

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



(1) **CERTIFICATE OF CONFORMITY**
(2) **PTB No. Ex-97.D.2177 X**
(TRANSLATION)

- (3) This certificate is issued for the electrical apparatus
Analog input module type CAI 12 Ex
- (4) manufactured by Hartmann & Braun GmbH & Co. KG
D-60484 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


Dr.-Ing. Johannsmeyer
Oberregierungsrat



Braunschweig, 21.08.1997

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.

SCHEDULE

to Certificate of Conformity PTB No. Ex-97.D.2177 X

The analog input module of type CAI 12 Ex is used for the bidirectional transmission of analog and digital electrical signals from/to the analog intrinsically safe supply circuit and the non-intrinsically safe system circuit.

The analog input module consists of the plug-in board CAI 12 Ex, the CS-connection unit-Ex (pluggable clamp-type terminal) for single operation and the CS-connection unit-Ex-redundant (additional electronic current limiting for connection of two plug-in boards to one supply circuit for 2-wire transducers).

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

Electrical data

Supply Circuit
(plug-in contacts)

20...33 V DC, approx. 12 W
safety relevant maximum DC-value:
 $U_m = 65 \text{ V DC}$

type D (C)
a5, a6, c5, c6 (+)

safety relevant maximum AC-value:
 $U_m = 253 \text{ V AC}$

a1, a2, a3, c1, c2, c3, a31
(- or ground)
(alternatively a4, c4)

System circuit (P-bus)
(plug-in contacts)

type D (C)
a8...a30, a32
c8...c32

protective conductor terminal

alternatively on front plate by fixing screws

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Terminals of the intrinsically safe circuits

CS-connection unit-Ex for single operation:

channel	connection unit resp. plug-in connectors	clamp-type terminal resp. plug pin
1	A	1,2
2	A	5,6
3	A	10,11
4	A	14,15
5	B	1,2
6	B	5,6
7	B	10,11
8	B	14,15
9	C	1,2
10	C	5,6
11	C	10,11
12	C	14,15
13	D	1,2
14	D	5,6
15	D	10,11
16	D	14,15

CS-connection unit-Ex-redundant for operation of two plug-in boards:

channel	connector unit resp. plug-in connectors	clamp-type terminal resp. plug pin
1	A	2,3
2	A	6,7
3	A	11,12
4	A	15,16
5	B	2,3
6	B	6,7
7	B	11,12
8	B	15,16
9	C	2,3
10	C	6,7
11	C	11,12
12	C	15,16
13	D	2,3
14	D	6,7
15	D	11,12
16	D	15,16

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Supply circuit

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

Maximum values: $U_o = 21 \text{ V}$
 $I_o = 28,5 \text{ mA}$
 $P_o = 600 \text{ mW}$

rectangular characteristic

These maximum values include the ripple effect caused by FSK interface communication.

effective internal inductance $\leq 10 \text{ } \mu\text{H}$

effective internal capacitance $= 2 \text{ nF}$

EEx ib	IIC	IIB
maximum permissible external inductance	1,3 mH	4,8 mH
maximum permissible external capacitance	79 nF	350 nF

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

or alternatively

The electrical data of the connected circuits as well as the maximum permissible external inductances and capacitances for connection of the terminals 1,2 or 5,16 or 10, 11 or 14, 15 (2, 3, or 6, 7 or 11, 12 or 15, 16 for redundancy) to intrinsically safe circuits are shown in the following table:

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

Total load current for a passive intrinsically safe detector connected in addition to a certified intrinsically safe circuit (eg. test equipment or FSK-communicator, values see table given above):

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

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

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

Special conditions

1. The analog input module CAI 12 Ex has to be installed outside the explosion hazardous area.
2. The analog input module CAI 12 Ex has to be installed in such a way that the requirements of the type of protection IP 20 in accordance with IEC publication 529 (144) are met.

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3. To meet the regulations for installation a thread measure of at least 50 mm between the terminals of the intrinsically safe circuits and the non-intrinsically safe circuits must be guaranteed.

Test documents

signed on

1. Description (21 sheets)	28.07.1997
2. Drawing No. 0764 523 X P01	02.07.1997
0764 523 X P02	02.07.1997
0764 523 X P04	02.07.1997
0764 523 X P07	02.07.1997
0764 523 X P10	02.07.1997
0764 523 X P11	02.07.1997
0764 523 X P12	02.07.1997
0764 523 X P13	02.07.1997
0764 523 X P14	02.07.1997
0764 523 X P15	02.07.1997
0764 523 X P16	02.07.1997
0764 523 X P17	02.07.1997
0764 523 X P18	02.07.1997
0764 523 X P19	02.07.1997
0764 523 X P20	02.07.1997
0764 523 X P21	02.07.1997
0489 532 X sheet1	28.07.1997
0489 532 X sheet2	28.07.1997
0489 532 X sheet3	28.07.1997
0489 532 X sheet4	28.07.1997
0489 532 X sheet5	28.07.1997
0489 532 X sheet6	28.07.1997
0632 591 X (4)	28.07.1997
0788 728 X sheet1	02.07.1997
0788 728 X sheet2	02.07.1997
0764 523 X sheet1	02.07.1997
0764 523 X sheet2	02.07.1997
0787 060 X1	02.07.1997
0787 060 X2	02.07.1997
0764 437 X	02.07.1997
0339 657 X	02.07.1997
0745 204 X	02.07.1997
0745 212 X	02.07.1997
0787 053 X1	02.07.1997
0787 053 X2	02.07.1997

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