

Scope :

**USER MANUAL**

**EXtreme® Ex s High / Medium Voltage  
Junction Box**

**BARTEC**

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## **Ex s High / Medium Voltage Junction Box (11 kV to 40 kV)**

**EXtreme®**



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Junction Box****BARTEC**

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**Manufacturer's address:**

**Bartec Technor AS**  
**Vestre Svanholmen 24**  
**4313 SANDNES**  
**Norway**

Further technical information is available on [www.bartec-technor.no](http://www.bartec-technor.no).

**Note on instructions**

When working in hazardous areas, the safety of personnel and equipment depends on compliance with the relevant safety regulations. The people in charge of installation and maintenance bear a special responsibility and it is essential that they have knowledge of the applicable rules and regulations. These instructions provide a summary of the most important safety measures and must be read by everyone working with the product. The instructions to be kept for future reference and must be available throughout the expected life of the product.

**Technical specifications**

The equipment listed in this manual are certified according to the latest requirements of the ATEX Directive 2014/34/EU and IECEx regulations.

**The certificate numbers:**

CML 20ATEX3132X  
 IECEx CML 20.0085X

**Example of the type label**

Technical data on label may vary according to installed equipment.

**Description**

The EXtreme® range of Ex s High / Medium Voltage Junction Boxes are available in many sizes. They are made of acid resistant stainless steel 316L and are rugged and designed for harsh environment like:

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- Oil and gas industry
- Chemical industry
- Pharmaceutical
- Industry
- Agribusiness

The EXtreme® range are designed for use in potentially explosive atmospheres and certified according to the requirements of the ATEX Directive and IECEx. The EXtreme® junction box comprises of a component certified Ex-e enclosure with up to four (phase +N) high voltage connection facilities supported by cast-resin post type insulators. An optional junction box may be connected to the main enclosure for connection of fibre optic cables. The method of connecting the enclosure together is described in the component certificates DNV-2008-OSL-ATEX-42438U and IECEx DNV 09.0005U. When the protection concept 'op pr' is applied and a window is placed in the fiber optic compartment, an additional junction shall be placed inside the fiber optic compartment for additional UV protection. Otherwise the optical splicing may be conducted directly inside the fiber optic compartment.

The junction box may be equipped with optional components such as anti-condensation heaters, thermostats, low voltage terminals, wireless sensors for measuring of internal relative humidity and temperature, IR windows (PS! Only for ATEX Certified solutions), lifting kits, ground balls on the bus bars. A cover made of Lexan 9030 may be provided to cover the inner high voltage compartment to avoid direct contact to uninsulated parts for the operator as the door is opened.

The minimum size of the junction box is (W/D/H) 100 cm x 150 cm x 50 cm, with the layout of internal connections as described in the manufacturer's documentation. When the option of a fibre optic compartment is used, the size of this enclosure will add onto the size of the high voltage compartment/enclosure.

The EXtreme® range is made in accordance with the following standards:

EN IEC 60079-0 : 2018	IEC 60079-0 : 2017
EN 60079-7 : 2015+A1:2018	IEC 60079-7 : 2017
EN 60079-28 : 2015	IEC 60079-28 : 2015
IEC 60079-33 : 2012	IEC 60079-31 : 2013
EN 60079-31 : 2014	IEC 60079-33 : 2012
EN IEC 61000-6-2 :2019	EN 60529:1991/A1:2000/A2:2013/AC:2016-12
EN 61439-1 :2011	EN 50581 :2012
EN 50419 :2006	

### Ex Marking

The EXtreme® shall be marked with the following:

 II 2 GD (for ATEX and IECEx)

 II 3 GD (only for IECEx)

Ex sb IIB/IIC T4/T5/T6 Gb

Ex sc IIB/IIC T4/T5/T6 Gc

Ex eb sb IIB/IIC T4/T5/T6 Gb

Ex ec sc IIB/IIC T4/T5/T6 Gc

Ex eb sb [op is] IIB/IIC T4/T5/T6 Gb

Ex ec [op is] sc IIB/IIC T4/T5/T6 Gc

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Ex eb sb [op is] op pr IIB/IIC T4/T5/T6 Gb  
 Ex eb sb op pr IIB/IIC T4/T5/T6 Gb  
 Ex [op is] sb IIB/IIC T4/T5/T6 Gb  
 Ex [op is] op pr sb IIB/IIC T4/T5/T6 Gb  
 Ex op pr sb IIB/IIC T4/T5/T6 Gb  
 Ex tb IIIC T85/105/135°C Db  
 Ex db sb IIB/IIC T4/T5/T6 Gb  
 Ex db eb sb IIB/IIC T4/T5/T6 Gb  
 Ex db eb sb [op is] IIB/IIC T4/T5/T6 Gb  
 Ex db eb sb [op is] op pr IIB/IIC T4/T5/T6 Gb  
 Ex db eb sb op pr IIB/IIC T4/T5/T6 Gb  
 Ex [op is] db sb IIB/IIC T4/T5/T6 Gb  
 Ex [op is] db op pr sb IIB/IIC T4/T5/T6 Gb  
 Ex db op pr sb IIB/IIC T4/T5/T6 Gb

Ex ec sc [op is] op pr IIB/IIC T4/T5/T6 Gc  
 Ex ec sc op pr IIB/IIC T4/T5/T6 Gc  
 Ex [op is] sc IIB/IIC T4/T5/T6 Gc  
 Ex [op is] op pr sc IIB/IIC T4/T5/T6 Gc  
 Ex op pr sc IIB/IIC T4/T5/T6 Gc  
 Ex tc IIIC T85/105/135°C Dc

Ta = -50/-40/-20°C to 45/50/55/60°C

Ta = -50/-40/-20°C to 45/50/55/60°C

### Electrical Data

Max. Voltage 40 kV

Max. Current 1250 A

IP rating – IP66

### Load current vs ambient temperature and temperature class:

I <sub>N</sub> Load current [A]	T <sub>amb</sub> [°C]		Temp Class	Dust Temp
0 ≤ I <sub>N</sub> ≤ 700	-50	60	T6	T85°C
700 ≤ I <sub>N</sub> ≤ 800	-50	50	T6	T85°C
	-50	60	T5	T105°C
800 ≤ I <sub>N</sub> ≤ 900	-50	45	T6	T85°C
	-50	60	T5	T105°C
900 ≤ I <sub>N</sub> ≤ 1000	-50	55	T5	T105°C
	-50	60	T4	T135°C
1000 ≤ I <sub>N</sub> ≤ 1100	-50	50	T5	T105°C
	-50	60	T4	T135°C
1100 ≤ I <sub>N</sub> ≤ 1250	-50	60	T4	T135°C

Table 1

**Load current vs minimum cable temperature:**

I <sub>N</sub> Load current [A]	ΔT Temperature Rise [K]	T <sub>amb</sub> [°C]		Maximum Temperature [°C]*	Temp Class	Dust Temp	Minimum Cable Operating Temp (when exceeding 85°C) [°C]**
≤700	20	-50	40	65	T6	T85°C	
	20	-50	45	70		T85°C	
	20	-50	50	75		T85°C	
	20	-50	55	80		T85°C	
	20	-50	60	85		T85°C	
700 ≤ I <sub>N</sub> ≤ 800	26	-50	40	71		T85°C	
	26	-50	45	76		T85°C	
	26	-50	50	81		T85°C	
	26	-50	55	86		T105°C	
	26	-50	60	91		T105°C	
800 ≤ I <sub>N</sub> ≤ 900	33	-50	40	78	T6	T85°C	
	33	-50	45	83		T85°C	
	33	-50	50	88	T5	T105°C	
	33	-50	55	93		T105°C	89
	33	-50	60	98		T105°C	94
900 ≤ I <sub>N</sub> ≤ 1000	41	-50	40	86	T5	T105°C	
	41	-50	45	91		T105°C	
	41	-50	50	96		T105°C	87
	41	-50	55	101		T105°C	92
	41	-50	60	106		T135°C	97
1000 ≤ I <sub>N</sub> ≤ 1100	48	-50	40	93	T5	T105°C	
	48	-50	45	98		T105°C	89
	48	-50	50	103		T105°C	94
	48	-50	55	108	T4	T135°C	99
	48	-50	60	113		T135°C	104
1100 ≤ I <sub>N</sub> ≤ 1250	65	-50	40	110	T4	T135°C	95
	65	-50	45	115		T135°C	100
	65	-50	50	120		T135°C	105
	65	-50	55	125		T135°C	110
	65	-50	60	130		T135°C	115

\* The 'Maximum Temperature' is calculated from:  $\Delta T + T_{amb} + 5K$  (safety margin)

Table 2

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## Meaning of symbols

⚠ This symbol means a hazard and precaution to be taken

## Safety instructions

⚠ The device must, including welding of the optical fibers, be installed, used and maintained in accordance with the following standards:

- IEC/EN 60079-14 (Explosive atmospheres - Part 14: Electrical installations design, selection and erection)
- IEC/EN 60079-17 (Explosive atmospheres - Part 17: Electrical installations inspection and maintenance)
- Decrees, orders, laws, directives, circulars, applications, standards, state of art and other documentation relating to its installation site

⚠ **It is forbidden to change anything (components, installation, wiring ...) without the prior written consent of Bartec Technor.**

⚠ **We cannot accept any responsibility for failure to observe these regulations:**

- Make sure of the compatibility between the information on the nameplate, the explosive atmosphere present, the area of use and ambient temperatures on surfaces
- Any damage on the device can cause the explosion-proof protection to become ineffective
- The installation of the enclosure must be done in the state of the art in the technical domains and only by qualified, competent and empowered personnel
- A defective or abnormal use as well as the noncompliance with the instructions of the present document exclude any clause of guarantee and do not engage our responsibility
- The use of the device in case of excessive deposits of dusts superior at 50mm according to EN / IEC 60079-31 is not authorized
- For dust applications, the diameter of unthreaded holes for cable entries shall be no greater than 0,7 mm larger than the nominal diameter of the entry device
- Liability for manufacturer traceability is ensured only at the first known delivery destination (serial number specified on the certification label)
- It is also required to observe the regulations of the country of use
- The EXtreme® contains non-metallic materials on which safety depends, their performance shall be considered with respect to the chemicals that may be present in the hazardous atmosphere

⚠ **Transport, storage**

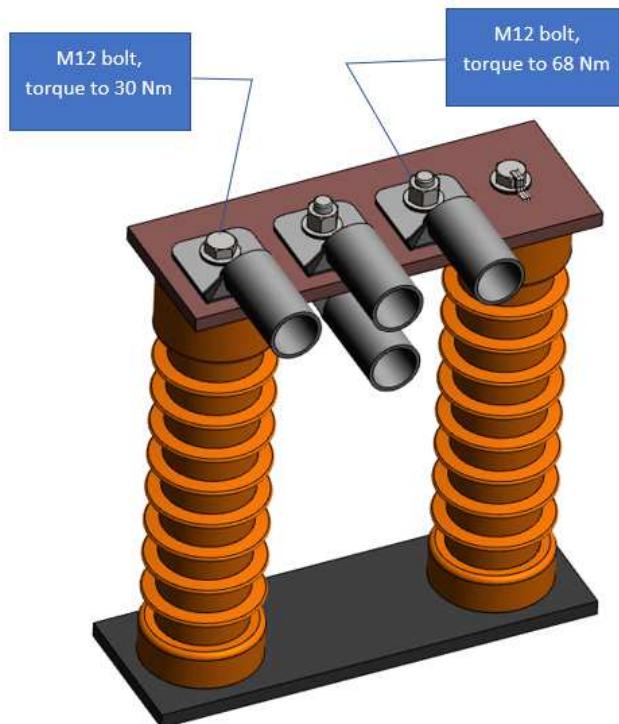
- Check if the product has been damaged during transport. If any damage is observed, do the statutory reserves to the carrier
- Do not put damaged products into service

Packaging	Location storage	Duration storage
Open	In a covered location, clean (without contact with external substances) and closed with temperature a constant humidity (-40°C < T < +70°C). Shielded from important temperature variations	2 years and more with regular inspection (cleanliness and mechanical damage)

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## ⚠ Putting into service

- Verify that the information on the label of the product is in accordance with the permissible conditions for the Ex area of the site of use (Group II: Surface Industries - Category 2: high level of protection for ATEX G = for Gas / D = for Dust, IECEx EPL - G = for Gas / D = for Dusts - IPxx: IP rating (waterproofness for solids and liquids))
- Check if there is a specific position of mounting
- The wiring of the cable conductors must be made with a particular care
- The conductor insulation must reach the terminal. The conductive core must not be damaged
- Not to exceed the authorized maximal temperature appropriate cables must be selected and take particular care installing them. Use as short conductors as possible
- Follow the instructions contained in the specifications
- Earthing / bonding: Each enclosure has an external connection facility for bonding. It is in reliable electrical contact with the internal earthing terminal and/or earth bar, as well as with any bonding terminals
- The size of the internal earthing terminals is in accordance with IEC 60079-0:2018 clause 15 and Table 12. This implies for internal earthing (S: conductor):
  - when  $S \leq 16 \text{ mm}^2$  then  $S_{PE} = S$
  - when  $16 \text{ mm}^2 < S \leq 35 \text{ mm}^2$  then  $S_{PE} = 16 \text{ mm}^2$
  - when  $S > 35 \text{ mm}^2$  then  $S_{PE} = 0.5 \times S$
- External bonding shall be connected
- When connecting cables, ensure that the incoming cables/wires are isolated from all sources of power during installation and until the cover is mounted on the enclosure
- Copper Bus Bar connections using M12 bolts shall be torqued to 30 Nm when the connection is done directly on the insulators and torqued to 68 Nm when the connection is done on the copper bus bars:



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- Torqued connections shall be torque sealed by the use of for example LOCTITE SF 7414
- Provide effective equipotential connection with a conductor with a cross-sectional area of at least 4mm<sup>2</sup>
- All external and internal connections for earthing/bonding are in SS316 to avoid corrosion
- Cable entries:  
Any type of cable or conduit entry certified Ex e, including multi cable transit frames, can be used and installed according to EN / IEC 60079-14 with minimum degrees of protection (IP Code): 66
- The incoming and outgoing cables shall be mechanically fixed to prevent movement upon a short circuit using cable clamps. The cable clamps shall be placed as close as possible towards the bus bars, considering the Medium Voltage cable termination kits
- When a fiber optic compartment (FOC) is used, the fibers may be spliced using hot fusion splicing directly inside the FOC
- When a fiber optic compartment (FOC) is used, and there is a window in the FOC, an additional FO splicing box must be used inside the FOC. The fibers shall be spliced using hot fusion splicing inside the internal FO box
- When anti condensation heaters are used, they shall have a maximum size of 300 W
- When an anti condensation heaters with a thermostat embedded in the supply cable, the set point of the thermostat shall be 18°C
- When an adjustable thermostat for the anti condensation heater is used, the set point of the thermostat shall be 25 K below the rated ambient temperature of the enclosure
- If the enclosures are painted, the following must be observed:
  - Wet paint, externally and/or internally, max thickness ≤ 0,2mm for gas group IIC, max thickness ≤ 2,0mm for gas group IIB
  - Powder paint, externally and/or internally, max thickness ≤ 0,2mm for gas group IIC, max thickness ≤ 2,0mm for gas group IIB
  - Additionally, the enclosures shall be marked with the following warning:
    - WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS 22922
- If the enclosures are fitted with PC plates (Lexan), the enclosures shall be marked with the following warning:
  - WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS 22922

For other installation applications, contact Bartec Technor as for further information

### Before starting

- Make sure the unit has been correctly mounted and not damaged
- Make sure the wiring and the tightening of the terminal screws have been performed properly (see descriptive tightening torque)
- The device shall not include any foreign objects and no part shall be damaged
- The cable gland/entries must be tightened (see user manual of the gland/entry for torque)
- After external cabling is completed, creepage and clearance distances are to be verified according to the details on the General Arrangement drawings of the respective job. Requirements for creepage and clearance distances are pending on electrical data for the specific cabinet.

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- Perform a dielectric test with:  $(1\ 000 + 2*U_N)$  V for 3 seconds. During the test no electrical arcing shall occur. The test shall be performed using calibrated measuring equipment, the equipment should have a valid calibration certificate.

### Technical features high voltage compartment

Possible cable entry sides: A) The bottom side  
B/C) The left or right sides  
D) The top  
E) The back

Cable entry may be either directly in the MVJB body itself or via flange plates. Multi Cable Transits (MCT) frames and packing systems may also be used for cable entry.

The internal bus bar arrangement inside the MVJB may vary based on where the incoming / outgoing cables are. The arrangement may be:

- 1) Top mounted, horizontal (normally for bottom entry cables) 
- 2) Centre mounted, horizontal (normally for bottom and top entry cables) 
- 3) Bottom mounted, horizontal (normally for top entry cables) 
- 4) Left mounted, vertical (normally for right side entry cables) 
- 5) Right mounted, vertical (normally for right side entry cables) 
- 6) Centre mounted, vertical (normally for left and right side entry cables) 
- 7) Top mounted, left, downwards diagonal (normally for bottom and right side entry cables) 
- 8) Top mounted, right, downwards diagonal (normally for bottom and left side entry cables) 
- 9) Bottom mounted, left, upwards diagonal (normally for top and right side entry cables) 
- 10) Bottom mounted, right, upwards diagonal (normally for top and left side entry cables) 

Each current carrying bus bar may carry up to six connected conductors. There shall be a minimum of one insulator per conductor. The earthing bus bar(s) may be fitted with as many connected conductors as practically may be fitted. The connection to the bus bars shall normally be done using cable lugs.

The EXtreme® may be fitted with a single door or several doors with a limitation of a width of each door of 1000mm. The EXtreme® may be fitted with one or more connecting junction boxes where for example fiber optic splicing may be done.

Lifting lugs, alternatively with reinforcement angle bars may be fitted on the EXtreme® – if so, these shall be replaced with certified blanking elements before it is put into service.

## Maintenance

Maintenance shall be performed according the below requirements and according to EN60079-17. The maintenance and repairs work on devices must be made only by authorized and trained personnel.

**⚠ Before any work the devices must be switched off. In addition:**

- Prevent and avoid any formation of layers of dusts: make a periodic cleaning with a wet cloth
- Do not take apart the command and control units (push buttons, pilot light, etc.)

**⚠ It is advisable that the following checks must be made at least once a year:**

- The external equipment and surfaces must not be damaged
- The cable entries and blanking plugs must be securely fastened and in place
- If the enclosure is opened and prior to closing, check the cleanliness of gasket and screws/quick locks and that they are without any kind of damages

**⚠ Special / Specific Conditions of Use (Special Conditions):**

The following conditions relate to safe installation and/or use of the equipment.

- For junction boxes used at voltages over 11kV (Zone 1) or 15kV (Zone 2) and installed in a location where an explosive atmosphere is considered present under normal operation or fault conditions (Zones either 1 or 2), the installer/user shall take into account any additional risks the location/environmental conditions and installation may pose to electrical breakdown or corona discharge, such as moisture/condensation and contaminants (dust, oils/greases, etc). Additionally, the installer shall consider the cables installed to ensure they do not increase any ignition risks, (materials, size and secureness of connections).
- The enclosure shall be free from all dust, moisture and any other pollutants before use.
- Cable sleeves and connection covers shall be considered as a part of the cable termination.
- Cables and lugs shall be suitably rated for the installation.
- Connections using M12 bolts shall be torqued to 30 Nm when the connection is done directly on the insulators and torqued to 68 Nm when the connection is done on the copper bus bars and cables routed and mounted so as not to apply lateral forces that could cause the connection to rotate.
- The minimum creepage and clearances specified below shall be observed during installation:

Ex sb, Zone 1

Minimum permitted distance between Phase and Phase and Phase and Earth		
Voltage 'U <sub>N</sub> ' [kV]	Creepage [mm]	Clearance [mm]
12	150	120
17,5	219	175
24	300	240
30	375	300

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31	388	310
36	450	360
40	500	400

Table 3

vii Due to the possibility of corona discharge the following shall be considered

- Sharp edges and corners shall be minimised on bared cable and lugs.
- Bends in cables shall be kept to a minimum and shall be of as large a radius as installation permits without compromising minimum creepage and clearances.
- Sharp bends in cables are not permitted.

viii Moisture and condensation may reduce the effectiveness of the creepage distances, to reduce the risk, the environmental conditions during installation and maintenance activities shall be observed. The enclosure shall only be opened when the local ambient temperature is between 5°C and 40°C with a maximum relative humidity of 80% to temperatures up to 31°C, decreasing linearly to 50% at 40°C.

ix The maximum power dissipated shall not exceed the values in the table shown in the description. These figures are based on the power being evenly distributed between all 3 busbars, therefor no single busbar shall exceed one third of the specified power. The maximum power shall be calculated in accordane with EIC/EN 60079-7 Annex E.2.

x When the marking includes 'op pr' or 'op is' the optical compartment shall not dissipate more than 100mW.

xi When the marking includes 'op pr' the cables entering or exiting the enclosure shall be suitably protected from damages/breakages and satisfy the requirements of IEC 60079-28 'op pr'.

xii When the marking includes 'op is' the fibre optic source supplying this equipment shall be suitably certified as compliant with EN/IEC 60079-28 and provide an EPL of Gb or better.

xiii An electric strength test shall be carried out on the EXtreme® junction box after it has been installed. The test shall be carried out at 2Um + 1000V in accordance with IEC/EN 60079-7 clause 7.1. When fitted, the heater should be separately tested a 2Um plus 1000V in accordance with IEC/EN 60079-7 clause 7.1.  
When fitted, the heater should be separately tested at 2Um plus 1000V in accordance with IEC/EN 60079-7 clause 7.1.

xiv It is the responsibility of the end user to eliminate circulating currents by the correct selection of cables, heir installation method and associated gland plate material.

xv If the enclosure has no coating or no window, this condition may be ignored. Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge when in dust locations. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces (e.g. steam generation, pneumatic processes, windblown dust, etc). In addition, the equipment shall only be cleaned with a damp cloth.

xvi Only fusion splice connections are permitted for op pr and the fibre cables shall be suitably protected from damage.

xvii If the Lexan window is fitted the enclosure shall be protected from sources of U.V. such as sunlight.

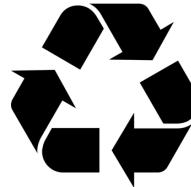
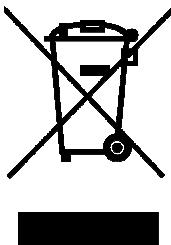
xviii If heaters are fitted, they shall be set to de-energise at least 25°C below the rated ambient of the enclosure.

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- xix When fitted with the adjustable thermostat the equipment shall only be used for T5 applications.
- xx The flameproof joints are not intended for repair, refer to the manufacturer.
- xxi If the enclosures are fitted with IR Windows for possible thermography, these can only be certified according to the ATEX Directive as the windows are not IECEx certified.

**⚠ Dismantling, taking out of service:**

When the unit is taken out of service, the materials must be disposed in a safe and environmentally friendly way. The enclosure units contain metal, electronic **components** and plastic parts. Therefore, the statutory requirements for disposing of electronic scrap (WEEE) must be observed (e.g. disposal by an approved disposal company). WEEE (Waste Electrical and Electronic Equipment) Directive, 2012/19/EU.



SS316L