

MANUAL

939



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Important

Read the manual carefully before using the cycle and save it for future use.

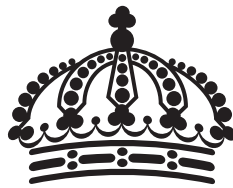
Monark Exercise AB

Monark has 100 years' experience of bicycle production.

The Monark tradition has yielded know-how, experience, and a real feel for the product and quality. Since the early 1900s, Monark's cycles have been living proof of precision, reliability, strength and service. Those are the reasons why we are now the world leader in cycle ergometers and the market leader in Scandinavia in transport cycles.

We manufacture, develop and market ergometers and exercise bikes, transport bikes and specialized bicycles. Our largest customer groups are within health care, sports medicine, public authorities, industry and postal services.

For more information: <https://monarksportsmed.com/>



MONARK EXERCISE

FOR LIFE AND PERFORMANCE

Product Information

Congratulations on your new ergometer!

Monark 939 is an electronically controlled medical and diagnostic cycle ergometer intended for clinical diagnostics, advanced aerobic testing, submaximal and maximal testing, occupational health and rehabilitation in professional environments.

The ergometer uses Monark's Electronic Pendulum System (EPS). Braking force is generated via a brake belt around the flywheel and controlled electronically. Workload is adjusted from the Novo Duo display, or from compatible external systems when connected.

The 939 can be used in two workload modes:

- **WATT** – constant power mode. The ergometer adjusts the braking force to maintain the selected power output regardless of cadence.
- **KP** – constant force mode. The ergometer maintains a fixed braking force. The power output changes according to cadence.

The Novo Duo display shows RPM, heart rate when an ANT+ chest belt is used, time, speed, distance, KP and WATT.

The 939 supports wired connection via RS232 and USB-B and wireless communication via BLE (FTMS) and ANT+ (FE-C).

Each 939 is calibrated at the factory. This means that you can begin to use the ergometer directly after assembly. If the user wishes to verify the scale or perform calibration, please read the instruction for "Calibration" in this manual.

Technical data power adaptor

Input voltage: 100–240 V AC; 50–60 Hz; 1.4–0.7 A

Output voltage: 12 V DC; 5.0 A

Polarity: + in the middle, see Fig: Polarity.



Fig: Polarity

Facts

- Electronic Pendulum System (EPS), easy to calibrate and verify
- Large, well-balanced flywheel 20 kg (44.1 lbs)
- Monark upright frame
- Adjustable saddle and handlebar
- Low step-through for easy access
- Novo Duo monochrome touchscreen display
- Connectivity via RS232, USB-B, BLE (FTMS) and ANT+ (FE-C)
- Designed for clinical diagnostics, CPET/ ECG integration, occupational health and rehabilitation

Width

520 mm (20 in)

Length

1240 mm (49 in)

Height

1100 mm (43 in) at handlebar

Recommended user height: >150 cm (>59 in)

Weight

64 kg (141 lbs)

Max user weight: 180 kg (397 lbs)

Serial number

The serial number is placed on the frame according to *Fig: Serial number*.

Always state the serial number when contacting Monark Exercise or your dealer regarding service, spare parts or support.



Fig: Serial number

NOTE!

Use of the product may involve considerable physical stress. It is therefore recommended that people who are not accustomed to cardiovascular exercise or who do not feel completely healthy, should consult a physician for advice.

Installation of Support Legs

When the cycle is delivered, the support legs must be installed before use. The cycle is equipped with one front support leg and one rear support leg.

See Fig: Overview support legs

Front support leg

The front support leg is installed using two pre-mounted M8×25 carriage bolts and two M8 flange lock nuts. These are already installed on the ergometer and NOT in the bag attached.

Position the support leg over the carriage bolts and tighten the flange lock nuts from underneath.

The square neck of the carriage bolts locks into the frame, so no counter-holding is required from above.

See Fig: Front support legs

Rear support leg

The rear support leg is installed using two M8×25 carriage bolts and two M8 flange lock nuts supplied loose in the accessory bag.

Insert the carriage bolts from the top through the frame and the support leg, then install the flange lock nuts from underneath.

Tighten securely until the support leg is firmly fixed to the frame. See Fig: Rear support legs

Tools

A 13 mm spanner or socket wrench is recommended for tightening the flange lock nuts, as it provides proper control and correct tightening torque.

After installation, ensure that both support legs are securely mounted and that the cycle stands stable on a level surface.



Fig: Overview support legs

- 1) Front support leg
- 2) Rear support leg



Fig: Front support legs

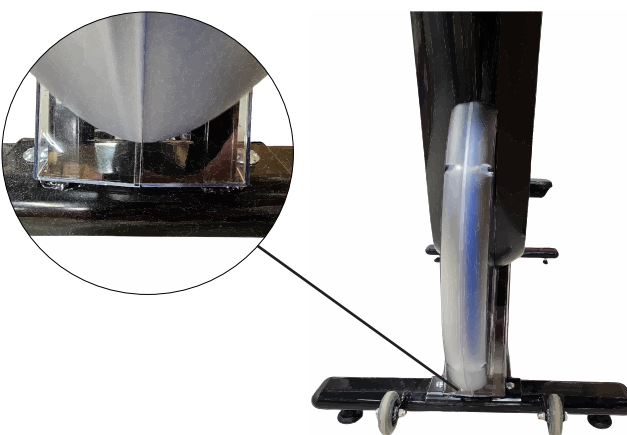
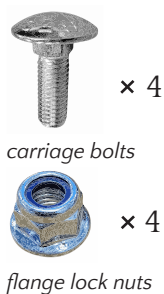


Fig: Rear support legs



Operating Instruction

Workload adjustment

The workload is controlled electronically by the Electronic Pendulum System (EPS).

Workload is adjusted from the Novo Duo display by increasing or decreasing the selected value.

See Fig: *Workload adjustment*

The ergometer can be used in WATT mode or KP mode.

In WATT mode, the ergometer maintains a selected power output. If cadence changes, the braking force is adjusted automatically.

In KP mode, the ergometer maintains a fixed braking force. The power output will then change according to cadence.

Power measurement

The ergometer is designed to measure power at the flywheel, which is the reference used in established test protocols (for example Åstrand submaximal tests).

The Novo Duo display calculates power (WATT) from the controlled braking force and the measured pedalling rate (RPM).

In KP mode, when RPM changes at a fixed kp, the displayed watt value changes accordingly.

Cycle adjustments

Seat height should be adjusted to a comfortable position. The appropriate height is to have the knee slightly bent when the sole of the foot is centred over the pedal axle with the pedal in the bottom position. To adjust the seat height loosen the handle on the seat tube.

See Fig: *Adjustments (1)*

The handlebar setting should be in a comfortable position when cycling. During longer exercise sessions it is recommended to occasionally change handlebar position. To adjust the handlebar, loosen the quick release handle (2).

See Fig: *Handlebar adjustments*.



Fig: *Workload adjustment*

1. decrease workload
2. increase workload



Fig: *Handlebar adjustments*

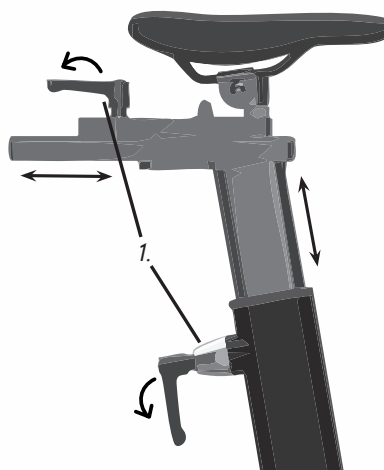


Fig: *Adjustments*

1. Locking handle, saddle

Validation

The following procedure ensures that the bike works for daily use.

- Check the HR function if you use a chest belt.
- Check that the workload changes when adjusted from the display.
- Test by pedalling and check that a reasonable RPM is obtained.
- Feel if the pedals move smoothly. Listen for unusual sounds. Adjust if necessary.
- Adjust the handlebar and saddle and make sure they are securely attached and that the adjustment is working properly.
- Make sure the support legs are in position by rocking the bike. Tighten if necessary.
- Check that the power adaptor is connected correctly and that the display starts normally.

If something unusual is found during the daily inspection that you cannot resolve, please call customer service.

Connection to external platforms

Monark 939 can transmit training and test data to external devices and software platforms.

USB-B: Wired connection for compatible external systems.

RS232: Wired connection for compatible diagnostic and external control systems.

BLE (FTMS): Wireless communication for training and test data.

ANT+ (FE-C): Wireless communication for compatible external devices and systems.

Heart rate: Receives HR data from compatible ANT+ chest belts.

Pairing is initiated from the external device or app by searching for the ergometer and selecting it in the device list.

The 939 can be used as a standalone ergometer or together with compatible external systems for diagnostic testing, data transfer and workload control.

NOTE!

Only use cables and external equipment that are compatible with the ergometer. Incorrect connection or unsuitable equipment may affect communication or damage the equipment.

When using wired communication, use one wired connection method at a time.

Meter instructions

Novo Duo display

The ergometer is equipped with a Monark Novo Duo display. See Fig: Display.

The display shows real-time data, including:

- **RPM** – Pedal revolutions per minute
- **TIME** – Time: HH:MM:SS
- **SPEED** – Km/h
- **DISTANCE** – Km
- **KP / WATT** – Workload / Power
- **ENERGY** – kCal (See Section “Calories”)
- **HR** – Heart rate when a chest belt is connected

▶ **START**

■ **STOP**

|| **PAUSE**

⚙ **SETTINGS**

< **BACK**

📶 **ANT+ (FE-C)**

📶 **BLE (FTMS)**

To start the display, press the On/Off button on the right side of the bike. When the display is on:

Start a session by pressing “start”

Pause by pressing “pause”

Reset the current session by pressing “stop”

The timer starts automatically when the pedals are moved.

Display view

The Novo Duo has several viewing modes. To change which data fields are shown, swipe with your finger to the right or left on the touchscreen. See Fig: Display views (View 1–4).

NOTE!

Do not expose the electronic display to direct sunlight or extremely high temperatures.
Do not use solvents when cleaning, only a dry cloth.

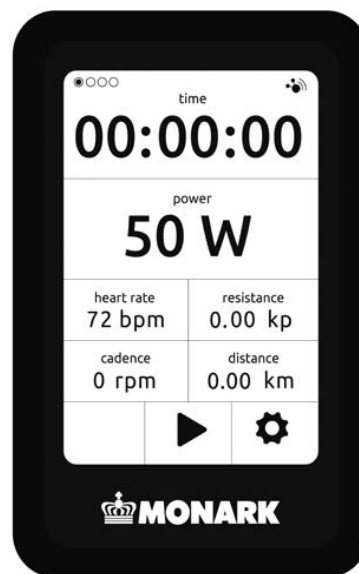


Fig: Display

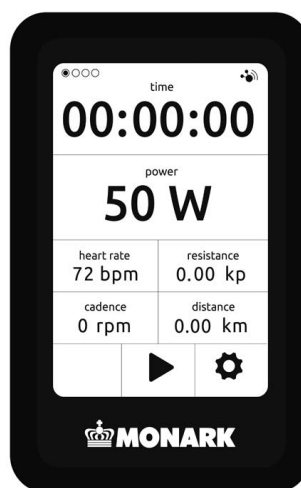


Fig: view 1

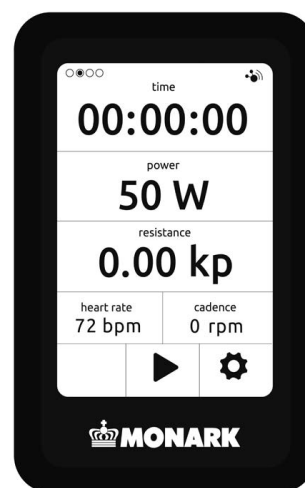


Fig: view 2

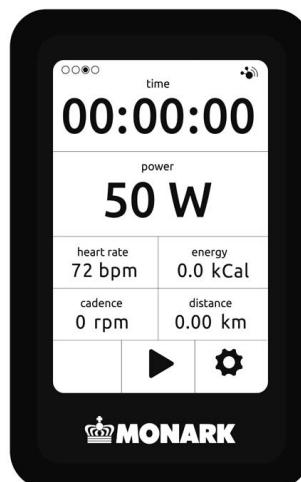


Fig: view 3

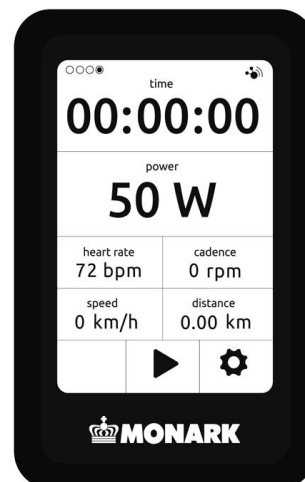


Fig: view 4

ANT+/BLE

When the display is connected to an external device, the ANT+ / BLE symbol is displayed in the upper right corner. See Fig: Ant+ and BLE

Change units

It is possible to switch between kP and watt. You do this by going to “Settings” and selecting Kilopond or Watt as “primary unit”.

See Fig: Change Units

Sleep mode

After ten minutes of inactivity, the display goes into sleep mode. To restart the display, press on the screen or start pedalling.

Calories

The energy cost of exercise on the ergometer is usually expressed in kilocalories (kcal) or kilojoules (kJ).

For Monark calibrated ergometers, a standard relationship often used for interpreting aerobic work is: 1 minute at 100 W $\approx$ 7 kcal.

This can be used as a guideline when converting measured power (W) and time (TIME) from the ergometer, or from external software, into an estimate of total energy expenditure.

Display ANT+ and BLE connection

The Novo Duo offers a wireless connection through BLE and ANT+ (through FTMS and FE-C protocols) and creates new opportunities to connect to third-party applications.

To connect the ergometer to an external device or app using BLE or ANT+, start searching for the ergometer on the external device. Turn the ergometer on before or during the search.

It may take up to one minute for the device to find the ergometer. Please note that the ergometer can only be connected to one BLE device at a time.



Fig: ANT+



Fig: BLE

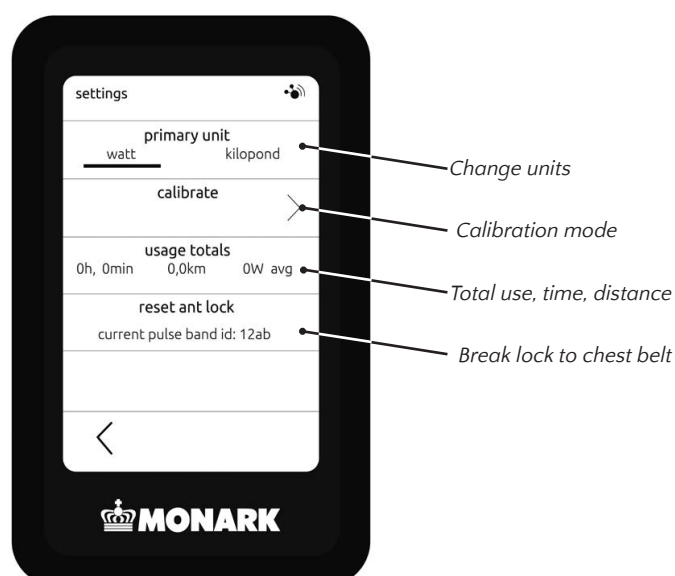


Fig: Change units

Heart rate (ANT+)

The user's heart rate can be measured with a chest belt that detects the pulse of the heart.

For the heart rate to show in the display you need to use a heart rate sensor with ANT+.

For correct heart rate measurement, position the sensor correctly and make sure that the skin is clean and moistened.

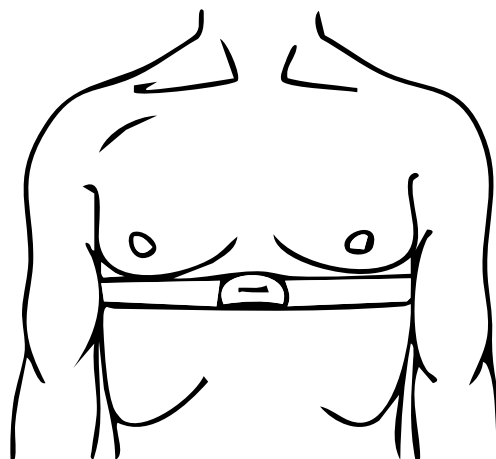


Fig: Placement chest belt

Scale adjustments

Turn on the power to the ergometer.

Release any tension in the brake belt by lifting the pendulum / pointer to slightly over 4 kp.

Hold the pendulum in this position for a few seconds, then move it down again. Check that the pointer conforms to the zero index. If the pointer is not in zero, the scale must be adjusted.

First, loosen the locking screw and then change the position of the scale so that the 0-index is in line with the pointer.

Tighten the screw after adjustment. See Fig: Zeroing.

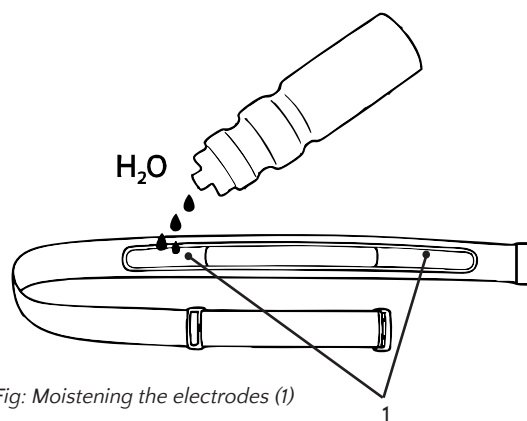


Fig: Moistening the electrodes (1)



Fig: Zeroing

1) Locking screw (white screw)

NOTE!

It is important that you are very precise when you adjust or reset the scale.

Calibration

Calibration is necessary so that the electronic and the mechanical parts of the ergometer match.

Usually it is not necessary to recalibrate the ergometer electronically, but it should be done after each service, change of electronic part, movement or if you adjusted the 0-index.

New calibration automatically replaces the old.

Pendulum calibration

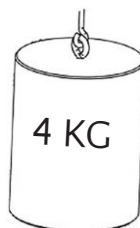
1. Remove the right-hand service cover (not the cover with the pendulum scale).
See Fig: Calibration 1
2. Check that the pendulum pointer indicates zero (0 kp) when the pendulum is hanging freely straight down.
See Fig: Calibration 2
If the pointer does not indicate zero, refer to section "Scale adjustment" before continuing. (Page 11)
3. Disconnect the brake belt from the spring and hang the calibrated 4 kg weight in the spring instead.
See Fig: Calibration 3
4. When the 4 kg weight is applied, the pendulum pointer shall indicate 4 kp on the scale.
See Fig: Calibration 4
If the pointer does not indicate 4 kp, the pendulum weight must be adjusted, see section "Adjustment of pendulum weight" and see Fig: Screw for adjusting weight in pendulum. (Page 14)
5. When the correct value is obtained, remove the 4 kg weight and reconnect the brake belt to the spring.
6. Make sure that the brake belt is correctly positioned on the surface of the brake wheel and has not slipped beside it.
7. After completing the mechanical calibration of the pendulum, an electronic calibration must be performed, see section "Electronic calibration".

Check the calibration of the pendulum once a year or when needed.

NOTE!

When calibrating the pendulum you need a 4 kg calibration weight.

The flywheel must be completely still before the weight is hung on!



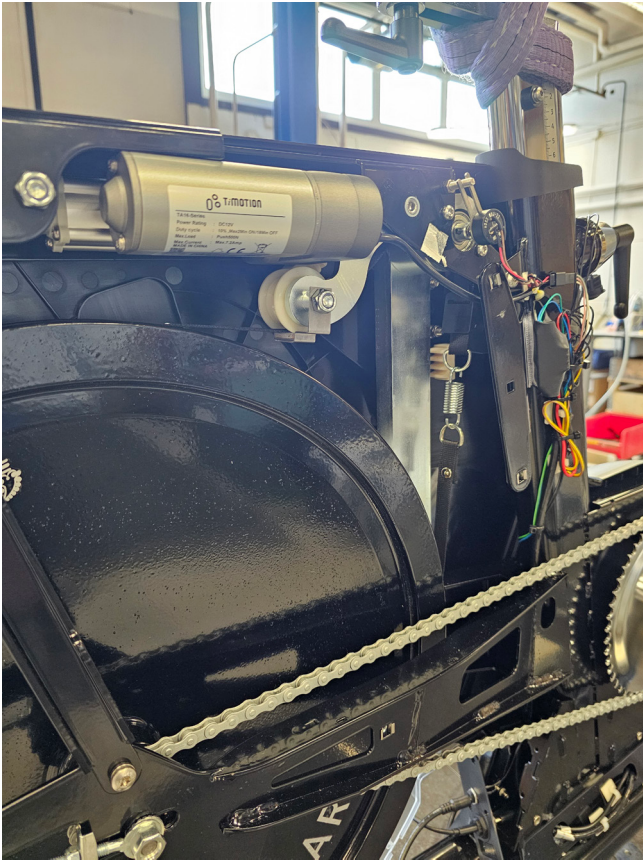


Fig: Calibration 1



Fig: Calibration 2

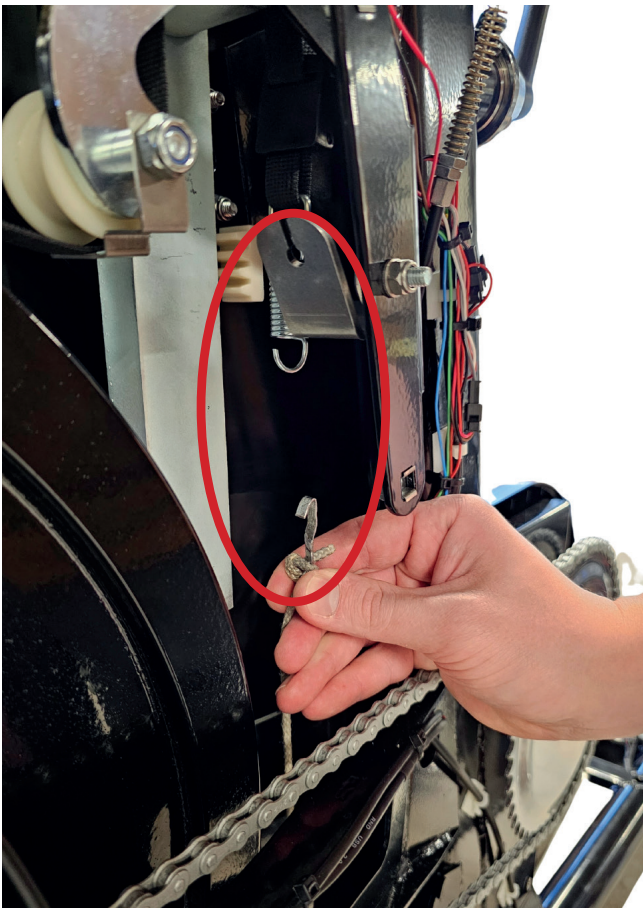


Fig: Calibration 3



Fig: Calibration 4

Adjustment of Pendulum Weight

To adjust the pendulum weight, use the Allen key supplied in the tool kit.

Loosen the small locking screw to release the large adjustment screw located inside the pendulum. Do not remove any screws.

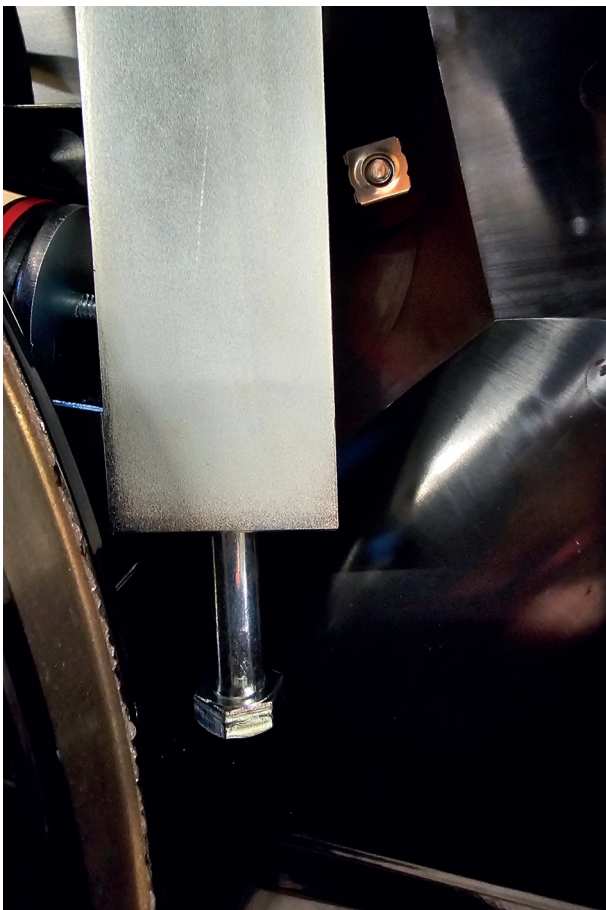
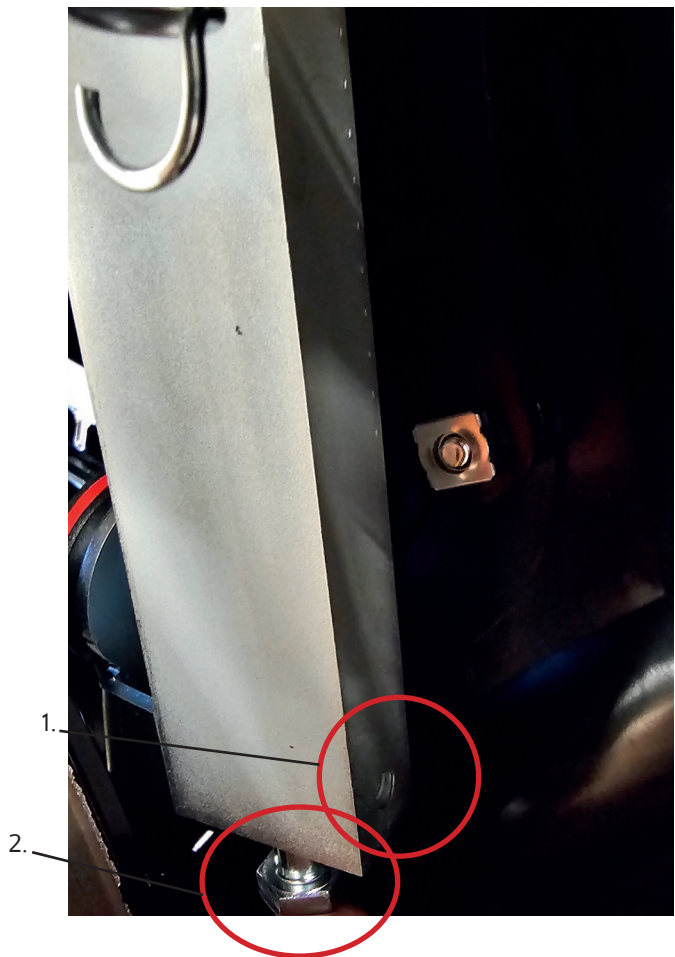
Adjust the large screw until the correct pendulum weight is obtained:

- Pendulum screw protruding further out = heavier pendulum
- Pendulum screw positioned further in = lighter pendulum

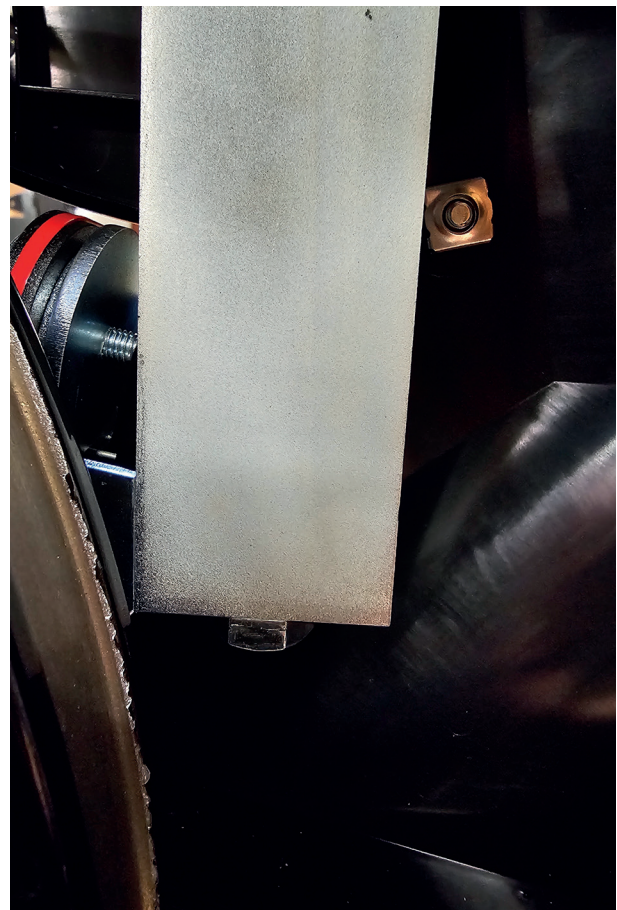
When the correct setting is reached, secure the adjustment by tightening the small locking screw.

Fig: Screw for adjusting weight in pendulum

- 1) Locking screw for pendulum
- 2) Pendulum screw



heavier pendulum



lighter pendulum

Calibration electronics

Electronic calibration can only be done from the display!

Calibration should be done after service, replacement of electronics part, if you have moved the bike or if you have adjusted the scale.

Start by adjusting the scale, see section “Scale adjustments” (page: 11), and release the brake belt tension.

1. Press “Settings” on the display.
Then you select “calibrate”.
See Fig: Settings and Fig: Calibrate
2. Then “0 kp” is shown in the display.
Let the pendulum hang free over 0 and then press the screen. *See Fig: 0 KP*
3. Then “2 kp” is shown in the display.
Hold the pendulum to 2 and then press the screen. *See Fig: 2 KP*
4. Then “4 kp” is shown in the display.
Hold the pendulum to 4 and then press the screen. *See Fig: 4 KP*
5. Then “6 kp” is shown in the display.
Hold the pendulum to 6 and then press the screen. *See Fig: 6 KP*

The calibration is complete!

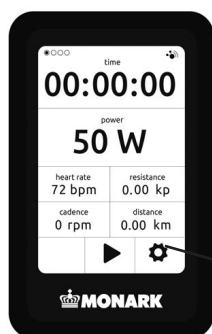


Fig: Settings

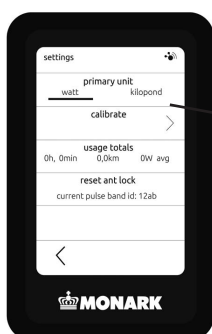


Fig: Calibrate

NOTE!

The pendulum must be kept still at the different positions. This is done by pressing down the pointer into the groove on the scale at each kp value.

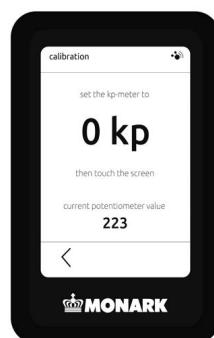


Fig: 0 KP

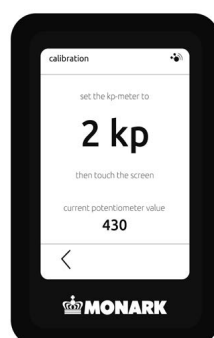
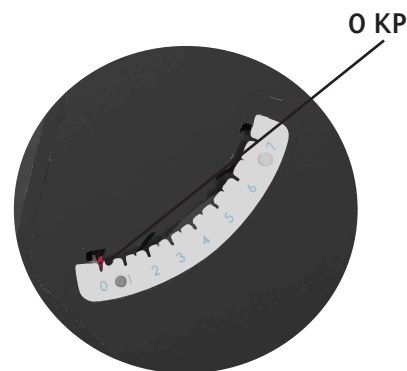


Fig: 2 KP

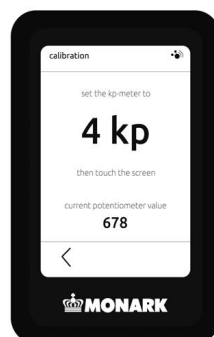
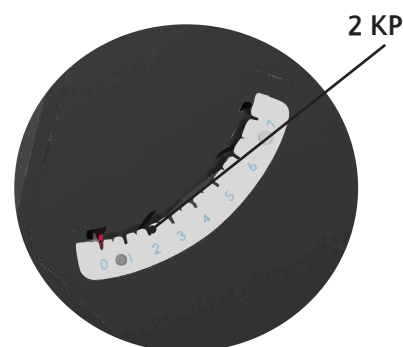


Fig: 4 KP

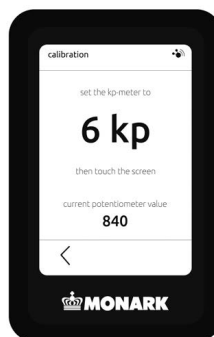
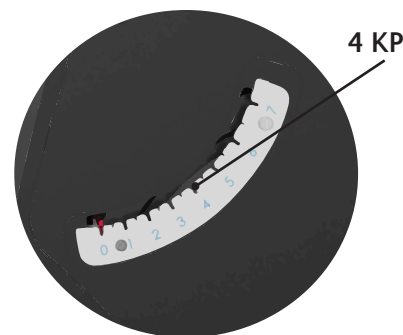
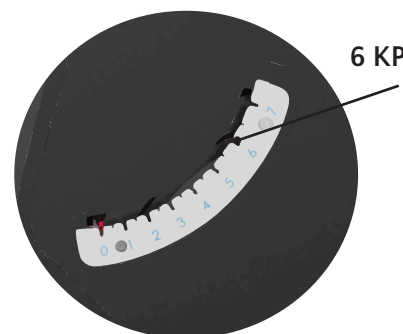


Fig: 6 KP



NOTE!

The potentiometer values shown in the pictures are only examples. The value varies depending on the value of the potentiometer at 0 kp.

Troubleshooting guide

Symptoms	Probable Cause / Corrective Action
There is a click noise when pedalling (increases with the workload)	- Check that the pedals are tight. - Check that the crank arms are tight. If the sound remains, contact your Monark dealer.
Scratching sound is heard when pedalling	- Check that the transport / carriage block has been removed. - Check that no covers are touching the flywheel, crank or other moving parts.
There's a click noise and a squeak noise when pedalling	- The chain may be too tight or dry. - Adjust and lubricate the chain. See Fig: Chain adjustments.
The display is not working	- Check that the power adaptor is connected to a working wall outlet and correctly connected to the bike. - Restart the bike with the On/Off button. - Check cables and connectors. Contact your Monark dealer if the problem persists.
Workload does not change	- Check that the bike is powered and that the display is on. - Restart the bike and adjust the workload again from the display. - If the workload still does not change, do not use the bike for testing. Contact your Monark dealer.
Time counting does not start	- Check that the brake belt is correctly positioned. - Check that the speed sensor receives signal from the magnet.
No connection to external device (RS232 / USB-B / BLE / ANT+)	- Check the RS232 or USB-B cable when using wired connection. - Verify that Bluetooth / ANT+ is enabled on the external device. - Make sure the app supports FTMS and/or FE-C. - Restart the bike and the external device. - Only one BLE device can be connected at a time.
No heart rate	- Check the chest belt battery, position and fit. - Make sure the electrodes are wet. - Check that the heart rate display is active on the Novo Duo display. - If needed, use contact gel or water with a few drops of washing-up liquid. - Test the chest belt on another person with a known good pulse reading. - Make sure no other nearby device is connected to the same chest belt.
Irregular heart rate	- Check with an external device, for example a heart rate watch. - Irregular readings may be caused by electromagnetic disturbance from power cables, elevators, fluorescent tubes or nearby electronic equipment. - Move the bike to another location or room. - If the heart rate remains irregular, check it manually. - If it remains irregular during work, the person's health should be examined.

Service

Note that the text about service and maintenance is universal and that all parts may not be relevant to your bike.

NOTE!

Make sure the voltage indicated on the appliance corresponds to the local mains voltage before making connections.

Warranty

EU countries - Private use

If you are a consumer living in the EU you will have a minimum level of protection against defects in accordance with EC Directive 1999/44/EC. In short, the directive states that your Monark Dealer will be liable for any defects, which existed at the time of delivery. In case of defects, you will be entitled to have the defect remedied within a reasonable time, free of charge, by repair or replacement.

EU countries - Professional use

Monark Exercise products and parts are guaranteed against defects in materials and workmanship for a period of one year from the initial date of purchase of the unit. In the event of a defect in material or workmanship during that period, Monark Exercise will repair or replace the product. Monark Exercise will not, however, refund costs for labour or shipping.

Other countries

Monark Exercise products and parts are guaranteed against defects in materials and workmanship for a period of one year from the initial date of purchase of the unit. In the event of a defect in material or workmanship during that period above, Monark Exercise will repair or replace (at its option) the product. Monark Exercise will not, however, refund costs for labour or shipping.

Service check and Maintenance

It is important to carry out a regular service on your ergometer, to ensure it is kept in good condition.

Service action:

- We recommend isopropyl alcohol to disinfect the surface of the bike. Use a damp but not wet cloth to clean the surface you wish to disinfect.
- Always keep the bike clean and well lubricated (once a week).
- Periodically wipe the surface with a rust preventative, especially when it has been cleaned and the surface is dry. This is done to protect the chrome and zinc parts as well as the painted parts (4 times per year).
- Check now and then that both pedals are firmly tightened. If not the threading in the pedal arms will be damaged. Also check that pedal arms are firmly tightened on the crank axle, tighten if necessary.
When the Ergometer is new it is important to tighten the pedals after 5 hours of pedalling (4 times per year).
- Check that the pedal crank is secure to the crank axle (4 times per year).
- Be sure that the pedals are moving smoothly, and that the pedal axle is clear of dirt and fibres (4 times per year).
- When cleaning and lubricating be sure to check that all screws and nuts are properly tightened (twice a year).
- Check that the chain is snug and there is no play in the pedal crank (twice a year).
- Check that pedals, chain and freewheel sprocket are lubricated (twice a year).
- Be sure that the brake belt does not show significant signs of wear (twice a year).
- Check that the handlebars and seat adjustment screws are lubricated (2 times per year).
- Be sure that all moving parts, crank and flywheel are working normally and that no abnormal play or sound exists. Play in bearings causes fast wearing and with that follows a highly reduced lifetime.
- Check that the flywheel is placed in the center and with plane rotation.

Flywheel bearing

The flywheel bearing is long-term greased and requires no supplementary lubrication. If a problem arises, please contact your Monark dealer.

Crank bearing

The crank bearing is greased and normally requires no supplementary lubrication. If a problem arises, please contact your Monark dealer.

Transportation

During transport the brake cord should be tightened to prevent it from falling off the flywheel.

Replacement of brake belt

To replace the brake belt remove covers if necessary. Make sure that the belt is loose.

To loosen the brake belt, release all brake belt tension before removing the belt.

Please note how the belt is assembled.

Remove it from the bike.

Attach the new brake belt and assemble the bike in reverse order.

NOTE!

When replacing the brake belt it is recommended to clean the brake surface.

See "Brake belt contact surface".

Brake belt contact surface

Deposits of dirt on the brake belt and on the contact surface may cause the unit to operate unevenly and will also wear down the brake belt.

The contact surface of the flywheel should be smoothed with fine sandpaper and any dust removed with a clean dry cloth.

Remove any potential covers and all workload on the brake belt and then remove it. Grind with a fine sand paper. Grinding is easier to perform if a second individual cautiously and carefully pedals the cycle.

Irregularities on the brake belt contact surface are removed by means of a fine sand paper or an abrasive cloth. Otherwise unnecessary wear on the brake belt may occur and the unit can become noisy.

Removing the right service cover to see the best area to come in contact with the brake belt.

See Fig: Brake belt contact surface

Always keep the brake belt contact surface clean and dry. No lubricant should be used. We recommend replacing the brake belt when cleaning the contact surface. In regard to assembly and adjustment of the brake belt, see "Replacement of brake belt".

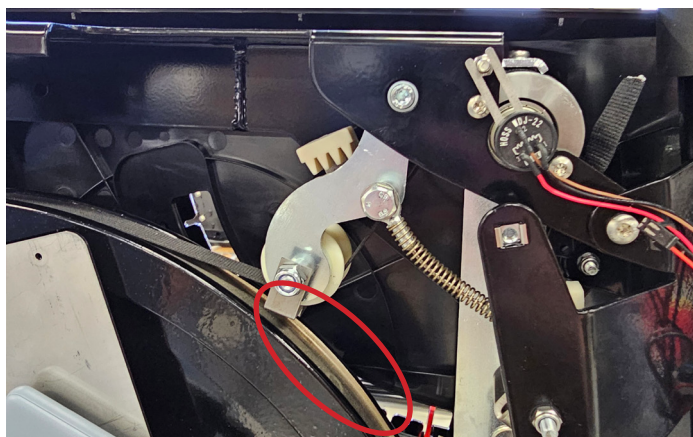


Fig: Brake belt contact surface

Chain 1/2" x 1/8"

Check the lubrication and chain play at regular intervals. Measure in the middle of the chain's free length. The chain should have a minimum play of 3–10 mm (1/4"). See *Fig: Chain adjustments*.

When the play is about 20 mm (3/4"), the chain must be tightened. Otherwise it may cause abnormal wear of the chain and sprockets.

Therefore, it is always recommended to keep the chain play as small as possible within the recommended range.

If the chain has become so long that correct chain play can no longer be achieved, the chain is worn and must be replaced. To adjust or replace the chain, remove covers if required.

To adjust the chain, the axle nuts (3) should be loosened. Loosening or tightening the nuts on the chain adjusters (2) will then move the hub and axle forward or backward. Then tighten the nuts on the hub axle again (3) to lock it in place.

See *Fig: Chain adjustments 2*.

It is very important to adjust both sides equally if the flywheel is already centered.

If not, adjust the flywheel's position by tightening the axle nuts accordingly.

To replace the chain, loosen the chain adjusters as much as possible. Dismantle the chain lock (6) and remove the chain. Use a pair of tongs to remove the spring. Put on a new chain and assemble the chain lock.

The spring of the chain lock should be assembled with the closed end in the movement direction (5) of the chain.

Use a pair of tongs for removing and assembling the spring (4).

See *Fig: Chain replacement*.

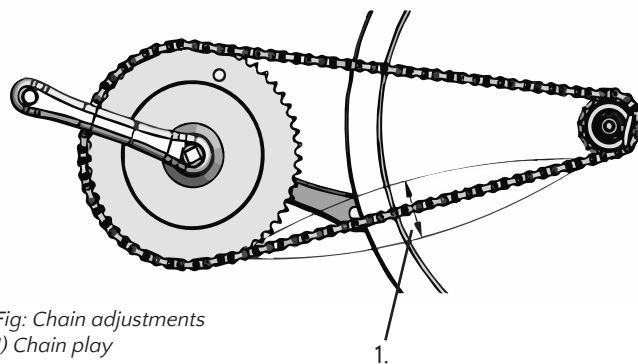


Fig: Chain adjustments
1) Chain play



Fig: Chain adjustments 2
1) Chain adjuster
2) Chain adjuster nuts
3) Axle nuts



From the left side
1) Chain adjuster
2) Chain adjuster nuts
3) Axle nuts

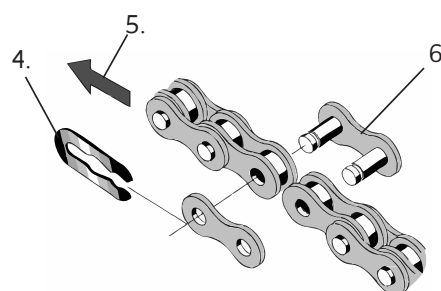


Fig: Chain replacement
4) Lock spring
5) Movement direction
6) Chain lock

NOTE!

At assembly the flywheel has to be parallel with the centerline of the frame. Otherwise the chain and sprockets make a lot of noise and wear out rapidly.

Then assemble the removed parts as above but in reverse order.

Freewheel sprocket

When replacing the freewheel sprocket remove frame covers if necessary. Remove the chain according to section "Chain 1/2" x 1/8".

Loosen the axle nuts and lift off the flywheel. Remove the axle nut, washer, chain adjuster and spacer on the freewheel side. Replace sprocket-adaptor and assemble the new parts in reverse order according to the above.

NOTE!

Do not tighten the axle nut completely. It must be possible to loosen the sprocket-adaptor half a turn.

The sprocket should be lubricated with a few drops of oil once a year. Tilt the cycle to make it easier for the oil to reach the bearing.

See *Fig: Lubrication*.



Fig: Lubrication

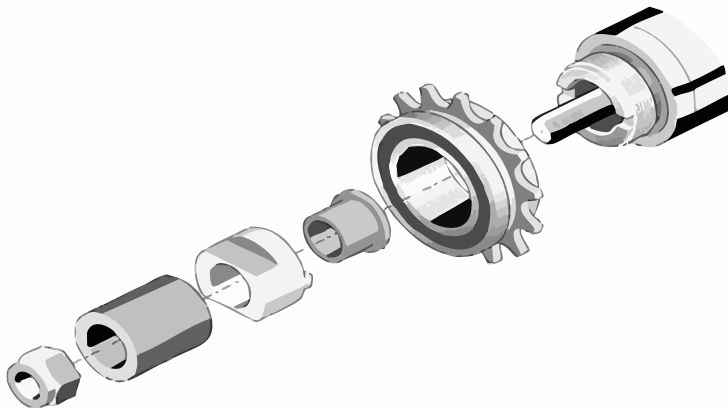


Fig: Hub assembly

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