1 **EC TYPE-EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

3 Certificate Number: **Sira 99ATEX3177** Issue: **6**

4 Equipment: **Busbar Junction Box**

5 Applicant: **ABTECH Ltd**

6 Address: Sanderson Street
Lower Don Valley
Sheffield
S9 2UA

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 60079-0: 2006
EN 60079-7: 2003
EN 61241-0: 2006
EN 61241-1: 2006

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of the equipment shall include the following:

II 2 G D
Ex e II T6 (Ta –40°C to + 60°C)
Ex tD A21 IP 66 T65°C (Ta –40°C to + 60°C) or
Ex e II T6 (Ta –40°C to + 40°C)
Ex tD A21 IP 66 T55°C (Ta –40°C to + 40°C) or
Ex e II T5 (T_a = -40°C to +45°C)
Ex tD A21 IP 66 T55°C (Ta –40°C to + 45°C)

Project Number 51A17090
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Certification Officer

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13 **DESCRIPTION OF EQUIPMENT**

The EEx e Busbar Enclosure comprises a 2 mm thick stainless steel 316L enclosure measuring approximately 780 mm long by 680 mm wide by 770 mm deep. The enclosure has openings located on three of the faces. The lid, which is hinged, is secured by eight fixings, seven M6 x 20 mm slotted or slotted/hexagonal captive screws that locate to seven M6 cage nuts and one M6 by 30 mm tank bush fixing screw. Sealing is provided by an adhesive backed, closed cell neoprene seal, which is 7 mm thick and 15 mm wide. Two of the faces, which are adjacent to the lid, are provided with two 5 mm thick stainless steel 316L or brass CZ112 removable gland plates. They are each secured by eighteen M8 x 16 mm hexagonal headed screws, which screw into eighteen M8 welded tank bushes. Sealing is provided by a 3 mm thick neoprene bonded, cork gasket. On the face directly opposite to the lid, there are four 2 mm thick stainless steel 316L mounting lugs, which are welded into place. Either an M16 or M10 x 50 mm external/internal earthing facility is located on the non-removable face opposite to the face which supports the lid hinges. Anti-loosening facilities are provided by appropriately sized spring and plain washers.

Inside the enclosure, there are four 12.5 mm thick, 100 mm wide, copper busbars. Each busbar comprises two identical copper bars, one on top of the other with a space between. The busbars are designed to be drilled to suit the users requirements with respect to the securing of crimped cables. When drilled for crimp lugs, the securing bolt passes through a copper spacer, which is positioned between the two busbars. The busbars are supported by an insulating frame manufactured from 20 mm and 12 mm thick Glastic ® grade UTR laminate part N° 1494. In all cases, the interfaces are sealed with cement to guarantee the maintenance of the appropriate creepage and clearance distances.

The enclosure has a maximum rating of 11 kV and 3000 A.

The temperature classification is dependent upon the power dissipation and the ambient range as per the table below:

Ambient range	Power dissipation	T Class	Temp. marking for dust
-40°C to +60°C	74.7 W	T6	T65°C
-40°C to +40°C	74.7 W	T6	T55°C
-40°C to +40°C	167.5 W	T5	T55°C

When three cables are connected per phase (i.e. six lugs per busbar) at the following maximum ratings:

Ambient range	T class	Maximum enclosure surface temp.	Maximum current per busbar	Max power dissipation (I^2R losses)
-40°C to +40°C	T5	T63°C	2439 A	192.0 W
-40°C to +40°C	T6	T51°C	2022 A	132.0 W
-40°C to +60°C	T6	T65°C	1509 A	73.6 W
-40°C to +45°C	T5	T56°C	2124 A	145.8 W

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Variation 1 - This variation introduced the following changes:

i. The introduction of an alternative size of enclosure that has the same depth and width as the previously certified enclosures but the height has been increased 1250 mm maximum.

Variation 2 - This variation introduced the following changes:

i. The re-calculation of the power dissipation figures and to replace the table of ambient range/power dissipation/temperature class/temperature marking for dust in which these figures are quoted.
ii. To permit the use of smaller cable lugs and/or to increase the number of connections per bus bar

Variation 3 - This variation introduced the following changes:

i. The recognition of three cables to be connected per phase and the introduction of an alternative certification coding, EEx e II T5 (T_a = -40°C to +45°C), when assembled in this manner.

Variation 4 - This variation introduced the following changes:

i. To permit a suitably certified and dimensioned heater to be fitted, this heater is defined as "Any suitably certified and dimensioned heater that is fitted with a thermostat set to a maximum of 25°C".
ii. The sizes of the of the busbar box to be increased.

Variation 5 - This variation introduced the following changes:

i. Following appropriate re-assessment to demonstrate compliance with the requirements of the EN 60079 and the EN 61241 series of standards, the documents originally listed in section 9, EN 50014:1997 (amendments A1 to A2), EN 50019:2000 and EN 50281-1-1:1998, were replaced by EN 60079-0:2006, EN 60079-7:2003, EN 61241-0:2006 and EN 61241-1:2006, the markings in section 12 were updated accordingly.

14 DESCRIPTIVE DOCUMENTS

14.1 Drawings

Refer to Certificate Annexe.

14.2 Associated Sira Reports and Certificate History

Issue	Date	Report/File No.	Comment
0	13 March 2000	R51A6055A	The release of the prime certificate.
1	11 May 2000	53V6876	The introduction of Variation 1 (This document was re-issued 18 December 2006 recognise the re-issue of the prime certificate).
2	23 August 2000	53V7181	The introduction of Variation 2 (This document was re-issued 18 December 2006 recognise the re-issue of the prime certificate).
3	15 November 2000	R53A7393A	The introduction of Variation 3 (This document was re-issued 18 December 2006 recognise the re-issue of the prime certificate).
4	15 August 2006	R51A15308A	The introduction of Variation 4 (This document was re-issued 18 December 2006 recognise the re-issue of the prime certificate).
5	18 December 2006	R51A6055A	Re-issued 18 December 2006 to amend the product description.

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE **Sira 99ATEX3177**
Issue 6

Issue	Date	Report/File No.	Comment
6	28 February 2008	R51A17090B	This Issue covers the following changes: • All previously issued certification was rationalised into a single certificate, Issue 6, Issues 0 to 5 referenced above are only intended to reflect the history of the previous certification and have not been issued as documents in this format. • The introduction of Variation 5. • The change of the company name from AB Controls and Technology, first recognised 31 January 2007.

15 **SPECIAL CONDITIONS FOR SAFE USE** (denoted by X after the certificate number)

None

16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II** (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.

17 **CONDITIONS OF CERTIFICATION**

17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.

17.2 Holders of EC type-examination certificates are required to comply with the production control requirements defined in Article 8 of directive 94/9/EC.

17.3 The power dissipation of the enclosure shall be calculated in accordance with Appendix C.2 of EN 50019:1994. The calculation shall take into account the contact resistance of any connection as well as the cable resistance. The power shall be dissipated evenly throughout the enclosure.

17.4 This certificate relies on the following previously certified products. When used as part of an SX Junction Box that is fitted with anti-condensation heater that includes a thermostat, the key attributes listed in the table below shall still be maintained by their original certificate.

Description	Certificate number	Key attributes
Anti-condensation heater fitted with a thermostat	As appropriate	Suitably certified by a notified body as a piece of equipment with a T6 temperature classification.

The manufacturer shall ensure that the previously certified heater that includes a thermostat is being used within the scope, the ratings and any special conditions for safe use that are specified in its associated certificate.

17.5 An electric strength test shall be carried out only when the terminals are fitted with cable. This test shall be carried out according to EN 60079-7: 2003 clause 7.1.

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Certificate Annexe

Certificate Number: **Sira 99ATEX3177**

Equipment: **Busbar Junction Box**

Applicant: **ABTECH Ltd**

Issue 0

Drawing	Sheet	Rev.	Date	Description
ABT 10264	1 of 1	A	21 Dec 99	External Label (Busbar)
ABT 10330	1 of 1	A	06 Dec 99	Busbar Enclosure
ABT 10331	1 of 1	A	06 Dec 99	Busbar Clamp
ABT 10332	1 of 1	A	06 Dec 99	Busbar Support Plates
ABT 10333	1 of 1	A	06 Dec 99	Phase Seperators
ABT 10334	1 of 1	A	06 Dec 99	Busbar Enclosure
ABT 10335	1 of 1	A	06 Dec 99	Busbars

Issue 1

Drawing	Sheet	Rev.	Date	Description
ABT 10551	1 of 1	A	11 May 2000	Busbar Enclosure

Issue 2

No new drawings were introduced.

Issue 3

No new drawings were introduced.

Issue 4

Drawing	Sheet	Rev.	Date (Sira stamp)	Description
ABT16373	1 of 1	A	11 July 2006	Extended BusBar Box

Issue 5

Drawing	Sheet	Rev.	Date	Description
ABT 10264	1 of 1	A	21 Dec 99	External Label (Busbar)
ABT 10330	1 of 1	A	06 Dec 99	Busbar Enclosure
ABT 10331	1 of 1	A	06 Dec 99	Busbar Clamp
ABT 10332	1 of 1	A	06 Dec 99	Busbar Support Plates
ABT 10333	1 of 1	A	06 Dec 99	Phase Seperators
ABT 10334	1 of 1	A	06 Dec 99	Busbar Enclosure
ABT 10335	1 of 1	A	06 Dec 99	Busbars

Issue 6

Drawing	Sheet	Rev.	Date	Description
ABT 16373	1 of 1	B	06 Dec 07	Extended Busbar Enclosure
ABT 10264	1 of 1	B	06 Dec 07	Certification Label

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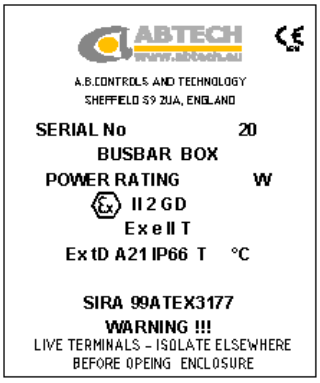
INSTALLATION, OPERATION & MAINTENANCE FOR ABTECH BUSBAR Boxes – SIRA99ATEX3177



Marking

The marking shown is for an apparatus certified Busbar enclosure.

The maximum permitted voltage is 11kV.

The maximum permitted power dissipation is marked on the label and identified by RATING_____WATTS.

Installation

Each BUSBAR box requires mechanical support from the underside.

The mass of a typical BUSBAR box is 270 kg

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, yellow and blue 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.

Two 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).

2 - BUSBAR box for multi-core cables.
This design permits only single side connection and incorporates the use of a trifurcating box to allow the splitting of a multi-core cable into single cores before they enter the bus bar chamber.

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 bar.

d) Attach the cable glands to the gland plate in accordance with the manufacturers instructions.

e) Prepare the first cable in accordance with the cable gland manufacturers 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.

f) Insert the cable through the cable gland and secure the armouring (if applicable) in accordance with the gland manufacturers instructions. If a stuffing gland is used secure the cable by tightening the sealing nut.

INSTALLATION, OPERATION & MAINTENANCE FOR ABTECH BUSBAR Boxes – SIRA99ATEX3177

g) 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.

h) Remove the cable from the gland and trim the conductor to length.

i) 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.

j) 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.

k) Once the correct length has been established make careful note of all the cable stripping lengths for repeat use.

l) Remove the applicable crimping lug from the bus bar assembly.

m) Partially Insert the cable core through the appropriate cable gland again and push the crimping lug onto the conductor.

n) 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.

o) Crimp the barrel onto the conductor using the correct size crimping die set. This may be of the indenting or hexagonal type.

p) Lift the cable and lug to just below the bus bar assembly and insert the M20 x 55 mm high tensile steel bolt through the hole in the palm of the lug.

q) Lift further until the bolt will locate in the fixing hole in the bus bar assembly.

r) Push the bolt through the bus bar assembly and secure the lug in place with the nut. 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.

s) Using the measurement notes taken of the now installed cable prepare each of the other cables.

t) Remove the bolt supporting the assembled cable and lug and lower the lug to the cable gland plate, threading the cable out of the box through the cable gland in the process.

u) Remove the bus bar assembly from the enclosure.

v) Repeat from j), (above), checking for length against the prepared cable and lug assembly, then l), m), n) & o).

w) Replace the bus bar assembly and repeat from p) to r), (above) with each cable.

x) Once all the cables have been installed apply a torque of 185Nm to each connection bolt.

y) Replace both of the undrilled (blank) gland plates complete with gaskets and secure the M8 gland plate fixings to 6Nm approx.

z) Replace the enclosure lid.

The ABTECH BUSBAR BOX is now ready for use.

For operation and maintenance see page 4

INSTALLATION, OPERATION & MAINTENANCE FOR ABTECH BUSBAR Boxes – SIRA99ATEX3177

2 – BUSBAR box for multi-core cables

The BUSBAR box for multi-core cables is generally supplied with a trifurcating box.

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) Prepare the first multi-core cable in accordance with the cable gland manufacturers 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 in the base gland plate of the trifurcating box, 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.**

h) Draw through the remainder of the multi-core cable and secure the armouring (if applicable) in accordance with the manufacturers instructions. If a stuffing gland is used secure the multi-core cable by tightening the sealing nut.

i) 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).

j) 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.

k) Trim each core to length as marked.

l) Cut back the conductor core insulation for each core. The length of the exposed conductor should be no more than 5mm longer that the internal length of the crimping lug barrel.

m) Draw the multi-core back up through the base gland plate of the trifurcating box and secure the gland again.

n) Check each individual cable core for length against its crimping lug.

o) Once the correct length has been established for each core make careful note of all the cable stripping lengths for repeated use.

p) 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.

q) Remove the applicable crimping lugs from the bus bar assembly.

r) 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.

s) 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.

t) Lift the cable cores together until the lugs are just below the bus bar assembly and insert an M20 x 55mm high tensile steel bolt through the hole in the palm of each lug.

u) Lift the cable cores further until the fixing bolts will locate in the bus bar assembly.

INSTALLATION, OPERATION & MAINTENANCE FOR ABTECH BUSBAR Boxes – SIRA99ATEX3177

v) For each cable core lug push the bolt through the bus bar assembly and secure the lug in place with the nut. Tighten moderately.

w) Check that the gland for the multi-core cable will secure 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.

y) 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.

z) Remove the bus bar assembly from the enclosure.

aa) Repeat g) above then repeat from q) to s) for each cable.

bb) When all cables have been prepared to stage s) replace the bus bar assembly in the enclosure with the cut-outs for the earth stud facing the rear of the box.

cc) Continue with stage t), u) & v). **Secure the glands for the multi-core cables now.**

dd) Tighten all of the cable lug fixing bolts to 185Nm.

ee) Replace the top access plate on the BUSBAR box.

ff) Replace the doors on both enclosures.

The ABTECH BUSBAR BOX is now ready for use.

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 bondinfg 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

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Chemical Attack

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

316 stainless steel
Neoprene, EPDM or silicone rubber
Neoprene bonded cork
Glass reinforced polyester
Copper
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 should be no foreseeable faults.