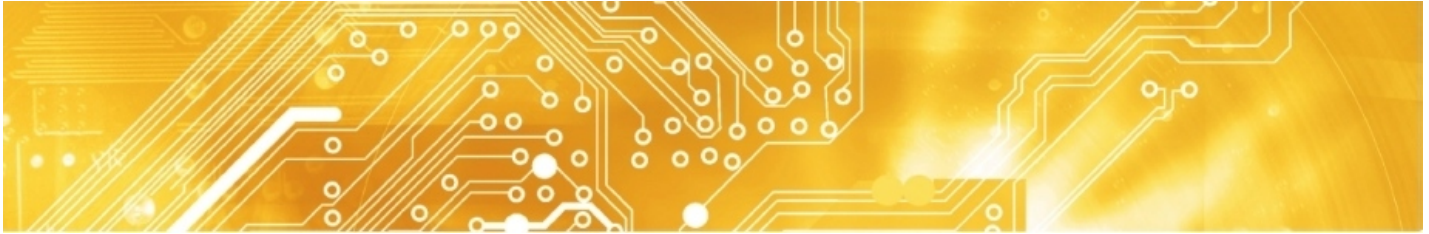




# SHORT-CIRCUIT INDICATORS



SHORT-CIRCUIT INDICATOR TYPE **K / KM / KH**



SHORT-CIRCUIT INDICATOR TYPE **VE AND FA**



SHORT-CIRCUIT INDICATOR TYPE **FLA3.1**



SHORT-CIRCUIT INDICATOR TYPE **MF**



SHORT-CIRCUIT INDICATOR TYPE **OK**

# SHORT-CIRCUIT INDICATOR

## TYPE OK

panel-mounted

### General description

The short-circuit indicator type OK can be used in radial networks with one input and open-ring networks. The indication of the short-circuit is done by one flag indicator for each phase. The sensors are divisible and can be retrofitted on the cable. The display device is powered by an exchangeable lithium battery and can be alternatively powered by an external power supply.



### The type OK is available in two versions:

**Version OK-L:** The potential-free connection between the sensors and the display unit is done by fibre optic cables. The sensor can be mounted on screened and unshielded cables.

**Version OK-S:** The connection between the sensors and the display unit is done by cable. The sensors must be mounted on screened cables only.

### Features and Options

Very long battery lifetime:	Due to the flag indication the battery lifetime is approx. 20 years
Optional reset input:	For reset by recovering 230 V AC
Optional sensor reset:	Sensor reset on recovering net current (only for OK-S)
Optional power supplies:	10-110 V DC or 110 / 230 V AC power supply with optional lithium backup battery

### External connectors

#### OK-L External connectors (refer to figure 1)

Optical terminal: connectors to short-circuit sensors L1, L2 and L3

#### MF-S External connectors (refer to figure 2)

- Connector 1 - 2: short-circuit sensor L1
- Connector 3 - 4: short-circuit sensor L2
- Connector 5 - 6: short-circuit sensor L3

#### Both versions

- Connector 9 - 10: external blinking lamp (Type BL4.1+BL6)
- Connector 10 - 11: remote reset input
- Connector 12 - 13: SCADA NO contact
- Connector 14 - 15: SCADA NC contact

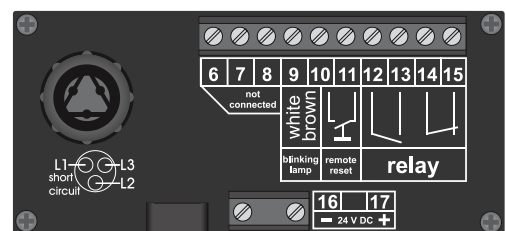


figure 1 - Connectors OK-L

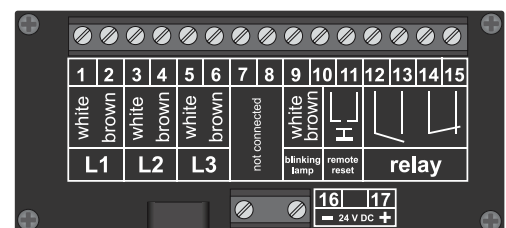
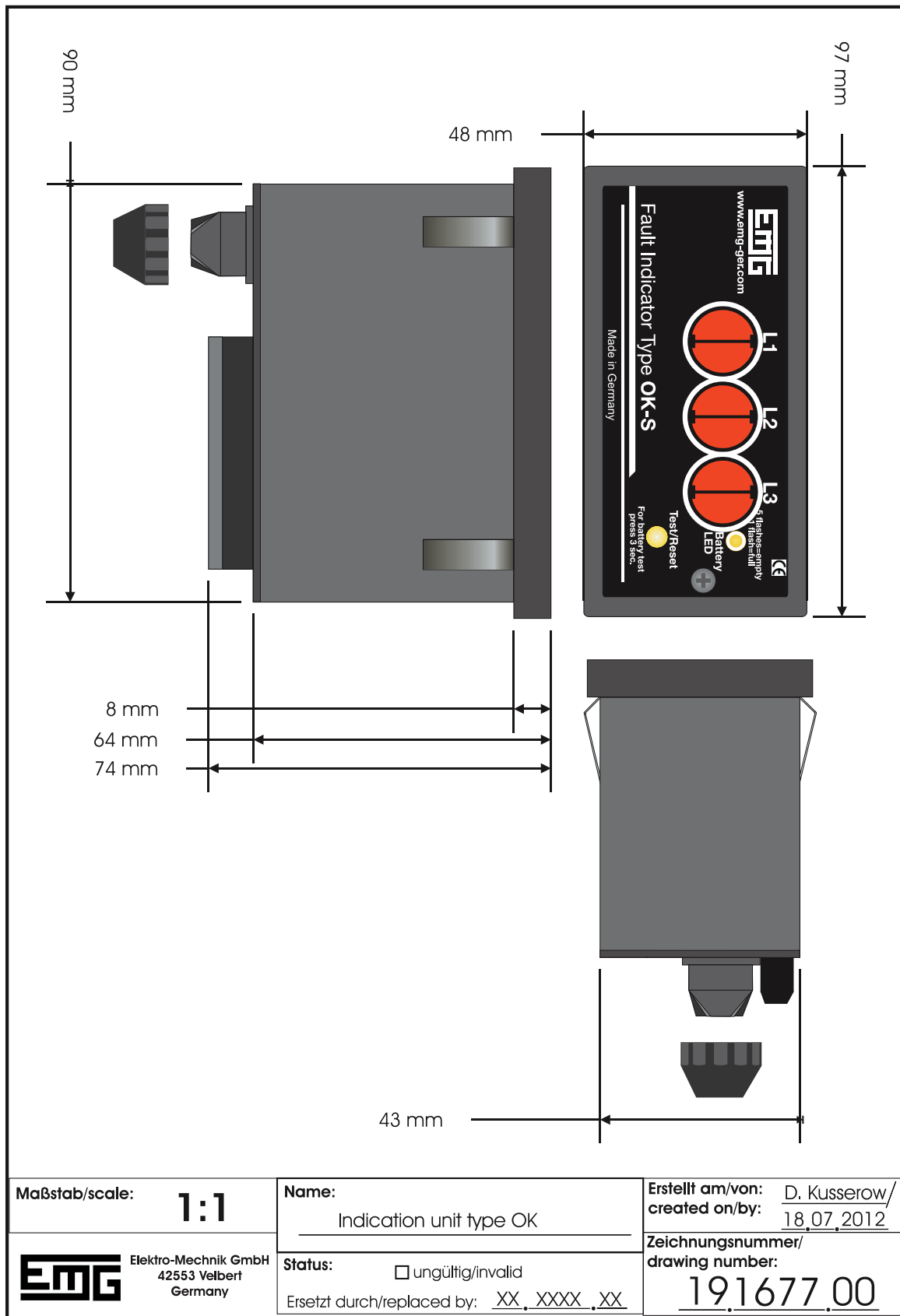
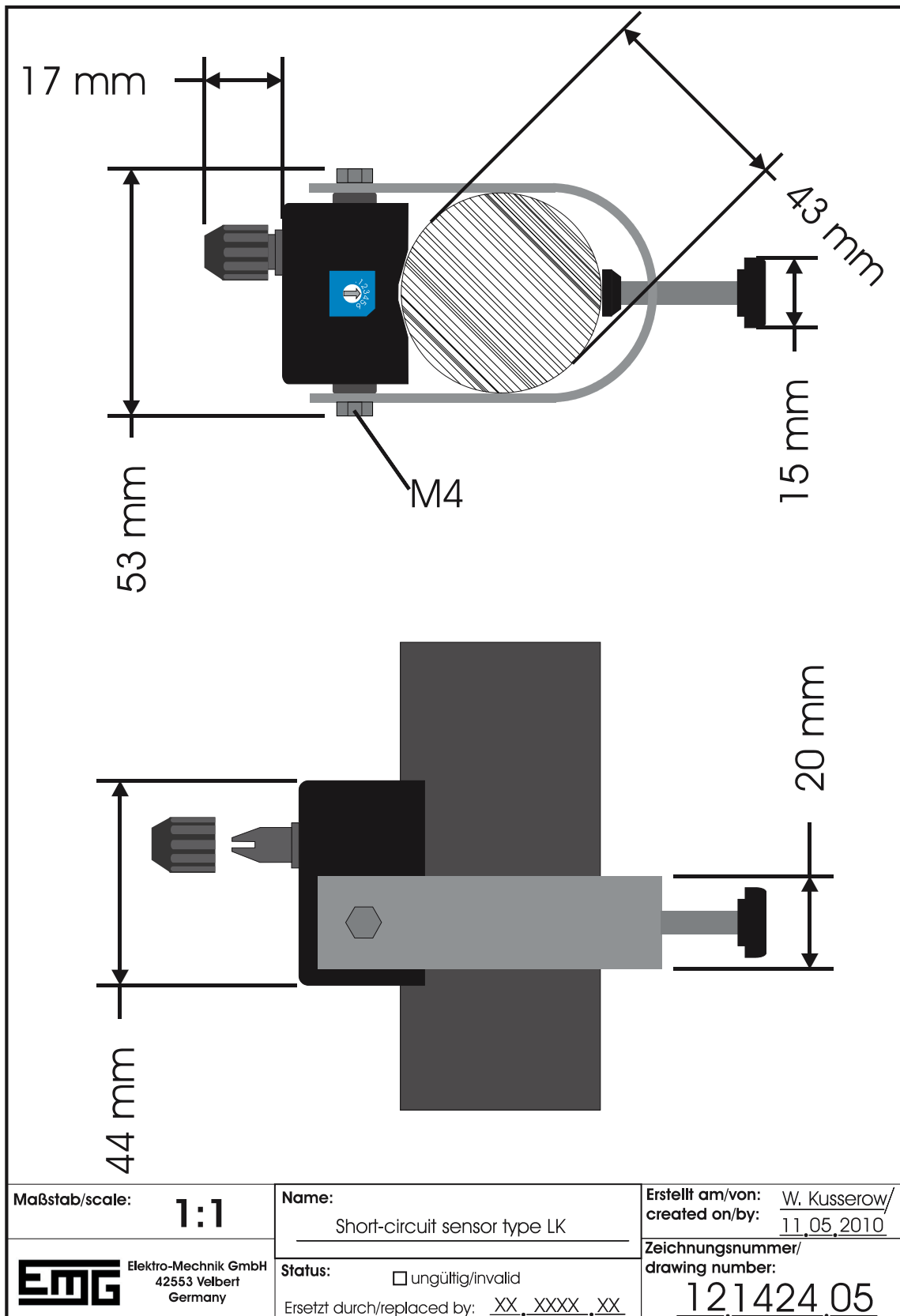


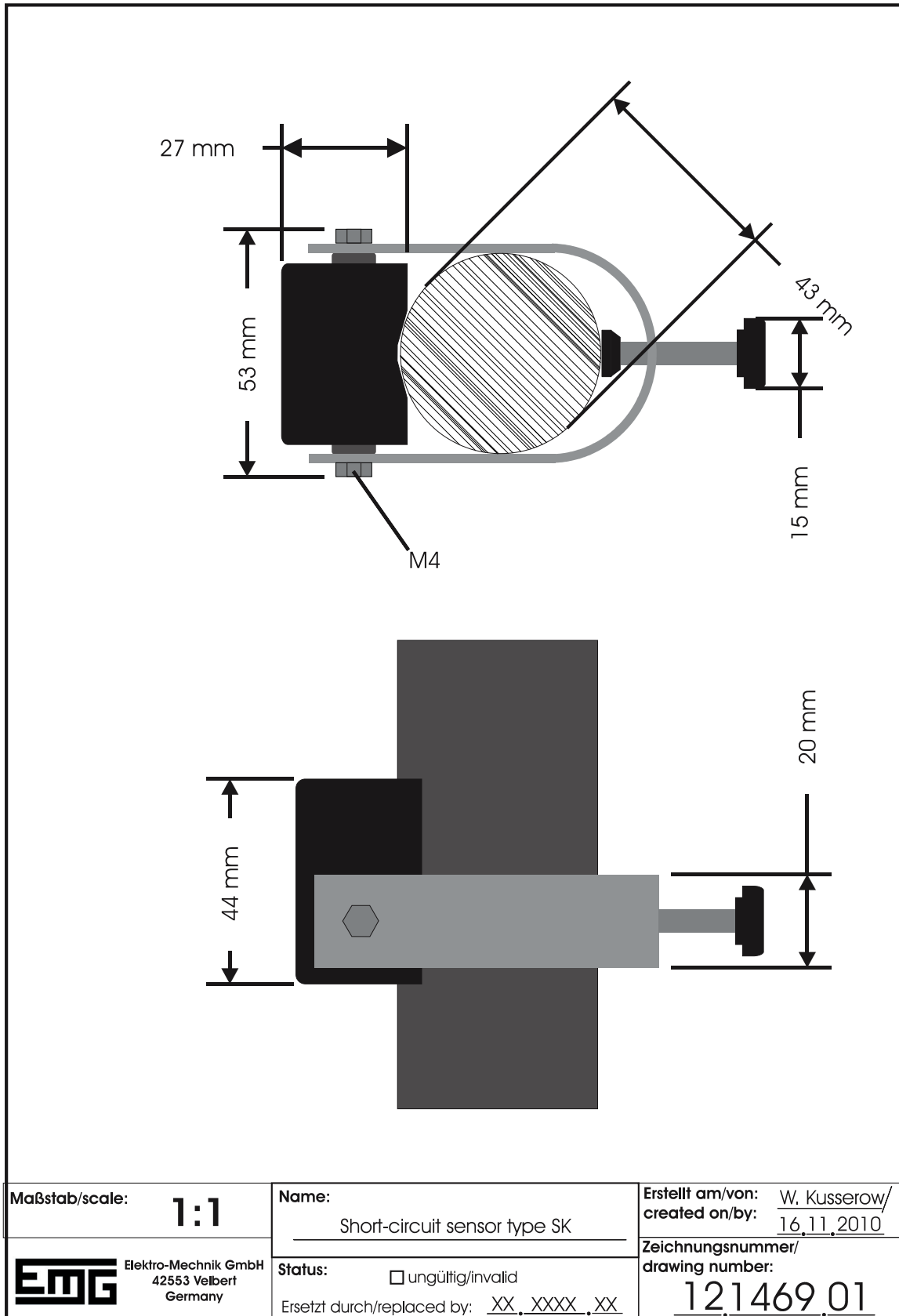
figure 2 - Connectors OK-S

Subject	Value
<b>OK-L</b> short-circuit current	adjustable: 200 / 300/ 400 / 500 / 600 / 800 / 1000 * A ( $\pm 10$ %)
<b>OK-S</b> short-circuit current	adjustable: 200 / 400 / 600 / 800 / 1000 * A ( $\pm 10$ %)
response delay	adjustable: 40 / 60 / 80 / 160 * ms
indication unit	suitable for panel installation
indication of a) short-circuit b) battery	a) one red flag for each phase b) one yellow LED
reset of the indicator	a) manual by push-button b) connection for a potential-free remote reset c) time: 1 / 2 / 4 / 8 * ( $\pm 1$ %) hours after fault d) Optional: self-acting after recovering of 110 - 230 VAC e) Optional: self-acting with returning net current (only for OK-S and from 20A net current upwards)
on site function test a) function test b) battery test	by push-button a) the button has to be pressed for 1 second b) the button has to be pressed for 3 seconds
dimensions: indication unit	97 mm x 48 mm x 47 mm (WxHxD) (dimensions of the cut out: 92 $^{+0.8}$ x 45 $^{+0.6}$ mm / IEC 61554 / DIN43700)
Protection class: indication unit	IP40
Protection class: sensors	IP67
internal type test	according to IEEE 495-2007
operation temperature range	-25°C to +70°C
power supply	lithium battery (LiSOCl <sub>2</sub> ) type AA / 3.6V / 2600 mAh Optional: 10 - 110V DC with lithium backup battery Optional: 115V AC / 230V AC with lithium backup battery
SCADA contact	1 x NO contact, 1 x NC contact permanent / wipe contact (100 * ms) max. 230 V AC / max. 2 A / max. 30 W
short-circuit sensor (CT)	<b>OK-L</b> three short circuit sensors type LK (fibre optic cable) <b>OK-S</b> three short circuit sensors type SK (copper cable) (three current transformers for single-core cable) diameter: 22-42* mm connection cable length: 3* m

\*PLEASE NOTE: other values can be ordered







# SHORT-CIRCUIT INDICATOR

## TYPE MF

panel-mounted

### General description

The short-circuit indicator can be used in radial networks with one input and open-ring networks. The sensors are divisible and can be retrofitted on the cable.

**The type MF is available in two versions:**

**Version MF-L:** The potential-free connection between the sensors and the display unit is done by fibre optic cables. The sensor can be mounted on screened and unscreened cables.

**Version MF-S:** The connection between the sensors and the display unit is done by cable. The sensors must be mounted on screened cables only.



### Features and Options

2nd short-circuit pass-through: Indication of a second short-circuit passing through by double blinking of the respective short-circuit LED.

Optional reset input: For reset by recovering 230 V AC

Optional sensor reset: Sensor reset on recovering net current (only for MF-S and net current of 20A upwards)

Optional power supplies: 10-110 V DC or 110 / 230 V AC power supply with optional lithium backup battery

### External connectors

#### MF-L External connectors (refer to figure 1)

Optical terminal: connectors to short-circuit sensors L1, L2 and L3

Connector 9 - 10: external blinking lamp (Type BL4.1+BL6)

Connector 10 - 11: remote reset input

Connector 13- 15: SCADA change-over contact

#### MF-S External connectors (refer to figure 2)

Connector 1 - 2: short-circuit sensor L1

Connector 3 - 4: short-circuit sensor L2

Connector 5 - 6: short-circuit sensor L3

Connector 9 - 10: external blinking lamp (Type BL4.1+BL6)

Connector 10 - 11: remote reset input

Connector 13- 15: SCADA change-over contact

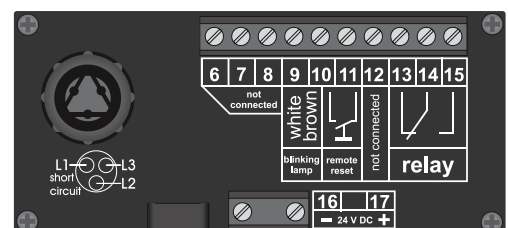


figure 1 - Connectors MF-L

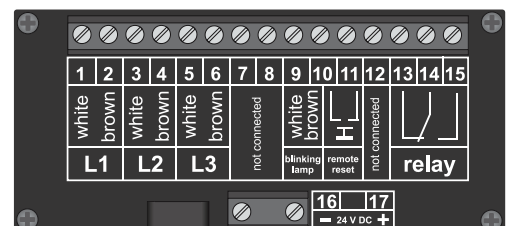


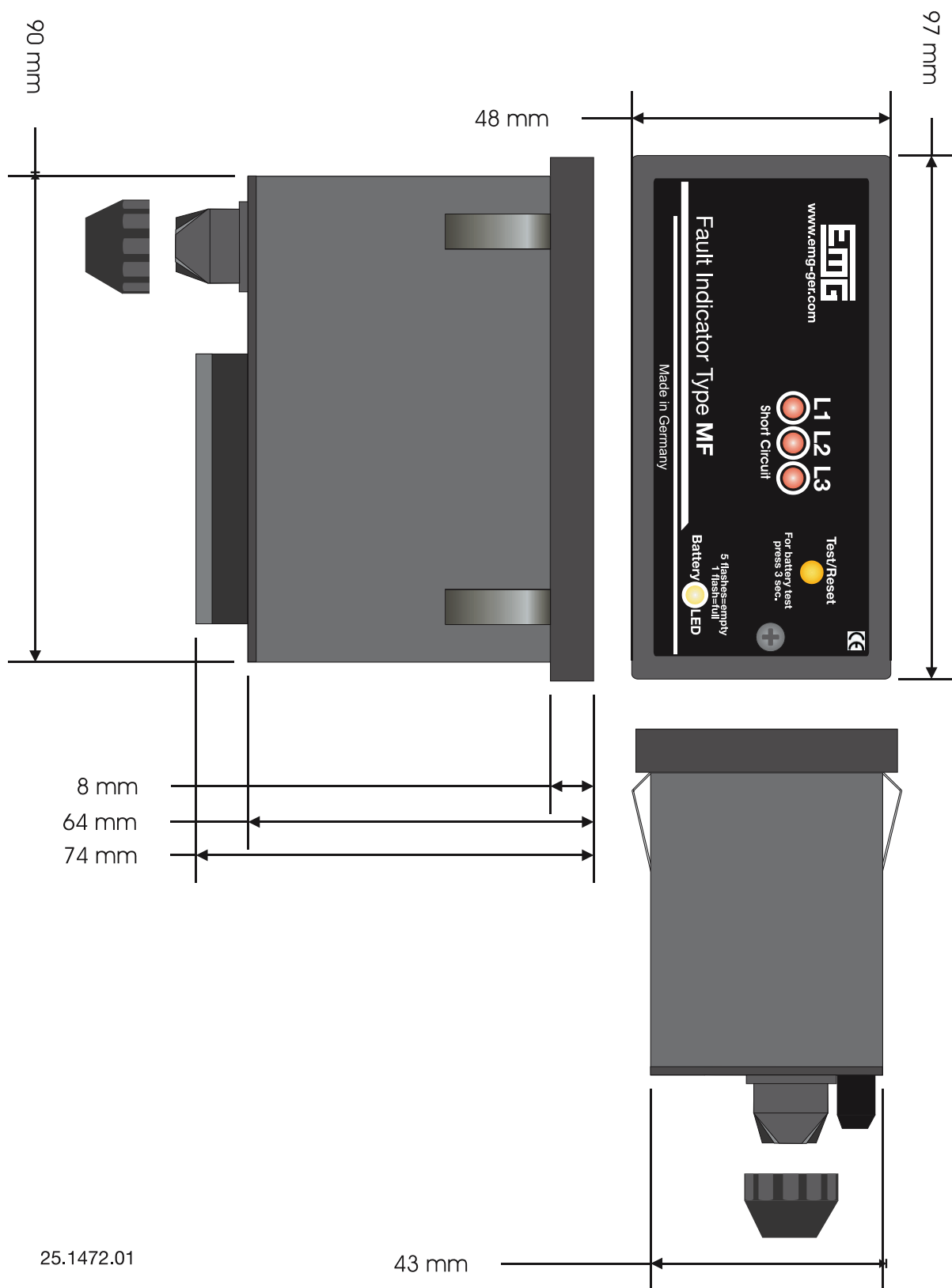
figure 2 - Connectors MF-S

## General Data

Subject	Value
<b>MF-L</b> short-circuit current (phase to phase)	adjustable: 200 / 300/ 400 / 500 / 600 / 800 / 1000 * A ( $\pm 10\%$ )
<b>MF-S</b> short-circuit current (phase to phase)	adjustable: 200 / 400 / 600 / 800 / 1000 * A ( $\pm 10\%$ )
response delay	adjustable: 40 / 60 / 80 / 160 * ms
indication unit	suitable for panel installation
indication of a) short-circuit b) battery	a) one red LED for each phase b) one yellow LED
reset of the indicator	a) manual by push-button b) connection for a potential-free remote reset c) time: 1 / 2 / 4 / 8 * ( $\pm 1\%$ ) hours after fault d) Optional: self-acting after recovering of 110 - 230 VAC e) Optional: self-acting after recovering net current (Only for MF-S and net current of 20A upwards)
on site function test a) function test b) battery test	by push-button a) the button has to be pressed for 1 second b) the button has to be pressed for 3 seconds
dimensions: indication unit	(WxHxD) 97 mm x 48 mm x 74 mm (dimensions of the cut out: 92+0.8 x 45+0.6 mm / IEC 61554 / DIN43700)
Protection class: indication unit	IP40
Protection class: sensors	IP67
internal type test	according to IEEE 495-2007
operation temperature range	-25°C to +70°C
power supply	lithium battery (LiSOCl <sub>2</sub> ) type AA / 3.6V / 2600 mAh Optional: 10-110 V DC with lithium backup battery type AA / 3.6V / 2600 mAh Optional: 110 / 230 V AC with lithium backup battery type AA / 3.6V / 2600 mAh
SCADA contact	1 x change-over contact permanent / wipe contact (100 * ms) max. 230 V AC / max. 2 A / max. 30 W
short-circuit sensor (CT)	<b>MF-L</b> three short circuit sensors type LK (fibre optic cable) <b>MF-S</b> three short circuit sensors type SK (copper cable) (three current transformers for single-core cable) diameter: 22-42* mm connection cable length: 3* m

\*PLEASE NOTE: other values can be ordered

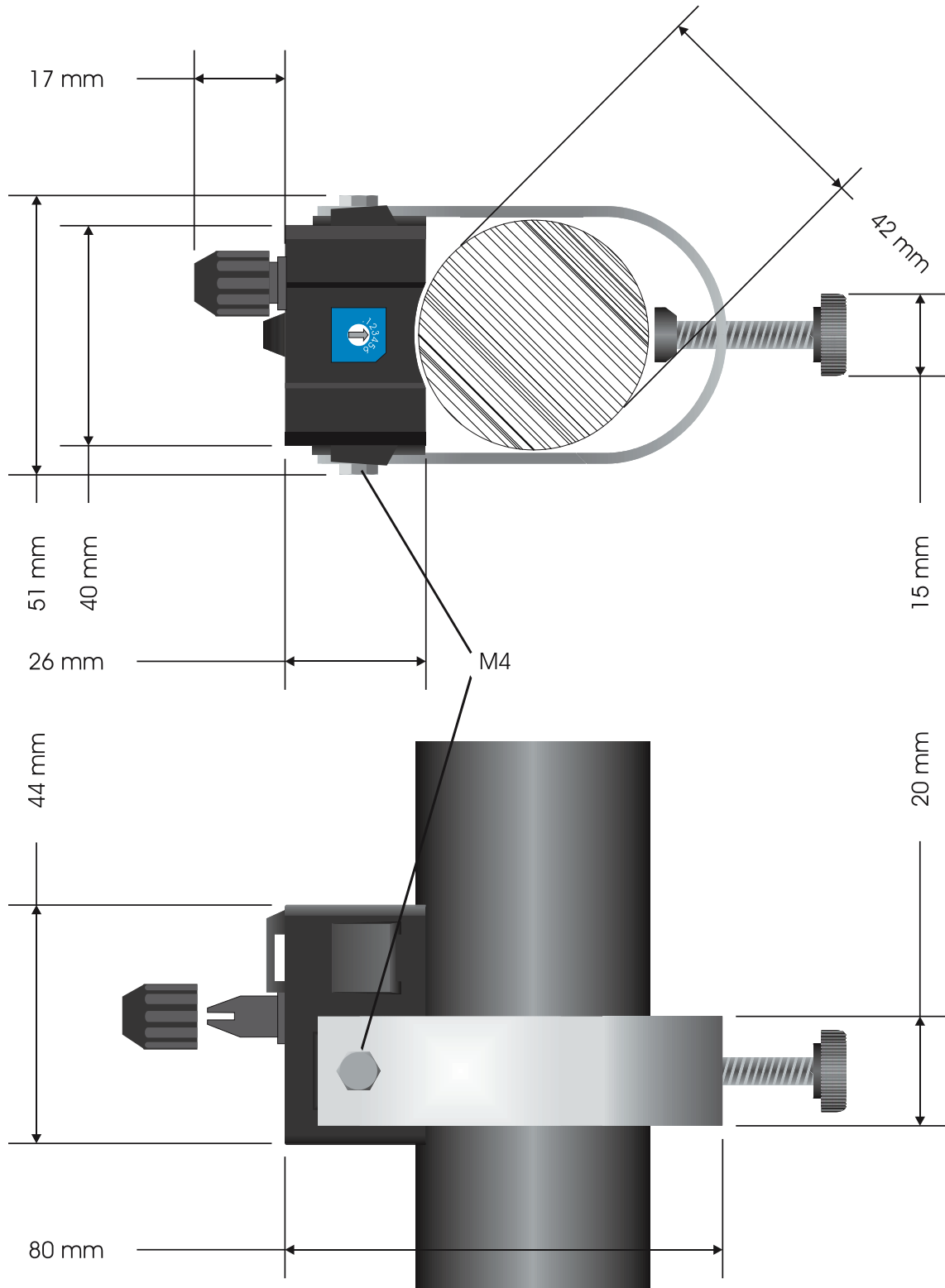




25.1472.01

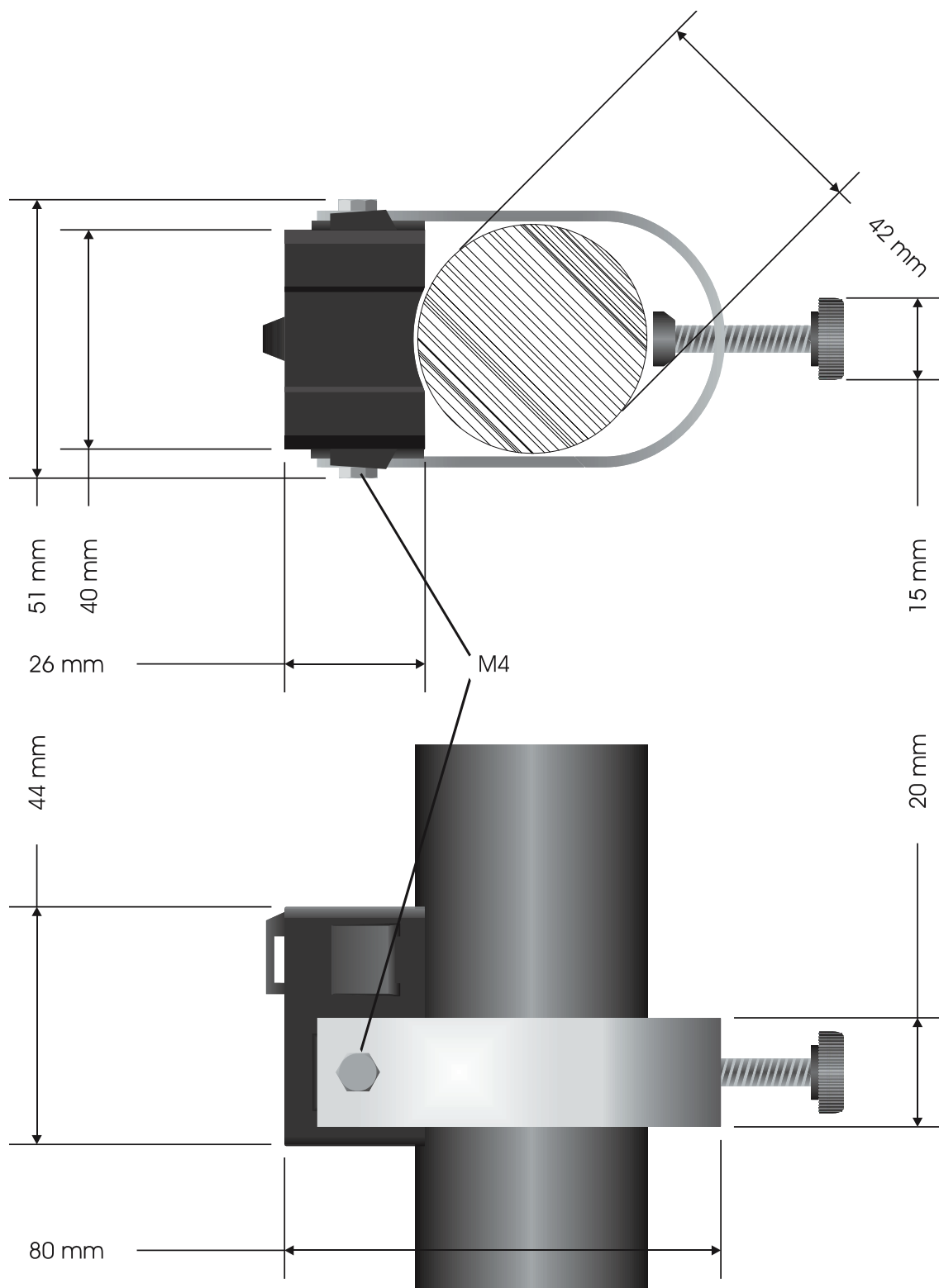
43 mm

Short-circuit sensors type LK



12.1424.10

Short-circuit sensors type SK



12.1469.03

# SHORT-CIRCUIT INDICATOR

## TYPE MF

surface mounted

### General description

The short-circuit indicator can be used in radial networks with one input and open-ring networks. The sensors are divisible and can be retrofitted on the cable.

The type MF is available in two versions:

**Version MF-L:** The potential-free connection between the sensors and the display unit is done by fibre optic cables. The sensor can be mounted on screened and unshielded cables.

**Version MF-S:** The connection between the sensors and the display unit is done by cable. The sensors must be mounted on screened cables only.

### Features and Options

- 2nd short-circuit: Indication of a second short-circuit passing through by double blinking of the respective short-circuit LED.
- Two relays: Configurable two relays. Options for configuration:
  - permanent contact or wipe contact
  - NO or NC contacts
 At site configuration by DIP switch.
- reset input: For reset by recovering auxiliary voltage supply (V DC or V AC)
- Optional three relays: The third relay can be used for the remote indication of an empty battery
- Optional sensor reset: Only type MF-S: Sensor reset on recovering net current (current load of approx. 25 A required)
- Optional power supplies: 10-110 V DC or 110 / 230 V AC power supply with optional lithium backup battery



### External connectors

- Connector 1 - 2: optional external power supply
- Connector 3 - 4: remote test input
- Connector 4 - 5: remote reset input
- Connector 14 - 15: external blinking lamp (Type BL4.1+BL6)
- Connector 16 - 17: SCADA relay contact 1 (configurable as NO or NC contact)
- Connector 18 - 19: SCADA relay contact 2 (configurable as NO or NC contact)
- Connector 19 - 20: optional SCADA relay contact for empty battery remote indication (configurable as NO or NC contact)

**MF-L:**  
Optical terminal L1 - L3: short-circuit sensors type LK for L1, L2 and L3 (please refer to figures 1)

**MF-S:**  
Connector 6 - 11: short-circuit sensors type SK for L1, L2 and L3 (please refer to figures 2)

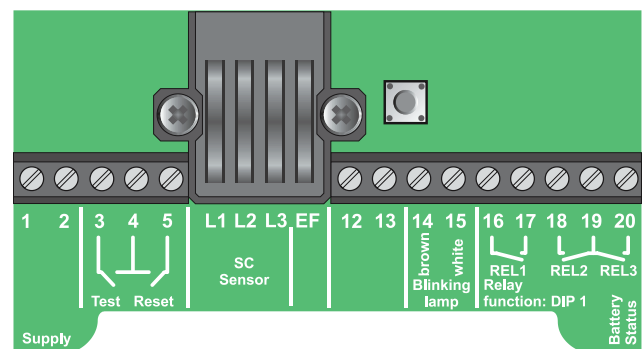


figure 1 - connectors MF-L

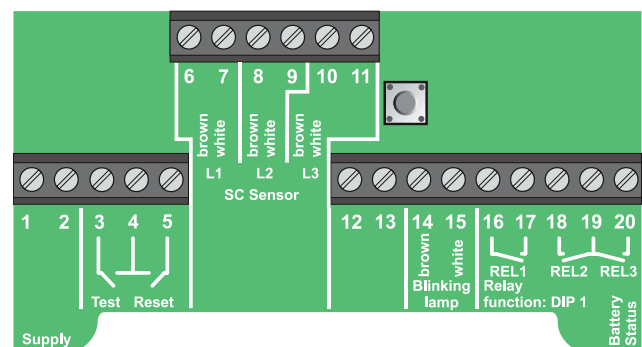
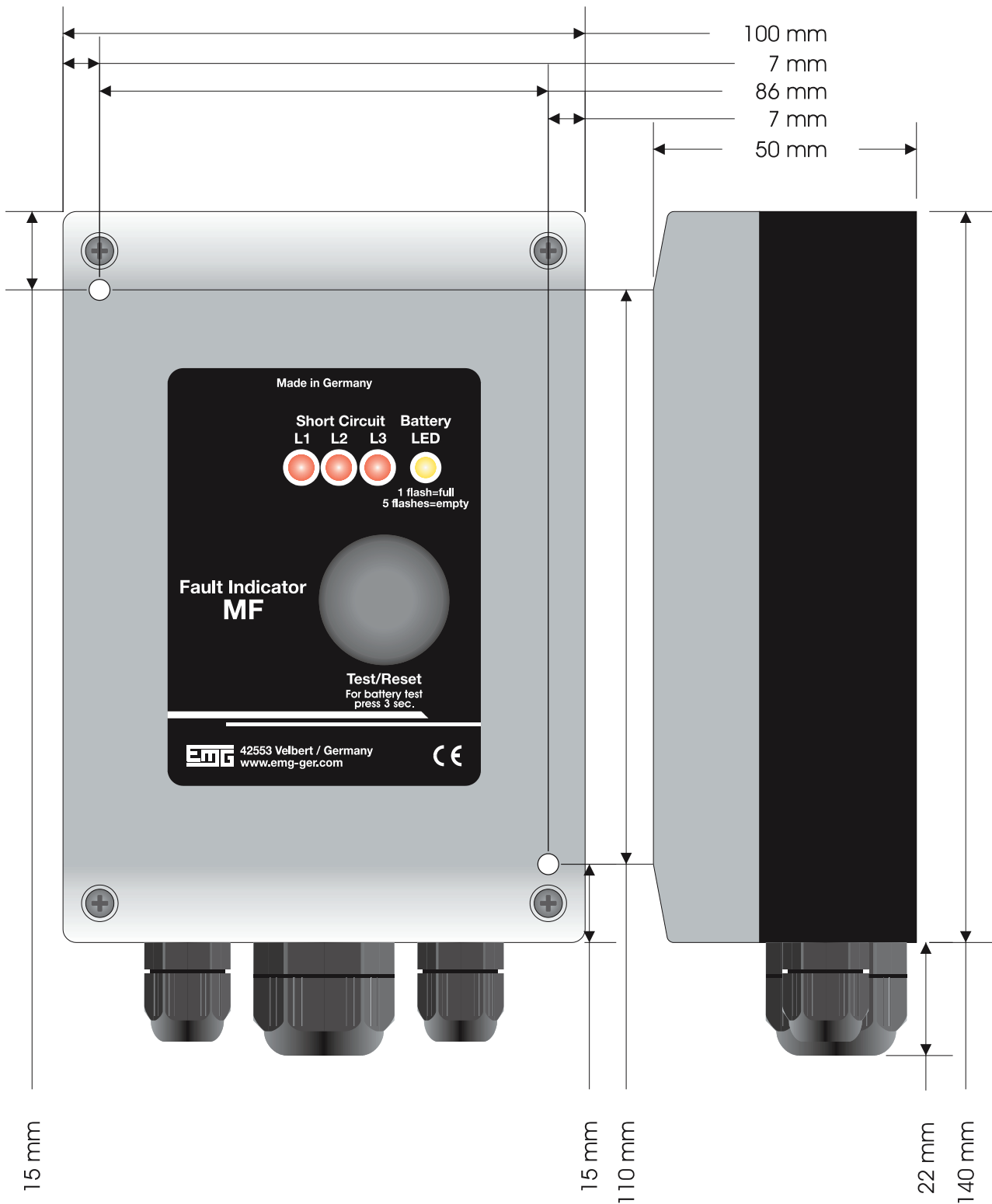


figure 2 - connectors MF-S

## General Data

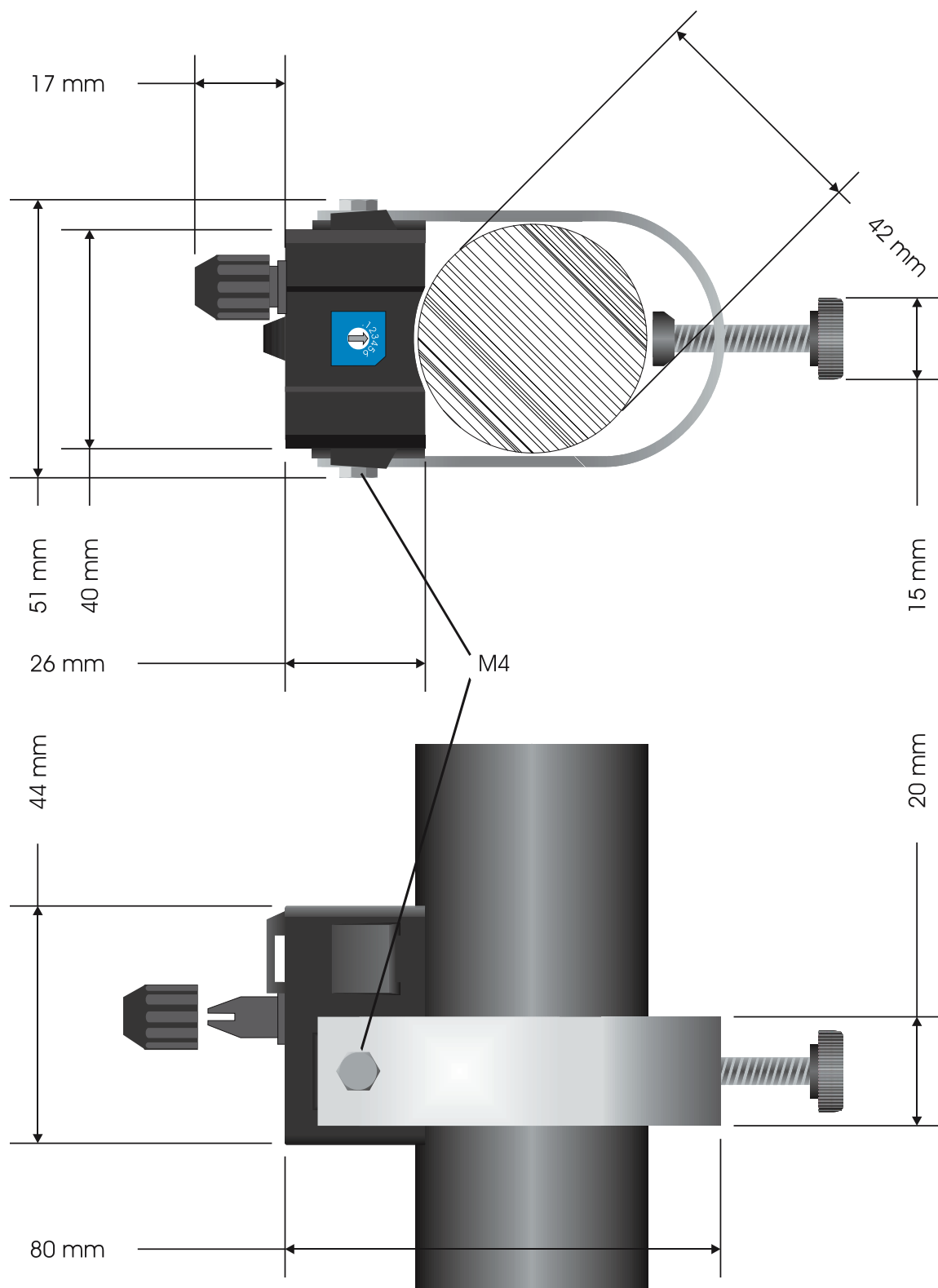
Subject	Value
<b>MF-L</b> short-circuit trip current (phase to phase)	adjustable: 200 / 300 / 400 / 500 / 600 / 800 / 1000 * A (±10 %)
<b>MF-S</b> short-circuit trip current (phase to phase)	adjustable: 200 / 400 / 600 / 800 / 1000 * A (±10 %)
response delay short-circuit	adjustable: 40 / 60 / 80 / 160 * ms
indication unit	suitable for surface installation
indication of a) short-circuit b) earth-fault c) battery	a) one red LED for each phase b) one red LED for earth-fault c) one yellow LED
reset of the indicator	a) manual by push-button b) connection for a potential-free remote reset c) time*: 1 / 2 / 4 / 8 (+/-1%) hours after fault d) sensor reset after recovering net current (on/off) Optional: e) self-acting after recovering of 230 V AC (on/off)
on site function test a) function test b) battery test c) remote function test	by push-button a) the button has to be pressed for 1 second b) the button has to be pressed for 3 seconds c) connection for a potential-free remote test
dimensions: indication unit	(WxHxD) 100 mm x 162 mm x 50 mm
Protection class: indication unit	IP65
Protection class: sensors	IP67
internal type test	according to IEEE 495-2007
operation temperature range	-25°C to +70°C
power supply	lithium battery (LiSOCl <sub>2</sub> ) type AA / 3.6V / 2600 mAh Optional: 10-110 V DC with lithium backup battery type AA / 3.6V / 2600 mAh Optional: 110 / 230 V AC with lithium backup battery type AA / 3.6V / 2600 mAh
SCADA contact	2x NO/NC contacts Optional: 1x additional relay for empty battery remote indication Configurable at site by DIP switch: - contact type (NO or NC) - permanent / wipe contact (100ms) max. 230 V AC / max. 2 A / max. 30 W
short-circuit sensor (CT)	<b>MF-L:</b> three short circuit sensors type LK (fibre optic cable) <b>MF-S:</b> three short circuit sensors type SK (copper cable) (current transformers for single-core cable) diameter: 22-42* mm connection cable length: 3* m

\*PLEASE NOTE: other values can be ordered



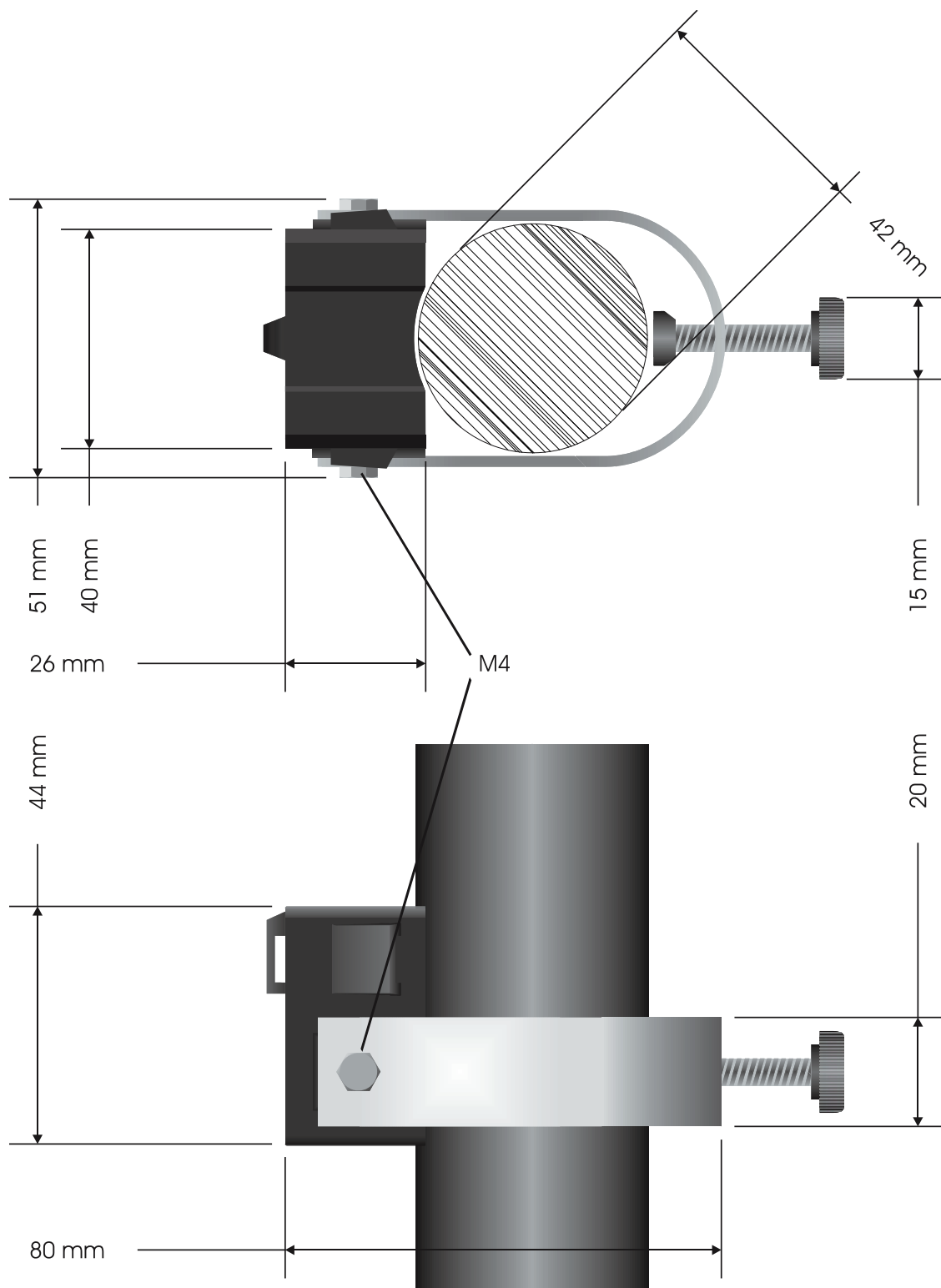
25.1662.01

Short-circuit sensors type LK



12.1424.10

Short-circuit sensors type SK



12.1469.03



# SHORT-CIRCUIT INDICATOR TYPE VE

panel-mounted / surface-mounted

## General description

The short-circuit indicator type VE can be used in radial networks with one input and open-ring networks. The indication of the short-circuit is done by one flag indicator for each phase.

The connection between the sensors and the display unit is done by cable. The sensor must be mounted on screened cables. The sensors are divisible and can be retrofitted. For the operation of the display device no power supply is required. The energy required to indicate the short-circuit is directly obtained from the sensors on the cable. The indicator type VE has a manual reset button.

The type VE is available in a panel-mounted and a surface-mounted housing.

## External connectors

### VE panel-mounted housing (refer to figure 3)

- Connector 1 - 2: short-circuit sensor L1
- Connector 3 - 4: short-circuit sensor L2
- Connector 5 - 6: short-circuit sensor L3
- Connector 13- 15: SCADA change-over contact

### VE surface-mounted housing (refer to figure 4)

- Connector 1 - 2: short-circuit sensor L1
- Connector 3 - 4: short-circuit sensor L2
- Connector 5 - 6: short-circuit sensor L3
- Connector 12- 14: SCADA change-over contact



Figure 1 - Panel-mounted housing of the display unit



Figure 2 - Surface-mounted housing of the display unit

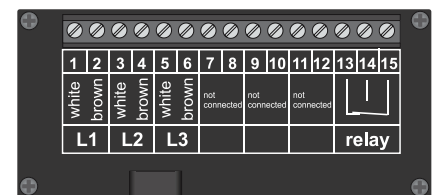


Figure 3 - Connectors (panel-mounted)

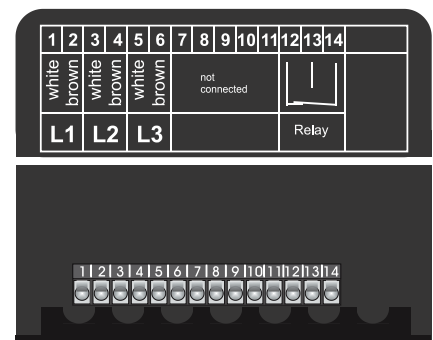
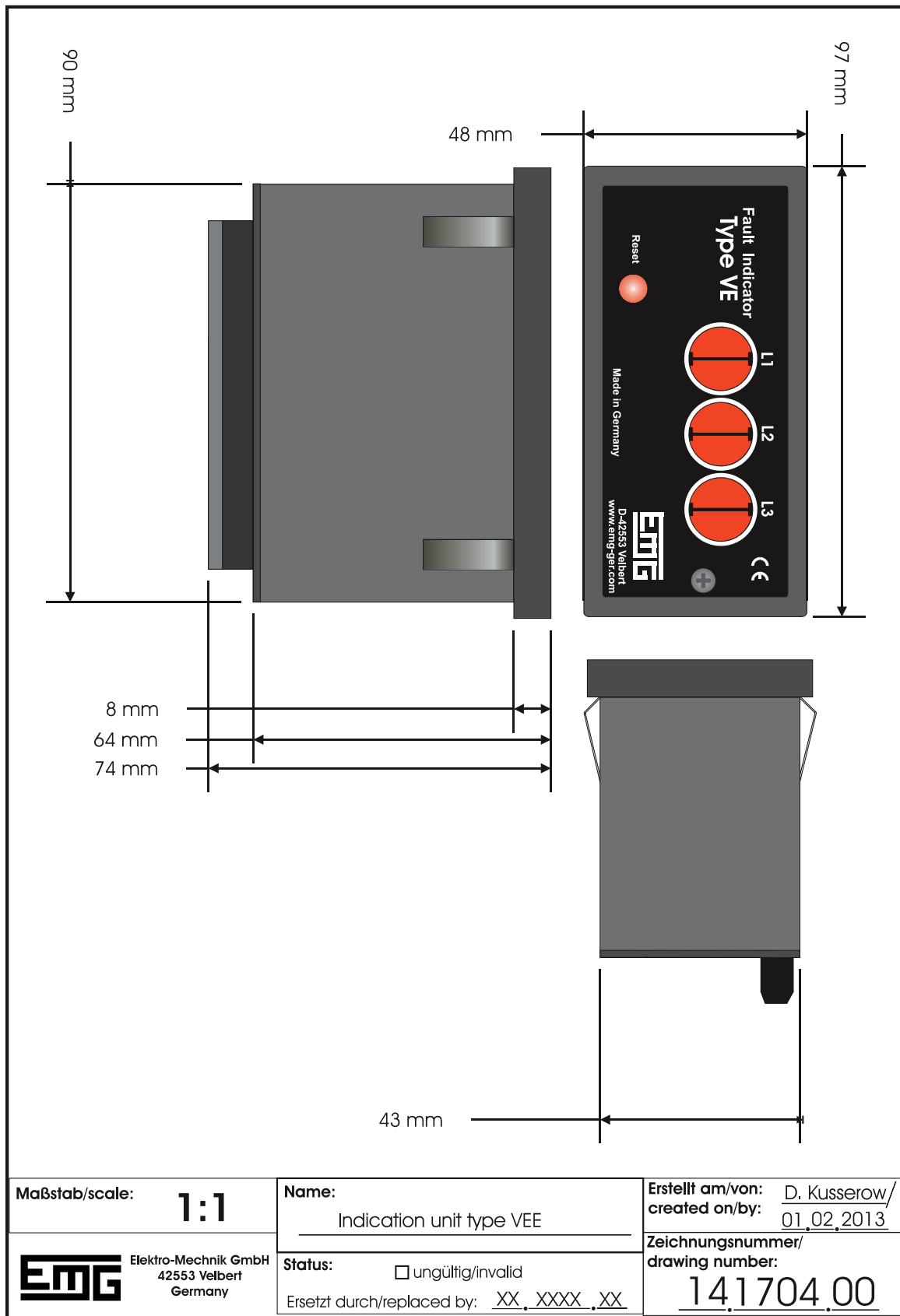



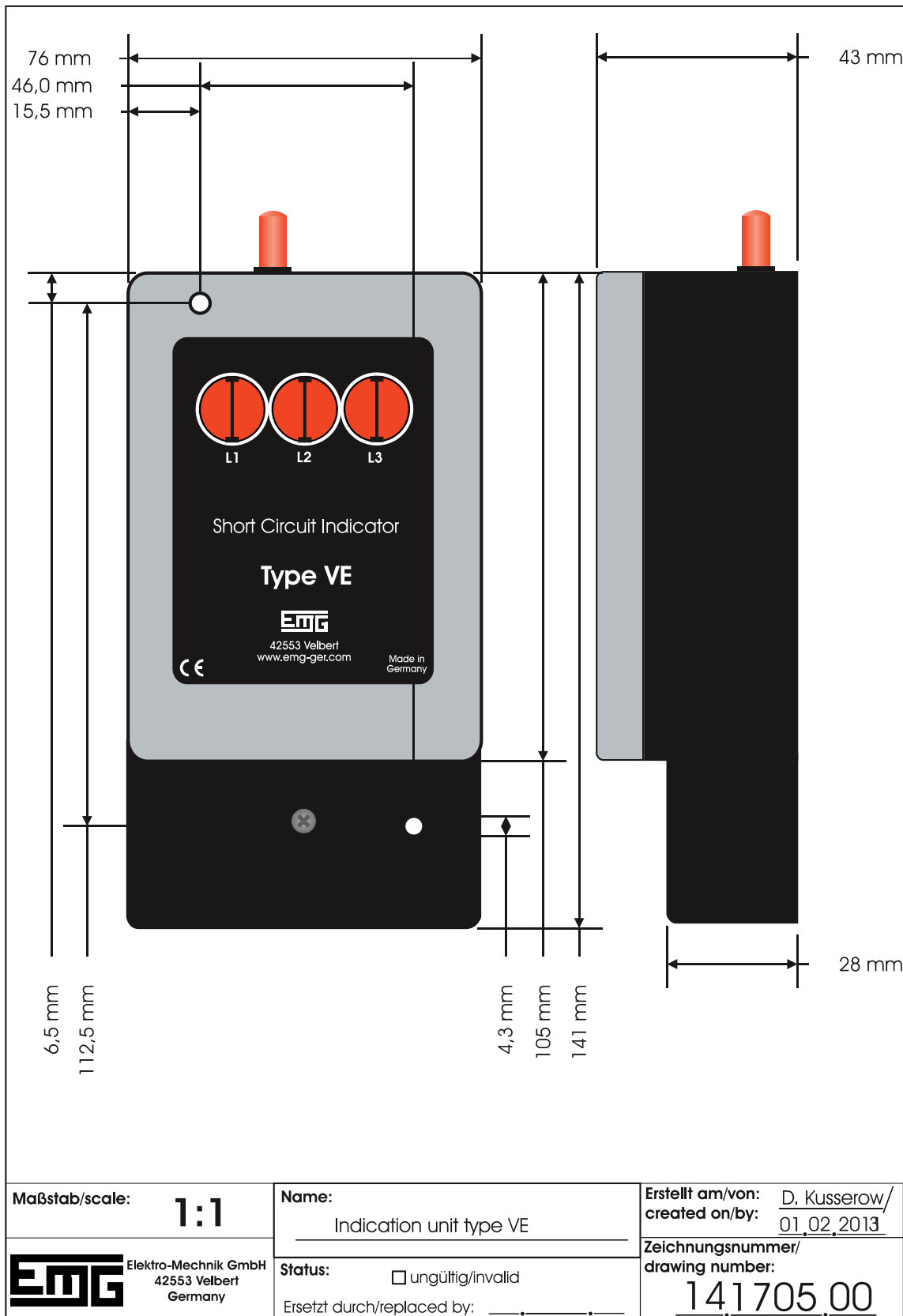
Figure 4 - Connectors (surface-mounted)

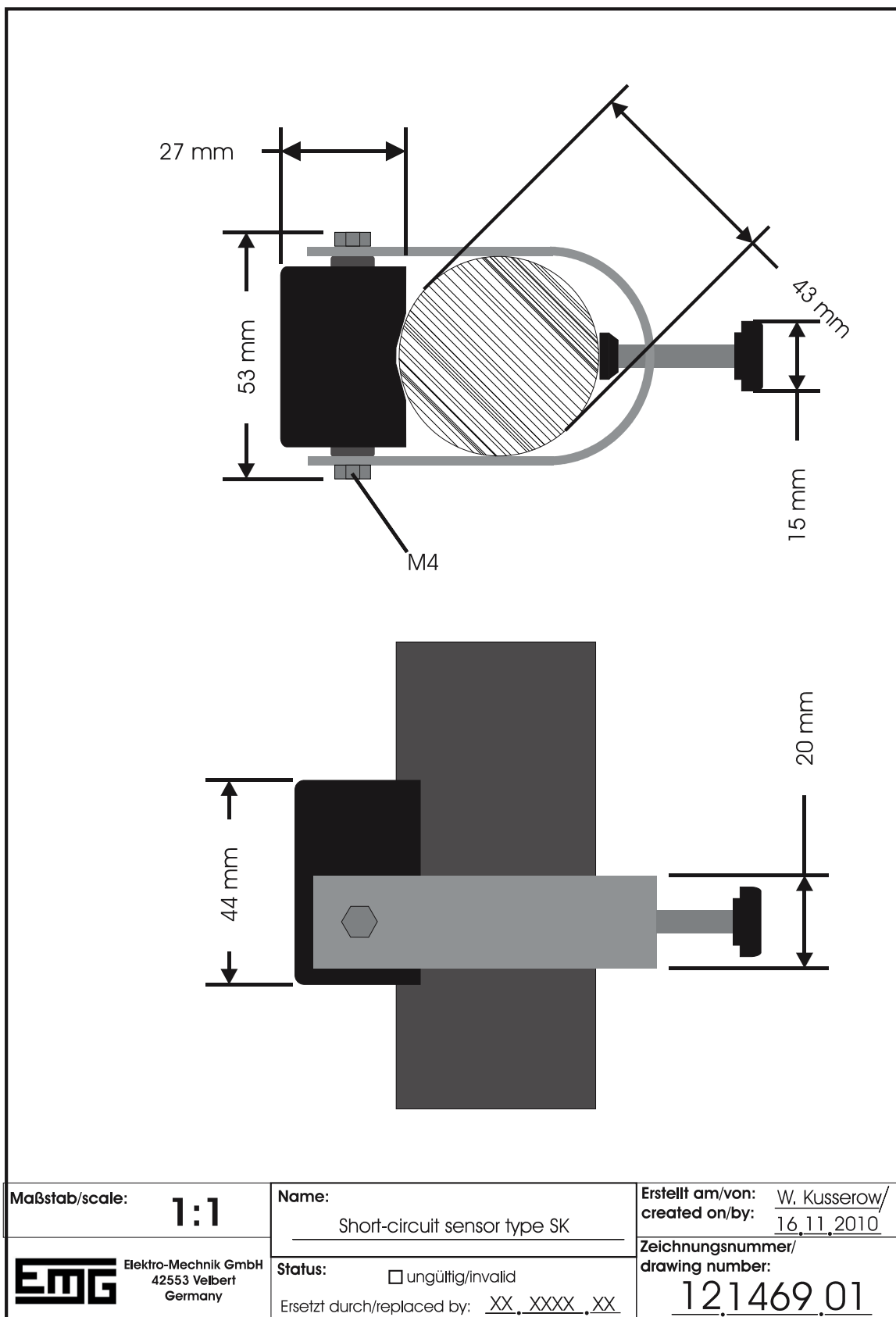
Subject	Value
trip current	adjustable: 200 / 400 / 600 / 800 / 1000 * A ( $\pm 10$ %)
indication of short-circuits	one red bistable flag for each phase
reset of the indicator	manual by push-button
dimensions: panel-mounted housing	97 mm x 48 mm x 47 mm (WxHxD) (dimensions of the cut out: $92_{+0.8}$ x $45_{+0.6}$ mm / IEC 61554 / DIN43700)
dimensions: surface-mounted housing	(WxHxD) 141mm x 76mm x 43mm
protection class: panel-mounted housing	IP40
protection class: surface-mounted housing	housing with electronic: IP65 terminal box: IP54
protection class: sensors	IP67
internal type test	according to IEEE 495-2007
operation temperature range	-25°C to +70°C
SCADA contact	1 x change-over contact permanent / wipe contact max. 230 V AC / max. 2 A / max. 30 W
short-circuit sensor (CT)	three short circuit sensors type SK (copper cable) (three current transformers for single-core cables) diameter: 22-42* mm connection cable length: 3* m

\*PLEASE NOTE: other values can be ordered



<b>Maßstab/scale:</b> 1:1	<b>Name:</b> Indication unit type VEE	<b>Erstellt am/von:</b> D. Kusserow/ <b>created on/by:</b> 01.02.2013
 Elektro-Mechnik GmbH 42553 Velbert Germany	<b>Status:</b> <input type="checkbox"/> ungültig/invalid Ersetzt durch/replaced by: XX.XXXX.XX	<b>Zeichnungsnummer/                  drawing number:</b> 141704.00





## FAULT INDICATOR

### TYPE **FLA3.1**

for overhead lines

#### General description

The fault indicator type FLA3.1 is used in overhead lines of a network. The indicator can be mounted under live conditions with the help of an adapter and a hot stick. The FLA3.1 is completely self-sustained by the monitored network from a current flow of 20A upwards. The indication is done by six flashing LEDs for a clear nighttime visibility and three red display areas for a clear daytime visibility.

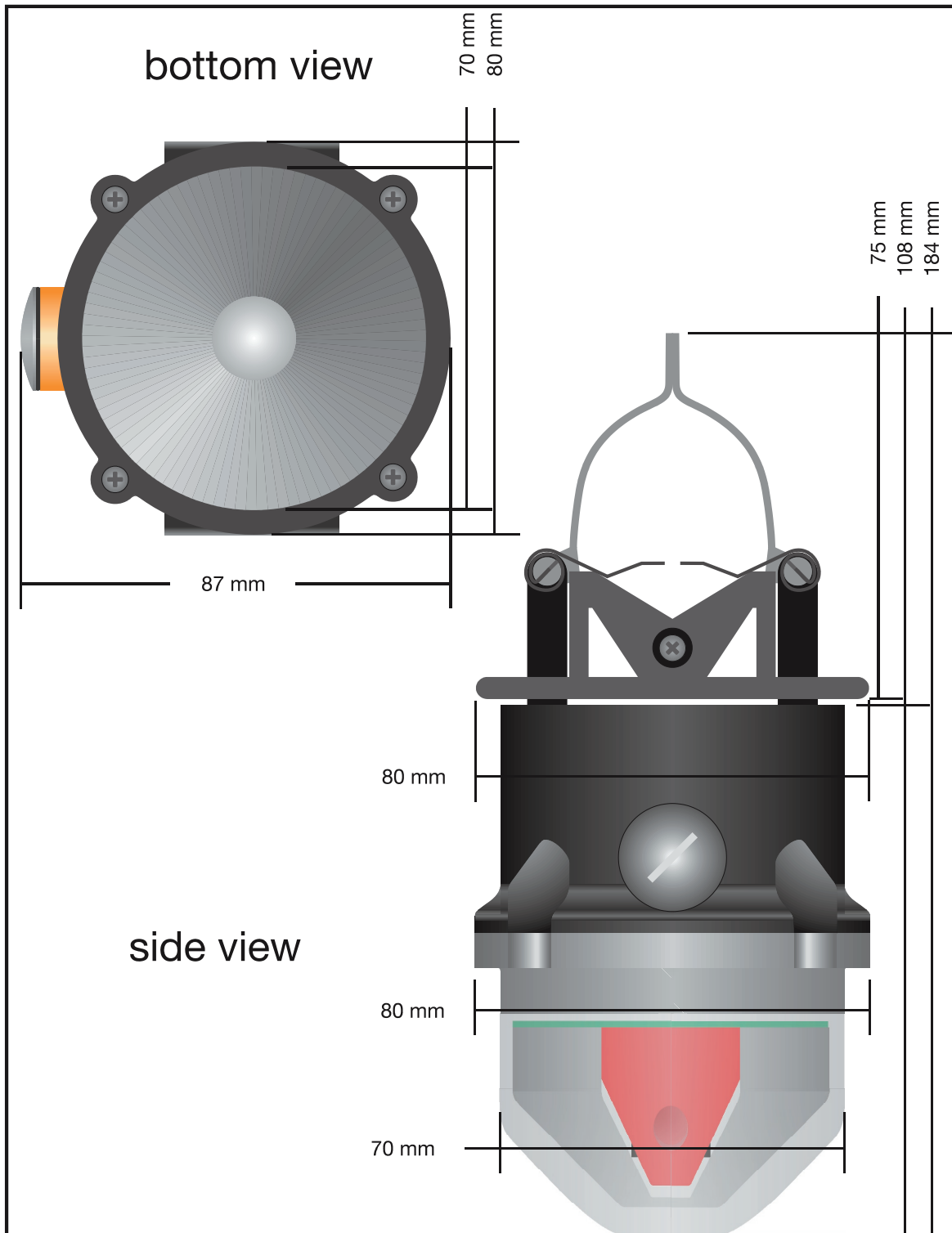
The FLA3.1 can communicate to a remote control via a bidirectional wireless connection. In this way all settings of the indicator can be adjusted at any time without removing the indicator from the powered line. The FLA3.1 stands out for the great flexibility of the adjustments that can be done. Beside the basic settings of the indicator like trip current, response delay, reset time, etc., the FLA3.1 can be adapted to auto-reclosers in the network. This provides for an optimized fault indication and also allows the indication of different fault types. Permanent and temporary faults can be distinguished and indicated separately.


The bidirectional connection between the remote control and the fault indicator allows to read out the present current of the monitored network with the remote control at any time.

The fault indicator type FLA3.1 can be connected to the remote indication interface type RIS. This allows an easy-to-install remote indication solution for the overhead line indicators.

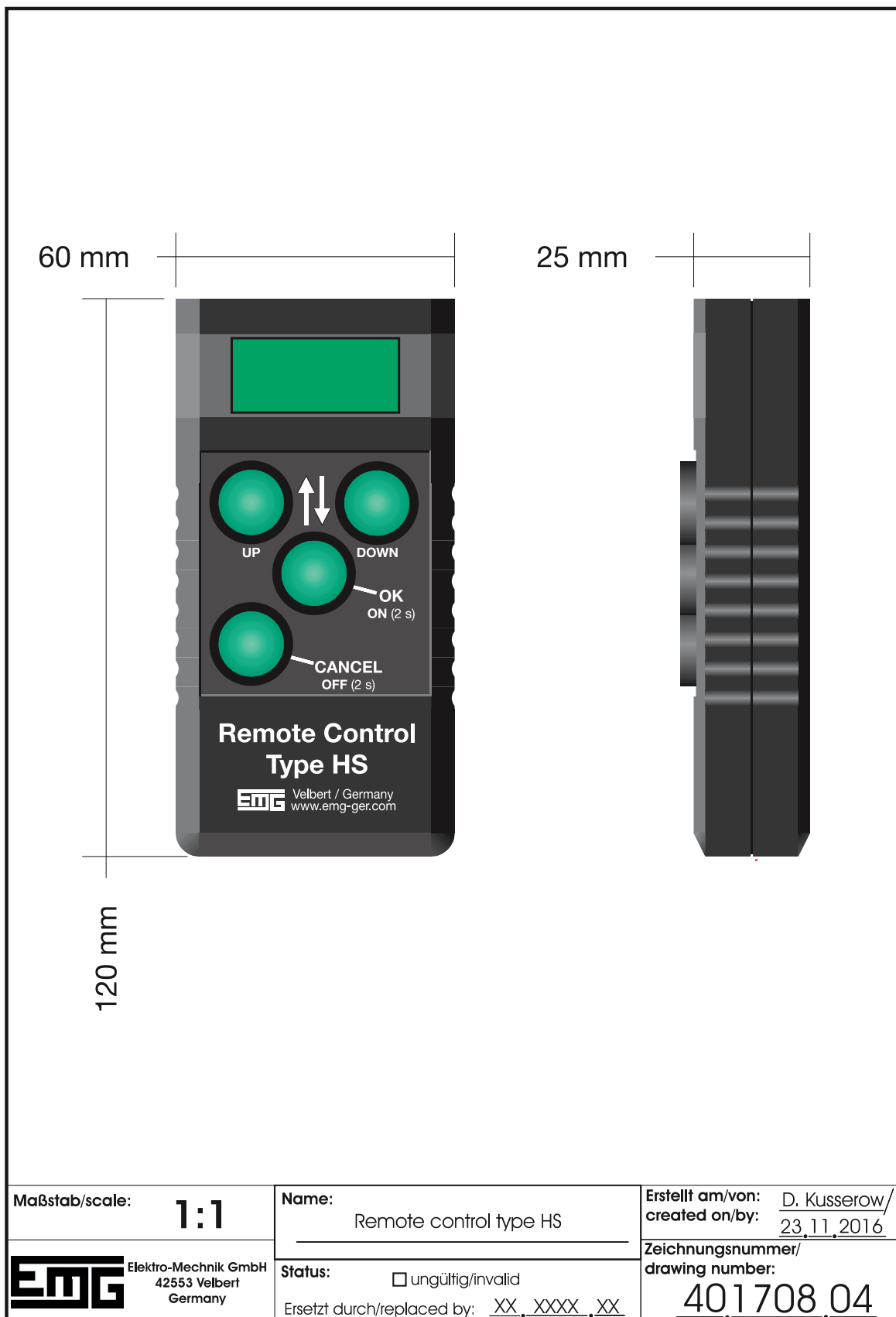


Subject	Value
trip current	a) Standard mode: trip current selectable between 40 and 1500 A in steps of 20A b) Automatic mode: automatic setting of the trip current depending on service current
response delay	selectable between 40 and 300 ms in steps of 20 ms
indication unit	suitable for surface installation
indication	6x LED indication, 360° visibility, >3000 mcd each Flag indication, 360° visibility, red signal color
reset of the indicator	a) reset by recovering service current: optional yes/no b) reset by remote control c) reset by time: selectable from 30 min to 12 hours in steps of 30 min
on-site function test	by remote control
dimensions	diameter: 80mm height: 184mm
protection class	IP67
housing material	ABS HI100-NP, Carbotex K20 UVR
weight	0.610kg
type tests	according to IEEE 495-2007, EN 60068-2-11 2000-02, ASTM G44-99 (2005)
operation temperature range	-20°C to +85°C
accuracy	+/- 10%
cable diameter ranges	a) 6 mm - 15mm b) 10 mm - 28 mm c) 25 mm - 42 mm
power supply	lithium battery (LiSOCl <sub>2</sub> ) type A / 3.6V / 3600 mAh self-sustained from 20A net current upwards
total fault indication hours	800 hours
flashing frequency	60 per minute
maximum operating voltage	<= 46kV
current withstand	25 KA / 170ms Sym. RMS
communication	433MHz bidirectional radio interface for remote control type HS and remote indication interface type RIS



<b>Maßstab/scale:</b> <span style="font-size: 2em; font-weight: bold;">1:1</span>	<b>Name:</b> Fault indicator type FLA3.1	<b>Erstellt am/von:</b> D. Kusserow/ <b>created on/by:</b> 10.06.2013
 Elektro-Mechnik GmbH 42553 Velbert Germany	<b>Status:</b> <input type="checkbox"/> ungültig/invalid Ersetzt durch/replaced by: <u>XX.XXXX.XX</u>	<b>Zeichnungsnummer/                  drawing number:</b> <span style="font-size: 1.5em; font-weight: bold;">401531_03</span>







## SHORT-CIRCUIT INDICATOR TYPE K / KM / KH

The short-circuit indicators type K, KH and KM can be used in radial networks with one input and open-ring networks.

The short-circuit indicators are single units of one sensor with integrated indication. The indicators are mounted on each conductor. The indication is done by a flag indicator. The indicator is divisible and can be retrofitted.

For the operation of the display device no power supply is required.

### The short-circuit indicator type K is available in three versions:

**Type K:** Automatic reset by recovering operating voltage. The indicator must be installed on unscreened cables.

**Type KH:** Manual reset with a button. The indicator can be mounted on screened and unscreened cables.

**Type KM:** Automatic reset by recovering operating voltage and manual reset. The indicator must be installed on unscreened cables.

#### Order Data

Type K	automatic reset	24.10.10
Type KM	automatic + manual reset	24.20.10
Type KH	manual reset	24.30.10

#### FEATURES AND BENEFITS

One trip current available between 150 A and 1500 A

Flag indication

Reset function

- Type K: automatic
- Type KH: manual
- Type KM: automatic and manual

No power supply required

Very robust and strong

Completely casted and sealed (IP67)



#### DOWNLOADS



datasheet\_K\_KM\_KH\_Rev1e

Size: **820.07 KB**

