

# Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



(1) **CERTIFICATE OF CONFORMITY**  
(2) **PTB No. Ex-95.D.2165 X**  
**(TRANSLATION)**

- (3) This certificate is issued for the electrical apparatus  
Analog sensing modules of types CAI10-Ex and CAI10-Ex.A
- (4) manufactured by **Hartmann & Braun GmbH & Co. KG**  
**D-Frankfurt**
- (5) This electrical apparatus and any acceptable variation thereto is specified in the Schedule to this Certificate of Conformity.
- (6) The Physikalisch-Technische Bundesanstalt, being an Approved Certification Body in accordance with article 14 of the Council Directive of the European Communities of December 18, 1975 (76/117/EEC), confirms that this electrical apparatus has been found to comply with the harmonized European Standards

**Electrical apparatus for potentially explosive atmospheres**

EN 50 014:1977 + A1...A5 (VDE 0170/0171 Part 1/1.87) General Requirements

EN 50 020:1977 + A1...A5 (VDE 0170/0171 Part 7/4.92) Intrinsic Safety "i"

after the apparatus has been successfully subjected to pattern evaluation. The results of this pattern evaluation have been recorded in a confidential test report.

- (7) The apparatus marking shall include the code:  
**[EEx ib] IIC**
- (8) The manufacturer shall be responsible for ensuring that any apparatus bearing the above marking conforms to the test documents specified in the Schedule to this certificate and that the routine verifications and tests prescribed have been carried out successfully.
- (9) The electrical apparatus may be marked with the Distinctive Community Mark according to Annex II to the Council Directive of February 6, 1979 (79/196/EEC). A facsimile of this mark is printed on this sheet of the certificate.

By order

Braunschweig, 09.01.1996

(signature)

Dr.-Ing. Johannsmeyer  
Oberregierungsrat

**8 pages, correct and complete as regards content.**  
By order

  
Dr.-Ing. Johannsmeyer  
Regierungsdirektor



Braunschweig, 18.06.1998

Test certificates without signature and official stamp shall not be valid.  
The certificates may be circulated only without alteration.  
Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.  
In case of dispute, the German text shall prevail.

# Physikalisch-Technische Bundesanstalt

## SCHEDULE

### to Certificate of Conformity PTB No. Ex-95.D.2165 X

The analog sensing modules of types CAI10-Ex and CAI10-Ex.A are used for the transmission of analog and digital electrical signals between the intrinsically safe analog supply circuit and the non-intrinsically safe system circuit.

The analog sensing module consists of the plug-in modules CAI10-Ex resp. CAI10-Ex.A, the CS-terminal unit-Ex (plug-in terminal clamp) for single operation and the CS-terminal unit-Ex-redundant (additional electronic current limiting for connection of two plug-in modules to one output circuit).

The permissible range of the ambient temperature is 0 °C up to +70 °C.

#### Electrical data

Power Supply circuit..... 20...33 V DC, approx. 9,25 W  
(plug terminals)

Form D [C] ..... Maximum voltage:  $U_m = 65$  V DC  
a5, a6, c5, c6 (+)

a1, a2, a3, c1, c2, c3, a31 ..... Maximum voltage:  $U_m = 253$  V AC  
(- or GND)  
(alternatively a4, c4)

System circuit (P-bus)  
(plug terminals)

Form D [C]  
a8 through a30, a32  
c8 through c32

Ground terminal:  
alternatively on the front plate by mounting screws

Terminals of the intrinsically safe circuits for the types CAI10-Ex and CAI10-Ex.A

CS-terminal unit-Ex for single operation

channel	terminal unit resp. plug-in connector	terminal resp. plug pin
1	A	1,2
2	A	5,6
3	A	10,11
4	B	1,2
5	B	5,6
6	B	10,11
7	C	1,2
8	C	5,6
9	C	10,11
10	D	1,2
11	D	5,6
12	D	10,11



# Physikalisch-Technische Bundesanstalt

Schedule to Certificate of Conformity PTB No.-Ex-95.D.2165 X

Total current for a connected passive intrinsically safe sensor for connection of an additional certified intrinsically safe circuit (e.g. test instrument or FSK-communicator, values see table above):

Total current for line 1  $I = 53,5 \text{ mA}$   
 Total current for line 2  $I = 66,1 \text{ mA}$

## CAI10-Ex.A

Supply circuit..... type of protection Intrinsic Safety EEx ib IIC  
 resp. EEx ib IIB

Maximum values:

$U_o = 20 \text{ V}$   
 $I_o = 28,5 \text{ mA}$   
 $P = 570 \text{ mW}$

Characteristic: rectangular

The ripple effect resulting from the FSK-interface communication is included in these maximum values.

The effective internal inductance is  $220 \mu\text{H}$ .

The effective internal capacitance is  $1,5 \text{ nF}$

EEx ib	IIC	IIB
max. permissible external inductance	1,3 mH	4,8 mH
max. permissible external capacitance	95 nF	397 nF

The electrical ratings are valid for operation with CS-terminal unit-Ex and CS-terminal unit-Ex-redundant.

or alternatively

For the connection of the terminals 1,2 or 5,6 or 10,11 (2,3 or 6,7 or 11,12 for redundancy) to intrinsically safe circuits the electrical data of the connected circuits as well as the maximum permissible external inductances and capacitances are shown in the following table:

Maximum values of the connected circuits	EEx ib IIB		EEx ib IIC				
	maximum permissible external		maximum permissible external				
	$U_o$	$I_o$	P	inductance	capacitance	inductance	capacitance
line 1	1,4 V	25 mA	10 mW	4,8 mH	300 nF	0,8 mH	60 nF
line 2	2 V	37,6 mA	18,8 mW	4,8 mH	300 nF	0,8 mH	60 nF

Total current for a connected passive intrinsically safe sensor for connection of an additional certified intrinsically safe circuit (e.g. test instrument or FSK-communicator, values see table above):

Total current for line 1  $I = 53,5 \text{ mA}$   
 Total current for line 2  $I = 66,1 \text{ mA}$

The intrinsically safe analog supply circuit is safely electrically isolated from all further circuits up to a peak value of the nominal voltage of 375 V.

# Physikalisch-Technische Bundesanstalt

Schedule to Certificate of Conformity PTB No.-Ex-95.D.2165 X

<u>Test documents</u>	signed on
1. Description (21 sheets)	03.11.1995
2. Drawing No.	
0788 721 sheet 1X	03.11.1995
0788 724 sheet 2X	03.11.1995
0339 850 X P01	02.08.1995
0339 850 X P02	02.08.1995
0339 850 X P04	02.08.1995
0339 850 X P07	02.08.1995
0339 850 X P10	02.08.1995
0339 850 X P12	02.08.1995
0339 850 X P18	02.08.1995
0339 850 X P24	02.08.1995
0339 850 X sheet 1	03.11.1995
0339 850 X sheet 2	02.08.1995
0339 851 X P01	02.08.1995
0339 851 X P02	02.08.1995
0339 851 X P03	02.08.1995
0339 851 X P04	02.08.1995
0339 851 X P12	02.08.1995
0339 851 X P18	02.08.1995
0339 851 X P24	02.08.1995
0339 851 X sheet 1	03.11.1995
0339 851 X sheet 2	02.08.1995
0339 669 X sheet 1	02.08.1995
0339 669 X sheet 2	02.08.1995
0339 669 X sheet 3	02.08.1995
0339 669 X sheet 4	02.08.1995
0339 669 X sheet 5	02.08.1995
0339 669 X sheet 6	02.08.1995
0339 671 X sheet 1	02.08.1995
0339 671 X sheet 2	02.08.1995
0339 671 X sheet 3	02.08.1995
0339 671 X sheet 4	02.08.1995
0339 671 X sheet 5	02.08.1995
0339 671 X sheet 6	02.08.1995
0339 659 X	02.08.1995
0339 657 X	03.11.1995
0338 593 X	02.08.1995
0338 602 X	03.11.1995
0745 204 X1	27.07.1995
0787 053 X1	27.07.1995
0787 053 X2	27.07.1995

3. Test sample

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## Special conditions

1. The analog sensing modules CAI10-Ex and CAI10-Ex.A shall be installed outside the explosion hazardous area.
2. The analog sensing module shall be installed in such a way that at least a degree of protection of IP 20 according to IEC publication 529 is met.
3. For the installation a thread measure of at least 50 mm shall be maintained between the connection facilities of the intrinsically safe circuits and the non-intrinsically safe circuits.

By order

Braunschweig, 09.01.1996

(signature)

Dr.-Ing. Johannsmeyer  
Oberregierungsrat

## 1. SUPPLEMENT

### to Certificate of Conformity PTB No. Ex-95.D.2165 X

manufactured by Hartmann & Braun AG  
D-Frankfurt

In future the type-series of the analog sensing modules CAI10-Ex and CAI10-Ex.A will be extended for the types CAI11-Ex and CAI11-Ex.A. The difference is a restricted communication between the analog intrinsically safe supply circuit and the non-intrinsically safe system circuit.

The "Electrical data", the "Special conditions" as well as all further details remain unchanged.

In future the marking may also be carried out in accordance with the drawing listed below.

Test documents

all signed on 10.05.1996

1. Description (1 sheet)
2. Drawing No. 0336169 X

By order:

Braunschweig, 16.09.1996

(signature)

Dr.-Ing. Johannsmeyer  
Oberregierungsrat

## 2. SUPPLEMENT

### to Certificate of Conformity PTB No. Ex-95.D.2165 X

manufactured by Hartmann & Braun AG  
D-Frankfurt

In future the analog sensing modules of types CAI10-Ex and CAI10-Ex.A may be manufactured according to the test documents listed below.

The modifications refer to the internal construction of the CS-terminal unit-Ex-redundant.

The "Electrical data", the "Special conditions", the details about the permissible range of the ambient temperature as well as all further details are also unchanged valid for this 2. supplement.

#### Test documents

all signed on 19.08.1996

Drawing No. 0745 204 X  
0787 053 X1  
0787 053 X2

By order:

Braunschweig, 06.12.1996

(signature)

Dr.-Ing. Johannsmeyer  
Oberregierungsrat