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Technical Documentation
TT-108

Silicone Keyboard Ex i

TT-108

19.3.2013

Operating Instructions

Contents

General Information

1 In short

Advantages of keyboard TT-108:

- Suitable for hazardous areas zone 1 and 2
- Well palpable keys, easy to find even with gloves
- Switch point easy to feel
- Case without gaps and edges, easy to clean
- Case, lead and plug material (silicone) resistant against most chemical fluids
- Dust and water proof, e.g. IP 68 (immersion)
- Suitable intrinsically safe interface and supply available (TW-100D)

2 Delivery components

Delivery includes:

- Keyboard TT-108 (only available in black)
- Manual

Technical Data

3 Data for Hazardous Areas:

- Type: TT-108
- II 2 G Ex ia IIC T4
- II 2 D Ex tD A21 IP68 T79℃
- -20℃ ≤ T_{amb} ≤ +50℃
- IBExU 05 ATEX 1084 X

- U_i ≤ 5,4 V
- I_i ≤ 250 mA
- P_i ≤ 1,2 W
- ΣC_i ≤ 13 µF
- ΣL_i ≤ negligible

Meaning of the Marking for Hazardous Areas:

II	2	G	Ex ia	IIC	T4
Group II = all areas without mining	Category 2 = zone 1 (frequent or long lasting explosive atmosphere)	Gas atmosphere	i = intrinsically safe a = two-failure safety	Hydrogen (the most ignitable gas)	Surface temperature less than 135℃

II	2	D	Ex tD	A21	IP68	T79℃
Group II = all areas without mining	Category 2 = zone 1 (frequent or long lasting explosive atmosphere)	Conductive / explosive dust	protected by enclosure (tight)	Test procedure A for zone 21 (and 22)	Dust and water proof, see below.	Maximum possible surface temperature

IBExU	05	ATEX	1084	X
Marking of the test board	Year of approval	Tested according to ATEX	Certificate number	Special conditions (see next page)

Feet for grounding

The metal bottom of the case must be grounded to avoid "isolated capacities" to be charged. Therefore the two feet of the case close to the cable outlet are electrically connected with the metal bottom of the case, which must have a conductive connection with the desktop. The user is responsible for the sufficient ground connection of the desktop.

IP codes
The marking may be IP66, IP68 and IP69k simultaneously, see certificate sections (12) and (15), which means, that there are no different keyboard versions for special IP codes. Meanings of the codes:

IP6...: Dust proof, complete contact protection

IP...6: Tall seas / strong water beam

IP...8: Total immersion, for TT-108: 1 hour at 1 m below water surface

IP...9k: Water beam from 4 directions with >80 bar und 80℃

Wall thickness is generally more than 5 mm, but much less around the keys and the lamps. Even hardly visible damages may decrease the IP protection here and make the dust protection become invalid. Please watch these areas.

Special Conditions ("X"):

Intrinsically Safe Supply and Data Transmission
TT-108 must be supplied by an Ex i interface with isolated (from the mains) power and data lines, according to the above mentioned data for hazardous areas. This is also valid for the dust protected version. We recommend TW-100D for interface installation in the safe area or TW-100Dm for installation inside of hazardous areas.

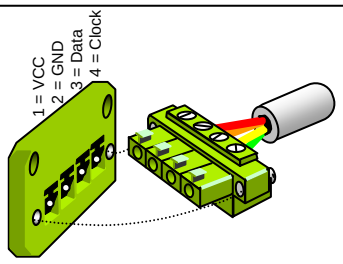
No plugging and unplugging inside of hazardous areas
because of possible discharging of hidden capacities.

Cleaning
Please clean the keyboard with a damp cloth or a soft brush. Cleaning only outside of hazardous areas because of possible charging of the cleaning tool !

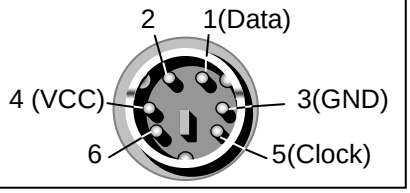
4 Electrical and Mechanical Data

- Dimensions: 390 x 151 x 22 mm
- Weight: 1280 g
- Cable length: approx. 2 m

Signals and numbers of the "Combicon" type input plug of Ex i interface TW-100D



Signals und numbers of the PS/2 plug



Appendix

5 Safety Advices

Read the manual completely and carefully before operation. Only the latest documentation is valid.

Installation, maintenance and cleaning of the units must only be performed by persons trained and authorized for this purpose, insofar as they are familiar with the units.

If it can be assumed that safe operation is no longer possible, switch off the unit and secure it against being used again.

It is prohibited for the operator or his staff to open the units in a way that is not described in this manual. This may only be done by specifically authorized personnel of E.L.B. Ex-Geräte GmbH & Co. KG.

Modifications and conversions to the units are not permissible and will cause the Ex protection and the guarantee to become void.

E.L.B. Ex-Geräte GmbH & Co. KG is not liable for any consequential damage.

The technical data specified for hazardous areas comply with the values certified in the European EEx approval. The user bears the sole responsibility of examining the equipment with regard to its suitability for the intended application and environmental conditions. E.L.B. Ex-Geräte GmbH & Co. KG accepts no liability for any lack of suitability.

For the installation, maintenance and cleaning of the units, it is absolutely necessary to observe the applicable ordinances and provisions concerned with explosion protection as well as the Accident Prevention Regulations and codes of practice in your region.

Further advices see chapter 3.

6 Liability

The technical data specified for hazardous areas comply with the values certified in the European EEx approval. The user bears the sole responsibility of examining the equipment with regard to its suitability for the intended application and environmental conditions. E.L.B. Ex-Geräte GmbH & Co. KG accepts no liability for any lack of suitability.

7 EC Declaration of Conformity

EC Declaration of Conformity

CE We hereby confirm the conformity of the equipment listed below with the directives of the Council of the European Community. The safety and installation instructions of the product documentation must be observed.

Model: **Keyboard TT-108**

Directive: **EMC Directive 2004/108/EG**

European Standards: EN 55022: 2008-07
EN 55024: 2003-10

Directive: **Low Voltage Directive 2006/95/EC**

European Standards: EN 60950: 2011-01

Directive: **94/9/EC**

European Standards:

EN 60079-0: 2012	Basic standard
EN 60079-11: 2012	Intrinsic safety „i“
EN 60079-31: 2009	Dust ignition protection by enclosure „t“

(The former dust protection standards EN 61241-0 and EN 61241-11 have been included in EN 60079-0 / EN 60079-11.)

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IBExU Institut für Sicherheitstechnik GmbH
An-Institut der TU Bergakademie Freiberg

[1] **EC-TYPE EXAMINATION CERTIFICATE**
according to Directive 94/9/EC, Annex III
(Translation)

[2] Equipment and Protective Systems intended for use in Potentially Explosive Atmospheres, Directive 94/9/EC

[3] EC-Type Examination Certificate Number: **IBExU05ATEX1084 X**

[4] Equipment: Keyboard
type TT-108

[5] Manufacturer: E.L.B. Ex-Geräte Bachmann GmbH & Co. KG

[6] Address: An der Hartbrücke 8
64625 Bensheim, Germany

[7] The equipment mentioned in [4] and any acceptable variation thereto are specified in the schedule to this EC-Type Examination Certificate.

[8] IBExU Institut für Sicherheitstechnik GmbH, NOTIFIED BODY number 0637 in accordance with article 9 of the Council Directive 94/9/EC of 23th 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 the equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in the test report IB-05-3-051 of 1st June 2005.

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 50014:1997+A1 +A2 and EN 50020:2002 and EN 500281-1-1:1998 +A1.

[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 under [17] in the schedule to this EC-Type Examination Certificate.

[11] This EC-Type Examination Certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this directive apply to the manufacture and supply of this equipment.

[12] The marking of the equipment mentioned in [4] shall include the following:

Ex II 2G EEx ia IIC T4
Ex II 2D T 79 °C IP 68
-20 °C ≤ Ta ≤ +50 °C

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Authorised for certifications Explosion protection
By order

(Dr. Lösch)

- Seal-
(ID no. 0637)

Freiberg, 6th June 2005

Certificates without signature and seal are not valid.
Certificates may only be duplicated completely and unchanged. In case of dispute, the German text shall prevail.

Schedule

[13] **Schedule**

[14] **to the EC-TYPE EXAMINATION CERTIFICATE IBExU04ATEX1084 X**

[15] **Description of the equipment**

The keyboard is an intrinsically safe apparatus and serves for the control of a PC in explosive areas. It consists of a silicon housing with aluminium-base plate, keys and 3 LED. The keyboard is intrinsically safe provided by associated apparatus.

Electrical data

Ambient temperature range:	up -20 °C to +50 °C
Degree of protection:	IP 66, IP 68 and IP 69k

Intrinsically safe input electric circuit:

U_i	≤ 5.4 V
I_i	≤ 250 mA
P_i	≤ 1.2 W
C_i	= 13 µF
L_i	negligible

[16] **Test report**

The test results are recorded in the test report IB-05-3-051 of 1st June 2005. The test documents are component of the test report and listed there.

Summary of the Test Result:

The keyboard type TT-108 fulfils the requirements of the Type of protection Intrinsic Safety for an explosion-proof electrical apparatus for Equipment Group II , Category 2G (Explosion Group of IIC, Temperature Class T4) as well as the regulations for protection of dust explosion of the Category 2D.

Safety instruction
In the operator's manual for the handling are instructions to be followed.

[17] **Special conditions**

The keyboard is not allowed to clean dry or plugged on in the explosive areas or explosive atmospheres.
For connection only galvanically isolated 'ia'- current sources are allowed.
The plug connection of the keyboard TT-108 must be outside of explosive dust areas or according to IP 6X.

[18] **Essential Health and Safety Requirements**

Confirmed by norms (see [9]).

By order

(Dr. Lösch)

Freiberg, 6th June 2005

[1] **1st Addition to**
EC-TYPE EXAMINATION CERTIFICATE IBExU05ATEX1084 X
according to Directive 94/9/EC, Annex III
(Translation)

[2] Equipment: **Keyboard**
Type TT-108

[3] Manufacturer: E.L.B. Ex-Geräte Bachmann GmbH & Co. KG

[4] Address: An der Hartbrücke 8
64625 Bensheim
Germany

[5] **Additions / Modifications**

The additions / alterations of the equipment mentioned under [2] compared with the certified equipment concern in particular:

a) The Keyboard fulfils the requirements of the standard series EN 60079 and EN 61241.
b) The marking was adapted to the current state.

All other electrical and mechanical parameters remain unchanged.

[6] **Test Report**

The proof of the explosion protection of the additions stated under [5] is documented in the Test Report IB-08-3-353 of 30 March 2009. The test documents are part of the Test Report and listed there.

[7] **Test result**

IBExU certifies, that the equipment stated under [2] fulfils the Essential Health and Safety Requirements of Directive 94/9/EC, Annex II, by compliance with EN 60079-0:2006, EN 60079-11:2007, EN 61241-0:2006 and EN 61241-1:2004.

The keyboard Type TT-108 mentioned under [2] fulfils the requirements of the Type of protection Intrinsic Safety for an explosion-proof electrical apparatus for Equipment Group II, Category 2G (Explosion Group IIC, Temperature Class T4) as well as the regulations for dust explosion protection of the Category 2D in the Type of protection Protection by enclosures "tD".

The marking of the equipment mentioned under [2] must contain the following details:

II 2G Ex ia IIC T4
II 2D Ex tD A21 IP68 T79 °C
-20 °C ≤ Ta ≤ +50 °C

This addition is only valid in connection with the EC-Type Examination Certificate IBExU05ATEX1084 X of 6 June 2005.

The special conditions and safety instructions mentioned in the EC-Type-Examination Certificate have to be taken into account furthermore.

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Authorized for certifications
- Explosion protection -

By order

(Dr. Wagner)

- Seal-
(ID no. 0637)

Freiberg, 30 March 2009

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