

OPERATING INSTRUCTIONS

AWE Evaluation Unit for FW100/FW300



Description
Installation
Operation



Document Information

Described Product

Product name: AWE

Document ID

Title: Operating Instructions AWE
Part No.: 8009387
Version: 1.0
Release: 2012-12

Manufacturer

SICK AG
Erwin-Sick-Str. 1 · 79183 Waldkirch · Germany
Phone: +49 7641 469-0
Fax: +49 7641 469-1149
E-mail: info.pa@sick.de

Trademarks

Windows is a trademark of the Microsoft Corporation.
Other product names used in this document may also be trademarks and are only used for identification purposes.

Original Documents

The English edition 8009387 of this document is an original document of SICK AG.
SICK AG assumes no liability for the correctness of an unauthorized translation.
Please contact the manufacturer or your local representative in case of doubt.

Legal information

Subject to change without notice.

© SICK AG. All rights reserved.

Notes On This Document	5
1 Safety Instructions.....	6
1.1 Authorized Personnel	6
1.2 Intended Use	6
1.3 General Safety Information and Protection Measures.....	6
1.4 Environmental Considerations	7
2 Description of the Evaluation Unit	9
2.1 Application	9
2.2 Overview.....	9
2.3 Technical Data for the FW 100 Evaluation Unit.....	10
Dimensions.....	10
3 Project Planning.....	11
3.1 From System Selection to Commissioning.....	11
3.2 Preparations for Electrical Installation.....	11
Important Information Regarding Electrical Installation	11
4 Installation	13
4.1 Installation Preparations.....	13
Safety Instructions	13
4.2 Mounting the Evaluation Unit.....	13
4.3 Electrical Connections for the Evaluation Unit.....	14
5 Commissioning.....	15
5.1 Operating the FW 100 Evaluation Unit	15
Controls.....	15
Function Keys and Menu Overview	16
Menu Structure	17
5.2 Startup	20
Commissioning the FW 100	20
Parameterizing the Evaluation Unit.....	20
Checking/Changing the Default Settings.....	21
6 Maintenance and Troubleshooting	23
6.1 Maintenance.....	23
System Status Indicators	24
Troubleshooting the FW 100 Dust Monitor Using the Evaluation Unit	25
FW 100 Warnings on the Evaluation Unit	25
Further Tips on Troubleshooting.....	26

Evaluation Unit

Notes On This Document

Purpose

These operating instructions provide information on the FW 100 Evaluation Unit. Up to three FW 100 dust monitors can be connected depending on your measuring task.

Information content

These operating instructions describe how the device functions and explain the procedures for mounting, installing, maintaining, and operating the Evaluation Unit. The operating instructions for the FW 100 dust monitor (order no. 800 904) are available with the device and must also be used.

Note Read the operating instructions carefully.

Always read the operating instructions before starting work. Warnings must be observed at all times.

Symbols used in this document

For quick access and reasons of clarity, symbols are used to highlight important safety information in these operating instructions. They are provided at the relevant points in the chapters.

► Always follow the safety instructions and warnings.

Note Provides information on the features of the device or system, along with additional tips.



Important

Indicates a risk of damage to the device or system components and potential functional impairments.



Warning

Identifies potential danger for personnel, particularly due to electrical equipment or as a result of incorrect handling of the device or system components. These warnings are intended to protect you from (fatal) injuries.

► Always read warnings carefully and follow them at all times!

1 Safety Instructions

1.1 Authorized Personnel

Those responsible for personal safety must ensure that:

- ▶ All work on the device components is carried out by qualified personnel only. These persons must be qualified by virtue of their expertise (training, education, experience) or understanding of the relevant standards, specifications, accident prevention regulations, and properties of the system. It is crucial that these persons be able to identify and avoid potential hazards in good time.
- ▶ These persons have gained sufficient expertise through training.
- ▶ The operating instructions supplied with the device and the associated system documentation are available to these persons for all work carried out and these persons observe this documentation in order to prevent danger or damage.

Technical experts are those persons defined in DIN VDE 0105, or IEC 364, or directly equivalent standards, such as DIN 0832.

1.2 Intended Use

Prerequisite

All planning, mounting, installation, commissioning, maintenance, and repair work must be carried out by adequately trained personnel only. This work must be inspected by experts in the relevant areas.

Correct handling

The following must be taken into account:

- ▶ The system must be operated in accordance with the technical data and specifications regarding reliable use, assembly, connection, ambient and operating conditions (see the order documentation, user information, rating plates, and so on), as well as the documentation supplied.
- ▶ Users must act in accordance with the local, system-specific conditions and with due consideration paid to the operating dangers and specifications.
- ▶ All of the measures required to maintain the device (transportation, storage, maintenance, and inspection requirements, for example) are provided.

1.3 General Safety Information and Protection Measures

These general safety instructions are extremely important. Please read this section carefully and follow the instructions provided at all times. Always observe the warnings provided in these operating instructions, particularly in the chapters on installation, commissioning, maintenance, and service.

Note

The Evaluation Unit components are designed for use in industrial power installations.

- ▶ When working on power connections or with live components, ensure that the power supply is switched off. Before reconnecting the power supply, install any shock protection devices that may have been removed.

Handling or using the device incorrectly can result in personal injury or material damage. For this reason, always observe the safety instructions provided.

Preventing malfunctions

In order to prevent malfunctions, which can cause personal injury or damage to the system either directly or indirectly, the operator must ensure that

- ▶ The maintenance personnel can be alerted immediately and at any time.
- ▶ The maintenance personnel is qualified to respond to malfunctions on the Evaluation Unit and associated system malfunctions correctly.
- ▶ The defective equipment can be switched off immediately if necessary.
- ▶ Switching off equipment does not indirectly cause further malfunctions.

Preventing follow-on damage

To prevent subsequent damage arising from malfunctions, which can cause personal injury or damage the system either directly or indirectly, the operator must ensure that the malfunctions are assessed by qualified personnel, who then initiate suitable measures.

1.4 Environmental Considerations

The Evaluation Unit was designed to minimize the impact on the environment. The individual modules can be easily separated and sent for recycling.

2 Description of the Evaluation Unit

2.1 Application

The optional Evaluation Unit is part of the FW 100 device range from SICK AG and is designed for the following applications:

- Measuring tasks in accordance with the Federal German Pollution Control Act (17th Implementing Ordinance) (e.g. refuse incineration plants)
- Remotely operating a FW 100 dust monitor
- Connecting up to 3 FW 100 dust monitors

2.2 Overview

The basic version of the Evaluation Unit is suitable for connecting an FW 100. A software license can be obtained allowing you to connect up to 3 FW 100 dust monitors.

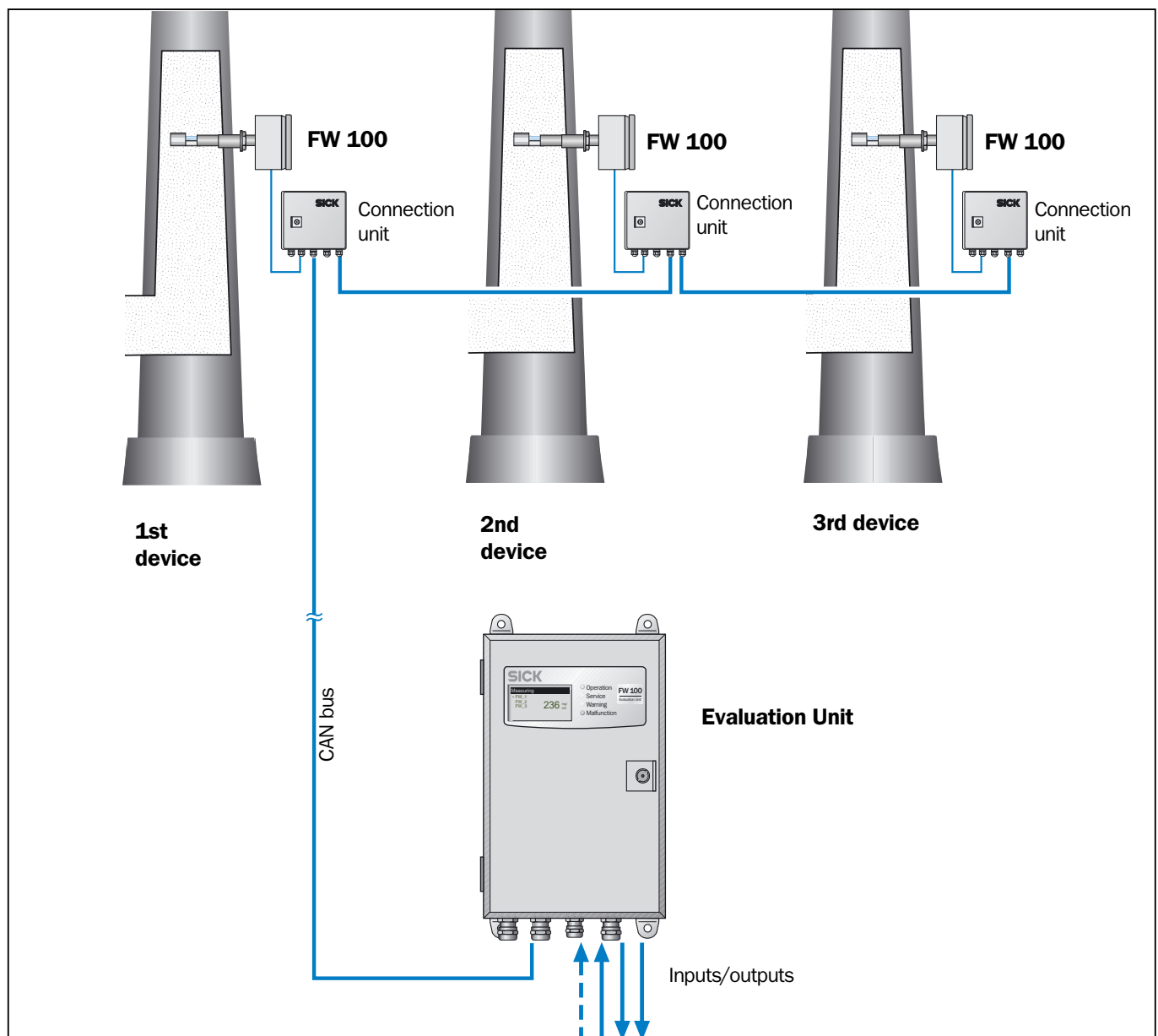


Fig. 2.1 Evaluation Unit with 3 FW 100 dust monitors

Evaluation Unit

**Evaluation Unit**

The Evaluation Unit is used to operate the FW 100 dust monitor and contains all of the required operating elements, such as:

- Graphical display for displaying the measured values, and menu for entering parameter settings
- LED status indicators and keypad

It controls the exchange of data with the FW 100, signals their operating statuses, and outputs measured values. It contains the inputs/outputs to the peripheral devices and data interfaces (CAN Bus) to the system components.

2.3 Technical Data for the FW 100 Evaluation Unit

For the FW 100 dust monitor specifications, see the FW 100 operating instructions (order no. 800 905).

Technical data	Values
Outputs	3 analog outputs: 0...20 mA, max. load 500 Ω ; electrically isolated Output 1: FW_1 (1st FW 100) Output 2: FW_2 (2nd FW 100) Output 3: FW_3 (3rd FW 100) 3 relay outputs: switching power: 48 V AC/DC, 1 A _{max} ; 30 VA; floating Relay 1 (=D01): malfunction (NC contact) Relay 2 (=D02): maintenance/check cycle (NO contact) Relay 3 (=D03): limit value (NO contact)
Inputs:	3 digital inputs: not assigned
Weight	Approx. 4.3 kg
Power supply	115/230 V AC; 50/60 Hz; power consumption: 13 W (20 VA)
Class of protection	IP 65 (NEMA 4X)

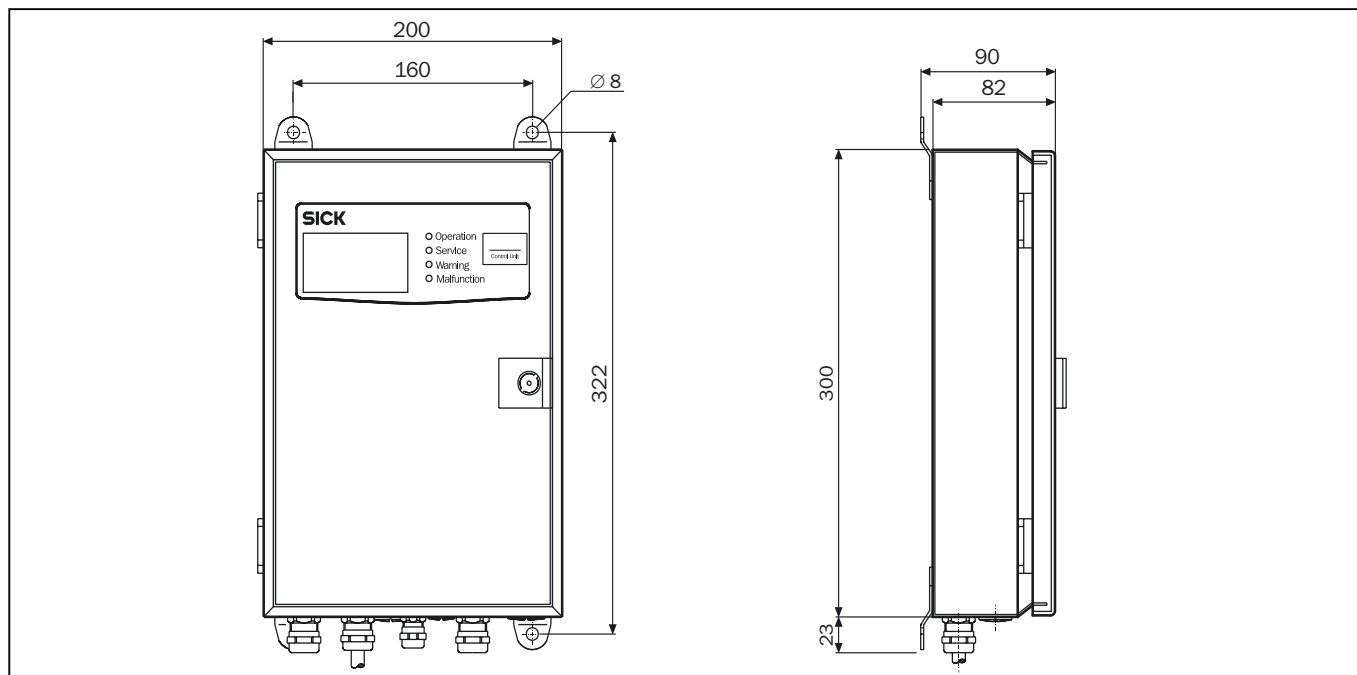
2.3.1 Dimensions

Fig. 2.2 Dimensions of the Evaluation Unit

3 Project Planning

3.1 From System Selection to Commissioning

1. Selecting the system

First make a preliminary selection of the components. How many FW 100 dust monitors are to be connected to the Evaluation Unit?

2. Preparations

■ Electrical installation

- Lay cables (power connections, Evaluation Unit data cable) to the measuring point.
- Make preparations for installing the Evaluation Unit and connection unit for the FW 100.
- If necessary, prepare the signal cables for the interfaces to the peripheral equipment.

■ Mounting location for the Evaluation Unit

- Mount the Evaluation Unit at an easily accessible position at the plant. Distance from measuring point: max. 1000 m.
- The mounting surface must be level.

3.2 Preparations for Electrical Installation

The installation activities must be carried out by the customer, unless otherwise agreed with the vendor.

Activities to be performed by the customer

The following must be provided by the customer:

- Power supply for the Evaluation Unit
- Signal cables for installation

3.2.1 Important Information Regarding Electrical Installation

VDE 0411/8.8 ► Provide a permanent power supply connection for the Evaluation Unit. The connections must be fused separately.

► Provide an external switch.

► Route out the wiring on the signal cables from the Evaluation Unit.

VDE 0411/5.1.2.2.2 ► Plan the cable lengths.

Cable connections on the Evaluation Unit

The Evaluation Unit can be used to connect a plotter, status/malfunction indicators, etc. Depending on its configuration, the Evaluation Unit supplies a maximum of 3 analog signals from 0 to 20 mA with a variable live zero of 0 or 4 mA.

Cable/type	Length	Cross-section	Note
Power	Depending on cable resistance	3 x 1.5 mm ²	Power supply: 115/230 V AC; 50/60 Hz
① A2Y(L)2Y	Up to 1000 m (total length)	3 x 0.5 mm ² ; High and Low twisted	CAN Bus connection: Evaluation Unit – FW 100
② A2Y(L)2Y	Depending on cable resistance	6 x 0.5 mm ² Twisted pair	Analog outputs: 0...20 mA
③ A2Y(L)2Y	Depending on cable resistance	6 x 0.75 mm ²	Digital outputs: 48 V AC/DC; max. 30 VA, 1 A

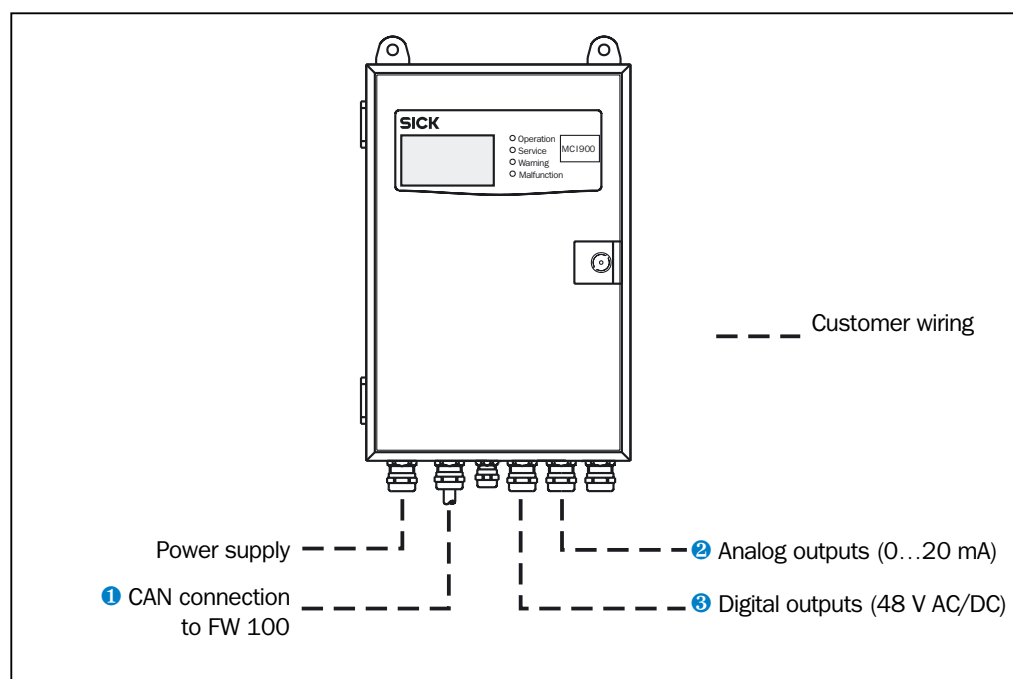


Fig. 3.1 Cable connections on the Evaluation Unit

4 Installation

4.1 Installation Preparations

4.1.1 Safety Instructions

Note For general safety instructions and precautions for handling the Evaluation Unit, see *Notes On This Document, Page 5*. Ensure that the safety instructions and, in particular, warnings in this manual are observed at all times.

4.2 Mounting the Evaluation Unit

The mounting location should be selected in accordance with the length of the cable for connecting the FW 100 connection unit (see 3.2 *Preparations for Electrical Installation, Page 11*).

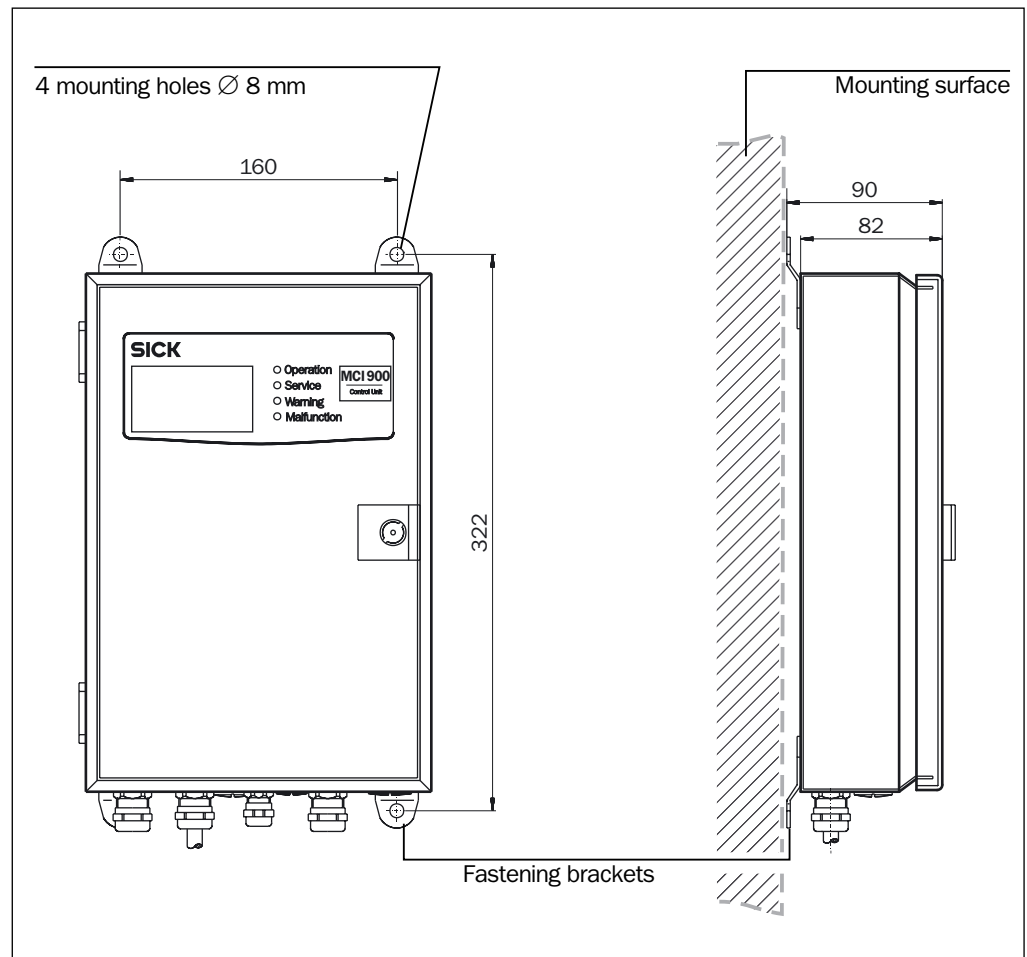


Abb. 4.1 Mounting the Evaluation Unit

- ▶ Mount the Evaluation Unit on a flat, vertical surface that is easily accessible.
- ▶ Mount the housing on the 4 fastening brackets using 4 bolts (M8).

4.3 Electrical Connections for the Evaluation Unit

The following cables from the Evaluation Unit must be connected on site:

- Cables to the FW 100 connection unit
- Cables to peripheral devices, such as plotters, switch elements for connecting
 - up to 3 relay outputs
 - up to 3 analog outputs

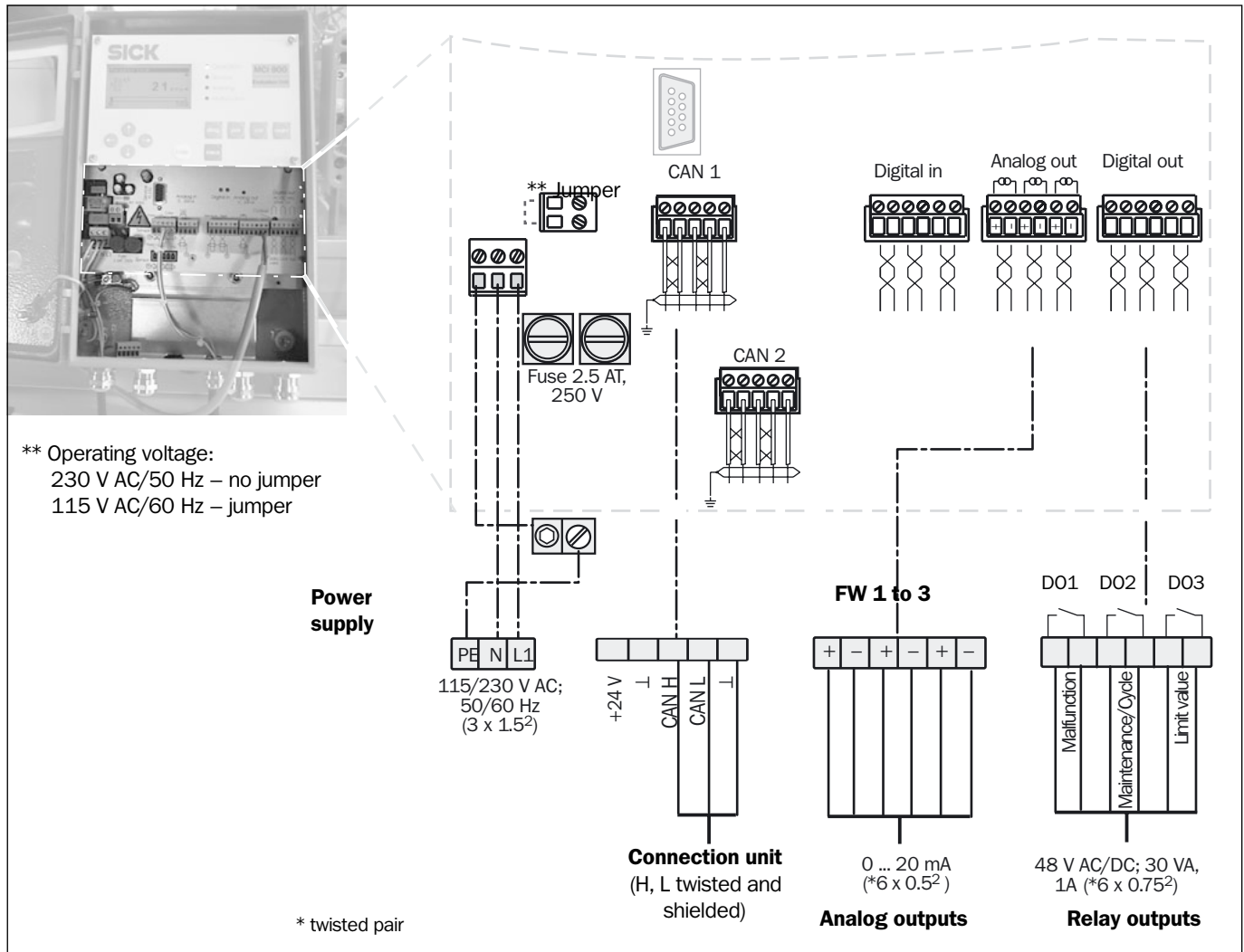


Fig. 4.2 Terminals on the Evaluation Unit

- Connect the cable to the connection unit.
- Connect the power supply.



Note the installed loads for the power supply!

The Evaluation Unit is designed for 230 V AC operation.

A suitable jumper must be inserted for 120 V AC operation (see Fig. 4.2, Page 14).

5 Commissioning

5.1 Operating the FW 100 Evaluation Unit

5.1.1 Controls

The Evaluation unit is used for displaying, entering, and configuring system parameters and control functions. The control panel, with display, status LEDs, and keypad, is accessed by opening the door on the housing.

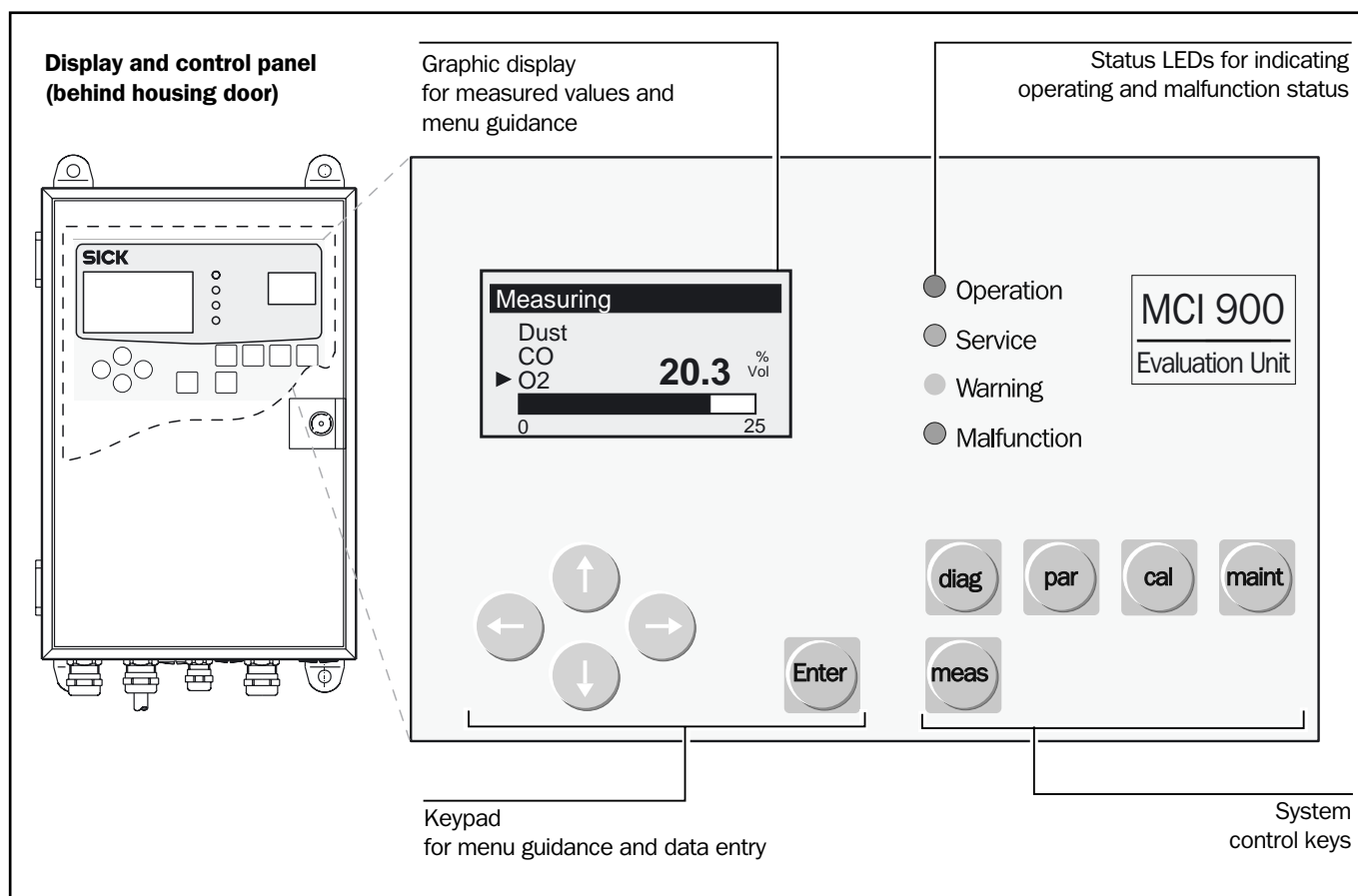


Abb. 5.1 Indicators and controls on the Evaluation Unit

Arrow keys

Navigate, choose, scroll through, or edit menu options, values, units, or digits.

Enter

Execute the selected menu entries or commands.

Display in Measuring mode

- Display the current dust measured value or status
- Representation of measured value (bar chart);
Measuring range: 0 to double the limit value

LEDs

- Operation Measuring mode
- Service Maintenance or Service mode
- Warning Warning message (see Diagnosis mode (diag))
- Malfunction Malfunction, error message (see Diagnosis mode (diag))

5.1.2 Function Keys and Menu Overview



Measuring mode

FW_1 16 mg/m³



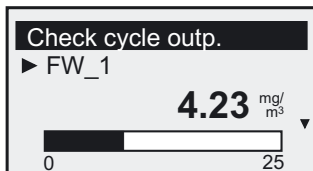
0

20

Current dust concentration value

Representation of measured value (bar chart)

Measuring range: 0 to double the limit value



Status indication

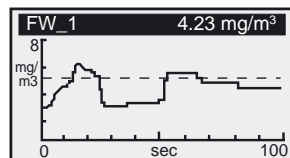
- Maintenance mode
- Make connection
- Malfunction
- Check cycle meas.
- Check cycle outp.
- Limit values
- Warning
- Measuring

The statuses of the connected FW 100 are displayed automatically.

x 2



Diagram



When you press the **meas** key again, the system displays the recorded measured values as a diagram.

When you press the **meas** key again, the system displays the measured values in numeric form.



Diagnosis

- Connect
- Malfunction
- Warning
- Limit value

Displays the sensor to which a connection is being established.
Option for selecting the sensor and error message display (plain text)
Option for selecting the sensor and warning display (plain text)
Displays the sensor limit value violations



Parameters

- Settings
- Device parameters

Parameter setting
Displays the serial number and software version of the Evaluation Unit and connected sensors



Calibration

Not assigned

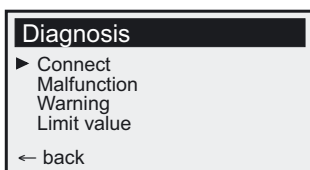


Maintenance

- Maintenance switch
- Test analog
- Test relay
- Reset system
- Reset parameters

Activates maintenance mode
Tests the analog outputs
Tests the relay outputs
Restarts the system
Resets the parameters to the factory settings

Display



- The operating mode (e.g. diagnosis) or the menu option that is currently selected is indicated in the heading.

- Four rows for submenus, plain-text messages, or specific settings (values)

- Function row:

← Back

Use **arrow** ← to return to higher menu level

edit: Enter

You activate the menu options or confirm entries with the **Enter** key

Select

You select a value with the **Enter** key

Password

When prompted to specify the password, enter **1 2 3 4** with ↑ (↓).

5.1.3 Menu Structure

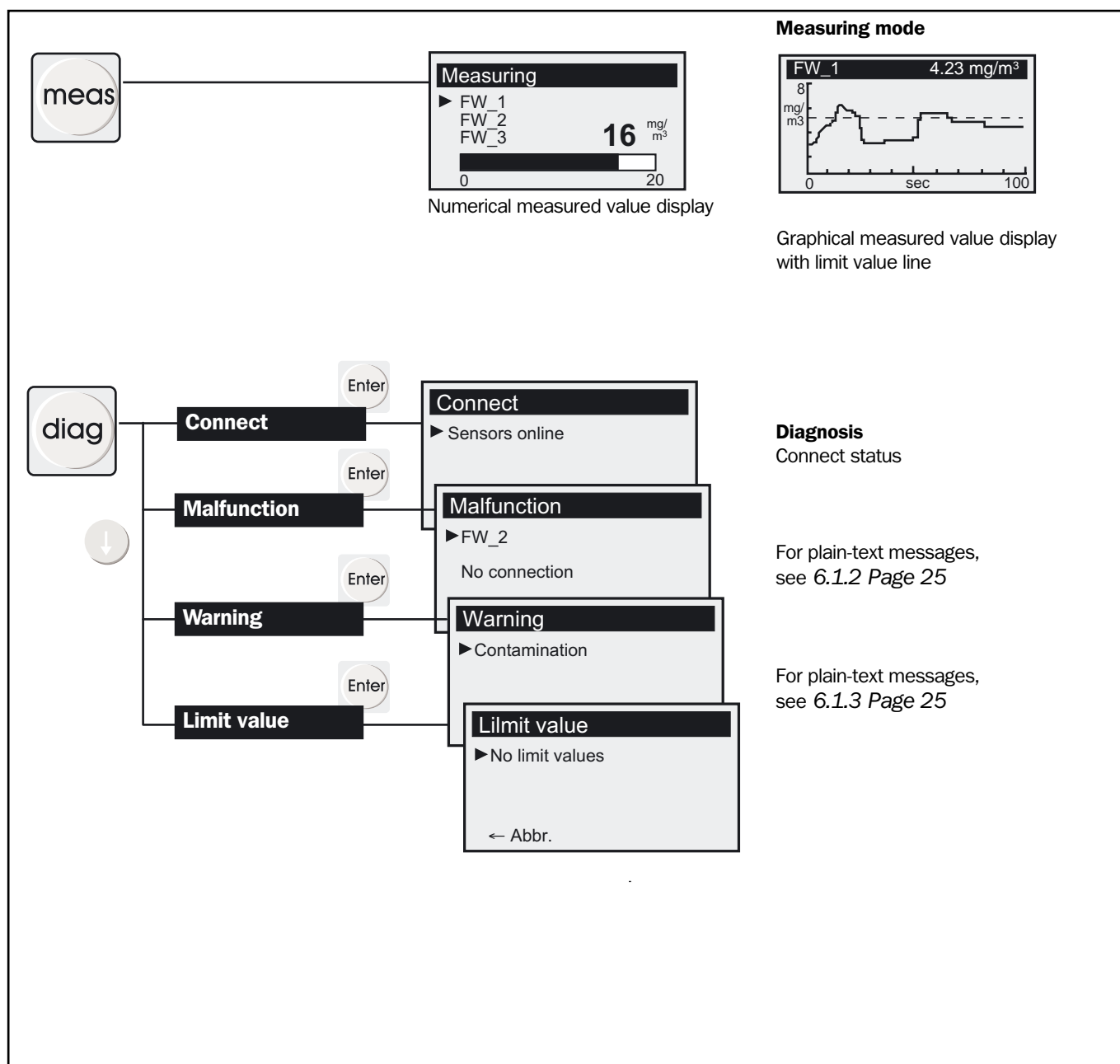


Fig. 5.2 Menu structure of the Evaluation unit (part 1)

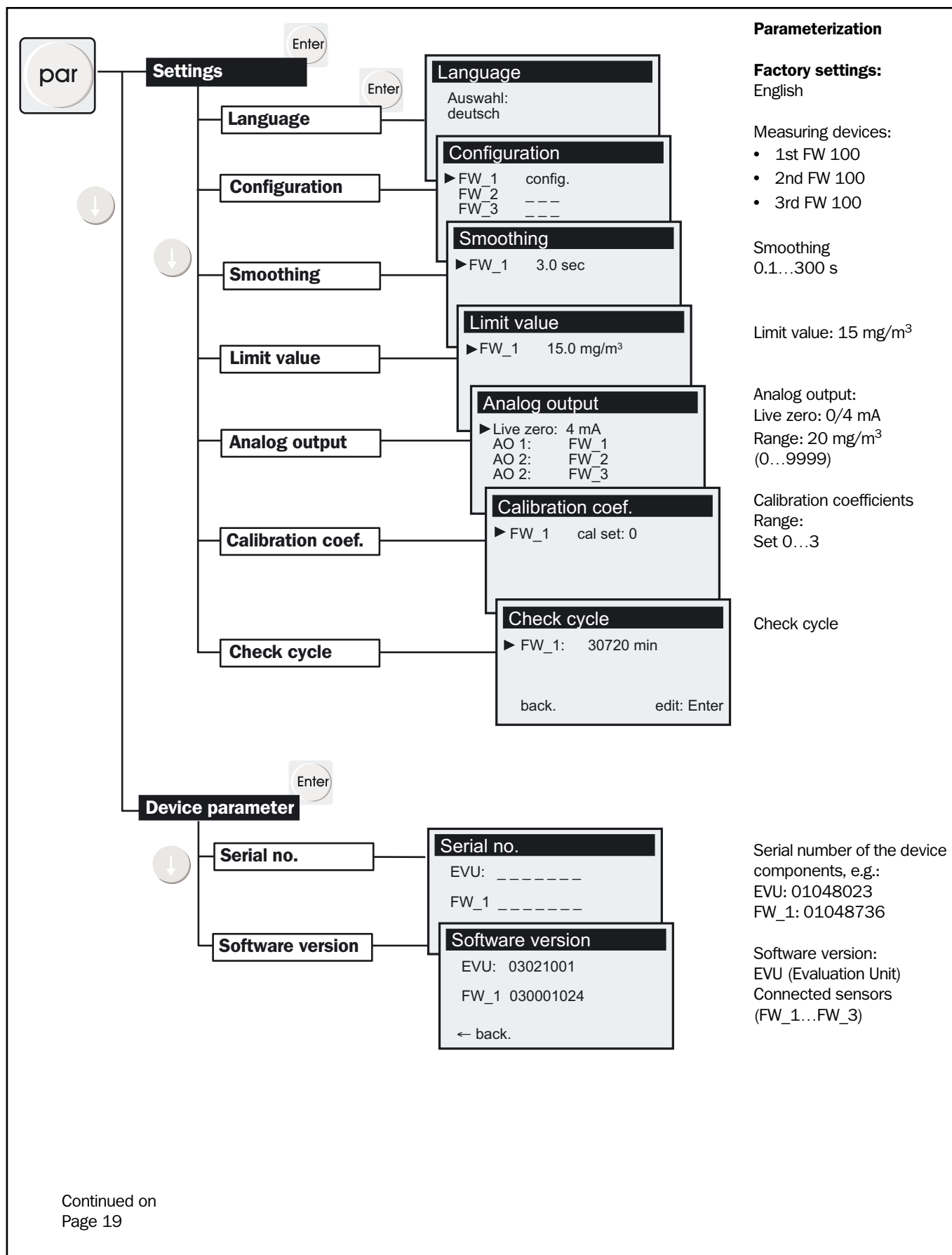


Fig. 5.3 Menu structure of the Evaluation Unit (part 2)

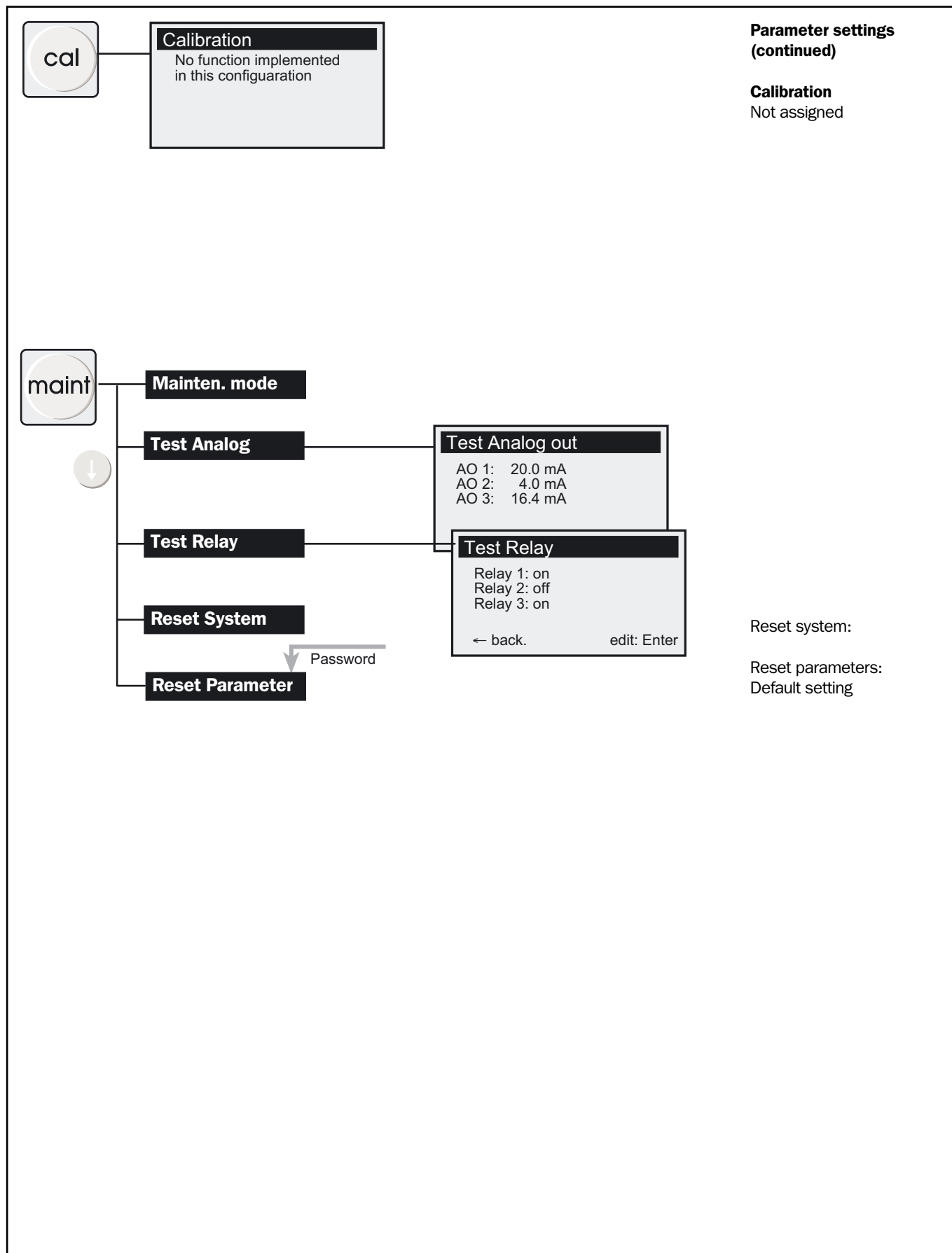


Fig. 5.4 Menu structure of the Evaluation Unit (part 3)

5.2 Startup




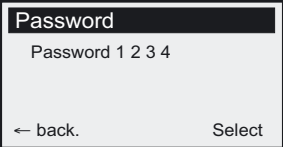



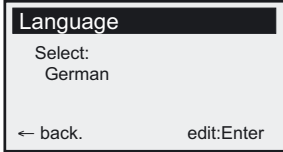



5.2.1 Commissioning the FW 100

See the operating instructions for the FW 100 (order no. 8 009 905).

5.2.2 Parameterizing the Evaluation Unit

The default settings are active when the system is delivered from the factory, or after you choose the "Reset parameters" command. When the system is started for the first time, these default settings must be checked to determine whether they are suitable for the measuring task, and adapted if necessary. To do so, simply work through the individual options in the Parameters menu.

Example The following example shows you how to set the display language and illustrates how the control elements on the Evaluation Unit are used. Detailed procedures will not be provided in the sections that follow, except in the case of settings where an explanation of the display contents is expedient.

Action	Procedure
	Setting the display language The texts displayed on the Evaluation Unit can be output in English or German. ► Activate Parameter mode
 	► Choose Settings ► Choose the Language menu option
   	Acknowledge the password prompt as follows: Use the arrow keys to enter and confirm the code 1 2 3 4 . You can now change the display language to English or German. You can also access other parameter settings here.
   	The display shows the active language (e.g. German). ► Choose, for example, English and confirm. The new language is displayed when you return to Measuring mode. ► Return to the main menu.

5.2.3 Checking/Changing the Default Settings

Parameter	Default (factory) setting	Range	Note
Language	English	German, English	Display/dialog language on Evaluation Unit; stored in the Evaluation Unit
Configuration	FW_1 config. FW_2 --- FW_3 ---		Factory settings; stored in the Evaluation Unit
T90 time	1 s	0.1...300 s	Mean value calculation across predefined time; stored in the sensor
Maintenance switch	Maint. Off	Mode: Off/On	
Limit value	15 mg/m ³	0...9999.9 mg/m ³	Limit value signal; stored in the sensor
Analog output (analog output cannot be assigned to the source)			
Live zero	4 mA	0/4 mA	Zero-point output; stored in the Evaluation Unit
Range	20 mg/m ³	0...9999.9 mg/m ³	Can be chosen separately for all 3 analog outputs; stored in the Evaluation Unit
Calibration coefficients			
	Set 0: quadr.: + 00.0000 lin.: +01.0000 abs.: +00.0000	Set 1: quadr.: + 00.0000 lin.: +00.5000 abs.: +00.0000 Set 2: quadr.: + 00.0000 lin.: +02.0000 abs.: +00.0000 Set 3: quadr.: + 00.0000 lin.: +03.0000 abs.: +00.0000	Range: <ul style="list-style-type: none"> Set 0 freely selectable (e.g. calculated by comparison measurement) Sets 1...3 set in factory
Check cycle			
FW_1	Enabled 120 min. enabled	Enabled/disabled Interval: 120...1440 min	Setting; stored in the sensor Check point output in accordance with check point calculation via the analog output on/off

Table 5.1: Default parameter settings (factory)

- Note ***
- Sensor parameters can only be changed when the sensor is in maintenance mode. The Evaluation Unit carries out a test if a parameter has been changed.
 - Communication is not possible if the sensor is still determining the check values, that is, no parameters can be set at that point. The system outputs an error message.

6 Maintenance and Troubleshooting

6.1 Maintenance

FW 100 See the operating instructions for the FW 100 (order no. 8 009 905).

General The system components must be inspected at regular intervals for external damage and contamination, in particular on the optical boundary surfaces. General recommendations for maintenance intervals cannot be provided, since this depends on the flue gas in the duct.









Note Always inform the SICK Service department or qualified personnel in good time of any malfunctions or potential repairs. In this way, the service engineer can procure any necessary spare or consumable parts by the maintenance date, and thus avoid unnecessary and costly round trips.

Routine Maintenance Activities

System component	Interval	Activity
FW 100	2...3 months	<ul style="list-style-type: none"> ▶ Clean optical boundary surfaces (see the FW 100 operating instructions).
Purge-air unit	1 month	<ul style="list-style-type: none"> ▶ Perform a visual inspection of the filter housing and filter insert. ▶ If the filter is excessively contaminated, remove the filter insert, clean the filter housing, and install a new filter insert (see the FW 100 operating instructions). ▶ If the maintenance requirement is triggered by the low-pressure monitor on the purge-air unit, remove the filter insert, clean the filter housing, and install a new filter insert (see the FW 100 operating instructions).
Evaluation Unit, FW 100	6 months	<ul style="list-style-type: none"> ▶ Contamination inspection: ▶ Check all device components for: ▶ External contamination (clean if necessary) ▶ Cable damage ▶ Loose fitting

Maintenance recommendation Initially, after the system components have been installed, we recommend that they be inspected at regular intervals (see table). The maintenance cycles can then be extended over time, and planned in the long term. Cleaning is usually required twice a year.

6.1.1 System Status Indicators

System status	Note	LED	Relay	Analog output
 Measuring mode	All the connected measuring devices are in measuring mode.	<ul style="list-style-type: none"> Operation lights up 	<ul style="list-style-type: none"> Error DO1 closed 	Measured value output in accordance with parameterization
 Connection status	As long as no connection is established with at least one <i>configured</i> measuring device.	<ul style="list-style-type: none"> Malfunction blinks 	<ul style="list-style-type: none"> Error DO1 closed 	Live zero output from the measuring device assigned to the AO.
 Maintenance	At least one connected measuring device is in maintenance.	<ul style="list-style-type: none"> Service lights up 	<ul style="list-style-type: none"> Maintenance DO2 closed 	Live zero output from the measuring device assigned to the AO.
 Check value calculation	A connected measuring device starts: <ul style="list-style-type: none"> the check cycle, and determines the check values: <ul style="list-style-type: none"> Contamination, span, zero point (FW 101) Span, zero point (FW 102) 	<ul style="list-style-type: none"> Operation lights up Service lights up 	<ul style="list-style-type: none"> Maintenance DO2 closed 	Last measured value from the measuring device assigned to the AO is retained.
 Check value output	A connected measuring device outputs the check values calculated in the check cycle and normalized to the analog output (90 s): <ul style="list-style-type: none"> Contamination, span, zero point (FW 101) Span, zero point (FW 102) 	<ul style="list-style-type: none"> Operation lights up Service lights up 	<ul style="list-style-type: none"> Maintenance DO2 closed 	Check values are output on the analog outputs assigned to the sensor (every 90 s): <ul style="list-style-type: none"> Contamination <ul style="list-style-type: none"> 0% Live zero (LZ) 70% 20 mA Span (target = 70% value) <ul style="list-style-type: none"> 0% Live zero 70% $LZ + 0.7 \cdot (20 \text{ mA} - LZ)$ 100% 20 mA Zero point concentration <ul style="list-style-type: none"> 0 mg Live zero >0 mg in accordance with measuring range setting
 Limit value	A connected measuring device indicates a limit value violation.	<ul style="list-style-type: none"> Operation lights up 	<ul style="list-style-type: none"> Limit value DO3 closed 	Measured value output in accordance with parameterization
 Warning	A connected measuring device signals a warning.	<ul style="list-style-type: none"> Operation lights up Warning lights up 	<ul style="list-style-type: none"> Error DO1 closed 	Measured value output in accordance with parameterization
 Malfunction	A connected measuring device signals a malfunction.	<ul style="list-style-type: none"> Malfunction blinks 	<ul style="list-style-type: none"> Error DO1 closed 	Live zero output from the measuring device assigned to the AO.

6.1.2 Troubleshooting the FW 100 Dust Monitor Using the Evaluation Unit

Error description/message	Possible cause	Remedy
no connection If the connection is interrupted: error relay (RO1) active after 5 s	A connection could not be established to the sensor selected.	<ul style="list-style-type: none"> ▶ Check the cable connection. ▶ Check the parameter settings.
EEPROM CRC	Error when reading the sensor parameter memory (EEPROM).	<ul style="list-style-type: none"> ▶ Restart the system. ▶ Clear the interference on the power supply, or connect to a phase with less interference.
Trigger level	<ul style="list-style-type: none"> • Air outlet blocked • Laser diode failure • Mechanical failure (wear and tear) • Fiber-optic cable defective 	<ul style="list-style-type: none"> ▶ Clean the optical boundary surfaces (see the FW 100 operating instructions, order no. 8 009 904). ▶ If necessary, contact the Service department.
Contamination	FW 101 contamination measurement: Contamination > 70 %	▶ Clean the optical boundary surfaces (see the FW 100 operating instructions, order no. 8 009 905).
Monitor signal	Laser diode failure	▶ Contact the Service department.
Span test	70% check point is outside the specifications	▶ Contact the Service department.

6.1.3 FW 100 Warnings on the Evaluation Unit

Warning	Possible cause	Remedy
Contamination	FW 101 contamination measurement: Contamination > 50 %	▶ Clean the optical boundary surfaces (see the FW 100 operating instructions, order no. 8 009 905).
Para. restored	Difficulties reading the sensor parameter memory	▶ Check the parameter settings.

6.1.4 Further Tips on Troubleshooting

Troubleshooting the Evaluation Unit

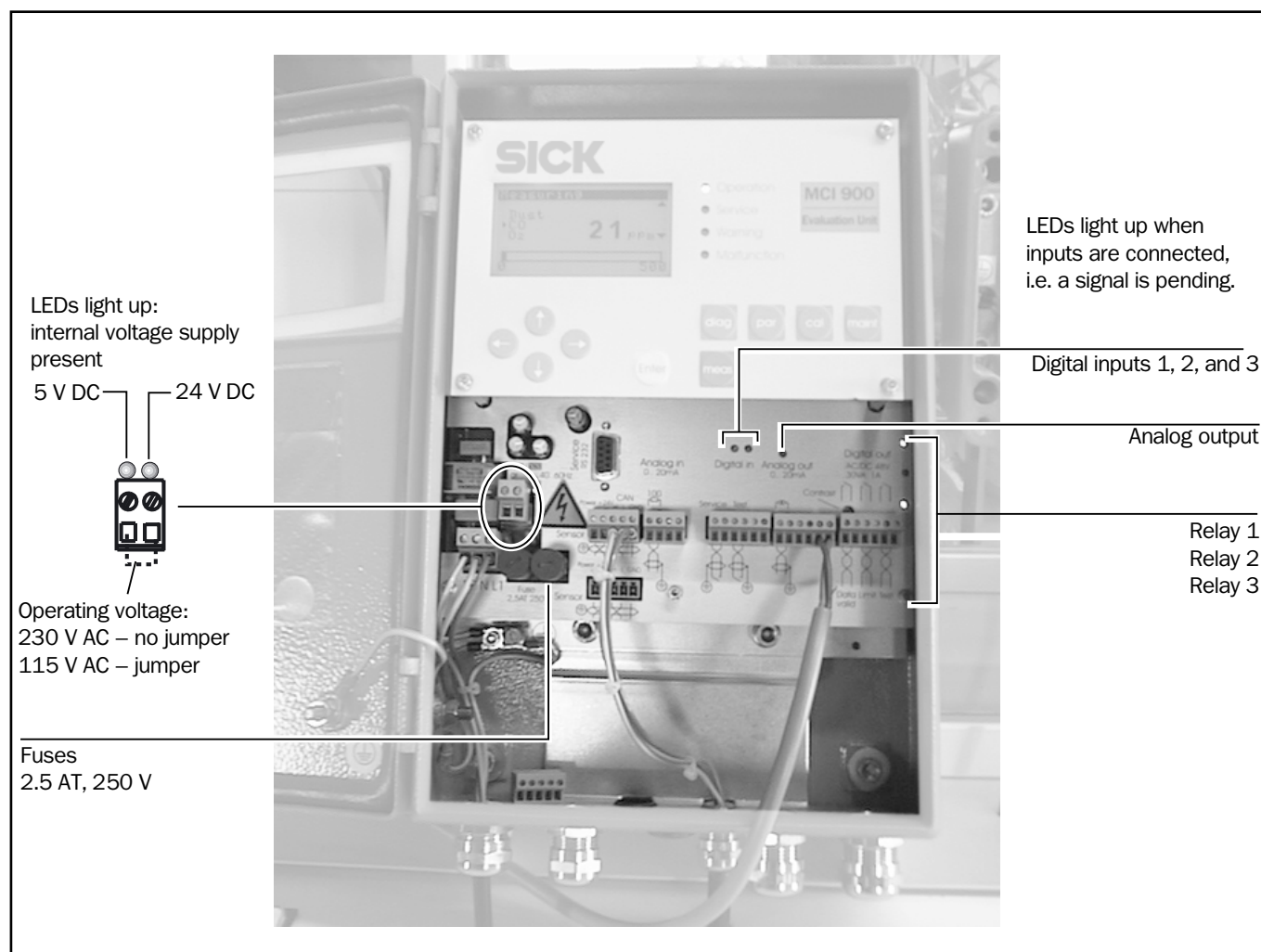


Abb. 6.1 LEDs, signals, and fuses in the Evaluation Unit

AWE

8009387/V 1.0/2012-12 | Subject to change without notice

SICK worldwide

You will find our local subsidiary
or agency at:
www.sick.com



Your local sales and service partner