

# Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



(1) **CERTIFICATE OF CONFORMITY**  
(2) **PTB No. Ex-96.D.2062 X**  
**(TRANSLATION)**

- (3) This certificate is issued for the electrical apparatus  
Analog output module type CAO10-Ex
- (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:  
**[Ex 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, 30.05.1996

(signature)

Dr.-Ing. Johannsmeyer  
Oberregierungsrat

**5 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-96.D.2062 X

The analog output module of type CAO10-Ex is used for the transmission of analog and digital electrical signals between the intrinsically safe analog output circuits and the non-intrinsically safe system circuit.

The analog output module consists of the plug-in module CAO10-Ex, 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

Supply circuit..... 20...33 V DC,  $\leq 15$  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)

Ground terminal  
alternatively on the front plate by mounting screws

System circuit (P-bus)  
(plug terminals)

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

Terminals of the intrinsically safe output circuits

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	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

# Physikalisch-Technische Bundesanstalt

Schedule to Certificate of Conformity PTB No.-Ex-96.D.2062 X

CS-terminal unit-Ex-redundant for operation of two plug-in modules:

channel	terminal unit resp. plug-in connector	terminal
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

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

Maximum values:

$$U_o = 20 \text{ V}$$

$$I_o = 28,5 \text{ mA}$$

$$P_o = 570 \text{ mW}$$

Characteristic: rectangular

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

The effective internal inductance is 220  $\mu$ H.

The effective internal capacitance is 1,5 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 or 14,15 (2,3 or 6,7 or 11,12 or 15,16 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:

# Physikalisch-Technische Bundesanstalt

Schedule to Certificate of Conformity PTB No.-Ex-96.D.2062 X

Maximum values of the connected circuits				EEx ib IIB		EEx ib IIC	
				maximum permissible external		maximum permissible external	
	U <sub>0</sub>	I <sub>0</sub>	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 mA

Total current for line 2 I = 66,1 mA

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

## Test documents

signed on

1. Description (21 sheets) 07.05.1996

2. Drawing No. 0788 724 sheet 1X 29.11.1995  
 0788 724 sheet 2X 29.11.1995  
 0338 008 X P01 29.11.1995  
 03209001 X P02 29.11.1995  
 03209001 X P04 29.11.1995  
 03209001 X P07 29.11.1995  
 0338 008 X P10 29.11.1995  
 0338 008 X P11 29.11.1995  
 0338 008 X P12 29.11.1995  
 0338 008 X P20 29.11.1995  
 0338 008 X P21 29.11.1995  
 0338 008 X sheet 1 29.11.1995  
 0338 008 X sheet 2 29.11.1995  
 0338 009 X P01 29.11.1995  
 0338 009 X P02 29.11.1995  
 0338 009 X P03 29.11.1995  
 0338 009 X P20 29.11.1995  
 0338 009 X P21 29.11.1995  
 0338 009 X sheet 1 29.11.1995  
 0338 009 X sheet 2 29.11.1995  
 0338 012 X sheet 1 29.11.1995  
 0338 012 X sheet 2 29.11.1995  
 0338 012 X sheet 3 29.11.1995  
 0338 012 X sheet 4 29.11.1995  
 0338 012 X sheet 5 29.11.1995  
 0338 012 X sheet 6 29.11.1995  
 0338 013 X sheet 1 29.11.1995  
 0338 013 X sheet 2 29.11.1995  
 0338 013 X sheet 3 29.11.1995  
 0338 013 X sheet 4 29.11.1995

# Physikalisch-Technische Bundesanstalt

Schedule to Certificate of Conformity PTB No.-Ex-96.D.2062 X

Drawing No.	0338 013 X sheet 5	29.11.1995
	0338 013 X sheet 6	29.11.1995
	0338 023 X	29.11.1995
	0338 798 X	29.11.1995
	0338 785 X	29.11.1995
	0745 204 X1	29.11.1995
	0787 053 X1	29.11.1995
	0787 053 X2	29.11.1995

## Special conditions

1. The analog output module of type CAO10-Ex shall be installed outside the explosion hazardous area.
2. The analog output 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 50 mm shall be maintained between the connection facilities of the intrinsically safe circuits and the non-intrinsically safe circuits.

By order

Braunschweig, 30.05.1996

(signature)

Dr.-Ing. Johannsmeyer  
Oberregierungsrat