



P/I signal converter

TEPI11

Operating Instructions

42/18-47-EN

04.2008

Rev. 04

Manufacturer:

ABB Automation Products GmbH

Schillerstraße 72

32425 Minden

Germany

Tel.: +49 551 905-534

Fax: +49 551 905-555

CCC-support.deapr@de.abb.com

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1 Safety

Read these operating instructions carefully prior to installing and commissioning the device.

These instructions are intended as an overview and do not contain detailed information on all designs for this product or every possible aspect of installation, operation and maintenance.

For additional information or in case specific problems occur that are not discussed adequately in these instructions, contact the manufacturer. The content of these instructions is neither part of any previous or existing agreement, promise or legal relationship nor is it intended to change the same.

All obligations of ABB Automation Products GmbH are created by the relevant sales agreement, which contains the complete and solely binding warranty regulations. These contractual warranty provisions are neither extended nor limited by compliance with this manual.

1.1 General Safety Information

The "Safety" chapter provides an overview of the safety aspects to be observed for the operation of the device.

The device is built based on state-of-the-art technology and is operationally safe. It was tested and left the factory in a proper state. The requirements in the manual as well as the documentation and certificates must be observed and followed in order to maintain this state for the period of operation.

The general safety requirements must be complied with completely during operation of the device. In addition to the general information, the individual chapters of the manual contain descriptions about processes or procedural instructions with specific safety information.

Only the observance of all safety information enables the optimal protection of personnel as well as the environment from hazards and the safe and trouble-free operation of the device.

1.2 Proper use

The TEPI11 signal converter is used for measuring the pressure of non-flammable media. The measurement is transmitted with an impressed current signal of 4 ... 20 mA. In explosion protection applications, the circuit must have an intrinsically safe Ex ib design.

The intrinsically safe design of the TEPI11 must be installed in a suitable housing with a protection class of at least IP 20. Refer to the "Special conditions" in certificate BVS 04 ATEX 178 X.

The device may only be used for the applications listed in these operating instructions and in the data sheet 18-0.15. All other use is improper use.

The highest allowable maximum ambient temperature range of -20 ... 60 °C (-4 ... 140 °F) may not be exceeded during operation.

Repairs, alterations and enhancements or the installation of replacement parts is only permissible as far as described in the manual. Further actions must be verified with ABB Automation Products GmbH. Excluded from this are repairs performed by ABB-authorized specialist shops.

1.3 Technical limits

The device is designed for use exclusively within the stated values on the name plate and in the technical specifications (see "Technical Specifications" chapter and data sheet). These must be complied with accordingly, e.g.:

- The maximum operating temperature may not be exceeded.
- The permitted operating temperature may not be exceeded.
- The housing protection system must be observed.

1.4 Warranty provision

A use contrary to the device's stipulated use, disregarding of this manual, the use of under-qualified personnel as well as unauthorized alterations excludes the manufacturer of liability from any resulting damages. The manufacturer's warranty expires.

1.5 Labels and symbols

1.5.1 Symbols and warnings

**Danger – <Serious damage to health / risk to life>**

One of these symbols in conjunction with the "Danger" warning indicates an imminent danger. If it is not avoided, death or serious injury will result.

**Warning – <Bodily injury>**

The symbol in conjunction with the "Warning" message indicates a possibly dangerous situation. If it is not avoided, death or serious injury could result.

**Caution – <Slight injuries>**

The symbol in conjunction with the "Caution" message indicates a possibly dangerous situation. If it is not avoided, slight or minor injury can result. May also be used for property damage warnings.

**Notice – <Property damage>!**

The symbol indicates a possibly damaging situation. If it is not avoided, the product or something in its area can be damaged.

**Important**

The symbol indicates operator tips or especially useful information. This is not a message for a dangerous or damaging situation.

1.5.2 Name plate

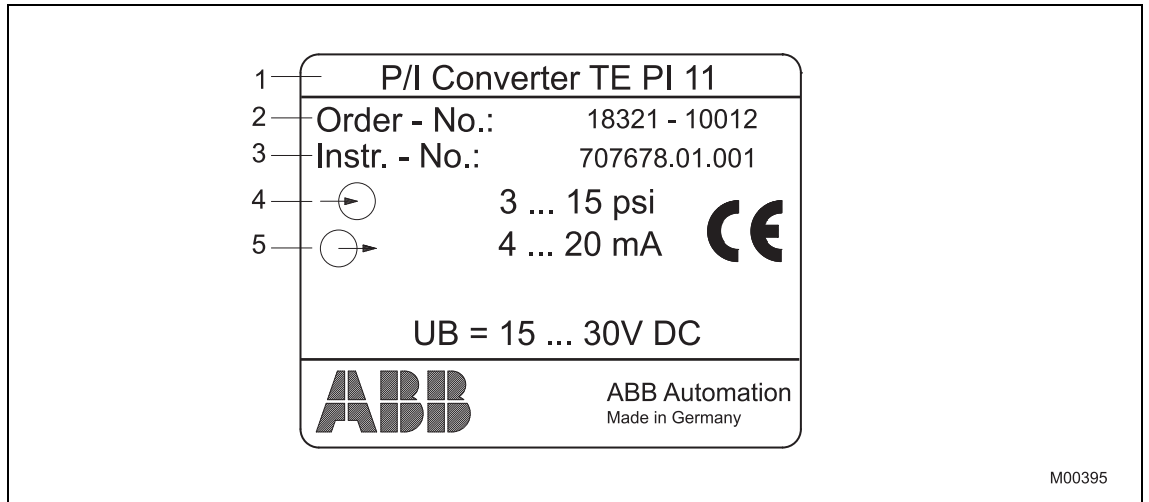


Fig. 1

- | | |
|----------------------|-----------------|
| 1 Full name of model | 4 Input signal |
| 2 Order code | 5 Output signal |
| 3 Serial number | 6 Serial number |

1.6 Operator liability

The operators must strictly observe the applicable national regulations in their countries with regards to installation, function tests, repairs, and maintenance of electrical devices.

1.7 Personnel qualification

The installation, commissioning and maintenance of the device may only be carried out through trained specialist personell authorized by the plant operator. The specialist personnel must have read and understood the manual and comply with its instructions.

1.8 Returning devices

Use the original packaging or a suitably secure packaging for returning the device for repair or for recalibration. Include the properly filled out return form (see attachment) with the device.

According to EC guidelines for hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for its shipping:

All delivered devices to ABB Automation Products GmbH must be free from any hazardous materials (acids, alkali, solvents, etc.).

1.9 Disposal

ABB Automation Products GmbH actively promotes environmental consciousness and has an operational management system in accordance with DIN EN ISO 9001:2000, EN ISO 14001:2004 and OHSAS 18001. Our products and solutions should have minimum impact on the environment and persons during manufacture, storage, transport, use and disposal.

This includes the environmentally friendly use of natural resources. Through its publications ABB conducts an open dialog with the public.

This product/solution is manufactured from materials that can be reused by specialized recycling companies.

1.9.1 Information on WEEE directive 2002/96/EC (Waste Electrical and Electronic Equipment)

This product/solution is not subject to the WEEE directive 2002/96/EC and relevant national laws (e.g., ElektroG in Germany).

Dispose of the product/solution directly in a specialized recycling facility and do not use the municipal garbage. Only privately used products may be disposed of in the municipal garbage according to the WEEE directive 2002/96/EC. Proper disposal prevents negative effects on people and the environment, and supports the reuse of valuable raw materials.

If it is not possible to dispose of old equipment properly, ABB Service can accept and dispose of returns for a fee.

1.10 Transport safety information

Check the devices for possible damage that may have occurred from improper transport. Damages in transit must be recorded on the transport documents. All claims for damages must be claimed without delay against the shipper and before the installation.

1.11 Storage conditions

The units must be stored in dry and dust-free conditions.

The storage temperature should be between -20 °C (-4 °F) and 70 °C (158 °F).

The storage time is basically indefinite, however, the warranty conditions stipulated in the order confirmation of the supplier are valid.

1.12 Installation safety information

- Only qualified specialists who have been trained for these tasks are authorized to mount and adjust the signal converter TEPI11 , and to make the electrical connection.
- When working on the signal converter TEPI11 always observe the locally valid accident prevention regulations and the regulations concerning the construction of technical installations.

1.13 Electrical installation safety information



Important

The signal converter TEPI11 has been manufactured and tested in accordance with DIN EN 61010-1 "Safety Requirements for Electronic Equipment" and has been supplied in a safe condition.

The electrical connection may only be performed by authorized specialist personnel according to the electrical plans.

Comply with electrical connection information in the manual. Otherwise, the electrical protection class can be affected.

The secure separation of contact-dangerous electrical circuits is only guaranteed when the connected devices fulfill the requirements of the DIN EN 61140 (VDE 0140 Part 1) (basic requirements for secure separation).

For secure separation, run the supply lines separated from contact-dangerous electrical circuits or additionally insulate them.

2 Design and function

The TEPI11 signal converter transforms electrical signals into pneumatic standard signals, e.g., 4 ... 20 mA in 0.2 ... 1 bar (3 ... 15 psi). It is therefore a connecting link between electrical/electronic and pneumatic systems. The patented signal conversion principle is based on the force balance method.

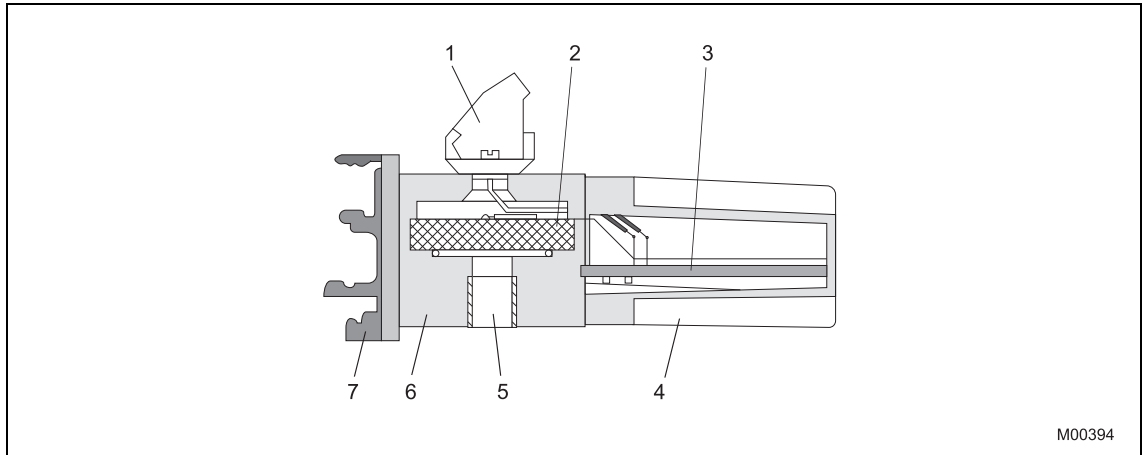


Fig. 2

- | | |
|---|--|
| 1 Screw terminal for the output signal | 5 Signal input with 1/8 NPT tap hole |
| 2 DMS sensor for gauge pressure | 6 Aluminum housing |
| 3 Electronic unit, printed board | 7 Screw terminal for the output signal |
| 4 Plastic protective cap, aluminum-coated | |

Functionality

The pressure at the input is recorded by the DMS sensor and converted proportionally by the downstream electronics unit to an analog output signal. The electronic unit is designed for two-wire technology, i.e. the power supply and output signal flow across the same wire pair. Secondary equipment such as the display, recorder or controller must be looped into the electrical circuit. A direct current of 15 ... 30 V is required for the power supply.

3 Installation

The TEPI11 signal converter has a special mounting base. Due to its universal design, it is suitable for mounting to EN 50022 - 35x7.5, EN 50045 - 15x5 and EN 50035 - G32 rails.

Vertical top-hat rail

For vertical rails, the electrical connection for the device should preferably be on the left.

Horizontal top-hat rail

For horizontal rails, the electrical connection for the device should preferably be facing up.

3.1 Operating conditions at installation site



Important

Prior to mounting check to ensure that the specifications in terms of safety and control applicable to the TEPI11 signal converter will not be exceeded at the installation location.

See chapter Technical data, page 15 .

3.2 Delivery scope

- Check the delivery for completeness, signs of damage, model and scope immediately upon arrival.
- Check whether the delivery is in accordance with your order.

4 Electrical connection



Important

For electrical installation, the following standards, data and documents must be observed:

- the relevant regulations and safety standards pertaining to the installation and operation of electrical systems.
- the additional regulations, standards and directives governing the installation and operation of explosion-proof systems, if explosion-proof devices are used.
- the values for the electrical connection in section Technical data, page 15.
- for explosion-proof devices also observe the specifications in the explosion protection certificate

4.1 Signal cables

Do not run signal cables close to power lines.



Important

Power lines produce interference in their near vicinity, which impairs the signals transmitted on the line.

4.2 Position of the terminals

The electrical connection is provided by 2-pole screw terminals for cables with a max. cross-sectional area of 2.5 mm² (14 AWG).

4.3 Connection

Do not reverse polarity when connecting the cable.

The supply circuit at the terminals must meet explosion protection requirements for "intrinsically safe" category "ib" devices.

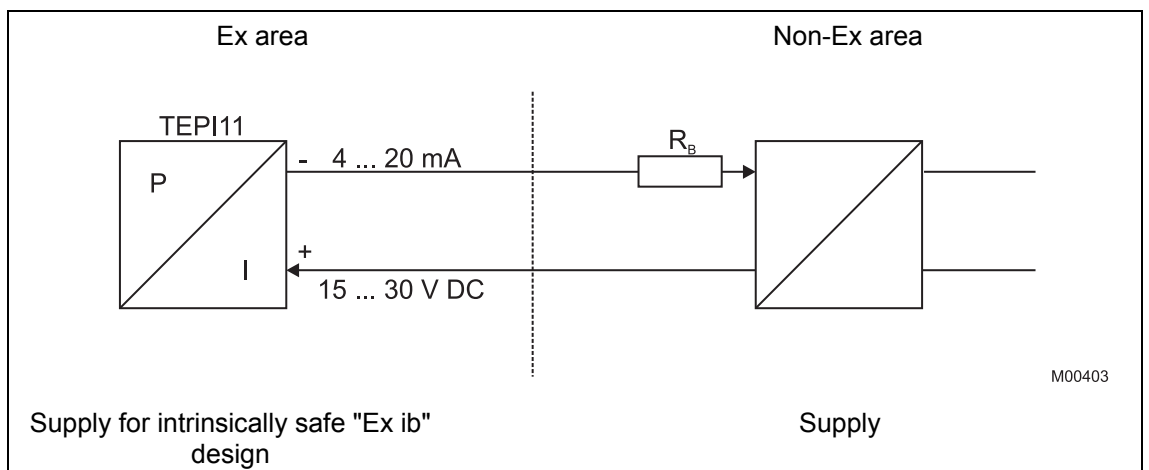


Fig. 3: Functional diagram

5 Pneumatic connection



Important

The TEPI11 signal converter must be supplied with instrument air that is free of oil, water and dust.

The purity and oil content should meet the requirements of Class 3 according to DIN/ISO 8573-1.



Notice - Potential damage to parts!

Impurities on the cables and signal converter can damage components.

The recommended pipe dimension is 6 x 1 mm. Dust, splinters or any other particles must be blown off the pipe before connecting.

To connect the air pipes, a 1/8 NPT tap hole is provided. We recommend that you use a line with 6x1 mm dimensions.



Notice - Potential damage to parts!

Pressure higher than 2 bar (30 psi) can damage the signal converter.

Provisions should be made to ensure that in the event of an error the pressure does not rise above 2 bar (30 psi).

6 Startup Operation

The signal converter is ready for operation immediately after installation and connection. No further adjustment is required.

7 Maintenance



Important

Note that the supplied instrument air must be free of oil, water and dust according to DIN/ISO 8573-1 to ensure trouble-free operation.

7.1 Readjusting the signal conversion

The signal converters are delivered in an adjusted condition. After longer operating periods, however, the tolerance limits may be exceeded due to aging of the DMS sensor or drift of the electronic unit. This can be eliminated by readjustment.

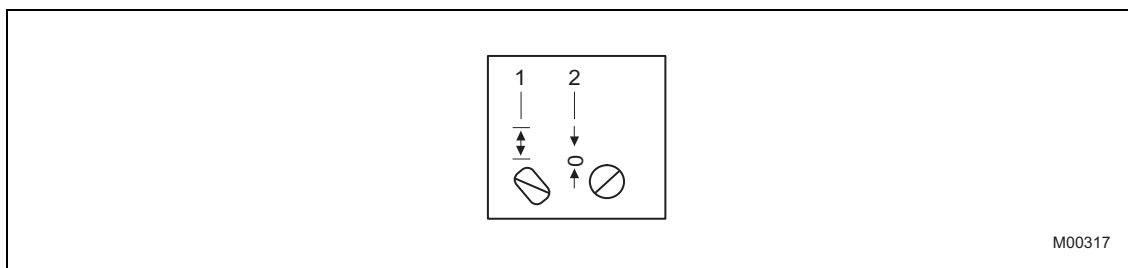


Fig. 4: Adjustment screws

The signal converter can be readjusted with 2 adjustment screws (see Fig. 4).

Designation	Description
1	Setting of range
2	Setting of zero point

8 Technical data

8.1 Input (pneumatic)

Sensing element

DMS sensor with silicon membrane

Input

0.2 ... 1 bar (3 ... 15 psi)

Overload limit

2 bar (30 psi)

8.2 Output (electrical)

Signal range

4 ... 20 mA, two-wire technology

Load voltage

$U_B = U_S - 12 \text{ V}$ (U_S = Supply voltage V)

Capacitance/Inductance

15 nF and 90 μ H

8.3 Power supply (electrical)

Supply voltage

12 ... 30 V DC, ripple $U_{SS} \leq 0.2 \text{ V}$

Power consumption

20 mA (at 100 % input signal)

8.4 Transmission data and influences

Characteristic

linear, direct or reverse action

Deviation

$\leq 0.5 \%$

Hysteresis

$\leq 0.15 \%$

Response sensitivity

$\leq 0.1 \%$

Temperature influence (zero point and span)

$\leq 1.4 \%$ / 10 K

Power supply

$\leq 0.015 \%$ / V change in supply voltage

Mechanical vibration

$\leq 0.5 \%$ to 1 g and 80 hz

Mounting orientation

$\leq 0.1 \%$ at 90° change of position.

EMC

meets EMC directive 89/336/EEC as of May 1989 (increased EMI shielding per EN 50082-2 PR as of 11/93)

CE mark

complies with EC directive for CE certificate of conformity

8.5 Explosion protection

Intrinsic Safety EEx ib IIC T6

8.6 Environmental capabilities

Climate class

ZUF acc. to DIN 40040

Temperature

-20 ... 60 °C (-4 ... 140 °F)

-20 ... 80 °C (-4 ... 176 °F)

for operation, storage or transport

Relative humidity

75 % mean, 95 % short-term

no condensation

8.7 Design for rail mounting

Material/protection

Housing IP 20

aluminum with plastic cap

Mounting

Rail mounting

EN 50022 - 35 x 7,5

EN 50035 - G 32

EN 50045 - 15 x 5

Electrical connection

2-pole screw terminal for 2.5 mm² (14 AWG)

Pneumatic connection

Two 1/8 NPT threads for air supply and output

Weight

0.25 kg (0.55 lb)

Dimensions

Refer to dimensional drawings

8.8 Dimensional drawings

8.8.1 Design for control room housing unit for rail mounting

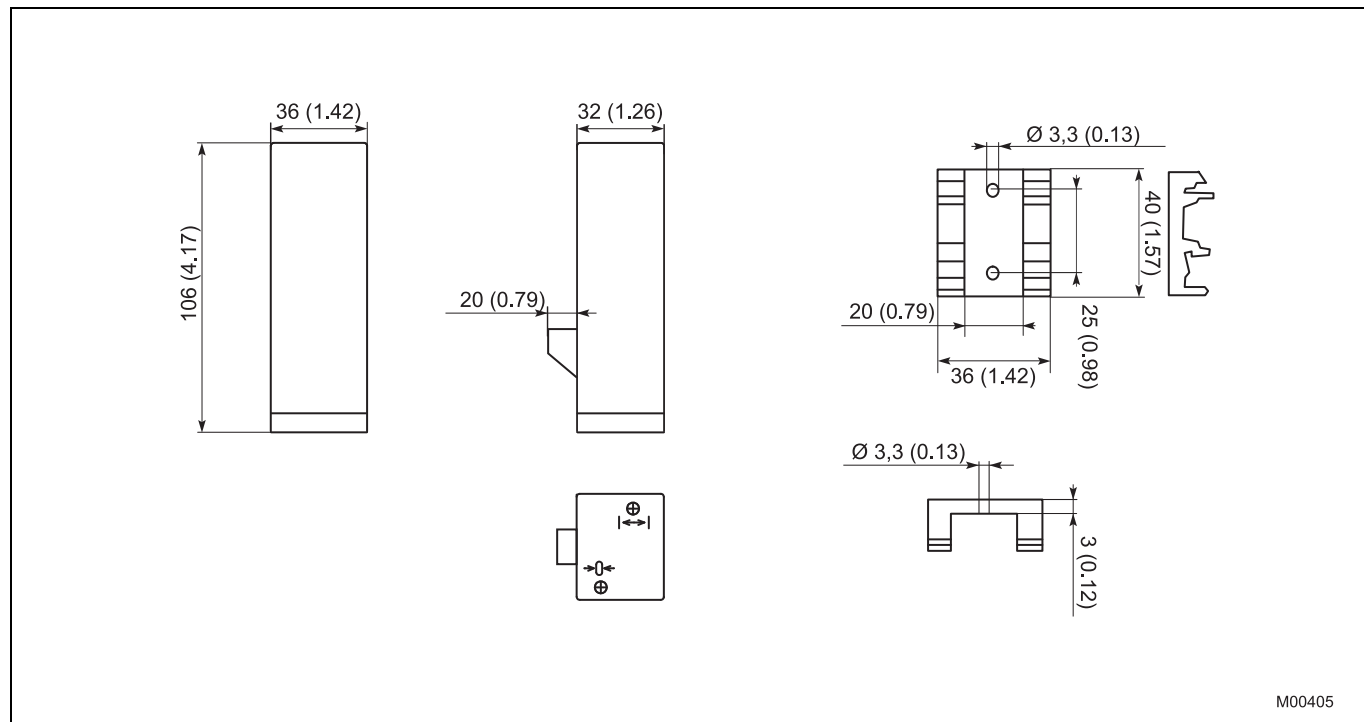




Fig. 5: Dimensions in mm (inch)

9 Appendix

9.1 Permits and certifications

	Symbol	Description
CE mark		By placing the CE mark on the model plate, ABB Automation Products GmbH declares its conformance with the following directives: <ul style="list-style-type: none"> - EMC directive 89/336/EEC. - Machinery directive 2006/42/EC
Ex approvals		By placing the Ex mark on the model plate, ABB Automation Products GmbH also declares its conformance with the following directive: <ul style="list-style-type: none"> - ATEX directive 94/9/EC



Important

All documentation, declarations of conformity and certificates are available in the download area of ABB Automation Products GmbH.

www.abb.com/instrumentation



EG-KONFORMITÄTSERKLÄRUNG

EC DECLARATION OF CONFORMITY
ATTESTATION DE CONFORMITE C.E.

Hersteller:	ABB Automation Products GmbH	
<i>Manufacturer / Fabricant:</i>	Minden	
Anschrift:	Schillerstraße 72	
<i>Address / Adresse:</i>	D-32425 Minden	
Produktbezeichnung:	PI - Signalumformer -	TEPI 11
<i>Product name:</i>	<i>PI Signal Converter -</i>	<i>TEPI 11</i>
<i>Désignation du produit:</i>	<i>Transducteur PI -</i>	<i>TEPI 11</i>

Das Produkt stimmt mit den Vorschriften folgender Europäischer Richtlinien überein:

This product meets the requirements of the following European directives:

Les produits répondent aux exigences des Directives C.E. suivantes:

89/336/EWG	EMV-Richtlinie *
<i>89/336/EEC</i>	<i>Electromagnetic Compatibility Directive *</i>
<i>89/336/C.E.E.</i>	<i>Directives concernant la compatibilité électromagnétique *</i>

* einschließlich Änderungen und deutscher Umsetzung durch das EMVG und Gerätesicherheitsgesetz

* including alterations and German realization by the EMC law and the instruments safety law

* y compris les modifications et la réalisation allemande par la loi cocemant la compatibilité électromagnétique et la sécurité d'appareils

Die Übereinstimmung mit den Vorschriften dieser Richtlinien wird nachgewiesen durch die vollständige Einhaltung folgender Normen:

Conformity with the requirements of these Directives is proven by complete adherence to the following standards:

La conformité avec les exigences de ces directives est prouvée par l'observation complète des normes suivantes:

EN 61000-6-2, EN 50081-1

30.10.2003

Datum
Date
Date



Dr. Wolfgang Scholz
Leiter R&D
Head of R&D
Responsable R&D



Bernhard Kruse
Leiter Qualitätsmanagement
Head of Quality Management
Responsable Assurance de la Qualité



Translation

EC-Type Examination Certificate

- (1) **EC-Type Examination Certificate**
- (2) **- Directive 94/9/EC -**
Equipment and protective systems intended for use in potentially explosive atmospheres
- (3) **BVS 04 ATEX E 178 X**
- (4) **Equipment:** P/I-Signal converter type TEPI 11 V18321-500xx
- (5) **Manufacturer:** ABB Automation Products GmbH
- (6) **Address:** D 32425 Minden
- (7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.
- (8) The certification body of EXAM BBG Prüf- und Zertifizier GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
The examination and test results are recorded in the test and assessment report BVS PP 04.2140 EG.
- (9) The Essential Health and Safety Requirements are assured by compliance with:
EN 50014:1997+A1-A2 General requirements
EN 50020:2002 Intrinsic Safety 'i'
- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate
- (12) The marking of the equipment shall include the following:

II 2G EEx ib IIC T6

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 19. August 2004

Signed: Migenda

Certification body

Signed: Dr. Eickhoff

Special services unit

Page 1 of 3 to BVS 04 ATEX E 178 X
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(until 31.05.2003: Deutsche Montan Technologie GmbH Am Technologiepark 1 45307 Essen)



(13) Appendix to

(14) **EC-Type Examination Certificate**

BVS 04 ATEX E 178 X

(15) 15.1 Subject and type

P/I Signal converter type TEPI 11 V18321-500xx

In the complete designation the "x" are replaced by numbers / letters specifying characteristic curve (rising 4...20 mA / falling 20...4 mA) and pressure range.

The type code may be extended optionally with further designations not relevant to explosion protection characteristics.

15.2 Description

The P/I-Signal converter type TEPI 11 V18321-500xx is intended for pressure measuring purposes of non flammable media and transfers the pressure signal to an intrinsically safe circuit (4...20 mA current loop).

The P/I-Signal converter type TEPI 11 V18321-500xx - shape: housing for rail mounting - is designated for installation in a suitable enclosure (degree of protection IP: IP20).

15.3 Parameters

15.3.1 Supply and signal circuit

Voltage	U_i	DC	30	V
Current	I_i		100	mA
Power	P_i		750	mW
Effective internal capacitance	C_i		15	nF
Effective internal inductance	L_i		90	μ H
Capacitance between circuit and enclosure			\leq 2,2	nF

15.3.2 Ambient temperature range: $-20^\circ\text{C} \leq T_a \leq +60^\circ\text{C}$

(16) Test and assessment report
BVS PP.04.2140 EG as of 19.08.2004.

(17) Special conditions for safe use

17.1 The P/I-Signal converter type TEPI 11 V18321-500xx shall be installed in a suitable enclosure providing a degree of protection IP20 as a minimum.

17.2 In case of installation of the P/I-Signal converter type TEPI 11 V18321-500xx in an enclosure made of plastics material or light alloy, the material of the enclosure shall comply with clause 7.3.2 or clause 8 EN 50014:1997 respectively.

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- 17.3 Internal wiring within this enclosure shall comply with clauses 6.4.1.1 and 7.6 e EN 50020:2002.
- 17.4 Terminals or connectors for the intrinsically safe circuits shall be arranged according to clauses 6.3.1 or 6.3.2 EN 50020:2002 respectively.

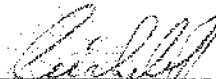
We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 19.08.2004
BVS-Scha/Mi A 20040445

EXAM BBG Prüf- und Zertifizier GmbH



Certification body



Special services unit

Page 3 of 3 (p. BVS 04 ATEX B 178 X)
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(until 31.05.2003: Deutsche Motoren Technologie GmbH, Am Technologiepark 1, 45307 Essen).

Statement about the contamination of devices and components

The repair and/or maintenance of devices and components will only be performed when a completely filled out explanation is present.

Otherwise, the shipment can be rejected. This explanation may only be filled out and signed by authorized specialist personnel of the operator.

Customer details:

Company:

Address:

Contact person:

Telephone:

Fax:

E-Mail:

Device details:

Type:

Serial no.:

Reason for the return/description of the defect:

Was this device used for working with substances which pose a threat or health risk?

Yes No

If yes, which type of contamination (please place an X next to the applicable items)

biological corrosive/irritating combustible (highly/extremely combustible)

toxic explosive other harmful substances

radioactive

Which substances have had contact with the device?

1.

2.

3.

We hereby certify that the devices/parts shipped were cleaned and are free from any dangerous or poisonous materials.

City, Date

Signature and company stamp

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www.abb.com/instrumentation

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ABB Limited

Salterbeck Trading Estate
Workington, Cumbria
CA14 5DS

UK

Tel: +44 (0)1946 830 611

Fax: +44 (0)1946 832 661

ABB Inc.

125 E. County Line Road
Warminster, PA 18974
USA

Tel: +1 215 674 6000

Fax: +1 215 674 7183

ABB Automation Products GmbH

Schillerstr. 72
32425 Minden
Germany

Tel: +49 551 905-534

Fax: +49 551 905-555

CCC-support.deapr@de.abb.com