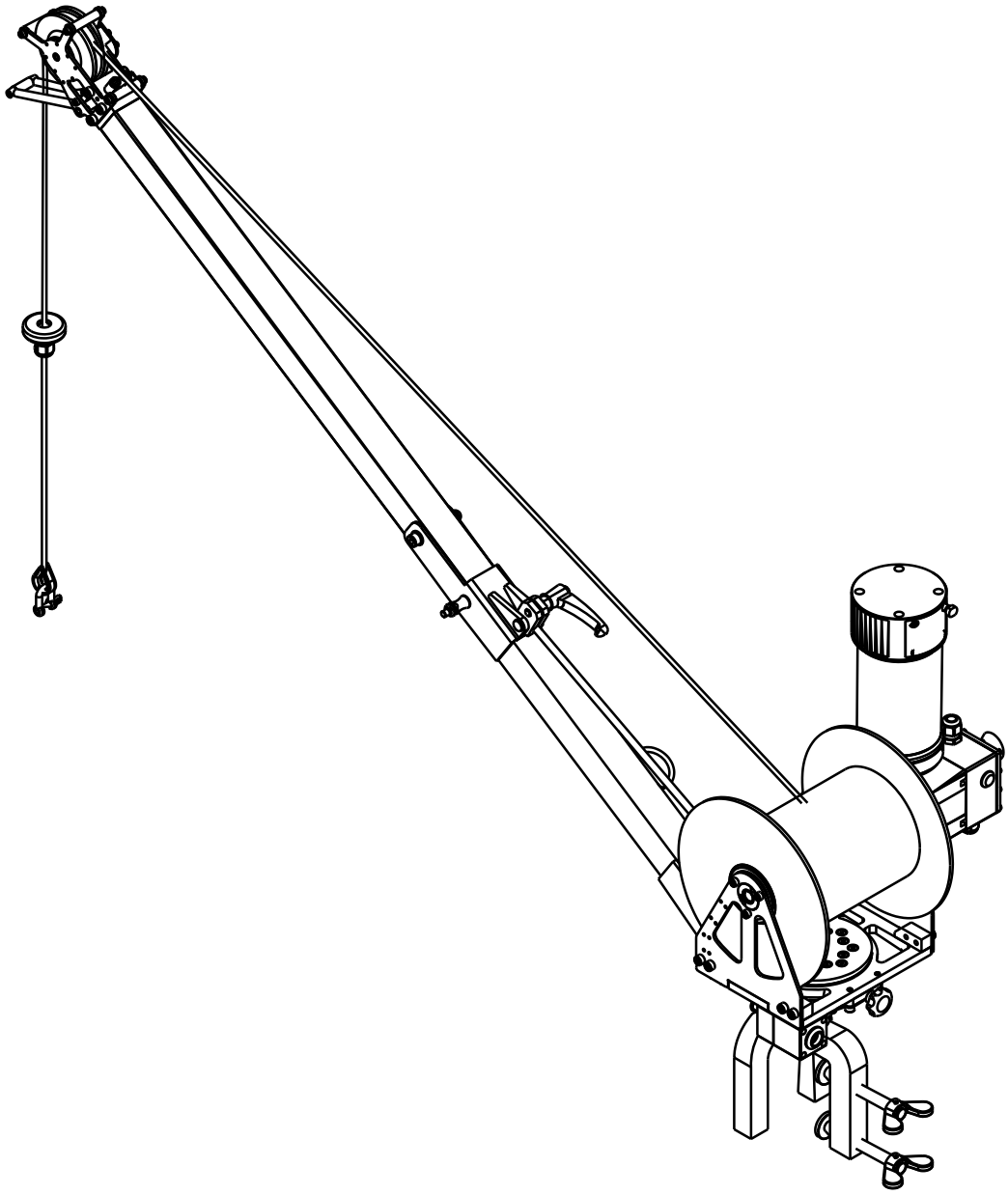


MOTOR WINCH 20 KG

OPERATION MANUAL

Product ID 440 105

Edition 09/26

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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 follow this 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

The Motor Winch 20 kg can be used for loads up to 20 kg. It is portable and also suitable for operation on small boats.

There are two different mounting bases for individual installation on board (boat clamp and screw-on plate). The winch is attached to the base with a collet and locked in place with an adjustable hand lever, making it easy to assemble or disassemble.

Additionally the winch has a slewing ring bearing that ensures it can be rotated easily. When a load is attached the slewing ring bearing provides a breaking force to prevent the boom from swinging uncontrollably. To completely prevent the winch from turning a break can be engaged with a star screw.

The control unit displays the length of deployed rope or cable and the current speed. It can be used to set a target speed for the winch. This makes it easy to exactly meet the schedule for e.g. a CTD profile or to hold the recommended speed of an Integrating Water Sampler IWS. The control unit has an intuitive menu navigation, a sunlight-readable and illuminated display and big tactile keys.

For winches equipped with electro-mechanical cable the core of the drum is fitted with a slip ring device which allows the online use of CTD probes or other electronic measuring instruments.

The drum capacity of the winch is rated to 300 meters of Dyneema rope or 150 meters of electro-mechanical multi conductor cable. Rope or cable must be ordered separately.

The winch is delivered with a 150 W electric motor with speed controller. For transport the motor is easily detached and re-attached to the winch by means of a bayonet fitting. It is splash water proof (IP65) and only needs a 12 V DC power supply with a 30 A or higher rating. A standard automotive battery is perfectly suitable.

STANDARD EQUIPMENT

1. 1 Winch body with boom
2. ___ m selected rope / wire length
3. 1 rope / wire termination
4. 1 Control unit
5. 1 Motor unit
6. 1 Screw-on plate
7. 1 Boat clamp
8. 1 Crank handle with securing nut
   (for emergency operation e.g. when battery is empty)
9. 1 Wire strain relief rope with snap hook
   (for emergency operation e.g. when battery is empty)
10. 1 Spare battery fuse 30 A
11. 1 Operation manual

TECHNICAL DATA

Winch:

Max. load:	20 kg
Min. load:	1 kg
Height of boom / length outboard:	1000 / 400 mm
Dimensions (theoretical box without boom):	360x270x160 mm
Dead weight:	17 kg
Material:	AISI 316, C45, POM
Max. length of rope:	150 m of 4.8 mm 5C-cable 200 m of 3.2 mm 2C-cable 300 m of 3 mm Dyneema rope
Storage temperature:	-20 ... 60° C
Operation temperature:	0 ... 40° C
Max operation altitude:	1000 m above mean sea level

Motor and gearbox:

Motor power rating:	150 W
Motor peak power:	260 W
Average motor current (when lifting max load):	20 A
Maximum motor torque:	11.4 Nm
Rated supply voltage:	12 V
Absolute maximum supply voltage:	14.6 V
Motor transmission ratio:	1:20
Planetary gearbox transmission ratio:	1:3
Rope speed:	2 … 40 cm/s [1]

Power Supply:

Battery type:	12 V Lead-acid AGM/Gel or LiFePO4 battery
Max battery voltage when fully charged:	14.6 V [2]
Min continuous current rating:	30 A
Min pulse current rating:	35 A for 1s

NOTICE



Only use supplied cables and connectors.

Only use with power sources specified under technical data. The winch is **not** suitable for use with electronic power supplies or DC/DC converters.

[1] Speed will be limited by the controller:

a) As a safety feature if the internal temperature exceeds 70° C. See section CONTROL UNIT on page 15 for details.

b) As a feature at low battery voltages (<11 V, blinking battery icon) to ensure the load can be lifted all the way up with the remaining charge.

[2] In particular some LiFePO4 batteries could have a higher voltage rating (often labelled as max charge voltage). Observe this when sourcing a battery.

SAFETY

This product has been designed to ensure safe and reliable operation. To avoid damage and accidents, the following must be observed:

⚠ CAUTION

Do not make any modifications to the winch.



Inspect the winch for damage, missing parts or loose fasteners before each use. Do not operate when any of the above was found.

Observe the winch at all times while it is moving. Stop if anyone comes near any moving parts or the rope becomes tangled.

Never exceed the maximum load rating.

Properly secure the payload before operation.

Avoid uneven windings. This can lead to sudden slippage or excessive torque (if the windings are not evenly distributed around the drum).

When a load is attached no one must be standing beneath the winch.

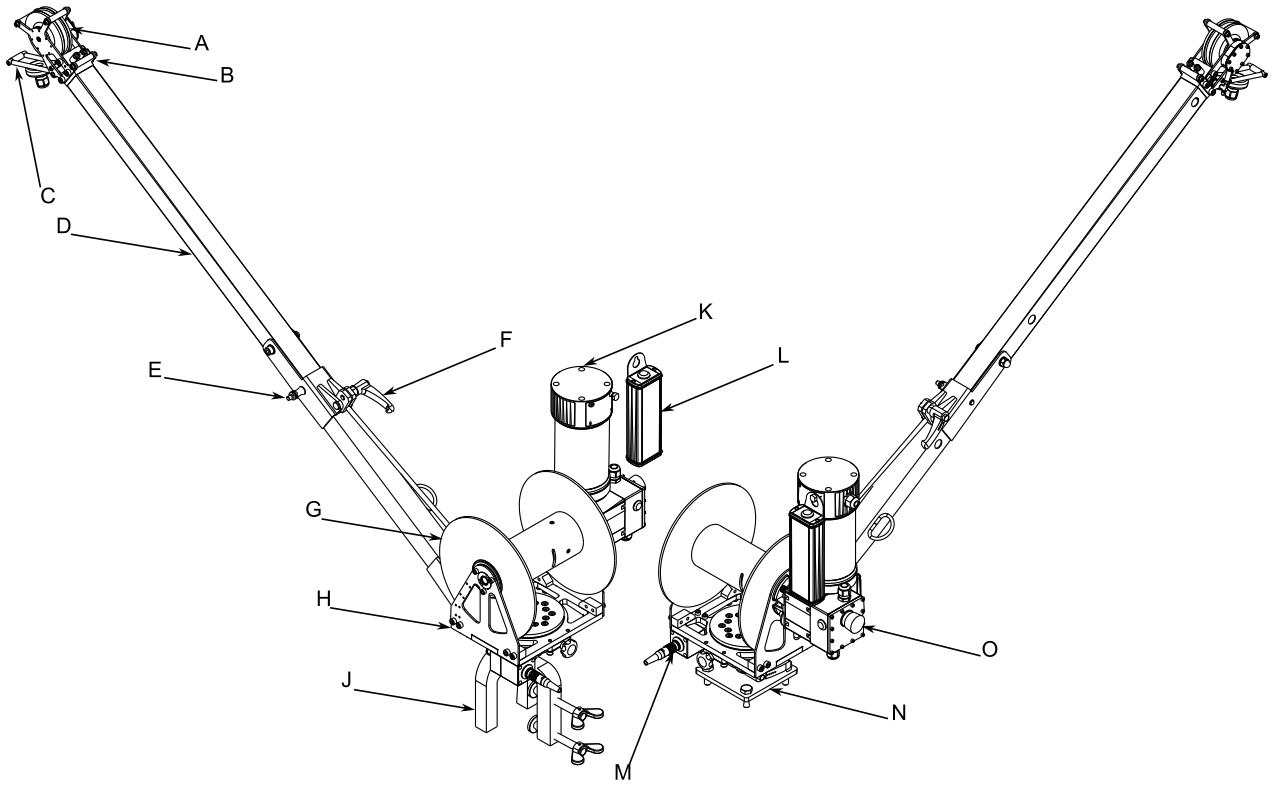
Stay clear of any moving parts as soon as the winch is connected to the power supply.

Avoid side loads on the winch when there are currents.

Know the location of the emergency stop and how to operate it quickly.

Report any malfunction to HYDRO-BIOS.

COMPONENTS

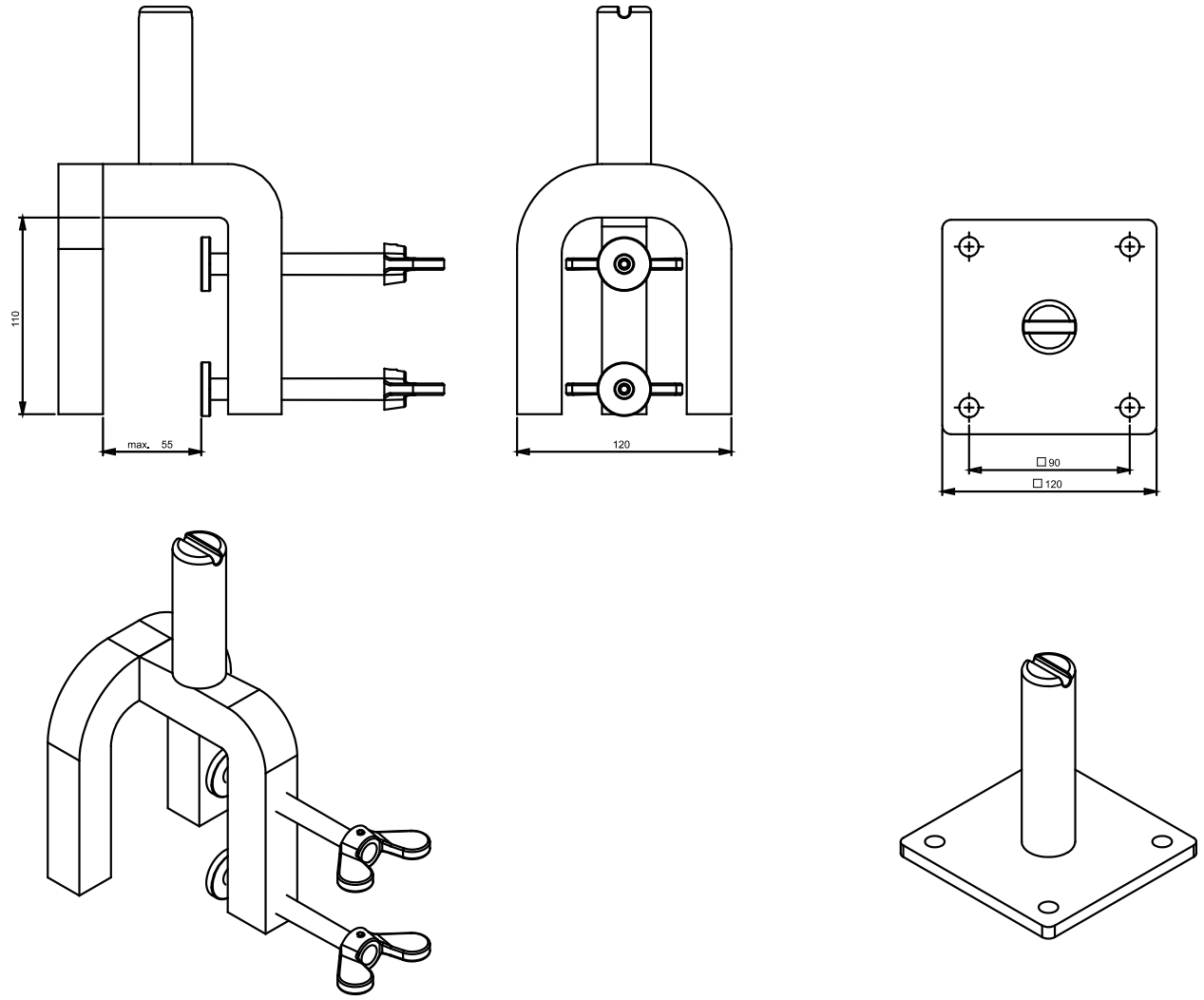


A.	pulley	H.	winch body
B.	cable guide	J.	boat clamp
C.	limit switch	K.	motor
D.	boom	L.	control unit
E.	joint interlock	M.	slip ring connector (for cables only)
F.	angle interlock	N.	screw-on plate
G.	drum flange	O.	emergency stop button

BOAT CLAMP / SCREW-ON PLATE

The provided **boat clamp** can be used for all purposes with a **load of up to 10 kg**. The boat clamp has a maximum width of 55 mm.

For loads from **10 kg to 20 kg** the **screw-on plate** must be used.



All dimensions in mm

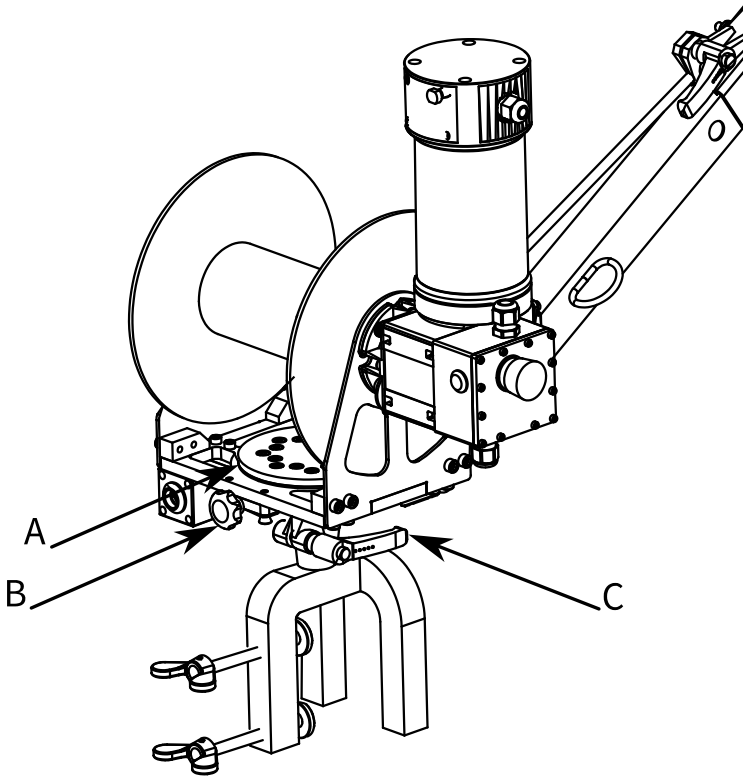
ROTARY INTERLOCK

To install place the winch onto the selected base and rotate it until the pin clicks into the slot and the base plate can no longer be rotated. To secure it tighten the adjustable hand lever (C).

CAUTION

Do not lift the winch while the motor is fitted!

The winch has a slewing ring bearing (A) that ensures it can be turned easily. When a load is attached the slewing ring bearing provides a breaking force to prevent the boom from swinging uncontrollably. To completely prevent the winch from turning there is a break (B) in addition that can be engaged with the star screw. Hand tighten ONLY, do not use any tools.



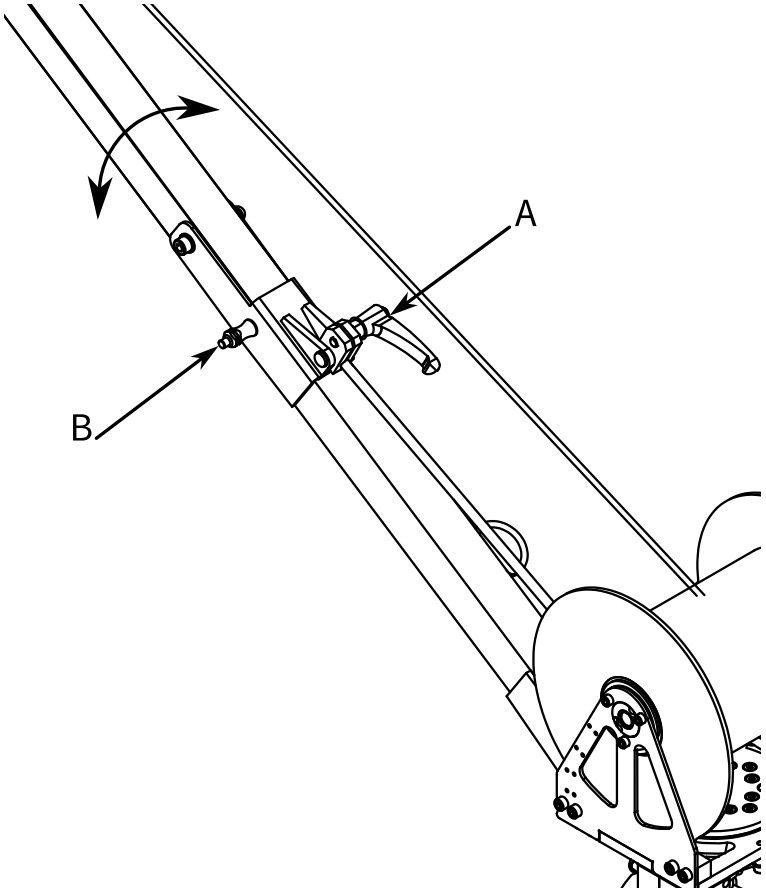
BOOM

The angle of the boom can be adjusted using a clamping mechanism.

To adjust the angle release the angle interlock (A). Hold the boom steady with one hand to prevent it from falling. The entire boom can then be moved up or down.

CAUTION

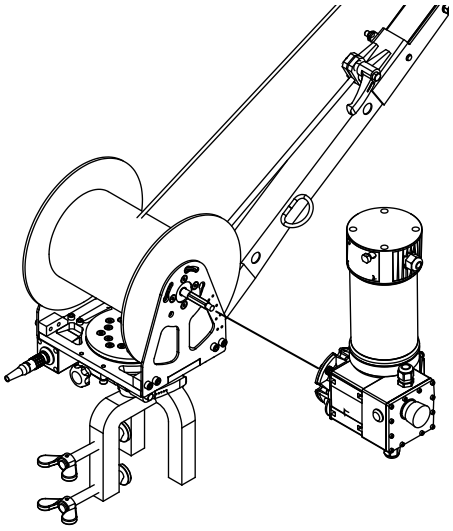
The adjustment must be done without a suspended load.

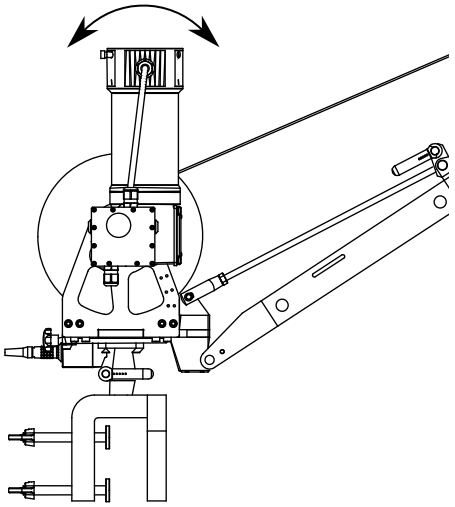


To fold the boom for transport press the button (B) of the safety pin and pull it out.

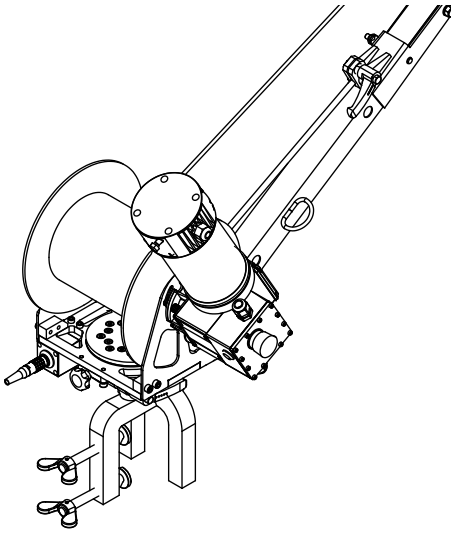
MOUNTING THE MOTOR UNIT

1. Dismount crank handle if mounted (page 15).
2. Slip the motor onto the main axle and turn it to find the position where it slides on completely.





3. Tilt the motor backwards approx. 30° while moderately pushing the motor against the winch body. The pins should now slide into their openings at the side of the winch body.



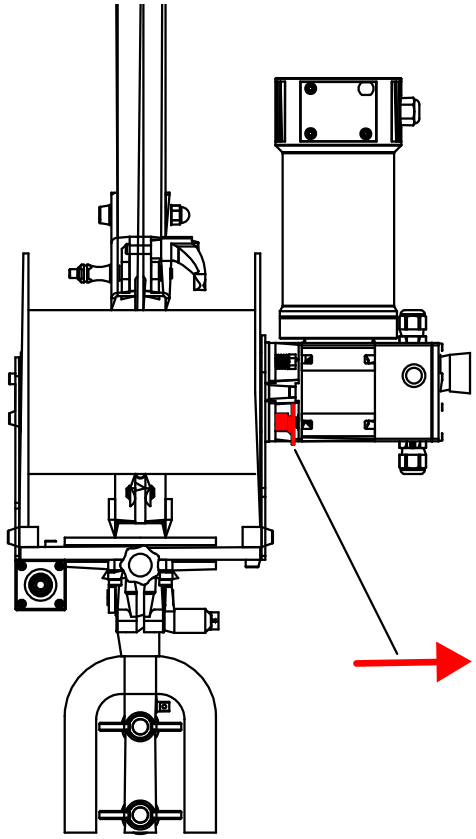
4. Turn the motor forwards clockwise into the upright position until it locks in.
5. The motor can now be connected to the counter cable at the pulley, to the control unit and to the 12 V power supply.

DISMOUNTING THE MOTOR UNIT

To release the interlock the red locking button is pulled away from the drum. The motor can now be tilted away from the boom (counter-clockwise) and be slid off the main axle.

CAUTION

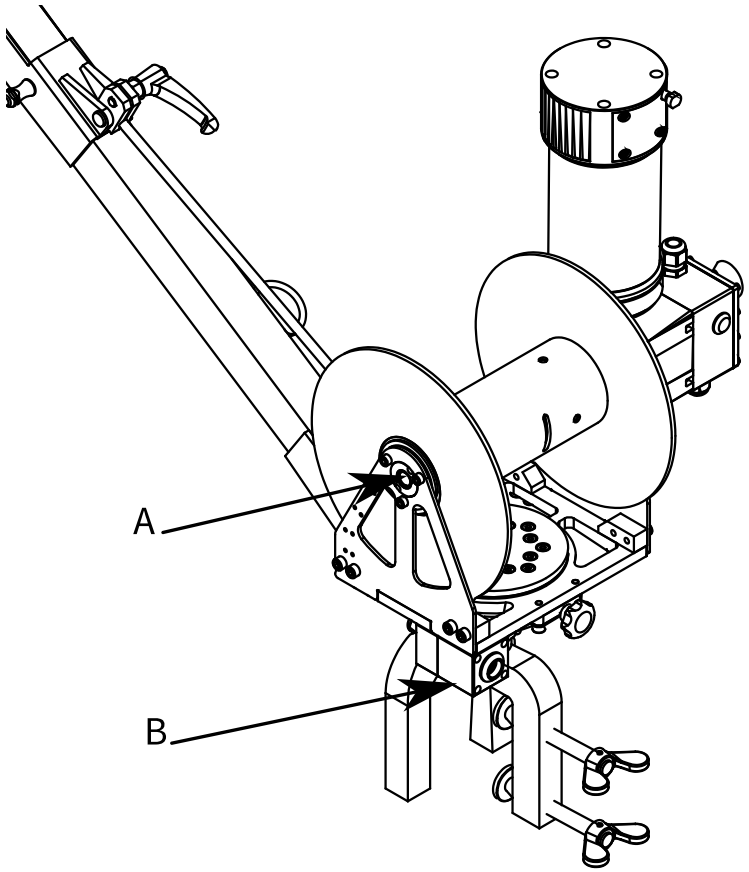
Dismounting the motor unit must be done without a suspended load.



SLIP RING (WINCHES WITH ELECTRO-MECHANICAL CABLE ONLY)

The connector for the slip ring is located at the bottom left corner of the winch body (standard: 5-pin conductor Lemo).

The slip ring is maintenance free.



A. slip ring integrated into the core of the drum

B. 5-pin Lemo conductor

EMERGENCY STOP BUTTON

Normally the winch will stop quickly when all control unit buttons are released, an end position is reached or a fault is detected. However, an electrical or mechanical defect as well as usage mistakes (somebody sits down on the remote) could potentially lead to the motor turning out of control – in this case:

- **Press the emergency stop button to cut power completely.**
- Remove battery cables immediately to avoid anyone resetting the emergency stop button while the device is still defective.
- Contact HYDRO-BIOS for advice.

The Emergency Stop button will disconnect the battery and stop any active movement immediately.

NOTICE



Be aware that when loaded near the maximum load (>15 kg) the winch can under some circumstances very slowly unwind after the emergency stop has been pressed. This unwinding will be slower than 5 cm/s and usually stop passively after a few seconds.

When the emergency stop button is pressed accidentally (e.g. during handling or transport) the winch will not power on. The button can be reset by twisting counter-clockwise as indicated on the button.

CONNECTING / DISCONNECTING THE BATTERY

CAUTION



Never attach a load to the winch without the battery being connected.

The battery cable, which is permanently fitted to the motor, has two quick-release battery clamps. To connect the clamps to the battery the clamp must be open. If not, hold the clamp on the cable side and push the red resp. blue plastic cover away from the cable. Place the round metal opening over the battery pin and press the cover down towards the cable. Make sure that the red plastic cover is on the positive pin and the blue plastic cover is on the negative pin of the battery.

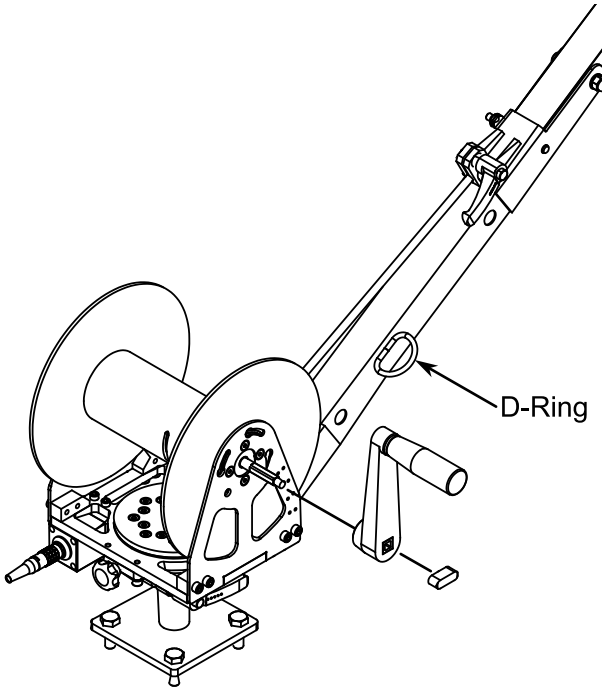
To disconnect the battery pull the plastic covers upwards and completely remove the clamps from the pins.

The battery cable has to be disconnected from the power supply:

- after pressing the emergency stop button
- before adjustment of the boom
- before removing the motor
- before dismounting the winch

EMERGENCY CRANK HANDLE

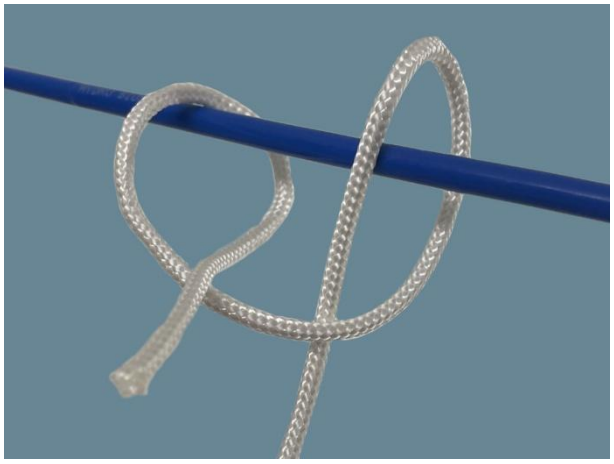
To mount and dismount the crank handle the associated wing nut must be unscrewed. The crank handle can now be pulled off to the side.



REPLACING THE MOTOR UNIT WITH THE CRANK HANDLE IN AN EMERGENCY

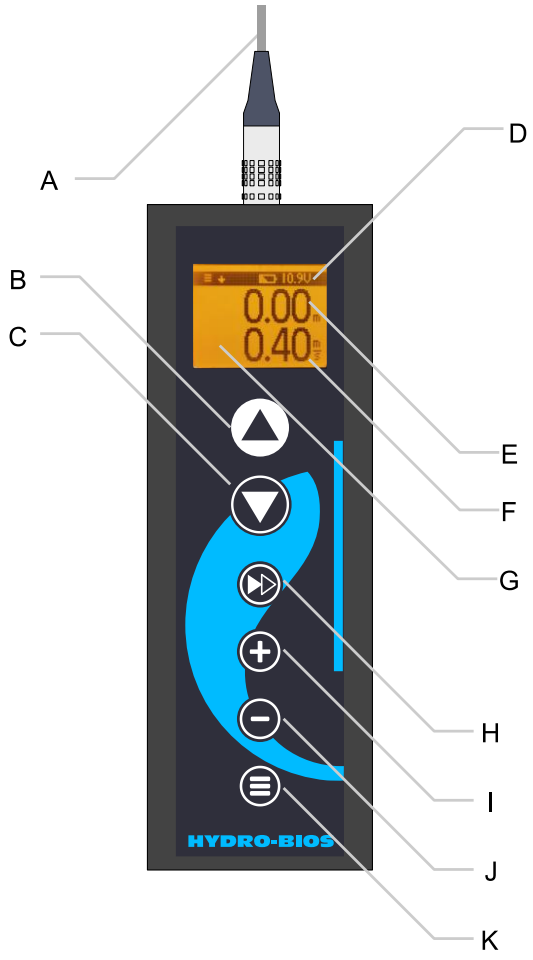
If the winch has been lowered and the battery is flat or the motor unit should be faulty, the winch cable must be unloaded before the motor unit can be removed.

1. Secure the open end of the supplied rope (with loop and snap hook) as close as possible to the pulley at the cable using a webbing knot (see pictures below).
2. Pull the loop with one hand and clip the snap hook into the D-Ring.
3. Remove the motor unit as described in DISMOUNTING THE MOTOR UNIT on page 13.
4. Fit the crank handle.
5. Turn the crank handle to wind the cable up until the rope becomes slack.
6. Hold the crank handle firmly, untie the knot from the rope.





CONTROL UNIT



A. motor connector cable
B. up (heave load)
C. down (lower load)
D. battery /supply voltage indicator
E. current rope length paid out
F. current speed (when moving) / speed setpoint (when stopped)
G. status icons are displayed here:
   end switch triggered
   end of rope
   speed reduced because motor hot[3]
   max speed enabled
H. toggle max speed on/off
I. increase speed setpoint
J. decrease speed setpoint
K. enter menu (short press) / power down (press for 3s)

MENU (SETTINGS)

Press the menu button (K) to cycle through the following settings:

1. set the zero position (e.g. water surface)
2. display contrast and brightness
3. rope / cable diameter
   This value is factory set and should not be changed under normal circumstances.
4. total cable length
   This value is factory set and should not be changed under normal circumstances.
5. language selection

Leave the menu by repeatedly pressing the menu button until back at the home screen. Alternatively, pressing the Up or Down button (B, C) while in the menu will automatically switch back to the main screen.

[3] The top speed will be reduced while this icon is active. Under normal circumstances this protection function would only trigger when lifting weights near 20 kg for an extended period of time while ambient temperature is near or above 40° C. If this icon is shown under other conditions, this may indicate a defect.

ERROR SCREENS

See chapter LOCALIZATION OF FAULTS.

LIMIT SWITCH

NOTICE

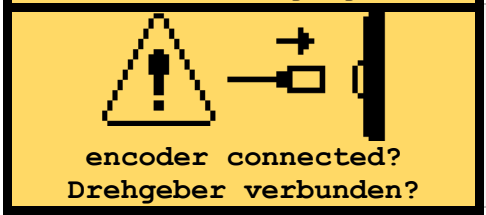
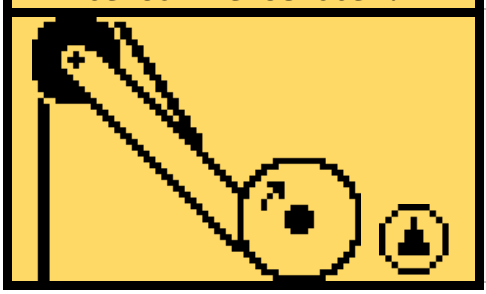
The abrupt emergency stop of the motor creates great mechanical stress on the gearbox. The limit switch is a safety function only! To increase the life of the gearbox it must not be used as an end stop in normal use.

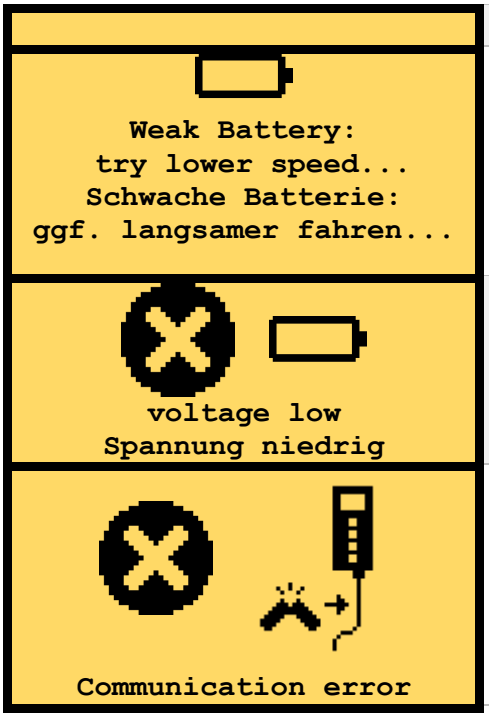
LOCALIZATION OF FAULTS

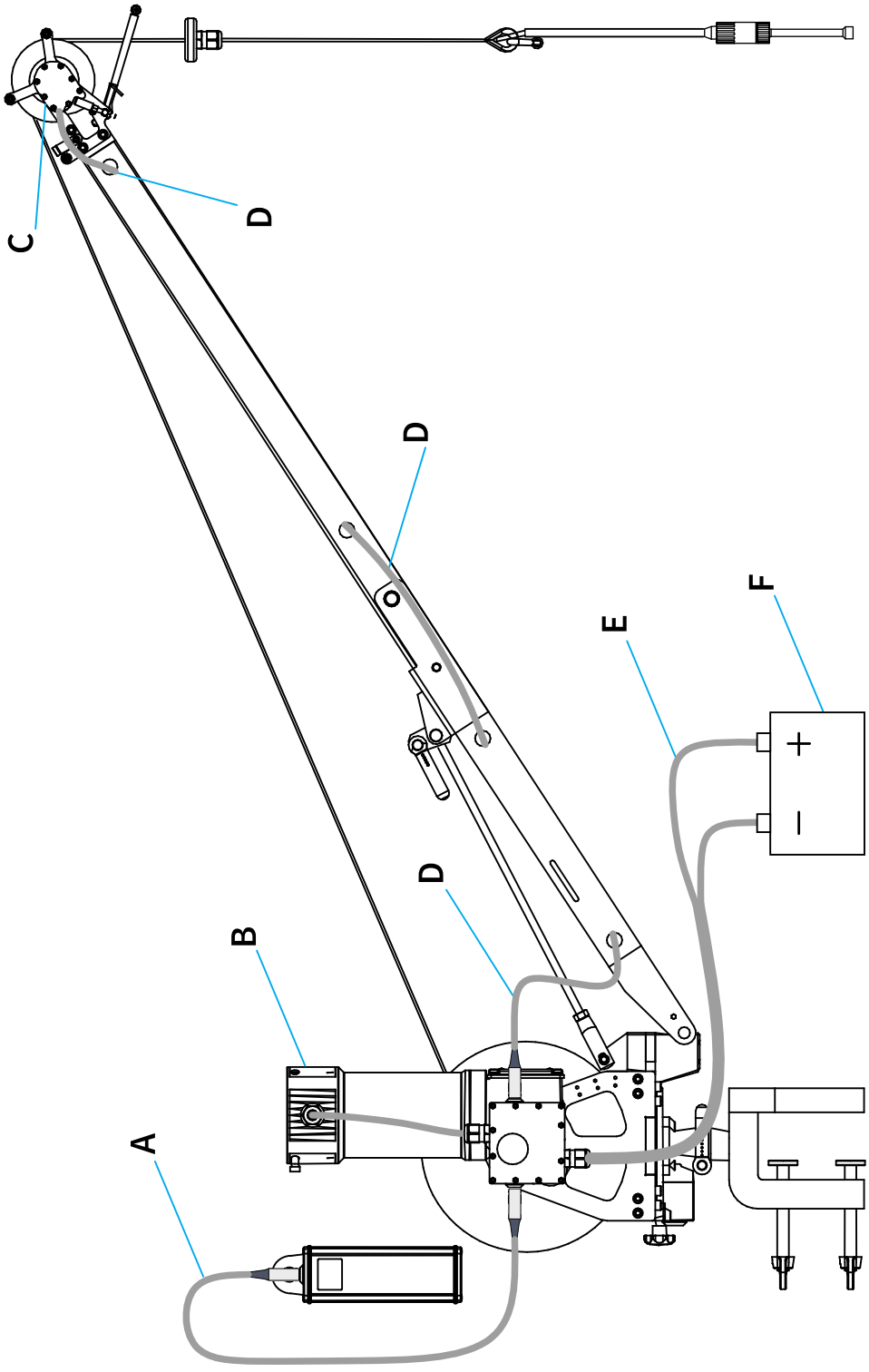
NO DISPLAY IN THE CONTROL UNIT

- Check if the **emergency stop button** was accidentally pressed.
  If pressed, reset it by twisting only after making sure it was not pressed on purpose due to a defect.
- Make sure the cable from the control unit to the motor is properly connected and undamaged.
- Make sure the battery is properly connected.
- Make sure the battery is charged (only a deeply discharged battery < 6 V would lead to no display – so the other causes above are more likely)
- Check the automotive fuse (Littelfuse 0895030.U) in the battery cable. The fuse is located in the last few centimeters of the battery cable before the clamps. If it is blown, replace with a spare only after identifying why it has blown.

ERROR SCREENS

screen	explanation	likely cause
	Too much torque is put on the motor.	max load exceeded? rope blocked? mechanical friction? damage?
	Encoder wheel detects no movement even though motor is running.	encoder wheel (pulley)
	Motor control cannot communicate with the encoder wheel electronics.	encoder disconnected? encoder cable damaged? encoder damaged?
	Encoder cannot detect the rotary magnet in the encoder wheel hub which it needs for detecting rotation.	Encoder unit not mounted properly or damaged? End switch not mounted properly?
	The encoder is not turning in the same direction as the motor.	You've reached the end of the rope/cable and it is now starting to roll up in the wrong direction. **Press up to wind in the right direction.**

	The battery voltage drops too much under load.	The battery / power source cannot deliver sufficient power. Replace with a stronger battery. As a temporary solution try lowering the speed.
	Voltage is too low for operation.	Charge the battery.
	Cannot communicate with motor controller.	cable broken? electrical interference from other machines?



A. control unit cable
B. motor
C. encoder
D. encoder cable to motor
E. main cable
F. battery

Fig. 1: connection overview

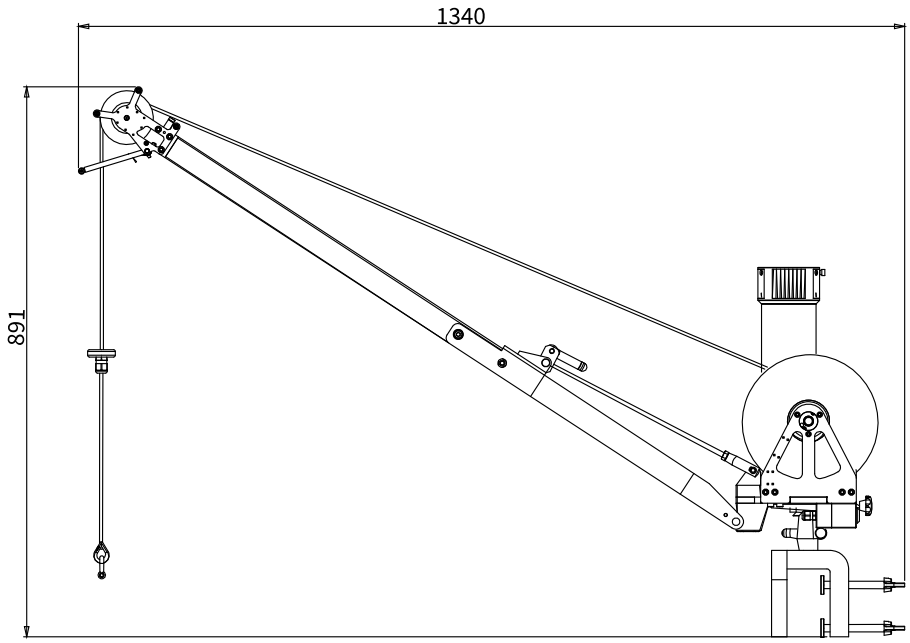


Fig. 3: dimensions, from the side, largest working radius

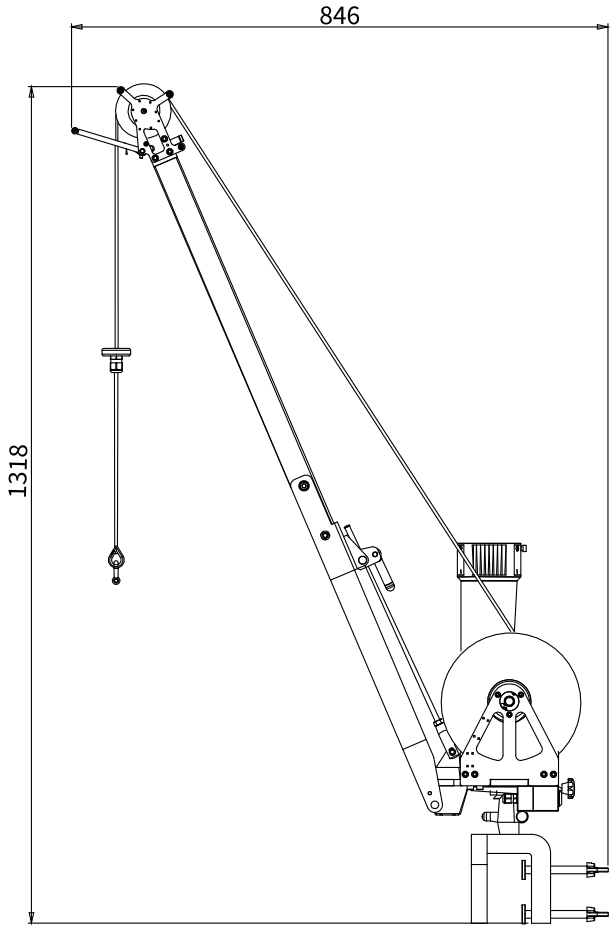


Fig. 2: dimensions, from the side, smallest working radius

All dimensions in mm

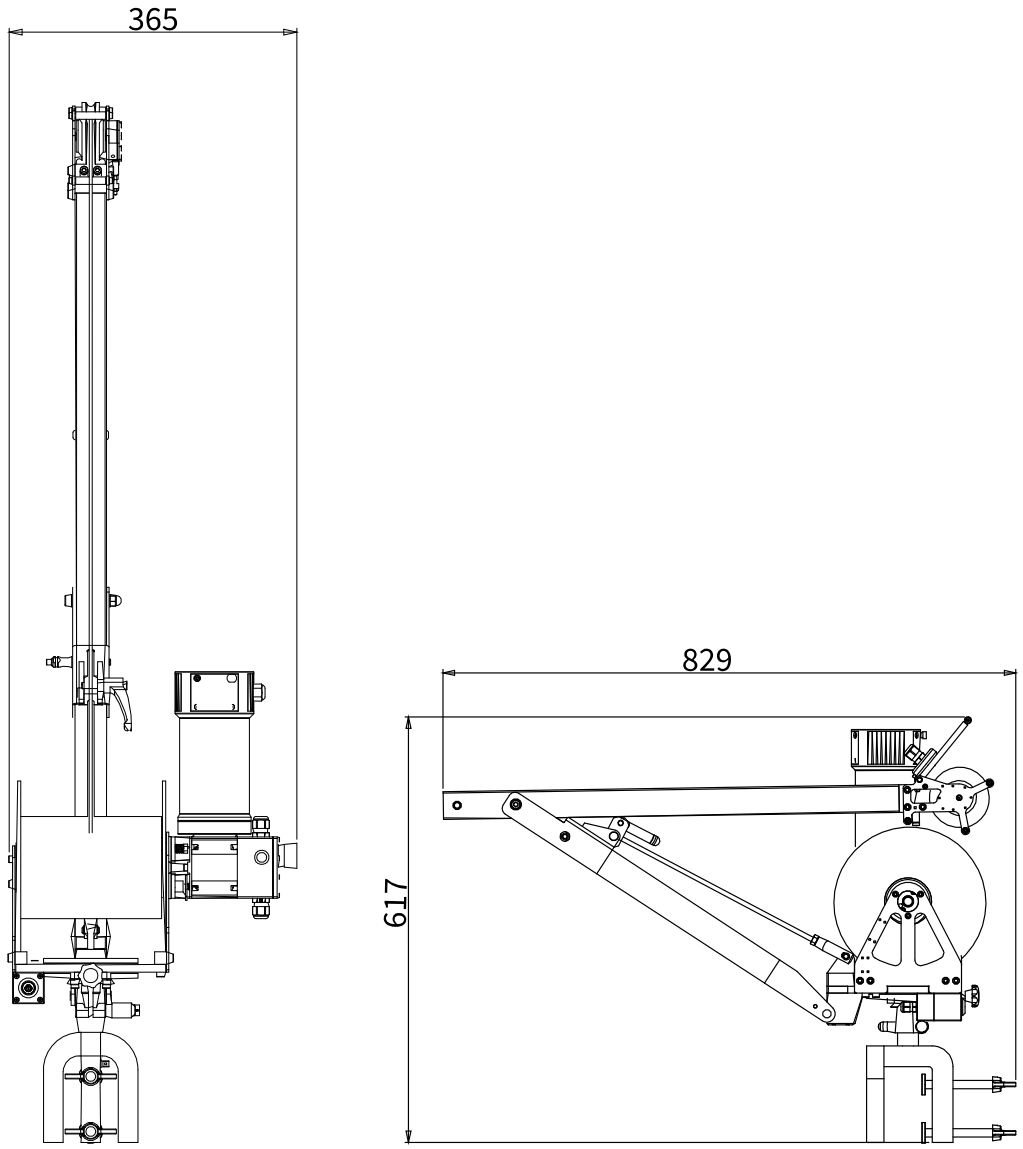


Fig. 4: dimensions, backside and folded up

All dimensions in mm