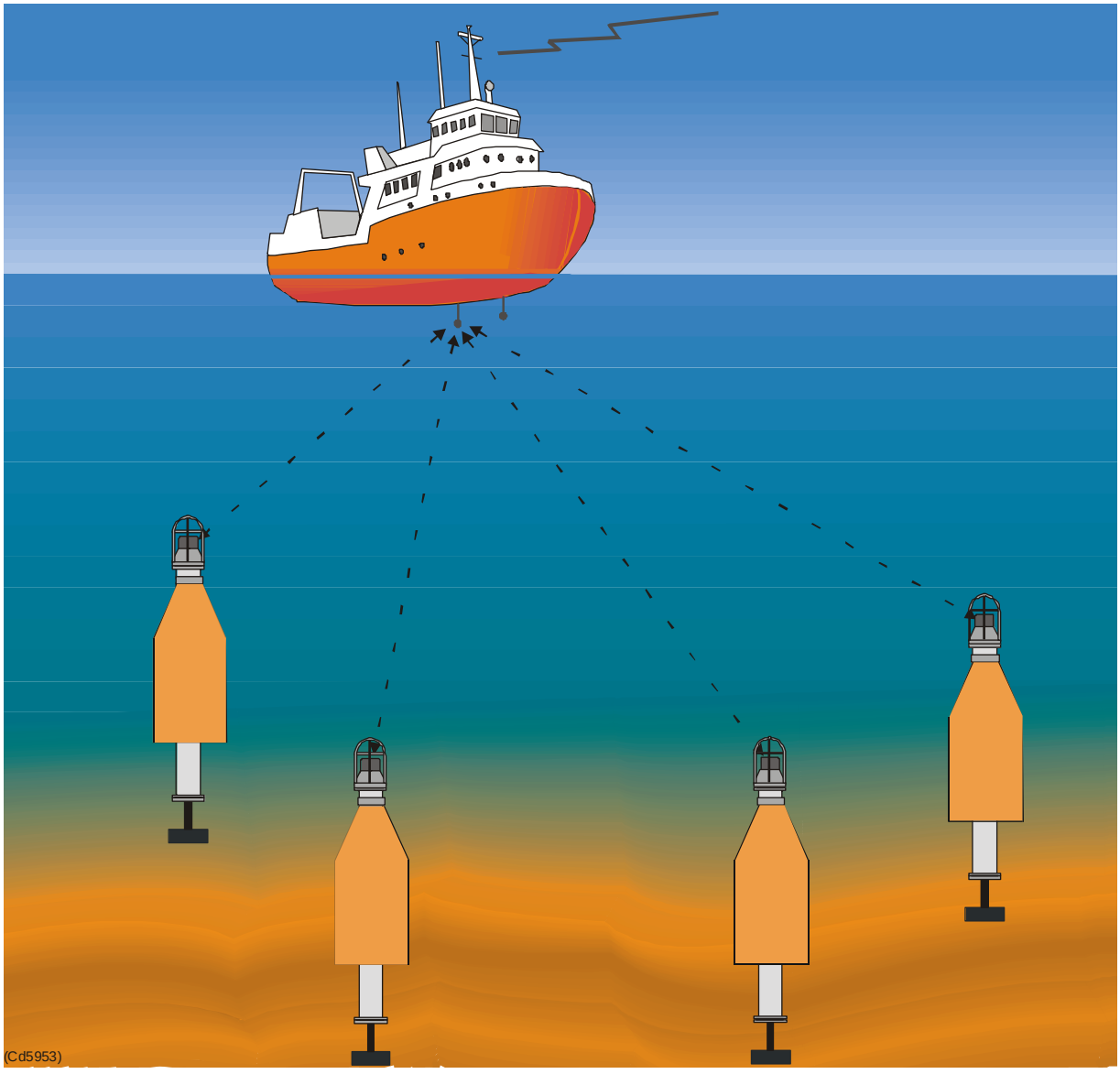
Instruction Manual

KONGSBERG

SPT and MPT 31x series

SSBL Positioning Transponder (SPT)
Multifunction Positioning Transponder (MPT)



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Instruction Manual

Document history

Rev	Date	Written by	Checked by	Approved by
O	25.06.2010	IJG	SER	JEF

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Disclaimer

Kongsberg Maritime endeavors to ensure that all information in this document is correct and fairly stated, but does not accept liability for any errors or omission.

Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment. Kongsberg Maritime disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

Support

All Kongsberg Maritime products:

Phone 24 hour: +47 815 35 355
E-mail: km.support@kongsberg.com

HiPAP, HPR, Transponder and ACS:
Phone 24 hour: +47 992 03 808
E-mail: km.support.hpr@kongsberg.com

Kongsberg Maritime AS

Strandpromenaden 50
P.O.Box 111
N-3191 Horten,
Norway

Telephone: +47 33 02 38 00
Telefax: +47 33 04 44 24
www.kongsberg.com
E-mail: subsea@kongsberg.com

KONGSBERG

Remarks

The reader

The installation information in this manual is intended for the design and installation engineers at the shipyard performing the installation. The information is supplied as the basis for the shipyard's own installation drawings applicable to the vessel. On completion of the installation, this manual must be kept on the vessel for reference purposes during system maintenance.

The operator information in this manual is intended to be used by the system operator. He/she should be experienced in the operation of positioning systems, or should have attended a Kongsberg Maritime training course.

The maintenance information in this manual is intended to be used by a trained maintenance technician or engineer, with experience of electronic and digital circuitry, computers and electromechanical design. The level of information is based on Kongsberg Maritime's maintenance philosophy: The onboard technical personnel shall, with the help of the documentation and the system's built-in test functions, be able to identify malfunctions, locate the fault, and replace major parts, modules and components on the "Line Replaceable Unit" (LRU) level. He/she will however not attempt to repair the LRUs.

HIGH VOLTAGE SAFETY WARNING

The voltages used to power this equipment are potentially lethal. Even 110 volts can kill.

Whenever possible, the following precautionary measures should be taken before any work is carried out inside the equipment:

- Switch off all high-voltage power supplies.
- Check the operation of any door interlocks and any other safety devices.
- Completely discharge all high-voltage capacitors.

It should be noted that interlocks and safety devices are normally located only at regular access points, and high voltages may be exposed during dismantling.

Caution	*Never work alone on high-voltage equipment! Refer to general safety procedures.*

Contents

1 ABOUT THIS MANUAL

Manual content

This manual describes all the SPT and MPT transponders, for medium deep water use -1000 m rated.

It provides general information, technical specifications, operating instructions, maintenance procedures and battery information and safety procedures. It also includes spare parts lists and outline dimension drawings for each of the transponder units.

Warning ***Some of the transponders described in this manual are explosion-protected electronic units of the type "Flameproof enclosure"!***

Abbreviations

BOP	Blow Out Preventer
HiPAP	High Precision Acoustic Positioning
HPR	Hydroacoustic Position Reference
LBL	Long Base Line
MF	Medium Frequency
MPT	Multifunction Positioning Transponder
N/A	Not Applicable
ROV	Remotely Operated Vehicle
SPT	SSBL Positioning Transponder
SSBL	Super Short Base Line
TP	Transponder
TD	Transducer

2 BASIC TRANSPONDER INFORMATION

The purpose of this chapter is to provide an overall description of the transponders included in this manual.

Topics

How to handle a transponder

Each transponder is normally delivered with separate battery. Standard battery is a Lithium battery.

Warning ***Due to safety rules, the transponder must be handled with care! Refer to Safety information for transponder and transponder battery on page 28.***

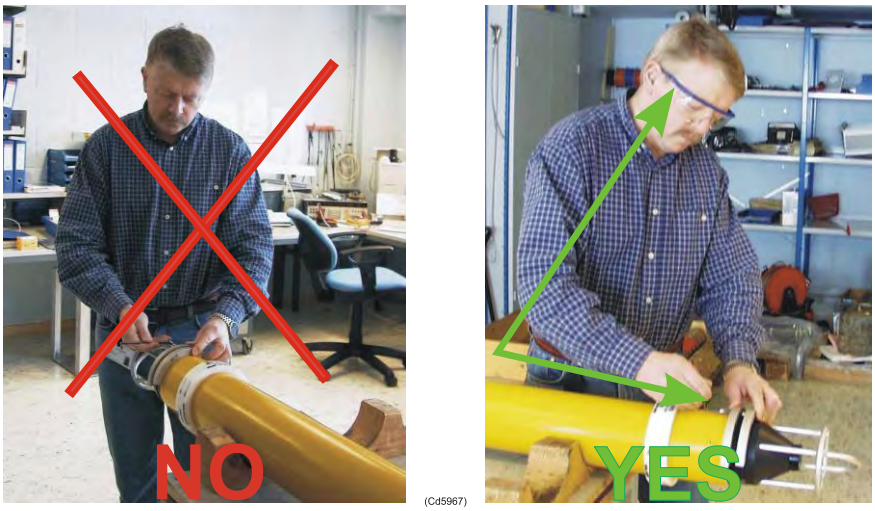


Figure 1 Special precaution to avoid personnel injury

General transponder description

The SPT and MPT 31x transponder series are designed for use with the HPR and HiPAP systems. The following are available:

- SPT 314 transponder series
- SPT 319 transponder series
- MPT 313 transponder series
- MPT 316 transponder series (for use in EEX, zone 0)
- MPT 319 transponder series

→ Examples of the transponders are shown in figure on page 5.

All models have an acoustic telemetry link for command and data transfer.

The transponder unit is designed with a modular construction such that the transducer, transponder electronics, battery pack and options (where applicable) can be replaced individually.

A transponder is normally a self-contained unit, its power being provided from an internal battery pack.

Most units are designed for ROV manipulator handling.

The transponder may be secured to a subsea structure using mounting brackets, or fitted with an anchor weight and floating collar for location on the open seabed.

Transponder identification

An identification clamp ring is tightened around the transponder body. This ring is engraved with:

- Transponder name
- Transponder registration number
- Unique serial number
- Frequency channel
- Type of battery

The figure shows an identification clamp ring for a transponder that uses channel 57 and includes a lithium battery. Name and serial number is engraved on the other side.

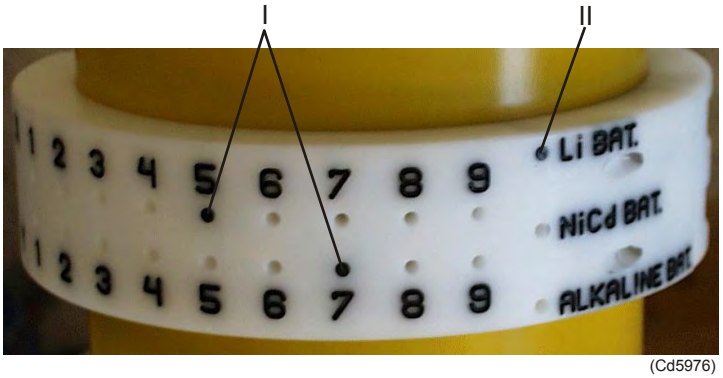


Figure 2 Example of identification clamp ring

If the TP configuration and battery is changed, the channel number (I) and the type of battery (II) can be altered by setting pegs into different holes in the clamp.

EEx transponder classification

The MPT 316 transponders are explosion protected electronic units of the types; EEx d IIB T6. The following units are available:

- MPT 316/DT EEx
- MPT 316/DT EEx 90

Caution	*The units must be used as defined, and meet the requirements of EN 50 014 -50 020 or VDE0171 Electronic apparatus for potentially explosive atmospheres respectively.*

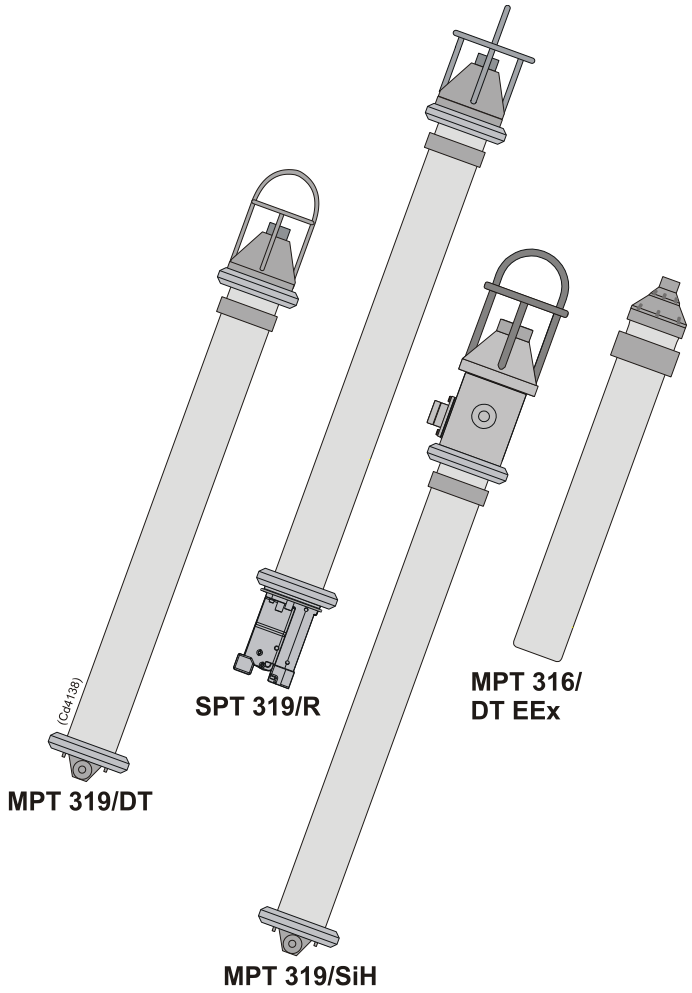


Figure 3 Examples of SPT and MPT transponders

Applications

On interrogation, all models will reply with either a single-or a multi-pulse response. The response information depends on the application. All SPT and MPT models can be used in the following applications:

- SSBL positioning
- Acoustic release
- Telemetry of sensor data
- Depth and temperature measurement

SPT specific applications

The following application can be used with the SPT only:

- Inclination measurement

MPT specific applications

The following applications can be used with the MPT only:

- LBL positioning
- Self positioning
- Range measuring

HPR and HiPAP compatibility

All the 31x transponders are compatible with the Kongsberg Maritime HPR 400 MF and HiPAP systems.

Available transponders

This manual covers the following transponders and special modules:

Transponder series	Model		Housing Material
SPT 314			
	SPT 314	Base unit	Aluminium
	SPT 314/R	Release	Aluminium
	SPT 314/I	Inclinometer	Aluminium
SPT 319			
	SPT 319	Bare unit	Aluminium
	SPT 319/R	Release	Aluminium
	SPT 319/H	Compass – magnetic	Aluminium
	SPT 319/S	Split transducer	Aluminium
	SPT 319/I	Inclinometer	Aluminium
	SPT 319/I-St	Inclinometer	Stainless steel
	SPT 319/E	With external battery	Aluminium
	SPT 319/SIE	Split transducer, Inclinometer and external battery	Aluminium
	SPT 319/SiHE	Serial interface for Octans module, Compass - magnetic and external battery	Aluminium
MPT 313			
	MPT 313	Basic unit (doughnut-shaped transducer)	Aluminium
	MPT 313/H	Compass - magnetic	Aluminium
	MPT 313/R	Release	Aluminium
	MPT 313/S	Split transducer	Aluminium

Transponder series	Model		Housing Material
	MPT 313/RS	Release and Split transducer	Aluminium
	MPT 313/SiH	Serial interface for Octans module, Compass - magnetic	Aluminium
MPT 319			
	MPT 319	Basic unit	Aluminium
	MPT 319/DT	Depth and Temperature	Aluminium
	MPT 319/R	Release	Aluminium
	MPT 319/DTR	Depth, Temperature and Release	Aluminium
	MPT/DT-St	Depth and Temperature	Stainless Steel
	MPT 319/L-St	Basic unit with long tube	Stainless Steel
	MPT 319/SiH	Serial interface for Octans module, Compass - magnetic	Aluminium
MPT 316			
	MPT 316/	Depth and Temperature with explosion-protected electronic unit	Stainless Steel
	MPT 316/	Basic unit with explosion-protected electronic unit and a 90 angle transducer	Stainless Steel

Special modules

Model	Function	Housing material
Octans module	Fibre optic gyrocompass	Aluminium
Battery unit L24	External subsea battery unit for powering the Octans module	Aluminium
Subsea SPT/MPT battery unit	External subsea SPT/MPT battery unit for powering the SPT 319/E series	Aluminium

Transponder model identification principles

The transponder name consists of:

- Model name (three letters)
- Model number (three digits)
- Any options included (letters after the digits)

  → See example below.

Model name

SPT = SSBL Positioning Transponder. MPT = Multifunction Positioning Transponder.

Model number

The three digits:

Digit 1: frequency band

Digit 2: depth rating

Digit 3: beamwidth

The following are available:

1st digit	2nd digit	3rd digit
Frequency band	Depth rating	Transducer beamwidth
3 = 30 kHz	1 = 1000 m	3 = + - 30º 4 = + - 45º 6 = + - 60º 9 = + - 90º

Options

The combination of letters after the number describes the options contained in the unit. The following options are available:

DT	Depth and Temperature sensors
R	Release mechanism
I	Inclinometer (one unit)
H	Heading magnetic compass
E	External battery

L	Long tube -indicates that the unit is longer than standard, to accommodate a larger battery
S	Split transducer
Si	Serial interface
EEx	The unit meet the requirements of EN 50 014 -50 020 or VDE0171 "*Electrical apparatus for potentially explosive atmosphere*" respectively
EEx 90	As described above, and the transducer is mounted at an angle of 90_ perpendicular to the longitudinal axes of the transponder

Housing material

Aluminium is standard housing material. If Stainless steel is used, the abbreviation "St" is added to the transponder name (see example below).

Example: **MPT 319/DT-St**

The example given (MPT 319/DT-St) therefore indicates that the transponder unit is an Multifunction Positioning Transponder, operating in the 30 kHz band, rated to 1000 meters depth, with a ± 90º beam width, and including the Depth and Temperature sensors. The housing material is stainless steel.

Transponder models description

Basic models

SPT 314

The SPT 314 can only operate as an SSBL transponder to provide positional information. It is equipped with a ± 45º beamwidth transducer. All SPT 314 models are based on this basic model.

SPT 319

The SPT 319 can only operate as an SSBL transponder to provide positional information. It is equipped with a ± 90º beamwidth transducer. All SPT 319 models are based on this basic model.

MPT 313

The MPT 313 transponder operates as either an SSBL or LBL transponder. It is equipped with a ± 30º beamwidth transducer. The transducer is "doughnut-shaped", and provides a horizontal beam. All MPT 313 models are based on this basic model.

MPT 319

The MPT 319 transponder operates as either an SSBL or LBL transponder to provide positional information. It is equipped with a ± 90º beamwidth transducer. All MPT 319 models are based on this basic model.

MPT 316

The MPT 319 transponder operates as either an SSBL or LBL transponder to provide positional information. It is equipped with a ± 60º beamwidth transducer. The unit is explosion-protected, and it is equipped with stainless steel housing. All MPT 316 models are based on this basic model.

Versions

/DT

The **Depth and Temperature** (DT) transponder is equipped with pressure and temperature sensors to measure:

- The depth at the position where the unit is moored.
- The temperature in the surrounding water.

Note *In the HPR 300 system only depth is obtainable.*

/R

The **Release mechanism** (R) transponder is a recoverable unit fitted with an automatic release mechanism and a floating collar. This detaches the anchor weight on request from the HiPAP / HPR system. Once the transponder has been released, it will float to the surface where it can be recovered.

You can reset the release-mechanism at the surface, and you can use the same unit many times in different areas. The anchor weight will be lost during the release-operation, so it will require replacement every time.

/H

The **Compass**, (H) transponder is equipped with a heading magnetic compass. This unit also has an inclinometer that can be read by telemetry. When used for positioning, only the compass values are achievable.

/I

The **Inclinometer** (I) transponder is equipped with one set of inclinometers set at 90 degrees to each other. It is used to measure and monitoring the angles of structures such as:

- Rise angle measurement on oil platforms.
- Monitoring underwater pipelines.
- Template levelling.

/L

The **Long tube**, (L) is a basic transponder equipped with a long housing of stainless steel, to incorporate a large battery.

/S

The **Split housing and transducer transponder** (S). The unit has separate housing (electronics unit) and transducer. The transducer has a 5 m long cable, to connect it to the housing.

/SiH

The MPT 313 and MPT 319/SiH is designed to interface the Octans module (fibre-optic gyro compass). It is also equipped with a heading magnetic compass.

→ Refer to the /**H** version.

/E

The **External battery**, (E) transponder is equipped with connector for connection of an external battery.

/SIE

The SPT 319/SIE is designed with split transducer, inclinometer sensor and connector for external battery.

→ Refer to the /**E** version.

/SiHE

The SPT 319/SiHE is designed to interface the Octans module (fibre-optic gyro compass). It is also equipped with a heading magnetic compass, and connector for external battery.

→ Refer to the /**H** version.

→ Refer to the /**E** version.

/EEx

The **Explosive-protected** (EEx) transponder. The unit is explosion-protected, and it is equipped with a stainless steel housing. It is classified as *EEx d IIB T6*.

This is a completely encapsulated unit, and is not prepared for ROV installation or retrieval, as it has no protection-cage.

The depth sensor (pressure) is at maximum scale at 500 m, but the transponder can be deployed down to 1000 m.

/EEx 90

The **Explosive-protected with a 90 angle transducer** (EEx90) transponder, is an explosion-protected unit, and the transducer is mounted at an angle of 90 perpendiculars on the longitudinal axes of the transponder. This transponder is to be used in an horizontal position. It is equipped with stainless steel housing. The transponder is equipped with a locking-pin at the top (see figure in the spare parts section), which is used to secure the transponder in position when deployed.

Fibre optic gyrocompass transponder

The MPT 313/SiH or the MPT 319/SiH together with the Octans module and the Battery unit L24, are a high performance true-north seeking gyrocompass that takes ***no influence from magnetic fields***.

The transponder and the Octans module are connected by a serial line (RS-232) in a subsea cable, with Gisma connectors. The Octans module is powered by one or two purpose-built Battery units L24. The Battery units L24 and the Octans module are connected by subsea cables with Gisma connectors.

- Octans fibre optic gyrocompass, true-north seeking gyrocompass
- Magnetic compass, for backup.

Note *When this transponder is used for positioning, only the compass values are achievable. Roll and pitch can be read by telemetry.*

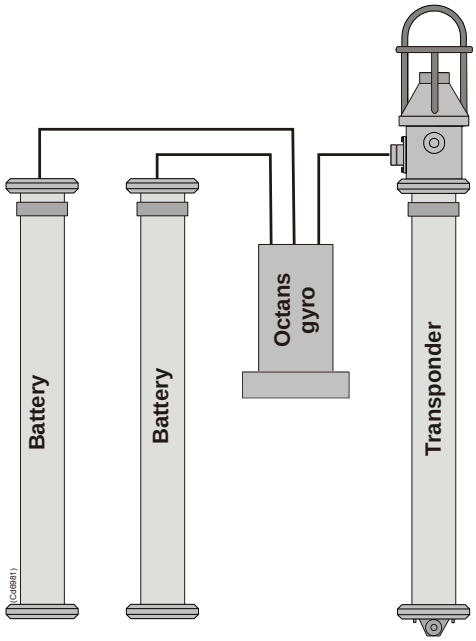


Figure 4 Example of a MPT/SiH transponder with batteries and gyrocompass

The four units can be assembled on an extension-shaft with candelabrum.

→ Refer to page 188

Battery pack L24 lifetime

→ Refer to page 61.

Orientation

→ Refer to page 47.

Operation

→ Refer to the APOS on-line help.

Beam patterns

The figure below shows beam pattern for the following transducer types; ± 90º, ± 60º and ± 45º. The beam pattern shows the transmit/receive sensitivity in the different directions.

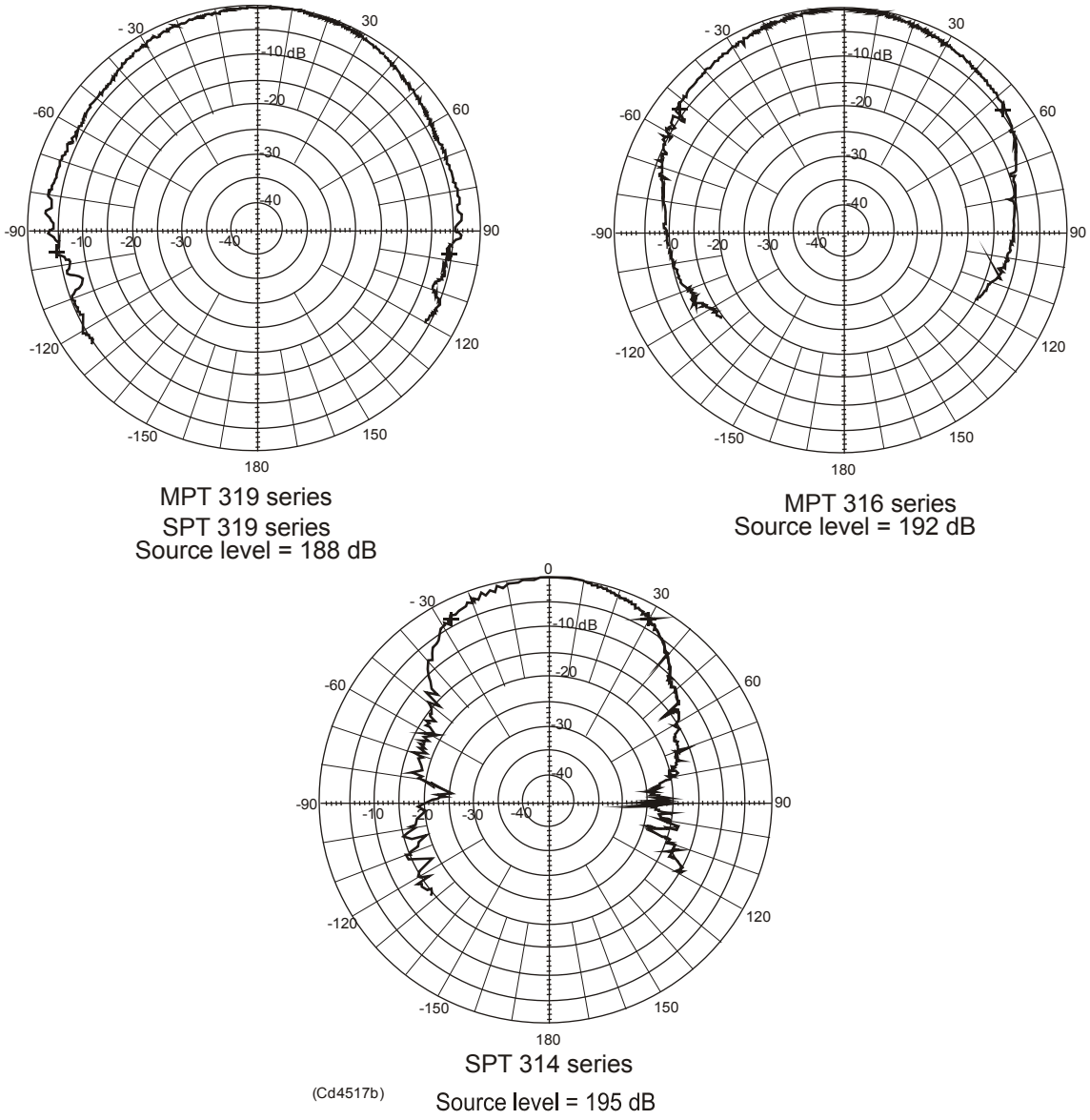
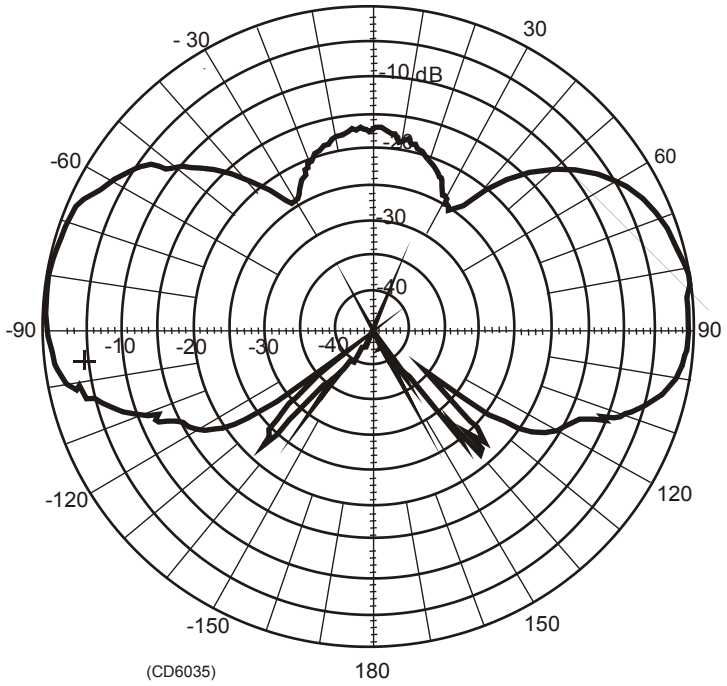


Figure 5 Examples of beam patterns

The figure below shows the beam pattern for the MPT 313 transducer. The beam pattern shows the transmit/receive sensitivity in the different directions.



MPT 313 series

Source level = 194 dB (Horizontal)

Figure 6 Examples of beam patterns

Auxiliary equipment

Various types of auxiliary equipment are used to mount a transponder in a correct and secure way. The most common types are:

- Floating collar
- Anchor-weight
- Mounting brackets
- Mounting collars
- Extension shaft with candelabrum

→ For auxiliary equipment supplied by Kongsberg Maritime, refer to page 89.

3 TECHNICAL SPECIFICATIONS

This chapter lists the main technical specification for the SPT and MPT 31x series.

Topics

Source level and receiver sensitivity

The technical details given in this paragraph are common for all the transponder types (both Aluminium and Stainless steel) described in this manual.

Model series	Source level – max (4 steps of 3 dB)	Receiver sensitivity HIGH/LOW (2 steps)
SPT 319	188	100 / 106
MPT 319	188	100 / 106
MPT 316	192	100 / 106
MPT 313	Horizontal: 194	100 / 106
SPT 314	195	100 / 106

Common transponder specifications

The technical details given in this paragraph are common for all the transponder types described in this manual.

Technical details	Aluminium models	Stainless steel models
Maximum depth rating	1000 meters	1000 meters
Housing material	Aluminium	Stainless steel
Flange and transducer head	Aluminium/anodized	Stainless steel
Finish	Polyurethane	
Operation temperature	0º to + 30º	0º to + 30º

→ Outline dimension and weight; see Drawing file181.

Note *The weight given for each transponder includes a lithium battery.*

Release units

As in common specifications, except:

Technical details	Aluminium models
Weight in water/air	2 kg/0.5 kg
Length	221 mm
Max diameter	138 mm

Sensors

Pressure and temperature sensor

Max depth on /DT - sensors - Resolution - Accuracy (FS)	1000 m 0.1 m < 0.1%
Temperature range on /DT - sensors Resolution Accuracy	- 5º to + 30º C 0.1º C 0.2º C

Compass sensor (magnetic)

Heading

→ Refer to the calibration on page 79.

Note *This specification may be obtained after calibration, but only if all the magnetic anomalies have been cancelled out by the calibration.*

Accuracy level	± 1.0 º RMS
Resolution	0.1 º
Repeatability	± 0.1 º

Tilt

Note *Tilt can be read by use of telemetry.*

Range	± 20 º
Accuracy level	± 0.2 º
Resolution	0.1 º
Repeatability	± 0.2 º

Inclinometer sensor

Maximum detectable angles

HPR 300 channels	± 15 deg
HPR 400 channels	± 60 deg

Resolution

HPR 300 channels, pulse position telemetry	0.25 deg
HPR 400 channels, pulse position telemetry	0.1 deg
HPR 400 channels, full telemetry	0.02 deg
Accuracy, standard sensors	0.25 deg

Aluminium transponders

Version/R and /DTR

As in common specifications, except:

Release; lift / buoyancy	225 kg

- Outline dimension and weight; see chapter Drawing file on page 181.
- Depth and temperature sensor, refer to page 21.

Version/H

As in common specifications.

- Outline dimension and weight; see chapter Drawing file on page 181.
- Compass sensor, refer to page 21.

Version/E

As in common specifications.

→ Outline dimension and weight; see chapter Drawing file on page 181.

Version/SIE

As in common specifications.

→ Outline dimension and weight; see chapter Drawing file on page 181.

Version/SiH

As in common specifications.

- Outline dimension and weight; see chapter *Drawing file on page 181.*
- Compass included in the SiH version, refer to page 21.

Version/SiHE

As in common specifications.

- Outline dimension and weight; see chapter *Drawing file on page 181.*
- Compass included in the SiHE version, refer to page .

Version/S and RS

As in common specifications, except:

Transducer unit

The same unit is used for both the S and RS transponder.

Type	Kongsberg Maritime
Material	Aluminium/Bronze
Cable	5 m
Beamwidth S/RS	Approx. 60 deg. at – 3 dB
Cable connector type for S/RS	4 pin Gisma plug: 10.00.1.04.2.10

→ Outline dimension and weight; see chapter Drawing file on page 181.

Electronic unit

The same unit is used for both the S and RS transponder.

→ Outline dimension and weight; see chapter Drawing file on page 181.

Stainless steel transponders

The models described in this section are only available in Stainless steel.

Version/DT

As in common specifications.

→ Outline dimension and weight; see chapter Drawing file on page 181.

→ Depth and temperature sensor, refer to page 43.

Version/L-St

As in common specifications except:

Transducer material	Stainless steel / Polyurethane

→ Outline dimension and weight; see chapter Drawing file on page 181.

Version/I-St

As in common specifications except:

Transducer material	Stainless steel / Polyurethane

→ Outline dimension and weight; see chapter Drawing file on page 181.

→ Inclinometer sensor, refer to page 22.

Version/EEx

As in common specifications except:

Transducer material	Titanium

→ Outline dimension and weight; see chapter Drawing file on page 181.

Version/EEx 90

As in common specifications except:

Transducer material	Titanium
Explosion proof classification	EEx d IIB T6

→ Outline dimension and weight; see chapter Drawing file on page 181.

Batteries

Battery weight

Lithium (standard) (L)	See Lithium battery label on page 22.
Alkaline (A)	8.0 kg
Rechargeable (R)	8.5 kg

Lithium battery label

All Lithium batteries have the following label:

(The serial number and production date is specified for each battery.)

Lithium Battery Pack

Serial no: _____ Prod.date :_____

	PART NUMBER	BATTERY TYPE	BATTERY WEIGHT (kg)	LITHIUM CONTENT (g)
	290-089501	L10/36 (15/20)	4,3	175
	290-101665	L10 /36(18/30)	5,6	240
	290-103053	L10/36(15/40)	6,6	235
	290-089505	L10/36(36/60)	11,7	480
	290-102726	L10/40(3/11)	1,7	70
	290-210845	L10/40(3/11)	1,7	70
	290-089010	L10/21(6/12)	2,2	90
	290-082380	L10/21(6/48)	6,7	270
	290-089592	L10/5(12/42)	6,5	228
	290-222071	L10/50(27/28)	6,6	247
	290-083530	L50/10/24	10	438
	290-219492	L24 (98)	11	490
	290-062447	L50	4,3	175
	290-080718	L80	6,8	280
	325902	L14.4 (48)	5,9	183

C A U T I O N !

This is a **lithium thionyl chloride battery**. Note that special precautions are required:

- *This battery must NOT be recharged, forced open or disposed off in fire.*
- *Refer to Safety Data Sheet, reg.no.859-164733*

Manufacturer:
Kongsberg Maritime AS
Strandpromenaden 50
N-3190 Horten, Norway
www.kongsberg.com

(Cd30136)

External batteries

Battery unit L24

This battery unit is used for powering to the Octans module.

→ Outline dimension and weight; see chapter Drawing file on page 181.

→ More information -Battery unit L24 on page 59

Depth rating	1000 m
Unit material	Aluminium
Finish	Aluminium/Polyurehtane
Operation temperature	0º to + 30º
Cable connector type for S/RS	4 pin Gisma plug: 10.00.1.04.2.10

Subsea SPT/MPT battery unit

As for Battery unit L24.

→ For more information see Subsea SPT/MPT battery unit on page 59

Octans module

→ Outline dimension see Outline drawings from page 181.

Depth rating	4000 m
Unit material	Aluminium
Finish	Aluminium/Polyurehtane
Operation temperature	0º to + 30º
External top connector type	4 pin Gisma plug: 10.00.1.04.2.10
External top connector type	7 pin Gisma plug 10.00.2.07.2.10

Compass (fibre optic gyrocompass)

Accuracy level	± 0.2 º
Resolution	0.01 º
Repeatability	± 0.025
Setting time	1 minute
Roll and pitch performance	0.01 º
Supply voltage	19 – 35 V
Power consumption	12 W / 0.5 A

External connectors and cables

Caution	*Take care when wiring a unit. Incorrect wiring may cause irreparable damage.*

Connectors

Fibre-optic gyrocompass transponder -MPT 319/SiH

The MPT 319/SiH transponder, the Octans module and the Battery unit L24 for powering the Octans module, are fitted with external connector(s).

The transponder holds one connector:

- For Octans connection, a 7-pins connector.

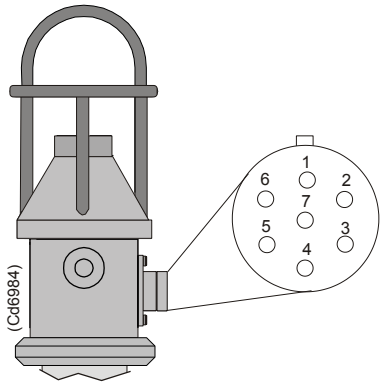


Figure 7 *7-pin connector-layout*

Pin No.	Function
1	TP Tx (RS-232)
2	TP Rx (RS-232)
3	GND for (RS-232)
4	
5	
6	ON/OFF (10V)
7	GND

Octans module

The Octans module holds three external connectors:

- One for transponder connection, a 7-pins connector.

Pin No.	Function
1	TP Tx (RS-232)
2	TP Rx (RS-232)
3	GND for (RS-232)
4	
5	
6	ON/OFF (10V)
7	GND

→ Connector -pin layout, refer to Figure 7 *7-pin connector-layout* on page 24.

- Two for battery unit connection, a 4-pins connector.

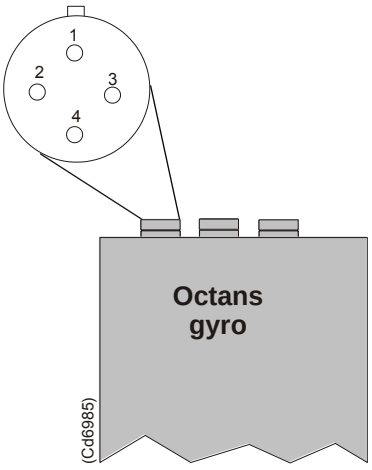


Figure 8 *4-pin connector-layout*

Pin No.	Function
1	24 V
2	GND
3	24 V
4	GND

Battery unit L24

The battery holds one connector:

- For Octans connection, a 4-pins connector.

Pin No.	Function
1	24 V
2	GND
3	24 V
4	GND

Version/E transponder

The transponder holds one connector:

- For battery unit connection, a 4-pins connector.

Pin No.	Function
1	10 V
2	GND
3	36 V
4	GND

Subsea SPT/MPT battery unit

- Connector, a 4-pins connector.

Pin No.	Function
1	10 V
2	GND
3	36 V
4	GND

Floating collars

Depth rating	1000 m
Colour	Orange

→ Outline dimension and weight; see chapter Drawing file on page 181..

Guiding collars

Depth rating	1000 m
Material	Polyurethane
Colour	Black / white

→ Outline dimension and weight; see chapter Drawing file on page 181.

Mounting brackets

No technical data available. Depends on type of mounting brackets used.

4 SAFETY INFORMATION FOR TRANSPONDER AND TRANSPONDER BATTERY

This chapter includes transponder safety information for the Kongsberg Maritime transponders with lithium battery, and separate Kongsberg Maritime transponder lithium batteries. It also includes emergency procedures.

Warning ***This chapter must be read before handling transponders with lithium battery and separate transponder lithium batteries.***

Topics

Identification of the products and company

Product name

All Kongsberg Maritime transponders come with a lithium battery, and separate Kongsberg Maritime transponder lithium batteries.

Range of products

PART NUMBER	BATTERY TYPE
290-089501	L10/36 (15/20)
290-101665	L10/36 (18/30)

PART NUMBER	BATTERY TYPE
290-103053	L10/36 (15/40)
290-089505	L10/36 (36/60)
290-102726	L10/40 (3/11)
290-210845	L10/40 (3/11)
290-089010	L10/21 (6/12)
290-082380	L10/21 (6/48)
290-089592	L10/50 (12/42)
290-222071	L10/50 (27/28)
290-083530	L50/10/24
290-219492	L24 (98)
290-062447	L50
290-080718	L80
325902	L14.4 (48)
319554	D48-Li

Company address

Kongsberg Maritime AS

P.O.Box 111

N-3190 Horten

Norway

Emergency contact

Duty phone 24 hour: +47 992 03 808

Composition and information on ingredients

Battery chemistry

A transponder lithium battery consists of **Lithium Metal** cells with chemistry:

Lithium Thionyl Chloride - Li/$SOCl_2$

Negative electrode: Lithium metal (Li)

Positive electrode: Carbon

Electrolyte: Solution of lithium tetrachloroaluminate ($LiAlCl_4$) in thionyl chloride

Battery weight and lithium content

PART NUMBER	BATTERY TYPE	BATTERY WEIGHT (kg)	LITHIUM CONTENT (g)
290-089501	L10/36 (15/20)	4,3	175
290-101665	L10/36 (18/30)	5,6	240
290-103053	L10/36 (15/40)	6,6	235
290-089505	L10/36 (36/60)	11,7	480
290-102726	L10/40 (3/11)	1,7	70
290-210845	L10/40 (3/11)	1,7	70
290-089010	L10/21 (6/12)	2,2	90
290-082380	L10/21 (6/48)	6,7	270
290-089592	L10/50 (12/42)	6,5	228
290-222071	L10/50 (27/28)	6,6	247
290-083530	L50/10/24	10	438
290-219492	L24 (98)	11	490
290-062447	L50	4,3	175
290-080718	L80	6,8	280
325902	L14.4 (48)	5,9	183
319554	D48-Li	5,9	183

Battery cell manufacturers/types

A transponder lithium battery consists of cells from one or two of the following manufacturers and types:

- Tadiran TL-2300
- Sonnenschein SL-780
- Saft LS 33600
- Saft LSH 20
- Sonnenschein SL-760

Battery design

A transponder lithium battery consists of several battery cells that are electrical connected, both in serial and parallel.

There are transponder batteries with different number of cells, voltages and capacity.

All transponder batteries include protection against short-circuits (re-settable fuses) and reverse current (diodes).

Hazards identification

Short-circuits, overheating, mechanical damage and exposure to water can start chemical reactions and high currents inside the transponder lithium battery. This can generate noxious gases and/or danger of explosions. The chemical reactions will continue without additional supply of oxygen, as the battery cells contain the necessary ingredients for maintaining the chemical reactions.

During operation, the battery is placed inside the transponder. Water ingression into the transponder can cause dangerous situations.

Danger of explosions

- If the cells that form the battery exceed the critical temperature of 180º C, they may explode.
- **External fire** - The temperature can reach the critical point of 180º C.
- **Water ingression** - The battery temperature will increase, caused by the high internal currents. The temperature can reach the critical point of 180º C.
- **Water ingression** - Electrolysis gives hydrogen. Together with oxygen, hydrogen can create oxyhydrogen gas inside the transponder (depends on the concentration). This gas is very inflammable/explosive.
- **Water ingression** - Chemical reactions in the battery will cause a pressure build-up inside the transponder. The transponder can explode if the inside pressure is high enough.
- If the transponder explodes, either the transducer or the bottom end cap will blow out, or the transponder becomes fragmented. This can cause serious damages on personnel and/or equipment.
- Some transponders have a relief valve that will prevent over-pressure. Noxious gases will then leak out of the transponder until the chemical reactions have stopped.

Note *The relief valve can be plugged, caused by products from the chemical reactions during an emergency as described above.*

Noxious gases

- Thionyl chloride ($SOCl_2$)
- Sulphur dioxide (SO_2)
- Hydrogen chloride (HCl)
- Chlorine (Cl_2)

First-aid measures

Inhalation:	Remove from exposure, rest and keep warm
Skin contact:	Wash off skin thoroughly with water. Remove contaminated clothing and wash it before reuse.
Eye contact:	Irrigate thoroughly with water for at least 15 minutes.
Ingestion:	Wash out mouth thoroughly with water and give plenty of water to drink.

All personnel that have been exposed to the noxious gases should immediately be seen by a doctor.

Fire-fighting measures

- Cool down the battery with copious amounts of cold water.
  - Transponder with lithium battery:
    * Immerse the transponder in the sea for 24 hours or permanent.
    * If this method is impossible, the transponder can be cooled down by use of a fire hose.
  - Separate transponder lithium battery:
    * Immerse the battery in the sea for 24 hours or permanent.
    * If this method is impossible, the battery can be cooled down by use of a fire hose.

Cooling down the battery with copious amount of cold water is the only way to reduce/stop the internal chemical reactions, or to limit the fire/explosions to as few battery cells as possible. The chemical reactions/fire will continue without additional supply of oxygen, so extinguisher like Lith-X will not work properly.

Applying water directly onto a battery may develop hydrogen gas, due to the possible electrolysis if the battery terminals are exposed to water. Mixed with air, this gas is very inflammable/explosive. However, if the water cooling takes place out on deck or in a storeroom with good ventilation, there will never be enough hydrogen gas to exceed the lower explosive limit of hydrogen in air (ca 4%).

Note *Remove transponders with lithium battery and separate transponder lithium batteries in case of an external fire if possible.*

Accidental release measures

→ Refer to paragraph Handling and storage on page 33.

Handling and storage

All personnel that handle transponders must know the transponder's status:

'Functioning' - 'Failing' - 'Unknown'

A Transponder with unknown status **must be handled** as a transponder that is failing.

Recovering a "*functioning*" transponder

- All transponders recovered from the sea, should be placed in a safe place out on deck and controlled for minimum 2 hours:
  - Look for outer damages that could involve a water leakage.
  - The transponder housing temperature must be checked to verify a possible temperature increase in the lithium battery.
- If everything is OK refer to Kongsberg Maritime transponder instruction manuals for normal procedures.

Recovering a "*failing*" transponder

- Handle as possible water ingression.
- Evacuate all unnecessary people.
- Recover the transponder with great precaution. Use a crane.
- No people should be near the transponder when it is lifted up on deck.
- Place the transponder in a safe place out on deck, shielded from people and vital equipment.
- Fasten the transponder in a crane, ready to lower it into the sea again.
- Control the transponder for minimum 2 hours:
  - Look for outer damages that could involve a water leakage.
  - The transponder housing temperature must be checked to verify a possible temperature increase in the lithium battery.

Failing and normal temperature:

- Take out the battery - see Opening a transponder with defect/possible defect battery.

Failing and increasing temperature:

→ See Handling a heated or self-heated transponder.

Handling a heated or self-heated transponder

- Evacuate all unnecessary people.
- Fasten the transponder to a rope and immerse it in the sea for 24 hours or permanent.
  - If this method is impossible, the transponder can be cooled down with copious amount of cold water. Use a fire hose.
- Recover the transponder and control the temperature.
- Repeat this until the temperature is low and stable.
- The transponder can now be opened - see Opening a transponder with defect/possible defect battery.

Handling a transponder if relief valve opens

- Evacuate all unnecessary people.
- Use necessary protection equipment.

- Fasten the transponder to a rope and immerse it in the sea for 24 hours or permanent.
  - If this method is impossible, the transponder can be cooled down with copious amount of cold water.
  - Use a fire hose.
- Repeat this until no gases come out the check valve and the temperature is low and stable.
- The transponder can now be opened

  → See Opening a transponder with defect/possible defect battery.
- Wash out chemical reaction products with water.

Opening a transponder with defect/possible defect battery

- The transponder is reported failing. There could have been water ingression in the transponder.
- Open the transponder in a safe place out on deck, shielded from people and vital equipment.
- Use necessary protection equipment.

Caution *Do not stand in front of transducer or bottom end cap, when opening the transponder.*

- If there has been water ingression, and the battery is still warm:
  - Disconnect the battery from the transponder electronics, and then - see *Handling heated or warm separate battery*.
- Wash out chemical reaction products with water.

Opening a "*functioning*" transponder

- The transponder is reported functioning.
- Open the transponder in a safe place out on deck, shielded from people and vital equipment.

Caution *Do not stand in front of transducer or bottom end cap, when opening the transponder.*

Handling heated or warm separate battery

- Evacuate all unnecessary people.
- Fasten the battery to a rope and immerse it in the sea for 24 hours or permanent.
  - If this method is impossible, the battery can be cooled down with copious amount of cold water.
  - Use a fire hose.
- Wash out chemical reaction products with water.

Handling transponders and separate transponder batteries in case of an external fire

- Remove transponders with lithium battery and separate transponder lithium batteries in case of an external fire if possible
- Cool down transponders and separate transponder batteries with copious amounts of cold water - see chapter *Fire-fighting measures* on page 32.

Storage

Caution *A transponder that is failing must be stored in a safe place out on deck, shielded from people and vital equipment.*

A transponder that is functioning, and separate batteries can be stored indoors. The battery must be removed from the transponder when stored indoors.

- Storage temperature:
  - Recommended storage temperature lies between 0º C and +25º C (max +50º C, min -55º C).
- Storage relative air humidity:
  - Recommended relative air humidity is 40 to 70%.
- A transponder/separate battery must not be stored directly in the sunlight.

- A battery must not be exposed to water.
- Storeroom:
  - A solid room with study racks for transponders/separate batteries.
  - A room where no people are staying or no vital equipment is placed.
  - Good ventilation.
  - Clearly identified.
  - Easy to remove transponders and batteries in case of an external fire.

Caution *The storeroom must have a sprinkler system or a fire station, with fire hose (water), must be placed outside the storeroom.*

Exposure controls and personals protection

Fire/explosion:

- Use self contained breathing apparatus.

Relief valve opens and noxious gasses come out:

- Use a full face mask with minimum BE-filter, and protective equipment of rubber or plastic.

Opening transponder with defect/possible defect battery:

- Use a full face mask with minimum BE-filter, and protective equipment of rubber or plastic.

Opening a functioning transponder:

- Use protective goggles.

Physical and chemical properties

Not applicable unless individual components exposed.

Stability and reactivity

The products are stable under normal conditions - see chapter *Hazards identifications* on page 31.

Toxicological information

- None, unless battery ruptures. In the event of exposure to internal contents, corrosive fumes with pungent odour will be very irritating to skin, eyes and mucous membranes. Over-exposure can cause symptoms of non-fibrotic lung injury and membrane irritation.

Inhalation:	Lung irritant.
Skin contact:	Skin irritant.
Eye contact:	Eye irritant.
Ingestion:	Tissue damage to throat and gastro/respiratory tract if swallowed.
Medical conditions:	Eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur.

Ecological information

None known if used/disposed of correctly.

Disposal considerations

- A lithium thionyl chloride battery does not contain any heavy metals, and is therefore not regarded as special waste (contains only biodegradable parts).
- A used transponder lithium battery often contains a significant amount of residual energy. It is the danger of explosion that presents a problem when disposing a battery. Used batteries must therefore be handled with the same care as new ones.

Transport information

Note	*Kongsberg Maritime delivers the transponder unit and the battery as separate units, in separate transportation cages. Kongsberg Maritime recommends that the transponder and the battery always are kept in separate transportation cages during transportation. Original transponder/battery cages must be used.*

All transponders with a lithium battery and separate transponder lithium batteries must be shipped in accordance with the prevailing national regulations.

Transponder with lithium battery:

Signs and symptoms:

UN no. 3091, Class 9 Miscellaneous
(Lithium batteries contained in equipment).

Separate transponder lithium battery:

UN no. 3090, Class 9 Miscellaneous (Lithium batteries)

Transport:

Aircraft:	IATA DGR
Sea Transport:	IMDG Code
Railway:	RID
Road transport:	ADR

- Aircraft - Only new separate transponder lithium batteries can be transported by air.
- Aircraft - Transport of all transponders with new lithium battery and new separate transponder lithium batteries by air is only permitted onboard cargo aircraft. The goods must be clearly labelled:
  CARGO AIRCRAFT ONLY

Caution *Transponder with lithium battery - During transport the lithium battery must always be disconnected from the electronics.*

- Original transponder/battery cages must be used.

Regulatory information

Not applicable.

Other information

The battery cell manufacturers' safety data sheets are available on the following internet addresses:

- Saft: www.saftbatteries.com
- Tadiran / Sonnenschein: www.tadiranbatteries.de

5 TRANSPONDER SETUP AND OPERATION

This chapter contains a brief overview of how to set-up and operate a transponder.

The transponders are designed for operation in water only.

Caution — *The transponder unit and the battery are delivered as separate units. The battery must be mounted onto the transponder chassis and connected before deployment.*

Topics

System set-up

All transponders are preset by the manufacturer. The channel setting may be changed if required. This can be done as follows:

- Use of internal switches, or
- use of acoustic telemetry from a HiPAP / HPR 400 system. (A HPR 300 system can not send telemetry for this purpose.)

For information about set-up of a transponder, refer to:

→ APOS Instruction manual / APOS on-line help.

Pre-deployment checks

Before you deploy the transponder, you must:

1. Check that the battery contains sufficient power for the proposed operation.
2. Before deployment, perform a visual inspection of the transponder.
3. Perform a functional check to ensure it will operate correctly once it has been positioned on the seabed.

   Ensure the transponder replies to the correctinterrogation frequency.

The functional check can be performed as follows:

Transponder in water -use the APOS function check. When checking, lower the transponder on a rope over the vessel's side.

→ Refer to the APOS Instruction manual / APOS on-line help.

Transponder on deck -use the Transponder Test and Configuration Unit (TTC 400).

→ Refer to the TTC 400 Instruction manual / TTC 400 Quick Reference Guide.

Mounting

A transponder may be secured to a subsea structure using mounting brackets, or fitted with an anchor weight and floating collar for location on the open seabed.

→ Refer to paragraph Mounting brackets on page 90.

Mounting an EEx transponder

At deployment, ensure a safe mounting of the transponder with adequate mechanical protection.

Deployment

Caution *During deployment prevent the transponder from slamming against other solid objects.*

Caution	*When you deploy the transponder, the anchor-weight must be lifted separately from the transponder. DO NOT attempt to lift both the transponder and the anchor-weight via the transponder -the transducer cage is only approved for lifting the transponder and the floating collar.*

When you deploy the transponder:

- The unit must be positioned with the transducer upright.
- Ensure a clear line of sight between the transponder's head and the ship's transducer.
- The transponder requires anchor-weight/brackets to hold the transponder securely in position on the seabed / ROV.

→ Refer to Auxiliary equipment on page 89.

Release mechanism

The transponder release mechanism must be attached to a shackle. The shackle will ensure a smooth release of the transponder when requested by the operator station.

Ready for operation

Once deployed, the transponder is ready for operation. The sensors in your application will respond to requests from the HPR / HiPAP system, when they are enabled using telemetry.

Positioning of a transponder

Positioning of a transponder can be done in two ways:

1 The normal way is that the topside sends a request to the transponder and then the transponder answers the request after a given time delay.

2 The other way is with the transponder in beacon mode - the transponder acts as an acoustic lighthouse by transmitting pulses regularly (with a given Pulse Repetition Interval) without being interrogated.

→ For more information, refer to the APOS on-line help.

Operation

The operation of the transponder is performed at the HiPAP / HPR (APOS) operator station. For information regarding operation, refer to:

→ APOS Instruction manual / APOS on-line help.

Special operation instructions

The information in this paragraph applies only to the EEx transponders.

Caution	*When you deploy or operate an explosion-protected unit, you must follow the respective national regulations and requirements.*

Transponder in use

Caution	*Caution All personnel that handle transponders must know the transponder's status:*

'Functioning'-'Failing'-'Unknown'

Caution	*A Transponder with unknown status must be handled as a transponder that is failing. For more information:*

→ Refer to Handling and storage on page 33.

Sensor information

DT sensor

No special preparations for the user.

For more information:

→ Transponders with depth and temperature sensors on page 83

→ See also the APOS on-line help.

Inclinometer sensors

The inclinometers' X and Y-axes are referenced to a flat area milled onto the top end cap. This is illustrated in the figure below.

- The Y-axis is parallel to the flat area and perpendicular to the longitudinal axis of the unit.
- The X-axis is perpendicular to both the longitudinal axis and the Y-axis.

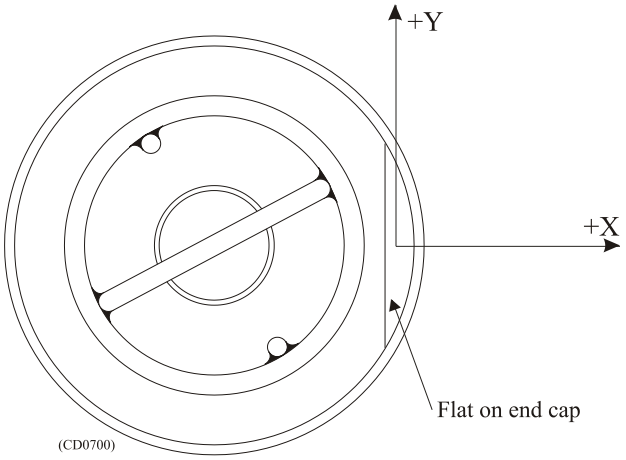


Figure 9 Top view of the inclinometer transponder showing the X/Y references

Compass sensor (magnetic)

Normally the steel around the compass transponder is heavily magnetic. Therefore, the compass of the transponder must be calibrated.

→ Refer to Calibration on page 79.

/H

- The Heading of the transponder is referenced to a flat area milled onto the top end cap. This is illustrated in the figure below.
- The Heading orientation is perpendicular to the longitudinal axis.

/SiH

- The Heading of the transponder is the same direction as the Gisma plug is pointing.

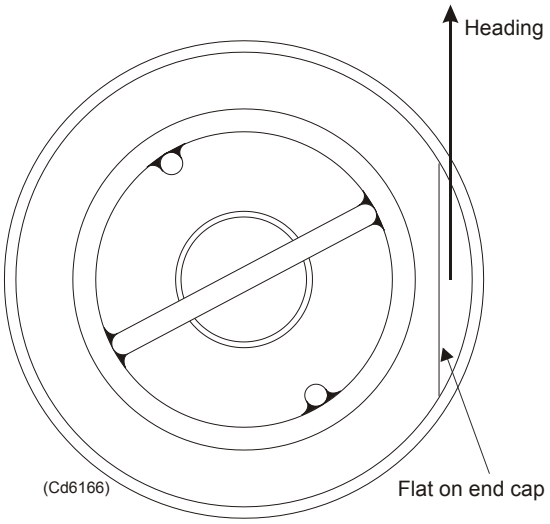


Figure 10 Compass transponder top – indicating Heading orientation

→ Refer to figure on page 168.

Octans module orientation

- The Heading of the Octans module is the same direction as the Gisma plugs are pointing.
- At installation, ensure that the “direction-arrow” is pointing upwards.

→ Refer to figure on page 170.

Recovery

After recovery, wash the unit thoroughly in fresh water to dissolve any salt deposits and clean off any sand or salt. If available a high pressure hose may be used.

→ Refer to chapter Handling and storage on page 33.

Caution	*It is very important that the release unit (if fitted) is washed properly. Salt deposits, may prevent the mechanical part’s mobility.*

Release mechanism

Note *Once the transponder reaches the surface, it can be lifted from the water by attaching a hook / rope to the transducer cage.*

The release mechanism has two moveable parts.

These are:

- Hook

  The hook sits at the bottom of the release unit, and holds the shackle to be released.

Figure 11 Release unit indicating the Hook

- L-arm

  The L-arm is attached to the holding plate. (The holdingplate has the shape of a very large coin, but much thicker).

Note *This holding plate has been adjusted during assembly and it MUST be loose. Do NOT attempt to tighten the bolt between the L-arm and the holding plate (see figure below).*

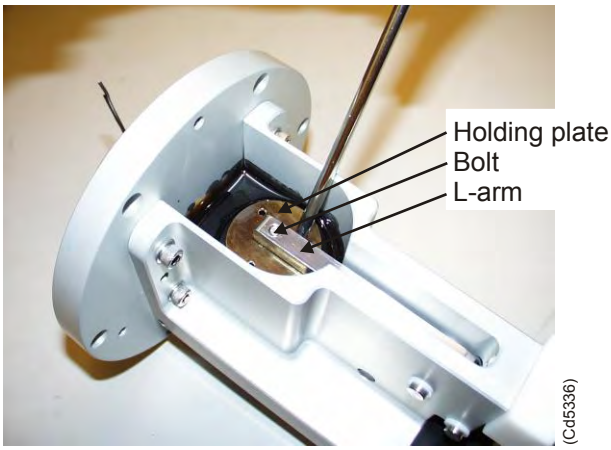


Figure 12 Release unit indicating the L-arm and holding plate

The release mechanism can be operated in one of the two following ways:

- Automatic
- Manual

Automatic release

Automatic release is normally used when the transponder is submerged.

- The release is performed within 10-15 seconds after the command is performed.

Note *Once the transponder reaches the surface, it can be lifted from the water by attaching a hook / rope to the transducer cage.*

Manual release

Manual release is normally used for testing purposes.

Note *Do NOT try to pull the L-arm or holding the plate away from magnet.*

1 Look into the small hole near the lower end of the springs.
The L-arm is just visible a few mm above the plastic”foot”.

2 Insert a medium sized screwdriver between the L-arm and the plastic foot, and pry apart.

– The mechanism will snap open.

Note *The L-arm is balanced between a strong magnet and two springs. When the mechanism is released, it kicks open with a sudden movement. Keep your fingers clear of the back of the L-arm and holding plate.*

(Cd5321)

Figure 13 Release unit – indicating manual release

Setting the release mechanism

1 Ensure the anchor shackle (rope) is located in the jaws. - Do not use a chain. A chain can cause corrosion.

2 Snap the hook back onto position.

3 Fasten the required load onto the shackle.

4 Put the shackle onto the hook.

Ensure right side up. The curved end **onto the hook** and the shackle bolt **away from** the hook.

→ Refer to Figure 11 Release unit indicating the Hook on page 46.

5 Swing the hook into place.

Ensure that the magnet face and the holding plate are free of grit and debris.

For proper function, ensure good parallel physicalcontact between the magnet and holding plate.

6 Push the back of the L-arm and holding plate towards the magnet until the magnet catches the holding plate.

7 Ensure the holding plate covers the circular face of the magnet.

Storage

Caution *A release unit must be stored in open position (released), as illustrated in the figure below.*

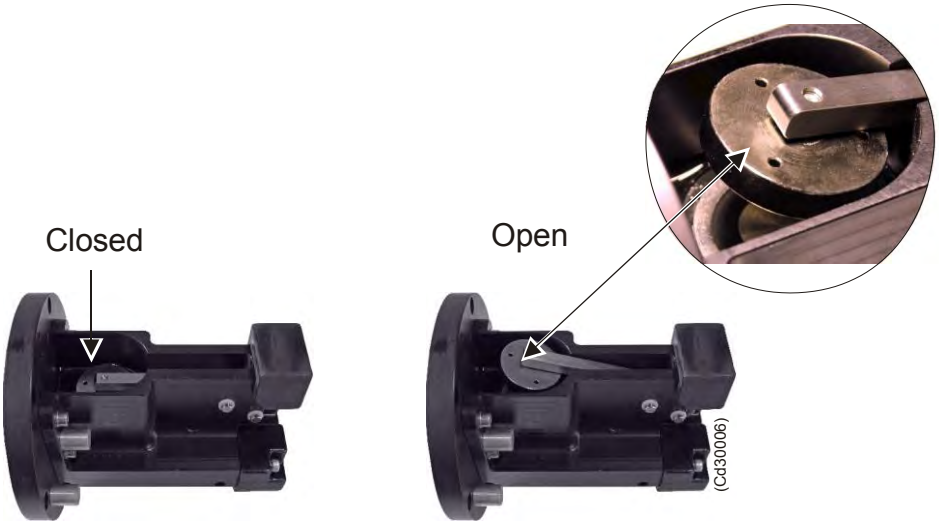


Figure 14 Release unit

6 BATTERIES

This chapter provides information about the batteries used with the transponders described in this manual. A battery is delivered as a separate unit. The following battery types are available:

- Lithium (standard) (L)
- Alkaline (A)
- Rechargeable (N)

The transponders are normally self-contained with power. The standard battery is a lithium battery. It is used to ensure long life.

A battery consists of two sections, one for the receiver (Rx) and one for the transmitter (Tx).

Topics

→ Battery layout on page 51

→ Battery specification on page 51

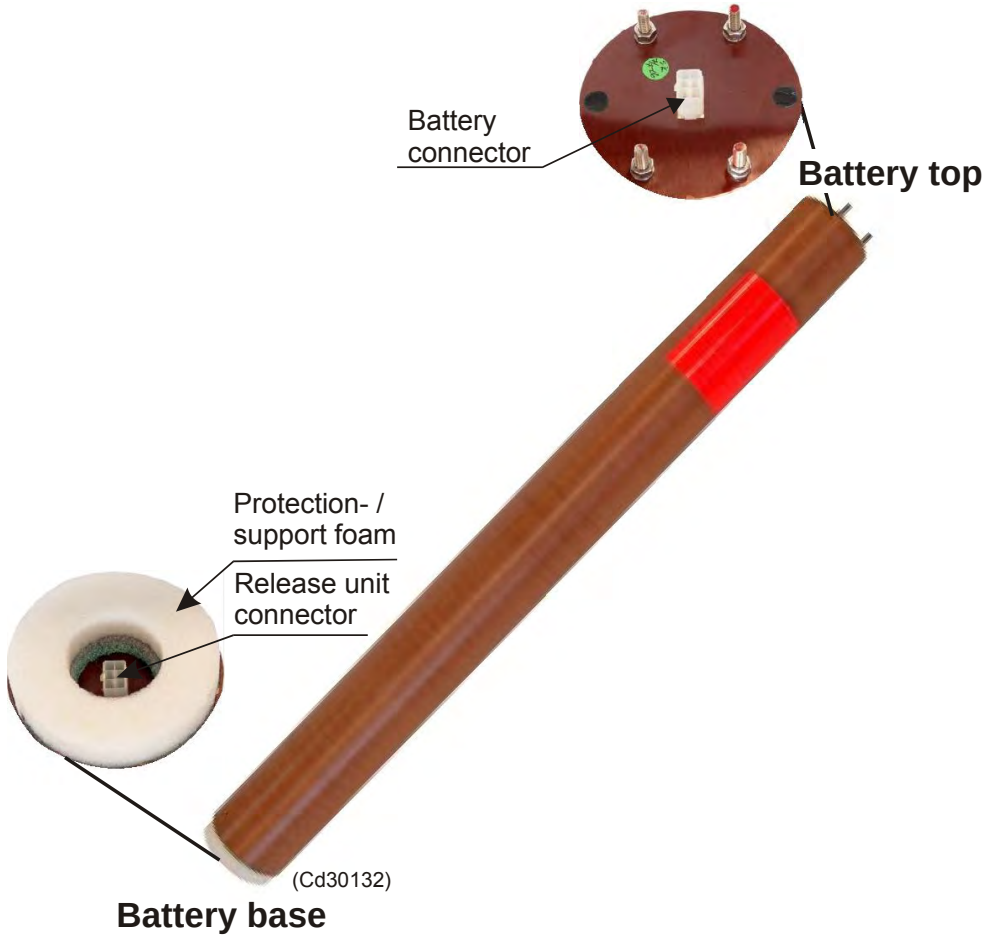
→ Battery replacement on page 51

→ Battery lifetime at operation on page 52

→ Battery packs from page 53

→ How to mount/connect/replace transponder battery from page 59

Battery layout



Battery specification

The battery specification includes:

- battery type
- Rx/Tx voltage
- number of battery cells used for Rx / Tx

Example: L10/36 (18/30)

The example given L10/36 (18/30), therefore indicates that this is a Lithium battery, with Rx voltage = 10 V / Tx voltage = 36 V. The Rx section comprises 18 battery cells, and the Tx section comprises 30 battery cells.

Battery replacement

The L10/36 (18/30) Lithium battery may be replaced by:

- Alkaline battery A10/36 (24/24),

or

- Rechargeable battery N10/36 (18/30).

An overview of the capacities of these batteries is presented in the table below. A more detailed specification is presented on the following pages.

Battery data	Lithium	Alkaline	Rechargeable
Battery type No.	L10/36 (18/30)	A10/36 (24/24)	N10/36 (18/30)
Max. continuous on-time	185 days	71 days	16 days
Quiescent level	1045 days	301 days	90 days
No. of replies, low source level	19.6 million	4.4 million	1.44 million
No. of replies, high source level	4.9 million	1.1 million	0.36 million

- The Alkaline battery capacity is approx. 20% of the Lithium battery.
- The rechargeable battery capacity is approx. 10% of the Lithium battery.

Battery lifetime at operation

The transponder has a battery monitoring function. For information on how to operate this function, see *the System operator manual / APOS on-line help.*

- Two pings are required to transmit the depth and compass information.
- Three pings to transmit the inclinometer information.
- When the transponder is set to HPR 400, and used for full telemetry, seven pings are required for each telegrams. The battery lifetime could therefore be much reduced from that stated in the figures below. However each reply is counted up and can be available to the operator.

APOS presents the battery status as ***High*** source level.

Note *When the battery is disconnected, the battery status will be lost. When the battery is re-connected, the battery status reading will indicate 100% (as for a new battery). To keep track of the*

consumption, you are advised to make a note of the battery status before disconnecting.

The figures in this section indicating the respective battery lifetime, shows the lifetime based on 10 ms pulse length.

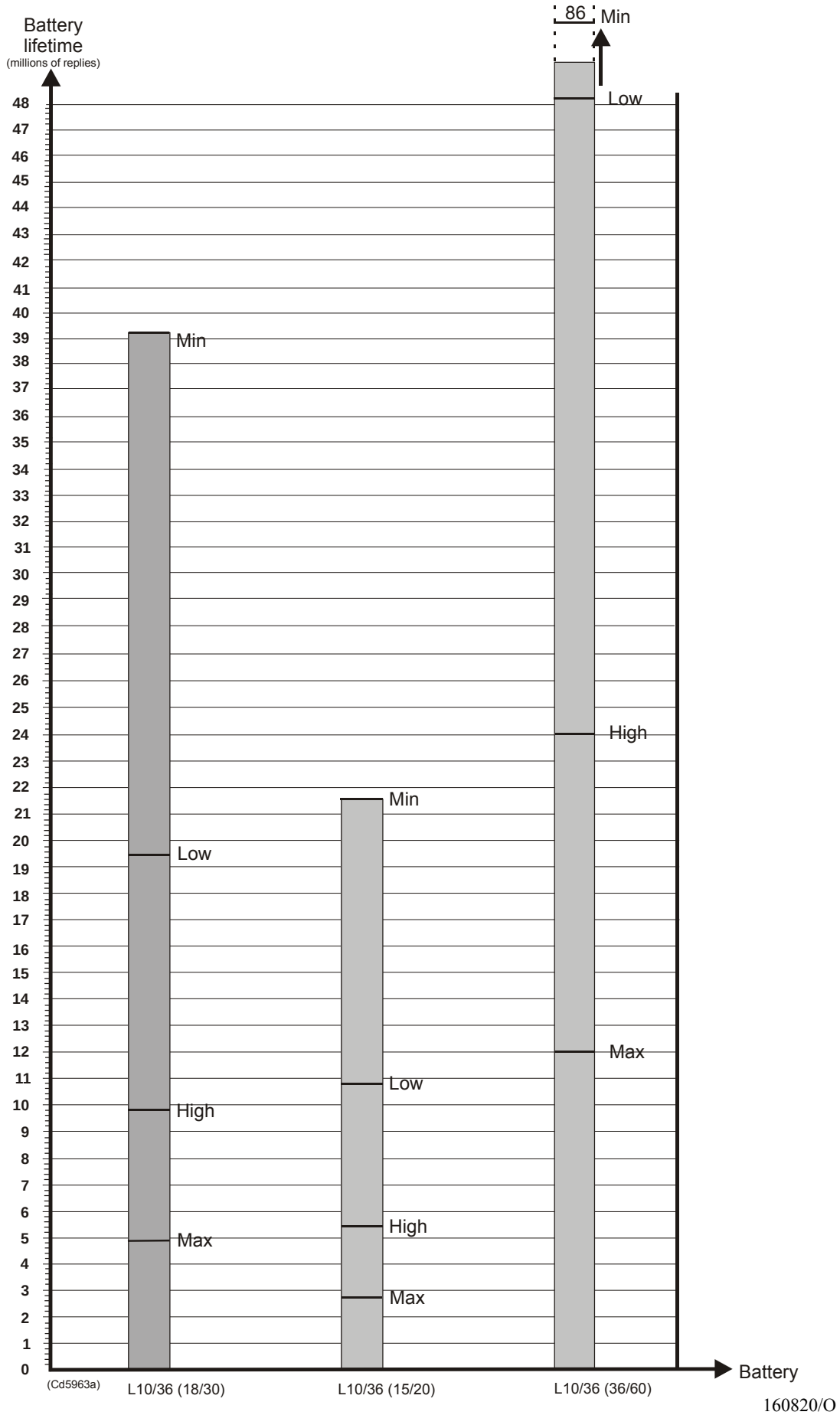
Lithium battery packs

To calculate the battery status for the transponder lithium battery, use the following equations:

High

- Max source level = $\frac{High}{2}$
- Low source level = $High \times 2$
- Min source level = $High \times 4$

Battery type	Transponder type
L 10/36 (18/30)	SPT 319 series SPT 314 series MPT 319 series MPT 313 series MPT 319/DT-St
L 10/36 (15/20)	MPT 316/DT EEx MPT 316/EEx 90
L 10/36 (36/60)	MPT 319/L-St


Battery lifetime
(millions of replies)
48
47
46
45
44
43
42
41
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
86
Min
Low
High
Max
Min
Low
High
Max
Min
Low
High
Max
Battery
(Cd5963a)
L10/36 (18/30)
L10/36 (15/20)
L10/36 (36/60)

Quiescent lifetime

Figure 15 Battery lifetime at operation

This is the total time the transponder can listen for interrogation pulses. After this time the transponder will not be able to reply.

Max continuous on time

This is the maximum time the transponder can be continuously in operation, receiving and transmitting. If a low interrogation rate is used, this time may be consumed.

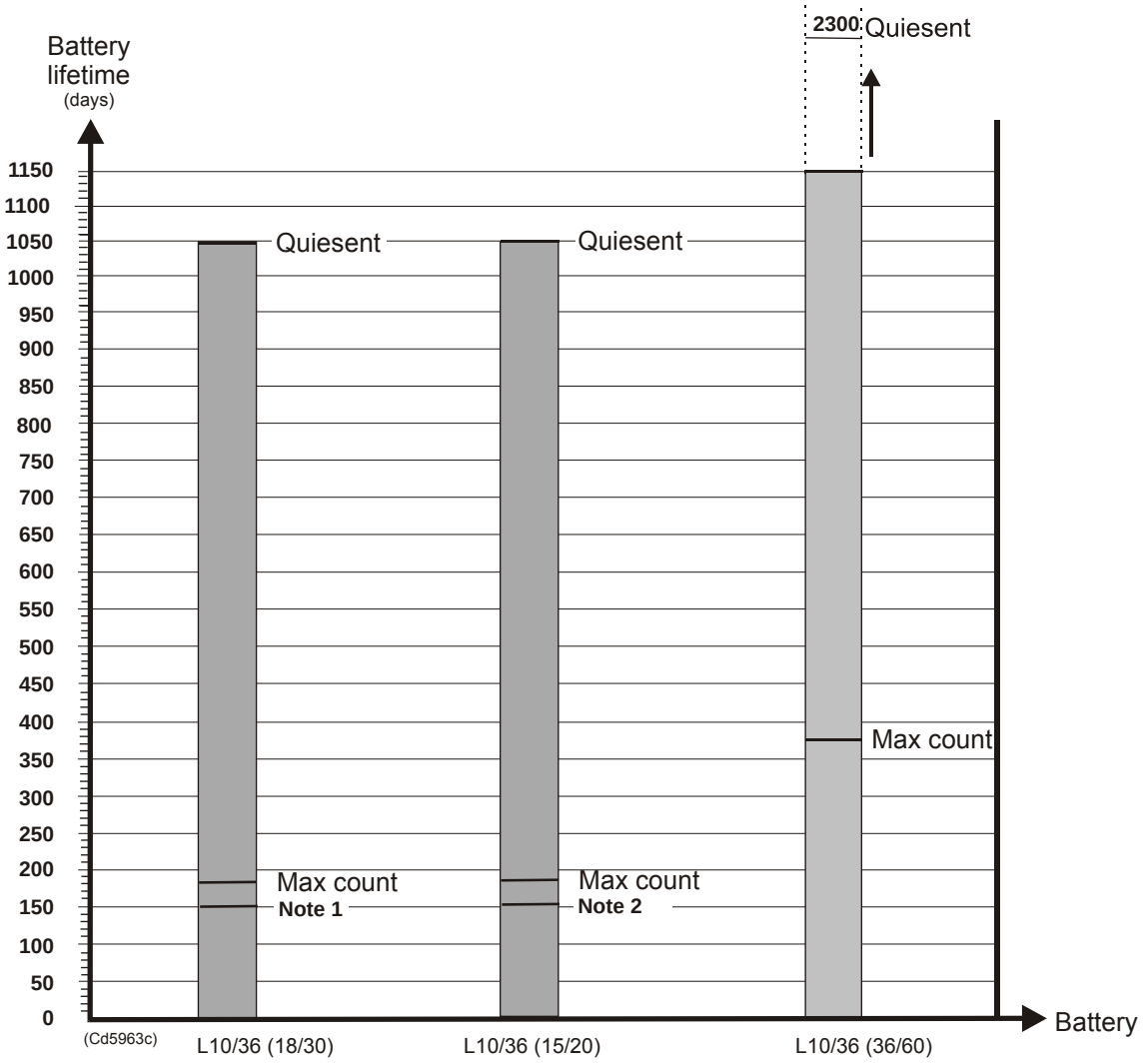


Figure 16 Battery lifetime at quiescent state

Note *For the MPT 319/DT-St, when it is used as depth transponder with 1 (one) ping every 5 seconds.*

Note *For the MPT 319/DT EEx, when it is used as depth transponder with 1 (one) ping every 5 seconds.*

Lithium battery storage

→ Refer to Handling and storage on page 33

Self-discharge depends on the temperature. The higher the temperature the greater the self-discharge will be over time.

Shelf lifetime:

The batteries may be stored for up to 10 years with little loss of capacity. The losses are approximately according to the figures below (room temperature):

- Capacity loss: 1st year -3%
- Next 9 years -1.5% per year

Note *Total capacity loss over 10 years will therefore be approximately 15%.*

Alkaline battery pack

An Alkaline battery, the Battery Pack A10/36 (24/24) is available. This battery pack may be used as a replacement for the transponder battery, L10/36 (18/30).

→ Battery specification, refer to page 51.

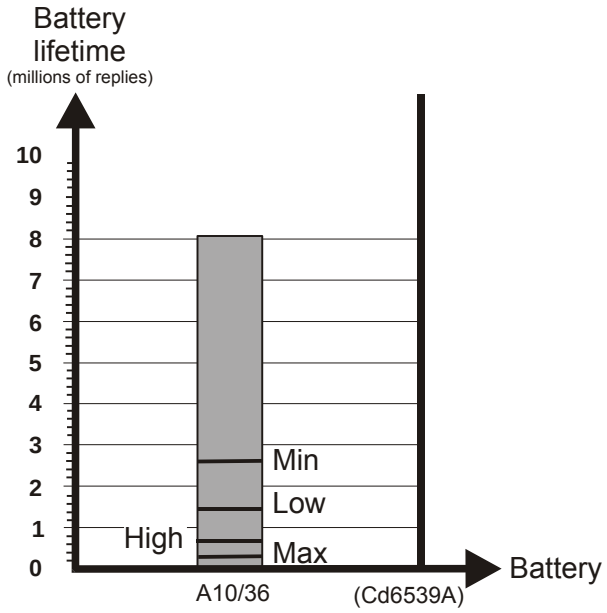


Figure 17 Battery lifetime at operation

Quiescent lifetime

This is the total time the transponder can listen for interrogation pulses. After this time the transponder will not be able to reply.

Max continuous on time

This is the maximum time the transponder can be continuously in operation, receiving and transmitting. If a low interrogation rate is used, this time may be consumed.

Battery lifetime at quiescent state

- Max continuous on time: 71 days
- Quiescent lifetime: 301 days

Alkaline battery storage

If the unit is not to be re-deployed in the near future, store it in a suitable environment.

Self-discharge depends on the temperature. The higher the temperature the greater the self-discharge will be over time.

Recommended storage temperature is room temperature or lower.

Shelf lifetime:

If the battery is stored in a dry place, (relative humidity < 65%), and with room temperature between 10 to 21 deg. C, up to 80% of initial capacity is still attainable after 4 years.

Caution	*The batteries must be stored in an upright position.*

Rechargeable battery pack

A rechargeable battery Nickel Cadmium (NiCd), the Battery Pack N10/36 (18/30) is available. This battery pack may be used as a replacement for the transponder battery, L10/36 (18/30).

→ Battery specification, refer to page 51.

The Battery Pack N10/36 (18/30) and battery charger is described in a separate manual.

The BNC 1036 Instruction manual (doc. no. 164039).

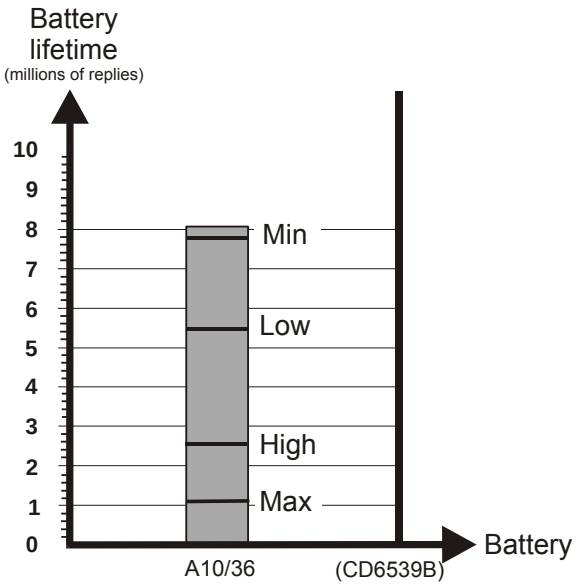


Figure 18 Battery lifetime at operation

Battery lifetime at quiescent state

- Max continuous on time: 16 days
- Quiescent lifetime: 90 days
- Number of charge/discharge cycles: 250

Battery unit L24

This is the battery used for powering the Octans module.

Battery type	Lithium
Number of cells	98
Capacity	168 Ah
Voltage	24 V
Lifetime	336 hours

Storage

Lithium battery storage.

→ Refer to page 56.

Subsea SPT/MPT battery unit

This is the battery used for powering the SPT 319/E-series.

Battery type	L 10/36 /36/60) Lithium - see page 53.

Storage

Lithium battery storage.

→ Refer to page 56.

How to mount the transponder battery

To mount the battery, proceed as follows:

→ See also how to connect the transponder battery on page 60.

1 Open the transponder unit.

→ Refer to page 71 for details.

2 Connect the battery as illustrated in Figure 19 on page 60.

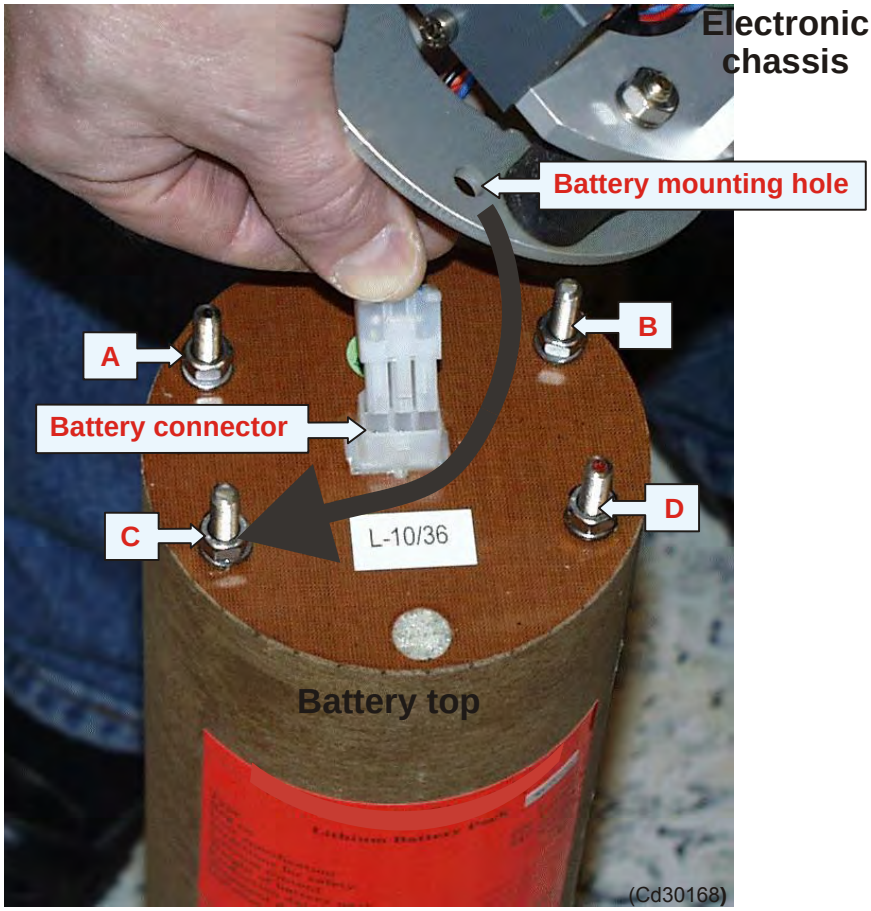


Figure 19 Connecting and mounting the battery

3 Fit the battery onto the chassis mounting holes (4 holes).

4 Mount the four nuts (A-D) and locking washers holding the battery to the chassis.

5 Assemble the transponder.

→ Refer to page 78 for details.

Note *Replace the used silica-gel bag with the new bag delivered with the battery.*

6 Check that the unit is correctly assembled and sealed.

7 Perform a functional check before deployment.

How to connect the transponder battery

To connect the battery, the unit must be opened.

→ Refer to page 64 for details.

1 Grab the connector firmly using both hands. Press the connector onto the battery plug.

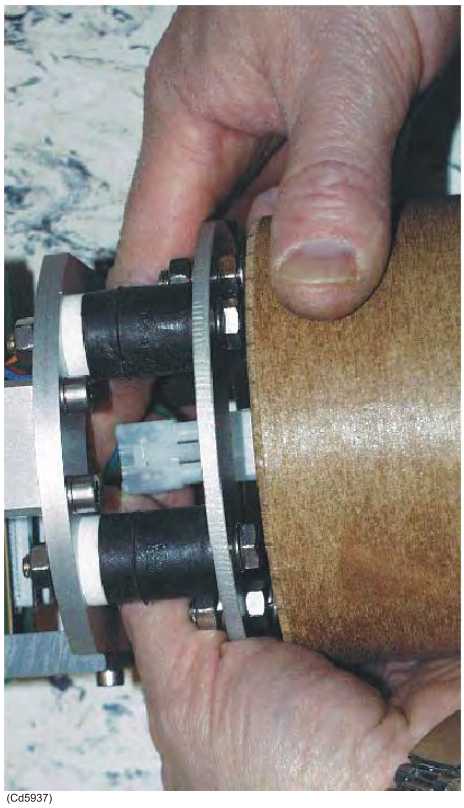

(Cd5937)

Figure 20 Connecting the battery

2 When the battery is connected, listen for the transponder initialization:

Three bursts should be transmitted at a rate of one per second.

-If no **bursts** are heard, disconnect the battery immediately, and wait minimum 20 sec. before connecting / reconnecting it again.

3 When the battery is correctly connected, assemble the transponder.

→ Refer to page 78 for details.

4 Check that the unit is correctly assembled and sealed.

5 Perform a functional check before deployment.

→ Refer to page 41 for details.

How to replace a transponder battery

To replace a transponder battery, proceed as follows:

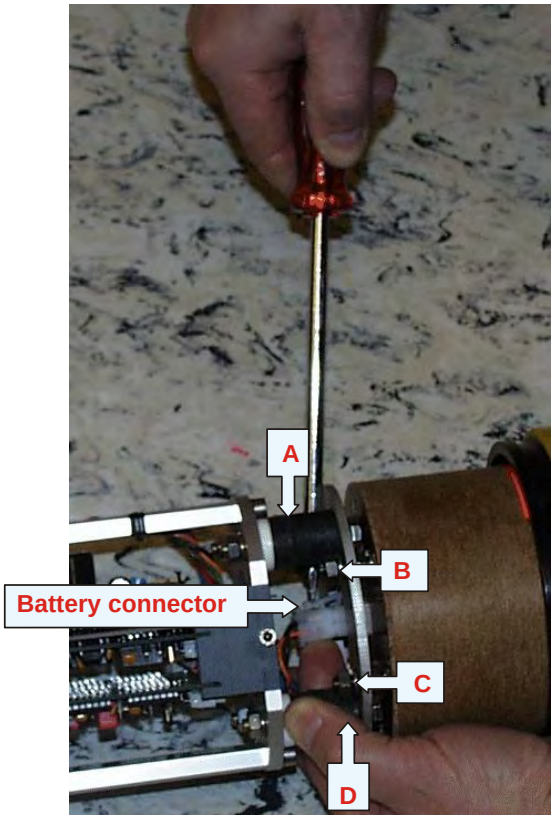
1 Open the transponder unit.

2 If the transponder is fitted with a release unit, you must first disconnect and remove the release unit.

→ Refer to page 78 for details.

3 Unplug the battery by :

Support the connector with your left hand and use a screw driver to press the release knob, as you pull out the connector.



(Cd30135)

Figure 21 Battery connector and mounting screws

4 Remove the four nuts and locking washers (A-D) holding the battery to the chassis.

5 The battery can now be removed from the chassis.

6 Replace the battery pack in the reverse order, as follows:

Mount the four nuts and locking washers holding the battery to the chassis.

→ Refer to Figure 21 Battery connector and mounting screws on page 62.

For responder transponders:

1 Connect the battery.

→ Refer to How to connect the transponder battery on page 60 for details.

2 Assemble the transponder.

→ Refer to How to assemble a transponder on page 78.

Note *Replace the used silica-gel bag with the new bag delivered with the battery.*

Note *When the battery is connected / disconnected the electronics is reset.*

After Hard reset / Reset, Tx power is set to:

- HiPAP = HIGH
- HPR 400 = HIGH
- HPR 300 = MAXIMUM

How to replace the battery pack for the Battery unit L24

To replace the battery of the Battery pack L24 unit, use the same procedure as for replacement of a transponder battery.

→ Refer to procedure on page 62.

How to replace the battery pack for the Subsea SPT/MPT battery unit

To replace the battery of the subsea SPT/MPT battery unit, use the same procedure as for replacement of a transponder battery.

→ Refer to procedure on page 62.

7 TRANSPONDER CONFIGURATION

This section holds information about the configuration of a transponder. All transponders are configured by the manufacturer. The configuration may be altered if required. The procedure to perform alterations will depend on the HiPAP / HPR system in use.

A transponder can operate with the following topside systems:

- HiPAP
- HPR 400 series
- HPR 300 series

- Each transponder series is dedicated to a specific frequency band.
- Altering the configuration, switching between the operating systems or changing the channel settings is done by:
  - Acoustic telemetry.
    (A HiPAP or a HPR 400 system is required).
  - Use of internal switches.
    (Located on the microcontroller board).
- A large number of transponder channels are available (depending on the selected system) to prevent interference between transponders, if several are located in the same area (a channel being an interrogation and reply frequency combination).

Topics

→ Frequency band on page 64

→ Acoustic telemetry -basics on page 65

→ Switch settings - basics on page 65

→ HPR 400/HiPAP channels on page 66

→ HPR 300 channels on page 67

Frequency band

For the transponders described in this manual, the 30 kHz frequency band is used.

Acoustic telemetry -basics

For information on how to use acoustic telemetry in a HiPAP / HPR 400 system:

→ Refer to the APOS on-line help.

Switch settings -basics

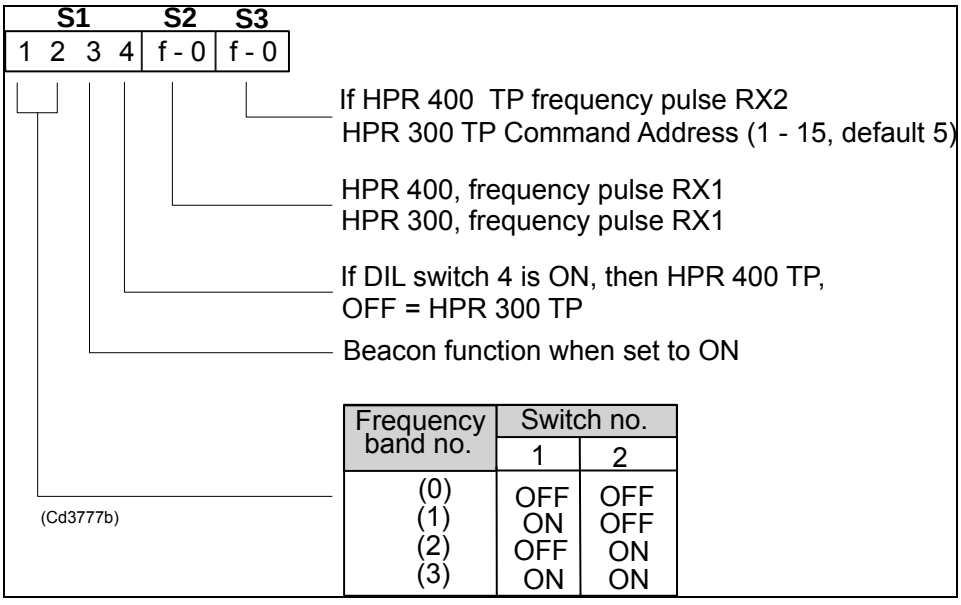
The switches for frequency and channel set-up are located on the microcontroller board:

→ Refer to Microcontroller board on page 86.

The set-up must therefore be done before unit installation, while the unit is open. The following switches are available; a 4-bit DIL switch and two 16-position rotary switches.

The set-up is described in Figure 22 and the switches are used as follows:

- The DIL switches (S1 -four switches) select the system of operation.
- The rotary switches S2 and S3:
  - For the HPR 400 and the HiPAP systems - select the transponder operating frequency and channel.
  - For the HPR 300 series -set the interrogation frequency and command address.



Frequency band no.	Switch no. 1	Switch no. 2
(0)	OFF	OFF
(1)	ON	OFF
(2)	OFF	ON
(3)	ON	ON

Figure 22 Microcontroller board – switch settings

HPR 400/HiPAP channels

HPR 400 system

The HPR 400 channel operation is the default. When set to HPR 400, the transponder executes all the commands for LBL and SSBL operation and subsea ranging. It also has an incorporated telemetry system.

HiPAP system

A HiPAP system uses the same channel working principle as a HPR 400 system. The following paragraphs therefore describe only the principles for a HPR 400 system.

The HPR 400 channel operation is the default. When set to HPR 400, the transponder executes all the commands for LBL and SSBL operation and subsea ranging. It also has an incorporated telemetry system.

Acoustic coding principle

The telemetry link uses a burst of seven pulses, all with different frequencies, transmitted in a sequence to make up a message. The coding principle is called “Factorial coding” and has a total of 5040 combinations, used as follows:

- 4096 of these are used for defining a 12-bit message.
- 4097 to 5040 are spare. The spare combinations may be used for other messages such as ASCII transmissions and special single messages.

A complete telegram is constructed by sending several messages in sequence.

HPR 400 channels and positioning frequencies

The number of channels available with an HPR 400 system depends on the transponder type used.

→ An overview of available channels and operating frequencies is given in the APOS on-line help.

Frequency band

- Rx frequencies used are: 21.000 - 24.500 kHz.
- Telemetry frequencies used are: 25.000 - 26.500 kHz, at 250 Hz intervals.

- Tx frequencies used are: 27.000 -31.500 kHz.

The HPR 400 system interrogates the transponders by transmitting two pulses with frequencies according to the protocol. The transponder reply is determined by the second interrogation pulse (refer to figure 24). When the first interrogation pulse is an odd number (o) the reply is 250 Hz higher than it is when the pulse is an even number.

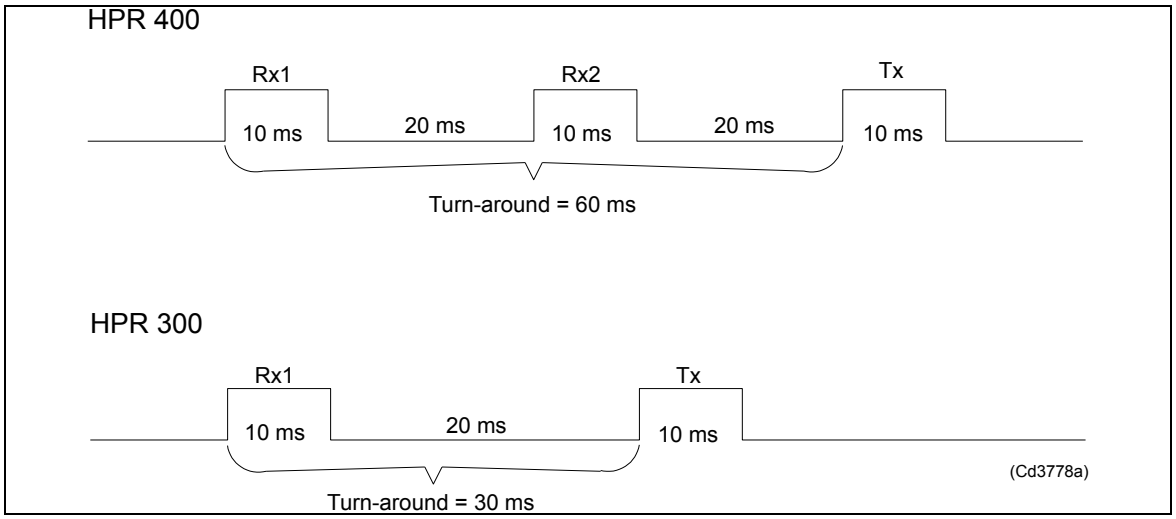


Figure 23 Transponder reception and transmission signal timing diagram

Switch settings for HPR 400:

DIP switches				
HPR	**S1-1**	**S1-2**	**S1-3**	**S1-4**
HPR 400	On	Off	Off	On
Rotary switches				
HPR 400	**S2**		**S3**	
	Set to the first digit of the desired channel number – Rx 1.		**Set to the second digit of the desired channel number – Rx 2.**	

→ Refer to Figure 22 on page 65.

HPR 300 channels

An HPR 300 system interrogates the transponders by transmitting one pulse with frequency according to the protocol.

→ Refer to Figure 23 Transponder reception and transmission signal timing diagram on page 67.

HPR 300 command function

The HPR 300 command function principles are the same for all the transponders described in this manual. In a HPR 300 system, the command system uses a combination of "Frequency shift keying" and "Pulse position coding".

The commands are transmitted as a series of tone bursts, two frequencies being required to transmit the range of commands to each transponder. These are:

- An Individual Interrogation Frequency (IFF) -specific to the particular transponder.
- A Common Command Frequency (CCF) -common to all transponders.

The command information is contained in the delay between the IFF and the CCF signals and in the CCF signal's repetition period.

HPR 300 frequencies and switch settings

The HPR 300 system uses the Common Command Frequency (CCF) of 20 kHz, and has a total of 14 channel numbers (frequency combinations) available.

→ An overview of channels and operating frequencies, see also the APOS on-line help.

Switch S2 setting	Transponder channel number	Operating frequencies	
		Interrogation (TP Rx)	Reply (TP Tx)
1	B01	20.492	29.762
2	B02	21.552	30.488
3	B03	22.124	31.250
4	B04	22.727	31.847
5	B05	23.364	32.468
6	B06	24.038	27.173
7	B07	24.510	27.777
8	B08	25.000	28.409
9	B09	26.042	29.070
A	B11	21.552	27.173
B	B22	22.727	28.409
C	B33	23.923	29.762

Switch S2 setting	Transponder channel number	Operating frequencies	
		Interrogation (TP Rx)	Reply (TP Tx)
D	B44	25.126	31.250
E	B55	26.445	32.468

Switch settings for HPR 300:

DIP switches				
HPR function	**S1-1**	**S1-2**	**S1-3**	**S1-4**
HPR 300	On	Off	Off	Off
HPR 300 Beacon function	On	Off	Off	Off
Rotary switches				
HPR 300	**S2**		**S3**	
	Set to the interrogation frequency.		**Set to the command address default setting – position 5.**	

→ Refer to Figure 22 on page 65.

The system interrogates the transponders by transmitting one pulse with frequencies according to the protocol.

8 MAINTENANCE

No maintenance is normally required, apart from washing the unit. To change the battery pack, the unit must be dismantled.

Caution	*For explosion-protected transponders, (stainless steel transponders) special maintenance is required. See paragraph below.*

To change the battery pack, the unit must be dismantled.

Topics

Preventive maintenance

Preventive maintenance is limited to keeping the unit clean.

Caution	*Do not use high pressure water as this will damage the transducer face.*

- Remove all traces of salt and debris.

- Before any connectors are disconnected, ensure the surrounding areas are dry.
- Inspect the unit for damage at regular intervals. Pay particular attention to the transducer surface. This is manufactured of a synthetic rubber material, and can be damaged easily.

Maintenance for explosion-protected units

Explosion -protected electronic units must be subjects to regular safety check and maintenance. The time interval of these tests is depending on the operational and ambient conditions.

Flameproof units are protected against penetration of water to a certain extent, due to the joints. Therefore, special attention must be paid to the penetration of water in the unit.

Testing the transponder

A transponder may be tested for *short* periods on deck.

→ Refer to page 41 for information on how to test a transponder.

Caution	*Continuous operation in air may cause the unit to overheat.*

How to open a transponder

This section includes separate procedures for:

- Aluminium transponders
- Stainless steel transponders

Before you open a unit:

1 Wash the unit thoroughly in fresh water, and dry off any moisture on the outside.

2 Place the transponder horizontally on a flat, clean work-bench, and support it so it cannot roll off.

Aluminium transponders

The pressure housing comprises of the cylinder body (housing), the transducer head and the bottom end cap. The transducer head includes the transducer, the top end cap and the transducer cage. The transducer head and the bottom end cap are both sealed into the housing, using two O-rings, and is held in position by the two semi-circular halves of an clamping ring. Two socked-head stainless steel screws are used to fasten together the two halves of each clamping ring.

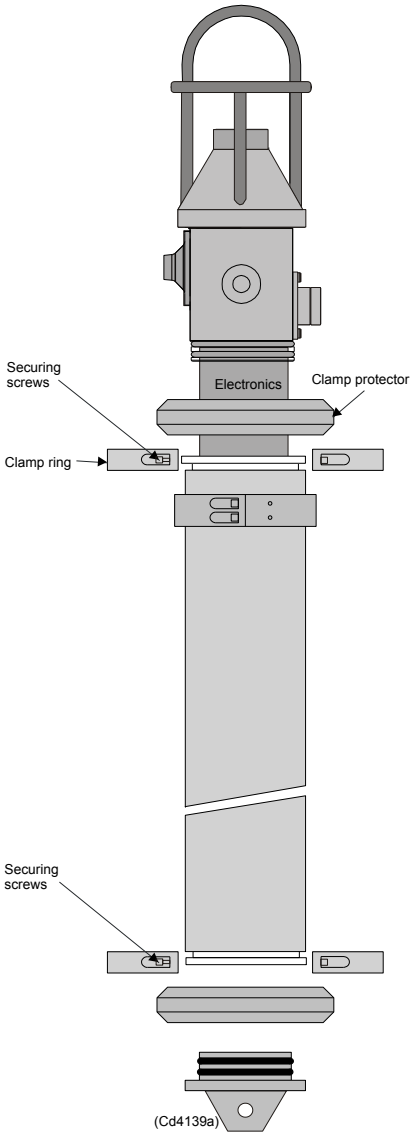


Figure 24 Example of a basic aluminium transponder pressure housing assembly

Opening the unit:

1 Remove the rubber clamp protector from the upper (transducer end) clamping ring.

2 Slacken the two securing screws and remove the two aluminium clamp pieces.

3 You are advised to use an extraction tool to remove the end caps (see figure below).

The extraction tool is a special designed Kongsberg Maritime. tool, and it is not delivered with the transponder.

The tool can be ordered from Kongsberg Maritime Extractor tool

See Figure 25 Extraction tool on page 73.

→ Order number for Extractor tool, refer to page 97.

Note *DO NOT use a screw-driver or similar tool in an attempt to lever the end cap out. This will damage the protective anodizing on the housing leading to corrosion, and may also damage the sealing surfaces.*

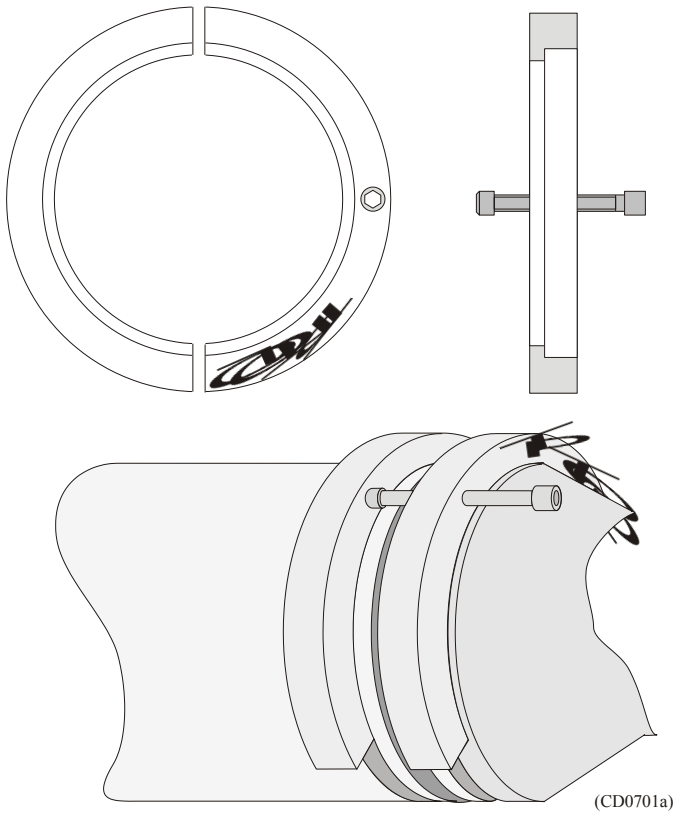


Figure 25 Extraction tool

4 With the transponder housing held securely, place one semi-circular half of the extraction tool (the half with the screw and the text) over the square groove in the end cap which normally takes the clamping ring. The text on the tool should be facing “outwards”, away from the body of the transponder.

5 Place the other half of the tool over the square groove in the transponder body such that when the screw in the first half of the tool is tightened it will press against the centre of the other part.

6 Tighten the screw against the other part of the tool such that it pulls the transducer head (top end cap) out of the transponder body. The extraction tool may need to be slackened, rotated around the transponder body, then re-tighten during the course of the operation, to ensure the end cap is pulled out without damaging the transponder body.

7 Support the end cap as it is withdrawn. Once the O-rings are clear of the housing, the transducer head and electronics chassis will be loose and the tool may be removed.

Note *If the transponder is fitted with a release unit ensure that the wires connected to the release unit and battery pack are not damaged when withdrawing the chassis.*

Note *DO NOT attempt to “unscrew” the transducer head from the housing as the internal wiring and circuitry can be damaged.*

Note *DO NOT use a screw-driver or similar tool in an attempt to lever the transducer head out. This will damage the sealing surfaces resulting in water ingress.*

8 There is a wire from the release mechanism or the responder connector (whichever is fitted) to the base of the battery pack. Disconnect this wire from the battery pack before attempting to remove the chassis too far from the transponder housing.

Stainless steel transponders

The pressure housing comprises the cylinder body (housing) and the transducer head. The transducer head includes the transducer and the top end cap. The transponder is fitted with a cage.

The transponder head is sealed into the housing, using two O-rings, and is held in position by socked-head stainless steel (SMO type) screws.

→ Refer to *Figure 26*, where an MPT 319/DT-St is used as an example.

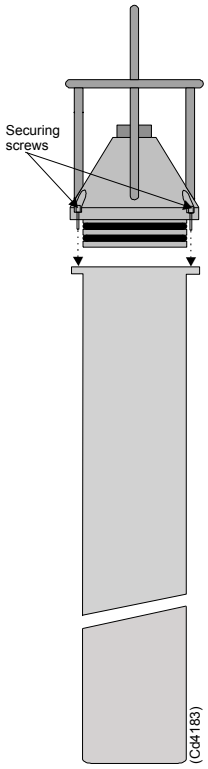


Figure 26 Example of a stainless steel transponder pressure housing assembly

Opening the unit:

1 Remove the securing screws that secure the transducer head into the housing.

- The EEx models have six securing screws.
- The /L-St, /DT-St and /I-St have four securing screws.

Note *DO NOT use a screw-driver or similar tool in an attempt to lever the end cap out. This will damage the sealing surface.*

2 Support the transponder head as it is withdrawn. No tool is to bee used. Just pull the two sections apart. Once the O-rings are clear of the housing, the transducer and electronics chassis may be removed from the housing.

Note	*The socked head screws are manufactured of SMO steel, and must only be replaced by screws of the same material.*

How to replace a transponder circuit board

→ Refer to How to open a transponder on page 71.

→ Refer to How to assemble a transponder on page 78.

Rx board, Tx board and Microcontroller board

To replace one of these circuit boards, follow the procedure below:

1 Short-circuit the capacitor in the electronics chassis, to discharge the transmitter capacitors (use a 10 to 20 Ω resistance). The location of the capacitor may vary, depending on model.

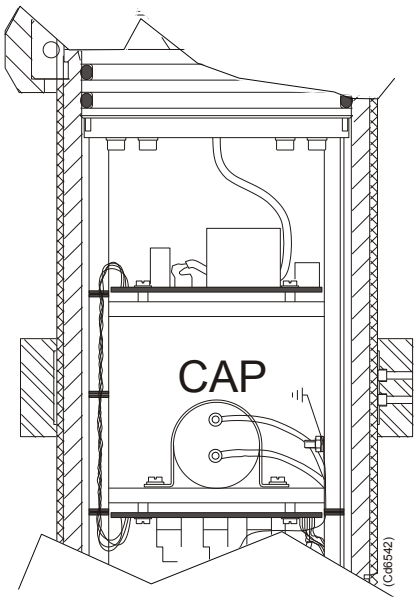


Figure 27 Part of a transponder, indicating location of the electronics chassis capacitor

2 Unscrew the plastic locking devices. The appropriate board can now be removed from the chassis.

3 Mount the new circuit board and tighten the locking devices. Take care not to over-tighten the locks.

Rx-amplifier matching board

To replace one of these circuit boards, follow the procedure below:

1 Open the transponder.

2 Remove the soldering at the connections. Remember to mark the wires.

3 Unscrew the four screws holding the board. The appropriate board can now be removed from the chassis.

4 Assemble the transponder.

How to replace the transducer

The transducer is a sealed unit and can not be opened. If the unit is not working, the whole unit must be replaced. Separate procedures are provided for:

- Aluminium transponders
- Stainless steel transponders

Aluminium transponders

1 Open the transponder.

2 Remove the transducer cage. The cage is bolted to the “cone”, which is screwed onto the top end cap.

3 Remove the soldering at the connections Tp1 and Tp 2 on the Rx amplifier matching board (the Tp1 and Tp2 are clearly marked). Remember to mark the wires.

4 Remove the electronic chassis (8 fixing screws).

5 Remove the transducer securing screws. This is done from the inside of the top end cap.

6 Assembly is basically the reverse of opening

Stainless steel transponders

1 Open the transponder.

2 Remove the transducer cage (if fitted).

3 Remove the soldering at the connections Tp1 and Tp 2 on the Rx amplifier matching board (the Tp1 and Tp2 are clearly marked).

Remember to mark the wires.

4 Remove the electronic chassis (not necessary on the EEx transponders).

5 Remove the transducer:

- The EEx models have 6 securing screws.
- The /L -St and /DT -St have 2 securing screws.

6 Assembly is basically the reverse of opening.

How to remove the bottom end cap / release unit

Note *This paragraph applies only to the aluminium transponders.*

When fitted, the release mechanism forms the bottom end cap of the pressure housing. Removing a standard end cap or a release unit is basically the same. The end cap is sealed into the transponder housing. The procedure describes how to remove the release unit:

1 Hold the transponder body securely, and agitate the release unit back and forth in the housing to break the seal.

2 Pull the release unit out. The unit should seal tightly into the housing, so some force will be required to withdraw it.

Note *A 1,3 m length of cable is connected between the release unit and the battery pack. Ensure this cable is not damaged when withdrawing the unit.*

Note *DO NOT attempt to "unscrew" the unit from the housing as the internal wiring and circuitry can be damaged.*

Note *DO NOT use a screw-driver or similar tool in an attempt to lever the unit out. This will damage the sealing surfaces resulting in water ingress.*

How to assemble a transponder

To replace the electronics chassis and battery pack into the housing, follow the procedure below:

Before you start:

1 Inspect the O-rings for damage. If in doubt, or if they have been used for more than one year, they should be replaced.

2 Place the new bag of silica-gel desiccant into the housing to absorb any humidity that may have entered the unit while it was open.

3 Ensure the mating surfaces and O-rings are *completely* clean, then wipe a thin film of non-acetic silicone grease or similar over the rings and mating surfaces.

Assembling:

1 Carefully insert the chassis into the housing. Do not allow the circuit boards to knock against the housing, and ensure no wires are trapped between the chassis and the housing or left protruding from the housing.

2 Ensure the bag of silica-gel is positioned such that it will not prevent the chassis from fully entering the housing.

3 When the O-rings on the end cap meet the lead-in chamfer at the entrance to the housing, support the base of the transponder unit and push firmly on the transducer top. Ensure the O-rings compress easily as the end cap enters the housing, and are not crimped or damaged.

4 When the end cap is fully home:

– For the aluminium transponders:

Place the two clamp parts around the housing.

Insert the two screws, and tighten them using a screwdriver-handled hexagonal key.

Replace the rubber clamp protector.

Note *Do not over-tighten the screws by using a lever type key. (The clamp do not assist with the seal, they only hold the end caps in position.*

Calibration

Note *The calibration only applies to transponders including the compass function.*

Compass transponders

All compasses can perform well in a controlled environment, where the ambient magnetic field consists solely of the earth's field. In most practical applications, however, an electronic compass module is mounted in a host system that can contain large sources of local magnetic fields.

By performing the calibration procedure, you allow the compass to identify the major sources of these local magnetic anomalies and subsequently cancel out their effects when measuring the earth's magnetic field for computing compass headings.

Note *The compass has to be in the same position / conditions in calibration and operation mode. Different positions will result in varying accuracy. The calibration is performed at the HPR / HiPAP system. Refer to the System operator manual / APOS on-line help for the calibration procedure.*

Transducer handling

At transportation and storage, the transducer face and the O-ring grooves must be protected.

As a precaution at storage, short-circuit the electrical wires. This prevents unpleasant voltages, which otherwise may appear from temperature variations.

Source level adjustment

For certain applications, you may require to adjust the source level. This is done at the HPR / HiPAP system. For information on how to adjust the source level, refer to *the System operator manual / APOS on-line help.*

Octans module

Caution *The Octans unit is a sealed unit and must not be opened. If the unit is not working as expected, contact Kongsberg Maritime.*

9 MAIN PARTS

This chapter gives a short description of the transponder main parts.

→ An example of the transponder's main parts is shown in figure on page 87.

Topics

Note *The design (placement of circuit boards) of the SPT 319/H transponder varies from the other models. On this transponder the Rx amplifier board is mounted differently, to make room for the Compass sensor.*

→ Refer to figure on page 114.

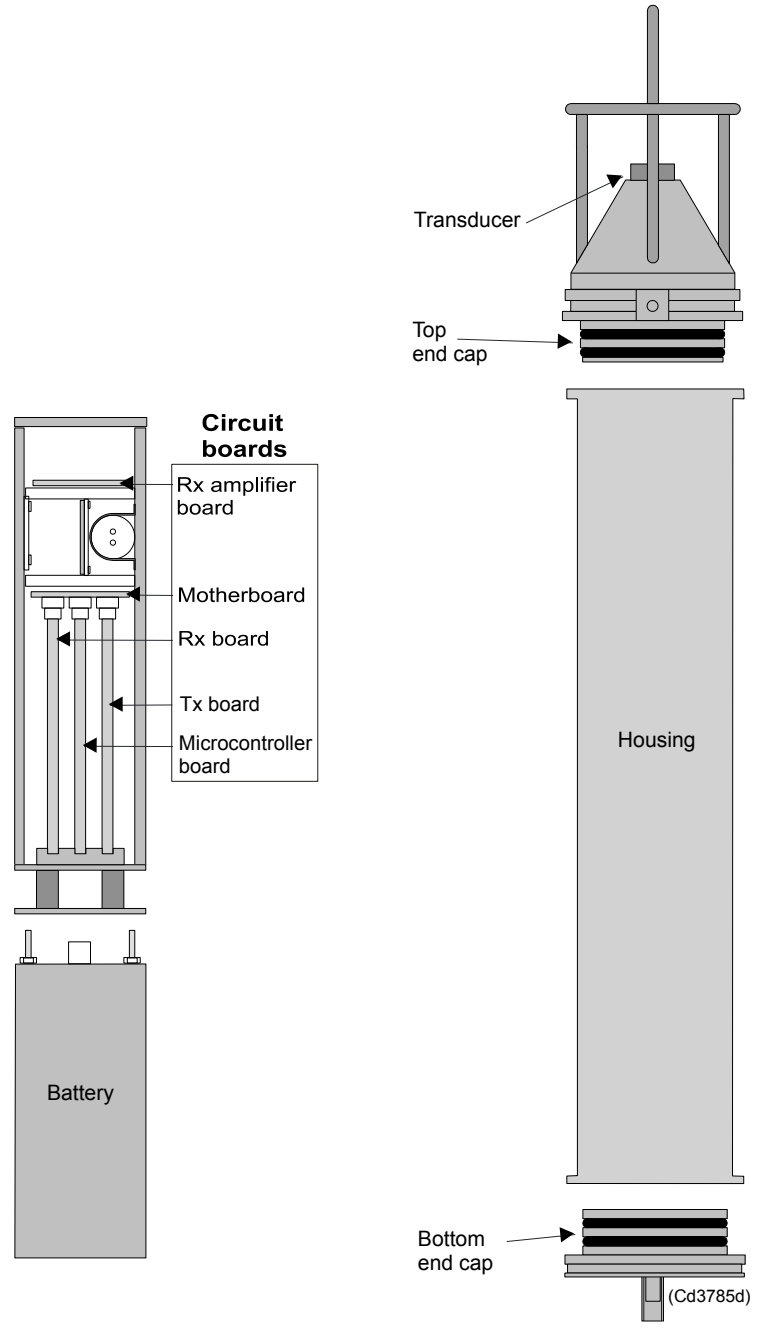


Figure 28 Example of an /TD aluminium transponder – main parts

Transducer

The transducer is mounted in one end of the cylindrical transponder. The following transducers are used:

- The transducer 90 (+-45) has a 90_ conical beam.
- The transducer 120 (+-60) has a 120_ conical beam.
- The transducer 180 (+-90) has a 180_ conical beam.

- The transducer 60 (+-30) has a 60_ doughnut shaped (horizontal) beam.

Depth and temperature sensors

For transponders with Depth and temperature sensors the transponder head is equipped with a hole to enable direct contact between the sensors and the sea water.

Note *Ensure that this hole is kept clean and open at all times.*

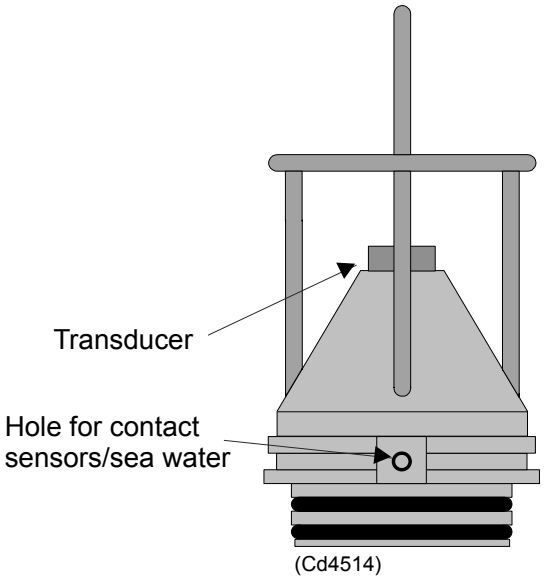


Figure 29 Transponder head for transponders with Depth and Temperature sensors

Housing

For information on the housing, refer to *Technical specification.*

Bottom end cap / Release unit

The following end caps are available:

- A standard bottom end cap that includes a pressure relief valve and a shackle.
- An end cap including the release mechanism (manually reset).

Circuit boards

The transponder electronics includes the five (5) circuit boards. These boards are standard for all applications.

Topics

Transmitter board (Tx)

The Transmitter board is a general purpose transmitter, containing its own frequency generator, power control and power supply circuits, (the board feeds both the receiver and microcontroller circuit boards.

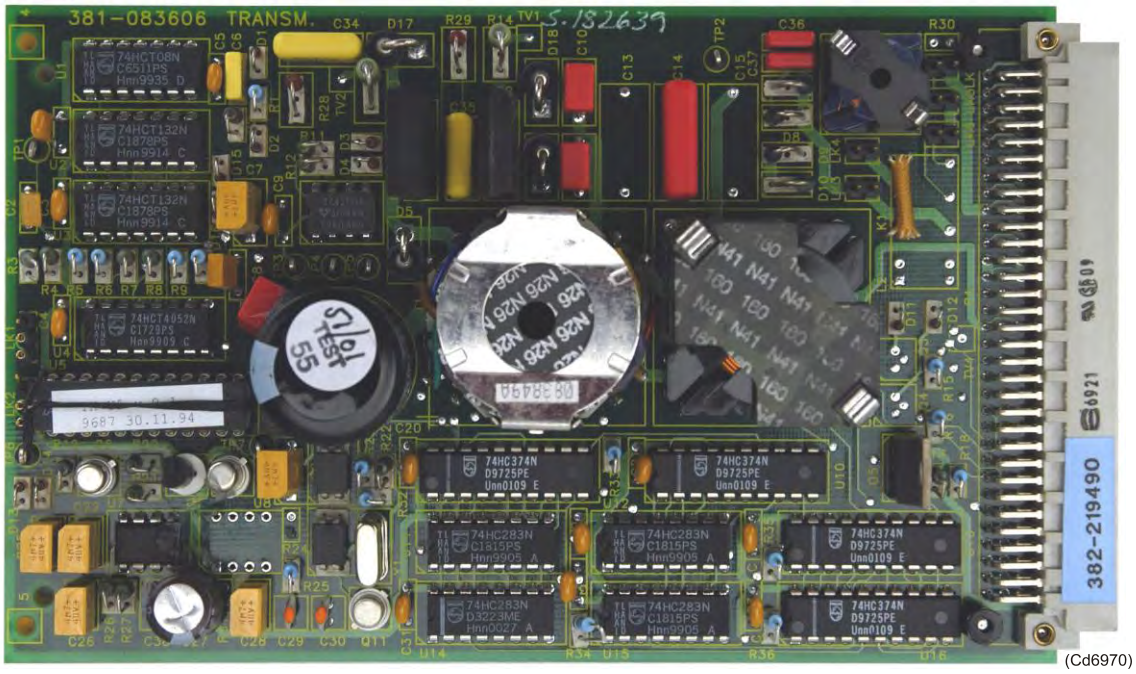


Figure 30 Transmitter circuit board

The board holds two voltage regulators which output the voltages required by the other boards. It also has a crystal oscillator which is used as the Tx frequency source, and a direct numerical synthesizer for generating the correct Tx frequency. Driver stages with power control, an output stage with over-current protection, and transducer matching circuits, complete the board.

Receiver board (Rx)

The receiver board is designed to receive transponder interrogation signals and telemetry signals. It contains nine narrow-band channel receivers, and a WIDE-detector and phase-locked loops for generating the right modulation frequencies to the channel receivers.

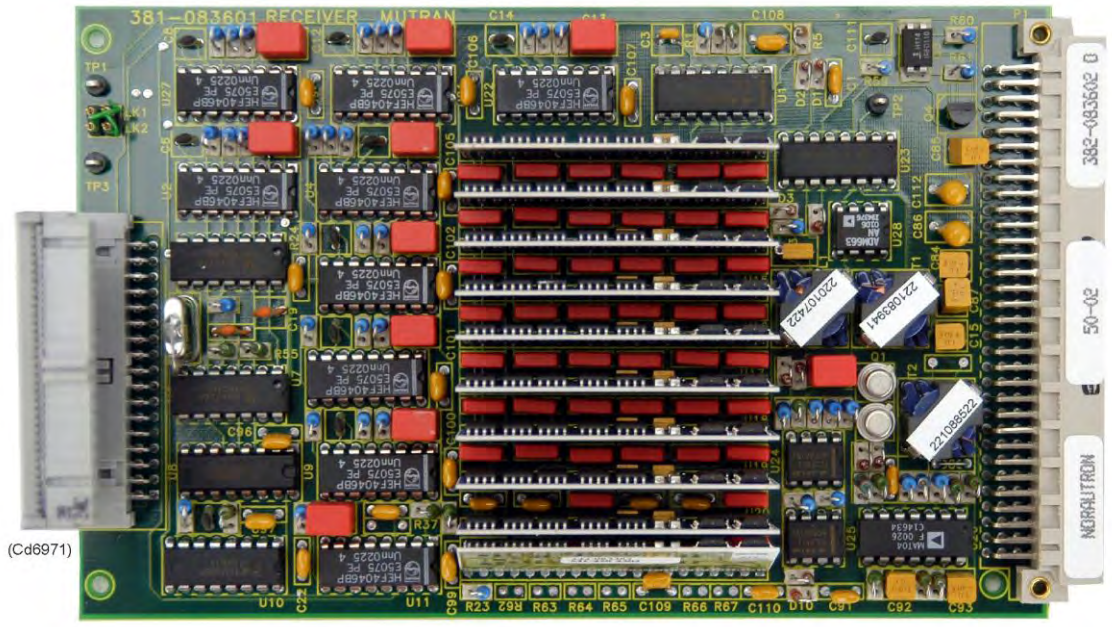


Figure 31 Receiver circuit board

The board consists of a two stage amplifier with signal limitation and an anti-aliasing filter, two channel receiver stages for wake-up, and seven channel receiver stages for telemetry which are all constructed as ceramic hybrid circuits. The channel receivers perform mixing, low-pass filtering, summing and envelope detection. The outputs from the channel receivers are fed to the microcontroller.

Rx amplifier matching board

The TP-PREAMP 24K Hz acts as a matching preamplifier between the transducer and the Channel Receiver circuit board.

→ Refer to Figure 32 for the block diagram.

The transducer is connected to TP1 and TP2.

The incoming signal passes through the matching component, T1. From T1, the input signal is connected to a two-step amplifier.

The first step of this amplifier is a low noise FET with a voltage gain of approximately 10 dB.

The signal then enters the micropower operational amplifier, where the gain can be altered in two steps; either 0 dB or 6 dB (approximate values). A logic “0” at TP7 causes 0dB to be achieved. A logic “1” at TP7 causes 6 dB to be achieved.

The amplifier contains a bandpass filter to reduce the input noise before the signal is connected to the output transformer T2. The output to the Rx board is on TP8 and TP9.

TP5 and TP6 are connected to the Transmitter board. When the system is transmitting, a TR-switch in the T1 block protects the input of the amplifier. Transmitted signals are transformed via T1 and leave the board from terminals TP1 and TP2.

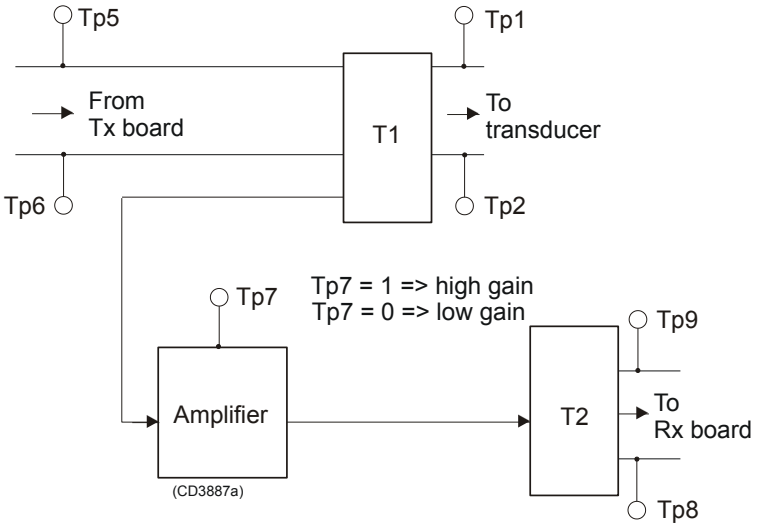


Figure 32 Rx amplifier matching board – block diagram

Microcontroller board

The Microcontroller board is a general purpose single microcontroller board, with the main task of performing calculations and digital signal control. It uses the *87C196KC/KD Microcontroller* manufactured by Intel, and is also equipped with a number of timers, inputs and outputs.

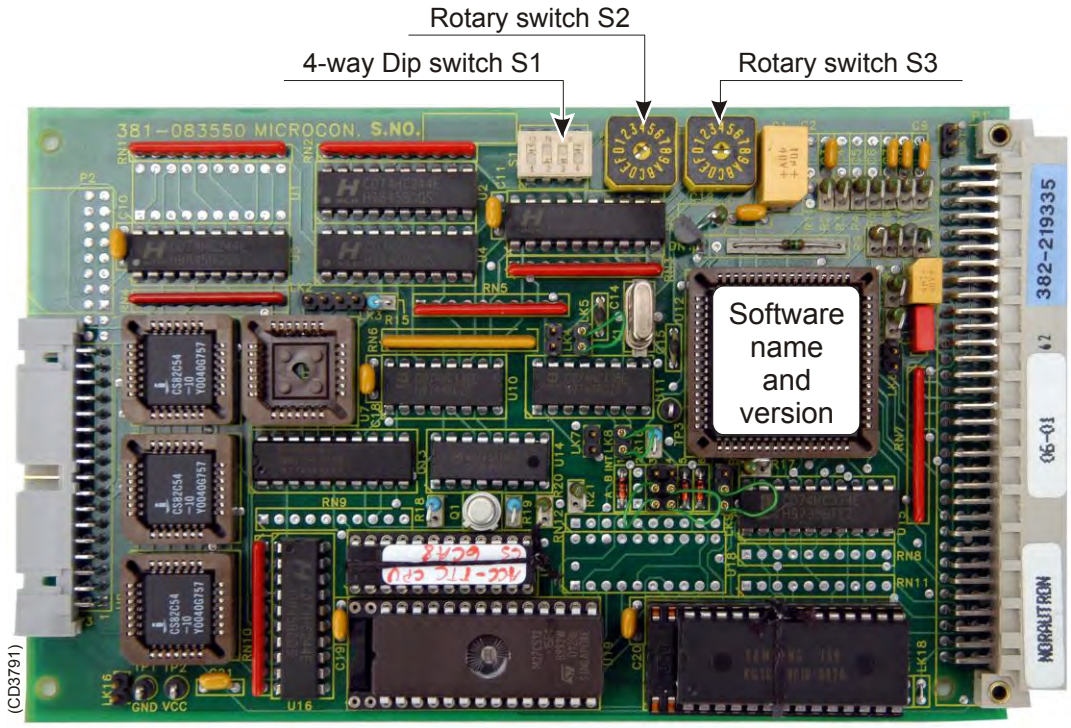


Figure 33 Microcontroller circuit board – switch locations

The 87C196 microcontroller is the main component on the board. It can be run in different modes such as active, idle and power down, the inactive modes being used to save power. The microcontroller performs all the calculations and controls all the board's inputs and outputs. The timers on the board are used for dividing down the off-board Phase-Locked-Loop frequencies, controlling the receiver frequency channels.

Switches

The board carries one 4-way Dip-switch block and two 10-position rotary switches:

- The Dip-switch block is used to set the system's operating frequency band.

Motherboard

The motherboard contains all the input/output interfacing for the transponder. It has an interface connection (P4) for the two inclinometers and a + 10 V supply which is turned on only during processing to conserve battery life. It also carries an interface plug (P5) for the Depth/Temp serial line. The TTL interface is buffered through U1 on the motherboard.

Interconnections

The interconnections will differ from transponder model to transponder model.

Note *For details of the interconnections between the circuit boards, the transducer and the electronics, and the battery and the electronics, contact Kongsberg Maritime.*

10 AUXILIARY EQUIPMENT

This chapter describes various types of auxiliary equipment that may be used to secure a transponder.

Topics

Anchor-weight

A transponder requires an anchor weight of approximately 60 to 70 kg to hold the transponder securely in position on the seabed. Use a length of **rope** from 3 to 15 metres long to attach the anchor, and then attach the "top" of the rope to the transponder.

Caution	*Do not use a chain. A chain can cause corrosion.*

The length of the rope depends on the transponder use.

- If you use LBL with very long base line in deep water, use up to15 m.
- If you use SSBL on a flat seabed, a 3 m rope is sufficient.

Floating rope

A floating rope may be used when collecting the transponder by a ROV.

→ Refer to example in the figure on page 99.

Auxiliary equipment supplied by Kongsberg Maritime

Topics

→ Guiding collars on page 92

Kongsberg Maritime may supply:

Floating collar

The collar is divided lengthwise into two halves. These halves are placed around the transponder housing and bolted together, enabling the collar to be assembled onto a transponder without removing the end cap clamping ring.

→ Floating collars on page 187

Mounting brackets

Different types of mounting brackets are available. This section presents a few examples:

- Mounting funnel
- Transponder rack (may be supplied by Kongsberg Maritime).

Mounting funnel

The figure below gives an example of how to mount a transponder using a mounting funnel. The funnel may have a closed or open bottom, depending on requirements. The mounting funnel material is chosen based on the customer's input regarding installation construction and transponder placement.

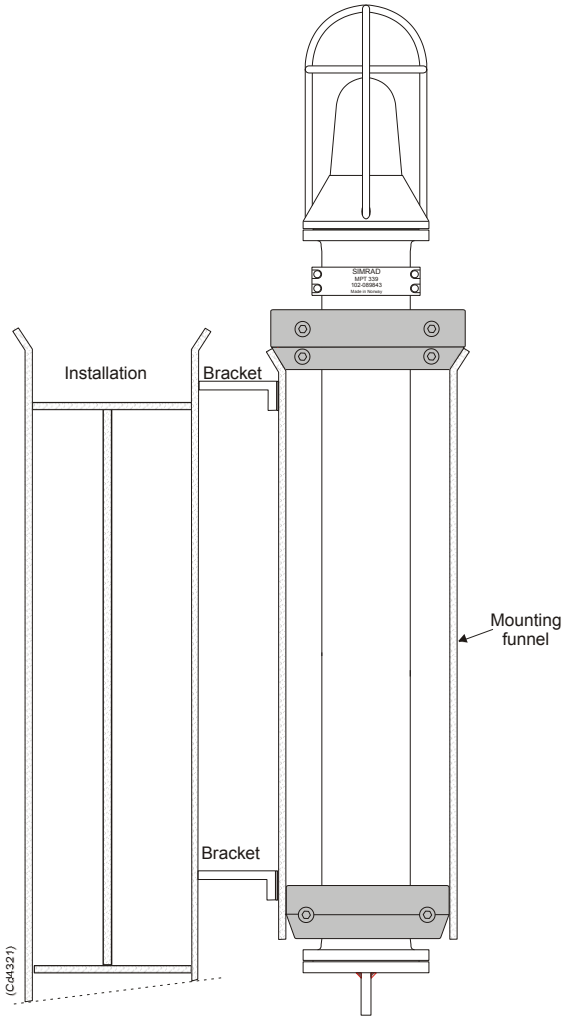


Figure 34 Example of mounting funnel

Transponder rack

The transponder rack illustrated in the figure below, may be used to mount an inclinometer transponder on a Kill and choke line. This type rack cannot be used with an ROV.

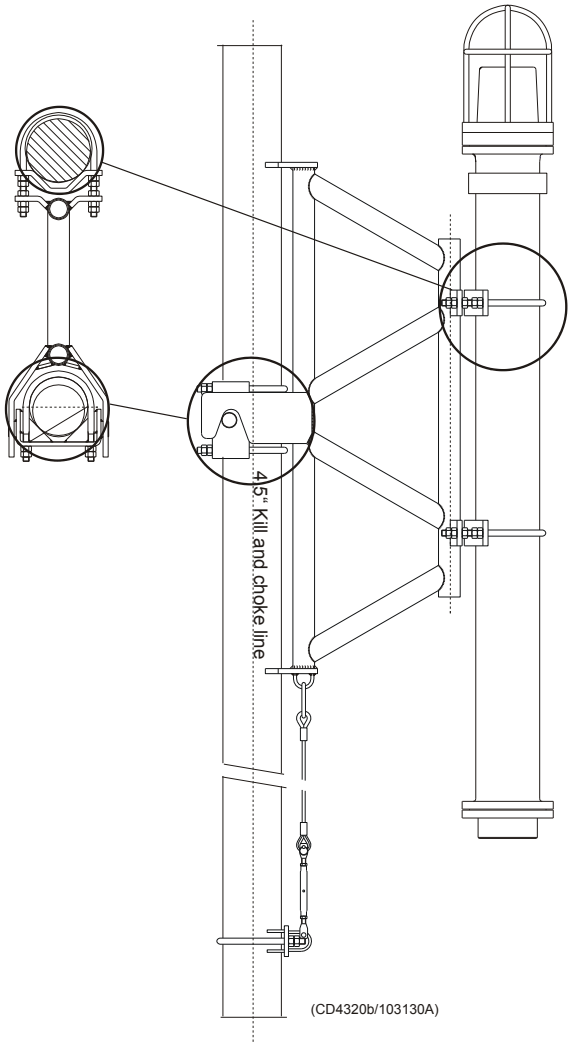


Figure 35 Transponder rack

Guiding collar

Different types of guiding collars may be used. The most common guiding collar delivered by Kongsberg Maritime comprises of two separate units; an upper and a lower. Each unit is divided into two parts. These parts are placed around the transponder housing and bolted together. It is important that the collar units are mounted correctly.

→ This is illustrated in the figure on page 99.

Note *Other types of guiding collars may be supplied on request.*

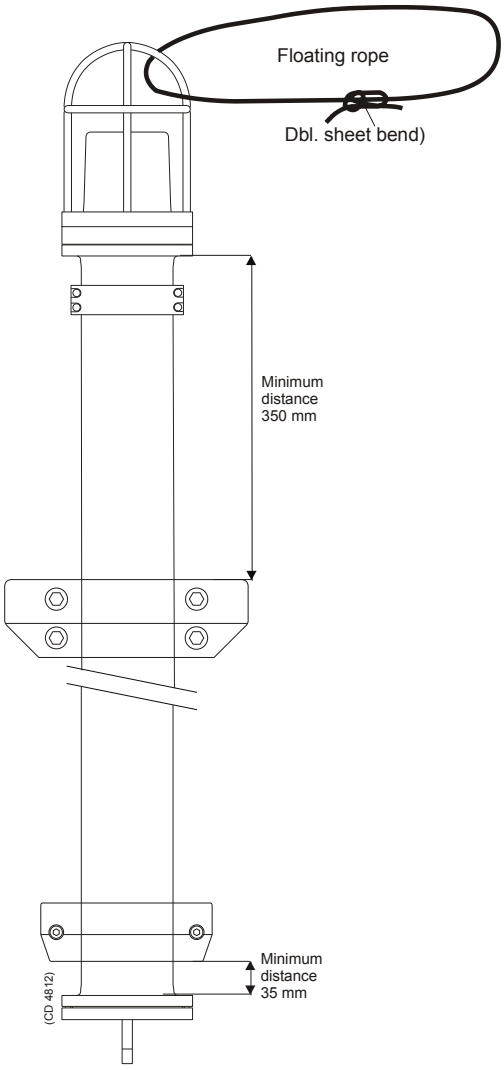


Figure 36 Example of transponder with fitted guiding collar and floating rope

A groove (12 mm wide) is made on the upper guiding collar unit.

Example of use:

The purpose of this groove is to fit the transponder correctly when using a funnel for mounting the transponder. The groove slides over a corresponding guide fin within the funnel. Correct mounting will restrict rotation of the transponder within the funnel. The funnel is equipped with a locking pin to secure the transponder (not supplied by Kongsberg Maritime).

11 SPARE PARTS

This chapter lists the parts and modules defined by Kongsberg Maritime as *Line Replaceable Units (LRUs)*. The required mounting components (such as nuts, bolts, washers etc.) are identified on the diagrams, but have not been allocated order numbers as we regard these items as standard commercial parts available from retail outlets around the world.

Topics

Codes used

The following codes are used in the parts lists:

Part no. -Kongsberg Maritime's part number.

Item name -The name of the item.

Technical data -Technical specifications and any other relevant information.

Drw. ref. -Reference number of the production or illustration drawing where the item is included. If a number is given here, the drawing will be included in the manual's/document's drawing file.

Drw. pos. -The item's position number on the drawing referenced above.

No. in sys. -The quantity of the item used in the system. *Note that this information is not provided for standard components such as nuts, bolts and washers.*

Rec. spares -The quantity of the item recommended to be carried as spares onboard the vessel.

Note *This information is not provided for standard components such as nuts, bolts and washers.*

Accessories

This list includes the common accessories used for all transponder types. Since the figure position differs on the figures for these common items, the Drw. pos. is left out.

Part no.	**Item name**	**Drw. ref.**	**No. in sys.**
-	**Technical data**	**Drw. pos.**	**Rec.spares**
540-085631	O-ring	Figures	2/4
-	99,1 x 5,7	-	-
599-089318	PCB guide	Figures	1/1
599-089320	-	-	-
Depends on model	Information clamp ring	Figures	1
	w/freq.	-	-
Depends on model	Information clamp ring	Figures	1
	w/reg. no.	-	-
599-089487	Plug for ID-clamp	Figures	3
-	-	-	-
659-063787	Lubricant	-	1
-	"AQUA LUBE"	N/A	1
659-063787	Bag of desiccant 10 g	-	1
-	Blaugel - 10/0801	N/A	1
599-089549	Guiding collar upper	N/A	-

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
599-089550	Guiding collar lower	-	1
119-086872	Floating collar	N/A	-
-	1000 m	-	1
857-160820	SPT and MPT 31x series Instruction manual	N/A	1
-	(This manual)	-	-

Sensors

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
298-097540	DT sensor	N/A	-
-	-	N/A	-
298-087677	Electronic compass module	N/A	-
-	-	N/A	-
339-211580	Inclinometer	N/A	-
-	-	N/A	-

Batteries

Note *The Lithium battery is specified with each transponder.*

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-216804	Alkaline battery	N/A	-
-	A10/36 (24/24)	N/A	-
290-212364	Rechargeable battery	N/A	-
-	N10/36 (18/30)	N/A	-

Extractor tool

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
709-089322	Extractor tool	N/A	-
-	-	N/A	-

SPT 314 basic transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-210452	SPT 314 Transponder complete without battery	Figure page 99	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 99	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 96.

Main modules

Main modules for the SPT 314 basic transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-210416	Electronic chassis	Figure page 99	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors (if used)	1	-

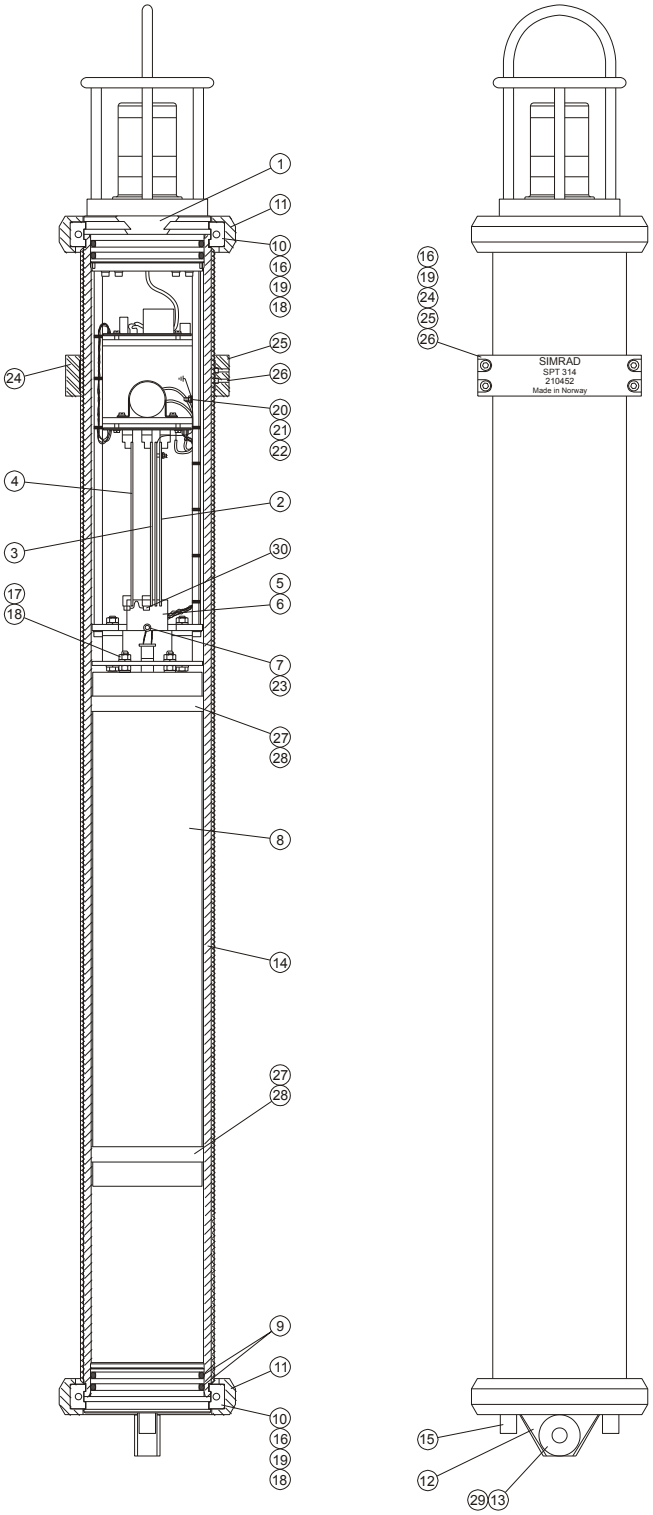
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
	are included		
382-211279	Tx board	Figure page 99	1
-	-	2	-
382-083551	Microcontroller board	Figure page 99	1
-	-	3	-
382-102853	Rx board	Figure page 99	1
-	-	4	-
599-089263	Bottom end cap	Figure page 99	1
-	-	12	-
599-089149	Housing	Figure page 99	1
-	-	14	-

- Separate Transducer unit, part. no: 312-210173

Accessories

→ Refer to the table on page 95.

SPT 314 basic transponder – Exploded view



Page 1 of 1 (CD4171)	SPT 134 basic transponder - exploded view	**860-210451** Rev.D

SPT 314/R transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-210494	SPT 314/R Transponder complete without battery	Figure page 102	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 102	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the SPT 314/R transponder.

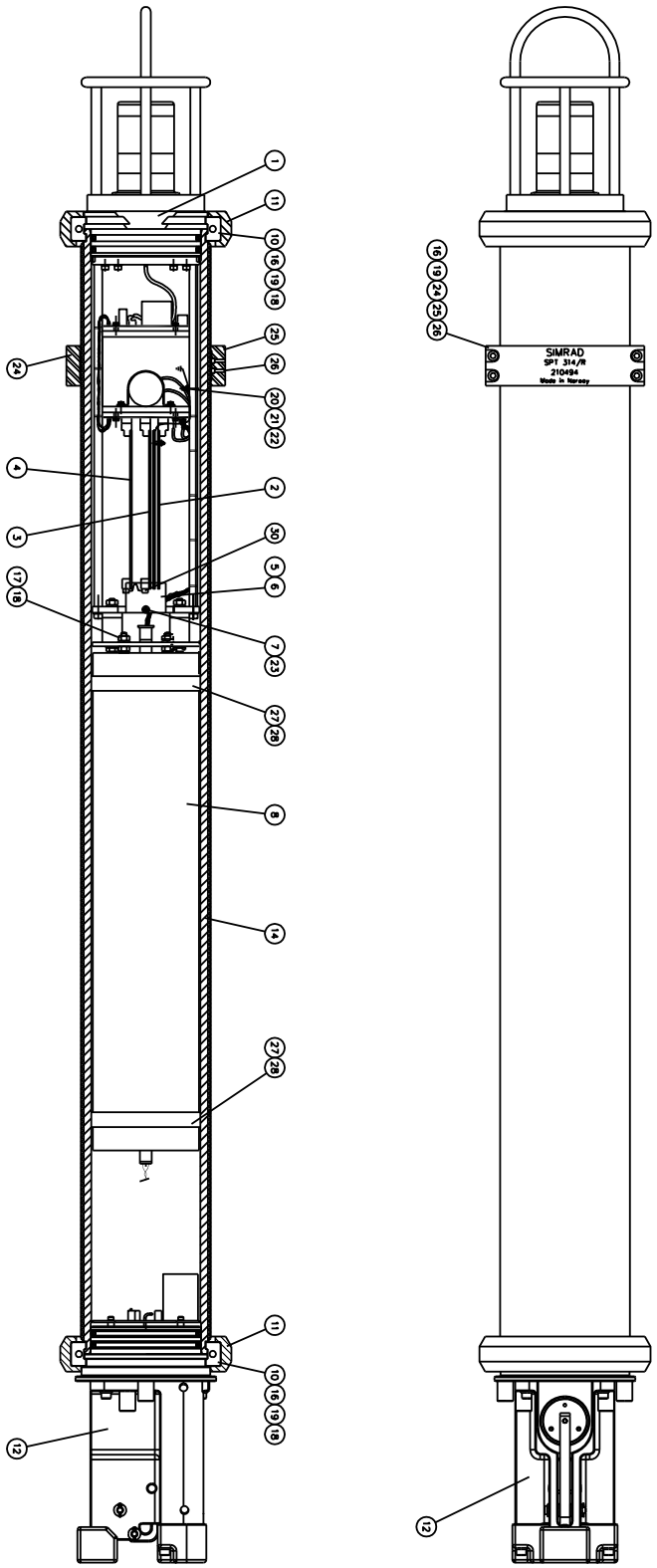
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-210416	Electronic chassis	Figure page 102	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors (if used) are included	1	-
312-210173	Separate Transducer unit	Figure page 102	1
(1)	-	1	-
382-211279	Tx board	Figure page 102	1
-	-	2	-
382-083551	Microcontroller board	Figure page 102	1

-	-	3	-
382-102853	Rx board	Figure page 102	1
-	-	4	-
599-089149	Housing	Figure page 102	1
-	-	14	-
499-215018	Release Unit	Figure page 102	1
-	-	12	-

Accessories

→ Refer to the table on page 95.

SPT 314/R transponder – Exploded view



Page 1 of 1 (Cd4173)	SPT 314/R transponder - exploded view	**860-210493** Rev.C

SPT 314/I transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-210473	SPT 314/I Transponder complete without battery	Figure page 105	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 105	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the SPT 314/I transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-210471	Electronic chassis	Figure page 105	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors **(2)** (if used) are included	1	-
382-211279	Tx board	Figure page 105	1
-	-	2	-
382-083551	Microcontroller board	Figure page 105	1
-	-	3	-
382-102853	Rx board	Figure page 105	1

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
-	-	4	-
599-089263	Bottom end cap	Figure page 105	1
-	-	12	-
599-089149	Housing	Figure page 105	1
-	-	14	-

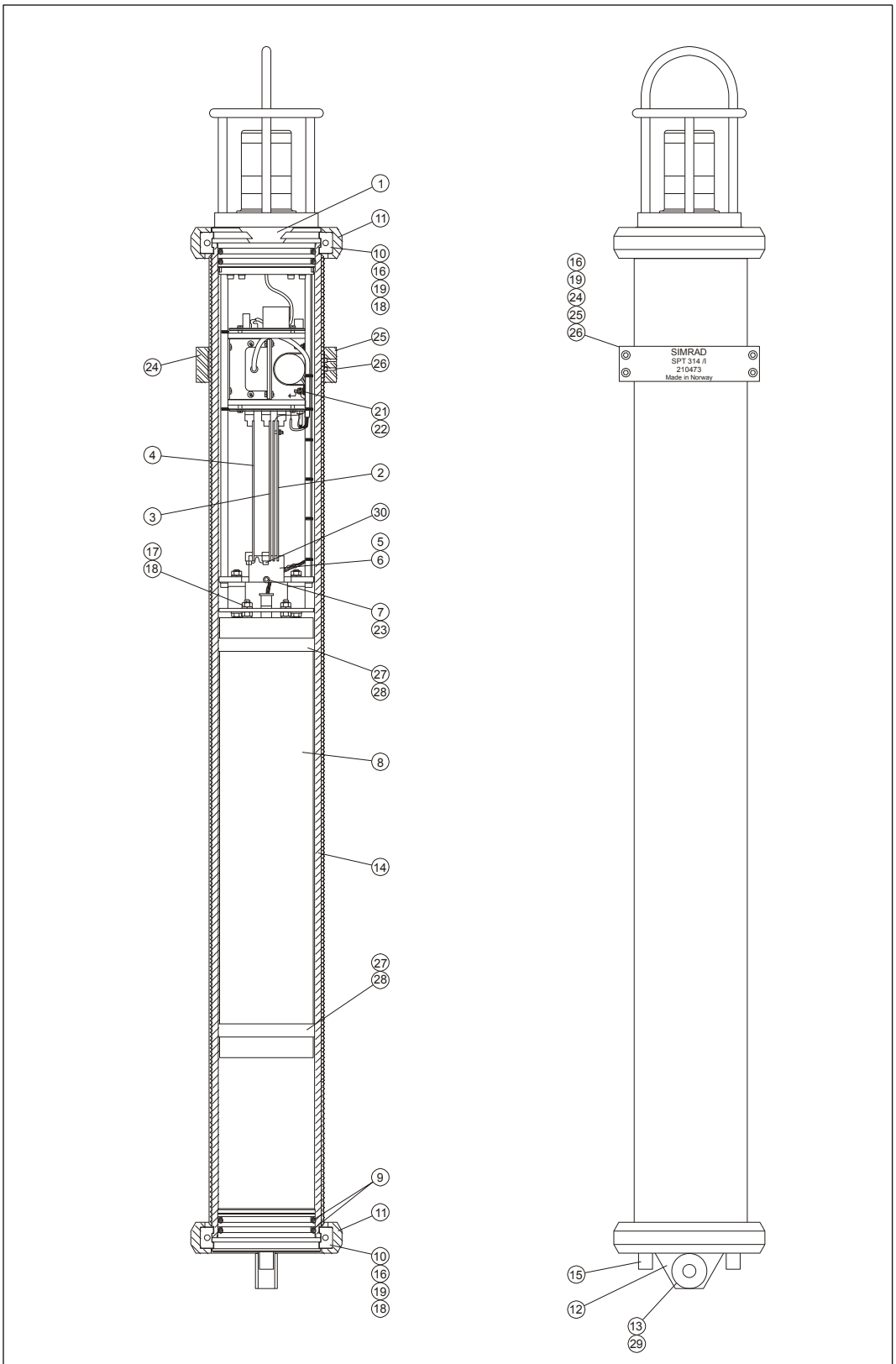
1 Separate Transducer unit, part. no: 312-210173

2 Separate Inclinometer, see page 96.

Accessories

→ Refer to the table on page 95.

SPT 314/I transponder – Exploded view



Page 1 of 1 (CD4172)	SPT 314/I transponder - exploded view	**860-210472** Rev.D

SPT 319 basic transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-103059	SPT 319 Transponder complete without battery	Figure page 108	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 108	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the SPT 319 basic transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-089330	Electronic chassis	Figure page 108	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors (if used) are included	1	-
382-083607	Tx board	Figure page 108	1
-	-	2	-
382-083551	Microcontroller board	Figure page 108	1
-	-	3	-
382-083602	Rx board	Figure page 108	1

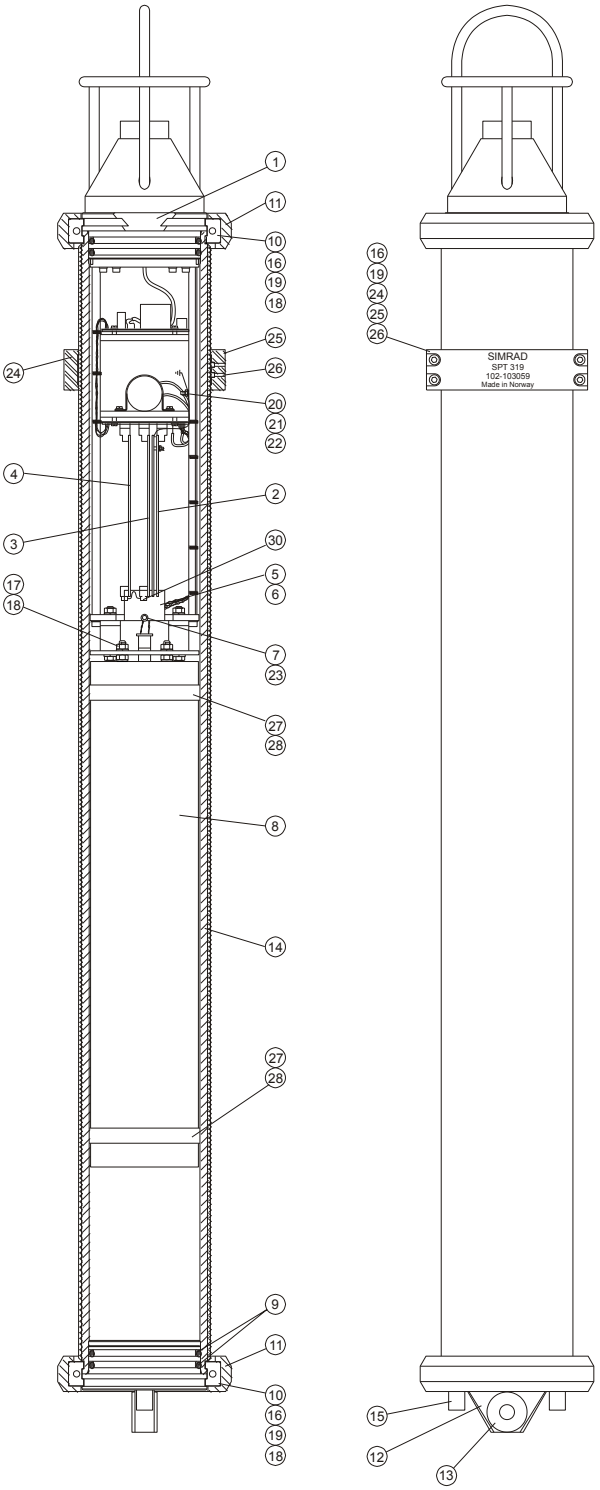
Part no.	Item name	Drw. ref.	No. in sys.
-	Technical data	Drw. pos.	Rec.spares
-	-	4	-
599-089263	Bottom end cap	Figure page 108	1
-	-	12	-
599-089149	Housing	Figure page 108	1
-	-	14	-

1 Separate Transducer unit, part. no: 312-073871

Accessories

→ Refer to the table on page 95.

SPT 319 basic transponder – Exploded view



Page 1 of 1 (CD4169)	SPT 319 basic transponder - exploded view	**102-103059** Rev.H

SPT 319/R transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-103060	SPT 319/R Transponder complete without battery	Figure page 111	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 111	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the SPT 319/R transponder.

Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	**Drw. pos.**	**Rec.spares**
299-089330	Electronic chassis	Figure page 111	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors (if used) are included	1	-
382-083607	Tx board	Figure page 111	1
-	-	2	-
382-083551	Microcontroller board	Figure page 111	1
-	-	3	-
382-083602	Rx board	Figure page 111	1

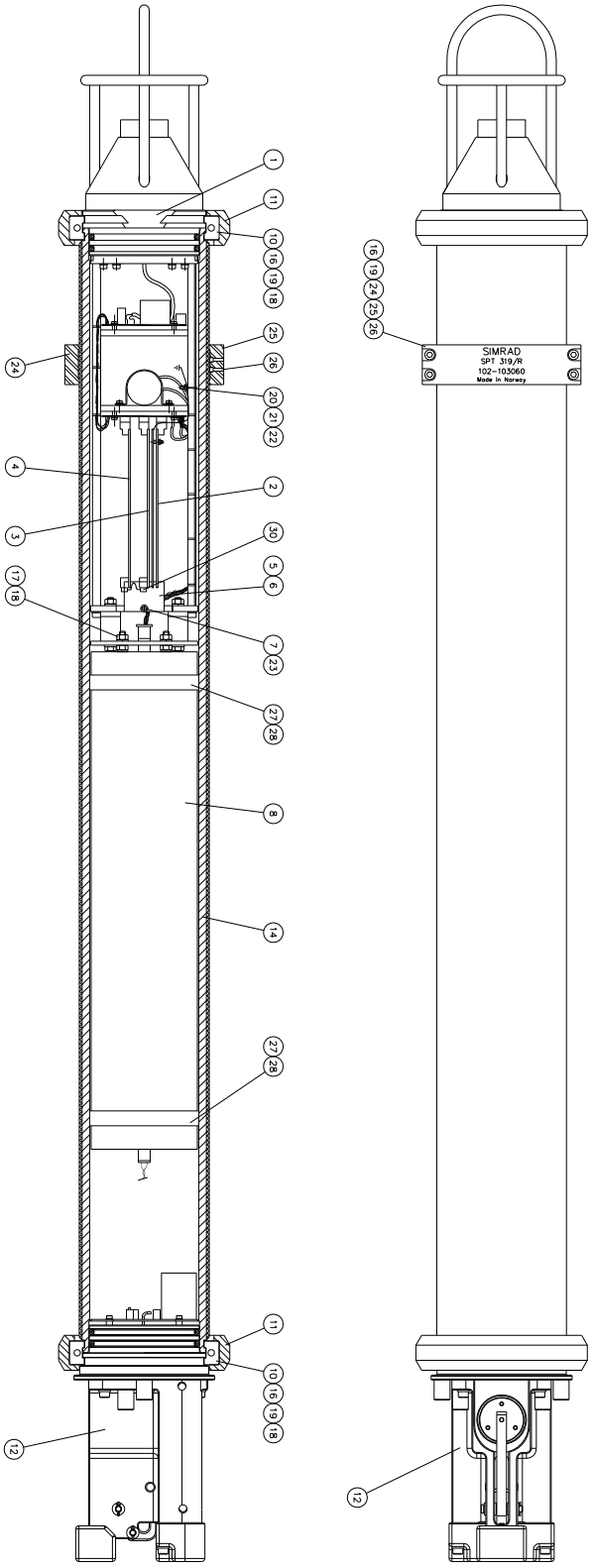
Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	**Drw. pos.**	**Rec.spares**
-	-	4	-
599-089149	Housing	Figure page 111	1
-	-	14	-
499-215018	Release unit	Figure page 111	1
-	-	12	-

1 Separate Transducer unit, part. no: 312-073871

Accessories

→ Refer to the table on page 95.

SPT 319/R transponder – Exploded view



Page 1 of 1 (CD4170)	SPT 319/R transponder - exploded view	**102-103060** Rev.D

SPT 319/H transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
860-211878	SPT 319/H Transponder complete without battery	Figure page 114	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 114	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the SPT 319/H transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-089523	Electronic chassis	Figure page 114	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors **(2)** (if used) are included	-	-
382-083607	Tx board	Figure page 114	1
-	-	2	-
382-083551	Microcontroller board	Figure page 114	1
-	-	3	-
382-083602	Rx board	Figure page 114	1

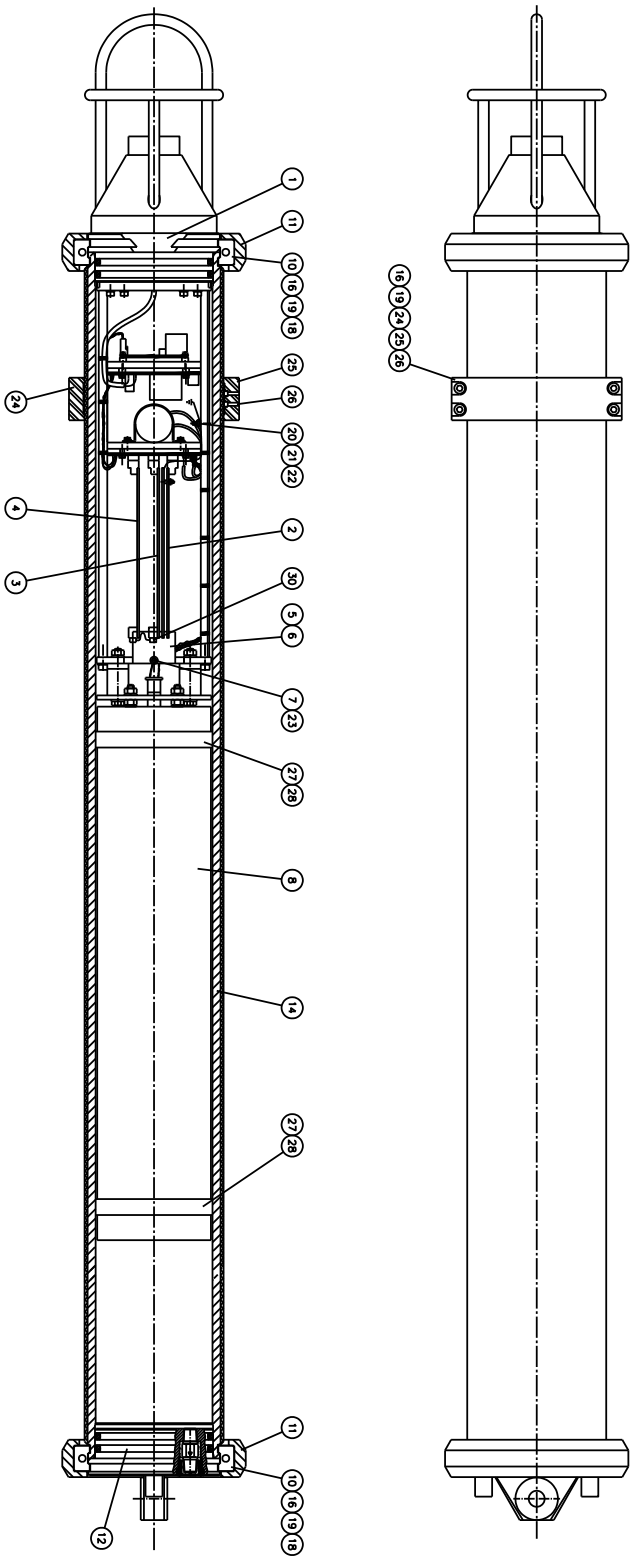
Part no.	Item name	Drw. ref.	No. in sys.
-	Technical data	Drw. pos.	Rec.spares
-	-	4	-
599-212422	Housing	Figure page 114	1
-	-	-	-

- Separate Transducer unit, part. no: 312-073871
- Separate Electronic compass module, see section on page 96.

Accessories

→ Refer to the table on page 95.

SPT 319/H transponder - Exploded



Page 1 of 1 (Cd4498)	SPT 319/H transponder - exploded view	**860-211879** Rev.E

SPT 319/I-St transponder

The standard SPT 319/I transponder is delivered with aluminium housing, see page 118.

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	**Drw. pos.**	**Rec.spares**
102-211515	SPT 319/I-St Transponder complete without battery	Figure page 117	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 117	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the SPT 319/I-St stainless steel transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
312-089504	SPT 319/I-St transducer	Figure page 117	1
-	-	1	-
299-089523	Electronic chassis	Figure page 117	1
-	Motherboard, Rxamp board and sensors **(1)** (if used) are included	1	-
382-083607	Tx board	Figure page 117	1
-	-	2	-
382-083551	Microcontroller board	Figure page	1

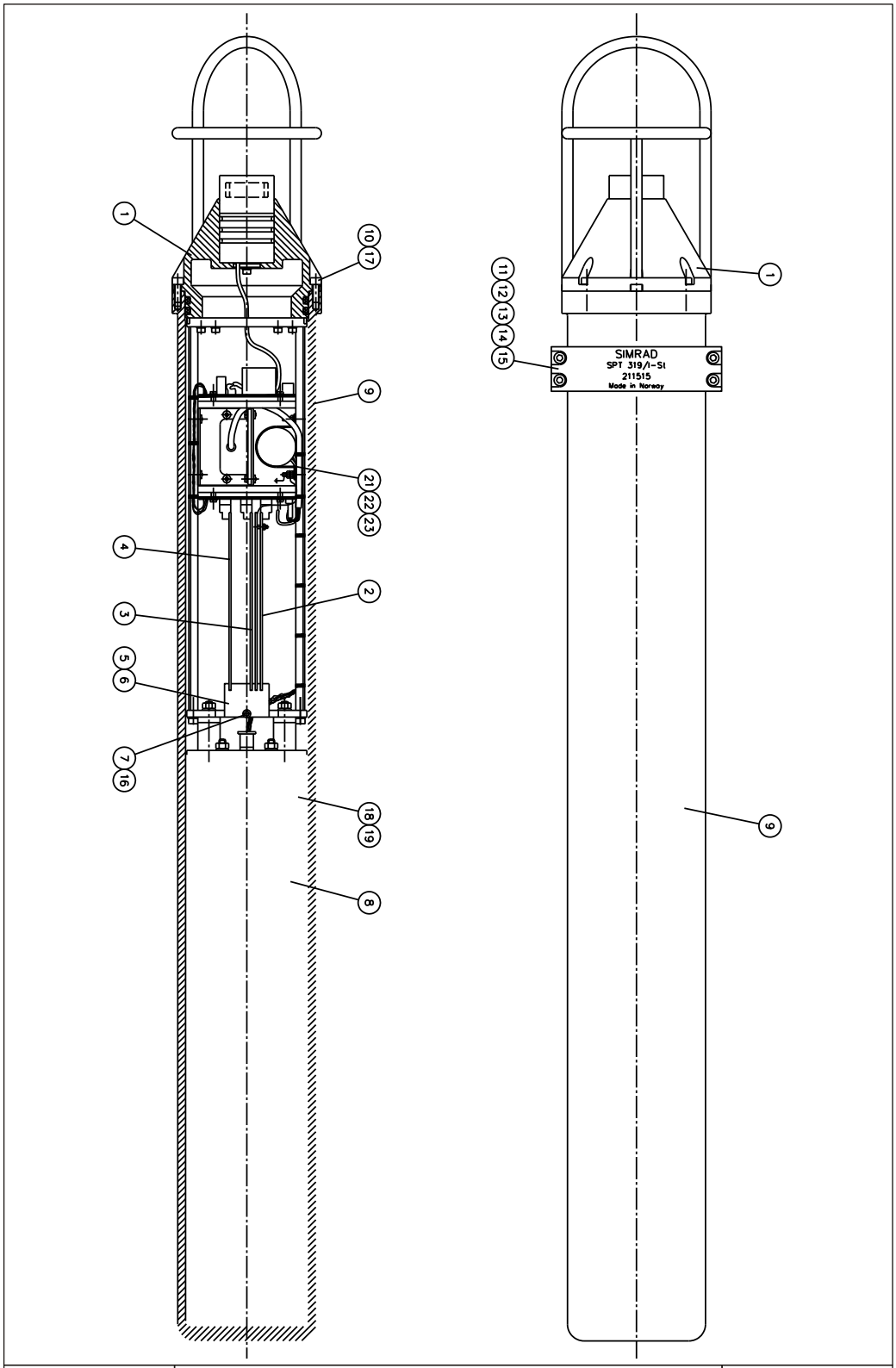
Part no.	**Item name**	**Drw. ref.**	**No. in sys.**
-	**Technical data**	**Drw. pos.**	**Rec.spares**
		117	
-	-	3	-
382-083602	Rx board	Figure page 117	1
-	-	4	-
599-089506	Housing	Figure page 117	1
-	-	9	-

- Separate Inclinometer, see page 96.

Accessories

→ Refer to the table on page 95.

SPT 319/I-St transponder – Exploded view



Page 1 of 1 (Cd6004)	SPT 139/I-St transponder - exploded view	**860-211516** Rev.C

SPT 319/I transponder

The SPT 319/I transponder can also be delivered with stainless steel housing, see page 115.

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-215558	SPT 319/I Transponder complete without battery	Figure page 120	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 120	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the SPT 319/I aluminium transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
312-073871	SPT 319/I-transducer	Figure page 120	1
-	-	1	-
299-089452	Electronic chassis	Figure page 120	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors **(2)** (if used) are included	1	-
382-083607	Tx board	Figure page 120	1
-	-	2	-

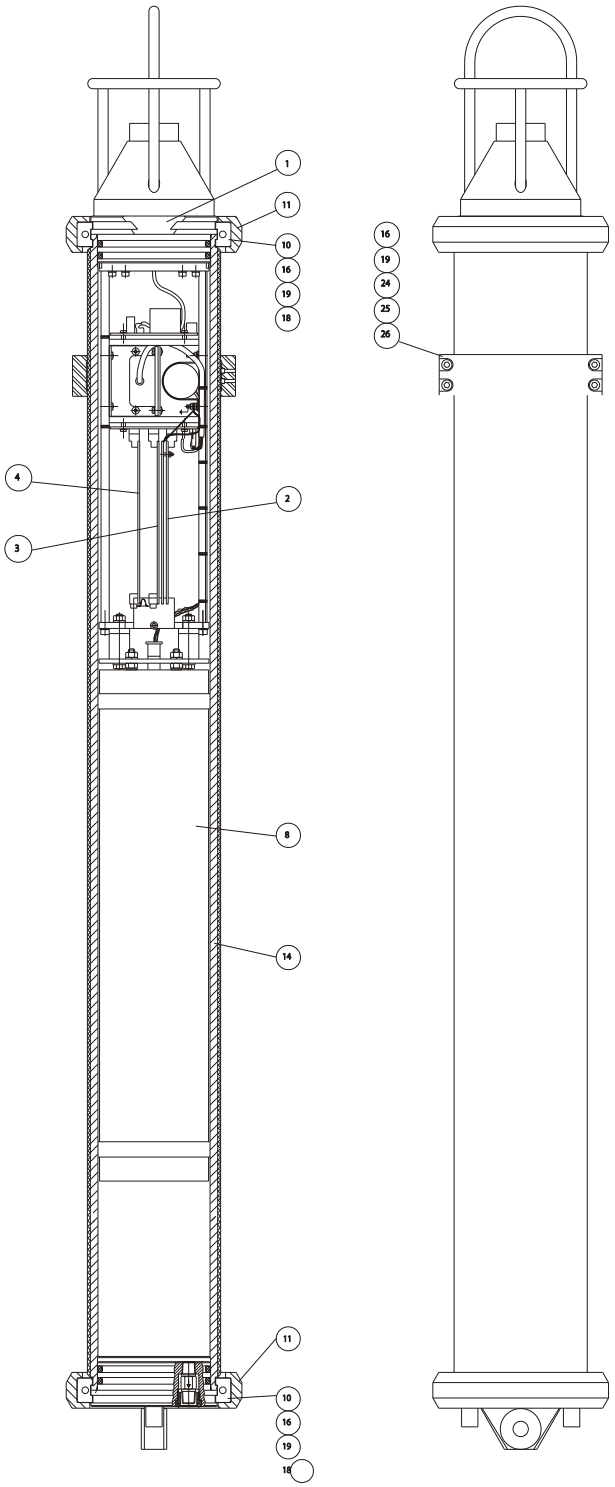
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
382-083551	Microcontroller board	Figure page 120	1
-	-	3	-
382-083602	Rx board	Figure page 120	1
-	-	4	-
599-089149	Housing	Figure page 120	1
-	-	14	-

- Separate Inclinometer, see page 96.

Accessories

→ Refer to the table on page 95.

SPT 319/I transponder – Exploded view



Page 1 of 1 (Cd6543)	Spt 319/I transponder - exploded view	**860-215559** Rev.B

SPT 319/S transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	**Drw. pos.**	**Rec.spares**
102-220107	SPT 319/S Transponder complete without battery	Figure page 123	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 123	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the SPT 319/S aluminium transponder.

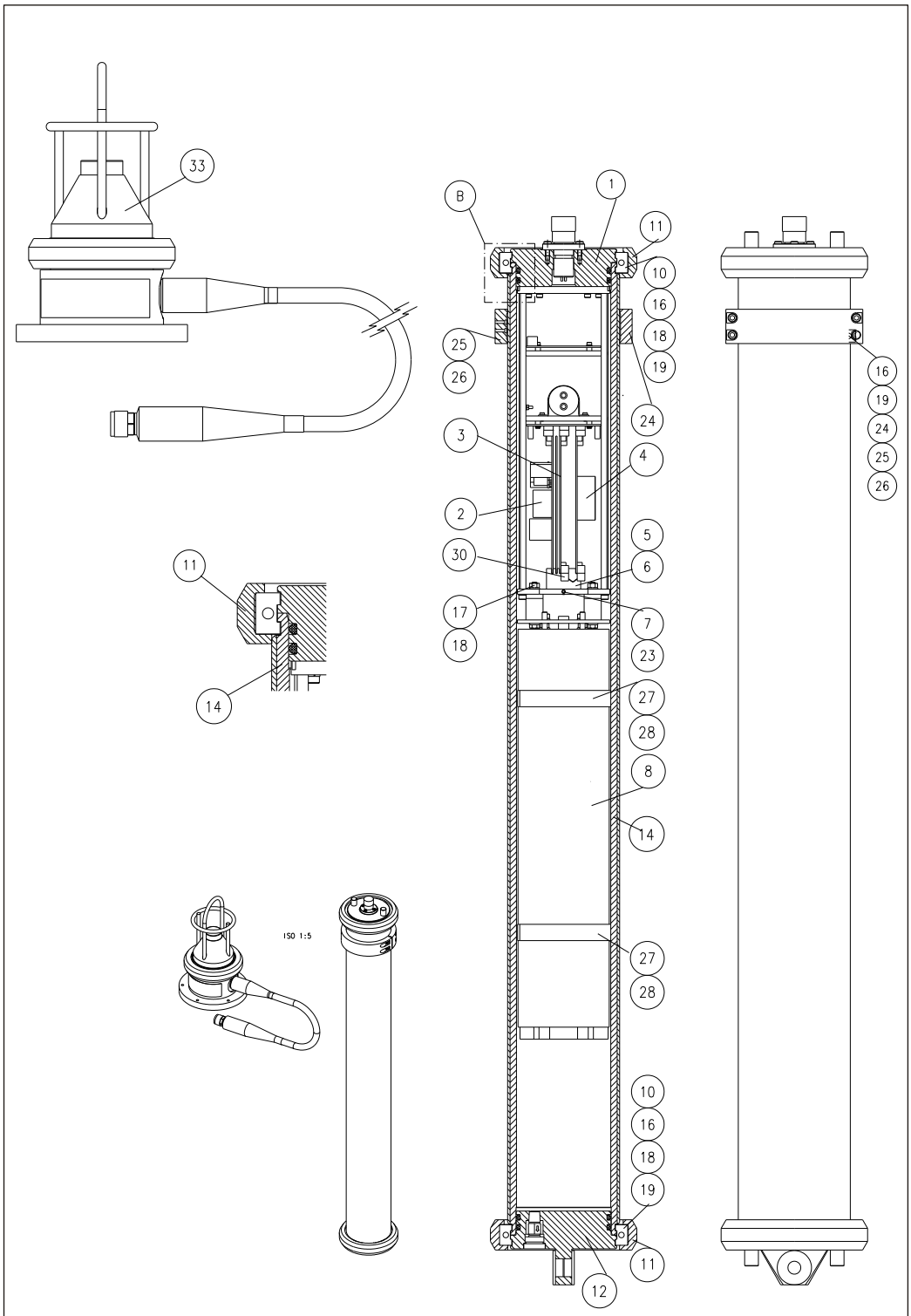
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
100-219687	Split TD 319 Transducer	Figure page 123	1
-	-	-	-
299-220153	Electronic chassis	Figure page 123	1
-	Motherboard, Rxamp board and sensors (if used) are included	1	-
382-083607	Tx board	Figure page 123	1
-	-	2	-
382-083551	Microcontroller board	Figure page 123	1
-	-	3	-
382-083602	Rx board	Figure page 123	1

Part no.	**Item name**	**Drw. ref.**	**No. in sys.**
-	**Technical data**	**Drw. pos.**	**Rec.spares**
-	-	4	-
499-212015	Bottom end cap	Figure page 123	1
-	-	10	-
599-089149	Housing	Figure page 123	1
-	-	14	-

Accessories

→ Refer to the table on page 95.

SPT 319/S transponder – Exploded view



Page 1 of 1 (Cd30035)	SPT 319/S transponder - exploded view	**102-220107** Rev.A

SPT 319/E transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	**Drw. pos.**	**Rec.spares**
331797	SPT 319/E Transponder complete without battery	Figure page 126	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 126	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the SPT 319/E transponder.

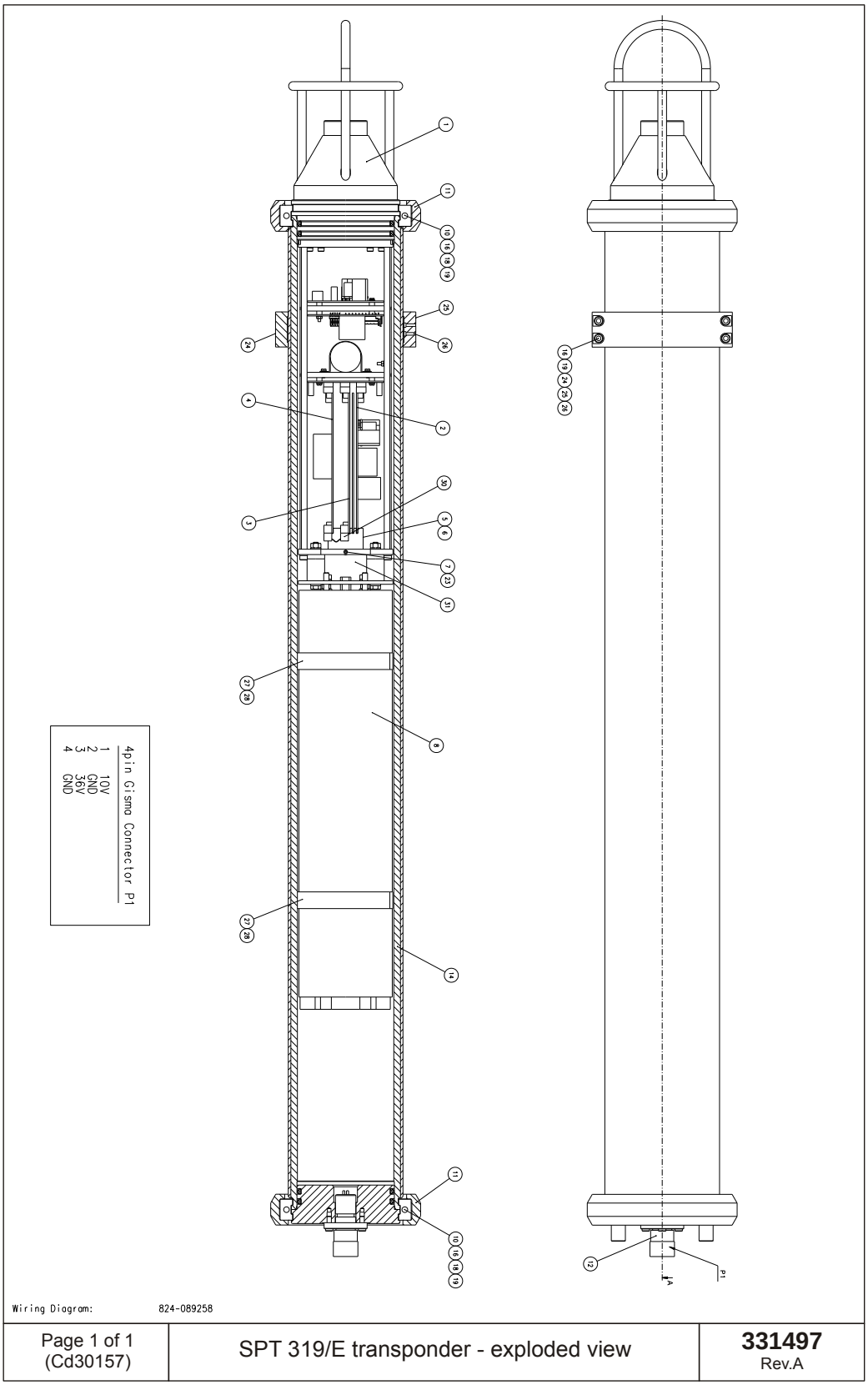
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-089330	Electronic chassis	Figure page 126	1
-	Transducer (1), Motherboard, Rxamp board and sensors (2) (if used) are included	-	-
382-083607	Tx board	Figure page 126	1
-	-	2	-
382-083551	Microcontroller board	Figure page 126	1
-	-	3	-
382-083602	Rx board	Figure page 126	1

Part no.	Item name	Drw. ref.	No. in sys.
-	Technical data	Drw. pos.	Rec.spares
-	-	4	-
599-089149	Housing	Figure page 126	1
-	-	14	-

Accessories

→ Refer to the table on page 95.

SPT 319/E transponder – Exploded view



SPT 319/SIE transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	**Drw. pos.**	**Rec.spares**
331498	MPT 319/SiE Transponder complete without battery	Figure page 129	1
-	All main modules are included (except battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 129	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the SPT 319/SiE transponder.

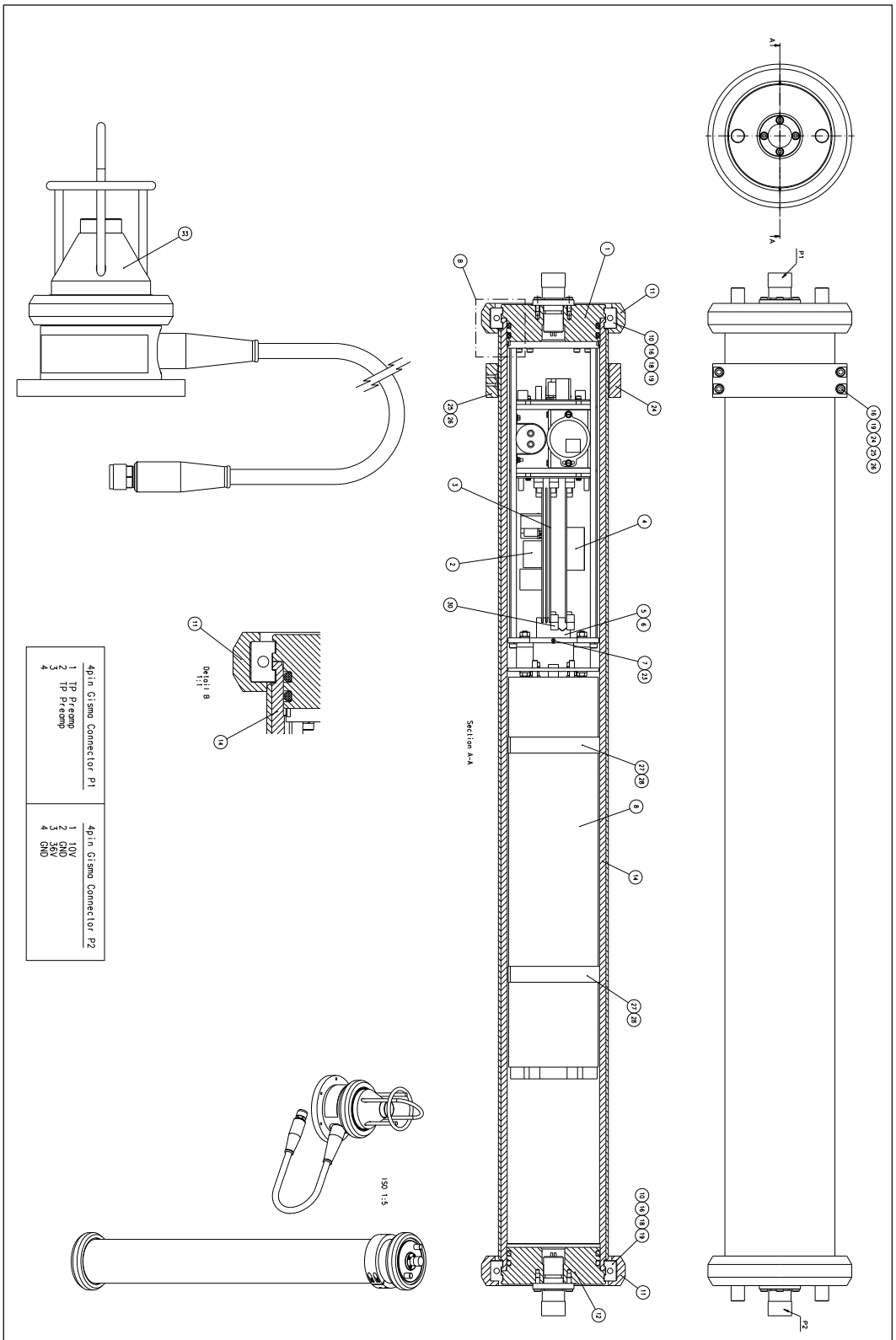
Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	**Drw. pos.**	**Rec.spares**
299-215998	Electronic chassis	Figure page 129	1
-	Transducer**,** Motherboard, Rxamp board, Serial interface board and sensors (if used) are included	1	-
382-083607	Tx board	Figure page 129	1
-	-	2	-
382-083551	Microcontroller board	Figure page 129	1
-	-	3	-
382-083602	Rx board	Figure page 129	1

Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	Drw. pos.	Rec.spares
-	-	4	-
599-089149	Housing	Figure page 129	1
-	-	14	-

Accessories

→ Refer to the table on page 95.

SPT 319/SIE transponder – Exploded view



Page 1 of 1 (Cd30158)	SPT 319/SiE transponder - exploded view	**331498** Rev.A

SPT 319/SiHE transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	**Drw. pos.**	**Rec.spares**
331499	MPT 319/SiHE Transponder complete without battery	Figure page 132	1
-	All main modules are included (except battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 132	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

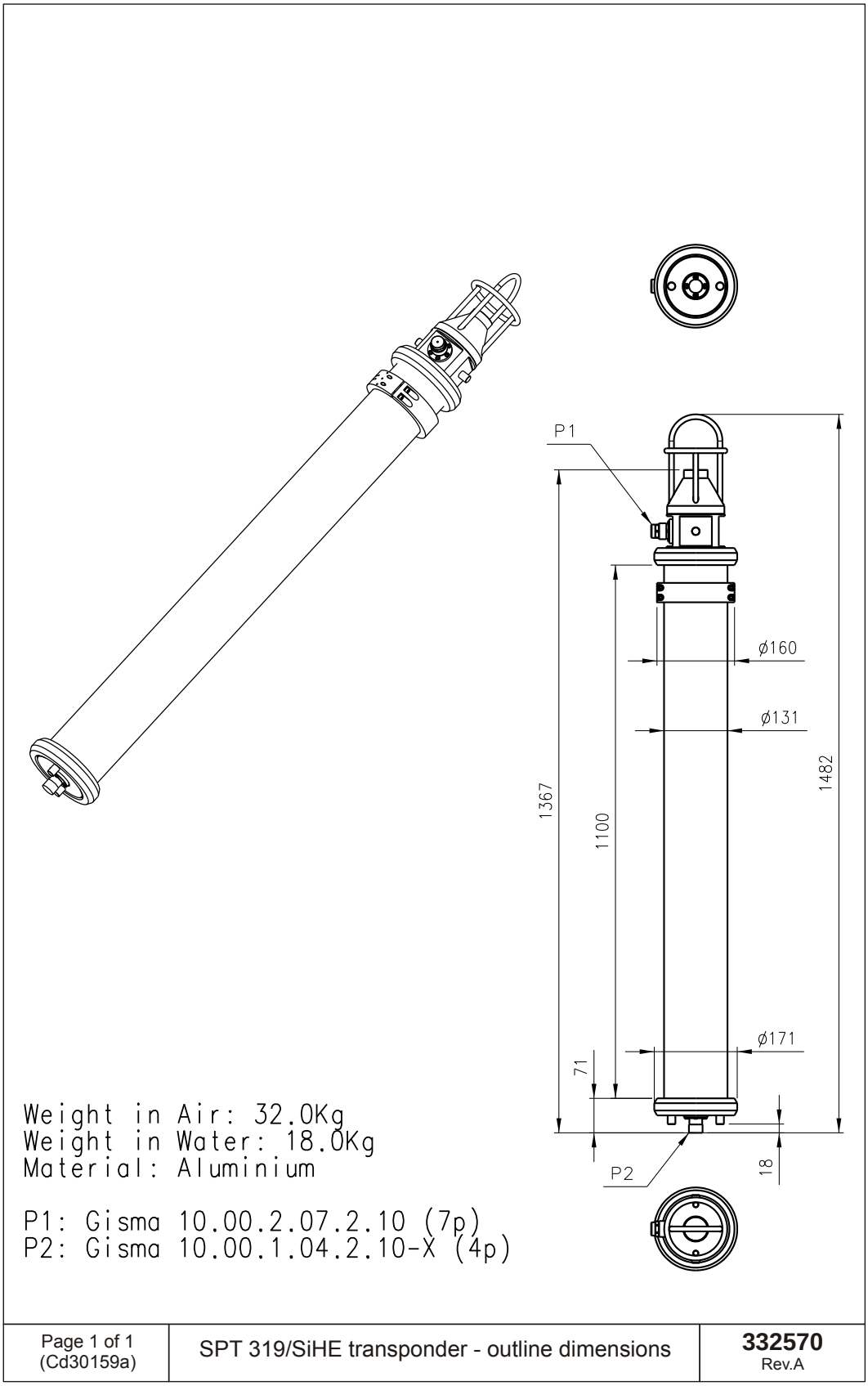
Main modules

Main modules for the SPT 319/SiHE transponder.

Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	**Drw. pos.**	**Rec.spares**
299-215998	Electronic chassis	Figure page 132	1
-	Transducer**,** Motherboard, Rxamp board, Serial interface board and sensors (if used) are included	1	-
382-083607	Tx board	Figure page 132	1
-	-	2	-
382-083551	Microcontroller board	Figure page 132	1
-	-	3	-
382-083602	Rx board	Figure page 132	1

Part no.	**Item name**	**Drw. ref.**	**No. in sys.**
	Technical data	**Drw. pos.**	**Rec.spares**
-	-	4	-
599-089149	Housing	Figure page 132	1
-	-	14	-

SPT 319/SiHE transponder – Exploded view



Page 1 of 1 (Cd30159a)	SPT 319/SiHE transponder - outline dimensions	**332570** Rev.A

MPT 313 basic transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-215587	MPT 313 Transponder complete without battery	Figure page 135	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 135	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the MPT 313 basic transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
312-215300	MPT 313 transducer	Figure page 135	1
-	-	7	-
299-215585	Electronic chassis	Figure page 135	1
-	Motherboard and sensors (if used) are incl.	1	-
382-211279	Tx board	Figure page 135	1
-	-	2	-
382-083551	Microcontroller board	Figure page 135	1

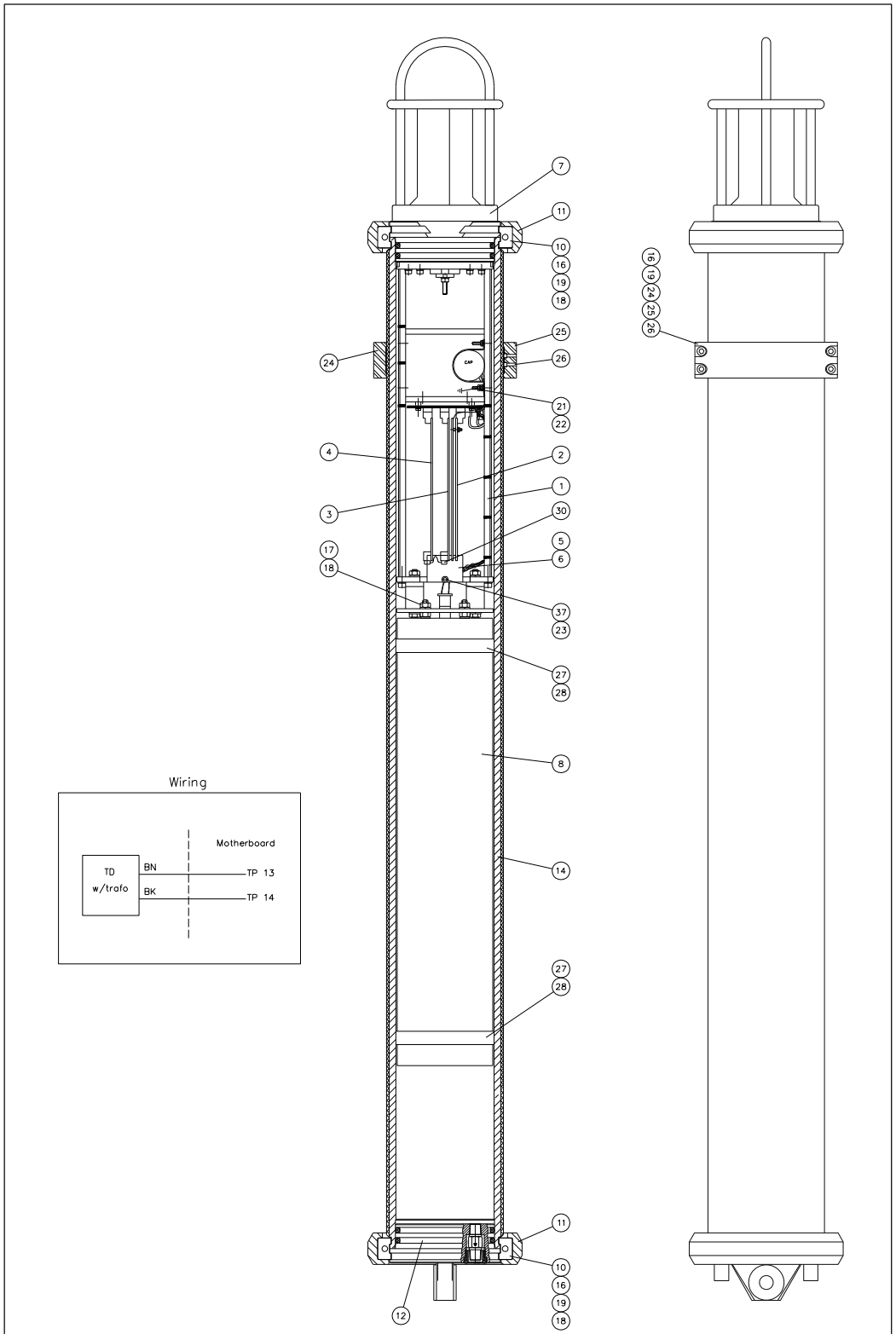
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
-	-	3	-
382-102853	Rx board	Figure page 135	1
-	-	4	-
599-089149	Housing	Figure page 135	1
-	-	14	-
540-086758	O-ring/ TD head	Figure page 135	2/4
-	59.5 x 3.0	-	-
540-033009	O-ring/ TD head	Figure page 135	2/4
-	70.0 x 3.0	-	-
549-086759	Backup ring/ TD head	Figure page 135	2/4
-	59.5 x 3.0	-	-

- Separate Transducer unit, part. no: 312-210173

Accessories

→ Refer to the table on page 95.

MPT 313 basic transponder – Exploded view



Page 1 of 1 (CD6060)	MPT 313 basic transponder - exploded view	**860-215588** Rev.B

MPT 313/H transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
	Technical data	**Drw. pos.**	**Rec.spares**
102-215589	MPT 313/H Transponder complete without battery	Figure page 138	1
-	All main modules are included (except battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 138	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the MPT 313/H transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
312-215300	MPT 313/H transducer	Figure page 138	1
-	-	7	-
299-215585	Electronic chassis	Figure page 138	1
-	Motherboard and sensors (1) (if used) are included	1	-
382-211279	Tx board	Figure page 138	1
-	-	2	-
382-083551	Microcontroller board	Figure page 138	1

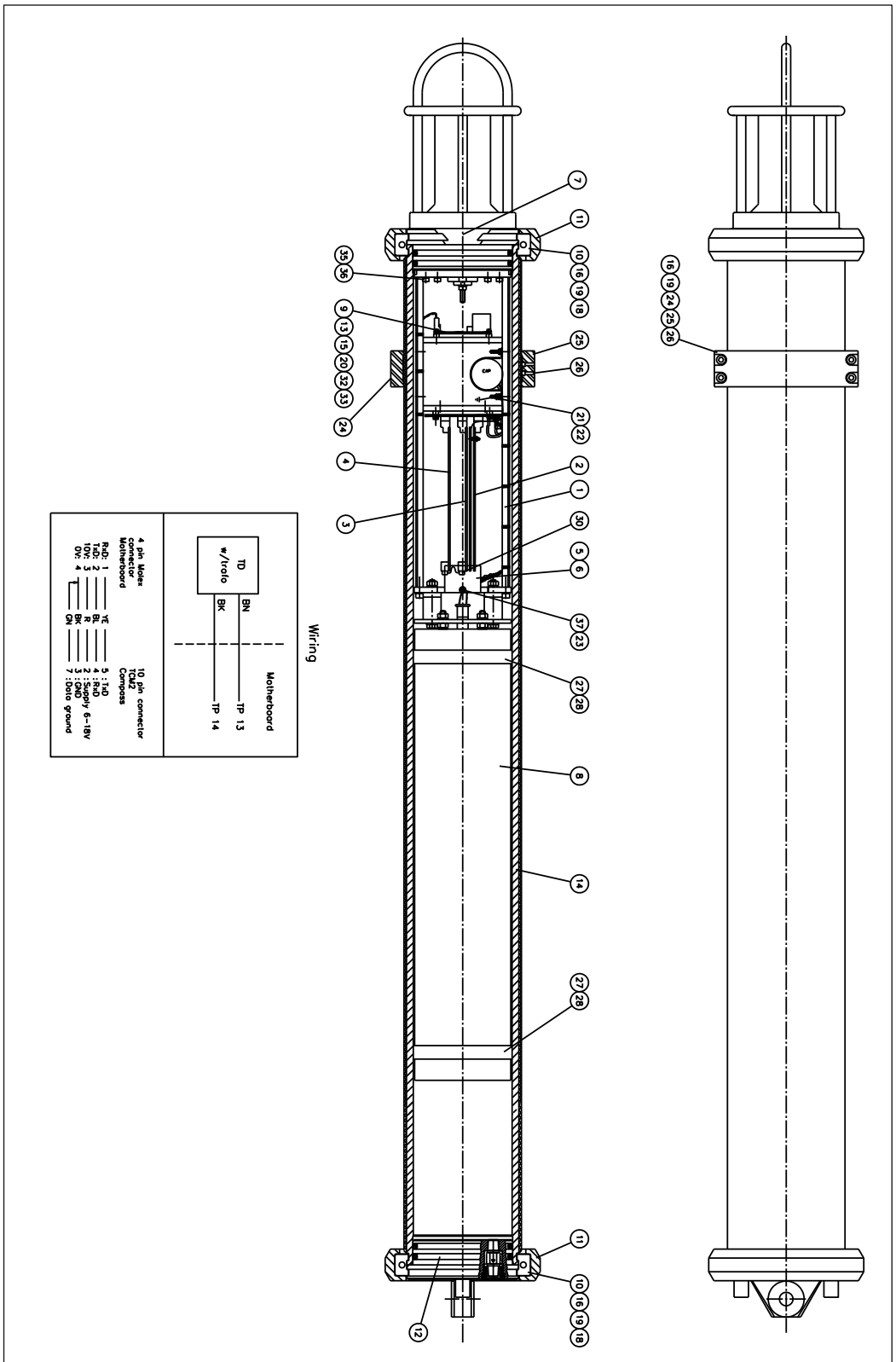
Part no.	Item name	Drw. ref.	No. in sys.
-	Technical data	Drw. pos.	Rec.spares
-	-	3	-
382-102853	Rx board	Figure page 138	1
-	-	4	-
499-212015	Bottom end cap	Figure page 138	
	-	12	
599-089149	Housing	Figure page 138	1
-	-	14	-

- Compass sensor, refer to page 103.
- O-rings / backup rings, see page 128

Accessories

→ Refer to the table on page 95.

MPT 313/H transponder – Exploded view



Page 1 of 1 (Cd6061)	MPT 313/H transponder - exploded view	**860-215590** Rev.D

MPT 313/R transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
300171	MPT 313/R Transponder complete without battery	Figure page 141	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 141	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the MPT 313/R transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-215585	Electronic chassis	Figure page 141	1
-	Transducer (1), Motherboard, Rxamp board and sensors (if used) are included	1	-
312-215300	Separate transducer unit	-	1
(1)	(Transponder head)	-	-
382-211279	Tx board	Figure page 141	1
-	-	2	-
382-083551	Microcontroller board	Figure page 141	1

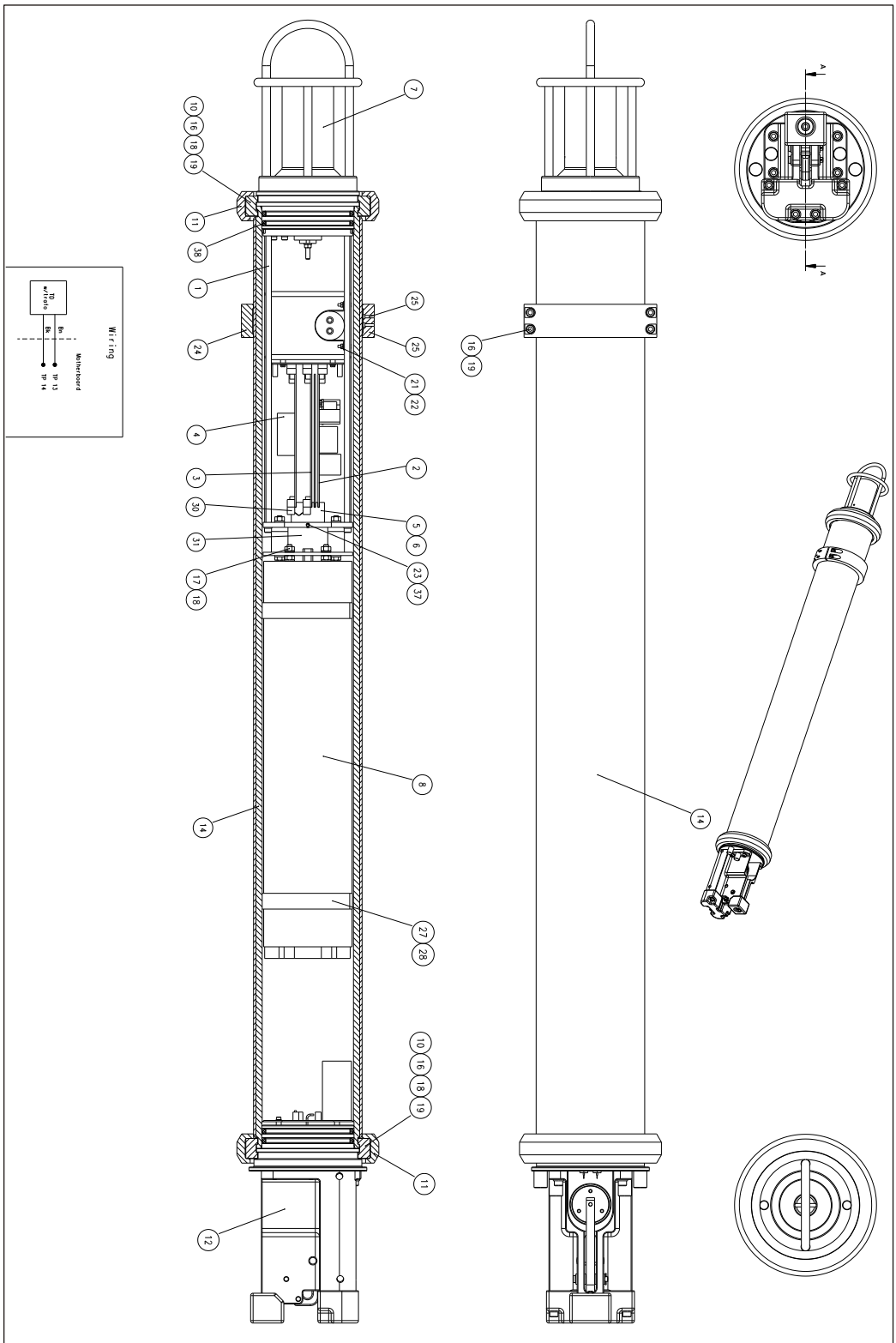
Part no.	**Item name**	**Drw. ref.**	**No. in sys.**
-	**Technical data**	**Drw. pos.**	**Rec.spares**
-	-	3	-
382-102853	Rx board	Figure page 141	1
-	-	4	-
198-085564	Release unit	Figure page 141	
	-	12	
599-089149	Housing	Figure page 141	1
-	-	14	-

- O-rings / backup rings, see page 128

Accessories

→ Refer to the table on page 95.

MPT 313/R transponder – Exploded view



Page 1 of 1 (Cd30128)	MPT 313/R - exploded view	**300171** Rev.A

MPT 313/S transponder

Complete transponder

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-217304	MPT 313/S Transponder complete without battery	Figure page 144	1
-	All main modules are included (except for battery)	N/A	-

MPT 313/RS transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-217305	MPT 313/RS Transponder complete without battery	Figure page 144	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 144	1
-	L10/36 (18/30)	7	-

Other available batteries

→ Refer to the table on page 95.

Main modules

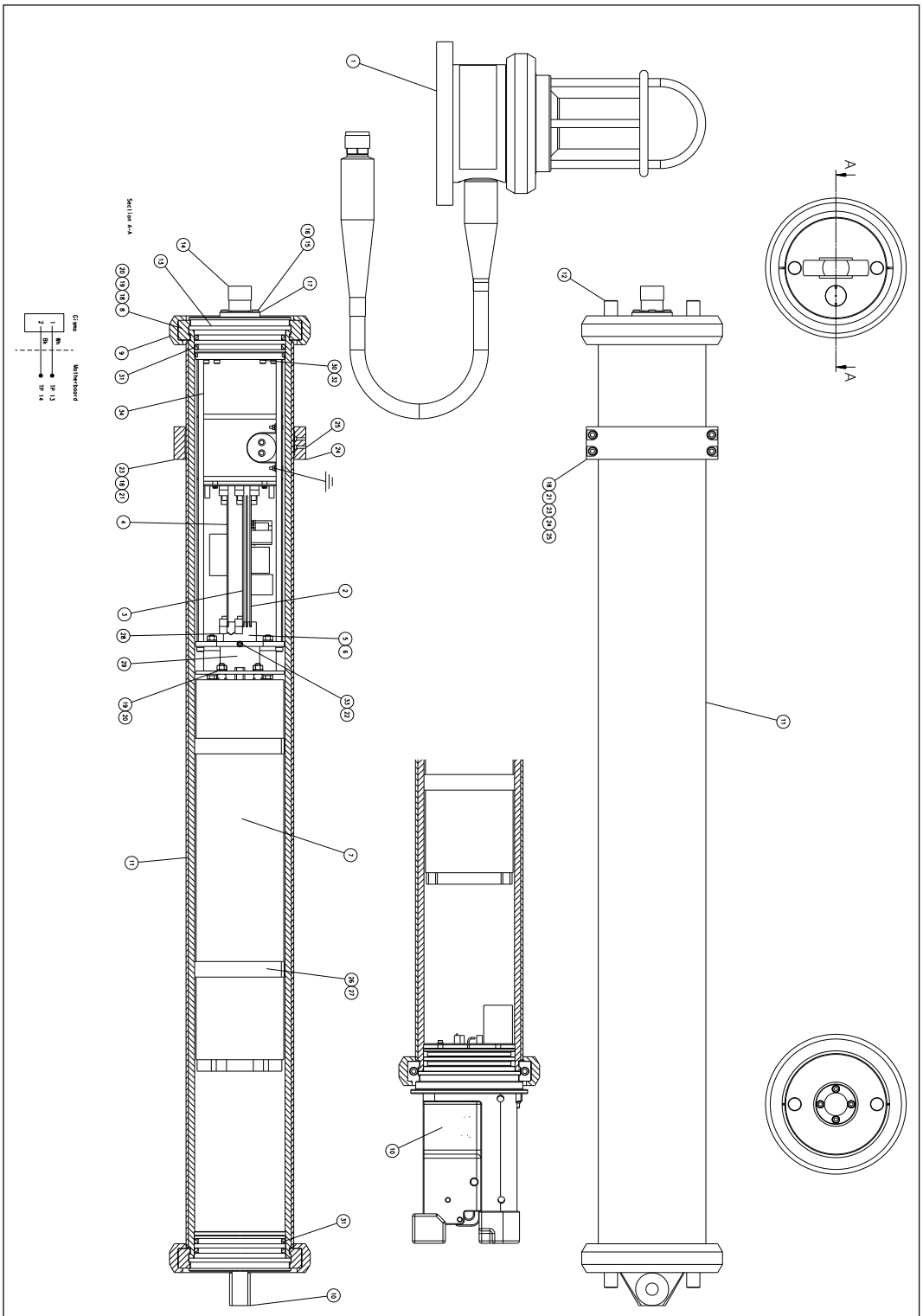
The main modules for both MPT 313/S and MPT 313/RS aluminium transponders.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
100-217308	Split TD 313 Transducer	Figure page 144	1
-	4 pins	1	-
382-083607	Tx board	Figure page 144	1
-	-	2	-
382-083551	Microcontroller board	Figure page 144	1
-	-	3	-
382-102853	Rx board	Figure page 144	1
-	-	4	-
599-089149	Housing	Figure page 144	1
-	-	11	-
499-212015	Bottom end cap for MST 313/S	Figure page 144	1
-	-	10	-
499-215018	Release unit for MST 313/SR	Figure page 144	1
-	-	10	-

Accessories

→ Refer to the table on page 95.

MPT 313/RS transponder – Exploded view



Page 1 of 1 (CD6903)	MPT 313/S and MPT 313/RS transponders - exploded view	**860-217306** Rev.B

MPT 313/SiH transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
300185	MPT 313/SiH Transponder complete without battery	Figure page 147	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 147	1
-	L10/36 (18/30)	8	-

Other available batteries Refer to the table on page 95.

Main modules

Main modules for the MPT 313/SiH transponder.

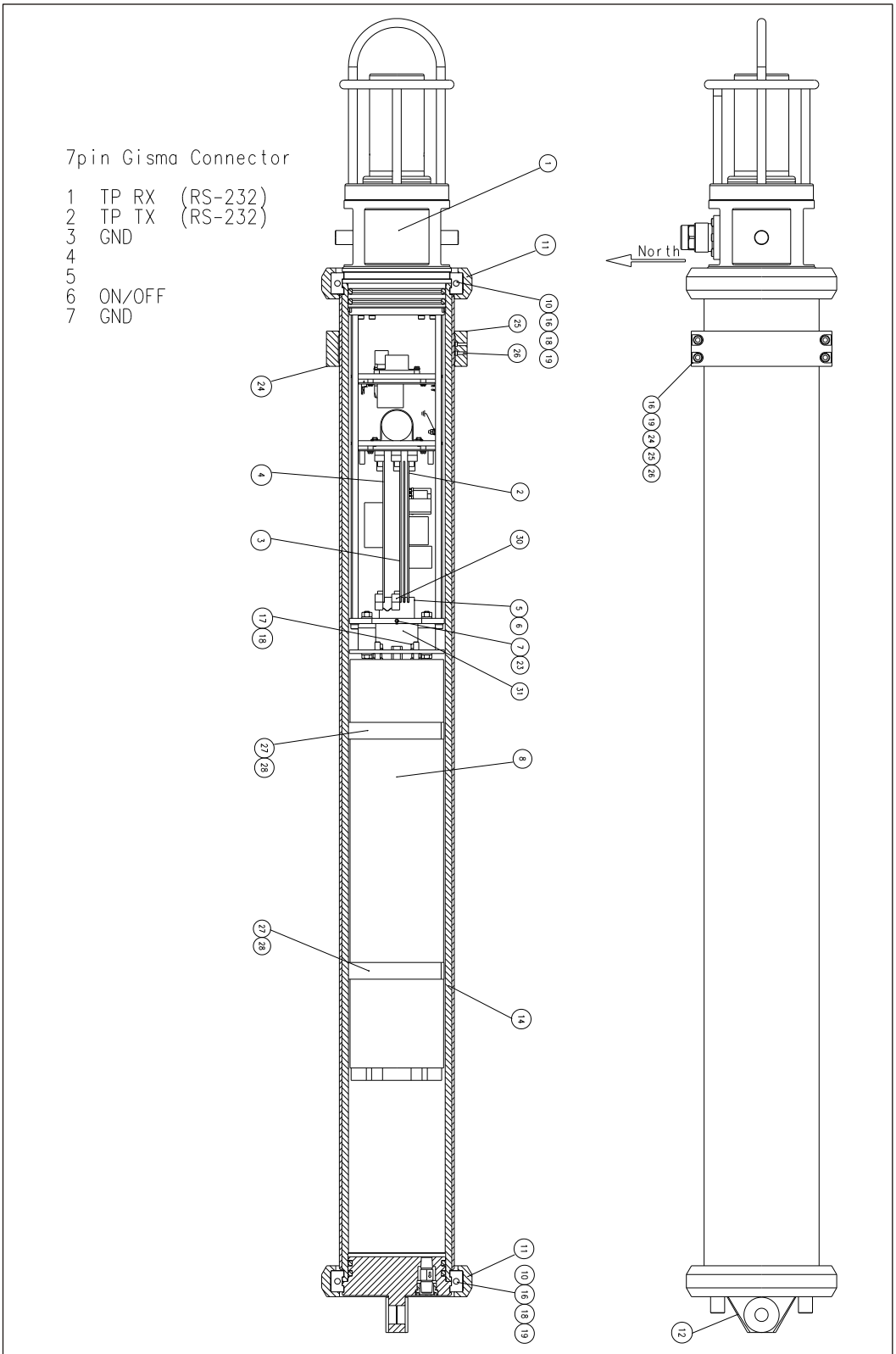
Accessories

→ Refer to the table on page 95.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
300398	Electronic chassis	Figure page 147	1
-	Transducer (1), Motherboard, Rxamp board and sensors (if used) are included	1	-
312-215300	Separate tranducer unit	Figure page 147	1
(1)	-	7	-
382-211279	Tx board	Figure page 147	1
-	-	7	-

Part no.	**Item name**	**Drw. ref.**	**No. in sys.**
-	**Technical data**	**Drw. pos.**	**Rec.spares**
382-083551	Microcontroller board	Figure page 147	1
-	-	2	-
382-102853	Rx board	Figure page 147	1
-	-	3	-
499-212015	Bottom end cap	Figure page 147	1
-	-	12	-
599-089149	Housing	Figure page 147	1
-	-	14	-

MPT 313/SiH transponder – Exploded view



Page 1 of 1 (Cd30129)	MPT 313/SiH - exploded view	**300185** Rev.A

Magnetic release mechanism

Complete unit

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
499-215018	Release unit complete	Figure page 148	1
-	-	N/A	-

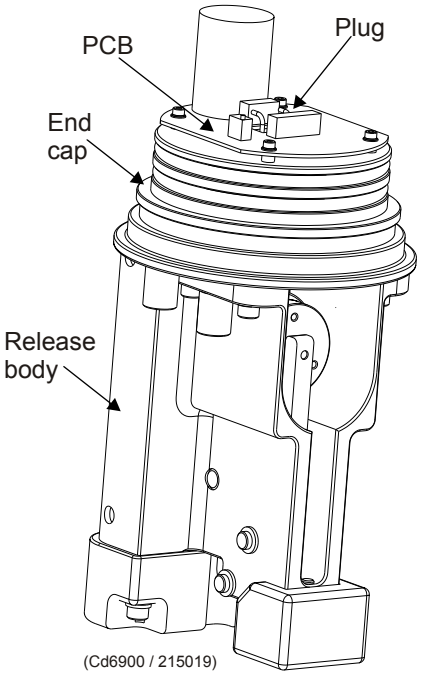


Figure 37 Magnetic release mechanism

MPT 319 basic transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-089315	MPT 319 Transponder complete without battery	Figure page 150	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 150	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the MPT 319 basic transponder.

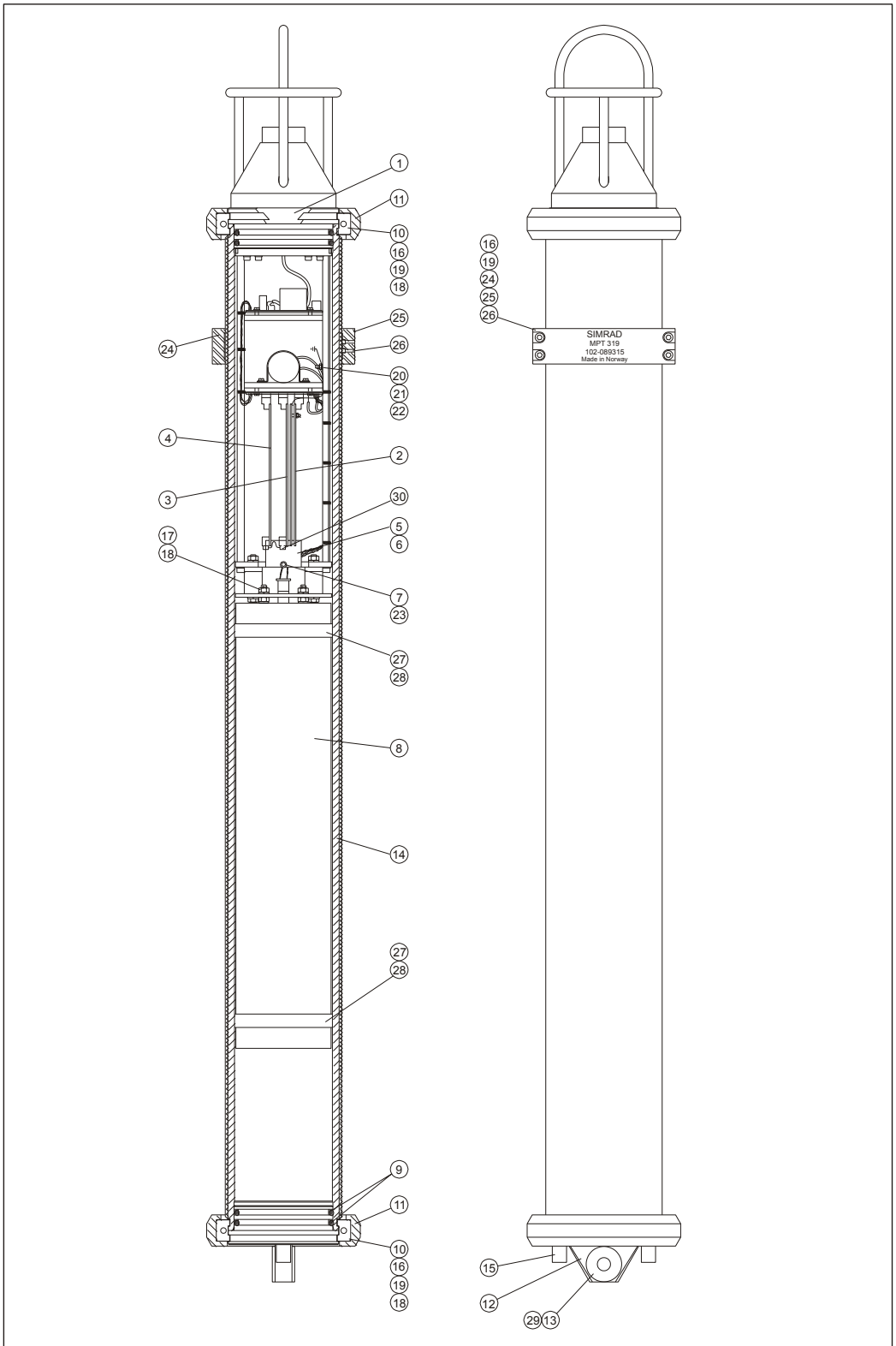
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-089330	Electronic chassis	Figure page 150	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors (if used) are included	1	-
382-083607	Tx board	Figure page 150	1
-	-	2	-
382-083551	Microcontroller board	Figure page 150	1
-	-	3	-
382-083602	Rx board	Figure page 150	1
-	-	4	-
599-089263	Bottom end cap	Figure page 150	1
-	-	12	-
599-089149	Housing	Figure page 150	1
-	-	14	-

- Separate Transducer unit, part. no: 312-073871

Accessories

→ Refer to the table on page 95.

MPT 319 basic transponder – Exploded view



Page 1 of 1 (CD4164)	MPT 319 basic transponder - exploded view	**102-089315** Rev.F

MPT 319/DT transponder

Note *The MPT 319/DT transponder can also be delivered with stainless steel housing, see page xx.*

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-089431	MPT 319/DT Transponder complete without battery	Figure page 153	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 153	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the MPT 319/DT aluminium transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-089183	Electronic chassis	Figure page 153	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors (2) are included	1	-
382-083607	Tx board	Figure page 153	1
-	-	2	-

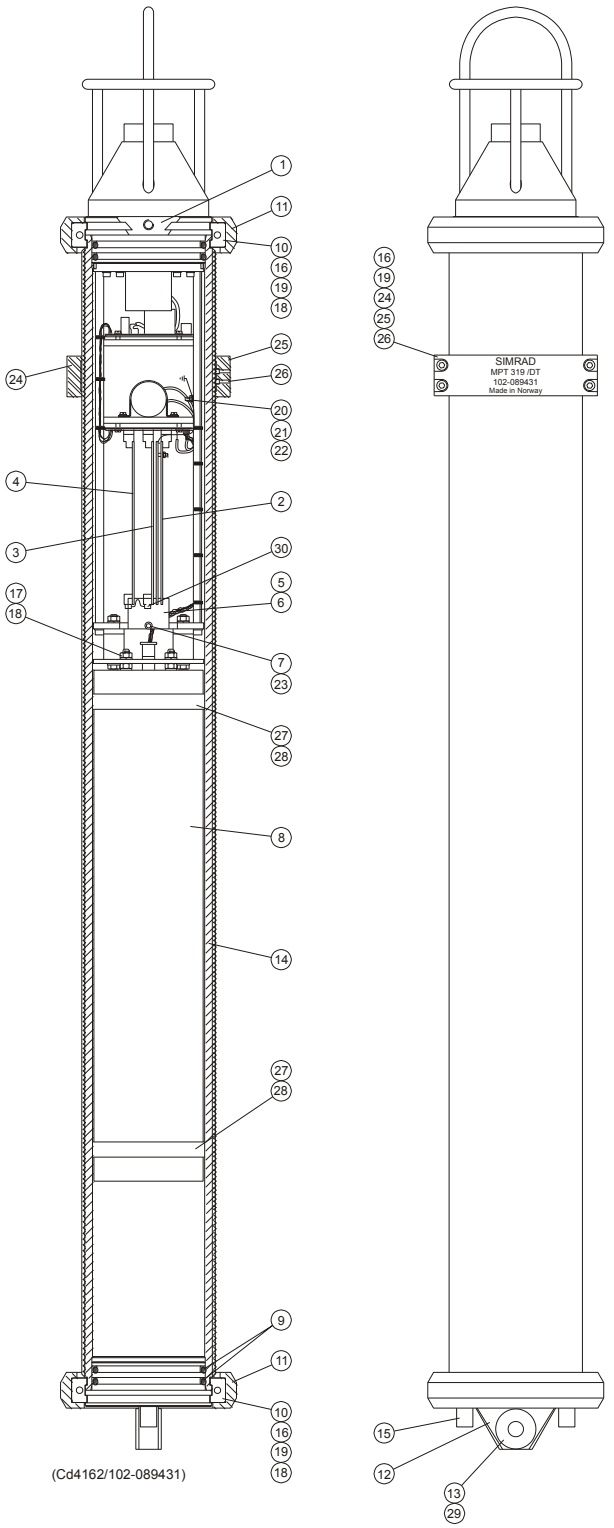
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
382-083551	Microcontroller board	Figure page 153	1
-	-	3	-
382-083602	Rx board	Figure page 153	1
-	-	4	-
599-089263	Bottom end cap	Figure page 153	1
-	-	12	-
599-089149	Housing	Figure page 153	1
-	-	14	-

- Separate Transducer unit, part. no: 312-073871
- Separate DT sensor, see page 103.

Accessories

→ Refer to the table on page 95.

MPT 319/DT transponder – Exploded view



Page 1 of 1 (CD4164)	MPT 319 basic transponder - exploded view	**102-089315** Rev.F

MPT 319/R transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-089419	MPT 319/R Transponder complete without battery	Figure page 156	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 156	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the MPT 319/R transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-089330	Electronic chassis	Figure page 156	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors (if used) are included	1	-
382-083607	Tx board	Figure page 156	1
-	-	2	-
382-083551	Microcontroller board	Figure page 156	1
-	-	3	-
382-083602	Rx board	Figure page 156	1

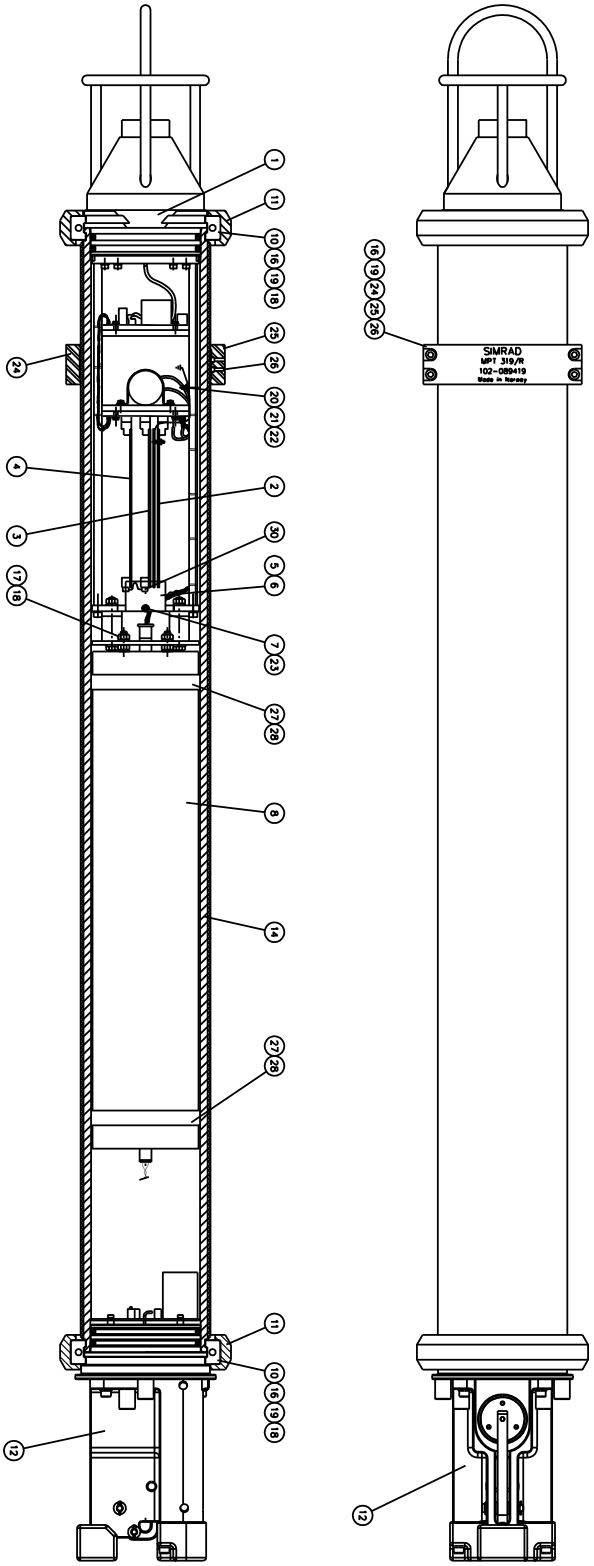
Part no.	Item name	Drw. ref.	No. in sys.
-	Technical data	Drw. pos.	Rec.spares
-	-	4	-
198-085564	Release unit	Figure page 156	1
-	-	12	-
599-089149	Housing	Figure page 156	1
-	-	14	-

- Separate Transducer unit, part. no: 312-073871

Accessories

→ Refer to the table on page 95.

MPT 319/R transponder – Exploded view



Page 1 of 1 (CD4163)	MPT 319/R transponder - exploded view	**102-089419** Rev.C

MPT 319/DTR transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-089319	MPT 319/DTR Transponder complete without battery	Figure page 159	1
-	All main modules are included (except for battery)	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 159	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the MPT 319/DTR transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-089183	Electronic chassis	Figure page 159	1
-	Transducer **(1)**, Motherboard, Rxamp board and sensors (2) (if used) are included	1	-
382-083607	Tx board	Figure page 159	1
-	-	2	-
382-083551	Microcontroller board	Figure page 159	1
-	-	3	-
382-083602	Rx board	Figure page 159	1

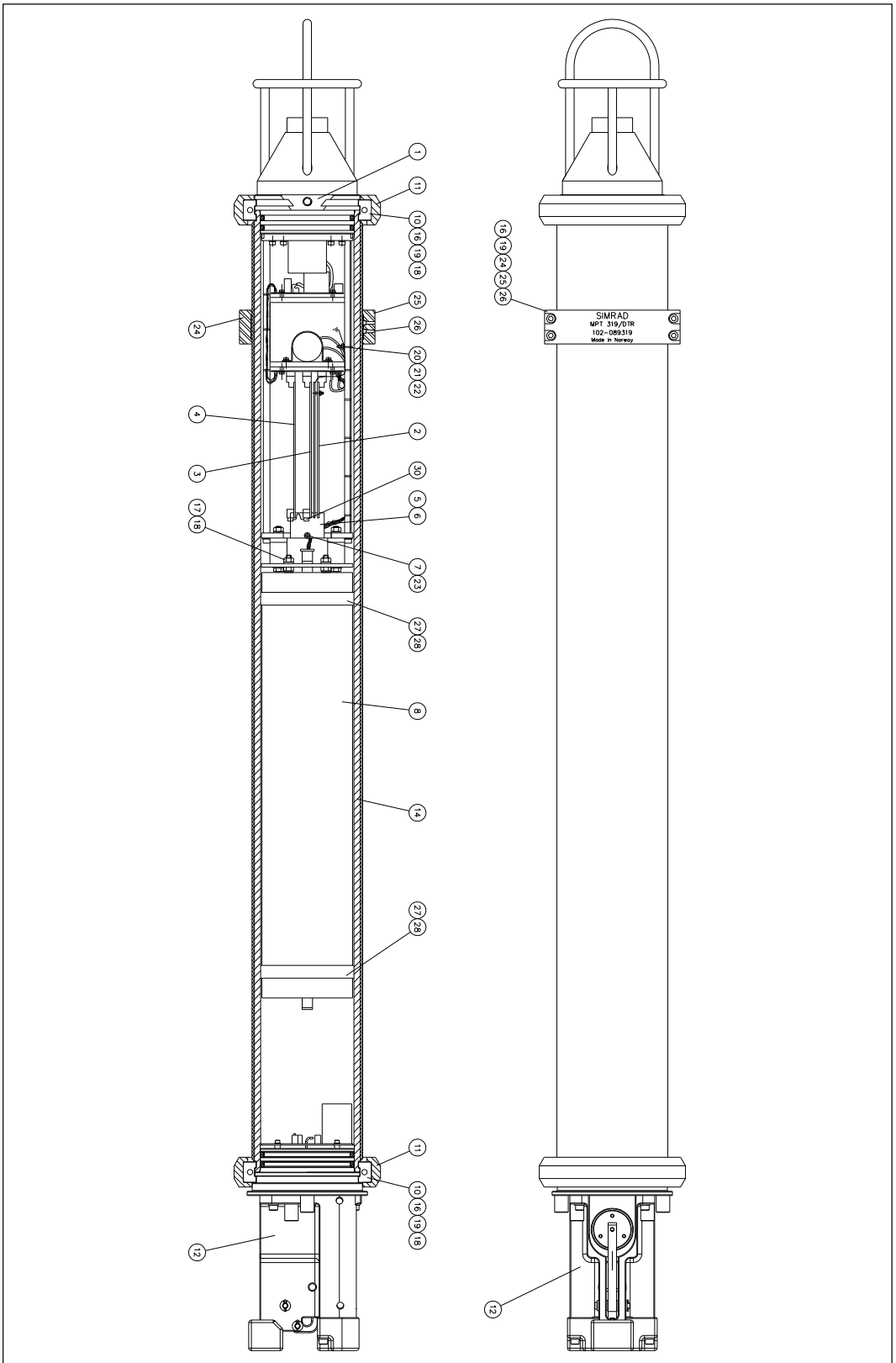
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
-	-	4	-
198-085564	Release unit	Figure page 159	1
-	-	12	-
599-089149	Housing	Figure page 159	1
-	-	14	-

- Separate Transducer unit, part. no: 312-073871
- Separate DT sensor, see page 103.

Accessories

→ Refer to the table on page 95.

MPT 319/DTR transponder – Exploded view



Page 1 of 1 (CD4161)	MPT 319/DTR transponder - exploded view	**102-089319** Rev.C

MPT 319/DT-St transponder

Note *The standard MPT 319/DT transponder is delivered with aluminium housing, see page 144.*

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-089498	MPT 319/DT-St Transponder complete without battery	Figure page 162	1
-	All main modules are included without battery	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 162	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules for the MPT 319/DT-St stainless steel transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
312-089504	MPT 319/DT-St transducer	Figure page 162	1
-	-	N/A	-
299-089523	Electronic chassis	Figure page 162	1
-	Motherboard, Rxamp board and sensors **(1)** (if used) are included	1	-

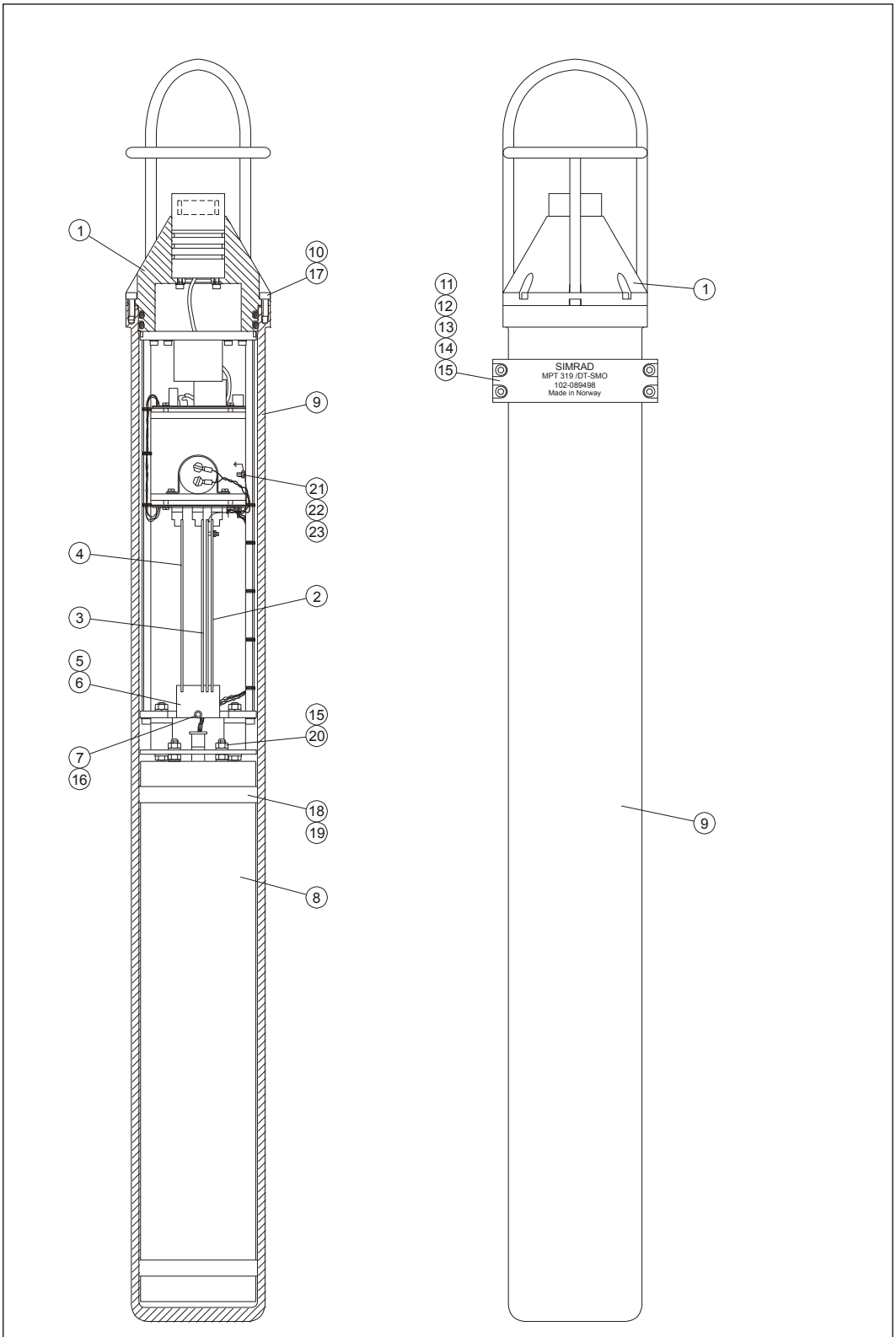
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
382-083607	Tx board	Figure page 162	1
-	-	2	-
382-083551	Microcontroller board	Figure page162	1
-	-	3	-
382-083602	Rx board	Figure page 162	1
-	-	4	-
599-089506	Housing	Figure page 162	1
-	-	9	-

- Separate DT sensor, refer to page 103.

Accessories

→ Refer to the table on page 95.

MPT 319/DT-St transponder – Exploded view



Page 1 of 1 (CD4166)	MPT 319/DT-St transponder - exploded view	**102-089498** Rev.A

MPT 319/L-St transponder

This list includes the common spare parts for the MPT 319/L-St transponder.

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-089499	MPT 319/L-St Transponder complete without battery	Figure page 165	1
-	All main modules are included without battery	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-089505	Battery pack (lithium)	Figure page 165	1
-	L10/36 (36/60)	8	-

Main modules

Main modules for the MPT 319/L-St transponder.

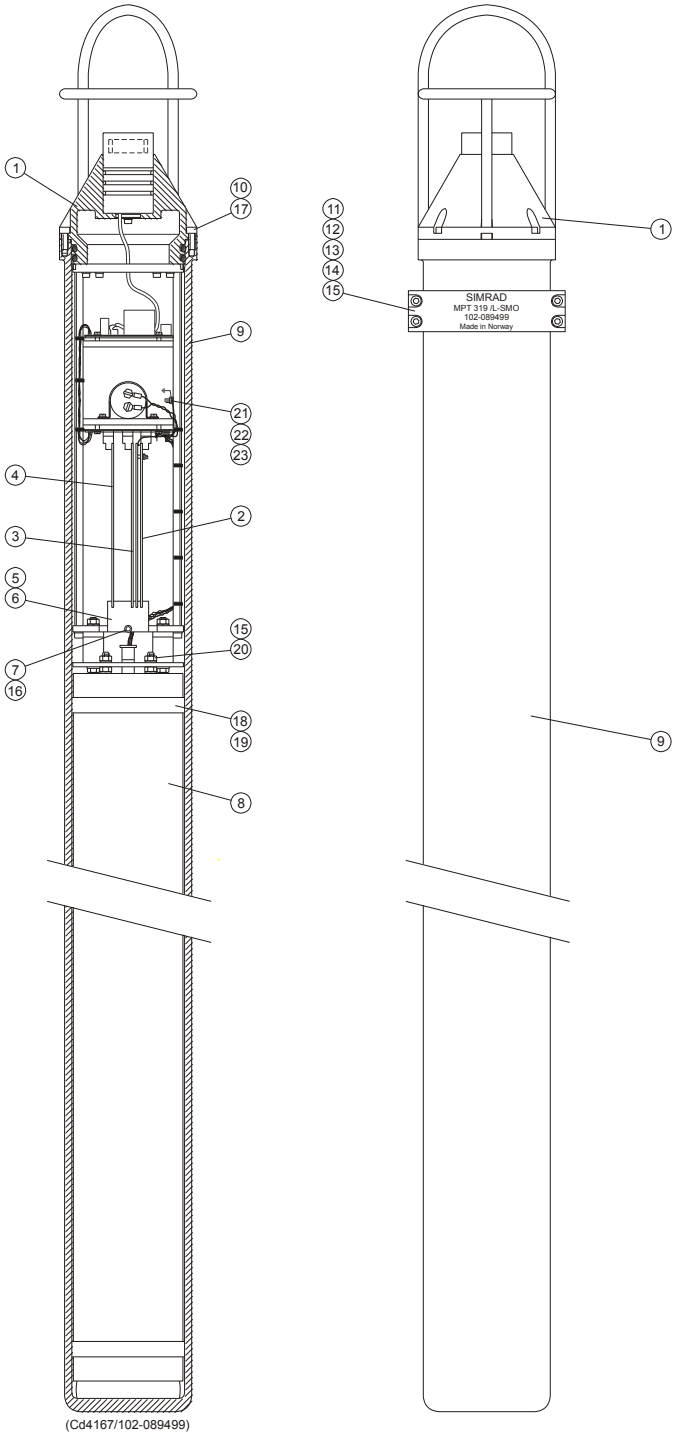
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
312-089504	MPT 319/L-St transducer	Figure page 165	1
-	-	N/A	-
299-089523	Electronic chassis	Figure page 165	1
-	Motherboard, Rxamp board and sensors (if used) are included	1	-
382-083607	Tx board	Figure page 165	1
-	-	2	-
382-083551	Microcontroller board	Figure page 165	1
-	-	3	-

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
382-083602	Rx board	Figure page 165	1
-	-	4	-
599-089507	Housing	Figure page 165	1
-	-	9	-

Accessories

→ Refer to the table on page 95.

MPT 319/L-St transponder – Exploded view



Page 1 of 1 (CD4161)	MPT 319/DTR transponder - exploded view	**102-089319** Rev.C

MPT 319/SiH transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-217878	MPT 319/SiH Transponder complete without battery	Figure page 168	1
-	All main modules are included without battery	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-101665	Battery pack (lithium)	Figure page 168	1
-	L10/36 (18/30)	8	-

Other available batteries

→ Refer to the table on page 95.

Main modules

Main modules for the MPT 319/SiH aluminium transponder.

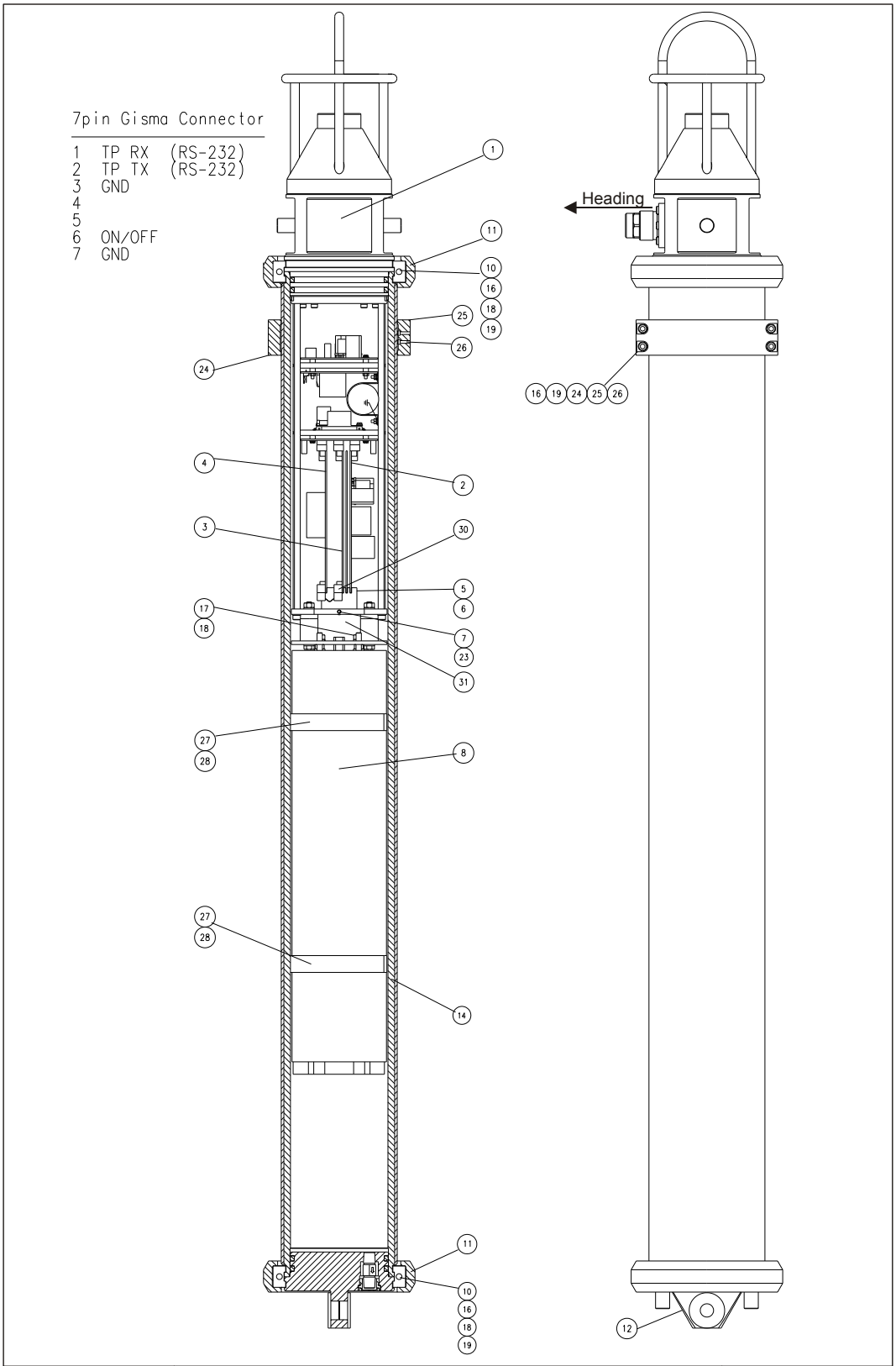
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
299-217969	Electronic chassis	Figure page 168	1
-	Transducer (1), Motherboard, Rxamp board and sensors (if used) are included	1	-
382-083607	Tx board	Figure page 168	1
-	-	2	-
382-083551	Microcontroller board	Figure page 168	1
-	-	3	-
382-083602	Rx board	Figure page 168	1

Part no.	Item name	Drw. ref.	No. in sys.
-	Technical data	Drw. pos.	Rec.spares
-	-	4	-
599-089507	Housing	Figure page 168	1
-	-	9	-
599-089263	Bottom end cap	Figure page 168	1
-	-	4	-
379-098646	Sealing cap	Figure page 168	1
-	-	33	-

Accessories

→ Refer to the table on page 95.

MPT 319/SiH transponder – Exploded view

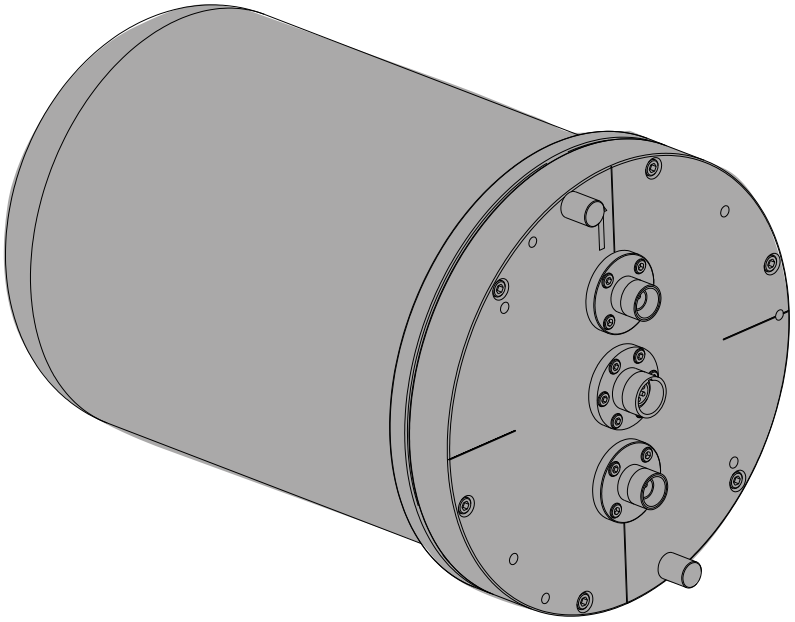


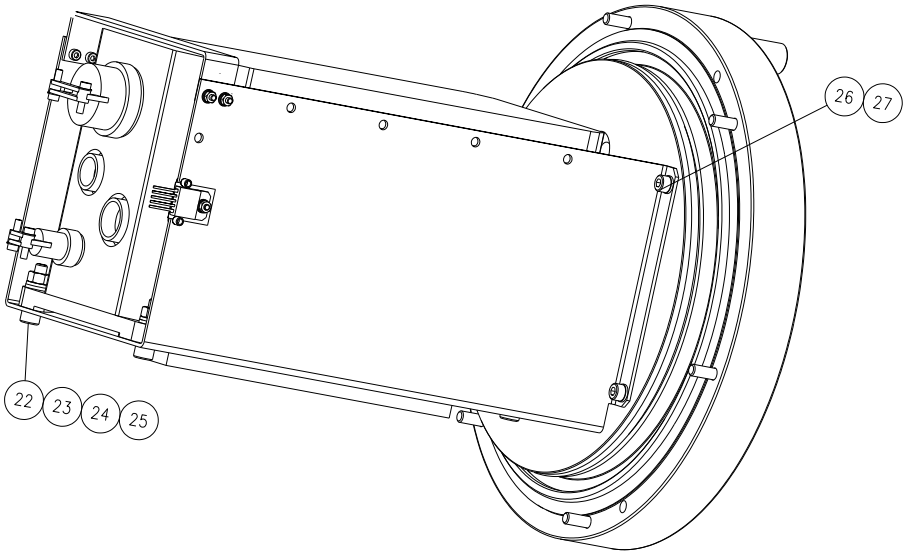
Page 1 of 1 (Cd6982)	MPT 319/SiH transponder - exploded view	**860-217879** Rev.A

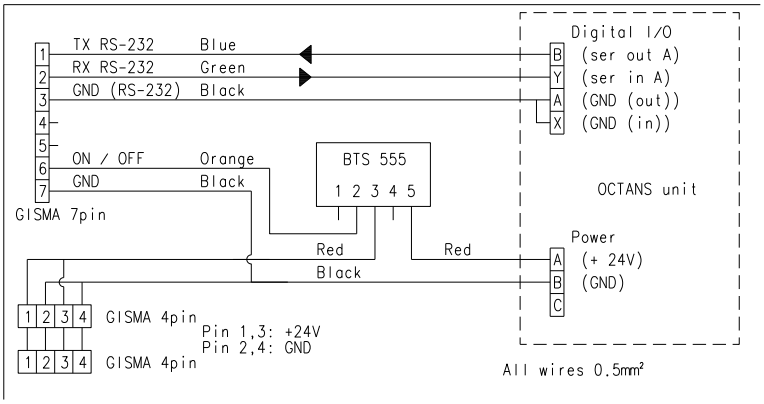
Octans module

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
129-217849	Octans module complete	Figure page 170	1
-	-	-	-
298-097741	Octans fibre-optic gyro compass	-	1
-	-	-	-

Octans module - Drawing and wiring







Note:
The drawing is not in scale.

Page 1 of 1 (CD7003)	Octans module	**861-217850** Rev.A

Battery unit L24

Complete unit

This battery unit is used for powering the Octans module.

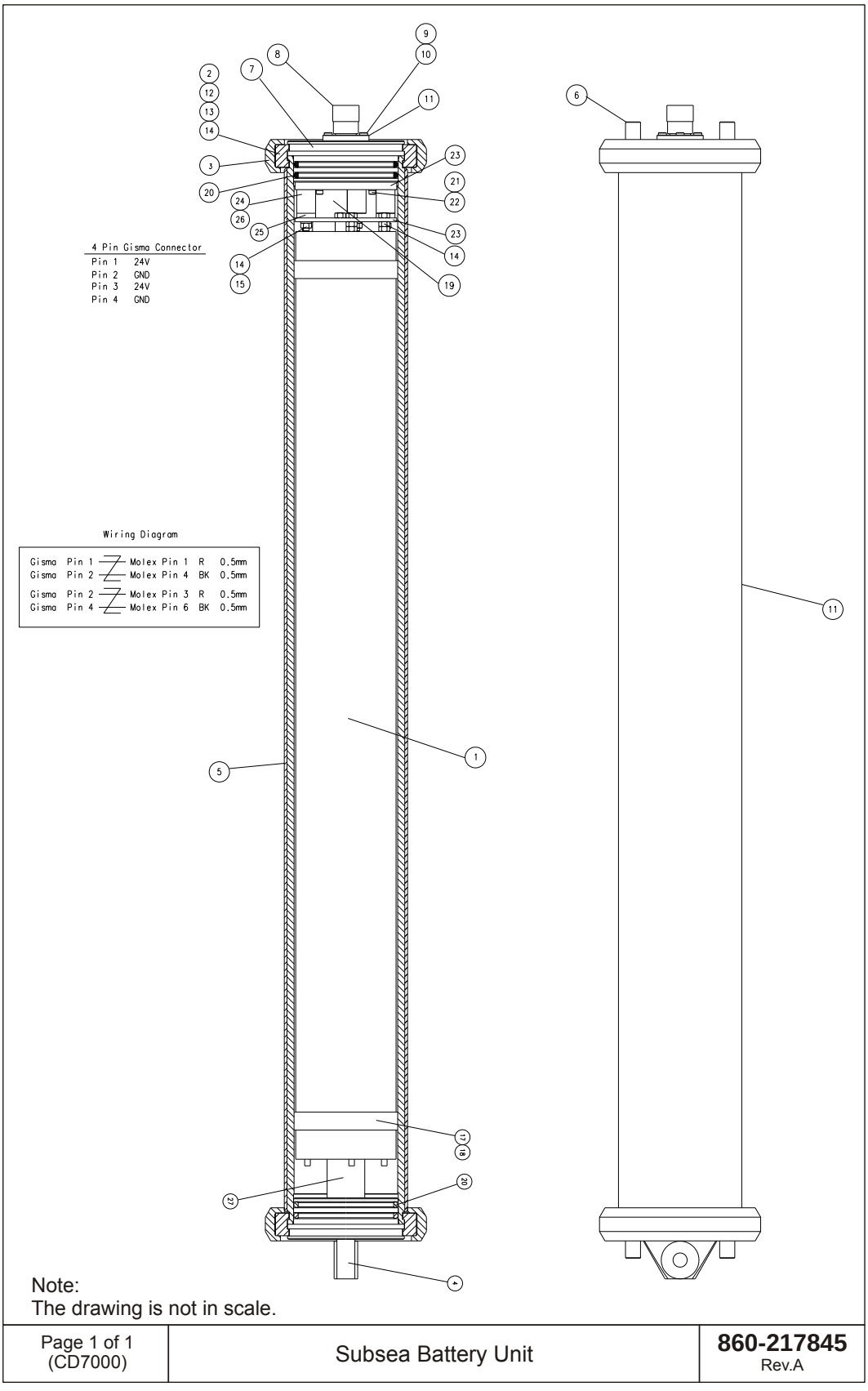
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
107-217844	Battery unit L24 complete	Figure page 172	1
-	-	-	-

Main modules

Main modules for the battery unit.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-219492	Battery pack	Figure page 172	1
-	(89)	1	-
599-089149	Housing	Figure page 172	1
-	-	5	-
599-089149	Top end cap	Figure page 172	1
-	w/Gisma connector	7	-
599-089263	Bottom end cap	Figure page 172	1
-	-	4	-

Battery unit L24 – Subsea battery unit



Subsea SPT/MPT battery unit

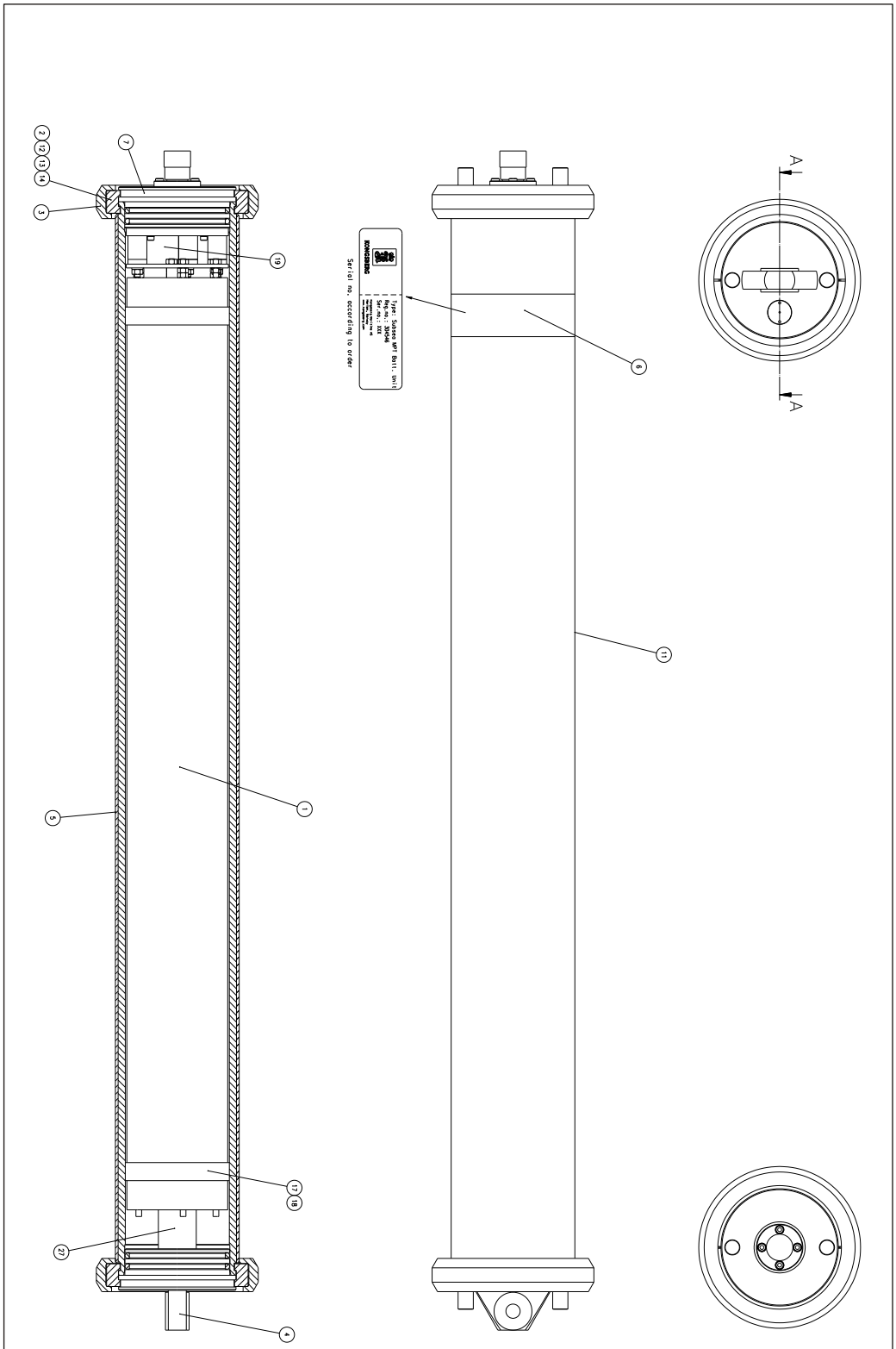
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
107-217844	Battery unit L 24 complete	Figure page 174	1
-	-	-	-

Main modules

Main modules for the battery unit.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
-	Battery pack	Figure page 174	1
-	L10/36 (96)	1	-
599-089149	Housing	Figure page 174	1
-	-	5	-
304510	Top end cap	Figure page 174	1
-	w/Gisma connector	7	-
599-089263	Bottom end cap	Figure page 174	1
-	-	4	-

Subsea SPT/MPT battery unit – Exploded view



Page 1 of 1 (Cd30161)	Subsea SPT/MPT battery unit	**304546** Rev.A

MPT 316/DT EEx transponder

Complete transponder without battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-089500	MPT 316/DT EEx Transponder complete without battery	Figure page 177	1
-	All main modules are included without battery	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-089501	Battery pack (lithium)	Figure page 177	1
-	L10/36 (15/20)	8	-

Main modules

Main modules for the MPT 316/DT EEx transponder.

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
312-089020	MPT 316/DT EEx transducer	Figure page 177	1
-	-	N/A	-
299-089524	Electronic chassis	Figure page 177	1
-	Motherboard, Rxamp board and sensors (1) (if used) are included	N/A	-
382-083607	Tx board	Figure page 177	1
-	-	2	-
382-083551	Microcontroller board	Figure page 177	1
-	-	3	-
382-083602	Rx board	Figure page 177	1

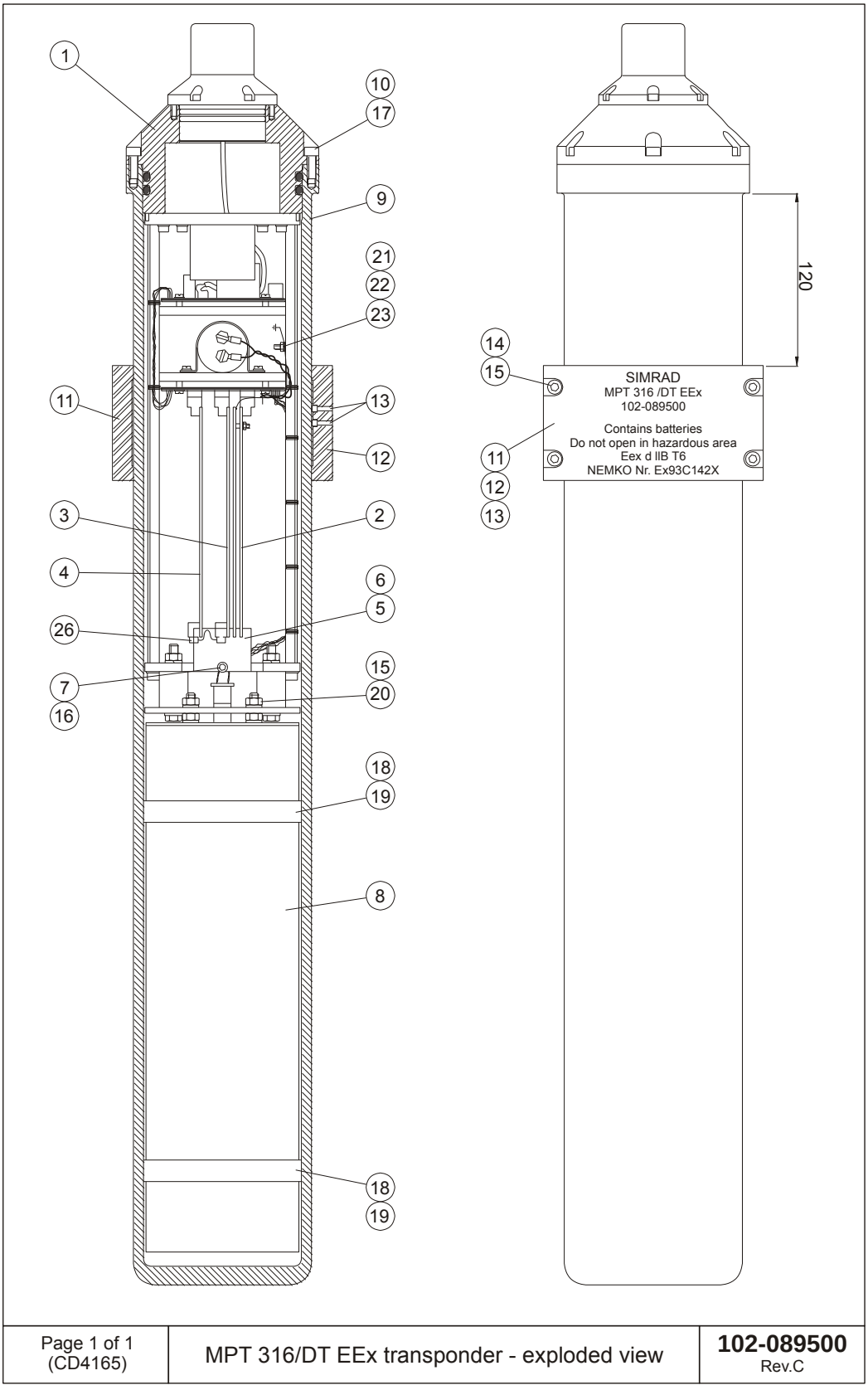
Part no.	Item name	Drw. ref.	No. in sys.
-	Technical data	Drw. pos.	Rec.spares
-	-	4	-
599-089496	Housing	Figure page 177	1
-	-	9	-

- Separate DT sensor, see page 103.

Accessories

→ Refer to the table on page 95.

MPT 316/DT EEx transponder – Exploded view



Page 1 of 1 (CD4165)	MPT 316/DT EEx transponder - exploded view	**102-089500** Rev.C

MPT 316/EEx 90 transponder

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
102-089745	MPT 316/EEx 90 Transponder complete without battery	Figure page 180	1
-	All main modules are included without battery	N/A	-

Standard battery

Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
290-089501	Battery pack (lithium)	Figure page 180	1
-	L10/36 (15/20)	8	-

Main modules

Main modules for the MPT 316/EEx 90 transponder.

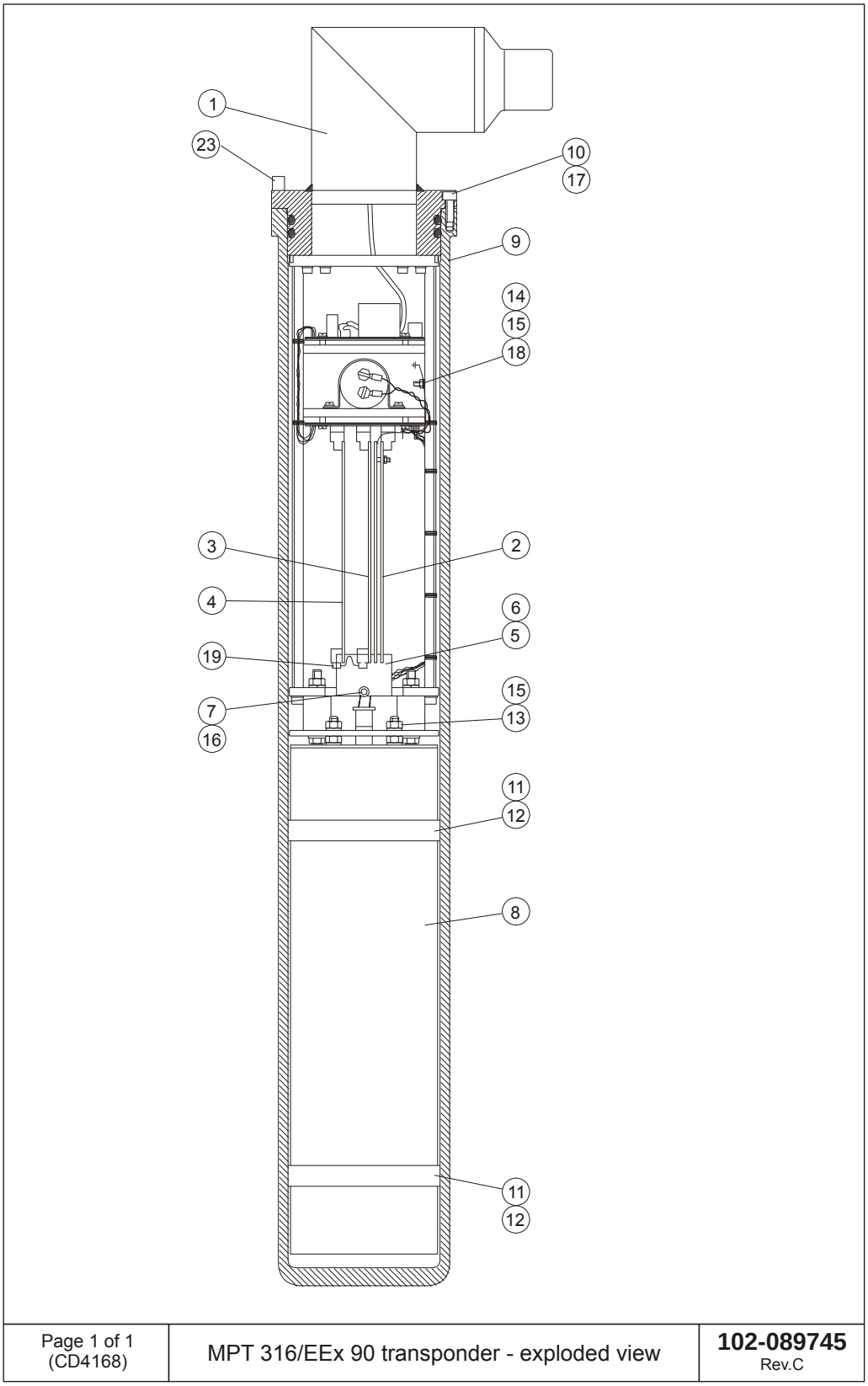
Part no.	Item name	Drw. ref.	No. in sys.
-	**Technical data**	**Drw. pos.**	**Rec.spares**
312-089020	MPT 316/EEx 90 transducer	Figure page 180	1
-	-	N/A	-
299-089524	Electronic chassis	Figure page 180	1
-	Motherboard, Rxamp board and sensors (1) (if used) are included	N/A	-
382-083607	Tx board	Figure page 180	1
-	-	2	-
382-083551	Microcontroller board	Figure page 180	1
-	-	3	-
382-083602	Rx board	Figure page 180	1
-	-	4	-
599-102653	Housing	Figure page 180	1

Part no.	Item name	Drw. ref.	No. in sys.
-	Technical data	Drw. pos.	Rec.spares
-	-	9	-
N/A	Locking pin	Figure page 180	1
-	-	23	-

Accessories

→ Refer to the table on page 95.

MPT 316/EEx 90 transponder – Exploded view



Page 1 of 1 (CD4168)	MPT 316/EEx 90 transponder - exploded view	**102-089745** Rev.C

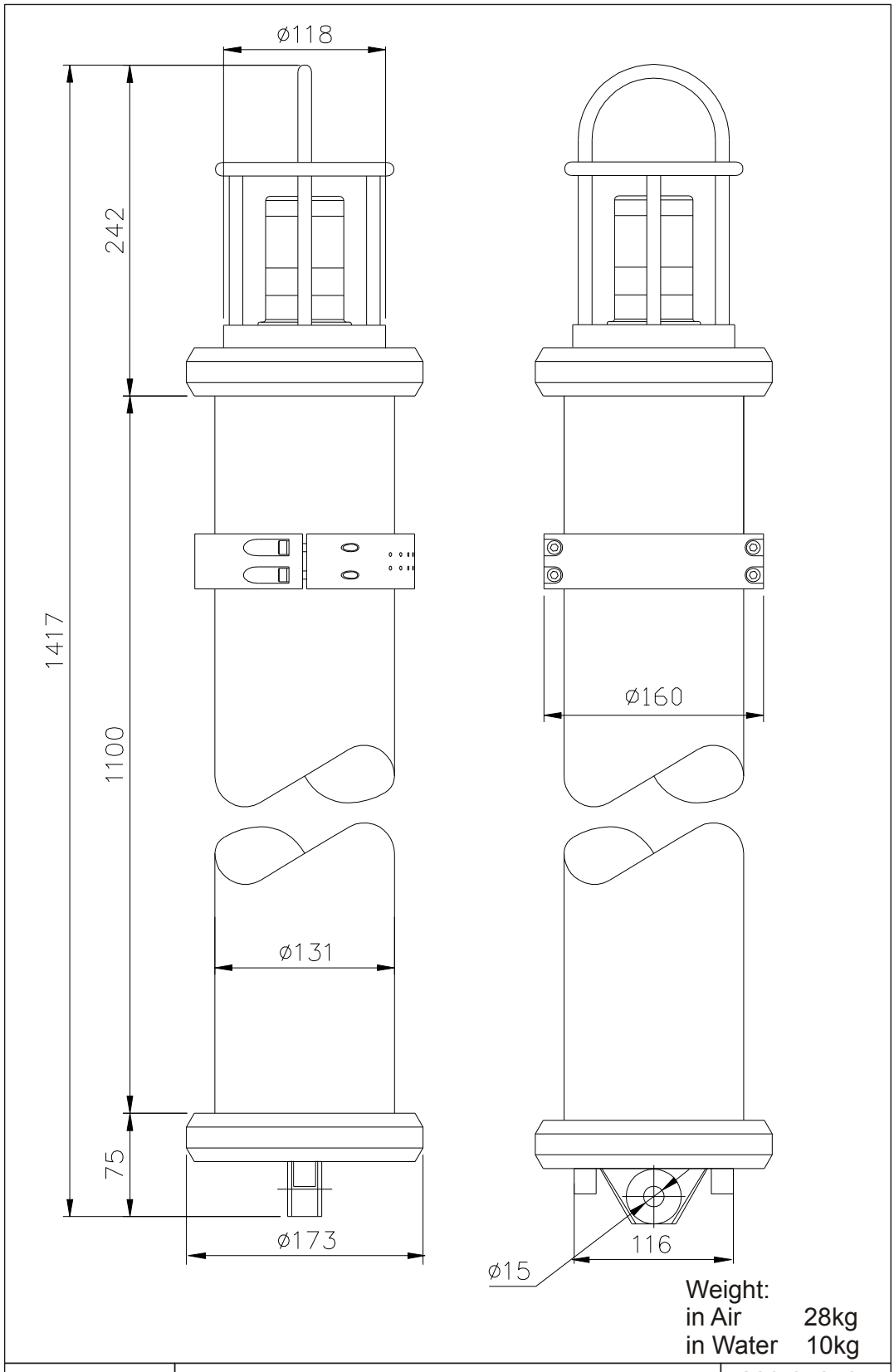
12 DRAWING FILE

This chapter holds illustrations referred to in various sections in this manual. The illustrations are based on the original system drawings and wiring diagrams.

- The original drawings are available in electronic format on request.

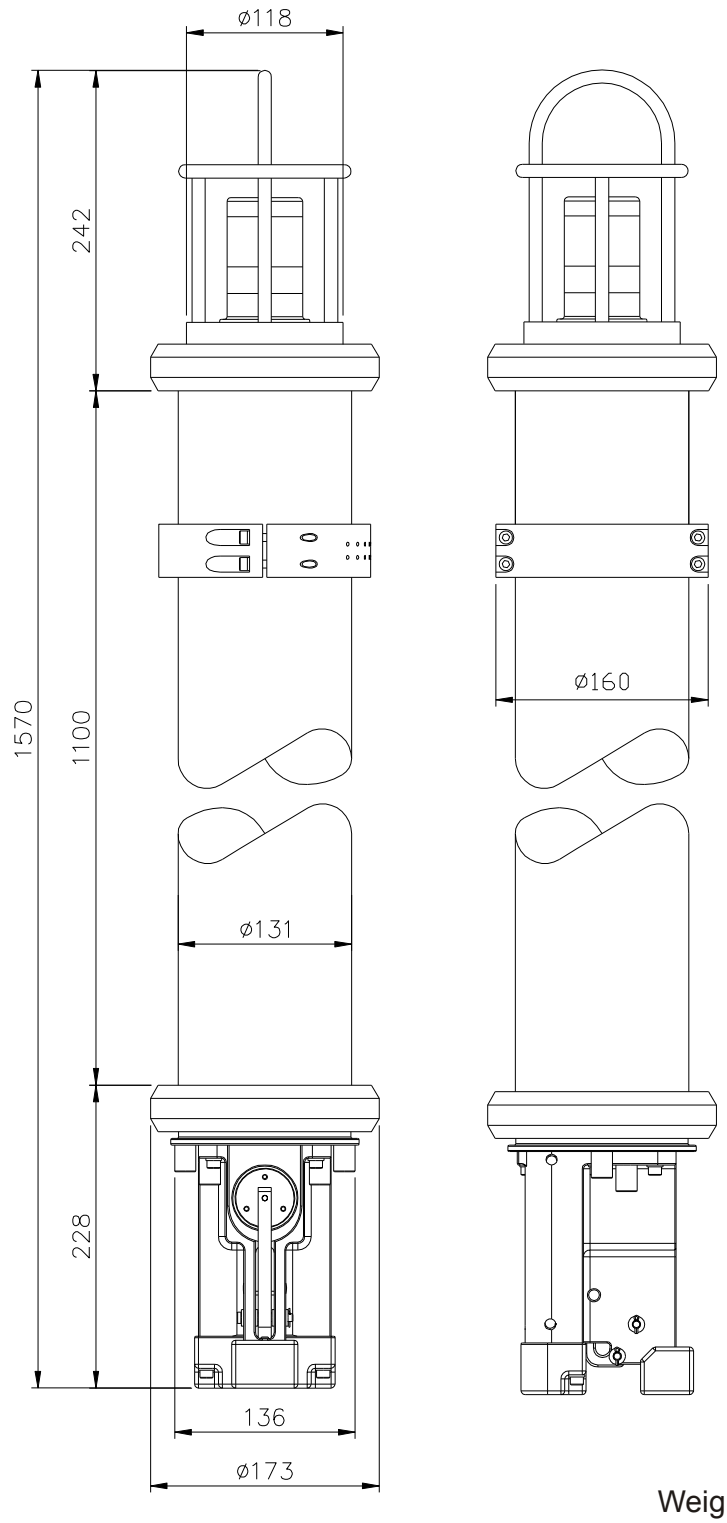
Drawings

SPT 314 transponder – outline dimensions



Page 1 of 1 (Cd30009)	SPT 314 transponder - outline dimensions	**830-219594** Rev.A

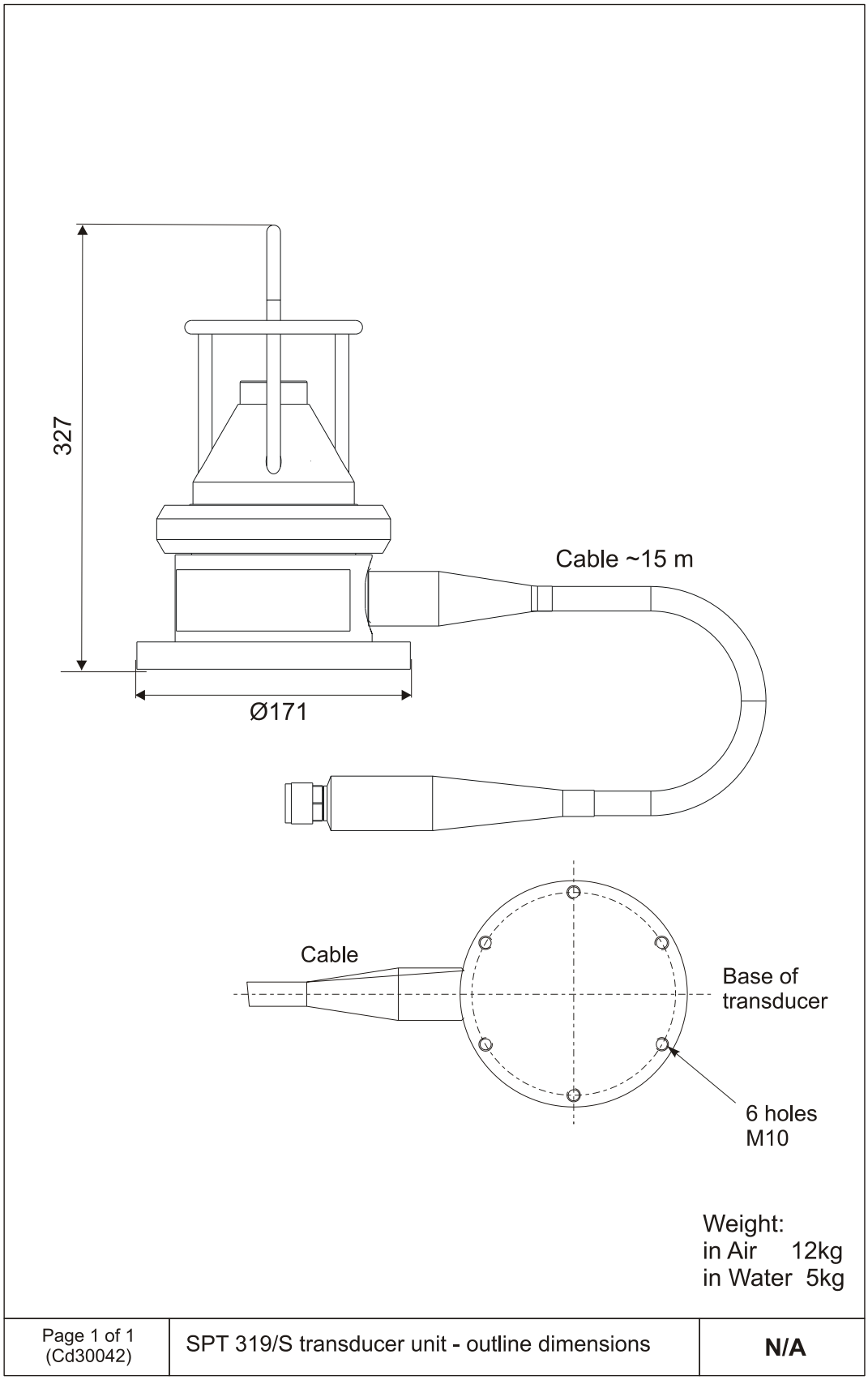
SPT 314/R transponder – outline dimensions



Weight:
in Air 31kg
in Water 11kg

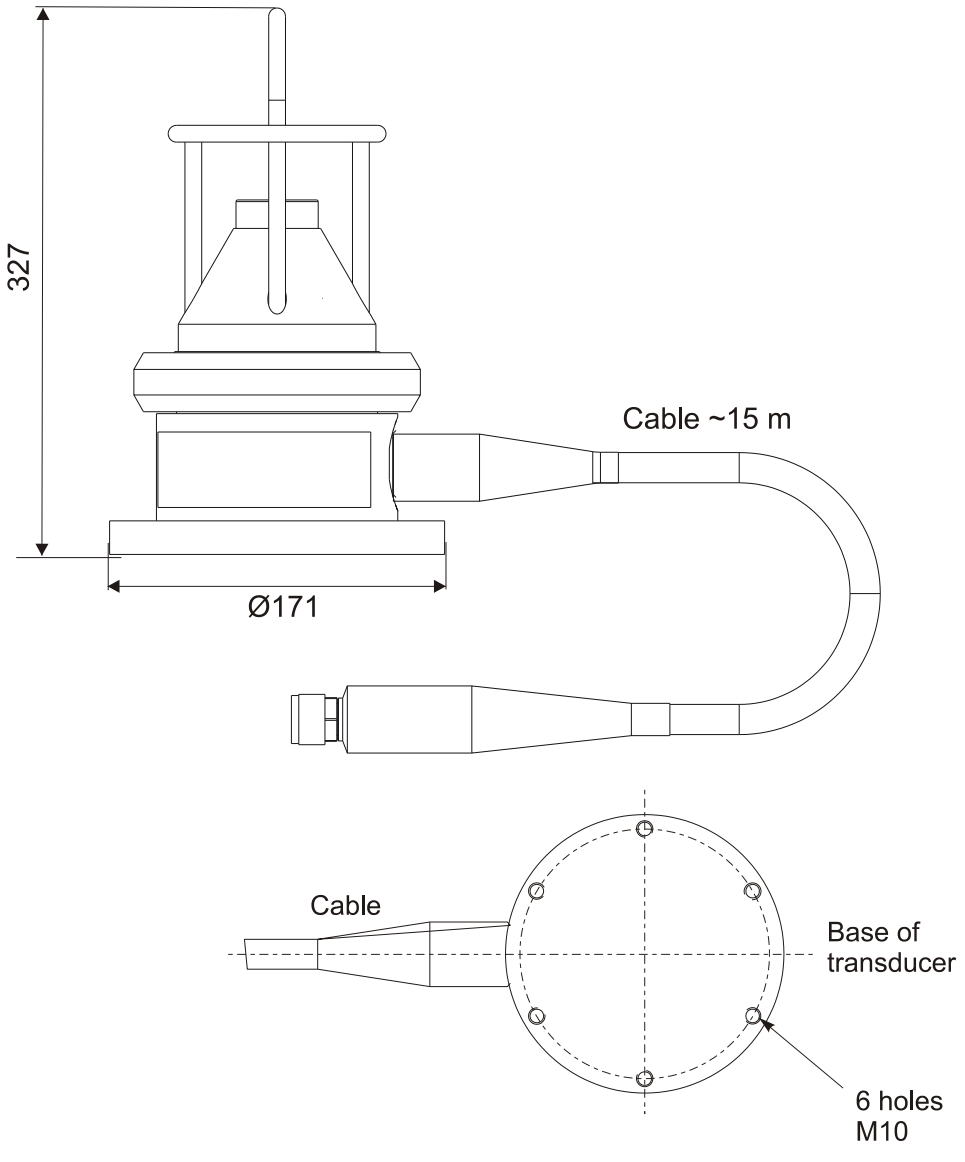
Page 1 of 1 (Cd30008)	SPT 314/R transponder - outline dimensions	**830-219595** Rev.A

SPT 319/S transponder – outline dimensions



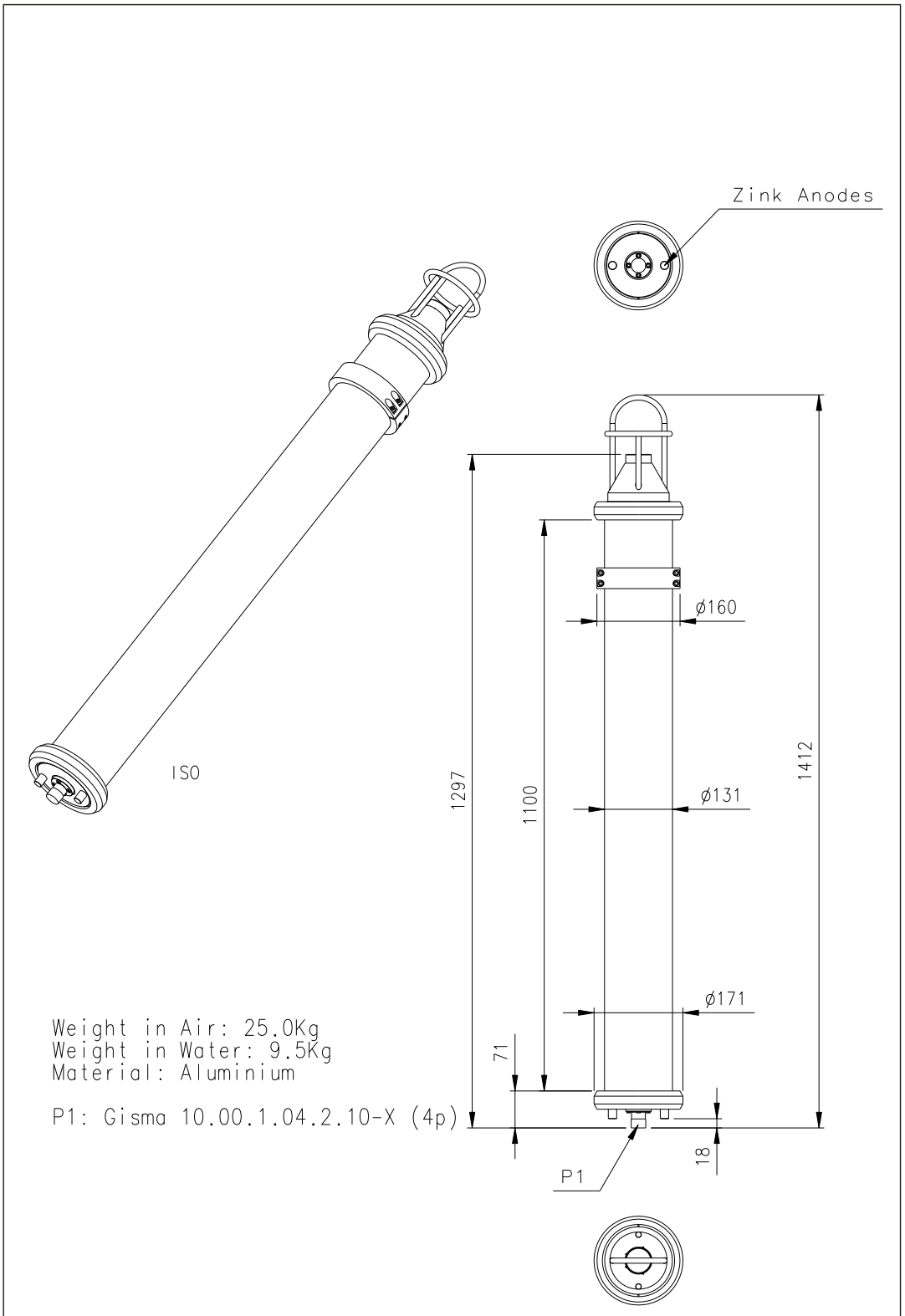
Page 1 of 1 (Cd30042)	SPT 319/S transducer unit - outline dimensions	**N/A**

Split TD 319 w/4-pin Gisma – outline dimensions



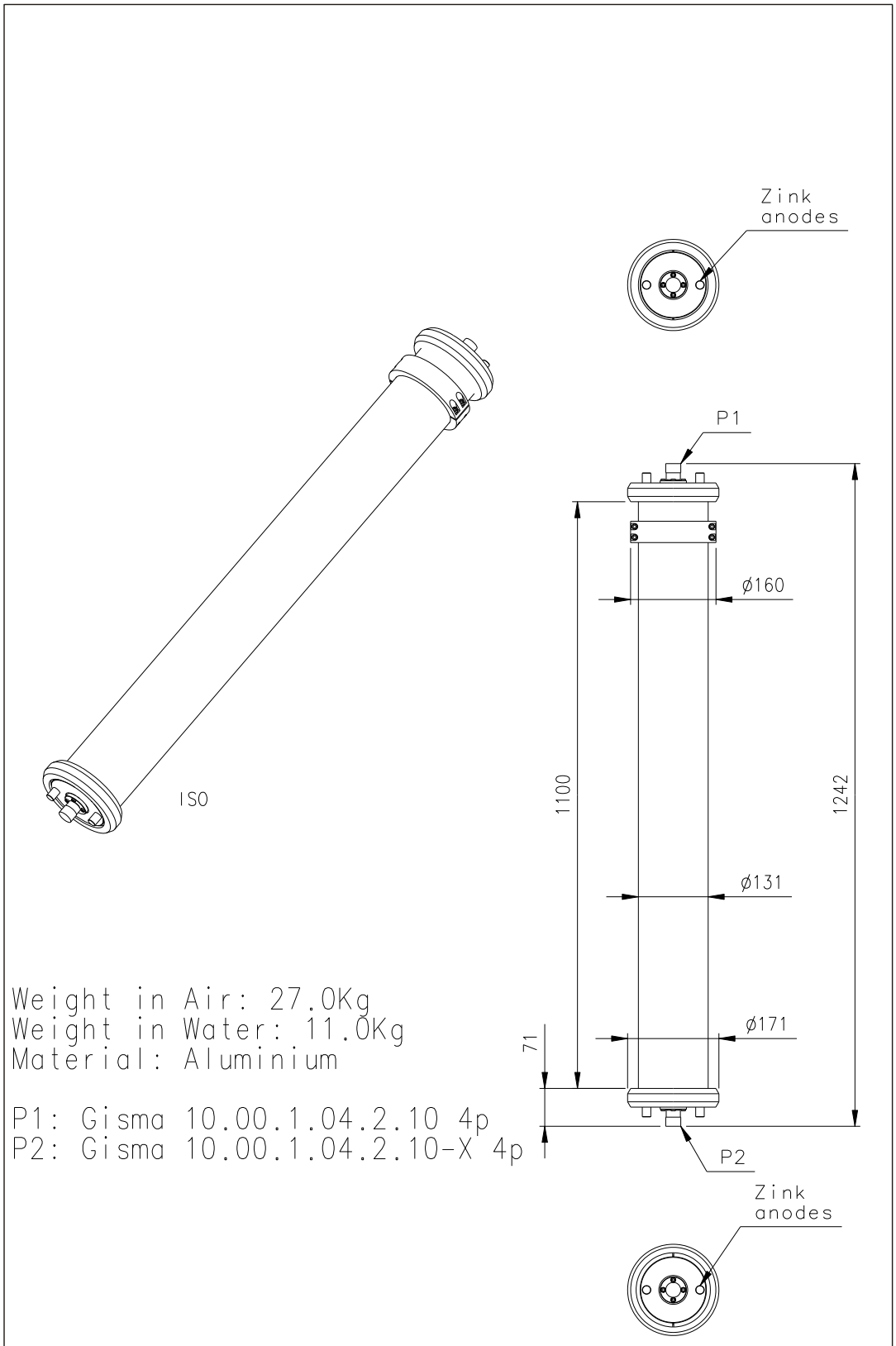
Page 1 of 1 (Cd30042)	SPT 319/S transducer unit - outline dimensions	**N/A**

SPT 319/E transponder – outline dimensions



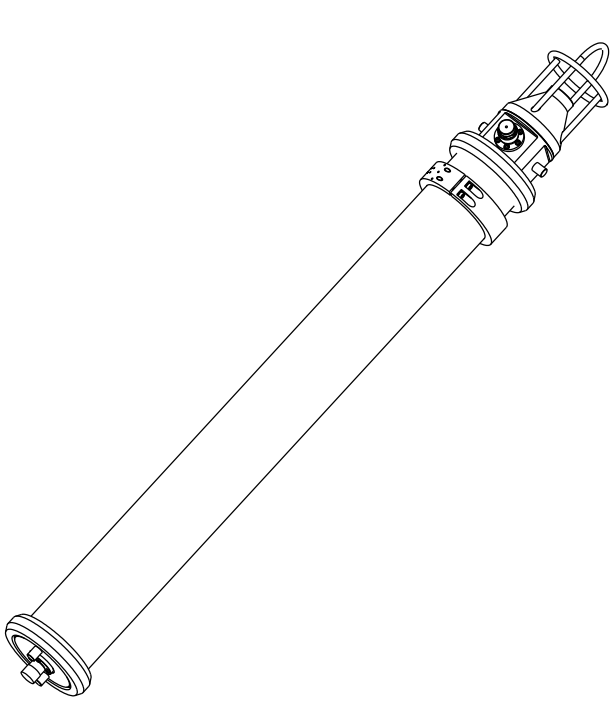
Page 1 of 1 (Cd30157a)	SPT 319/E transponder - outline dimensions	**332568** Rev.A

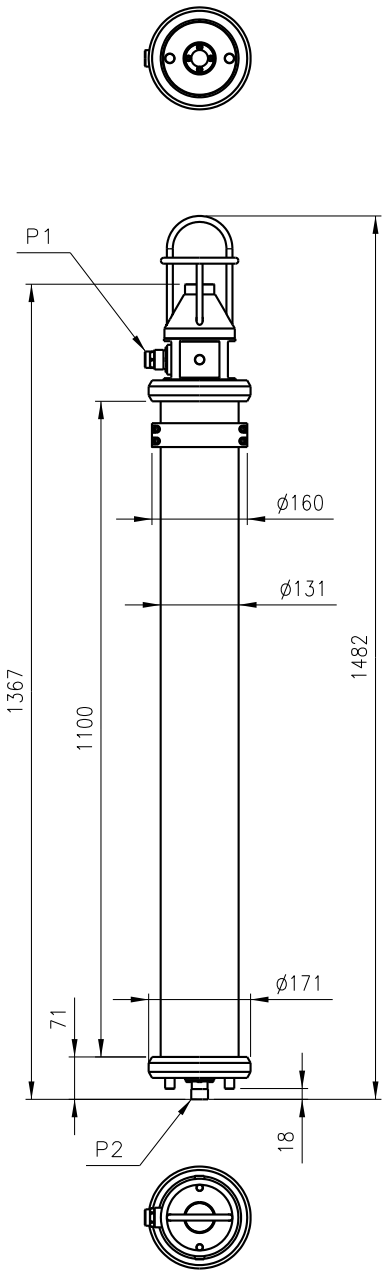
SPT 319/SIE transponder – outline dimensions



Page 1 of 1 (Cd30158a)	SPT 319/SIE transponder - exploded view	**332569** Rev.A

SPT 319/SiHE transponder – outline dimensions



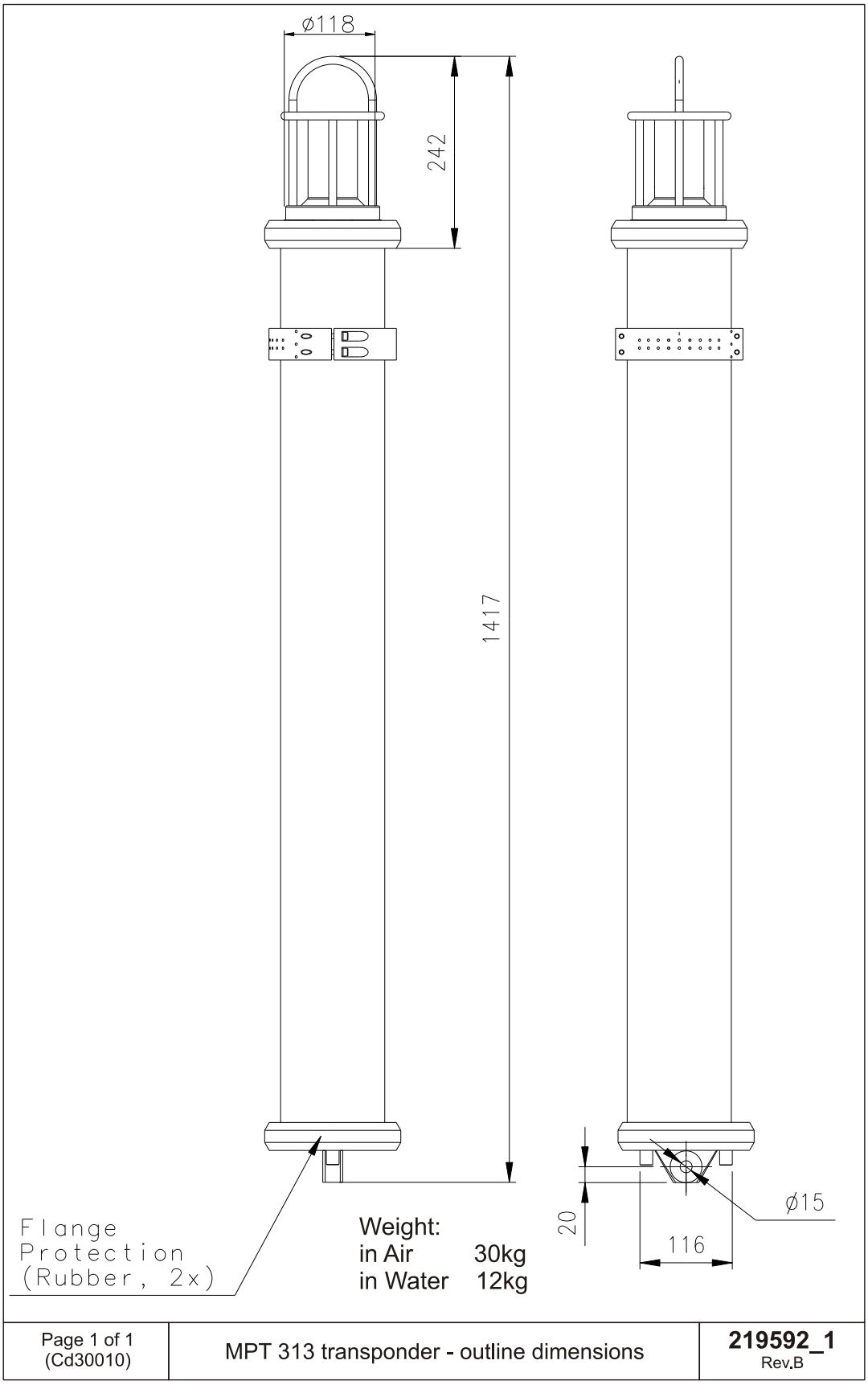


Weight in Air: 32.0Kg
Weight in Water: 18.0Kg
Material: Aluminium

P1: Gisma 10.00.2.07.2.10 (7p)
P2: Gisma 10.00.1.04.2.10-X (4p)

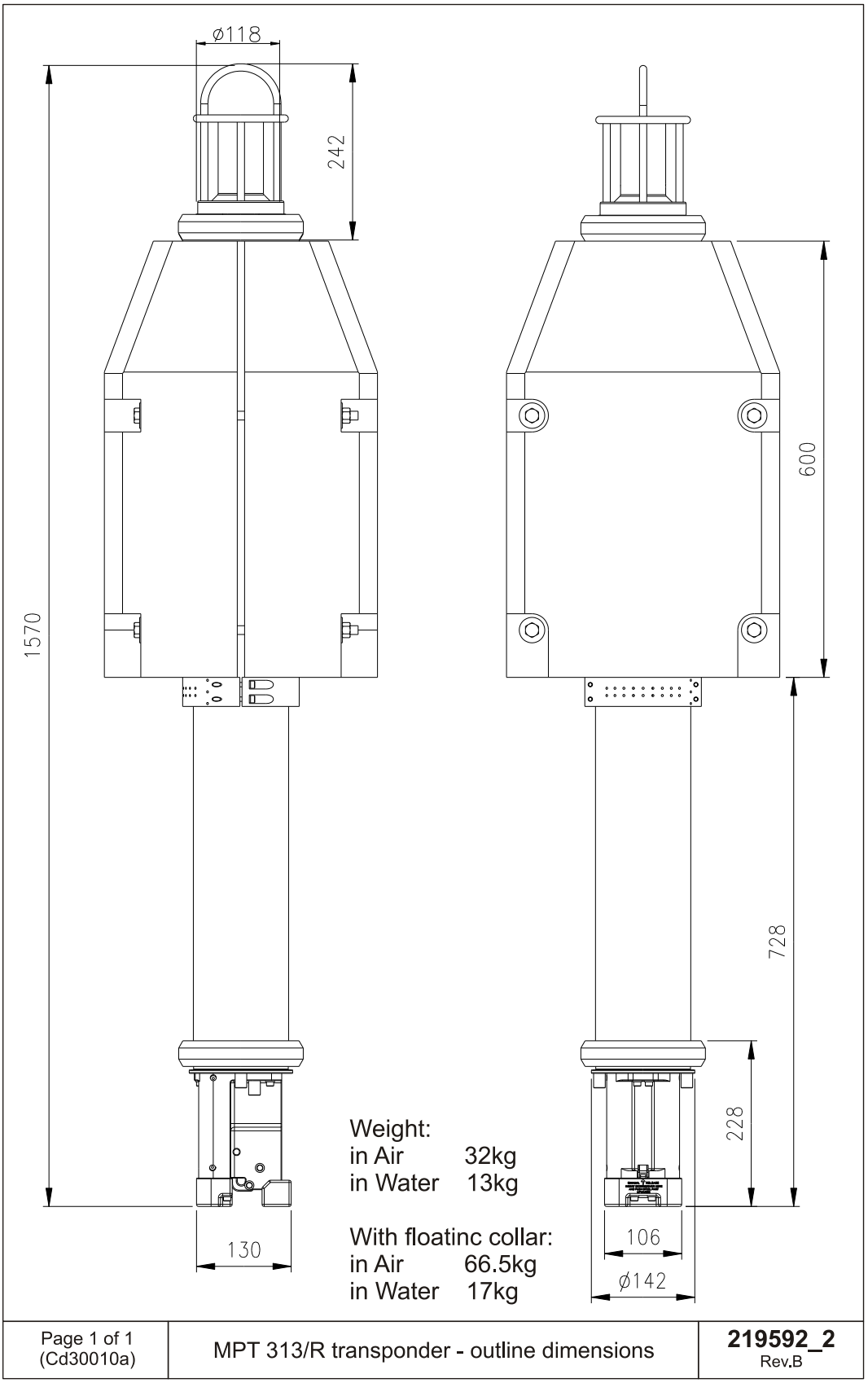
Page 1 of 1 (Cd30159a)	SPT 319/SiHE transponder - outline dimensions	**332570** Rev.A

MPT 313 transponder – outline dimensions



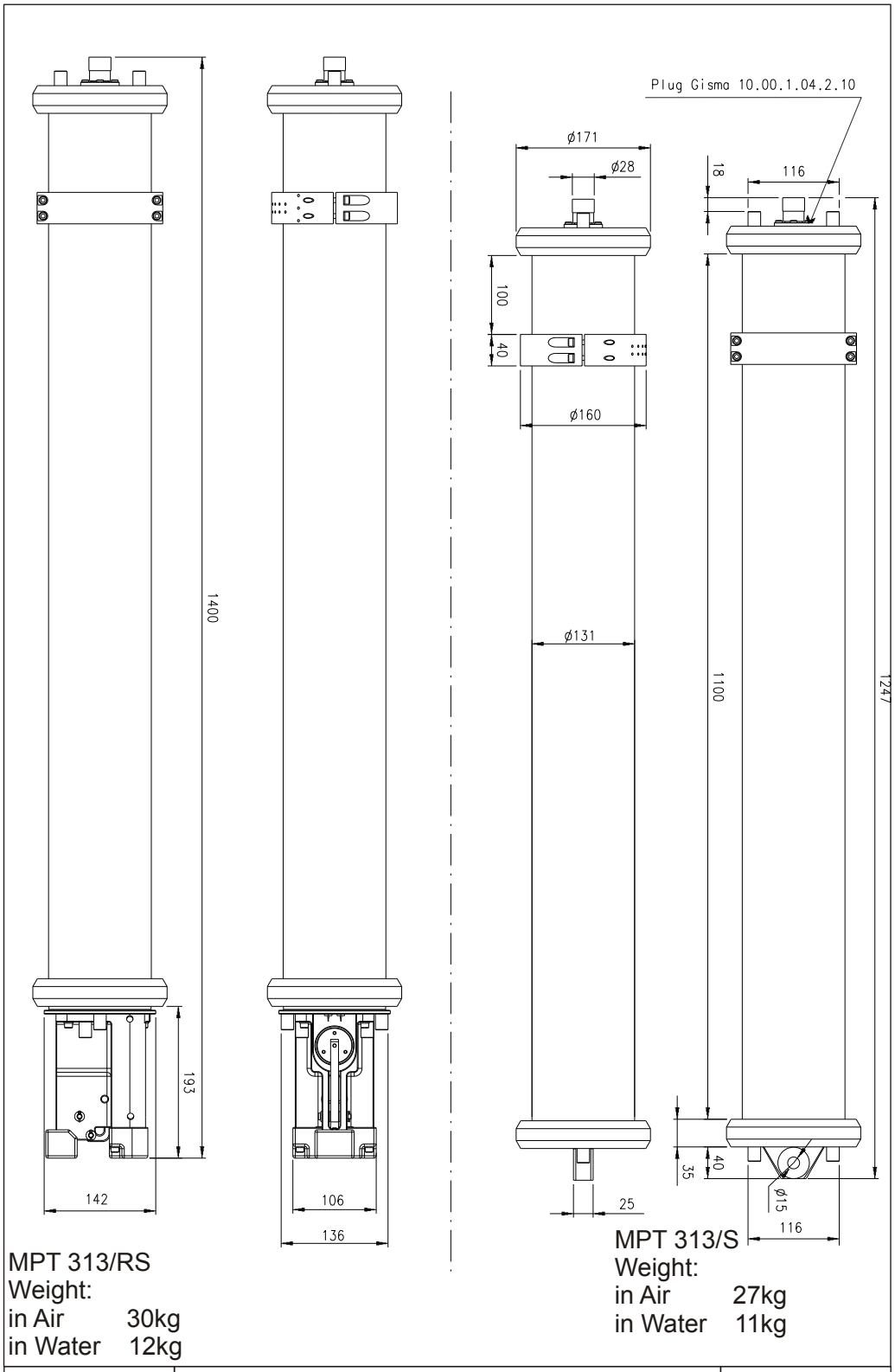
Page 1 of 1 (Cd30010)	MPT 313 transponder - outline dimensions	**219592_1** Rev.B

MPT 313/R transponder – outline dimensions



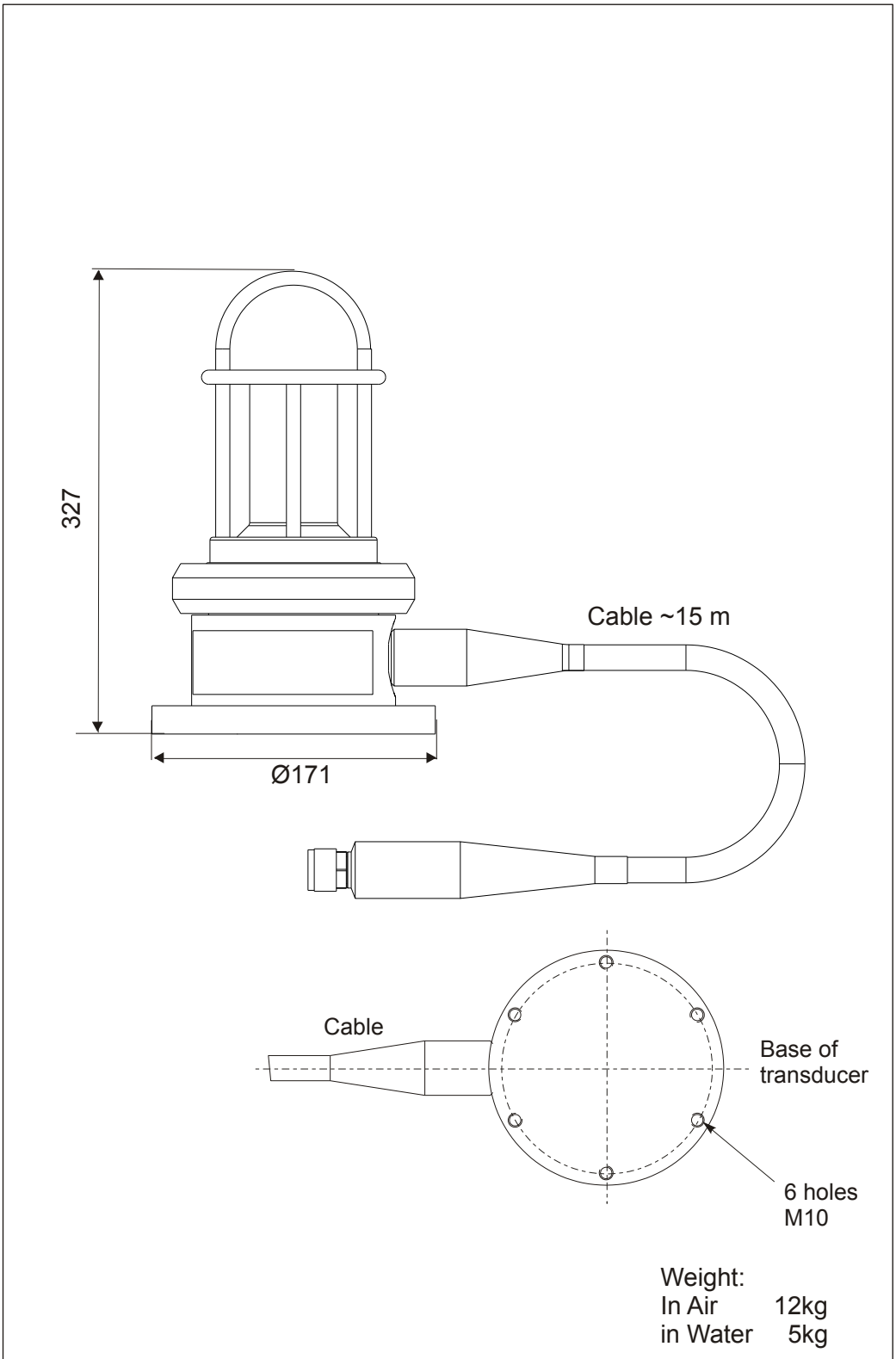
Page 1 of 1 (Cd30010a)	MPT 313/R transponder - outline dimensions	**219592_2** Rev.B

MPT 313/S and MPT 313/RS transponder – outline dimensions



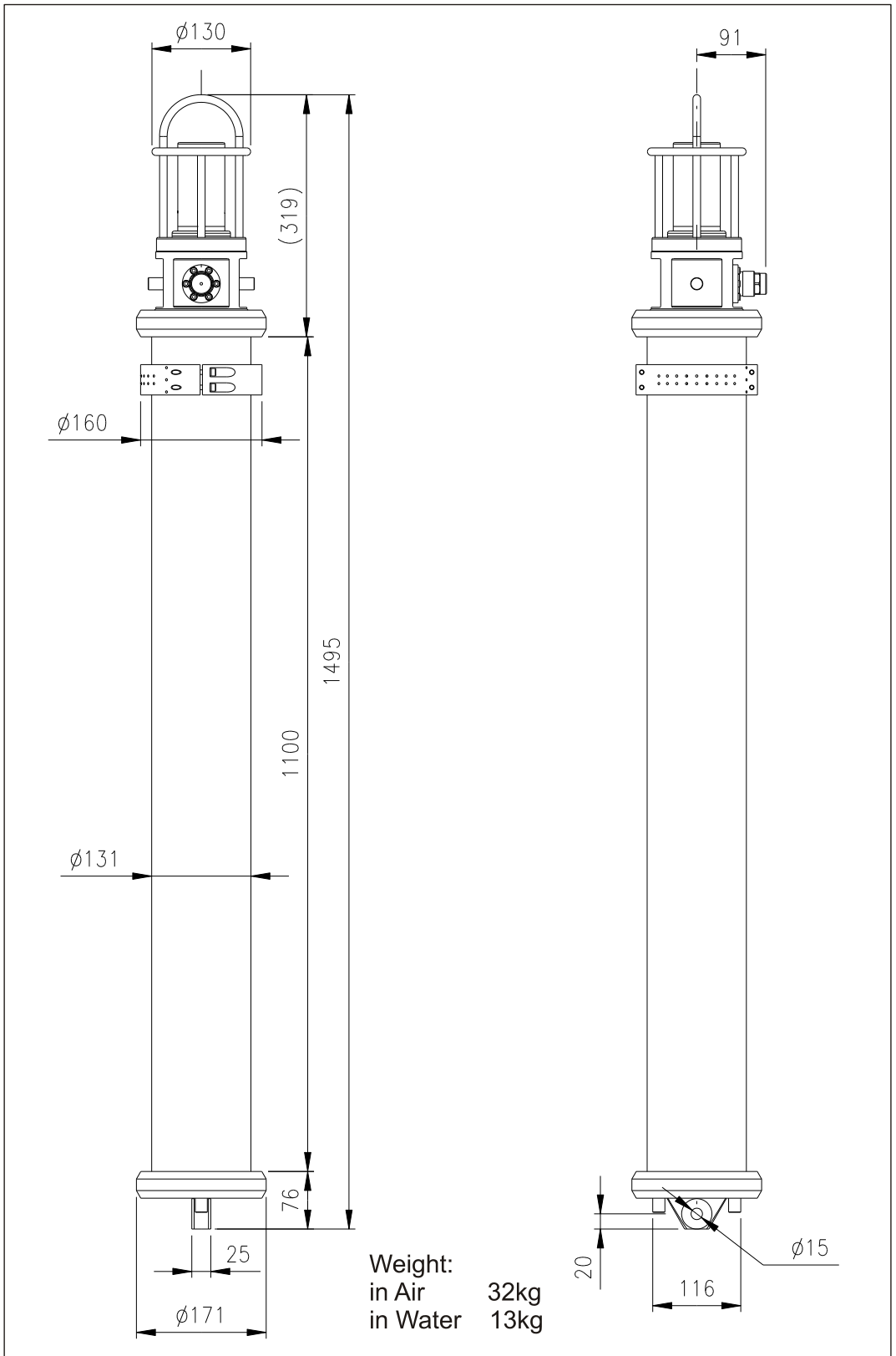
Page 1 of 1 (Cd30020)	MPT 313/S and MPT 313/RS transponder - outline dimensions	**830-217307** Rev.B

MPT 313/S and MPT 313/RS transducers– outline dimensions



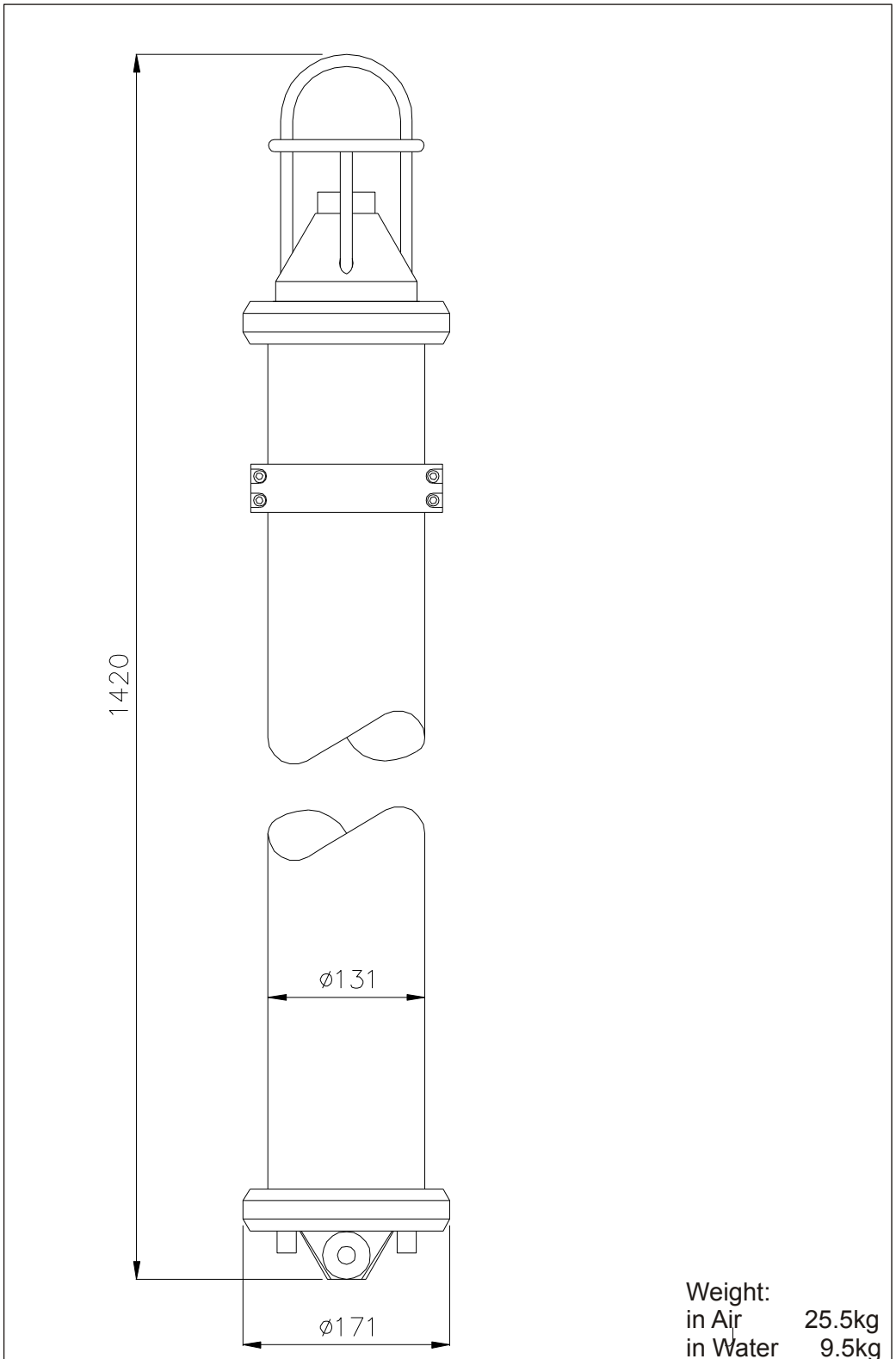
Page 1 of 1 (Cd30041)	MPT 313/S and MPT 313/RS transducer unit - outline dimensions	**N/A**

MPT 313/SiH transponder – outline dimensions



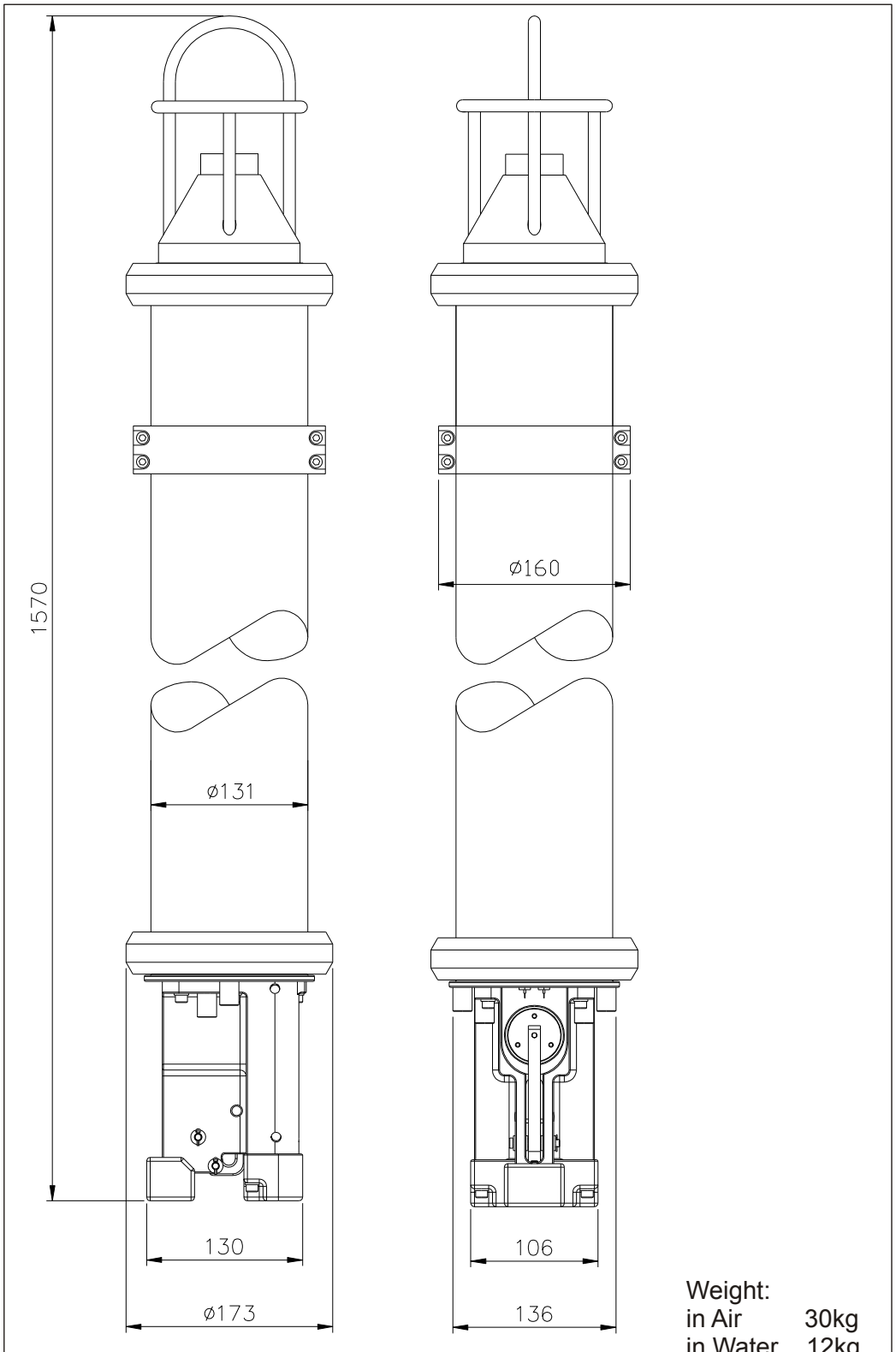
Page 1 of 1 (Cd30010b)	MPT 313/SiH transponder - outline dimensions	**830-219592_3** Rev.B

MPT 319 and SPT 319 transponder – outline dimensions



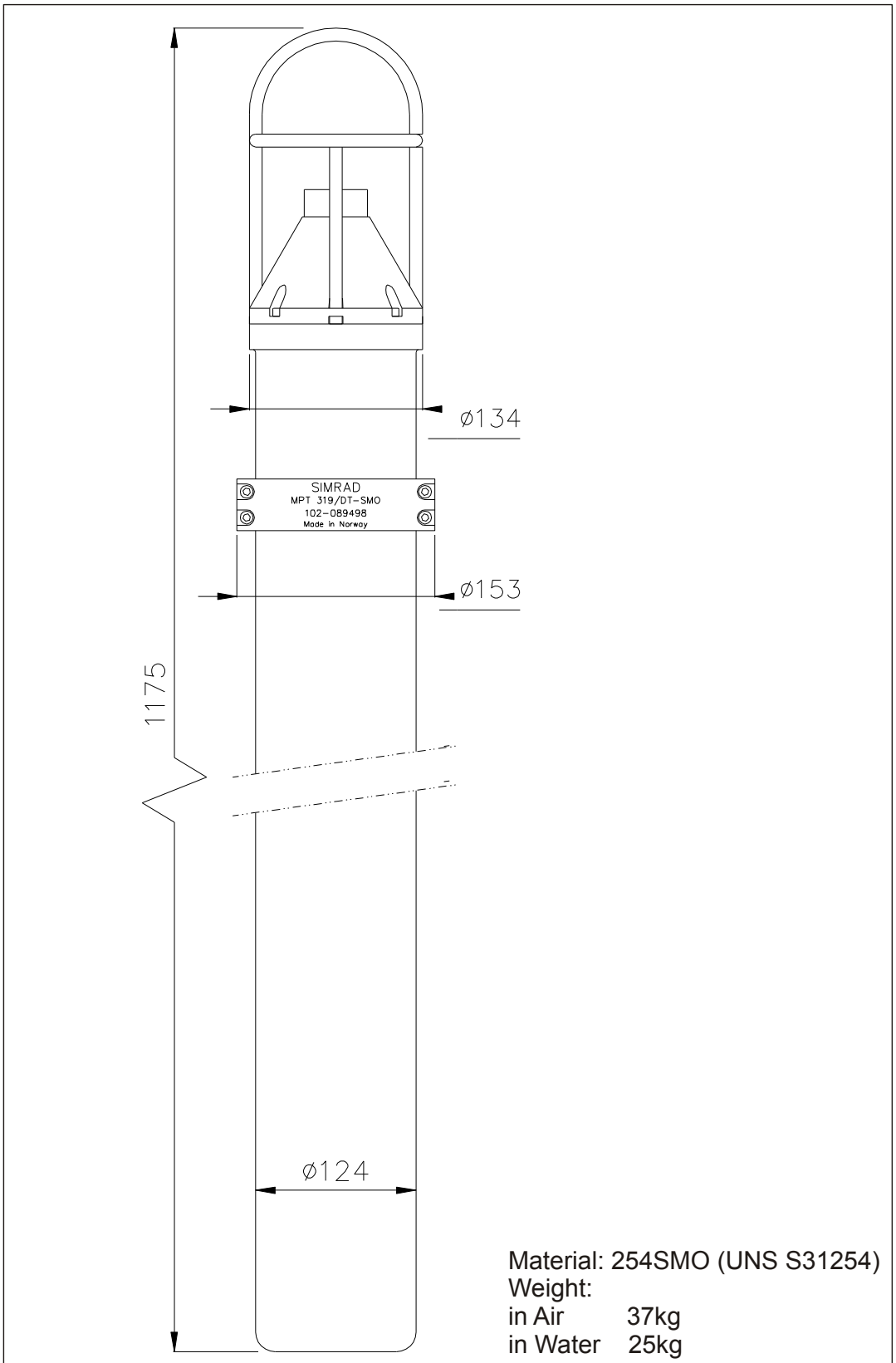
Page 1 of 1 (Cd30013)	MPT 319 and SPT 319 transponder - outline dimensions	**830-089417** Rev.B

MPT 319/R and SPT 319/R transponder – outline dimensions



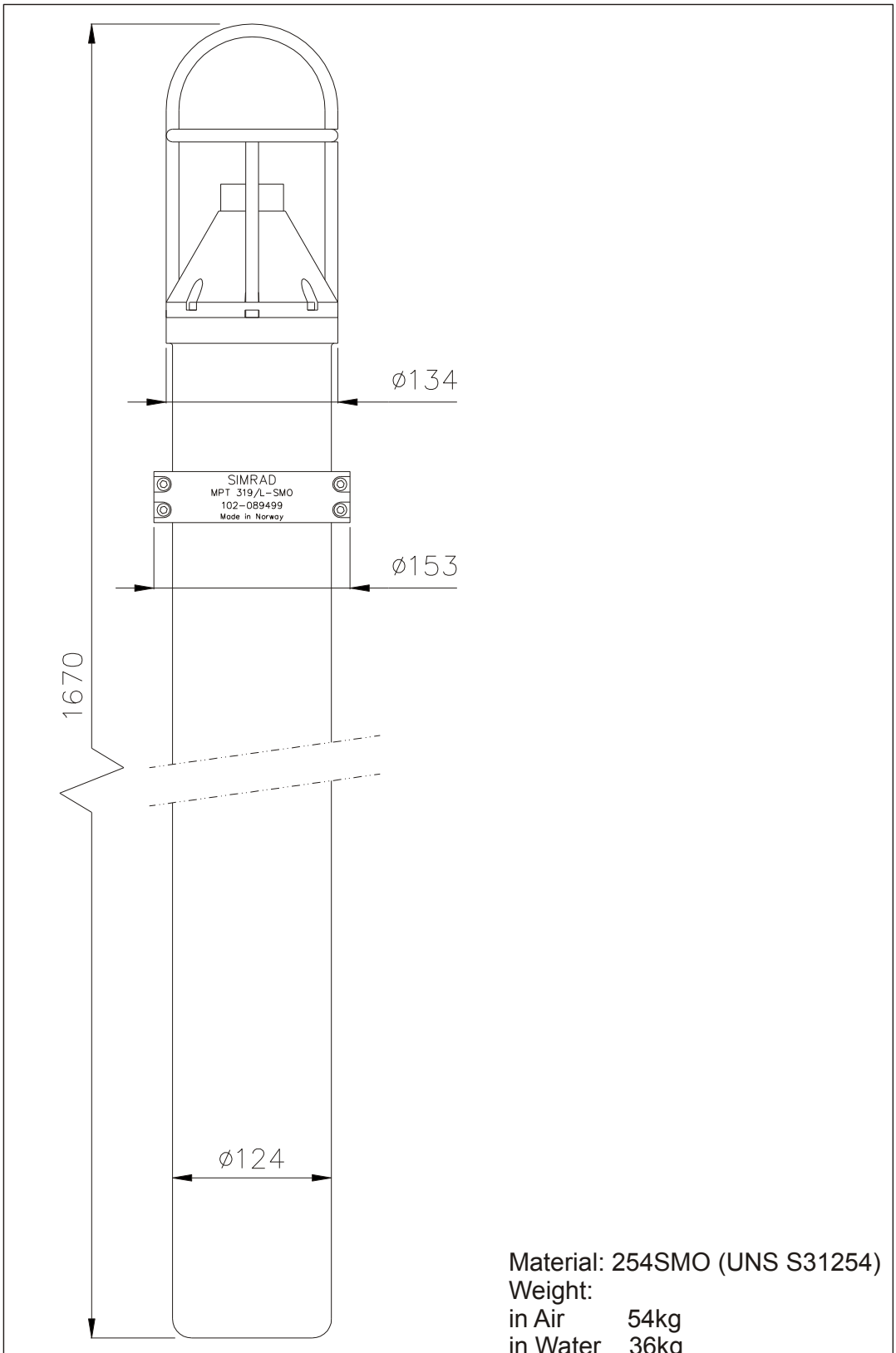
Page 1 of 1 (Cd30014)	MPT 319/R and SPT 319/R transponder - outline dimensions	**830-089418** Rev.B

MPT 319/DT-St transponder – outline dimensions



Page 1 of 1 (Cd30015)	MPT 319/DT-St transponder - outline dimensions	**830-089450** Rev.B

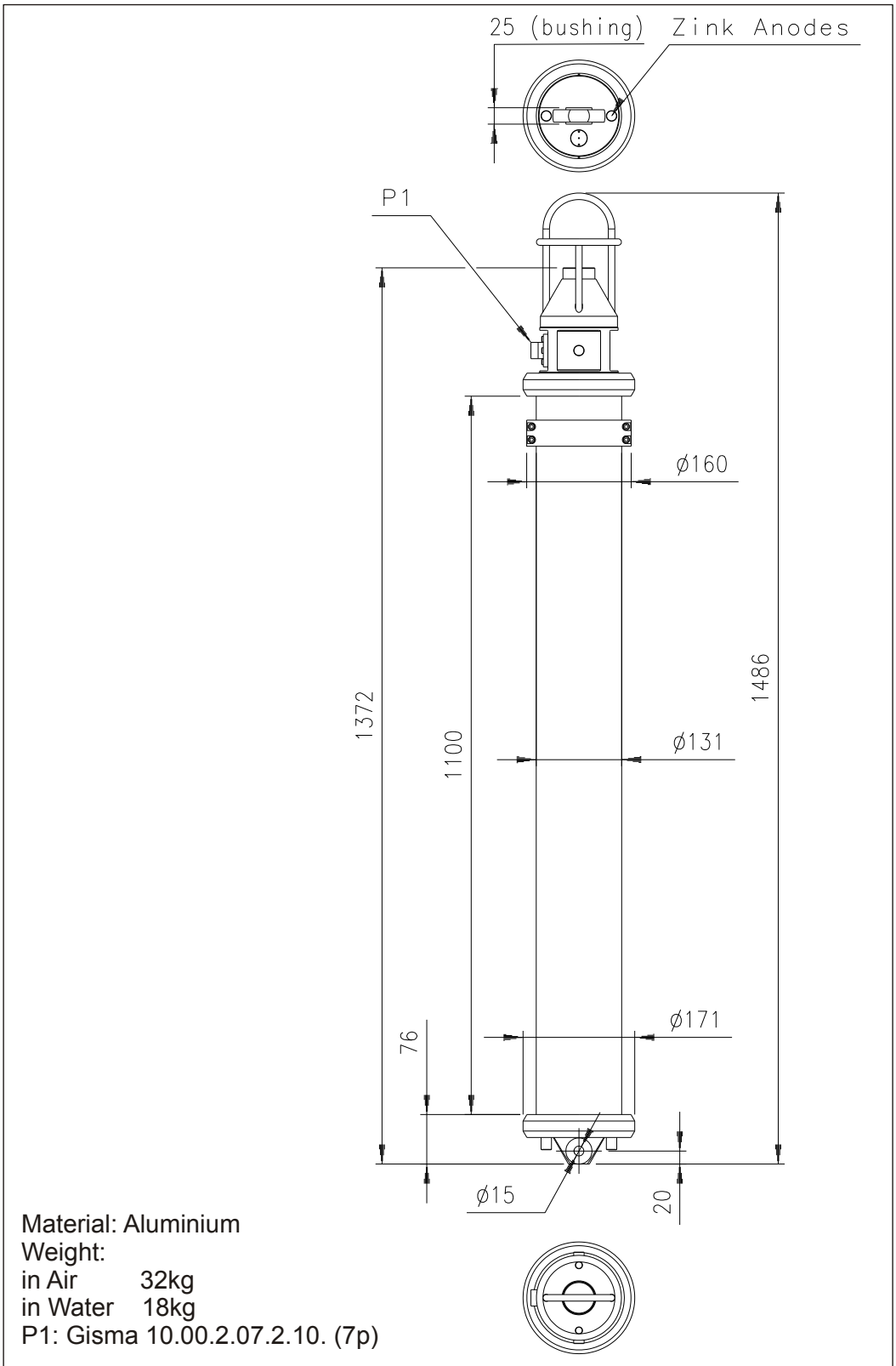
MPT 319/L-St transponder – outline dimensions



Material: 254SMO (UNS S31254)
Weight:
in Air 54kg
in Water 36kg

Page 1 of 1 (Cd30016)	MPT 319/L-St transponder - outline dimensions	**830-089451** Rev.B

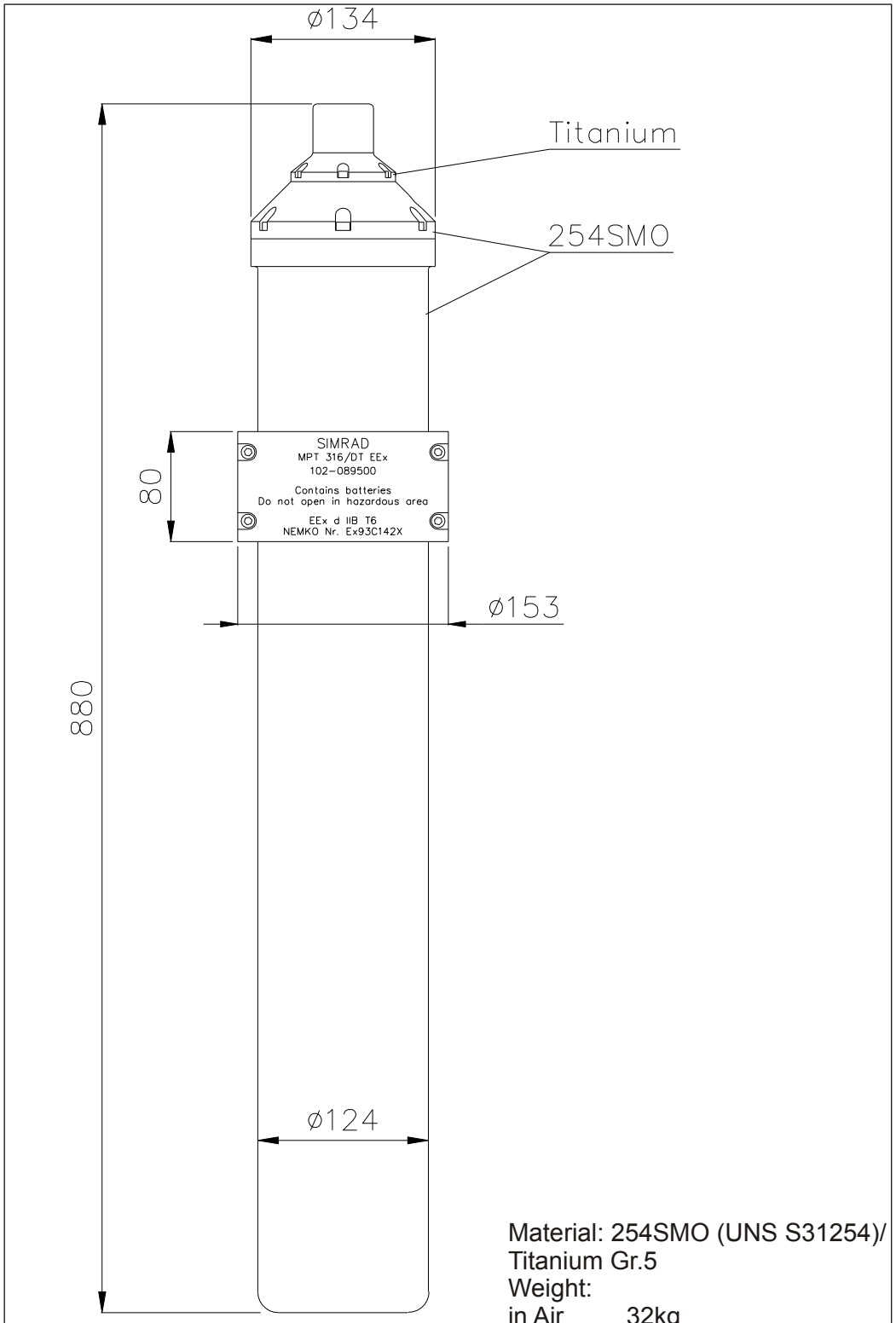
MPT 319/SiH transponder – outline dimensions



Material: Aluminium
Weight:
in Air 32kg
in Water 18kg
P1: Gisma 10.00.2.07.2.10. (7p)

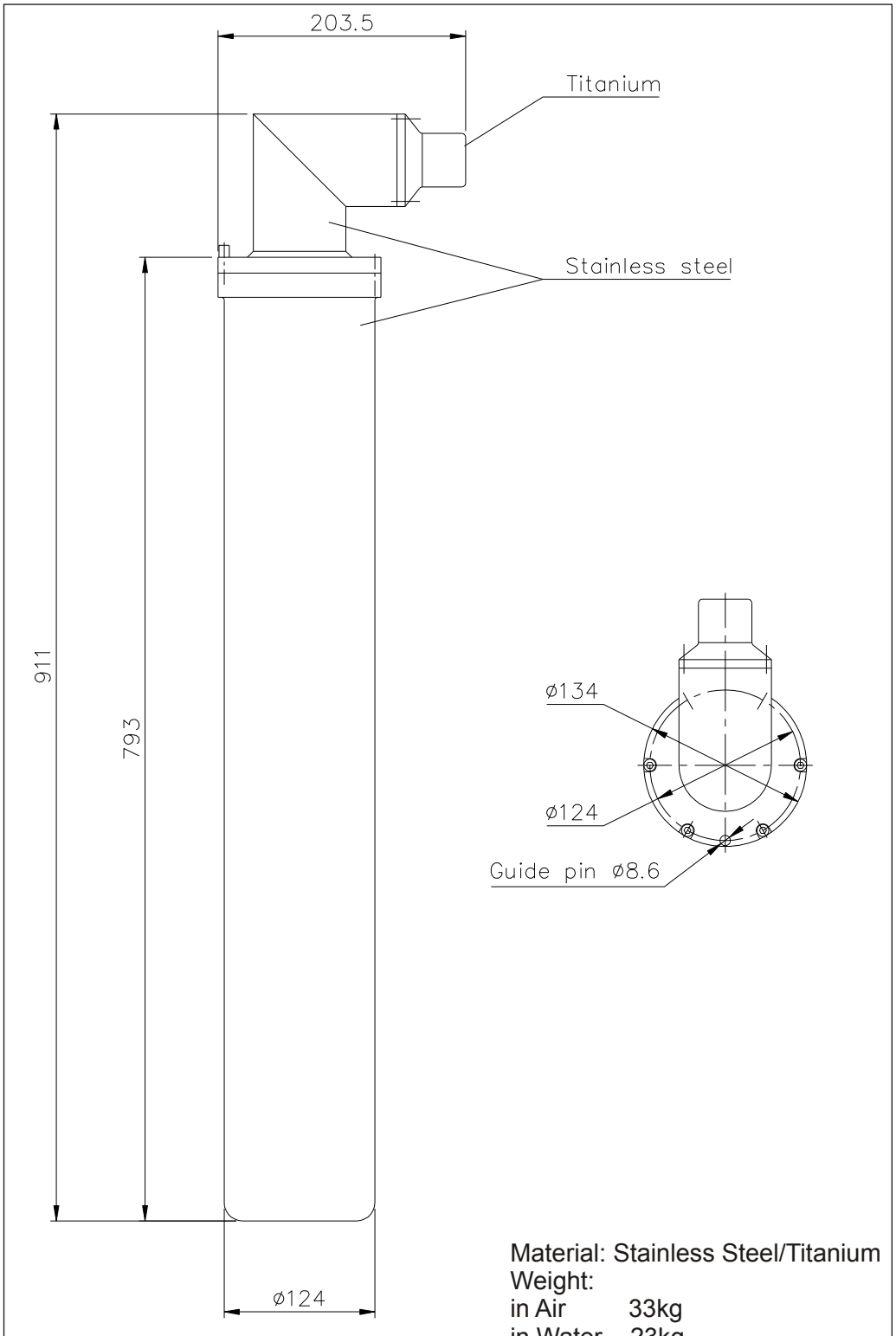
Page 1 of 3 (Cd30030)	MPT 319/SiH transponders - outline dimensions	**830-216124** Rev.A

MPT 316/EEx-St transponder – outline dimensions



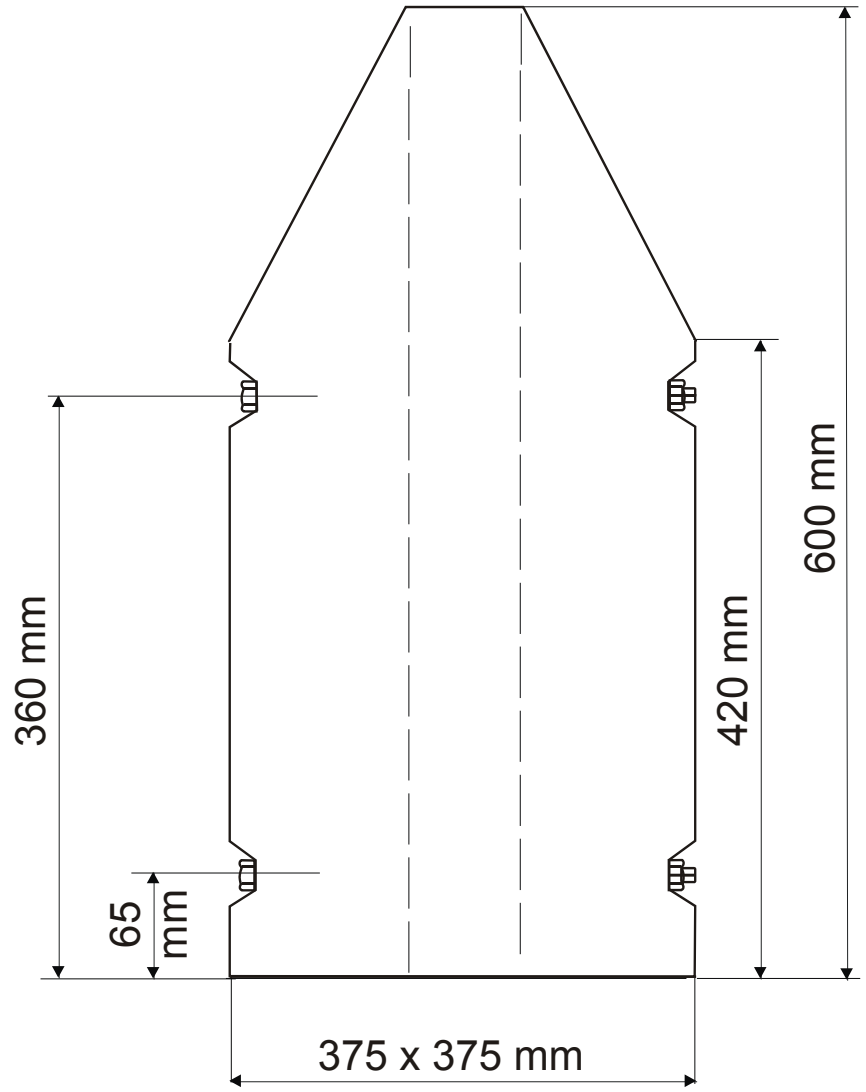
Page 1 of 1 (Cd30012)	MPT 316 EEx-St transponder - outline dimensions	**830-089449** Rev.C

MPT 316/EEx 90 transponder – outline dimensions



Page 1 of 1 (Cd30011)	MPT 316 EEx 90 transponder - outline dimensions	**830-089744** Rev.A

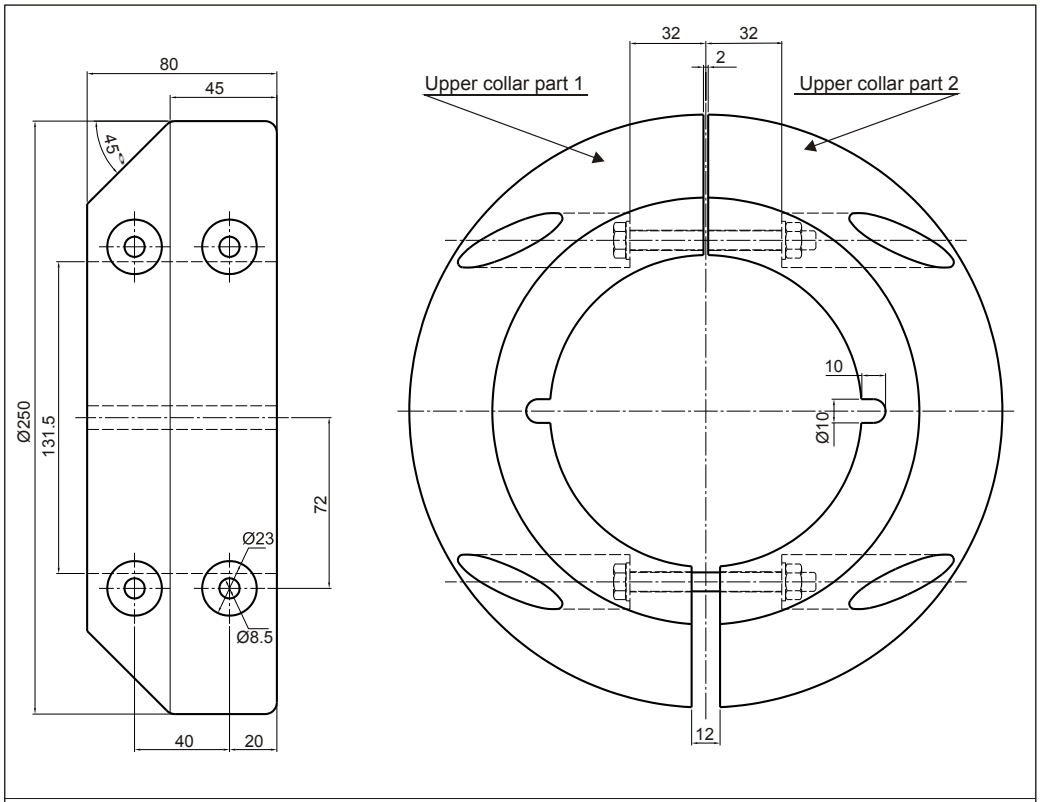
Floating collar for SPT/MPT transponders 1000 m - outline dimensions

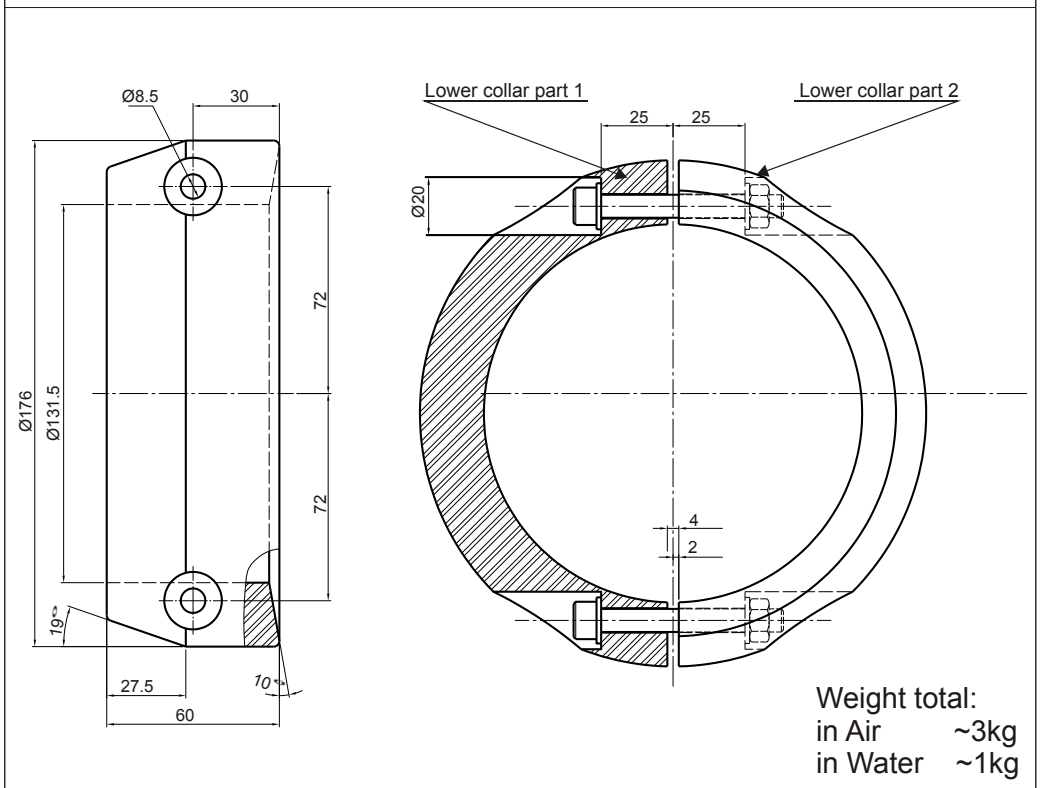


Weigh in Air 34.5kg
total buoyancy in Water 30kg

Page 1 of 1 (CD30040)	Floating collar for SPT / MPT transponders 1000 m - outline dimensions	**N/A**

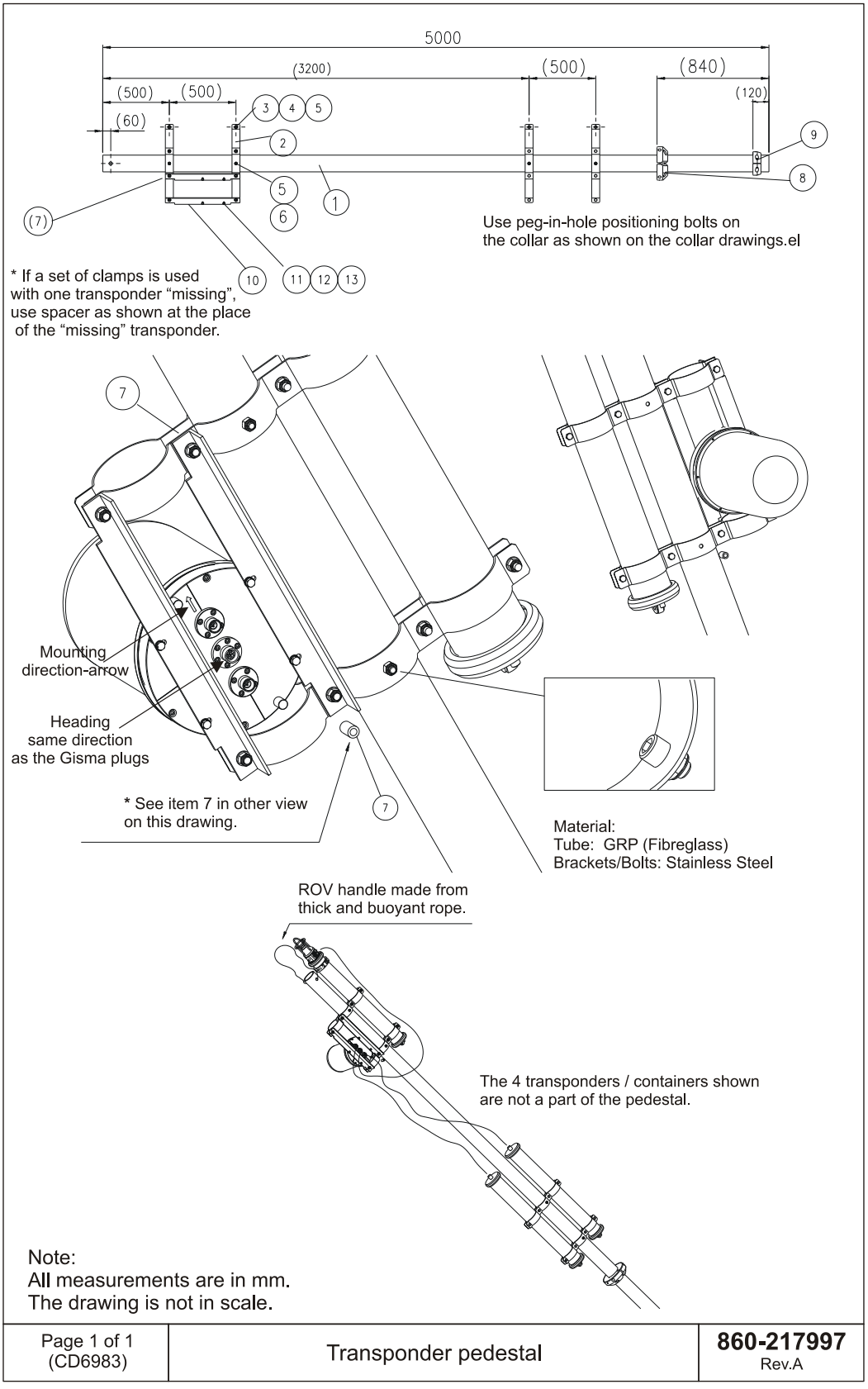
Guiding collar for SPT/MPT transponders 1000 m - outline dimensions





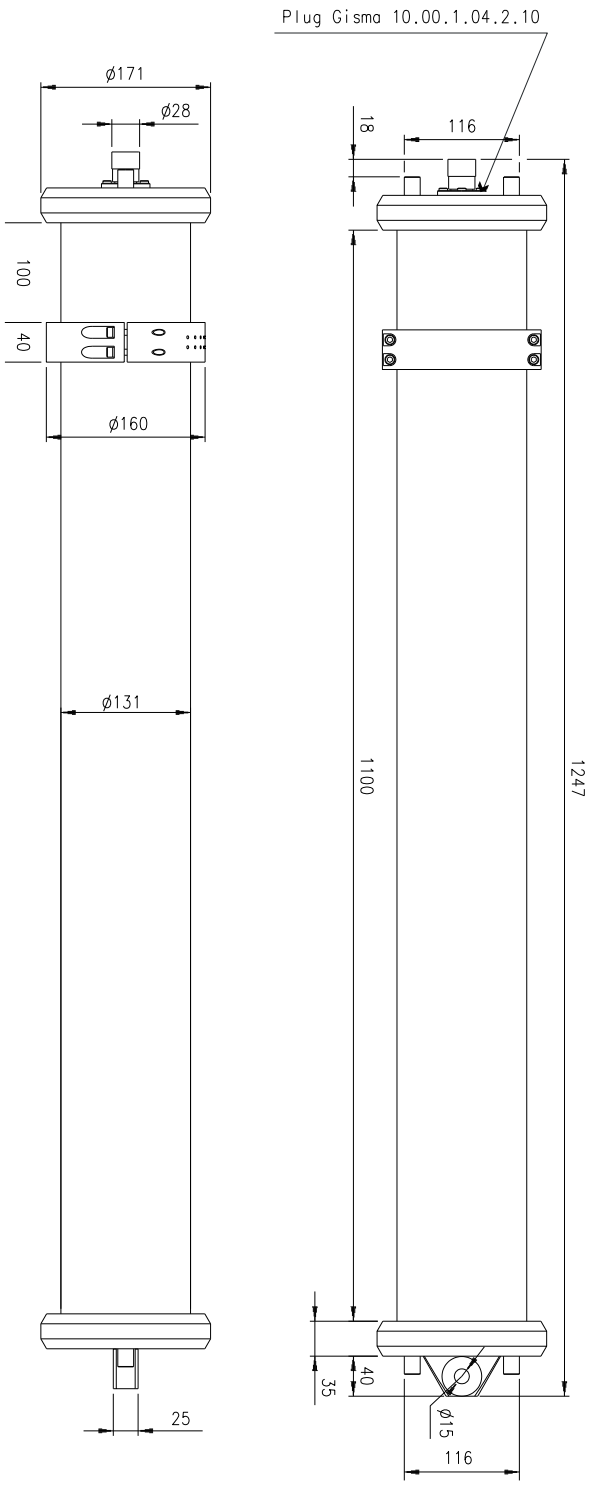
Page 1 of 1 (Cd30039)	Guiding collar for SPT / MPT transponders 1000 m - outline dimensions	**198-086386/ 198-086387** Rev.B

Transponder pedestal



Page 1 of 1 (CD6983)	Transponder pedestal	**860-217997** Rev.A

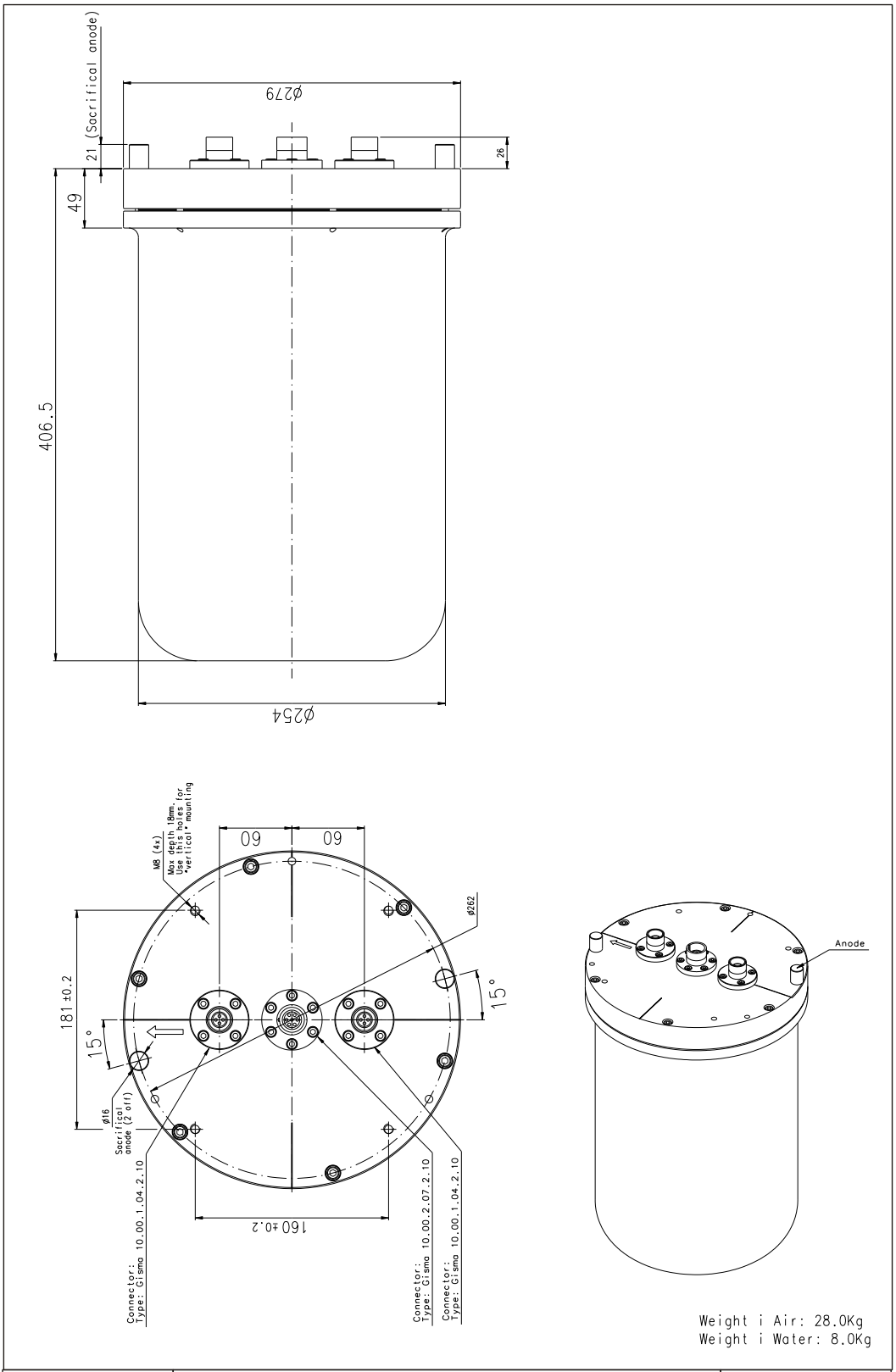
Subsea battery pack – outline dimensions



Weight:
in Air ~24.5kg
in Water ~10kg

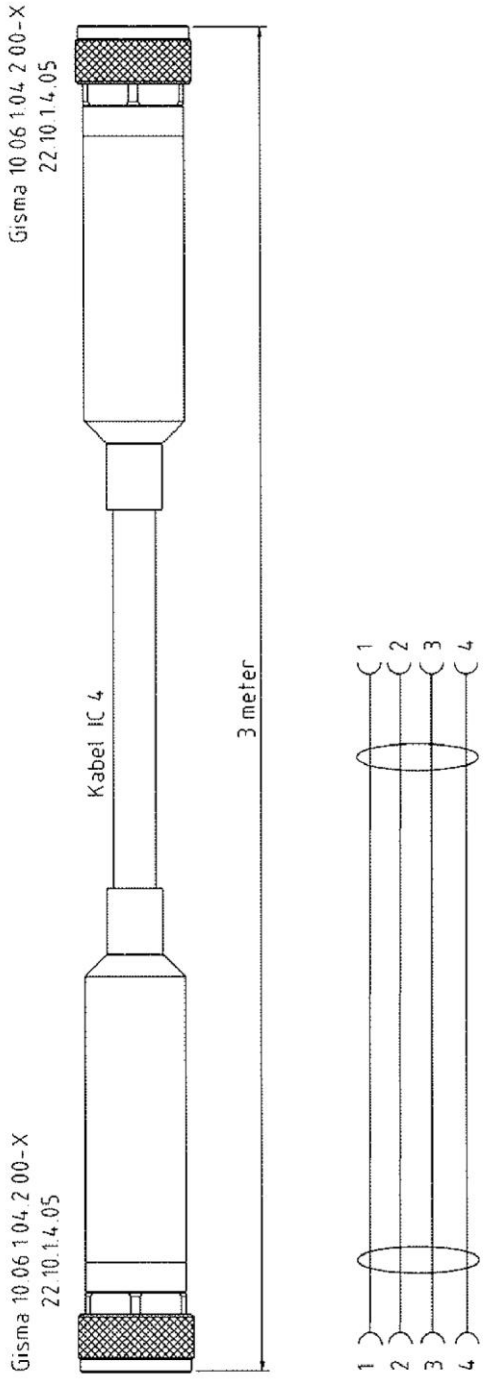
Page 1 of 1 (Cd30046)	Subsea Battery Unit - outline dimensions	**N/A**

Octans module - outline dimensions



Page 1 of 1 (Cd30047a)	Octans module - outline dimensions	**325107** Rev.A

Transponder cable



Page 1 of 1 (Cd30160)	Transponder cable	**ME10712/ 331634**

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The next pages present the index of this manual.

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