

Switch Box Types NSKEx and MSKEx




Installation Instructions with Operating Instructions and Technical Annex

in accordance with EC Directive Low Voltage Directive 73/23/EEC
in accordance with EC Directive Electromagnetic Compatibility 89/336/EEC

English Version

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More information and current addresses of our branch offices and resellers can be found under:




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A) General

A1 Explanation of symbols

Notes in these instructions are indicated by symbols:

 xxxxx	Hazard / Caution / Warning ... draws attention to a dangerous situation that may cause death or serious injuries to persons and/or damage to the piping system.
	Note ... draws attention to an imperative instruction.
	Information ... provides useful tips and recommendations

If these notes, cautions and warnings are not followed, hazards may result and the manufacturer's guarantee may become void.

A2 Intended use

Switch box type NSKEx / MSKEx is used in conjunction with pneumatic actuators for valves. It serves signal detection indicating the "Open / Closed" state following attachment to a valve. Switch boxes are also suitable for connecting up intrinsically safe circuits. In such cases they are specially marked as such.

The switch box is fitted with initiators or mechanical limit switches according to the customer's specifications – for terminal diagrams of typical position detectors see Annex D2.


EBRO switch boxes can be used in Zone 1 and 2 potentially explosive atmospheres according to certified explosion subgroups IIA, IIB and IIC and temperature class T5/T6 as well as in Zones 21 and 22 – depending on the certified max. surface temperature. To wire up the solenoid valve EEx e connection terminals can be fitted afterwards at the customer's request.


The switch boxes and their components conform to the relevant standards EN 60079-0, EN 60079-1, EN 60079-7, IEC 60079-11, EN 60079-18, prEN 61241-0 and EN 61241-1. See D1.

For mechanical connection to the pneumatic actuator there are mounting kits to VDI/VDE 3845 available with various bracket dimensions - see dimension sheet in Annex D3.

The switch box may only be put into operation after compliance with the following documents:

- <Manufacturer's declaration on EC Directives>,
- these assembly / operating instructions that are enclosed with the delivery.


Use of the switch box in a  potentially explosive atmosphere is only permitted if

- ▶ the customer has explicitly drawn attention to the fact
- ▶ and the switch box is marked with the  symbol and the field of application on the rating plate in accordance with Directive 94/9/EC.

Non-compliance with this <Intended use> constitutes gross negligence and relieves the manufacturer, EBRO-Armaturen, of its product liability.

A3 Marking of the switch box

Every Ex switch box bears the following data on the enclosure or rating plate:

For	Marking	Remark
Manufacturer	BARTEC	For address see section 13 <Further information>
Valve type	e.g. 07-31A1-1350/9001	(Enclosure marks) see overview in section 4.3
Conformity	CE	Conformity with Pressure Equipment Directive 97/23EC
Code	0032	"Notified body" in accordance with EU Directive
SN (serial no.)	e.g. 037574/08	Digits 1-6: consecutive no., digits 7-8: year
max. perm. U	UN max (and numerical value)	Numerical values for upper operating limit
max. perm. I	Imax (and numerical value)	Numerical values for upper operating limit
Test certificate	IBExU02ATEX1126	
Additional marking if required	Explosion protection Maximum marking	For example:  II 2 G Ex ed ia/ib ma/mb II C T6 /T5 II 2D Ex tD A21 IP6X T80°C, 90°C, 95°C

*) **Note:** The year of manufacture is coded in the serial no.

The rating plate should not be covered so that the installed valve remains identifiable.

A4 Installed components

The switch box is fitted with position indicators according to the customer's specifications.

For use in Zone 1 and 2 potentially explosive atmospheres only certified components such as switches and initiators may be fitted. For use in Zones 21 and 22 switches and initiators of industrial quality may also be fitted inside the dust-tight enclosure provided the manufacturer produces separate evidence of temperature rise. Extensions to the switch box are only permitted in agreement with the manufacturer. Assembly instructions and safety instructions issued by the manufacturer of the components must be observed.

A5 Cable entries

When connecting cables and leads to equipment with the Increased Safety degree of protection it is necessary to use entries which are certified as explosion-proof and are suitable for the respective types of cable and lead. They must maintain the "e" degree of protection and contain a suitable sealing component to ensure that the control system is provided with at least IP 54 protection. Metal lead entries must be connected to the earthing system.


Any drillholes not required for cable entries must be closed off with plugs certified as being explosion-proof.

When connecting cables and leads to equipment for use in Zones 21 and 22 the minimum IP 65 protection required must remain intact.




A6 Transport and storage

For storage and transport the switch box must be left in the factory packaging and only unpacked just before installation in the pipe section.

B) Assembly and commissioning



	<p><i>This set of instructions contains safety instructions for foreseeable risks when mounting / connecting up the switch box in a control system.</i></p> <p>It is the user's responsibility to complete these instructions for other specifically local risks. It is assumed that all the requirements for the system are met.</p>
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B1 *Safety instructions for commissioning*

 	<ul style="list-style-type: none"> • Mounting the switch box on the valve and connection to the user's control system may only be performed by qualified staff. Qualified staff, as defined by these instructions, are persons who, on account of their training, special knowledge and professional experience, are able to correctly assess and perform the work entrusted to them as well as recognise and eliminate potential hazards. • The function of a fitted switch box must agree with the <Intended use> which is described in section A2. Operating conditions must match the markings on the rating plate of the switch box. • The degree of protection marked on the switch box assumes that the cable entries are sealed accordingly.
 Explosion hazard / electric shock hazard	

B2 *Basic requirements for assembly / dismantling*

- Make sure that only switch boxes are installed whose explosion protection class matches the operating conditions. See the relevant marking on the rating plate (*section A4*).
- The information on the rating plates and on the EC Type Test Certificate must be observed. More technical information about the switch boxes can be obtained from the sources in section A6 and is indicated on the product.
- Components may only be retrofitted in agreement with the manufacturer taking the EC Type Test Certificate into consideration. Conductors must be connected carefully in such a way that the single wires are not damaged.
- When connecting multi-wire or flexible conductors the ends of the conductors must be prepared.

	Attachment of wire end ferrules must always be performed using suitable crimping tools in order to achieve a consistent quality of crimp. All terminals, including ones which are not being used, must be tightened up.
	Screw connections to the valve must be locked to prevent them from coming loose.

- Metal enclosures in potentially explosive atmospheres must be provided with equipotential bonding having a cross-section of at least 4 mm².
- Metal enclosures for **intrinsically safe equipment** do **not** have to be connected to the equipotential bonding system unless it is required by the equipment documentation.

B3 *Installation procedure*

- Examine switch boxes for any damage in transit. Damaged switch boxes must not be installed.
- For enclosures set up outdoors it may be necessary to take precautions which ensure operation conforming to the intended use. These include, for example, rain canopies, and if necessary, outer enclosures with an adequate degree of protection.
- Connection to the user's control system must be performed according to the planner's/user's instructions.
Terminal diagrams are stuck into the lid of the switch box.
- When wiring up an "Increased Safety" solenoid valve in a switch box for "intrinsically safe circuits" the minimum distances of 50 mm thread measure must be maintained.
- It is essential that any detectable malfunctions be remedied prior to commissioning. See also section C3 <Troubleshooting>.

B4 *Initial commissioning*

- Any electrical equipment for use in potentially explosive atmospheres must be selected according to the conditions to be defined for the individual type of installation. The equipment may only be operated if it is undamaged and clean.
- All electrical connections to the user's control system must be subjected to testing by an electrician before being put into operation for the first time.

C) Operating instructions

According to Directive 2006/42/EC the planner of the system must conduct a comprehensive risk analysis.

For this purpose the manufacturer, EBRO Armaturen, makes the following documents available:

- these Installation and Operating Instructions,
- the Declaration on EC Directives, enclosed at the beginning.



This set of instructions contains safety instructions for foreseeable risks in using the switch box in industrial applications.

It is the responsibility of the planner/user to complete these instructions for other, specifically system-related risks.

C1 **Safety instructions for operation and maintenance**



- The function of a switch box must agree with the <Intended use>, which is described in section A2.
- Operating conditions must match the markings on the rating plate of the switch box.
- Any work necessary on the switch box may only be performed by qualified staff. Qualified staff, as defined by these instructions, are persons who, on account of their training, special knowledge and professional experience, are able to correctly assess and perform the work entrusted to them as well as recognise and eliminate potential hazards.
- In the case of control systems for use in areas containing combustible dust the ignition temperature of the relevant dust/air mixture or the smouldering temperature of the relevant dust must, in compliance with the safety factor defined in DIN EN 50281-1-2, be higher than the maximum surface temperature of the switch box.

Dust deposits of > 5 mm must be removed.

- The user of an electrical system in a potentially explosive atmosphere must keep the equipment in a proper condition, operate and monitor it properly and perform maintenance and repair work (Elex V, § 13 and EN 60079-14).
- If the degree of protection is affected, only original parts may be used for replacement purposes (e.g. lid seals / cable glands).
- When performing maintenance and/or remedying faults, the safety regulations indicated must be observed.



Electric shock hazard

DO NOT OPEN THE SWITCH BOX IF THE POWER IS SWITCHED ON!

In  duty: **EXPLOSION HAZARD**

C2 **Automatic mode**

If the switch box has been connected up to the user's control system in accordance with section B, no further measures are required. Section C1 <Safety instructions> must be observed.

Maintenance: At suitable intervals check to make sure that screw connections to the valve are OK.

C3 Troubleshooting

Type of fault	Remedy
Fault in electrical components and/or (supply) cables	If faults are diagnosed on the electrical connections in/on the terminal box or its components, they must be remedied by qualified staff in compliance with the information in section D <Planning documents>.

D) Technical annex / planning documents

D1 Technical specification of the switch box

The switch boxes meet standards EN 60079-0, EN 60079-1, EN 60079-7, IEC 60079-11, EN 60079-18 prEN 61241-0 and EN 61241-1 and were developed, manufactured and tested in accordance with EN ISO 9001 and EN 60 999.

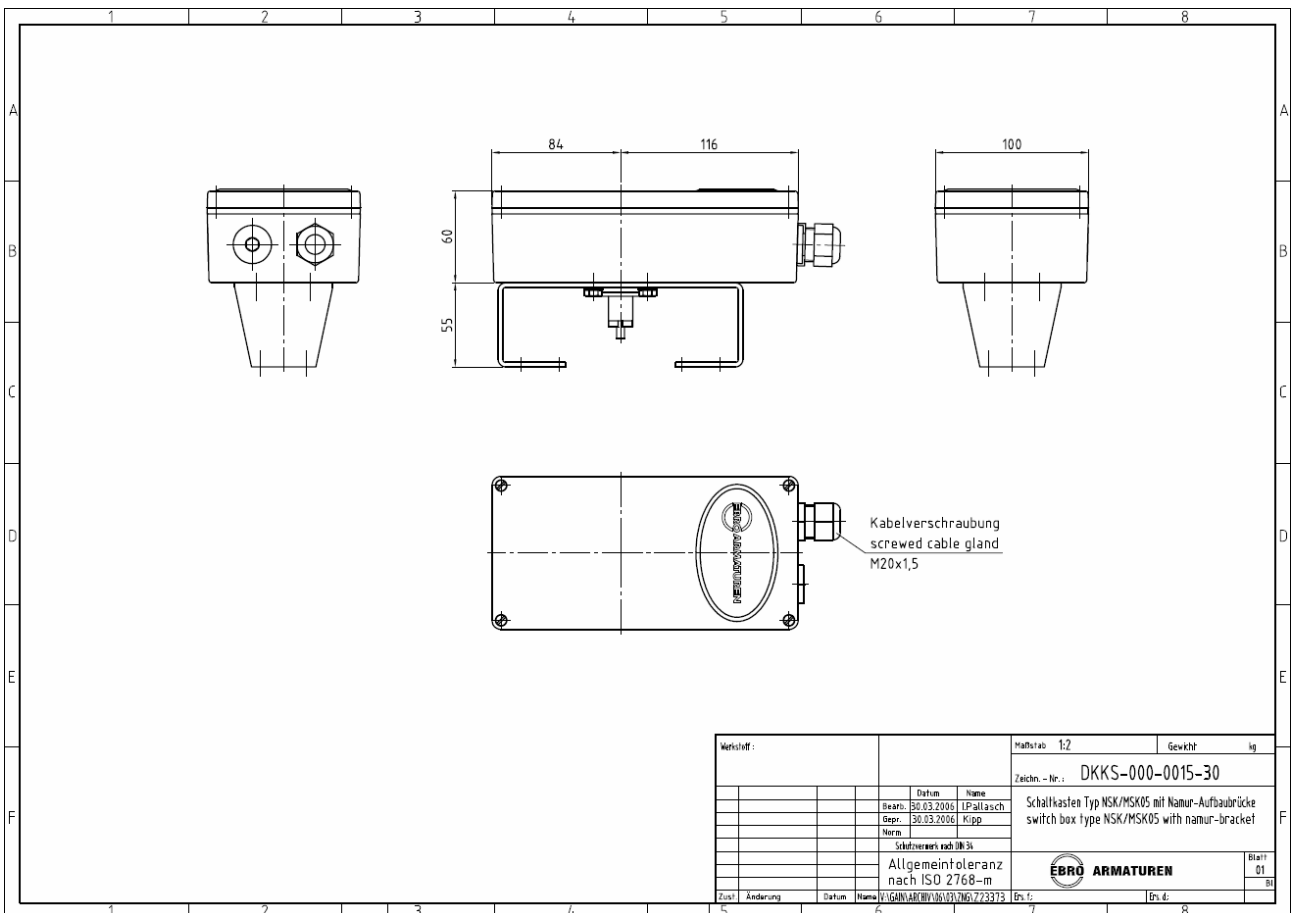
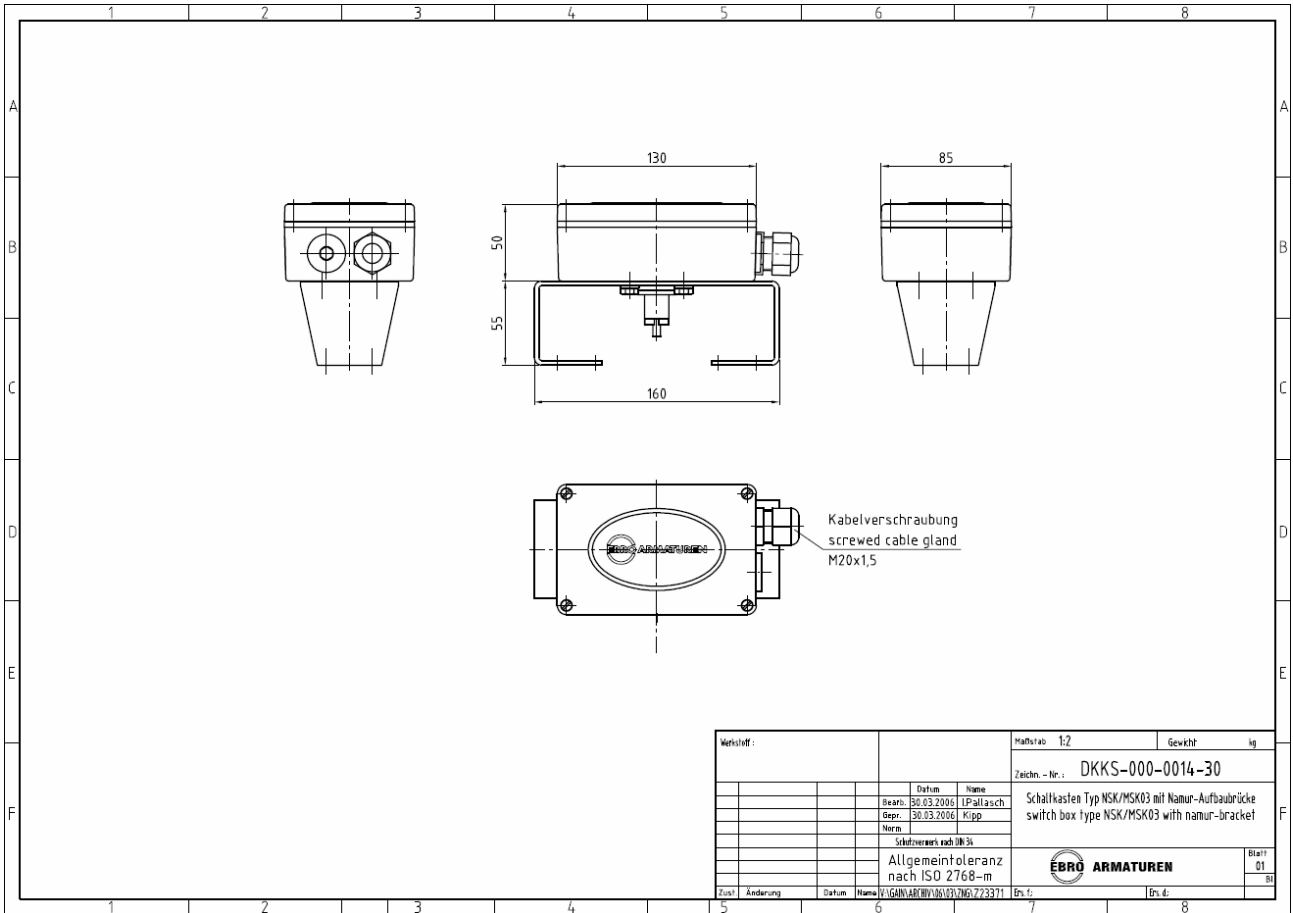
D2 Terminal diagram

The valid terminal diagram is stuck into the lid of each switch box.
The valid terminal diagram is annexed as a separate document.

D3 Data sheets of typical position indicators

The valid data sheet of the position indicator is annexed as a separate document.

D4 Dimensional drawings



D5  **Type Test Certificate**

IBExU Institut für Sicherheitstechnik GmbH
Accredited Institute of TU Bergakademie Freiberg

[1] **EC TYPE TEST CERTIFICATE**



[2] Equipment and protective systems for the intended use in potentially explosive atmospheres, **Directive 94/9/EC**

[3] EC Type Test Certificate number: **IBExU02ATEX1126**

[4] Equipment or protective system: EEx limit monitor
Type 07-31A-.../... to 07-31E-.../...

[5] Manufacturer: BARTEC Komponenten und Systeme GmbH

[6] Address: Max-Eyth-Strasse 16
D-97980 Bad Mergentheim

[7] The type of this equipment or protective system and the various permissible configurations are defined in the Annex to this EC Type Test Certificate.

[8] IBExU Institut für Sicherheitstechnik GmbH, NOTIFIED BODY No. 0637 in accordance with Article 9 of European Parliament and Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system meets the basic safety and health requirements for the conceptual design and construction of the equipment or protective system for the intended use in potentially explosive atmospheres, as set out in Annex II of the Directive. The test results are recorded in the confidential test report IB-02-3-567 dated 15.11.2002.


[9] The basic safety and health requirements are met by compliance with EN 50014:1997/A1/A2 and EN 50019:2000 in conjunction with EN 50018:2000, EN 50028:1987, EN 50020:1994 and EN 50281-1-1:1998/A1.

[10] If the certificate number is followed by the character "X", attention is drawn to special conditions for safe use of the equipment in the Annex to this EC Type Test Certificate under [17].

[11] This EC Type Test Certificate only relates to the conceptual design and construction of the defined equipment or protective system. Further requirements of this Directive apply to the manufacture and placing on the market of this equipment or protective system.

[12] The marking of the equipment or protective system must indicate the following information:

 **II 2 G EEx edmi IIC T5 or T6**

 **II 2 D IP 65 T 80 °C or 95 °C**

The combination of symbols for the degrees of protection depends on the degrees of protection of the various components used.

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Tel.: 03731 3805-0 - Fax 03731 23650

Explosion Protection Certification Body

By
[handwritten signature]
(Dr. Lösch)

Circular seal:
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Freiberg, 15.11.2002

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Annex

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IBExU02ATEX1126

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[13] **Annex**

[14] **to EC TYPE TEST CERTIFICATE IBExU02ATEX1126**

[15] **Description of the equipment or protective system**

The EEx limit monitor converts mechanical positions of a shaft to electrical signals. It consists of an enclosure with In-creased Safety degree of protection or, in the intrinsically safe configurations, it is of industrial quality. The enclosure is fitted with transducers such as switches or initiators as well as other components.

Technical data:

Rated voltage: up to 750 V ^{*)}
Rated frequency: AC 50 Hz / 60 Hz or DC ^{*)}
Rated current: up to 7 A ^{*)}
Ambient temperature range: -20°C to +40°C
Extended: -55°C to +70°C
Degree of protection to EN 60529: at least IP65
^{*)} depending on components used

The figures are maximum values and the actual electrical figures are determined by the electrical equipment installed. The manufacturer defines the final ratings within the scope of these limits and thus ensures compliance with the maximum surface temperature and permissible operating temperature of the components.

The actual ambient temperature range depends on the permissible temperature range of the various components used.

Test documents

- 1 Description (7 sheets) dated 02.07.2002, signed on 09.08.2002
- 2 Drawing no. 01-31A1-6501 dated 08.08.2002, signed on 09.08.2002
- 3 Parts list no. 31-31A1-6501St dated 02.07.2002, last change on 02.11.2002, signed on 04.11.2002

[16] **Test report**

The test results were recorded in the confidential test report IB-02-3-567 dated 15.11.2002.

Summary of test results:

EEx limit monitor Type 07-31A-..../.... to 07-31E-..../.... meet the explosion protection requirements for equipment in equipment group II and equipment categories 2 G and 2 D.

Safety information

- The required degree of protection, at least IP 54 or IP 6X, during installation and operation is only achieved if cable and conduit entries tested and certified for explosion protection are used properly. Openings not required for cable and conduit entries must be sealed off by suitable plugs tested and certified for explosion protection.

[17] **Special conditions for safe use**

None

[18] **Basic safety and health requirements**

Met by compliance with standards (see [9]).

By
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Freiberg, 15.11.2002

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IBExU02ATEX1126

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[1] 1st Extension to



EC TYPE TEST CERTIFICATE IBExU02ATEX1126

- [2] Equipment: EEx limit monitor
Type 07-31A*-****/**** to 07-31E*-****/****
- [3] Manufacturer: BARTEC GmbH
previously BARTEC Componenten und Systeme GmbH
- [4] Address: Max-Eyth-Strasse 16
D-97980 Bad Mergentheim

[5] Extensions/modifications

A sealing material for the service temperature range of -55°C to +100°C was added.

Temperature class T4 may only be used for the installation of suitably certified intrinsically safe circuits. The marking has been changed accordingly.

[6] Test result

The proof of explosion protection of the modifications/extensions to the EEx limit monitor is provided in test report IB-03-3-699 dated 16.12.2003. The test documents constitute an integral part of the test report, where they are listed.

Limit monitors EEx Type 07-31A*-****/**** to 07-31E*-****/**** continue to meet the explosion protection requirements for equipment in equipment group II and equipment categories 2G and 2D.

The stipulations contained in EC Type Test Certificate IBExU02ATEX1126 including Annex must be observed.

[7] The marking of the limit monitors with intrinsically safe components has been changed as follows:

II 2G EEx e d m ia or ib IIC T6, T5 or T4

The combination of symbols for the degrees of protection depends on the degrees of protection of the various components used.

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Freiberg, 16.12.2003

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1st Extension to IBExU02ATEX1126

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[1] **2nd Extension to**



EC TYPE TEST CERTIFICATE IBExU02ATEX1126

- [2] Equipment: EEx limit monitor
Type 07-31A*-*-* */* to 07-31E*-*-* */*
- [3] Manufacturer: BARTEC GmbH
- [4] Address: Max-Eyth-Strasse 16
D-97980 Bad Mergentheim

[5] **Extensions**

EEx limit monitor Type 07-31A*-*-* */* to 07-31E*-*-* */* has been extended to include Type 07-31M*-*-* */*. The latter consists of an aluminium enclosure with Increased Safety "e" degree of protection, in which terminals and switches have been installed. The openings in the enclosure wall are either provided with cable and conduit entries or with a cable and conduit entry and a plug component. The components fitted inside and mounted are certified separately. EEx limit monitor Type 07-31M*-*-* */* may also be used in areas where an explosive atmosphere of dust/air mixtures can be expected to occur occasionally.

Technical data:

Rated voltage to	400 V	
Rated operating voltage	250 V	250 V
Rated operating current	4 A	0.15 A
Service category	AC-15	DAC-13
Thermal rated current	6 A	
Ambient temperature range (depending on sealing rings used and components mounted)	-30°C to +60°C or -55°C to +60°C	
Degree of protection to EN 60529	IP 65	

[6] **Test result**

The proof of explosion protection for the added type 07-31M*-*-* */* is provided in test report IB-03-3-699 dated 16.12.2003. The test documents constitute an integral part of the test report, where they are listed.

EEx limit monitor Type 07-31M*-*-* */* meets the explosion protection requirements for equipment in equipment group II and equipment categories 2G and 2D.

The stipulations contained in EC Type Test Certificate IBExU02ATEX1126 including Annex must be observed.

[7] The marking of EEx limit monitor Type 07-31M*-*-* */* is:

II 2 G EEx ed IIC T6 T _a -30°C to +60°C	/	II 2 D IP 65 T 80 °C T _a -55°C to +60°C
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Freiberg, 16.12.2003

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[1] **3rd Extension to**



EC TYPE TEST CERTIFICATE IBExU02ATEX1126

- [2] Equipment: EEx limit monitor
Type 07-31A*-*-* */* to 07-31E*-*-* */* and 07-31M*-*-* */*
- [3] Manufacturer: BARTEC GmbH
- [4] Address: Max-Eyth-Strasse 16
97980 Bad Mergentheim
Germany

[5] **Extension**

EEx limit monitor Type 07-31D*-*-* */* may be used in an ambient temperature range of -55°C to +60°C, depending on the seal used.

[6] **Test result**

The proof of explosion protection for the extension to the EEx limit monitor is provided in test report IB-04-3-359 dated 21.01.2005. The test documents constitute an integral part of the test report, where they are listed.

Summary

EEx limit monitor Types 07-31A*-*-* */* to 07-31E*-*-* */* and 07-31M*-*-* */* continue to meet the explosion protection requirements for equipment in equipment group II and equipment categories 2G and 2D.

Safety information

- If EEx limit monitor Type 07-31D*-*-* */* is used in an ambient temperature range of -55°C to +60°C, the components used must also be suitable for that temperature range.
- The stipulations contained in EC Type Test Certificate IBExU02ATEX1126 including Annex must be observed.

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Freiberg, 21.01.2005

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3rd Extension to IBEx-
U02ATEX1126

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[1] **4th Extension to**



EC TYPE TEST CERTIFICATE IBExU02ATEX1126

- [2] Equipment: Ex limit monitor
Type 07-31A*-****/**** to 07-31E*-****/**** and 07-31M*-****/****
- [3] Manufacturer: BARTEC GmbH
- [4] Address: Max-Eyth-Strasse 16
97980 Bad Mergentheim
GERMANY

[5] **Extension**

Ex limit monitor Types 07-31A*-****/**** to 07-31E*-****/**** and 07-31M*-****/**** also meet the requirements of standard series EN 60079.
The equipment series was extended to include two enclosure sizes, a printed circuit and a remote position indicator.

[6] **Test result**

The proof of explosion protection for the Ex limit monitor is provided in test report IB-05-3-272 dated 05.01.2006. The test documents constitute an integral part of the test report, where they are listed.



Summary

IBExU certifies that the equipment specified in [2] meets the basic safety and health requirements laid down in Annex II of Directive 94/9/EC by compliance with EN 60079-0:2004, EN 60079-1:2004, EN 60079-7:2003, E IEC 60079-11:2004, EN 60079-18:2004, prEN 61241-0:2002 and EN 61241-1:2004.

Safety information

- If Ex limit monitor Types 07-31A*-****/**** and 07-31D*-****/**** are used in an ambient temperature range of -55°C to +60°C, the components used must also be suitable for that temperature range.
- The stipulations contained in EC Type Test Certificate IBExU02ATEX1126 including Annex and its extensions must be observed.
- All separately approved Ex components used must also meet the requirements of standard series EN 60079.

[7] The marking of the Ex limit monitor specified in [2] is:

 II 2G Ex e d ia or ib ma or mb II T6 or T5
 II 2 D Ex tD A21 IP6X T 80 °C, 90 °C or 95 °C
-55 °C ≤ T_a ≤ 60 °C

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Freiberg, 06.01.2006

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4th Extension to IBExU02ATEX1126

Declaration in compliance with EU-Directives

The manufacturer

EBRO Armaturen

Gebr. Bröer GmbH
Karlstrasse 8
58135 Hagen
Deutschland

declares that the products:

Limiting values transmitter for quarter turn actuators

Type: MSK 03Ex / MSK04Ex / MSK 05Ex / MSK 06Ex

NSK 03Ex / NSK 04Ex / NSK 05Ex / NSK 06Ex

in accordance with the requirements of the following standards:

EN 60079-0 :2004

EN 60079-1 :2004

EN 60079-7 :2003

EN 60079-18 :2004

E IEC 60079-11 :2004

prEN 61241-0 :2002

EN 61241-1 :2004

EN 60947-5-2

EN 60947-5-6

Explosive atmospheres

Explosive atmospheres

Electrical apparatus for use in the presence of combustible dust

Low-voltage switchgear and controlgear

Product documents are available on the following:

Planning documentation, Technical datasheets, catalogue pages

These products comply with the following directives:

94/9/EG

Equipment and protective systems in hazardous areas



II 2G Ex e d ia oder ib ma oder mb IIC T6 oder T5



II 2D Ex tD A21 IP 6X T80°C, 90°C oder 95°C

73/23/EEC

Directive Low Voltage Directive

89/336/EWG

Electromagnetic compatibility (EMC)

Hagen, 4.12.2009


Dirk Mischnick, Managing Director