Control Ex

CONNECTOR



(AI500 Rev L)

Hawke International
UK Office,
Bredbury Park Industrial Estate,
Ashton Rd,
Stockport,
SK6 2QN. UK

Sales: +44 (0) 161 830 66
Technical: +44 (0) 161 830 66
Fax: +44 (0) 161 830 66
E-mail: sales@ehawke.co

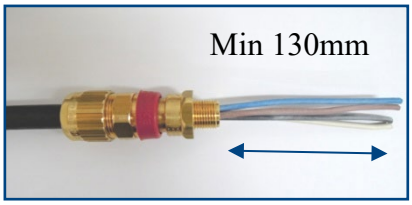
Connection Solutions
www.ehawke.com
HAWKE International
HUBBELL

IMPORTANT NOTE

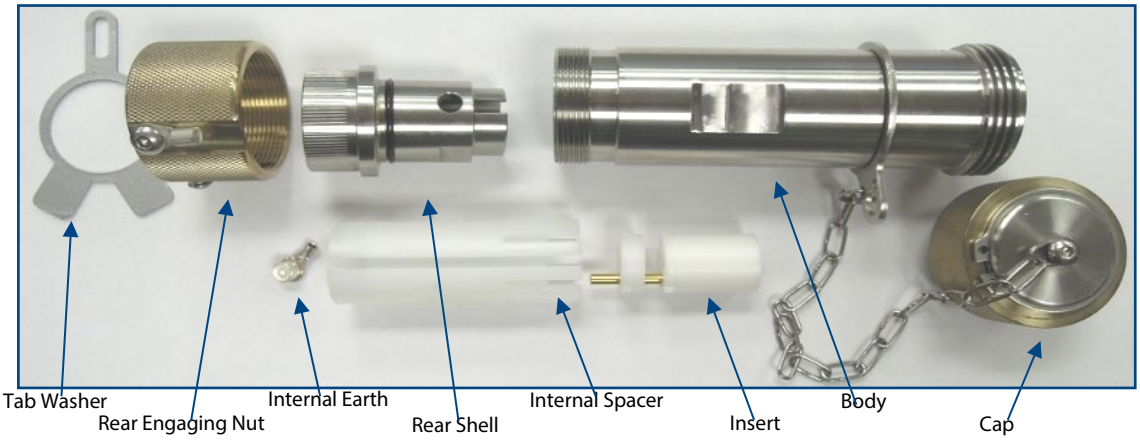
1. *Hawke International does not recommend the use of their ControlEx Connectors in applications where rigid PVC / SWA / PVC power cabling is used in portable / semi-portable applications.*
2. *Barrier type glands must be fitted to flexible power and loose filled control cabling entering the connectors to maintain the Exd protection concept and to reduce the potential for core movements within the cable being transferred to the connector's internal components.* **Where connectors are terminated to topside umbilical cables, or portable connectors, a barrier type cable gland should always be used.**
3. *Hawke Ex Connector products are designed to be used in multi-voltage applications in circuits up to 660V AC/DC. It is possible that on certain installations, there may be a mix of applications utilising different voltages on the Connector products. In these instances, the installer / circuit designer must ensure that the plugs and sockets, or their associated cabling, is clearly marked with the correct circuit voltage and current rating to ensure that the equipment being supplied is matched correctly with the supply voltage. The variable insert positions which are a feature of the Connectors may also be used to provide additional means of safety in these applications.*

1. Remove the CP/CR connector assembly, electrical insert and cable gland (sold separately) from their packaging.

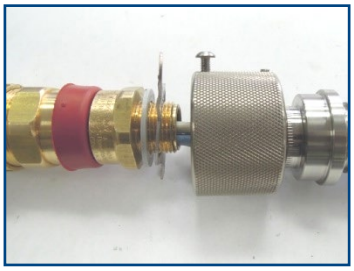
2. Terminate the cable into the cable gland in accordance with the manufacturer's Instructions. Ensure a minimum tail length of 130mm.

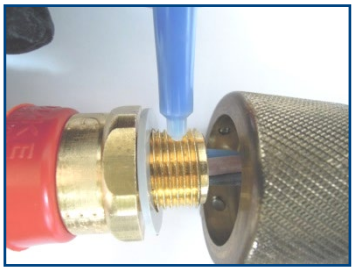


3. **Unscrew the rear engaging** nut from the connector shell, removing the rear shell and keyway tube.



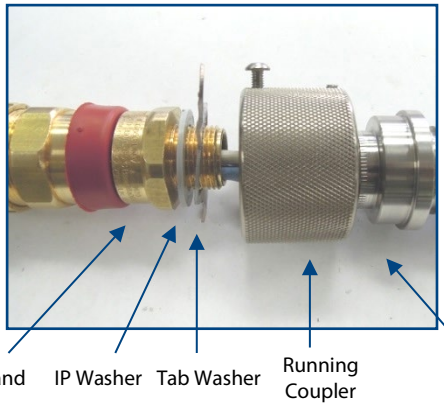
4. Slide the rear engaging nut over the rear shell as shown and screw the rear shell onto the entry thread of the cable gland ensuring there is a sealing washer between the gland and rear shell. A small amount of Loctite 638 or equivalent can be added to the cable gland thread at this stage to further help prevent loosening of the cable gland in portable applications.

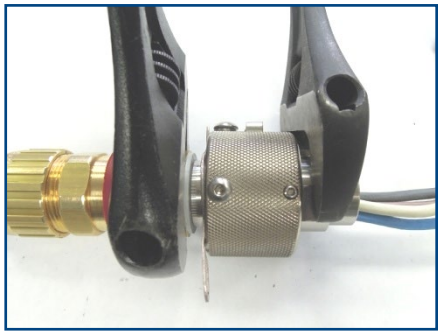




Where a thread adaptor is being used, ensure a suitable IP seal is fitted between the cable gland and thread adaptor, and thread adaptor & running coupler. If the thread adaptor has an integral O-Ring, please ensure this makes full contact with the cable gland and running coupler to maintain the IP protection. Check to ensure the captive O-Ring seal on the rear shell is in place and is undamaged.

If the tab washer is being used, ensure this is fitted in the orientation shown. Use the flats on the rear shell to further tighten.

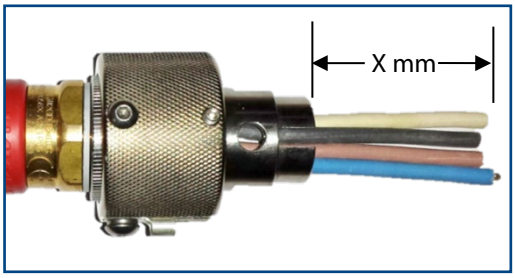




Tighten cable gland to rear shell as shown

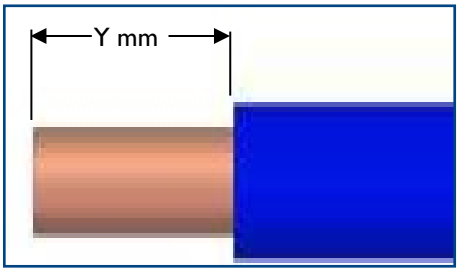
5. Cut the conductors to the length shown in the table below.

Insert Type	16	25	32	40	50	63
1.5 & 2.5mm² Solder / Crimp	36 – 0 +7	56 – 0 +7	56 – 0 +10	56 – 0 +10	56 – 0 +10	56 – 0 +15
6mm² Crimp	-	38 – 0 +4	38 – 0 +4	-	-	-
10 & 16mm² Crimp	-	-	29 – 0 +4	-	-	-
25 & 35mm² Crimp	-	-	-	29 – 0 +4	-	-
6mm² Solder	-	-	52 – 0 +4	-	-	-
10 & 16mm² Solder	-	-	-	-	-	-
25 & 35mm² Solder	-	-	-	52 – 0 +4	-	-



Note: Maximum tolerance is to allow for twisted cables and placement of cores within connector shell. If core spacing relative to insert numbering does not require excess core, use minimum cut lengths.

6. Strip back the insulation from the conductor's as shown

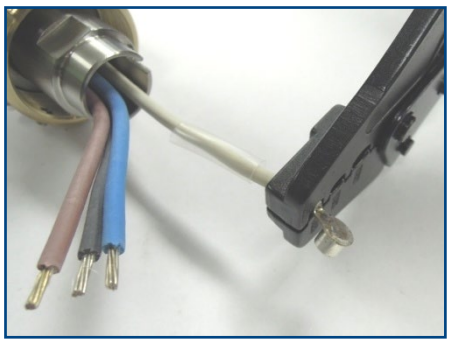


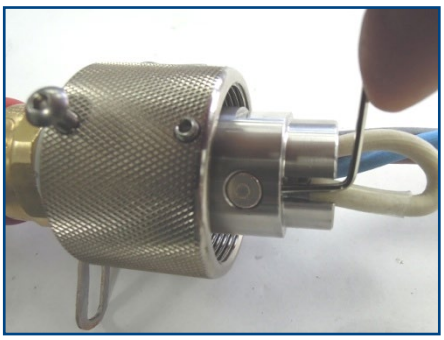
Insert Type	Length (Y mm)
1.5mm² Solder / Crimp	6
2.5mm² Solder / Crimp	6
6mm² Solder	7
6mm² Crimp	8
10mm² Solder	9
10mm² Crimp	11
16mm² Solder	9
16mm² Crimp	11
25mm² Solder	9
25mm² Crimp	11
35mm² Solder	9
35mm² Crimp	11

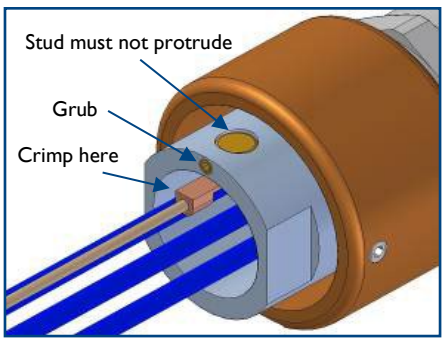
7. Proceed to step 8 if internal earthing is not required.

NOTE: *If internal earthing is not being used, the internal earth crimp **must not** be fitted and the grub screw in the rear shell **must be** removed*

If earthing is required slide the internal crimp (supplied with CP/CR inserts) over the earth conductor and crimp using suitable tool. The stud can then be fitted into the rear shell and fastened using the grub screw shown. The stud on the earth crimp should not protrude from the outer diameter of the rear shell. Adjust if necessary.



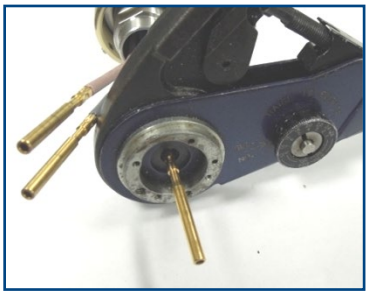




8. a) Solder inserts – black (1.5 – 35mm^2). Tin the conductors and fill the solder cups on the back of the inserts with solder as required Solder conductors in place and remove any solder spikes/excess from the solder cup.
It is advised that heat shrink should be fitted over the connection at this point

b) Solder inserts – white (1.5 – 4mm^2). As above, however, inserts should be soldered outside of the insert body and not fully assembled. If the contacts are to be solder terminated to the conductors, this must be done prior to insertion through the rear contact retainer.
It is advised that heat shrink should be fitted over the connection at this point

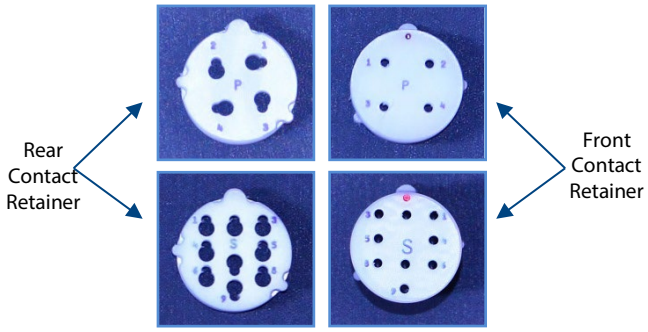
Then follow (c ii & iii).

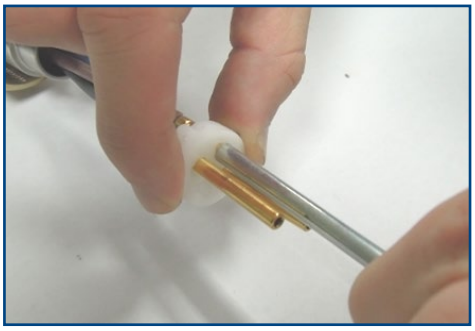


c) Crimp Inserts (1.5 – 4mm^2) – white.

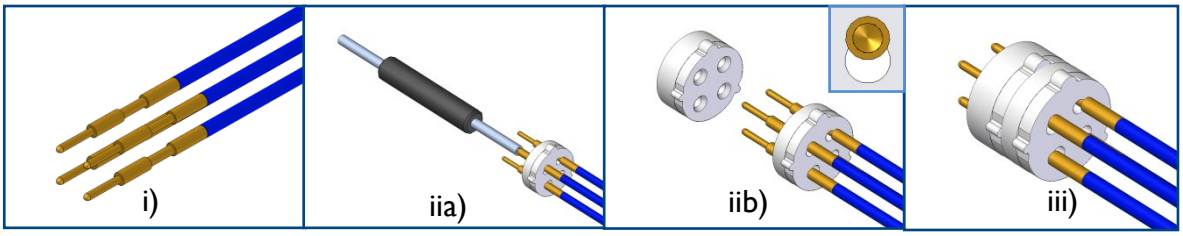
i) Crimp the conductors into the contacts using Astro Crimp Corp – 615708 Crimp Tool M22520/1-01 Large. For 0.75 to 1.5mm^2 conductors use the 1.5 die. For 1.6 to 4mm^2 use the 2.5 die.
It is advised that heat shrink should be fitted over the connection at this point

ii) Feed the contacts through the required numbered hole on the rear contact retainer and slide the insertion tool over the contacts up to the groove (one end for pin and one for socket). Clip the groove on the contact into position in the rear contact retainer with the tool.



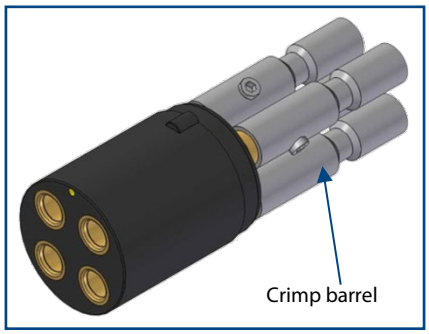


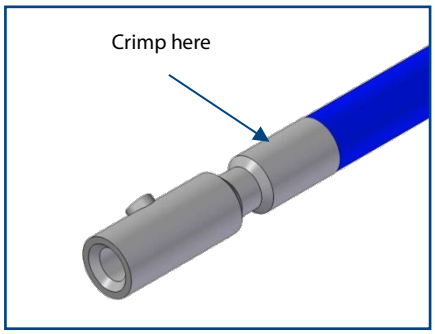
iii) Align the main pip on the rear contact retainer with the key on the front contact retainer and slide over the contacts into position. Ensure the 2 smaller pips are also in line

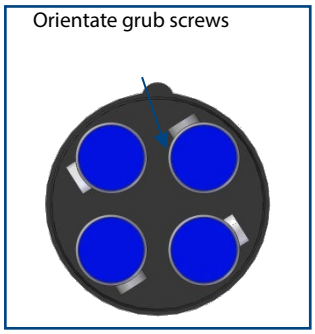


d) Crimp Inserts (6 – 35mm^2) – black. Undo the grub screws on the crimp barrels and slide them off the back of the contacts. Slide the conductors into the back of the barrel. Orientate the barrel so that the grub screws are pointing outwards and crimp with a suitable crimp tool.

Push the barrels back onto the rear of the contacts and tighten grub screw into the groove on the contact. Back off grub screw half a turn on crimp barrels of 10mm^2 or larger to allow them to slide up and down the contact slightly

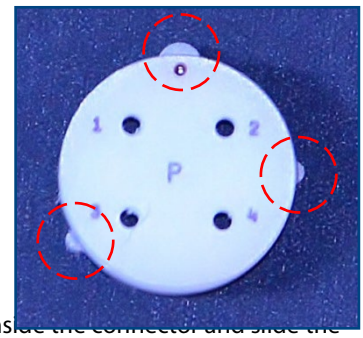






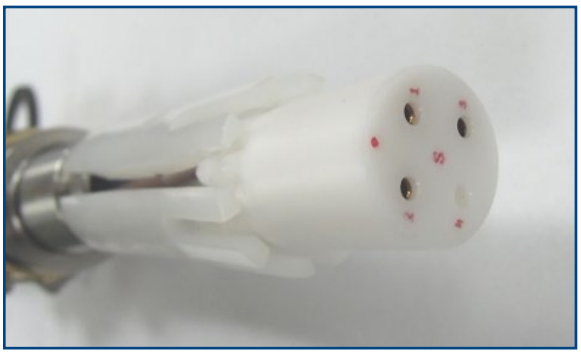
9. Clip spacer tube over conductors. Bend conductors slightly so that there is no or minimal gap between the insert/spacer tube and rear shell. On crimp insert of 10mm^2 or larger, slide the crimp barrels up and down the contacts to achieve this and then lock them in place by tightening the grub screw's on the crimp barrels.

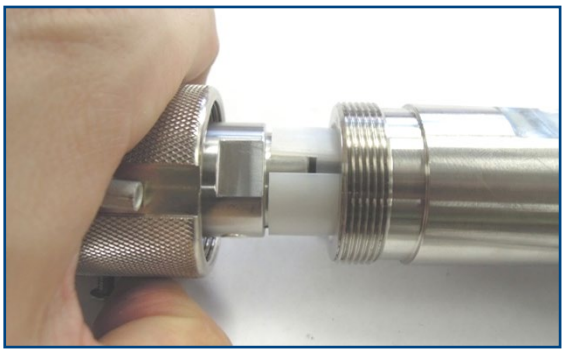
The insert has 3 pips, shown below, which should be located as shown. The main centre keyway should align with the centre of the spacer tube



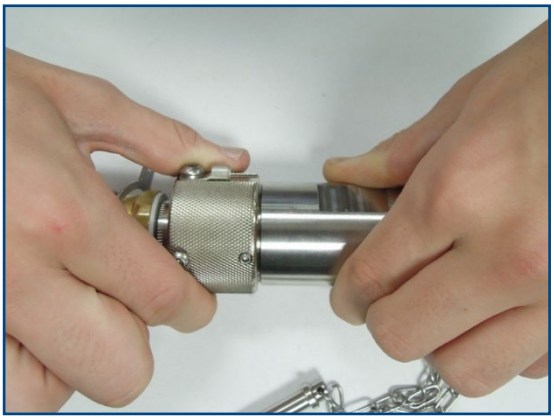
NOTE: *If being used on offshore topside applications where extreme temperature fluctuations or extreme levels of humidity may be present, it is advisable to use Dow Corning 4 Electrical Insulating Compound within the spacer tube to help prevent any possible humidity build-up. See point 15 below*

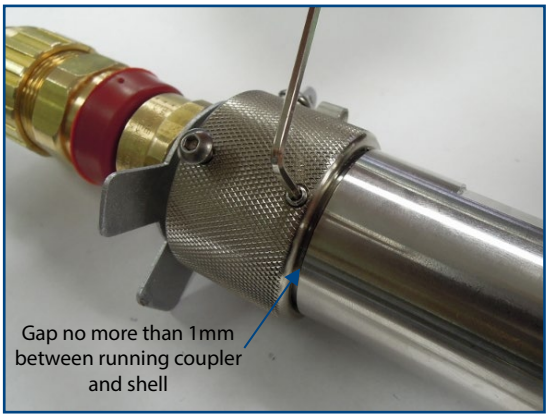
10. Looking from the front of the connector shell, align the key on the insert to the required key inside the connector and slide the whole assembly into the shell. The EX16 connector has 3 keyways, and all other connectors have 5 possible keyways





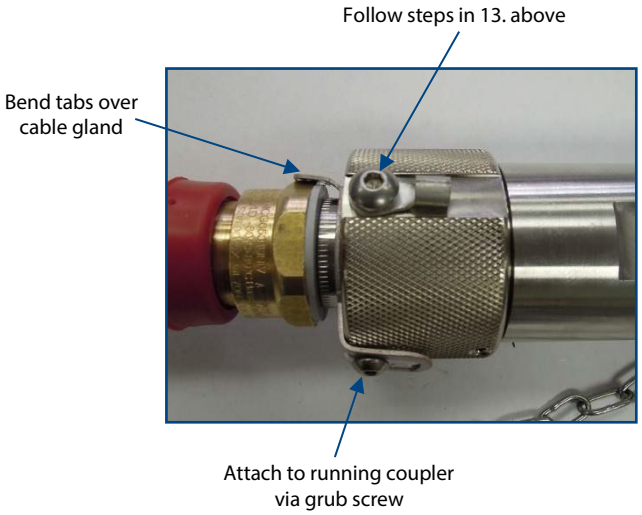
11. Fully screw the rear engaging nut onto the thread on the connector shell, do not rotate the connector shell during this process. Tighten grub screw in rear engaging nut. There should be a gap visible of no more than 1mm between running coupler and shell





12. If the tab washer is being used, fix the tab using the button head screw to the rear engaging nut. Bend the tabs over the flats of the cable gland.

13. If being used, terminate the external earth to the ring terminal crimp provided with the insert. Remove the button head screw and spring washer from the rear engaging nut. Attach the crimp to the rear engaging nut as shown above



14. The connector is now ready for use. Please refer to the 'Hook Up' procedure.

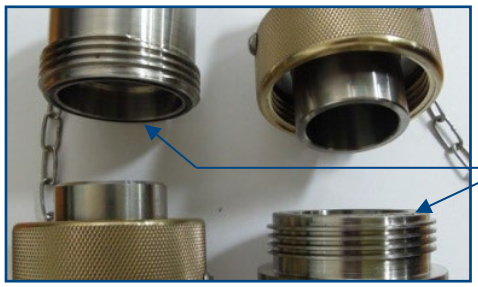
Addition of Dow Corning 4 Electrical Insulating Compound

15. If additional protection is required due to extreme atmospheric conditions, before inserting the assembled connector insert and spacer tube into the connector shell (step 10 above) Dow Corning 4 Electrical Insulating Compound can be used to fill the spacer tube. It is recommended that the running coupler be filled, along with the inner face of the insert to ensure no humidity can affect the contacts

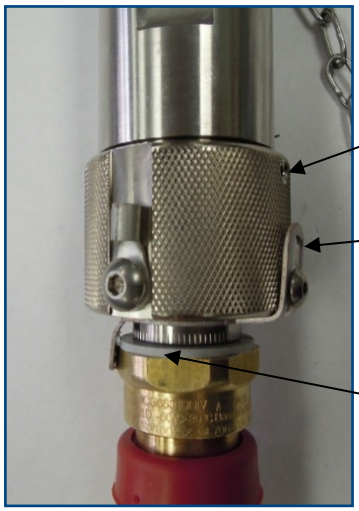
MK IV Hook Up Procedure

Before commencing hook up, a visual inspection should be carried out on the cable / gland / connector assembly. The assembly should be checked to ensure that all of the assembly components are tight. If the assembly components have loosened during transportation / cable installation, they should be retightened in accordance with the relevant assembly instruction sheets without twisting the cable in the cable gland / connector assembly.

Areas to be checked:



Ensure O-Ring seals are fitted and undamaged.



Ensure gland (and any thread adaptor) is fully tightened to the connector shell

Ensure Running Coupler is fully tightened to the connector shell and that the grub screw is also fully tightened.

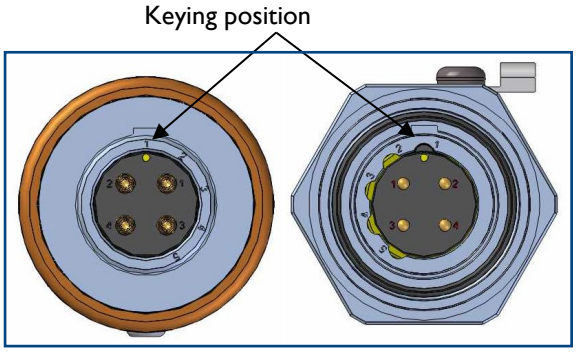
If fitted, ensure locking tab washer is correctly attached to the connector shell and the gland flats.

Ensure suitable IP washer is fitted between cable gland and connector (and if fitted, between adaptor)

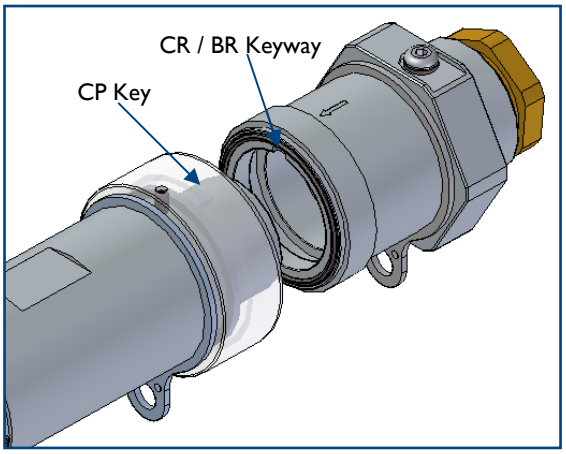
NB: These areas should also be checked as part of a routine maintenance program.

1) Turn off the power to the connectors.

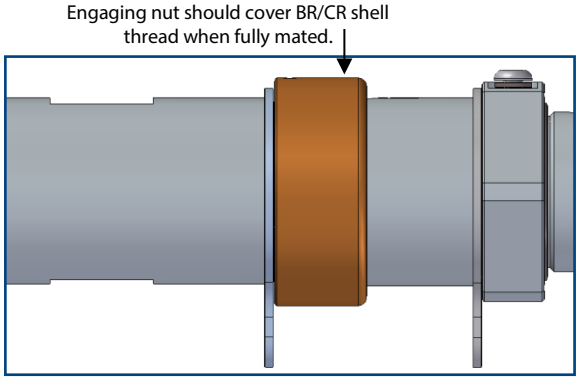
2) Ensure the connectors are both set to the same keying position number and are of the same insert type.



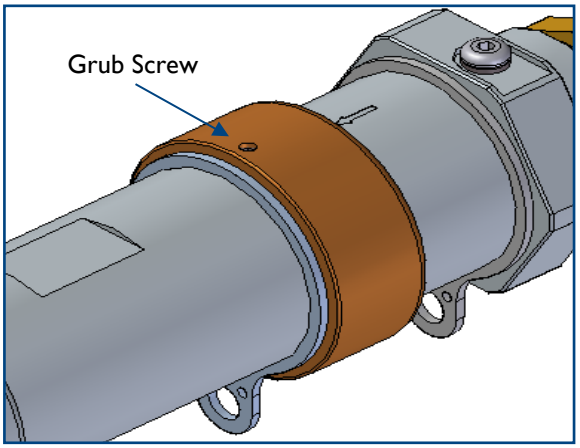
3) Engage the CP connector with the BR / CR connector and align the key on the CP connector to the keyway on the BR / CR connector.



4) Engage the two connectors by screwing the engaging nut clockwise onto the BR/CR shell. If the engaging nut will not screw on more than half a turn, then the connectors are set to different keying positions.



5) Tighten the grub screw on the engaging nut.



6) If the optional locking pin is being used, this should be fitted at this stage, once the connectors are fully mated.



7) To disconnect, turn off the power, slacken the tightened grub screw, turn the engaging nut anti-clockwise and remove the connector. If power is to be put through the connectors whilst de-mated, then a flameproof cap (available separately) must be fitted.

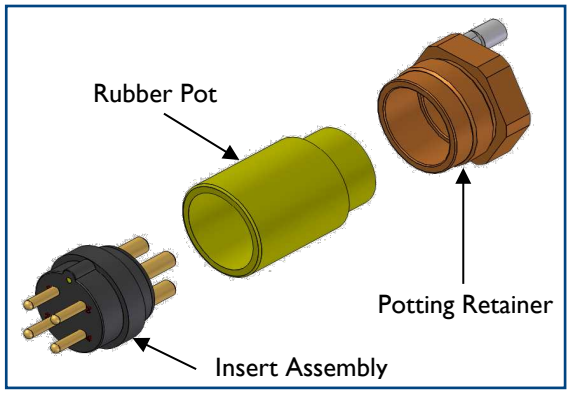
MK IV Bulkhead Receptacle Termination Procedure

IMPORTANT NOTE

1. Hawke International does not recommend the use of their ControlEx Connectors in applications where rigid PVC / SWA / PVC power cabling is used in portable / semi-portable applications.
2. Hawke International recommends that barrier type glands are fitted to flexible power and loose filled control cabling entering the connectors to maintain the Exd protection concept and to reduce the potential for core movements within the cable being transferred to the connector's internal components.
3. Hawke Ex Connector products are designed to be used in multi-voltage applications in circuits up to 660V AC/DC. It is possible that on certain installations, there may be a mix of applications utilising different voltages on the Connector products. In these instances, the installer / circuit designer must ensure that the plugs and sockets, or their associated cabling, is clearly marked with the correct circuit voltage and current rating to ensure that the equipment being supplied is matched correctly with the supply voltage. The variable insert positions which are a feature of the Connectors may also be used to provide additional means of safety in these applications.

1) Remove the Electrical Insert assembly and BR Connector assembly from their packaging. Do not throw away the packaging.

2) Slide the potting retainer and rubber pot off the back of the electrical insert assembly.



3) a) Solder inserts (1.5 – 35mm^2).

Tin the conductors and fill the solder cups on the back of the inserts with solder as required Solder conductors in place and remove any solder spikes / excess from the solder cup.



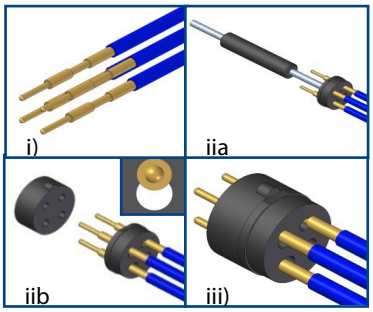
b) Crimp Inserts (1.5 – 4mm^2).

i) Crimp the conductors into the contacts using Astro Crimp Corp – 615708 Crimp Tool M22520/1-01 Large. For 0.75 to 1.5mm^2 conductors use the 1.5 die. For 1.6 to 4mm^2 use the 2.5 die. If the

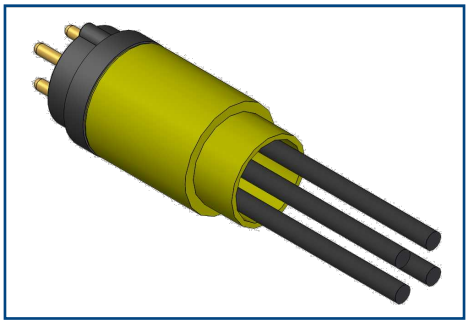
ii) contacts are to be solder terminated to the conductors; this must be done prior to insertion through the rear contact retainer.

iii) Feed the contacts through the required numbered hole on the rear contact retainer and slide the insertion tool over the contacts up to the groove (one end for pin and one for socket). Clip the groove on the contact into position in the rear contact retainer with the tool.

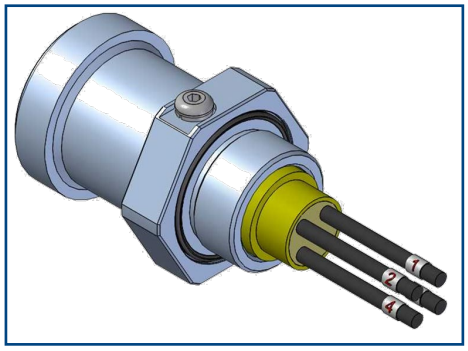
iv) Align the flat on the rear contact retainer with the key on the front contact retainer and slide over the contacts into position.



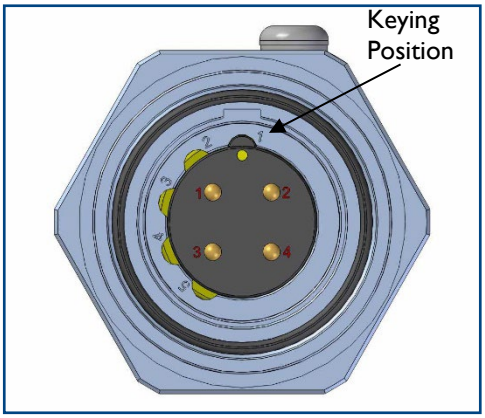
4) Slide the rubber pot back onto the insert.



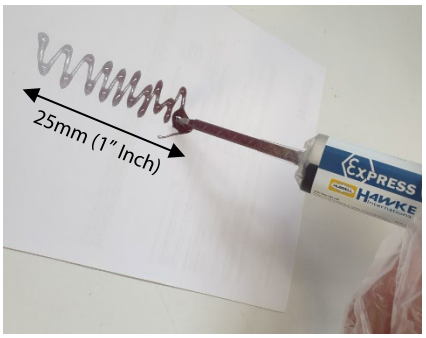
5) Push the electrical insert assembly into the rear of the BR connector assembly. Do not push all the way in.



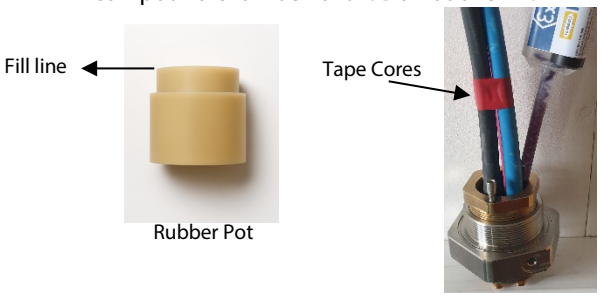
6) Rotate the insert assembly until the coloured dot on the face of the insert is aligned to the required keying position.



7) Stand the connector facedown. Secure as necessary.
8) Prepare cartridge for dispense: Ensure gloves provided are worn throughout filling process. Snap off / Unscrew cartridge lid and fit nozzle. Purge approx. 25mm (1") bead of resin onto a disposable surface to ensure resin is properly mixed.



9) Ensure connector is held vertically. Tape cores so they stand centrally the pot. Place BR rear shell and potting retainer over compound pot.
with the nozzle starting as far down the rubber pot as possible, inject the resin and fill until the compound chamber is full. Do not overfill.



Note: Please ensure that the threads on the BR rear shell and the potting retainer are free of any resin.

10) Allow resin to gel. Please refer to the graphs for gel and cure times in AI2035.



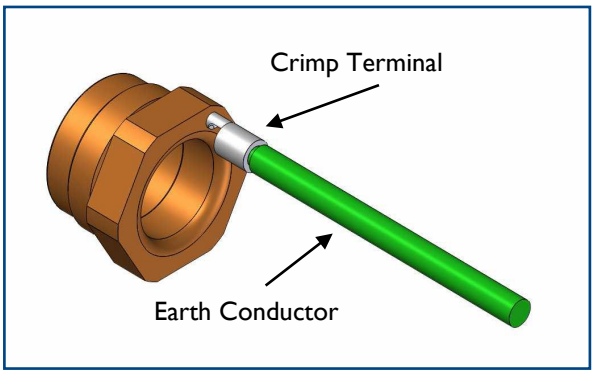
11) Remove BR real shell and the potting retainer inspect rubber pot if the resin is properly filled without any voids. If fill level drops, top up compound chamber until is full.
Check the resin is properly filled without any voids. Move tape cores and manipulate the cable cores to ensure resin has filled any voids between them.



12) Connector installation can now continue as per AI500 assembly instructions. Once resin is fully cured, cores can be manipulated, and system can be energised

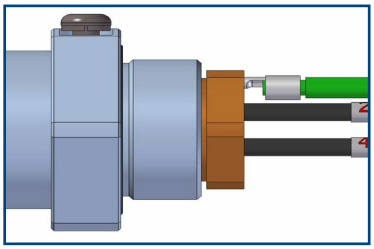
Note: For ControlEx BR, only sizes up to 1.5mm² and 2.5mm² are permitted for crimping or soldering. For larger sizes, due to the restricted space within the rubber pot, only soldering is allowed.

13) If an internal earth has been carried through, then an earth conductor (see table right) must be attached to the crimp terminal on the potting retainer. (Earth conductor must be long enough to reach the common earth of enclosure or apparatus).

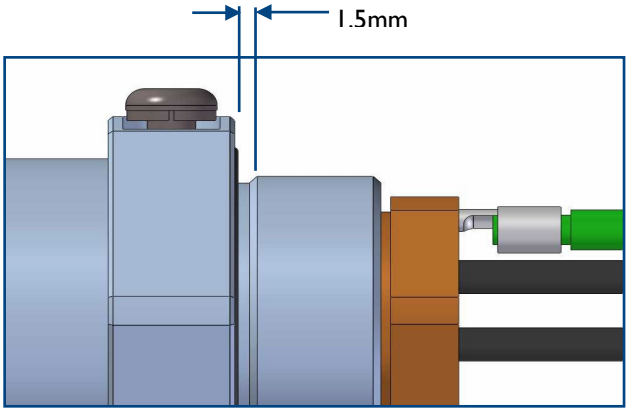


Earth Conductor Information		
Insert Conductor Size	**Earth Conductor Size (min)**	**Supplied Crimp Range**
1.5mm²	4mm²	2.7 - 6.6mm²
2.5mm²	4mm²	2.7 - 6.6mm²
4mm²	4mm²	2.7 - 6.6mm²
6mm²	6mm²	2.7 - 6.6mm²
10mm²	10mm²	6.7 - 10.5mm²
16mm²	16mm²	10.6 - 16.7mm²
25mm²	16mm²	10.6 - 16.7mm²
35mm²	16mm²	10.6 - 16.7mm²

14) Hand tightens the potting retainer into the BR shell. Now tighten a further 1½ to 2 full turns with a spanner.

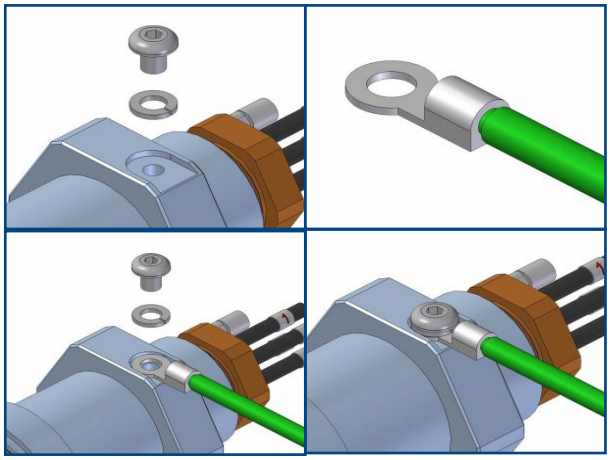


15) The connector assembly can now be installed in the enclosure or apparatus. It should be noted that there is a 1.5mm undercut on the entry thread of the BR shell when installing in 'd' rated equipment.



16) If an internal earth has been carried through, it must be terminated to the common earth of the enclosure or apparatus. The earth conductor terminated in step 11 must also be attached to the common earth.

17) The final step is to terminate the external earth. To do this, remove the button head screw and spring washer from the BR shell. Now terminate the earth conductor (see table in step 11) to the crimp supplied with the insert. Attach the crimp to the BR shell as shown.



18) The connector is now ready for use. Please refer to the 'Hook Up' procedure.

Specific condition of use

1. These connectors shall be electrically isolated before any attempt is made to remove the covers or join or separate the two halves.
2. When separated the flameproof caps shall be fitted and locked before any associated supply cables are energised.
3. The cable entry device selected for use with the in-line connectors shall provide a mechanical cable retention facility appropriate to the cable type and conditions of service.
4. The cable terminated within the bulkhead connector shall be mechanically protected from pulling and twisting, and the potted ferrule shall not be subjected to temperatures exceeding 100°C.
5. When used in dust environments the cable entry threads, or bulkhead mounting, shall be sealed in accordance with the installation code of practice to ensure that a minimum ingress protection of level IP6X is maintained.
6. The flameproof joints are not intended to be repaired.
7. The user must ensure that the maximum working voltage used is suitable for the type of connector used and installation is in accordance with the requirements of IEC 60079-14.

CONTROLEX MKIV	Pin configuration	Upper Ambient Temperature of +40°C		Upper Ambient Temperature of +50°C		Upper Ambient Temperature of +60°C		ATEX / IECEx / Inmetro Recommended Max Voltage AC/DC	CSA Recommended Max Voltage AC/DC
		T6	T5	T6	T5	T6	T5		
Connector Size		Maximum Current per Contact Amps		Maximum Current per Contact Amps		Maximum Current per Contact Amps			
Ex 16									
3 x 1.5sq mm + Grd	3 x 16 AWG + Grd	9.8	10	8.75	10	7	9.4	750	600
4 x 1.5sq mm + Grd	4 x 16 AWG + Grd	8.5	10	7.6	9.3	6.1	8.15	750	600
Ex 25									
4 x 1.5 sq mm + Grd	4 x 16 AWG + Grd	10	10	9.3	10	7.6	10	750	600
9 x 1.5 sq mm + Grd	9 x 16 AWG + Grd	7.15	8.4	6.2	8	5	6.7	750	600
12 x 1.5 sq mm + Grd	12 x 16 AWG + Grd	6.2	7.25	5.35	6.9	4.38	5.8	750	600
4 x 2.5 sq mm + Grd	4 x 12 AWG + Grd	13.5	15.8	11.7	15	9.5	12.6	750	600
7 x 2.5 sq mm + Grd	7 x 12 AWG + Grd	10.2	12	8.8	11.4	7.2	9.5	750	600
4 x 6 sq mm + Grd	4 x 10 AWG + Grd	19.2	22.5	16.6	21.5	13.5	18	750	600
4 x 6 sq mm + Grd 4 sq mm cable	4 x 11 AWG + Grd	19	19	14	18	11	15	750	600
Ex 32									
12 x 1.5 sq mm + Grd	12 x 16 AWG + Grd	7	8.3	6.2	7.6	5.1	6.5	750	600
19 x 1.5 sq mm + Grd	19 x 16 AWG + Grd	5.6	6.6	4 .9	9	4	5.2	750	600
10 x 2.5 sq mm + Grd	10 x 12 AWG + Grd	9.8	11.5	8.5	10.4	7	9	750	600
12 x 2.5 sq mm + Grd	12 x 12 AWG + Grd	8.9	10.5	7.8	9.5	6.4	8.2	1000	600
4 x 6 sq mm + Grd	4 x 10 AWG + Grd	22	25.9	19.2	23.5	15.8	20.4	750	600
4 x 6 sq mm + Grd 4 sq mm cable	4 x 11 AWG + Grd	18	21.0	16.0	19.0	13.0	17.0	750	600
6 x 6 sq mm + Grd	6 x 10 AWG + Grd	18	2 1.1	15.7	19.2	12.9	16.6	750	600
6 x 6 sq mm + Grd 4 sq mm cable	6 x 11 AWG + Grd	15	17.0	13.0	16.0	10.0	14.0	750	600
3 x 10 sq mm + Grd	3 x 8 AWG + Grd	32.5	38.2	28.4	34.8	23.3	30.1	750	600
4 x 10 sq mm + Grd	4 x 8 AWG + Grd	28	33.1	24. 1	30	20.2	26.1	750	600
3 x 16 sq mm + Grd	3 x 6 AWG + Grd	38	44.8	33.3	40.8	27.3	35.3	750	600
4 x 16 sq mm + Grd	4 x 6 AWG + Grd	33	38.8	28.8	35 .3	23 .7	30.6	750	600
Ex 40									
24 x 1.5 sq mm + Grd	24 x 16 AWG + Grd	5.3	6.3	4.6	5.8	3.7	5	750	600
30 x 1.5 sq mm + Grd	30 x 16 AWG + Grd	4 .8	5.7	4.1	5.1	3.3	4.4	1000	600
19 x 2.5 sq mm + Grd	19 x 12 AWG + Grd	7.6	9	6.5	8.2	5.3	7.1	750	600
4 x 25 sq mm + Grd	4 x 4 AWG + Grd	40	48.5	35.3	44	28.6	38.1	750	600
4 x 35 sq mm + Grd	4 x 1 AWG + Grd	44.7	53.2	38.7	48.3	31.3	41.8	750	600
8 x 6 sq mm + Grd	4 x 10 AWG + Grd	16	19.5	14	18	11.5	15.5	750	600
8 x 6 sq mm + Grd 4 sq mm cable	4 x 11 AW G + Grd	14	16.0	12.0	15.0	9.0	13.0	750	600
5 x 10 sq mm + Grd	5 x 8 AWG + Grd	26	32	23	29	18.5	25	750	600
5 x 16 sq mm + Grd	5 x 6 AWG + Grd	31.5	37.5	27	34	22	29.5	750	600
Ex 40 (Special) 4 x 2.5	4 x 12 AWG + Grd	16	17	14	17	11	15	3000	N/A
Ex 50									
5 x 25 sq mm + Grd	5 x 4 AWG + Grd	38.01	47.14	33.33	43.46	26.87	37.27	750	600
5 x 35 sq mm + Grd	5 x 1 AWG + Grd	41.63	51.64	36.51	47.61	29.44	40.82	750	600
37 x 1.5 sq mm + Grd	37 x 16 AWG + Grd	4.5	5.5	3.9	5.1	3.1	4.4	750	600
27 x 2.5 sq mm + Grd	27 x 12 AWG + Grd	6.6	8.2	5.8	7.6	4.6	6.5	750	600
37 x 2.5 sq mm + Grd	37 x 12 AWG + Grd	5.6	7	4.9	6.4	4	5.5	300	600
13 x 6 sq mm + Grd	13 x 10 AWG + Grd	13.5	16.5	11.5	15.5	9.5	13.2	750	600
13 x 6 sq mm + Grd 4 sq mm cable	13 x 11 AWG + Grd	11	14	10	13	8	11	750	600
Ex 63									
37 x 2.5 sq mm + Grd	37 x 12 AWG + Grd	5.6	7	4.9	6.4	4	5.5	750	600
49 x 1.5 sq mm + Grd	49 x 16 AWG + Grd	4.4	5.8	3.9	5.3	3.1	4.4	750	600
60 x 1.5 sq mm + Grd	60 x 16 AWG + Grd	5	6.6	4.4	6	3.6	5	750	600
65 x 1.5 sq mm + Grd	65 x 16 AWG + Grd	3.89	5.08	3.40	4.62	2.75	3.89	750	600
73 x 1.5 sq mm + Grd	73 x 16 AWG + Grd	3.67	4.79	3.21	4.36	2.59	3.67	750	600

HAWKE / CONTROL Ex IZE – TYPE
MAXIMUM DISSIPATED WATTAGE = *W

Ex II 2 GD Ex db IIC T6…T5 Gb, Ex tb IIIC T80°C…T95°C Db IP66/67,

Tamb -40 °C to +40 °C…60 °C.

HAWKE SK6 2QN UK

CERTIFICATES:

CML 23 ATEX 1064X IECEx CML 23.0026X CML 23 UKEX 1065X

Inmetro IEx 14.0216X EA3C KZ 7100841.01.01.03126

CSA 2633583

SERIAL NO: YEAR OF MANUFACTURE / XXXXX 0598 CE 1180 UKCA

WARNING: DO NOT SEPERATE WHEN ENERGISED OR WHEN AN EXPLOSIVE GAS OR DUST ATMOSPHERE IS PRESENT.

Note: Female thread detail may be added to certification label.

*FILL IN AS APPROPRIATE FROM THE FOLLOWING TABLE

CONNECTOR SIZE	UPPER AMBIENT = 40°C		UPPER AMBIENT = 50°C		UPPER AMBIENT = 60°C	
	TEMP CLASS		TEMP CLASS		TEMP CLASS	
	T6	T5	T6	T5	T6	T5
16	5W	7W	4W	6W	2.6W	4.6W
25	8W	11W	6W	10W	4W	7W
32	10.5W	14.5W	8W	12W	5.4W	9W
40	12W	17W	9W	14W	5.5W	10.5W
50	13W	20W	10W	17W	6.5W	12.5W
63	17W	29W	13W	24W	8.5W	17W

The maximum temperature as for the T Class i.e. T6 = 80°C and T5 = 95°C
**T5 = 95°C and T6 = 80°C

No maintenance or servicing is required on this product.
Do not exceed maximum dissipated wattage stated in above table.

Declaration of Conformity in accordance with European Directive 2014/34/EU and UK Statutory Instrument 2016/1107
Manufacturer: *Hawke International*
Address: *Bredbury Park Industrial Estate, Ashton Rd, Stockport, SK6 2QN, United Kingdom*

Equipment: ControlEx MK IV Ex 16 to Ex63

Provisions of the Directive fulfilled by the Equipment:
Group II Category 2GD Exdb IIC Gb, Extb IIIC Db – IP66

Notified Body for EU-Type Examination: Eurofins E&E CML Limited
EU-type Examination Certificate: CML 23 ATEX 1064X
Notified Body for production: 0598

Approved Body for UK-Type Examination: Eurofins E&E CML Limited
UK-Type Examination Certificate: CML 23 UKEX 1065X
Notified Body for Production: 1180

Harmonised Standards used: EN 60079-0:2018, EN60079-1:2014, EN60079-31:2014

On behalf of the above named company, I declare that, on the date the equipment accompanied by this declaration is placed on the market, the equipment conforms with all technical and regulatory requirements of the above listed directives.

.....
Michael Truswell
Technical Manager