Safety instructions

PLB5000 Isolation barrier

PLZ5291

Rev 3

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1.1 Technical and commercial support

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1.2 About Pentronic AB

Pentronic is one of Europe's largest manufacturers of industrial temperature sensors. In Scandinavia Pentronic is the leading supplier of equipment for temperature measurement to industry, research and education. Pentronic manufactures temperature sensors in its own facility, primarily Pt100 and thermocouples.

Pentronic collaborates with world leading manufacturers of calibration equipment, measurement and control instrumentation, optical temperature measurement and measurement equipment for moisture, thickness and flow.

1.3 Document history

See table 1.1 for correlation between product revision of the PLZ5291 isolation barrier and the revision of this document. To locate the product revision of the isolation barrier see section 4.

Table 1.1: Document history

Document number	Document revision	Release date	Revision notes	Product revision
7-5-0-1-1/629	1	2021-04-10	First release	1.0.X
7-5-0-1-1/629	2	2025-10-03	Updated certificate. Reclassified as an Ex component.	1.0.X
7-5-0-1-1/629	3	2026-02-19	Added Ex parameters for gas group IIB, Connector torque updated.	1.0.X

2 Introduction

2.1 Scope and purpose

The Ex safety instruction manual must be read and used by qualified personnel during installation and commissioning of the PLZ5291 isolation barrier.

The safety instructions in this document apply to PLZ5291 isolation barrier with IECEx approval **IECEx DNV 25.0006U** and ATEX approval **DNV 25 ATEX 32395U**.

2.2 Documentation, standards and directives

The safety instructions shall be read in conjunction with the documentation stated in table 2.1.

Table 2.1: Product documentation

Document
PLT5167, PLT5396, PLT5397 Ex Safety instructions
PLT5497 Ex Safety instructions
PLG5465 Ex Safety instructions

The PLZ5291 isolation barrier adhere to the directives and standards stated in table 2.2 and table 2.3.

Table 2.2: Associated directives

Directive	Title
2014/30/EU	DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electro-magnetic compatibility
2014/34/EU	DIRECTIVE 2014/34/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres
2011/65/EU	RoHs DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Table 2.3: Associated standards

Standard	Title
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use – EMC requirements– Part 1: General requirements
IEC 61326-3-1:2008	Electrical equipment for measurement, control and laboratory use - EMC requirements- Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) - General industrial applications
EN 55011:2009	Industrial, scientific and medical equipment - Radio frequency disturbance char-acteristics - Limits and methods of measurement with amendment EN 55011:2009/A1:2010
EN IEC 60079-0:2018	Explosive atmospheres – Part 0: Equipment – General requirements
EN 60079-7:2015 + A1:2018	Explosive atmospheres – Part 7: Equipment protection by increased safety ”e”
EN 60079-11:2012	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety ”i”
EN 60079-18:2015 + A1:2017	Explosive atmospheres – Part 18: Equipment protection by encapsulation ”m”
IEC 60079-0:2017 Edition:7.0	Explosive atmospheres – Part 0: Equipment – General requirements
IEC 60079-7:2017 Edition:5.1	Explosive atmospheres – Part 7: Equipment protection by increased safety ”e”
IEC 60079-11:2011 Edition:6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety ”i”
IEC 60079-18:2014 Edition:4.0	Explosive atmospheres – Part 18: Equipment protection by encapsulation ”m”

3 General information

The PLZ5291 is an isolation barrier for both supply and PLB communication between PLB5000 transmitters located in Zone 1 and PLB5000 components located in Zone 2 or non-hazardous areas

The isolation barrier is designed for industrial use in potentially explosive areas in Zone 1 in accordance to directive 2014/34/EU and IECEx.

 II 2(2) G
Ex eb mb [ib Gb] IIC T4 Gb
-40°C $\leq T_{amb} \leq$ +85°C

When an isolation barrier is installed and operated in a hazardous area the general Ex installation regulations IEC/EN 60079-14 as well as these safety instructions must be observed.

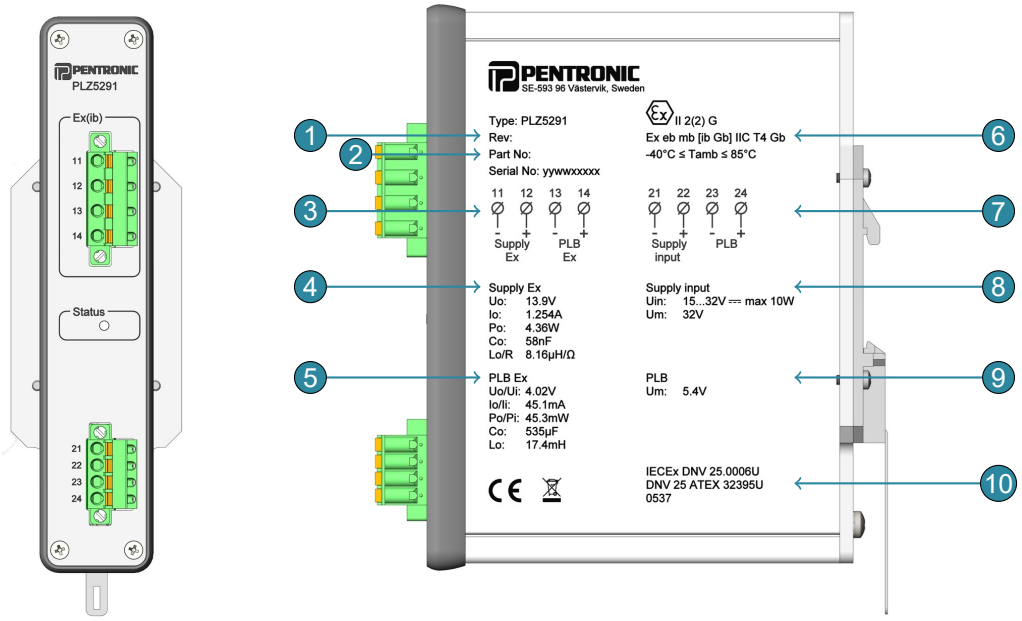
3.1 General safety instructions

The following instructions should be observed to ensure safety:

- Installation and commissioning of this component shall be performed by qualified personnel.
- These operating instructions shall always be available to the personnel carrying out installation and operation.
- With exception to the external power supply, this component is only intended to be used with compatible parts included in the PLB5000 cable-bus-based temperature measurement system.
- Do not operate the PLZ5291 isolation barrier outside the electrical, thermal and mechanical specifications.
- Before installation ensure that the area group and the temperature class comply with the application area rating.
- Before installation the component shall be inspected to ensure there is no sign of visible damage.
- In case of malfunction or visible signs of damage, the component shall immediately be put out of service.
- Modifications of the PLZ5291 isolation barrier is not permitted.

4 | Product marking

Information regarding identification, Ex marking, etc is found on the front and side of the device, see figure 4.1.



(a) Front marking (b) Side marking

Figure 4.1: Product marking of the PLZ5291 isolation barrier

1. Product revision of barrier (unique identification of HW)
2. Barrier part number
3. Pin identification for intrinsic safe circuits, Supply Ex and PLB Ex
4. Ex safety ratings for intrinsic safe circuit, Supply Ex (see table 5.3)
5. Ex safety ratings for intrinsic safe circuit PLB Ex (see table 5.4)
6. Ex-marking
7. Pin identification for non-intrinsic safe circuits, Supply input and PLB
8. Ratings for non-intrinsic safe circuit, Supply input (see table 5.1)
9. Ratings for non-intrinsic safe circuit, PLB (see table 5.2)
10. IECEx and ATEX certificate numbers

5 Ex safety parameters

Table 5.1: **Supply input**

Property	IIC	IIB
U_m	32V	32V

Table 5.2: **PLB data bus**

Property	IIC	IIB
U_m	5.4V	5.4V

Table 5.3: **Supply bus output - ex(ib)**

Property	IIC	IIB
U_o	13.9V	13.9V
I_o	1.254A	1.254A
P_o	4.36W	4.36W
C_o	58nF	4μF
L_o	22.6μH	90.4μH
L_o/R_o	8.16μH/Ω	32.62μH/Ω

Table 5.4: **PLB Ex supply bus ex(ib)**

Property	IIC	IIB
U_o/U_i	4.02V	4.02V
I_o/I_i	45.1mA	45.1mA
P_o/P_i	45.3mW	45.3mW
C_o	535μF	1mF
L_o	17.4mH	69.6mH

6 Installation

In addition to requirements in this document, requirements of installation instructions IEC/EN 60079-14 must be observed.

6.1 Schedule of Limitations

1. When the component is installed in Zone 1 or Zone 2, it shall be mounted in a certified Ex e enclosure that provides an ingress protection rating not less than IP54 in accordance with IEC 60079-0 and IEC 60079- 7 as applicable.

2. If the isolation barrier PLZ5291 is installed in a safe area, then an instrument cabinet shall be used.

3. Isolation barrier PLZ5291 shall be supplied by separately certified SELV power sources.

6.2 Ambient temperature

The isolation barrier is certified for temperature class T4 with an ambient temperature between -40°C $\leq$ T_{amb} $\leq$ +85°C. Ensure that the isolation barrier complies with the expected environmental limits of the application and that ambient temperature of the application is within this limits.

6.3 Earthing and bonding

Earthing shall be ensured via the DIN-rail, by an external equipotential bonding.

6.4 Supply Ex port

The Supply Ex port must be analyzed toward total capacitance of all transmitters and the cable. The transmitters exposed capacitance (Ci) exceeds 1% of the Supply Ex ports allowed capacitance (Co: 58nF) and therefore needs to be analyzed with a safety factor ($\frac{Co}{2}$).

The transmitters exposed inductance is negligible and as long as no other inductive parts are connected to the bus, Lo/Ro can be verified against Lc/Rc instead of Lo towards Lc.

6.5 PLB Ex port

The PLB Ex port voltage, current and power matches the transmitters voltage, current and power (Uo/Ui, Io/Ii and Po/Pi) and can therefor be connected. Inductance and capacitance of all transmitters and the bus cable need to be verified against Lo and Co of the PLB Ex port.
Where the sum of all transmitters exposed capacitance (Ci) exceeds 1% of the PLB Ex ports allowed capacitance (Co: 535μF), Co need to be analyzed with a safety factor ($\frac{Co}{2}$).

6.6 Supply and PLB connector

Supply and PLB shall only be connected to the isolation barrier via the attached connection terminals. The isolation barrier is delivered either with a push-in spring connector or a screw connection connector.

Connection wires shall be in accordance to the specification 6.6.1 or 6.6.2.

If the connection terminal is detached, ensure that the torque used during reattachment is 0.3Nm for screw connection terminals and 0.25 - 0.3 Nm for push-in spring connector terminals.

The connection terminal is available as a spare part from Pentronic.

6.6.1 Wiring requirements for screw connectors

- Connection wires shall be in accordance to table 6.1.
- 7 mm wire stripping length shall be used for all types of wire.
- Wires shall be tightened with a torque of 0.5-0.6 Nm.

Table 6.1: Wiring specifications for screw connection

Conductor type	Min	Max
Conductor cross section solid	0.4 mm²	2.5 mm²
Conductor cross section flexible	0.4 mm²	2.5 mm²
Conductor cross section flexible, with ferrule without plastic sleeve	0.4 mm²	2.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve	0.4 mm²	2.5 mm²
Conductor cross section AWG	21	12
Two conductors with same cross section, solid	0.4 mm²	1.0 mm²
Two conductors with same cross section, stranded	0.4 mm²	1.5 mm²
Two conductors with same cross section, stranded, ferrules without plastic sleeve	0.4 mm²	1.5 mm²
Two conductors with same cross section, stranded, TWIN ferrules with plastic	0.8 mm²	1.5 mm²

6.6.2 Wiring requirements for Push-in spring connectors

- Connection wires shall be in accordance to table 6.2.
- 10mm wire stripping length shall be used for all wire types.
- The wire cross section used shall be able to pass a pull-out test with a force of 15N.

Table 6.2: Wiring specifications for push-in spring connection

Conductor type	Min	Max
Conductor cross section solid	0.5 mm²	2.5 mm²
Conductor cross section flexible	0.5 mm²	2.5 mm²
Conductor cross section flexible, with ferrule without plastic sleeve	0.5 mm²	2.5 mm²
Conductor cross section flexible, with ferrule with plastic sleeve	0.5 mm²	2.5 mm²
Conductor cross section AWG	24	12
Two conductors with same cross section, stranded, TWIN ferrules with plastic	0.5 mm²	1.5 mm²

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