

Safety Instructions

Cerabar PMC51B, PMP51B

Control Drawing IS

Class I, II, III, Div. 1, Groups A-G

Class I, Zone 0, AEx/Ex ia IIC Ga



Cerabar PMC51B, PMP51B

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About this document

The document number of these Safety Instructions (XA) must match the information on the nameplate.

Associated documentation

All documentation is available on the Internet:

www.endress.com/Deviceviewer

(enter the serial number from the nameplate).

To commission the device, please observe the Operating Instructions pertaining to the device:

PMC51B

BA02009P, TI01506P

PMP51B

BA02011P, TI01508P

Certificates and declarations**CSA C/US certificate**

Certificate number:

80066208

Manufacturer address

Endress+Hauser SE+Co. KG

Hauptstraße 1

79689 Maulburg, Germany

Address of the manufacturing plant: See nameplate.

Extended order code

The extended order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible. Additional information about the nameplate is provided in the associated Operating Instructions.

Structure of the extended order code

PMx51B	–	*****	+	A*B*C*D*E*F*G*..
<i>(Device type)</i>		<i>(Basic specifications)</i>		<i>(Optional specifications)</i>

* = Placeholder

At this position, an option (number or letter) selected from the specification is displayed instead of the placeholders.

Basic specifications

The features that are absolutely essential for the device (mandatory features) are specified in the basic specifications. The number of positions depends on the number of features available. The selected option of a feature can consist of several positions.

Optional specifications

The optional specifications describe additional features for the device (optional features). The number of positions depends on the number of features available. The features have a 2-digit structure to aid identification (e.g. JA). The first digit (ID) stands for the feature group and consists of a number or a letter (e.g. J = Test, Certificate). The second digit constitutes the value that stands for the feature within the group (e.g. A = 3.1 material (wetted parts), inspection certificate).

More detailed information about the device is provided in the following tables. These tables describe the individual positions and IDs in the extended order code which are relevant to hazardous locations.

Extended order code: Cerabar

The following specifications reproduce an extract from the product structure and are used to assign:

- This documentation to the device (using the extended order code on the nameplate).
- The device options cited in the document.

Device type

PMC51B, PMP51B

Basic specifications

Position 1, 2 (Approval)		
Selected option		Description
PMC51B	CB	CSA C/US IS Cl. I, II, III, Div. 1, Gp. A-G; Cl. I, Zone 0, AEx/Ex ia IIC Ga
PMP51B	CC	CSA C/US IS Cl. I, Div. 1, Gp. A-D; Cl. I, Zone 0, AEx/Ex ia IIC Ga

Position 3, 4 (Output)		
Selected option		Description
PMC5 1B PMP5 1B	BA	2-wire, 4-20 mA HART
	BB	2-wire, 4-20 mA HART, switch output ¹⁾
	BC	2-wire, 4-20 mA HART + 4 to 20 mA analog ¹⁾
	DA	2-wire, PROFIBUS PA
	FA	PROFINET over Ethernet-APL, 10Mbit/s

1) Only in connection with Position 6 = J

Position 5 (Display, Operation)		
Selected option		Description
PMC5 1B PMP5 1B	L	Prepared for display FHX50B + M12 connection ¹⁾
	M	Prepared for display FHX50B + Gland M20
	N	Prepared for display FHX50B + Thread NPT1/2
	O	Prepared for display FHX50B + Thread M20

1) Only in connection with Position 1, 2 = CC

Position 6 (Housing, Material)		
Selected option		Description
PMC5 1B PMP5 1B	B	Single compartment; Alu, coated
	J	Dual compartment; Alu, coated

Position 10 (Diaphragm Seal Type)		
Selected option		Description
PMP5 1B	G	Temperature isolator
	M m capillary, 316L
	N m capillary, PVC>316L
	O m capillary, PTFE>316L
	R ft capillary, 316L
	S ft capillary, PVC>316L
	T ft capillary, PTFE>316L

Optional specifications

ID Mx (Sensor Design)		
Selected option		Description
PMC51B PMP51B	MA	Sensor remote, cable PE, 2 m/80 in + mounting bracket, wall/pipe, 316L
	MB	Sensor remote, cable PE, 5 m/200 in + mounting bracket, wall/pipe, 316L
	MC	Sensor remote, cable PE, 10 m/400 in + mounting bracket, wall/pipe, 316L
	MD	Sensor remote, cable PE, 15 m/600 in + mounting bracket, wall/pipe, 316L
	MH	Sensor remote, cable FEP, 5 m/200 in, IP69 + mounting bracket, wall/pipe, 316L

ID Px, Rx (Accessory Enclosed)		
Selected option		Description
PMC51B PMP51B	PA	Weather protection cover, 316L ¹⁾
	PB	Weather protection cover, plastic ²⁾

- 1) Only in connection with Position 6 = J
 2) Only in connection with Position 6 = B

Safety instructions:
General

- Comply with the installation and safety instructions in the Operating Instructions.
- Staff must meet the following conditions for mounting, electrical installation, commissioning and maintenance of the device:
 - Be suitably qualified for their role and the tasks they perform
 - Be trained in explosion protection
 - Be familiar with national regulations
- Install the device according to the manufacturer's instructions and national regulations.
- Do not operate the device outside the specified electrical, thermal and mechanical parameters.
- Only use the device in media to which the wetted materials have sufficient durability.
- Avoid electrostatic charging:
 - Of plastic surfaces (e.g. enclosure, sensor element, special varnishing, attached additional plates, ...)
 - Of isolated capacities (e.g. isolated metallic plates)
- Alterations to the device can affect the explosion protection and must be carried out by staff authorized to perform such work by Endress+Hauser.

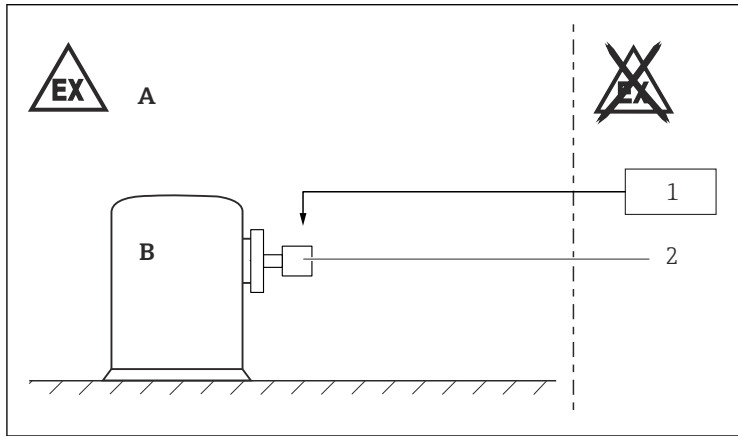
Safety instructions:
Specific conditions of use

- To avoid electrostatic charging: Do not rub surfaces with a dry cloth.
- In the event of additional or alternative special varnishing on the enclosure or other metal parts or for adhesive plates:
 - Observe the danger of electrostatic charging and discharge.
 - Do not install in the vicinity of processes (≤ 0.5 m) generating strong electrostatic charges.
- Avoid sparks caused by impact and friction.

Optional specification, ID Px, Rx = PA

Connect the weather protection cover to the local potential equalization.

Safety instructions:
Installation



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- A *Basic specification, Position 1, 2 = CB:*
 Zone 0; Class I, II, III, Div. 1, Groups A-G
Basic specification, Position 1, 2 = CC:
 Zone 0; Class I, Div. 1, Groups A-D
- B *Process;*
Basic specification, Position 1, 2 = CB:
 Zone 0; Class I, II, III, Div. 1, Groups A-G
Basic specification, Position 1, 2 = CC:
 Zone 0; Class I, Div. 1, Groups A-D
- 1 *Associated apparatus [Ex ia], intrinsically safe power supply units*
 2 *PMC51B, PMP51B*

- After aligning (rotating) the enclosure, retighten the fixing screw.
- Continuous service temperature of the connecting cable: $\geq T_a + 20 \text{ K}$.
- Observe the pertinent guidelines when interconnecting intrinsically safe circuits.
- Observe the maximum process conditions according to the manufacturer's Operating Instructions.
- Install the device to exclude any mechanical damage or friction during the application. Pay particular attention to flow conditions and tank fittings.

Potential equalization

Integrate the device into the local potential equalization.

Intrinsic safety

General

- Install per National Electrical Code (NFPA70) or Canadian Electrical Code, Part I (C22.1), as applicable.
- For transmitter parameters: See "Connection data" section.
- Associated devices with galvanic isolation between the intrinsically safe and non-intrinsically safe circuits are preferred.
- Control room equipment may not use or generate over $250 \text{ V}_{\text{rms}}$.
- Always follow the installation instructions provided by the intrinsic safety barrier manufacturer when installing this equipment.
- **WARNINGS:** Substitution of components may impair intrinsic safety.
- The transmitter enclosure is to be connected to ground via internal or external ground terminals.
- The intrinsically safe input power circuit of the device is isolated from ground. The dielectric strength is at least $500 \text{ V}_{\text{rms}}$.

4-20 mA HART

Basic specification, Position 3, 4 = BB, BC

- When both channels are used, wiring for each channel must use grounded/shielded pairs.
- Care must be taken in the length of cable/conductor insulation and shielding removed so as to avoid excessive lengths of exposed conductors and prevent conductors of channel 1 from contacting conductors of channel 2.
- The configuration of the intrinsic safety barrier(s) must be approved for the country in use and Install according to the manufacturer's instructions.

Basic specification, Position 3, 4 = BA, BB, BC

Entity installation

Use an intrinsic safety barrier or other associated equipment that is approved for the country in use and satisfies the following conditions:

$$U_o \leq U_i, I_o \leq I_i, C_o \geq C_i + C_{\text{cable}}, L_o \geq L_i + L_{\text{cable}} \text{ and } P_o \leq P_i.$$

PROFIBUS PA

Basic specification, Position 3, 4 = DA

FISCO installation

- The FISCO concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage (U_i), the current (I_i) and the power (P_i) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (U_o), the current (I_o) and the power (P_o) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (C_i) and inductance (L_i) of each apparatus (other than the termination) connected to the fieldbus must be less than or equal to 5 nF and 10 μ H respectively.
- In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system. The voltage U_o of the associated apparatus has to be limited to the range of 14 to 24 V_{DC}. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except to a leakage current of 50 μ A for each connected device. Separately powered equipment needs a galvanic isolation to assure that the intrinsically safe fieldbus circuit remains passive.
- The cable used to interconnect the devices needs to have the parameters in the following range:
 - Loop resistance, R: 15 to 150 Ω /km
 - Inductance per unit length, L: 0.4 to 1 mH/km
 - Capacitance per unit length, C: 80 to 200 nF/km
 - $C = C_{\text{line/line}} + 0.5 C_{\text{line/screen}}$, if both lines are floating, or
 - $C = C_{\text{line/line}} + C_{\text{line/screen}}$, if the screen is connected to one line
 - Length of spur cable: 30 m
 - Length of trunk cable: 1 km
 - Length of splice: 1 m

- At each end of the trunk cable an approved infallible line termination with the following parameters is suitable:
 - $R = 90$ to 100Ω
 - $C = 0$ to $2.2 \mu\text{F}$
- One of the allowed terminations might already be integrated in the associated apparatus.
- The number of passive devices connected to the bus segment is not limited due to IS reasons. If the above rules are respected, up to a total length of 1 000 m (sum of the length of trunk cable and all spur cables), the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

Entity installation

Use an intrinsic safety barrier or other associated equipment that is approved for the country in use and satisfies the following conditions:

$$U_o \leq U_i, I_o \leq I_i, C_o \geq C_i + C_{\text{cable}}, L_o \geq L_i + L_{\text{cable}} \text{ and } P_o \leq P_i.$$

Ethernet - APL

Basic specification, Position 3, 4 = FA

2-WISE installation

- The 2-WISE concept allows interconnection of intrinsically safe apparatus and associated apparatus not specially assessed for such a combination. For the acceptance of the interconnection of the different intrinsically safe circuits of these apparatus, the comparison of the voltage U_i with U_o , the current I_i with I_o , and the power P_i with P_o of the interconnected circuits must demonstrate that U_i , I_i and P_i are equal to or greater than U_o , I_o and P_o of the connected circuits. In addition, the maximum internal capacitance (C_i) and maximum internal inductance (L_i) of each apparatus (other than those from auxiliary devices) connected to a 2-WISE system must not exceed 5 nF and 10 H respectively.
- In a powered 2-WISE system only 2 ports (power source and power load) are allowed to be connected at the opposite ends of a cable, with a maximum of two auxiliary devices connected in between. The power source port supplies DC power to the system, and the power load port consumes DC power from the system. Auxiliary device ports may also consume DC power from the system. The voltage U_o of a power source port must be in the range of 14 to 17.5 V.
- Any other device connected to the cable shall be passive, meaning that it is not allowed to provide energy to the system, with the exception of a leakage current of 1 mA for a power load port and a leakage current of 50 A for each auxiliary device port. The intrinsically safe circuit of a 2-WISE port shall be galvanically isolated from non-intrinsically safe circuits.
- The parameters of cable used to interconnect 2-WISE ports must be as follows:
 - Cable resistance, R_c : 15 to 150 Ω /km
 - Cable inductance, L_c : 0.4 to 1 mH/km
 - Cable capacitance, C_c : 45 to 200 nF/km
 - $C = C_{\text{line/line}} + 0.5 C_{\text{line/screen}}$, if both lines are floating, or
 - $C = C_{\text{line/line}} + C_{\text{line/screen}}$, if the screen is connected to one line
 - Length of cable (not including cable stubs): ≤ 200 m
 - Length of cable stubs: ≤ 1 m
- If the above rules are respected, the inductance and the capacitance of the cable will not impair the intrinsic safety of the installation.

Entity installation

Use an intrinsic safety barrier or other associated equipment that is approved for the country in use and satisfies the following conditions:


$$U_o \leq U_i, I_o \leq I_i, C_o \geq C_i + C_{\text{cable}}, L_o \geq L_i + L_{\text{cable}} \text{ and } P_o \leq P_i.$$

Process seals

Device Type PMC51B

- The device is rated Single Seal in accordance with UL122701 and does not require the use of an external secondary process seal.
- The Single Seal rating is valid for a maximum pressure of up to 40 bar and a maximum process temperature (T_p) up to 125 °C.

Device Type PMP51B

- The device is rated Single Seal in accordance with UL122701 and does not require the use of an external secondary process seal.
 - The Single Seal rating is valid for a Maximum Working Pressure (MWP) of 0 to 700 bar and a maximum process temperature (T_p) up to 400 °C.
-  ▪ Limitation of the Maximum Working Pressure (MWP) for each device is marked on the nameplate and must not be exceeded! This value may be less than the Single Seal rating.
- Limitation of the maximum process temperature (T_p) with regards to the device options, temperature code rating and maximum ambient temperature as specified in the "Temperature tables" section of this document must be considered!
 - Verify the chemical compatibility of the process fluid with the process seal material (see field "Mat." on the nameplate)!

Temperature tables



Optional specification, ID Px, Rx = PB

When using the weather protection cover: Reduce the admissible ambient temperature by 10 K.

Class I, Div. 1 / Zone 0



- The specified ambient and process temperature ranges exclusively refer to the explosion protection and must not be exceeded. Operationally permitted ambient temperature ranges can be restricted depending on the version: See Operating Instructions.
- Do not exceed the max. ambient temperature at the enclosure.
- The process temperatures refer to the temperature at the separation membrane.

Device Type PMC51B

Temperature class	Process temperature T _p (process)	Ambient temperature T _a (ambient)	
		<i>Basic specification, Position 3, 4 =</i>	
		BA, DA, FA	BB, BC
		<i>Basic specification, Position 6 =</i>	
		B, J	J
T6	+40 °C	-40 to +50 °C	-40 to +45 °C
	+80 °C	-40 to +45 °C	-40 to +40 °C
T4	+60 °C	-40 to +60 °C	-40 to +55 °C
	+80 °C	-40 to +60 °C	-40 to +50 °C
	+100 °C	-40 to +55 °C	-40 to +50 °C
	+125 °C	-40 to +50 °C	-40 to +40 °C

Device Type PMP51B

Temperature class	Process temperature T _p (process)	Ambient temperature T _a (ambient)	
		<i>Basic specification, Position 3, 4 =</i>	
		BA, DA, FA	BB, BC
		<i>Basic specification, Position 6 =</i>	
		B, J	J
T6	+60 °C	-40 to +50 °C	-40 to +45 °C
	+70 °C	-40 to +50 °C	-40 to +45 °C
	+80 °C	-40 to +45 °C	-40 to +40 °C
T4	+70 °C	-40 to +65 °C	-40 to +55 °C
	+80 °C	-40 to +60 °C	-40 to +55 °C
	+100 °C	-40 to +55 °C	-40 to +50 °C
	+125 °C	-40 to +50 °C	-40 to +45 °C

Basic specification, Position 10 = G

Temperature class	Process temperature T _p (process)	Ambient temperature T _a (ambient)	
		Basic specification, Position 3, 4 =	
		BA, DA, FA	BB, BC
		Basic specification, Position 6 =	
		B, J	J
T6	+80 °C	-40 to +60 °C	-40 to +55 °C
T4	+130 °C	-40 to +70 °C	-40 to +60 °C
T3	+190 °C	-40 to +60 °C	-40 to +60 °C
T2	+290 °C	-40 to +60 °C	-40 to +55 °C
T1	+300 °C	-40 to +60 °C	-40 to +55 °C
	+400 °C	-40 to +55 °C	-40 to +50 °C

Basic specification, Position 10 = M, N, O, R, S, T

Temperature class	Process temperature T _p (process)	Ambient temperature T _a (ambient)	
		Basic specification, Position 3, 4 =	
		BA, DA, FA	BB, BC
		Basic specification, Position 6 =	
		B, J	J
T6	+80 °C	-40 to +60 °C	-40 to +55 °C
T4	+130 °C	-40 to +70 °C	-40 to +60 °C
T3	+190 °C	-40 to +70 °C	-40 to +60 °C
T2	+290 °C	-40 to +70 °C	-40 to +60 °C
T1	+400 °C	-40 to +70 °C	-40 to +60 °C

Version with separate enclosure

Optional specification, ID Mx = Mx

Temperature class	Process temperature T _p (process)	Ambient temperature T _a (ambient)	
		Basic specification, Position 3, 4 =	
		BA, DA, FA	BB, BC
		Basic specification, Position 6 =	
		B, J	J
T6	+80 °C	-20 to +60 °C	-20 to +55 °C
T4	+100 °C	-20 to +60 °C	-20 to +55 °C

Class II, III, Div. 1

- The specified surface temperature takes into account all direct heat influences from process heat and self-heating at the enclosure.
- Surface temperatures at the process side maybe higher and must be considered by the user (e.g. at high temperature process connections).
- The T-marking is based on the process temperature of the compact designs.
- The specified ambient and process temperature ranges exclusively refer to the explosion protection and must not be exceeded. Operationally permitted ambient temperature ranges can be restricted depending on the version: See Operating Instructions.
- Do not exceed the max. ambient temperature at the enclosure.
- The process temperatures refer to the temperature at the separation membrane.

For detailed information see Technical Information.

Device Type PMC51B

Temperature class	Process temperature T_p (process)	Ambient temperature T_a (ambient)	
		<i>Basic specification, Position 3, 4 =</i>	
		<i>BA, DA, FA</i>	<i>BB, BC</i>
		<i>Basic specification, Position 6 =</i>	
		<i>B, J</i>	<i>J</i>
T135 °C	+60 °C	-40 to +60 °C	-40 to +55 °C
	+80 °C	-40 to +60 °C	-40 to +55 °C
	+100 °C	-40 to +55 °C	-40 to +50 °C
	+125 °C	-40 to +50 °C	-40 to +45 °C

Device Type PMP51B

Temperature class	Process temperature T _p (process)	Ambient temperature T _a (ambient)	
		Basic specification, Position 3, 4 =	
		BA, DA, FA	BB, BC
		Basic specification, Position 6 =	
		B, J	J
T125 °C	+70 °C	-40 to +65 °C	-40 to +55 °C
	+80 °C	-40 to +60 °C	-40 to +55 °C
	+100 °C	-40 to +55 °C	-40 to +50 °C
	+125 °C	-40 to +50 °C	-40 to +45 °C

Basic specification, Position 10 = G

Temperature class	Process temperature T _p (process)	Ambient temperature T _a (ambient)	
		Basic specification, Position 3, 4 =	
		BA, DA, FA	BB, BC
		Basic specification, Position 6 =	
		B, J	J
T125 °C	+130 °C	-40 to +70 °C	-40 to +60 °C
	+190 °C	-40 to +60 °C	-40 to +60 °C
	+290 °C	-40 to +60 °C	-40 to +55 °C
	+300 °C	-40 to +60 °C	-40 to +55 °C
	+400 °C	-40 to +55 °C	-40 to +50 °C

Basic specification, Position 10 = M, N, O, R, S, T

Temperature class	Process temperature T _p (process)	Ambient temperature T _a (ambient)	
		Basic specification, Position 3, 4 =	
		BA, DA, FA	BB, BC
		Basic specification, Position 6 =	
		B, J	J
T125 °C	+130 °C	-40 to +70 °C	-40 to +70 °C
	+190 °C	-40 to +70 °C	-40 to +70 °C
	+290 °C	-40 to +70 °C	-40 to +70 °C
	+300 °C	-40 to +70 °C	-40 to +70 °C
	+400 °C	-40 to +70 °C	-40 to +70 °C

Connection data*Basic specification, Position 3, 4 = BA, BB, BC*

Power supply	
Channel 1	Channel 2 (only BB, BC)
$U_i \leq 30 V_{DC}$ $I_i \leq 300 \text{ mA}$ $P_i \leq 1 \text{ W}$ $C_i \leq 10 \text{ nF}$ $L_i = 0$	$U_i \leq 30 V_{DC}$ $I_i \leq 300 \text{ mA}$ $P_i \leq 1 \text{ W}$ $C_i \leq 10 \text{ nF}$ $L_i = 0$

Basic specification, Position 3, 4 = DA

Power supply	
FISCO	Entity
$U_i \leq 17.5 V_{DC}$ $I_i \leq 380 \text{ mA}$ $P_i \leq 5.32 \text{ W}$ $C_i \leq 5 \text{ nF}$ $L_i = 0$	$U_i \leq 24 V_{DC}$ $I_i \leq 300 \text{ mA}$ $P_i \leq 1.2 \text{ W}$ $C_i \leq 5 \text{ nF}$ $L_i = 0$

Basic specification, Position 3, 4 = FA

Power supply	
2-WISE	Entity
$U_i \leq 17.5 V_{DC}$ $I_i \leq 380 \text{ mA}$ $P_i \leq 5.32 \text{ W}$ $C_i \leq 5 \text{ nF}$ $L_i = 0$	$U_i \leq 17.5 V_{DC}$ $I_i \leq 300 \text{ mA}$ $P_i \leq 1.2 \text{ W}$ $C_i \leq 5 \text{ nF}$ $L_i = 0$

In connection with: *Basic specification, Position 5 = L, M, N, O*
 Installation according to the specifications of FHX50B.



Only the type of protection suitable for the device shall be connected!



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