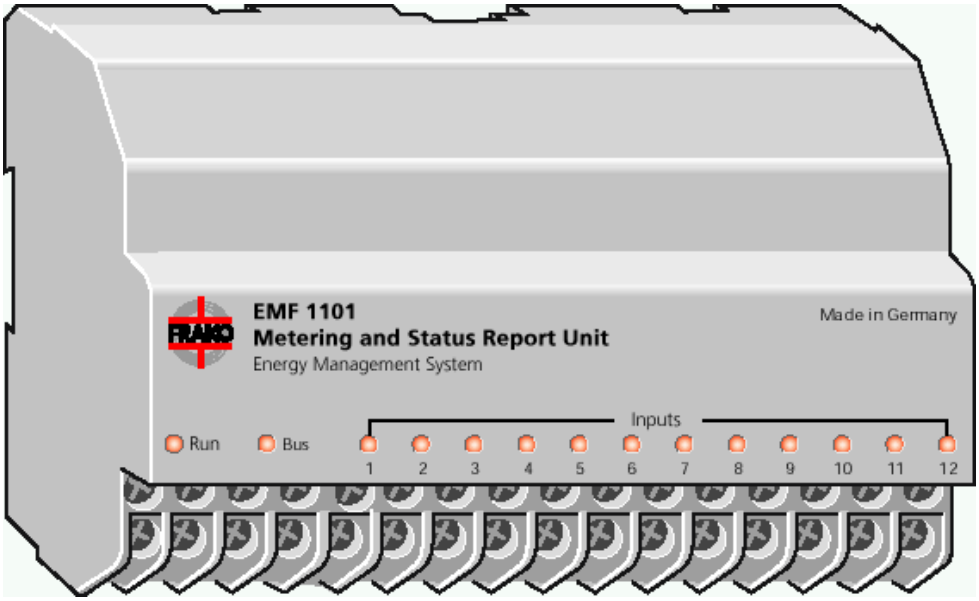
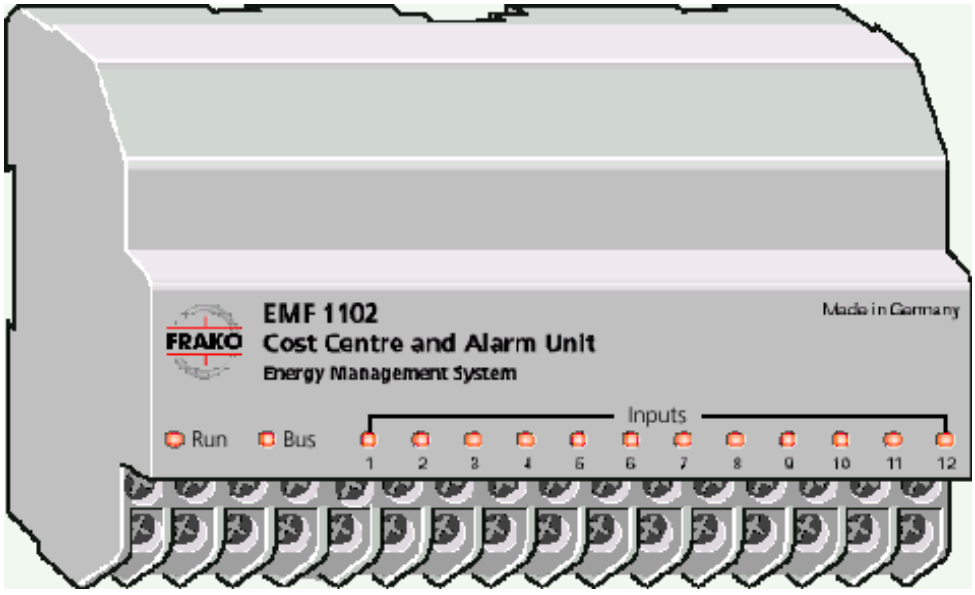
EMF 1101 / EMF 1102

Operating Instructions

EMF 1101 Metering and Status Report Unit



EMF 1102 Cost Centre and Alarm Unit



Safety Instructions and Warnings

Important: Read before use!!

- The user must ensure that all operators are familiar with these operating instructions, and follow them.
- Read the operating instructions carefully before mounting, installing, and putting the unit into operation.
- Proceed as specified in the operating instructions.
- Installation and start-up should only be done by appropriately skilled personnel, observing any existing rules and regulations.
- The unit carries mains voltage, and must not be opened.
- If there is any visible damage to the unit, it must not be installed, connected, or put into operation.
- If the unit does not function after start-up, it must be disconnected from the power mains again.
- Any additional laws, standards, guidelines etc. concerning this product that may exist must be observed.

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1. Summary instructions

- **Installation:**
  - To mount the unit, snap it onto a DIN ‘top-hat’ rail.
  - Connect terminals according to the terminal diagram, Figure 1, page 7.

Important note:
Keep the unit disconnected from the power supply during installation and when servicing it.

- **Initial start-up:**

  If the unit is operated in combination with a bus central unit EMZ or a communication modul EMP, a bus address must be assigned with the Konfig Tool software. (see section 4.3)
  The Konfig Tool software is included with the EMVIS software or the EMP 1100, or else will be supplied on request.

- **Basic setting:**

  If the unit is operated in combination with a central unit EMZ, the basic settings are made by means of the SYSTEM SW software. When a metering, status, or alarm channel is logged on, the required setting parameters are requested.

  On the other hand, if the unit is employed as an independent cost centre and alarm unit, or for counting pulses or status monitoring for external systems, the configuration is done with the EMF SW software. (See sections 5.2 and 5.3)

2. Functions

The EMF 1101 Metering and Status Report Unit and the EMF 1102 Cost Centre and Alarm Unit serve to count, store, and forward signal pulses and to register and forward status signals and alarms.

The units have twelve inputs. Pulse transmitters of all kinds that possess a floating mechanical or electronical contact according to the S0 definition (DIN 43 864) can be connected to the inputs. All inputs have a common frame potential and are floating with respect to the supply voltage. The units also have a separate 12-V supply for electronic pulse transmitters.

The pulses registered can be summed up and converted into a consumption figure. Difference channels can be formed for employing up and down counters. An input for rate changing permits metering separately according to tariff rate.

The EMF 1101 metering and status report unit and the EMF 1102 cost centre and alarm unit have the following functions:

- Counting the input pulses in two registers (A/B); can be switched over by means of one of the twelve inputs
- Adjustable debouncing time and trigger pulse edge
- Conversion of the pulse-count values into directly readable data
- Registering and forwarding status signals
- Input channels can also be used optionally as elapsed-time meters

The EMF 1102 cost centre and alarm unit offers the following functions in addition:

- Separate determination of the ON/OFF operating times (contact times closed/open) for each input channel
- Determination of present demand (pulses per time)
- Monitoring of pulse counters, operating times, and demands by upper and lower limit alarms
- Time-controlled or event-controlled registering and storing of pulse counts or operating times
- Monitoring of the differential values of the cyclically registered pulse counts or operating times
- Registering upper or lower limit overshoots, with time and date
- Sending SMS messages when upper or lower limit is exceeded

The unit is a component of the FRAKO Energy Management System. The basic setting is done via the central unit EMZ, the EMP 1100, or the RS232 adapter.

2.1 Operating modes of unit

The following modes of operation are possible for the EMF 1101 metering and status report unit and the EMF 1102 cost centre and alarm unit:

a) as a metering and status-report unit of the FRAKO Energy Management System
b) as an independent metering and status report unit, in combination with an EMP 1100 communications processor for pulse counting or status monitoring for other systems.

The following additional mode of operation is possible for the EMF 1102 cost-centre and alarm unit:

c) as an independent cost centre and alarm unit capable of data editing and recording.

2.2 Call-back and SMS functions

The call-back and SMS functions are only possible with an EMF 1102 cost centre and alarm unit. To use these, the unit must be operated as an independent cost centre and alarm system, and be connected directly to a modem (see also section 3.2.5, Figure 3).

2.3 Power supply for external devices

The unit also has the capability of providing external pulse transmitters with an operating voltage. This is approx. 12 V, and can supply a maximum load of 50 mA (observe the notes in Section 3.2.3.).

2.4 Tariff rate switching

Channel 12 is used automatically as the input for tariff rate switching, if one or more counter channels is using tariff rate switching. In this case, if Input 12 is programmed as a status channel, for example, the registration of normal-rate and off-peak-rate times is possible, as well.

However, if the unit is not used as a data-capture unit for the FRAKO Energy Management System, the tariff rate switching channel can be chosen at will.

2.5 Bus connection

The units can be addressed by means of an EMZ central unit, an EMP communications processor, or an RS232 adapter.

2.6 Display

The EMF 1102 possesses 14 LED indicators with the following functions:

Run: This indicator blinks about once a second, indicating that the EMF 1102 is operating properly.

Bus: Indicates accesses via the FRAKO Starkstrombus®.

Inputs: An LED is allocated to each input. This lights up when the input contact is closed and has been detected by the unit. If the input contact is open, this LED remains off.

3. Installation

3.1 Mounting

The EMF 1101 / 1102 has a standard housing for mounting on a 35-mm DIN-standard mounting rail. It can be mounted in any position.

Important:

This unit is intended solely for installation in distribution and electrical cabinets. It must not be possible to touch the terminals during subsequent operation.

3.2 Electrical connection

The connections are to be made in accordance with the terminal diagram in Figure 1.

Important note:

The unit and its supply leads must be disconnected from the power supply during installation and servicing.

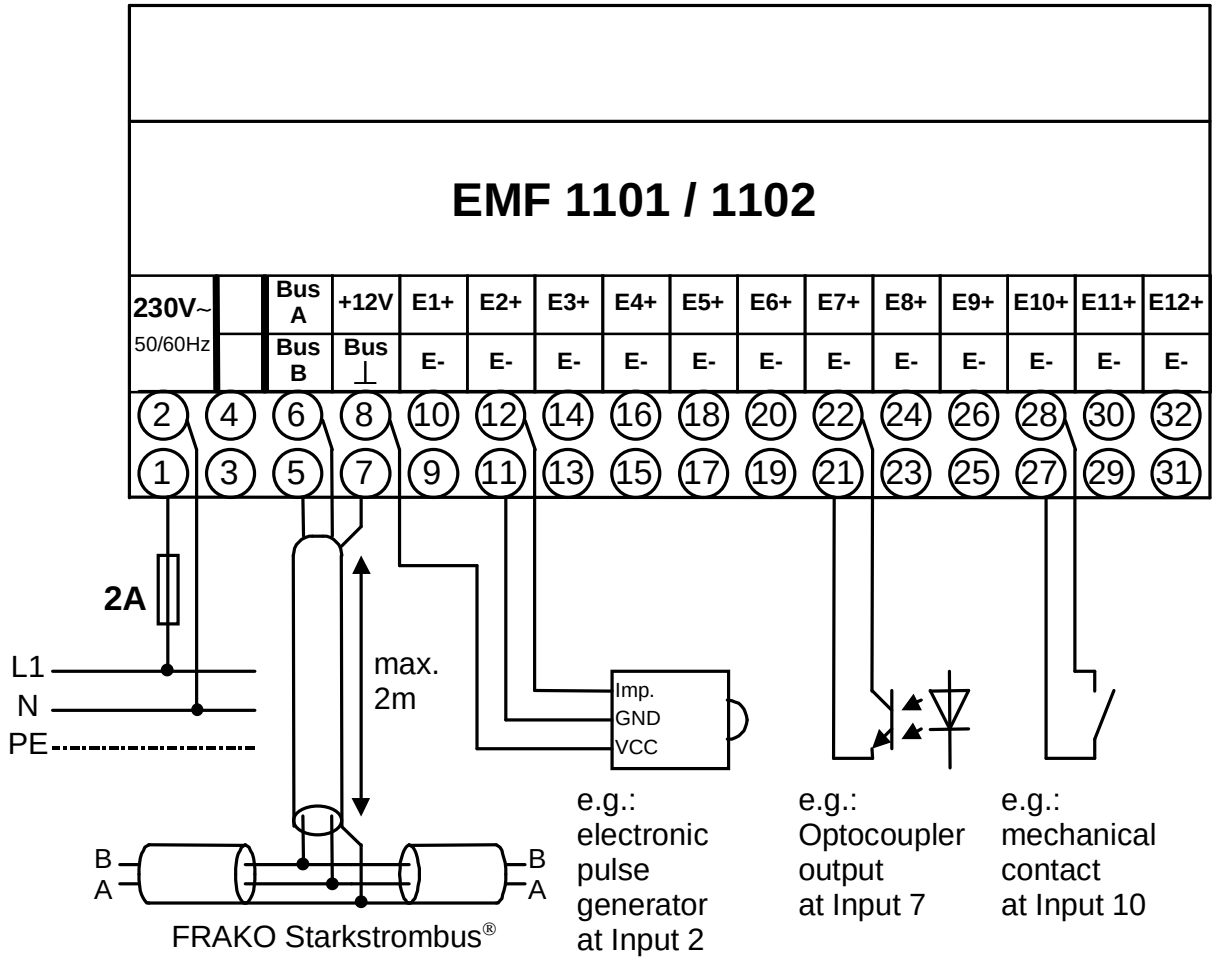

Figure 1: Terminal diagram

3.2.1 Supply voltage

The supply voltage is 230 V A.C., 50 / 60 Hz. It is to be connected to the "**230V**~**"** terminals in accordance with the terminal diagram in Figure 1, page 7.

Important note:

The termination of the supply voltage is to be protected externally by 2 Amp fuse.

3.2.2 Connection of the inputs

All inputs ("**E1+"** to "**E12+"**) meet the S0 definition and have a common frame potential (all "**E-"** terminals are connected together). However, these inputs are floating with respect to earth.

The inputs maintain the following electrical values:

Open-circuit voltage (contact open):	12 V ± 10%
Short-circuit current:	12 mA ± 10%
Current at 800 Ω:	≥ 10 mA

Caution:

An external voltage must not be applied to the inputs. Nor may the inputs be connected in parallel with other inputs.

3.2.3 Power supply for external device

A supply voltage of 12 V ± 10% can be tapped from the "**+12V"** and "**E-"** terminals for external devices. The maximum current load is 20 mA. If up to three input channels remain unused (always open), the maximum load may be up to 50 mA.
The values for all combinations are listed in the table below:

Connected inputs:	Maximum consumption
12	20 mA
11	30 mA
10	40 mA
9	50 mA maximum

3.2.4 Connection to FRAKO Starkstrombus®

The connection is made to the terminals "**Bus A",** "**Bus B"** and "**Bus ⊥"** in accordance with the terminal diagram in Figure 1, page 7.

3.2.5 Connection via an RS232 adapter

With the RS232 adapter, one EM unit (EMF, EMR, or EMA) can be connected to the RS232 serial interface of the PC. The connection is made to the bus connector of the respective unit. It is not possible to set up a bus structure.
At present, only the EMF-SW software can access the EMF 1101 / 1102 via the RS232 adapter.

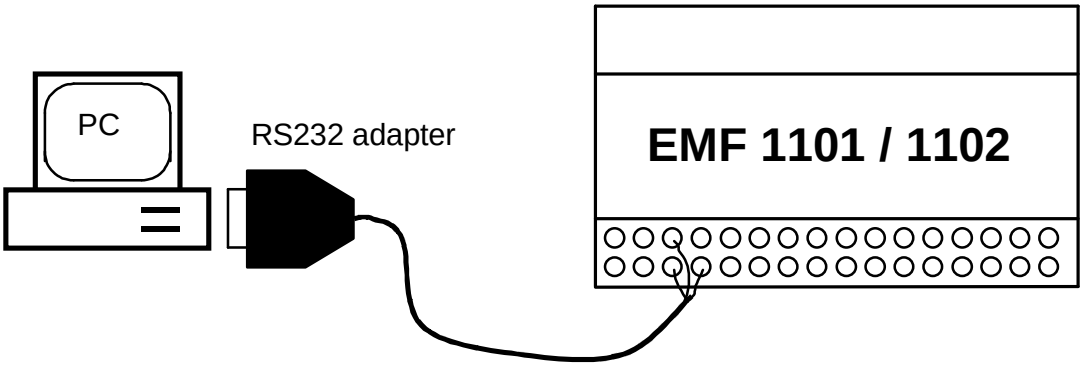

Figure 2: Connection by means of RS232 adapter

The assignment of the individual conductors of the RS232 adapter is given on the label on the cable.

If a modem is connected between the RS232 adapter and the PC, as well, a “null-modem” RS232 cable must be used between the RS232 adapter and the modem.

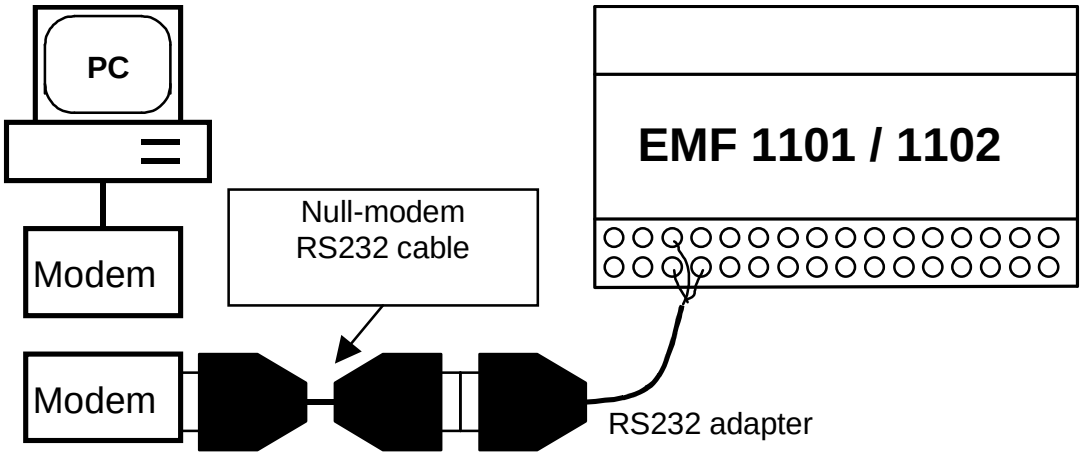

Figure 3: Set-up with RS232 adapter and modem

4. Start-up

4.1 Before start-up

Important note:

Make sure before start-up that the supply terminals of the unit can no longer be touched (e.g. by a locked door or a cover).

After the installation as described in Section 3 has been performed, and the above note has been followed, the EMF 1101 / 1102 may be energized and put into service.

4.2 Function testing

Once power has been applied, the "**Run**" LED begins to blink about once a second.

A status-monitor LED ("**Inputs**") lights up as soon as the corresponding input is detected as closed. Open inputs remain unlit.

If the unit is already being addressed via the bus connection, each access is indicated by the "**Bus**" LED (which lights up during the access).

4.3 Assigning a bus address

Each device connected to the FRAKO Starkstrombus® must possess a unique bus address. As delivered, the EMF 1101 / 1102 does not possess a valid bus address.

For the initial start-up of the EMF 1101 / 1102 or when changing its bus address, use the "Konfig Tool" software.

See the operating instructions for Konfig Tool.

Important:

Each bus address may only be assigned once. For extensive systems, it is advisable to draw up a table of the bus addresses.

The Konfig Tool software is included with the EMVIS software or the EMP 1100, or else will be supplied on request.

If the EMF 1101 / 1102 is addressed via an RS232 adapter, it is not necessary to assign a bus address.
Only one EMF 1101 / 1102 can be connected with each RS232 adapter.

5. Basic settings

Depending on the operating mode of the unit, it must be configured differently. Three operating modes are described below:

- The EMF 1101 / 1102 as a metering and status report unit in the FRAKO Energy Management System.
- The EMF 1102 as an independent cost centre and alarm system.
- The EMF 1101 / 1102 as a metering, data-acquisition, or alarm unit for other systems via the EMP 1100 (protocol: 3964R/RK512).

5.1 The EMF in the FRAKO Energy Management System

In this operating mode, the EMF 1101 / 1102 serves as a metering and status-report unit in the FRAKO Energy Management System. The EMF 1102 can also perform these functions.

The unit is connected to the bus central unit EMZ by means of the FRAKO Starkstrombus®. The settings for the unit are performed with the “System-SW.EXE” software. This software is supplied with the EMVIS visual-display software.

In order to use the alarm and monitoring functions of the EMF 1102 as well, the settings must be made with the EMF-SW software. (This is also part of the EMVIS package.)

5.2 The EMF 1102 as a cost centre and alarm system

This operating mode employs the EMF 1102 Cost Centre and Alarm Unit as an independent unit. All settings must be made via the EMF-SW software, which also serves for on-line visualization and for data export. The on-line help function of this software provides comprehensive information on the adjusting and operating capabilities of the EMF 1102.

The following paths connecting the “EMF-SW” program and the EMF 1102 are possible:

a) PC → EMZ (central unit) → FRAKO Starkstrombus® → EMF 1102
b) PC → EMP 1100 → FRAKO Starkstrombus® → EMF 1102
c) PC → RS232 adapter → EMF 1102
d) PC → modem/modem → RS232 adapter → EMF 1102

The links between the PC and EMZ or EMP 1100 can also be replaced by a modem connection.

The devices named above, EMZ, EMP 1100 and RS232 adapter, belong to the FRAKO Energy Management System and can be ordered from FRAKO.

Important:

A “null-modem” RS232 cable (inverted conductors) must be employed between the RS232 adapter and the modem.

Only if path (d) is chosen can the SMS functions of the EMF 1102 be used as well.

A few seconds after being switched on, the EMF 1102 checks whether it is connected to a bus central unit EMZ or an EMP 1100 communications processor. If this is not the case, configuration data will be transmitted to any modem there may be. Therefore, it is necessary to switch on the modem before or at the same time as the EMF 1102.

5.3 The EMF 1101 / 1102 for other systems

In combination with an EMP 1100 communications processor, both the EMF 1101 Metering and Status Report Unit and the EMF 1102 Cost Centre and Alarm Unit can serve as data sources for systems from other suppliers.

The EMF 1101 / 1102 is connected via the FRAKO Starkstrombus® to the EMP 1100. The configuration of the EMF 1101 / 1102 must be performed with the “EMF-SW” software. The on-line help function of this software provides comprehensive information on the setting and operating capabilities of the EMF 1102.

The link between the other system and the EMP 1100 is established via the 3964R/RK512 protocol. In this way, all the current switching, alarm, and meter states can be read from the EMP 1100’s data modules. The EMP 1100 is passive with respect to other systems.

Note that neither the SMS functions nor the call-back functions can be utilized in this operating mode. Nor can the recorded data be forwarded to other systems via the communications processor.

In the EMP 1100 communications processor, the EMF 1101 Metering and Status Report Unit can be logged in as *EMF 1100/1* (types $09 and $0A). The EMF 1102 Cost Centre and Alarm Unit can be logged in either as *EMF 1100/1* or as *EMF 1102*.

6. Notes on start-up and trouble-shooting

Malfunctions:	**Possible causes:**	**Remedy:**
After start-up, the LED “Betrieb/Run” does not blink	No or the wrong operating voltage has been applied	Check the connecting (see Figure 1 page 7)
After connecting an externally-powered device, the EMF 1101 / 1102 no longer operates	The external device’s power consumption is too high	Check whether the max. load has been exceeded: see Section 3.2.3
The LED lights up when the contact is not wired up or is open	Input is defective	
The LED does not light up when the contact is closed	Contact impedance is too high	Use contact that meets the S0 definition
The Eingang/Input LED does not blink, despite impressed pulses	The debouncing time has been set too long	Check the basic settings
Bus LED does not blink, and no readings are transmitted to the EMZ 110x or the EMP 1100; error messages to the bus central unit EMZ	Bus not connected properly	See Figure 1 (page 7)
	Faulty start-up, wrong bus address in the unit	Check start-up – see Section 4 et seq.
	Basic settings false, wrong bus address in bus central unit EMZ	Select correct bus address

7. Technical specifications

Inputs:

Number:	12
Specification:	S0 interfaces, common "**E-**" potential (suitable for connecting floating and electronic contacts)
Switching time:	≥ 25 ms
Short-circuit current:	12 mA ± 10%
U_{max}:	12 V ± 10%
Internal operating points:	"Off" at ca. 3 mA; "On" at ca. 7.5 mA

Voltage supply:

Supply voltage:	230V A.C. ± 10%
Frequency:	45 Hz to 65 Hz
Power input:	ca. 10 VA
Type:	to VDE 0411 Safety Class II (also DIN EN 61 010 - 1)

Enclosure class:

Housing / terminals:	IP 40 / IP 20

Connection to FRAKO power bus:

Electrical connection:	to EIA RS 485 standard
Transmission rate:	76.8 kbit/sec
Protocol:	FRAKO Starkstrombus®

Design data:

Housing material:	PC with 10% GF, V-0 flame-retardant to UL-94 V-0
Dimensions:	140 x 89 x 59 mm (W x H x D) see Figure 4
Weight:	0.60 kg
Installation:	on 35-mm DIN-standard mounting rail
Installed position:	arbitrary
Connections:	Screw terminals
Max. conductor cross-section:	2.5 mm²

Operating conditions:

Ambient temperature:	0° C to 50° C

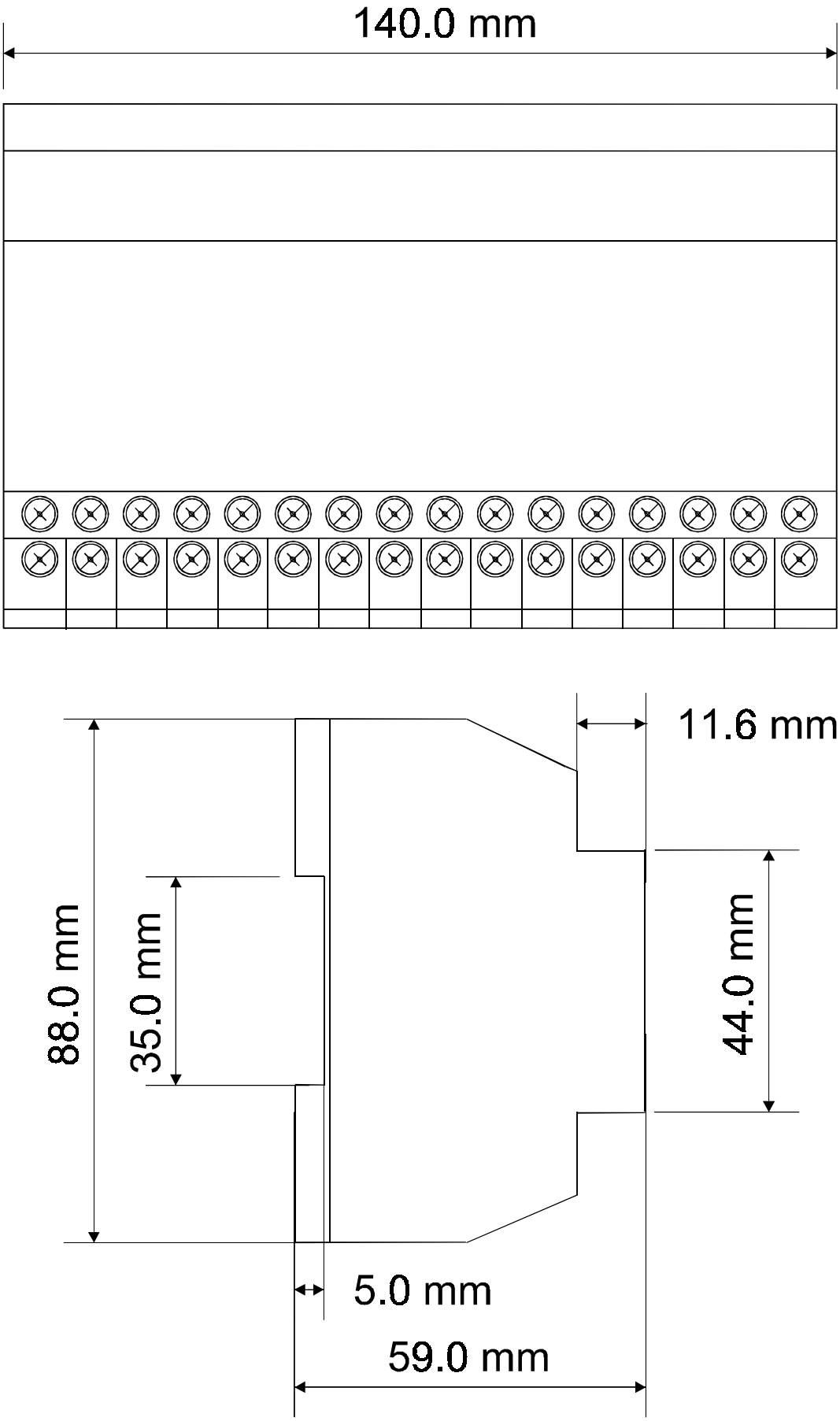

Figure 4: Dimension diagram

EMF 1102 ab SW V 2.00 - V0.90-