Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(1) # EC-TYPE-EXAMINATION CERTIFICATE

(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 02 ATEX 2051

(4) Equipment: Analog output, type AO41Ex and type AOH40Ex

(5) Manufacturer: Hans Turck GmbH & Co KG

(6) Address: 45472 Mülheim/Ruhr, Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC 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 confidential report PTB Ex 02-22059.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 + A1 + A2 **EN 50020:1994**

(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 the 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 2(1)G EEx ib[ia] IIC T4

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, April 29, 2002

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 24

(13) # SCHEDULE

(14) ## EC-TYPE-EXAMINATION CERTIFICATE PTB 02 ATEX 2051

(15) Description of equipment

The 4-channel analog output, type AOH40Ex and AO41Ex, is part of the excom field bus system for the module racks, type MT... , as specified in PTB 00 ATEX 2194 U. In conjunction with this module rack unit, the 4-channel analog output may only be operated within the excom system.

The analog output modules of type AOH40Ex are produced as HART versions. They are used to control actuators in a process engineering environment with digital HART communication.

The analog output modules of type AO41Ex are also used to control actuators in a process engineering environment, however without using HART communication.

All modules are used to safely electrically isolate intrinsically safe field circuits of category "ia" from intrinsically safe bus and supply circuits of category "ib".

The field circuits are electrically isolated from the supply circuit and the CAN bus.

The ambient temperature range is –20 °C ... +70 °C.

Electrical data

I) Supply circuit

Plug connector X101, connecting pins 15, 16
Only for connection to the certified intrinsically safe circuit as detailed in PTB 00 ATEX 2194 U, designed to type of protection Intrinsic Safety EEx ib IIC, with the following maximum values:

U_{max} = 20 V AC (amplitude)
f = 307 kHz ± 5 KHz
P ≈ 2.5 W (power consumption)

The intrinsically safe AC supply circuit is electrically isolated from the intrinsically safe field circuits and the CAN signal circuits of the module, as shown in table 4, EN 50020.

II) Signal circuit (CAN bus) (internal circuit only; no external connections)

III) Address coding circuit (internal circuit only; no external connections)

IV) Field circuit for types AOH40Ex and AO41Ex for passive actuators

Terminals on the system module rack

Channel 1: 1, 2
Channel 2: 5, 6
Channel 3: 9, 10
Channel 4: 13, 14

type of protection Intrinsic Safety
EEx ia IIC / IIB or EEx ib IIC / IIB
Maximum values for each channel:

U_o = 22.1 V
I_o = 93 mA
P_o = 403 mW

Output characteristic: trapezoidal with:

U_Q = 27.54 V
R = 300 Ω
effective internal capacitance: $C_i \leq$ 1.1 nF
effective internal inductance: $L_i \leq$ 0.22 mH

For the external capacitance C_O and the external inductance L_O, the following maximum permissible values apply, the effective internal values having already been considered:

Type of protection	EEx ia and EEx ib	
Group	IIC	IIB
L_O	1.78 mH	1.78 mH
C_O	100 nF	500 nF

All the channels of the field circuits are electrically interconnected via earth. The channels of the four intrinsically safe field circuits are safely isolated from one another up to a voltage of 30 V, as shown in table 4, EN 50020. This means that the above tabulated values apply to each channel.

(16) Test report PTB Ex 02- 22059

(17) Special conditions for safe use

None

(18) Essential health and safety requirements

Covered by Standards.

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, April 29, 2002

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

1st SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 02 ATEX 2051

(Translation)

Equipment: Analog output, types AOH40Ex and AO41Ex

Marking: ⟨Ex⟩ **II 2(1)G EEx ib [ia] IIC T4**

Manufacturer: TURCK, Hans, GmbH &Co KG

Address: Witzlebenstraße 7, D-45472 Mülheim, Germany

Description of supplements and modifications

The 4-channel analog output modules, types AOH40Ex and AO41Ex, of the excom system may in future be manufactured in compliance with the test documents listed in the test report.

The modifications concern the revised documentation as well as the output power of the field circuits.

All other details remain unaffected by the modifications.

Electrical data

IV) Field circuits for types AOH40Ex and AO41Ex for passive actuators

Terminals at the
system module rack (X102)
Channel 1: 1, 2
Channel 2: 5, 6
Channel 3: 9, 10
Channel 4: 13, 14

type of protection Intrinsic Safety
EEx ia IIC / IIB or EEx ib IIC / IIB
Maximum values per channel:
U_o = 22.1 V
I_o = 93 mA
P_o = 640 mW
Output characteristic: trapezoidal, with
U_Q = 27.54 V
R = 298 Ω
Effective internal capacitance: $C_i \leq$ 1.1 nF
Effective internal inductance: $L_i \leq$ 0.22 mH

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1st SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 02 ATEX 2051

The maximum values of the external capacitance C_O and the external inductance L_O are shown in the table below. They already consider the effective internal values.

Type of protection	EEx ia and EEx ib	
Group	IIC	IIB
L_O	1.78 mH	1.78 mH
C_O	100 nF	500 nF

All the channels of the field circuits are electrically interconnected via ground. The channels of the four intrinsically safe field circuits are safely electrically isolated from each other up to a voltage of 30 V as shown in EN 50020, table 4. The values specified in the table above thus apply to each channel.

Test report: PTB Ex 03-23312

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, November 12, 2003

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

2nd SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 02 ATEX 2051

(Translation)

Equipment: Analog output, types AO41Ex and AOH40Ex

Marking: Ⓔx **II 2 (1) G EEx ib [ia] IIC T4**

Manufacturer: Hans TURCK GmbH & Co.KG

Address: Witzlebenstraße 7, D-45472 Mülheim an der Ruhr, Germany

Description of supplements and modifications

Subject-matter of this 2nd supplement is the revision and completion of the test documents for organisational reasons.

All other specifications apply also for this 2nd supplement.

Test report: PTB Ex 04-23353

Zertifizierungsstelle Explosionsschutz
By order:

(signature)

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, July 5, 2004

1 page, correct and complete as regards content.
By order:

Dr.-Ing. Johannsmeyer
Direktor und Professor

Braunschweig, July 12, 2005

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 24

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3rd SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 02 ATEX 2051

(Translation)

Equipment: Analog output, types AO41Ex and AOH40Ex

Marking: ⟨Ex⟩ **II 2 (1) G EEx ib [ia] IIC T4**

Manufacturer: Hans TURCK GmbH & Co.KG

Address: Witzlebenstraße 7, D-45472 Mülheim an der Ruhr, Germany

Description of supplements and modifications

In the future the analog output modules, types AO41Ex and AOH40Ex may also be manufactured according to the test documents listed in the test report.

The modifications concern the internal and external construction and the alteration of the type designation and the marking for organisational reasons.

In the future the equipment will be labelled corresponding to the model type with the following type designation:

8/AO41Ex and **8/AOH40Ex**

In the future the equipment will be labelled with the following marking:

⟨Ex⟩ **II 2 (1 G/D) G EEx ib [ia] IIC T4**

All other specifications apply also for this 3rd supplement.

Test report: PTB Ex 04-23347

Zertifizierungsstelle Explosionsschutz
By order:

(signature)

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, July 5, 2004

1 page, correct and complete as regards content.
By order:

Dr.-Ing. Johannsmeyer
Direktor und Professor

Braunschweig, July 7, 2005

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4. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 02 ATEX 2051

(Translation)

Equipment: Analog output, type AO41Ex and AOH40Ex

Marking: ⟨Ex⟩ **II 2 (1 G/D) G EEx ib [ia] IIC T4**

Manufacturer: Hans Turck GmbH & CO KG

Address: Witzlebenstrasse 7, 45472 Mülheim, Germany

Description of supplements and modifications

Safety-relevant components have been modified in the analog output modules, type AO41Ex and AOH40Ex respectively variant 8/AO41Ex and 8/AOH40Ex.

All other specifications apply without changes also for this 4th supplement.

Test report: PTB Ex 07-27099

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

Braunschweig, April 19, 2007

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

5. S U P P L E M E N T

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 02 ATEX 2051

(Translation)

Equipment: Analog output, type AO41Ex and type AOH40Ex

Marking:  **II 2 (1) G Ex ib [ia Ga] IIC T4 Gb and II (1) D [Ex ia IIIC Da] or**
II 2 (1) G Ex ib [ia] IIC T4 and II (1) D [Ex ia IIIC]

Manufacturer: Hans Turck GmbH & Co.KG

Address: Witzlebenstraße 7, 45472 Mülheim an der Ruhr, Germany

Description of supplements and modifications

In the future the analog outputs of types AO41Ex and AOH40Ex may also be manufactured according to the test documents listed in the test report.

The modifications concern the internal and external design.

All other specifications of the EC-type examination certificate and its supplements as well as the notes for manufacture and operation apply without changes.

The permissible range of the ambient temperature is -20 °C up to +60 °C.

Electrical data

I) AC-supply circuit..... type of protection Intrinsic Safety Ex ib IIC
(terminals 15/16) only for connection to the certified intrinsically safe circuit according to PTB 00 ATEX 2194 U

Maximum values:

U_{max} = 20 V AC (amplitude)
f = 307 kHz ± 5 KHz
P ≈ 2.5 W (power consupmtion)

The AC-supply circuit is electrically isolated from the intrinsically safe field circuits up to a voltage of 60 V and separated from the CAN-signal circuits according to EN 60079-11, table 5.

II) Signal circuit (CAN-Bus)..... system-internal circuit designed to type of
(terminals CAN-Bus 1: 9/10 protection Intrinsic Safety Ex ib IIC
terminals CAN-Bus 2: 11/12) without external connection facilities

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5. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 02 ATEX 2051

The signal circuit (CAN supply) is safely electrically isolated from all other intrinsically safe circuits up to a voltage of 30 V (EN 60079-11, table 5)

The signal circuit (bus-line 1) and the signal circuit (bus-line 2) are safely separated from each other up to a voltage of 30 V according to EN 60079-11, table 5. They are, however, electrically interconnected (only) in the module.

III) Adress coding..... system-internal circuit designed to type of protection Intrinsic Safety Ex ib IIC without external connection facilities

IV) Field circuits ..... type of protection Intrinsic Safety Ex ia IIC or Ex ia IIIC

channel 1: +19/-21, terminals +11/-12
channel 2: +13/-15, terminals +21/-22
channel 3: +7/-9, terminals +31/-32
channel 4: +1/-3, terminals +41/-42)

Maximum values per channel:

U_o = 22.1 V
I_o = 93 mA
P_o = 640 mW

trapezoidal output characteristic with

U_Q = 27.54 V
R = 292 Ω
C_i = 1.1 nF
L_i = 220 µH

For relationship between level of protection and external reactances, reference is made to the following table. The effective internal values are already considered.
(Basis: limiting curves given in report PTB-ThEx-10)

	Ex ia or Ex ib	
	IIC/IIIC	IIB/IIIC
L_o	0.5 mH	2 mH
C_o	65 nF	270 nF

All channels of the field circuits are electrically interconnected via ground inside the module. The channels of the four intrinsically safe field circuits are safely separated from each other at the output side up to a voltage of 30 V according to table 5, EN 60079-11. Therefore, the values tabulated above apply to each channel (no interconnection).

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5. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 02 ATEX 2051

Applied standards

EN 60079-0:2009 **EN 60079-11:2007** **EN 61241-11:2006**

Assessment and test report: PTB Ex 11-21009

Zertifizierungssektor Explosionsschutz
On behalf of PTB:

Braunschweig, August 17, 2011

Dr.-Ing. U. Johannsmeyer
Direktor und Professor