





4.3 LPA-A3 Antenna

4.3.1 Lifting

The health and Safety notices shown at the beginning of this handbook must be observed at all times when installing, terminating, commissioning, operating and maintaining the equipment and its sub-assemblies.

All variants of the Kelvin Hughes LPA-A3 S-band low profile antenna are supplied with a set of slings that must be used for lifting the antenna. These slings are individually marked with the antenna's serial number and must be retained with the equipment for possible future maintenance work.

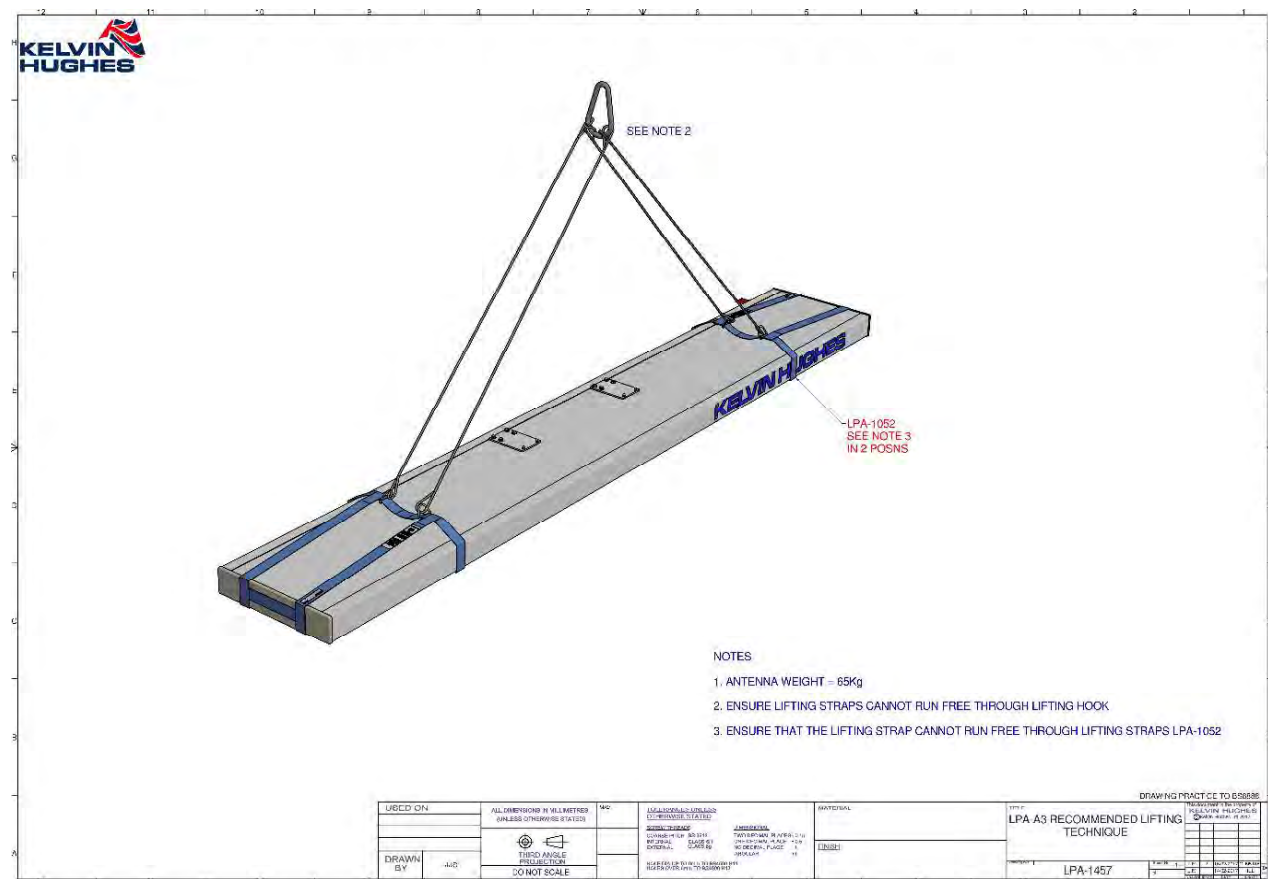
Prior to use, the slings must be fully checked for cuts, abrasions or signs of chemical damage. If there is any evidence of damage the lifting slings must not be used and should be replaced.

SPARES/ REPLACEMENTS

Replacement lifting strap can be ordered from HENSOLDT UK by quoting part number LPA-1052 (two required) and the serial number of the antenna.

MAXIMUM WEIGHT

The LPA-1052 lifting slings have a maximum weight limit of 200kg. They must only be used for lifting the LPA-A3 antenna and are not designed for lifting of any other equipment.



4.3.2 Tools, torque settings & bolts

TOOLS

In addition to the normal tools required for installation and service work, the following tools will be required whilst installing the antenna:

- M4 (7mm), M6 (10mm) and M10 (17mm) spanners. Two M10 spanners are recommended.
- 8.0mm hex-key.
- Torque wrench (see below for torque values).
- Loctite 222 adhesive (Thread locking Adhesive - low strength).
- Greased plastic compound such as Henley's compound or Denso-Tape for waterproofing waveguide couplings.

MOUNTING BOLTS

The bolts supplied as part of the antenna assembly and fitting kit must be used to secure the antenna to the turning unit. During assembly, all bolts must be prevented from loosening by the application of Loctite 222 or similar on the threads during assembly.

TORQUE VALUES

BOLT DESCRIPTION	TORQUE
MAIN MOUNTING BOLTS M10 bolts (10 off) holding the antenna to the swing casting	56Nm
SWING CASTING BOLTS M6 mm bolts (4 off) on the swing casting	7Nm
WAVEGUIDE COUPLING M6 bolts (4 off) used to connect the antenna waveguide to the rotating joint	2.26Nm

4.3.3 Installation

FITTING KIT

A fitting kit is supplied with the antenna. Prior to installation this kit should be identified and the contents checked against the packing note supplied with the antenna.

The bolts contained in this kit **MUST** be used to secure the antenna to the gearbox.

ANTENNA INSTALLATION PROCESS

Remove the four x M6 bolts and washers from the swing casting in the positions shown opposite.

RETAIN THESE BOLTS AS THEY WILL BE RE-USED LATER IN THE INSTALLATION.



Remove the 10 x M10 bolts and washers shown opposite from the LPA.

RETAIN THESE BOLTS AS THEY WILL BE RE-USED LATER IN THE INSTALLATION.



PLACE THE ANTENNA ON THE SWING CASTING

Observing all health & safety requirements and ensuring there is no risk of the LPA slipping or falling, lift the LPA onto the swing casting.

ANTENNA INSTALLATION PROCESS

Remove all protective caps, tapes etc. and ensure that waveguide faces are clean and free from grease or dirt.

NOTICE

Do not remove the smaller end cap shown opposite. Removal of this end cap invalidates the warranty status of the unit.

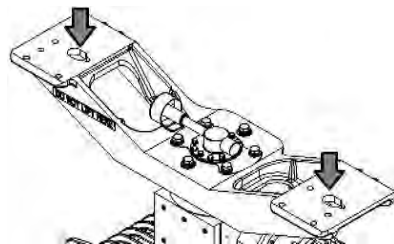


FIT TWO OF THE MOUNTING BOLTS

With the LPA still supported by the lifting equipment, carefully position the LPA onto the swing casting so that the antenna waveguide is correctly aligned with the Ro-Jo coupling.

Two of the mounting positions on the swing casting are slotted as shown opposite.

Two of the mounting bolts can be loosely fitted into the slots to assist in aligning the antenna whilst the waveguide couplings are bolted together.



CAUTION: ANTENNA SUPPORT

The LPA must remain supported until ALL mounting bolts are inserted and fully tightened.

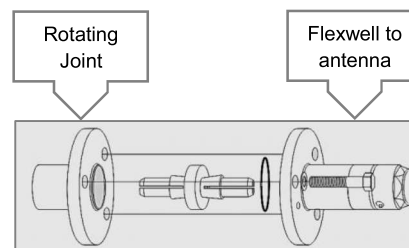
FIT THE RF COUPLING (BULLET)

Join the flexwell to the Ro-Jo ensuring the RF coupling (bullet/ kit part number ZV-9758) and 'O' rings from the fitting kit are in place as shown opposite.

CONNECT THE FLEXWELL

Join the flexwell together using the M6 bolts and washers (plain and spring) supplied in the ZV-9758 fitting kit.

Tightened to a torque of **2.26Nm**.



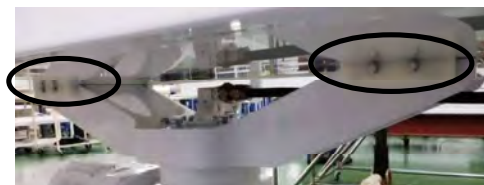
FIT THE REMAINING MOUNTING BOLTS

Secure the LPA onto the swing casting using the remaining M10 nuts, bolts and washers that were removed from the antenna prior to installation.

The M10 bolts holding the antenna to the swing casting must be tightened to a torque of **56Nm**.

On both arms of the swing casting, re-fit the four x M6 bolts and washers removed earlier.

Tightened to a torque of **7Nm**.



example of an antenna shown for illustration purposes only

WATERPROOFING

Waterproof the waveguide joint by sealing with a layer of greased plastic compound such as Henley's compound or Denso-Tape. It is only necessary to apply enough tape to seal the coupling and the fasteners. Multiple layers of tape are not required.

ANTENNA CLEARANCE

After installation, the antenna should be checked to ensure that it can freely rotate without obstruction.

4.3.4 Dimensions

Please refer to section 4.2.7 for the antenna dimensions.

4.4 GTX-A24 drive control unit

ACCESS

The GTX-A24 is designed to be internally wall/ bulkhead mounted in a position that:

- Offers quick, unobstructed, well illuminated access to the safety switch and status indicators located on the top of the unit.
- Is not affected by strong electromagnetic field generators.
- Is not in an area of heavy vibration.
- A dust free environment.
- Away from direct sunlight.
- To meet with electrical safety recommendations, the unit should be situated in a restricted area where access is only available to authorised personnel.

DIMENSIONS

Refer to the following page.

CLEARANCE

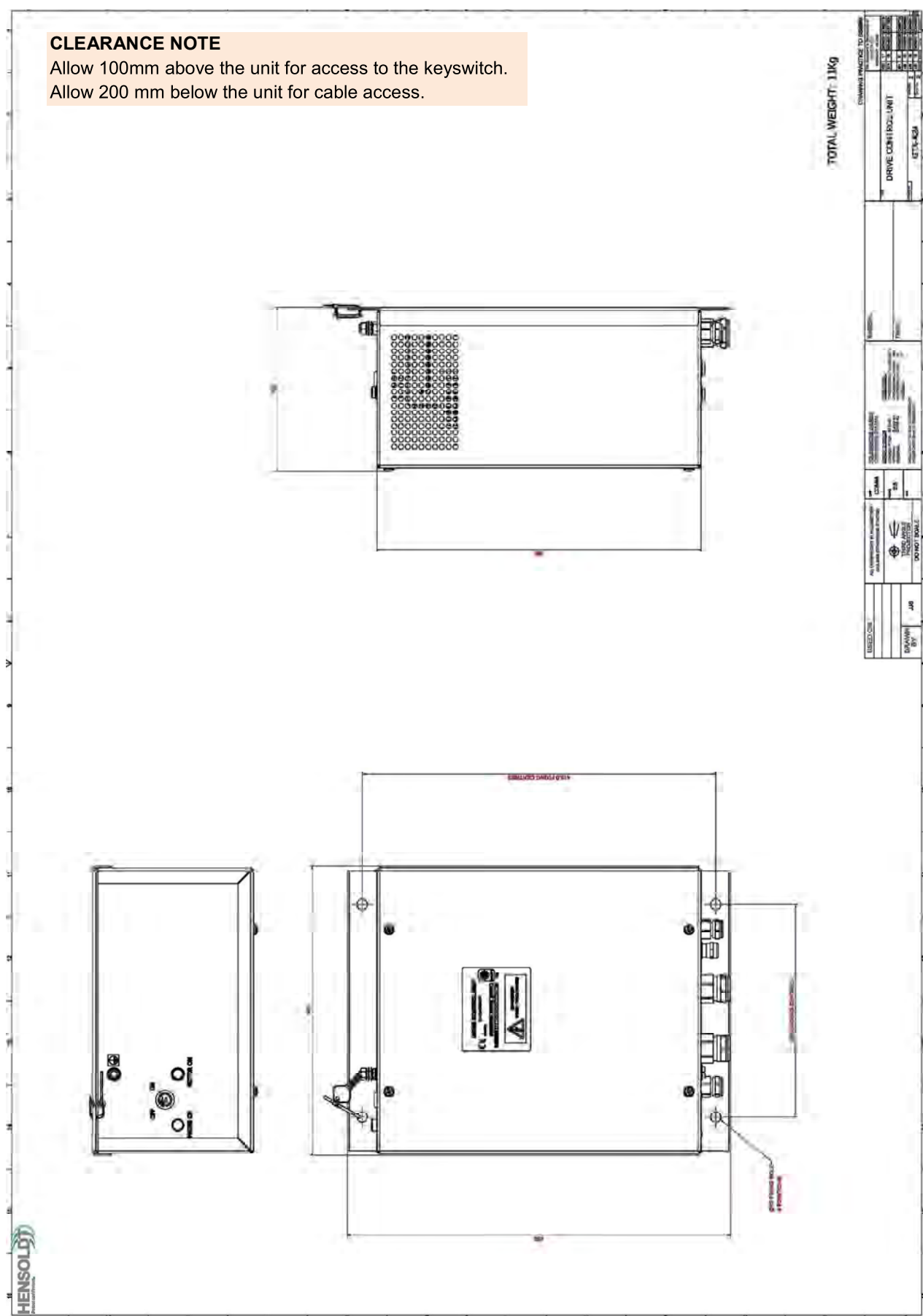
Clearance around the unit is shown on the dimension drawings.

GROUNDING

The unit must be connected to a tested and proven earth point using the M8 earth stud located at the top of the unit.

CLEARANCE NOTE

Allow 100mm above the unit for access to the keyswitch.
Allow 200 mm below the unit for cable access.



4.5 GTX-A234 Optional 110VAC/ 220VAC transformer

110VAC APPLICATIONS

The GTX-A24 only operates from 220VAC. For 110V AC ships supplies, the optional GTX-A234 transformer is required.

INSTALLATION CONSIDERATIONS

The GTX-A234 is designed to be internally mounted in a position that offers unrestricted access for service and maintenance access. It should be mounted in a position where it cannot be accidentally used as a step.

To meet with electrical safety recommendations, the unit should be situated in a restricted area where access is only available to authorised personnel.

VENTILATION

During normal operation these units will become warm. Ensure there is adequate space around the enclosure for ventilation to prevent overheating of the unit during normal operation.

Ensure the transformer will not damage any mounting surface or cause overheating of equipment in its vicinity.

DIMENSIONS

Refer to the following page.

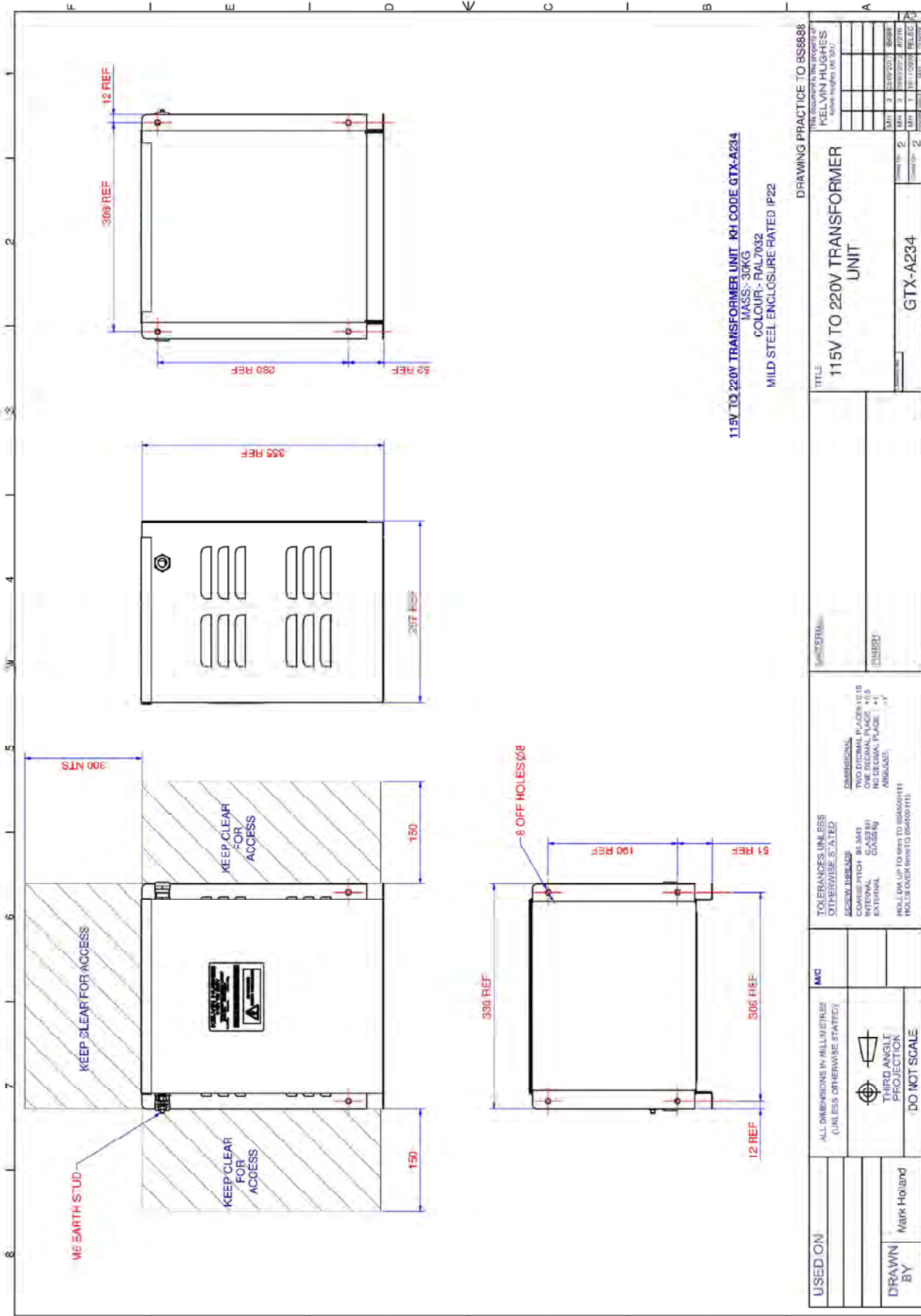
OPERATION

There are no operator or commissioning functions on or within the unit.

EARTH

The unit has an earth stud on the side of the unit that must be securely connected to a tested earth/ grounding point before connection to the system.

All earth connections must be tested for conductivity using a high current impedance meter such as a Megger or similar.





5 Termination

5.1 Pre-termination requirements

The health and Safety notices shown at the beginning of this handbook must be observed at all times when installing, terminating, commissioning, operating and maintaining the equipment and its sub-assemblies.

MECHANICAL

Ensure all equipment is correctly mounted in accordance with the details shown in section 4 and that all fastenings are secure and correctly tightened.

Damaged, incorrectly or poorly mounted equipment must be identified prior to commencing any cable termination or system commissioning.

EARTHING

Ensure that the earthing points of the complete system are securely and electrically connected to a proven and tested earth/ ground point.

CABLING

- Check that all cables relevant to the installation have been correctly installed.
- Cables should have adequate service loops and be correctly and safely restrained.
- All cable screens should be terminated as shown on the wiring drawings.
- All cable entries must be checked for signs of fretting, chafing or damage and, as necessary sealed against water ingress. Any damaged cables must be replaced or appropriately repaired.

TRANSMITTERS

Transmitters must not be operated into an open circuit or poorly matched feed cable, waveguide or antenna. Damage to the RF head can occur if transmitters are run with no load connected i.e. no antenna connected.

MAIN SUPPLIES

Prior to applying any AC mains voltages, check that voltage selectors on power supplies are correctly set and the mains supply is appropriate for the equipment.

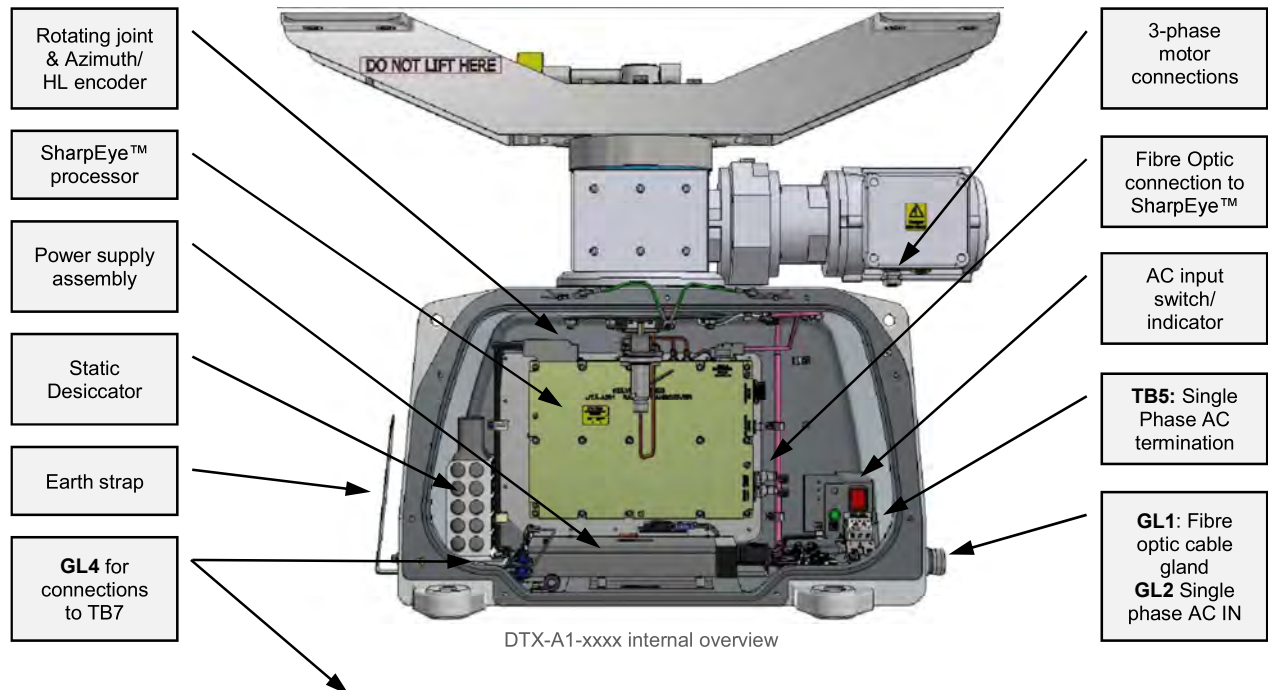
TOOLS

In addition to the normal tools required for electrical installation, the following tools will be required:

- M20 and M25 open ended spanners for the DTX-A460 fibre optic cable glands.

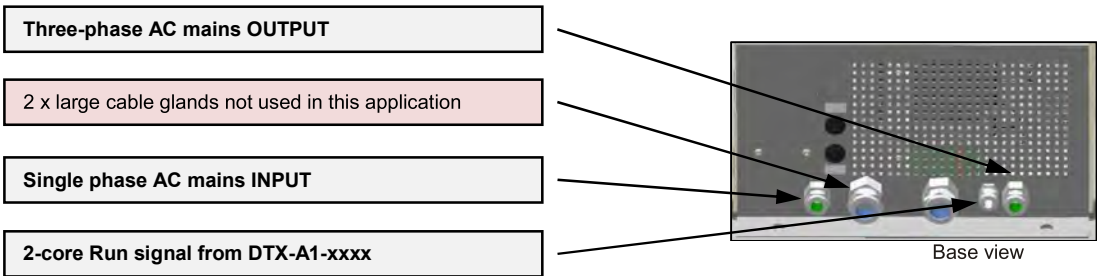
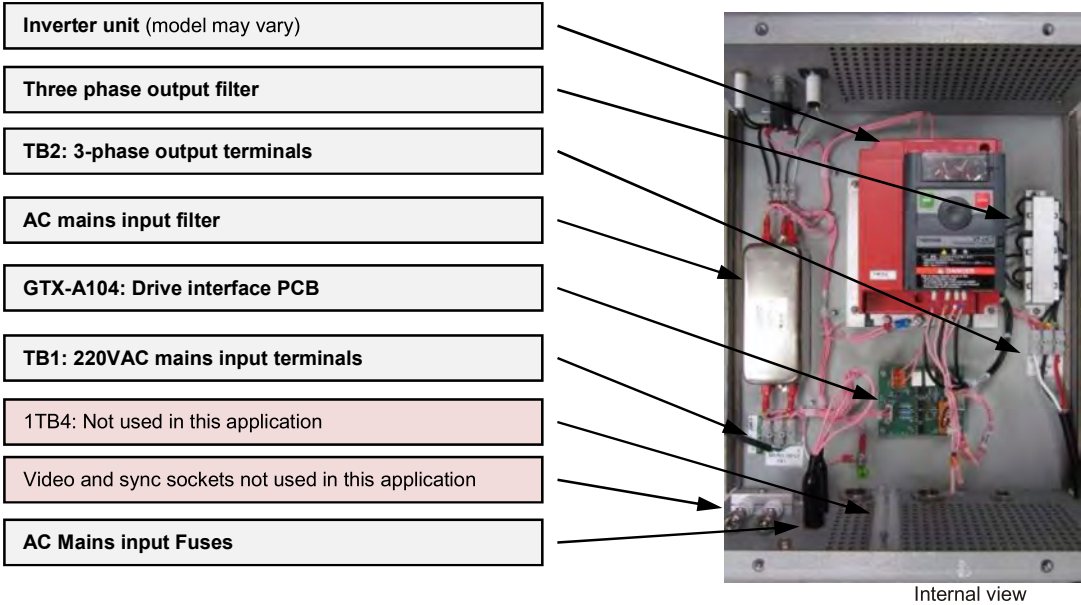
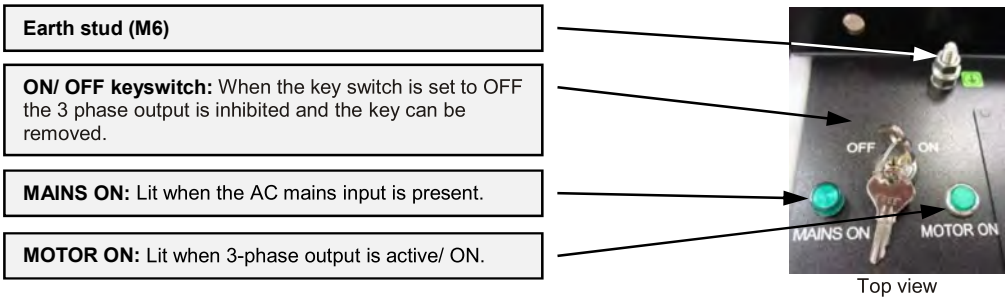
5.2 Internal layouts

5.2.1 DTX-A1-xxxx



Detail of GL4 and TB7

5.2.2 GTX-A24



5.3 Cable & connector information

5.3.1 Cabling requirements

CABLING STANDARDS

Cabling, terminations and connections are to be made to the applicable regulations required by class and/ or the flag state; for example, IEC 60092, IEEE45, IPC 620 etc.

- Cables are to be of correct specification and rating and are to be run in suitable cable trays or guides.
- Cables must not be laid in positions that can cause any obstruction or hazard.
- Cable runs must allow for service loops.

MARKING & IDENTIFICATION

- All cables should be clearly marked to identify the signal source, for example AC Input, Motor control etc.
- Power breakers must be clearly labelled to show what equipment is fed from a specific breaker.

CABLE LAYING AND SECURING

- All cables should be kept as short as possible to minimize attenuation of signals.
- In order to reduce electromagnetic interference effects, all cables between antenna and radar system units should be routed as directly as possible, consistent with consideration for other equipment.
- Cables should not be installed close to high-power lines such as radar or radio-transmitter lines.
- Crossing of cables should be done at right angles (90°) to minimize magnetic field coupling from other systems.
- Cables should not be exposed to sharp edges, and should be free of damage.
- Cables should be installed with sufficient physical separation, as defined in the manufacturer's documentation.
- All cables should be secured in position using cable ties placed at regular intervals.
- Metal cable ties must be used when running cable in any deck head or bulkhead areas.
- The minimum bend radius of the cables should be observed.

CABLE PULLING

The DTX-A460-xx fibre optic cable is supplied with a protective sleeve that are screwed onto the cable glands.

THE PROTECTIVE SLEEVE MUST NOT BE REMOVED UNTIL THE CABLE HAS BEEN PULLED AND THE SYSTEM IS READY TO BE TERMINATED.

Removing the sleeve during cable storage or installation can lead to damage of the fibre cable and connectors and voids the warranty status of the unit.

The protective sleeves have a hole in the end that can be used to attach a pulling rope.

The minimum bend radius noted in section 5.3.3 must be observed when pulling fibre optic cables.

PROTECTIVE SLEEVE REMOVAL

When the fibre Optic cable is ready to be terminated, the protective cover can be removed (unscrewed) from the main cable assembly. See section 5.3.3 for details on the cable gland assembly.



Fibre Optic cable with protective cover fitted

5.3.2 Cable gland assembly

AC CABLE GLANDS

The following diagram details the assembly of the cable glands used in the system.

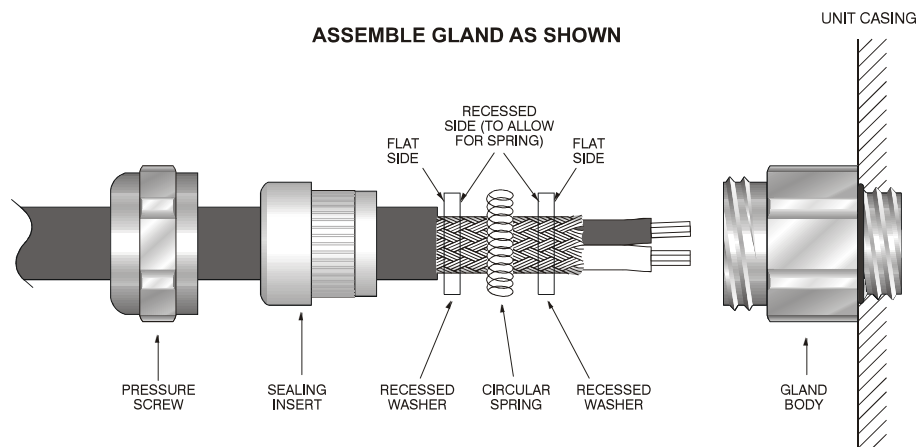
PULL TEST

When any cable has been installed and the gland tightened, pull and push the cable ensuring that no movement of the cable is possible in the gland.

PREPARE CABLE (LENGTHS OF CORES AND SCREEN TO BE CUT TO SUIT APPLICATION)

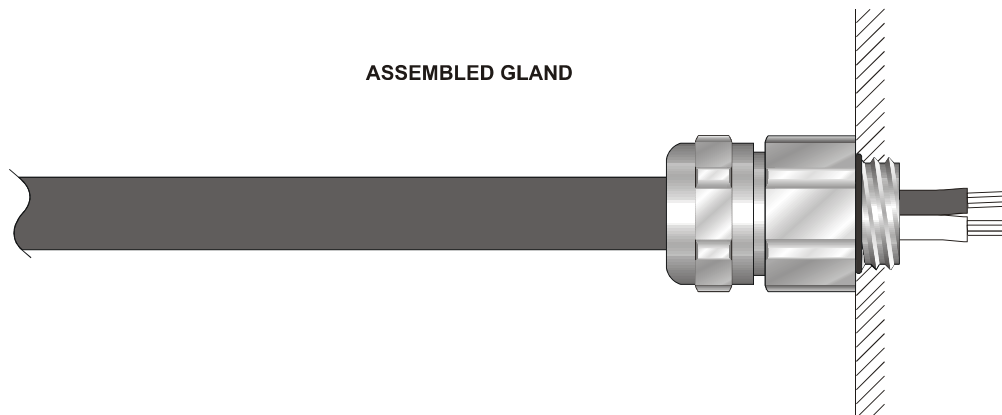


ASSEMBLE GLAND AS SHOWN



NOTE: THE BRAIDED SCREEN IS BONDED BY A CIRCULAR SPRING BETWEEN THE TWO RECESSED WASHERS. THE CABLE GLAND'S SEALING INSERT PRESSES ON THE WASHERS. WHEN THE PRESSURE SCREW IS TIGHTENED UP IT COMPRESSES THE SPRING TIGHTLY AROUND THE SCREEN; AT THE SAME TIME THE SEALING INSERT BONDS THE SCREW WITH THE GLAND BODY.

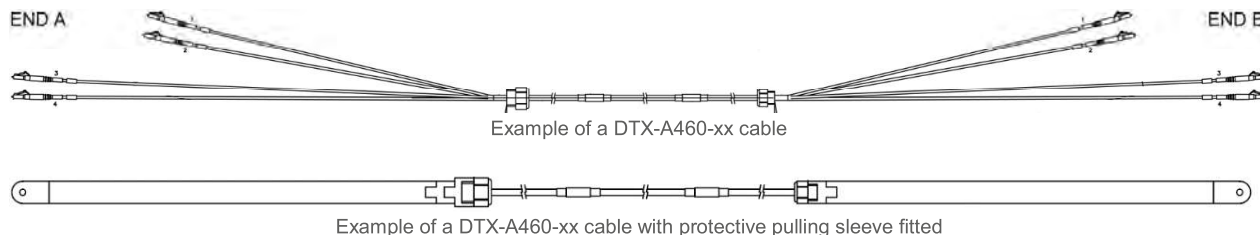
ASSEMBLED GLAND



5.3.3 Fibre optic cable & gland

CABLE PART NUMBER

A pre-terminated cable reference DTX-A460-xx will be supplied with the equipment. **Note 1**



END A METAL CABLE GLAND (transceiver connection)

The metal cable gland connects to GL1 on the transceiver housing.

- A metal blanking plate on the housing will need to be removed prior to fitting the gland.
- **M20 PLASTIC GLAND and M20/ M25 THREAD ADAPTOR:** The cable gland on the cable assembly is fitted with an M20 black plastic gland and an M20/ M25 thread adaptor *that must be removed before fitting.* **Note 2**

END B PLASTIC CABLE GLAND (network switch connection)

The plastic cable gland is located at the end of the cable assembly that connects to the MDC-A201-1.

- The cable gland is not used in this application but must not be removed.
- The cable assembly should be suitably supported/ restrained so that no strain is placed on the fibre connections to the MDC-A201-1.

CABLE PULLING/ PROTECTIVE SLEEVE/ CABLE GLAND

- The protective sleeves on the ends of the cable are designed to prevent damage to the connectors and should only be removed when the cable has been successfully laid.
- The cable must only be pulled with the protective sleeve fitted and should be pulled using the hole at the end of the tube.

CABLE LAYING

Fibre optic cables can be laid in a similar fashion to standard copper cables however the characteristics of the cable can be significantly degraded if the cable is subjected to excessive pulling or strain, the use of a tight or excessive bend radius, crushing forces, shock or continued vibration.

To minimise the risk of damage to the cable the following must be observed:

- Do not deform the cable; specific care should be taken when using cable ties or restraints
- Do not pull fibre optic cables using copper cables
- Never use fibre optic cables as support for other cables

CABLE LAYING DIRECTION

The fibre optic cable should be laid *from* the DTX-A1-xxxx transceiver, through the deck/ bulkhead down to the MDC-A201-1 Managed Network Switch.

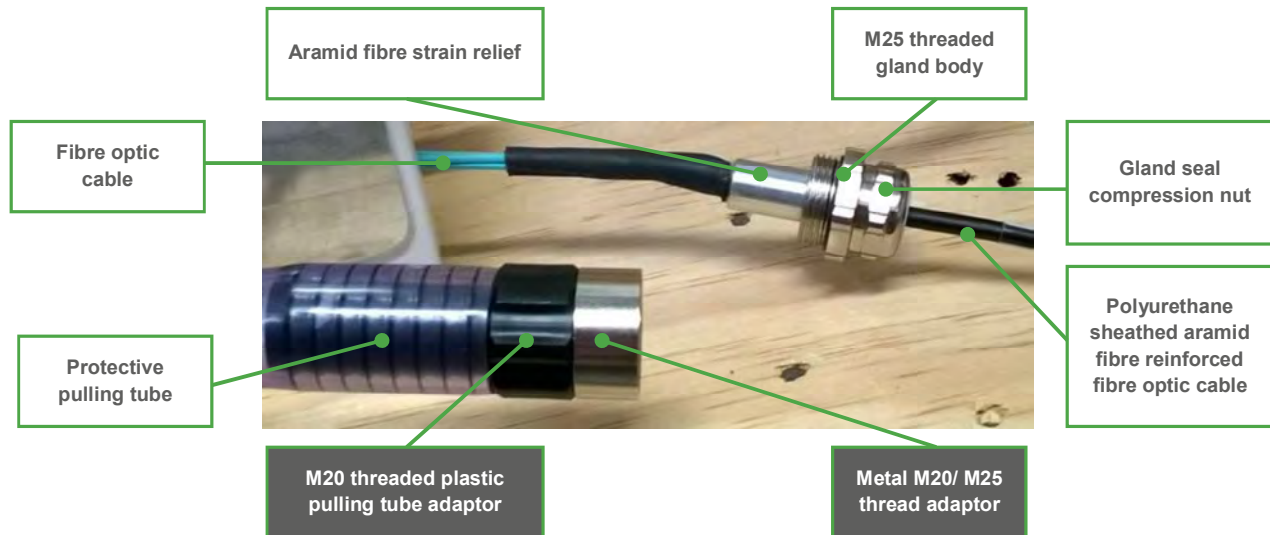
BEND RADIUS

Ensure that all bends have a cable radius of not less than 50mm.

Note 1: Where '-xx' is the cable length in metres.

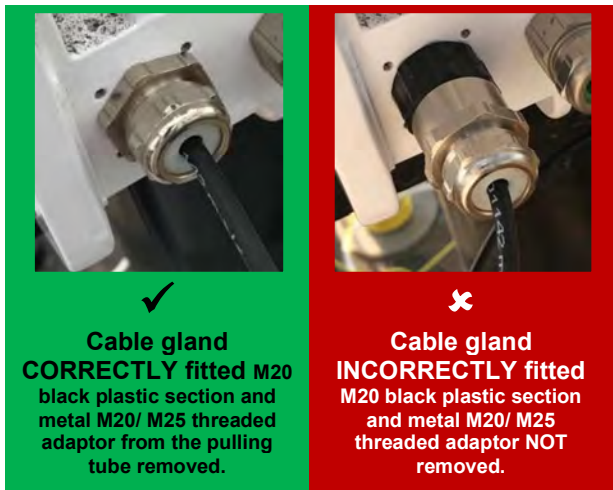
Note 2: The M20 black plastic cable gland and M20/ M25 thread adaptor **MUST BE REMOVED** before fitting the metal cable gland into the MK7 housing. Refer to the following page for details.

DETAIL OF FIBRE OPTIC CABLE & PROTECTIVE SLEEVE



The M20 black plastic section and the metal M20/ M25 threaded adaptor of the pulling tube **MUST BE REMOVED** from the cable assembly before fitting the metal cable gland into the MK7 housing.

Once installed, the cable gland must be tightened so that it securely grips the fibre cable.



SPARE CORES/ CONNECTORS

The spare fibre optic cables/ connectors (cores 3 and 4) are not used in this application. Observing the minimum bend radius (10x cable diameter), the spare cables should be tied back into a secure position where they cannot be damaged.

DO NOT cut or remove the connectors from the cable assembly.

5.3.4 SFP modules and fibre connections

SFP modules are supplied within the fitting kits for the DTX-A1-xxxx and the MDC-A201-1 Network Switch. They are used to connect the fibre optic cable between the transceiver and Managed Network Switch. **Note 1**

Once installed, the SFP module requires no commissioning or configuration.



Example of an SFP module

DTX-A1-**** SHARPEYE™ TRANSCEIVER CONNECTION	MDC-A201-1 MANAGED NETWORK SWITCH CONNECTION
The SFP module needs to be inserted into the slot marked SFP1 on the side of the SharpEye™ processor located within the transceiver housing.  SharpEye™ transceiver SFP inserted into slot SFP1	The SFP module should be inserted into PORT 9 of the network switch. If port 9 is already in use, use ports 10, 11 or 12.  MDC-A201-1 Managed Network Switch

Tx / Rx POLARITY **Note 2**

SharpEye™ processor	
Rx Port	Lower (Fibre cable 1 or A)
Tx Port	Upper (Fibre cable 2 or B)

MDC-A201-1	
TX port	Lower (Fibre cable 1 or A)
Rx Port	Upper (Fibre cable 2 or B)

NOTICE

The Tx/ Rx Polarity of the SFP module cannot be seen when the unit is fully installed



SFP module uninstalled



SFP module Installed

REMOVAL

The SFP module can be removed by lifting the small bar at the connector end of the module. This releases the module so it can be withdrawn.

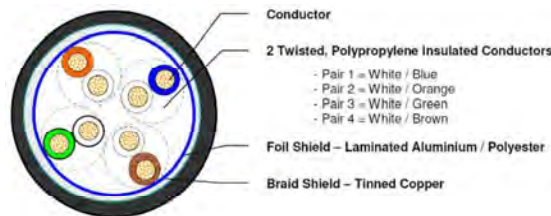
Note 1: The make and model of the SFP module may vary from the image shown.

Note 2: Polarity and cable numbers are for the DTX-A460-xx cable.

5.3.5 LAN Cable and connectors

CABLE PART No. 45-762-0279-001

- CAT 5E SF/UTP foiled and braided screen > 80% coverage.
- The LAN cable must be ordered separately.
When ordering please specify the length required where the unit of measure 1 = 1 metre.



- Cabling must be used up to a maximum cable length of 100m to the remote terminal device but it is recommended to keep the cable length as short as is possible.

CAUTION: DO NOT USE UNSHIELDED CABLES or RJ45 CONNECTORS

The shielded CAT 5E cable & RJ45 connectors specified must be used for all LAN cable connections within the Kelvin Hughes/ Hensoldt UK radar network.

BEND RADIUS

Minimum bend radius of 10x cable diameter (cable diameter 6.65mm).

CONFIGURATION

T-568B Straight connection is used for all LAN cabling throughout the Kelvin Hughes Navigation Display system and connections to the transceivers.

RJ45 CONNECTOR PART No. 45-925-0735-001

Shielded RJ45. Connectors are not supplied and must be requested at the time of ordering.

CRIMP TOOL

Cables are supplied unterminated. The RJ45 connector must be connected to the cable using a suitable crimping tool.

PIN	CABLE COLOUR	SCHEMATIC
1	O/W Orange/ White	1
2	O Orange	2
3	Gn/W Green/ White	3
4	Bl Blue	4
5	Bl/W Blue/ White	5
6	Gn Green	6
7	Bn/w Brown/ White	7
8	Bn Brown	8



Example of an unshielded connector

TESTING

Once crimped, the cable must be tested to ensure full connections have been made including the outer screen/ shield.

CAUTION

Incorrectly or poorly terminated network cables can cause networking issues.

LONG CABLES

Where LAN cable runs exceed 90metres, SFP modules must be used at both ends of the cable run. Please contact Hensoldt UK for details.

5.3.6 Grounding

All parts of the system must be fully and correctly connected to a proven earth point prior to connecting any source of AC power.

CONNECTION POINT

All HENSOLDT UK equipment is fitted with a single protective earth connection point which is indicated on the mechanical installation drawings.

CONDUCTIVITY TESTS

During installation and maintenance and prior to making any other electrical connections, the earth connections must be tested for conductivity using a high current impedance meter such as a Megger or similar.

WRIST STRAPS

Fully isolate all sources of AC before attaching ESD protective wrist straps to the system.

CABLE SCREENS

Unless otherwise specified, cable screens should be connected at both ends of the cable to a proven and tested earth point by use of connectors or cable glands.

5.3.7 AC: Single phase connection

AC CONNECTIONS

Regardless of the connection point, Earth cables for AC mains connections must be longer than the Live and Neutral cables. This ensures that the earth cable is the last to disconnect in the event of the cable being accidentally pulled away from the equipment or the AC connection.

AC BREAKERS

To comply with EN60950 requirements, it is recommended that all single-phase AC supplies to the system are via a clearly labelled, readily accessible disconnection devices having Class B, yellow (110VAC supplies) or Blue (240VAC supplies), 3-pole plugs & sockets (not supplied). These outlets should be installed as near to the equipment as is practical and safe.

5.3.8 AC: Three phase connection (motor)

TERMINAL COVER RETAINING BOLTS

A 4.0mm hex key is required to remove the three-phase junction box cover.

CABLE GLAND

The three-phase cable is passed through the gland located on the motor junction box. The cable gland may need to be changed depending on the length of the AC cable, cable glands are provided within the fitting kit.

PULL TEST

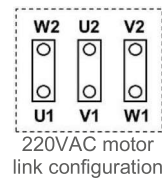
When a cable has been installed and the gland tightened, pull and push the cable ensuring that no movement of the cable is possible in the gland. This must be carried out on all cables.

The AC cable **MUST** be secured to the gearbox using a heavy duty cable tie.

TERMINATION & MOTOR LINKS

Regardless of the connection point, the Earth cable for AC mains connections *must be longer* than the other power cables. This ensures that the earth cable is the last to disconnect in the event of the cable being accidentally pulled away from the equipment.

- Cables must be terminated using the spade connectors provided in the fitting kit.
- The spade connectors must be correctly crimped and never soldered.



CAUTION: JUNCTION BOX MOTOR LINKS

The links in the three-phase motor junction box must be checked/ set before making any electrical connections
OR before applying AC power to the system.

GROUND CONNECTION & CONTINUITY CHECKS

The system must be correctly connected to a proven and tested earth point before making any AC connection.

- The 3-phase cable screen/ earth must be connected to the screw terminal using the spade connectors provided in the fitting kit.
- Ensure that the motor cable screen is earthed, ideally at both ends. Check by continuity testing that the cable braid/ screen makes contact with the motor earth terminal.

5.3.9 Power & signal cable

2-CORE POWER (LOW POWER)

Cable reference I

Kelvin Hughes part number:	45-762-0173-001
Core Details:	2 x 1.6 mm ² Multi-strand annealed copper wire braided with 0.2mm diameter tinned copper wire, 79% coverage.
Outer Diameter:	8.0 mm
Bend radius:	Repeated 8x cable diameter Single 4x cable diameter
Rating:	264 V maximum @ 50/60Hz, 10A.

2-CORE (POWER)

Cable reference K

Kelvin Hughes part number:	5344-787
	This cable is used for services requiring a moderate current carrying capacity, i.e. single phase AC mains supplies.
Core details:	Two cores each comprising of 7 strands of 0.67mm copper cable 0.67mm ² , cross linked polythene insulation, braided with 0.2mm diameter tinned copper wire, 79% coverage, low smoke, zero halogen outer sheath.
Outer diameter:	12 mm
Rating:	250/440 V grade.

3-CORE (POWER)

Cable reference L

Kelvin Hughes part number:	5344-788
	This cable is used for services requiring a moderate current carrying capacity, i.e. 3-phase mains supplies.
Core Details:	Specification as per 2-core cable ref K.
Outer Diameter:	13 mm ² (0.44 inches).
Bend radius:	6 x cable diameter.
Rating:	250/440 V grade.

4-CORE (SIGNAL)

Cable reference C

Kelvin Hughes part number	1344-720
	This cable is used for low power signals.
Core details	4 x 0.55mm ² (16x0.2) core flexible tin annealed copper conductors. Low smoke, zero halogen outer sheath.
Outer diameter:	7.3mm braided with 0.2mm +CW >85% coverage
Rating:	440VAC max
Minimum bend radius:	6 x overall diameter.