Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

(1) # EU-TYPE-EXAMINATION CERTIFICATE

(Translation)

(2) Equipment or Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

PTB 03 ATEX 2217 **Issue: 1**

(4) Product: Excom modul, type AI401Ex

(5) Manufacturer: Hans Turck GmbH & Co. KG

(6) Address: Witzlebenstraße 7, 45472 Mülheim an der Ruhr, Germany

(7) This product and any acceptable variation thereto is 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 17 of the Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential Test Report PTB Ex 17-26241.

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

EN 60079-0:2012+A11:2013 **EN 60079-11:2012**

(10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions of Use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the specified product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

(12) The marking of the product shall include the following:

Ex II 2(1) G Ex ib [ia Ga] IIC T4 Gb or Ex ib [ia Ga] IIC T4

II (1) D [Ex ia Da] IIIC or [Ex ia] IIIC

Konformitätsbewertungsstelle, Sektor Explosionsschutz Braunschweig, October 25, 2017
On behalf of PTB:

Dr.-Ing. F. Lienesch
Direktor und Professor

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 56

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(13) # SCHEDULE

(14) **EU-Type Examination Certificate Number PTB 03 ATEX 2217, Issue: 1**

(15) Description of Product

The Excom module, type AI401Ex is an analog input module which converts analog signals from sensors in intrinsically safe field circuits into binary signals for further processing in field bus systems. It provides inputs for active sensors and inputs for passive sensors.

It is designed in type of protection Intrinsic Safety "i" and it is intended to be used within the I/O Fieldbus system type excom® with the module subrack, type MT according to PTB 00 ATEX 2194 U.

The excom module, type AI401Ex ensures the electrical isolation for the various circuits. These isolate the external field circuits from the internal data buses and the internal supply voltage.

The operation of the excom module, type AI401Ex inside of an enclosure with a degree protection of at least IP54 is ensured by the application within the I/O Fieldbus system type excom® in potentially explosive atmospheres.

The permissible ambient temperature range is: -20°C up to +70°C

Electrical data

I.)	**AC-supply circuit**	type of protection Intrinsic Safety Ex ib IIC; only for connection to the module subrack, type MT according PTB 00 ATEX 2194 U P = 2.2 W (power consumption)

The intrinsically safe AC-supply circuit is safely electrically isolated from ground and up to a peak value of the nominal voltage of 60V from all other intrinsically safe circuits.

II.)	**Signal circuit (CAN-BUS)**	type of protection Intrinsic Safety Ex ib IIC; only for connection to the module subrack type MT according PTB 00 ATEX 2194 U
III.)	**Address encoding**	type of protection Intrinsic Safety Ex ib IIC; only for connection to the module subrack type MT according PTB 00 ATEX 2194 U

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2217, Issue: 1

IV.) Field circuits

Inputs for active sensors

Channel 1: 13+ , 14-
Channel 2: 23+ , 24-
Channel 3: 33+ , 34-
Channel 4: 43+ , 44-

type of protection Intrinsic Safety
[Ex ia Ga] IIC/IIB or [Ex ia Da] IIIC
maximum values per channel:

U_o = 6 V

I_o = 2.5 mA

P_o = 4 mW

linear characteristic

C_i negligibly low

L_i negligibly low

maximum values for common external reactances:

(the values below correspond to the ISpark program 6.2)

	IIC	IIB
L_o (mH)	C_o (µF)	C_o (µF)
5	2	10
2	2.3	12
1	2.6	14
0.5	3	17
0.2	3.7	22

or

for interconnection of the field circuits with active sensors

type of protection Intrinsic Safety Ex ia IIC/IIB or Ex ia IIIC according to separate certificate

maximum values per channel:

U_i = 30 V

I_i = 107 mA

P_i = 644 mW

V.) Field circuits

Inputs for passive sensors

Channel 1: 11+ , 12-
Channel 2: 21+ , 22-
Channel 3: 31+ , 32-
Channel 4: 41+ , 42-

type of protection Intrinsic Safety
[Ex ia Ga] IIC/IIB or [Ex ia Da] IIIC
maximum values per channel:

U_o = 19 V

I_o = 90 mA

P_o = 615 mW

C_i negligibly low

L_i negligibly low

maximum values for common external reactances:

(the values below correspond to the ISpark program 6.2)

	IIC	IIB
L_o (mH)	C_o (µF)	C_o (µF)
2	---	0.97
1	---	0.97
0.5	0.12	0.97
0.2	0.17	1.1
0.1	0.20	1.3

All four channels may also be connected to the inputs to **IV) field circuits** with active intrinsically safe circuits whose intrinsically safe values do not exceed the aforementioned parameters. Only passive intrinsically safe circuits may be connected to the inputs to **V) field circuits**.

Either one passive sensor or one active sensor shall be assigned to each channel.

The intrinsically safe channels of the field circuits are safely electrically isolated from ground and from each other and - up to a peak value of the nominal voltage of 60V - from all other intrinsically safe circuits. In each channel, the inputs for passive and active sensors are electrically interconnected.

Modifications

The modifications concern the adaptation to the standards. The internal structure has been adapted. The changes concern the use of alternative components in the electronic circuitry.

(16) Test Report PTB Ex 17-26241

(17) Specific conditions of use

SCHEDULE TO EU-TYPE EXAMINATION CERTIFICATE PTB 03 ATEX 2217, Issue: 1

(18) Essential health and safety requirements

Met by compliance with the aforementioned standards.

According to Article 41 of Directive 2014/34/EU, EC-type examination certificates which have been issued according to Directive 94/9/EC prior to the date of coming into force of Directive 2014/34/EU (April 20, 2016) may be considered as if they were issued already in compliance with Directive 2014/34/EU. By permission of the European Commission supplements to such EC-type examination certificates and new issues of such certificates may continue to hold the original certificate number issued before April 20, 2016.

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Dr.-Ing. F. Lienesch
Direktor und Professor

Braunschweig, October 25, 2017

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 03 ATEX 2217

(4) Equipment: Analog input, type AI40Ex...

(5) Manufacturer: Hans Turck GmbH & Co KG

(6) Address: Witzlebenstr. 7, 45472 Mülheim, 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 03-23439.

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

EN 50014:1997 + A1 + A2 **EN 50020:2002**

(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 (1G/D) G EEx ib [ia] IIC T4

Zertifizierungsstelle Explosionsschutz
By order:

(signature)

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, August 23, 2004

4 pages, correct and complete as regards content.
By order:

Dr.-Ing. Johannsmeyer
Direktor und Professor

Braunschweig, July 1, 2005

(13) # SCHEDULE

(14) ## EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 2217

(15) Description of equipment

The analog input, type AI40Ex... converts analog field signals into binary signals for the processing in fieldbus systems. Each channel provides a non-feeding input for active sensors and a feeding input for passive sensors. The module, type AI40Ex... forms part of the fieldbus system excom manufactured by Turck and shall only be operated in combination with the module subrack of type MT... according to PTB 00 ATEX 2194 U in the hazardous area of category 2G. The intrinsically safe field circuits may be conducted into areas of category 1G or 1D.

The degree of protection IP20 acc. to IEC 60529 is guaranteed when the module is plugged into the subrack MT.. .

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

The type of protection is: ⟨Ex⟩ **II 2 (1G/D) G EEx ib [ia] IIC T4**

Electrical data

I.) AC-supply circuit
(J2:15, 16)

Only for connection to the certified intrinsically safe circuit according to PTB 00 ATEX 2194 U in type of protection Intrinsic Safety EEx ib IIC with the following maximum values:
U_{max}= 20 V AC (amplitude)
f = 300 ... 314 kHz
P = 3.5 W (input power)
P = 1.5 W (power consumption in the module)
C_i negligibly low
L_i negligibly low

The intrinsically safe AC-supply circuit is safely electrically isolated from ground and - up to a peak value of the nominal voltage of 60 V - from all other intrinsically safe circuits.

II) Signal circuit (CAN-Bus)

exclusively system-internal circuit, no external connection facilities
CAN-Bus A J2: 9, 10
CAN-Bus B J2:11, 12

III) Address encoding circuit
exclusively system-internal circuit, no external connection facilities
(soldered intrinsically safe circuitry on backplane J2:1 through 6)

IV) Field circuit for active sensors
terminal clamps at the system module subrack for:
channel 1: 3, 4 channel 2: 7, 8 channel 3: 11, 12 channel 4: 15, 16
type of protection Intrinsic Safety EEx ia IIC/IIB with the following maximum values:

$U_0 \leq 6.0$ V
$I_0 \leq 45$ mA
$P_0 \leq 68$ mW
internal capacitance: $C_i = 24.2$ nF
internal inductance: L_i negligibly low
characteristic: linear

	EEx ia IIC	EEx ia IIB
L_o (mH)	10	20
C_o (nF)	1400	7300

The following maximum values apply for the infeed from active sensors of type of protection Intrinsic EEx ia IIC/IIB:

Linear characteristic (a)
$U_i \leq 30$ V
$I_i \leq 72$ mA
$P_i \leq 540$ mW

Linear characteristic (b)
$U_i \leq 22$ V
$I_i \leq 98$ mA
$P_i \leq 540$ mW

Trapezoidal characteristic (including rectangular characteristic)
$U_i \leq 30$ V
$I_i \leq 45$ mA
$P_i \leq 540$ mW

V) **Field circuit for passive sensors, feeding**
terminal clamps at the system module subrack for:
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 with the following maximum values:

$U_0 \leq 19.1$ V
$I_0 \leq 90$ mA
$P_0 \leq 800$ mW
internal capacitance: $C_i = 24.2$ nF
internal inductance: L_i negligibly low
characteristic: trapezoidal
$R_i = 134$ Ω
$U_Q = 23.3$ V

The internal capacitance has already been considered in the following table:

	EEx ia IIC	EEx ia IIB
L_o (mH)	0.20	1.00
C_o (µF)	0.125	0.87

The non-feeding field circuits for active sensors and the feeding field circuits for passive sensors are electrically interconnected within the respective channel. The channels, however, are electrically isolated from each other up to a voltage of 30 V.

(16) Test report PTB Ex 03-23439

(17) Special conditions for safe use

none

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungsstelle Explosionsschutz
By order:

(signature)

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, August 23, 2004

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

1. 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 03 ATEX 2217

(Translation)

Equipment: Analog input, type AI401.. or AI40Ex...

Marking: Ⓔx **II 2 (1) G Ex ib[ia] IIC T4 and II (1) D Ex [iaD]**

Manufacturer: Hans Turck GmbH & Co. KG

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

Description of supplements and modifications

The Excom module of type AI40Ex is supplemented by type AI401.. and may in future also be manufactured according to the test documents listed in the assessment and test report.

The modifications concern the internal and external construction.

The permissible range of the ambient temperature is -20 °C ... 70 °C.

The marking has been adapted to the state of the standards.

All other specifications of the EC-type examination certificate apply without changes.

Electrical data

I.) AC-supply circuit
(J2: 15, 16)

System-internal circuit in type of protection Intrinsic Safety Ex ib IIC/IIB or Ex iaD without external connection facilities. 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 = 300 ... 314 kHz
P = 3.5 W (input power)
P = 1.5 W (power consumption in the module)
C_i negligibly low
L_i negligibly low

The intrinsically safe AC-supply circuit is safely electrically isolated from ground and - up to a peak value of the nominal voltage of 60 V - from all other intrinsically safe circuits.

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

1. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 2217

II) Signal circuit (CAN-Bus)
(J2: 9, 10 CAN-Bus A)
(J2: 11, 12 CAN-Bus B)

system-internal circuit, without external connection facilities

III) Address encoding circuit
(J2: 1...6)

system-internal circuit, without external connection facilities

IV) Field circuit for active sensors
terminal clamps at the system module subrack for:
channel 1: 3, 4
channel 2: 7, 8
channel 3: 11, 12
channel 4: 15, 16)

type of protection Intrinsic Safety Ex ia IIC/IIB or Ex iaD

Type AI401..	Type AI40Ex
$U_0 \leq$ 6.0 V	$U_0 \leq$ 6.0 V
$I_0 \leq$ 2.5 mA	$I_0 \leq$ 45 mA
$P_0 \leq$ 4 mW	$P_0 \leq$ 68 mW
linear characteristic	linear characteristic
C_i negligibly low	C_i = 24.2 n F
L_i negligibly low	L_i negligibly low

Type		Ex ia IIC	Ex ia IIB
AI401..	L_o	10 mH	20 mH
	C_o	1.9 µF	8.6 µF
AI40Ex	L_o	10 mH	20 mH
	C_o	1.4 µF	7.1 µF

The following maximum values apply to the infeed from active sensors of type of protection Intrinsic Safety Ex ia IIC/IIB or Ex iaD:

Type AI401..
$U_i \leq$ 30 V
$I_i \leq$ 107 mA
$P_i \leq$ 644 mW

Type AI40Ex
characteristic linear (a)
$U_i \leq$ 30 V
$I_i \leq$ 72 mA
$P_i \leq$ 540 mW

or (b)
$U_i \leq$ 22 V
$I_i \leq$ 98 mA
$P_i \leq$ 540 mW

characteristic trapezoidal or rectangular
$U_i \leq$ 30 V
$I_i \leq$ 45 mA
$P_i \leq$ 540 mW

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

1. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 2217

IV) **Field circuit** ..... type of protection Intrinsic Safety Ex ia IIC/IIB
for passive sensors, feeding or Ex iaD
(terminal clamps at the
system module subrack for:
channel 1: 1, 2
channel 2: 5, 6
channel 3: 9, 10
channel 4: 13, 14)

Maximum values per channel:

For relationship between type of equipment and electrical parameters, reference is made to the table

Type	AI401..	AI40Ex
U_o	19.1 V	19.1 V
I_o	90 mA	90 mA
P_o	615 mW	800 mW
R_i	304 Ω	134 Ω
C_i	negligibly low	24.2 nF
L_i	negligibly low	
characteristic	trapezoidal	

Type		Ex ia IIC	Ex ia IIB
AI401..	L_o	0.2 mH	1 mH
	C_o	0.17 µF	0.96 µF
AI40Ex	L_o	0.2 mH	1 mH
	C_o	0.125 µF	0.87 µF

The internal capacitance has already been considered with the tabulated values

The non-feeding field circuits for active sensors and the feeding field circuits for passive sensors are electrically interconnected within the respective channel. The channels, however, are electrically isolated from each other up to a voltage of 30 V.

Applied standards

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

Assessment and test report: PTB Ex 10-20066

Zertifizierungssektor Explosionsschutz
On behalf of PTB:

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

Braunschweig, August 4, 2010

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

2. SUPPLEMENT

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

to EC-TYPE-EXAMINATION CERTIFICATE PTB 03 ATEX 2217

(Translation)

Equipment: Analog input, type AI401.. or AI40Ex...

Marking: Ⓔx **II 2 (1) G Ex ib[ia] IIC T4 and II (1) D [Ex iaD]**

Manufacturer: Hans Turck GmbH & Co. KG

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

Description of supplements and modifications

The marking has been corrected.

All other specifications of the EC-type examination certificate apply without changes.

Applied standards

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

Assessment and test report: PTB Ex 10-20066

Zertifizierungssektor Explosionsschutz
On behalf of PTB:

Braunschweig, September 13, 2010

(signature)

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

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

Dipl.-Ing. Wilkens Braunschweig, October 8, 2010

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