyor belt

1. Mount the encoder where the level of vibration on the belt is as low as possible. We recommended you mount it near to the revolving axle.
2. When mounting, ensure that there is a good connection between the encoder and the belt.

Note When mounting, make sure that the attachment arm is pulled away from the belt.

4.5 Mounting the photoelectric sensor (VML Prime 2D H only)

When using the **VML Prime 2D H**, mount the photoelectric sensor and reflector on the frame in accordance with the technical drawing. A mounting bracket is included for the mounting of the photoelectric retro-reflective sensor.

1. Insert the two M6 sliding nuts (1) into the slot of the carrier profile on which the photoelectric sensor is mounted.
2. Place the support rail on the profile and screw it on with two M6 screws (see the two arrows).

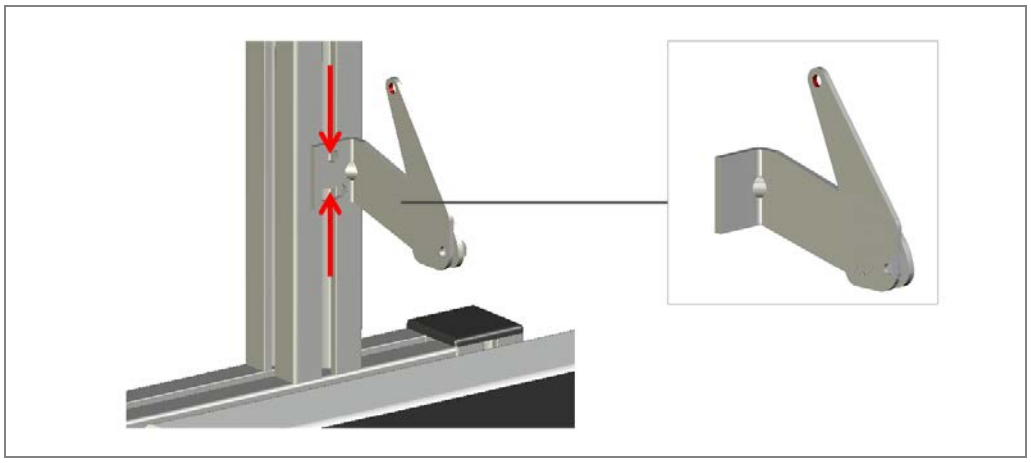


Fig. 65: Mounting the photoelectric sensor mounting bracket

3. Mount the photoelectric retro-reflective sensor on the mounting bracket using the two M5 hexagon screws.
4. Align the photoelectric sensor in such a way that the light band runs parallel to the conveying surface and perpendicular to the conveying direction. Fix the photoelectric sensor using the clinch stud (see the circle in the following figure).

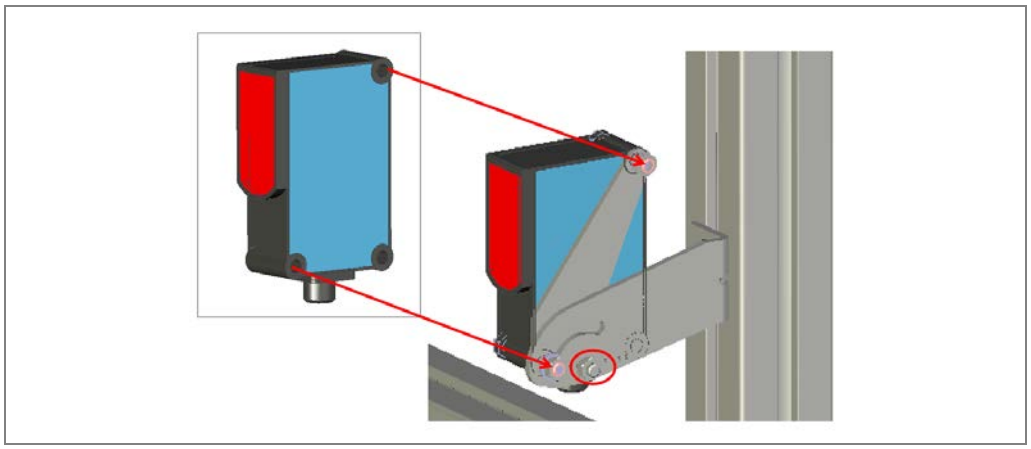


Fig. 66: Mounting the photoelectric sensor

Mounting the reflector

➢ Mount the reflector on the opposite side of the conveyor belt. Use the supplied adapter plate.

Note The reflector must be positioned in line with the light beam from the photoelectric retro-reflective sensor.

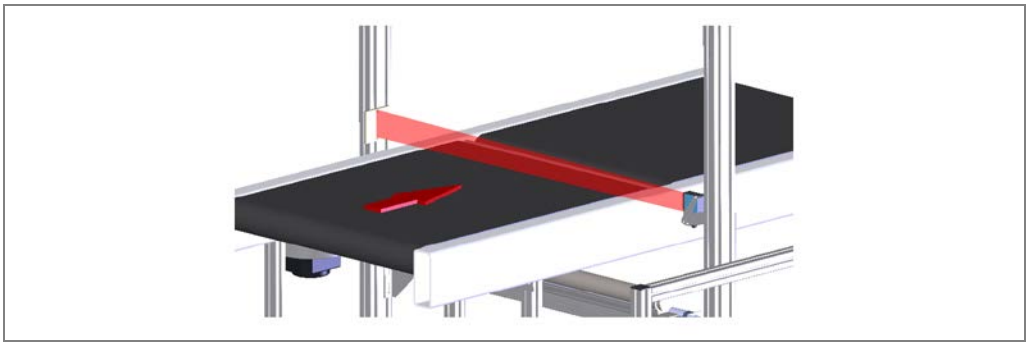


Fig. 67: Positioning the reflector in the beam path of the photoelectric retro-reflective sensor

4.6 Mounting the controller cabinet

Mount the controller cabinet on the right-hand side (viewed in conveying direction) of the frame. It should be mounted as close to the measuring system as possible, so that all connecting cables can be laid easily.

Make sure that the cabinet can be easily opened.

⚠ *WARNING*

Risk of injury due to falling components

The controller weighs approx. 15 kg.

➢ Do not perform any mounting work alone.

➢ Ask a second person to hold the components during mounting.

➢ Wear safety shoes.

Mounting

➢ Fasten the controller cabinet on two transverse profiles using the attachment rail, as per the technical drawing.

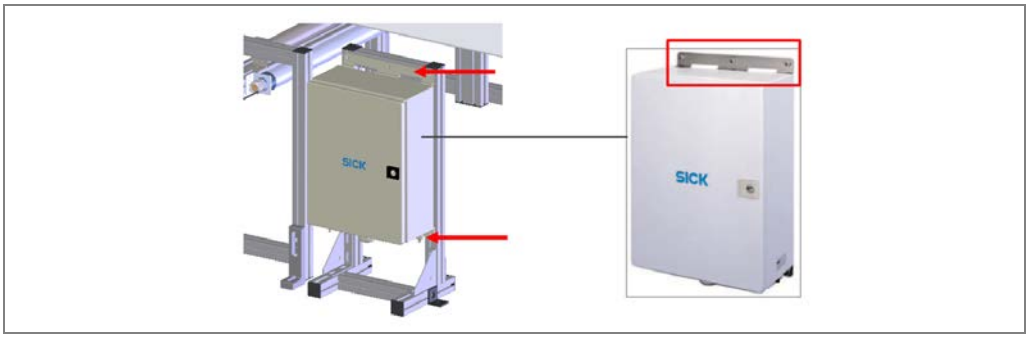


Fig. 68: Mounting the controller cabinet on the transverse profile using the mounting kit

Note With the VML520 MID or VML520 MID-s calibratable system, the controller cabinet for the **MSC800** must also be mounted in accordance with the technical drawing.

4.7 Using the steel frame

WARNING

Risk of injury due to falling components

The steel frame components weigh up to 25 kg.

- ➢ Do not perform any mounting work alone.
- ➢ Ask a second person to hold the components during mounting.
- ➢ Wear safety shoes.

4.7.1 Assembling the steel frame

In a similar way to the item profile frame, the steel frame is constructed in the form of a gate around the conveying system. The gate must be mounted at the gap between two conveyor belts so the light beams from the light grid fall on the center of the gap.

The height and width of the steel frame are customer-specific. More detail can be found in the delivery specification.

The steel frame consists of the following components.

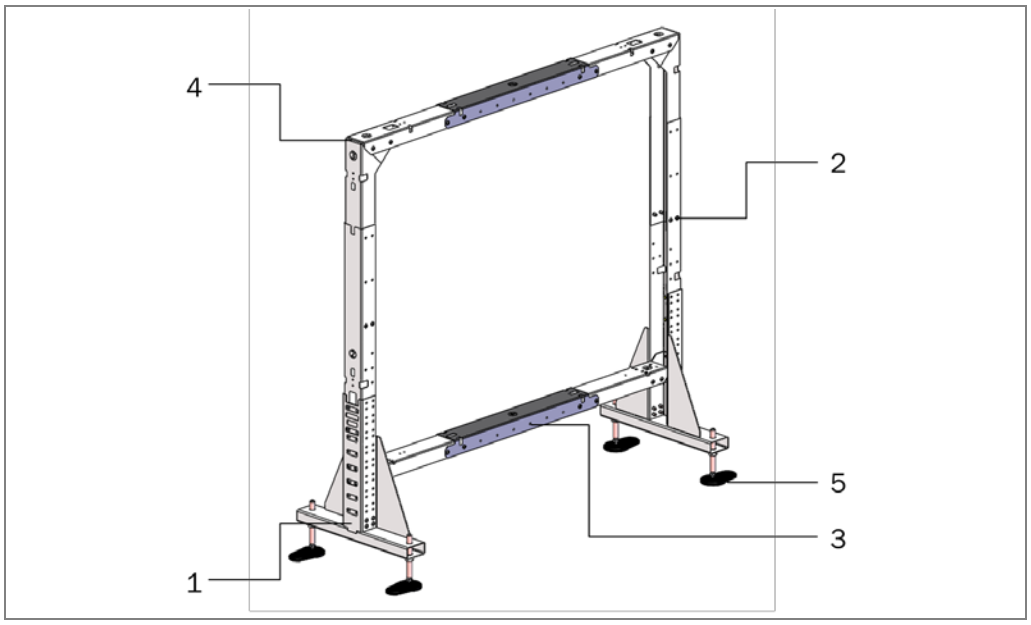


Fig. 69: Steel frame: components

Number	Designation
1	Foot
2	Vertical columns with defined bore and mounting holes
3	Horizontal crossbars with defined bore holes
4	Bracket for connecting columns and crossbars in a stable manner
5	Leveling feet for leveling and anchoring the frame to the floor

Tab. 10:Steel frame: components

WARNING

Risk of injury due to falling components

The weight of the steel components is up to 25 kg.

- Do **not** perform any mounting work alone.
- Ask a second person to assist you with the component replacement process.
- Wear safety shoes.

General notes for installation

The frame consists of several components which are numbered (1 to 9) and therefore support a logical approach when it comes to assembly.

Mounting the vertical columns

Start by assembling the vertical columns.

- To do this, get parts 1 to 4 and two screw feet ready.

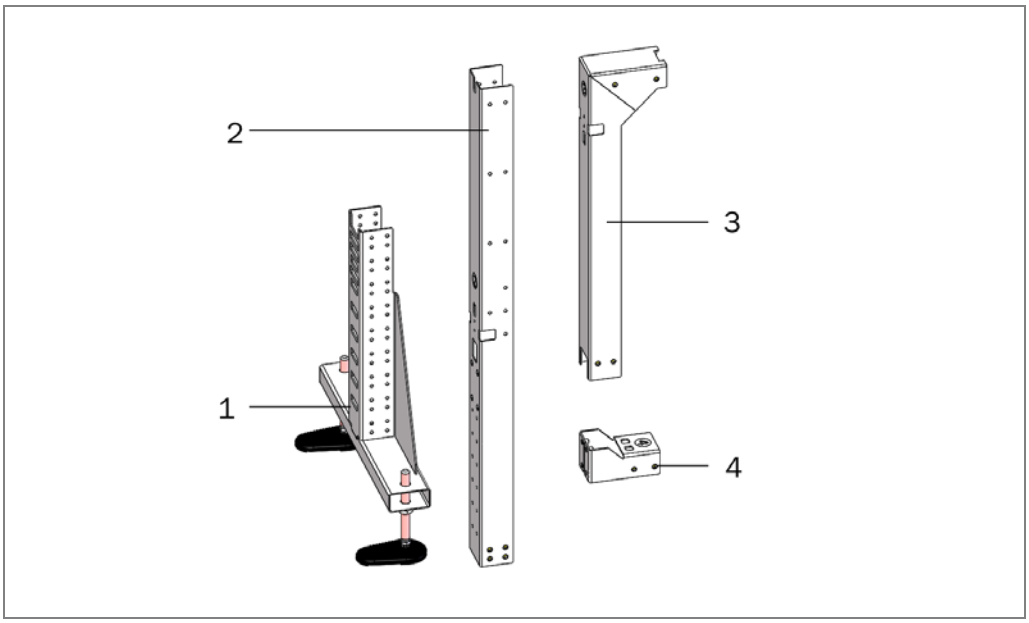


Fig. 70: Steel frame: vertical column components

1. Screw the leveling feet into the two screw feet 1.

Note

Ensure that both are screwed in to the same height.

2. Screw in profile part 2 up to the mark in accordance with the desired conveyor belt height and tighten it.
3. Screw profile part 3 into profile part 2 until the stop and fasten it.

4. Push profile part 4 into profile part 2 and fasten it. With the help of the marks, the column can be quickly adjusted to the detection height of the MLG-2 used.

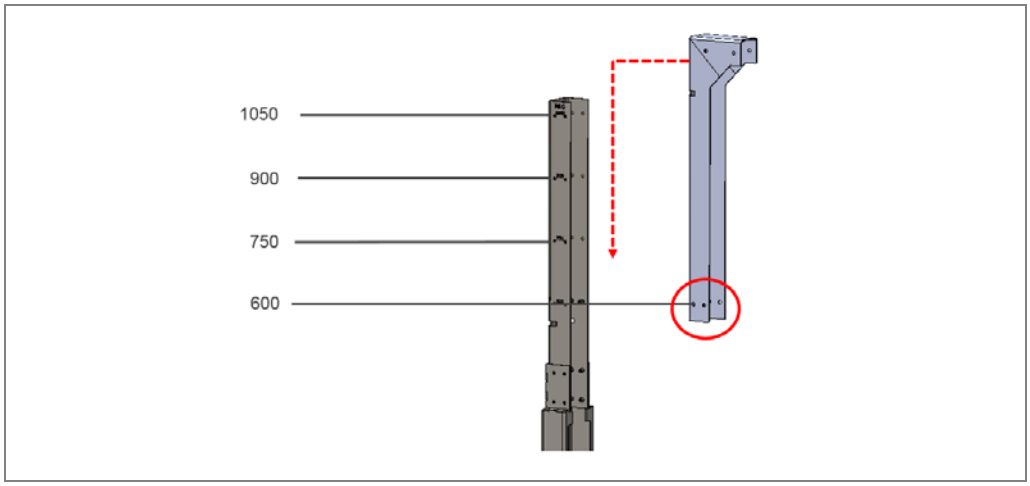


Fig. 71: Steel frame: mark for detection height

5. Fasten the bracket to the bracket of the lower horizontal bar with profile part 4.

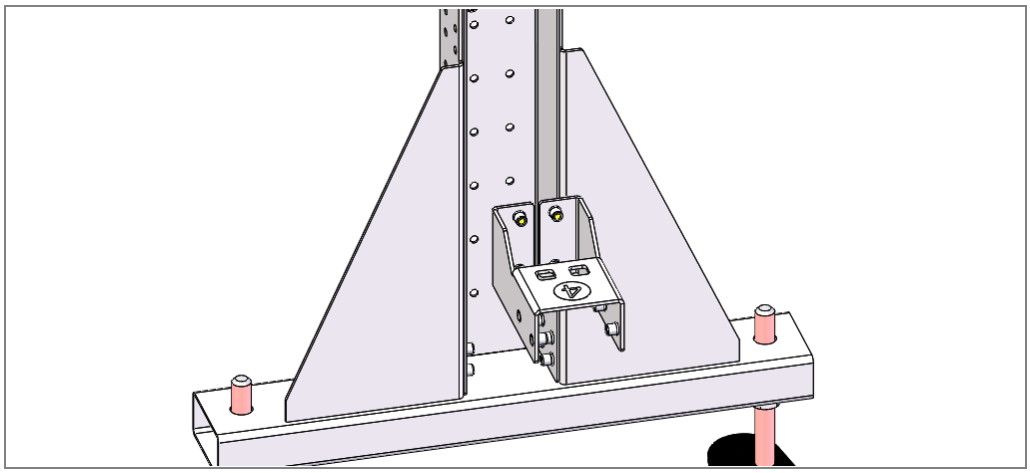


Fig. 72: Steel frame: mounting the bracket for horizontal bars

Assembling the horizontal crossbars

Assemble the profile parts of both horizontal bars.

1. Insert both profile parts with the number 5 and profile part 6 into one another and tighten these.
2. With the help of the marks, the bar can be quickly adjusted to the detection width of the MLG-2 used.

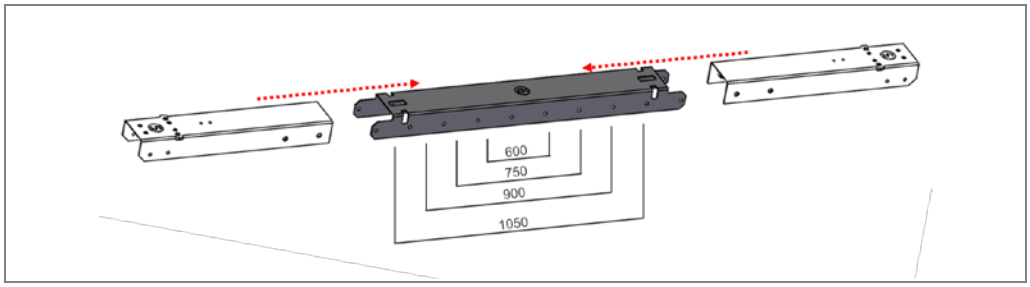


Fig. 73: Steel frame: assembling the lower crossbar

3. Assemble the upper horizontal bar in the same manner.
4. To do this, push both profile parts with the number 6 into profile part 7.

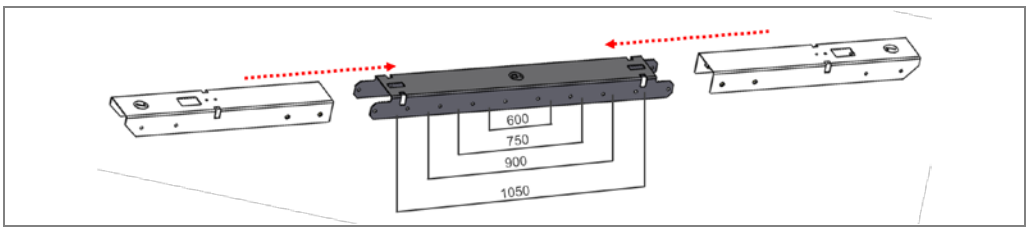


Fig. 74: Steel frame: assembling the upper crossbar

Mounting the frame

As the last step, mount the frame. To do this, assemble both prepared vertical columns and both horizontal bars.

Fig. 75: Steel frame: assembling the vertical columns and crossbars

1. Put the lower horizontal bar at the height of the gap under the conveyor.

Note

➢ Prop the bar up a little.

2. Place the two columns on the right and left of the gap.
3. Lift the lower horizontal bar onto the bracket provided for this and screw the bar to the brackets.
4. Place the upper horizontal bar on the brackets on both columns and screw the brackets and bar together.

4.7.2 Mounting the components on the steel frame

With the exception of the controller cabinet, all device components are attached directly to the steel frame.

Pre-defined holes facilitate mounting.

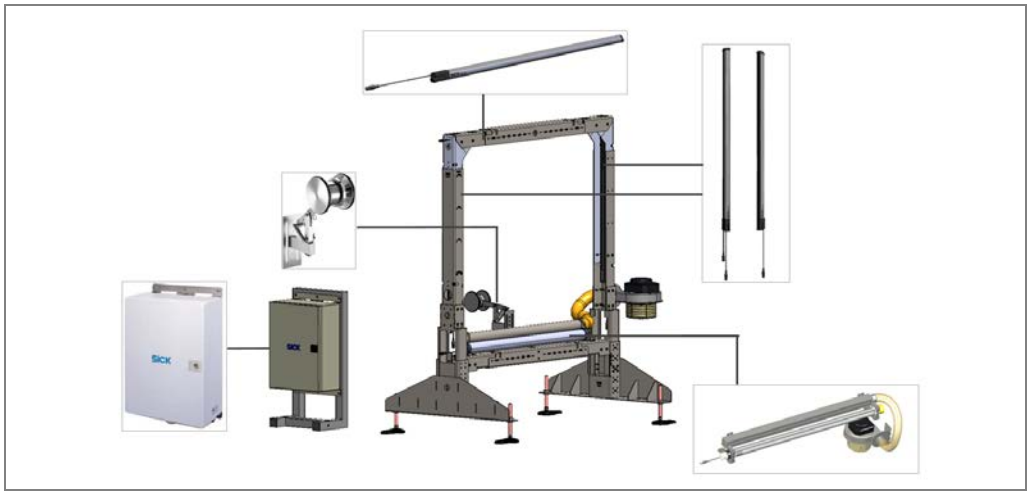


Fig. 76: Steel frame: component overview

4.7.2.1 Mounting the light grids on the steel frame

The light grids are mounted on the steel frame with QuickFix brackets in the same way as on the item frame. Separate brackets are used to mount the protective pipe.

The layout is described in detail in chapter **4.3 Mounting the** light grids.

Note Ensure that the connecting cables of the **horizontal** light grid point in **the conveying direction to the right** and those of the **vertical** light grid point **downward**.

Attaching QuickFix brackets

Firstly, mount the QuickFix brackets on the frame profile in the bore holes provided for this purpose.

Unlike on the item profile, no sliding nut is using for mounting.

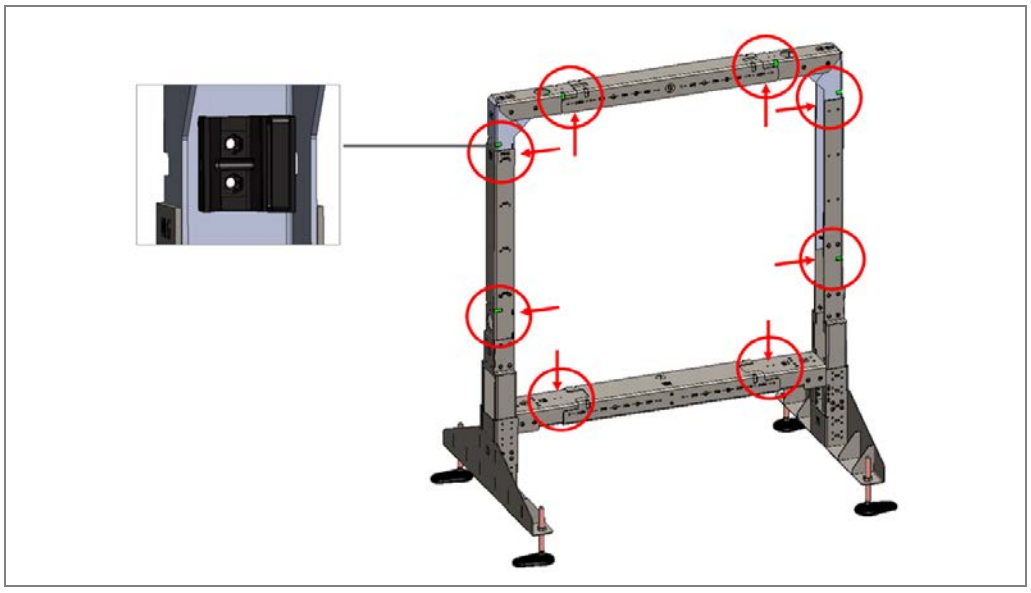


Fig. 77: Steel frame: holes for mounting the light grids

1. Push both parts of the clamping housing into one another.
2. Place two hexagon nuts into both openings of the longer clamping housing from the inside and one hexagon nut into the opening of the shorter clamping housing from the outside.

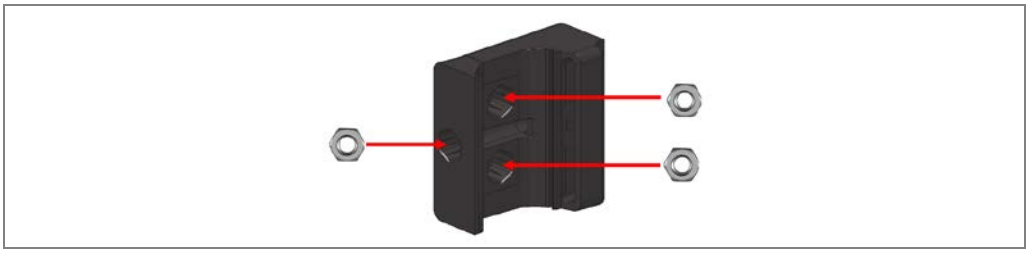


Fig. 78: Steel frame: inserting nuts into QuickFix brackets to hold the MLG

3. Screw the two inserted clamping housings together with an M5 screw.

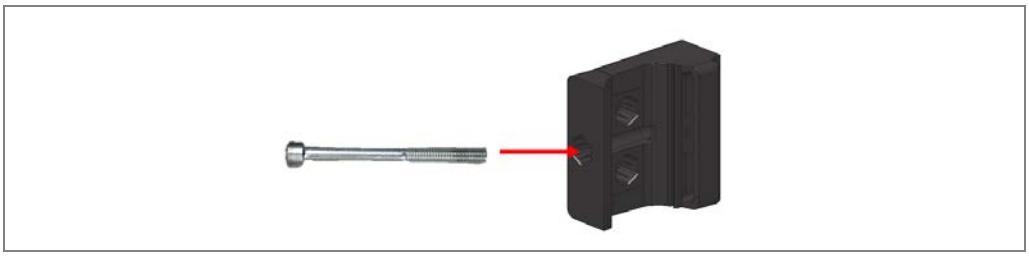


Fig. 79: Steel frame: screwing together the QuickFix brackets for holding the MLG

4. Do not tighten this screw yet. The QuickFix brackets must remain loosened so that the light grids can be clamped in the QuickFix brackets.
5. Hold the QuickFix brackets from the inside at both threaded holes.
6. Mount the QuickFix brackets over the outer side of the bar with two fixing screws and tighten the screws.

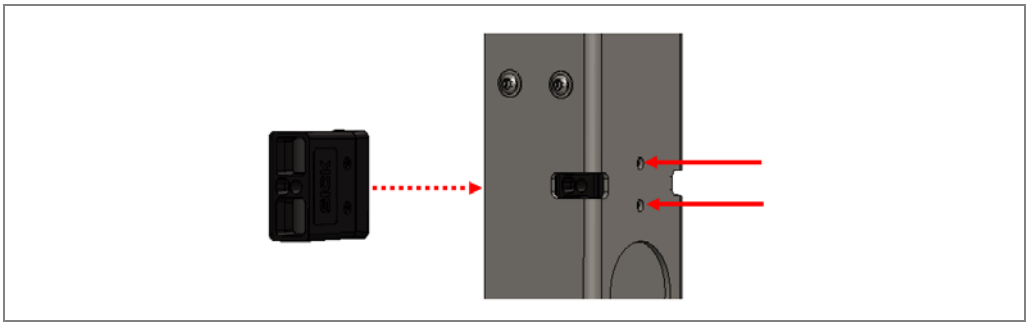


Fig. 80: Steel frame: screwing QuickFix brackets for holding the MLG to the bar

Mounting the light grids in the QuickFix bracket

1. Firstly, insert the sender and receiver of the **vertical** light grid in the loosened QuickFix brackets.
2. Then lower the light grid until the upper end touches the bracket.

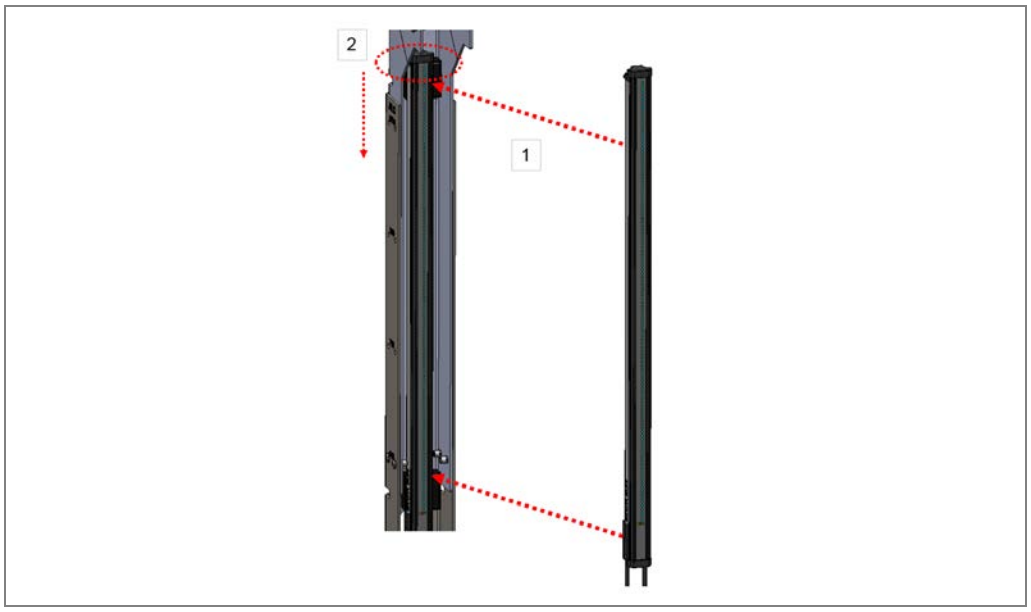


Fig. 81: Steel frame: clamping the MLG in the QuickFix bracket

3. Now tighten the QuickFix bracket.
4. Firstly, insert the sender and receiver of the **horizontal** light grid in the loosened QuickFix brackets.
5. Then push the light grid to the right in the conveying direction until the end touches the bracket.

4.7.2.2 Mounting the protective pipe without cleaning unit

If the sender installed in the IPG2 protective pipe is used without a cleaning unit and fan, the same brackets are used for mounting the protective pipe on the steel frame as for mounting on the item profile frame.

Installing the light grid in the protective pipe

➢ Install the light grid in the protective pipe. Detailed information on this can be found in chapter **4.3.3 Mounting the protective pipe** with sender.

Attaching the protective pipe to the transverse profile

The protective pipe is mounted on the lower crossbar. The crossbar has pre-defined holes which enable mounting without additional alignment of the protective pipe in the y-direction. The brackets are each fixed with two screws.

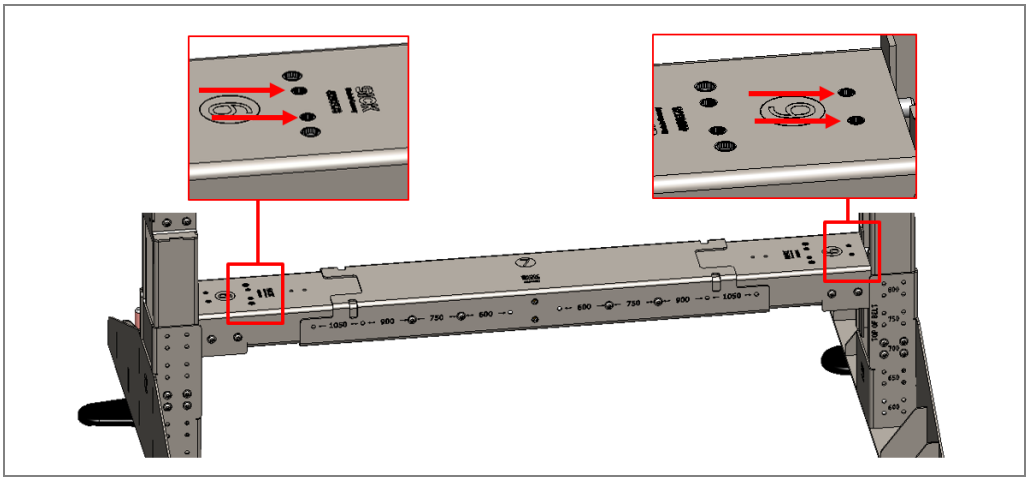


Fig. 82: Steel frame: holes for mounting the protective pipe

Carry out installation in the same way as in chapter **4.3.3.2 Attaching the protective pipe** to the mounting frame.

1. Mount the cable-side bracket on the crossbar with the two fixing screws.
2. Insert the protective pipe with the light grid into the bracket.
3. Put the bracket on the upper end of the protective pipe and fix the protective pipe. Screw both fixing screws into the through holes.
4. Now mount the upper bracket on the crossbar with the two fixing screws.

Fig. 83: Steel frame: attaching the protective pipe to the transverse profile

Aligning the protective pipe

➢ Align the protective pipe with the MLG in the brackets in such a way that the diodes of the MLG point vertically upward and then fix this position.

4.7.2.3 Mounting the protective pipe with cleaning unit

If the protective pipe is mounted together with the vent duct and fan, special brackets are used which hold both the protective pipe and the vent duct. The crossbar has pre-defined holes.

The procedure is essentially the same as mounting protective pipes and the vent duct in the individual brackets (for this, see the chapters **4.3.3.2 Attaching the protective pipe** to the mounting frame and **4.3.5.1 Mounting the** vent duct).

Mounting the protective pipe

1. Mount the cable-side bracket on the crossbar with the two fixing screws.

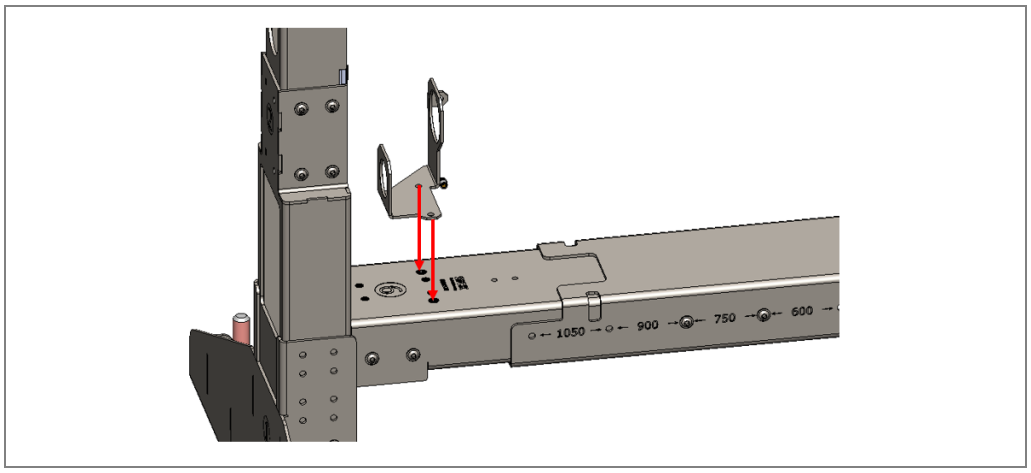


Fig. 84: Steel frame: attaching the bracket for mounting the protective pipe and vent duct

2. Insert the protective pipe with the cable-side light grid into the lower cutout of the bracket.
3. Hold the top end of the light grid with one hand.

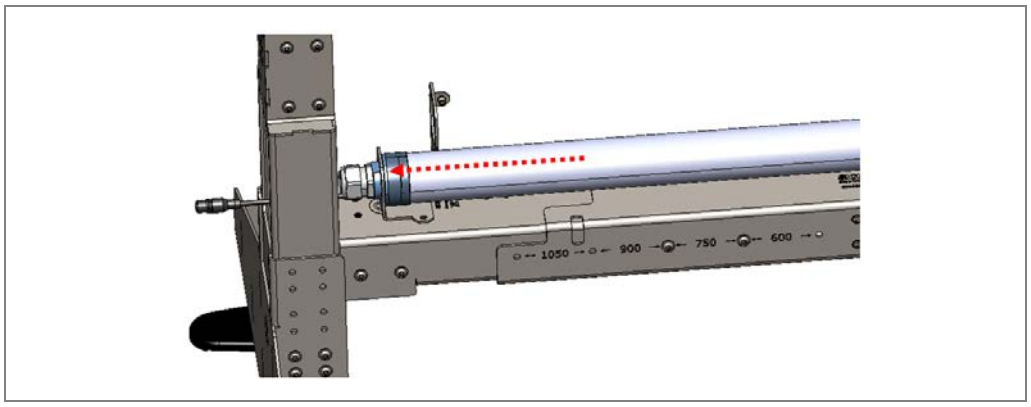
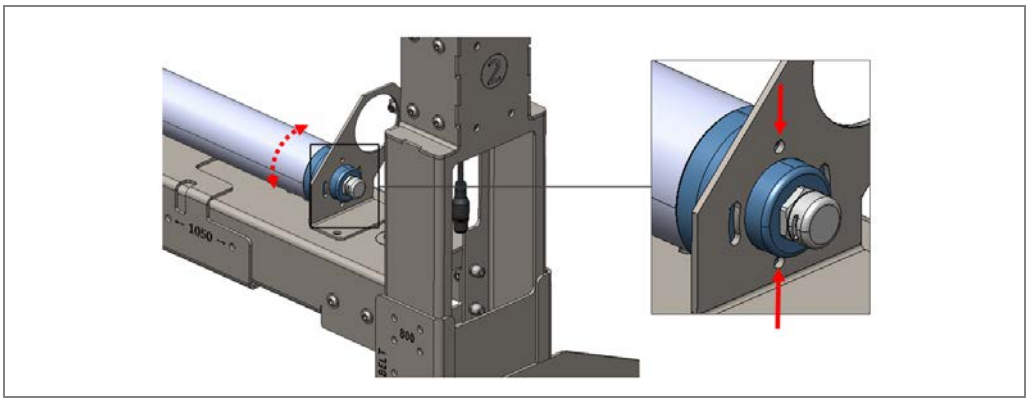


Fig. 85: Steel frame: putting the protective pipe in the bracket

4. Put the bracket on the upper end of the protective pipe.
5. Align the protective pipe with the MLG in the brackets in such a way that the diodes of the MLG point vertically upward.
6. Fix this position. Screw both fixing screws into the through holes and then tighten them.



7. Mount the upper bracket on the crossbar with the two fixing screws.

Aligning the protective pipe and vent duct in the bracket

1. Slide the vent duct into both brackets from the side.
2. Turn the vent duct in the brackets until the vent slot points just over the plastic pipe.
3. Tighten the clamping screws.

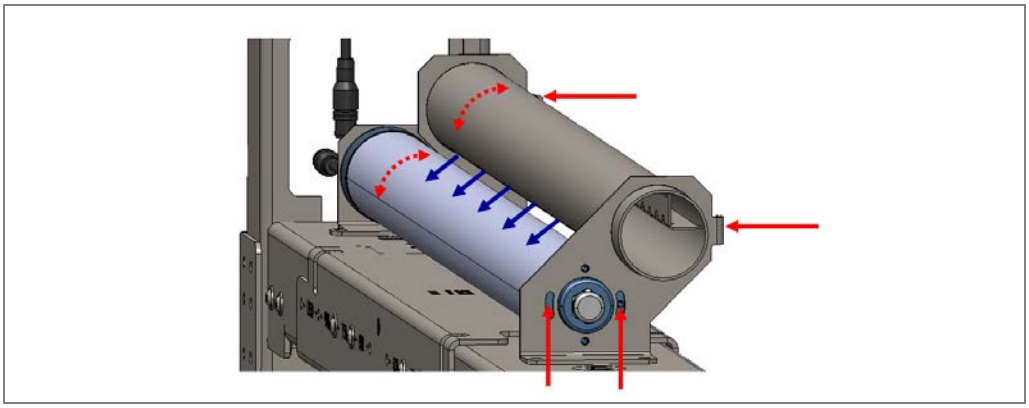


Fig. 86: Steel frame: aligning the protective pipe and vent duct in the bracket

Mounting the fan unit

The cleaning unit fan is supplied with pre-mounted brackets.

WARNING

Risk of injury due to falling components

The fan weighs approximately 2.5 kg.

- ➢ Do **not** perform any mounting work alone.
- ➢ Ask a second person to hold the components during mounting.
- ➢ Wear safety shoes.

1. Mount the fan on the **left-hand** main chassis beam (viewed in conveying direction).
2. Connect the fan and vent duct using the flexible hose connection (see also chapter **4.3.5.2 Mounting and connecting the** fan).

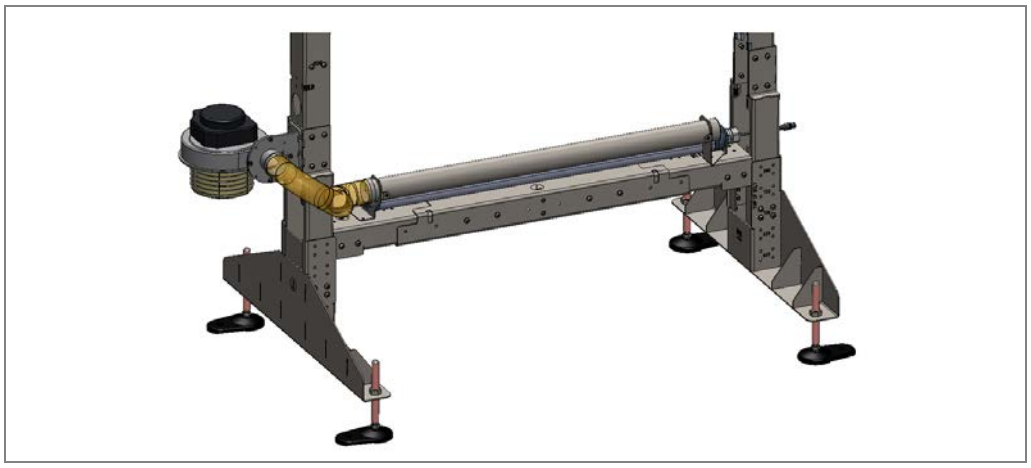


Fig. 87: Steel frame: mounting the fan unit

4.7.2.4 Mounting the measuring wheel encoder

The spring-loaded measuring wheel encoder is mounted centrally, near to the revolving axle under the feed conveyor belt. It is attached directly to the lower crossbar using an adapter plate.

1. Mount the adapter plate with the two fixing screws.

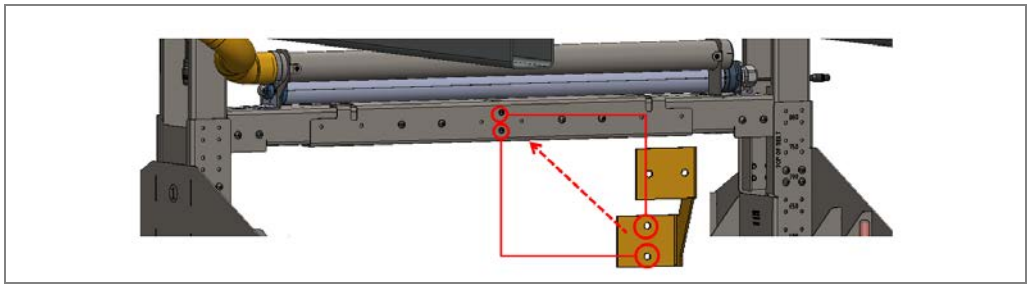


Fig. 88: Steel frame: mounting the adapter plate for the measuring wheel encoder

2. Place the mounting bracket of the measuring wheel encoder on the adapter plate and screw it tight.

   Select a mounting height which ensures a good connection between the encoder and the underside of the conveyor belt.

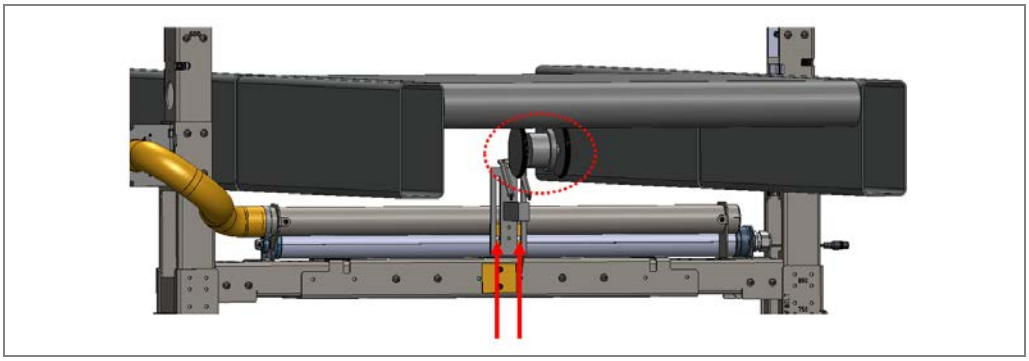


Fig. 89: Steel frame: attaching the measuring wheel encoder to the adapter plate

4.7.2.5 Mounting the photoelectric sensor

The separate photoelectric sensor used by the VML Prime 2D H system variant is fastened centrally to the gap in the frame profile together with the reflector. The lower threaded holes for the QuickFix brackets of the vertical light grids are used for this.

1. Mount the photoelectric retro-reflective sensor on the mounting bracket using the two M5 hexagon screws.

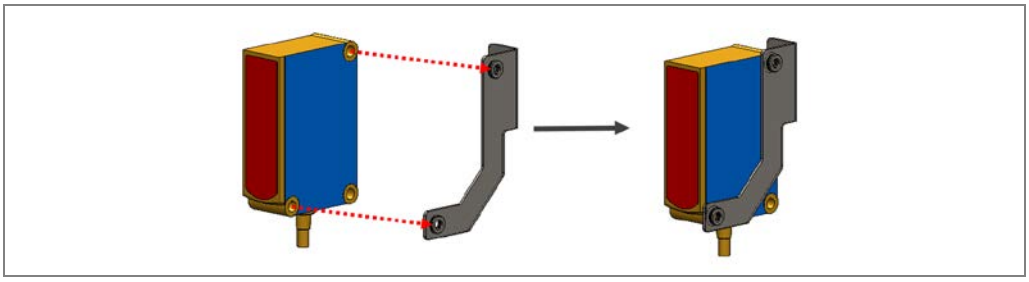


Fig. 90: Steel frame: mounting the photoelectric sensor on the mounting bracket

2. Hold the mounting bracket from the inside at both threaded holes.
3. Mount the bracket over the outer side of the bar with two fixing screws and tighten the screws. The photoelectric sensor is correctly aligned due to its prescribed mounting position.

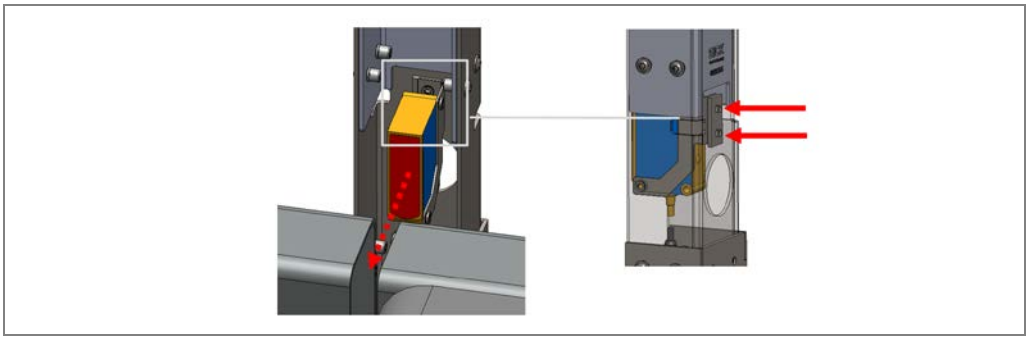


Fig. 91: Steel frame: mounting the photoelectric sensor on the bar

Mounting the reflector

1. Mount the reflector on the adapter plate of the photoelectric retro-reflective sensor using the two M5 hexagon screws.

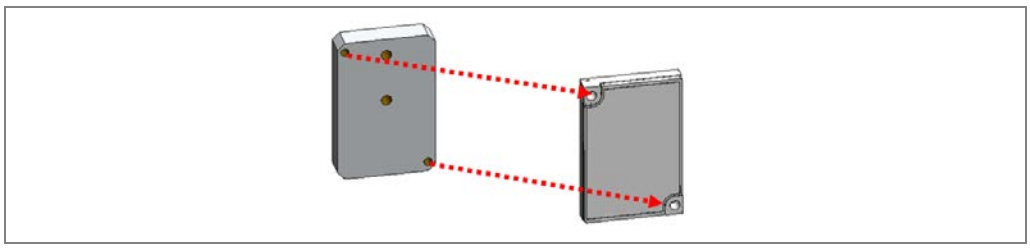


Fig. 92: Steel frame: mounting the reflector on the adapter plate

2. Hold the adapter plate from the inside at both threaded holes of the vertical bar opposite the photoelectric sensor.
3. Mount the adapter plate over the outer side of the bar with two fixing screws and tighten the screws. Due to the prescribed mounting position, the reflector is automatically positioned in line with the light beam from the photoelectric retro-reflective sensor.

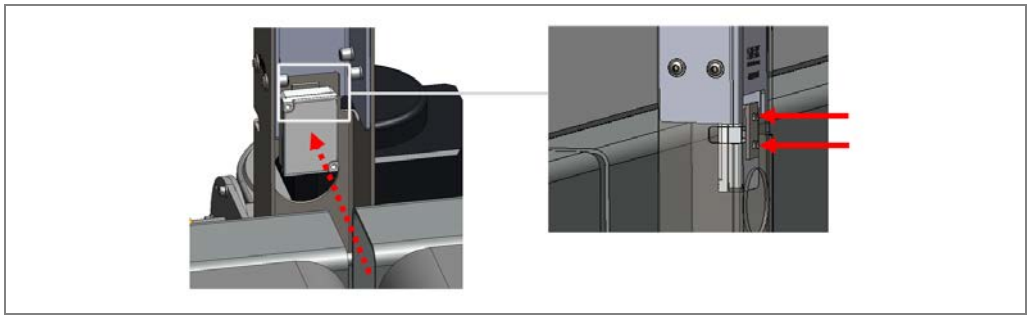


Fig. 93: Steel frame: mounting the reflector on the bar

4.7.2.6 Installing the controller cabinet

Mount the controller cabinet on the right-hand side (viewed in conveying direction) of the frame.

- ➢ Place it as close to the measuring system as possible, so that all connecting cables can be laid easily.
- ➢ Ensure that the controller cabinet is positioned securely and is not blocking any paths.

4.7.3 Aligning the steel frame with the conveyor

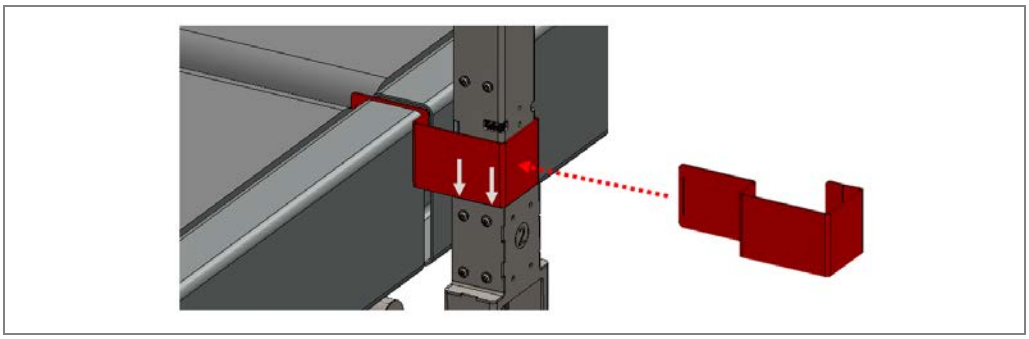
The mounting situation on site ensures that the light grids are correctly aligned with one another, the light grid beams fall in a single plane, and each emitting diode meets the opposite receiver diode vertically.

The light grids do not need to be aligned manually.

Only the mounting frame needs to be aligned with the conveyor. This alignment is performed with the alignment aid included with delivery.

Placing the alignment aid on the vertical bar

➢ Place the alignment aid on both vertical columns. The alignment aid must rest on profile part **2** in each case.



As a result, the upper edge of the alignment aid is located on the first light beam of the vertical light grid.

Making sure the light beams fall on the center

➢ Align the frame in the x-direction in such a way that the alignment aid is centered in the belt gap.

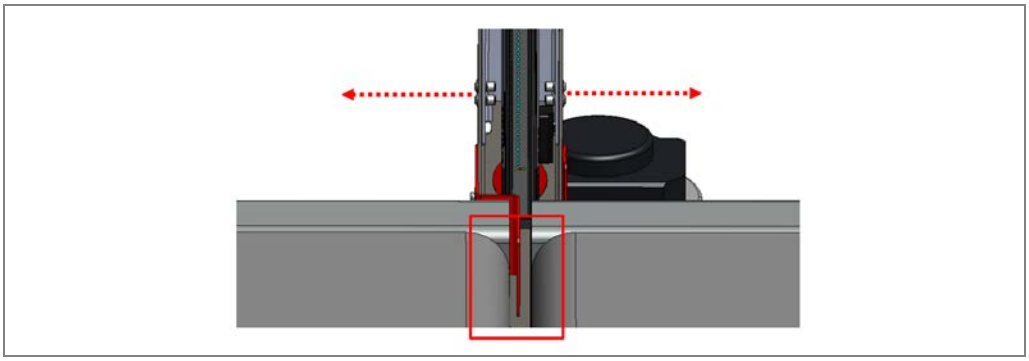


Fig. 94: Steel frame: making sure the light beams fall on the center of the conveyor

Determining the distance to the conveyor

It is important to ensure that the entire width of the conveyor is covered by the light grids. The alignment aid is also used to determine the correct distance between the mounting frame and the right-hand and left-hand edge of the conveyor.

➢ Align the frame in such a way that the first and last light beam of the horizontal light grids correspond to the mark on the alignment aid.

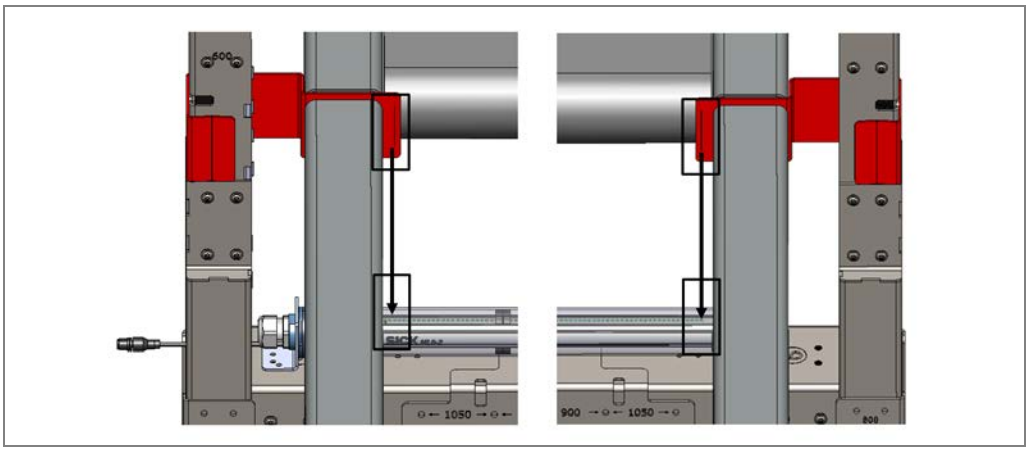


Fig. 95: Steel frame: determining the distance to the conveyor

4.7.4 Attaching cable clamps to the steel frame

Use cable clamps to fix the connecting cables. They make it easy to fix cables to the steel bars.

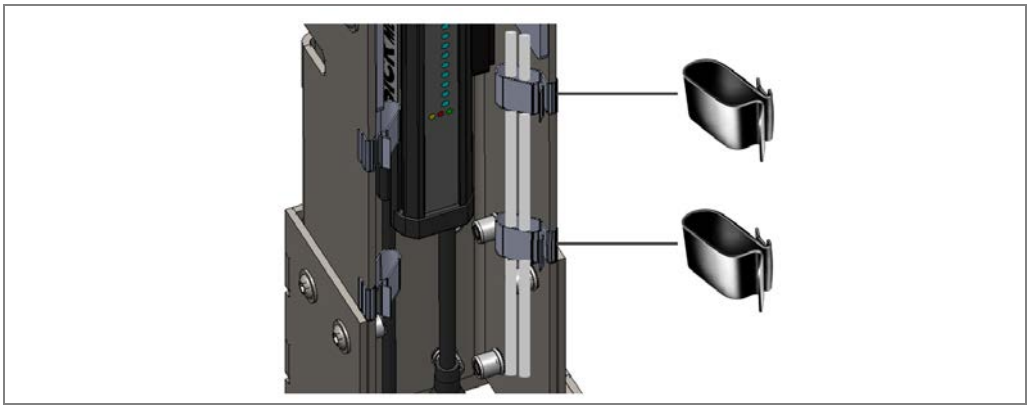


Fig. 96: Steel bar: cable clamps

4.8 Dismantling the measurement system

⚠ *WARNING*

Risk of injury due to components tipping over

If profiles of the mounting frame have been upended, it is possible that they could tip over during disassembly.

- ➢ Do **not** perform any mounting work alone.
- ➢ Where applicable, ask a second person to assist you with the component replacement process.
- ➢ Wear safety shoes.

Dismantling

1. Switch off the supply voltage.
2. Disconnect all connection cables.
3. Remove all devices from the mounting brackets.
4. Dismantle the frame.

Note On final decommissioning, please observe the requirements for environmentally correct disposal in chapter **7.3 Disposal**.

5 Electrical installation

HAZARD

Risk of injury due to electrical current

Only a qualified electrician or trained person working under the guidance and supervision of a qualified electrician is permitted to work on electrical systems or equipment, and they must comply with the electrical regulations.

HAZARD

Disconnect the power to the system

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

- Make sure that the entire system is disconnected from the power supply during the electrical installation work.

HAZARD

Risk of injury due to electrical current

The central control unit of the system is connected to the power supply (AC 100 ... 264 V / 50 ... 60 Hz).

- Standard safety requirements must be met when working on electrical systems.
- The power supply must be disconnected when attaching and detaching electrical connections.
- Select and implement wire cross-sections and their correct fuse protection in accordance with the applicable standards.

5.1 Wiring diagram

Establish the connections in accordance with the enclosed circuit diagrams. The following figures serve as guidelines for the connections.

NOTE

Legal-for-trade mode

For calibratable systems, the electrical installation must be performed by SICK AG service technicians.

VML Prime 3D

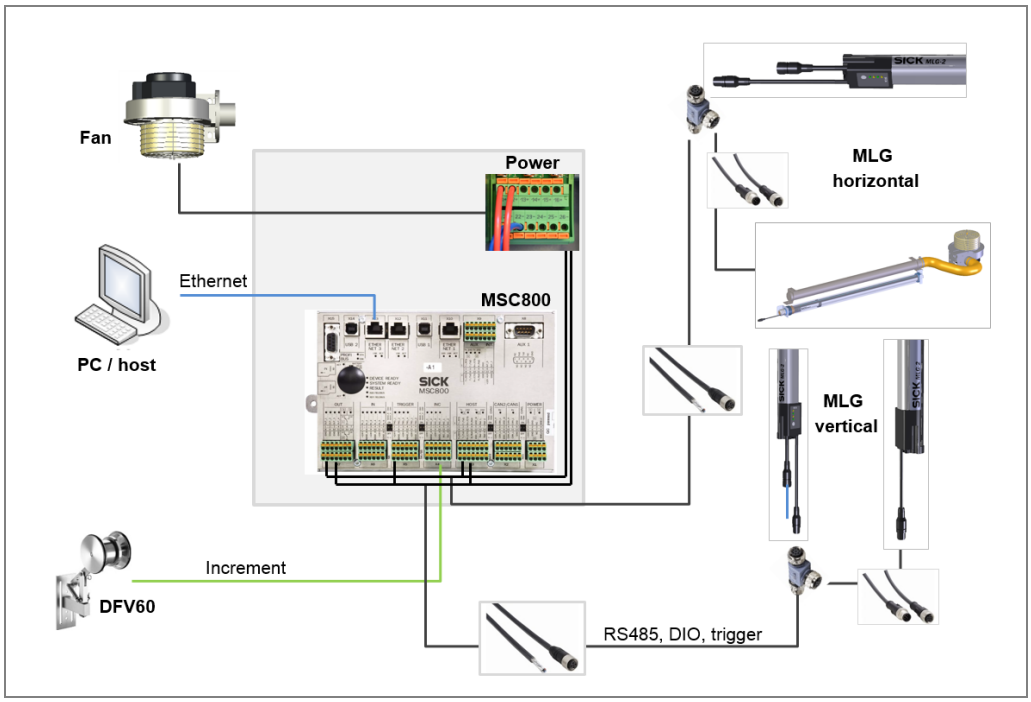


Fig. 97: VML Prime 3D wiring diagram

VML Prime 2D V

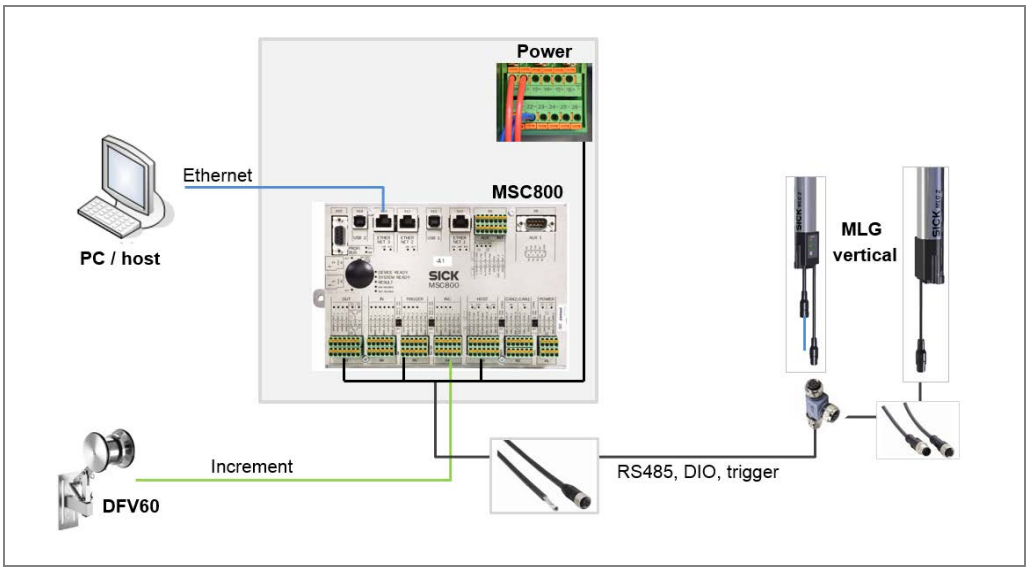


Fig. 98: VML Prime 2D V wiring diagram

VML Prime 2D H

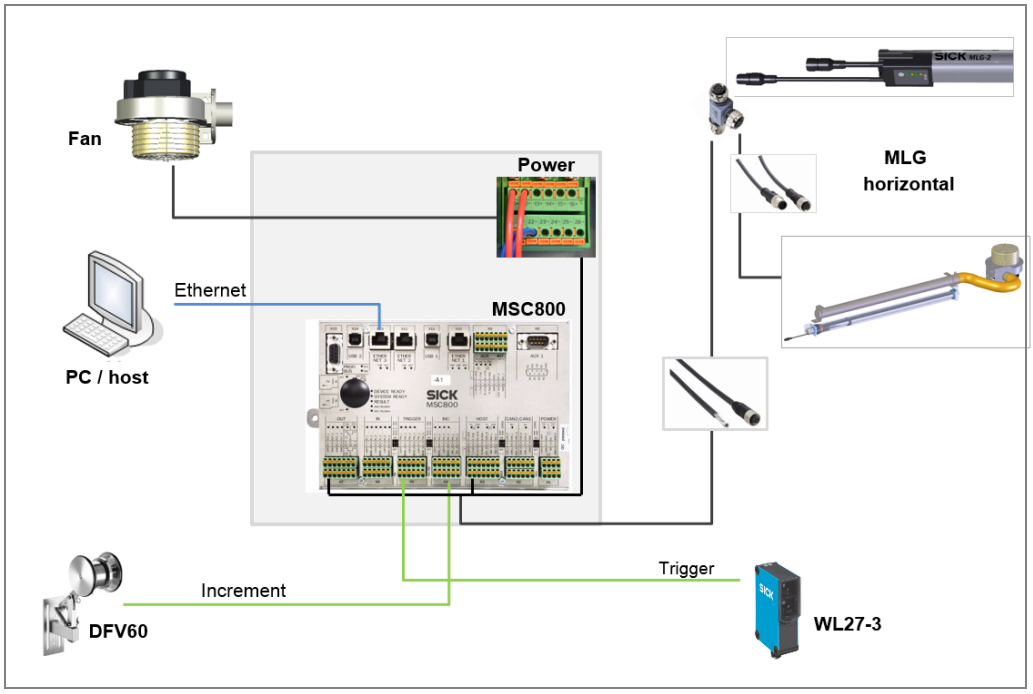


Fig. 99: VML Prime 2D H wiring diagram

Note Be sure to also observe the VML Prime **circuit diagrams** contained in the appendix to these operating instructions.

5.2 General notes

5.2.1 Routing the cable to the MSC800

Be sure to closely observe the following notes during connection to the MSC800:

1. Run the cable to the controller cabinet. Use the cable channels on the mounting frame.
2. Put the rubber sleeve over the cable
3. Route the cable through the sleeve and cable entry of the controller cabinet.

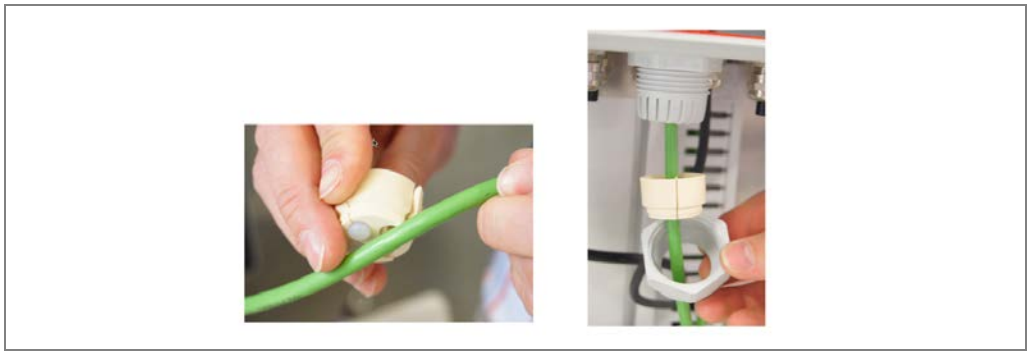


Fig. 100: Guiding cables in the controller cabinet through sleeve and cable entries

4. Tightly screw the cable entry.

5.2.2 Connecting the cable shielding

To protect the communication against external interference, some connecting cables have shielding which must be connected to the housing of the MSC800.

1. Remove approx. 300 mm of the cable sheath.
2. Shorten the shielding, leaving 30 mm at the bottom end.
3. Insert the cable through the cable entry screw.
4. Put the shielding around the cable entry screw as shown.

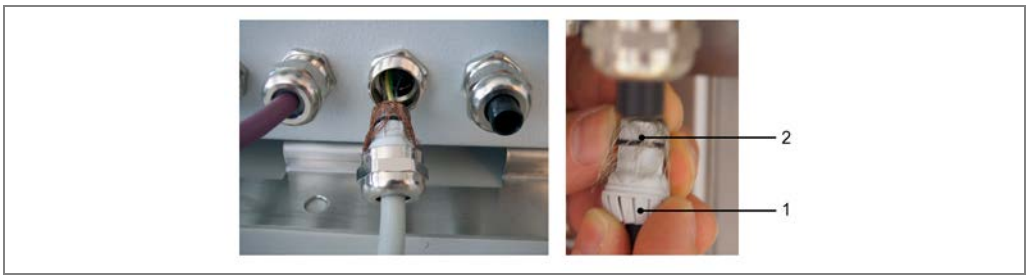


Fig. 101: Connecting the cable shielding at the inlet to the controller cabinet

5. Screw in the cable entry screw. Use a size 20 open-end wrench to tighten the screw.

Note

➢ Make sure that the cable is securely attached and cannot be pulled out (strain relief).

5.2.3 Connecting wire ends in the controller terminal block

Connect the wire ends to the terminals blocks of the MSC800 as follows:

1. Remove approx. 10 mm of the insulation from each of the wires.
2. Twist the wire ends.
3. Do not use ferrules and do not solder the wire ends.
4. Connect the wires to the terminal block as follows: Using a small screwdriver, push the clamping device down.

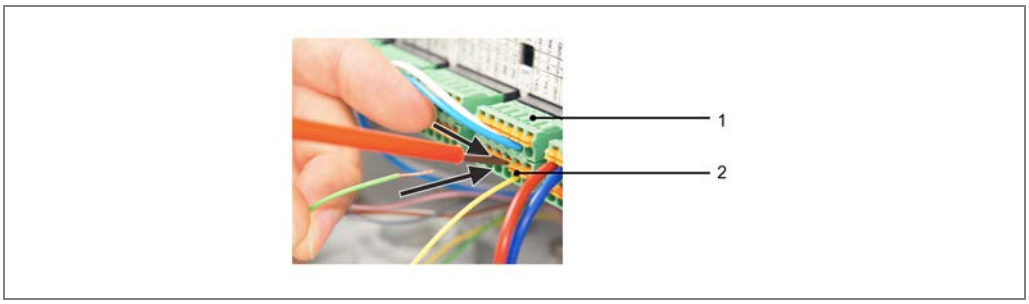


Fig. 102: Connecting wires to the controller terminal block

5. Insert the wire ends. Make sure that no wires are sticking out.
6. Release the clamping device and check that the wires are firmly attached.

5.3 Components in the controller cabinet

The control cabinet of the MSC800-1100 contains the logic unit and the power supply unit.

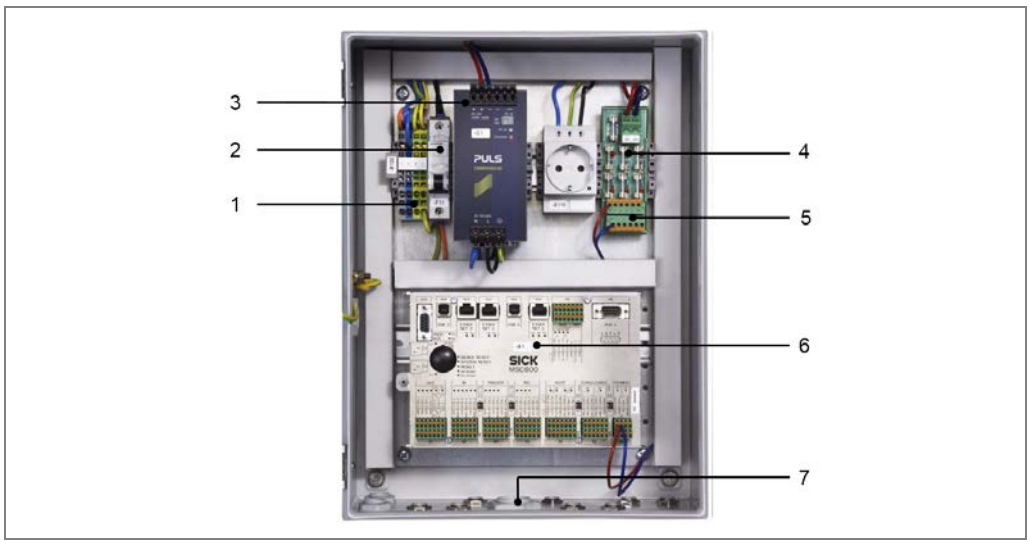


Fig. 103: Components in the MSC800-1100

No.	Component
1	Terminals for line voltage IN
2	Circuit breaker for protective contact socket and power supply module 3 Power supply module 10 A for
3	supply voltage DC 24 V
4	Fuses for supply voltage DC 24 V
5	Terminals for supply voltage OUT (DC 24 V, max. 10 A)
6	Logic unit with connections and SD memory card for parameter cloning
7	Cable entries (M screw connections)

Tab. 11: Components in the MSC800-1100

5.4 Connecting the voltage supply to the controller

HAZARD

Disconnect the power to the system

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

➢ Make sure that the entire system is disconnected from the power supply during the electrical installation work.

HAZARD

Risk of injury due to electrical current

The power supply (AC 100 ... 264 V/50 ... 60 Hz) is protected by a 1-pin line safety switch (phase).

If the phase and neutral conductors are swapped when connecting to the -X100 terminal block, there is a risk of electrocution if you touch the respective contacts, even after the input circuit has been switched off with the -F12 circuit breaker.

➢ Carefully connect the power supply to the -X100 terminal block.

➢ Verify that the power supply is connected correctly before the main switch is used to switch on the customer's power.

Note

To ensure the cables are securely attached and in compliance with the IP 54 enclosure rating, the coupling nuts for strain relief on the controller cabinet must be tightened.

➢ Check that the cables are firmly attached.

➢ No visible metal surfaces are permitted on the wires.

➢ Connect the voltage supply to the X100 terminal block as follows:

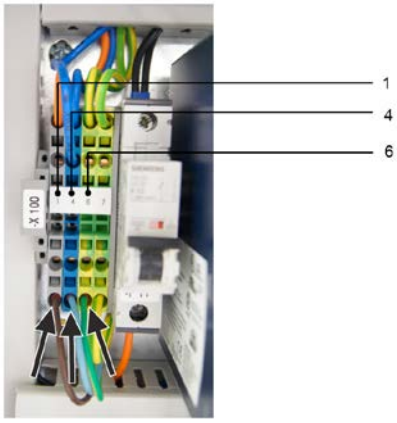


Fig. 104: Connecting the MSC800 to the external voltage supply

Terminal	Color of the terminal block	Signal	Function
-X100/1.**1**	Gray	L	Power supply AC 100 ... 264 V/50 ... 60 Hz (phase)
-X100/1.**4**	Blue	N	Power supply AC 100 ... 264 V/50 ... 60 Hz (neutral conductor)
-X100/1.**6**	Green-yellow	PE	Protective conductor

Tab. 12: Pin assignment of the -X100 terminal block on the MSC800

5.5 Connecting the light grids

The sender and receiver of each light grid are synchronized via a cable. This means that cabling is required between the sender and receiver. For ease of connection, tee connectors are available.

The tee connectors connect the sender and the receiver. They also make it possible to connect the latter to the MSC800.

Light grid connections

The light grids feature the following connections:

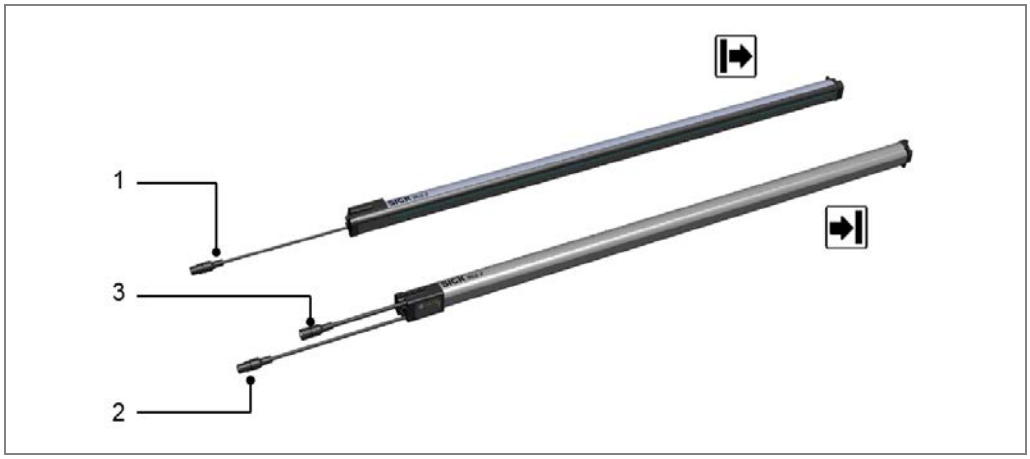


Fig. 105: MLG-2 connections

No.	Component
1	Sender data connecting cable
2	Receiver data connecting cable
3	The receiver unit also features an Ethernet connection for maintenance purposes.

Connecting cables

The following connecting cables are supplied for connecting the light grids:

- **Tee connectors** (8-pin, 5-pin, 8-pin) for connecting the sender and receiver to each other and for connecting them to the MSC800.
- **5-pin connecting cable** for connecting the sender to the tee connector.
- **8-pin connecting cable** with an open end for connecting the tee connector and the MSC800.

5.5.1 Connecting the sender and receiver

Re-establish the connection between the sender and the receiver.

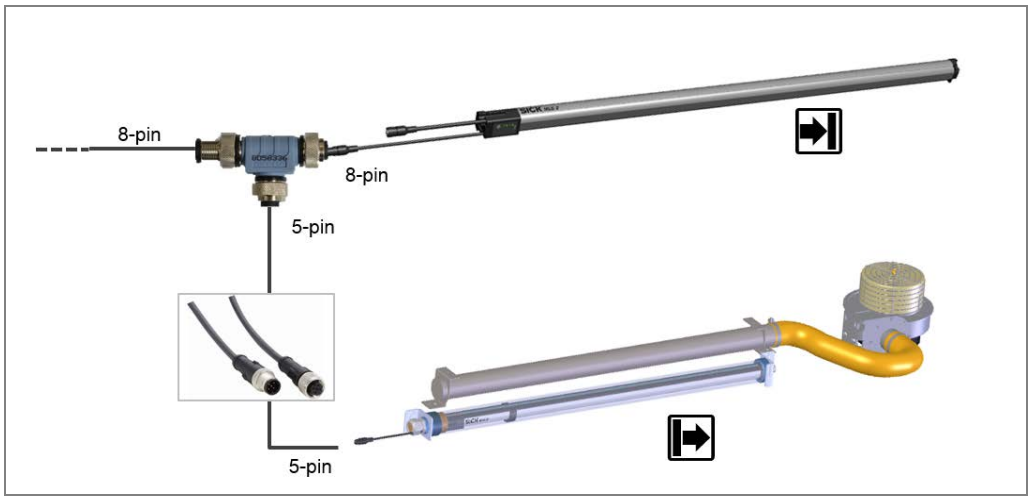


Fig. 106: Connecting the sender and receiver

1. Connect the 8-pin female connector of the tee connector to the male connector of the cable connection on the receiver and screw together the plug connector.
2. Connect the male connector of the 5-pin connecting cable to the 5-pin female connector of the tee connector and screw together the plug connector.
3. Run the cable to the sender.
4. Connect the 5-pin cable connection of the sender to the connecting cable and screw together the plug connector.

5.5.2 Connecting the light grids with the MSC800 using tee connectors

Using the relevant tee connectors, connect the horizontal and vertical light grids with the MSC800. The connection is made using a cable with an 8-pin plug connector on one end and an open end for connection to the MSC800 on the other.

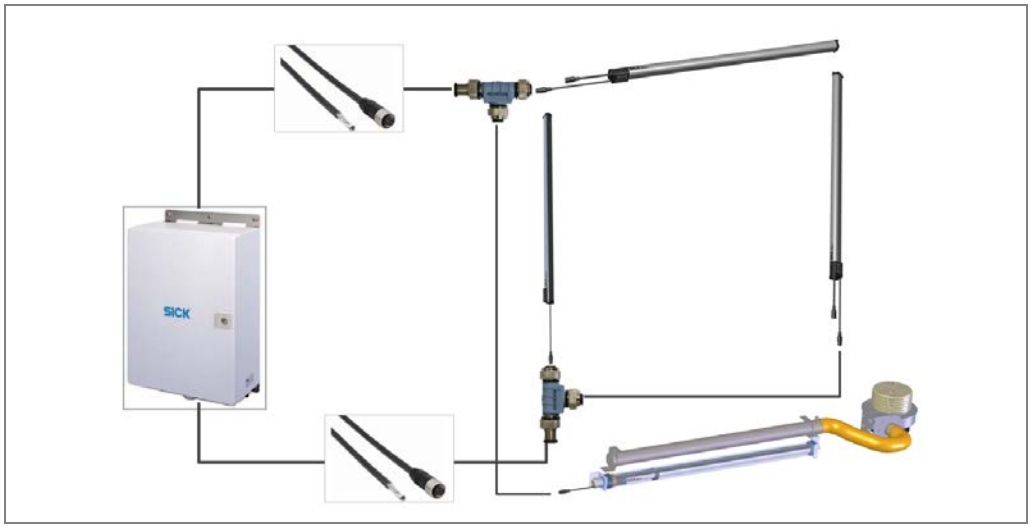


Fig. 107: Connecting the light grids with the MSC800 using tee connectors

Routing the cables to the MSC800

1. Connect the female connector of the connecting cable to the male connector of the tee connector and screw together the plug connector.
2. Route the open end of the cable onward through the cable entry and into the controller cabinet.
3. Connect the shielding as described previously and screw the cable entry on.

Connecting the horizontal light grid to the MSC800 (HOST 1)

Connect the free wire ends to the terminal blocks **OUT** and **HOST 1**.

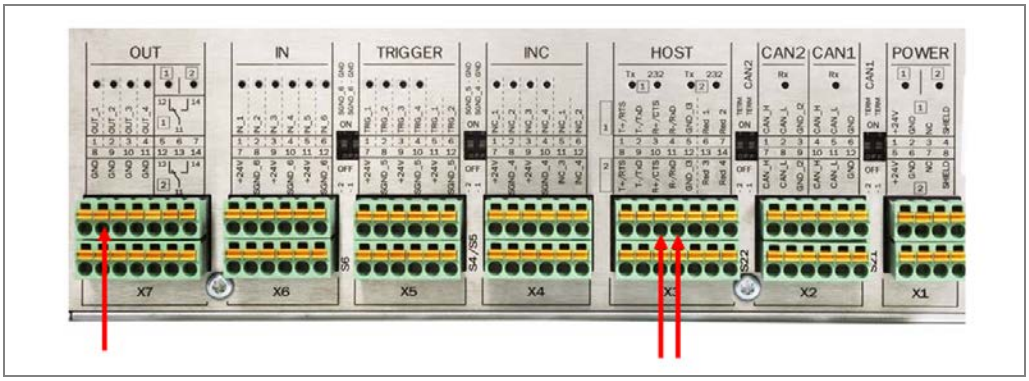


Fig. 108: Connecting the horizontal light grid to the MSC800 (HOST 1)

Wire color	Terminal block	Connection
Pink	X7 (OUT)	2 OUT_2
Violet	X3 (HOST 1)	3 R+/CTS
Orange	X3 (HOST 1)	4 R-/RxD

Tab. 13: Connecting the wire ends for the horizontal light grid to the MSC800

* The wire ends that are not connected must be insulated with a heat-shrinkable sleeve and secured to prevent electrical connections.

Voltage supply

➢ Connect the free wire ends to the fuse block as follows:

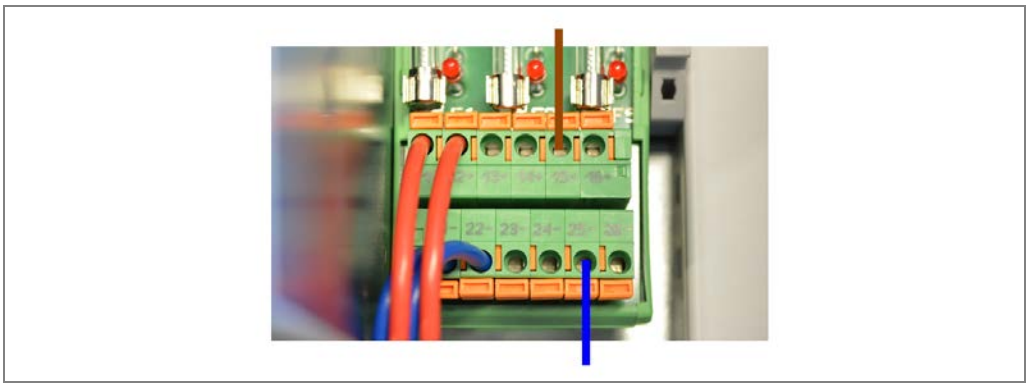


Fig. 109: Connecting the horizontal light grid to the voltage supply of the MSC800

Wire color	Area on fuse block	Connection
Brown	F1_6	15 +
Blue	F1_6	25 -

Tab. 14: Connecting the horizontal light grid to the voltage supply of the MSC800

Connecting the vertical light grid to the MSC800 (HOST 2)

Connect the free wire ends to the terminal blocks **OUT** and **HOST 2**. As the vertical light grid also acts as a measurement trigger, the terminal block **TRIGGER** must also be taken into consideration.

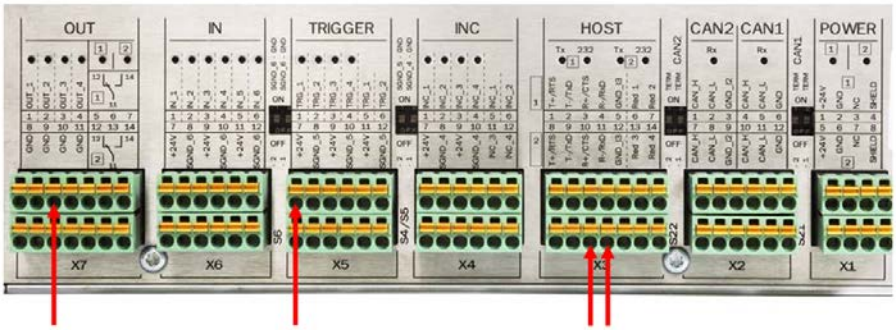


Fig. 110: Connecting the vertical light grid to the MSC800 (HOST 2)

Wire color	Terminal block	Connection
Pink	X7 (OUT)	3 OUT_3
Black	X5 (TRIGGER)	1 TRG_1
Violet	X3 (HOST 2)	10 R+/CTS
Orange	X3 (HOST 2)	11 R-/RxD

Tab. 15: Connecting the vertical light grid to the MSC800 (HOST 2)

Voltage supply

➢ Connect the free wire ends to the fuse block as follows:

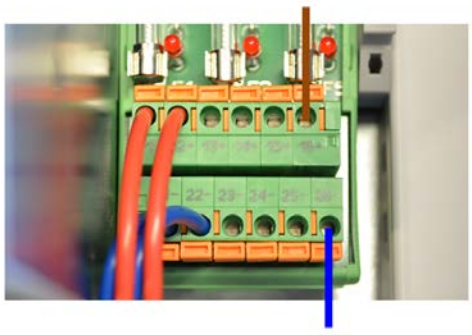


Fig. 111: Connecting the vertical light grid to the voltage supply of the MSC800

Wire color	Area on fuse block	Connection
Brown	F1_6	16 +
Blue	F1_6	26 -

Tab. 16: Connecting the vertical light grid to the voltage supply of the MSC800

5.6 Connecting the measuring wheel encoder

The DFV60 measuring wheel encoder is connected to the controller via a connecting cable that is included with delivery. There is an M12 female connector at one end of this. The other end is open **with** shielding.

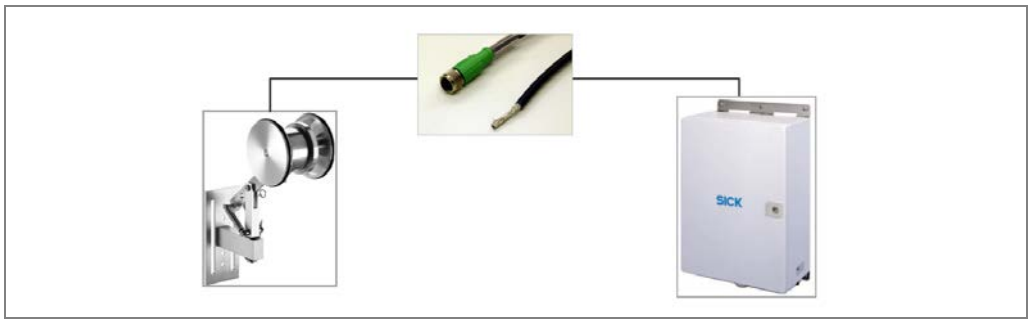


Fig. 112: Measuring wheel encoder – MSC800 connecting cable

1. Screw the M12 plug connector onto the male connector on the measuring wheel encoder.
2. Route the open end of the cable to the controller cabinet and then through the cable entry and into the MSC800.
3. Put the shielding around the cable entry screw of the controller cabinet.
4. Screw in the cable entry screw.

Connecting encoder cable to the MSC800

Connect the free wire ends to the **INC** terminal block (1).

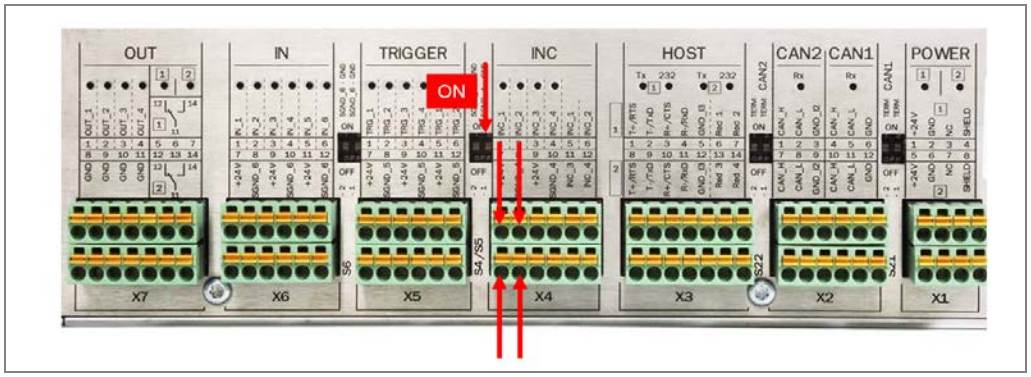


Fig. 113: Connecting measuring wheel encoder connecting cable to MSC800

Wire color	Terminal block	Connection
White	X4 (INC)	1 INC_1
Black	X4 (INC)	2 INC_2
Brown	X4 (INC)	7 24 V
Blue	X4 (INC)	8 SGND_4

Tab. 17:Connecting measuring wheel encoder connecting cable to MSC800

Switching on the signal ground

Activate the signal ground for the measuring wheel encoder.

➢ Using a small screwdriver, push the **two** switches **TRIGGER** and **INC upward**between the two terminal blocks.

5.7 Connecting the separate photoelectric sensor

With the VHL Prime 2D H, the photoelectric retro-reflective sensor is connected to the controller via a connecting cable included with delivery. There is an M12 plug connector at one end of it. The other end is open **without** shielding.

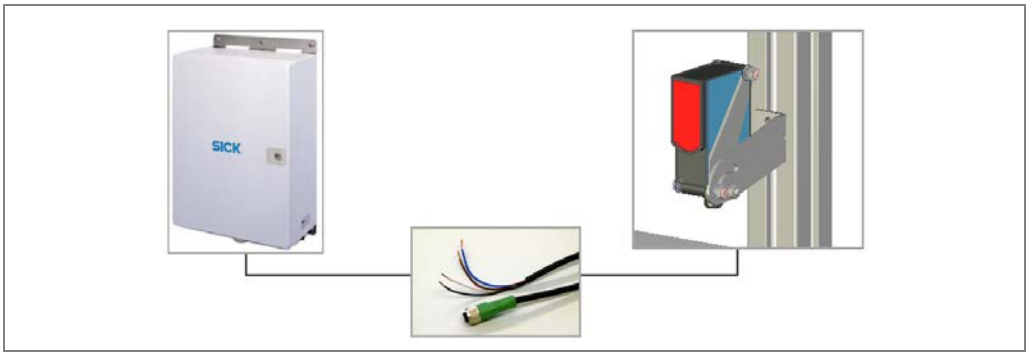


Fig. 114: Photoelectric retro-reflective sensor – MSC800 connecting cable

1. Screw the M12 plug connector into the male connector on the photoelectric retro-reflective sensor.
2. Route the open end of the cable to the controller and onwards through the cable entry and into the controller cabinet.

Connecting the photoelectric sensor to the MSC800

Connect the two free wire ends to the **X5 (TRIGGER)** terminal block as follows:

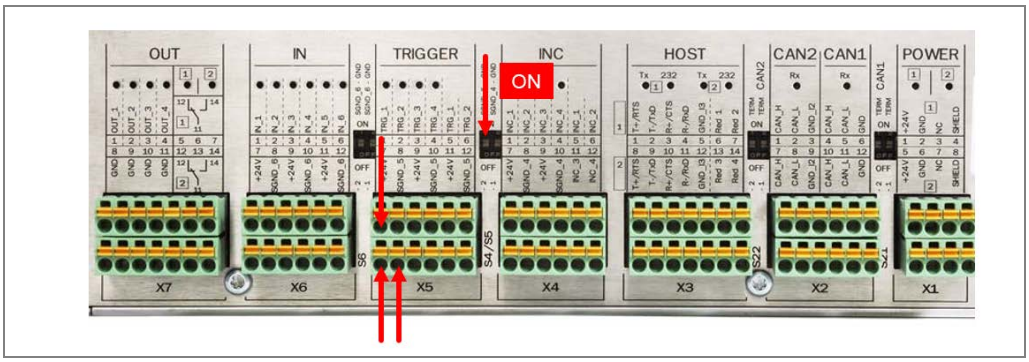


Fig. 115: Connecting photoelectric retro-reflective sensor connecting cable to MSC800

Wire color	Terminal block	Connection
Black	TRIGGER	1 TRG_1
Brown	TRIGGER	7 24 V
Blue	TRIGGER	8 SGND_5
White	Not connected*	

Tab. 18: Connecting photoelectric retro-reflective sensor connecting cable to MSC800

Switching on the signal ground

Switch on the signal ground for the trigger signal.

➢ Using a small screwdriver, push the **SGND 5 GND** switch **upward**.

5.8 Connecting the fan

The fan is connected to the voltage supply in the controller cabinet via a cable harness and the provided extension cable with one 5-pin female connector and one open end without shielding.

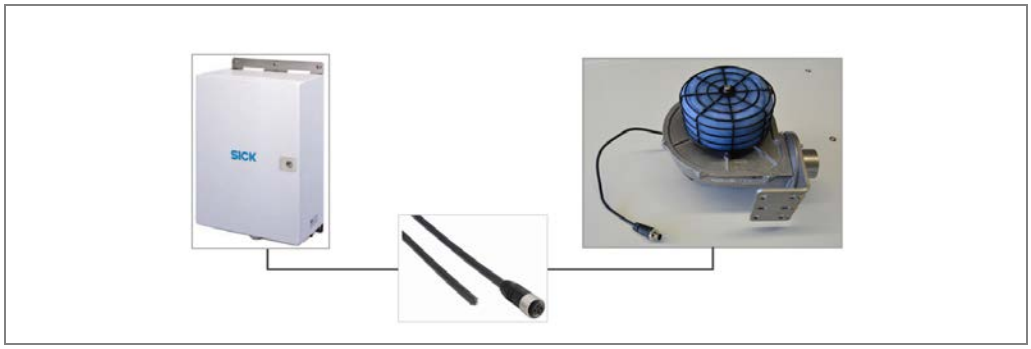


Fig. 116: Connecting the fan

1. Connect the M12 male connector to the female connector of the cable harness and screw together the plug connector.
2. Route the open end of the cable to the controller cabinet and then through the cable entry and into the MSC800.
3. Screw in the cable entry screw. Use the size 20 open-end wrench to tighten the screw.

Connecting the fan to the MSC800

Connect the free wire ends to the **fuse block** with the 3.14 A fuse:

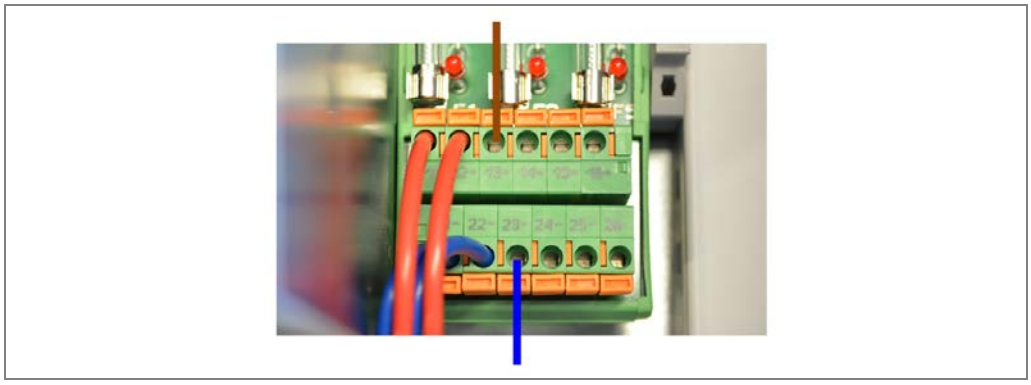


Fig. 117: Connecting the fan to the MSC800

Wire color	Area on fuse block	Connection
Brown	F1_3	13 +
Blue	F2_3	23 -

Tab. 19: Connecting the fan to the MSC800

6 Commissioning

⚠ WARNING

Do not commission without testing by qualified safety personnel

Before you operate the VML Prime measurement system for the first time, you must have it checked and approved by qualified safety personnel. Observe the notes provided in chapter **2 Safety**.

NOTE

Legal-for-trade mode

For calibratable systems, commissioning must be performed by SICK AG service technicians.

6.1 Starting commissioning

6.1.1 Switching on the system

Establish the voltage supply. The system starts up automatically with a delay of 10 seconds.

Internal check for operational readiness

The light grids and the MSC800 central control unit perform self-diagnostics to check whether they are ready for operation.

Operational readiness after 60 s

The system is ready for operation after approx. 60 seconds.

6.1.2 Checking the operational readiness of the devices

If all the devices have been connected correctly, a check can be performed following power-up to see whether the devices are functioning correctly.

6.1.2.1 Checking the operational readiness of the MSC800

If the controller is ready for operation after power-up, the **DEVICE READY** and **SYSTEM READY** LEDs must be illuminated.

Fig. 118: Checking the operational readiness of the MSC800

6.1.2.2 Ensuring the operational readiness of the light grids

If the light grids are connected to the voltage supply correctly, the green LEDs on both the sender and the receiver will be illuminated.

Fig. 119: Checking voltage supply to the light grids

Checking signal strength

Yellow (3 Hz) After the system is switched on for the first time, the **alignment mode** for coarse alignment is active at the receiver unit. The yellow LED on the receiver unit flashes rapidly if the signal it is receiving is too weak. The LED goes out as soon as the signal strength is sufficient.

Note The LED behavior does **not provide information about optimum alignment** of the components. It only indicates whether the signal arriving at the receiver is strong enough.

After the first teach-in process, the alignment mode is deactivated.

Checking whether objects are detected

➢ Move an object into the monitoring field. The yellow LED must light up on the receiver of each of the light grid pairs. The yellow LED lights up if at least one beam of light is interrupted.

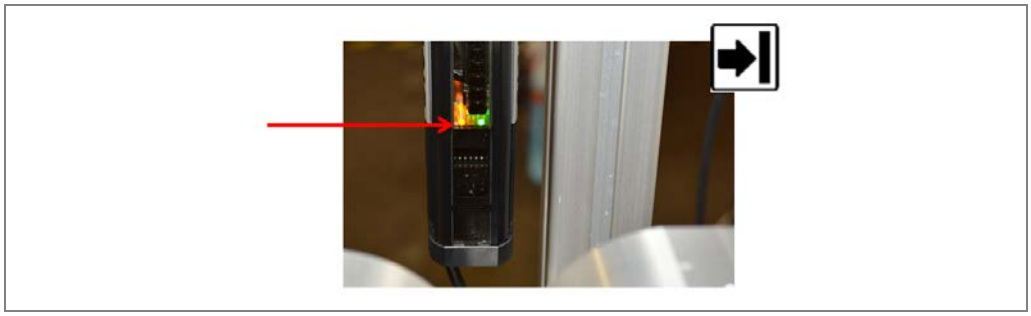


Fig. 120: Checking object detection at the light grids

Note Once the object is removed, the yellow LED should go out.

You can also tell whether the light grids (triggers) are functioning properly by looking at the controller.

- If there is no object in the detection field, the LED for the **1 TRG_1** connection on the **TRIGGER** block should not be illuminated.
- The LED is illuminated if an object breaks the beam path of the vertical light grid and activates the trigger. The trigger is activated when at least **two** of the beams of the vertical light grid are interrupted.

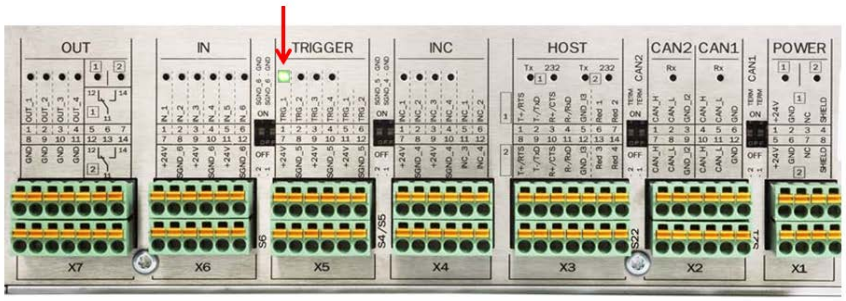


Fig. 121: Checking the operational readiness of the photoelectric sensor by looking at the LED on the controller

6.1.2.3 Ensuring the operational readiness of the separate photoelectric sensor

Checking the operational readiness of the photoelectric retro-reflective sensor

If the reflector and photoelectric sensor have been correctly aligned with one another and the sensing range is sufficient, the green and yellow LED receive indicators light up.

Fig. 122: Checking the operational readiness of the photoelectric retro-reflective sensor

If the **yellow** LED receive indicator does not light up, you must readjust the photoelectric sensor and reflector or increase the sensing range.

➢ Position the reflector in line with the light beam from the photoelectric sensor and align the light spot with the reflector.

Select a position in which the red light band is displayed exactly on the reflector. The sensor must have a clear view of the reflector, with no object in the path of the beam.

You must ensure that the optical openings of the sensor and reflector are completely clear.

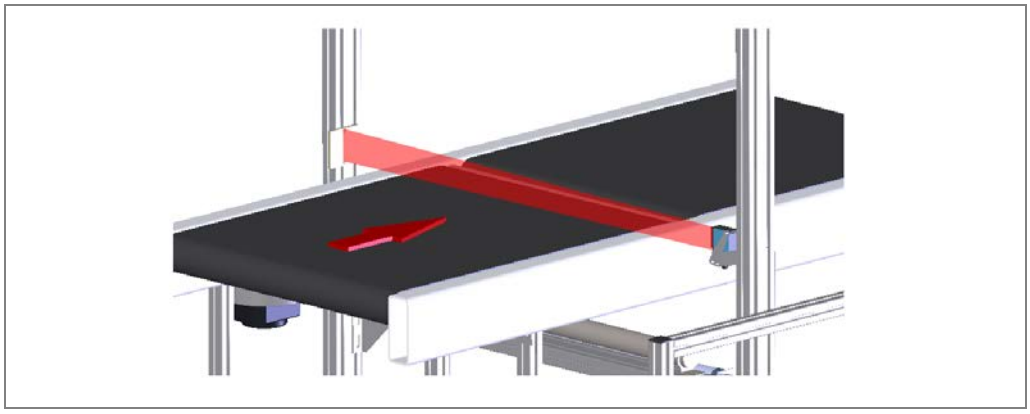


Fig. 123: Aligning the reflector and photoelectric sensor

➢ Press the **Teach-in** pushbutton (≥ 2 s, < 4 s). The yellow LED display goes out. If both display LEDs then light up permanently, the teach-in was successful.

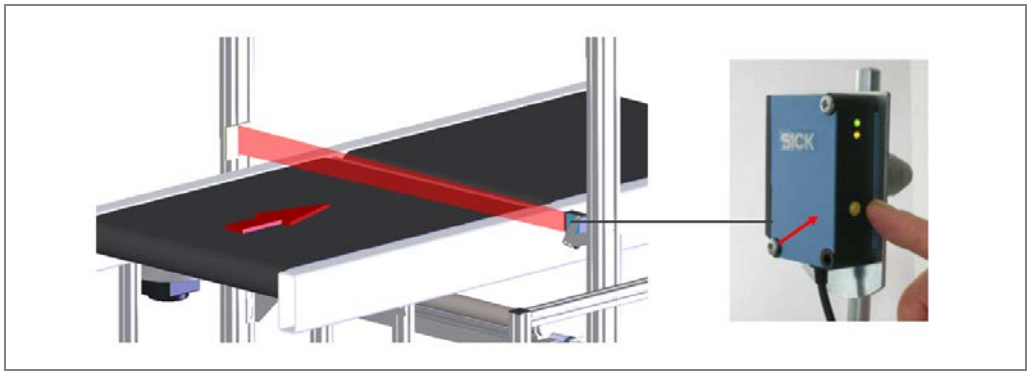


Fig. 124: Using the potentiometer to set the sensitivity of the photoelectric sensor

Note If one or both display LEDs flash slowly directly after teach-in, the alignment of the light band on the reflector is not correct.

1. If necessary, clean the optical interfaces.
2. Align the light band on the reflector again until both LEDs blink quickly.
3. Repeat the teach-in.

Checking whether objects are detected

➢ Move an object into the light beam. The yellow LED receive indicator should go out.

Once the object is removed, the LED should light up again.

You can also tell whether the device is functioning properly by looking at the controller. If the path to the reflector is clear, the LED for the **1 TRG_1** connection on the **TRIGGER** block should light up. The LED goes out if an object breaks the light beam and activates the trigger.

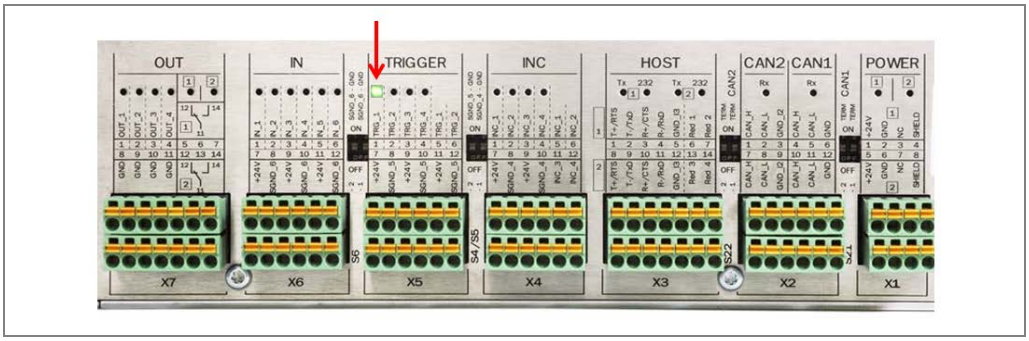


Fig. 125: Checking the operational readiness of the photoelectric sensor by looking at the LED on the MSC800

6.1.2.4 Checking the operational readiness of the measuring wheel encoder

Check that the measuring wheel encoder is functioning correctly.

➢ Turn the measuring wheel of the encoder by hand – if possible – and watch the **INC_1** and **INC_2** LEDs on the **INC** terminal block.

- The LEDs should be flashing.

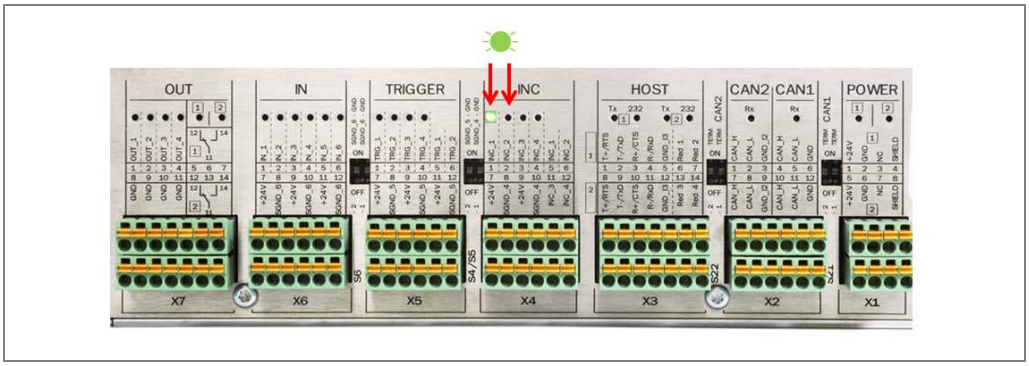


Fig. 126: Checking the operational readiness of the encoder by looking at the LEDs on the controller

Note

➢ Alternatively, you can also start the conveyor belt.

➢ Make sure that there is good contact between the measuring wheel and the conveyor belt.

6.2 Preparing the configuration PC

6.2.1 Establishing a connection with the configuration PC

The VML Prime volume measurement system is configured via a configuration PC.

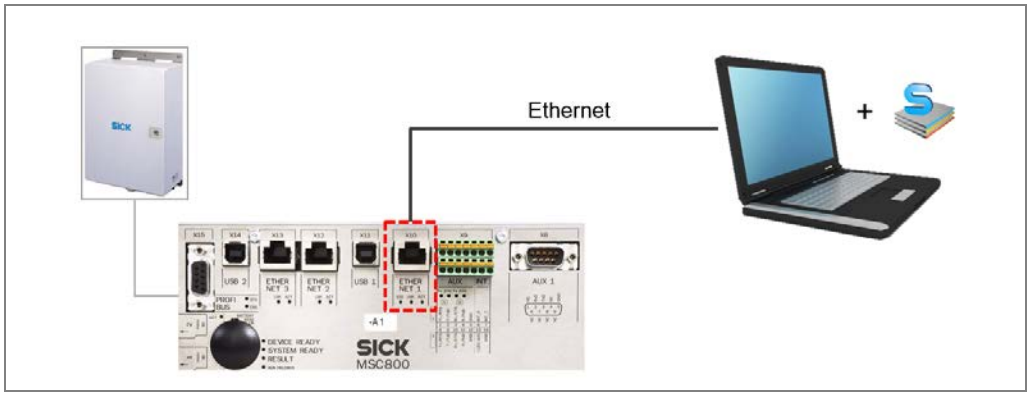


Fig. 127: Connecting to the configuration PC

Connecting the configuration PC

1. Connect the configuration PC to the MSC800 controller with an Ethernet cable.
2. Use the free **X10** Ethernet interface on the MSC800 to do so.

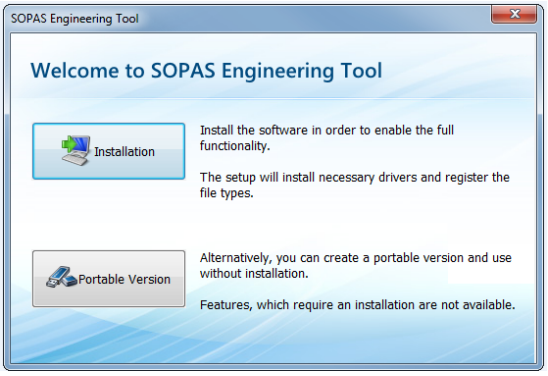
Note Upon delivery, the default IP address for the MSC800 is 192.168.0.1. It is adjusted during the configuration process.

➢ Make sure that the configuration PC is in the number range of the MSC800. If not, change the IP address of the configuration PC accordingly.

6.2.2 Installing SOPAS

Install the latest version of the configuration software from the SICK homepage on the configuration PC.

1. Open the www.sick.de website in the browser.
2. Enter SOPAS in the search field and start the search.
3. Download the latest version of the **SOPAS Engineering Tool** software and save this in a temporary directory on the configuration PC.
4. Start the installation by double-clicking the **setup.exe** file.



5. Select the **Installation** installation type. The installation is prepared.
6. Select the user language of the wizard.

7. Click **OK** to confirm. The Setup Wizard opens.

8. Follow the Setup Wizard and perform the installation. Depending on the configuration, a program group is created and an icon is placed on the desktop.

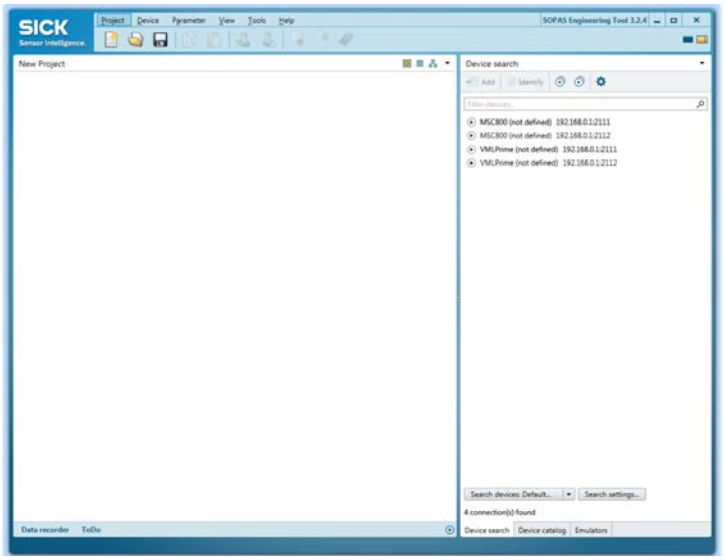
6.3 Creating a configuration in SOPAS

6.3.1 Launching SOPAS

You have already connected the configuration PC to the MSC800.

➢ Launch SOPAS. The corresponding icon is located in the Windows start menu and on the desktop by default.

The initial screen is displayed.



If the number ranges for the MSC800 and the configuration PC correspond, then the connected **VML Prime** system is detected and displayed in the list of connected devices on the right-hand side.

Note MSC800 and VML Prime use two ports (like all SICK devices). Ports are part of the network address and can be used to establish various connections between the devices. Port **2112** is freely configurable but port **2111** is a fixed port for outputting data. It is used for device configuration.

6.3.2 Transferring the VML Prime to a SOPAS project

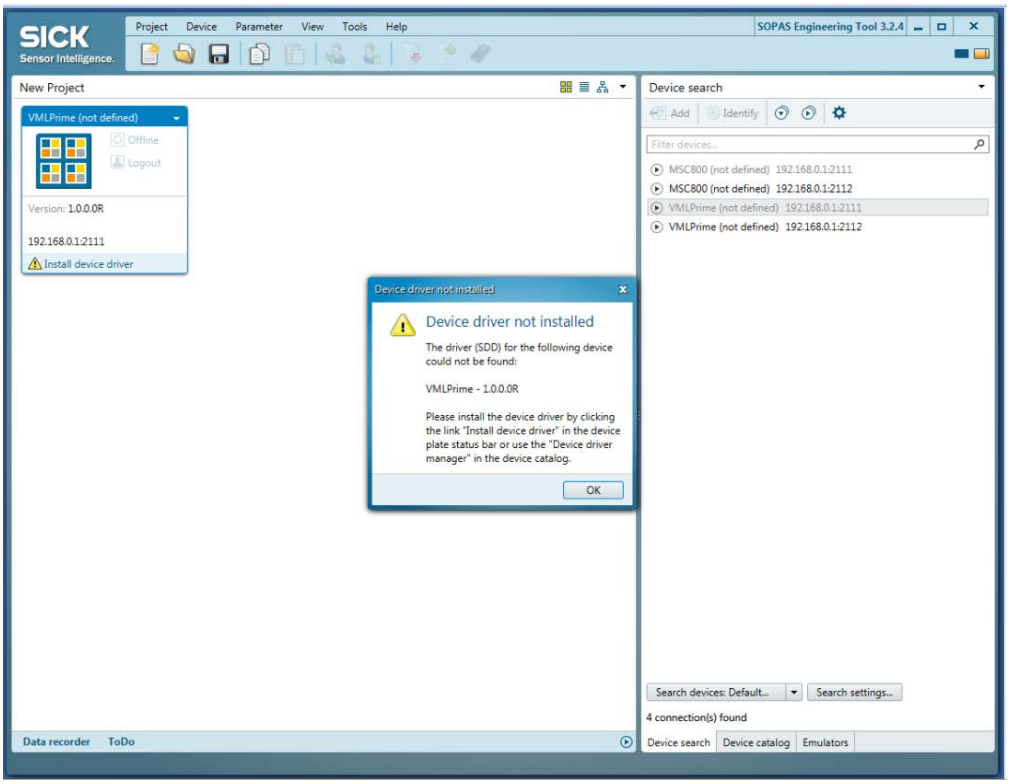
Add the detected VML Prime system to a SOPAS project. One or more devices are combined and edited in a single project.

1. In the list, select the detected VML Prime with the port **2111**.

2. Click the **Add** icon to transfer the VML Prime into the project.

   Alternatively, you can transfer by double-clicking on the list entry or dragging and dropping.

The transferred system is displayed in the left-hand window as a **tile**.



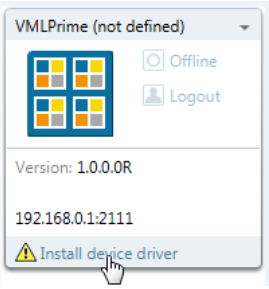
Note A notification will appear if the device drivers for the connected VML Prime are not yet known in the SOPAS project.

6.3.3 Loading device drivers into the SOPAS project

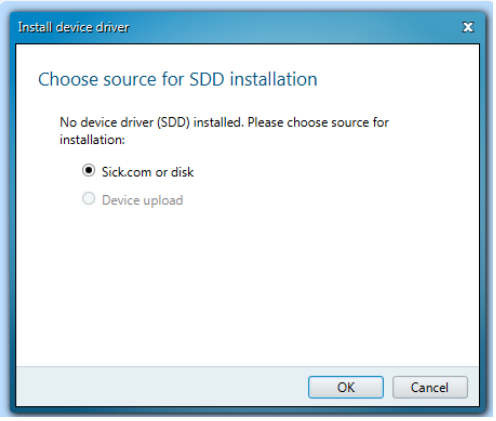
Install the device driver for the VML Prime. By doing so, a copy of the device parameters is created in the SOPAS project.

Getting started

1. Press **OK** to confirm you have seen the notification.
2. Click **Install device driver** in the tile.



3. You will be asked where you want to get the device drivers from. During initial commissioning, only the **SICK.com or disk** option is active.



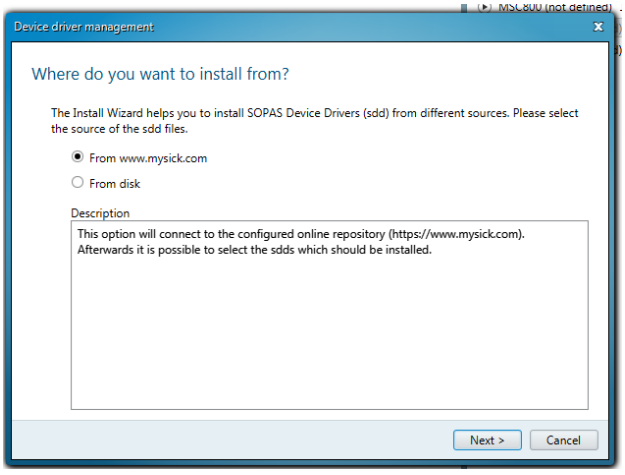
4. Click **OK** to confirm. The device driver manager wizard opens.

Selecting a data source

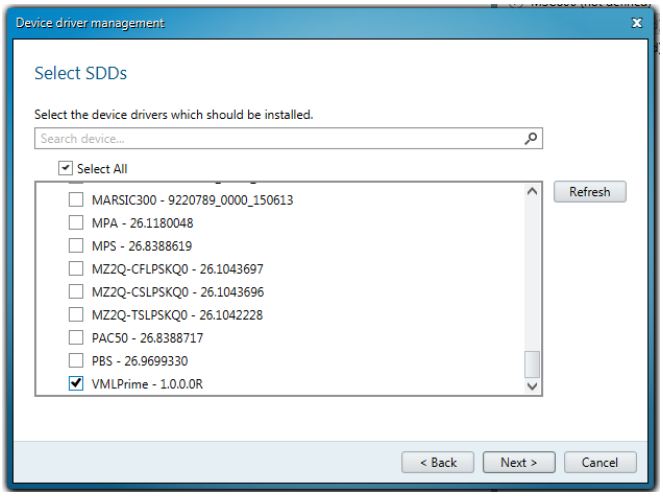
1. Specify whether you would like to obtain the device driver from the SICK homepage or from a local disk.

Recommendation

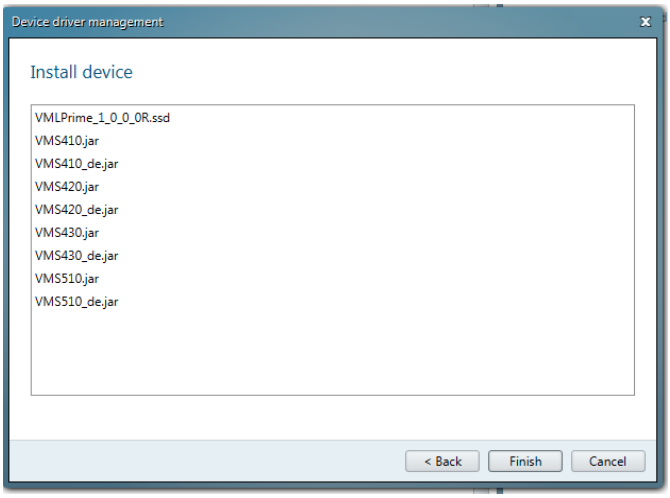
We recommend obtaining the current device driver directly from the SICK homepage. Select the **From www.mysick.com** option.



2. Click **Next** to establish the connection to the driver manager. The driver which is suitable for the VML Prime system is activated automatically.

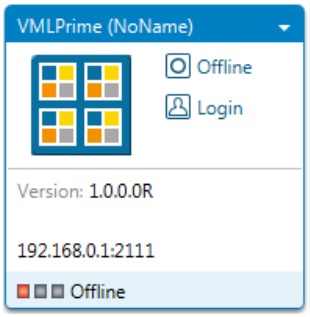


3. Click **Next** to confirm your selection. The device drivers are downloaded and installed in the SOPAS project. A notification informs you that the download process is complete.



4. End the device driver installation by clicking **Finish**. The device driver manager closes.

   It can be inferred from the tile that the VML Prime is now recognized by the configuration PC but is not yet connected to the system, meaning that it is still offline.

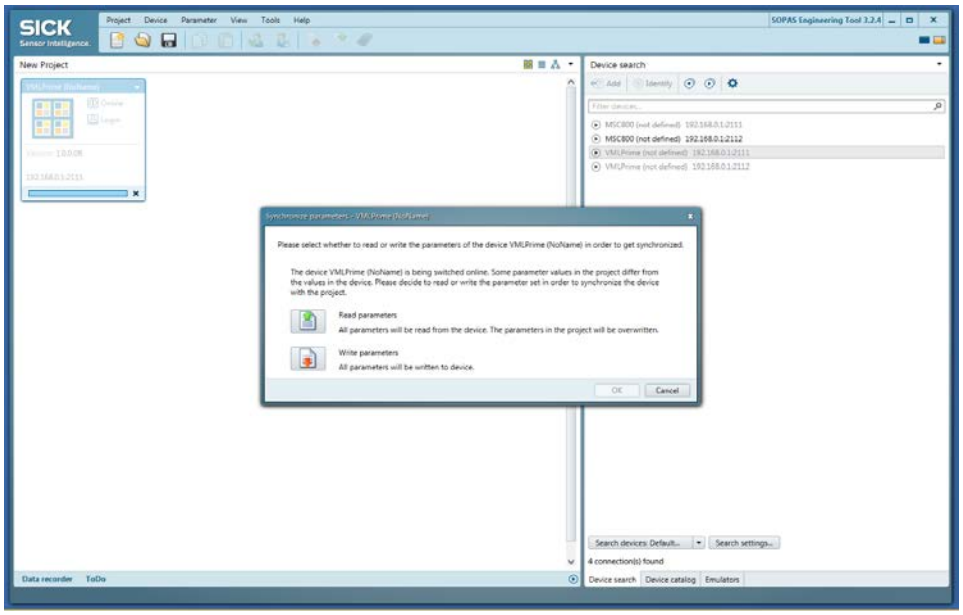


6.3.4 Setting the VML Prime to online

Establish a connection between the SOPAS project and the VML Prime. This connection will make it possible to read parameters and configuration data from the devices in the connected system or write these to the system devices from SOPAS.

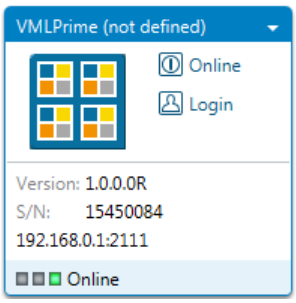
1. Click the **Offline** button in the tile.

   Alternatively, you can open the context menu and select the **Go online** command there.
2. You are prompted to synchronize the VML Prime's device data with the device data of the SOPAS project.



3. As the SOPAS project has not yet received any device data during the initial commissioning, click the **Read parameters** option.

The connection between the VML Prime and the configuration PC is now established. **Online** appears in the tile. The LED lights up green.

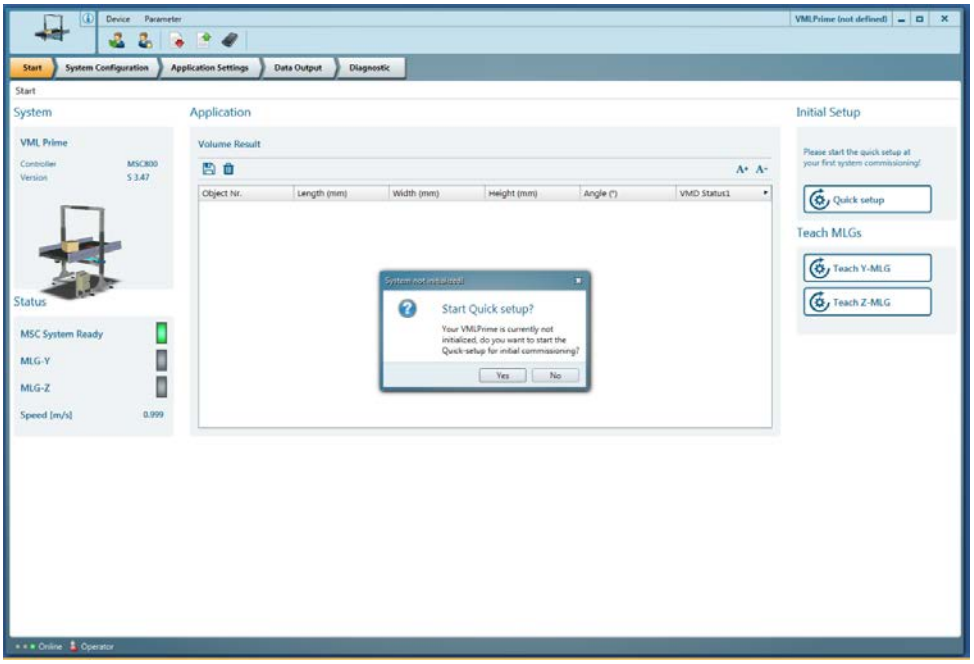


The parameters are transferred from the connected system devices to the SOPAS project. The SOPAS project and system devices are therefore synchronized.

6.4 Opening the configuration and analysis interface

The SOPAS configuration and analysis interface guides you through all of the necessary settings during commissioning and provides detailed system information during operation.

➢ Click in the project tree by double-clicking on the tile. The configuration and analysis interface is opened.



The top area contains the menu bar and toolbar as well as a bar with workflow symbols to switch between the individual workspaces of the configuration and analysis interface. The bars are visible in all workspaces.

The layout and structure of the lower area depend on which workspace has been selected.

Note A check is performed to see whether VML Prime has already been configured. If this is not the case, you will be prompted to launch the commissioning wizard.

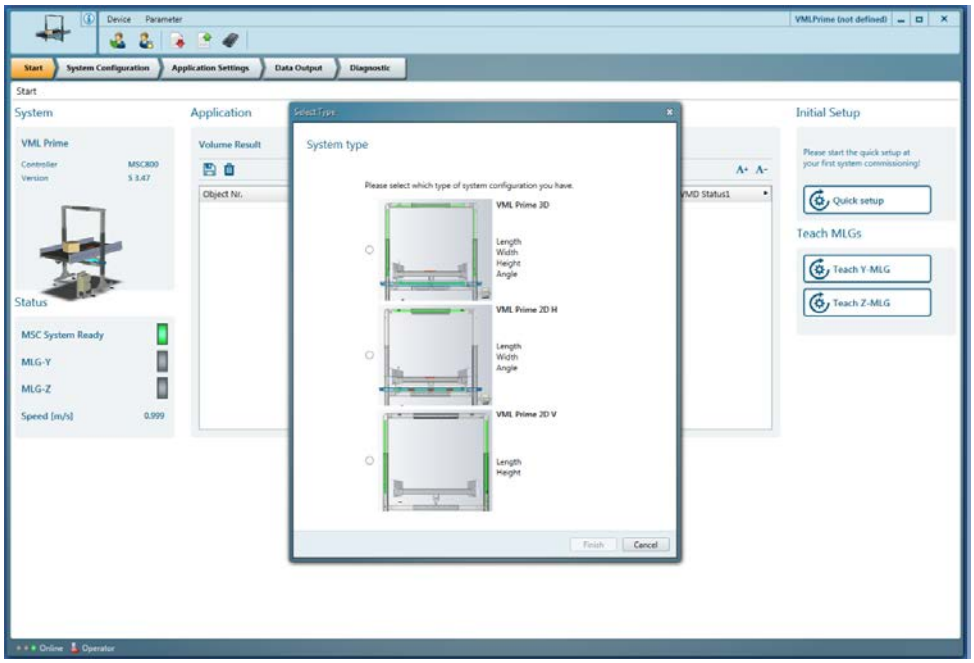
➢ Click **Yes**. You will then be taken through three wizards.

6.4.1 Selecting the configuration

Firstly, in the **System type** wizard, select the VML Prime configuration installed at your site.

Note On the pages that follow, we will describe the **VML Prime 3D** configuration.

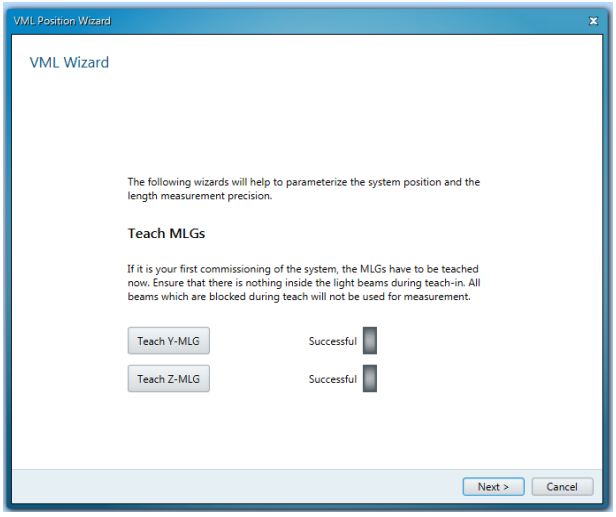
1. Click on the VML configuration.



2. Press **Finish** to confirm.

The parameter set of the selected system is loaded. The parameters are subsequently adapted to the local requirements.

For this, the wizard for configuring the position of the volume measurement system in relation to the conveyor opens first of all.



6.4.2 Teaching in light grids

The light grids must be taught in during initial commissioning.

The teach-in process ensures optimum sensitivity of the light grids. For this, the switching thresholds for all beams are adjusted for the sensing range and the ambient conditions.

Prerequisites

Before the teaching in the light grids, the following prerequisites must be fulfilled.

- Clean the front screen of the MLG-2 modules.
- Stop the conveyor belt to prevent vibrations during the teach-in process.
- Remove all objects from the detection field. During teach-in, there must be **no objects in the light path**.

Performing the teach-in process

Both light grid pairs are taught in separately.

1. In the **Teach MLGs** area, click the **Teach Y-MLG** button. The horizontal light grid pair is taught in.

   At the MLG-2 receiver, all LEDs will briefly illuminate one after the other. The yellow LED flashes slowly during the teach-in process.

   If the teach-in process has been successful, the yellow LED on the receiver will go out. A successful teach-in process will be indicated by a green light symbol on the page of the wizard.

2. Perform the teach-in process in the same way for the vertical light grid pair.

Teach-in process unsuccessful

If the teach-in process for a light grid pair has been unsuccessful, the red LED on the relevant receiver will flash rapidly. A red light symbol will be displayed on the page of the wizard.

- In this case, check that the light grid pairs are correctly aligned, that the front screens are clean, and that there are no objects located in the light path.
- Then carry out the teach-in process again.
- Check whether the MLG-2 sender is connected.

Permanently blanking beams (for systems with guiding plates or protective barriers)

If beams are shadowed during the teach-in process, this will be taken into account accordingly for all measurements in future.

Therefore, it is essential that no objects are accidentally located in the light path.

The targeted exclusion of certain beams is only intended for conveying systems with guiding plates or protective barriers, if the latter permanently shadow individual diodes.

Through the teach-in process, VML Prime can be adjusted to the permanently shadowed diodes so that this does not have a disruptive effect on the calculation of measurement values.

In doing so, it does not matter if there are diodes below the guiding plates or not. No measuring points below the guiding plates are required for measuring objects.

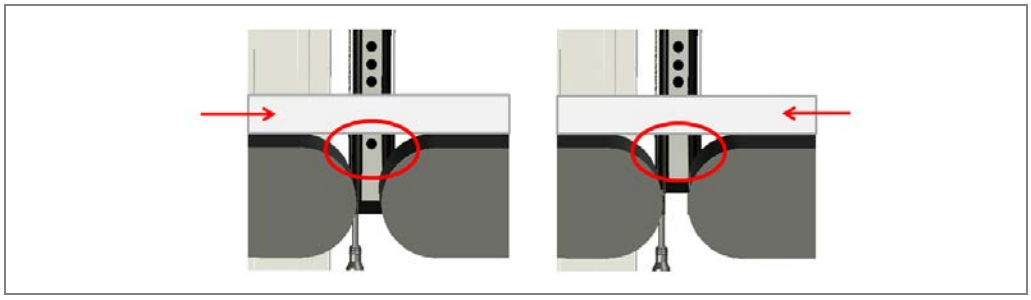


Fig. 128: Permanently blanking beams

The one prerequisite is that the object height to be measured is higher than the guiding plates.

6.4.3 Calibrating light grids in relation to the coordinate system of the conveyor

The position of the light grids in relation to the origin of the conveyor is determined using a reference box.

We recommend using the SICK reference box available as an accessory with the defined dimensions 402 mm x 302 mm x 202 mm. This reference box can be ordered from SICK using part number **SICK PN 4040035**.

The reference box is placed in different positions on the conveyor belt and measured. The wizard determines all key system parameters, such as resolution, detection height, and detection width, from the measured values.

These values only need to be checked for plausibility and then saved.

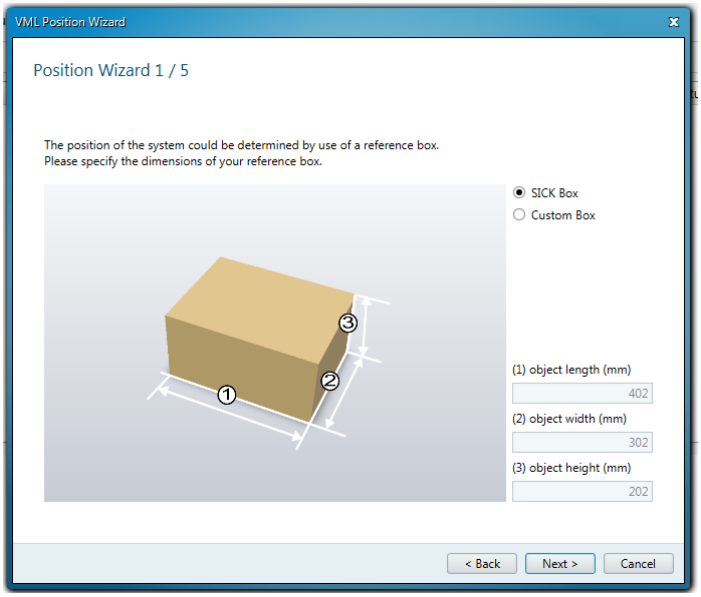
Getting started

➢ Click **Next** to end the successful teach-in process for the light grids. You will end up at the **position wizard**.

Note You can also call up the wizard at a later date in the **System Configuration** workspace via the SOPAS configuration and analysis interface.

Storing the reference dimension for configuration

On the first page of the wizard, specify the size of the reference box.

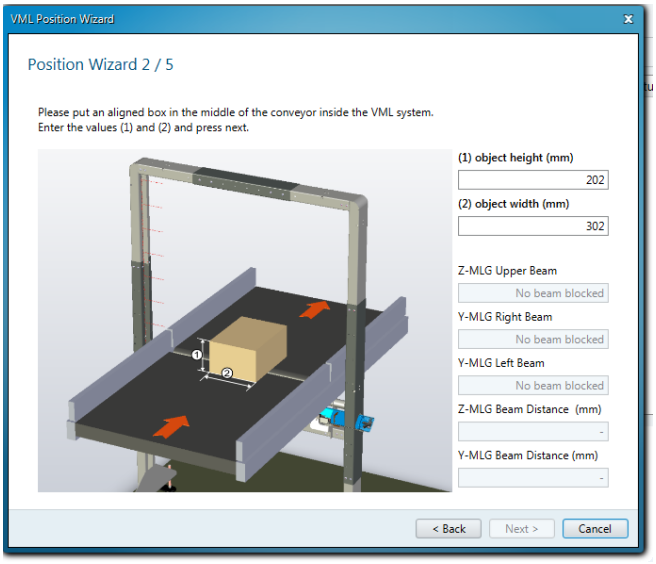


- If you select the **SICK Box** option, the fixed values of the reference box are displayed. They cannot be changed.
- If you select the **Custom Box** option, you must enter the length, width, and height of the box in the fields at the bottom.

Determining the resolution

On the second page of the wizard, the resolution (beam separation) of the light grids used is determined on the basis of the diodes shadowed by the reference box.

1. When the page is called up, the height and width values which are to be measured are specified.

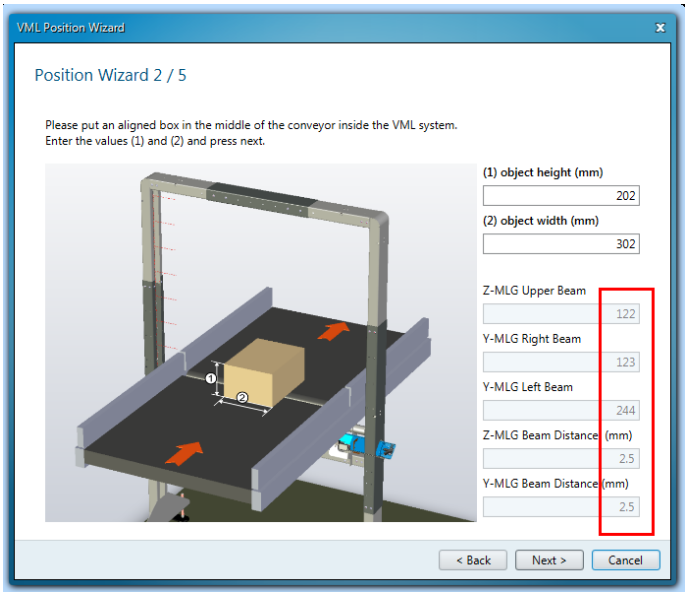


2. Place the reference box on the conveyor belt as described on the page of the wizard.

Note Ensure that the height and width values specified on the page of the wizard correspond to the actual height and width.

- Place the reference box without twisting it.

3. The wizard determines the assignment of the light beams and indicates the last light beam assigned in the z-direction and the first (right) and last (left) light beam assigned in the y-direction (in the conveying direction).
4. The beam separation of the respective light grid pairs is derived from this information.



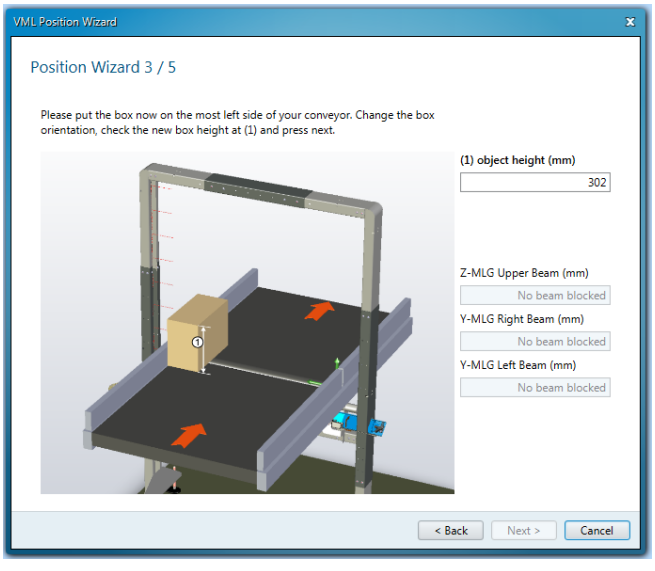
5. Check whether the beam separation has been detected correctly and click **Next** to confirm.

Calibrating the origin

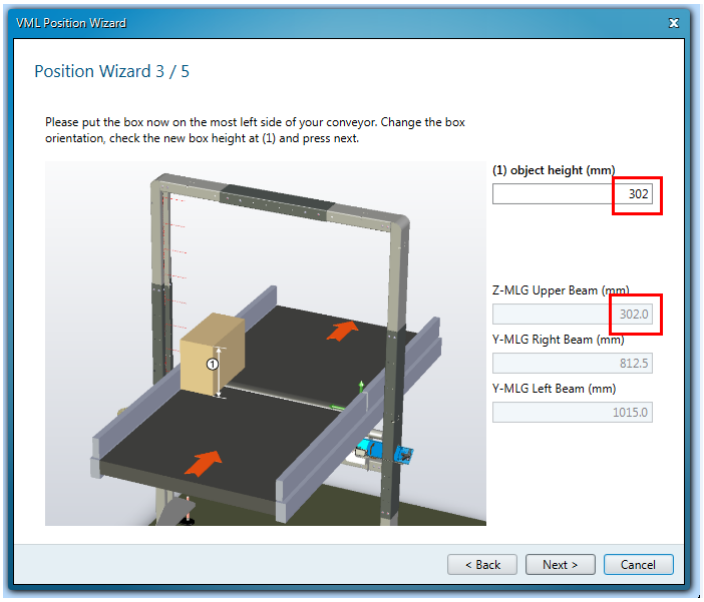
On the third and fourth pages of the wizard, the distances between the shadowed light beams (the uppermost light beam in the z-direction, the right-hand and left-hand light beams in the y-direction) are determined from the system origin. The box is calibrated once from the left-hand edge of the belt and once from the right-hand edge of the belt.

The distances determined relate to a coordinate system in which the conveying surface acts as the zero point for the z-coordinate and the right-hand edge of the belt (when viewed in the conveying direction) serves as the zero point for the y-coordinate.

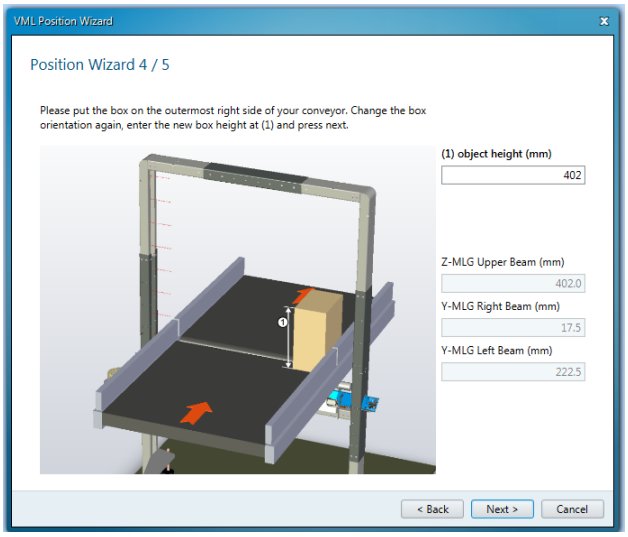
1. When the third page is called up, the height value which is to be measured is specified. No light beams have been assigned yet.



2. Place the reference box on the **left-hand** edge of the conveyor (in the conveying direction) as described on the page of the wizard. Make sure that the specified height value of the box corresponds to the actual box height.



3. Check whether the uppermost beam separation corresponds to the specified box height. The difference between the left-hand and right-hand beam separation must correspond to the actual box width.
4. Click **Next** to confirm your selection.
5. Proceed in the same way on the fourth page. The only difference is that another height value is specified.
6. Place the box on the **right-hand** edge of the conveyor (in the conveying direction) as described.

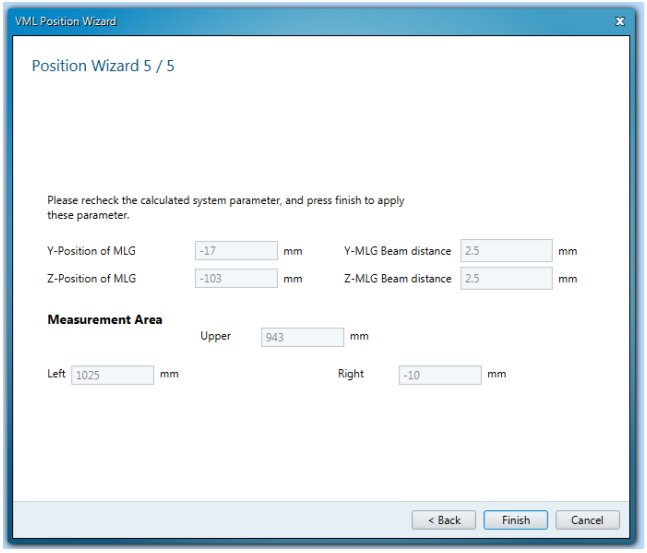


7. Check whether the uppermost beam separation corresponds to the specified box height. The difference between the right-hand light beam and the left-hand light beam must correspond to the actual box width.
8. Click **Next** to confirm your selection.

Defining the measuring range limits

On the fifth page of the position wizard, the measuring range suitable for the conveyor is determined from the values calculated previously.

A distance is factored in on all sides of the measuring range so that excess heights and excess widths can be detected and output.



The values have the following meanings:

Value	Meaning
Y-Position of MLG	Distance factored in for the first diode from the y-zero point (= right-hand edge of the conveyor)
Z-Position of MLG	Distance factored in for the first diode from the z-zero point (= conveyor surface as zero)
Y-MLG Beam distance	Resolution of the horizontal light grid
Z-MLG Beam distance	Resolution of the vertical light grid
Upper	Height of the measuring field in the z-direction (= detection height of the MLG) plus 2 mm.
Left	Width of the measuring field plus 10 mm.
Right	Right-hand edge of the conveying system (= 0) minus 10 mm

Checking the measuring range limits

1. Check whether the calculated measuring range limits are suitable for your requirements.
2. Click **Finish** to confirm the values.

6.4.4 Calibrating the incremental encoder

In this step, the fixed preset encoder settings of the measuring wheel encoder are adjusted to the actual measuring situation on site.

For this, a length correction factor is calculated on the basis of five valid length measurements of the reference object. This is used to correct mechanical influences on the measurements (caused by slip, for example).

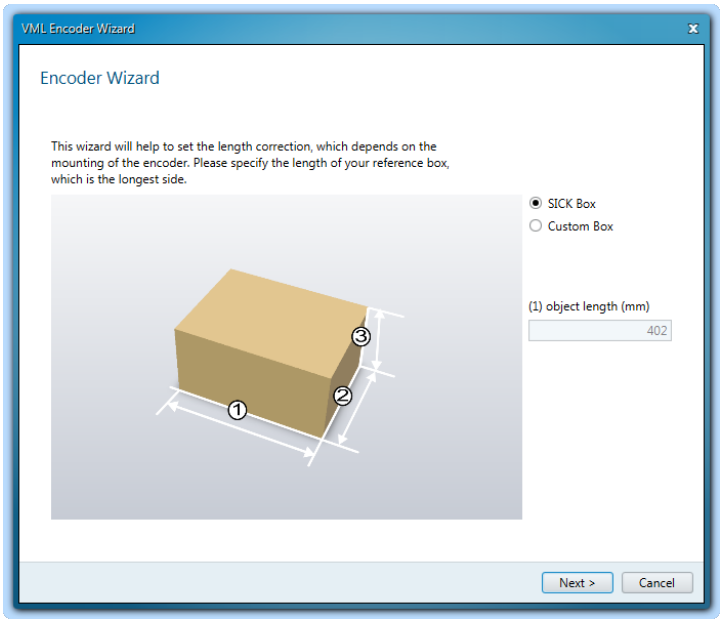
Getting started

➢ Click **Finish** to quit the position wizard. You will end up at the encoder wizard.

Note You can also call up the wizard at a later date in the **System Configuration** workspace via the SOPAS configuration and analysis interface.

Storing the reference dimension for configuration

On the first page of the wizard, specify the length of the reference box.



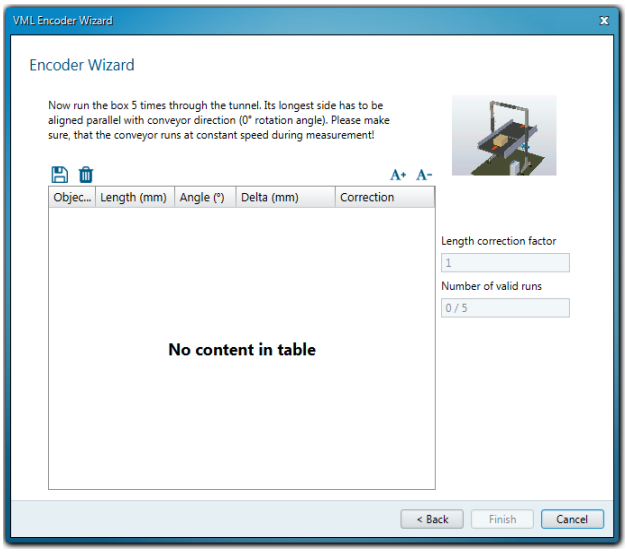
➢ If you select the **SICK Box** option, the length of the reference box is fixed. It cannot be changed.

➢ If you select the **Custom Box** option, you must enter the length in the length field.

Determining the correction value

On the second page of the wizard, the correction value for the length calculation is specified.

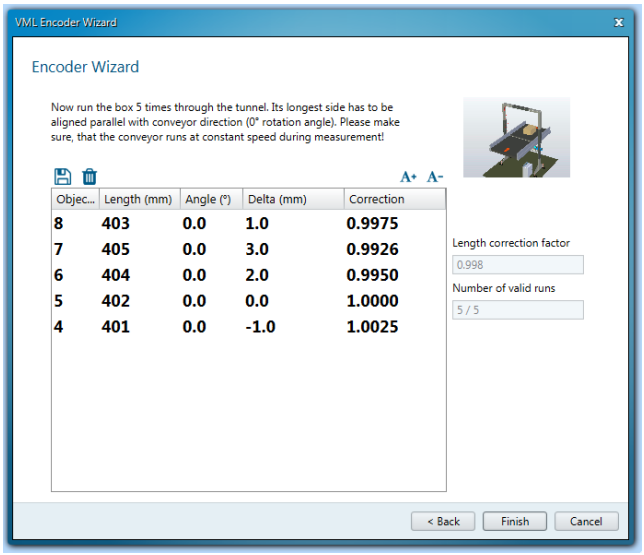
1. When the page is called up, no measured values are displayed yet. The **Length correction factor** field contains the factor **1**.



2. Measure the reference box several times in a row.

Note Make sure that the long side of the box is guided through the light grids parallel to the conveying direction and at a constant speed.

3. The measurement results are listed in a table. The number of valid measurements is incremented.



4. Take the deviation between the measured length value and the actual length value from the **Delta (mm)** column. The **Correction** column specifies the relevant factor with which the measured length value is corrected to obtain the actual length.

   The average correction value generated using the measurements is displayed in the **Correction** field.

Completing the optimization of the length measurement

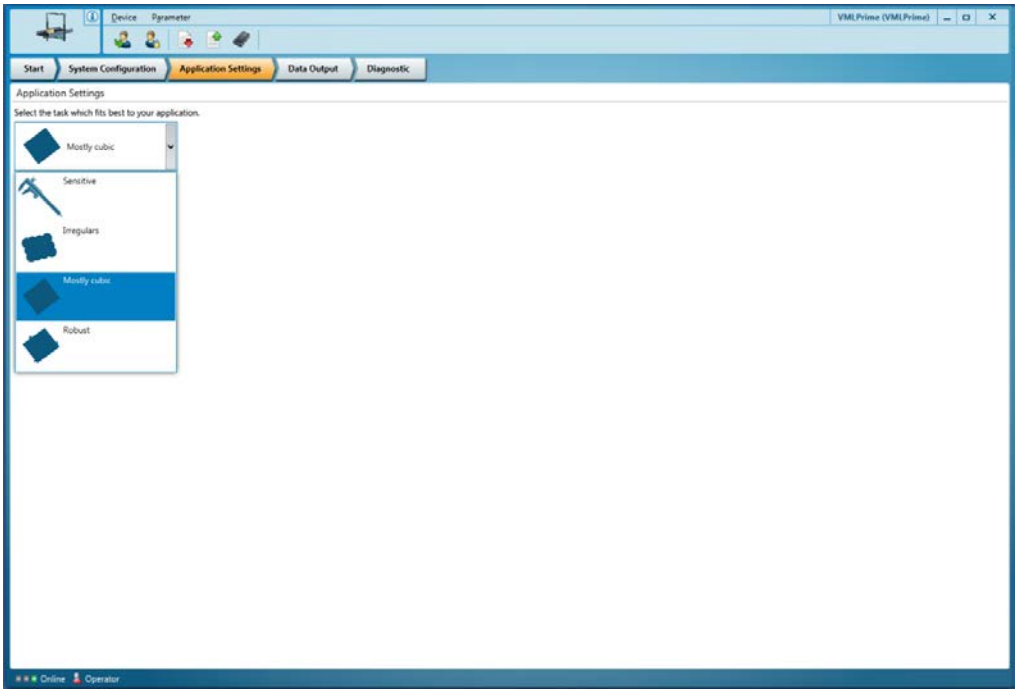
If five valid measurements are available, the optimization of the length measurement can be completed.

➢ Click **Finish**.

The wizard closes. You will receive a notification informing you that you must continue with the commissioning in the **Application Settings** workspace.

6.4.5 Specifying the system environment

Specify the system environment in the **Application Settings** workspace. Specify which type of objects you are measuring primarily and determine the filter for the calculation logic in the MSC800 in line with this.



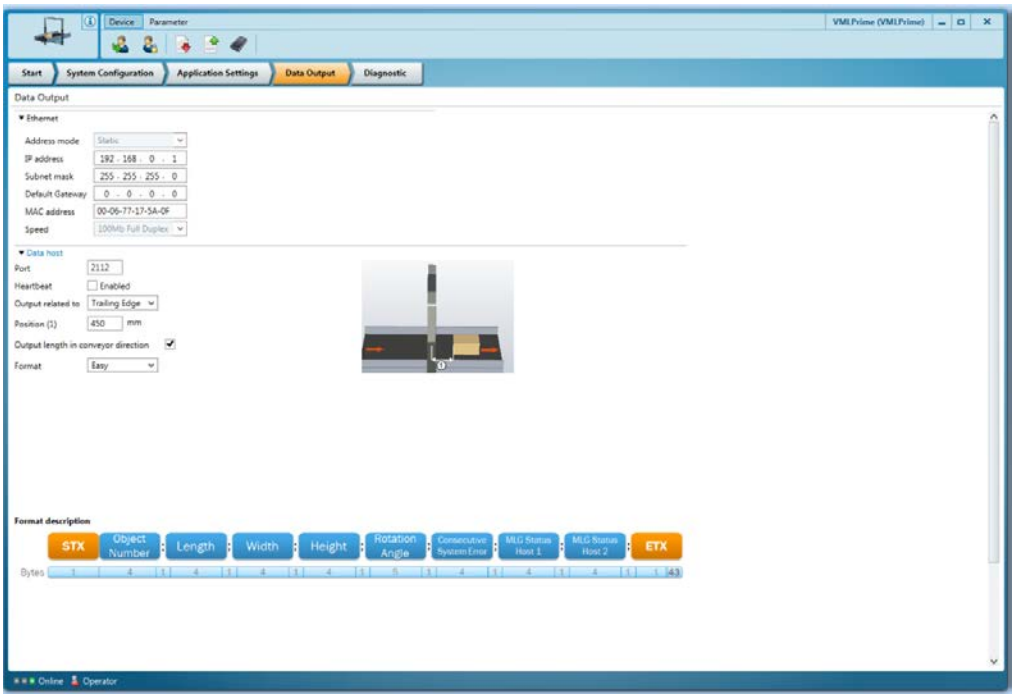
In addition to the properties of the objects, the treatment of protrusions, such as straps, film remnants, or tape, also influences the calculation logic. The VML Prime volume measurement system detects protrusions on the object and can include or ignore these in the volume measurement.

➢ Select the appropriate filter setting. The filters are listed from weak to strong. The default setting is **Mostly cubic**.

- **Sensitive**: Protrusions are also included in the calculation.
- **Irregulars**: In addition to cuboid objects, the filter setting also takes objects of virtually any shape into account.
- **Mostly cubic**: The filter setting assumes primarily cuboid objects.
- **Rugged**: The filter masks protrusions or indistinct corners and edges.

6.4.6 Configuring the data output

In the **Data Output** workspace, you can configure the data interface and the format for outputting the measurement results to the higher-level system.



The MSC800 is essentially set up as a server within the network. This means that the measurement results are initially buffered and retrieved by the client computer. The TCP/IP network protocol is used.

Configure the data interface in the **Ethernet** area. A static address is used for the MSC800 by default.

1. In the **IP address** field, specify the IP address at which the MSC800 can be reached in the customer's network. The field contains the preassigned default IP address 192.168.0.1. If necessary, change the IP address accordingly.

Note If necessary, connect to the MSC800 again.

2. Enter the valid subnet mask.
3. If necessary, add information about the IP address of the gateway if a connection is to be established outside the target network.

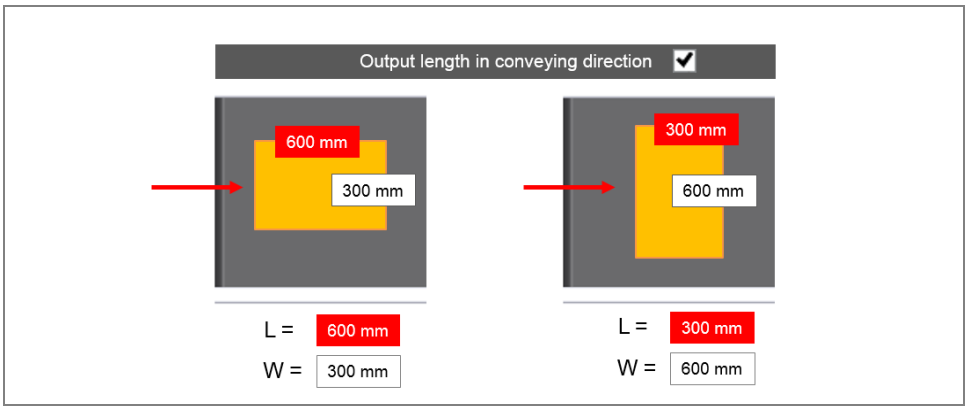
In the **Data host** area, configure the scope of the data output.

1. Specify the **Port** via which the connection from the client to the MSC800 server is to be established. We recommend the freely configurable port 2112. Change this accordingly.
2. If a data telegram for monitoring the connection between the MSC800 (server) and the client is to be output in addition to the measurement results, tick the **Heartbeat** checkbox. Specify the interval in seconds in which the data telegram is to be output.

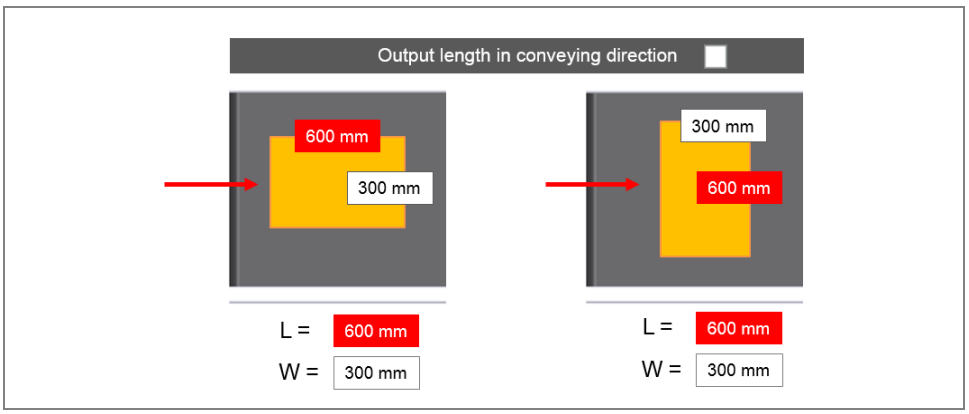
3. Define the reference point of the data output and the output time using the **Output related to** and **Position (1)** fields.
   - The data output time is usually related to the **trailing edge** of the object. This is also the default setting. In this case, the information in the **Position** field calculates the output time as a distance value from the trailing edge to the measuring range.

     The output time therefore depends on the object length.
   - If the reference point for the data output is switched to the **leading edge**, you must take the object length into account when specifying the distance value. The distance value must not be smaller than the maximum object length plus the calculation time for the path of 300 ms.

     Select this setting if you wish to always have the same output time, regardless of the object length.
4. The **Output length in conveyor direction** checkbox is ticked by default. This means that the length of the object is always determined in the conveying direction, even if this is not the longest side of the object.



If you untick the checkbox, the VML Prime determines the longest side, regardless of the orientation of the object on the conveyor belt.

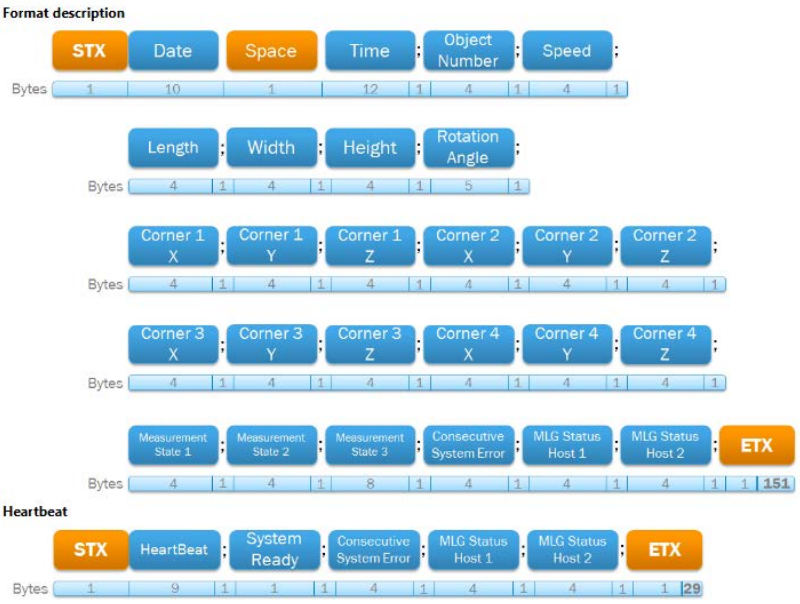


5. Determine the scope of the output in the **Format** field using the **Easy** and **Expert** entries. The character string of the select output format in described in detail in the lower area with the number of bytes.

6. Use the illustration to find out the bytes in which the information relevant to you is supplied. Note the order of the measured values within the character string.

   A character is saved in a byte. The individual values are separated by a semicolon within the character string.

7. In the **Expert** format, more information is provided.



Note If you have enabled **Heartbeat**, this is broken down in both output formats in the character string.

6.4.7 Saving the configuration permanently in devices

If you are connected to the system via SOPAS, all the changes to the configuration are transferred to the devices and applied immediately. However, they are only saved in the devices' volatile memory.

Saving the configuration permanently

- To save the configuration permanently in the device, click the **Permanently Save Parameters** icon in the SOPAS toolbar.

  The configuration for all devices in the system is saved in one step.

The configuration saved permanently in the devices is loaded each time the devices are restarted.

Saving the configuration on the configuration PC

You can also save the configured and displayed settings as a file on your PC. The settings within this file can be loaded subsequently (if required) and transferred to the device.

1. In the configuration and analysis interface, click on the **Device** menu item and select the **Export** command.
2. Select a directory and file name and then confirm your choice.

6.5 Performing a test run

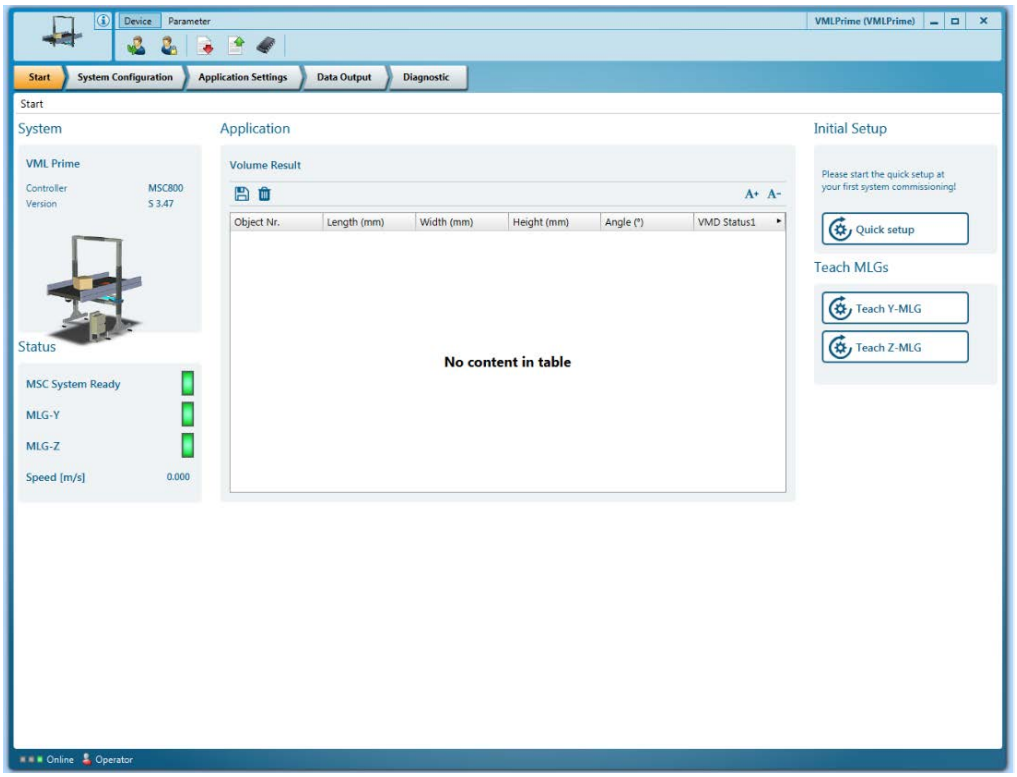
Finish commissioning the system by performing a test run. The test run must make sure that VML Prime is working correctly and that it is delivering plausible measured values.

➢ Use a reference box to test the measurement accuracy of the system.

Getting started

1. Go to the **Start** workspace in the configuration and analysis interface.
2. The measurement results from the encoder correction factor calculation are displayed in the **Application** area.

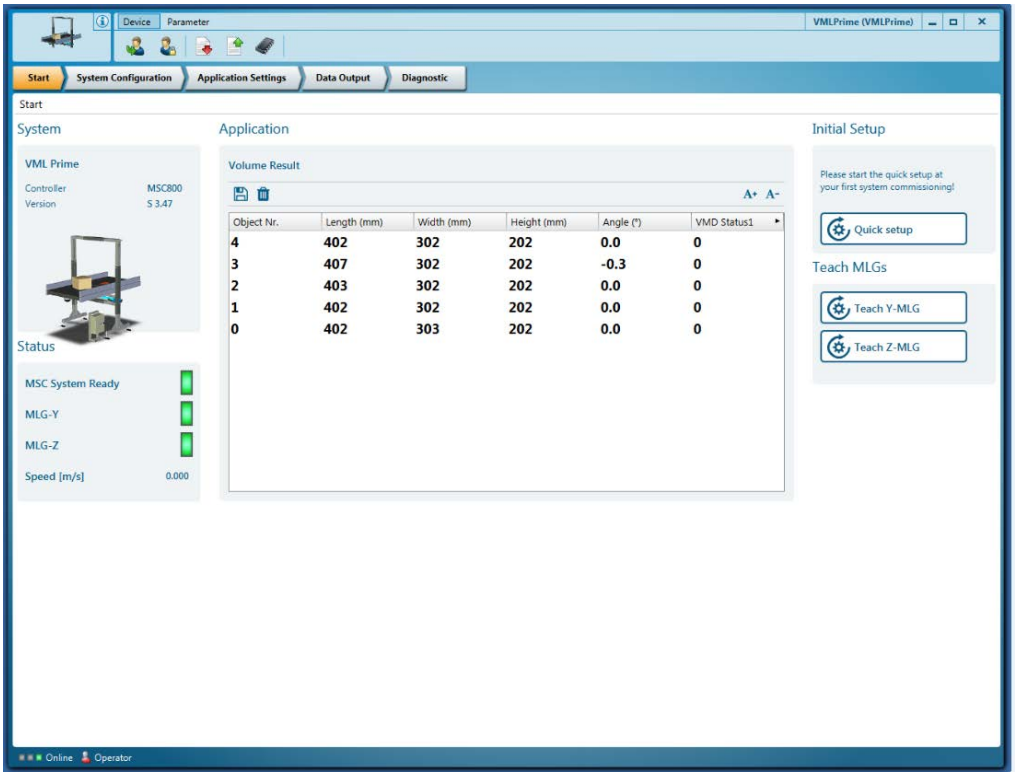
3. If you click on the delete icon, all measurement results will be removed from the **Volume Result** table.



Checking the measurement results

➢ Measure the reference box at various orientations and positions on the conveyor belt. Placing the reference box on the left-hand and right-hand sides of the conveyor belt and in the middle is sufficient.

The measurement results from the measuring runs are listed line-by-line in the **Volume Result** table.



This list can be used to verify the measurement accuracy of the system.

- ➢ Make sure that the calculated measured values are within the tolerance range.
- ➢ Make sure that the measured values are also correct for all orientations of the object.

Displaying the status

If the measurements are free of errors, a value of **0** appears in the **VMD Status 1** column.

If there is an incorrect measurement, further information on the error can be provided by the status value.

- ➢ For this, show the **VMD Status 2** and **VMD Status 3** columns using the arrow button in the table header.
- ➢ The table in the appendix shows how you can decode the errors using the numerical code (see chapter **9.4 Error codes (VMD** status)).

If no dimensions are calculated

If no dimensions are calculated, proceed as follows:

- ➢ Check that the system has been cabled correctly.
- ➢ Ensure that the signal ground of the measuring wheel encoder and the trigger is switched on.
- ➢ Check that the **encoder parameters** have been determined correctly.

6.6 Optimizing the measurement results

If necessary, the measurement results can be optimized even further.

6.6.1 Optimizing the height measurement

In the example, we can see that the height measurement does not fall within the tolerance limit. Here, the reason for this is that the vertical light grid is mounted too low. As the first diode is below the conveyor belt, and the height is determined from the furthest shadowed diode from the bottom diode, the measurement result displayed is too high.

The height measurement can be adjusted by adjusting the z-coordinate in the coordinate system. In the example, the z-axis is moved upward by 18 mm (reference value – actual value) so that it is at the same height as the conveyor belt.

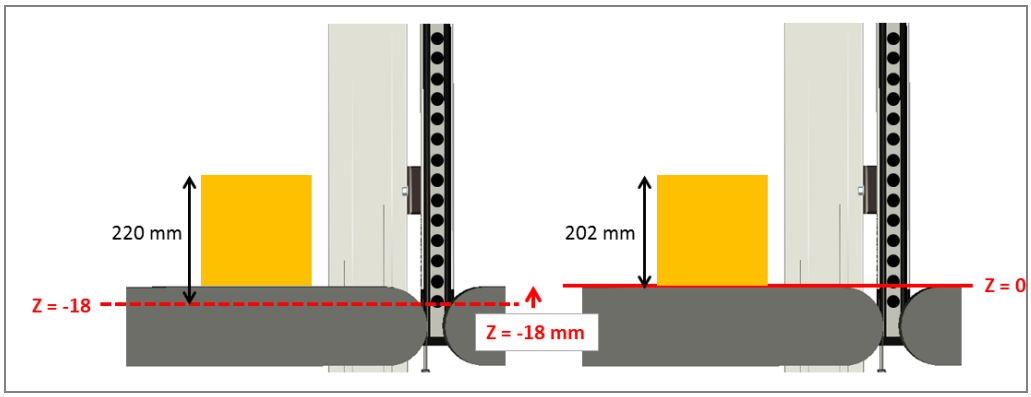
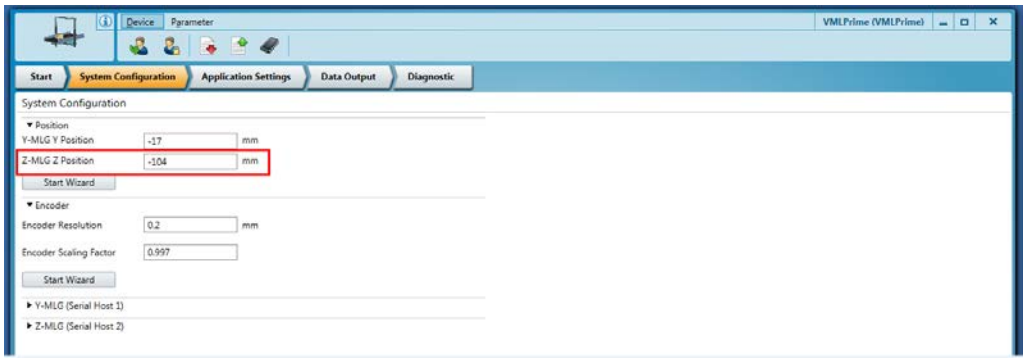


Fig. 129: Optimizing the height measurement

➢ Go to the **System Configuration** workspace in the SOPAS configuration and analysis interface and adjust the **Z-MLG position**.



As a rule, the following applies:

➢ If the measurement result is smaller than the actual height value, reduce the z-coordinate (+X mm).

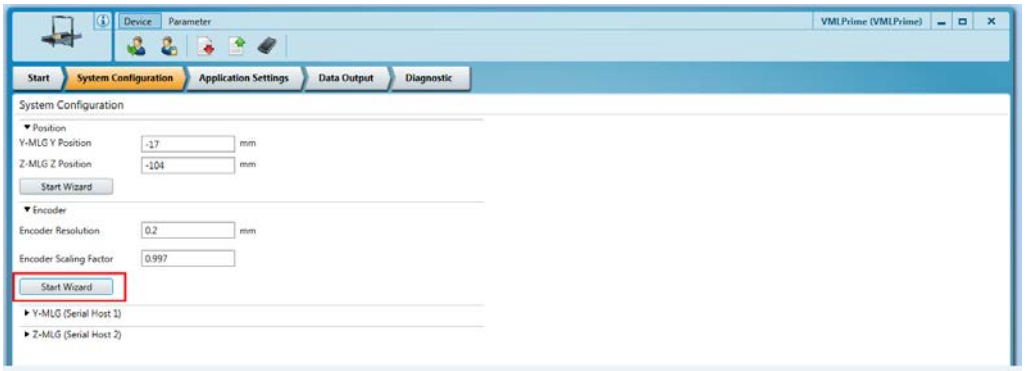
➢ If the measurement result is larger, increase the z-coordinate (-X mm).

6.6.2 Optimizing the length measurement

If a systematic length error occurs, the length correction factor of the incremental encoder may need to be adjusted.

Note Do **not** change the factor manually in the System Configuration workspace.

Call up the **VML encoder wizard** and correct the factor by carrying out new measurements of the reference object (see chapter **6.4.4 Calibrating the** incremental encoder).



6.6.3 Optimizing the width measurement

The width values determined should not require measurement calibration if the light grids have been correctly mounted and aligned.

If deviations from the required width of the reference box should arise, however, this could be a result of misalignment of the two horizontal MLG-2 components in the y-direction.

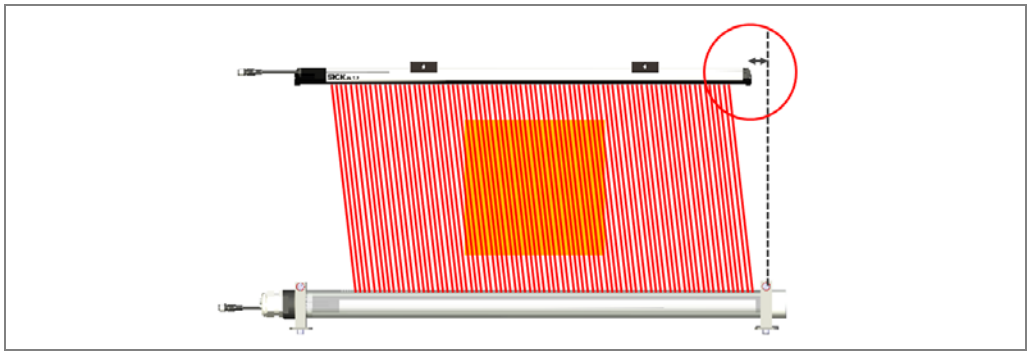


Fig. 130: Optimizing the width measurement

This would mean that although the beam still hits the receiver diodes due to beam expansion in this case, it does not do so at the perpendicular angle required. Due to the inclination of the light beams, an object might shadow more diodes than if the beam were pointing in a vertical direction, resulting in a deviation in the width measurement.

➢ Check the mechanical structure of measurement assembly and correctly align the horizontal components with the y-axis.

7 Maintenance

In general, the system components are maintenance-free. Specific maintenance intervals must be observed in respect of the optically relevant surfaces of the light grids and the rotating parts of the encoder.

NOTE

Legal-for-trade mode

When operating a calibratable system, the position of the measurement system must not be changed during maintenance work.

The seals must not be broken. If seals are broken, the system can no longer be operated as calibratable or be used for billing purposes.

The following maintenance work must be carried out at the specified time intervals:

Device	Maintenance task	Interval *	Carried out by
MLG-2	Clean the front screen of the sender and receiver	1x/month	Trained personnel
Measuring wheel encoder	Visually inspect the measuring wheel encoder for signs of measuring wheel wear and check the contact between the measuring wheel and conveyor belt	4x/year	Trained personnel
Separate photo-electric sensor	• Clean the light emission window and reflector • Visually inspect the photoelectric retro-reflective sensor and reflector for rotation that may have occurred as a result of touching or similar	4x/year	Trained personnel
Cleaning unit	• Clean the surface of the plastic pipes	1x/month	Trained personnel
Fan	• Clean the housing surface	4x/year	Trained personnel
	• Change the filters	4x/year	Trained personnel
General	Visually inspect the electrical cabling and wiring for damage	1x/year	Specialist
	Check the measurement accuracy	1x/year	Specialist
	Carry out a functional test with a reference object	Whenever the system is started	Trained personnel
The intervals depend on the ambient conditions, the mounted cleaning unit, and the degree of contamination. In addition, the intervals must be defined according to how significant they are for the customer process.			

Tab. 20: Maintenance intervals

7.1 Maintenance during operation

7.1.1 Visual inspection of the cables

Regularly check the electrical installation. Check that all cable connections are securely attached.

WARNING

Loose connections or scorched cables

➢ Defects such as loose connections or scorched cables must be rectified immediately.

HAZARD

Damaged cable insulation

There is a risk of electrocution if the insulation of the connecting cables is damaged.

7.1.2 Light grid

The MLG-2 modular light grid is maintenance-free. Depending on the ambient conditions, regular cleaning is required. Depending on the ambient conditions of the MLG-2, the front screens must be cleaned regularly and in the event of contamination.

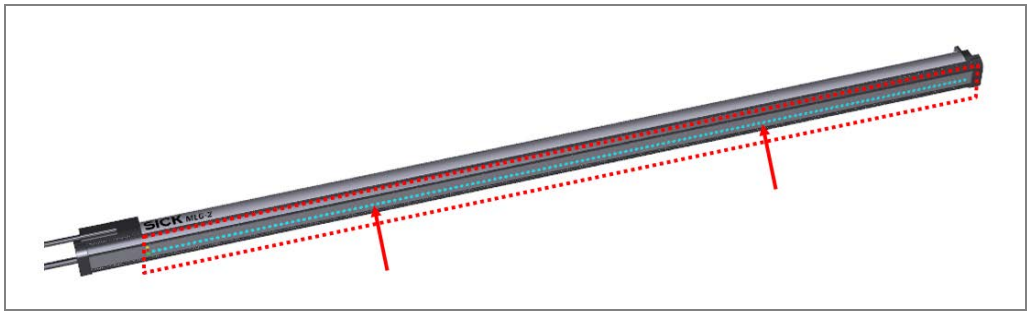


Fig. 131: Cleaning the light grids

Contamination message

3 Hz yellow

The MLG-2 light grid has a contamination warning which is indicated via a flashing yellow light emitting diode on the receiver.

The yellow LED also displays the same flashing behavior during the teach-in process.

The contamination message is also displayed in the SOPAS software and can be depicted accordingly via the communication protocol.

Recommendation

Static charges cause dust particles to stick to the front screen. You can reduce this effect by using a SICK anti-static plastic cleaner (part number 5600006) and a SICK lens cloth (part number 4003353).

How to clean the front screen

- ➢ Use a clean, soft brush to remove dust from the front screen.
- ➢ Then wipe the front screen with a clean, damp cloth.
- ➢ Check the position of the sender and receiver after cleaning.
- ➢ Perform the teach-in process on the MLG-2 again. Start SOPAS configuration software and establish a connection to the system. A wizard for teaching in both light grids is available on the start page of the configuration and analysis interface.

NOTE

Damage to the front screen

The front screen is made of plastic. The optical output is weakened by scratches and streaks on the front screen.

- ➢ Do not use aggressive cleaning agents.
- ➢ Do not use abrasive cleaning agents.
- ➢ Avoid scratching and chafing motion on the front screen.

NOTE

Do not move the light grids from their position

The light grids must not be moved from their position during cleaning.

- ➢ Do not apply too much pressure to the light grids when cleaning.

7.1.3 Cleaning unit components

7.1.3.1 Cleaning the IPG2 protective pipe

When using the cleaning unit with protective pipe, you must clean the pipe regularly.

Depending on the ambient conditions, the Plexiglas must be cleaned regularly and in the event of contamination. Cleaning is predominantly required at the areas where the light beams are directed vertically upward through the Plexiglas to the receiver diodes.

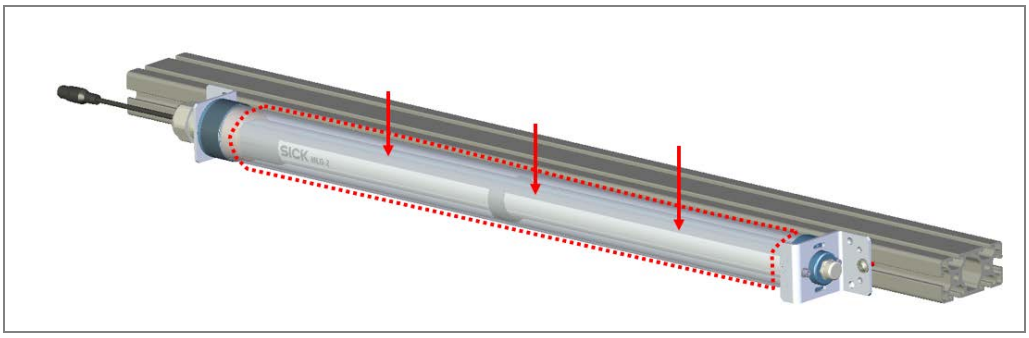


Fig. 132: Cleaning the protective pipe

Recommendation

Static charge may cause dust particles to stick to the Plexiglas. You can reduce this effect by using a SICK anti-static plastic cleaner (part number 5600006) and a SICK lens cloth (part number 4003353).

How to clean the front screen

- ➢ Use a clean, soft brush to remove dust from the plastic pipe.

- Then wipe the plastic pipe with a clean, damp cloth.
- Perform the teach-in process on the MLG-2 again. Start SOPAS configuration software and establish a connection to the system. A wizard for teaching in both light grids is available on the start page of the configuration and analysis interface.

NOTE

Damage to the Plexiglas

The pipe is made of plastic. The optical output is weakened by scratches and streaks on the Plexiglas.

- Do not use aggressive cleaning agents.
- Do not use abrasive cleaning agents.
- Avoid scratching and chafing motion on the surface.

NOTE

Do not move the plastic pipe from its position

The plastic pipe with the MLG-2 mounted inside must not be moved from its position during cleaning.

7.1.3.2 Changing the air filter mat

Change the air filter mat of the fan in accordance with the respective maintenance interval.

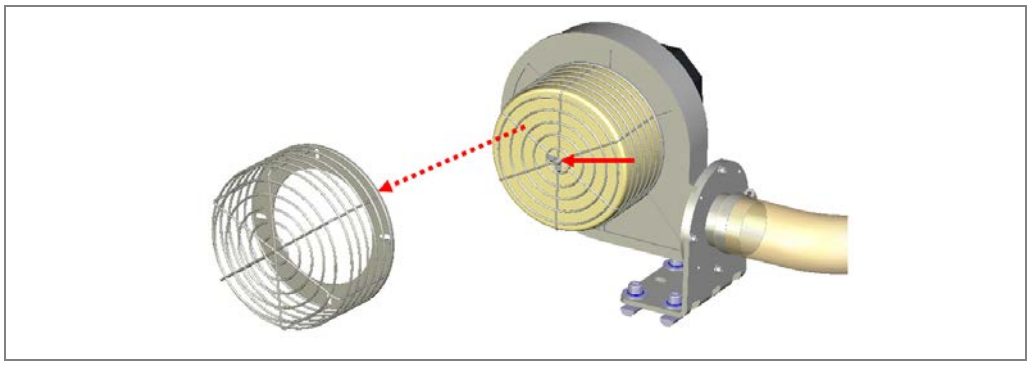


Fig. 133: Changing the air filter mat in the cleaning unit

1. Loosen the wing nut.
2. Remove the air filter mesh.
3. Remove the air filter mat and replace it.
4. Mount the air mesh and tighten the wing bolt.

7.1.4 Measuring wheel encoder

Make sure that the incremental encoder is in direct and secure contact with the drive technology and that the measuring wheel is not slipping as it turns.

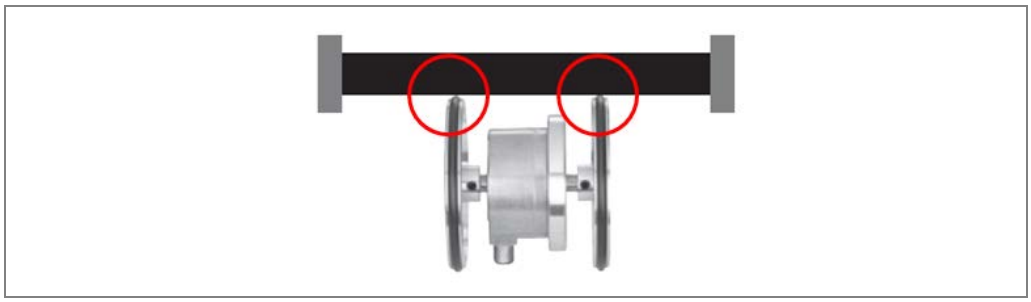


Fig. 134: Visual inspection of measuring wheel encoder

- ➢ Check the level of wear on the measuring wheel.
- ➢ If it is so badly worn that contact with the conveyor belt is impaired, the entire measuring wheel encoder must be replaced.

7.1.5 Photoelectric retro-reflective sensor

Contamination can result in faulty switching behavior.

- ➢ Remove any contamination on the optical surfaces of the sensors to prevent faulty switching behavior.
- ➢ Check the screws and plug connectors at regular intervals.
- ➢ Check that the photoelectric sensor and reflector are correctly aligned.

7.2 Replacing components

Faulty or damaged components must be dismantled and replaced with new or repaired components. All customer-specific parameters are stored on the microSD card for the MSC800.

Therefore, components can be easily replaced without involving a qualified electrician or trained personnel.

NOTE

Repair work on the individual components may only be performed by qualified and authorized service personnel from SICK AG.

HAZARD

Disconnect the power to the system

- Make sure the power supply for the entire system is disconnected throughout the entire time that you are carrying out maintenance and repair work.

HAZARD

Risk of injury due to electrical current

Only a qualified electrician or trained person working under the guidance and supervision of a qualified electrician is permitted to work on electrical systems or equipment, and they must comply with the electrical regulations.

7.2.1 Replacing light grids

In principle, individual components of a light grid pair can be exchanged.

NOTE

Claims under the warranty rendered void

Do not open the device housing. The devices are sealed.

None of the parts inside it need to be maintained or replaced.

If the device is opened, any warranty claims against SICK AG will be void.

NOTE

Legal-for-trade mode

For calibratable systems, the customer may not replace the light grid.

The light grid seals must not be broken. If a seal is broken, the system can no longer be operated as calibratable or be used for billing purposes.

- Please contact the manufacturer if repair is needed.

Removing cabling

- When replacing the sender unit, unscrew the extension cable from the cable connector on the sender.
- When replacing a receiver unit, unscrew the tee connector from the cable attachment on the receiver.

7.2.1.1 Replacing MLG

Light grids, which are clamped directly in a QuickFix bracket, are removed from the bracket and replaced with the new device.

The following procedure applies to both item frames and steel frames.

Removing the MLG from the QuickFix bracket

1. Slightly unscrew the fixing screw on the QuickFix bracket.
2. Undo the clamps and take the components out of the two brackets. The brackets remain mounted on the mounting frame.

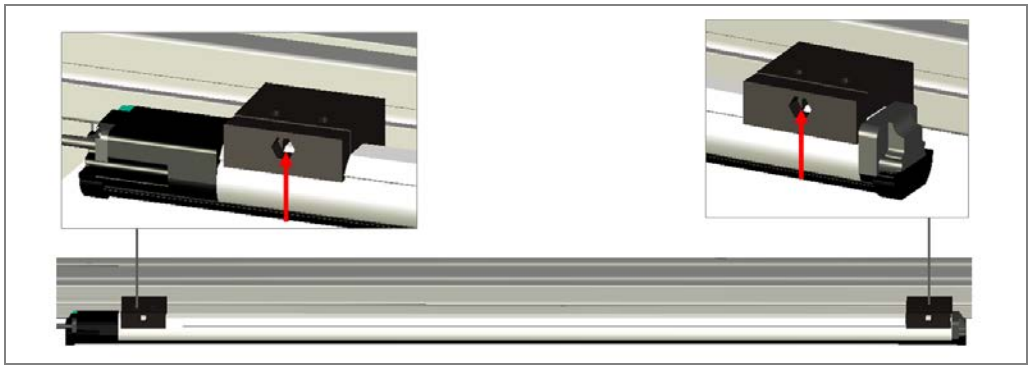


Fig. 135: Removing the MLG from the QuickFix bracket

Mounting the replacement device

Mount the replacement device in the reverse order.

1. Insert the replacement sender or receiver unit in the QuickFix brackets on the mounting frame. Make sure that the head of the QuickFix bracket is placed exactly in the MLG-2 housing slot.
2. Attach the two QuickFix brackets to the component housing. Push the two parts of the bracket together until you hear a click.
3. Screw the Allen screw into the sliding nut.
4. Make sure that the components are hanging centrally above the conveying surface. In the case of vertical components the first diode should be approx. 2 mm above the conveying surface.
5. Re-establish the connection to the connecting cables.

7.2.1.2 Replacing the protective pipe with MLG

If the IPG2 protective pipe is being used, the MLG-2 must be removed. The procedure is illustrated for side mounting of the protective pipe on the item profile. The same applies to the steel frame.

Removing the protective pipe

1. Loosen and remove the two fixing screws from the slot in the upper bracket.
2. Undo the fixing screw on the upper bracket and move the bracket within the profile slot out of the protective pipe in the y-direction.

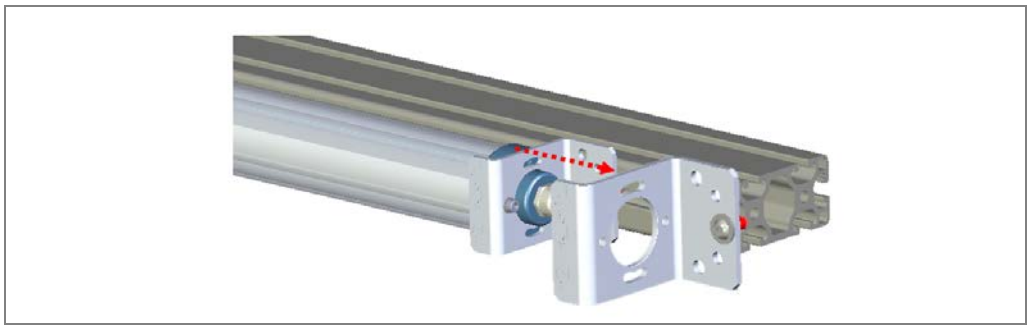


Fig. 136: Removing the protective pipe

Note Hold the protective pipe with one hand.

3. Pull the protective pipe out of the cable-side bracket.

Removing the light grid from the protective pipe

For removal, the assembly procedure is performed in reverse order. Detailed information can be found in chapter **4.3.3.1 Installing the MLG in** the protective pipe.

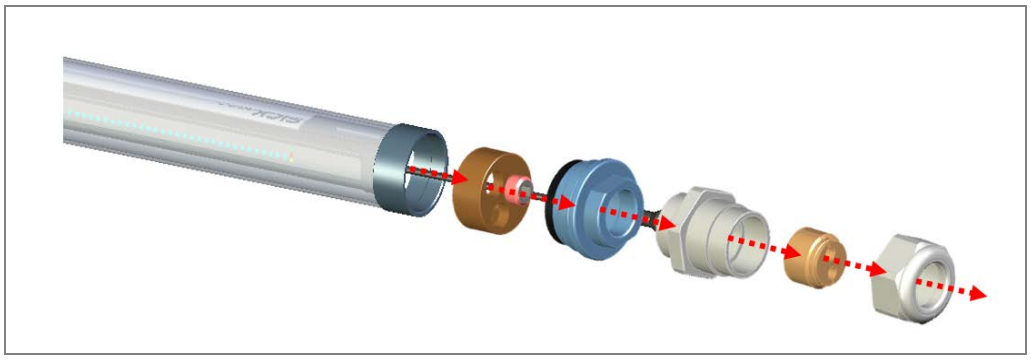


Fig. 137: Removing the light grid from the protective pipe

1. Screw the nut from the cable gland on the cable-side end.
2. Remove the seal insert.
3. Screw the cable gland from the end cap.
4. Undo the setscrew in the centering device.
5. Remove the end cap.
6. Pull the centering device out of the protective pipe.
7. Disconnect the centering device from the connecting cable.
8. Pull the light grid out of the protective pipe.
9. Remove the spacer.

Installing the replacement device

Install the replacement device in the protective pipe in reverse order.

7.2.1.3 Subsequent work

After a light grid has been replaced, we recommend performing the following steps:

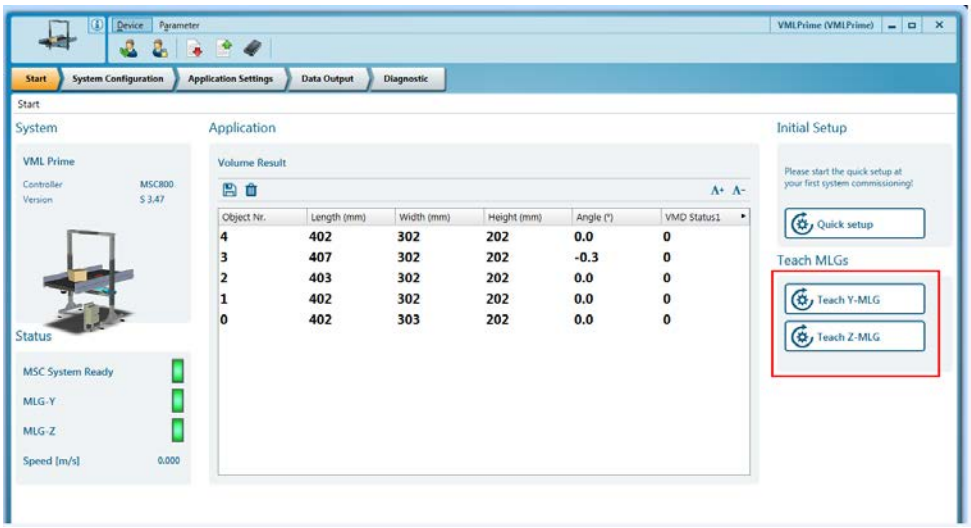
Alignment

➢ Align the replacement grid correctly. You must make sure that the light grid beams are on a single plane and that the emitted beams exactly fall on the relevant diodes of the receiver unit.

The procedure for aligning the components is described in chapter **4.3.4 Fine adjustment of** the light grids .

Testing operational readiness

1. Switch the voltage supply inside the controller cabinet back on.
2. Check that the green status LED lights up after approx. 40 seconds.
3. Move an object into the detection range. The yellow LED must light up on the receiver.
4. Perform the teach-in process on the MLG-2 again. Start SOPAS configuration software and establish a connection to the system. A wizard for teaching in both light grids is available on the start page of the configuration and analysis interface.

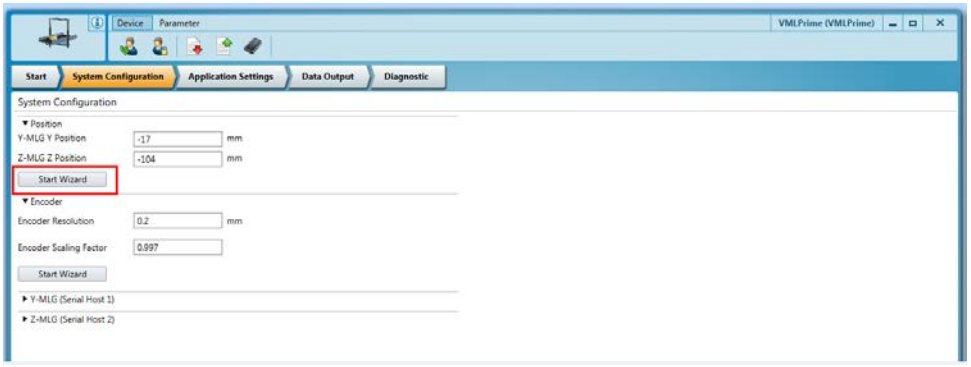


Running through the commissioning wizard (recommended)

We recommend calling up the position wizard on the SOPAS configuration and analysis interface and running through it again.

This will ensure that optimum measurement results are also achieved after the component has been replaced.

1. Switch to the **System Configuration** workspace.
2. In the Position area, click the **Start Wizard** button.



Additional information can be found in chapter **6.4.3 Calibrating light grids in relation to the coordinate** system of the conveyor.

Performing a test run

➢ Start a test run with the reference object and check whether the VML Prime measuring system is providing plausible measurement results.

7.2.2 Replacing the fan

The replacement device is supplied with a pre-mounted bracket.

Removing the fan

1. Unscrew the connecting cable from the cable connector on the fan.
2. Undo the bracket and remove the connecting hose from the fan couplings.

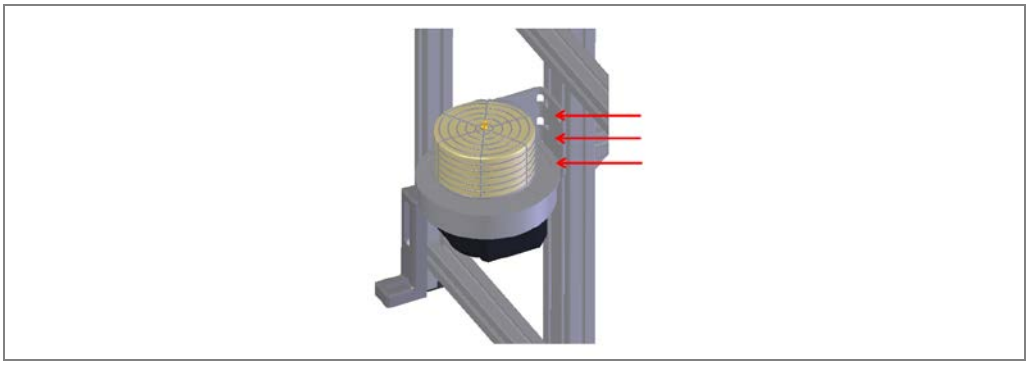


Fig. 138: Replacing the fan

3. Undo the fixing screws on the bracket and remove the fan with its bracket from the mounting frame.

Mounting the replacement device

1. Mount the replacement device on the mounting frame in the reverse order.
2. Tighten the fixing screws and check that the device is securely attached.
3. Place the connecting hose on the fan couplings and screw the hose connection into place.
4. Plug the connecting cable into the female connector of the cable connection and screw the M12 plug connector into place.

7.2.3 Replacing components in the control cabinet

7.2.3.1 Replacing the MSC800

NOTE

VML520 MID or VML520 MID-s

With the VML520 MID or VML520 MID-s calibratable systems, the customer may not remove or replace the controller.

➢ Please contact the manufacturer if repair is needed.

HAZARD

Risk of injury due to electrical current

The power supply unit of the controller cabinet is connected to the power supply (AC 100 ... 264 V / 50 ... 60 Hz).

➢ Standard safety requirements must be met when working on electrical systems.

Note

➢ Before removing the controller, you should make a note of how the cables are assigned to the connections.

Removing connecting cables

1. Switch off the controller supply voltage.
2. Unplug the connected Ethernet cable (1) from the female connector.

Fig. 139: Unplugging the cables and terminal blocks from the controller

3. Unplug the terminal blocks (2), together with the cabling, from the controller slots.

Note

Make sure that no wires are pulled out from the terminal blocks.

Removing the controller

1. Undo the controller fixing screw (3) on the left-hand side.
2. Pull the controller to the right and then remove it from the control cabinet.
3. Remove the microSD card from the slot (4) in the controller that has been removed.

Installing the controller

1. Insert the microSD card that you have removed into **Slot SD 1** on the new controller.
2. Insert the new controller in the control cabinet.
3. Pull it to the left and use the fixing screw to secure it in the control cabinet.
4. Place the terminal blocks, together with the cabling, back inside the designated slots.
5. Plug the Ethernet cables into the designated connectors.
6. Check the switch positions of the micro switches between the terminal blocks. Set them to the same positions as the switches on the controller that has been removed (signal ground).
7. Switch the controller supply voltage back on. The controller starts and, after initialization, loads the parameter set from the memory card to the permanent parameter memory of the logic unit.

7.2.3.2 Replacing the battery in the MSC800

NOTE

Legal-for-trade mode

For calibratable systems, the customer may not replace the battery.

➢ Please contact the manufacturer if repair is needed.

A battery powers the real-time clock of the MSC800. The battery must be replaced when drained.

Fig. 140: Position of the battery in the MSC800 controller

1. Remove the black plastic cover on the MSC800.
2. Remove the battery from the holder and replace it with a new type 2032 CR battery.
3. Reattach the black plastic cover.
4. Dispose of the old battery as hazardous waste in accordance with the RoHS guidelines (Europe).
5. Set the system time again using the SOPAS software (**project tree → MSC800 → System → REAL-TIME CLOCK area**).

7.2.3.3 Replacing the power supply unit

HAZARD

Risk of injury due to electrical current

The power supply unit of the controller cabinet is connected to the power supply (AC 100 ... 264 V / 50 ... 60 Hz).

➢ Standard safety requirements must be met when working on electrical systems.

Note

➢ Before removing the power supply unit, you should make a note of how the cables are assigned to the connections.

Removing the power supply unit

1. Switch off the MSC800 supply voltage.
2. Undo and disconnect all cables from the power supply module (1).

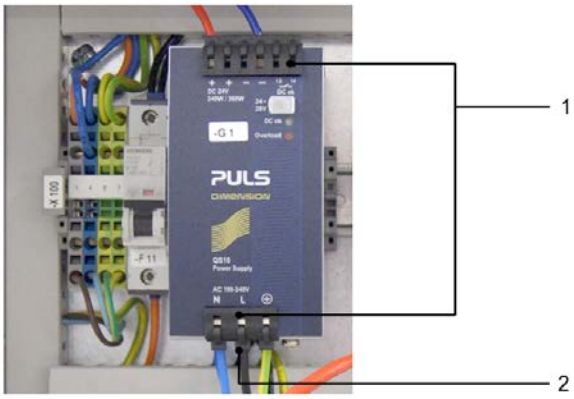


Fig. 141: Disconnecting the cables from the controller power supply unit

3. Release the defective power supply module from the control cabinet of the controller. To do this, use a suitable screwdriver to slide the black clip forward on the bottom of the power supply unit (2).
4. Lift the power supply unit and pull it forward and out of the bracket.

Installing the power supply unit

1. Place the new power supply module on the controller mounting rail and apply pressure until the power supply module audibly clicks into place.
2. Reconnect all the cables to the power supply unit.
3. Switch on the controller supply voltage.

7.2.4 Replacing the measuring wheel encoder

NOTE

Legal-for-trade mode

For calibratable systems, the customer may not remove or replace the measuring wheel encoder.

The measuring wheel encoder and connections must be secured against disassembly.

➢ Please contact the manufacturer if repair is needed.

1. Unscrew the M12 plug connector from the male connector on the measuring wheel encoder.
2. Undo the fixing element that is holding the defective encoder to the conveyor belt.

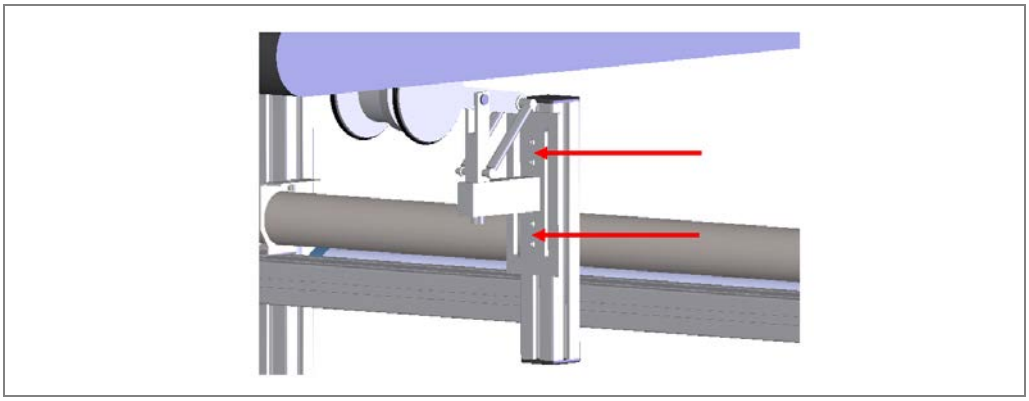


Fig. 142: Replacing the measuring wheel encoder

3. Replace the defective measuring wheel encoder with a new one. Mount the new encoder on the conveyor belt.

Note Make sure that it is installed in the right direction on the conveyor belt.

4. Screw the M12 plug connector onto the male connector on the measuring wheel encoder.

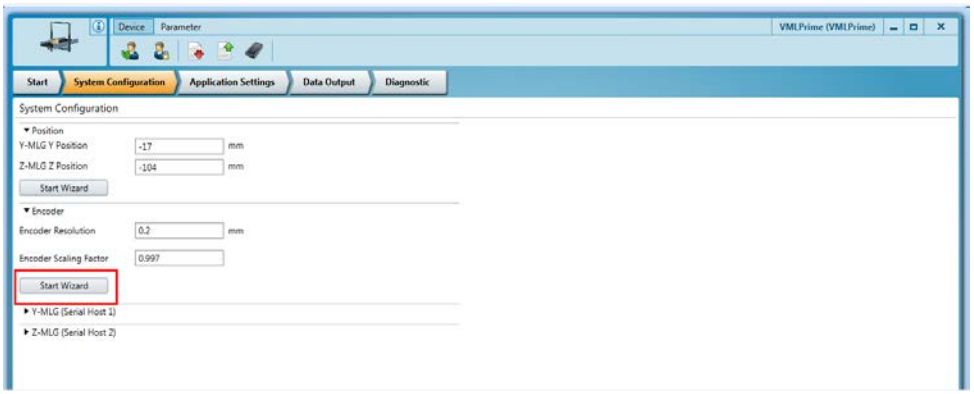
Note Check that the measuring wheel encoder is functioning correctly. This procedure is described in detail in chapter **6.1.2.4 Checking the operational readiness** of the measuring wheel encoder**.**

Running through the commissioning wizard (recommended)

We recommend calling up the encoder wizard on the SOPAS configuration and analysis interface and running through it again.

This will ensure that optimum measurement results are also achieved after the component has been replaced.

1. Switch to the **System Configuration** workspace.
2. In the **Encoder** area, click the **Start Wizard** button.



Additional information can be found in chapter **6.4.4 Calibrating the** incremental encoder.

7.2.5 Replacing the separate photoelectric retro-reflective sensor

NOTE

VML520 MID or VML520 MID-s

With the VML520 MID or VML520 MID-s calibratable systems, the customer may not replace the photoelectric sensor.

➢ Please contact the manufacturer if repair is needed.

1. Unscrew the M12 plug connector from the male connector on the photoelectric retro-reflective sensor.
2. Undo the clinch stud (1) which fixes the photoelectric retro-reflective sensor to the mounting bracket.
3. Undo both M5 hexagon screws (2) on the mounting bracket. When doing so, hold the photoelectric retro-reflective sensor with one hand.

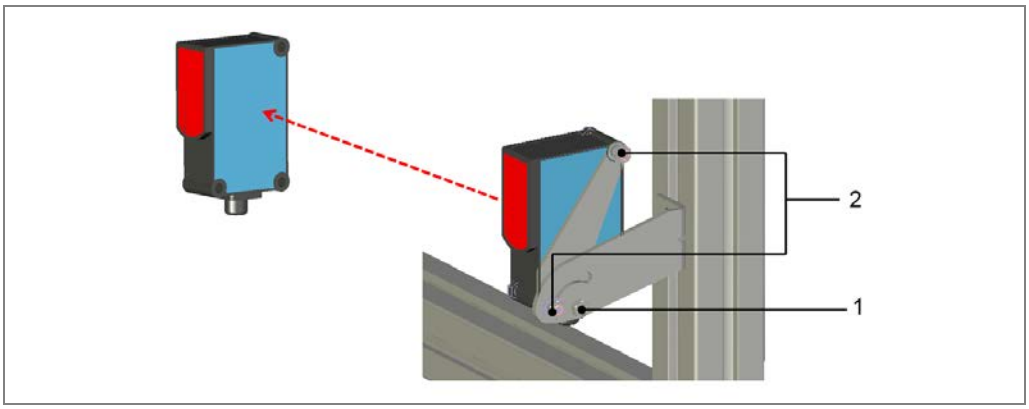


Fig. 143: Replacing the photoelectric retro-reflective sensor

4. Remove the defective photoelectric sensor from the mounting bracket.
5. Replace the defective photoelectric sensor with a new one.
6. Mount the replacement device on the mounting bracket using the two M5 hexagon screws.
7. Fix the photoelectric sensor in place with the clinch stud.
8. Screw the M12 plug connector onto the male connector on the photoelectric retro-reflective sensor.
9. Align the photoelectric sensor correctly on the reflector. The reflector must be in line with the light beam from the photoelectric retro-reflective sensor.

Note Check that the photoelectric retro-reflective sensor is functioning correctly. There is a detailed description of how to do this in the chapter entitled **Checking the operational readiness of the photoelectric retro-reflective sensor**.

7.2.6 Checking the measurement accuracy

The measurement accuracy must be checked after performing the following maintenance work/modifications:

- Replacement of a light grid (sender unit, receiver unit).
- Replacement of the measuring wheel encoder.
- Changes to the frame that alter the position of the light grids.
- Replacement of the belt on the conveying line that has the measuring wheel encoder attached to it.
- Changes to the side edges of the belt (changing measuring range, performing the teach-in function again)

7.3 Disposal

Unusable or irreparable devices must be dismantled and disposed of in an environmentally safe manner in accordance with the relevant national waste disposal regulations.

SICK AG is not currently able to take back devices that are irreparable or can no longer be used.

8 Fault diagnosis

This chapter describes how to identify and remedy faults affecting the VML Prime measurement system.

8.1 Response to faults

⚠ WARNING

Danger due to malfunction!

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

- ➢ Immediately put the machine/system out of operation if you cannot clearly identify or allocate the fault and if you cannot safely remedy the fault.

8.2 SICK support

If you cannot remedy the error with the help of the information provided in this chapter, please contact your SICK subsidiary.

8.3 Fault indicators of the components

This section explains what the LED fault indicators of the individual devices mean and how to respond to them.

8.3.1 Fault indicator on the light grids

If the red LED lights up on the sender and receiver units, this indicates that a fault has occurred.

The receiver unit indicates the type of fault via a combination of red, yellow, and green LEDs.

Red LED	Yellow LED	Green LED	Problem	Cause	Remedy
					➢
●	○	○	Hardware fault	Device is defective.	➢ Replace the device.
●	●		Synchronization error	Connecting cable not connected or cable faulty.	➢ Connect the device correctly. ➢ Replace any defective cables.
●	○	●	Short-circuit	Faulty power supply.	➢ Establish the correct voltage supply.
	☀ **3 Hz yellow**		Contamination warning	MLG-2 front screen contaminated.	➢ Clean the front screen.

Tab. 21: LED indicators in case of a fault at the MLG receiver

8.3.2 Fault indicator on the separate photoelectric retro-reflective sensor

The following behavior of the LED receive indicator suggests a fault/error:

LED	Meaning
Permanently off	Reflector is not aligned with the light beam of the photoelectric sensor. ➢ Readjust the photoelectric sensor, clean it, or check the application conditions.
Flashing	Reflector is only being detected in the fringe range. ➢ Readjust the photoelectric sensor, clean it, or check the application conditions.
Lit or flashing even when there is an object in the path of the light beam	➢ Reduce the sensitivity via the potentiometer until the LED goes out. Once the object is removed, the LED should light up again. ➢ If this does not happen, adjust the sensitivity until the switching threshold has been set correctly.

Tab. 22: LED fault indicator in the event of a photoelectric retro-reflective sensor fault

8.4 Troubleshooting with the MSC800

Check that the MSC800 is working and that all interfaces are connected correctly.

MSC800 does not work

- The **DEVICE READY** LED on the MSC800 does not light up.

Cause	Remedy
Fuse is defective.	➢ Check the fuse block and replace the defective fuse if necessary.
Power supply is not switched on.	➢ Establish the correct voltage supply.
Device is defective.	➢ Replace MSC800 (see chapter **7.2.3.1 Replacing the** MSC800). With the VML520 MID or VML520 MID-s calibratable systems, the customer may not remove or replace the device. ➢ Contact the manufacturer.

Tab. 23:MSC800 fault situation: controller does not work

MLG-2 does not work

Cause	Remedy
Fuse is defective	➢ Check the fuse block and replace the defective fuse if necessary.
Power supply is not switched on	➢ Establish the correct voltage supply.
Connecting cables not connected or are connected incorrectly.	➢ Connect the MLG-2 to the MSC800 correctly.
Device is defective.	➢ Replace the device. With the VML520 MID or VML520 MID-s calibratable systems, the customer may not remove or replace the device. ➢ Contact the manufacturer.

Tab. 24:MSC800 fault situation: MLG does not work

Checking the measuring wheel encoder

The LEDs on the **INC** terminal block should flash alternately as the measuring wheel turns.

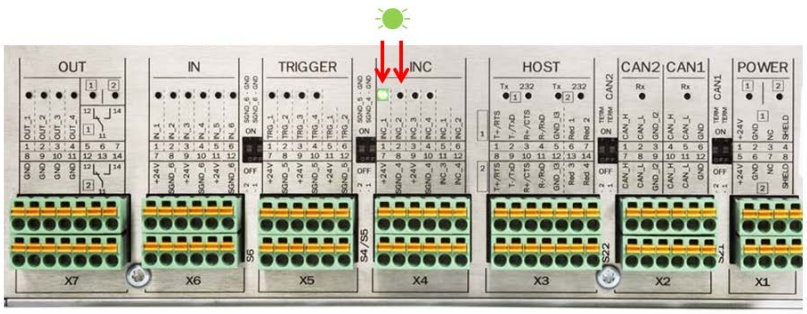


Fig. 144: MSC800 fault situation: LED for incremental signals

If the LEDs do not flash, possible causes might be:

Cause	Remedy
There is no/insufficient contact between the measuring wheel and the conveyor belt.	➢ Make sure that there is good contact between the measuring wheel and the conveyor belt on site. ➢ If the measuring wheel shows signs of wear, replace it. ➢ Replace the measuring wheel encoder if necessary.
Signal ground not activated.	➢ Set the **SGND_4** signal ground switch to **on**.
Wire is not attached correctly in the terminal block (2).	➢ Check that the wires are attached correctly.
Encoder is defective.	➢ Replace the device. With the VML520 MID or VML520 MID-s calibratable systems, the customer may not remove or replace the device. ➢ Contact the manufacturer.

Tab. 25:MSC800 fault situation: LED for incremental signals

Checking the trigger

If the measuring range is clear, the LED at connection **1 TRG_1** in the **TRIGGER** block should not light up (1). If an object is located in the measuring range, the LED should light up.

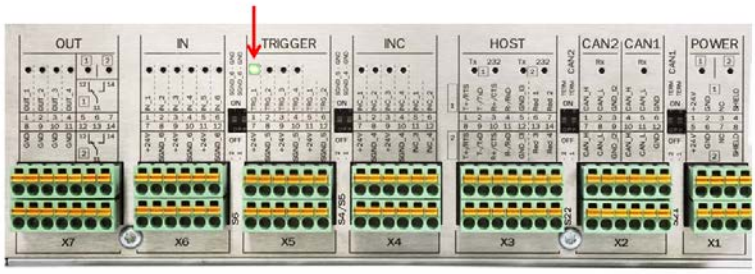


Fig. 145: MSC800 fault situation: LED for triggering

If the LEDs light up, even when the measuring range is clear, possible causes might be:

Cause	Remedy
Path of the beam is permanently shadowed by an object. Guiding plates or protective barriers have not been blanked.	➢ Blank the guiding plates or protective barriers using the teach-in process.

Tab. 26:MSC800 fault situation: LED for triggering (LED lights up)

If the LEDs do not light up, even when there is an object in the measuring range, possible causes might be:

Cause	Remedy
Signal ground not activated.	➢ Set the **SGND_5** signal ground switch to **on**.
Wire is not attached correctly in the terminal block.	➢ Correct the position of the wires in the **TRIGGER** terminal block.
Trigger wires not inserted or are inserted incorrectly.	➢ Insert the black wire into the **TRIGGER** terminal block at connection point **1 TRG_1**.
Voltage supply not on.	➢ Establish the correct voltage supply.

Tab. 27:MSC800 fault situation: LED for triggering (LED does not light up)

“SYSTEM READY” LED does not light up

The **SYSTEM READY** LED on the MSC800 does not light up.

Fig. 146: MSC800 fault situation: “SYSTEM READY” LED does not light up

Possible causes can include:

Cause	Remedy
MLG-2 is defective	➢ Replace the device. With the VML520 MID or VML520 MID-s calibratable systems, the customer may not remove or replace the device. ➢ Contact the manufacturer.
Diodes significantly contaminated	➢ Clean the front screens of the sender and receiver units
MSC800 is defective	➢ Replace the device. With the VML520 MID or VML520 MID-s calibratable systems, the customer may not remove or replace the device. ➢ Contact the manufacturer.
Host 1 and Host 2 not wired or wired incorrectly	➢ Check and correctly wire the connections at the HOST1 and HOST2 terminal blocks.

Tab. 28:MSC800 fault situation: “SYSTEM READY” LED does not light up

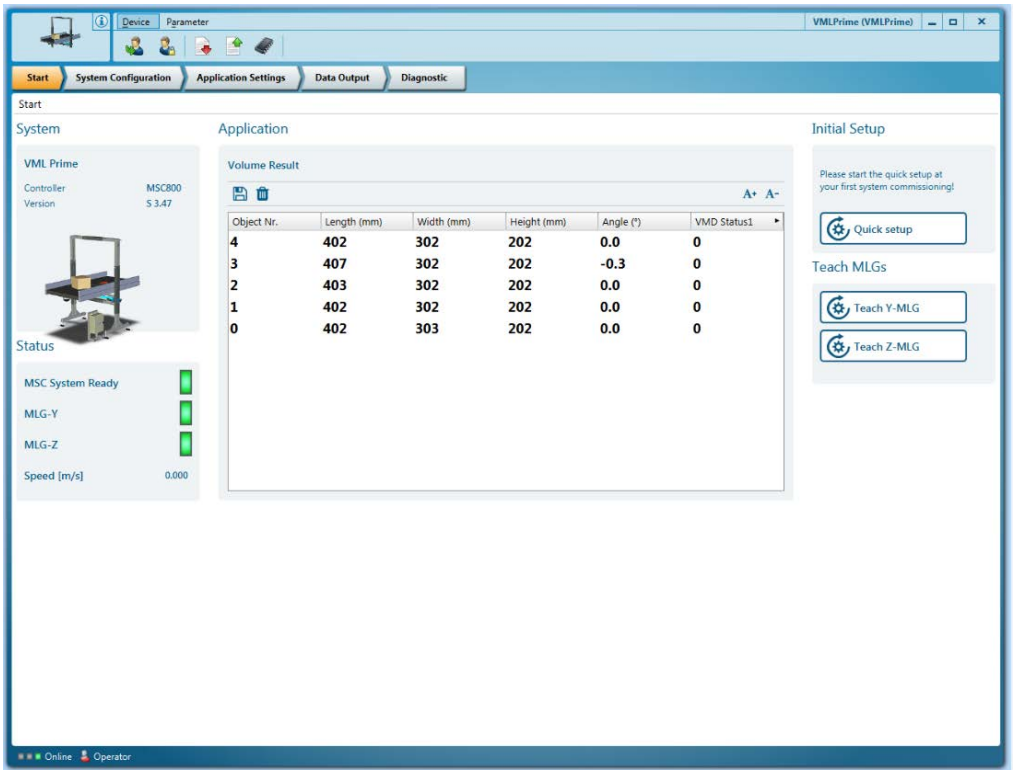
8.5 Detailed fault analysis in SOPAS

The SOPAS configuration and analysis interface helps to analyze faults.

➢ Start SOPAS configuration software and establish a connection to the system.

Measurement error

Measurement errors are documented directly in the measurement value table in the **Start** workspace using error codes.



If the measurements are free of errors, a value of **0** appears in the **VMD Status 1** column.

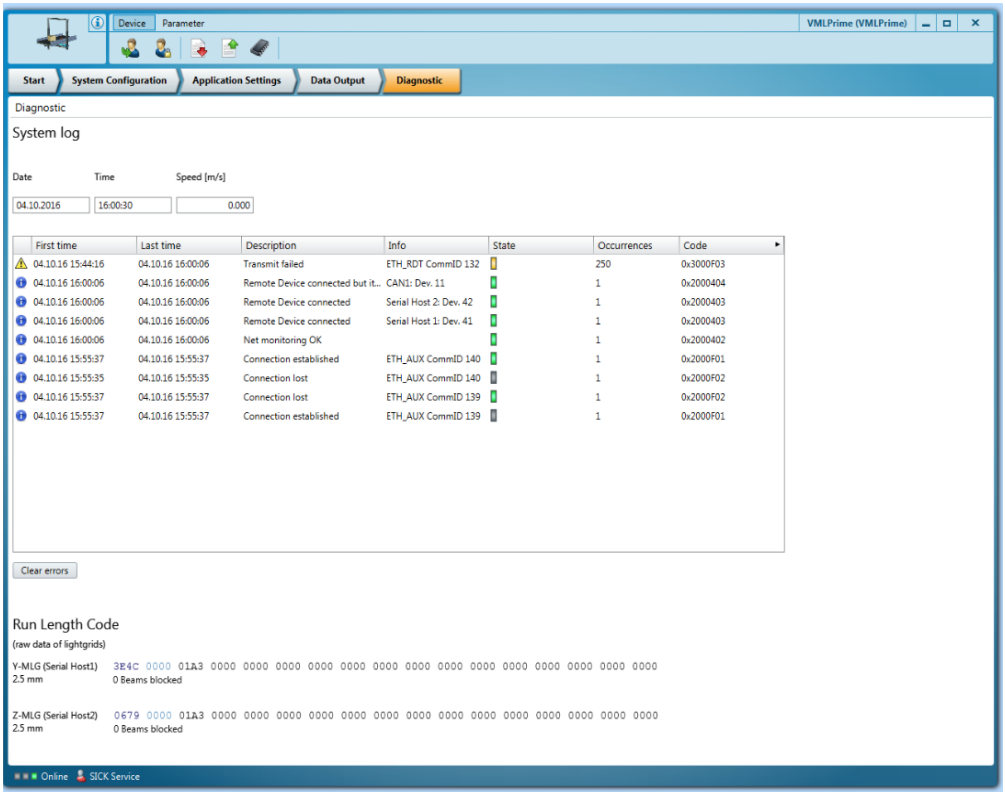
If there is an incorrect measurement, further information on the error can be provided by the status value.

➢ For this, show the **VMD Status 2** and **VMD Status 3** columns using the arrow button in the table header.

➢ The table in the appendix shows how you can decode the errors using the numerical code (see chapter **9.4 Error codes (VMD** status)).

System messages and error codes

The **Diagnostic** workspace lists both system and error messages.



Fault output is staggered, allowing for an increasingly detailed level of analysis. Communication errors can occur when transmitting telegrams to the MSC800 via the Ethernet interface, for example.

The system differentiates between four error types: **information**, **warning**, **error**, and **severe error**.

Note Please contact SICK support for a more detailed analysis of the fault situation.

Cause of severe measurement errors

Severe measurement errors can be caused by various factors, including:

Cause	Remedy
Static object in measuring range	➢ Remove the object from the measuring range.
Although the MLG-2 is no longer taking measurements, it is not indicating a fault	➢ Check the connecting cables and replace defective cables. ➢ Check the MLG-2 and, if necessary, replace the device. ➢ Check whether the trigger is permanently engaged.
There is no/insufficient contact between the measuring wheel and the conveyor belt	➢ Check the measuring wheel for signs of wear. ➢ Replace the measuring wheel encoder if necessary.

Tab. 29: Cause of severe measurement errors

9 Technical specifications

9.1 VML Prime data sheet

Component	Explanation
Min. object size (L x W x H)	Up to 50 mm x 50 mm x 5 mm The minimum detectable object size depends on the beam separation and the conditions of the conveyor. The minimum object length depends on the diameter of the roll at the belt gap. It is calculated using the following formula: *L (min.) = 2.5 * Ø (roll)*
Max. object size (L x W x H)	2,600 mm x 1,000 mm x 1,000 mm Higher object sizes on request.
Conveying system	• Flat conveying surface • Both belts synchronized at the same speed • On one level, not misaligned • Singulated objects (see minimum distance)
Dimensioning accuracy (L x W x H)	Up to ± 5 mm x 5 mm x 2 mm up to 1.0 m/s Up to ± 5 mm x 5 mm x 5 mm up to 2.0 m/s The values depend on the beam separation and the belt speed. Higher speeds on request.
Minimum distance between objects	200 mm
Minimum distance between the vertical light grid and the first data output point	Data output typically occurs 300 ms (milliseconds) after the measuring range at the earliest (measured from the back edge of the object* and depending on the maximum object size and conveyor speed). * Assumed max. object dimensions 650 mm x 650 mm x 450 mm (L x W x H)

Tab. 30: VML Prime data sheet

NOTE

Legal-for-trade mode

Special operating points apply to the operation of a calibrated VML520 MID or VML520 MID-s. You can find these in the supplement to operating instructions (8021098).

9.1.1 MSC800-1100 data sheet

Functions	Receives all digital signals, e.g., trigger and/or encoder. Combines the results read from the attached sensors, e.g., VMD or bar code reader. Calculates, filters, and assigns results to an object. Outputs results to the host interface. Outputs the diagnostics data to the connected SVP diagnostic tool (optional).
Number of MLG-2s	2
“HOST” data transmission rate	Serial: 300 ... 57,600 bit/s Ethernet: 10/100 Mbit/s PROFIBUS DP: 12 MBd
“HOST” protocols	SICK standard, all standard system integrator interfaces. Customization upon request
“Terminal” data interface	RS-232, 9,600 Bit/s, 8 data bits, no parity, 1 stop bit Ethernet TCP/IP
Switching inputs	16 (all inputs are displayed via one LED each). All inputs are optically isolated and protected against reverse polarity
Switching outputs	4x PNP Imax = 30 mA, short-circuit protected, variable Signal duration adjustable, 2x volt-free relay contacts
Interfaces	1x serial, AUX (9-pin D-SUB for serial diagnostics) 2x serial, Host (wiring) 3x Ethernet, AUX, or Host (RJ-45) 1x PROFIBUS, Host (9-pin D-SUB)
Voltage supply	AC 100 ... 264 V/50 ... 60 Hz
Housing	Powder-coated metal housing
Spray / dust protection	IP65 (to DIN 40 050)
Safety class	Class 3 (VDE 0106/IEC 1010-1)
Standardization	EN55011, EN 50082-1, EN 50082-2/ acc. to IEC 68-2-6 Test FC / acc. to IEC68-2-27 Test EA
Weight	Approx. 15 kg
Operating temperature	0 °C ... +40 °C
Storage temperature	-20 °C ... +70 °C
Max. rel. air humidity	95% non-condensing
Dimensions	500 mm x 400 mm x 155 mm

Tab. 31: MSC800-1100 data sheet

9.1.2 MLG-2 light grid data sheet

The following information applies to an MLG-2 with a beam separation of 5 mm.

General data	
Protection class	III (EN 61140)
Enclosure rating	IP 65 and IP 67 (EN 60529) * Do not use light grids outdoors without protection (risk of condensation)
Class according to UL 60947	Class 2
Ambient operating temperature	-30 °C ... +55 °C
Storage temperature	-40 °C ... +70 °C
Vibration resistance	5 g, 10 Hz ... 55 Hz (EN 60068-2-6)
Shock resistance	15 g, 16 ms (EN 60068-2-27)
Electromagnetic compatibility	According to EN 61000-6-2 Immunity standard for industrial environments and EN 61000-6-4 Emission standard for industrial environments
MTTF	120,000 h
Dimensions	See Chapter **9.2.1 MLG-2**
Weight	Sender and receiver approx. 2 kg/m + 0.1 kg
Materials Housing Front screen	 Aluminum, anodized PMMA
Firmware version	See type label
Electrical data	
Supply voltage V_S	DC 24 V ± 20%
Residual ripple (within V_S)	< 10%
Current consumption of sender	< 110 mA + (0.05 mA × number of beams)
Current consumption of receiver	< 120 mA + (0.2 mA × number of beams)
Technical measurement data	
Wavelength	850 nm
Ambient light immunity	150,000 lx (constant light, indirect)
Beam separation	2.5 mm; 5 mm; 10 mm
Number of beams	See **9.2.1 MLG-2 Pro dimensional** drawings
Detection height	See **9.2.1 MLG-2 Pro dimensional** drawings
Initialization time after switch-on	< 1 s
Response time	< 11 ms
Minimum presence time	< 5.6 ms

Tab. 32:MLG-2 light grids

9.1.3 Data sheet for measuring wheel encoder

Component	Explanation
Electrical interface	4.5 ... 32 V
Number of lines	30
Reference signal	Quantity: 1 Position: 90° electric., logically gated with A and B
Error limits	± 0.03°
Signal	HTL
Supply voltage	DC 4.5 ... 30 V
Enclosure rating	IP 65 acc. to EN 60529
Weight	0.5 kg
Operating temperature range	-20 °C ...+100 °C
Storage temperature range (without packaging)	-40 °C ... +100 °C
Rel. Air humidity	90%, non-condensing
Dimensions [W x H x D]	220 mm x 288 mm x 86 mm

Tab. 33: Data sheet for measuring wheel encoder

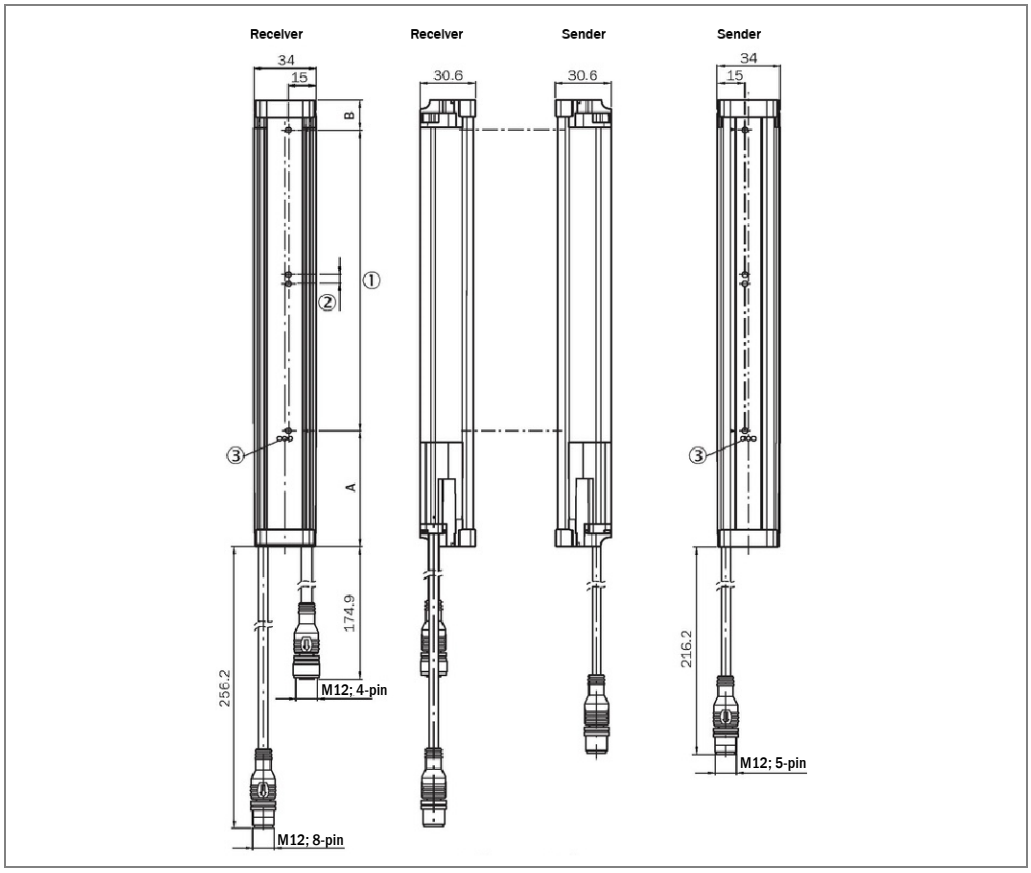
9.1.4 WL27-3 photoelectric retro-reflective sensor data sheet

Features	
Sensor/detection principle	Photoelectric retro-reflective sensor
Dimensions (W x H x D)	24.6 mm x 80 mm x 54.2 mm
Housing design (light emission)	Cuboid
Sensing range max.	0 m ... 1.5 m
Sensing range	0 m ... 1.5 m
Type of light	Visible red light
Light sender	PinPoint LED
Distance from sensor to reflector	0.5 m ... 4.5 m
Minimum object size	5 mm, location-independent detection within the light band
Setting	Single teach-in button
AutoAdapt	✓
Special features	Detection height 24 mm
Mechanics/electronics	
Supply voltage	DC 10 V ... 30 V
Residual ripple	≤ 5 Vss
Current consumption	≤ 35 mA (without load)
Switching output	PNP
Switching function	Complementary output
Switching type	Light/dark switching
PNP HIGH/LOW signal voltage	Approx. UV - 2.5 V / 0 V
Output current Imax	≤ 100 mA
Response time	≤ 2.5 ms (signal transit time with resistive load)
Switching frequency	200 Hz (with a light/dark ratio of 1:1)
Connection type	Cable with M12 male connector, 4-pin, 270 mm 6)
Cable material	PVC
Circuit protection	A (UV connections reverse polarity protected) B (inputs and outputs reverse polarity protected) C (interference suppression)
Protection class	II (rated voltage DC 50 V)
Weight	130 g
Housing material	ABS plastic
Optics material	PMMA
Enclosure rating	IP 67
Special design	Light band
Ambient temperature, operation	-30 °C ... +60 °C
Ambient temperature, storage	-40 °C ... +75 °C

Tab. 34: Photoelectric retro-reflective sensor data sheet

9.2 VML Prime dimensional drawings

9.2.1 MLG-2 Pro dimensional drawings



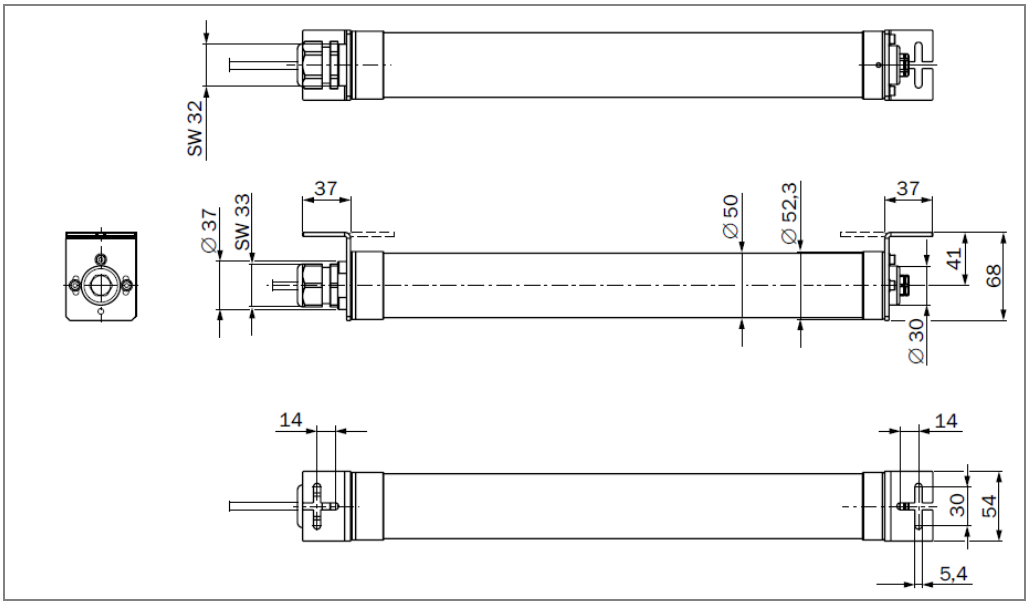
①	Detection height (see optical properties)
②	Beam separation (RM)
③	Status indicator: green, yellow, red LEDs

	A Distance from MLG-2 edge to first beam	**B** Distance from MLG-2 edge to last beam
Beam separation 2.5 mm	62.25	17.25
Beam separation 5 mm	63.3	16.1
Beam separation 10 mm	68.3	16.1
Beam separation 25 mm	83.3	16.1
Beam separation 50 mm	108.3	16.1

Tab. 35: Distance from MLG-2 edge to first/last beam

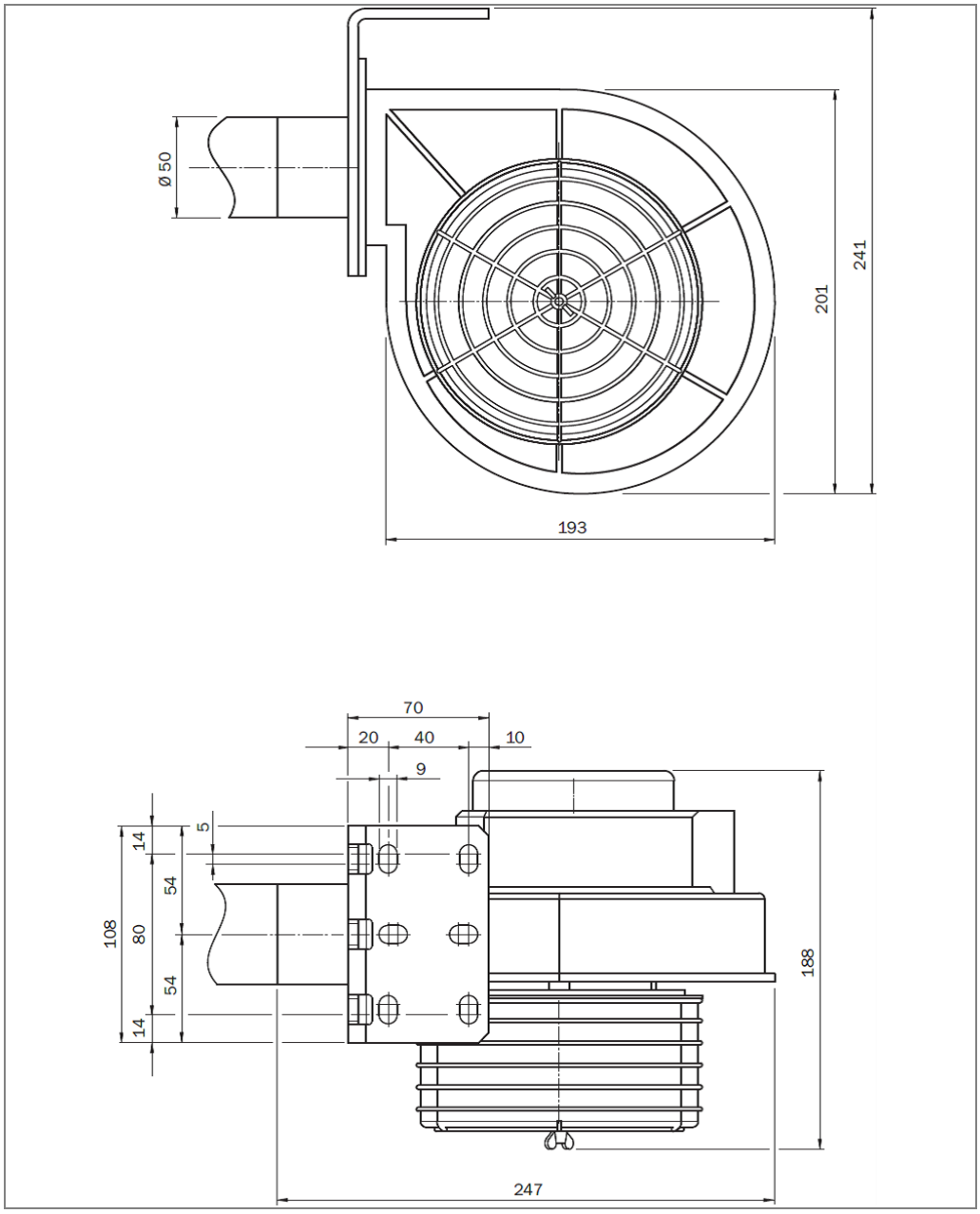
Beam separation (in mm)	**Detection height (in mm)**				
2.5 mm	445	595	745	895	1,045
5 mm	445	590	745	895	1,045
10 mm	440	590	740	890	1,040
25 mm	425	575	725	875	1,025
50 mm	400	550	700	850	1,000

9.2.2 Dimensional drawing of IPG2 protective pipe

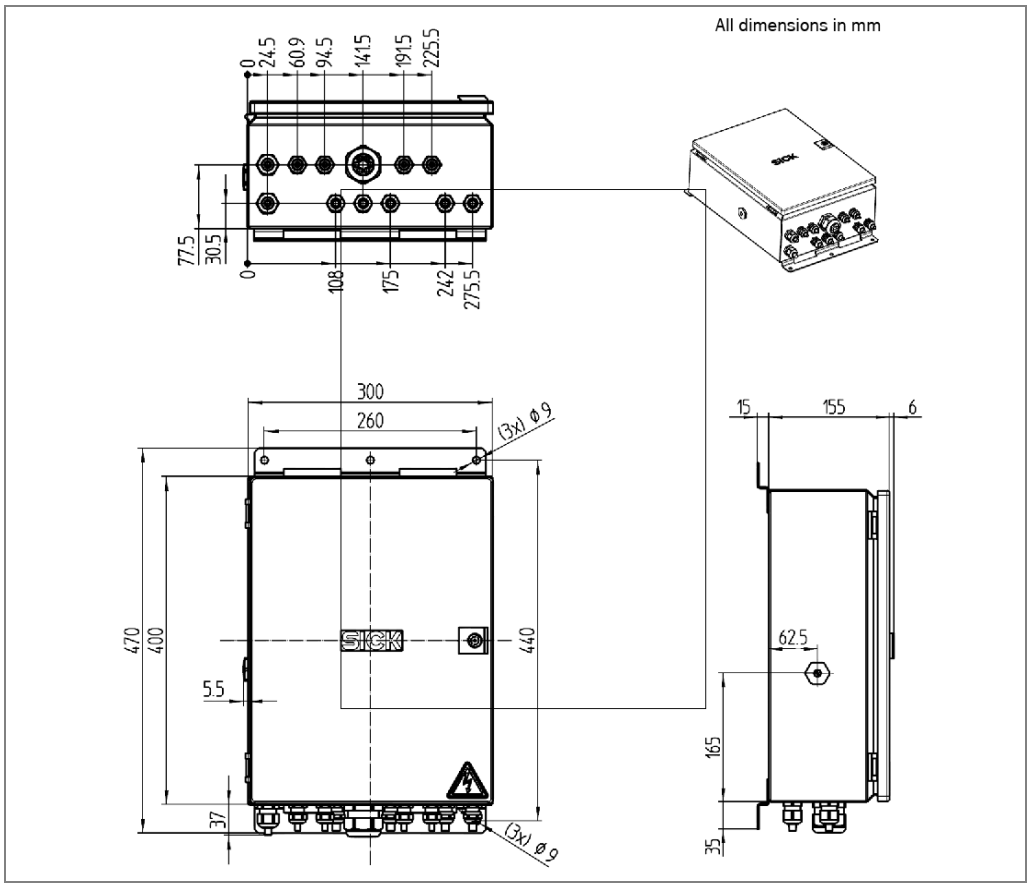


Tab. 36: Dimensional drawing of IPG2 protective pipe

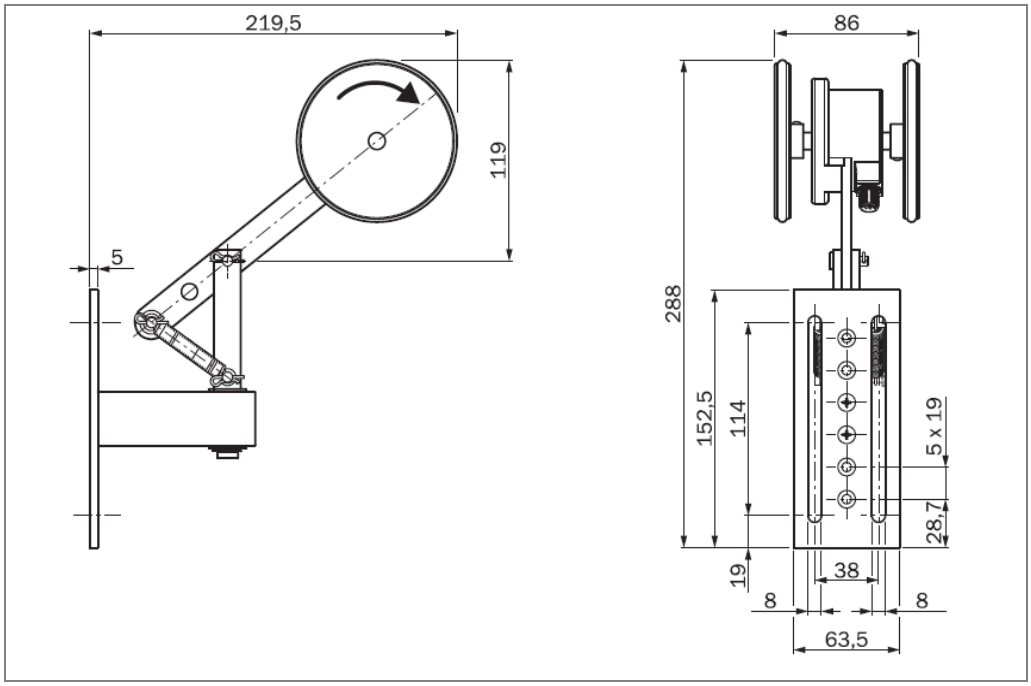
9.2.3 Dimensional drawing of fan unit



9.2.4 Dimensional drawing of MSC800-100



9.2.5 Dimensional drawing of measuring wheel encoder



9.2.6 Separate WL27-3 photoelectric retro-reflective sensor

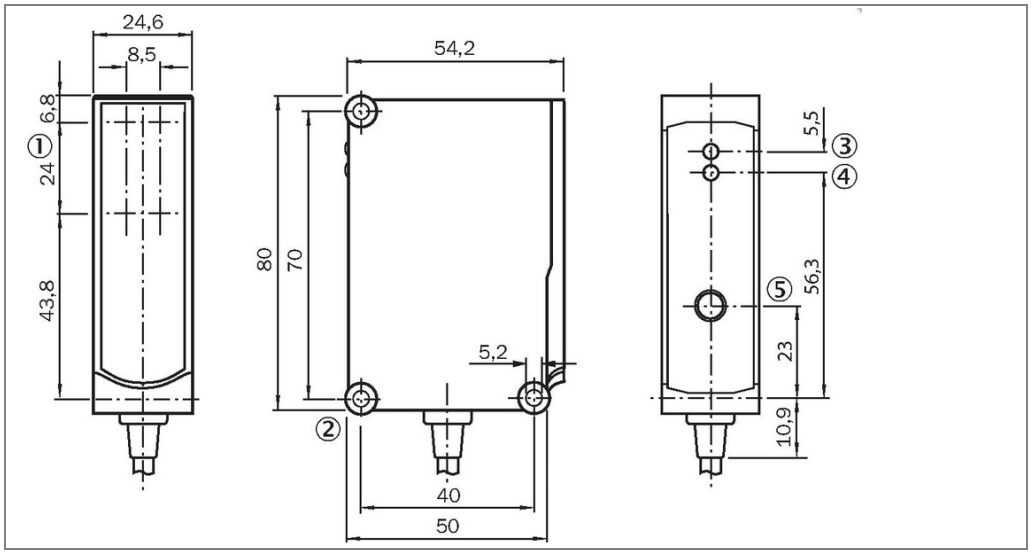


Fig. 147: Dimensional drawing of WL27-3 photoelectric retro-reflective sensor

①	Light band outlet opening
②	Mounting hole Ø 5.2 mm
③	Green LED indicator: supply voltage active
④	LED indicator: status of received light beam
⑤	Sensititvity control: single teach-in button

9.3 Compliance with EU directives

EU declaration of conformity (extract)

The undersigned, who represents the manufacturer below, hereby declares that the product complies with the regulations of the EU directive(s) below (including all relevant changes), and that it is based on the relevant standards and/or technical specifications.

Complete EU declaration of conformity for download

You can call up the EU declaration of conformity and the current operating instructions for the protective device by entering the item number in the search field at www.sick.com (part number: see the type label entry in the **Ident. no.** field).

After successful standardization, the declaration of conformity for the system is declared according to the following directive:

Measuring Instruments Directive: 2014/32/EU (2016-04-20)

The customer receives the certificate after successful standardization.

9.4 Error codes (VMD status)

VMD status 1

Byte2		Byte1		Byte0	
ASCII		ASCII		ASCII	
				0	Calibratable result
				1	Non-calibratable result
		0	Item inside measuring area		
		1	Item outside measuring area		
0	OK				
1	Item too big to be measured				
2	Item too small to be measured				
Example: 201 = Item too small to be measured					

Tab. 37: VMD status 1 error codes

VMD status 2

Byte3		Byte2		Byte1		Byte0	
ASCII		ASCII		ASCII		ASCII	
						0	Calibratable result
						1	Non-calibratable result
				0	OK		
				1	Item outside right measuring area		
				4	Item outside left measuring area		
				5	Item outside left and right measuring area		
		0	OK				
		1	Item too short to be measured related to length				
		2	Item too low to be measured related to height				
		3	Item too low related to height and too short related to length				
		4	Item too small to be measured related to width				
		5	Item too small related to width and too short related to length				
		6	Item too small related to width and too low related to height				
		7	Item too small related to width and too low related to height and too short related to length				
0	OK						
1	Item too long related to length						
2	Item too high related to height						
3	Item too high related to height and item too long related to length						
4	Item too wide related to width						
5	Item too wide related to width and item too long related to length						
6	Item too wide related to width and item too high related to height						
7	Item too wide related to width and item too high related to height and item too long related to length						
Example: 0401 = Item too small to be measured related to width							

Tab. 38: VMD status 2 error codes

VML Prime

VMD status 3

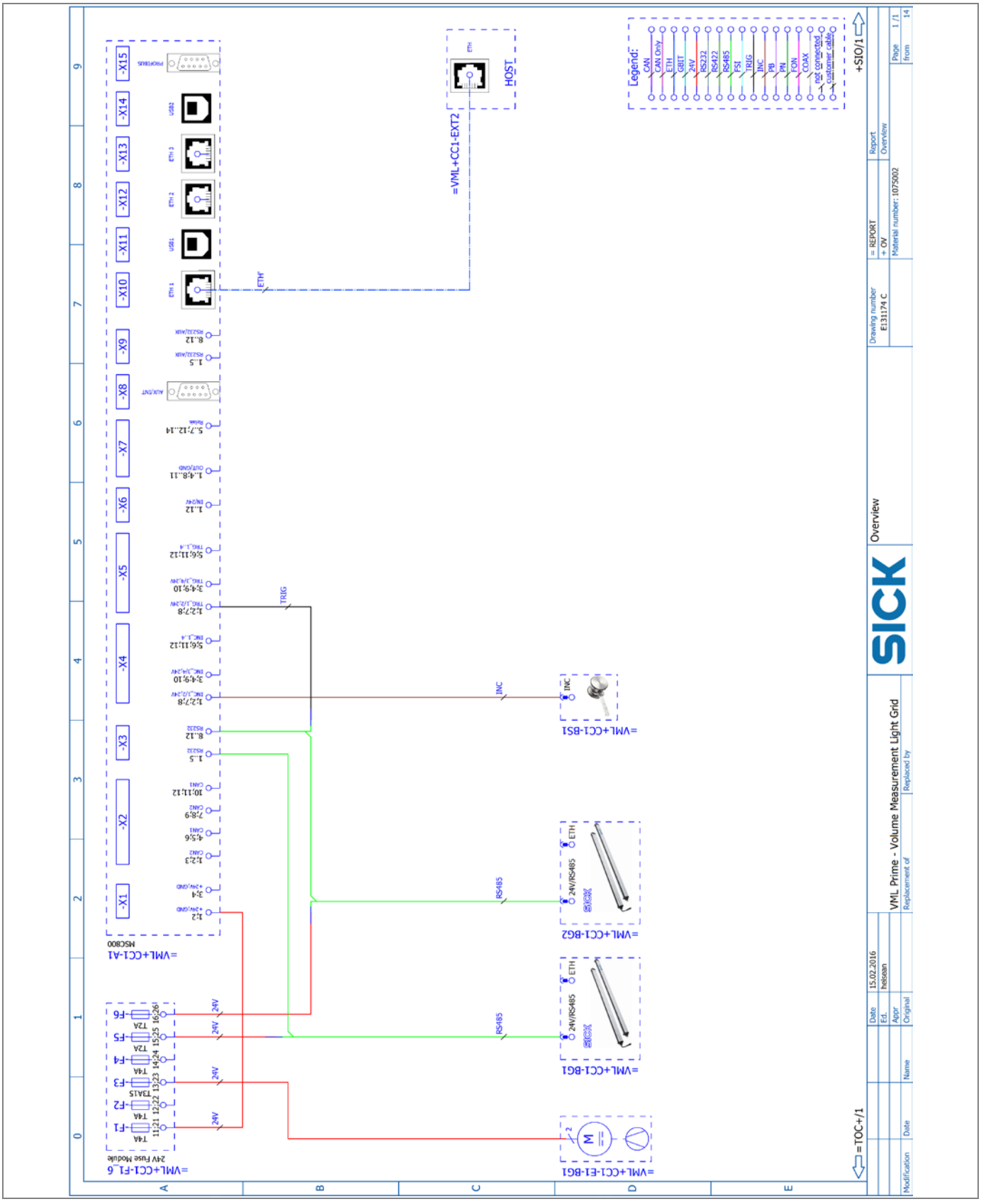
Byte6	Byte5	Byte4	Byte3	Byte2	Byte1	Byte0
ASCII	ASCII	ASCII	ASCII	ASCII	ASCII	ASCII
						0
					0	
				0		
			0			
		0				
	0					
8	Incorrect measurement data due to heavy contamination					
Example: 8000000 = Contamination message * * A contamination message is only issued if the beams which have been shadowed through the measured object are contaminated.						

Tab. 39: VMD status 2 error codes

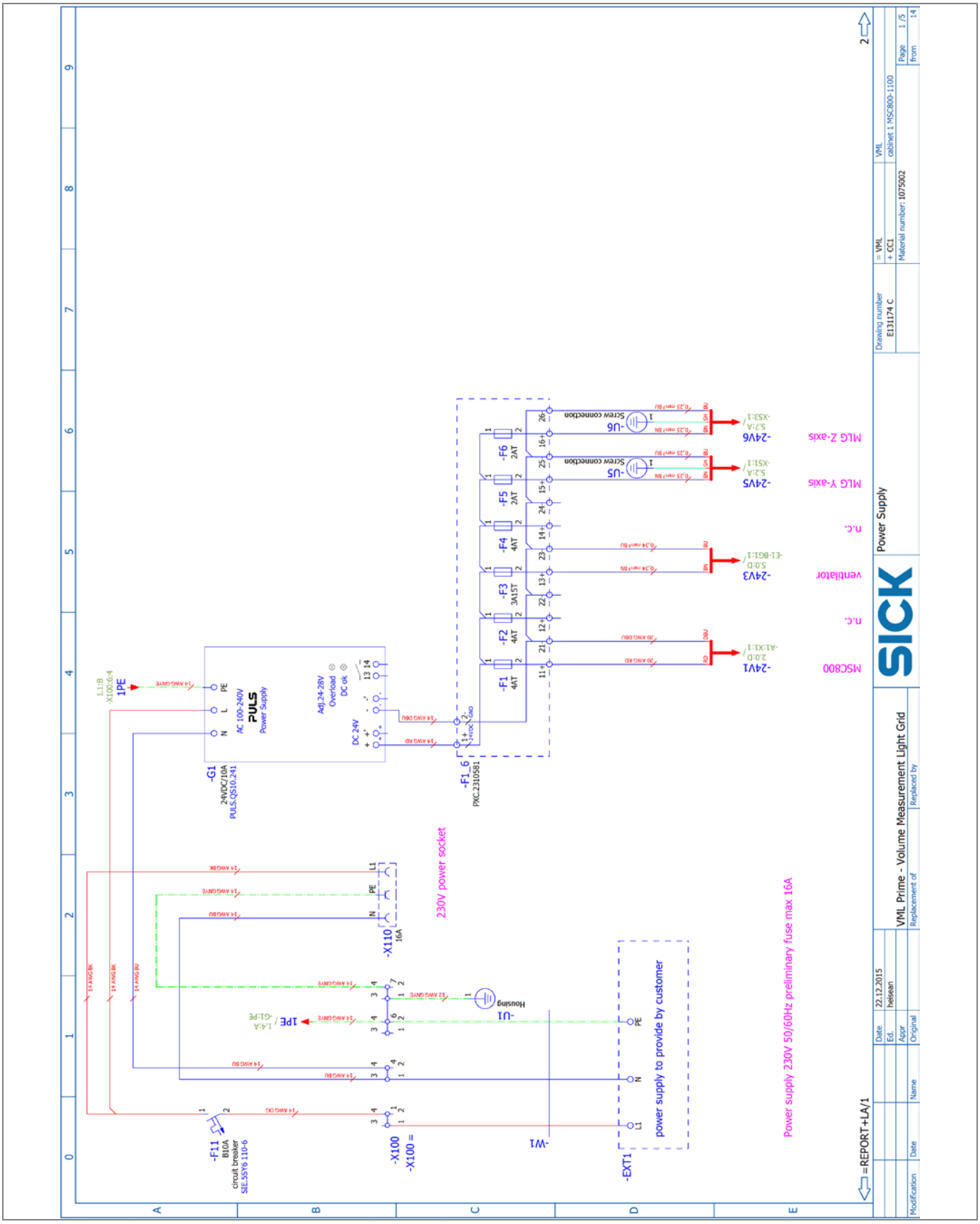
9.5 Circuit diagrams

9.5.1 VML Prime 3D

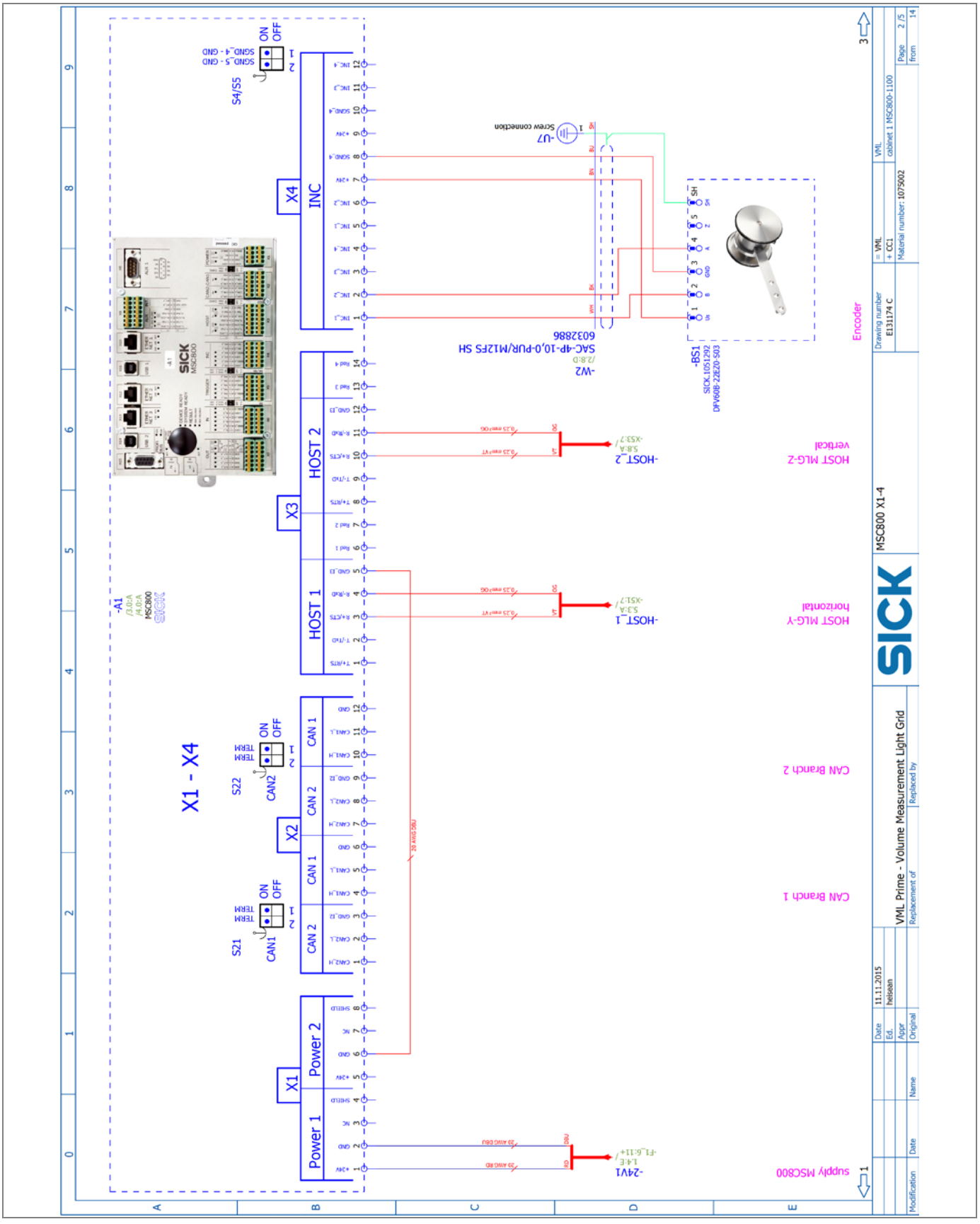
Overview



Power supply



MSC800 X1-X4


X1 - X4
X1
Power 1
Power 2
X2
CAN 1
CAN 2
X3
HOST 1
HOST 2
X4
INC
S4/S5
S22
S21
ON
OFF
TERM
CAN2
CAN1
-A1
MSC800
SICK
-HOST_2
-HOST_1
-W2
SAC-4P-10,0-PUR/M12FS SH
6032886
-BS1
SICK-1051232
DFV60B-22EZ0-S03
-U7
Screw connection
-24V1
HOST MLG-Z
vertical
HOST MLG-Y
horizontal
CAN Branch 2
CAN Branch 1
supply MSC800
Encoder
MSC800 X1-4
VML Prime - Volume Measurement Light Grid
SICK
Drawing number
E1331174 C
Material number: 1075002
cabinet 1 MSC800-1100
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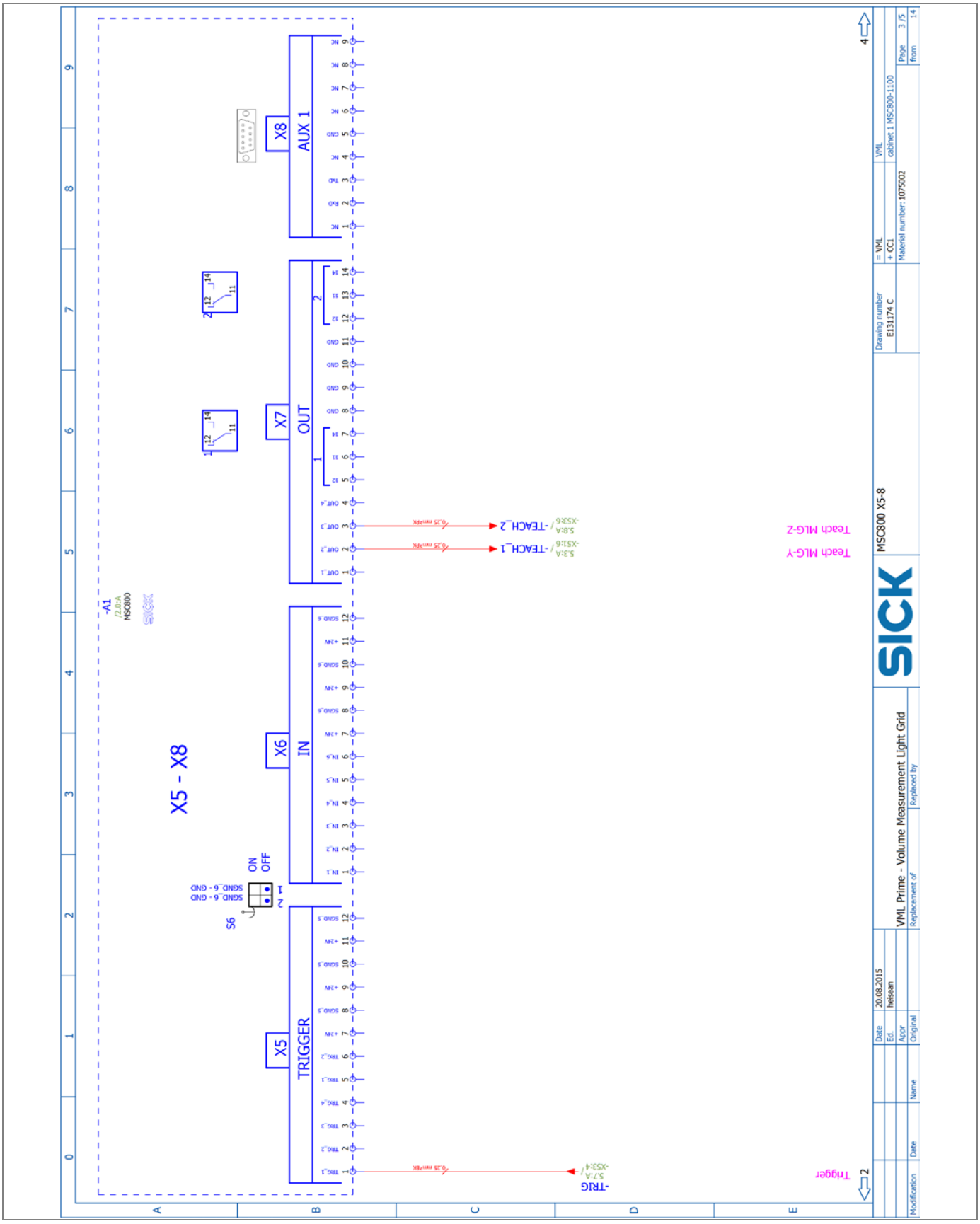
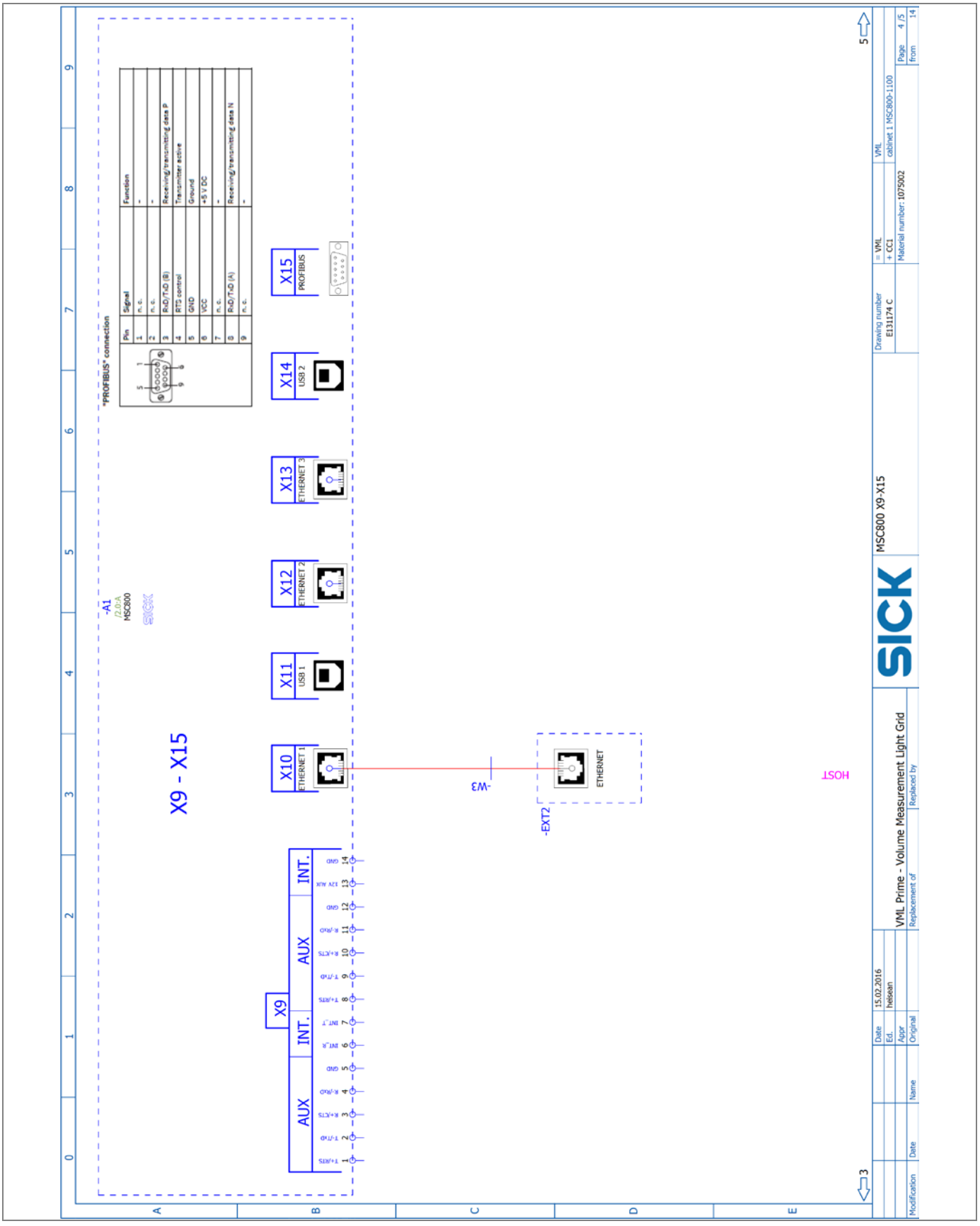
heleean

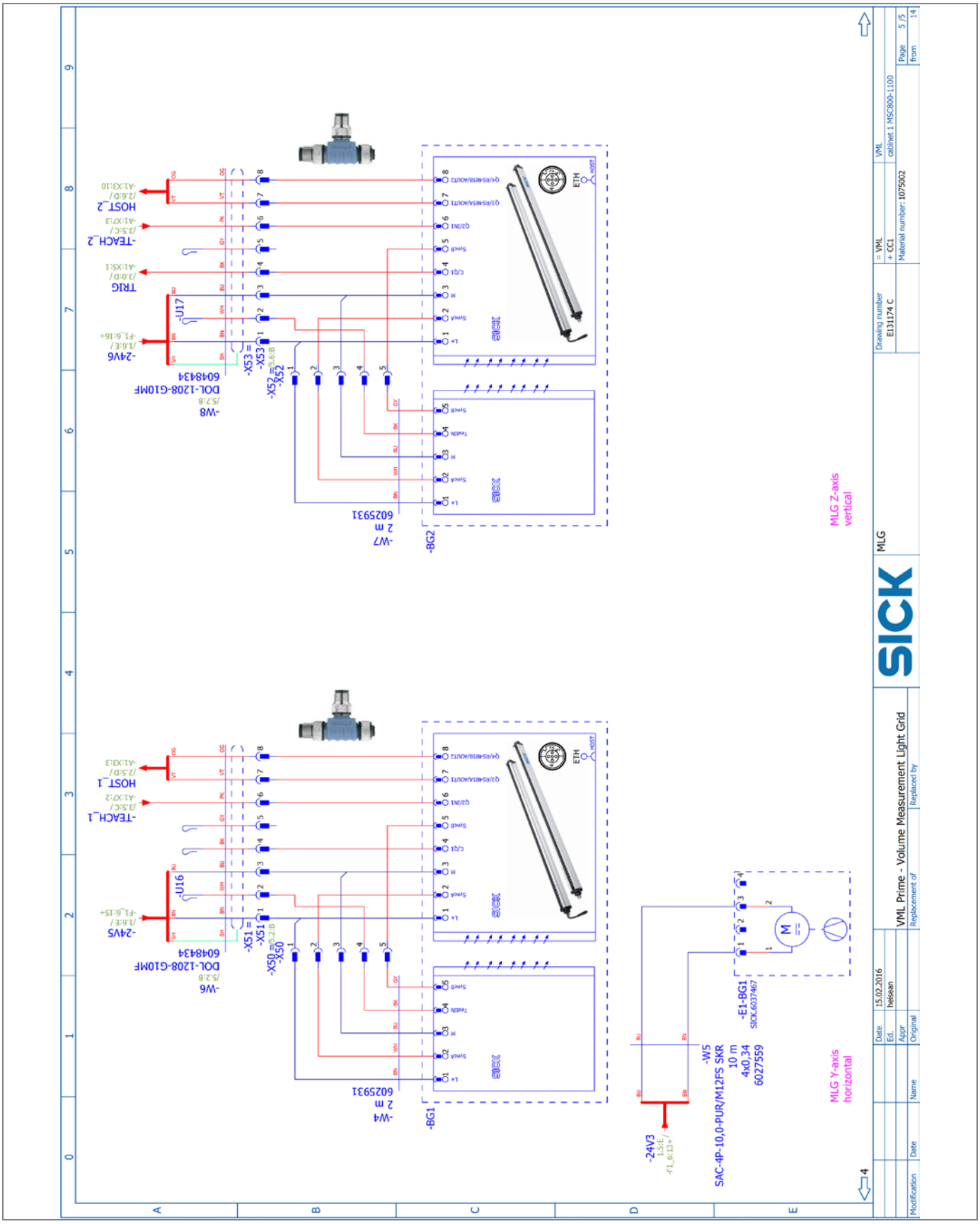
MSC800 X5-X8


X5 - X8
X8
AUX 1
X7
OUT
X6
IN
X5
TRIGGER
-A1
/2.0:A
MSC800
S6
ON
OFF
SGND_6 - GND
SGND_6 - GND
-TEACH_2
-TEACH_1
-TRIG
Teach MLG-Z
Teach MLG-Y
Trigger
MSC800 X5-8
VML Prime - Volume Measurement Light Grid
SICK
Drawing number
E131174 C
Material number: 1075002
cabinet 1 MSC800-1100
Page 3 /5
from 14
20.08.2015
heisean
Original
Name
Date
Modification
Replacement of
Replaced by

MSC800 X9-X15

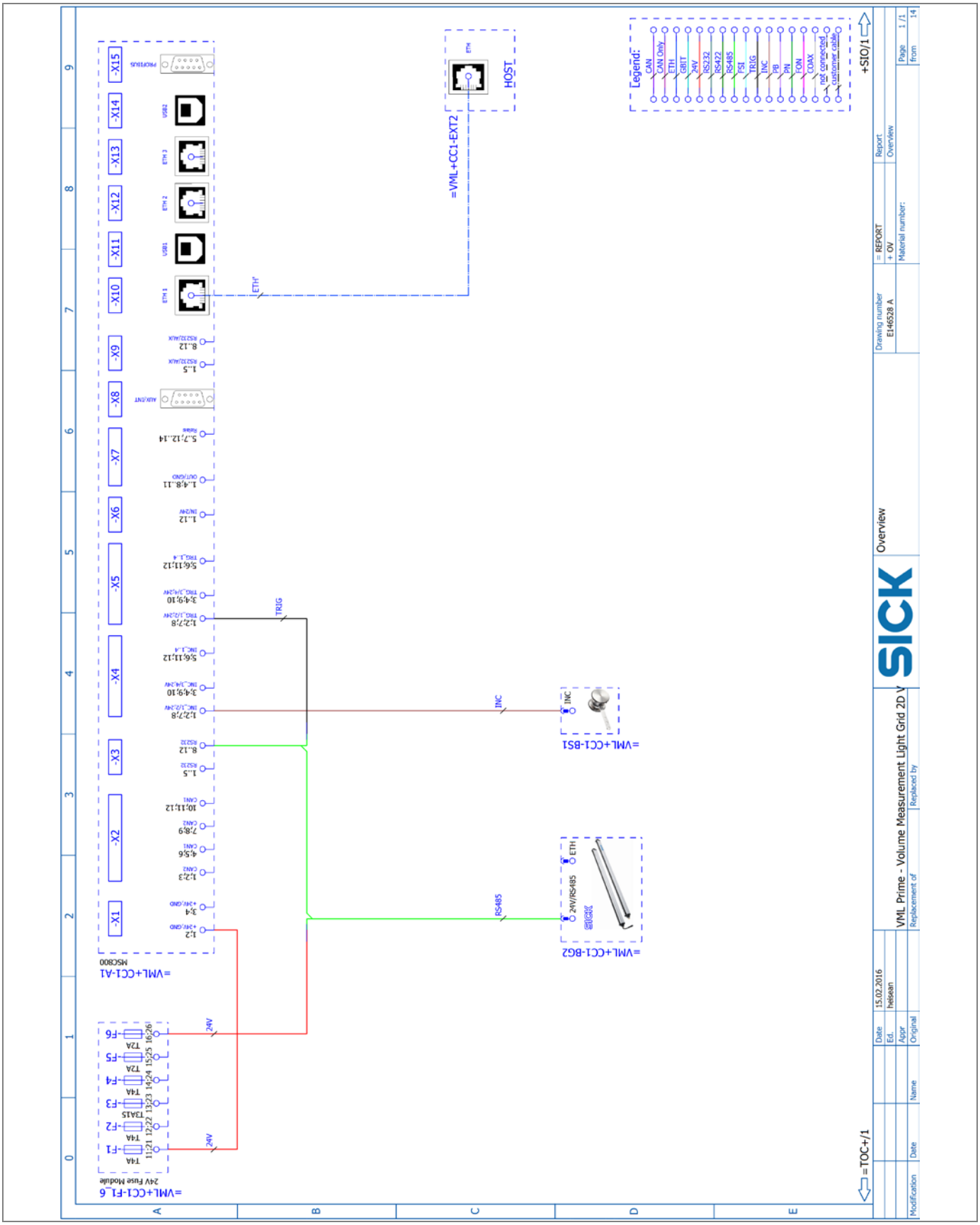


MLG

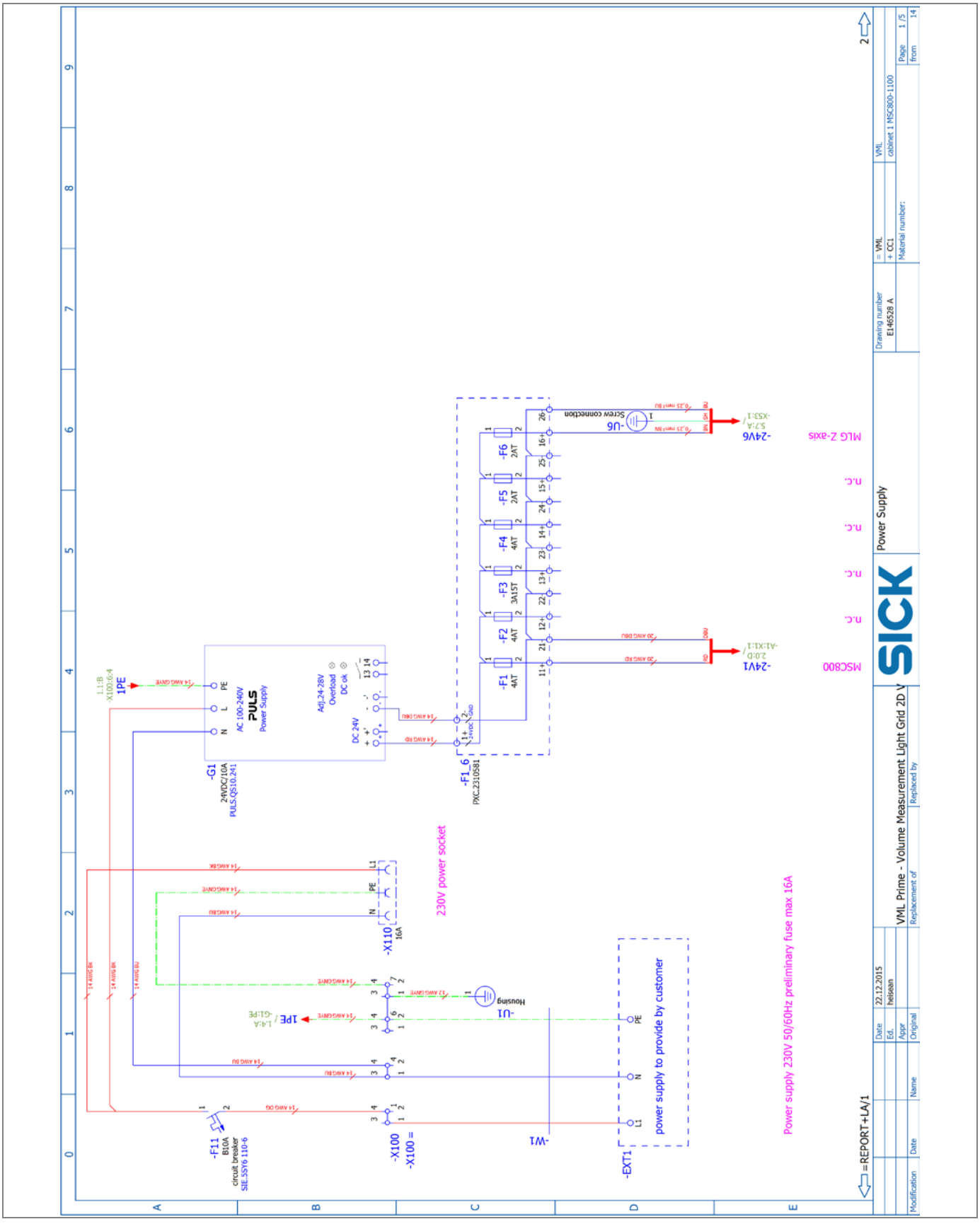

MLG
VML Prime - Volume Measurement Light Grid
SICK
MLG Z-axis
vertical
MLG Y-axis
horizontal
-BG2
-BG1
-W7
-W4
-W5
-E1-BG1
-U17
-U16
-X52
-X53
-X50
-X51
HOST_2
TEACH_2
TRIG
HOST_1
TEACH_1
-24V6
-24V5
-24V3
DOL-1208-G10MF
6048434
6025931
2 m
10 m
4x0,34
SAC-4P-10,0-PUR/M12FS SKR
6027559
SICK.6037467
ETH
HOST

9.5.2 VML Prime 2D V

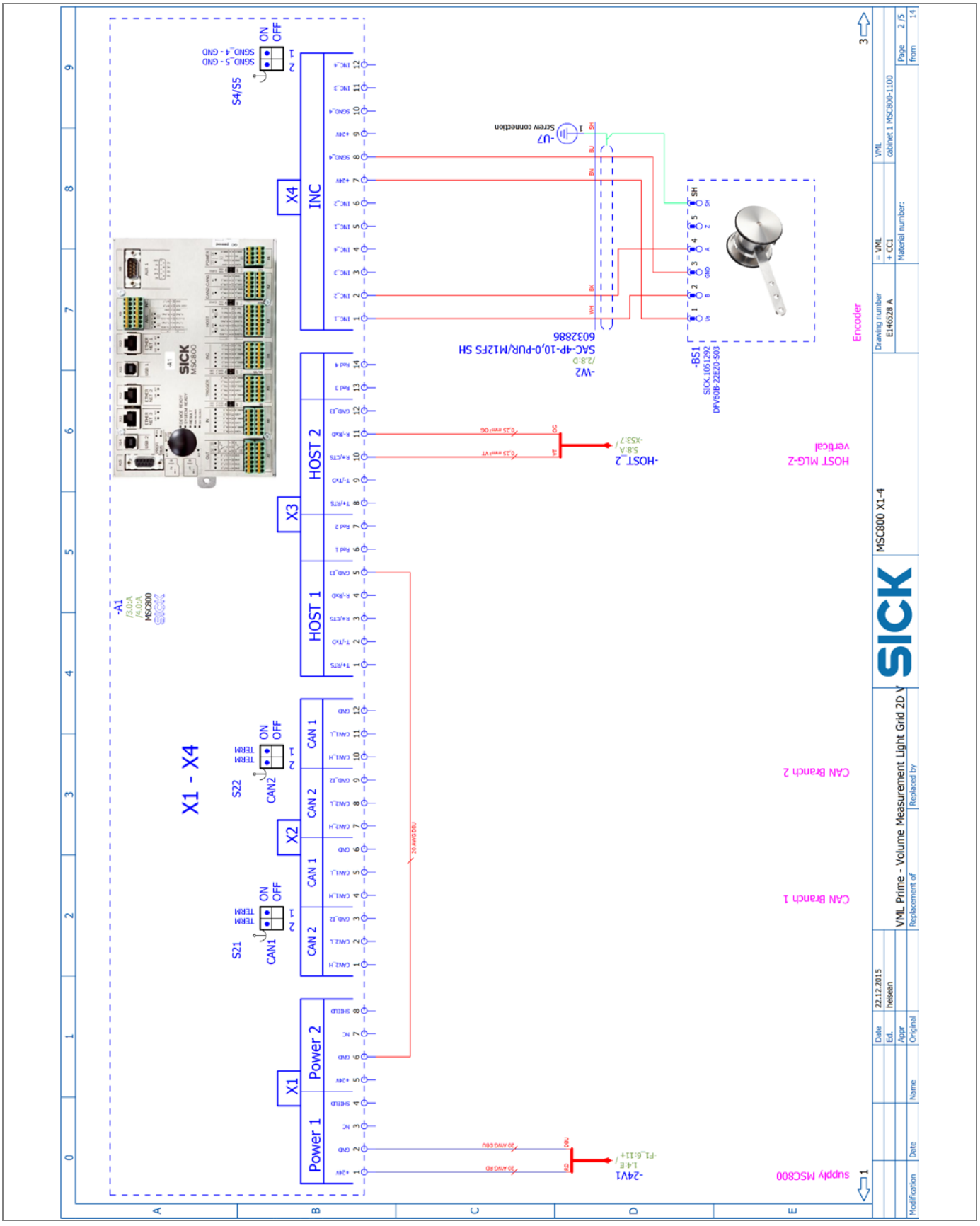
Overview



Power supply



MSC800 X1-X4


X1 - X4
X1
Power 1
Power 2
X2
CAN 2
CAN 1
X3
HOST 1
HOST 2
X4
INC
S4/S5
S22
S21
-A1
MSC800
-U7
Screw connection
-W2
SAC-4P-10,0-PUR/M12FS SH
6032886
-BS1
SICK-1051292
DFV60B-22EZ0 S03
-HOST_2
HOST MLG-Z vertical
CAN Branch 2
CAN Branch 1
Encoder
-24V1
supply MSC800
MSC800 X1-4
SICK
VML Prime - Volume Measurement Light Grid 2D V
Drawing number
E146528 A
Material number:
Page
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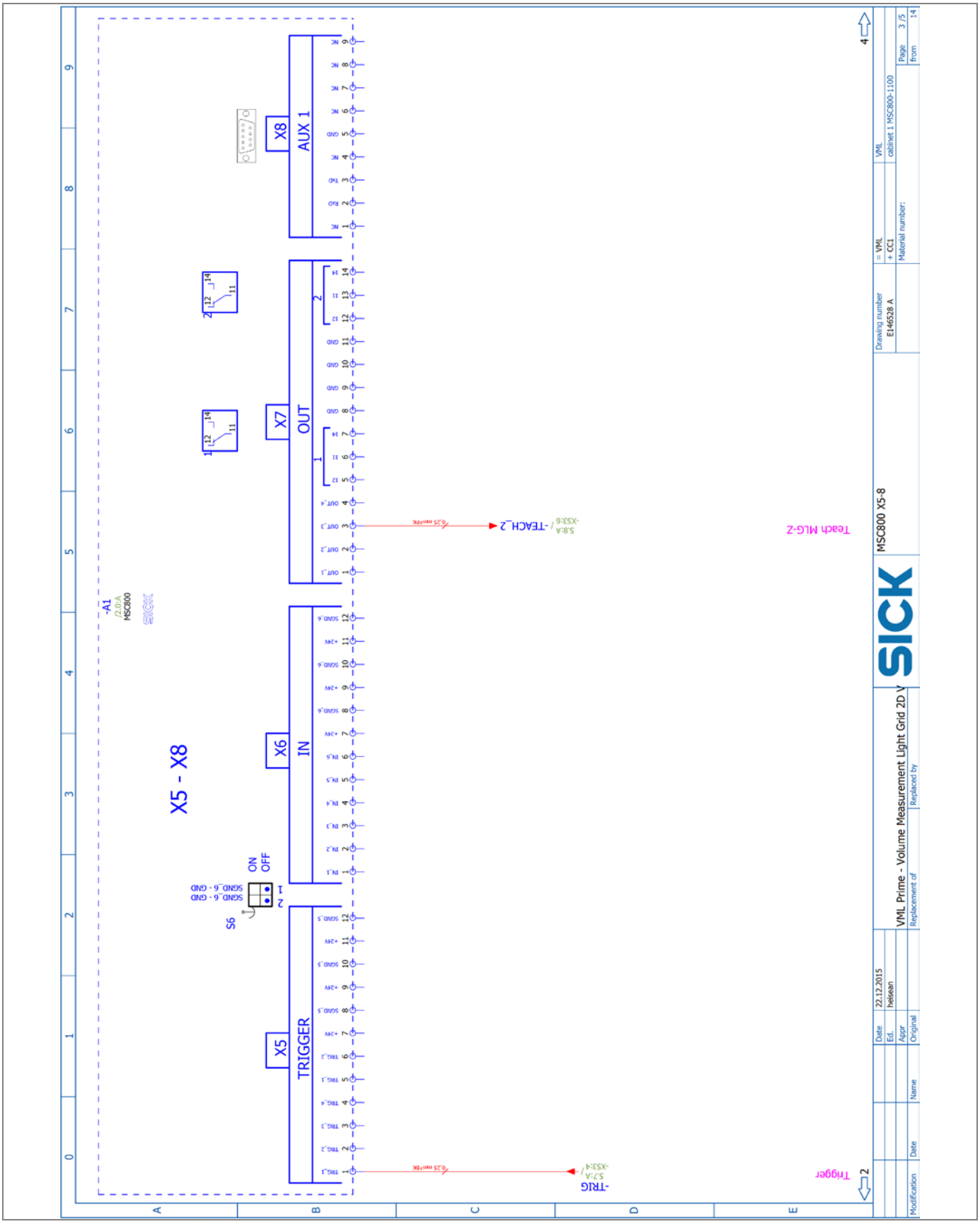
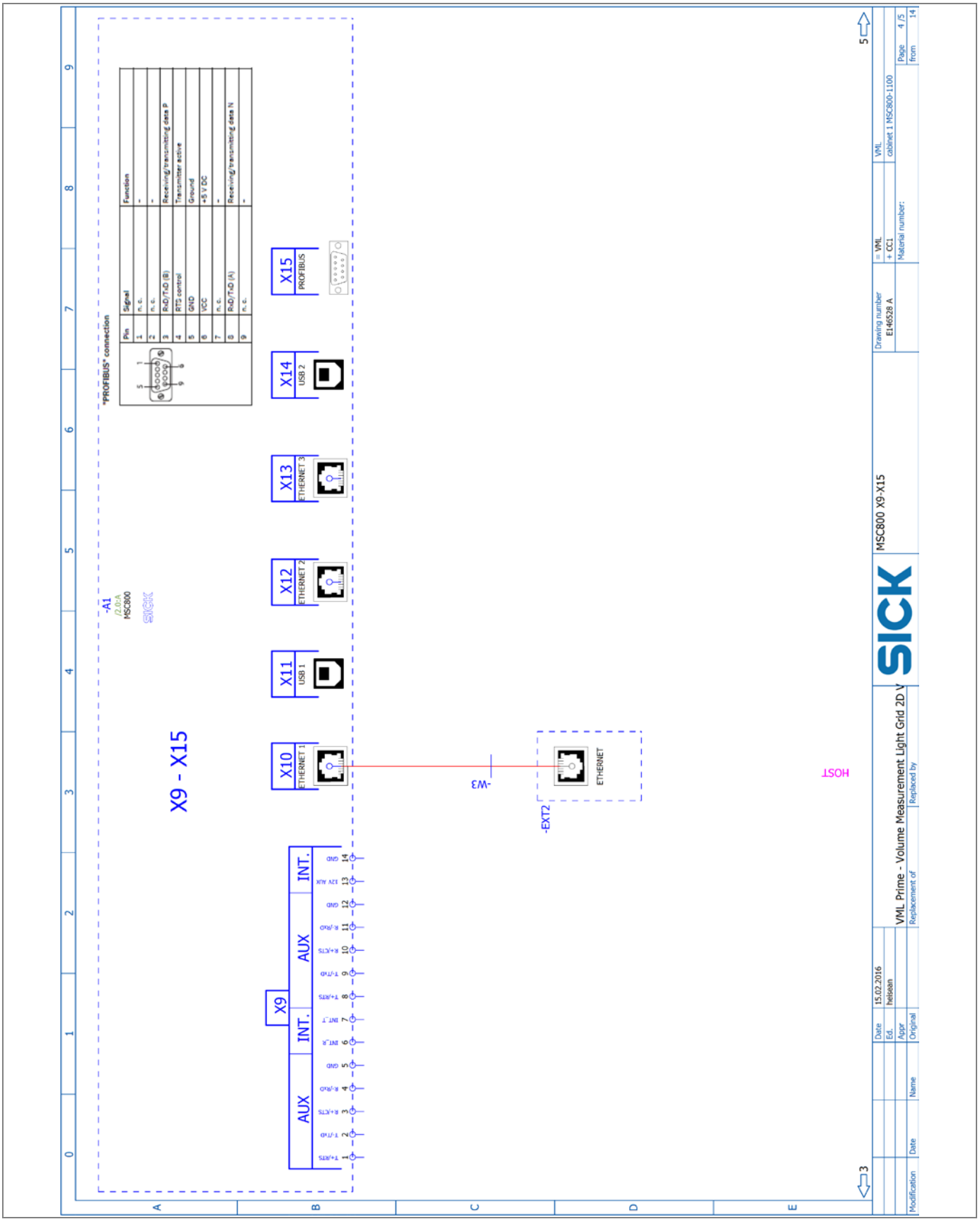
from
14

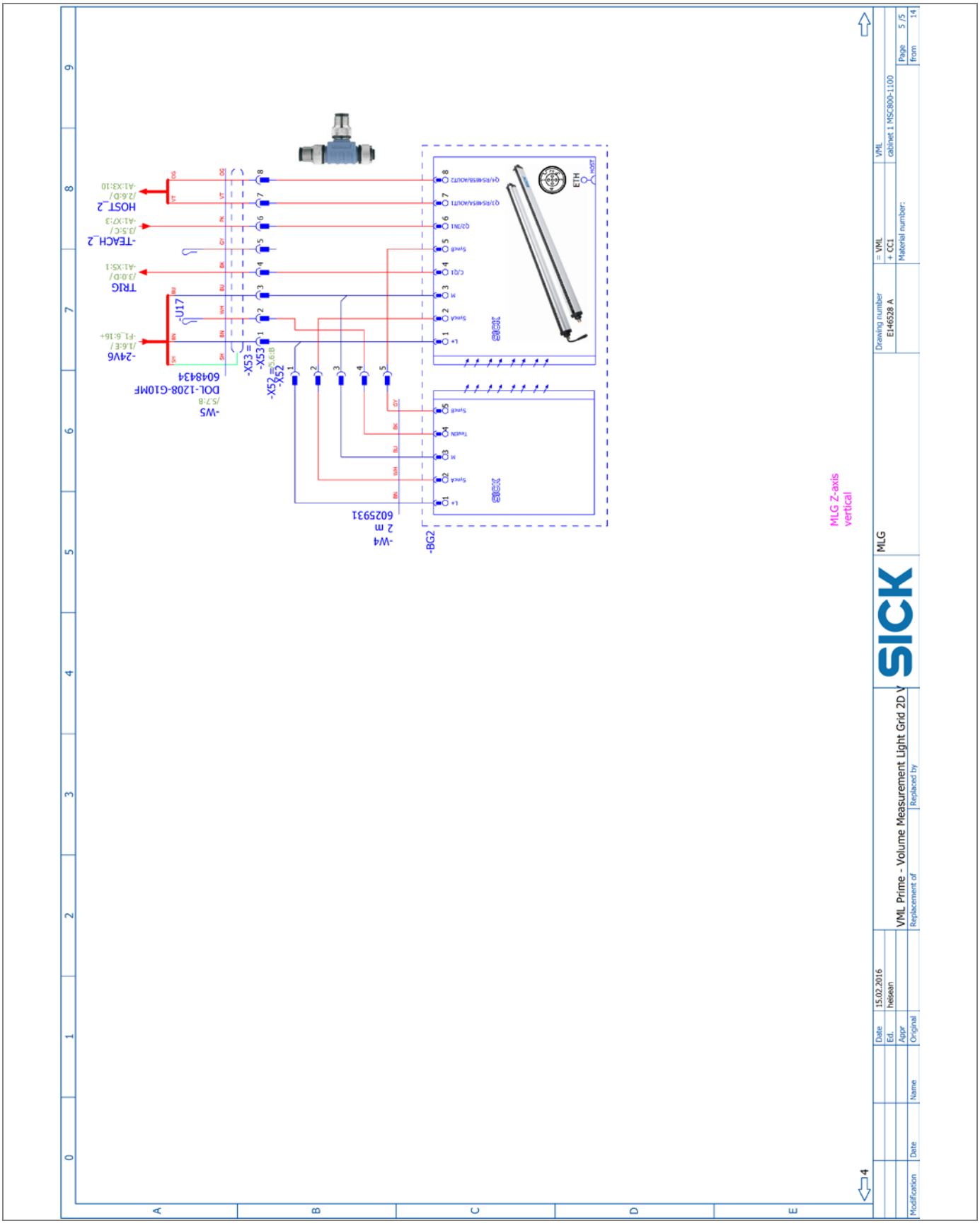
MSC800 X5-X8


X5 - X8
X5
TRIGGER
X6
IN
X7
OUT
X8
AUX 1
-A1
/2.0:A
MSC800
S6
ON
OFF
SGND_6 - GND
-TEACH_2
-TRIG
Teach MLG-Z
Trigger
MSC800 X5-8
SICK
VML Prime - Volume Measurement Light Grid 2D V
Drawing number
E146528 A
= VML
+ CC1
Material number:
VML
cabinet 1 MSC800-1100
Page
from
3 /5
14
Date
Ed.
Appr
Original
22.12.2015
heisean
Replacement of
Replaced by
Modification
Name
Date

MSC800 X9-X15



MLG


MLG Z-axis vertical
MLG
SICK
VML Prime - Volume Measurement Light Grid 2D V
-BG2
-W4
2 m
6025931
DOL-1208-G10MF
6048434
-W5
-X52
-X53
-U17
-24V6
TRIG
HOST_2
TEACH_2
ETH
Drawing number
E146528 A
Material number:
cabinet 1 MSC800-1100
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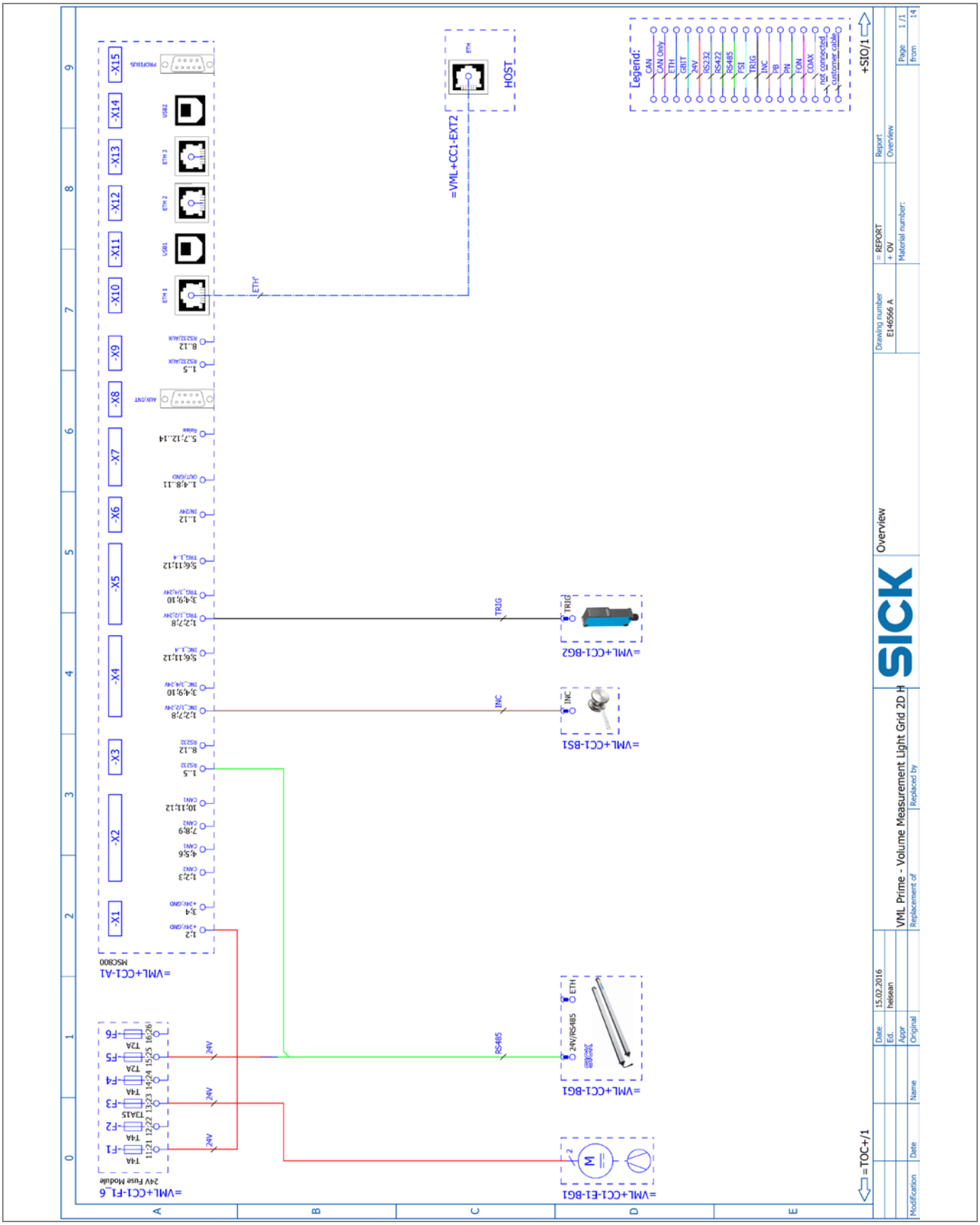
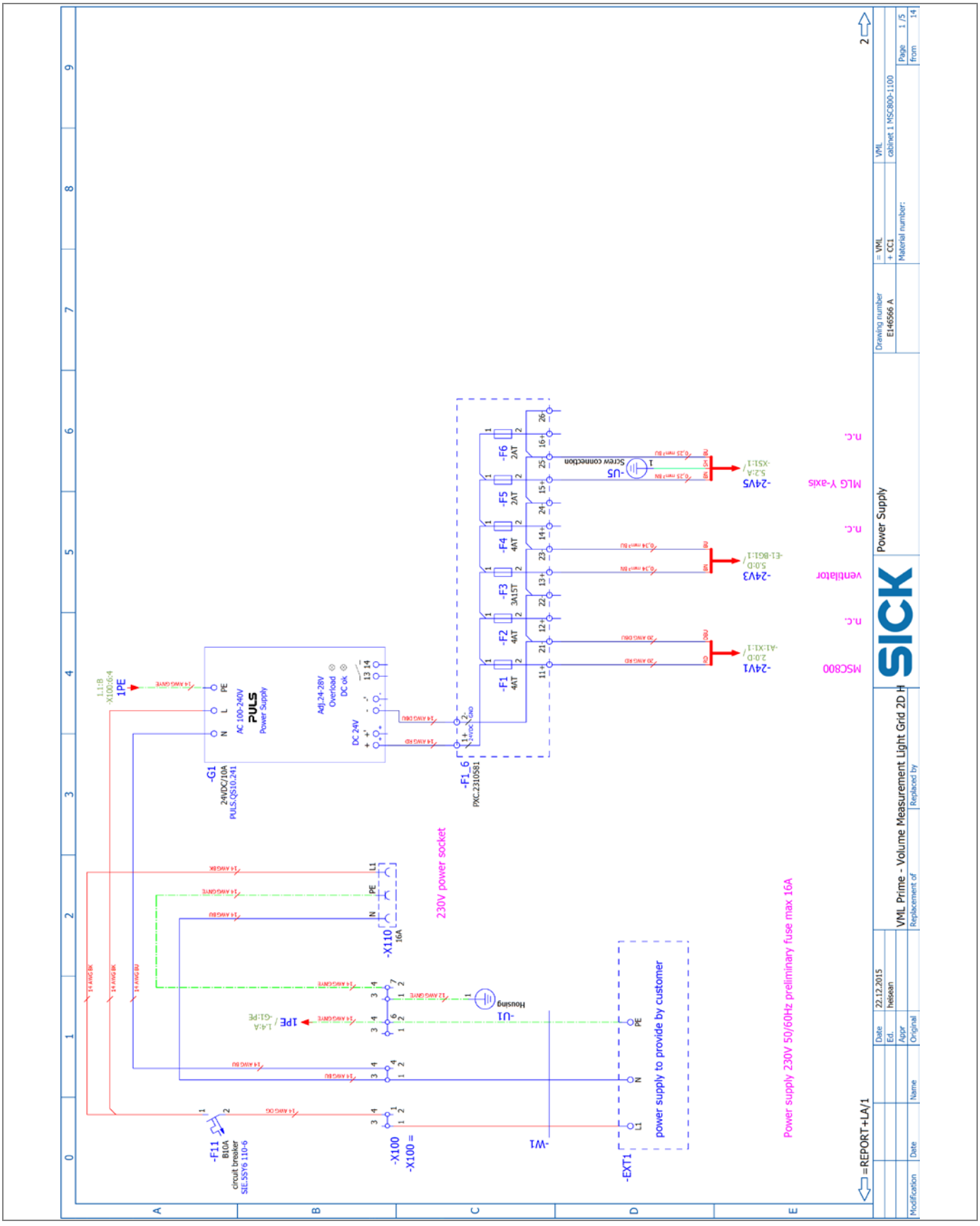
from 14
Date 15.02.2016
Ed. helsean
Appr
Original
Replacement of
Replaced by
Modification
Name
Date

9.5.3 VML Prime 2D H

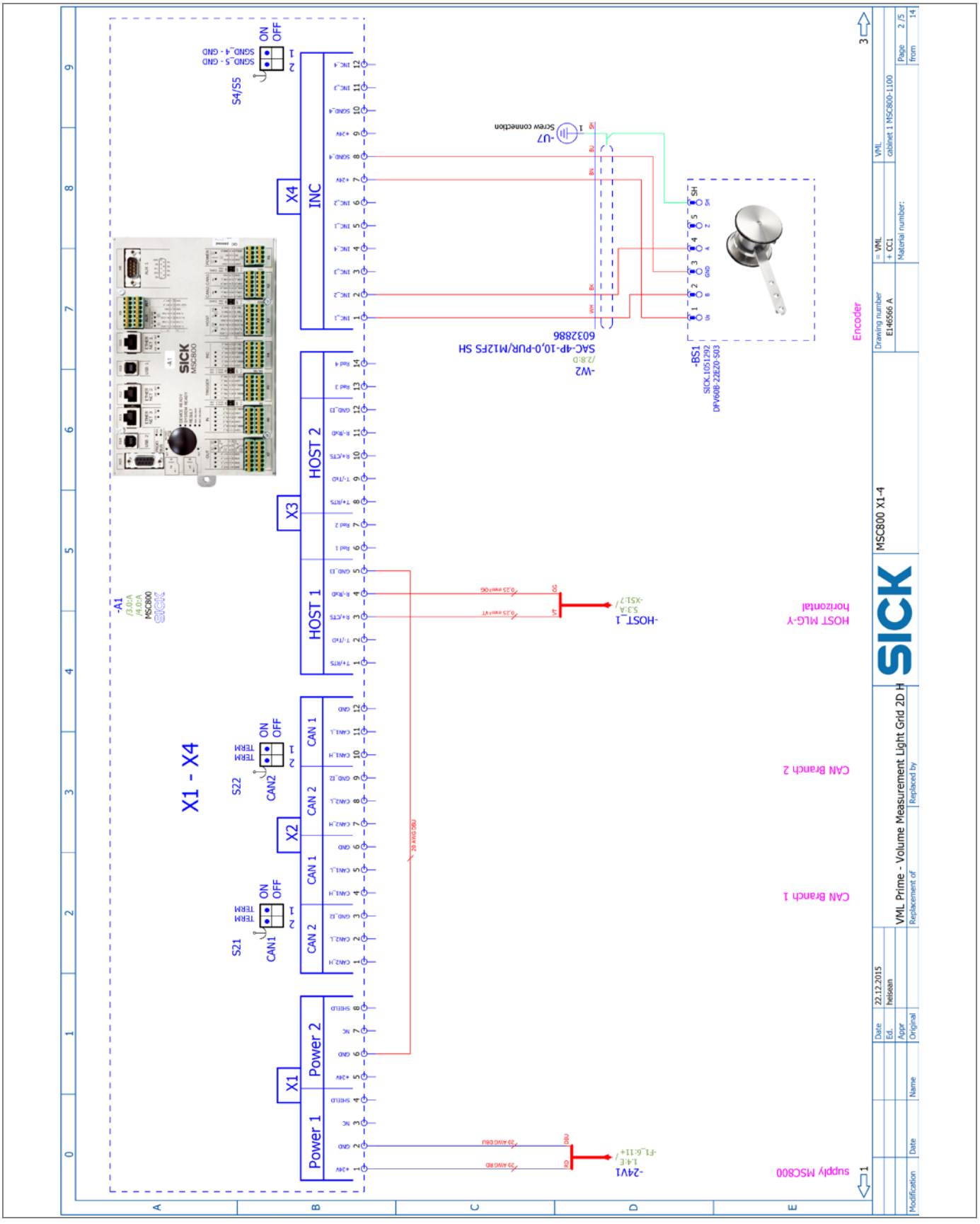
Overview



Power supply



MSC800 X1-X4


X1 - X4
X1
Power 1
Power 2
X2
CAN 1
CAN 2
X3
HOST 1
HOST 2
X4
INC
S4/S5
S22
S21
ON
OFF
TERM
CAN2
CAN1
-A1
MSC800
-HOST_1
HOST MLG-Y horizontal
CAN Branch 2
CAN Branch 1
-24V1
supply MSC800
-BS1
-W2
-U7
Screw connection
Encoder
SICK
MSC800 X1-4
VML Prime - Volume Measurement Light Grid 2D H
VML
cabinet 1 MSC800-1100
Drawing number
E146566 A
Material number:
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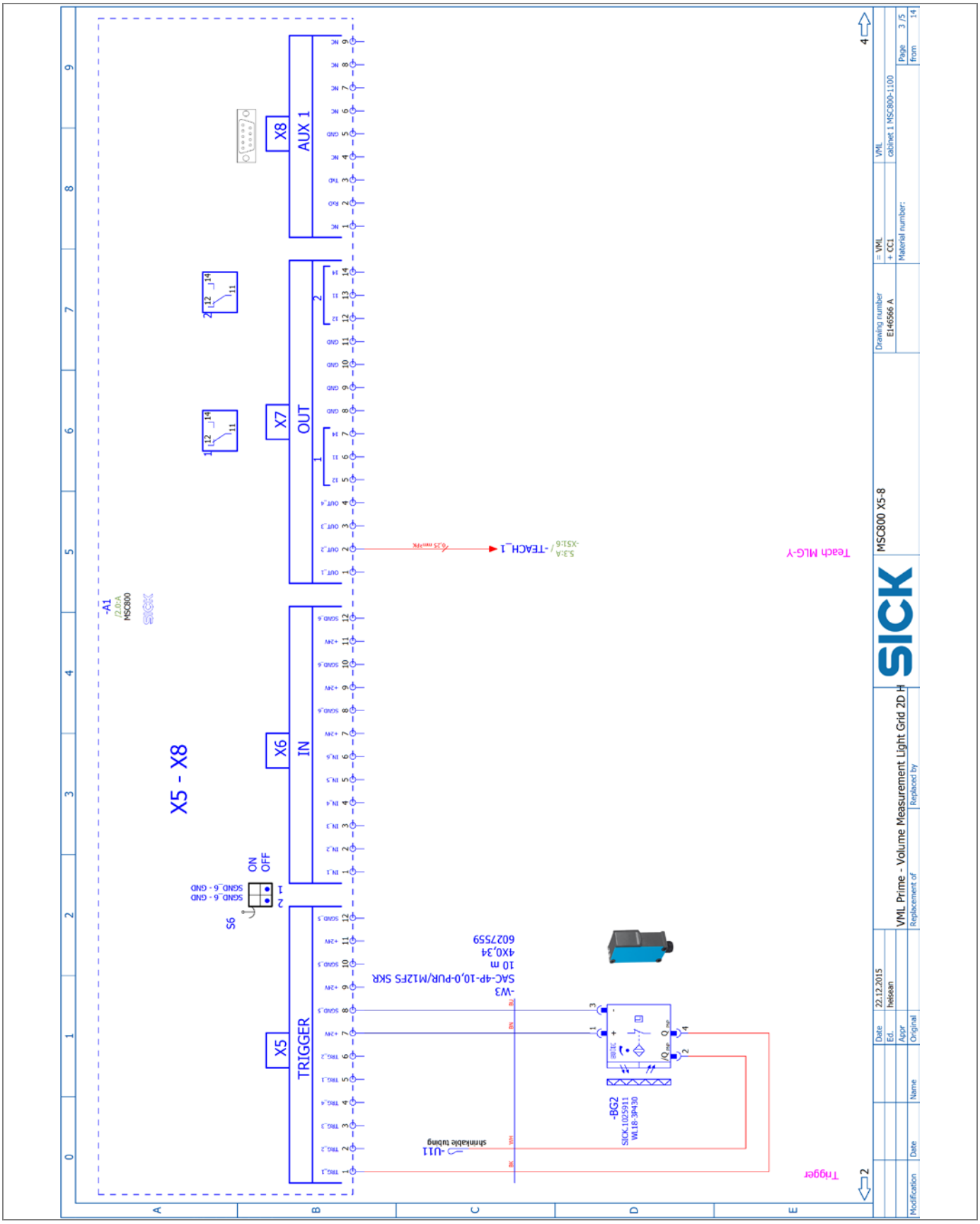
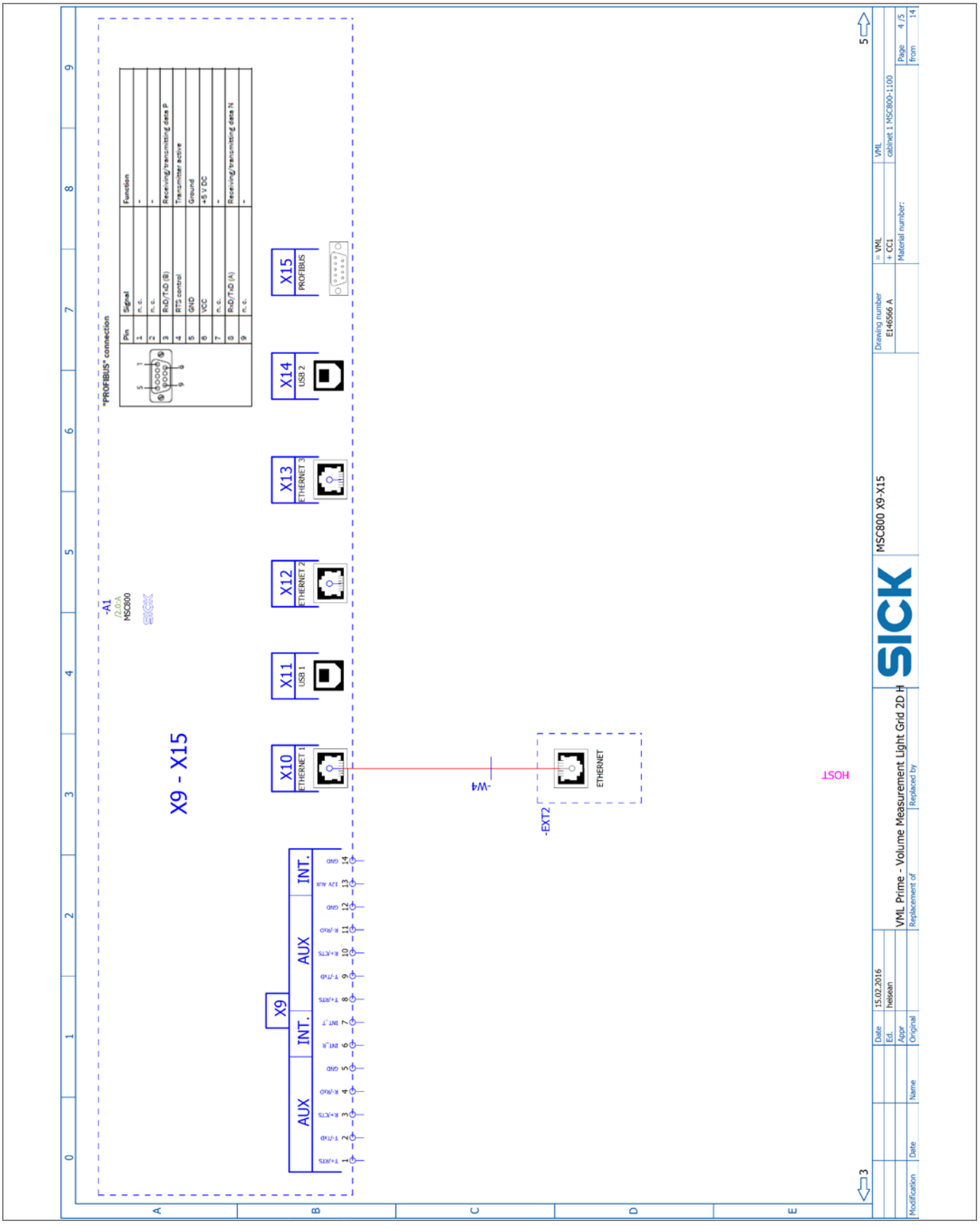
from 14
22.12.2015
helsean

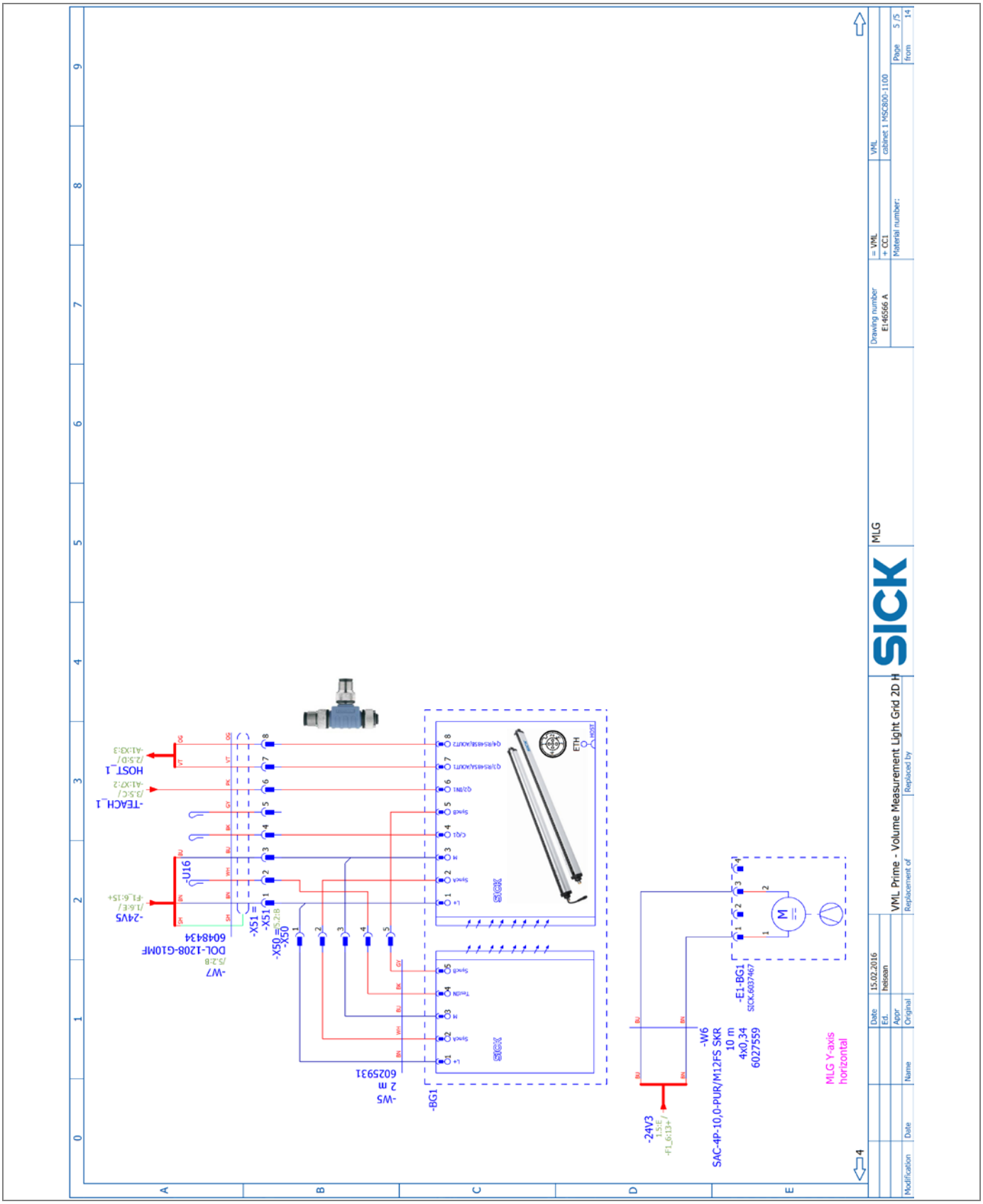
MSC800 X5-X8


X5 - X8
X8
AUX 1
X7
OUT
X6
IN
X5
TRIGGER
-A1
/2.0:A
MSC800
S6
ON
OFF
SGND_6 - GND
-TEACH_1
Teach MLG-Y
Trigger
-W3
SAC-4P-10,0-PUR/M12FS SKR
10 m
4X0,34
6027559
-BG2
SICK.1025911
WL18-3P430
-U11
shrinkable tubing
MSC800 X5-8
VML Prime - Volume Measurement Light Grid 2D H
SICK
Drawing number
E146566 A
= VML
+ CC1
Material number:
VML
cabinet 1 MSC800-1100
Page 3 /5
from 14
Date 22.12.2015
Ed. helsean
Appr
Original
Name
Date
Modification
Replacement of
Replaced by

MSC800 X9-X15



MLG


MLG
SICK
VML Prime - Volume Measurement Light Grid 2D H
-BG1
-W7
-W6
SAC-4P-10,0-PUR/M12FS SKR
10 m
4x0,34
6027559
-E1-BG1
-W5
2 m
6025931
-24V3
-24V5
-TEACH_1
HOST_1
ETH
MLG Y-axis
horizontal

10 Appendix

10.1 List of tables

10.2 List of figures

10.3 Keywords index

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Australia
Phone +61 3 9457 0600
1800 334 802 – tollfree
E-Mail sales@sick.com.au

Austria
Phone +43 22 36 62 28 8-0
E-Mail office@sick.at

Belgium/Luxembourg
Phone +32 2 466 55 66
E-Mail info@sick.be

Brazil
Phone +55 11 3215-4900
E-Mail marketing@sick.com.br

Canada
Phone +1 905 771 14 44
E-Mail information@sick.com

Czech Republic
Phone +420 2 57 91 18 50
E-Mail sick@sick.cz

Chile
Phone +56 2 2274 7430
E-Mail info@schadler.com

China
Phone +86 20 2882 3600
E-Mail info.china@sick.net.cn

Denmark
Phone +45 45 82 64 00
E-Mail sick@sick.dk

Finland
Phone +358-9-2515 800
E-Mail sick@sick.fi

France
Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Germany
Phone +49 211 5301-301
E-Mail info@sick.de

Hong Kong
Phone +852 2153 6300
E-Mail ghk@sick.com.hk

Hungary
Phone +36 1 371 2680
E-Mail office@sick.hu

India
Phone +91 22 4033 8333
E-Mail info@sick-india.com

Israel
Phone +972 4 6881000
E-Mail info@sick-sensors.com

Italy
Phone +39 02 274341
E-Mail info@sick.it

Japan
Phone +81 3 5309 2112
E-Mail support@sick.jp

Malaysia
Phone +6 03 8080 7425
E-Mail enquiry.my@sick.com

Mexico
Phone +52 472 748 9451
E-Mail mario.garcia@sick.com

Netherlands
Phone +31 30 2044 000
E-Mail info@sick.nl

New Zealand
Phone +64 9 415 0459
0800 222 278 – tollfree
E-Mail sales@sick.co.nz

Norway
Phone +47 67 81 50 00
E-Mail sick@sick.no

Poland
Phone +48 22 539 41 00
E-Mail info@sick.pl

Romania
Phone +40 356 171 120
E-Mail office@sick.ro

Russia
Phone +7 495 775 05 30
E-Mail info@sick.ru

Singapore
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Slovakia
Phone +421 482 901201
E-Mail mail@sick-sk.sk

Slovenia
Phone +386 591 788 49
E-Mail office@sick.si

South Africa
Phone +27 11 472 3733
E-Mail info@sickautomation.co.za

South Korea
Phone +82 2 786 6321
E-Mail info@sickkorea.net

Spain
Phone +34 93 480 31 00
E-Mail info@sick.es

Sweden
Phone +46 10 110 10 00
E-Mail info@sick.se

Switzerland
Phone +41 41 619 29 39
E-Mail contact@sick.ch

Taiwan
Phone +886 2 2375-6288
E-Mail sales@sick.com.tw

Thailand
Phone +66 2645 0009
E-Mail Ronnie.Lim@sick.com

Turkey
Phone +90 216 528 50 00
E-Mail info@sick.com.tr

United Arab Emirates
Phone +971 4 88 65 878
E-Mail info@sick.ae

United Kingdom
Phone +44 1727 831121
E-Mail info@sick.co.uk

USA
Phone +1 800 325 7425
E-Mail info@sick.com

Vietnam
Phone +84 945452999
E-Mail Ngo.Duy.Linh@sick.com

Further locations at **www.sick.com**

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