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SeaBat 7125 quick guide
Version 1.4, May 21 2007

1 INTRODUCTION

This document is intended as a quick installation guide for the SeaBat 7125. It is not intended to replace the operator's manual, merely to present relevant information in a concise form.

2 SEABAT 7125 DESCRIPTION

The SeaBat 7125 is a High-Resolution Multibeam Sonar System operating at either 200 or 400 kHz, which measures relative water depths over a wide swath perpendicular to the vessel's track. The SeaBat 7125 produces bathymetry data suitable for the generation of high-resolution hydrographic charts that exceed international standards.

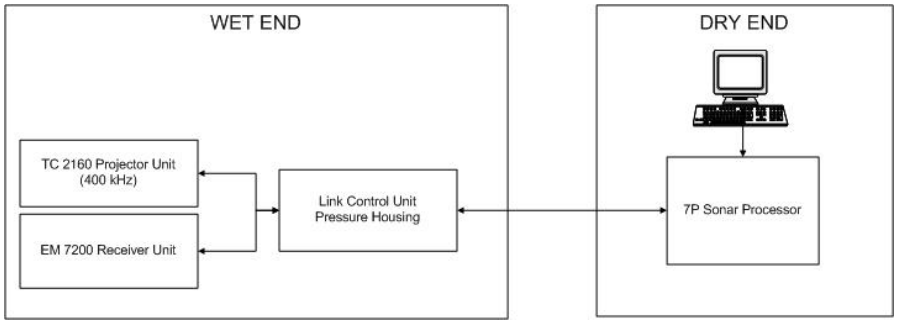
The SeaBat 7125 may be mounted on a surface vessel, ROV or towed body and is available in depth ratings up to 6000 meters.

3 COMPONENT DESCRIPTION

A single transmission from the Projector Unit illuminates a 128° swath on the sea floor. The seabed return signal is received by the Receiver Unit, digitized, and transmitted via the Link Control Unit to the Sonar Processor, where it is formatted for display and data output. Bathymetry, Side-scan, and Snippets data are all displayed locally or exported via Ethernet to an external data collection system.
A Windows®-based user interface controls the system, allowing the operator to select system configuration, data output, and storage options.

A typical standard SeaBat 7125 system consists of the following components:

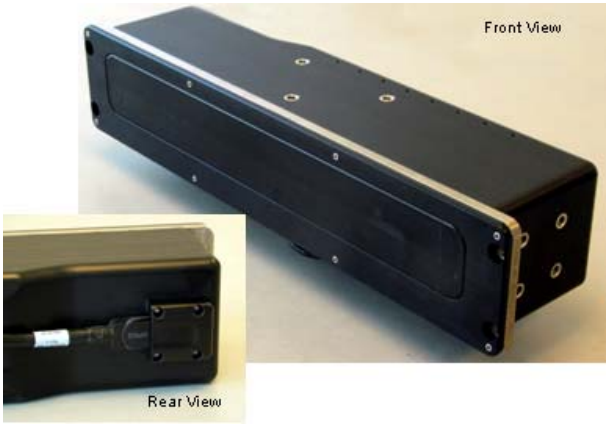
- EM 7200 Receiver Unit (1)
- TC 2160 400 kHz Projector Unit & TC2163 200kHz projector (If dual frequency)
- 7-L Link Control Unit (1)
- 7-P Sonar Processor Unit (SPU) with Display, Keyboard, and Pointer Device
- Cable Set (1)



Parameters	200kHz	400kHz
Across-Track Beamwidth	Transmit: >128° Receive: 1.0° (center)	Transmit: >128° Receive: 0.5° (center)
Along-Track Beamwidth	Transmit: 2° Receive: 27°	Transmit: 1° Receive: 27°
Number of Horizontal Beams	256 equi-angle or equi-distant	256 equi-angle or 512 equi-angle/equi-distant
Swath Coverage	128°	
Range (typical)	1 - 500 meters	1 - 200 meters
Ping Rate	Up to 50 pings/sec	
Pulse Length	10 to 300 microseconds	
Depth Resolution	5 mm	

3.01 EM 7200 Receiver Unit

The unit is constructed using a Grade 2 Titanium lid on which the receive ceramics are mounted, protected by a Polyurethane acoustic window.



Specification	Value
Dimensions	Height: 102 mm Width: 496 mm Depth: 131 mm
Weight	Air: 10.3 kg Seawater: ~5.1 kg
Temperature	Operation: -2° to 35° C Storage: -30° to 70° C

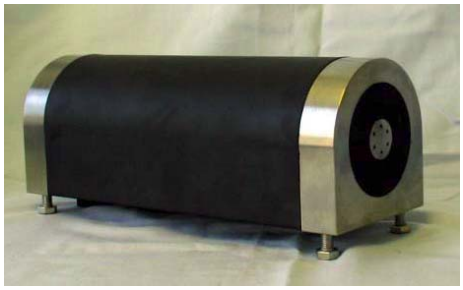
3.02 TC 2160 400kHz Projector Unit

The TC 2160 Bathymetry Projector Unit produces a narrow beam that is 1° along-track by 128° across-track. The entire 128° sector is illuminated in one transmission. The ping rate is set based on range selection, and can be modified by the operator through the user interface.

Specification	Value
Dimensions	Height: 77 mm Width: 62 mm Depth: 285 mm
Weight	Air: 2.75 kg Seawater: 1.75 kg
Temperature	Operation: -5° to 40° C Storage: -30° to 70° C

2.05 TC 2163 Projector Unit (Optional)

The TC 2163 Projector Unit produces a narrow beam that is 2° along-track by 128° across-track.



Specification	Value
Dimensions	Height: 100 mm Width: 100 mm Depth: 259 mm
Weight	Air: 11.75 kg Seawater: 8.75 kg
Temperature	Operation: -5° to 40° C Storage: -30° to 70° C

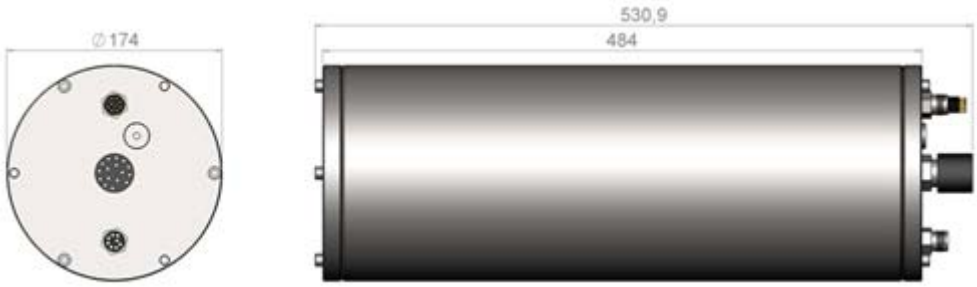
3.03 Link Control Unit

The Link Control Unit (LCU) provides the bi-directional high-speed data link between the Projector / Receiver Units and the 7-P Sonar Processor Unit. Full bandwidth digital data from the Receiver Unit is formatted and transmitted to the Sonar Processor, while operator commands are received from the Sonar Processor and distributed for implementation. The LCU also manages power distribution and monitoring functions.

The LCU is installed inside a cylindrical pressure housing that has electrical connectors mounted on one of the end caps. One connector is provided for each of the Projector and Receiver Units, and one is provided for communications and power.

The standard cable between the LCU and the Sonar Processor is 25 meters in length. Choice of cable type depends on the quantity of data required and the length of the link. Longer cable runs will require conversion to an optical signal running over a single-mode fiber.

Specification	Value
Housing Dimensions	Length (External): 530.9 mm Diameter (External): 174 mm
Weight	Air: 15.7 kg Water: 5.2 kg
Temperature	Operating: -0° to +40° C Storage: -30° to +70° C



LCU Outline Dimensions

In a standard installation, LCU receives 48 VDC power from the SPU, then provides the required DC voltages for the Projector and Receiver Units. In an ROV, towed body, or AUV installation, power will be supplied by the vehicle.

3.04 7-P Sonar Processor Unit

The 7-P Sonar Processor is a high-performance sonar processing unit that manages data flow and signal processing using a state-of-the-art FPGA processing architecture. This highly integrated design offers reliability, maintainability, and high performance in a small size.

The 7-P Sonar Processor offers a highly flexible platform that supports a number of disparate functions, including highly accurate time stamping, storage of interfaced sensors, and optional beam data storage on a large, external RAID array, in addition to more standard functions such as user displays and control interface.

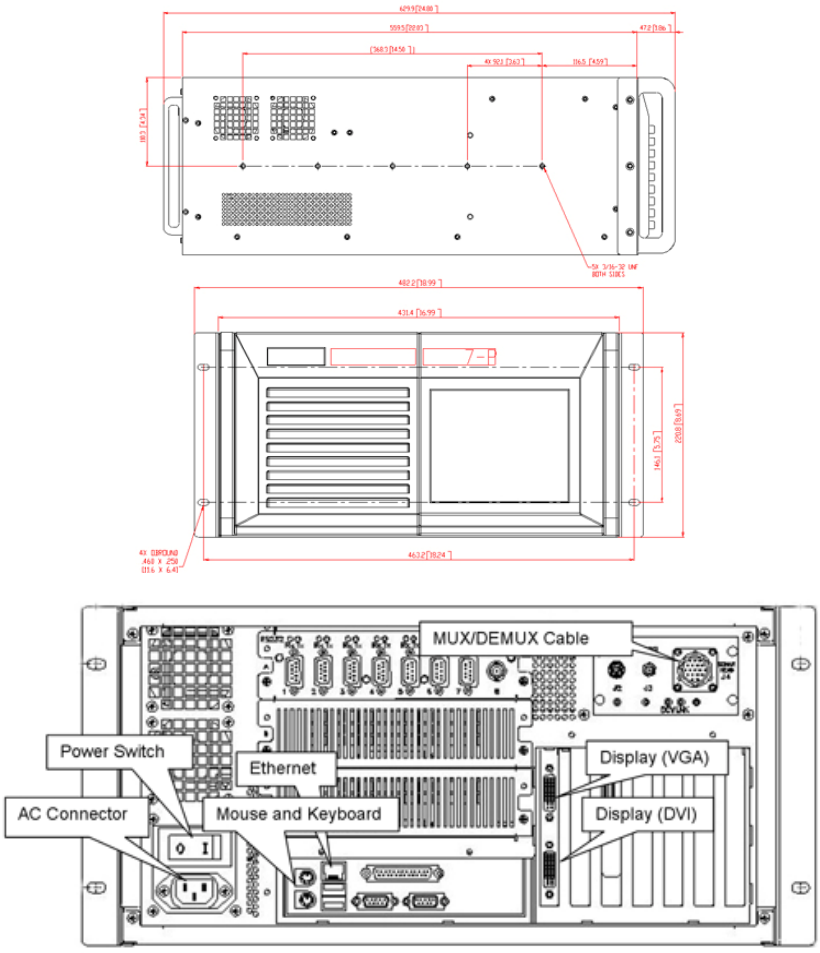
The 7-P is housed inside a 19", 5U high rack-mounted chassis and receives data from the Receiver Unit via the LCU. The Sonar Processor performs initial signal processing and beam forming before presenting data or exporting it to an external system.

By using a common data transfer protocol, the 7-P is capable of connecting to any combination of SeaBat series Projector Unit, Receiver Unit and LCU, and can easily be upgraded or modified.

The SeaBat 7-P Sonar Processor:

- Receives digitized sonar data from the LCU.
- Receives operational settings either directly through the user interface, or remotely from an external system.
- Provides beam forming and initial processing of acoustical data.
- Controls, formats and outputs data to external systems. This can include making beam formed data and pre-processed image data available to external systems over a fast Ethernet connection.
- Provides an interface for a sound velocity sensor so that range measurements and receiver beam forming can be conducted correctly.

Specification	Value
Dimensions	Height: 220.8 mm Width: 482.2 mm (with mounting ears) Depth: 629.9 mm (with handles)
Weight	30 kg
Temperature	Operating: 0° to +40° C Storage: -30° to +55° C



7-P Sonar Processor Unit (Rear Panel)

3.05 Software & firmware

CAUTION: The 7-P Sonar Processor was designed and assembled specifically to accommodate the RESON-provided software packages installed at the factory. Installing additional software on this machine can result in decreased performance and/or system malfunction.

Installation of additional software on the 7-P Sonar Processor is done at the customer's own risk. In the event that software is installed on the 7-P Sonar Processor Unit by a non-RESON authorized technician, RESON accepts no responsibility for any consequences that may arise in connection with the installation.

The 7P SPU is a PC with additional plug-in cards and specific hardware installed. Refer to the system block diagram for details. The Windows XP Professional operating system is modified to load specific drivers and set a configuration suitable for system operation.
In order to operate, a number of files are placed in the PROGRAM FILES\RESON directory on the system C:\ drive. These include:

- **7KCenter.exe** – 7KCentre is the main processing software and handles data IO, record generation and formatting and interface to the beamformer.7K centre support DLLs are used for functions such as autopilot.
- **Seabat7K.exe** – SeaBat 7K is the Graphical user Interface (GUI)
- **7K_0.XML** – Configuration file
- **Topxxxxxxxx.bit** – The BIT files are the main beamformer files loaded into the processing FPGA upon startup
- **7K_BITE.HTM –** The BITE configuration file which contains limits for each BITE item.

There are also a number of support files in this directory required for operation:

3.06 XML files and startup

The system configuration is controlled through the 7K Control centre which is installed on the system. Initialize the system by double-clicking the 7KConbtrol centre icon on the desktop, selecting the desired configuration then pres START. The control centre copies the appropriate XML file and starts the system.

The XML files hold all configuration data for the system including beam geometry, startup defaults and other system settings. Care should be taken not to overwrite or otherwise corrupt these files.

One XML file for each configuration is provided:

400kHz 256 beam equi-angle

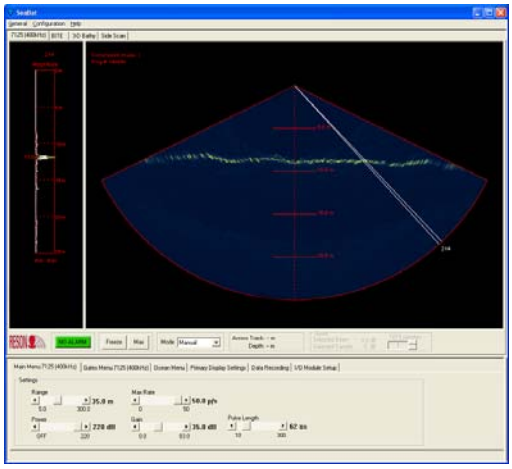
400kHz 512 beam equi-angle

400kHz 512 beam equi-distant

When the 7Kcenter is started, it loads the XML file called 7K_0.XML. Batch files in the C:\ PROGRAM FILES\RESON directory and desktop copy the appropriate XML file and renames it 7K_0.XML prior to the centre starting.

Once the files are copied, the 7K centre is started, followed by the User interface.

The 7K Graphical User Interface provides the user with a means of configuring and controlling the sonar system a number of displays for monitoring data.



4 TYPICAL SCOPE OF SUPPLY (SINGLE FREQUENCY)

Item	Quantity
EM 7200 400 kHz Receiver Unit	1
TC 2160 400 kHz Projector Unit	1
Projector to LCU Cable, 3m (11393)	1
Receiver to LCU Cable, 3m (11392)	1
TL 8105 LCU Aluminum Pressure Housing with 400m or 6000m Depth Rating	1
7-P Sonar Processor Unit with Keyboard and Pointer Device	1
LCU to 7-P Sonar Processor Cable, 25m	1
17" LCD Monitor	1
SeaBat 7125 Operator's Manual with Documentation CD	1
LCU Pigtail, 5m	1
Shipping Cases	Set

5 INSTALLATION

5.01 Mounting

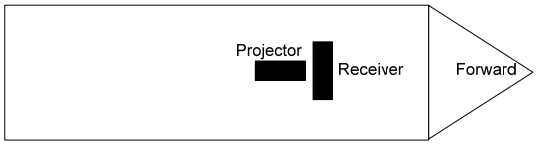
Mounting on a surface vessel may be over the side, over the bow, or through a moon pool. The Sonar Head Assembly should be immersed in water to a depth of at least 0.8 m to ensure that noise from the surface (waves) and turbulence generated by the mounting structure do not degrade performance. The depth should also be sufficient to avoid shadows from the keel, hull, or other obstacles.
Take care that the Sonar Head Assembly is electrically isolated from the structure to avoid corrosion problems.

5.02 Orientation & field of view

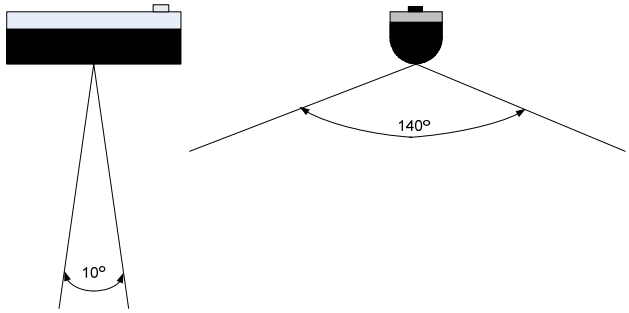
The Sonar Head Assembly should be mounted with the faces of the arrays oriented vertically downwards. Projector orientation should be parallel to the longitudinal axis of the platform and the receiver perpendicular to that axis. It is normal that the receiver is forward of the projector but this is not mandatory.

If necessary, the Projector Unit may be oriented forward or the Sonar Head Assembly rotated away from vertical, however allowances must be made in the processor setup and data acquisition software. In addition, an alternate mounting makes the head more susceptible to impact damage and collection of trailing debris.

The receiver should be orientated with the connector to the platform port when looking in plan view.



TheTC2160 400khz and TC2163 200kHz projectors require a free field of view of 140° across-track and at least 10° along track. Care should be taken that no structures which may cause reflections are in this field of view. Take care to fix the projector securely using the mounting holes.



5.03 Location

The receiver is susceptible to external noise sources, particularly acoustic noise within the receive band of 400±15kHz and 200±15kHz. In addition, broadband noise such as pumps, thrusters, engines etc will adversely affect performance and care should be taken to avoid these areas.
Acoustic emitters particularly broadband devices such as Doppler logs (DVL/ADCP) are known to cause significant interference and care should be taken to separate such devices as much as possible from the sonar or to implement some synchronization scheme.

It is normal to submerge the receiver and projector assembly approximately 0.8m below the surface to avoid surface (wave and flow) noise. Operation at high speed may increase flow noise around the receiver and consideration should be given to a hydrodynamic fairing under these conditions.

5.04 Reference point

Providing the projector(s) and receiver are mounted within ±250mm of each other in the X & Y planes AND the face of the projector and the face of the receiver are aligned in the Z plane, the SYSTEM acoustic centre is the centre of the projector array as shown in the attached drawing 12851. Maintaining relative orientation like this produces a maximum depth error of 1 sample which is negligible and acceptable.

5.05 Mounting bracket

RESON offer a mounting bracket to fix the projector(s) and hydrophone rigidly within the stated tolerances.

6 CABLE CONNECTIONS

The cable connections from the Receiver and Projector Units to the LCU should be made prior to immersing the unit in water. A light coating of grease on each connector face will ensure sealing. Unused connectors should be sealed with a dummy plug. Ensure that cables are securely fastened and that strain relief is provided to prevent cable damage.

Care should be taken to avoid impact to either the projector or the receive face as damage could degrade system performance.

Ensure that cables are securely fastened and that strain relief is provided to prevent cable damage. Care should be taken to avoid impact to either the Projector Unit or the Receiver Unit face as damage could degrade system performance.

7 INTERFACES

7.01 LCU to projector interface

The projector(s) are connected to the LCU using an 8-conductor shielded cable. Cables are available in 1, 3, 4 & 10m Lengths (3m is standard and supplied with a system). The cable has an Impulse LPMIL-8#16-FS on the projector end and an Impulse MCIL-8-MP on the LCU end. Refer to Drawing 11393 in Appendix 1

Transmit signals are routed from the transmitter sub-assembly in the LCU to the projector through this cable.

Standard Projector Unit Connections	
Pin 1	Pin 2 of id Chip (Negative)
Pin 2	Pin 1 of id Chip (Positive)
Pin 3	Not Used
Pin 4	Not Used
Pin 5	Transmit Drive Voltage (Positive)
Pin 6	Transmit Drive Voltage (Negative)
Pin 7	Not used
Pin 8	Not used

7.02 Receiver to LCU interface

The receiver is connected to the LCU using an 8-conductor shielded cable. Cables are available in 1, 3, 4 & 10m Lengths (3m is standard and supplied with a system). The cable has an Impulse LPMIL-8#16-MP on the receiver end and an Impulse MCIL-8-FS on the LCU end. Refer to Drawing 11392 in Appendix 1

Standard Receiver Unit Pinout	
Pin 1	Receiver data Signal (uplink) (Positive)
Pin 2	Receiver data Signal (uplink) (Negative)
Pin 3	Downlink (Positive)
Pin 4	Downlink (Negative)
Pin 5	Receiver data Signal (uplink) (Positive)
Pin 6	Receiver data Signal (uplink) (Negative)
Pin 7	12V DC Power (Positive)
Pin 8	12V DC Power (Negative)

7.03 LCU to 7P interface

The 7K systems utilise a high speed bi-directional data link between the LCU & 7P processor. Data rates are approximately 320Mbits/second uplink and 1Mbit/second downlink. The data transmission is modelled on the IEEE802.3 hardware standard for gigabit Ethernet allowing the use of standard Ethernet cables (Cat 5e) and hardware. Gigabit Ethernet software protocols are not implemented or compatible.

The standard cable supplied with a system is 25m in length and consists of a 16-pin Impulse connector (MIL-16-MP) at the wet end and an Amphenol 18-pin connector (PT06A-14-18P) at the surface. The RESON drawing number is 11679. The cable is available in 25m, 50m & 100m lengths. The cable consists of four twisted pairs which carry the bi-directional signal between the 7P & LCU, power conductors, a SYNC pair and a downlink pair (not used) Refer to drawing 11679 in Appendix 1. Note that the sync pair is not connected in the Amphenol connector.

For cable runs in excess of 100m, the data link needs to be converted to an optical signal. The use of a signal modelled on Gigabit Ethernet allows commercial components to be used.

7.04 Power interface

A standard LCU requires a nominal 48V DC input

A standard 48V LCU (single or dual frequency) consumes approximately 60W average. As discussed above, peak can vary but with a nominal 5A peak is 250W with a maximum duration of 50mS.

7.05 7P external interfaces

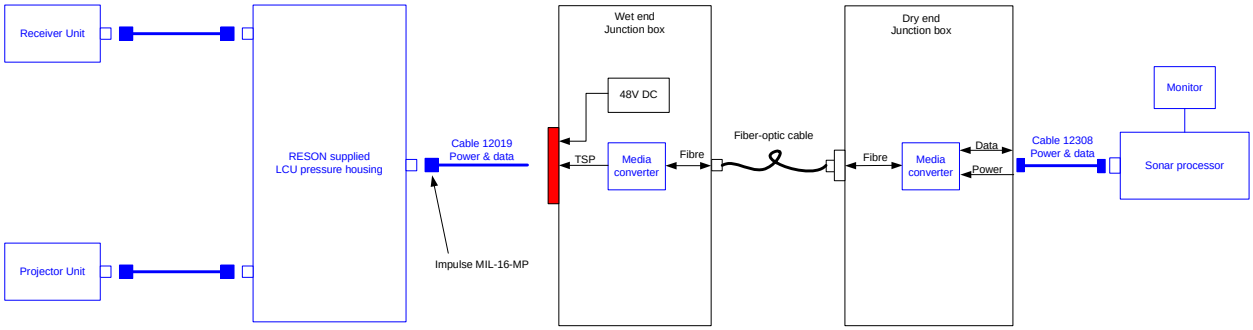
Primary data interface to the 7P is via Gbit Ethernet. Refer to Interface Control Document for details.

8 ROV INSTALLATION

Installation on an ROV is similar to that described in the previous section. Generally, communications will be routed through the ROV umbilical and junction box and power will be supplied locally from the vehicle.

ROV power supplies should be sized appropriately. Switching power supplies with frequencies of 200 or 400kHz should be avoided to reduce noise.

Due to typical ROV umbilical lengths, it may be necessary to transmit the uplink signals to the surface unit via fiber optic cable. For this purpose, RESON offers an optional fiber optic converter.



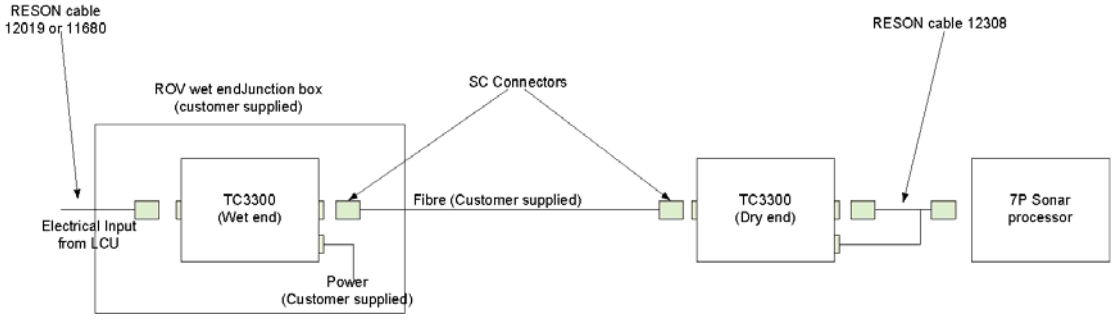
This bidirectional link can run over a single mode fiber (where cable lengths in excess of 40 km are possible). The performance of a fiber optic link is highly dependent on the quality of the link, the number of connections and the end-to-end optical loss.

RESON offers a converter which resides in a customer pressure housing and converts the electrical output from the LCU to an optical signal. At the surface, the optical signal is converted back to electrical before routing into the 7-P Sonar Processor.

The unit RESON offer as an option is the TC3300 media converter manufactured by TC Communications. This unit was deigned for long distance network communications using either single or multimode fibre-optics.

RESON offer a fibre-optic conversion kit (Part number 87000046) which contains:

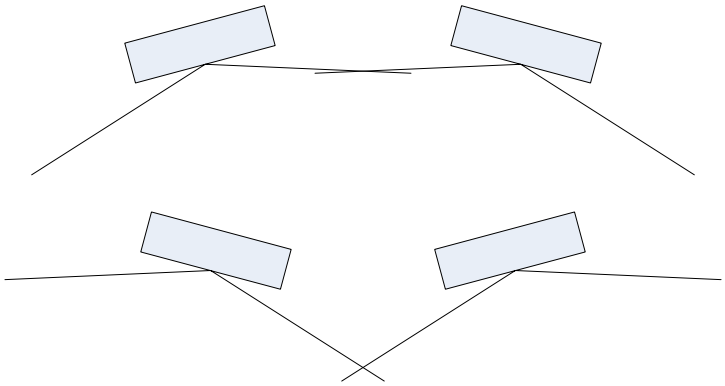
- 1 x 12308 cable
- 1 x 12019 pigtail
- 2 x Single mode fibre-optic converters
- 2 x ST to SC fibre adapters.



Refer to drawings 11680, 12308 & 12019 in Appendix 1.

9 DUAL-HEAD

For certain operations a dual-head configuration is desirable. Typical reasons for a dual head are either increased swath coverage where the heads are tilted outwards (bottom) or a need for increased resolution directly below the platform where the heads are tilted inwards (top). Depending on the application, tilt angle of 15° is typical.



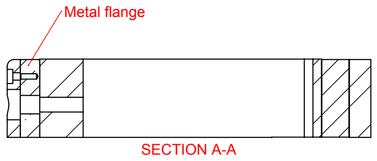
A dual head system consists of two projectors, two receivers, two LCUs and two 7P processors. Synchronisation is achieved through the network between the two 7Ps and is configured through the GUI. Refer to the operator's manual for more details.

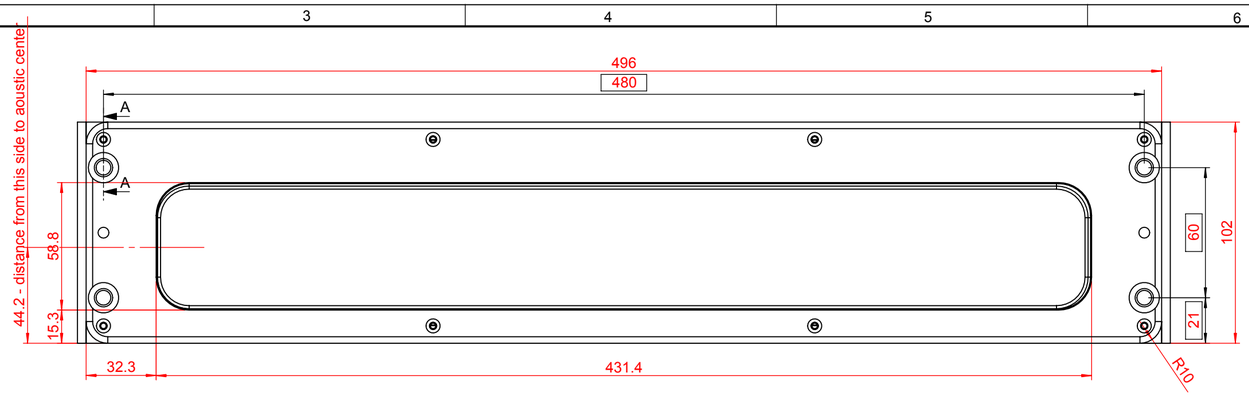
10 TIMING

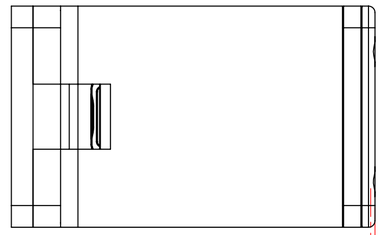
All exported data is time-tagged and it is critical that the 7P processor be synchronized to an external clock. The system is normally synchronized to GPS time using a combination of 1PPS and associated ZDA message. Refer to the operator's manual for more details.

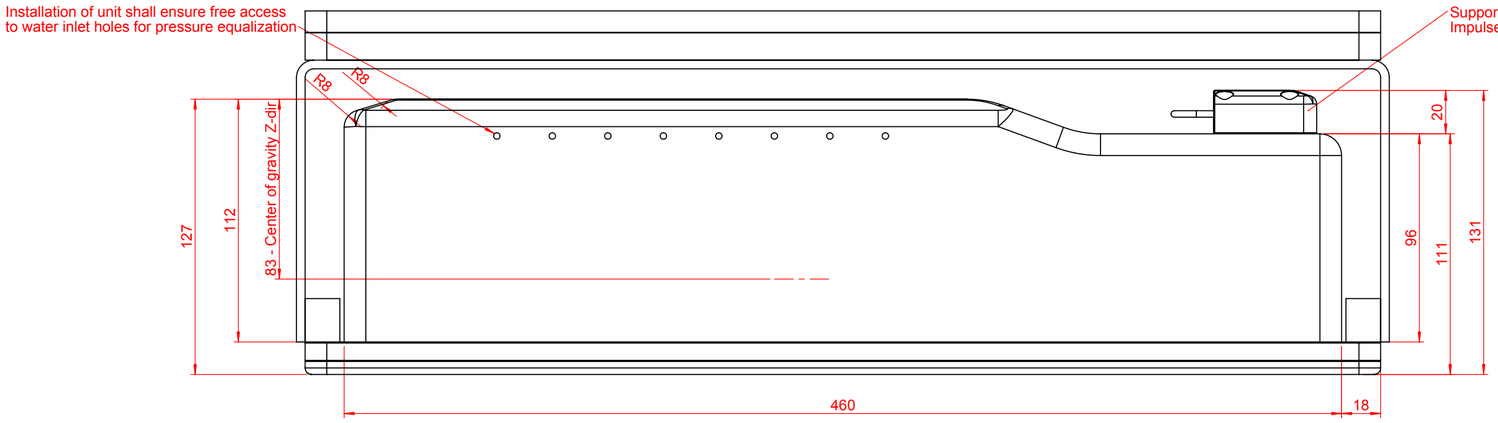
11 SOUND VELOCITY

In order to correctly perform beam steering, input from a sound velocity probe located in the vicinity of the array is required. This is normally interfaced serially to the 7P COM port. Refer to the operator's manual for more details.

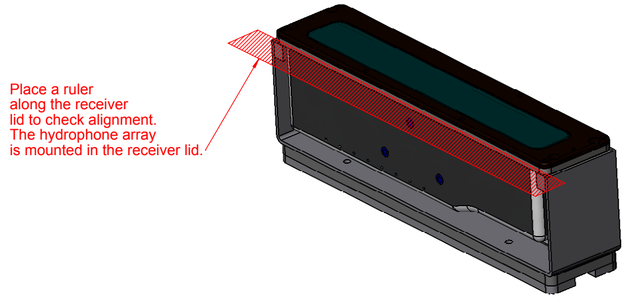


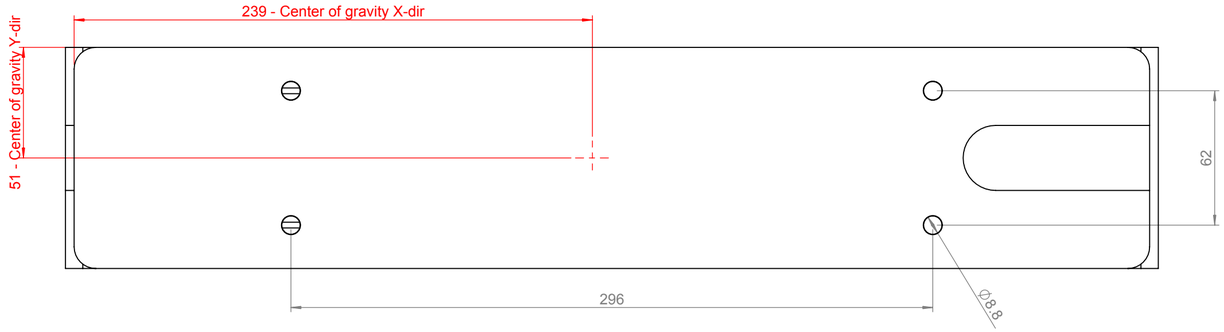


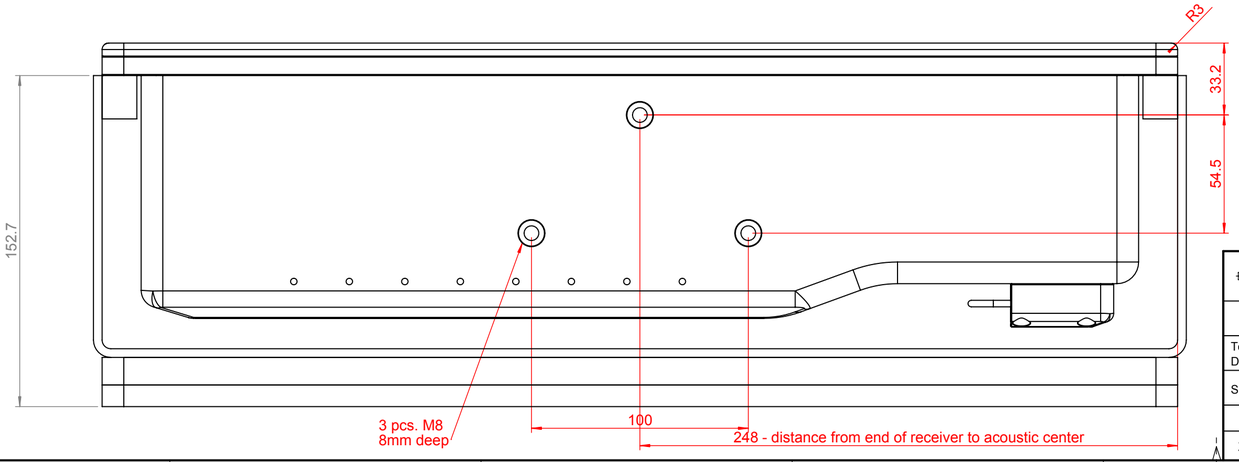




2 - distance from surface to acoustic center







Estimated weight:

9.6kg (Air)
4.6kg (Water)

Scale: 1:2	Material: -		
Unless otherwise stated the below applies			
Tol. for linear dim.: DS/ISO 2768-1f		Thread tolerances: (DS/ISO 965-1)	6H/6g
Surface roughness: Ra 3.2		Break corners: Internal radii:	
Prepared	Designed	QA	
2006-02-28 MSE			

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Tel.: +45 47 38 00 22
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Title: EM7200 Installation dwg

Dwg. no._Rev. no.: 7200M021_005

Dokument Coding: Green

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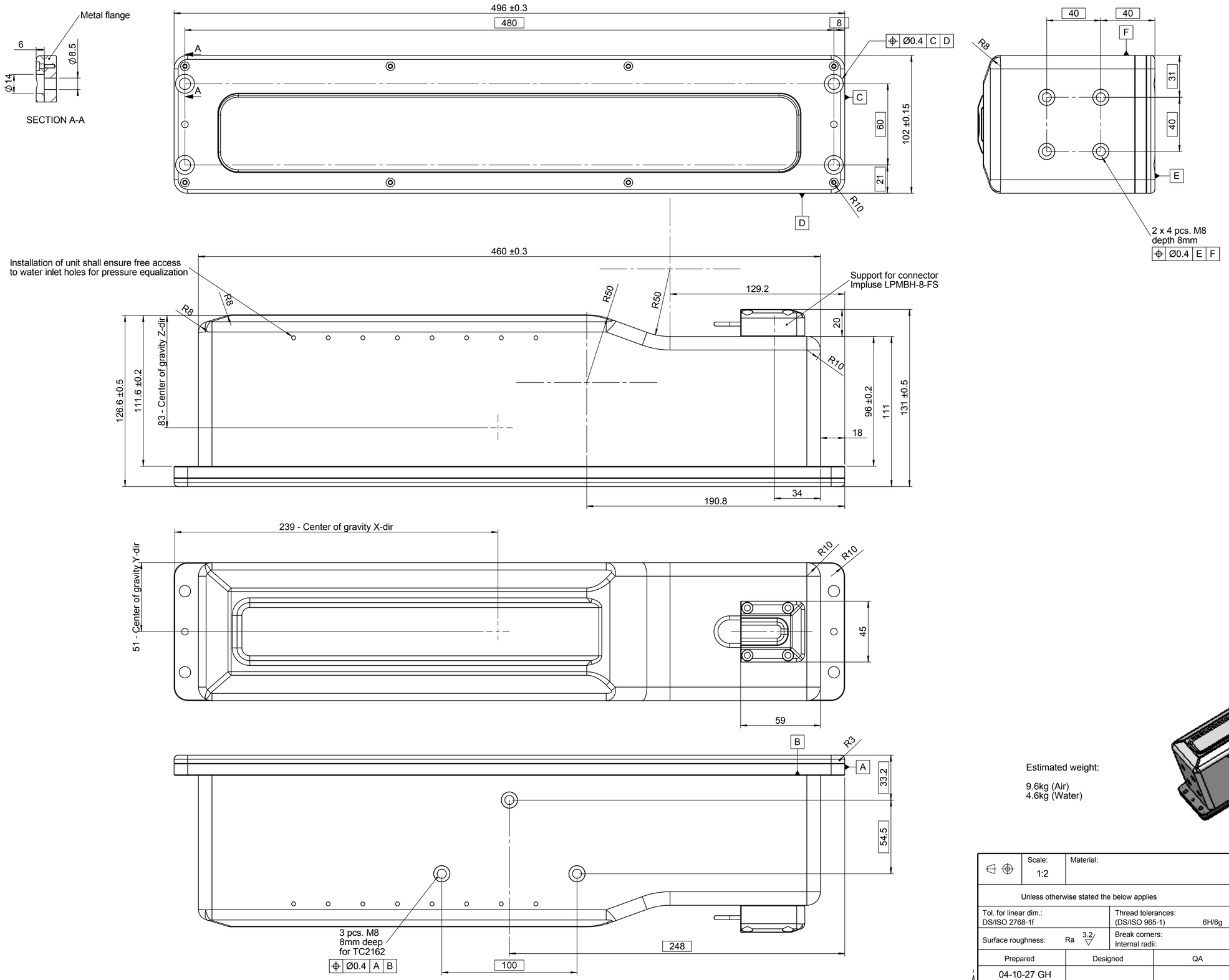
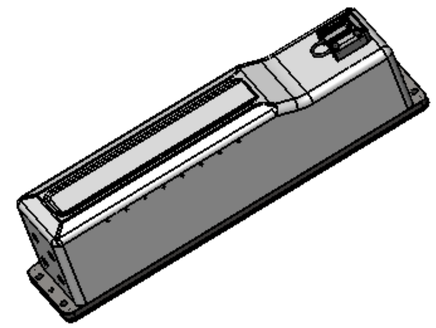


Estimated weight:

9.6kg (Air)
4.6kg (Water)



Scale: 1:2	Material:	RESON	Title: Outline drawing
Unless otherwise stated the below applies			
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Surface roughness: Ra 3.2	Break corners: Internal radii:	Tel.: +45 47 38 00 22 Fax: +45 47 38 00 66	Dokument Coding: Green
Prepared: 04-10-27 GH	Designed	QA	

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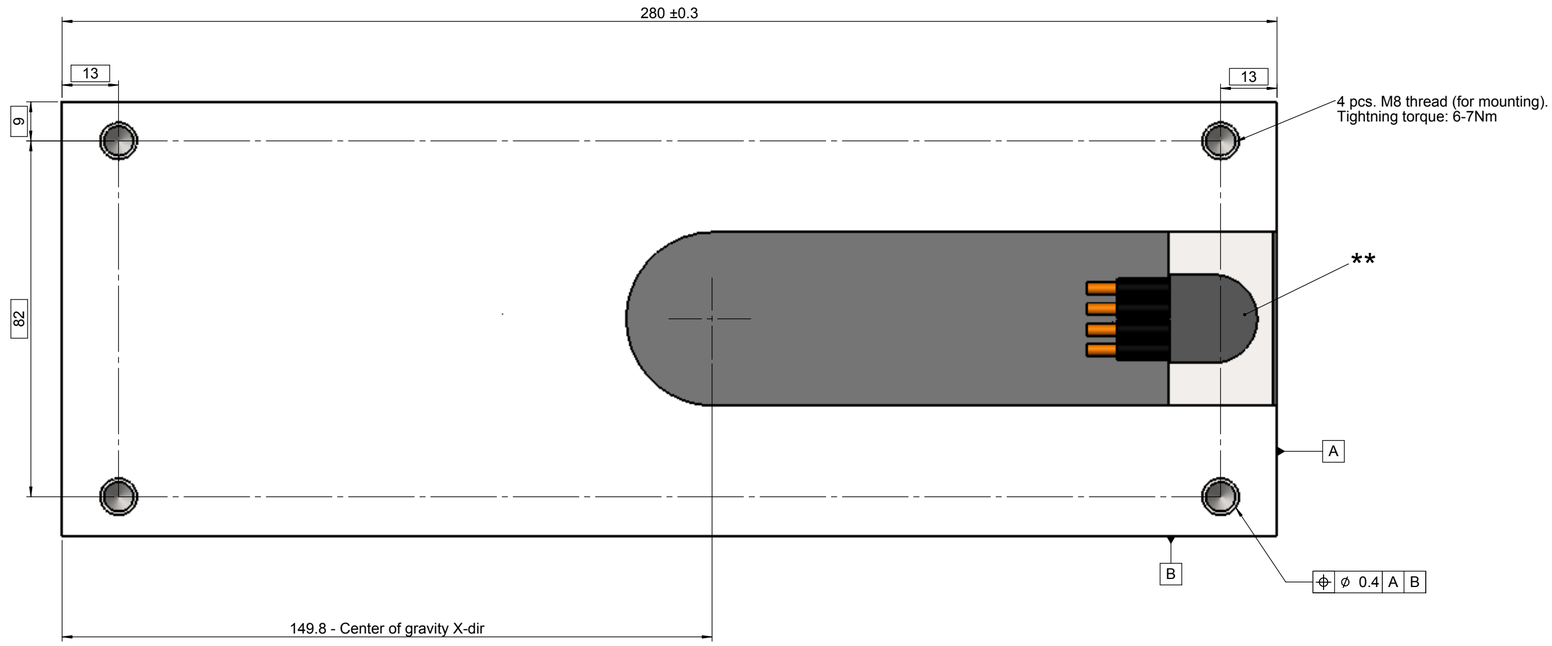
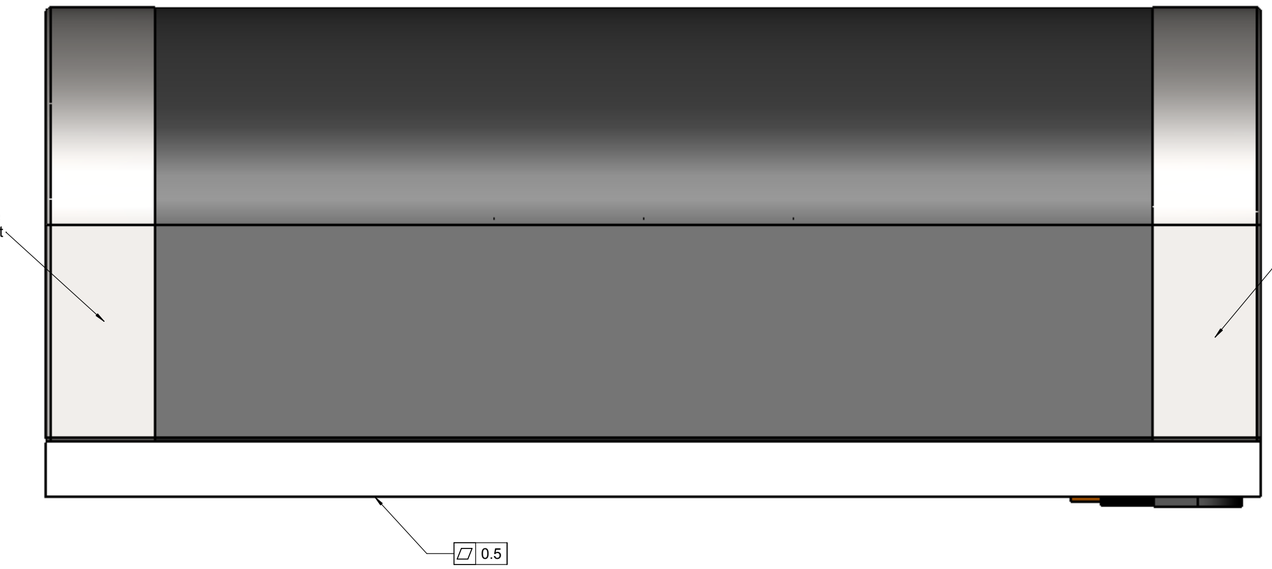
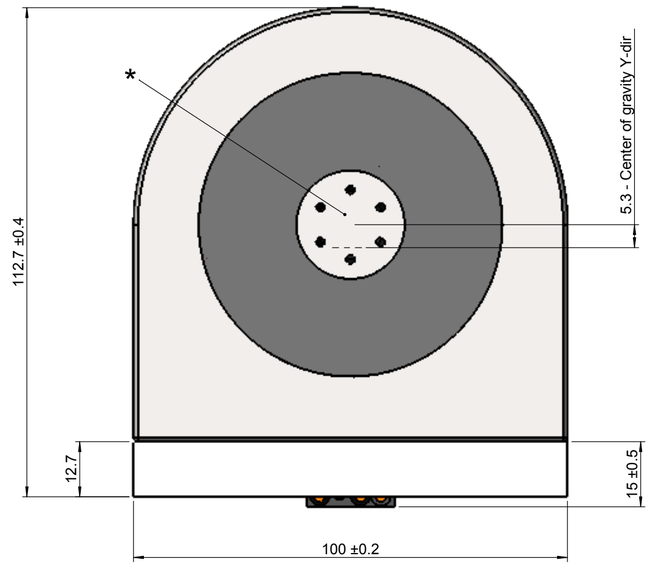




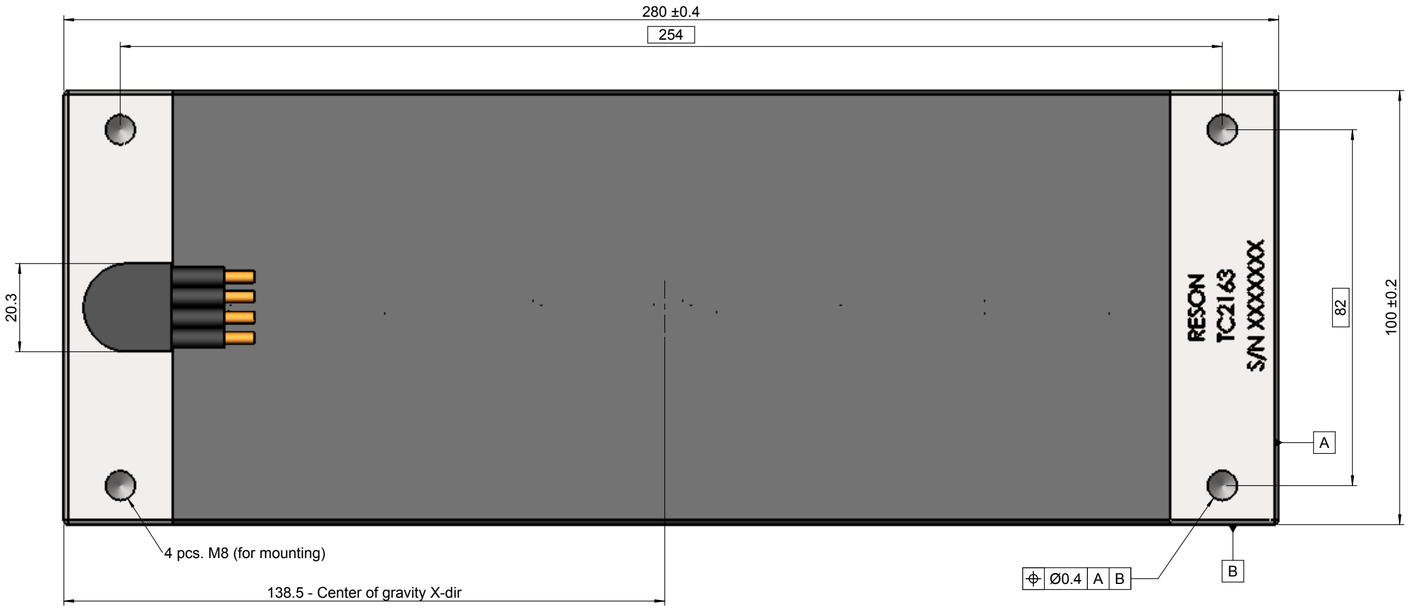


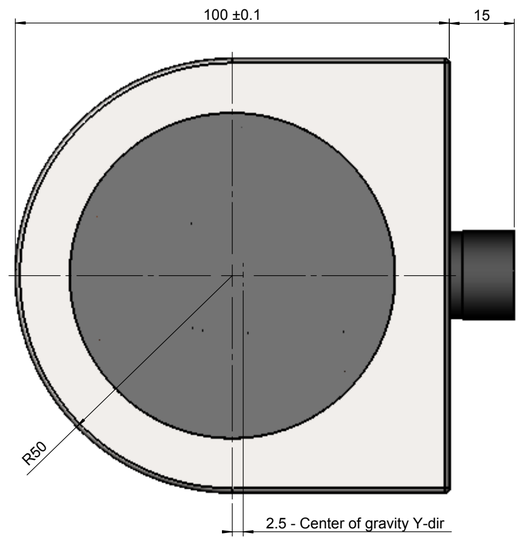
* Installation of unit shall ensure free access to water inlet holes for pressure equalization

** Connector Impulse LPMBH-8-MP

Scale: 1:1	Material: XXX	RESON	Title: TC2163 Installation drawing
Unless otherwise stated the below applies		RESON A/S Fabriksvangen 13 DK-3550 Slangerup	Dwg. no._Rev. no.: 2163M021_002
Tol. for linear dim.: DS/ISO 2768-1f	Thread tolerances: (DS/ISO 965-1) 6H/6g	Tel.: +45 47 38 00 22 Fax: +45 47 38 00 66	Dokument Coding: Green
Surface roughness: Ra 3.2	Break corners: Internal radii:		
Prepared: 2005-08-25 MSE	Designed	QA	

S:\STANDARD\SW\A2_004





Mass proporties:

7.5kg (Air)
6.4kg (Water)

Scale: 1:1	Material: XXX		
Unless otherwise stated the below applies			
Tol. for linear dim.: DS/ISO 2768-1f		Thread tolerances: (DS/ISO 965-1) 6H/6g	
Surface roughness: Ra 3.2		Break corners: Internal radii:	
Prepared	Designed	QA	
2005-03-30 MSE			

RESON A/S
Fabriksvangen 13
DK-3550 Slangerup

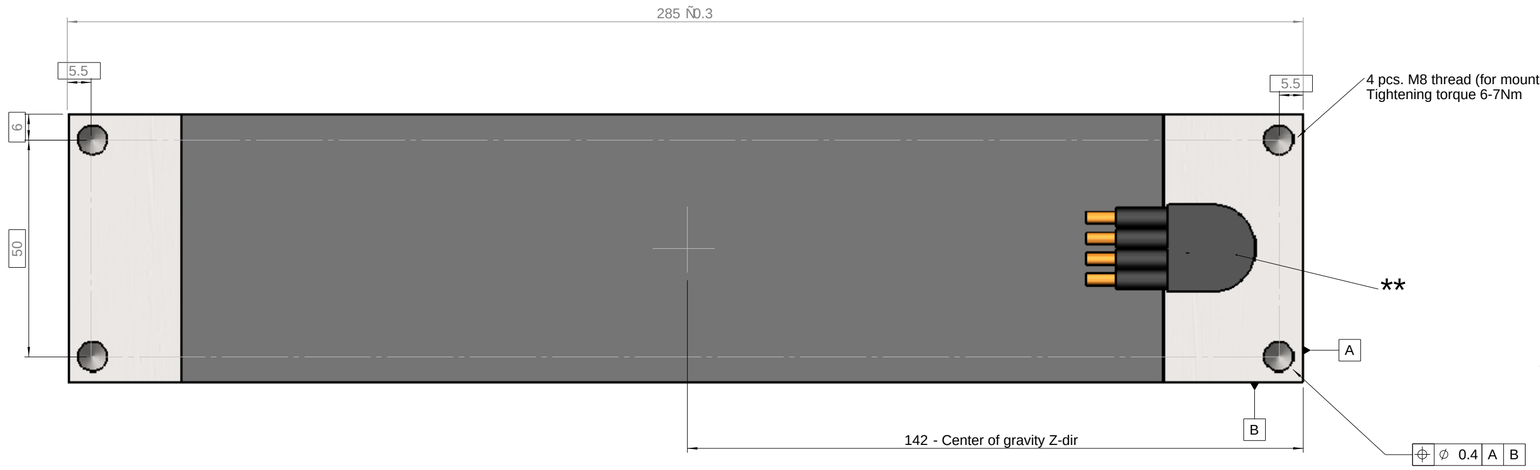
Tel.: +45 47 38 00 22
Fax: +45 47 38 00 66

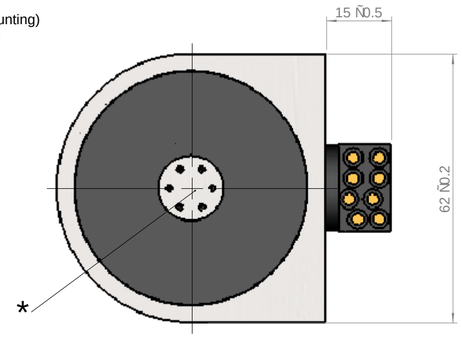
Title:
TC2163
Outline dimension

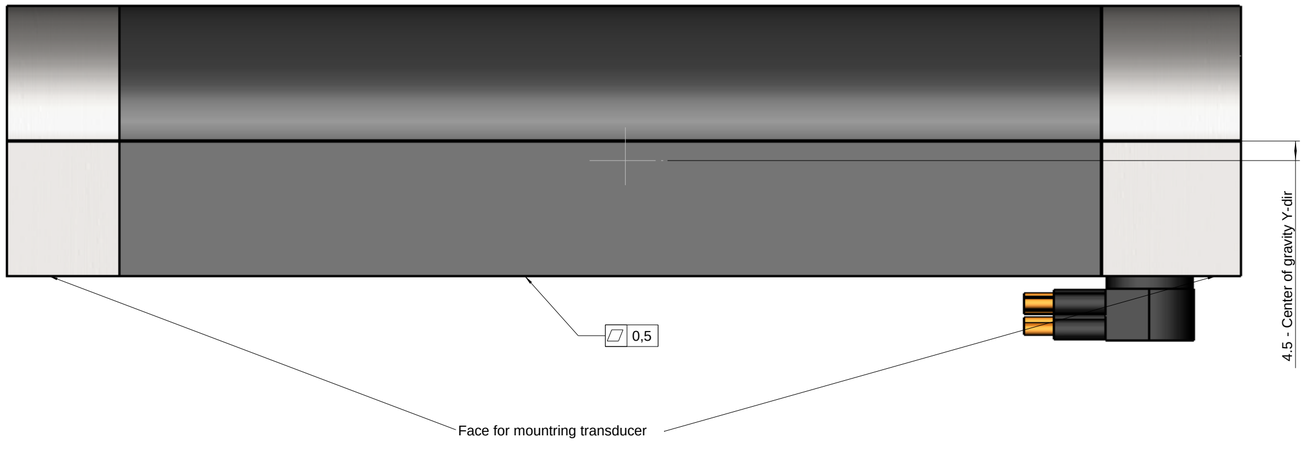
Dwg. no._Rev. no.:
2163M011_003

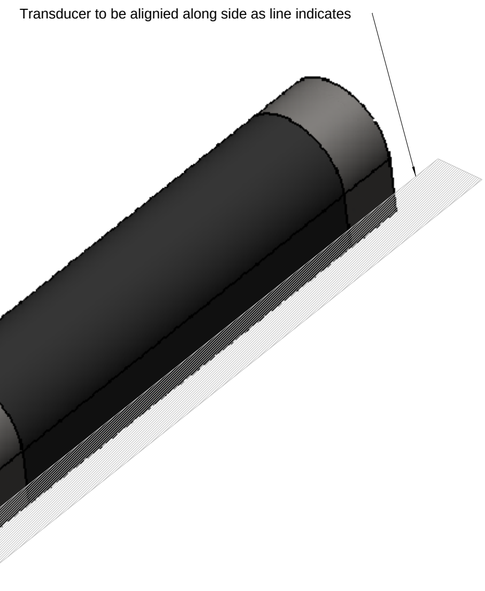
Dokument Coding: Green

S:\STANDARD\SW\A2_004







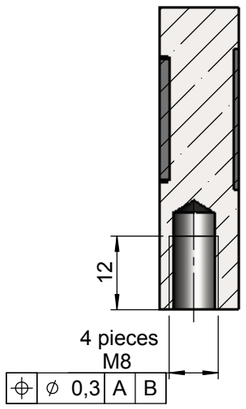


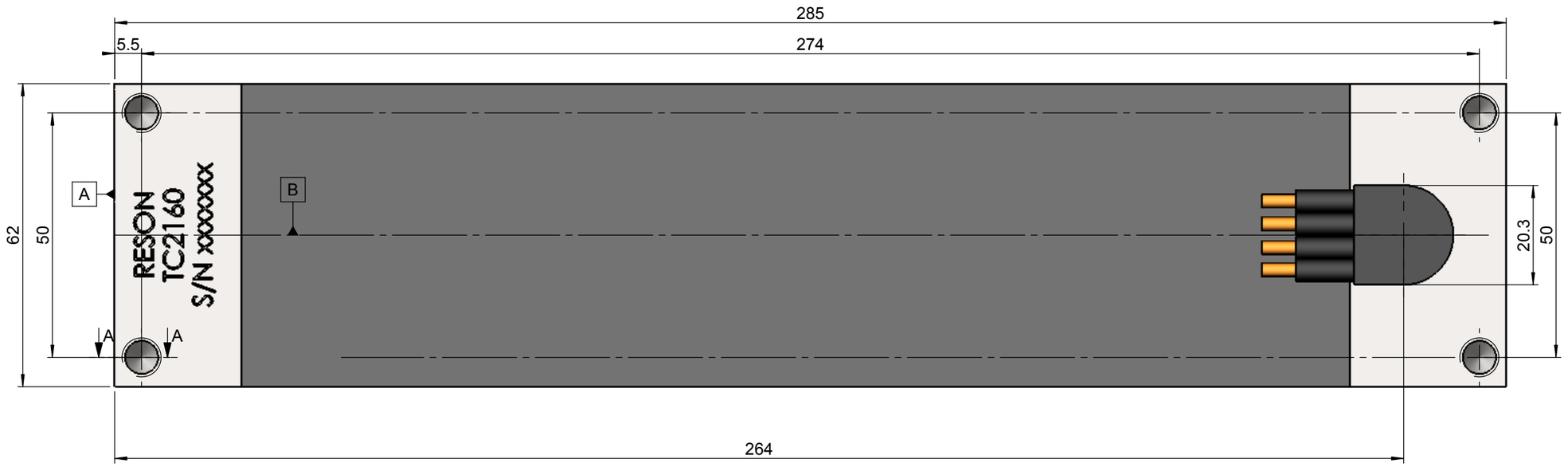
* Installation of unit shall ensure free access to water inlet holes for pressure equalization

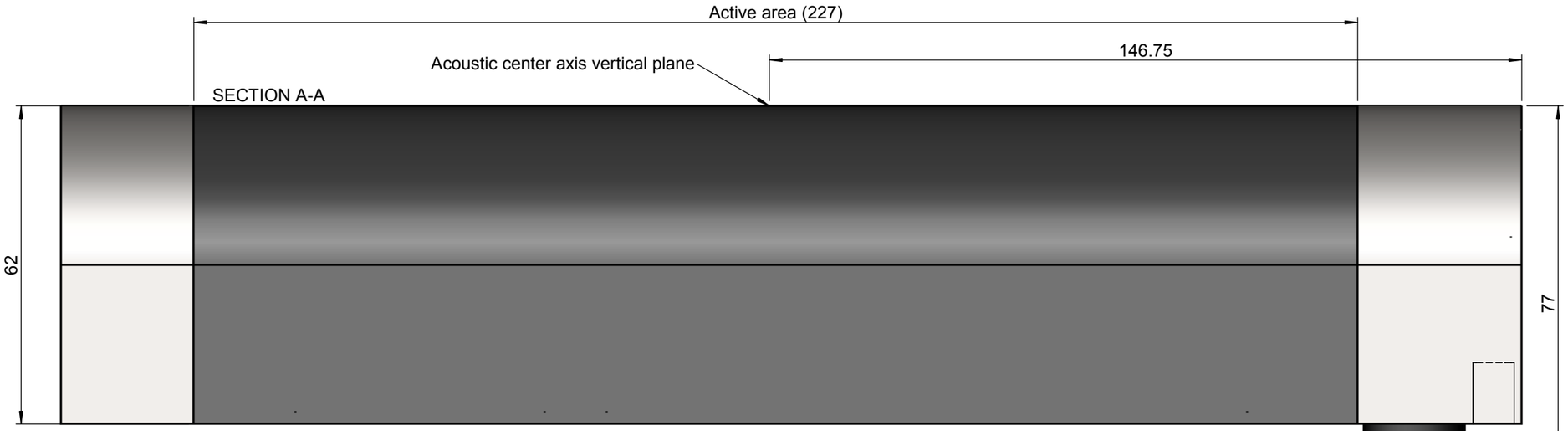
** Connector Impulse LPMBH-8-MP

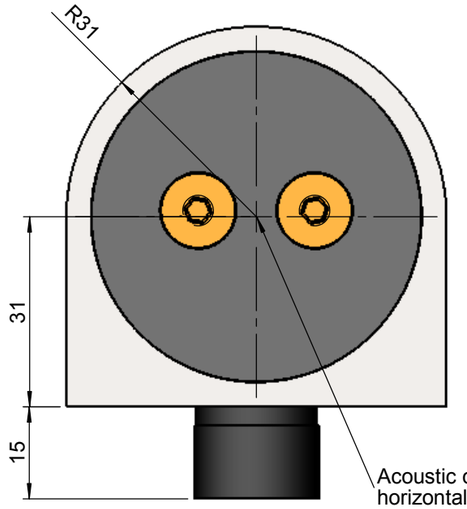
Scale: 1:1	Material: XXX	RESON A/S Fabriksvangen 13 DK-3550 Slangerup Tel.: +45 47 38 00 22 Fax: +45 47 38 00 66	Title: TC2160 Installation drawing
Unless otherwise stated the below applies			Dwg. no._Rev. no.: 2160M021_002
Tol. for linear dim.: DS/ISO 2768-1f	Thread tolerances: (DS/ISO 965-1) 6H/6g		Dokument Coding: Green
Surface roughness: Ra 3.2	Break corners: Internal radii:		
Prepared: 2005-03-23 MSE	Designed	QA	

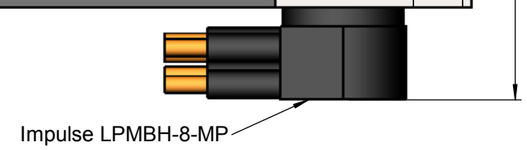
S:\STANDARD\SW\A2_004

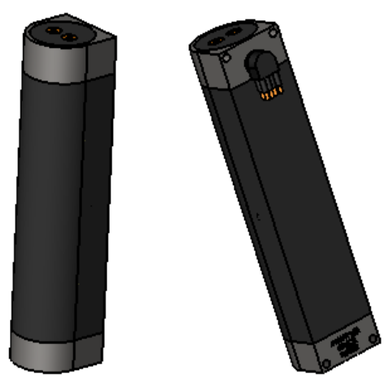












Scale: 1:1	Material: XXX	
Unless otherwise stated the below applies		
Tol. for linear dim.: DS/ISO 2768-1f	Thread tolerances: (DS/ISO 965-1)	6H/6g
Surface roughness: Ra 3.2	Break corners: Internal radii:	
Prepared	Designed	QA
XXX		

RESON A/S
Fabriksvangen 13
DK-3550 Slangerup

Tel.: +45 47 38 00 22
Fax: +45 47 38 00 66

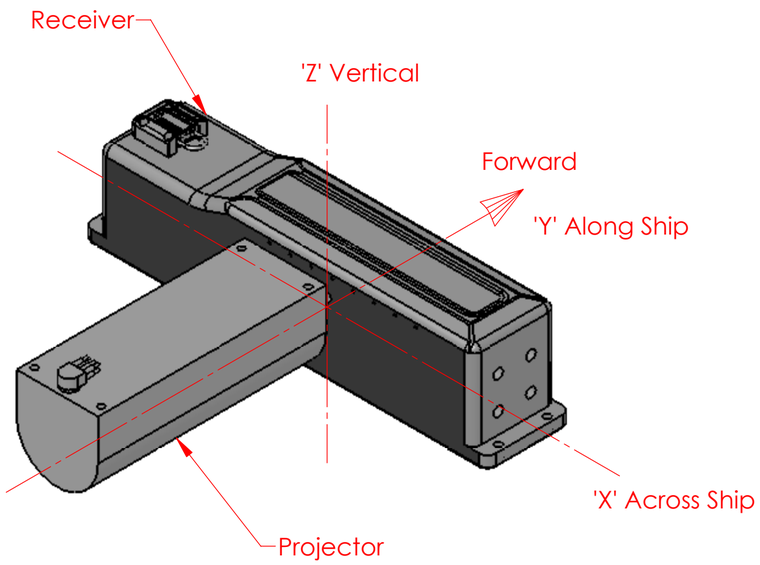
Title: TC2160 Outline

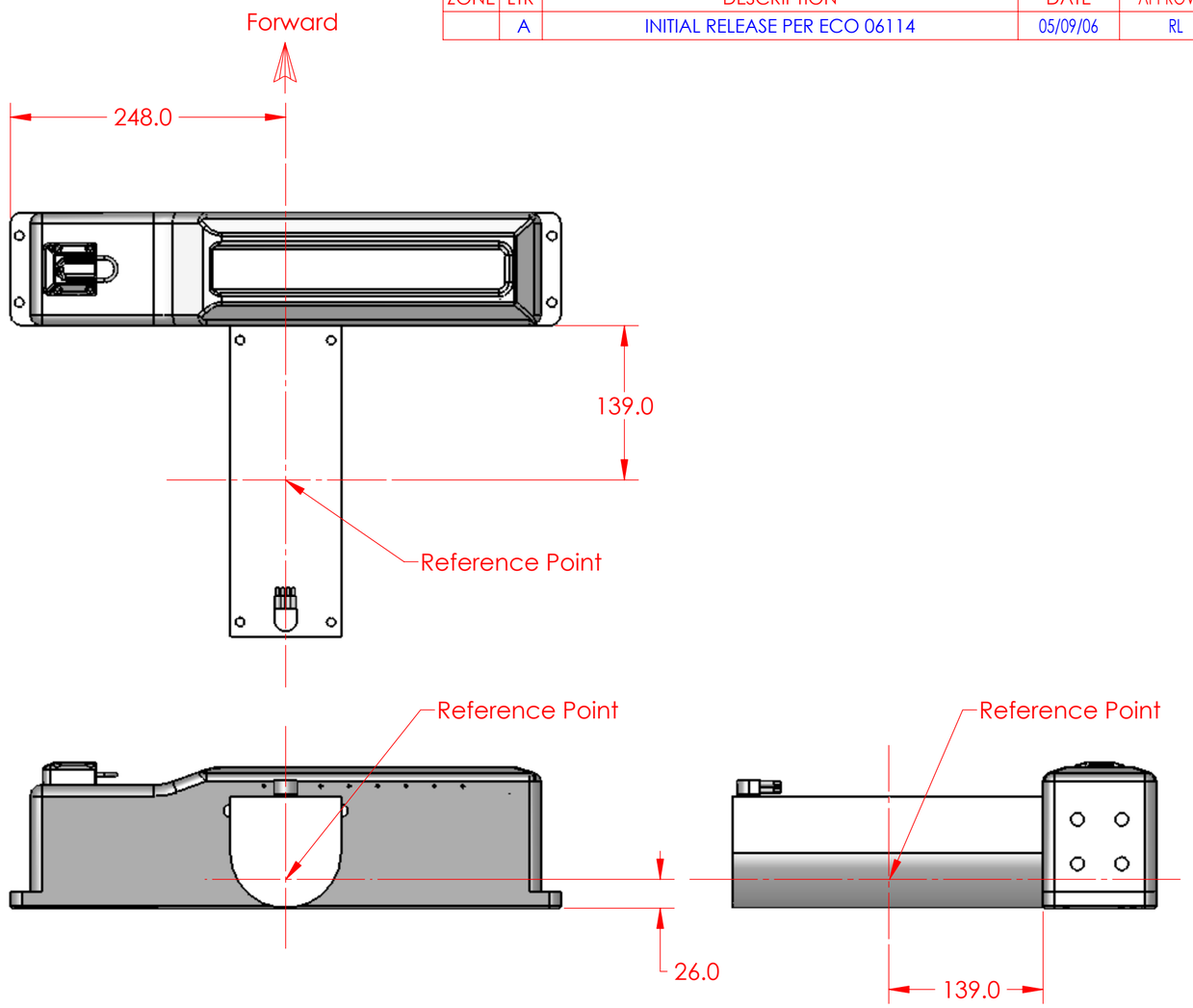
Dwg. no._Rev. no.: 2160M011_001

Dokument Coding: Green

S:\STANDARD\DWG\SW\A3_004

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE PER ECO 06114	05/09/06	RL





Notes:

1. It is critical that the faces of the Projector and Receiver are aligned in the vertical ('Z') Plane within ±2.0 mm

2. Alignment along ship ('Y') plane, and across ship ('x') plane should be within ±250 mm

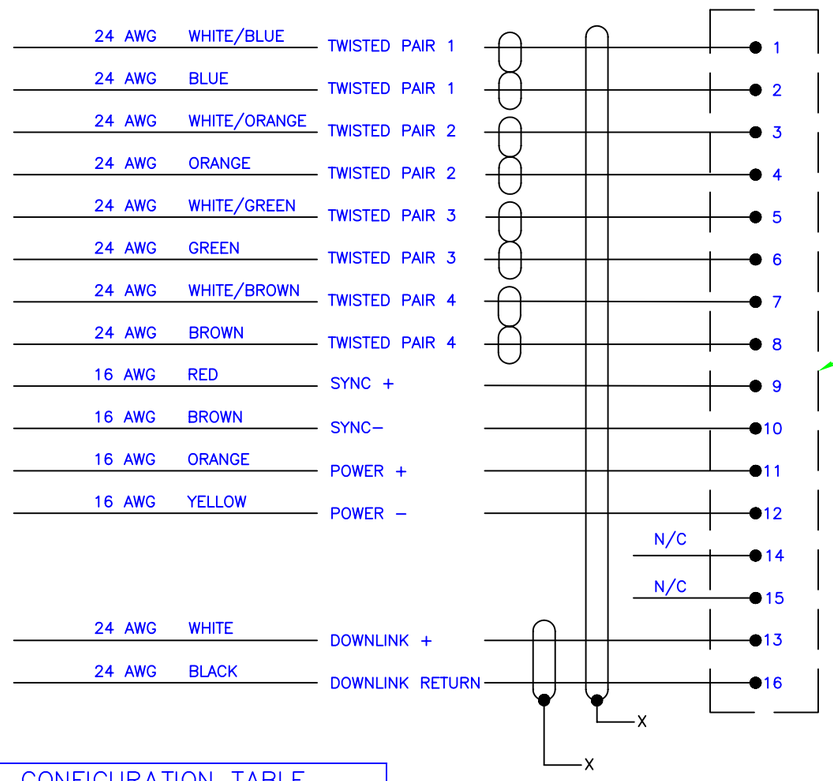
		UNLESS OTHERWISE SPECIFIED	DESIGNED:	RESON, INC. GOLETA, CALIFORNIA 93117
		DIMENSIONS ARE IN MILIMETERS	DATE:	
		DO NOT SCALE DRAWING	DRAWN I SALINAS	TITLE: SEABAT 7125 REFERENCE POINT
		DIMENSIONS ARE REFERANCE	DATE: 05/09/06	
THIRD ANGLE PROJECTION			CHECKED R LEAR	
			DATE: 05/09/06	SIZE: C / DRAWING NO: 12851 / REV: A
NEXT ASSY	USED ON		RELEASED R LEAR	
APPLICATION			DATE: 05/09/06	SCALE: 1:4 / SHEET: 1 OF 1

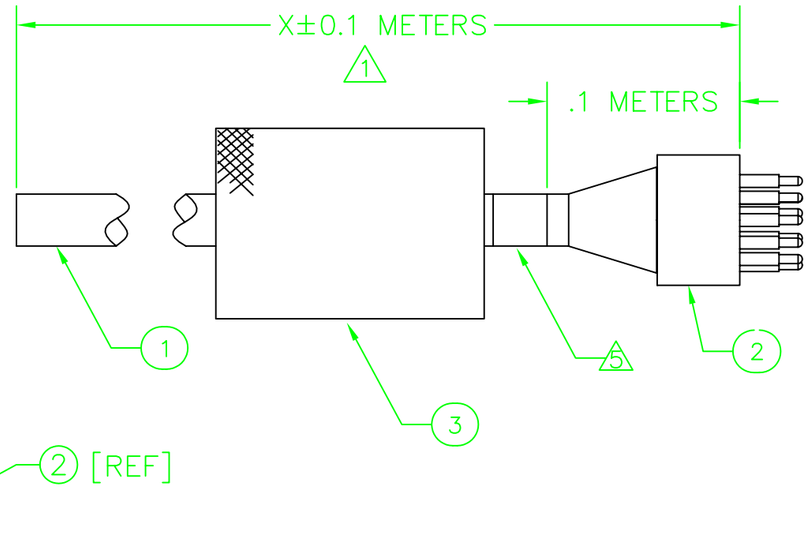
12851.DRW
SolidWorks Drawing File

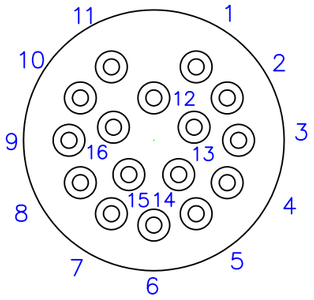
C-INCH.DRWDOT REV A

NOTES: UNLESS OTHERWISE SPECIFIED
1. X IS BUILD LEVEL AND CABLE LENGTH IN METERS.
2. ITEMS 2 AND 3 ARE VENDOR SUPPLIED PARTS. 100% EQUIVALENT PARTS MAY BE USED, BUT ONLY AFTER RESON APPROVAL.
3. NO STRAIN RELIEF LOOPS ON WIRES.
4. CABLES NOT TO BE UNTWISTED MORE THAN 9.5MM AT EACH END.
5. LABEL: TEXT SIZE 0.156" RESON PN, REV___
6. LABEL TO BE PERMANENTLY ATTACHED TO CABLE.
7. OBSERVED MINIMUM BEND RADIUS OF 6.0 INCHES DURING HANDLING, PACKAGING, OR INSTALLATION.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE PER ECO 04089	04-03-09	RQA
	B	RELEASED PER ECO 04429	04-10-15	DFL
	C	RELEASED PER ECO 04497	04-12-06	RQA
	D	RELEASED PER ECO 06003	06-02-09	DFL







2 [REF]

CONFIGURATION TABLE		
DASH NO.	RESON PN	LENGTH
-5	85000937	5m
-25	85001154	25m

QTY	PART NUMBER	DESCRIPTION	ITEM	LEVEL
1	64500067	LOCKING SLEEVE, FEMALE (IMPULSE: DLSB-F)	3	0
1	64500059	CONNECTOR, MIL-16-MP	2	0
Xm	67700021	CABLE, PER RESON DRAWING # 11676 (SEE NOTE 1)	1	0

PARTS LIST

THIRD ANGLE PROJECTION

NONE	7XXX
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING
TOLERANCES
.XX ±0.03
.XXX ±0.010
X° ±0.5°
REMOVE ALL BURRS
BREAK CORNERS: 0.005/0.010
INTERNAL RADII: 0.005/0.001
FINISH: 125

DESIGNED:	R. ABBOTT
DATE:	03-03-06
DRAWN	A ROSS
DATE:	03-03-06
CHECKED	R. ABBOTT
DATE:	03-11-24
RELEASED	R. ABBOTT
DATE:	04-03-09

RESON, INC.
GOLETA, CALIFORNIA 93117

TITLE: CABLE ASSY, PIGTAIL, MIL-16-MP, 7K

DRAWING NO: 12019 REV: D

SIZE: C | SCALE: NONE | SHEET: 1 OF 1

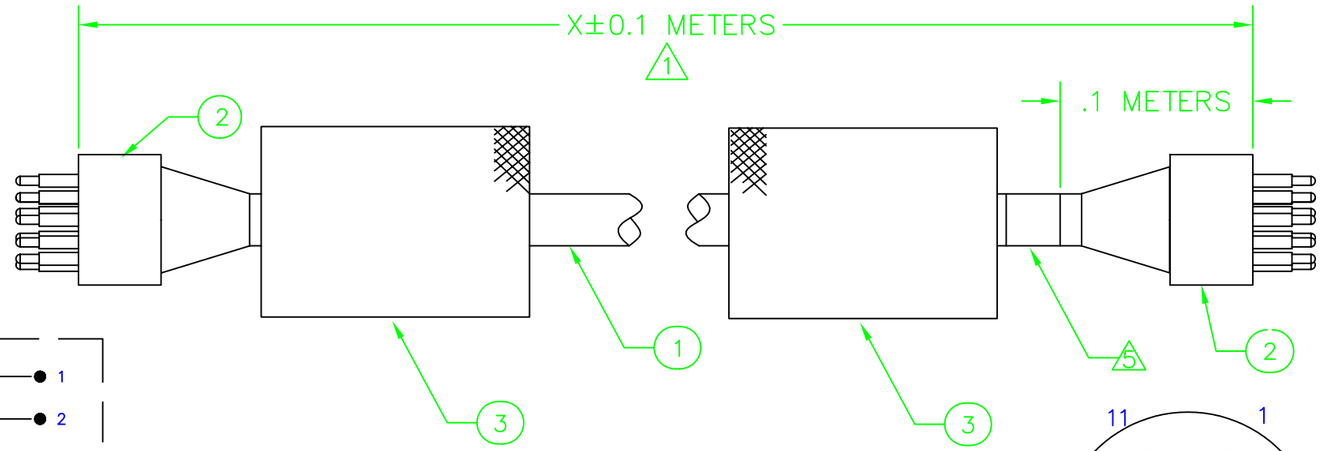
ACAD FILE: 12019d.DWG

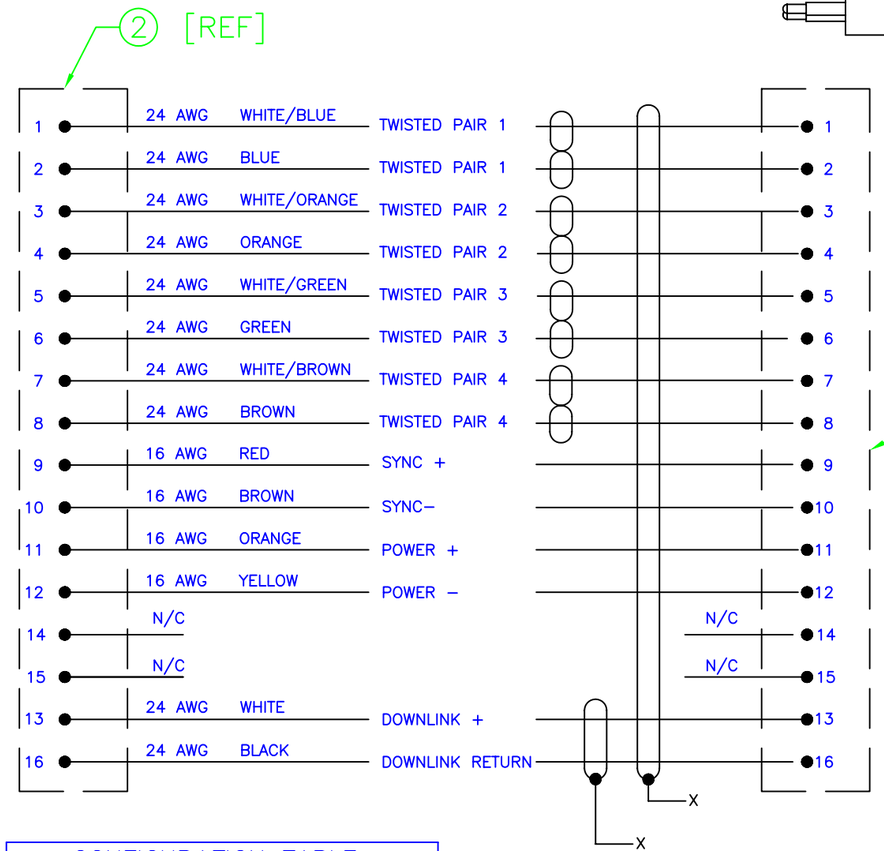
ANSI-C.DWG REV A

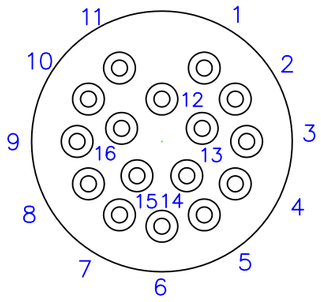
NOTES: UNLESS OTHERWISE SPECIFIED

1. X IS BUILD LEVEL AND CABLE LENGTH IN METERS.
2. ITEMS WITH QTY IN PARENTHESIS DENOTE VENDOR SUPPLIED PARTS. 100% EQUIVALENT PARTS MAY BE USED, BUT ONLY AFTER RESON APPROVAL.
3. NO STRAIN RELIEF LOOPS ON WIRES.
4. CABLES NOT TO BE UNTWISTED MORE THAN 9.5MM AT EACH END.
5. LABEL: TEXT SIZE 0.156"
   RESON PN, REV A
   MIN BEND RADIUS
   3.3 INCHES
6. LABEL TO BE PERMANENTLY ATTACHED TO CABLE

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE PER ECO 04033	04-02-05	RQA







CONFIGURATION TABLE		
DASH NO.	RESON PN	LENGTH
-4.00	85001141	4.0
-25	85000980	25m

QTY	PART NUMBER	DESCRIPTION	ITEM	LEVEL
(2)	64500067	LOCKING SLEEVE, FEMALE (IMPULSE: DLSB-F)	3	0
(2)	64500059	CONNECTOR, MIL-16-MP	2	0
Xm	67700021	CABLE, PER RESON DRAWING # 11676 (SEE NOTE 1)	1	0

PARTS LIST

THIRD ANGLE PROJECTION

NEXT ASSY	USED ON
NONE	7XXX

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING
TOLERANCES
.XX ±0.03
.XXX ±0.010
X° ±0.5°
REMOVE ALL BURRS
BREAK CORNERS: 0.005/0.010
INTERNAL RADII: 0.005/0.001
FINISH: 125

DESIGNED:	R. ABBOTT	03-03-06
DRAWN	A ROSS	03-03-06
CHECKED	R. ABBOTT	03-11-24
RELEASED	R. ABBOTT	04-02-05

RESON, INC.
GOLETA, CALIFORNIA 93117

TITLE: CABLE ASSY TP, WET MIL-16-MP, MIL-16-MP 7K

DRAWING NO: 11680 REV: A

SIZE: C SCALE: NONE SHEET: 1 OF 1

ACAD FILE: 11680a.DWG

ANSI-C.DWG REV A

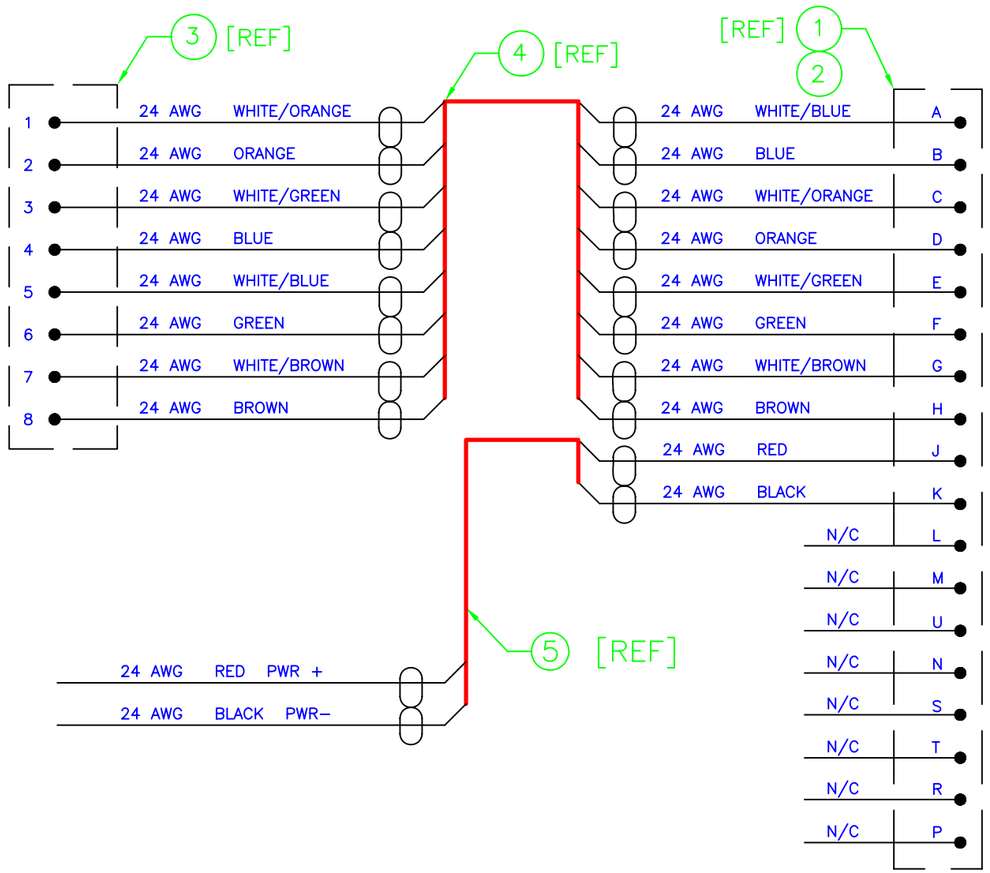
NOTES: UNLESS OTHERWISE SPECIFIED
1. X IS BUILD LEVEL AND CABLE LENGTH IN METERS.
2. CABLES NOT TO BE UNTWISTED MORE THAN 9.5MM AT EACH END.
3. APPLY LOCTITE (ITEM 7) TO THE MS CONNECTOR THREADS, WHERE INDICATED, DURING ASSEMBLY.
4. LABEL CABLE WITH RESON PART NUMBER AND REV.
5. CUT ITEM 6 INTO 12.5mm LENGTH AND SHRINK OVER CABLES EVERY 125mm.

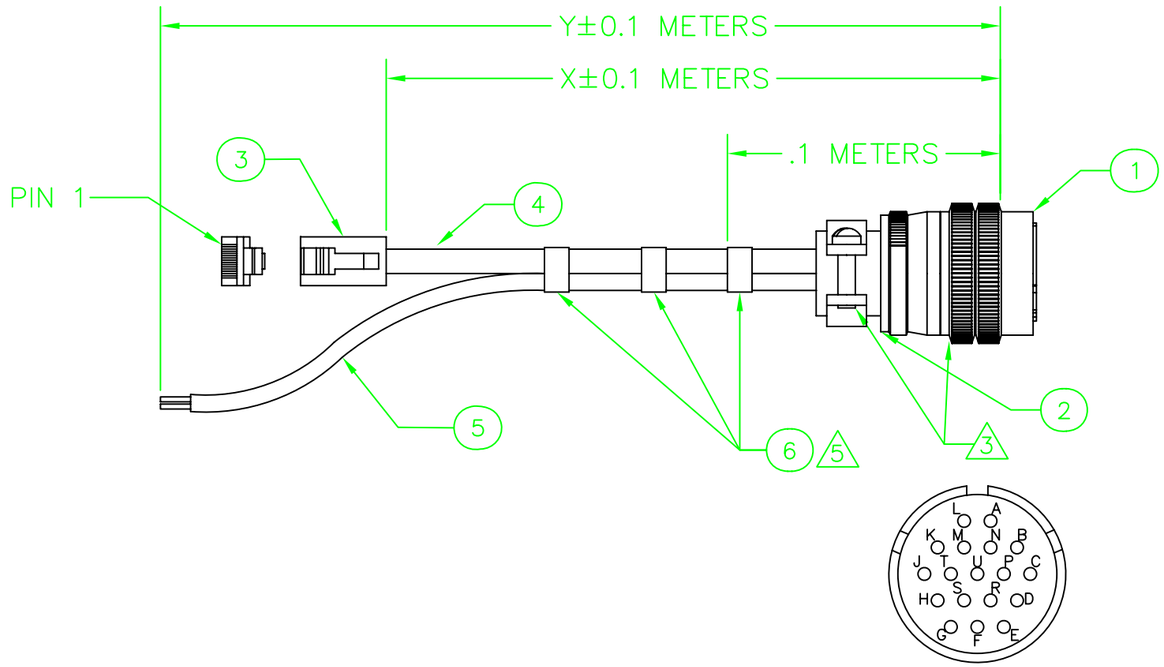
CONFIGURATION TABLE

DASH NO.	RESON PN	LENGTH(X)	LENGTH(Y)	Z (NOTE 5)	Z/12.5
-1	85001361	1m/39.4"	1.25m/49.2"	87.5mm/3.5"	7
-2	85001420	2m/78.75"	2.25m/88.6"	187.5mm/7.4"	15
-3	85001421	3m/118.1"	3.25m/127.95"	287.5mm/11.3"	23
-5	85001422	5m/196.85"	5.25m/206.7"	487.5mm/19.2"	39
-10	85001423	10m/393.7"	10.25m/403.55"	987.5mm/38.9"	79

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	B	RELEASED PER ECO 04491	04-12-03	RQA
	C	RELEASED PER ECO 05155	05-05-10	RQA
	D	RELEASED PER ECO 05427	05-12-12	DFL
	E	RELEASED PER ECO 05443	05-12-22	DFL





QTY REQD	-X	PART NUMBER	DESCRIPTION	ITEM	LEVEL
	AR	84000004	ADHESIVE,THREAD LOCKING,BLUE[LOCTITE #242]	7	0
	Z	67800009	TUBING, SHRINK, 1/2", CLEAR	6	0
	Y	67700006	CABLE, SHIELDED TW/PR, 24AWG, BLK/RED	5	0
	X	67700032	CABLE, DATATUFF 5E, 24AWG, 4PR, UNSHLD	4	0
	1	64000262	CONN PLUG, RJ45, 24-26AWG STRANDED	3	0
	1	64300059	CABLE CLAMP, [AMPHENOL: 97-3057-1008]	2	0
	1	64300057	CONN, PLUG, 18-PIN, RND [AMPHENOL: PT06A-14-18P]	1	0

PARTS LIST

THIRD ANGLE PROJECTION

NEXT ASSY	USED ON
NONE	7XXX
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING
TOLERANCES
.XX ±0.03
.XXX ±0.010
X° ±0.5°
REMOVE ALL BURRS
BREAK CORNERS: 0.005/0.010
INTERNAL RADII: 0.005/0.001
FINISH: 125

DESIGNED:	R. ABBOTT
DATE:	04-09-29
DRAWN	R. ABBOTT
DATE:	04-09-29
CHECKED	R. ABBOTT
DATE:	04-10-29
RELEASED	R. ABBOTT
DATE:	04-10-29

RESON, INC.
GOLETA, CALIFORNIA 93117

TITLE: CABLE ASSY
TC3300 TO PT06A-14-18P
7K

DRAWING NO: 12308 REV: E

SIZE: C | SCALE: NONE | SHEET: 1 OF 1

ACAD FILE: 12308e.DWG

ANSI-C.DWG REV A