ZEBRA-TECH LTD

www.zebra-tech.co.nz

Instrumentation and equipment for environmental monitoring and research

SELF-CONTAINED HYDRO-WIPER
OPERATION MANUAL

English. 01/2018.V1.0

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1. INTRODUCTION

The Hydro-Wiper is a mechanical wiper system designed to fit easily to a variety of optical instruments. Using a regular gentle brushing action, the Hydro-Wiper keeps the optical window of the instrument clean from bio-fouling and other unwanted deposits such as mud. The Hydro-Wiper reduces the need for costly site visits to manually clean the instrument, maintaining data integrity throughout long deployments.

This manual is supplied with all standard self-contained Hydro-Wipers and provides an overview of installation and operation. If technical assistance is required, please do not hesitate to contact Zebra-Tech. Please see page 20 for our contact details.

FEATURES

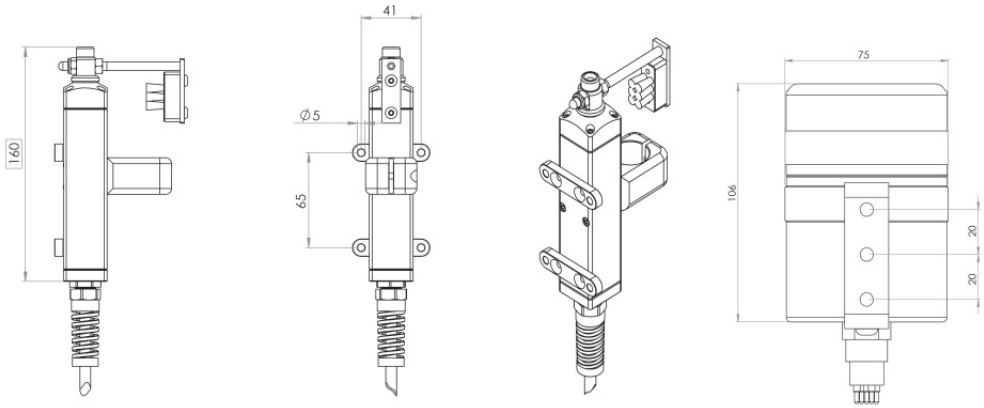
Your Hydro-Wiper offers the following features:

- Easy to install and simple to operate
- Ultra-low power consumption for long term deployments
- High precision wipe interval timing for minimal clock drift during long deployments
- Adjustable wipe angle
- Customisation
- Very robust for harsh field conditions
- Brush design that has been extensively field proven in extreme conditions around the world
- On board self-monitoring for reliable operation; if the wiper arm is knocked in front of the instrument face, the wiper arm automatically moves to one side.

2. HYDRO-WIPER SPECIFICATIONS

Brush:	User replaceable
Battery Housing O-ring:	#142 (2 3/8” x 3/32”)
Cable:	EPDM jacketed cable between the wiper and battery housing (1m standard length)
Cable Entry:	30m Rated - Cable glands with strain relief, O-ringed puck and resin back fill. 100m Rated - wet pluggable connectors
Clock Accuracy:	+/- 1 minute per year (0-40oC)
Construction:	Passivated Stainless steel, Acetal
Power Supply:	6 x alkaline AA batteries
Power Consumption:	Quiescent, 0.02mA, ~80mA during a wipe
Deployment Endurance:	Wipe interval dependent. In excess of 6 months with a 2 hour wipe interval
Depth Rating:	30 meters as standard, 100m option
Wipe Interval:	User select (15, 30, 45, 60, 120, 180, 240, 300, 360 or 720 mins)

TABLE 1: HYDRO-WIPER SPECIFICATIONS



OPTIONS

The following options are available with your Hydro-Wiper

Connectors:	Wet pluggable connectors on wiper and /or battery housing
Cable:	Additional cable between the wiper and battery housing
Customization:	Custom clamps, brushes and arms
Extended Battery Housing:	Twice the number of batteries (12) for extended deployment
Extended Depth Rating:	100 meters
Multi-Wipe :	Wipe up to 3 sensors per Hydro-Wiper. Available for Turners Cyclops and Odyssey sensors.

TABLE 2: HYDRO-WIPER OPTIONS

3. HYDRO-WIPER COMPONENTS

Your Hydro-Wiper is supplied as a fully self-contained and complete system. It consists of the following components:

- Wiper body, to which the instrument is attached
- Wiper control housing. In addition to the batteries, the wiper control housing contains the control electronics, power switch, wiper interval select switch and status LED.
- An electrical cable connecting the wiper body to the control housing
- Field tool kit.

WIPER BODY

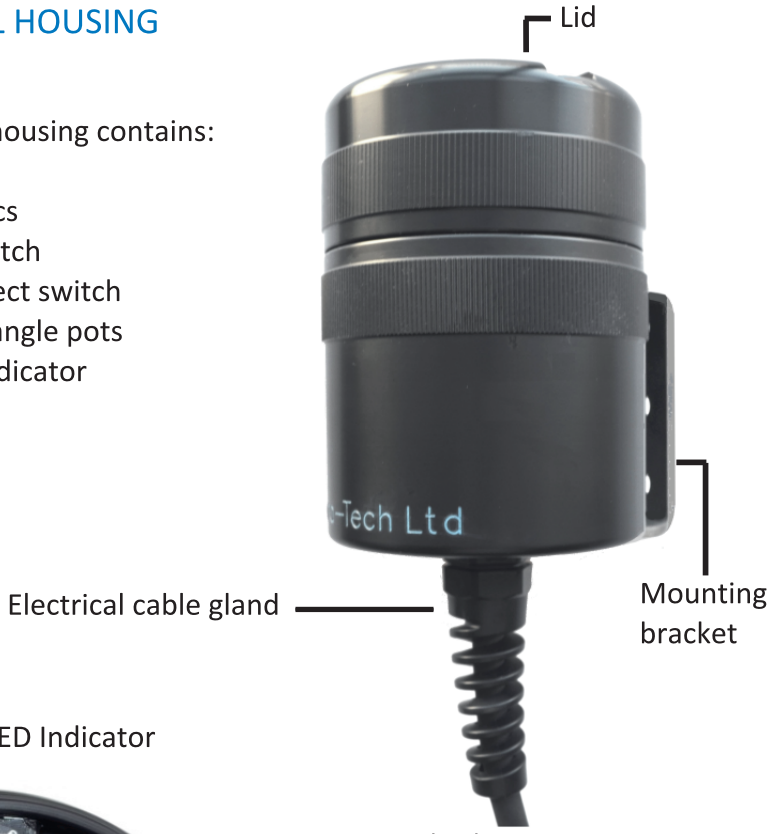
The wiper body consists of:

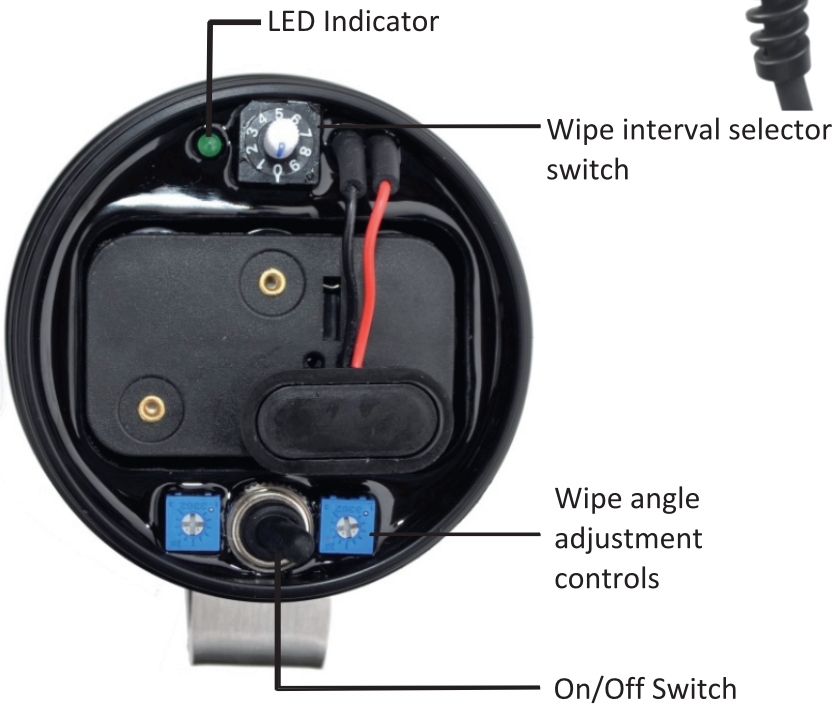
- Wiper motor and gearbox
- Wiper shaft position sensing system
- Wiper arm with brush.
- Mounting clamp for the optical instrument.
- Anode

WIPER CONTROL HOUSING

The wiper control housing contains:

- Batteries
- Control electronics
- On/off power switch
- Wipe interval select switch
- Adjustable wipe angle pots
- Diagnostic LED indicator





ELECTRICAL CABLE

The Hydro-Wiper is fitted with 1 meter of cable between the wiper body and control housing as standard. However, the length of cable required may vary depending on the type of installation. Additional cable can be fitted at the factory when the Hydro-Wiper is built. Please specify the cable required when ordering.

FIELD TOOL KIT

The field tool kit supplied with the Hydro-Wiper contains:

- Lid shifting tool
- Spare control housing O-ring
- O-ring grease
- Set of batteries
- Replacement anode

4. PREPARING FOR DEPLOYMENT

FITTING YOUR SENSOR INTO THE HYDRO-WIPER CLAMP

If you require technical assistance fitting the Hydro-Wiper to your instrument, please contact Zebra-Tech. See contact page for our details.

ADJUSTING WIPER BRUSH PRESSURE

NOTE!
Ensure the Hydro-Wiper is switched off when manually rotating the wiper brush.

The success of the Hydro-Wiper is based on the brush sweeping lightly across the sensor window at regular intervals – it is not a scrubbing action. If there is excessive pressure, the life of the brush will be reduced and damage to the sensor surfaces may occur. If the brush pressure is insufficient, contact between the brush and optical window will be lost and fouling may develop.

There are two methods to adjust the brush pressure depending on the orientation of the brush. Vertical brushes are for instruments with the windows on the side. Horizontal brushes are for instruments with optical window on top of the sensor.

1. Vertical brushes:
The brush is mounted on an adjustable arm. The length of the arm controls the brush pressure applied to the face of the sensor. This is generally factory set and should not need adjustment unless you are changing sensors.

If it is necessary to adjust the brush pressure, loosen the nuts on the wiper arm and rotate the wiper arm in the desired direction. Tighten the nuts after adjustment.

2. Horizontal brushes:
The brush pressure can easily be adjusted by sliding the sensor upwards or downwards in the clamp. Do this by loosening the clamp screw and tightening again once you have made the desired adjustment.

Vertical Brush - Adjust arm

Horizontal Brush - Adjust clamp

MOUNTING THE WIPER CONTROL HOUSING

Use the marine grade (316) stainless steel bracket attached to the wiper control housing to attach the wiper control housing to the required structure.

NOTE!
Avoid attaching the bracket directly to a metal structure. Doing so can cause electrolysis, which may result in rapid deterioration of the metal parts.

CONNECTOR HANDLING INSTRUCTIONS (100m depth rated Hydro-Wipers)

- Pins and sockets must be clean before mating.
- Periodically lubricate pins with light application of silicone spray.
- Do not use penetrating oil on or near the connector. This will cause permanent damage.
- Ensure correct alignment before mating.
- When separating, never pull on the cable. Do not twist or bend, always pull straight.

SECURING THE WIPER CABLE

Use cable ties to secure the wiper cable to avoid possible snags and fouling.

NOTE!
Do not allow the cable to constantly move with the water currents as fatigue and eventual failure may result.

5. OPERATING THE HYDRO-WIPER

OPENING AND CLOSING THE WIPER CONTROL HOUSING

To open the wiper control housing, unscrew the lid in an anti-clockwise direction. If the lid is tight, use the lid shifting tool supplied with your Hydro-Wiper. This tool fits into the groove in the top face of the cap and allows greater leverage.

To close, screw the cap onto the battery housing until it is just hand tight. Do not over tighten or use the cap shifting tool to tighten the cap.

NOTE!
Always clean and service the O ring before closing the lid. Refer to the maintenance section of this manual for instructions on doing this.

INSTALLING THE BATTERY

Switch the power switch to the off position. Gently pull the battery connector off the battery holder contacts. Remove the battery holder from the control housing and insert 6 new AA batteries into the battery holder. Check all the batteries are correctly orientated. Put the battery holder back into the control housing. Re-attach the battery connector to the battery holder contacts. Switch on the Hydro-Wiper. The LED should flash 4 times and then a wipe is performed.

NOTE!
Use only good quality AA 1.5 volt alkaline batteries (eg. Energizer or Duracell brand).

SETTING THE WIPE INTERVAL

The wipe interval is the period of time between the start of one wipe and the start of the next. The optimal wipe interval will depend on environmental conditions at the field site. Generally a wipe interval of 2 to 3 hours should prove sufficient to keep the sensor clean in moderate fouling conditions.

The wipe interval is controlled by the position of the wipe interval switch. Refer to table 3 on page 14 and set the wipe interval switch at the desired setting as shown in the photo below.

NOTE!
Ensure the Hydro-Wiper is switched off when adjusting the wipe interval.

WIPE INTERVAL AND ESTIMATED BATTERY ENDURANCE

Switch Position:	Wipe Interval:	Battery Endurance (days)*
0	15 minutes	81
1	30 minutes	157
2	45 minutes	229
3	60 minutes	298
4	120 minutes	538
5	180 minutes	735
6	240 minutes	901
7	300 minutes	1042
8	360 minutes	1163
9	720 minutes	1639

TABLE 3: WIPE INTERVAL SELECT SWITCH SETTINGS

*Assumes new Energizer AA batteries using a standard Hydro-Wiper. Extended Deployment Hydro-Wiper endurance available on request.

The Hydro-Wiper wipe interval timer starts 0.5 seconds after the power is switched on.

ADJUSTING THE WIPE ANGLE AND PARK POSITION

Both the wipe angle and park position of your Hydro-Wiper have been factory set to suit the sensor for which it was built. However, there may be circumstances when you would like to alter these. This may arise when converting your Hydro-Wiper for use with a different instrument.

To adjust either the wipe or the park position, unscrew the lid from the wiper control housing. Locate the blue controls as pictured on page 16.

NOTE!
Ensure the Hydro-Wiper is switched off when adjusting the wipe angle or park position, changes only take effect on power-up.

For both controls, turning clockwise will increase the angle. Turning counter-clockwise will decrease the angle. Park position determines where the wiper will stop between wipes. Wipe angle determines how far the wiper will sweep.

LED STATUS INDICATOR

When the Hydro-Wiper is switched on, the LED status indicator will blink 4 times and then a wipe will be performed. During deployment the LED will blink every 15 seconds. The number of blinks indicates the performance status of the Hydro-Wiper as shown in table 4.

LED Blink Sequence:	**Status Description:**
Once every 15 seconds	Normal operation
Twice every 15 seconds	Previous wipe failed
Three times every 15 seconds	Low battery shutdown

TABLE 4: LED STATUS INDICATOR BLINK SEQUENCE

DURING DEPLOYMENT

Unpredictable events can happen during a deployment. The Hydro-Wiper has been designed to withstand the harsh nature of field deployments.

- The wiper drive shaft features a slip mechanism, so the wiper arm can be manually moved if necessary without causing any damage. This also protects the wipe gearbox from damage in the event the wiper arm is subject to force or shock loading during deployment.
- The Hydro-Wiper routinely monitors the position of the wiper arm. If the wiper arm is moved from the park position, the Hydro-Wiper will detect this and move the wiper arm to one side.
- If the wiper arm becomes jammed at any stage during a wipe, the direction of rotation will be reversed in an attempt to dislodge the obstruction. If this is unsuccessful, the Hydro-Wiper will abort the wipe. The diagnostic LED will flash twice every 15 seconds whilst this situation continues.

6. MAINTENANCE

Your Hydro-Wiper requires very little maintenance and should provide reliable operation for many years.

REPLACEABLE HYDRO-WIPER PARTS

The only replaceable parts are the batteries, wiper brush and anode.

Under normal conditions the wiper brush should last many thousands of wipes. However, should your wiper brush require replacement, these are inexpensive and obtainable directly from Zebra-Tech Ltd or your Hydro-Wiper reseller.

Anodes reduce corrosion of the Hydro-Wiper shaft in harsh environments. Replacement anode buttons can be purchased from Zebra-Tech or your local Hydro-Wiper reseller. To replace the anode button, simply unscrew the old one and swap it.

From 2017, anodes have been supplied with new Hydro-Wipers as standard. However, anodes can be added to legacy Hydro-Wipers. Please contact Zebra-Tech for more information.

SERVICING THE WIPER CONTROL HOUSING O-RING

Service the O-ring each time you open the wiper control housing and before deployment.

1. Carefully remove the O-ring from the groove in the wiper control housing.
2. Clean the O-ring, the O-ring groove and the sealing face on the inside of the lid using a tissue.
3. Inspect the O-ring for cracks, deterioration or damage. Replace the O-ring if necessary. A spare O-ring is provided in your Hydro-Wiper field kit.
4. Wipe some O-ring grease onto the O-ring and the sealing face on the inside of the lid.
5. Replace the O-ring into the groove in the battery housing.

7. TROUBLESHOOTING

WIPE FAILURE

Should the wiper arm jam during a wipe due to an obstruction, it will attempt to dislodge itself by undergoing a series of direction reversals. If unsuccessful the wipe will be aborted and the LED will blink 3 times every 15 seconds until the next wipe is due.

NOTE!
The Hydro-Wiper is not damaged in the event of the wiper arm becoming completely jammed by an obstruction.

NOTE!
The LED indicator will blink twice every 15 seconds when the Hydro-Wiper has failed to complete the last scheduled wipe.

LOW BATTERY SHUTDOWN

Low battery shutdown occurs when the battery pack reaches around 6.5 volts. No wipes will be performed when the Hydro-Wiper is in low battery shutdown mode.

NOTE!
The LED indicator will blink three times every 15 seconds when the Hydro-Wiper is in low battery shutdown mode.

8. FURTHER ASSISTANCE

For further assistance with this or any other Zebra-Tech product, please contact:

Zebra-Tech Ltd
PO Box 1668
Nelson 7040
New Zealand

Tel: International 0064 3 548 0468
Fax: International 0064 3 548 0466

Email: enquiry@zebra-tech.co.nz
For up to date information about the Hydro-Wiper and other products available, please visit the Zebra-Tech Ltd website at:
www.zebra-tech.co.nz

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