OPERATING INSTRUCTIONS, INSTALLATION AND MAINTENANCE FOR EXPLOSIONPROOF TWO POLES CONNECTORS

SERIES CNB-.../.../.

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1 Marking

The connector CNB-… can be carried out in a bipolar version with or without auxiliary contact and presents, depending on the material with which it is made, different markings which have to be used with regard to the following instructions:

1.1 Material: aluminium alloy, carbon steel , stainless steel or brass or bronze for ATEX only

Two poles connectors Group II for ATEX

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-
(serial number / year of manufacture)	XXXXX / XXXX
(specific ATEX marking)	Ex II 2G II 2D
(complementary marking)	Ex db IIC T_(a) Gb Ex tb IIIC T… (a)°C Db IP66
	Tamb (f)
(UE type certificate)	EXA 17 ATEX 0027 X
(characteristics)	(b) V (c) A Tcable (d) °C
(additional prescriptions)	(e) A/mm² max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

Two poles connectors with auxiliary Group II for ATEX

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-A
(serial number / year of manufacture)	XXXXX / XXXX
(specific ATEX marking)	Ex II 2G II 2D
(complementary marking)	Ex db IIC T_(a) Gb Ex tb IIIC T… (a)°C Db IP66
	Tamb (f)
(UE type certificate)	EXA 17 ATEX 0027 X
(characteristics)	(b) V (c) A Tcable (d) °C
(additional prescriptions)	(e) A/mm² max Aux 10A max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

Note: for the characteristics(a), (b), (c), (d), (e), (f) see § 10 and 11.

1.2 Material: carbon steel, stainless steel or brass or bronze for ATEX only.

Two poles connectors Group I for ATEX

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-
(serial number / year of manufacture)	XXXXX / XXXX
(specific ATEX marking)	Ex I M2
(complementary marking)	Ex db I Mb IP66
Or:	
(specific ATEX marking)	Ex I M2 II 2G II 2D
(complementary marking)	Ex db I Mb Ex db IIC T(a) Gb Ex tb IIIC T… (a)°C Db IP66
	Tamb (f)
(UE type certificate)	EXA 17 ATEX 0027 X
(characteristics)	(b) V (c) A Tcable (d) °C
(additional prescriptions)	(e) A/mm² max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

Two poles connectors with auxiliary Group I for ATEX

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-A
(serial number / year of manufacture)	XXXXX / XXXX
(specific ATEX marking)	Ex I M2
(complementary marking)	Ex db I Mb IP66
Or:	
(specific ATEX marking)	Ex I M2 II 2G II 2D
(complementary marking)	Ex db I Mb Ex db IIC T(a) Gb Ex tb IIIC T… (a)°C Db IP66
	Tamb (f)
(UE type certificate)	EXA 17 ATEX 0027 X
(characteristics)	(b) V (c) A Tcable (d) °C
(additional prescriptions)	(e) A/mm² max Aux 10A max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

Note: for the characteristics(a), (b), (c), (d), (e), (f) see § 10 and 11

1.3 Material: aluminium alloy, carbon steel , stainless steel or brass or bronze for IECEx only

Two poles connectors Group II for IECEx

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-
(serial number / year of manufacture)	XXXXX / XXXX
(marking)	Ex db IIC T_(a) Gb Ex tb IIIC T... (a)°C Db IP66 Tamb (f)
(IECEx certificate)	IECEx EXA 17.0006 X
(characteristics)	(b) V (c) A Tcable (d) °C
(additional prescriptions)	(e) A/mm^2 max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

Note: for the characteristics(a), (b), (c), (d), (e), (f) see § 10 and 11

Two poles connectors with auxiliary Group II for IECEx

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-A
(serial number / year of manufacture)	XXXXX / XXXX
(marking)	Ex db IIC T_(a) Gb Ex tb IIIC T... (a)°C Db IP66 Tamb (f)
(IECEx certificate)	IECEx EXA 17.0006 X
(characteristics)	(b) V (c) A Tcable (d) °C
(additional prescriptions)	(e) A/mm^2 max Aux 10A max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

1.4 Material: carbon steel, stainless steel or brass or bronze for IECEX only.

Two poles connectors Group I for IECEX

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-
(serial number / year of manufacture)	XXXXX / XXXX
(marking)	Ex db I Mb IP66
Or:	
(marking)	Ex db I Mb Ex db IIC T(a) Gb Ex tb IIIC T... (a)°C Db IP66 Tamb (f)
(IECEx certificate)	IECEx EXA 17.0006 X
(characteristics)	(b) V (c) A Tcavo (d) °C
(additional prescriptions)	(e) A/mm^2 max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

Note: for the characteristics(a), (b), (c), (d), (e), (f) see § 10 and 11

Two poles connectors with auxiliary Group I for IECEX

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-A
(serial number / year of manufacture)	XXXXX / XXXX
(marking)	Ex db I Mb IP66
Or:	
(marking)	Ex db I Mb Ex db IIC T(a) Gb Ex tb IIIC T... (a)°C Db IP66 Tamb (f)
(IECEx certificate)	IECEx EXA 17.0006 X
(characteristics)	(b) V (c) A Tcavo (d) °C
(additional prescriptions)	(e) A/mm^2 max Aux 10A max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

1.5 Material: aluminium alloy, carbon steel , stainless steel or brass or bronze both ATEX and IECEx.

Two poles connectors Group II for ATEX/IECEx

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-
(serial number / year of manufacture)	XXXXX / XXXX
(specific ATEX marking)	Ex II 2G II 2D
(complementary marking)	Ex db IIC T_(a) Gb Ex tb IIIC T... (a)°C Db IP66
	Tamb (f)
(UE type certificate)	EXA 17 ATEX 0027 X
(IECEx certificate)	IECEx EXA 17.0006 X
(characteristics)	(b) V (c) A Tcavo (d) °C
(additional prescriptions)	(e) A/mm^2 max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

Note: for the characteristics(a), (b), (c), (d), (e), (f) see § 10 and 11

Two poles connectors with auxiliary Group II for ATEX/IECEx

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-A
(serial number / year of manufacture)	XXXXX / XXXX
(specific ATEX marking)	Ex II 2G II 2D
(complementary marking)	Ex db IIC T_(a) Gb Ex tb IIIC T... (a)°C Db IP66
	Tamb (f)
(UE type certificate)	EXA 17 ATEX 0027 X
(IECEx certificate)	IECEx EXA 17.0006 X
(characteristics)	(b) V (c) A Tcavo (d) °C
(additional prescriptions)	(e) A/mm^2 max Aux 10A max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

1.6 Material: carbon steel, stainless steel or brass or bronze both ATEX and IECEx.

Two poles connectors Group I for ATEX/IECEx

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-
(serial number / year of manufacture)	XXXXX / XXXX
(specific ATEX marking)	Ex I M2
(complementary marking)	Ex db I Mb IP66
Or:	
(specific ATEX marking)	Ex I M2 II 2G II 2D
(complementary marking)	Ex db I Mb Ex db IIC T(a) Gb Ex tb IIIC T... (a)°C Db IP66
	Tamb (f)
(UE type certificate)	EXA 17 ATEX 0027 X
(IECEx certificate)	IECEx EXA 17.0006 X
(characteristics)	(b) V (c) A Tcavo (d) °C
(additional prescriptions)	(e) A/mm^2 max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

Note: for the characteristics(a), (b), (c), (d), (e), (f) see § 10 and 11

Two poles connectors with auxiliary Group I for ATEX/IECEx

(Manufacturer)	EXCEN S.r.l. Via Marcora 61/69 20097 S. Donato M.se
(CE marking + n° O.N.)	CE 0080
(type)	CNB-A
(serial number / year of manufacture)	XXXXX / XXXX
(specific ATEX marking)	Ex I M2
(complementary marking)	Ex db I Mb IP66
Or:	
(specific ATEX marking)	Ex I M2 II 2G II 2D
(complementary marking)	Ex db I Mb Ex db IIC T(a) Gb Ex tb IIIC T... (a)°C Db IP66
	Tamb (f)
(UE type certificate)	EXA 17 ATEX 0027 X
(IECEx certificate)	IECEx EXA 17.0006 X
(characteristics)	(b) V (c) A Tcavo (d) °C
(additional prescriptions)	(e) A/mm^2 max Aux 10A max

WARNING: DO NOT SEPARATE WHEN ENERGIZED

2 Protection method “d”- Flameproof enclosures

It is a protection method in which the components that can ignite an explosive atmosphere are enclosed in the enclosure, which is able to withstand the pressure developed during an internal explosion of an explosive mixture and to prevent the flame transmission to the external explosive atmosphere. Important:

2.1 the cable entrances must be made with certified cable glands. Make sure that they fit the type of cable employed and keep their respective protection mode. Choose them with regard to the European Standard Prescriptions IEC/EN 60079-14 (current edition);

2.2 further unused entrance holes must be closed only with certified plugs;

2.3 don’t damage the enclosure with no authorised holes;

2.4 check the absence of stress causes of the connector different from the one for which the case itself has been designed (e.g.: exposure to crash damages, presence of corrosive agents, possibility of short circuits with power dissipation superior to the possible limits);

2.5 it is necessary to pay much attention while handling the different components of the opened case in order to avoid any kind of flame holding joints or “o-ring” gaskets damage.

3 IP66 Degree of Protection

The protection envelope of the electric equipment prevents the entrance of both dust and spout–canalised water. Important: after every opening locate again the protective silicone-fat coat and make sure that the “o-ring” gaskets are safe and in their housings.

4 Installations

CAUTION !: The flameproof series CNB-.. connector must be installed according to the standards IEC/EN 60079-14; the maintenance operations must be made with regard to the instructions of the standards IEC/EN60079-17. No change in the material is allowed.

See the below drawing in the bottom of the present documents.
Bipolar EXCEN connectors are made with the following elements: semi female Ref. 1 connector (plug), semi male Rif. 2 connector (drive). For the semi recharge connector (plug), Ref. 4 see the following instructions.
The risk of polarity inversion is not to be calculated thanks to the appropriate Ref 10 pin.
The semi male Ref. 2 connector must be normally fixed either on the trolley or on the battery and connected with battery cables.
The semi female Ref. 1 connector is going to remain open for the connection and therefore connected to the trolley cables.

4.1 Connector Ex d assembling:

4.1.1 observe polarity indicated on the connector;

4.1.2 unscrew blocking screw Ref. 7 of the handle Ref. 5;

4.1.3 lift handle Ref. 5;

4.1.4 extract the semi female Ref. 1 connector from the semi male Ref. 2 connector by pulling the handle Ref. 5;

4.1.5 remove cable gland Ref. 3;

4.1.6 disassemble cable glands in the following sequence of components:body, rubber ring, ring, ring nut;

4.1.7 insert on the battery cable with sequential order: ring nut, ring, rubber ring, cable gland body;

4.1.8 unscrew the n°4 Ref. 9 fixing screws of the Ref. 8 flange inside the two semi connectors and extract Ref. 12 and Ref. 14 insulators together with their female Ref. 11 (drive) and male Ref. 13 (plug) contacts;

4.1.9 establish the length of the battery cable;

4.1.10 extract the external ring nut of the cable to 15÷20 mm;

4.1.11 for cable fixing you can also proceed with one of the following methods:
a) by welding: hit contact(either male or female) and pour tin in its location, then insert cable and let cool. Check mechanic seal;
b) by cable gland pliers: insert cable in the contact seat (either male or female) and press with the suitable pliers. Check mechanic seal;

4.1.12 insert insulators around connector contacts and block them with the blocking flange Ref. 8 and the n°4 screws Ref. 9;

4.1.13 deeply screw the cable gland bodies on the semi connector body, blocking it by means of a medium type thread locker set on a whole thread;

4.1.14 insert rubber ring and ring , then firmly lock the ring nut.

4.2 Assembling of semi recharge connector Ref. 4 on the battery charger :
4.2.1 observe polarity indicated on the connector
4.2.2. in the semi recharge connector the contact blocking flange Ref. 8, the suitable fixing screws Ref. 9 and the contact insulators Ref. 14 are not to be used, as the recharge connector is made with insulation material.
4.2.3 unscrew cable glands IP Rif. 6
4.2.4 unscrew the two (M6) contact recharge blocking screws Ref. 15 (plug)
4.2.5 extract contacts
4.2.6 disassemble cable glands components (body, rubber ring, ring, ring nut)
4.2.7 insert on the battery charter cable following this sequence: ring nut, ring, rubber ring, cable gland body
4.2.8 proceed as illustrated in 4.1.9, 4.1.10, 4.1.11
4.2.9 insert contacts in the semi recharge connector again and block them with the two screws Ref. 15
4.2.10 deeply screw cable gland IP bodies on the semi connector body, blocking it by means of a medium type thread locker set on a whole thread
4.2.11 insert rubber ring and ring and firmly lock ring nut

5 Setting at work

CAUTION !:	Before setting at work an electric system placed in a security installation it is necessary that the user verifies its accordance both with project data and correct installation. Make sure that the security electric system is appropriate to the potentially explosive atmosphere classification in which it has to be set at work. The following operations must be done only outside potentially explosive atmosphere.

5.1. Observe electric parameters indicated in § 9) and written on the target.
5.2. Make sure that the two connector parts are disconnected.
5.3. Make sure that the circuit, to which the connector is connected, is open and that no charges are present.
5.4. Check battery charge.
5.5. Make sure that the cables are correctly connected and fixed with the suitable cable glands.
5.6. Make sure that the polarities indicated on the connector have been respected before connecting to the system.
5.6.1. Make sure that the “O-Ring” gasket between male and female (of the connector) is in good condition and in the correct position.
5.7. Mechanically connect the two parts - male and female - of the connector by pulling the two parts until stroke end.
5.8. Fix the handle with the suitable M6 screw.
5.9. Close the circuit connected to the connector.

CAUTION !:	Only at the end of the aforesaid operations it is possible to use the connector in a potentially explosive atmosphere.

6 Use

6.1 The connector is designed in order to connect circuits under direct current and in particular for power supply battery of industrial vehicle, other machines and systems, which have been designed to operate in places with potentially explosive atmosphere because of the presence of gas, steams and inflammable dusts.
6.2 The connector can be used in a potentially explosive atmosphere exclusively when the two parts that constitute it are deeply inserted, the handle is in its blocking position and the fitting blocking screw is completely screwed.

CAUTION!	It is strictly forbidden and dangerous open and close the connector in a dangerous area when energized; this operation must be done only in a safe area. The battery must be always recharged only outside the dangerous area except in case of EXCEN authorisation.

6.3 Usage of battery recharge; the connector can be used outside dangerous areas to recharge the battery, expecting the following conditions:
6.3.1 leave outside dangerous area the machine to which the battery is connected;
6.3.2 proceed either by taking off tension to the installation or by switching on the battery-detaching button;
6.3.3 open connector by proceeding as illustrated in points 4.1.2 and 4.1.4;

6.3.4 for the connection to the battery recharge, use only the suitable semi female recharge EXCEN connector by inserting it in the battery semi male connector;

6.3.5 follow the instruction which are either written on the battery recharge or attached to it about recharge.

7 Ordinary check

About ordinary maintenance see following table:

Frequency	Inspection	Maintenance
1 week	Make sure that contacts are perfectly functioning	Replace of contacts
	Make sure that all screws are screwed deeply	Screw firmly
	Check cable integrity	Replace both cable and cable glands rubber rings (seal rings)
	Check integrity of O-Ring gasket	Replace and fatten gasket with silicone fat
	Check blocking of combination screws	Firmly block the two screws
2 weeks	Make sure that cable glands are not loosened	Firmly block cable glands
4 weeks	Make sure that targets are legible	Replace target

8 Extraordinary check

About extraordinary check see following table

Frequency	Inspection	Maintenance
6 month	Check if male contact diameter is between 9.5 mm and 10 mm	Replace male contacts
	Make sure that the female contact elastic ring is in its original position	Replace female contacts
1 year	Check integrity of cable glands rubber rings (seal rings)	Replace of cable glands rubber rings

9 Cleaning

While cleaning pay particular attention in order to avoid damaging the connector combination joints. Do not use aggressive and corrosive liquids, water under pressure streams and high temperature water streams.

10 Special conditions for safe use

The cable connection to the plug must be installed in a safe area.

The resistance to yield stress in any part of the connector must be ≥ 640 N/mm^2.

The flameproof joints have different values from those specified in the tables of the IEC 60079-1 standard. For information regarding the dimensions of the flameproof joints contact the manufacturer.

11 Electrical characteristics, ambient temperature and temperature class

The temperature class and the maximum surface temperature are determined according to the current density based on the section of the cable used. The connectors are suitable for use in ambient with the following range of temperature:
from -60°C to +40°C or + 45°C or + 50°C or + 55°C or + 60°C.

11.1 Parameters for connectors series CNB-1 and CNB-2

The maximum permissible section of conductors is 70 mm^2.
The maximum current and current density values, indicated in the table, refer to conductors with a section of 50 and 70 mm^2.
In case cables with smaller sections are used the maximum current value decreases accordingly, as well as the maximum current density value.

Tamb	Temperature class	Maximum surface temperature °C	**Nr. 1 connector** (nr 1 positive cable and nr.1 negative cable)		
			Max cable temperature °C	Max current intensity A	Current density A/mm^2
40 °C	T4	125	124	350	7
	T5	90	90	350	5
	T5	90	90	275	5
	T6	75	75	250	4
	T6	75	75	200	4
45 °C	T4	130	129	350	7
	T4	95	95	350	5
	T5	95	95	275	5
	T6	80	95	250	4
	T6	80	79	200	4
50 °C	T4	100	100	350	5
	T4	100	100	275	5
	T5	85	84	250	4
	T5	85	84	200	4
55 °C	T4	105	105	350	5
	T4	105	105	275	5
	T5	90	89	250	4
	T5	90	89	200	4
60 °C	T4	110	110	350	5
	T4	110	110	275	5
	T5	95	94	250	4
	T5	95	94	200	4
Maximum nominal voltage 120Vdc					
Maximum current intensity for auxiliary contacts 10 A					

11.2 Parameters for connectors series CNB-3 e CNB-31

The maximum permissible section of conductors is 120 mm^2.
The maximum current and current density values, indicated in the table, refer to conductors with a section of 95 mm^2.
In case cables with smaller sections are used the maximum current value decreases accordingly, as well as the maximum current density value.

Tamb	Temperature class	Maximum surface temperature °C	**Nr. 1 connector** (nr 1 positive cable and nr.1 negative cable)			**Nr. 2 connectors** (nr 2 positive cables and nr.2 negative cables)		
			Max cable temperature °C	Max current intensity A	Current density A/mm^2	Max cable temperature °C	Max current intensity A	Current density A/mm^2
40 °C	T4	115	120	4,8	425	4,5	120	919
		130	135	5,7	476	5	135	1075
	T5	95	100	3,7	358	3,8	100	710
	T6	80	85	2,9	307	3,2	85	554
45 °C	T3	135	140	5,7	476	5	140	1075
	T4	115	120	4,6	408	4,3	120	867
	T5	95	100	2,9	307	3,2	85	554
	T6	80	85	2,6	290	3	85	502
50 °C	T3	140	145	5,7	476	5	145	1075
	T4	130	135	5,1	442	4,7	135	971
	T5	95	100	3,2	324	3,4	100	606
	T6	80	85	2,4	273	2,9	85	449
55 °C	T3	145	150	5,7	476	5	150	1075
	T4	130	135	4,8	425	4,5	135	919
	T5	95	100	2,9	307	3,2	100	554
	T6	80	85	2,1	256	2,7	85	397
60 °C	T3	150	155	5,7	476	5	155	1075
	T4	115	120	3,7	358	3,8	120	710
		130	135	4,6	408	4,3	135	867
	T5	95	100	2,6	290	2,9	100	502
	T6	80	85	1,8	240	2,5	85	345
Maximum nominal voltage 120Vdc								
Maximum current intensity for auxiliary contacts 10 A								

