Technical description

EXM-8-SB

External Modem for rail bus

Item number	WNR
3275822	CWA-60068139

Conductix-Wampfler Automation GmbH
Handelshof 16 A
14478 Potsdam
Germany
Telephone: +49 331 887344-0
Fax: +49 331 887344-19
Email: info.potsdam@conductix.com
Internet: www.conductix.com
Translation of the original
TNB_0054_EXM-8-SB, 2, en_GB

Table of contents

TNB_0054_EXM-8-SB, 2, en_GB

1 Information on the description

1.1 Revision history

We reserve the right to make changes to the information present in this document, which result from our constant effort to improve our products.

Version	Date	Comment/reason for change
1	03.2022	Version for EXM-8-SB
2	12.2022	WNR 60064118 removed

1.2 How to use and store the description

To work safely with the product, it is necessary to observe the safety notes and action instructions. All persons working with the product must have understood the user information in this description and apply it conscientiously. The operator must fulfil his duty of care and ensure that all persons working with the product have read and understood the user information and are implementing it.

This description forms part of the product and must be accessible to all persons working with the product at all times.

1.3 Applicable documents

The documents contained in the project documentation also apply if the device / system is part of a project-specific system plan.

Their own documentation applies to connected devices and components.

1.4 Copyright protection

1.5 Illustrations

The illustrations that accompany this description have been purposely selected. They are provided for basic understanding and may differ from the actual design. No claims shall be accepted for possible discrepancies.

1.6 Brands

The popular names, trade names, production descriptions, etc. used in this description may constitute trademarks even without special designations and as such may be subject to legal requirements.

2 Warranty and liability

2.1 Warranty

The warranty only covers production defects and faulty components.

The manufacturer assumes no responsibility for damages caused during transport or unpacking. In no case and under no circumstances will the manufacturer be liable for defects or damages caused by misuse, incorrect installation or inadequate environmental conditions or from dust or corrosive substances.

Consequential damages are excluded from the warranty.

Should you have further questions regarding the warranty, please contact the supplier.

2.2 Limitation of liability

All information and notes in this description have been compiled taking into account the applicable standards and regulations, the state of the art and our many years of knowledge and experience.

Conductix-Wampfler Automation GmbH assumes no liability for damage and malfunctions during operation due to:

- Failure to comply with the description
- Non-intended use
- Use by untrained personnel
- Unauthorised alteration or modification
- Use of the product, despite negative transport inspection

Furthermore, Conductix-Wampfler Automation GmbH's warranty obligation will cease to exist in case of a failure to comply with the description.

3 Safety instructions

This section contains information on all safety aspects for optimum protection of personnel and for safe operation without malfunctions.

To prevent dangers, these notes must be read and followed by personnel. Only then can safe operation be guaranteed.

Of course, all legally applicable general safety and accident prevention regulations must be complied with.

Conductix-Wampfler Automation GmbH assumes no liability for damage or accidents that were caused by non-observance of these safety notes.

3.1 Warning concept

This description contains notes that must be observed for your own personal safety and to avoid property damage. Notes regarding your personal safety are highlighted by a warning triangle; notes regarding property damage do not have a warning triangle.

When several hazard levels occur, the warning always refers to the highest level. If a warning of injury to persons is indicated with a warning triangle, the same warning might include an additional warning of property damage.

3.1.1 Arrangement of warnings

If warnings refer to an entire section, they are placed at the beginning of the section (e.g. chapter start).

If warnings refer to a specific action instruction, they are placed in front of the respective action instruction.

3.1.2 Structure of warnings

- **SIGNAL WORD**
- ↳ Type of danger and its source
- ↳ Possible consequences, if not observed
- ↳ Danger avoidance measures
- ↳ Preventive measures

3.1.3 Signal words

Warnings are indicated using signal words based on hazard levels.

Signal word	Meaning
 ⚠WARNING!	This combination of symbol and signal word indicates a possible dangerous situation that can result in death or serious injury if it is not avoided.
 NOTICE!	This combination of symbol and signal word indicates a possible dangerous situation that can result in material damage if it is not avoided.

3.1.4 Hazard symbols

Warnings of the groups 'danger' and 'warning' are content-based. They are presented with clear danger symbols.

Warnings of the 'caution' group do not have a specific danger symbol.

Warning signs	Type of danger
	Warning – high-voltage.
	Warning – danger of falling.
	Warning – danger zone.

3.1.5 Suggestions and recommendations

This symbol indicates important information to help you handle the product.

3.2 Intended use

The EXM-8-SB external modem has been designed and constructed exclusively for the intended use described below.

The EXM-8-SB external modem is a device for industrial and commercial systems for data transmission in transport systems with rail bus communication. The EXM-8-SB has been specially designed as a communication module for connecting to Conductix and LJU vehicle control systems.

3.3 Foreseeable incorrect use

Any use that goes beyond this description is forbidden.

⚠ WARNING!

Hazard from non-intended use!

Any use of the device other than and/or beyond the intended use can cause hazardous situations.

- Only use the device as intended.
- It is paramount to comply with all the specifications and permitted conditions at the place of use.
- Do not use the device in potentially explosive atmospheres.
- Do not operate the device in environments with harmful oils, gases, vapours, dusts, radiation, etc.

3.4 Modifications and alterations

For the purpose of avoiding hazards and for ensuring optimum performance, any modifications, additions, or alterations to the device require Conductix-Wampfler Automation GmbH's express consent.

3.5 Responsibility of the operator

The device is used in an industrial environment. The operator of the device is therefore subject to statutory obligations regarding work safety.

In addition to the work safety instructions in this description, the safety, accident prevention and environmental regulations applicable to the area where the device is used must be complied with.

The following applies in particular:

- The operator must familiarise with the applicable work safety regulations and must also determine the dangers that are posed by the particular work conditions at the location of use by means of a risk assessment. This must be realised in the form of operating instructions for operating the device.
- This description must be kept within easy reach of the device and be accessible to those persons charged with working both on and with the device at all times.
- The specifications of the description must be adhered to fully and unconditionally!
- The device may only be operated when in a perfect and operationally safe condition. The device must be checked for detectable defects prior to each time it is put into service.
- The system operator must ensure that the responsibilities for activities on the system are unambiguously defined and only adequately qualified personnel familiar with the operating and safety regulations are working on and with the device.

3.6 Personnel and qualifications

The product / system belonging to this description may only be handled by personnel qualified for the respective task. This is done taking into account the descriptions associated with the particular task, especially the safety and warning information contained therein.

Due to their training and experience, qualified personnel are able to recognize risks and avoid possible hazards when dealing with this product / system.

⚠ WARNING!

Injury hazard from insufficient qualification!

Improper handling can cause substantial bodily harm or material damage.

3.7 Special hazards

⚠ WARNING!

Live parts

The EXM-8 external modem is installed tightly onto the conductor lines. Contact with live parts poses an immediate danger to life.

- Work on electrical components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with electrical engineering regulations.
- Isolate the conductor lines from the power supply and secure them against reactivation for all work on the EXM-8.
- Switch off the connected vehicle control system for all work on the EXM-8.
- Always use insulated tools.

4 Product description

4.1 Functions

4.1.1 Communication

The EXM-8 external modem is a communication module which is connected externally to Conductix or LJU vehicle control systems. The vehicle control system communicates with the system controller via the EXM-8.

In this process, the data transmission from and to the vehicles occurs via the rail bus, which is routed parallel to the track with two separate conductor lines (SB_A and SB_B).

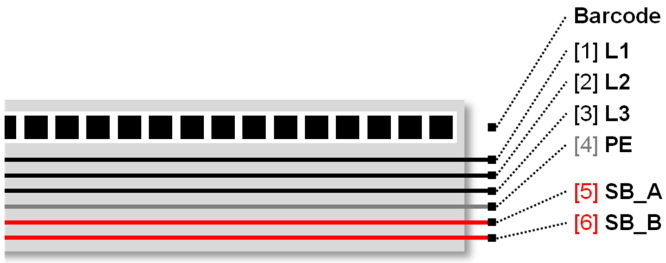

Fig. 1: Separate conductor lines [5] and [6]

Commands, messages and vehicle data are sent cyclically and acyclically between the vehicles and the system controller via the rail bus.

Communication

A precondition for communication between vehicles and the system controller is also the use of a communication and command system, which forms the interface between the system controller (PLC) and the vehicle control systems.

Possible communication systems:

- *Decentralised bus master system*
- *Intelligent data management system (iDM system)*

4.1.2 Data transmission

The data transmission between the vehicles and the communication system used is performed by means of voltage modulation. I.e. bipolar signal voltages ±24 V are placed on the rail bus.

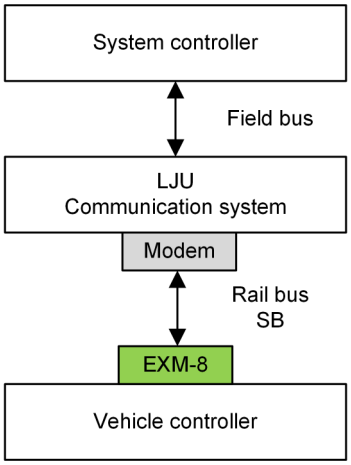

Fig. 2: Data communication

Data from the system controller to the vehicles is modulated through the modem of the communication system directly to the rail bus. The EXM-8 receives this data and provides it to the vehicle control system for evaluation.

Conversely, data of the vehicle for the system controller is modulated by the EXM-8 to the rail bus and received by the modem of the communication system. This data is evaluated by the communication system and provided to the system controller.

Data between the used communication system and the connected system controller is exchanged via a field bus system.

4.2 Structure

The EXM-8 external modem is designed as a compact device.
The most important parts of the EXM-8 are shown in the figure below.

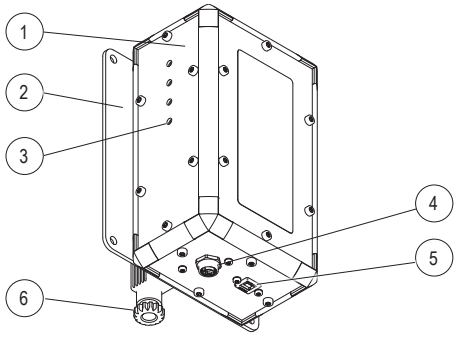

Fig. 3: EXM-8 basic device

1 Housing with internal electronics
2 Mounting plate with fixing points
3 4x status LED
4 Port for voltage supply and data
5 Service interface
6 Port for rail bus and PE on the rear of the device

4.3 Type label

The following image shows the type label of an external modem with rail bus communication EXM-8-SB.

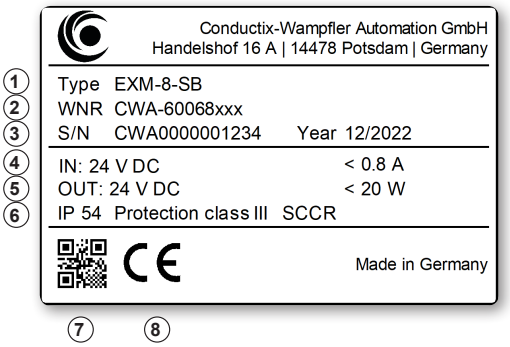

Fig. 4: EXM-8-SB type label

1 Model name
2 Item number (WNR)
3 Serial number, year of construction
4 Input voltage, input current
5 Output voltage, output power
6 Protection type, protection class
7 QR-Code (serial number)
8 CE marking

5 Transport and storage

5.1 Transport

NOTICE!

Transport

Incorrect or improper transport may cause damage to the device.

- Only trained personnel are allowed to transport the device.
- If necessary, use suitable transport aids.
- Transport the devices with utmost care.
- Observe the symbols on the packaging.
- Do not remove packaging and transport securing devices until you are ready to start with the installation.

5.2 Transport inspection

Check the delivery for completeness and transport damage upon receipt.

Proceed as follows in case of any apparent damage:

- Refuse to accept the delivery or accept it only conditionally. Take note of the extent of the damage and write it down on the carrier's transport documents or delivery note.
- Initiate a complaints process and report the incident to the supplier. If Conductix-Wampfler Automation is your direct supplier you will find our contact information in this document.
  ↳ *Chapter 'Customer service and addresses' on page 49*

Claims for damages

Claim any defect as soon as it becomes apparent. Damages can only be claimed within the applicable claim periods.

5.3 Storage

NOTICE!

Storage

Incorrect or improper storage may cause damage to the device.

- Cover connections with protective caps during storage.
- Avoid mechanical stress and vibrations.
- Store in a dry and dust-free location.
- Regularly check the condition of the stored device.
- Keep environmental conditions as specified in the technical information.
- Keep the storage temperature as specified in the technical information.

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6 Mechanical installation

Objective

This section provides details on the mechanical installation. Electrical installation is possible following successful mechanical installation.

Responsible party

The system integrator (e.g. system builder, operator) is responsible for trouble-free and safe installation. As the contact person, he responds to all the fitter's queries regarding safe-to-use equipment; e.g.:

- Fire protection
- Electrical equipment
- Ladders and scaffolding
- Requirements for assembly tools
- Lifting and transportation

Required personnel

Due to their training and experience, only qualified and appropriately instructed personnel are able to correctly assess the respective initial situation, identify risks and avoid hazards.

Personnel required for installation:

- Adequately qualified fitter

Required personal protective equipment

The person responsible must ensure that the personnel under his responsibility are wearing the required personal protective equipment. The required personal protective equipment satisfies the requirements for the work to be carried out and all the requirements demanded by the scope of work.

Personal protective equipment that fulfils its intended purpose:

- protects its wearer from injury;
- reduces the seriousness and severity of potential injuries.

Wear:

- Work protection clothing
- Safety shoes
- Protective gloves
- Protective goggles

Safety in the work area

- Note the safety signs in the area around the system.
- Pay attention to the safety notes in additional applicable documentation (supplier documents).

Work safety

Pay attention to company and task-specific work safety regulations, as well as the country-specific legal and safety regulations applicable at the location of use.

Wear additional protective equipment

As an employee, you wear protective equipment supplied by the area supervisor. If work tasks have been delegated only temporarily, then you also wear any protective equipment that has become additionally required.

Special hazards

⚠ WARNING!

Live parts

The EXM-8 external modem is installed tightly onto the conductor lines. Contact with live parts poses an immediate danger to life.

- Work on electrical components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with electrical engineering regulations.
- Isolate the conductor lines from the power supply and secure them against reactivation for all work on the EXM-8.
- Switch off the connected vehicle control system for all work on the EXM-8.
- Always use insulated tools.

⚠ WARNING!

Risk of falling

Risk of falling when installing the device to typical attachment points on an overhead track.

- Provide safe ascent for all activities on the device.
- Always use certified climbing aids.

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6.1 Installation location and position

The EXM-8 is intended for direct installation on the material-handling vehicle.

NOTICE!

Collisions

Damage to system components and the device.

- Choose the installation position of the device so that collisions with system components are excluded.

Installation location

Note the following points regarding the installation location of the EXM-8 on the material-handling vehicle:

- Install the EXM-8 as tightly as possible to the conductor lines for the rail bus.
  Recommended: directly on the current collectors for the rail bus
- Indicator and status LEDs of the EXM-8 should always be visible
- Ports of the EXM-8 should always be accessible

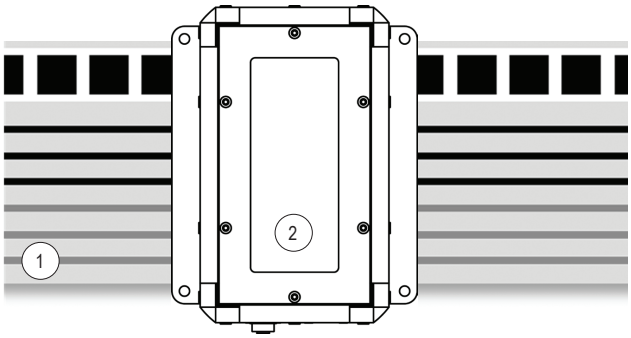

Fig. 5: Recommended installation location

1 Conductor lines of the track
2 EXM-8 external modem installed on the material-handling vehicle

NOTICE!

Faults due to long connection cables.

Long connection cables to the current collectors for the rail bus may lead to faults during operation and low data rates.

- Install the EXM-8 in direct proximity to the current collector for the rail bus.
- Keep the connection cables between current collectors for the rail bus and EXM-8 as short as possible.
- Comply with cable requirements.

Installation position

Recommended installation position for the EXM-8:

- Vertical (ports underneath)
- Indicator and status LEDs facing away from the direction of travel

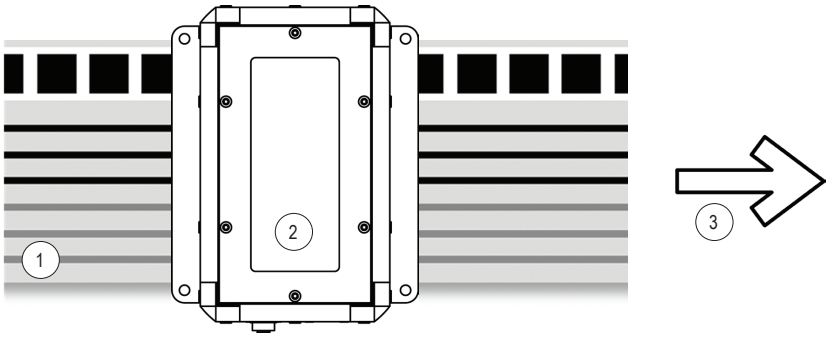

Fig. 6: Recommended installation position and direction of travel

1 Conductor lines of the track
2 EXM-8 external modem installed on the material-handling vehicle
3 Direction of travel of the material-handling vehicle

6.2 Installation

Install the EXM-8 as follows:

- Install the EXM-8 directly above the holes in the mounting plate on the material-handling vehicle.
- Fix the EXM-8 to the material-handling vehicle with secure non-releasing screw connections.

Connector on the rear of the EXM-8 device

- *During installation, provide a duct for the connector on the rear of the EXM-8 device.*

NOTICE!

Dampen impacts and vibrations

If the device is subjected to impermissible heavy impacts or vibrations, the amplitude and acceleration must be attenuated by means of appropriate measures.

- Use vibration-damping and vibration-eliminating systems.

Fixing points

The EXM-8 has four fixing holes in the mounting plate by means of which the EXM-8 is installed on the material-handling vehicle.

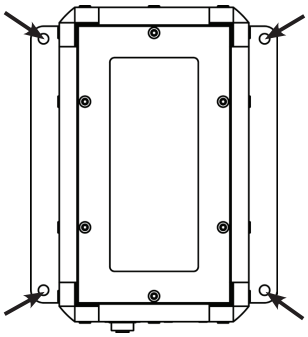

Fig. 7: Fixing points

Number of fixing holes	4
Ø Fixing hole	6.5 mm
Material thickness of the mounting plate	3 mm

Dimensional drawing

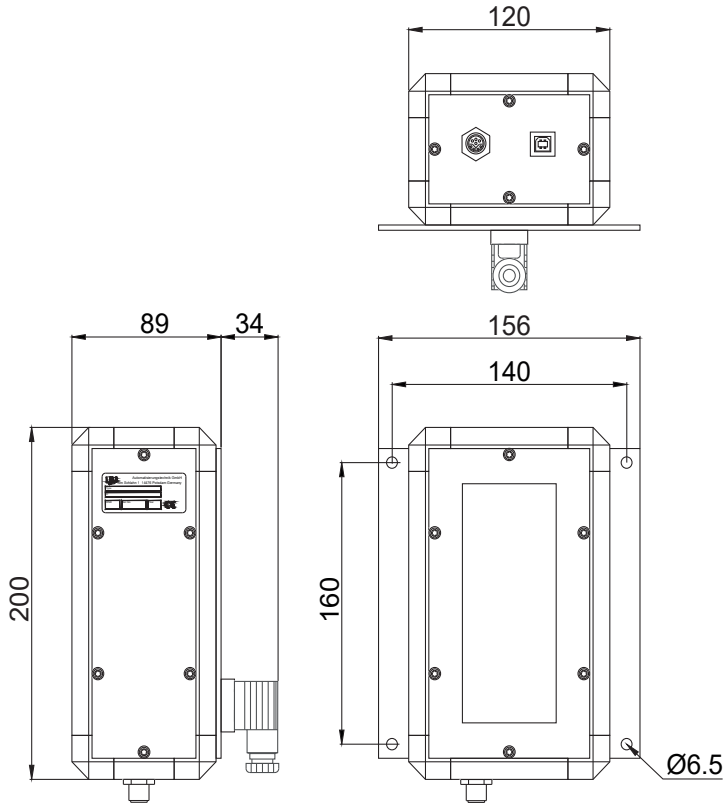

Fig. 8: Dimensional drawing

7 Electrical installation

Objective

This section provides details on the electrical installation. Commissioning is possible following successful electrical installation.

Responsible party

The system integrator (e.g. system builder, operator) is responsible for trouble-free and safe electrical installation. As the contact person, he responds to all the fitter's queries regarding safe-to-use equipment; e.g.:

- Fire protection
- Electrical equipment
- Ladders and scaffolding
- Requirements for assembly tools

Required personnel

Due to their training and experience, only qualified and appropriately instructed personnel are able to correctly assess the respective initial situation, identify risks and avoid hazards.

Personnel required for electrical installation:

- Qualified electrician
- Adequately qualified fitter under the direction and supervision of a qualified electrician

Required personal protective equipment

The person responsible must ensure that the personnel under his responsibility are wearing the required personal protective equipment. The required personal protective equipment satisfies the requirements for the work to be carried out and all the requirements demanded by the scope of work.

Personal protective equipment that fulfils its intended purpose:

- protects its wearer from injury;
- reduces the seriousness and severity of potential injuries.

Wear:

- Work protection clothing
- Safety shoes
- Protective gloves
- Protective goggles

Safety in the work area

- Note the safety signs in the area around the system.
- Pay attention to the safety notes in additional applicable documentation (supplier documents).

Work safety

Pay attention to company and task-specific work safety regulations, as well as the country-specific legal and safety regulations applicable at the location of use.

Wear additional protective equipment

As an employee, you wear protective equipment supplied by the area supervisor. If work tasks have been delegated only temporarily, then you also wear any protective equipment that has become additionally required.

Special hazards

⚠ WARNING!

Live parts

The EXM-8 external modem is installed tightly onto the conductor lines. Contact with live parts poses an immediate danger to life.

- Work on electrical components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with electrical engineering regulations.
- Isolate the conductor lines from the power supply and secure them against reactivation for all work on the EXM-8.
- Switch off the connected vehicle control system for all work on the EXM-8.
- Always use insulated tools.

⚠ WARNING!

Risk of falling

Risk of falling when installing the device to typical attachment points on an overhead track.

- Provide safe ascent for all activities on the device.
- Always use certified climbing aids.

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7.1 Connection instructions

NOTICE!

Malfunctions due to improper device connection

Improper device connection may lead to malfunctions during operation.

- Always follow the connection instructions.

All connections of the EXM-8 are designed to be pluggable. It is via these connections that the EXM-8 is to be connected with the current collectors for the rail bus, the PE of the material-handling vehicle and with the vehicle control system of the material-handling vehicle.

Note the following instructions for the EXM-8 connection:

- Configure the connections from the EXM-8 to the current collectors to be as short as possible.
- Route connection cables to the current collectors in a twisted manner.
- Route connection cables from and to the EXM-8 separately from power cables.
- To ensure protection class IP54 is attained, only use screwed M12 plug connectors and the supplied connectors.
- Secure plug connections against accidental loosening with appropriate safeguards (brackets, screw caps).
- Do not connect cables under tensile strain to the EXM-8. Use strain relief devices.

7.2 Connection overview

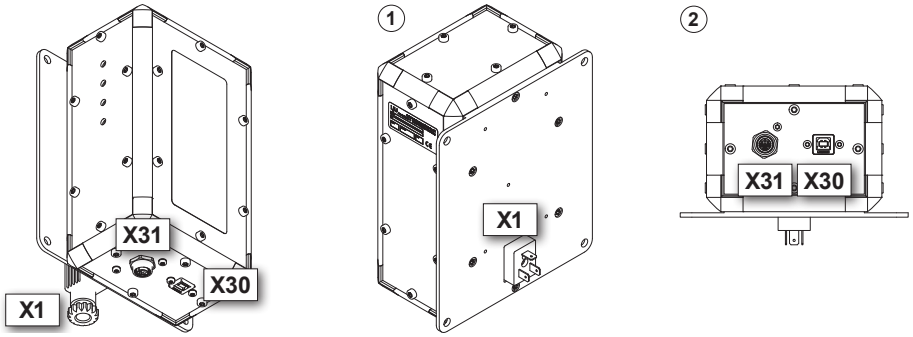


Fig. 9: Connection overview

Port	Name	Connects to
X1 On the rear of the device ①	Rail bus / PE	Current collectors for rail bus and PE
X30 On the rear of the device ②	Service interface USB	Service computer
X31 On the rear of the device ②	Voltage supply / data	Vehicle control system of the material-handling vehicle

7.3 X1 – rail bus/PE

NOTICE!

Faults due to long connection cables.

Long connection cables to the current collectors for the rail bus may lead to faults during operation and low data rates.

- Install the EXM-8 in direct proximity to the current collector for the rail bus.
- Keep the connection cables between current collectors for the rail bus and EXM-8 as short as possible.
- Comply with cable requirements.

NOTICE!

PE connection

EXM-8 must be earthed for proper operation.

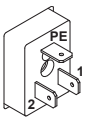
- Establish an electrically conductive PE connection from X1 to the PE of the material-handling vehicle.
- Comply with cable requirements.

The current collectors for the rail bus and the PE of the material-handling vehicle are connected to X1 with the supplied plug.

Connect rail bus and PE to X1 as follows:

1. Make sure that the system is isolated from the power supply.
   - Isolate the conductor lines from the power supply and secure them against reactivation.
   - Switch off the vehicle control system.
2. Connect the current collectors for the rail bus as per the pin assignment in the supplied plug. Twist connection wires for the rail bus!
3. Connect PE of the material-handling vehicle as per pin assignment in the supplied plug.
4. Connect the plug to X1 and fix the plug with the locking screw.

Pin assignment X1

		Pin	Signal
HTP Valve connector 2-pin + PE		1	SB_A (data A)
		2	SB_B (data B)
		PE	PE
Plug (supplied	HTP M1NS2000 (2-pin + PE)		

Rail bus cable requirement

Cable type	Single wire, highly flexible
Wire cross section	1.5 mm^2
Cable length	Max. 300 mm
Cable recommendation	LiFY

PE cable requirement

Cable type	Single wire, green/yellow, highly flexible
Wire cross section	1.5 mm^2
Cable length	Depending on PE connection point on the material-handling vehicle
Cable recommendation	LiFY, green/yellow

7.4 X30 – service interface USB

Service interface

Service measures may only be taken by Condictix-Wampfler staff or specialists trained by Conductix-Wampfler.

In the event of service measures by unauthorised persons, all warranty claims against Conductix-Wampfler Automation GmbH are invalidated.

For service purposes (such as software updates, configuration settings, etc.), the service connector is connected to at X30 to the EXM-8 via USB.

- The X30 port is designed as a USB 2.0 type-B socket.
- The service computer is connected to the EXM-8 with a commercially available USB 2.0 type-A connection cable to USB 2.0 type-B.
- When service work is not being performed, the port must be sealed with the attached cover.

7.5 X31 – voltage supply/data

The vehicle control system of the material-handling vehicle is connected to X31. The EXM-8 is supplied with voltage and communicates with the vehicle control system via this connection. Data between the EXM-8 and vehicle control system is exchanged via Ethernet.

Connect the EXM-8 to the vehicle control system as follows:

1. Make sure that the system is isolated from the power supply.
   - Isolate the conductor lines from the power supply and secure them against reactivation.
   - Switch off the vehicle control system.
2. Connect the EXM-8 to the vehicle control system.
   - Connect and secure pre-assembled hybrid cable to X31 of the EXM-8.
   - Connect other side of the hybrid cable to the vehicle control system (for connection see connection diagram for the vehicle control system) and secure it.
     The connection to the vehicle control system can be found in the connection diagram *[ANS]* to the vehicle control system.

Pin assignment X31

		Pin	Signal
Hybrid M12 socket 8-pin, Y-coded		1	TX+ (Data Transmit +)
		2	TX- (Data Transmit -)
		3	RX+ (Data Receive +)
		4	RX- (Data Receive -)
		5	L+ (Power +24 VDC)
		6	L+ (Power +24 VDC)
		7	L- (GND)
		8	L- (GND)

Voltage supply/data cable requirement

Cable type	Hybrid cable Ethernet hybrid CAT5 (100 MBit/s), 8-pin, Y-coded M12 connector on Y-coded M12 connector, power with Ethernet (PWE)
Wire cross section	4x 0.15 mm^2 (data) 4x 0.6 mm^2 (supply)
Cable length	Max. 10,000 mm
Cable recommendation	Phoenix Contact Hybrid cable NBC-MSY/ 1.0-94H/MSY SCO

8 Commissioning

Objective This section provides details on correct commissioning. Daily operation can start following successful commissioning.

The device is delivered in a configured condition ready for operation. No further adjustments are necessary.

Service interface

Service measures may only be taken by Condictix-Wampfler staff or specialists trained by Conductix-Wampfler.

In the event of service measures by unauthorised persons, all warranty claims against Conductix-Wampfler Automation GmbH are invalidated.

9 Operation

The EXM-8 is connected to the vehicle control system of the material-handling vehicle and is supplied with voltage by it. When the vehicle control system is switched on, the EXM-8 is in operation.

9.1 Indicators

9.1.1 Overview

There are four LEDs on the left side of the EXM-8 device which indicate the status of the EXM-8.

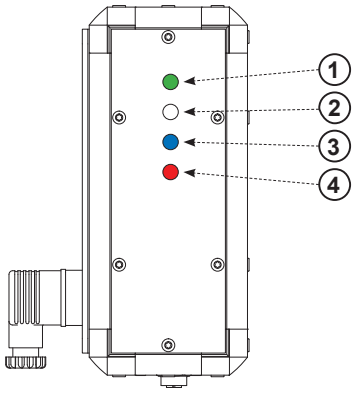


Fig. 10: Status LEDs

LED	Colour	Name
1	Green	Power
2	White	RxD (receive)
3	Blue	TxD (transmit)
4	Red	Status

9.1.2 Operation indicators

Power LED This LED indicates the EXM-8 is ready for operation.

Indicator	Meaning
Off ○	EXM-8 off – no voltage supply
On – LED is permanently illuminated green ●	EXM-8 is ready for operation

RxD LED This LED indicates that the EXM-8 is receiving data (receive).

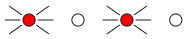
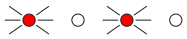
Indicator	Meaning
Off ○	EXM-8 not receiving data
Flashing – LED flashes white ✳ ○ ✳ ○	EXM-8 receiving data via the rail bus

TxD LED This LED indicates that the EXM-8 is sending data (transmit).

Indicator	Meaning
Off ○	EXM-8 not sending data
Flashing – LED flashes blue ✳ ○ ✳ ○	EXM-8 sending data via the rail bus

9.1.3 Error indicators

Status LED This LED indicates the status of the EXM-8.

Indicator	Meaning
Off ○	EXM-8 error-free
Slow flashing – LED flashes red (approx. 1 time per second) 	EXM-8 has errors – replace or request service of EXM-8
Quick flashing – LED flashes red (approx. 5 times per second) 	Bootloader active – briefly during the activation process

Error messages

Errors are output via the data interface from X31 to the vehicle control system. A detailed error message appears on the display of the vehicle control system.

Error codes and their meaning can be found in the BV software description of the connected vehicle control system.

9.2 Maintenance and cleaning

⚠ WARNING!

Live parts

The EXM-8 external modem is installed tightly onto the conductor lines. Contact with live parts poses an immediate danger to life.

- Work on electrical components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with electrical engineering regulations.
- Isolate the conductor lines from the power supply and secure them against reactivation for all work on the EXM-8.
- Switch off the connected vehicle control system for all work on the EXM-8.
- Always use insulated tools.

Personnel

Maintenance, cleaning and servicing must only be performed by trained and qualified personnel. Personnel who are to be trained or instructed are only allowed to perform activities under the constant supervision of a trained and qualified individual.

9.2.1 Maintenance

NOTICE!

Mechanical loads may lead to device failure.

- Check the device for damage at regular intervals.
- Opening the device for testing purposes is not intended.

Service the device as follows:

- **Brackets**
  - □ Check for loose connections.
- **Connections**
  - □ Check for loose connections.
  - □ Check cable insulation.
  - □ Cover any ports not being used.
- **Indicators**
  - □ Remove soiling.
- **Recommended maintenance interval**
  - □ 6 months

9.2.2 Cleaning

NOTICE!

Damage to the device due to improper cleaning

- Do not use any cleaning agents, such as methylated spirits, or other cleaners!
- Do not clean with sharp objects!

Clean the device as follows:

- **Device**
  - □ Clean with dry cloths only.
- **Recommended cleaning intervals**
  - □ 6 months

TNB_0054_EXM-8-SB, 2, en_GB

10 Service

⚠ WARNING!

Live parts

The EXM-8 external modem is installed tightly onto the conductor lines. Contact with live parts poses an immediate danger to life.

- Work on electrical components may only be carried out by qualified electricians or persons instructed and supervised by a qualified electrician in accordance with electrical engineering regulations.
- Isolate the conductor lines from the power supply and secure them against reactivation for all work on the EXM-8.
- Switch off the connected vehicle control system for all work on the EXM-8.
- Always use insulated tools.

10.1 Removing/changing the EXM-8

10.1.1 Removing the EXM-8

1. Make sure that the system is isolated from the power supply.
   - Isolate the conductor lines from the power supply and secure them against reactivation.
   - Switch off the vehicle control system.
2. Disconnect external connections.
3. Disconnect mechanical connections.

10.1.2 Installing the EXM-8

1. Check the new EXM-8 for transport damage.
2. Mechanically install the EXM-8.
   ↳ *Chapter ‘Mechanical installation’ on page 21*
3. Electrically install the EXM-8.
   ↳ *Chapter ‘Electrical installation’ on page 27*

10.2 Repairing the EXM-8

If you need to repair the device, please refer to your closest service partner or contact Conductix-Wampfler Automation GmbH directly.

Chapter 'Customer service and addresses' on page 49

Repairs

Faulty devices may only be repaired by Conductix-Wampfler staff or specialists trained by Conductix-Wampfler.

In the event of repairs by unauthorised persons, all warranty claims against Conductix-Wampfler Automation GmbH are invalidated.

TNB_0054_EXM-8-SB, 2, en_GB

11 Disposal

11.1 Information on disposal and environmental regulations

If no return or disposal agreements exist, the individual components are to be properly dismantled and then separated and disposed of pursuant to current regulations or taken for recycling.

The device comprises electric and electronic components. Separate and dispose of them according to applicable provisions.

Follow the hazardous materials directive, in particular the regulations on handling hazardous materials.

Materials designated for recycling are to be disposed of as per the respective recycling procedure.

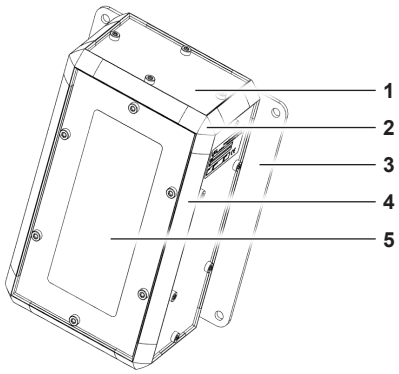
12 Technical specifications

12.1 General information

Mechanical data

Dimensions H × W × T	200 mm × 120 mm × 89 mm
Fixing	4 × Fixing hole ∅ 6.5 mm
Weight	1.4 kg

Material



No.	Name	Material
1	Front and side plates	Aluminium
2	Profile corner	ABS plastic, green
3	Mounting plate	Aluminium
4	Edge profile	Aluminium
5	Front film	Polyethylene

Ambient conditions

Climatic environmental conditions As per DIN IEC 60721-3-3	Category: 3K3 (Fixed-location usage*; weatherproof)
Mechanical environmental conditions As per DIN IEC 60721-3-3	Category: 3M4 (Fixed-location usage*; weatherproof)
Ambient temperature	+10 to +45 °C
Relative humidity	< 80% non-condensing
Storage temperature	-10 to +50 °C
Protection class	IP 54
Protection class	III

* The term **fixed-location usage** refers to use in conjunction with a rail system. The rail system must be designed so that the device is not subjected to impermissible impacts.

12.2 Electrical information

Power supply

Supply type	Direct feed from connected vehicle control system
Rated input voltage	24 VDC (±10 %)
Current consumption	Min. 150 mA Max. 800 mA

Rail bus

Bus voltage	±24 V modulated
Input signal	Differential
Current consumption	±5 mA (tolerance: ±1 mA)
Bus protocol	LJU bus
Transmission speed	Max. 500 kbit/s

Data interface

Interface data type	Ethernet
Transmission protocol	UDP
Transmission speed	Max. 10 Mbit/s

Service interface

Interface data type	Universal Serial Bus
Specification	USB 2.0
Transmission speed	Max. 480 Mbit/s

12.3 Cable lengths and specifications

Rail bus cable requirement

Cable type	Single wire, highly flexible
Wire cross section	1.5 mm^2
Cable length	Max. 300 mm
Cable recommendation	LiFY

PE cable requirement

Cable type	Single wire, green/yellow, highly flexible
Wire cross section	1.5 mm^2

TNB_0054_EXM-8-SB, 2, en_GB

PE cable requirement

Cable length	Depending on PE connection point on the material-handling vehicle
Cable recommendation	LiFY, green/yellow

Voltage supply/data cable requirement

Cable type	Hybrid cable Ethernet hybrid CAT5 (100 MBit/s), 8-pin, Y-coded M12 connector on Y-coded M12 connector, power with Ethernet (PWE)
Wire cross section	4x 0.15 mm^2 (data) 4x 0.6 mm^2 (supply)
Cable length	Max. 10,000 mm
Cable recommendation	Phoenix Contact Hybrid cable NBC-MSY/ 1.0-94H/MSY SCO

12.4 Approvals and standards

Conformity

Devices made by Conductix-Wampfler Automation GmbH have been designed to comply with EU directives. Please contact Conductix-Wampfler Automation GmbH if you wish to obtain a copy of the EU Declaration of Conformity.

12.5 Device drawing

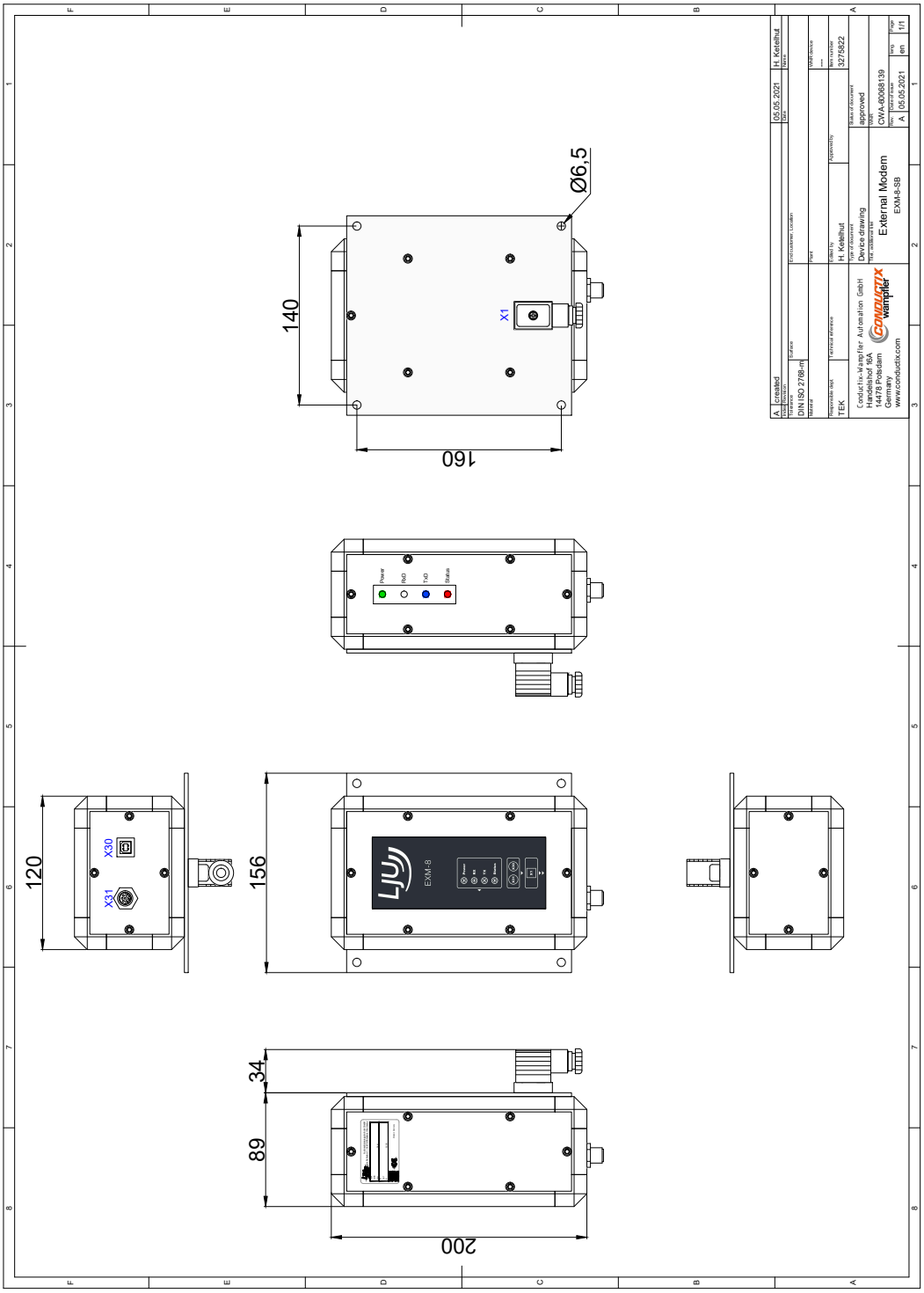


Fig. 11: Device drawing EXM-8-SB

13 Customer service and addresses

Customer service

Our service team is available to provide technical information.

- **Conductix-Wampfler Automation - Service**
  Phone: +49 331 887344-15 | Fax: +49 331 887344-19
  E-mail: service.potsdam@conductix.com

Service forms

Service forms are available for download under www.conductix.com.

Please send completed service forms to service.potsdam@conductix.com.

Further contacts

Conductix-Wampfler Automation GmbH

Handelshof 16 A | 14478 Potsdam | Germany

Phone: +49 331 887344-0 | Fax: +49 331 887344-19

E-mail: info.potsdam@conductix.com | Internet: www.conductix.com

- **Conductix-Wampfler Automation - Sales**
  Phone:+49 331 887344-02 / -04 | Fax: +49 331 887344-19
  E-mail: sales.potsdam@conductix.com
- **Conductix-Wampfler Automation - Service**
  Phone: +49 331 887344-15 | Fax: +49 331 887344-19
  E-mail: service.potsdam@conductix.com
- **Conductix-Wampfler Automation - Repairs**
  Phone: +49 331 887344-615 | Fax: +49 331 887344-19
  E-mail:repair.potsdam@conductix.com

Conductix-Wampfler GmbH

Rheinstrasse 27 + 33 | 79576 Weil am Rhein | Germany

Phone: +49 7621 662-0 | Fax: +49 7621 662-144

E-mail: info.de@conductix.com | Internet: www.conductix.com

For further addresses of sales and service locations, visit:

- *www.conductix.com*

14 Index