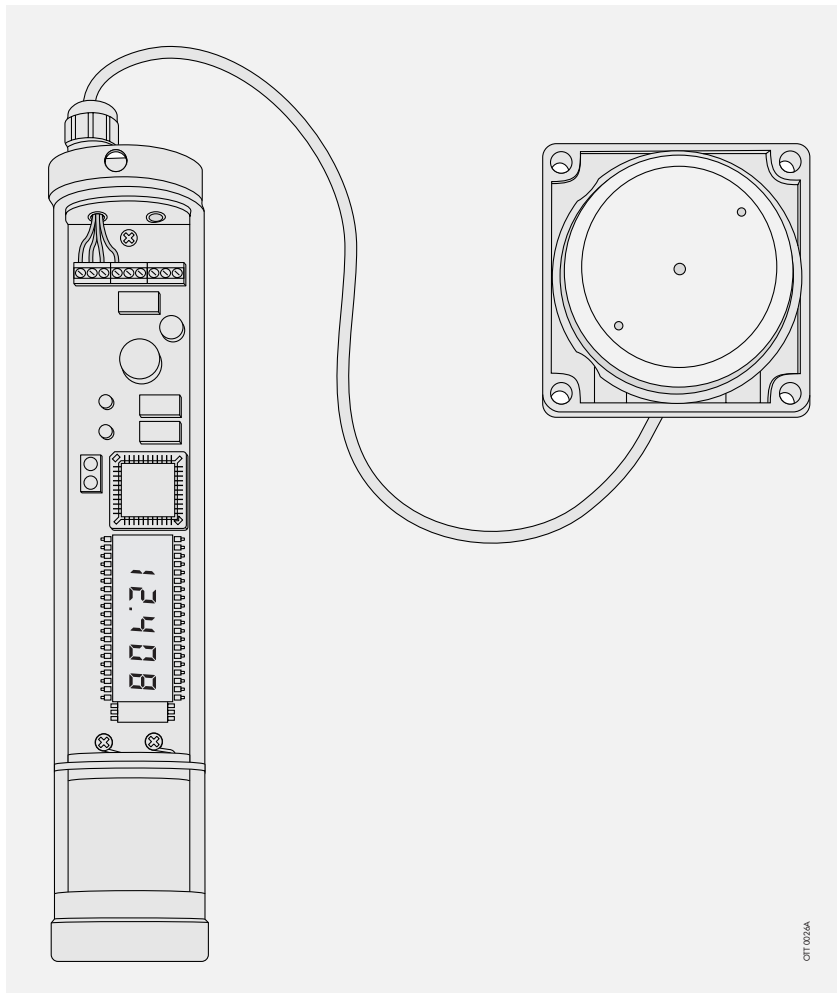


Operating Instructions **Shaft Encoder with Data Logger Thalimedes**



Contents

| | |
|---|----|
| Contents | 2 |
| Order numbers | 2 |
| 1 Introduction | 3 |
| 2 Installing the Thalimedes | 4 |
| 2.1 Installation as stand-alone device | 4 |
| 2.2 Installation as attachment device | 6 |
| 2.3 Installation in well pipe | 11 |
| 3 Commissioning the Thalimedes | 13 |
| 3.1 Fitting the battery | 13 |
| 3.2 Activating the Thalimedes | 14 |
| 3.3 Setting operating parameters | 15 |
| 4 Reading out stored measured values from Thalimedes | 19 |
| 5 Connecting Thalimedes RS 232-interface | 20 |
| 6 Error messages on display | 21 |
| 7 Technical data | 22 |

Scope of delivery

- ▶ **Thalimedes**
 - 1 shaft encoder with data logger consisting of:
 - Encoder unit, transducer cable + data logger unit
 - 1 battery (1.5 V); C-cell
 - 1 attachment kit
 - 1 Operating Instructions

Order numbers

| | | |
|----------------------|---|----------------|
| ▶ Thalimedes | Shaft Encoder with Data Logger | 55.430.001.3.2 |
| ▶ Accessories | Float | 27.001.071.3.5 |
| | - 80 mm Ø | |
| | Counterweight | 27.050.013.4.2 |
| | - 0,100 kg | |
| | Float cable 10 m | 27.150.040.9.2 |
| | 30 m | 27.150.041.9.2 |
| | 50 m | 27.150.042.9.2 |
| | 100 m | 27.150.043.9.2 |
| | - 1 mm in diameter; Nirosta | |
| | - Crimp sleeves | |
| | Well pipe assembly kit for 4"; 4,5"; 5" + 6" | 55.430.050.3.2 |
| | Communication program HYDRAS II | 56.PKH.01M.O.0 |
| | Infrared-interface adapter Linkit (IrDA) | 97.961.066.9.5 |

1 Introduction

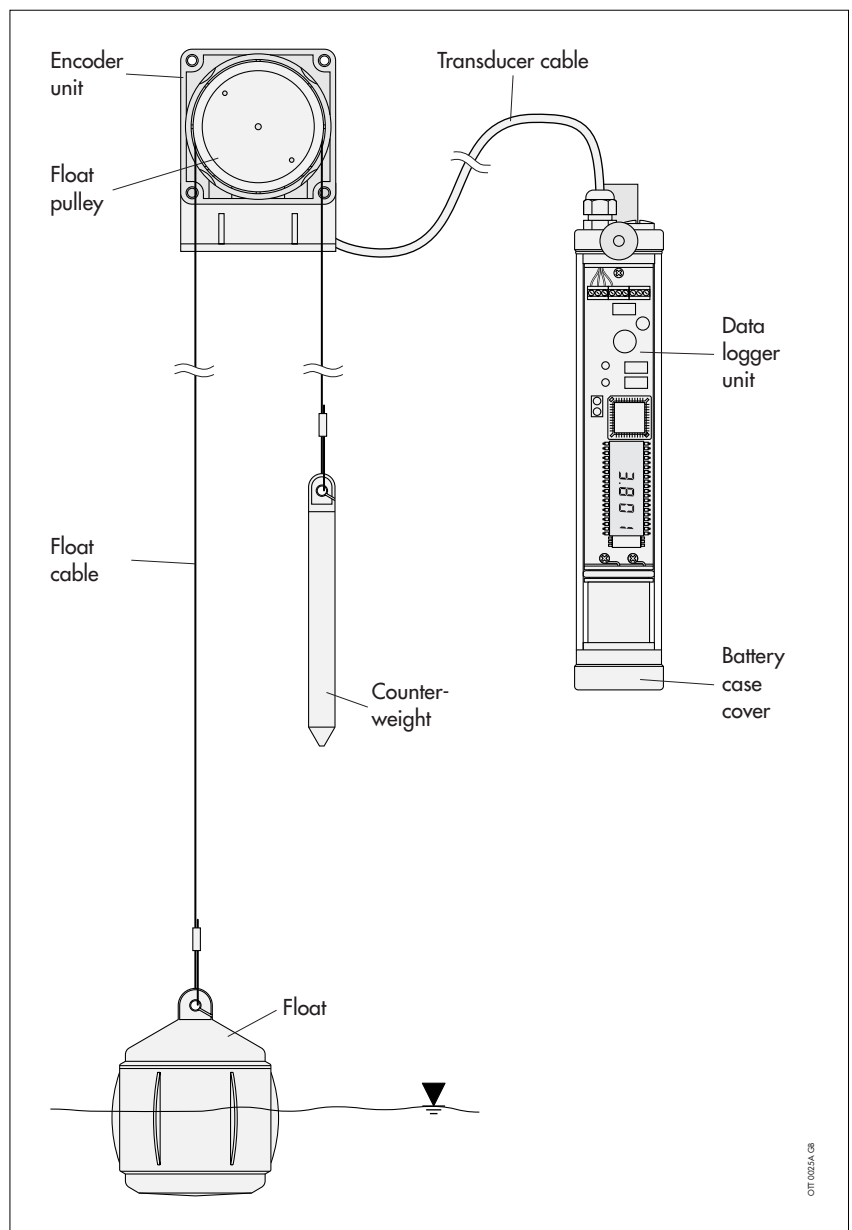
The Thalimedes is a float-operated shaft encoder with data logger, used to continuously measure ground and surface water levels.

Changes in water level are transferred via a float-cable-counterweight-system to the float pulley on the encoder unit. The rotation caused by this action is converted to an electrical signal, which is transferred by the transducer cable to the data logger and then saved as a measured value. The storage intervals may be preset in accordance with the hydrological measured values required.

An attachment kit is included in the scope of delivery, facilitating easy installation either as a "stand-alone" unit or in combination with any water level recorders from OTT or other manufacturers. A well pipe assembly kit (accessories) permits installation in pipes of between 4" and 6" in diameter.

The current water level, date, time and battery status can be read off a display at any time. The stored values may be read out from either an infrared (IrDA) or RS 232-interface. Remote data sampling is possible via these interfaces. A single 1.5 V C-type cell powers the unit for up to 15 months.

Fig. 1: Layout of a water level station with the OTT Thalimedes Shaft Encoder with Data Logger



2 Installing the Thalimedes

The Thalimedes may be installed in one of the three following ways:

- ▶ As a **stand-alone device**
- ▶ As an **attachment device** on any mechanical water level recorder
 - Variant 1: existing float cable is fed through the Thalimedes float pulley
or
 - Variant 2: Thalimedes float pulley is connected to the float pulley on the water level recorder by means of a carrier unit
- ▶ In a **4"; 4,5"; 5" or 6" well pipe**

An attachment kit with all of the required parts is supplied with the Thalimedes for assembly either as a stand-alone device or as an attachment (see fig. 2).

Other accessories required

- ▶ Stand-alone device: float, cable, counterweight
- ▶ Well pipe: Well pipe assembly kit, float, cable, counterweight

2.1 Installation as stand-alone device

Please refer to Figs. 2 + 3 and follow the steps below:

Attach encoder unit

- Screw on encoder unit with connection angle B ③ (M 6 x 25 + washers); attach connection angle B on level base with double-sided adhesive strip ⑨ (attach with screws if necessary)

Attach data logger unit

- Adjust the position of the data logger unit as desired so that the display is clearly legible.
- Attach holder ④ to level base with double-sided adhesive strip ⑨ (attach with screws if necessary, hole diameter: 5.2 mm).
- Fix the data logger unit onto the holder and fasten with the nut for holder ⑥.

Assemble float unit

- Determine distance between minimum (deepest) water level to upper edge of encoder unit and add approx. 50 cm to this value = length of float cable; cut float cable to length.
- Form loops at either end of the float cable; slip the sleeves over the loops and pinch with a flat nose pliers; suspend float and counterweight inside the loops.
- Place the float cable over the float pulley; allow the float unit to stabilise.

Now turn to Chapter 3.

Fig. 2: Thalimedes attachment kit

The adhesive strips can be cut to the required size with a scissors.

- Position ⑥ has two functions:
 – either as base for the carrier unit
 or
 – as nut for holder ④ (instead of a hexagonal nut)

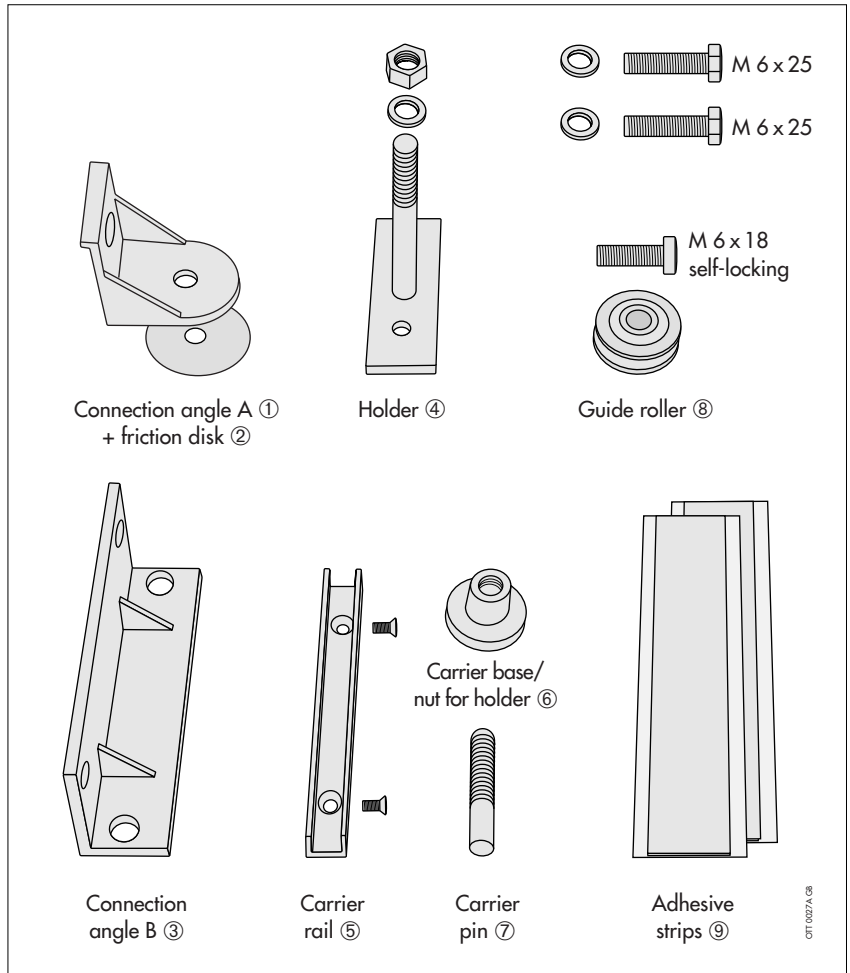
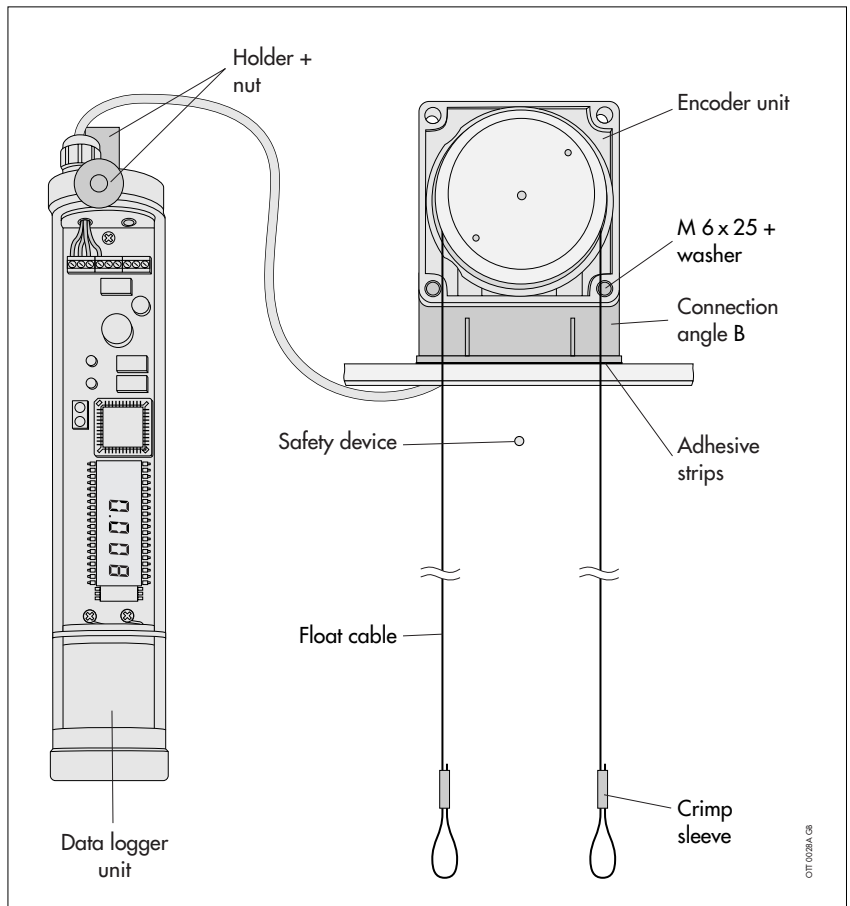


Fig. 3: Installing the Thalimedes as a stand-alone device

A safety device (e. g. a hook or screw) prevents the float and counterweight from being lost during assembly.

Mount connection angle B so that it faces towards the front.



2.2 Installing as attachment device

Figs. 4 to 9 are examples of different methods of attaching the unit to mechanical water level recorders. The diagrams show which parts from the attachment kit are used in each case.

Select the relevant diagram for your purposes and follow the steps below:

Attach encoder unit

- If carrier unit is fitted (Fig 8 + 9): Attach carrier rail ⑤ to Thalimedes float pulley with two flat-head screws; attach carrier base ⑥ to float pulley opposite (mechanical water level recorder) with double-sided adhesive strip; twist carrier pin ⑦ into the carrier base.
- Depending on the type of level recorder used, attach the encoder using either
 - connection angle A ① with friction disc ② fitted underneath or
 - with connection angle B ③ (M 6 x 25 + washers); connection angle B on level base support with double-sided adhesive strip ⑨ (attach with screws if necessary).
- Place existing float cable over both float pulleys or connect float pulleys by means of the carrier pin and carrier rail.

Attach data logger unit

- Adjust the position of the data logger unit as desired so that the display is clearly legible.
- Attach holder ④ to level base with double-sided adhesive strip ⑨ (attach with screws if necessary, hole diameter: 5.2 mm)
- Fix the data logger unit onto the holder and fasten with the nut for holder ⑥.

Now turn to Chapter 3.

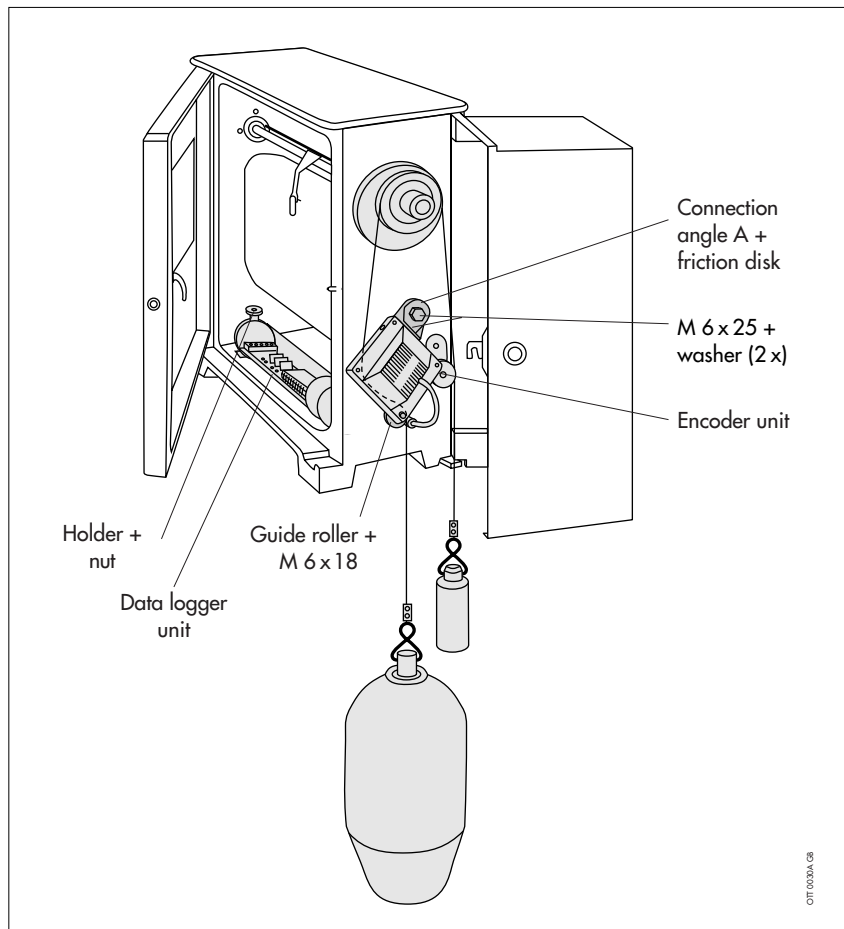
Fig. 4: Example of attachment to OTT R20 Strip-Chart Recorder

Float cable also fed through Thalimedes float pulley

Pass the transducer cable through the hole in the recorder housing. Fit cable gland, if applicable. To do so, remove the transducer cable temporarily from the data logger unit and then reconnect. Check that the terminal strip is correctly configured.

Do not fasten the guide roller screw too tightly.

- Parts required:
- Connection angle A ①
 - + friction disk ②
 - Holder ④
 - Nut for holder ⑥
 - Guide roller ⑧
 - Adhesive strip ⑨



OTT 0030A GB

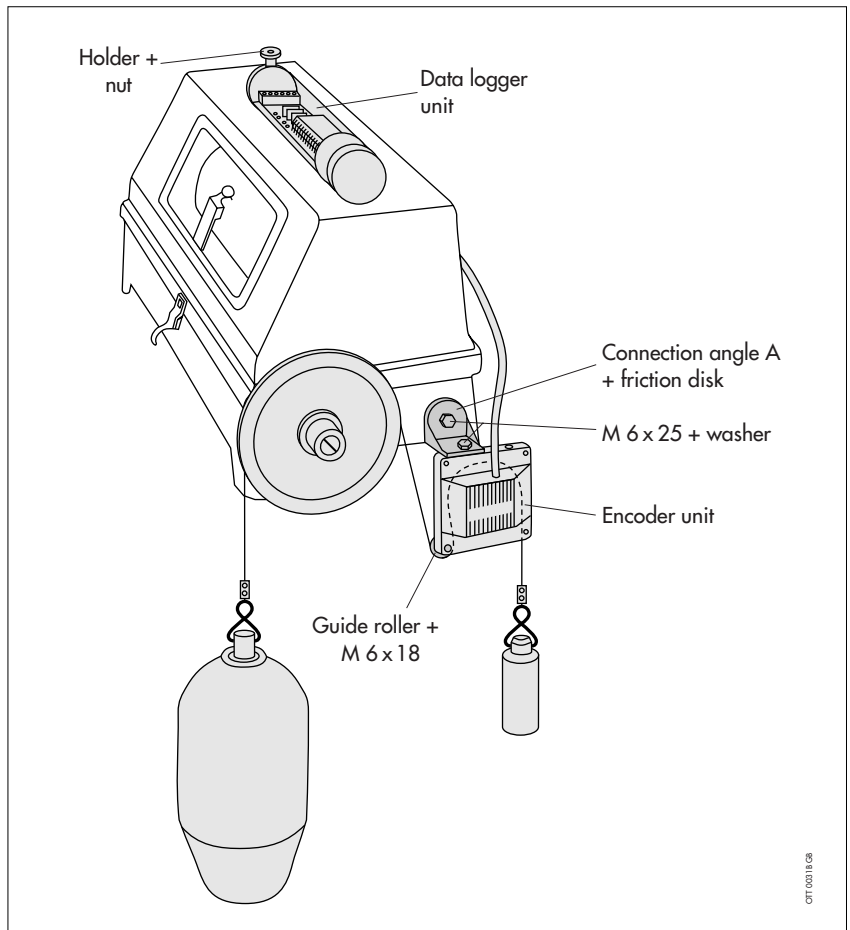
Fig. 5: Example of attachment to OTT Horizontal Water Level Recorder Type X

Float cable also fed through Thalimedes float pulley

If space permits, mount the data logger unit beside the level recorder. This prevents the data logger unit from slipping when the level recorder is opened.

Do not tighten the guide roller screw too tightly.

- Parts required:
- Connection angle A ①
 - + friction disk ②
 - Holder ④
 - Nut for holder ⑥
 - Guide roller ⑧
 - Adhesive strip ⑨



OTT 00318 GB

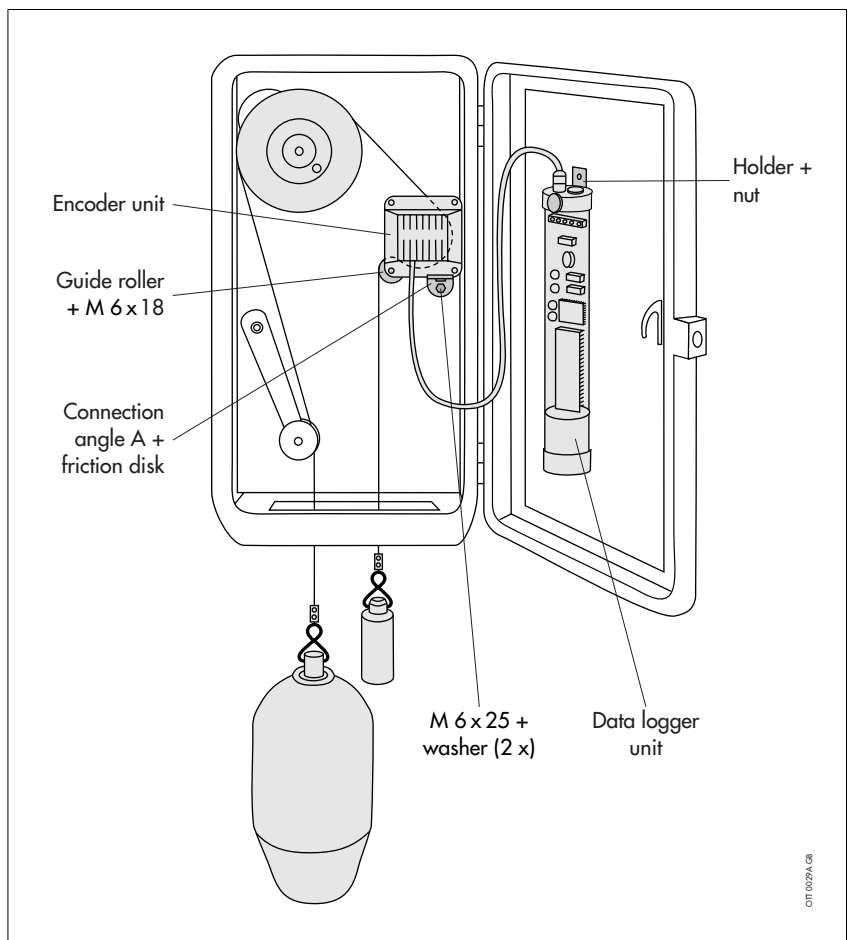
Fig. 6: Example of attachment to OTT R16 Vertical Water Level Recorder

Float cable also fed through Thalimedes float pulley

Float pulley circumference: set to 198.7 mm (0.6 mm float cable)

Do not tighten the guide roller screw too tightly.

- Parts required:
- Connection angle A ①
 - + friction disk ②
 - Holder ④
 - Nut for holder ⑥
 - Guide roller ⑧
 - Adhesive strip ⑨



OTT 0029A GB

Fig. 7: Example of attachment to Strip-Chart Recorder from another manufacturer

Float cable also fed through Thalimedes float pulley
Do not tighten the guide roller screw too tightly.

- Parts required:
- Connection angle A ①
 - + friction disk ②
 - Holder ④
 - Nut for holder ⑤
 - Guide roller ③
 - Adhesive strip ⑨

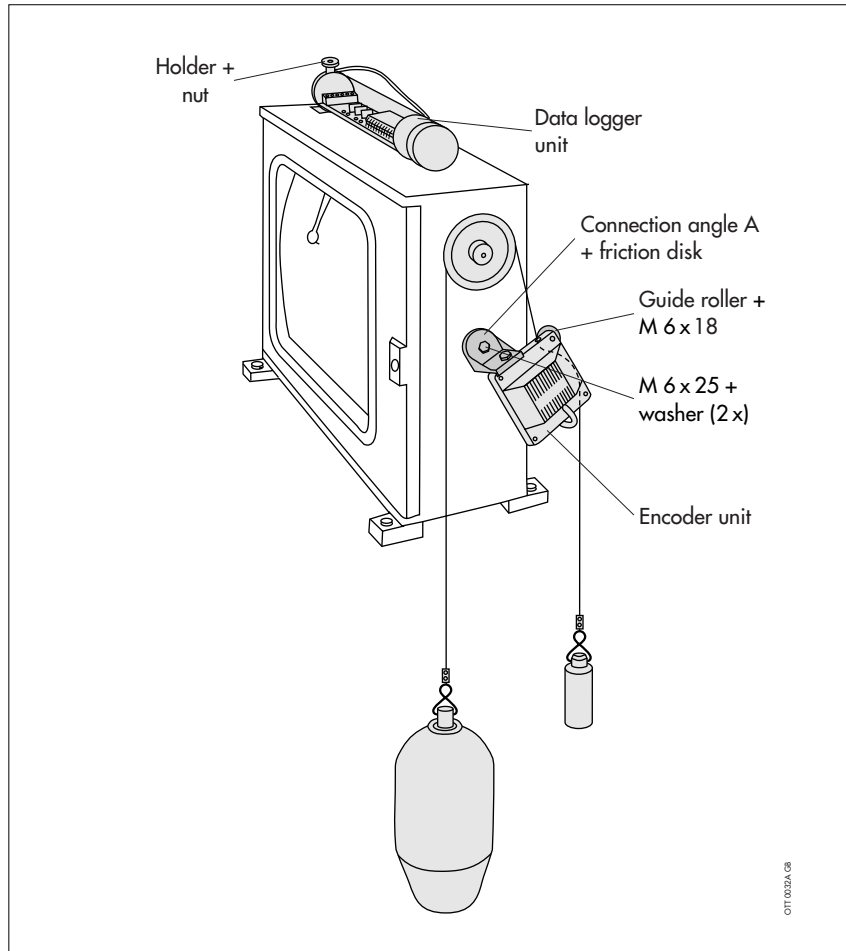


Fig. 8: Example of attachment to Vertical Drum Recorder from another manufacturer

Connecting the Thalimedes by means of a carrier unit

Attach the carrier base to the float pulley so that it can rotate freely. There is no need to adjust the attachment point exactly, because of the way the carrier unit functions.

- Parts required:
- Connection angle B ③
 - Holder ④
 - Carrier rail ⑤
 - Carrier base ⑥
 - Carrier pin ⑦
 - Adhesive strip ⑨

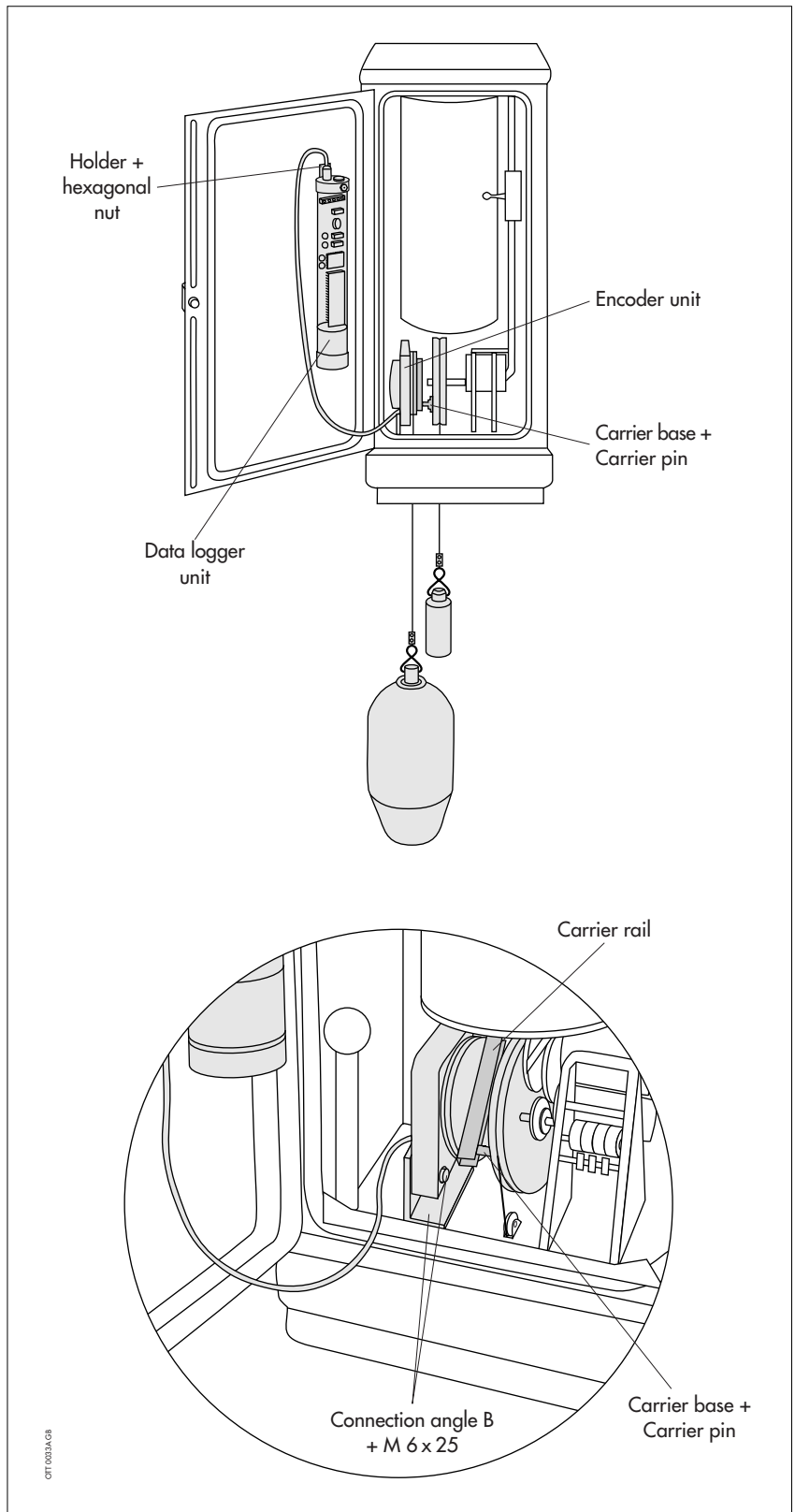
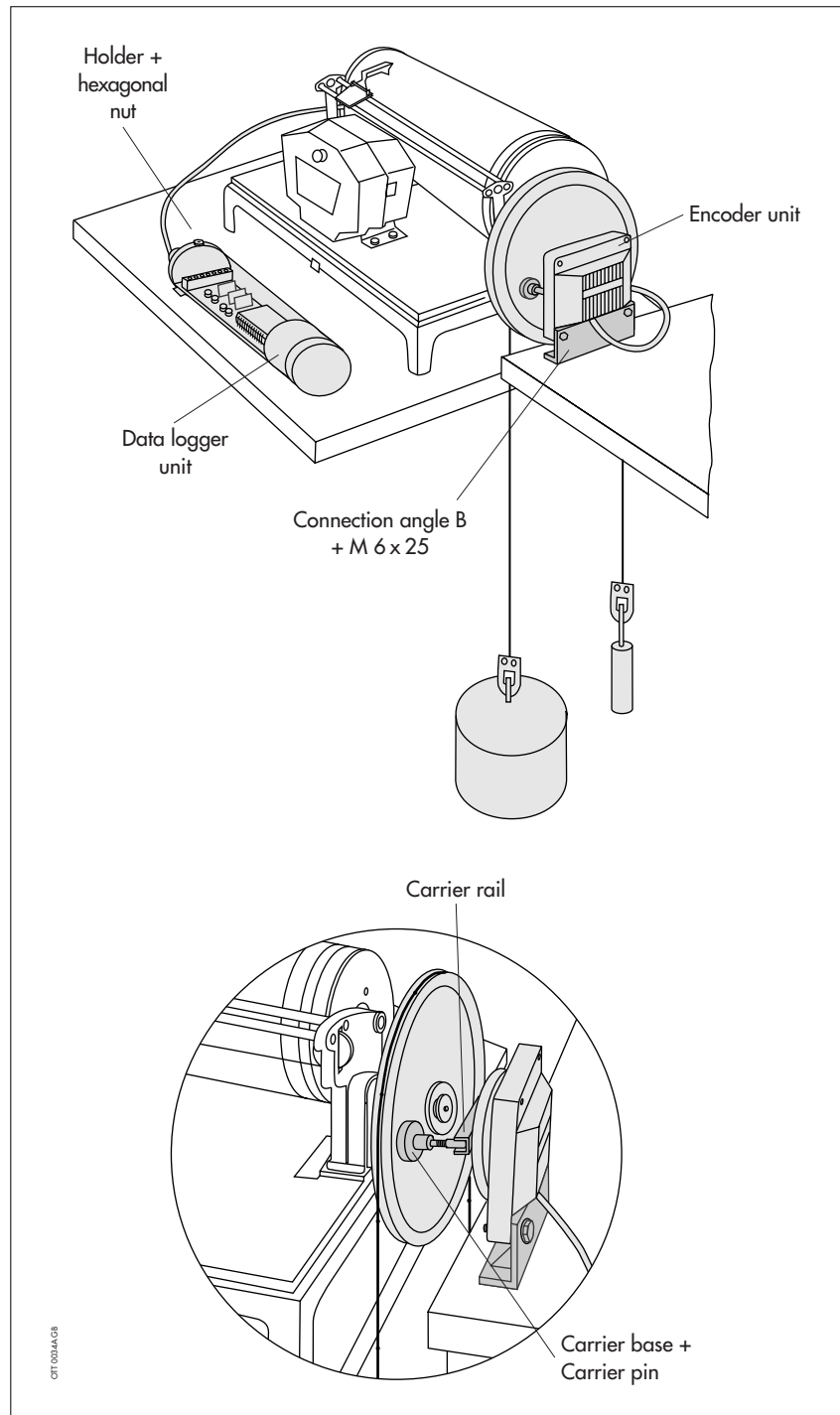


Fig. 9: Example of attachment to horizontal drum level recorder from another manufacturer

Connecting the Thalimedes by means of a carrier unit

- Parts required:
Connection angle B ③
Holder ④
Carrier rail ⑤
Carrier base ⑥
Carrier pin ⑦
Adhesive strip ⑨



2.3 Installation in well pipe

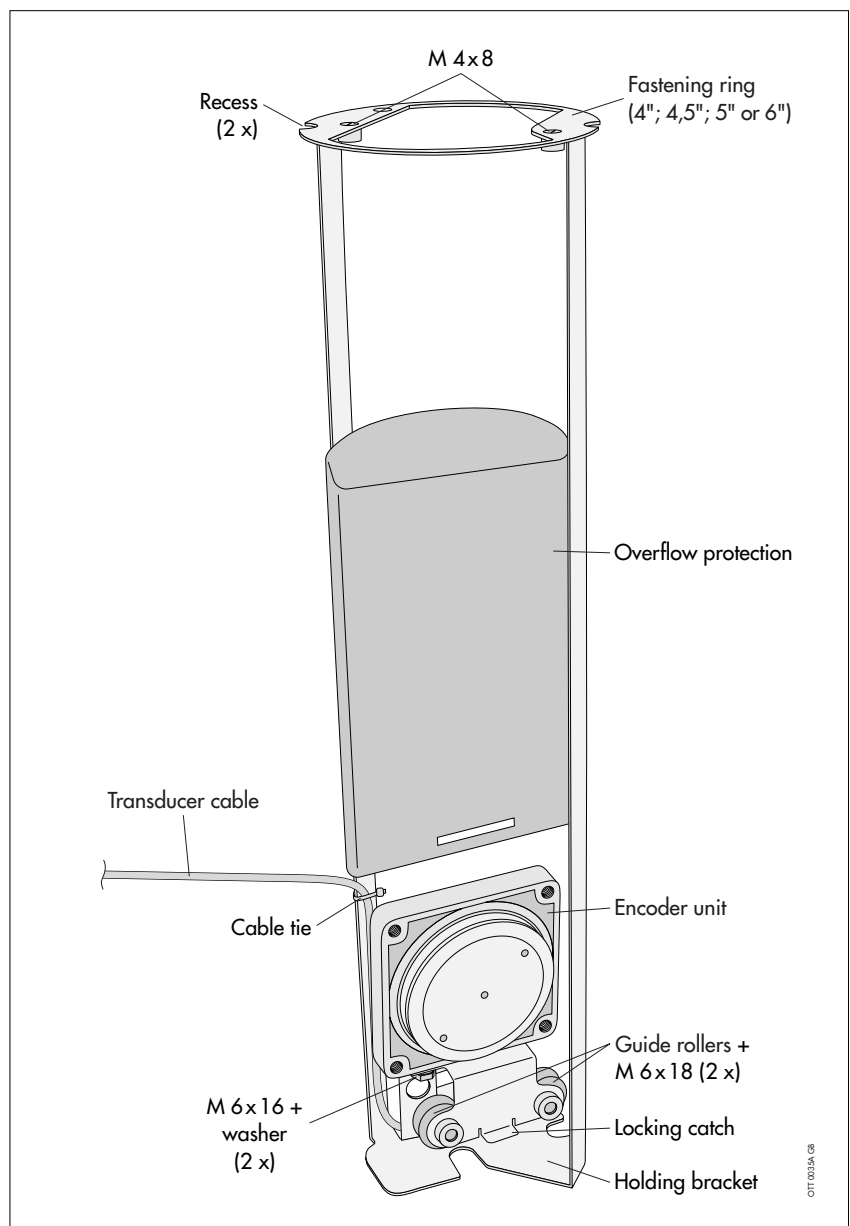
Using the well pipe assembly set (accessories), the Thalimedes can also be installed in 4"; 4.5"; 5" or 6" pipes.

Top caps from OTT or HT are to be used to seal the pipes (others available on request). The holding bracket of the well pipe assembly set is designed so that the data logger unit may be easily removed during read out of the Thalimedes. An electric contact gauge may also be used without difficulty when the well pipe assembly kit is in place. The measuring tape is then passed in front of the holding bracket.

Follow the steps for assembly below:

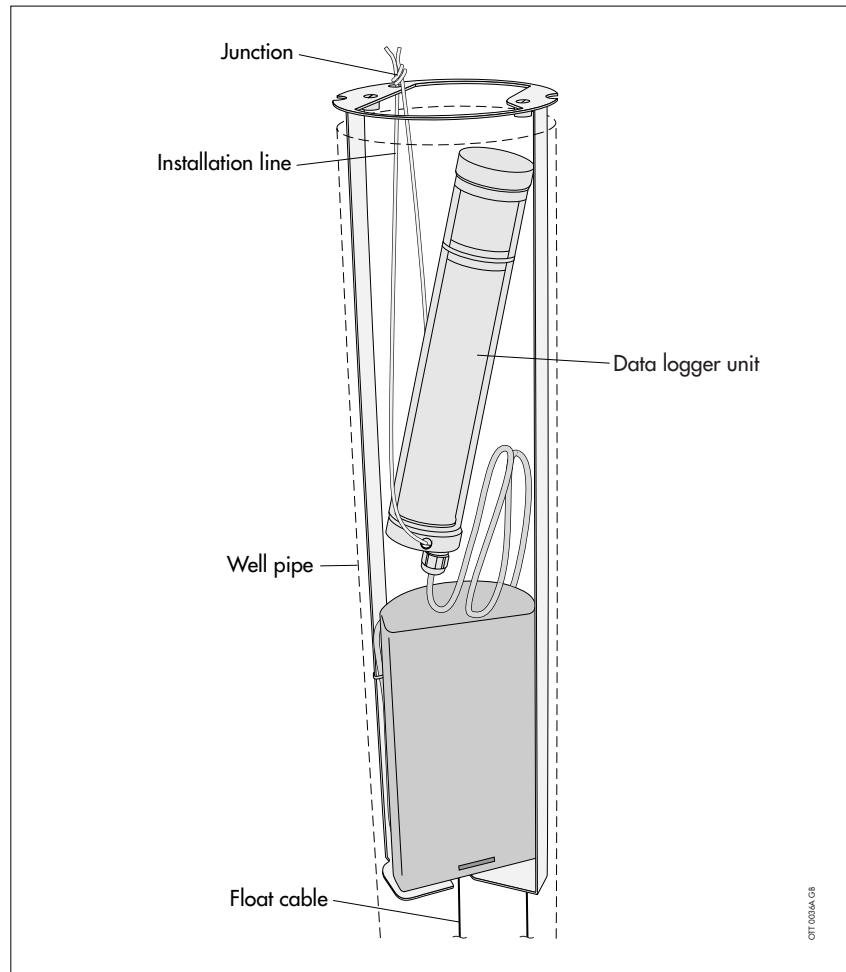
- Select a fastening ring to suit the well pipe used.
- Fit the well pipe assembly kit and encoder unit – as shown in Fig.10; make sure to mount fastening ring as shown.
The socket head cap screw with hexagon socket are supplied for the guide rollers; only fasten the screws (self-locking) lightly.
- Use a cable tie to attach the transducer cable to the holding bracket.

Fig. 10: Assembling Thalimedes Well Pipe installation kit



- Secure the data logger unit to the holding bracket with the installation line (see Fig. 11); the logger unit should remain outside holding bracket.
- Place float cable over the float pulley.
- Push overflow protection (functions using diving bell principle) over the encoder unit until it engages with both locking catches.
- Carefully lower float, then entire well pipe assembly kit and counterweight into the well pipe; the fastening ring will then come to rest on the bottom part of the top cap; the data logger unit remains outside the well pipe (in OTT top caps: Turn the fastening ring so that there is a recess on the suspension bracket of the top cap).
- Set Thalimedes operating parameters as described in Chapter 3.3
- Suspend Thalimedes in well pipe (see Fig.11).
- Close top cap

Fig. 11: Pipe assembly kit fitted with Thalimedes in a well pipe
For the sake of clarity, the top cap is not illustrated



3 Commissioning the Thalimedes

3.1 Fitting the battery

Follow the steps below:

- Detach the data logger unit from holder ④
- Unscrew the battery case cover
- Insert the battery as indicated on the label; use only the following type of battery: 1.5 V C-cell (LR 14 C AM 2); alkaline type
- Screw on the battery case cover and tighten securely; the Thalimedes briefly shows all display segments (during commissioning and if the battery is removed for more than 20 minutes).

The Thalimedes is now switched on and calculates measured values using the operating parameters set in the factory.

Battery life: up to 15 months depending on ambient temperature

- The battery must be replaced if the battery voltage falls below 1 V. It is especially important to change the battery in good time if the ambient temperature is below 0 °C and if inspection is only carried out at extended intervals. Battery service life is greatly reduced at temperatures below 0 °C. Depending on their design, alkaline batteries retain approx. 50 % of their original capacity (taken at 20 °C) at 0 °C and only approx. 25 % at -20°C.

Measured values saved in the Thalimedes are stored in a non-volatile memory. This prevents data loss during battery change, or when the device is stored without batteries for an extended period.

If changing a battery at a later stage takes longer than approx. 20 minutes, the time and the zero point must be reset (setting operating parameters: set time + measured value). This is the only instance where the measured values of the current day are not saved.

- Please remove the battery if decommissioning the Thalimedes. This will prevent the battery from being discharged prematurely and irrelevant measured values from being stored.

3.2 Activating the Thalimedes

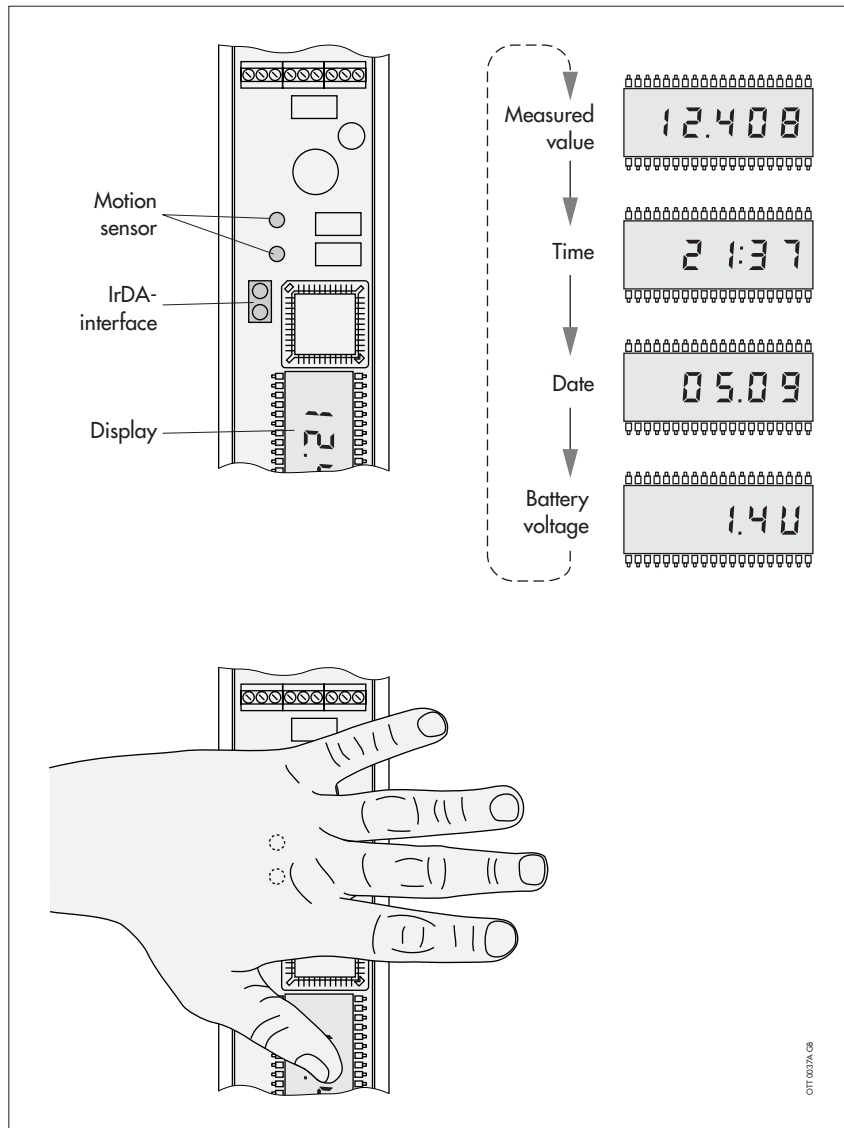
The Thalimedes display is switched off in measuring mode. To read off the current measured value, you must activate (awake) the Thalimedes. The Thalimedes must also be activated when setting the operating parameters and reading out the measured values.

- To activate the Thalimedes, place your hand over the motion sensor until the display is visible (approx. 2 to 4 seconds). The display now indicates the current measured value.
- Place your hand briefly over the sensor again to consecutively display the values Time, Date, Battery voltage.
- The display switches off three minutes after the last time the sensor was activated by hand.

Fig. 12: Position of motion sensor/
display value sequence

The Thalimedes motion sensor only reacts to changes. This prevents objects which are permanently located near the sensor from accidentally activating the device (e. g. pipe inner wall).

The IrDA-interface is used to set the operating parameters and to read out the measured values.



3.3 Setting operating parameters

Various operating parameters must be set when commissioning the Thalimedes (Configuring Thalimedes).

The following equipment is required:

- ▶ A PC with infrared interface or with Linkit interface adapter (accessories); also the communication program HYDRAS II (KH2); version upwards of X1.35
- or
- ▶ the OTT Multifunctional Unit VOTA with Linkit-interface adapter (accessories)

No direct contact is required to set parameters: they are set with an invisible infrared beam (IrDA-interface).

Setting parameters with a PC

Follow the steps below:

- Start communication program on the PC.
- Activate Thalimedes.
- Align the PC infrared interface in the direction of the Thalimedes; distance maximum 1 metre.
- Press function key F5 (Menu Special program/Thalimedes configuration)
- Press function key F1 (read); the software calls up the current (factory preset) settings; the parameter setting window appears:

Fig. 13: Configuration window of communication program HYDRAS II



- Press function key F3 (edit) and enter the required values. The meaning of the various fields is explained on the following pages.
- Check: Thalimedes still active?; infrared interface still aligned?
- Press function key F2 (program); the operating parameters are now permanently stored in the Thalimedes.

Setting parameters with VOTA

Follow the steps below:

- Refer also to the VOTA operating manual.
- Prepare VOTA (see operating manual) and switch on.
- Activate Thalimedes.
- Align the VOTA infrared interface in the direction of the Thalimedes; distance maximum 1.5 metres.
- Select first menu item "Configuration" and "IrDA" ; the configuration window appears on the VOTA display.

Fig. 14: Configuration window of multifunctional unit VOTA

Press "extended" to call up the extended configuration window.

Fig. 15: Configuration window of multifunctional unit VOTA
Window with extended selection

- Enter the desired values. The meaning of the various fields is explained on the following pages.
- Check: Thalimedes still active?; infrared interface still aligned?
- Select "Write"; the operating parameters are now permanently stored in the Thalimedes.

Meaning of various input fields

- ▶ Station/sensor: Alphanumeric input according to individual requirements
- ▶ Unit: Either m, cm or ft (see table 1 on page 18!)
- ▶ Storage interval: Interval at which the Thalimedes calculates the measured values.
- ▶ Storage delta: The measured value is not stored if the difference between the previous stored value and the current measured value is less than the storage delta → aperiodic measured values. If 0 is entered here, the Thalimedes will store all measured values regardless of their magnitude → periodic measured values.
Careful setting of the storage delta can filter out irrelevant fluctuations, such as wave motion. Aperiodic measured values also save storage space.
- ▶ Circumf. of the pulley: Circumference of the float pulley in operation; Thalimedes float pulley: 200 mm (1 mm float cable diameter); if the Thalimedes is connected to the level recorder with the carrier unit: Enter the circumference of the level recorder float pulley.
- ▶ Set meas. value: "Value" field: Establish relation to zero point → enter calculated measured value with staff gauge/electric contact gauge; Select "√" to adopt the value.
(for VOTA: simply enter new value)
- ▶ Date/time: Display of Thalimedes time and date
- ▶ Battery: Anzeige der Batteriespannung in Volt
- ▶ Version: Display of battery voltage in volts
- ▶ Set date/time: Sets the Thalimedes time (uses PC/VOTA time)
- ▶ Erase data storage: Completely deletes Thalimedes measured value storage
- ▶ Change direction of rotation: Changes the effect of the float pulley direction of rotation on the measured value (count up/down);
Select "√" to change the current effect (for VOTA: select "yes")
- ▶ Baudrate RS232C/V.24: The communication speed at which the integral RS 232-interface sends/receives (e. g. for modem operation).
- ▶ SDI-12 sensor/OTT address: This function applies to future Thalimedes versions (US standard).

Factory settings

- ▶ Station/sensor: Device serial number/0001
- ▶ Unit: m
- ▶ Storage interval: 01:00 h
- ▶ Storage delta: 0.000 m
- ▶ Circumf. of the pulley: 200.0 mm
- ▶ Date/time: 01.01/00:00 (time starts when battery inserted)
- ▶ Baudrate RS232C/V.24: 19200

Setting measuring mode for level or depth measurement

Use the function "Change direction of rotation" to select between level and depth measurement.

This function simultaneously adjusts the effect of the float pulley-rotation direction on the measured value (count up/down). It depends on which end of the float cable the float and the counterweight are located respectively.

- Select the setting for function "Change direction of rotation" so that the following conditions are met:

| | Water level | Measured value |
|-------------------|--------------------|----------------------------|
| Depth measurement | rises ↑ falls ↓ | decreases ↓ increases ↑ |
| Level measurement | rises ↑ falls ↓ | increases ↑ decreases ↓ |

- You can test this setting by manually moving the float cable. The measured value on the display must react in accordance with the desired measuring mode.

Range of values for storage delta, float pulley circumference and measured value

Choosing a particular measuring unit means that the range of values for

- ▶ storage delta
- ▶ float pulley circumference
- ▶ measurement value

and the resolution possible are automatically set by the Thalimedes.

The following table indicates the corresponding value ranges:

Table 1: Possible settings for Unit/Storage delta/Float pulley circumference and related measurement range, plus resolution which may be achieved

| Unit | Storage delta | Float pulley circumference | Measurement value | Resolution |
|-------------|----------------------|-----------------------------------|--------------------------|-------------------|
| m | 0–0.255 m | 1.0–999.9 mm | 0–±19.999 m | 1 mm |
| cm | 0–255 cm | 1.0–999.9 mm | 0–±19.999 cm | 1 cm |
| ft | 0–2.55 ft | 0.010–9.999 ft | 0–±199.99 ft | 0.01 ft |

4 Reading out stored measured values from Thalimedes

Follow the steps below (the prerequisites are the same as for point 3.3):

Readout with PC

- Start communication program on the PC.
- Activate Thalimedes.
- Align the PC infrared interface in the direction of the Thalimedes; distance maximum 1 metres.
- Press function key F3 (Menu Reading/all devices via IrDA).
- Measured values are copied to the PC from the Thalimedes. During this process "IrDA" appears on the Thalimedes display.

Readout with VOTA

- Refer also to the VOTA operating manual!
- Prepare VOTA (see operating manual) and switch on.
- Activate Thalimedes.
- Align the VOTA infrared interface in the direction of the Thalimedes; distance maximum 1.5 metres.
- Select menu item "Download data" and "IrDA".
- Measured values are copied from the Thalimedes to the VOTA; during this process "IrDA" appears on the Thalimedes display.

5 Connecting the Thalimedes RS 232-interface

It is possible to connect a modem to the serial RS 232-interface for remote sampling.

Fig. 16 displays the configuration of the terminal strip.

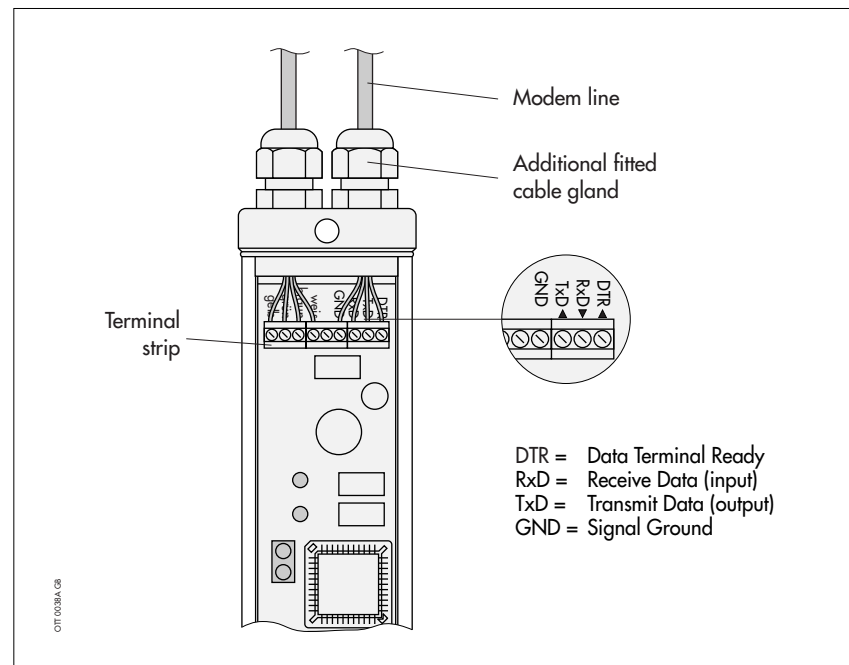
- Remove the welch plug from the data logger unit and attach the cable gland supplied.
- Attach modem connection.
- Initialise modem:
 - Take calls ATSO=2
 - DTR ignore = AT&D0
 - Command echo Off = ATE0
 - Checkback signals Off = ATQ1
 - Save settings = AT&W

The modem communication speed must match the speed of the Thalimedes.

Standard 19 200 bit/s (for high-speed modems 57 600 bit/s). Settings of serial interface: data bits: 8; parity: none; stop bits: 1; (8N1).

- Connect signal lines DTR + DSR and RTS + CTS of the modem.
- Special modem initialisations available on request.

Fig. 16: Thalimedes terminal strip configuration



6 Error messages on display

If a measurement error or operational fault occurs, one of the following error messages appears on the display:



- ▶ **Err3** Measured value overflow
The measuring range set has been exceeded (measured value ≥ 20 m; ≥ 200 m; ≥ 200 ft). In this case the Thalimedes continues to count – from zero – and indicates the measured value and Err3 on the display alternately.
This occurs, for example, when insufficient allowance has been made for fluctuations in the water level.
If the water level returns to the valid range, the Thalimedes will once again calculate the correct measured values.
 - Select another measurement range, if applicable.
 - Check that float/float cable/float pulley/counterweight are not damaged and are functioning correctly.
- ▶ **Err4 Err5 Err6** Transducer cable either not properly connected or broken.
 - Check that transducer cable is properly connected to terminal block.
 - If transducer cable is broken: ask for replacement from manufacturer.
- ▶ **Err10** Measured value not calculated
Measured value may not be calculated due to empty battery, e. g. severely depleted battery at lower ambient temperature
 - Replace battery

The Thalimedes saves these error messages instead of a measured value in data storage.

7 Technical data

| | | | |
|---------------------------------------|------------|------------|-------------|
| Measurement range switch-selectable | ± 19.999 m | ± 199.99 m | ± 199.99 ft |
| Resolution | 0.001 m | 0.01 m | 0.01 ft |
| Maximum measuring error ¹⁾ | ± 0.002 m | ± 0.002 m | ± 0.0066 ft |
| | ± 1 Digit | ± 1 Digit | ± 1 Digit |

Data logger unit

| | |
|-------------------------|---|
| Display | 1 line LCD, 4 1/2 positions, 12 mm character height |
| Memory | approx. 30 000 measured values (EEPROM) |
| Sampling interval | 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 min 1, 2, 3, 4, 6, 8, 12, 24 h 0 = OFF |
| Interfaces | RS 232 C + infrared (IrDA) |
| Voltage supply | 1 x 1,5 V „C-cell“ (LR 14 C AM 2) alkaline type (excluding battery power supply) |
| Dimensions L x diameter | 244 mm x 47 mm |
| Weight (incl. battery) | 0.320 kg |
| Housing material | plastic |
| System of Protection | IP 68 |
| Temperature range | -20 to +70 °C |

Encoder unit

| | |
|----------------------------|--|
| Float pulley circumference | 200 mm |
| Standard float cable | 1 mm diameter other diameters can be adjusted; e. g. 0.6 mm float cable diameter → set float pulley diameter to 198.7 mm |
| Dimensions L x W x H | 82 mm x 82 mm x 34 mm |
| Weight | 0.140 kg |
| Housing material | plastic |
| System of Protection | IP 54 |
| Temperature range | -20 to +70 °C |

Transducer cable

| | |
|--------|-----|
| Length | 1 m |
|--------|-----|

EMI limit values

| | |
|---|--|
| - Immunity to electrostatic discharge (ESD) | fulfills EN 61000-4-2 Intensity 2 (4 kV contact discharge) |
| - Immunity to electromagnetic fields (EMF) | fulfills EN 61000-4-3 Intensity 3 (10 V/m) |
| - Immunity against transient interference (burst) | fulfills EN 61000-4-4 Intensity special (4 kV) |
| - Immunity to lightning impulse voltages (surge) | fulfills EN 61000-4-5 Intensity 2 (1 kV) |
| - Conducted and radiated interference emission | fulfills EN 55022 class B |

¹⁾ Basic accuracy encoder unit (without float/float cable/counterweight)

OTT MESSTECHNIK GmbH & Co. KG

P.O. Box 21 40 · D-87411 Kempten
Ludwigstrasse 16 · D-87437 Kempten
Phone ++49(0)8 31 56 17-0
Fax ++49(0)8 31 56 17-209

e-mail: info@ott-hydrometry.de
Internet: <http://www.ott-hydrometry.de>