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**Type code:**

1 Surge protection devices type M-LB-Ex-5\*\*\*\* / type M-LB-5\*\*\*\*

M-LB-	*	*	*	*	*	*
						SP = spring terminals for base module or any digits or symbols specifying properties without safety relevance
						0 – used for diverse modules apart from protection module 1 – protection module one wire, ungrounded 2 – protection module two wire, ungrounded 3 – protection module one wire, grounded 4 – protection module two wire, grounded
						0 – used for diverse modules apart from protection module 1 – protection module with 1V nominal voltage 4 – protection module with 24V nominal voltage
						0 – base module                      1 – protection module 2 – protection module with status indication 3 – power feed module            4 – fault status module            5 – maintenance module 9 – dummy module (informative note; not subject to assessment)
						always 5
						Ex – for devices for intrinsically safe applications place holder not used - for all other devices

2 Auxiliary devices type M-UPR-\*

M-UPR-03-S\*: Power rail

M-UPR-I\*: Insulation spacer

“\*”: any digits or symbols specifying properties without safety relevance.

Allocation of different versions of the surge protection device to Equipment Protection Level (EPL), temperature class and ambient temperature range shall be achieved from the following tables:

Devices, designed as intrinsically safe apparatus or associated apparatus

Surge protection barrier	Group II (Gas application) optional types / levels of protection	ambient temperature range
M-LB-Ex-50**** fitted with M-LB-Ex-51****	Ex ia [ia Ga] IIC / IIB / IIA T6...T4 Gb Ex ib IIC / IIB / IIA T6...T4 Gb Ex ic IIC / IIB / IIA T6...T4 Gc	- 40 °C ≤ T <sub>a</sub> ≤ + 60 °C (T6) - 40 °C ≤ T <sub>a</sub> ≤ + 70 °C (T5) - 40 °C ≤ T <sub>a</sub> ≤ + 80 °C (T4)
M-LB-Ex-50**** fitted with M-LB-Ex-52****	Ex ec [ia Ga] IIC / IIB / IIA T4 Gc Ex ec [ib Gb] IIC / IIB / IIA T4 Gc Ex ec [ic] IIC / IIB / IIA T4 Gc	- 40 °C ≤ T <sub>a</sub> ≤ + 60 °C

Surge protection barrier	Group III (Dust application) optional types / levels of protection	ambient temperature range
M-LB-Ex-50**** fitted with M-LB-Ex-51****	[Ex ia Da] IIIC [Ex ib Db] IIIC [Ex ic Dc] IIIC	- 40 °C ≤ T <sub>a</sub> ≤ + 80 °C
M-LB-Ex-50**** fitted with M-LB-Ex-52****	[Ex ia Da] IIIC [Ex ib Db] IIIC [Ex ic Dc] IIIC	- 40 °C ≤ T <sub>a</sub> ≤ + 60 °C

Surge protection barrier	Group I (Mining application) optional types / levels of protection	ambient temperature range
M-LB-Ex-50**** fitted with M-LB-Ex-51****	[Ex ia Ma] I [Ex ib Mb] I	- 40 °C ≤ T <sub>a</sub> ≤ + 80 °C
M-LB-Ex-50**** fitted with M-LB-Ex-52****	[Ex ia Ma] I [Ex ib Mb] I	- 40 °C ≤ T <sub>a</sub> ≤ + 60 °C

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Devices, providing only non-intrinsically safe circuits

Surge protection barrier	Group II (Gas application) types / levels of protection	ambient temperature range
M-LB-50*** fitted with M-LB-51***	Ex ec IIC T6...T4 Gc	- 40 °C ≤ T <sub>a</sub> ≤ + 60 °C (T6) - 40 °C ≤ T <sub>a</sub> ≤ + 70 °C (T5) - 40 °C ≤ T <sub>a</sub> ≤ + 80 °C (T4)
M-LB-50*** fitted with M-LB-52***	Ex ec IIC T4 Gc	- 40 °C ≤ T <sub>a</sub> ≤ + 60 °C

Power supply, Evaluation units	Group II (Gas application) type / level of explosion protection	ambient temperature range
M-LB-50*** fitted with M-LB-5x*** <sup>1)</sup>	Ex ec IIC T4 Gc	- 40 °C ≤ T <sub>a</sub> ≤ + 60 °C

<sup>1)</sup> x = 3, 4, 5

### Description of devices

#### Base module type M-LB-Ex-50\*\*\*

The base module comes with a Polycarbonate housing, mountable on T35 DIN rails and is designed as assembly, providing input- and output terminals for the circuit to be protected, a receptacle for various protection modules and, in combination with the inserted protection module, earth connection via the grounded DIN rail.

The PCB inside the housing, interconnecting input- / output terminals and connection facilities of the receptacle does not carry any electronic components.

The base module for intrinsically safe application is equipped with a blue coloured housing.

The base module type M-LB-Ex-50\*\*\* in combination with a protection module type M-LB-Ex-51\*\*\* or type M-LB-Ex-52\*\*\* forms a protection barrier intended to be inserted in an intrinsically safe supply or signal circuit

The base module type M-LB-Ex-50\*\*\*, fitted with protection module type M-LB-Ex-51\*\*\*, may be installed in the save area or in areas requiring EPL Gb equipment.

The base module type M-LB-Ex-50\*\*\*, fitted with protection module type M-LB-Ex-52\*\*\*, may be installed in the save area or in areas requiring EPL Gc equipment.

#### Base module type M-LB-50\*\*\*

The base module comes with a Polycarbonate housing, mountable on T35 DIN rails and is designed as assembly, providing input- and output terminals for the circuit to be protected, a receptacle for various protection modules and, in combination with the inserted protection module, earth connection via the grounded DIN rail.

The PCB inside the housing, interconnecting input- / output terminals and connection facilities of the receptacle does not carry any electronic components.

The base module for non-IS application is equipped with a black coloured housing.

The base module type M-LB-50\*\*\* in combination with a protection module type M-LB-51\*\*\* or type M-LB-52\*\*\* forms a surge protection barrier intended to be inserted in a non-intrinsically safe supply or signal circuit.

The base module type M-LB-50\*\*\* fitted with protection module type M-LB-51\*\*\* or type M-LB-52\*\*\* may be installed in the save area or in areas requiring EPL Gc equipment.

#### Additional application options of base module type M-LB-50\*\*\*

The base module type M-LB-50\*\*\* in combination with power feed module type M-LB-53\*\*\* and power rail type M-UPR-03-S\* forms non-intrinsically safe power supply for fault status module type M-LB-54\*\*\*, maintenance status module type M-LB-55\*\*\*, protection modules with status indication type M-LB-52\*\*\* and non-IS electronic area on protection modules with status indication type M-LB-Ex-52\*\*\*.



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**Protection module type M-LB-Ex-51\*\*\***

Module, providing surge suppressing components between intrinsically safe circuit lines and between intrinsically safe circuit and earth potential.

Due to variation of internal circuitry, the device is suitable to protect earthed or in normal operation unearthed single wire or two wire intrinsically safe circuits.

**Protection module with status indication type M-LB-Ex-52\*\*\***

Module, providing surge suppressing components between intrinsically safe circuit lines and between intrinsically safe circuit and earth potential.

Due to variation of internal circuitry, the device is suitable to protect earthed or in normal operation unearthed single wire or two wire intrinsically safe circuits.

In addition, the PCB is fitted with non-IS circuitry, detecting and indicating overvoltage events.

This non-IS circuitry is supplied by power feed module type M-LB-53\*\*\* via power rail type M-UPR-03-S\*.

**Protection module type M-LB-51\*\*\***

Module, providing surge suppressing components between non-intrinsically safe circuit lines and between non-intrinsically safe circuit and earth potential.

Due to variation of internal circuitry, the device is suitable to protect earthed or in normal operation unearthed single wire or two wire circuits.

**Protection module with status indication type M-LB-52\*\*\***

Module, providing surge suppressing components between non-intrinsically safe circuit lines and between non-intrinsically safe circuit and earth potential

Due to variation of internal circuitry, the device is suitable to protect earthed or in normal operation unearthed single wire or two wire circuits.

In addition, the PCB is fitted with circuitry, detecting and indicating overvoltage events.

The circuitry is supplied by power feed module type M-LB-53\*\*\* via power rail type M-UPR-03-S\*.

**Fault status module type M-LB-54\*\*\*, Maintenance status module type M-LB-55\*\*\***

Evaluation modules, supplied by power feed module type M-LB-53\*\*\* via power rail type M-UPR-03-S\*.

The modules provide fault signal outputs and communicate with each other and with protection module with status indication type M-LB-52\*\*\* / M-LB-Ex-52\*\*\* via data line in power rail type M-UPR-03-S\*.

**Power feed module type M-LB-53\*\*\***

Module, providing connection between input terminals of base module type M-LB-50\*\*\* and power rail connector of the power feed module via voltage regulator and watch dog electronic circuitry.

**Power rail type M-UPR-03-S\***

Power supply and data-bus assembly, located across all M-LB-5\*\*\*\* / M-LB-Ex-5\*\*\*\* modules on the DIN rail and is attached to suitable receptacles of M-LB-5\*\*\*\* / M-LB-Ex-5\*\*\*\* modules. Power rail is used only in conjunction with protection modules with status indication. The power rail does not provide any electronic components.

**Insulation spacer type M-UPR-I:**

Separation wall between M-LB-5\*\*\*\* and M-LB-Ex-5\*\*\*\* devices on the DIN rail to verify the required distance between non-IS and IS terminals of M-LB-5\*\*\*\* devices.

Listing of all components used referring to older standards: not applicable.

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**Rating**

1. Base module type M-LB-Ex-50\*\*\* fitted with surge protection module type M-LB-Ex-51\*\*\*:  
Protected intrinsically safe circuit, level of protection “ia”, “ib” or “ic”
- 1.1 Mounting in safe location or in areas requiring EPL Gc

Voltage	$U_i$	DC 6 V / AC 6 V <sub>p</sub> (M-LB-Ex-511**) DC 30 V / AC 30 V <sub>p</sub> (M-LB-Ex-514**)
	$U_n$	DC 1 V (M-LB-Ex-511**) DC 24 V (M-LB-Ex-514**)
Current	$I_i$	500 mA at T <sub>a</sub> 30 °C 30 mA at T <sub>a</sub> 80 °C <sup>1)</sup>
Power	$P_i$	N / A
Effective internal capacitance	$C_i$	negligible
Effective internal inductance	$L_i$	18 µH / 2 x 18 µH
Remarks: value of $U_i$ depends on parameters of surge protection components; parameters $U_o$ , $I_o$ , $P_o$ , $C_o$ and level of protection “ia”, “ib” or “ic” at output terminals are identical with parameters / level of protection of the intrinsically safe circuit connected to input terminals; parameter $L_o$ at output terminals is identical with parameter of the intrinsically safe circuit connected to input terminals minus 18 µH per module (single wire circuit) or minus 2 x 18 µH (two wire circuit). <sup>1)</sup> Interpolation for required $I_i$ depending on T <sub>a</sub> ; refer to device data sheet. N / A = not applicable		

- 1.2 Mounting in areas requiring EPL Gb:

- 1.2.1 Base module type M-LB-Ex-50\*\*\* fitted with single wire surge protection module type M-LB-Ex-5111\* or with M-LB-Ex-5113\*:

Voltage	$U_i$	DC 6 V / AC 6 V <sub>p</sub>
	$U_n$	DC 1 V
Current	$I_i$	T4 resp. T5: refer to 1.1 T6: 100 mA at T <sub>a</sub> -40 °C ... 60 °C
Power	$P_i$	N / A
Effective internal capacitance	$C_i$	negligible
Effective internal inductance	$L_i$	18 µH
Remarks: parameters $U_o$ , $I_o$ , $P_o$ , $C_o$ and level of protection “ia” or “ib” at output terminals are identical with parameters / level of protection of the intrinsically safe circuit connected to input terminals; parameter $L_o$ at output terminals is identical with parameter of the intrinsically safe circuit connected to input terminals minus 18 µH per module. <sup>1)</sup> Interpolation for required $I_i$ depending on T <sub>a</sub> ; refer to device data sheet. N / A = not applicable		

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1.2.2 Base module type M-LB-Ex-50\*\*\* fitted with single wire surge protection module type M-LB-Ex-5141\* or with M-LB-Ex-5143\*:

Voltage	$U_i$	DC 30 V / AC 30 V <sub>p</sub> <sup>1)</sup>
	$U_n$	DC 24 V
Current	$I_i$	500 mA at T <sub>a</sub> 30 °C 30 mA at T <sub>a</sub> 80 °C <sup>2)</sup>
Power	$P_i$	T4: 600 mW
		T5: 500 mW
		T6: 80 mW
Effective internal capacitance	$C_i$	negligible
Effective internal inductance	$L_i$	18 µH
<b>Remarks:</b> parameters $U_o$ , $I_o$ , $P_o$ , $C_o$ and level of protection “ia” or “ib” at output terminals are identical with parameters / level of protection of the intrinsically safe circuit connected to input terminals; parameter $L_o$ at output terminals is identical with parameter of the intrinsically safe circuit connected to input terminals minus 18 µH per module. <sup>1)</sup> For applications with signal voltage $\leq 15$ V, alternatively to $P_i$ limitation $U_i$ limitation may be used. $U_i$ shall be DC 15 V / AC 15 V <sub>p</sub> independent of temperature class. <sup>2)</sup> Interpolation for required $I_i$ depending on T <sub>a</sub> ; refer to device data sheet.		

1.2.3 Base module type M-LB-Ex-50\*\*\* fitted with two wire surge protection module type M-LB-Ex-51\*2\* or with M-LB-Ex-51\*4\*: refer to 1.1

2. Base module type M-LB-Ex-50\*\*\* fitted with surge protection module type M-LB-Ex-52\*\*\*:

2.1 Non-IS supply- and signal circuits

Rated voltage	$U_r$	DC 19 V $\leq U \leq$ 30 V
	$U_m$	AC / DC 60 V
Rated current	$I_r$	8 mA
Rated power consumption	$P_r$	0.25 W
<b>Remarks:</b> the power supply circuit is connected to power feed module type M-LB-53*** output via power rail type M-UPR-03-S*; the surge event signal output is connected to data signal input of fault status module type M-LB-54*** and maintenance status module type M-LB-55***.		

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2.2 Protected intrinsically safe circuit, level of protection “ia”, “ib” or “ic”

Voltage	U <sub>i</sub>	DC 6 V / AC 6 V <sub>p</sub> (M-LB-Ex-521**) DC 30 V / AC 30 V <sub>p</sub> (M-LB-Ex-524**)
	U <sub>n</sub>	DC 1 V (M-LB-Ex-521**) DC 24 V (M-LB-Ex-524**)
Current	I <sub>i</sub>	500 mA at T <sub>a</sub> 30 °C 100 mA at T <sub>a</sub> 60 °C <sup>1)</sup>
Power	P <sub>i</sub>	N / A
Effective internal capacitance	C <sub>i</sub>	negligible
Effective internal inductance	L <sub>i</sub>	18 µH / 2 x 18 µH
<p>Remarks:  value of U<sub>i</sub> depends on parameters of surge protection components;  parameters U<sub>o</sub>, I<sub>o</sub>, P<sub>o</sub>, C<sub>o</sub> and level of protection “ia”, “ib” or “ic” at output terminals are identical with parameters / level of protection of the intrinsically safe circuit connected to input terminals;  parameter L<sub>o</sub> at output terminals is identical with parameter of the intrinsically safe circuit connected to input terminals minus 18 µH per module (single wire circuit) or minus 2 x 18 µH (two wire circuit).  <sup>1)</sup> Interpolation for required I<sub>i</sub> depending on T<sub>a</sub>; refer to device data sheet.  N / A = not applicable</p>		

3. Base module type M-LB-50\*\*\* fitted with surge protection module type M-LB-51\*\*\* or type M-LB-52\*\*\*

Voltage	U <sub>max</sub>	DC 6 V (M-LB-5*1**) DC 30 V (M-LB-5*4**)
	U <sub>n</sub>	DC 1 V (M-LB-5*1**) DC 24 V (M-LB-5*4**)
Current (M-LB-51***)	I <sub>n</sub>	500 mA at T <sub>a</sub> 30 °C 30 mA at T <sub>a</sub> 80 °C <sup>1)</sup>
Current (M-LB-52***)	I <sub>n</sub>	500 mA at T <sub>a</sub> 30 °C 100 mA at T <sub>a</sub> 60 °C <sup>1)</sup>
<p>Remark:  value of U<sub>max</sub> depends on parameters of surge protection components;  <sup>1)</sup> Interpolation for required I<sub>n</sub> depending on T<sub>a</sub>; refer to device data sheet  power supply circuit and surge event signal output of surge protection module type M-LB-52***: identical with 2.1</p>		



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4. Supply- and signal circuits of fault status module type M-LB-54\*\*\* and maintenance status module type M-LB-55\*\*\*

4.1 Power supply

Rated voltage	$U_r$	$DC\ 19\ V \leq U \leq 30\ V$
Rated current	$I_r$	6 mA
Rated power consumption	$P_n$	0.25 W
Remark: the power supply circuit is connected to power feed module type M-LB-53*** output via power rail type M-UPR-03-S*		

4.2 Fault status output circuit / maintenance status output circuit (solid state relay output)

Rated voltage	$U_r$	AC / DC 30 V
	$U_m$	AC / DC 60 V
Rated current	$I_r$	500 mA
Terminals		3, 4
Remark: $U_m = AC / DC\ 60\ V$ applies, if protection module type M-LB-Ex-52*** is supplied via common power rail type M-UPR-03-S*		

5. Circuits of power feed module type M-LB-53\*\*\*

5.1 Power supply input

Rated voltage	$U_r$	$DC\ 19\ V \leq U \leq 30\ V$
	$U_m$	AC / DC 60 V
Rated current	$I_n$	1 A
Rated power consumption	$P_n$	0.4 W
Terminals		3, 4
Remark: $U_m = AC / DC\ 60\ V$ applies, if protection module type M-LB-Ex-52*** is supplied via power rail type M-UPR-03-S*:		

5.2 Power supply output, connected to module type M-LB-Ex-52\*\*\*, M-LB-52\*\*\*, M-LB-54\*\*\*, M-LB-55\*\*\* via power rail type M-UPR-03-S\*

Rated output voltage	$U_r$	$DC\ 19\ V \leq U \leq 30\ V$
Rated output current	$I_r$	1 A
Remark: the output circuit is present at power rail connection facility		

6. Ambient temperature range: depending on required signal current and required temperature class. Refer to product information.



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## Specific Conditions of Use:

1. General (Group II and safe location application):
  - 1.1 Surge protection barrier consisting of base module type M-LB-Ex-50\*\*\* fitted with protection module type M-LB-Ex-51\*\*\* or type M-LB-Ex-52\*\*\* shall be mounted on a metallic DIN-rail located in a controlled environment providing pollution degree 2 (or better) according to IEC 60664-1.  
For earthed protection module versions M-LB-Ex-51\*3\*, M-LB-Ex-51\*4\* and M-LB-Ex-52\*3\*, M-LB-Ex-51\*4\*, the DIN-rail shall be connected to local equipotential bonding.
  - 1.2 Keep the separation distances according to IEC 60079-14 between base modules type M-LB-Ex-50\*\*\* for intrinsically safe application fitted with M-LB-Ex-5\*\*\*\* modules and base modules type M-LB-50\*\*\* for non-intrinsically safe application fitted with non-IS M-LB-5\*\*\*\* modules arranged on the same DIN rail (e.g. with insulation spacer type M-UPR-I\*).
  - 1.3 Surge protection performance has not been subject to assessment.
2. Group II application
  - 2.1 Surge protection barrier consisting of base module type M-LB-Ex-50\*\*\* fitted with protection module type M-LB-Ex-51\*\*\*
    - 2.1.1 Installation in areas requiring EPL Gb equipment:  
The surge protection barrier must be connected to intrinsically safe circuit with EPL Ga or Gb.
    - 2.1.2 Installation in areas requiring EPL Gc equipment:  
The surge protection barrier must be connected to intrinsically safe circuit with EPL Ga, Gb or Gc.
    - 2.1.3 Avoid electrostatic discharge, if installed in areas requiring EPL Gb or Gc.
3. Surge protection barrier consisting of base module type M-LB-Ex-50\*\*\* fitted with protection module type M-LB-Ex-52\*\*\*  
Installation in areas requiring EPL Gc equipment:
  - The surge protection barrier shall be installed in an enclosure, which complies with EPL Gc requirements according to IEC 60079-0 / IEC 60079-7 and provides degree of IP protection IP54 according to IEC 60529.
  - Connection or disconnection of energized non-intrinsically safe circuits is only permitted in the absence of a potentially explosive atmosphere.
4. Base module type M-LB-50\*\*\* fitted with protection module type M-LB-51\*\*\* or type M-LB-52\*\*\* and base module type M-LB-50\*\*\* fitted with module type M-LB-5x\*\*\* (x = 3, 4, 5) and power rail type M-UPR-03-S\*:  
Installation in areas requiring EPL Gc equipment:
  - The devices shall be installed in an enclosure, which complies with EPL Gc requirements according to IEC 60079-0 / IEC 60079-7 and provides degree of IP protection  $\geq$  IP54 according to IEC 60529.
  - Connection or disconnection of energized circuits is only permitted in the absence of a potentially explosive atmosphere.
5. General (Group I application):  
Surge protection barrier consisting of base module type M-LB-Ex-50\*\*\* fitted with protection module type M-LB-Ex-51\*\*\* or type M-LB-Ex-52\*\*\*  
Insertion of the surge protection barrier in intrinsically safe circuits of Group I intrinsically safe systems shall be subject to separate certification procedure, if required by local installation rules.