DISTRIBUTION BOX
TYPE 07-5105-****/****
INSTRUCTION MANUAL NO. BP/IO/12/08

EXPROTEC

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1. Introduction

Distribution boxes type 07-5105-****/**** and 07-5105-****/****S are designed for connecting intrinsically safe "ia/ib" and optical "op is" installations for communication, data transmission, control systems, video surveillance equipment, sensors, etc. The boxes are used for connecting and branching cables and wires using certified connection terminals. Housing type 07-5105-****/****** is made of black polyester reinforced with glass fibre and housing type 5105-****/******S is made of stainless steel. All housings are of Ex e type.

The product may be used in underground mines in workings classified as class "a", "b" or "c" methane explosion hazard and class "A" or "B" coal dust explosion hazard.

The product may be used in explosive gas atmospheres falling within zone 0, 1 or 2 (G) and may be used in a location where dust explosive atmospheres falling within zone 21 or 22 (D) occur.

2. Type designation

07-5105–* * * * / * * * * X

Version	Code	Dimensions of the housing LxBxH mm	Code	Dimensions of the housing LxBxH mm	Code	Housing	Code X
polyester with cover (black)	05	100x100x60	1001/0006	200x300x150	2003/0015	Steel	S
		150x150x80	1501/5008	380x300x155	3803/0015	Polyester	---
		400x150x80	4001/5008	300x380x210	3003/8021		
		200x200x80	2002/0008	400x400x210	4004/0021		
		300x200x80	3002/0008	400x600x210	4006/0021		
		150x150x100	1501/5010	600x600x210	6006/0021		
		200x200x120	2002/0012	600x760x210	6007/6021		
		300x200x120	3002/0012	600x800x300	6008/0030		
		400x200x120	4002/0012	800x800x300	8008/0030		
		600x200x120	6002/0012	800x1000x300	8001/00030		
		300x300x120	3003/0012	1000x1000x300	10001/00030		
		300x300x160	3003/0016	1000x1200x300	10001/20030		
		380x380x160	3803/8016	1200x1000x300	12001/00030		
		400x200x160	4002/0016	1200x1000x400	12001/00040		
		400x400x160	4004/0016				

Unusual housing sizes - as requested by the client.

3. Technical data

Table 1. Technical specifications

Design features:			
07-5105-****/****	glass-fibre reinforced polyester		—
07-5105-****/****S	stainless steel		—
Explosion protection marking***)	I M1 Ex ia I Ma*) I M1 Ex ia op is I Ma*)		
	II 1G Ex ia IIC TX Ga*)**) II 1G Ex ia op is IIC TX Ga*)**)		
	II 2D Ex ia IIIC TX Db*)**) II 2D Ex ia op is IIIC TX Db*)**)		
EU-type examination certificate	OBAC 05 ATEX 008		—
Protection rating	EPDM gasket	IP66	—
	SILICONE gasket	IP65	—
Installation position	support structure		—
Connected cable cross-section	0.5..10		mm^2
Sizes of cable glands	M12x1,5; M16x1,5; M20x1,5; M25x1,5; M32x1,5; M40x1,5; M50x1,5; M63x1,5;		—
Range of cable glands	3.5..35		mm

*) Explosion-proof design marking depends on the type of terminals used.
**) Explosion-proof (TX) design marking depending on the gasket used.
***) Explosion-proof design marking specified in a separate table.

Marking of explosion-proof design:				
Electrical terminals	**Electrical and fiber optic terminals**	**Ambient temperature**	**Gasket**	**Protection rating**
I M1 Ex ia I Ma	I M1 Ex ia op is I Ma	-20..+40°C	EPDM	IP66
II 1G Ex ia IIC T6 Ga	II 1G Ex ia op is IIC T6 Ga	-20..+40°C		
I M1 Ex ia I Ma	I M1 Ex ia op is I Ma	-55..+55°C	SILICONE	IP65
II 1G Ex ia IIC T6 Ga	II 1G Ex ia op is IIC T6 Ga	-55..+40°C		
II 1G Ex ia IIC T5 Ga	II 1G Ex ia op is IIC T5 Ga	-55..+55°C		
II 2D Ex ia IIIC T80C Db	II 2D Ex ia op is IIIC T80C Db	-55..+40°C		
II 2D Ex ia IIIC T95C Db	II 2D Ex ia op is IIIC T95C Db	-55..+55°C		

Operating conditions:				
Altitude above sea level		up to 1000		m
Relative humidity at 35°C		up to 95		%
Transport temperature		EPDM gasket	-20..+60	°C
		SILICONE gasket	-55..+60	°C
Relative humidity for transport		up to 95		%
Mechanical exposures – frequency		10..55		Hz
Mechanical exposures – amplitude		0.35		mm
Vibration resistance (10...55Hz)		5		g
Impact strength		7		Nm
Surface resistance of polyester housing	Ro	< 10^9		Ω
Operation position		any position (avoid fixing with glands upwards)		—
Type of operation		continuous		—

Basic parameters:			
Rated voltage	Um	250	V AC
	Um	250	V DC
Maximum current per circuit	Im	16	A
Number of terminals		according to customer requirements, limited by the internal dimensions of the housing and the spacing between the electrical circuits	—
Terminal types		spring loaded, screwed, plug-in, KRONE LSA+, optical	—

Table 2. Intrinsically safe technical parameters

Permitted parameters of the intrinsically safe circuit at the terminals of the terminal strip (branch):			
Terminal strip Safety level "ia"/"ib"	Ui = 60	—	V
	Ii = 2	—	A
	—	—	W
	—	—	F
	—	—	H

4. Identification of the hazards caused by the equipment during its operation.

4.1 Introduction

! WARNING
Safe operation of the equipment requires special training, knowledge and experience. Do not attempt to operate this equipment unless qualified to do so. Improper or careless operation can lead to serious accidents or death for the operator or others.

The equipment is designed to meet specific technical conditions and customer requirements.

WARNING!
Modification of equipment for which authorisation has not been granted or use of repaired parts or other replacement parts not meeting the manufacturer's technical specifications may result in serious risk or loss of warranty, certification or approvals.

If modifications to the equipment are required, they must be made only after written authorisation has been obtained from the manufacturer.

4.2 Hazards during operation of equipment

Before starting up the equipment, ensure that it does not endanger the life and health of others.

WARNING!
Before starting up the equipment, make sure that the dangerous voltage supply cables are undamaged and properly inserted into the appropriate glands of the equipment.

The installation of temporary connections is prohibited.

4.3 Special conditions for safe use

WARNING!
The device can be used in mining plants, in workings classified as class "a", "b" or "c" methane explosion hazard and class "A" or "B" coal dust explosion hazard. The device must be de-energized when the methane concentration exceeds the value specified in applicable regulations.
The equipment can be operated in explosive gas atmospheres of zone 0, 1 or 2 (G) and operated in a location where dust explosive atmospheres of zone 21 or 22 (D) occur.

WARNING!
Special conditions for safe use: **- When installing in an housing of the distribution box type 07-5105-****/****, or 07-5105-****/******S - for stainless steel housings, certified devices listed in the table, the conditions and guidelines for installation of these devices must be taken into account.** **- When introducing various intrinsically safe circuits into the box, observe the insulation distances on the surface of the materials and in the air in accordance with the requirements of PN-EN 60079-11.** **- The manufacturer shall specify on the nameplate or information plate the acceptable voltage and current parameters for the external intrinsically safe circuits entering the box.** **- The maximum number and cross-section of wires for each housing code and the permissible continuous current is indicated in the operating instructions.** **- Terminals for intrinsically safe circuits shall be installed in such a way that the surface and air gaps between intrinsically and non-intrinsically safe circuits and/or different intrinsically safe circuits, and between these circuits and the ground, which are specified in EN 60079-11, are maintained.**

5. Construction and principle of operation

5.1 Mechanical part

Housing type 07-5105-****/****** is made of black polyester reinforced with glass fibre and housing type 5105-****/******S is made of stainless steel. The cover of the housing is screwed to the base with captive Allen screws. Between the cover and the base, there is a cord gasket arranged in the groove of the cover, providing IP 65 (66) protection. Installation of the box to the ground is carried out by means of mounting screws laid in the ducts, lying outside the space sealed with a gasket or by means of external mounting brackets.

For the connection of cables and wires in reinforced design equipment, only ATEX Ex-certified cable entries adapted to the cables and wires to be inserted may be used. They shall meet the requirements of reinforced design 'e' and shall have an appropriate seal to maintain at least IP 65(66) protection for the complete distribution box.

Metal cable or wire entries must be connected to an earthing system. BARTEC Earth-loc or earthing plates can be used for this purpose.

Unused threaded holes for cable entries must be sealed with certified plugs with the required protection level of at least IP65(66).

5.2 Electrical part

The electrical equipment of the product depends on its design. Only certified terminal modules and/or bus terminals with a maximum rated voltage of up to 1000V AC/DC and a maximum cable cross section of up to 10 mm^2 may be used. KRONE LSA-PLUS switch disconnectors are used for tele-technical connections and F-F or BNC-BNC adapters for electrical video signals (CVBS 1 Vpp). Video adapters are mounted on the insulation board. The panel is made of DELMA POLYESTER epoxy-polyester glass with a CTI factor of 500. Video adapters can also be mounted via KEYSTONE modules in the holes in the mounting plate.

5.3 Optical part

Optical equipment is limited to the use of optical fibre adapters and optical fibre panels for the assembly and proper management of optical fibres. The optical adapters are designed to connect optical fibre cables for video transmission or ETHERNET networks, etc. The adapters are mounted directly or via KEYSTONE modules in the holes of the mounting plate. All types of single and multimode optical fibre adapters are allowed, i.e: LC, FC, ST, SC, E2000, MTRJ, DIN, MU type PC, UPC, APC..

5.4 Installation and layout of the components

The installation of terminals, connectors and adapters is provided on TH-35 rails or mounting plates. All connection terminals are clearly marked. The connection terminals for protective conductors are separated and marked. Metal mounting plates are connected to these terminals. The product can be equipped with an external grounding terminal connected to the terminals inside the housing. The external earthing terminal is made in the form of a threaded pin (bolt) passing through the wall of the housing, protected against unscrewing. The insulation distances in the air and on the material surface between the individual connection terminals meet the requirements of PN-EN 60079-11.

5.4.1 Cable glands

Certified metal and plastic cable entries can be used in the boxes. The gullies are secured against unscrewing by locknuts or gluing. In the case of fixed installations, not exposed to mechanical forces on the cables lead into the product, it is not necessary to use cable glands with fixings. In mobile installations, which are exposed to forces on the cables connected to the unit, it is recommended to use cable entries with a mounting bracket or use an external mounting bracket to fix the cables to the distribution box mounting structure.

5.4.2 The "l" distance between cables and/or wires inserted into the housing

In order to eliminate the difficulty for the user to insert cables or single-wire wires into the box housing and connect them to the terminals, the minimum air distance calculated as (1.5 x S) for the cable cross-section (S) up to 6 mm^2 and (2 x S) for the cable cross-section (S) above 6 mm^2 was used. The value of the "l" distance is given in the table below:

Table 3."l" distance

No.	Cable cross section	Number of single- and multi-core cable entries minimum distance "l" (mm)		
		single wire	two wires	three or more wires, two next to each other
1.	**2.5**	20	20	20
2.	**4**	20	20	25
3.	**6**	20	25	30
4.	**10**	25	30	40
5.	**16**	30	40	50

6. Marking

Each device has a nameplate, made of stainless steel or self-adhesive foil, attached to the cover of the housing (on the outside) containing the following data: CE mark, number of the supervisory unit, name of the manufacturer, name of the device, type, Ex symbol in a hexagon, explosion-proof version marking, degree of protection, factory number / year of manufacture.

7. Installation and safety instructions

7.1 General information

The activities listed below should be performed by an employee with appropriate qualifications and authorisations to install electrical equipment in potentially explosive atmospheres, in accordance with applicable regulations.

7.2 Information on installation and disassembly

Use suitable tools in good working order for installation and disassembly. The housings should be mounted to the base through the holes in the body using bolts or dowels. The housing can be mounted in any position; avoid mounting the housing with the glands facing upwards. When using cables or wires with wire conductors, use tube ends at their ends, in accordance with the cross-section of the conductor and pressed with suitable tools.

7.3 Anti-electrocution protection

Stainless steel and polyester housings are equipped with an internal earthing terminal.
During installation and operation, general rules of conduct and health and safety under such conditions must be followed.

7.4 Analysis of hazards during operation and installation

Table 4. Hazards and protection measures

Predicted hazard	Methods of protection
Injuries, crushing during transport	Manual Handling
Mechanical assembly: injuries, abrasions	Use appropriate spanners and assembly tools in good working order as well as working clothes
Electrocution	Earthing terminals and warning signs. Installation and operation only by persons with appropriate professional qualifications

8. Storage and transport conditions

The unit should be stored in closed storage rooms in the temperature and relative humidity specified in the technical data, in an environment free from harmful vapours and corrosive gases. Transport horizontally or vertically, secured against movement.

9. Inspections and maintenance principles

During operation, ad hoc and periodic inspections should be carried out to ensure trouble-free operation of the unit.

- **Ongoing inspections:**
  Ongoing inspections are to be carried out in case of changing the installation location and in case of need to replace damaged elements or components.
- **Periodical inspections:**
  Periodical inspections – depending on the operating conditions, inspections should be carried out at intervals of 6 to 12 months.

WARNING!
Observe the safety regulations before and during any inspections or maintenance. Maintenance and repair work may be carried out by qualified personnel.

9.1 Inspections and maintenance

9.1.1 External

It is recommended that the condition of the housing be checked periodically once a year, with particular emphasis on the seals, the completeness of fixing screws and the condition of cable entries and plugs. Each time the housing is opened, all screw connection terminals must be checked and tightened.

9.1.2 Housing interior

Check the cleanliness of the interior of the unit housing. If there is a significant accumulation of dust, remove it. Compressed air must not be used for this purpose in order to prevent dust from entering the connectors and terminals in places where it is not visible.

9.1.3 Electrical connection

Check the electrical connections in order to detect possible mechanical damage to the insulation of the cables. If the insulation is damaged, replace cable with a new one.

10. List of spare parts

The installation of the individual components included in the following list and their electrical connections are made in accordance with the drawings provided with this manual.

Table 5. List of materials

No.	Name and type	Manufacturer	Marking	Certificate No.	Gr. I	Gr. II
1.	Terminal strip **07-97**-****/****	Bartec	I M2 Ex e I II 2G Ex e II	PTB 99 ATEX 3117 U PTB 01 ATEX 1049 U PTB 01 ATEX 1050 U PTB 01 ATEX 1051 U ZELM 13 ATEX 0514 U	X	X
2.	Two-piece multi-pin quick release coupling **EX STS**	WIELAND	I M2 Ex ia I	BVS 03 ATEX E 184X	X	–
3.	Cable gland **HSK-M-Ex-d, HSK-M-PVDF-Ex-d, HSK-MZ-Ex-d**	Hummel	II 2 G Ex db IIC Gb II 1 D Ex ta IIIC Da	KEMA 99 ATEX 6968 X	X	X
4.	End cap **V-Ms-Ex-d, V-Ms-FPM-Ex-d, V-Ms-VMQ-Ex-d**	Hummel	II 2 G Ex d e IIC Gb II 1 D Ex ta IIIC Da	KEMA 06ATEX0024	X	X
5.	Reduction **RSD-Ms-Ex-d**	Hummel	II 2 G Ex d e IIC Gb II 1 D Ex ta IIIC Da	KEMA 06ATEX0024	X	X
6.	Cable gland **HSK-K-Ex**	Hummel	II 2G 1D Ex e II tD A20 IP68*	DMT 02 ATEX E 047 X	X	X
7.	Blanking plug for cable entry **HSK-V-Ex**	Hummel	II 2G Ex e IIC Gb II 1D Ex ta IIIC Da	BVS 03 ATEX E 298 X	X	X
8.	Cable gland **HSK-K-Ex-Active**	Hummel	II 2G Ex e IIC Gb II1D Ex ta IIIC Da	BVS 14 ATEX E 025X	X	X
9.	Cable gland **HSK-K-MZ-Ex,**	Hummel	II 2G Ex e IIC Gb II 1D Ex ta IIIC Da	KEMA 99 ATEX 6971 X	X	X

No.	Name and type	Manufacturer	Marking	Certificate No.	Gr. I	Gr. II
	HSK-M-Ex, **HSK-M-PVDF-Ex,** **HSK-MZ-Ex,** **HSK-MZ-PVDF-Ex**		II 2G 1D Ex e II tD A20 IP68*	DMT 03 ATEX E 051X	X	X
10.	End cap **V-Ms-Ex-d,** **V-Ms-FPM-Ex-d,** **V-Ms-VMQ-Ex-d**	Hummel	II 2G Ex d IIC Gb II 1D Ex ta IIIC Da	DMT 03 ATEX E049	X	X
11.	End cap **V-Ex,** **V-Ms-Ex,** **V-Ms-FPM-Ex,** **V-Ms-VMQ-Ex**	Hummel	II 2G Ex e IIC Gb II 1D Ex ta IIIC Da	DMT 03 ATEX E049	X	X
12.	Reduction **RSD-Ms-Ex**	Hummel	II 2G Ex e IIC Gb II 1D Ex ta IIIC Da	DMT 03 ATEX E049	X	X
13.	Screw or spring-loaded coupling (type Ex)	Weidmüller Interface GmbH & Co. KG	In accordance with ATEX certif-icate	In accordance with ATEX certificate	X	X
14.	Screw or spring-loaded coupling (type Ex)	Phoenix Contact	In accordance with ATEX certif-icate	In accordance with ATEX certificate	X	X
15.	Screw or spring-loaded coupling (type Ex)	Wago	In accordance with ATEX certif-icate	In accordance with ATEX certificate	X	X
16.	Telephone strip **KRONE LSA-PLUS**	Various manufacturers	Only Ex i circuits	Simple device	X	X
17.	Adapter – optical fibre	Various manufacturers	Only Ex op is circuits	Simple device	X	X
18.	Terminating resistor, rectifier diode for con-trol purposes	Various manufacturers	Only Ex i circuits	Simple device	X	X
19.	Polyester housing 07-5105-****/**** **Ex i** **07-5185-****/****	Bartec	I M2 Ex e I II 2G Ex e II	IBExU 01 ATEX 1042U	X	X
			II 2G Ex ia/ib IIA, IIB, IIC, T6, T5, Gb II 2D Ex ia/ib IIIC, T95C Db	PTB 08 ATEX 1064		
20.	Stainless steel housing 07-5105-****/****S **Ex i** **07-56**-****/****	Bartec Polska Sp. z o.o.	I M2 Ex e I II 2GD Ex e II	OBAC 07 ATEX 210U	X	X

Table 6. Housings used in the distribution boxes type 07-5105-**/******

No.	Designation	Name and type	Manufacturer	Housing material	Housing form
1.	07-5105-****/****	**07-5185-****/****	BARTEC	Polyester ≤ 1GΩ	Cover, bottom
2.	07-5105-****/****S	**07-56**-****/****	BARTEC POLAND	Stainless steel	Housing set with doors, covers (sight glass)

11. List of standards and regulations

The following standards and regulations have been used in the design of this unit:

Table 7. Standards and regulations

Directive/Standard	Description
Directive 2014/34/EU	Equipment and protective systems intended for use in a potentially ex-plosive atmosphere (ATEX)
PN-EN 60079-0:2013-03 +A11:2014-03 (EN 60079-0:2012+A11:2013)	Explosive atmospheres - Part 0:Equipment.Essential requirements.
PN-EN 60079-11:2012 (EN 60079-11:2012)	Explosive atmospheres - Part 11:Equipment protection with “i” intrinsic safety.
PN-EN 60079-28:2015-12 (EN 60079-28:2015)	Explosive atmospheres - Part 28: Protection of equipment and trans-mission systems using optical radiation.

Directive/Standard	Description
PN-EN 60079-31:2014-10 (EN 60079-31:2014)	Explosive atmospheres - Part 31:Equipment dust ignition protection by housing "t"
Directive 2014/30/EU	Electromagnetic compatibility (EMC)
PN-EN 61000-6-2:2008 (EN 61000-6-2:2005)	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards. Industrial environment immunity.
PN-EN 61000-6-4:2008/A1:2012 (EN 61000-6-4:2007/A1:2011)	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards. Emissions for industrial environments.
Additional	
PN-EN 50303:2004	Group I category M1 equipment intended to remain functional in atmospheres endangered by methane and/or coal dust
PN-G 50003:2003	Work protection in the mining industry – Electrical devices for mining operations – Requirements and tests.

12. Disposal

After the period of use is finished, disposal must be performed according to environmental protection regulations.

In case of a lack of knowledge in the matter, the town or municipal office will provide all necessary information.

13. Orders and service

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Components should be replaced by the manufacturer or a company authorised by the manufacturer. The manufacturer is not responsible for the quality of the equipment after the customer provides repairs or replacement of components on their own.

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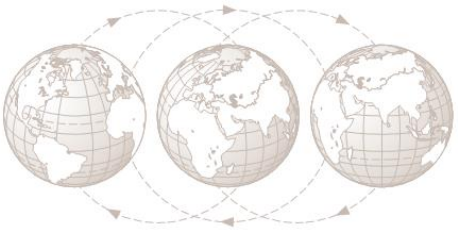

EXPROTEC protects the people and the environment by the safety of its components, systems and equipment

EXPROTEC develops and manufactures innovative components and systems, compliant with international standard and suitable for use in potentially explosive atmospheres, environmental protection, radioactive protection and industry.

EXPROTEC Sp. z o.o.

2022