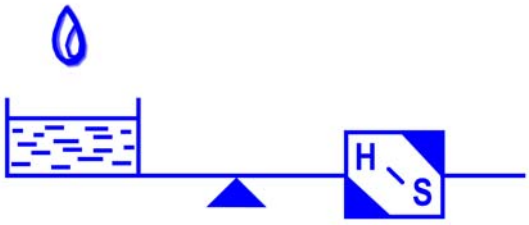

INSTRUCTION MANUAL

TOP SETTING WADING RODS

MODEL TSR

QUALITY SYSTEM
IS0
9001
2000
CERTIFIED

HYDROLOGICAL SERVICES PTY LTD
PO BOX 332, LIVERPOOL B.C NSW 1871, AUSTRALIA
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CONTENTS

I HYDROLOGICAL SERVICES STANDARD WARRANTY TERMS

WARRANTY, DISCLAIMER AND LIMITATION OF LIABILITY:

We warrant this product to be free from defects in material and workmanship for a period of three years from the date of shipment hereof or its total rated life, whichever first occurs. During the warranty period, we will repair or replace this product if it is returned to us with shipping charges prepaid and we determine it to be defective. This warranty shall not apply if this product has been subjected to misuse, negligence, accidents, or misapplied, or modified or repaired by unauthorised persons, or improperly installed, and we shall not be liable to any person for personal injury or property damage caused by such a product.

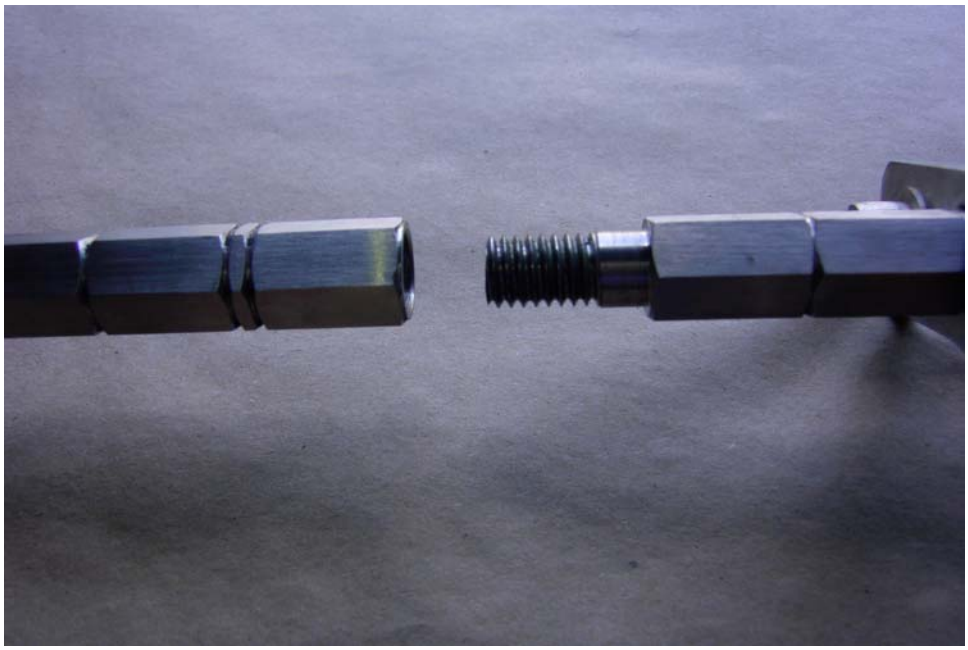
All other warranties, express and implied, including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE, are disclaimed. All other remedies and liabilities, including incidental, consequential, and special damages, losses, and expenses, are excluded.

Note: It is Hydrological Services' policy to support all of our products. If design or workmanship problems arise after the expiry of the warranty period we request that you contact us.

II INSTRUCTION FOR SEPARATION OF SPLIT TOP SET ROD

STEP 1: ALIGN 19 WITH 0 FOR METRIC
(ALIGN 4 WITH 0 FOR IMPERIAL)

STEP 2: UNSCREW THE SUSPENSION ROD AS SHOWN



STEP 3: UNSCREW THE HEX ROD AS SHOWN

NOTE: To re-assemble reverse order from Step 3 to Step 1

III GENERAL

The model TSR Top Setting Wading Rods were developed to simplify the task of the hydrographer while carrying out gauging of small streams.

The TSR shall only be used in shallow streams, where it is safe for the hydrographer to carry out gaugings while wading.

The TSR is available in Metric and Imperial models and each model is available in lengths of 4 feet (1200mm), 6 feet (1800mm) and 8 feet (2400mm)

The device:

- ensures the stable placement of the rod on the stream bed.
- allows the depth of the stream to be measured.
- enables the hydrographer to precisely position the current meter at 0.2, 0.4, 0.6 and 0.8 of water depth without removing the rod from the stream bed.
- allows the direct connection of the current meter and pulse counter without external cables.

The Top Setting Wading Rods are manufactured from durable materials selected to meet the environmental conditions in the field.

VI UNPACKING

Remove the packing material from the TSR carry case

This product has been inspected to ensure compliance with your purchase order and has been appropriately packed to ensure the safe transit to your warehouse, however a thorough inspection of the product should be carried out upon receipt to confirm compliance and to identify any damage that may have occurred during transit.

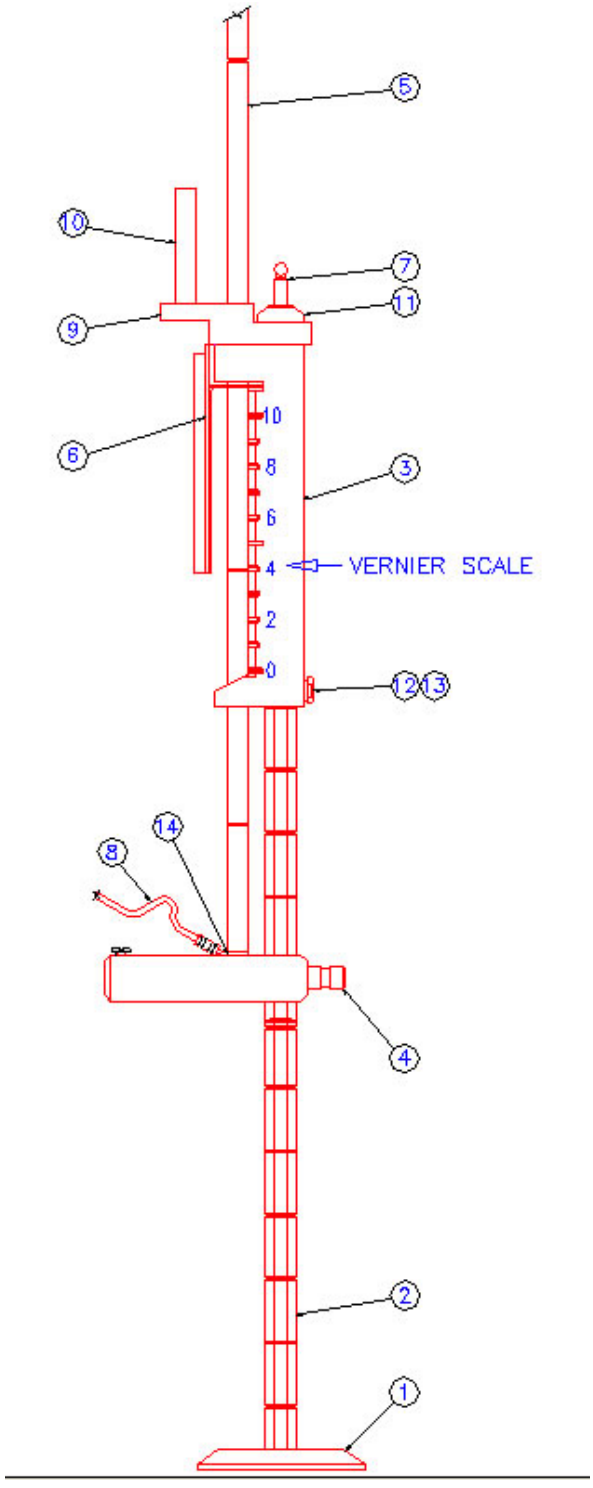
Any short supply or damage should be reported to Hydrological Services Pty Ltd within seven days of receipt of the product.

The Hydrological Services Model TSR Top Setting Wading Rods have been pre-assembled in the factory and are ready for service.

This product does NOT include a pulse counter or current meter unless specifically requested in the purchase order.

V OPERATION

Diagram 1



Preparation – refer to Diagram 1 above

Position the tail fin on the METER MOUNTING (Item 4) and secure with screw.

Position the appropriate current meter, complete with fan on the METER MOUNTING (Item 4) and secure with screw.

Connect CABLE (Item 8) to current meter.

Position the pulse counter (current meter counter) on PIN (Item 9) and connect lead to CONTACT (Item 7).

Depress TRIGGER (Item 6) the SUSPENSION ROD (Item 5), complete with the current meter, to slide within the HAND GRIP BODY (Item 3).
Ensure that the suspension rod slides smoothly for its full length.

Do not permit the current meter to fall to the foot as damage to the meter may occur.

Power up the pulse counter (current meter counter) and carry out function test as per manufacturer's instructions.

Rotate the current meter fan to generate pulses then check that the pulses are being received by the pulse counter.

The device is now ready for operation.

An appropriate stream cross section should have been previously selected and set up for gauging.

Operation

Place the Top Setting Wading Rod vertically in the stream at the appropriate point in the cross section, ensuring that the base plate is stable and that the meter is directed into the flow.

Read off the depth of stream on the GRADUATED ROD (Item 2).

Top Setting Wading Rods are available in both Metric and Imperial models. The following pages shows the use of both models in detail.

Relationship between the GRADUATED ROD (Item 2) & the SUSPENSION ROD (Item 5)

The GRADUATED ROD (Item 2) is designed for measurement of individual soundings across the stream section. This rod is graduated with markings every 0.1 feet for the imperial TSR and 20 millimetres for the metric TSR.

NB: The graduations on the SUSPENSION ROD (Item 5) and VERNIER SCALE (Item 3) are NOT to be used for direct measurement of soundings. These graduations on these Items have been designed for accurate setting of the current meter to the required 'depth of observation'.

Imperial Rods

The GRADUATED ROD (Item 2) is graduated in 0.1 feet. To assist in the reading, the rod is marked with a triple groove at full feet graduations, double groove at half feet graduations and single groove at 0.1 feet graduations.

With respect to the GRADUATED ROD (Item 2), the stream bed is the zero reference.

The current meter can be readily set at 0.2, 0.4, 0.6 and 0.8 of the sounding by aligning the appropriate graduation on the SUSPENSION ROD (Item 5) with the appropriate graduation on the VERNIER SCALE (Item 3).

When a 'multiplier' is applied to the measured sounding (i.e. the reading taken from the GRADUATED ROD (Item 2), the correct 'depth of observation' for a current meter velocity measurement is calculated.

The table below summarises the various multipliers to be used for each required depth of observation:

MULTIPLIER TABLE

Depth of Observation	0.2d	0.4d	0.6d	0.8d
Multiplier Used	2.0	1.5	1.0	0.5

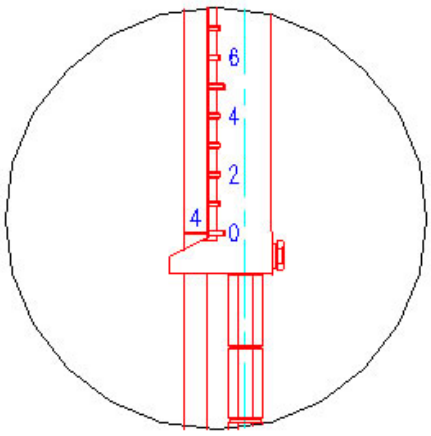
Where d = sounding taken from GRADUATED ROD (Item 2)

Refer to the following examples.

Example 1 - The sounding has been read at 2.0 feet on the GRADUATED ROD (Item 2).

Setting at 0.2d

1. From the table above, the calculated reading is '**4**' (i.e. multiplier '2.0' * sounding '2')
2. To set the current meter at 0.2 of the 2.0 feet sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**4**' on the suspension rod is in line with graduation '**0**' on the VERNIER SCALE (Item 3).

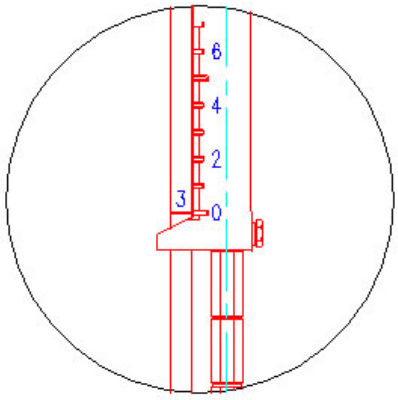


DEPTH OF WATER = 2 FEET
SOUNDING AT 0.2D
CURRENT METER POSITIONED AT 1.6 FEET

3. Release the trigger.
4. This will position the current meter at 1.6 feet on the GRADUATED ROD (i.e.: 0.2 of sounding)

Setting at 0.4d

1. From the table above, the calculated reading is '**3**' (i.e. multiplier '1.5' * sounding '2')
2. To set the current meter at 0.4 of the 2.0 feet sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**3**' on the suspension rod is in line with graduation '**0**' on the VERNIER SCALE (Item 3).

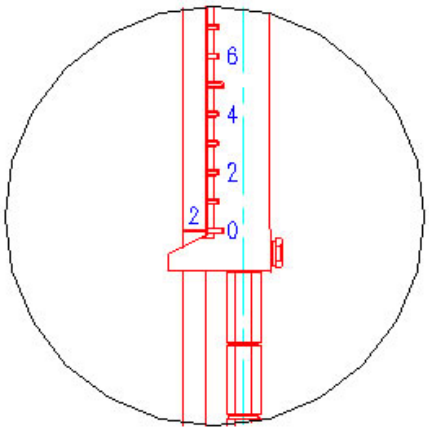


DEPTH OF WATER = 2 FEET
SOUNDING AT 0.4D
CURRENT METER POSITIONED AT 1.2 FEET

3. Release the trigger.
4. This will position the current meter at 1.2 feet on the GRADUATED ROD (0.4 of sounding)

Setting at 0.6d

1. From the table above, the calculated reading is '**2**' (i.e. multiplier '1.0' * sounding '2')
2. To set the current meter at 0.6 of the 2.0 feet sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**2**' on the suspension rod is in line with graduation '**0**' on the VERNIER SCALE (Item 3).

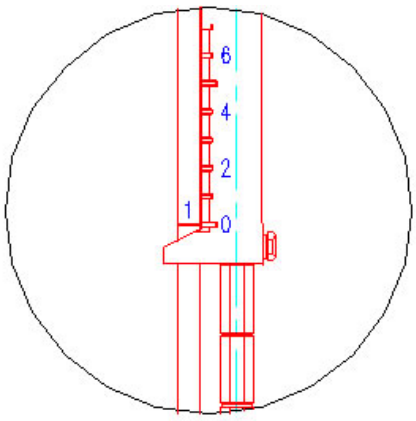


DEPTH OF WATER = 2 FEET
SOUNDING AT 0.6D
CURRENT METER POSITIONED AT 0.8 FEET

3. Release the trigger.
4. This will position the current meter at 0.8 feet on the GRADUATED ROD (0.6 of sounding)

Setting at 0.8d

1. From the table above, the calculated reading is '**1**' (i.e. multiplier '0.5' * sounding '2')
2. To set the current meter at 0.8 of the 2.0 feet sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**2**' on the suspension rod is in line with graduation '**0**' on the VERNIER SCALE (Item 3).



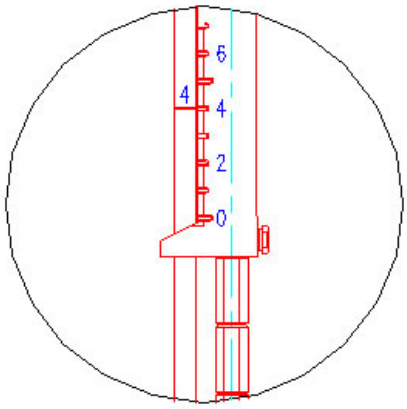
DEPTH OF WATER = 2 FEET
SOUNDING AT 0.8D
CURRENT METER POSITIONED AT 0.4 FEET

3. Release the trigger.
4. This will position the current meter at 0.4 feet on the GRADUATED ROD (0.8 of sounding)

Example 2 The sounding has been read at 2.2 feet on the GRADUATION ROD (Item 2)

Setting at 0.2d

1. From the table above, the calculated reading is '**4.4**' (i.e. multiplier '2.0' * sounding '2.2')
2. To set the current meter at 0.2 of the 2.2 feet sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**4**' on the suspension rod is in line with graduation '**4**' on the VERNIER SCALE (Item 3).

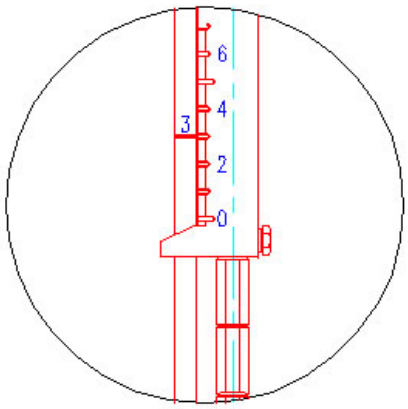


DEPTH OF WATER = 2.2 FEET
SOUNDING AT 0.2D
CURRENT METER POSITIONED AT 1.76 FEET

3. Release the trigger.
4. This will position the current meter at 1.76 feet on the GRADUATED ROD (0.2 of sounding)

Setting at 0.4d

1. From the table above, the calculated reading is '**3.3**' (i.e. multiplier '1.5' * sounding '2.2')
2. To set the current meter at 0.4 of the 2.2 feet sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**3**' on the suspension rod is in line with graduation '**3**' on the VERNIER SCALE (Item 3).

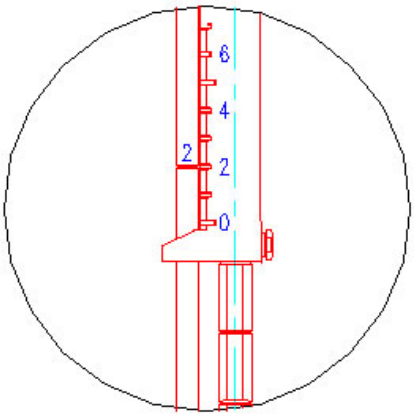


DEPTH OF WATER = 2.2 FEET
SOUNDING AT 0.4D
CURRENT METER POSITIONED AT 1.32 FEET

3. Release the trigger.
4. This will position the current meter at 1.32 feet on the GRADUATED ROD (0.4 of sounding)

Setting at 0.6d

1. From the table above, the calculated reading is '**2.2**' (i.e. multiplier '1.0' * sounding '2.2')
2. To set the current meter at 0.6 of the 2.2 feet sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**2**' on the suspension rod is in line with graduation '**2**' on the VERNIER SCALE (Item 3).

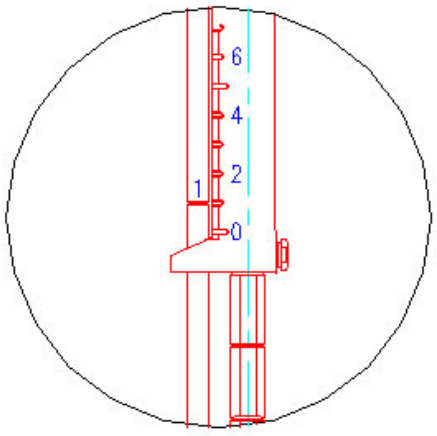


DEPTH OF WATER = 2.2 FEET
SOUNDING AT 0.6D
CURRENT METER POSITIONED AT 0.88 FEET

3. Release the trigger.
4. This will position the current meter at 0.88 feet on the graduated rod (0.6 of sounding)

Setting at 0.8d

1. From the table above, the calculated reading is '**1.1**' (i.e. multiplier '0.5' * sounding '2.2')
2. To set the current meter at 0.8 of the 2.2 feet sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**1**' on the suspension rod is in line with graduation '**1**' on the VERNIER SCALE (Item 3).



DEPTH OF WATER = 2.2 FEET
SOUNDING AT 0.8D
CURRENT METER POSITIONED AT 0.44 FEET

3. Release the trigger.
4. This will position the current meter at 0.44 feet on the GRADUATED ROD (0.8 of sounding)

Metric Rods

The rod is graduated in 20 millimetres graduations. To assist in the reading, the rod is marked with a triple groove at 500 millimetre graduations, double groove at 100 millimetre graduations and single groove at 20 millimetre graduations.

With respect to the GRADUATED ROD (Item 2), the stream bed is the zero reference.

The current meter can be readily set at 0.2, 0.4, 0.6 and 0.8 of the sounding by aligning the appropriate graduation on the SUSPENSION ROD (Item5) with the appropriate graduation on the VERNIER SCALE (Item 3).

The correct 'depth of observation' for current meter velocity measurement, is based on a multiplier, which when applied to the measured sounding (i.e. that taken from the GRADUATED ROD (Item 2) requires the application of a multiplier to calculate the correct setting to be used on the SUSPENSION ROD (Item 5). The table below summarises the various multiplier to be used, based on required depth of observation:

MULTIPLIER TABLE

Depth of Observation	0.2d	0.4d	0.6d	0.8d
Multiplier Used	2.0	1.5	1.0	0.5

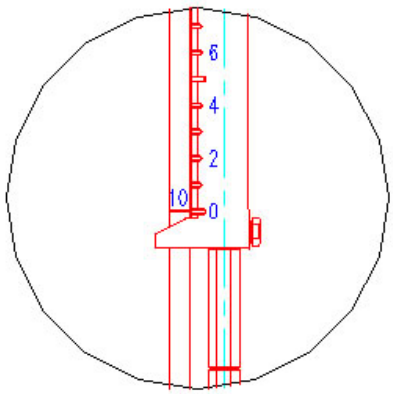
Where d = sounding taken from GRADUATED ROD (Item 2)

Refer to the following examples.

Example 1 – The sounding has been read at 5 decimetres (500mm) on the GRADUATION ROD (Item 2).

Setting at 0.2d

1. From the table above, the calculated reading is '**10**' (i.e. multiplier '2.0' * sounding '5')
2. To set the current meter at 0.2 of the 5 decimetre sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**10**' on the suspension rod is in line with graduation '**0**' on the VERNIER SCALE (Item 3).

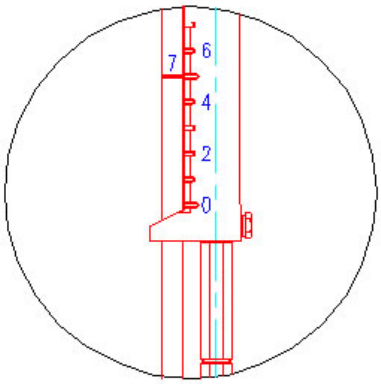


DEPTH OF WATER = 500 MILLIMETRES
SOUNDING 0.2D
CURRENT METER POSITIONED AT 400 MILLIMETRES

3. Release the trigger.
4. This will position the current meter at 4.0 decimetres (i.e. 400mm) on the GRADUATED ROD (0.2 of sounding)

Setting at 0.4d

1. From the table above, the calculated reading is '7.5' (i.e. multiplier '1.5' * sounding '5')
2. To set the current meter at 0.4 of the 5 decimetre sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**7**' on the suspension rod is in line with graduation '5' on the VERNIER SCALE (Item 3).

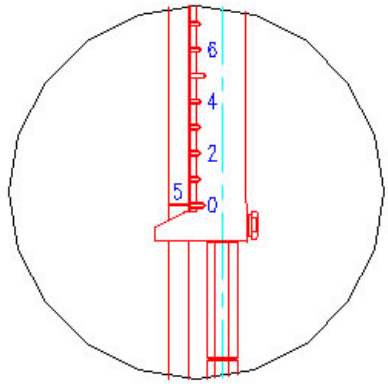


DEPTH OF WATER = 500 MILLIMETRES
SOUNDING 0.4D
CURRENT METER POSITIONED AT 300 MILLIMETRES

3. Release the trigger.
4. This will position the current meter at 3.0 decimetres (i.e. 300mm) on the GRADUATED ROD (0.4 of sounding)

Setting at 0.6d

1. From the table above, the calculated reading is '5' (i.e. multiplier '1.0' * sounding '5')
2. To set the current meter at 0.6 of the 5 decimetre sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**5**' on the suspension rod is in line with graduation '**0**' on the VERNIER SCALE (Item 3).

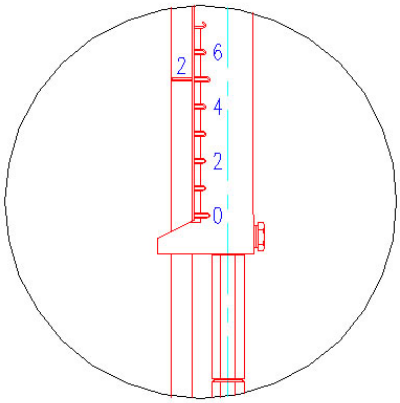


DEPTH OF WATER = 500 MILLIMETRES
SOUNDING 0.6D
CURRENT METER POSITIONED AT 200 MILLIMETRES

3. Release the trigger.
4. This will position the current meter at 2.0 decimetres (200mm) on the graduated rod (0.6 of sounding)

Setting at 0.8d

1. From the table above, the calculated reading is '**2.5'** (i.e. multiplier '0.5' * sounding '5')
2. To set the current meter at 0.8 of the 5 decimetre sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**2**' on the suspension rod is in line with graduation '**5**' on the VERNIER SCALE (Item 3).



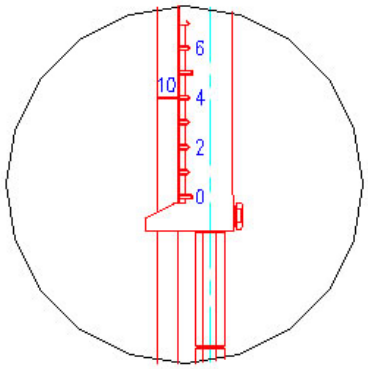
DEPTH OF WATER = 500 MILLIMETRES
SOUNDING 0.8D
CURRENT METER POSITIONED AT 100 MILLIMETRES

3. Release the trigger.
4. This will position the current meter at 1.0 decimetres (100mm) on the GRADUATED ROD (0.8 of sounding)

Example 2 **The sounding has been read at 5.2 decimetres or 520mm on the GRADUATION ROD (Item 2)**

Setting at 0.2d

1. From the table above, the calculated reading is '**10.4**' (i.e. multiplier '2.0' * sounding '5.2')
2. To set the current meter at 0.2 of the 5.2 decimetre sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**10**' on the suspension rod is in line with graduation '**4**' on the VERNIER SCALE (Item 3).

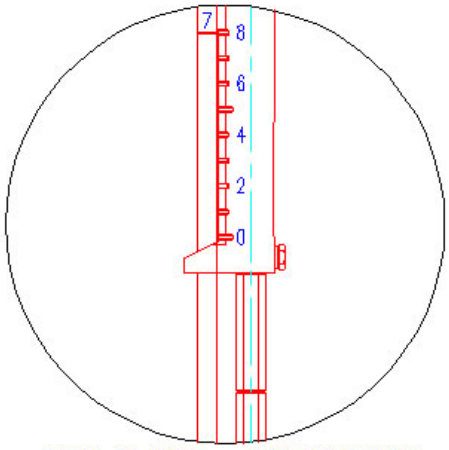


DEPTH OF WATER = 520 MILLIMETRES
SOUNDING 0.2D
CURRENT METER POSITIONED AT 420 MILLIMETRES

3. Release the trigger.
4. This will position the current meter at 4.2 decimetres (420mm) on the GRADUATED ROD (0.2 of sounding)

Setting at 0.4d

1. From the table above, the calculated reading is **'7.8'** (i.e. multiplier '1.5' * sounding '5.2')
2. To set the current meter at 0.4 of the 5.2 decimetre sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**7**' on the suspension rod is in line with graduation '**8**' on the VERNIER SCALE (Item 3).

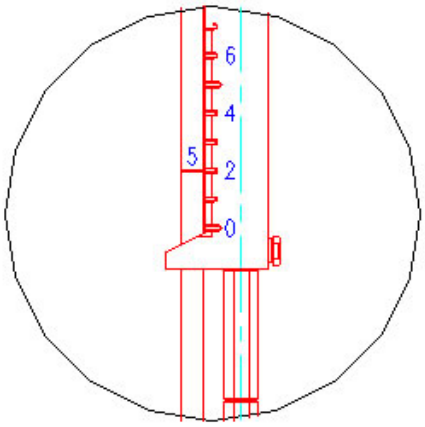


DEPTH OF WATER = 520 MILLIMETRES
SOUNDING 0.4D
CURRENT METER POSITIONED AT 310 MILLIMETRES

3. Release the trigger.
4. This will position the current meter at 3.1 decimetres (310mm) on the GRADUATED ROD (0.4 of sounding)

Setting at 0.6d

1. From the table above, the calculated reading is **'5.2**' (i.e. multiplier '1.0' * sounding '5.2')
2. To set the current meter at 0.6 of the 5.2 decimetre sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**5**' on the suspension rod is in line with graduation '**2**' on the VERNIER SCALE (Item 3).

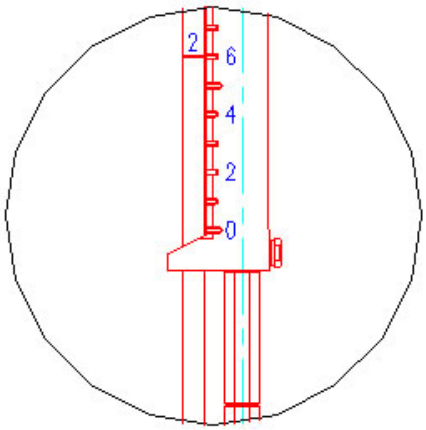


DEPTH OF WATER = 520 MILLIMETRES
SOUNDING 0.6D
CURRENT METER POSITIONED AT 210 MILLIMETRES

3. Release the trigger.
4. This will position the current meter at 2.1 decimetres (210mm) on the graduated rod (0.6 of sounding)

Setting at 0.8d

1. From the table above, the calculated reading is **'2.6'** (i.e. multiplier '0.5' * sounding '5.2')
2. To set the current meter at 0.8 of the 5.2 decimetre sounding, depress the TRIGGER (Item 6) and slide the SUSPENSION ROD (Item 5) until the graduation mark '**2**' on the suspension rod is in line with graduation '**6**' on the VERNIER SCALE (Item 3).



DEPTH OF WATER = 520 MILLIMETRES
SOUNDING 0.8D
CURRENT METER POSITIONED AT 110 MILLIMETRES

3. Release the trigger.
4. This will position the current meter at 1.1 decimetres (110mm) on the GRADUATED ROD (0.8 of sounding)

VI MAINTENANCE

Because of the excellent durability of the Top Setting Wading Rods it is only necessary to clean and thoroughly dry the device after use prior to packing away. This is essential to remove any corrosive contaminants that may be present in the water being gauged.

Periodically it may be necessary to remove oxidization from the electrical contact to ensure positive contact. This should be done with superfine emery paper or “scotchbrite” pad.

VII PART LIST

Refer to Diagram 1

ITEM NO.	DESCRIPTION	PART NO.
1	Foot Plate	TSR07-02
2	Graduated Rod - 48 inch	TSR07-01
	Graduated Rod - 72 inch	TSR07-02
	Graduated Rod - 96 inch	TSR07-03
	Graduated Rod -1200 mm	TSR07-04
	Graduated Rod -1800 mm	TSR07-05
	Graduated Rod -2400 mm	TSR07-06
3	Hand Grip Body - Imperial	TSR01-01
	Hand Grip Body - Metric	TSR01-04
4	Meter Mounting – Price	TSR05-01
	Meter Mounting - HS OSS-PC1	TSR05-03
5	Suspension Rod - 48 inch	TSR08-01
	Suspension Rod - 72 inch	TSR08-02
	Suspension Rod - 96 inch	TSR08-03
	Suspension Rod -1200 mm	TSR08-04
	Suspension Rod -1800 mm	TSR08-05
	Suspension Rod -2400 mm	TSR08-06
6	Trigger	TSR03-01
7	Contact	SC043-43
8	Cable	TSR09
9	Contact Block	TSR02-01
10	Counter Suspension Pin	TSR02-02
11	Contact Body	TSR04-01
12	Insulating Sleeve 1	TSR01-02
13	Insulating Sleeve 2	TST01-03
14	Insulating Washer	TSR05-02
15	Carry Case - 48 inch	TSR10
	Carry Case - 72 inch	TSR11
	Carry Case - 96 inch	TSR12

VIII Appendix (A) OSS-B1 Installation to TSR

Figure 1: Initial State

Figure 2: Unscrew the Foot Plate

Figure 3: Loosen the Tail of the OSS-B1 body as shown

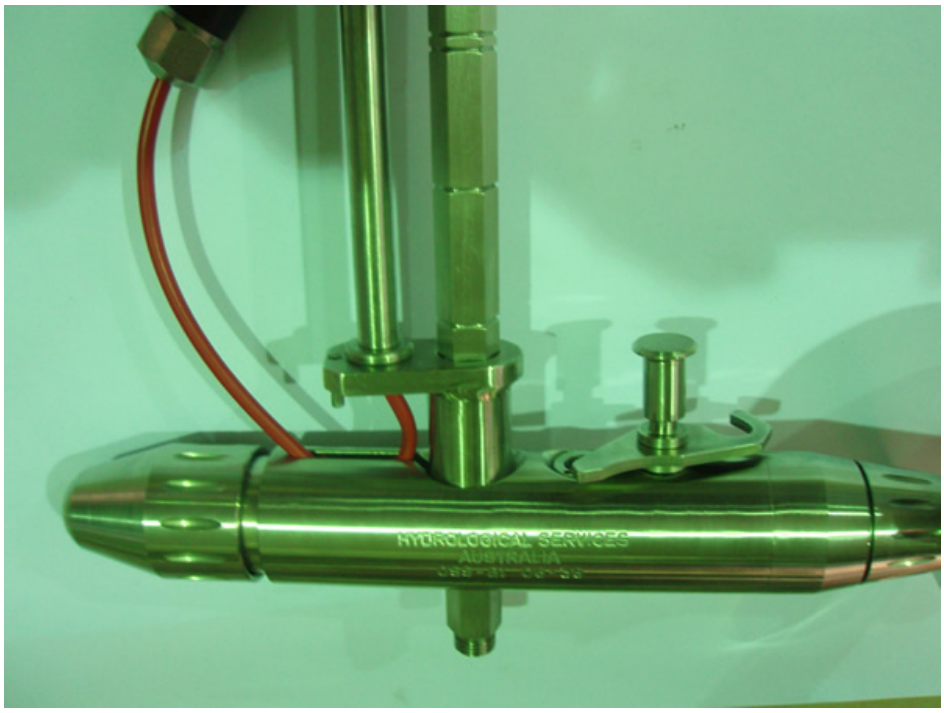


Figure 4: Loop the cable as shown

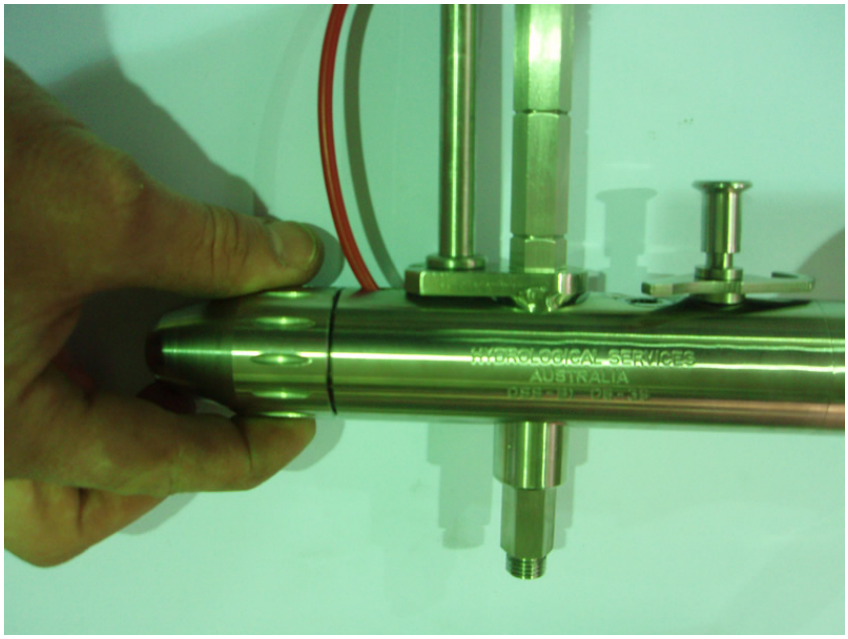


Figure 5: Locate the pin in the OSS-B1 body slot & tighten the tail to the rod as shown

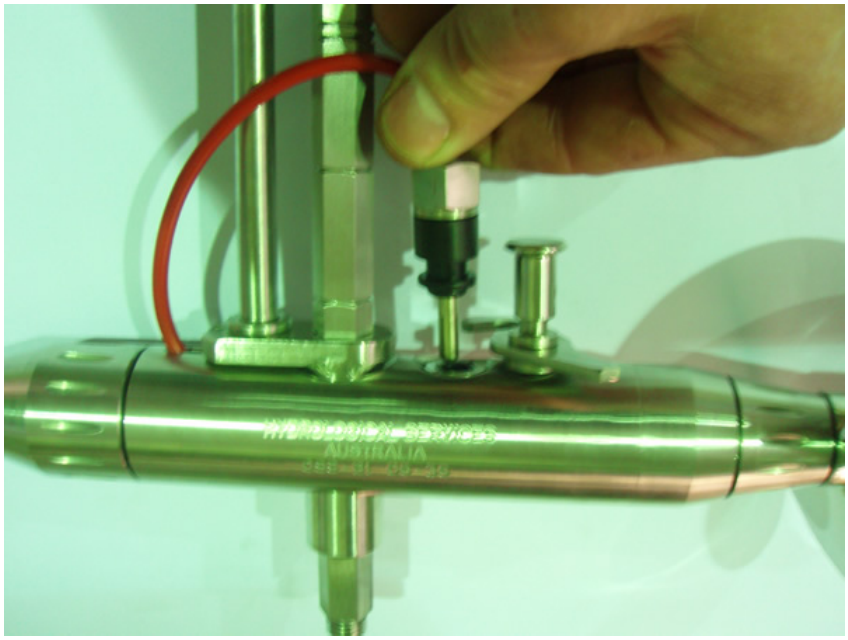


Figure 6: Plug the Angle Plug (AP01) in place by pushing down firmly & Secure Clamp in place

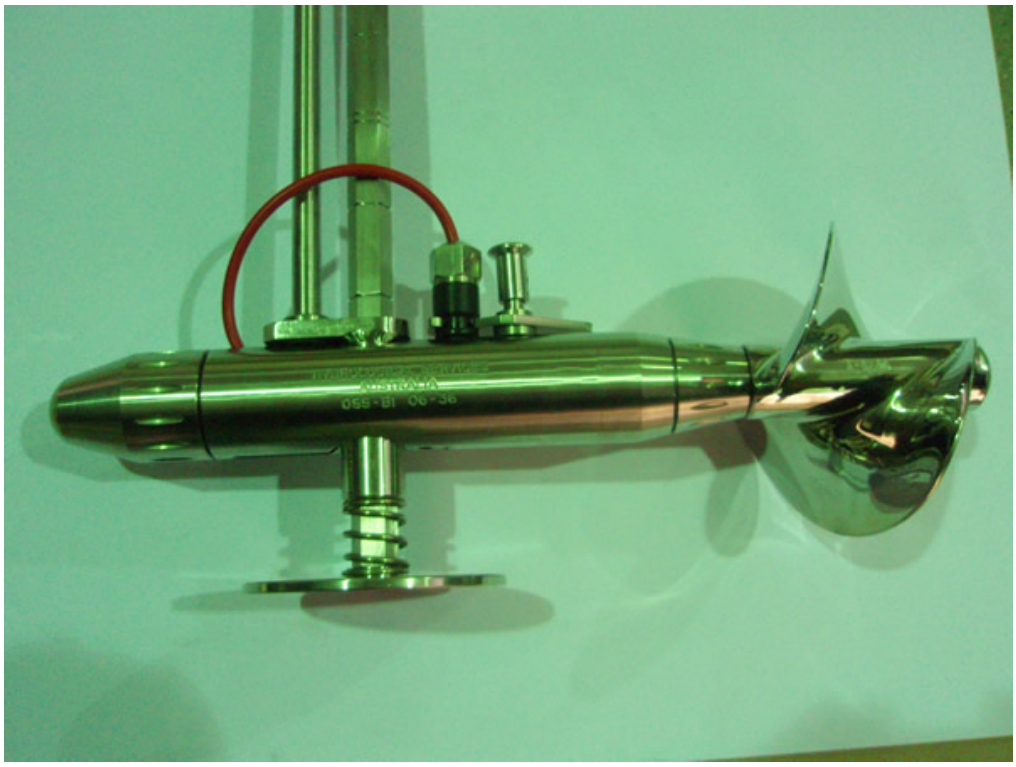


Figure 7: Screw the Foot Plate back on as shown