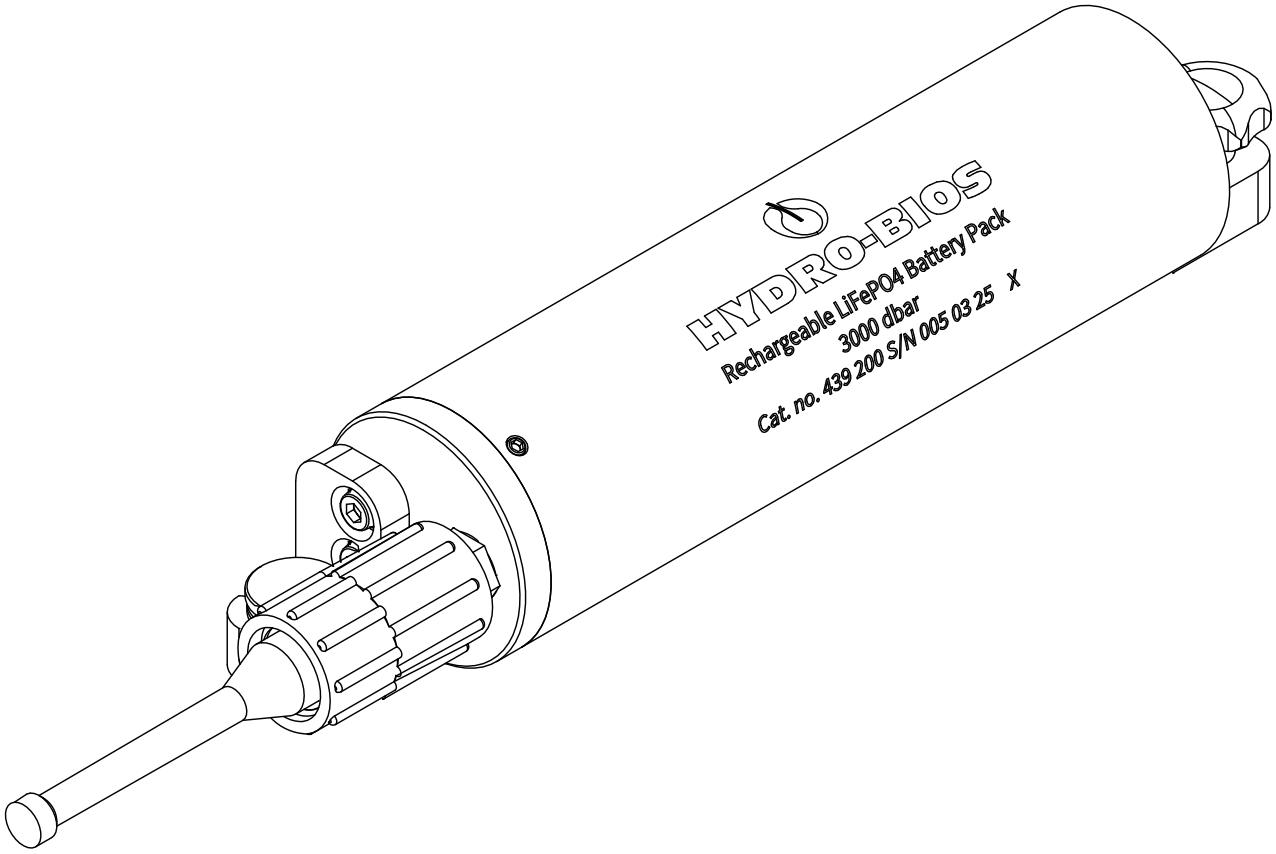


RECHARGEABLE BATTERY PACK LiFePO4 7500 mAh

OPERATION MANUAL

Product ID 439 200

Edition 03/25

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NOTICE



Please read this manual carefully before operating or performing maintenance on the instrument. Pay special attention to all danger, warning and caution statements. Failure to do so could result in serious injury and/or damage to the instrument. Keep manual available at all times.

LAYOUT AND MEANING OF WARNINGS

All safety instructions found in this operation manual are composed in accordance with the following pattern (signal words):

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.
NOTICE may also indicate a situation which, if not avoided, may cause damage to equipment.

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GENERAL DESCRIPTION

Rechargeable Battery Pack LiFePO4 7500mAh is a rechargeable power supply with integrated protection, battery management and charge controller for underwater use with HYDRO-BIOS devices - especially the **MultiNet®** and **Multi Water Sampler** line of products. It has a significantly higher energy capacity compared to the standard battery module and is intended for long duration sampling.

Key features:

- **High energy capacity** of 74.25 Wh for 75 to 300+ hours **MultiNet®** operation time (depending on configuration and installed sensors)
- **Safe**
    - Uses LiFePo4-chemistry with very low risk of thermal runaway compared to typical lithium ion batteries used in consumer devices. Benign failure behaviour when physically damaged.
    - Integrated auto reset protection against short circuit, overcurrent, overheating, low temperatures, overcharge, overdischarge.
- **Stable power output** independent of state of charge through regulated output i.e. no drop in voltage or power at low charge states.
- **High cycle life** Typically less than 10% capacity drop after 1000 charge-discharge-cycles due to choice of cell chemistry and custom battery management.
- **Long storage time** due to low self-discharge rate of typically 1% per month.
- **Remaining charge and estimated run time** displayed in Oceanlab.

Retrofit to existing MultiNet® and Multi Water Sampler possible through user installable screw-in mounting brackets. No sending in of the device to be powered required.

STANDARD EQUIPMENT

1. 1 pcs. Rechargeable Battery Pack LiFePO4 7500 mAh
2. 1 pcs. Charger including AC-cord
3. 1 pcs. Connecting cable IL 3 M - IL 2 F
4. 1 pcs. Operation manual
5. 1 pcs. Dummy connector BH 3 M incl. locking sleeve
6. 1 pcs. PIN-lubricant
7. 1 pcs. Spanner 10 mm

439 200 -010 Mount MPS Mini / Midi

1. 2 pcs. Support
2. 2 pcs. Clamp
3. 7 pcs. Washer 6.4 mm
4. 4 psc. Screw M6x12
5. 1 pcs. Screw M6x16
6. 1 pcs. Screw M6x20
7. 1 pcs. Nut M6
8. 1 pcs. Hexagon socket screw key 5 mm

439 201 -020 Mount MPS Maxi / Mammoth

1. 2 pcs. Support
2. 5 pcs. Washer 6.4 mm
3. 3 pcs. Screw M6x16
4. 1 pcs. Screw M6x20
5. 1 pcs. Hexagon socket screw key 5 mm

439 202 -030 Mount MWS 6

1. 1 pcs. Support plate
2. 3 pcs. Bow screw
3. 6 pcs. Washer 6.4 mm
4. 6 pcs. Nut M6

439 203 -040 Mount MWS 12 / MWS 24

1. 1 pcs. Support plate
2. 2 pcs. Bow screw
3. 4 pcs. Washer 6.4 mm
4. 4 pcs. Nut M6

TECHNICAL DATA

parameter	conditions	min	typical	max	unit
chemistry		Lithium Iron Phosphate (LiFePo4)			
capacity	Not including ageing. Average load current between 1 mA and 2 A. Ambient temperature above 5° C.	7200	7500	7700	mAh
self-discharge			1		% per month
capacity loss after 1000 charge-discharge-cycles			10		%
electronics operate from		-30[1]		85	° C
storage ambient temperature[2]		-40		85	° C
charging ambient temperature[3]		5° C		40	° C
AC supply for charger		80	110/230	264	V
			50/60		Hz
continuous current rating	ambient temperature 5° to 60° C		3.5		A
stage 1 overcurrent protection[4]	15 s delay		4.5		A
stage 2 overcurrent protection[4]	no delay		6.5		A
over temperature protection[4]	circuit board temperature		90		° C
output voltage[5]		8.55	9	9.45	V
charging time 0 -> 100%	ambient temperature between 5° C and 25° C		3		h
charging time 0 -> 100%	ambient temperature 40° C		~5		h
charging time 0 -> 100%	ambient temperature <5° C (slow charging to prevent battery damage)		~14		H
weight			3.3		kg
diameter			70		mm
height	without brackets		270		mm

[1] Due to cell chemistry limitation. Operation between -40° C and -30° C possible for typically 10 min if load <50 mA. Do not run high loads (e.g. motors in Hydro-Bios equipment) below -30° C as this may result in accelerated battery ageing.
[2] See section on storage recommendations
[3] Protection function will disable charging below outside this temperature range.
[4] If this value is exceeded e.g. by defective load or high ambient temperature the load is disconnected for some seconds after which a reconnection is attempted. (hiccup mode)
[5] Minor fluctuation of 0.3 V output voltage is an intentional signal that communicates the batteries state of charge to OceanLab.

MOUNTING TO MULTI PLANKTON SAMPLER

MOUNTING THE SUPPORTS FOR THE BATTERY PACK TO MPS MINI / MIDI

1. Make sure the levers are released and the motor unit is switched off.
2. Remove the standard battery pack (A) and cable from the motor unit.
3. Remove screws and washers (B, C) from the MPS frame (fig. 1).
4. Fix the supplied screw M6 x 20 and washer into the thread of screw B from below and tighten.
5. Place the rear support D into place acc. to fig. 2, the bore of the long ‘leg’ fitting over the just installed screw B. Hand-fix with supplied nut and washer, don’t tighten the nut yet.
6. Place the bracket (E) in place (fig 2) and fix using 2 supplied screws M6 x 12 with washers.
7. Tighten the screws and the nut.
8. Place the front support (F) into position acc. to fig. 2 and align the bore on the long ‘leg’ to the thread of screw C. Insert supplied screw M6 x 16 with washer, don’t tighten it yet.
9. Place the bracket (G) in place (fig 2) and fix using 2 supplied screws M6 x 12 with washers.
10. Tighten the screws.

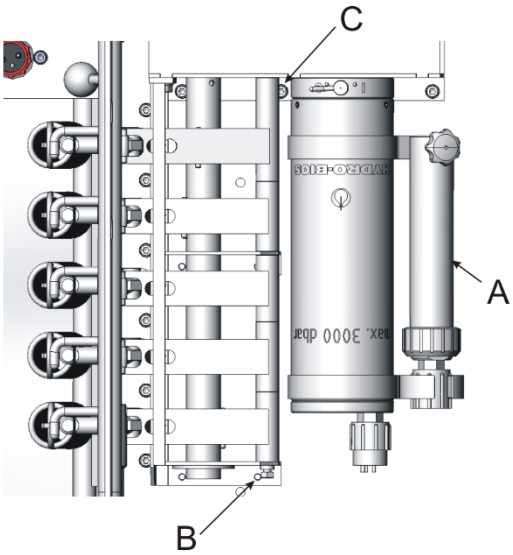


Fig. 1: MPS Mini / Midi top view

To mount the Battery Pack to the MPS, place the Battery Pack over the supports, the end with the screw pointing towards the front of the MultiNet (fig. 3). Press the button (H) and insert the arrestor pin into the keyhole-shaped opening of the rear support (J). Slide the Battery Pack forward until the screw (K) is aligned with the thread (L) on the front support. Tighten screw K by hand, do not use tools!

Connect the cable to the motor unit and Battery Pack, make sure the pins are greased with a suitable pin lubricant.

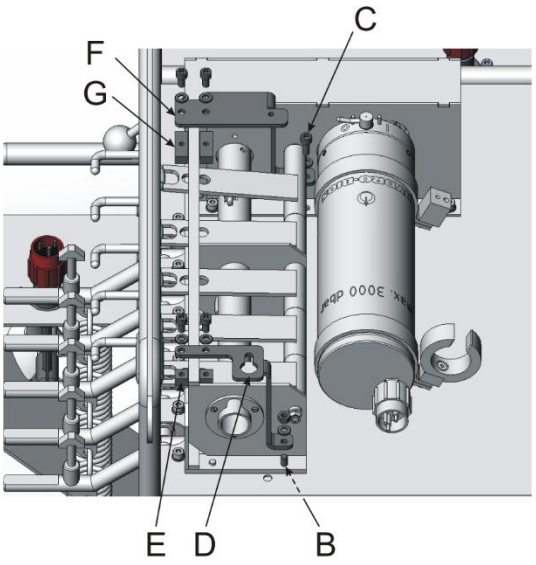


Fig. 2: exploded view supports

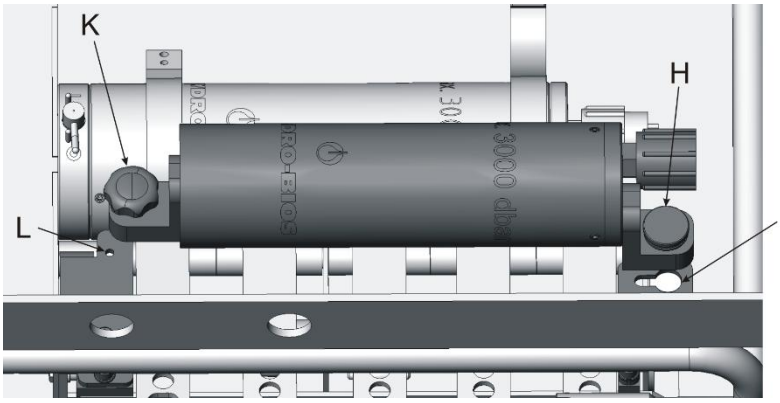


Fig. 3: mounting Battery Pack

MOUNTING THE SUPPORTS FOR THE BATTERY PACK TO MPS MAXI / MAMMOTH

1. Make sure the levers are released and the motor unit is switched off.
2. Remove the standard battery pack (A) and cable from the motor unit.
3. Stretch levers 10 through 5 and immediately put the safety locking bar in place.
4. Remove screw B and washer (fig. 4) and replace with the supplied screw M6 x 20 and washer from below.
5. Release levers 5 through 10 according to the procedure described in the MPS manual.
6. Remove screws and washers (C, D, E). If the MPS is equipped with sensors, remove the sensor protection cage.
7. Place the rear support (F) into place acc. to
1. fig. 5, the bore of the long 'leg' fitting over the just installed screw B. Hand-fix with supplied nut and washer, don't tighten the nut yet.
8. Align the bore (G) with the safety bar holder (H) and the thread on rail (J). Insert screw M6 x 16 with washer and tighten screw and nut, making sure the safety locking bar runs freely and smoothly and isn't obstructed by the safety bar holder. If applicable mount the sensor protection cage back in place.
9. Insert a screw M6 x 16 with washer into bore (K) of the front support (L). Position the support with the screw aligned to thread of screw (C). See illustrations for how to bring the support into place (fig. 7-11, p. 8). Hand-fix the screw, don't tighten it yet.
10. Align the bore (M) with the safety bar holder (N) and the thread on rail (J). Insert screw M6 x 16 with washer and tighten screw and nut, making sure the safety locking bar runs freely and smoothly and isn't obstructed by the safety bar holder.

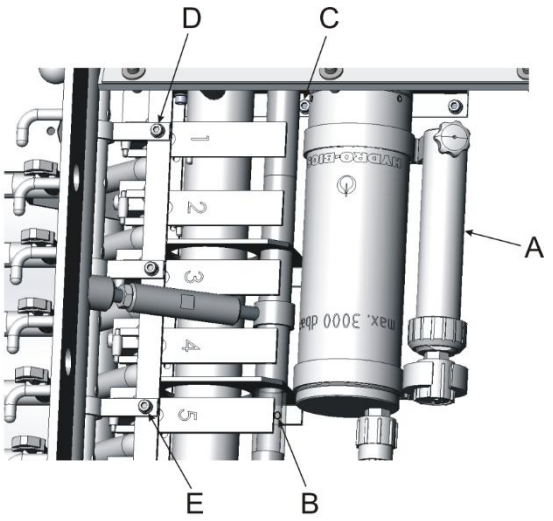


Fig. 4: MPS Maxi / Mammoth top view

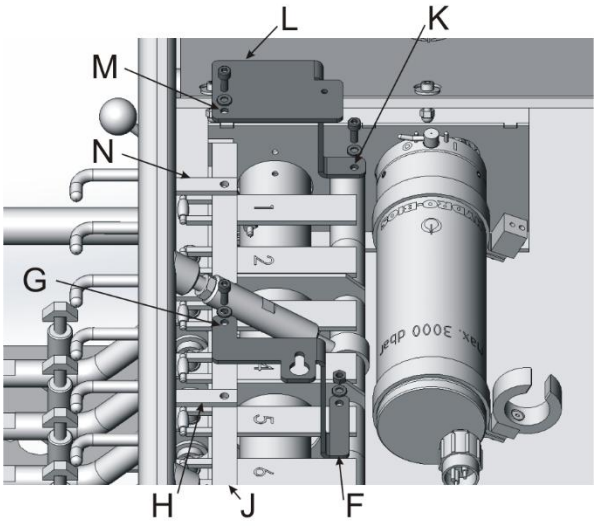


Fig. 5: exploded view supports

To mount the Battery Pack to the MPS place the Battery Pack over the supports, the end with the screw pointing towards the front of the MultiNet (fig. 6). Press the button (O) and insert the arrestor pin into the keyhole-shaped opening of the rear support (P). Slide the Battery Pack forward until the screw (Q) is aligned with the thread (R) on the front support. Tighten screw Q by hand, do not use tools!

Connect the cable to the motor unit and Battery Pack, make sure the pins are greased with a suitable pin lubricant.

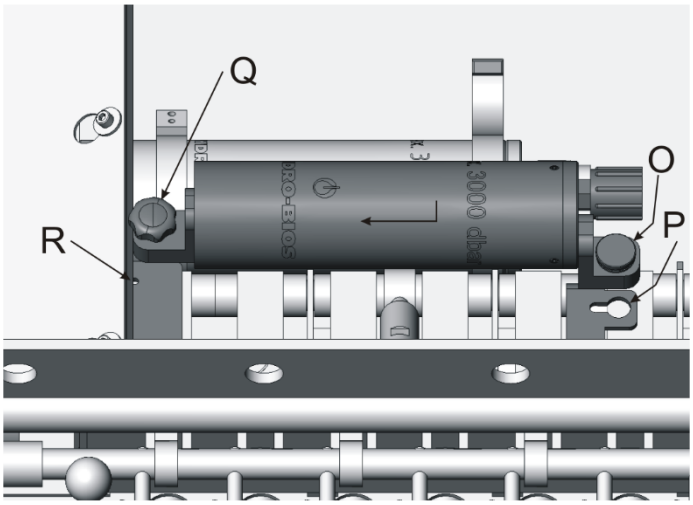


Fig.6: mounting battery Pack

HOW TO BRING FRONT SUPPORT IN POSITION (MPS MAXI / MAMMOTH)

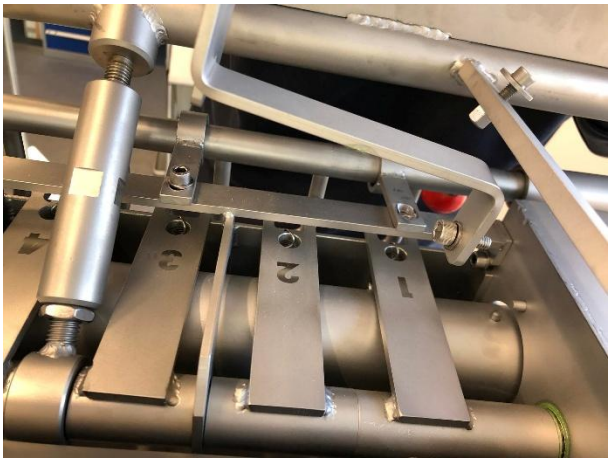


Fig. 7

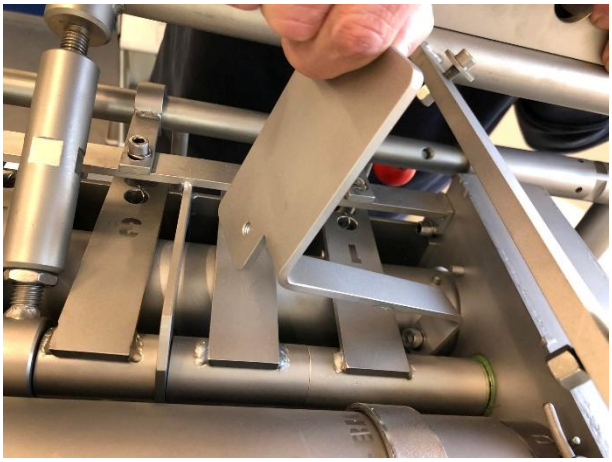


Fig. 8



Fig. 9

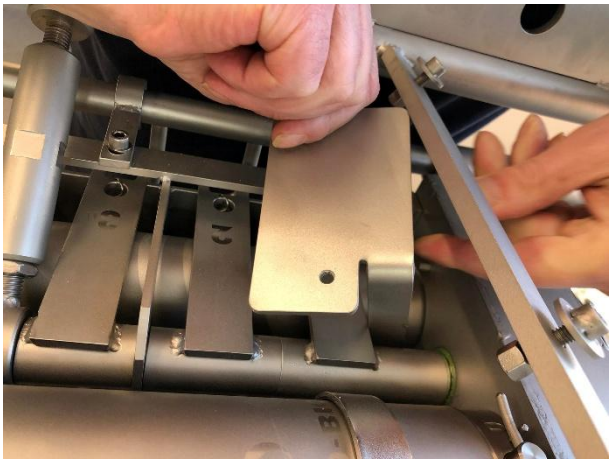


Fig. 10

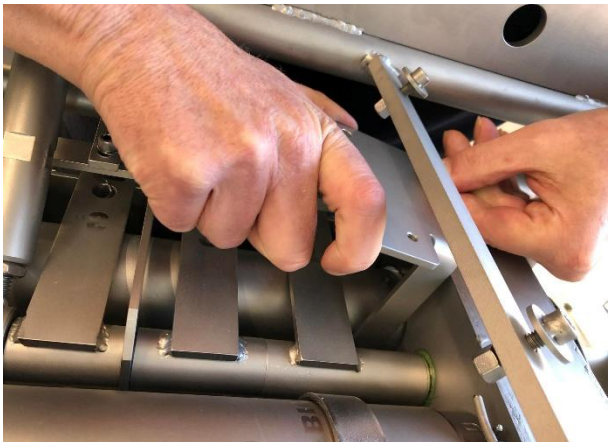


Fig. 11

MOUNTING TO MULTI WATER SAMPLER

MOUNTING THE SUPPORT PLATE FOR THE BATTERY PACK TO MWS 6 / 12 / 24

1. Make sure the motor unit is switched off.
2. Remove the standard battery pack A (fig. 13) and cable from the motor unit.
3. Place the support plate B onto the inner ring of the MWS acc. to fig 12 - 14 for MWS 6, MWS 12, MWS 24, respectively. Make sure the support plate is positioned between rack no. 2 and 3 for MWS 6, between rack no. 10 and 12 for MWS 12 and between rack no.23 and 1 for MWS 24.
4. Attach bow screws (C) to the corresponding bores in the support plate (fig. 15 / 16) and tighten the nuts evenly.

To mount the Battery Pack to the MWS place the Battery Pack over the support, the end with the screw pointing towards the threaded hole of the support (fig. 17). Press the button (D) and insert the arrestor pin into the keyhole-shaped opening of the rear support (E). Slide the Battery Pack forward until the screw (F) is aligned with the thread (G) on the support. Tighten screw F by hand, do not use tools!

Connect the cable to the motor unit and Battery Pack, make sure the pins are greased with a suitable pin lubricant.

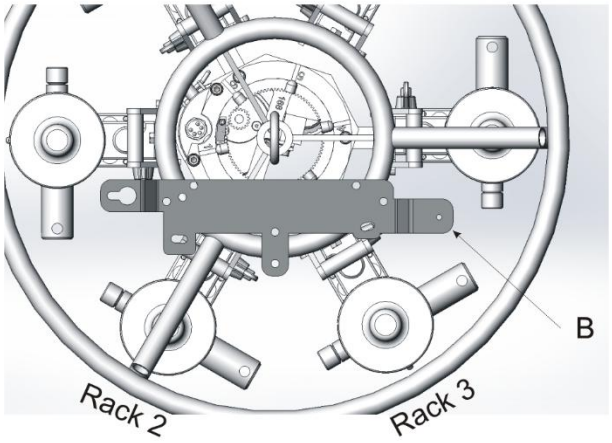


Fig. 12: MWS 6 top view

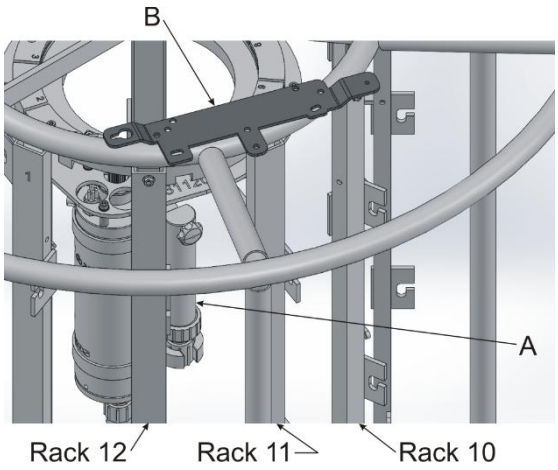


Fig.13: MWS 12 top view

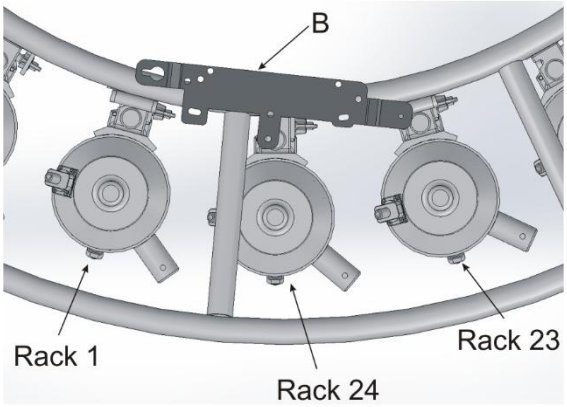


Fig.14: MWS 24 top view

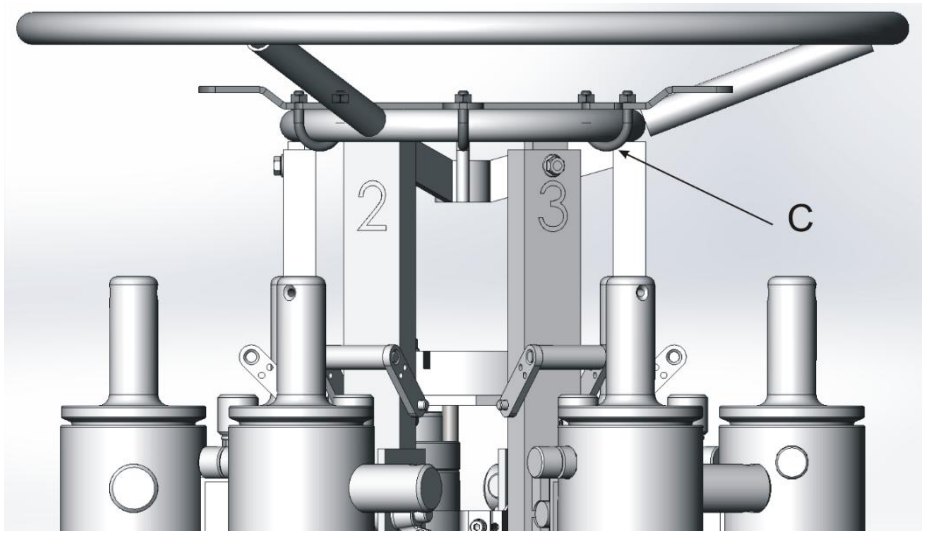


Fig. 15: MWS 6 side view

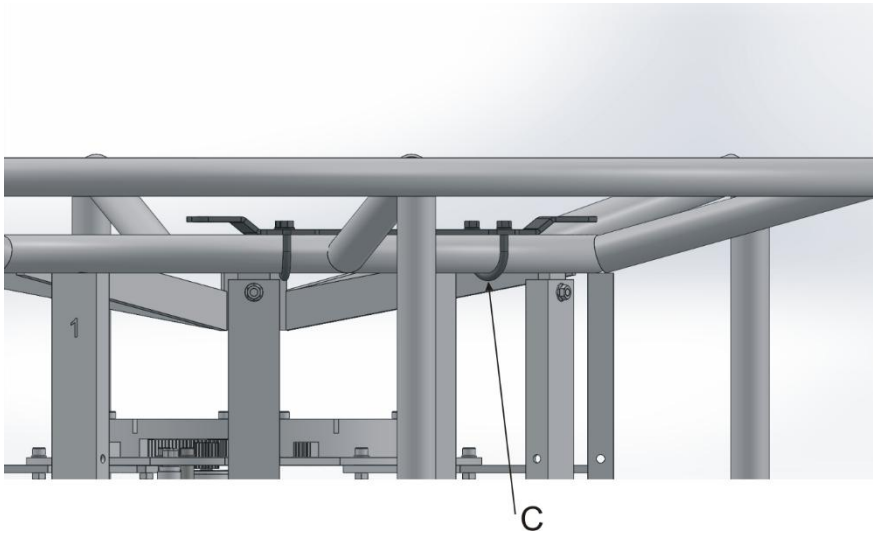


Fig. 16: MWS 12 / 24 side view

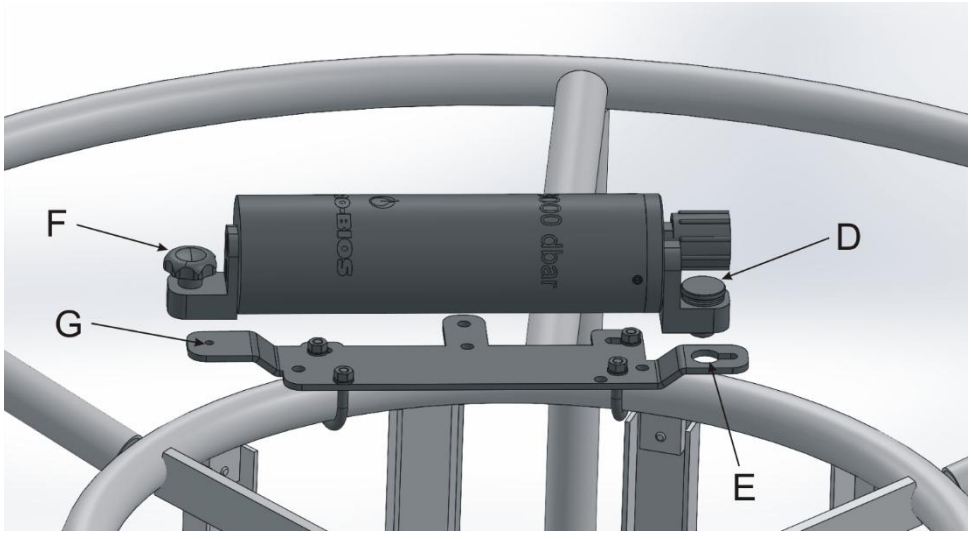
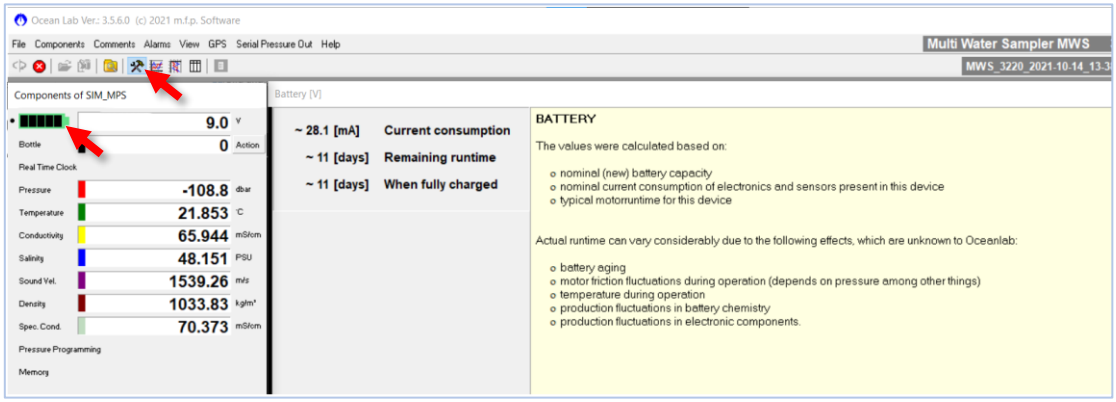


Fig. 17: mounting Battery Pack

USAGE

Do not use if Battery Pack, cable or connector show signs of damage.

1. Connect Battery Pack to motor unit of the device to be powered using SUBCONN adapter cable.
2. Turn on device.
3. If connected to PC OceanLab will show the state of charge of the Battery Pack when in online-mode.



   a. Click on “Controlling Mode” then on the battery symbol to get an estimation of the remaining run-time.

   b. Note that it may take up to thirty seconds for the battery charge state to be displayed.

4. When discharged the Battery Pack will turn off in order to protect against battery cell damage.

When fully discharged charge the Battery Pack at least partially as soon as possible to prevent accelerated battery ageing.

NOTES ON USAGE IN BELOW ZERO °C

LiFePO4 batteries perform well under extreme temperatures compared to other battery types. Still, like all batteries they do not like cold temperatures and show decreased performance or in extreme cases even suffer irreversible capacity loss or damage.

-5° C to +1° C

Useable capacity will reduce by around 10% typically. This is reversible, i.e. next use in warmer conditions will result in full capacity again.

State of charge estimation accuracy will be reduced by around 10% (skewing towards underestimation). Therefore leaving the Battery Pack on the cold deck for some time and then dropping it into relatively warm water could result in the state of charge as displayed in OceanLab increasing slightly after some minutes.

-30° C to -5° C

Avoid running high loads (e.g. motors) of devices powered by Battery Pack for more than a few seconds at these temperatures (i.e. on deck). Otherwise a protection function could be triggered resulting in a temporary power disconnect (reset of the device to be powered).

Keep times on deck as short as possible. The state of charge as displayed in OceanLab will be underestimated at these low temperatures.

Useable capacity will drop 30% or more. This is partially reversible. Since water will not get this cold, this is usually not a practical issue.

-40° C to -30°C

Avoid using the Battery Pack under these conditions as it may get damaged or suffer irreversible and severe capacity loss.

That being said the thermal capacity of the Battery Pack is relatively large and it should be possible to take the Battery Pack from a warm room and bring it on deck at these temperatures for a short amount of time and quickly dropping it into the (much warmer) water. This has not been tested however and is therefore not recommended.

CHARGING



Do not use if cables or charger show signs of damage.

1. Disconnect Battery Pack from the device it is powering.
2. Bring Battery Pack to a dry location with 5° to 40° C ambient temperature.
   Note: outside this temperature range device will charge very slowly (>12h) or not at all.
3. Secure charger and Battery Pack against falling and rolling.
4. Connect charger at the AC-side.
5. Connect charger at the SUBCONN side.
6. Blue state of charge LED indicates progress.
7. 0-80% charged:
   LED blinking several times per second.
   _|¯|_|¯|_|¯|_|¯|_|¯|_|¯|
8. 80-99% charged:
   LED blinking about once every second.
   _|¯|_____|¯|_____
9. fully charged:
   led is turned on continuously.
   |¯¯¯¯¯¯¯¯¯¯¯¯¯¯¯¯¯¯¯¯¯¯¯¯|
10. Unplug charger.

LONG TERM STORING

As with all rechargeable batteries the Battery Pack must be sufficiently charged if storing for extended periods of time.

1. Charge to at least 50%.
2. Disconnect charger[6].
3. Store.
4. Repeat after at most 12 months.

[6] Leaving the charger connected will not keep the battery charged over longer periods of time.

LOCALIZATION OF FAULTS

1. The device that is supposed to be powered by the Battery Pack does not turn on.
    - Battery Pack could be discharged. Charge for at least 15 min and re-connect.
    - Cable connections could be loose or disconnected.
2. Battery Pack does not charge.
    - Power LED is off:
        i. AC cable could be unplugged.
        ii. AC power could be unavailable (e.g. wall outlet defective).
        iii. Cable / charger could be defective.
    - Power LED is on but state of charge LED is off:
        i. SUBCONN could be disconnected.
        ii. Charging cable or Battery Pack could be defective.
        iii. Battery Pack temperature is outside charging temperature range.