

INSTALLATION, OPERATION & MAINTENANCE for ABTECH BUSBAR BOX CML 22UKEX3187X, CML 20ATEX3085X and IECEx CML 20.0062X

Marking

The marking shown is for an apparatus certified BusBar Box.

The maximum permitted voltage is 11kV.

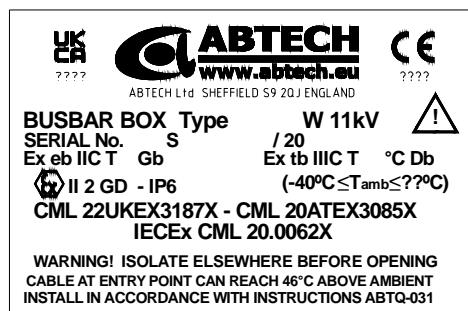
The maximum permitted power dissipation is marked on the label and identified by RATING _____ W.

The maximum ambient temperature may be as low as +40°C or as high as +90°C

The IP rating is IP66, IP67 or IP68.

An IP67 rated BusBar Box complies with IP66

An IP68 rated BusBar Box complies with IP66 and IP67.



This product has been designed in accordance with general electrical safety standards.

In addition, the following hazardous area equipment standards are applicable to this product:

IEC 60079-0:2017 Ed. 7.0,
EN IEC 60079-0:2018

IEC 60079-7:2017 Ed. 5.1,
EN 60079-7:2015/A1:2018,

IEC 60079-31:2013 Ed. 2,
EN 60079-31:2014

NOTE: Both the IEC and EN versions of 60079-31 require that clearance entries shall not exceed the nominal thread size of the entry device by more than 0.7mm. We recommend that devices provided with NPT or NPTF taper threads be provided with a threaded entry either through a welded boss or through a thread adaptor (hub) with a metric male thread.

Installation

Each BUSBAR box requires mechanical support from the underside.

The mass of a typical BUSBAR box is 270 kg but may be significantly greater.

The unsupported mass of the cables should be added.

It is recommended that the enclosure also be secured to a substantial vertical surface.

It is recommended that the bus bar closest to the door be selected as the neutral (where applicable) followed by the phases red (brown), yellow (grey) and blue (black) working towards the rear of the box. If the wiring system does not include a neutral, then the bus bar nearest the door may be used for earthing/grounding or not used at all.

Several formats are available: -

1 - BusBar Box for single core cables.

This design allows for either a through connection (in at the bottom, out at the top) or single side connection (in and out at bottom only or top only). Whilst 316 (EN 1.4401) and 316L (EN1.4404) stainless steels are non-magnetic, gland plates are also available in brass with a maximum copper content of 65%.

2 - BusBar Box for multi-core cables – Option 1.

This design allows for either a through connection (in at the bottom, out at the top) or single side connection (in and out at bottom only or top only). It uses the same size format as for single core cables (see 1 above) and incorporates the use of a trifurcation box either at the bottom, or the top, or both, to allow the splitting of a multi-core cable into single cores before they enter the bus bar chamber.

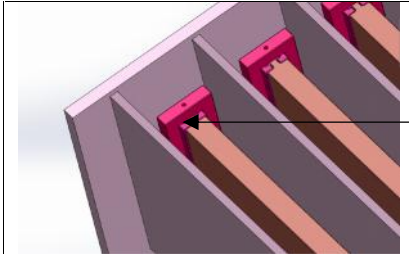
3 - BusBar Box for multi-core cables – Option 2.

This design is taller to allow the splitting of a multi-core cable and incorporate space for cable core bending without the use of a trifurcating box.

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1 – BUSBAR box for single core cables

- a) Mount the enclosure on the support frame and secure
- b) Open and remove the lid.
- c) Remove the machine screws securing the blank gland plate opposite the first cable entry gland plate to be used. This will allow essential access to the bus bars.
- d) Check that the busbar collar retention screws are tight. The thread size is M3, use a 2.5mm Allen key. Torque should not exceed 1.3Nm.



- e) Attach the cable glands to the gland plate in accordance with the manufacturer's instructions.
- f) Prepare the first cable in accordance with the cable gland manufacturer's instructions. (This should be one of the cable cores for the blue phase for attachment to the rearmost bus bar). Leave sufficient length of cable core and core insulation to comfortably reach the crimp type terminal supplied. Remember to include the length of the crimping barrel.
- g) Insert the cable through the cable gland and secure the armouring (if applicable) in accordance with the gland manufacturer's instructions. If a stuffing gland is used secure the cable by tightening the sealing nut.
- h) Carefully mark the cable to length so that the conductor will reach the stop on the inside of the crimping lug barrel. The cable core should have no intentional bends. The cable gland used should be directly below (or above for top entry) the crimping lug barrel.
- i) Remove the cable from the gland and trim the conductor to length.
- j) Cut back the conductor insulation. The length of the exposed conductor should be no more than 5mm longer than the internal length of the crimping lug barrel.
- k) Insert the cable through the appropriate cable gland again and into the barrel of the crimping lug to check for correct length. If armoured cable is used check that the armouring will clamp in the cable gland as intended by the gland manufacturer.
- l) Once the correct length has been established make careful note of all the cable stripping lengths for repeat use.
- m) Remove the applicable crimping lug from the bus bar assembly.
- n) Partially Insert the cable core through the appropriate cable gland again and push the crimping lug onto the conductor.
- o) Rotate the crimping lug so that the face which contacts with the bus bar is both facing and parallel to the rear of the box.
- p) Crimp the barrel onto the conductor using the correct size crimping die set. This may be of the indenting or hexagonal type.
- q) Lift the cable and lug to just below the bus bar assembly and insert the 55mm long high tensile steel machine screw through the hole in the palm of the lug.
- r) Lift further until the bolt will locate in the fixing hole in the bus bar assembly.
- s) Push the bolt through the bus bar assembly.
- t) Apply a small smear of high temperature grease to the inside of the nut, just sufficient to lubricate the thread, and secure the lug in place with the nut.
- u) Tighten moderately and check again that the cable gland will adequately clamp the cable armour as intended by the gland manufacturer. **DO NOT CLAMP THE ARMOUR AT THIS TIME.**
- v) Using the measurement notes taken of the now installed cable prepare each of the other cables.
- w) Repeat from j), (above), checking for length against the prepared cable and lug assembly, then l), m), n) & o).
- x) Once all the cables have been installed apply a torque of to each connection screw in accordance with the following table:

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Machine screw size	Torque with grease applied (see 't' above)	Torque when No grease available
M10	46 to 53	61 to 68
M20	377 to 433	510 to 560

- y) Complete the installation of the cable glands by securing the cable armour.
- z) Replace both of the undrilled (blank) gland plates complete with gaskets and secure the M8 gland plate fixings to 6Nm approx.
- aa) Replace the enclosure lid and fasten all the fixing screws.

The ABTECH BUSBAR BOX is now ready for use.
For operation and maintenance see page 7

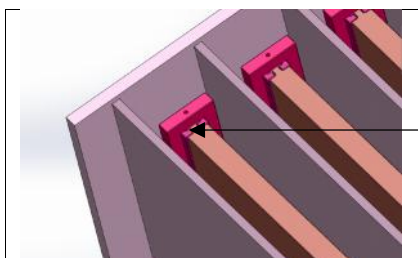
NOTE:

If the installer chooses to omit the grease in step 'y', above, it may prove difficult to remove the nut (should this ever be required) due to the self-locking properties of austenitic stainless steels.

2 – BUSBAR box for multi-core cables Option 1

This option of BUSBAR box for multi-core cables is provided with one or two trifurcation boxes.

- a) Mount the BUSBAR box assembly complete with trifurcating box on the support frame and secure.
- b) Remove the door from both boxes.
- c) Fit the cable gland for one of the incoming multi-core cables to the base gland plate of the trifurcating box.
- d) Fit the cable glands for each core of the multi-core cable to the underside of the gland plate separating the BUSBAR box and the trifurcating box.
- e) Remove the top plate of the BUSBAR box.
- f) Check that the busbar collar retention screws are tight. The thread size is M3, use a 2.5mm Allen key. Torque should not exceed 1.3Nm.



- g) Prepare the first multi-core cable in accordance with the cable gland manufacturer's instructions. Leave sufficient length of cable core and core insulation to comfortably reach each of the crimp type phase terminals supplied. Remember to include the length of the crimping barrel for each terminal.
- h) Insert the multi-core cable through the cable gland in the base gland plate of the trifurcating box.
- i) When sufficient cable has been drawn through thread each core through its applicable gland in the gland plate separating the BUSBAR box and the trifurcating box. Ensure the correct phase connection before proceeding further.
- j) Draw through the remainder of the multi-core cable and secure the armouring (if applicable) in accordance with the manufacturer's instructions. If a stuffing gland is used secure the multi-core cable by tightening the sealing nut.
- k) Carefully mark each core to length so that the conductor will reach the stop on the inside of the applicable crimping lug barrel. (The cable core should have no intentional bends inside the BUSBAR box. All cable core bending must be within the trifurcating box. The cable gland used for each core should be directly below the crimping lug barrel).
- l) Unscrew the securing nut for the multi-core cable gland and withdraw the gland and cable until the individual cores are accessible within the BUSBAR box.
- m) Trim each core to length as marked.
- n) Cut back the conductor core insulation for each core. The length of the exposed conductor should be no more than 5mm longer than the internal length of the crimping lug barrel.

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- o) Draw the multi-core back up through the base gland plate of the trifurcating box and secure the gland again.
 - p) Check each individual cable core for length against its crimping lug.
 - q) Once the correct length has been established for each core make careful note of all the cable stripping lengths for repeated use.
 - r) Again, unscrew the securing nut for the multi-core cable gland and withdraw the gland and cable until the individual cores are accessible within the BUSBAR box.
 - s) Remove the applicable crimping lugs from the bus bar assembly.
 - t) Push the appropriate crimping lug onto each conductor and rotate each lug so that the face which contacts with the bus bar is both facing and parallel to the rear of the box.
 - u) Crimp the barrel of each lug onto the conductor using the correct size crimping die set. This may be of the indenting or hexagonal type.
 - v) Lift the cable cores together until the lugs are just below the bus bar assembly and insert a 55mm long high tensile steel machine screw through the hole in the palm of each lug.
 - w) Lift the cable cores further until the fixing bolts will locate in the bus bar(s).
 - x) For each cable core lug push the machine screw through the bus bar(s).
 - y) Apply a small smear of high temperature grease to the inside of the securing nut, just sufficient to lubricate the thread, and secure the lug in place with the nut. Tighten moderately.
 - z) Check that the gland for the multi-core cable will secure in its mounting hole. Do not secure the gland at this time.
 - aa) Using the noted measurements taken earlier from the now installed cable, prepare each of the other cables, as follows:
 - bb) Remove the bolts securing the assembled cable to the bus bar and withdraw the multi-core cable and gland until the lugs rest on the gland plate that separates the BUSBAR box from the trifurcating box.
 - cc) Repeat s) above then repeat from u) to z) for each cable.
 - dd) When all cables have been prepared to stage z) secure the glands for the multi-core cables.
 - ee) Once all the cables have been installed apply a torque of to each connection screw in accordance with the following table:
- | Machine screw size | Torque with grease applied (see 'y' above) | Torque when No grease available |
|--------------------|--|---------------------------------|
| M10 | 46 to 53 | 61 to 68 |
| M20 | 377 to 433 | 510 to 560 |
- ff) Replace the top access plate(s) on the BUSBAR box.
 - gg) If the BusBar Box is also fitted with a top trifurcation box return to c) above and fit the cable gland(s) to the top gland plate of that trifurcation box. Continue as for the bottom trifurcation box.
 - hh) Once all gland plates and access plates have been replaced and secured, replace the enclosure lid(s) and fasten all the fixing screws.

The ABTECH BUSBAR BOX is now ready for use.
For operation and maintenance see page 7

NOTE:

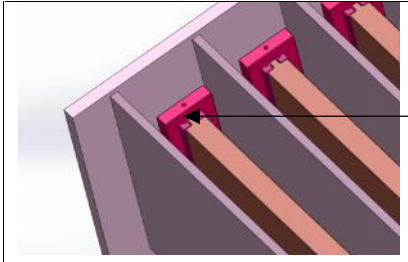
If the installer chooses to omit the grease in step 'y' above it may prove difficult to remove the nut, should this ever be required, due to the self-locking properties of austenitic stainless steel.

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3 – BUSBAR box for multi-core cables Option 2

This option of BUSBAR box for multi-core cables includes additional space internally to accommodate cable bending radii.

- a) Mount the BUSBAR box assembly on the support frame and secure.
- b) Remove the door(s). A wide BusBar Box may have more than one door.
- c) Fit the cable gland for one of the incoming multi-core cables to the intended base gland plate of the BusBar Box.
- d) Remove the corresponding top plate of the BUSBAR box.
- e) Check that the busbar collar retention screws are tight. The thread size is M3, use a 2.5mm Allen key. Torque should not exceed 1.3Nm.



- f) Prepare the first multi-core cable in accordance with the cable gland manufacturer's instructions. Leave sufficient length of cable core and core insulation to comfortably reach each of the crimp type phase terminals supplied. Remember to include the length of the crimping barrel for each terminal.
- g) Insert the multi-core cable through the cable gland and secure the armouring (if applicable) in accordance with the manufacturer's instructions. If a stuffing gland is used secure the multi-core cable by tightening the sealing nut.
- h) Carefully mark each core to length so that the conductor will reach the stop on the inside of the applicable crimping lug barrel, allowing enough conductor length to accommodate the bending required to align it with the appropriate crimp terminal barrel.
- i) Unscrew the securing nut for the multi-core cable gland and withdraw the gland and cable until the individual cores are accessible within the BUSBAR box.
- j) Trim each core to length as marked.
- k) Cut back the conductor core insulation for each core. The length of the exposed conductor should be no more than 5mm longer than the internal length of the crimping lug barrel.
- l) Draw the multi-core back up through the base gland plate and secure the gland again.
- m) Check each individual cable core for length against its crimping lug.
- n) Once the correct length has been established for each core make careful note of all the cable stripping lengths for repeated use.
- o) Again, unscrew the securing nut for the multi-core cable gland and withdraw the gland and cable until the individual cores are accessible within the BUSBAR box.
- p) Remove the applicable crimping lugs from the bus bar assembly.
- q) Push the appropriate crimping lug onto each conductor and rotate each lug so that the face which contacts with the bus bar is both facing and parallel to the rear of the box.
- r) Crimp the barrel of each lug onto the conductor using the correct size crimping die set. This may be of the indenting or hexagonal type.
- s) Lift the cable cores together until the lugs are just below the bus bar assembly and insert a 55mm long high tensile steel machine screw through the hole in the palm of each lug.
- t) Lift the cable cores further until the fixing bolts will locate in the bus bar(s).
- u) For each cable core lug push the machine screw through the bus bar(s).
- v) Apply a small smear of high temperature grease to the inside of the securing nut, just sufficient to lubricate the thread, and secure the lug in place with the nut. Tighten moderately.
- w) Check that the gland for the multi-core cable will locate in its mounting hole. Do not secure the gland at this time.
- x) Using the noted measurements taken earlier from the now installed cable, prepare each of the other cables, as follows:
- y) Remove the bolts securing the assembled cable to the bus bar and withdraw the multi-core cable and gland until the lugs cable ends are accessible below the phase barriers.

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- z) Repeat r) and s) for each conductor.
- aa) Repeat from t) to w) for each cable.
- bb) When all cables have been prepared to stage w) secure the gland for the multi-core cable.
- cc) Repeat from g) for other multicore cables.
- dd) Once all the cables have been installed apply a torque of to each connection screw in accordance with the following table:

Machine screw size	Torque with grease applied (see 'v' above)	Torque when No grease available
M10	46 to 53	61 to 68
M20	377 to 433	510 to 560

- ee) Replace the top access plate(s) on the BUSBAR box.
- ff) Once all gland plates and access plates have been replaced and secured, replace the enclosure lid(s) and fasten all the fixing screws.

The ABTECH BUSBAR BOX is now ready for use.
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NOTE:

If the installer chooses to omit the grease in step 'y' above it may prove impossible to remove the nut without damage, should this be required, due to the self-locking properties of austenitic stainless steel.

Operation

1. The lid must be secured using all the lid screws provided in order to maintain the IP rating.
2. No attempt must be made to remove the enclosure lid whilst electrical power is connected to the contents of the enclosure.
3. The earthing/grounding facility must be connected to the earth bonding circuit at all times when electrical power is connected to the enclosure.

Maintenance

Routine maintenance is likely to be a requirement of local health and safety legislation. The laws of the applicable country must be considered, and maintenance checks carried out accordingly.

Additional checks that are advisable to ensure the efficiency of the ABTECH BUSBAR unit are :-

Activity	Frequency
1 Check that the lid seal is not damaged and is in place	Each time the enclosure is opened
2 Check that all lid fixing screws are in place and secured	Each time the enclosure is opened
3 Check that all gland plate fixing screws are in place and secured	Each time the enclosure is opened
4 Check that the mounting bolts are tight and free of corrosion	Annually
5 Check the security of all cable glands	Annually
6 Check the enclosure for damage	Annually
7 Check that all screw clamp terminals are secure	As manufacturers recommendation

Earthing balls (when fitted)

There is an optional facility for safety during routine maintenance. Special busbars or busbar spacers are available fitted with earthing balls for the connection of portable earthing equipment. Where these are fitted an acrylic front shield is also fitted for the insertion of a check dead stick. Once the circuit has been confirmed dead the acrylic shield, held in place with 2 off M10 nylon nuts, must be removed and portable earthing equipment connected to each earthing ball in accordance with the earthing kit manufacturer's instructions. On completion of any routine maintenance, ensure all portable earthing equipment has been removed prior to refitting the acrylic shield and securing it in place.

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Chemical Attack

The ABTECH BUSBAR units are manufactured from the following materials :-

316 stainless steel

Neoprene or silicone rubber

Glass reinforced polyester

Copper (busbars)

High tensile steel.

Consideration should be given to the environment in which the BUSBAR unit is to be used to determine the suitability of these materials to withstand any corrosive agents that may be present.

Static Hazard

ABTECH BUSBAR units do not present a hazard from static electricity.

Vibration

The ABTECH Bus Bar boxes are designed for use in areas subject to normal industrial levels of vibration.

They are not designed for use in areas subject to intentional or extreme conditions of vibration.

Protection from Foreseeable Faults

Circuits connected in the enclosure must be externally protected using suitable circuit interruption devices to prevent overloading. Provided the enclosure is correctly installed, there are no foreseeable faults.