

POLAR M450



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POLAR M450 USER MANUAL

INTRODUCTION

Congratulations on your new M450! Designed for cycling enthusiasts, M450 with GPS and Smart Coaching encourages you to push your boundaries and perform at your best. Get an instant overview of your training right after a session with the Flow app. Plan and analyze your training in detail with the Flow web service.

This user manual helps you get started with your new training companion. To check the video tutorials and the latest version of this user manual, go to www.polar.com/en/support/M450.



M450

View your training data, such as heart rate, speed, distance and altitude.

H7 HEART RATE SENSOR

See live, accurate heart rate on your M450 during training. Your heart rate is information used to analyze how your session went.

i Only included in M450 with heart rate sensor sets. If you bought a set that does not include a heart rate sensor, not to worry, you can always buy one later.

USB CABLE

Use the USB cable to charge the battery and to sync data between your M450 and the Polar Flow web service via FlowSync software.

POLAR FLOW MOBILE APP

View your training data at a glance after every session. Flow app syncs your training data wirelessly to the Polar Flow web service. Download it from the App Store or Google Play.

POLAR FLOWSYNC SOFTWARE

Flowsync software allows you to sync data between your M450 and the Flow web service on your computer via the USB cable. Go to flow.polar.com/start to download and install Polar FlowSync software.

POLAR FLOW WEB SERVICE

Plan and analyze every detail of your training, customize your device and learn more about your performance at polar.com/flow.


GET STARTED

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SET UP YOUR M450

Please do the setup in the Polar Flow web service. There you can fill in all the physical details required for accurate training data at once. You can also select language and get the latest firmware for your M450. To do the setup in the Flow web service, you need a computer with an Internet connection.


Alternatively, if you can't get to a computer with an Internet connection right away, you can start from the device. **Please note that the device contains only part of the settings.** To make sure you get to enjoy your M450 at its best, it's important that you do the setup in the Polar Flow web service later.

 *M450 is delivered in sleep mode. It wakes up when you plug it into a computer or a USB charger. If the battery is completely empty, it takes a couple of minutes for the charging animation to appear.*

SET UP IN THE POLAR FLOW WEB SERVICE

1. Go to flow.polar.com/start and download the Polar FlowSync software, which you need to connect your M450 to the Flow web service.
2. Open the installation package and follow the on-screen instructions for installing the software.
3. Once the installation is complete, FlowSync opens automatically and asks you to plug in your Polar device.
4. Plug M450 into your computer's USB port with the USB cable. M450 wakes up and starts charging. Let your computer install any USB drivers if it suggests so.
5. The Flow web service opens automatically on your internet browser. Create a Polar account or sign in if you already have one. Fill in your physical settings precisely as they have an effect on calorie calculation and other Smart Coaching features.

6. Start synchronization by clicking **Done**, and the settings will be synchronized between M450 and the service. FlowSync status will change to completed, once the synchronization is done.

 *The languages you can choose in the Polar Flow web service are: **Dansk, Deutsch, English, Español, Français, Italiano, 日本語, Nederlands, Norsk, Polski, Português, 简体中文, Русский, Suomi or Svenska.***

SET UP FROM THE DEVICE

Plug M450 into your computer's USB port or a USB charger with the cable that came in the box. **Choose language** is displayed. Press START to choose **English**. Your M450 is delivered with English only, but you can add other languages when doing the setup in the Polar Flow web service later.

Set the following data, and confirm each selection with the Start button. If you want to return and change a setting at any point, press Back until you reach the setting you want to change.

1. **Time format** : Choose **12 h** or **24 h**. With **12 h**, select **AM** or **PM**. Then set the local time.
2. **Date** : Enter the current date.
3. **Units** : Choose metric (**kg, cm**) or imperial (**lb, ft**) units.
4. **Weight** : Enter your weight.
5. **Height** : Enter your height.
6. **Date of birth** : Enter your date of birth.
7. **Sex** : Choose **Male** or **Female**.
8. **Training background** : **Occasional (0-1 h/week), Regular (1-3 h/week), Frequent (3-5 h/week), Heavy (5-8 h/week), Semi-Pro (8-12 h/week), Pro (12+ h/week)**. For more information on training background, see [Physical Settings](#).
9. **Ready to go!** is displayed when you're done with the settings, and M450 goes to time view.

CHARGE THE BATTERY

The M450 has an internal, rechargeable battery. Use the USB cable included in the product set to charge it via the USB port on your computer. You can also charge the battery via a wall outlet. When charging via a wall outlet use a USB power adapter (not included in the product set). If you use an AC adapter, make sure that the adapter is marked with "output 5Vdc" and that it provides a minimum of 500mA. Only use an adequately safety approved AC adapter (marked with "LPS", "Limited Power Supply" or "UL listed").


1. Lift the rubber cover off the USB port. Plug the micro USB connector into the USB port in the M450, and plug the other end of the cable into your PC.



2. **Charging** appears on the display.
3. When M450 is fully charged, **Charging completed** is displayed.

Don't leave the battery fully discharged for a long period of time or keep it fully charged all the time, because it might affect the battery life time. Keep the USB port cover closed when not in use.

 *Do not charge the battery when the M450 is wet.*

 *Do not charge the battery in temperatures under 0 °C / 32°F or over +50 °C / 122 °F. Charging your M450 in an environment where temperature is not within this temperature range may permanently damage the battery capacity - especially if the temperature is higher.*

BATTERY OPERATING TIME

The battery operating time is up to 16 hours with GPS and heart rate sensor. The operating time depends on many factors, such as the temperature of the environment in which you use your M450, the features you select and use (e.g. the use of the front light reduces the operating time), and battery aging. The operating time is significantly reduced in temperatures well below freezing.

LOW BATTERY NOTIFICATIONS

Battery low. Charge

The battery charge is low. It is recommended to charge M450.

Charge before training

The charge is too low for recording a training session.

A new training session cannot be started before charging M450.

When the display is blank, M450 has either gone to sleep mode or its battery is empty. M450 goes to sleep mode automatically when it's in time view and you haven't pressed any button for ten minutes. It wakes up from sleep mode when you press any button. If it doesn't wake up, it's time to charge.

BUTTON FUNCTIONS AND MENU STRUCTURE

BUTTON FUNCTIONS

M450 has five buttons that have different functionalities depending on the situation of use. See the tables below to find out what functionalities the buttons have in different modes.



LIGHT

| TIME VIEW AND MENU | PRE-TRAINING MODE | DURING TRAINING |
|--|--|---|
| <ul style="list-style-type: none"> • Illuminate the display • Press and hold to lock buttons | <ul style="list-style-type: none"> • Illuminate the display • Press and hold to enter sport profile settings | <ul style="list-style-type: none"> • Illuminate the display • Press and hold to enter Quick Menu |

BACK

| TIME VIEW AND MENU | PRE-TRAINING MODE | DURING TRAINING |
|---|---|--|
| <ul style="list-style-type: none"> • Exit the menu • Return to the previous level • Leave settings unchanged | <ul style="list-style-type: none"> • Return to time view | <ul style="list-style-type: none"> • Pause training by pressing once • Press and hold for 3 seconds to stop training recording |

| TIME VIEW AND MENU | PRE-TRAINING MODE | DURING TRAINING |
|---|-------------------|-----------------|
| <ul style="list-style-type: none"> • Cancel selections • Press and hold to return to time view from menu • Press and hold to sync with Flow app in time view | | |

START

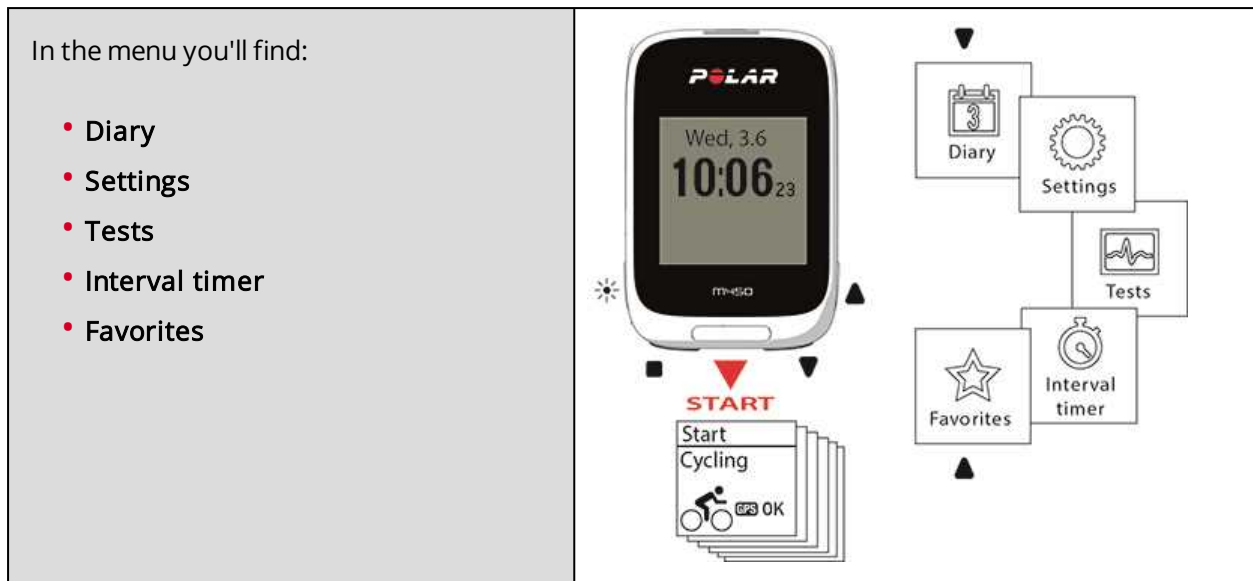
| TIME VIEW AND MENU | PRE-TRAINING MODE | DURING TRAINING |
|---|--|--|
| <ul style="list-style-type: none"> • Confirm selections • Enter pre-training mode • Confirm the selection shown on the display | <ul style="list-style-type: none"> • Start a training session | <ul style="list-style-type: none"> • Press and hold to set zone lock on/off • Continue training recording when paused • Press to record a lap |

UP / DOWN

| TIME VIEW AND MENU | PRE-TRAINING MODE | DURING TRAINING |
|---|--|--|
| <ul style="list-style-type: none"> • Move through selection lists • Adjust a selected value | <ul style="list-style-type: none"> • Move through sports list | <ul style="list-style-type: none"> • Change training view |

MENU STRUCTURE

Enter and browse through the menu by pressing UP or DOWN. Confirm selections with the START button, and return with the BACK button.



DIARY

In **Diary** you'll see the current week, past four weeks and next four weeks. Select a day to see your training sessions of that day, the training summary of each session and the tests you have done. You can also see your planned training sessions.

SETTINGS

In **Settings** you can edit:

- Sport profiles
- Physical settings
- General settings
- Watch settings

For more information, see [Settings](#).

TESTS

In **Tests**, you'll find:

Orthostatic test

Fitness test

For more information, see [Features](#).

INTERVAL TIMER

Set time and/or distance based interval timers to precisely time work and recovery phases in your interval training sessions.

For more information, see [Start a Training Session](#).

FAVORITES

In **Favorites** you'll find training targets that you have saved as favorites in the Flow web service.

For more information, see [Favorites](#).

PAIRING SENSORS WITH M450

Before taking a new *Bluetooth* Smart ® heart rate sensor, cycling sensor or mobile device (smartphone, tablet) into use, it has to be paired with your M450. Pairing only takes a few seconds, and ensures that your M450 receives signals from your sensors and devices only, and allows disturbance-free training in a group. Before entering an event or race, make sure that you do the pairing at home to prevent interference due to data transmission.

PAIRING COMPATIBLE BLUETOOTH SMART ® SENSORS WITH M450

For instructions on pairing specific sensors, see [Compatible Sensors](#).

PAIR A MOBILE DEVICE WITH M450

Before pairing a mobile device, create a Polar account if you do not already have one, and download Flow app from the App Store or Google Play. Make sure you have also downloaded and installed FlowSync software onto your computer from flow.polar.com/start, and registered your M450 in the Flow web service.

Before trying to pair, make sure your mobile device has *Bluetooth* turned on, and airplane mode/flight mode is not turned on.

To pair a mobile device:

1. In M450, go to **Settings > General settings > Pair and sync > Pair mobile device** and press **START**
2. Once your device is found, the device ID **Polar mobile xxxxxxxx** is displayed on M450.
3. Press **START**, **Connecting to device** is displayed, followed by **Connecting to app**.
4. Accept the Bluetooth pairing request on your mobile device and type in the pin code shown on your M450.
5. **Pairing completed** is displayed when you are done.

or

1. On your mobile device, open Flow app and sign in with your Polar account.
2. Wait for the Connect product view to appear on your mobile device (**Searching for Polar M450**) is displayed.
3. In M450 time mode, press and hold **BACK**.
4. **Connecting to device** is displayed, followed by **Connecting to app**.
5. Accept the Bluetooth pairing request on your mobile device and type in the pin code shown on your M450.
6. **Pairing completed** is displayed when you are done.

DELETE A PAIRING

To delete a pairing with a sensor or mobile device:

1. Go to **Settings > General settings > Pair and sync > Paired devices** and press **START**.
2. Choose the device you want to remove from the list and press **START**.
3. **Delete pairing?** is displayed, choose **Yes** and press **START**.
4. **Pairing deleted** is displayed when you are done.

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SPORT PROFILE SETTINGS


Adjust the sport profile settings to best suit your training needs. In M450, you can edit certain sport profiles settings in **Settings > Sport profiles**. You can, for example, set the GPS on or off in different sports. A wider range of customization options is available in the Flow web service. For more information, see [Sport Profiles in Flow](#).

There are six sport profiles on your M450 by default:

- **Cycling**
- **Road cycling**
- **Indoor cycling**
- **Mountain biking**

- Other outdoor
- Other indoor


In the Flow web service you can add new sports to your list, and sync them to your M450. You can have a maximum of 20 sports on your M450 at a time. The number of sport profiles in the Flow web service is not limited.

 *If you have edited your sport profiles in the Flow web service before your first training session, and synced them to your M450, the sport profile list will contain the edited sport profiles.*


SETTINGS

To view or modify sport profile settings, go to **Settings > Sport profiles** and choose the profile you want to modify. You can also access the settings of the currently selected profile from pre-training mode by pressing and holding LIGHT.

- **Training sounds:** Choose **Off**, **Soft**, **Loud** or **Very loud**.
- **Heart rate settings: Heart rate view:** Choose **Beats per minute (bpm)** or **% of maximum**.
Check HR zone limits: Check the limits for each heart rate zone. **HR visible to other device:** Choose **On** or **Off**. If you choose **On**, other compatible devices (e.g. gym equipment) can detect your heart rate.
- **Bike power settings: Power view:** Set how you want to view your power data (**Watts (W)**, **Watts/kg (W/kg)** or **% of FTP**). **Power, rolling average:** Choose 1, 3, 5, 10, 15, 30 or 60 second rolling average of power data. **Set FTP value:** Set your FTP (Functional Threshold Power) value. The setting range is 60 to 600 watts. **Check power zone limits:** Check your power zone limits.

 *Bike power settings are visible only if you have paired the sensor. For more information on calibration, see [Polar LOOK Kéo Power Sensor Bluetooth® Smart](#).*

- **GPS recording:** Choose **Off** or **On**.
- **Bike settings: Wheel size:** Set the wheel size in millimeters. For more information, see [Measuring wheel size](#). **Crank length:** Set the crank length in millimeters. **Used sensors:** View all the sensors you have linked to the bike.
- **Speed settings: Speed view:** Choose **km/h** (kilometers per hour) or **min/km** (minutes per kilometer). If you have chosen imperial units, choose **mph** (miles per hour) or **min/mi** (minutes per mile). **Check speed zone limits:** Check the limits for each speed zone.
- **Automatic pause sett.: Automatic pause:** Choose **On** or **Off**. If you set the automatic pause **On**, your session is automatically paused when you stop moving. **Activation speed:** set the speed at which recording is paused.
- **Automatic lap:** Choose **Off**, **Lap distance** or **Lap duration**. If you choose **Lap distance**, set the distance after which each lap is taken. If you choose **Lap duration**, set the duration after which each lap is taken.

 To use automatic pause or distance-based automatic lap, you must have the GPS function on or Polar Speed Sensor Bluetooth® Smart in use.

PHYSICAL SETTINGS

To view and edit your physical settings, go to **Settings > Physical settings**. It is important that you are precise with the physical settings, especially when setting your weight, height, date of birth and sex, as they have an impact on the accuracy of the measuring values, such as the heart rate zone limits and calorie expenditure.

In **Physical settings** you'll find:

- **Weight**
- **Height**
- **Date of birth**
- **Sex**
- **Training background**
- **Maximum heart rate**

WEIGHT

Set your weight in kilograms (kg) or pounds (lbs).

HEIGHT

Set your height in centimeters (metric) or in feet and inches (imperial).

DATE OF BIRTH

Set your birthday. The order in which the date settings are depends on which time and date format you have chosen (24h: day - month - year / 12h: month - day - year).

SEX

Select **Male** or **Female**.

TRAINING BACKGROUND

Training background is an assessment of your long-term physical activity level. Select the alternative that best describes the overall amount and intensity of your physical activity during the past three months.

- **Occasional (0-1h/week):** You do not participate regularly in programmed recreational sport or heavy physical activity, e.g. you walk only for pleasure or exercise hard enough to cause heavy breathing or perspiration only occasionally.

- **Regular (1-3h/week):** You participate regularly in recreational sports, e.g. you run 5-10 km or 3-6 miles per week or spend 1-3 hours per week in comparable physical activity, or your work requires modest physical activity.
- **Frequent (3-5h/week):** You participate at least 3 times a week in heavy physical exercise, e.g. you run 20-50 km/12-31 miles per week or spend 3-5 hours per week in comparable physical activity.
- **Heavy (5-8h/week):** You participate in heavy physical exercise at least 5 times a week, and you may sometimes take part in mass sports events.
- **Semi-pro (8-12h/week):** You participate in heavy physical exercise almost daily, and you exercise to improve performance for competitive purposes.
- **Pro (>12h/week):** You are an endurance athlete. You participate in heavy physical exercise to improve your performance for competitive purposes.

MAXIMUM HEART RATE

Set your maximum heart rate, if you know your current maximum heart rate value. Your age-predicted maximum heart rate value (220-age) is displayed as a default setting when you set this value for the first time.

HR_{max} is used to estimate energy expenditure. HR_{max} is the highest number of heartbeats per minute during maximum physical exertion. The most accurate method for determining your individual HR_{max} is to perform a maximal exercise stress test in a laboratory. HR_{max} is also crucial when determining training intensity. It is individual and depends on age and hereditary factors.

GENERAL SETTINGS

To view and edit your general settings, go to **Settings > General settings**

In **General settings** you'll find:

- Pair and sync
- Front light settings
- Flight mode
- Time
- Date
- Week's starting day
- Button sounds
- Button lock
- Units
- Language
- About your product

PAIR AND SYNC

- **Pair and sync mobile device:** Pair mobile devices with your M450.
- **Pair other device:** Pair heart rate sensors and cycling sensors with your M450.
- **Paired devices:** View all the devices you have paired with your M450.
- **Sync data:** Sync data with Flow app. **Sync data** becomes visible after you have paired your M450 with a mobile device.

FRONT LIGHT SETTINGS

- **Front light:** Choose **Manual front light** or **Automatic front light**
 - **Manual front light:** Manage the front light manually from the quick menu.
 - **Automatic front light:** The M450 turns the front light on and off according to light condition.
- **Activation level:** Choose **Dark**, **Dusk** or **Light**.
- **Blink rate:** Choose **Blinking off**, **Slow**, **Fast** or **Very fast**.

FLIGHT MODE

Choose **On** or **Off**


Flight mode cuts off all wireless communication from the device. You cannot use it in training sessions with *Bluetooth*® Smart sensors nor when syncing your data to the Polar Flow mobile app because *Bluetooth*® Smart is disabled.

TIME

Set the time format: **24 h** or **12 h**. Then set the time of day.

DATE

Set the date. Also set the **Date format**, you can choose **mm/dd/yyyy**, **dd/mm/yyyy**, **yyyy/mm/dd**, **dd-mm-yyyy**, **yyyy-mm-dd**, **dd.mm.yyyy** or **yyyy.mm.dd**.


 *When you sync your M450 with the Flow web service via the FlowSync software or via the Flow app, the time and date settings are automatically updated according to the computer's or phone's watch settings.*

WEEK'S STARTING DAY

Choose the starting day of each week. Choose **Monday**, **Saturday** or **Sunday**.

BUTTON SOUNDS

Set the button sounds **On** or **Off**.

 Please note that this selection does not modify training sounds. Training sounds are modified in sport profile settings. For more information, see "Sport Profile Settings" on page 16.

BUTTON LOCK

Choose **Manual lock** or **Automatic lock**. In **Manual lock** you can lock the buttons by manually from the Quick menu. In **Automatic Lock** the button lock automatically goes on after 60 seconds.

UNITS

Choose metric (**kg, cm**) or imperial (**lb, ft**). Set the units used to measure weight, height, distance and speed.

LANGUAGE

Choose: **Dansk, Deutsch, English, Español, Français, Italiano, 日本語, Nederlands, Norsk, Polski, Português, 简体中文, Русский, Suomi** or **Svenska**. Set the language of your M450.

ABOUT YOUR PRODUCT

Check the device ID of your M450, as well as the firmware version, HW model and A-GPS expiry date.

QUICK MENU

In pre-training mode, press and hold LIGHT to access the settings of the currently chosen sport profile:

- **Training sounds:** Choose **Off, Soft, Loud** or **Very loud**.
- **Heart rate settings:** **Heart rate view:** Choose **Beats per minute (bpm)** or **% of maximum**.
Check HR zone limits: Check the limits for each heart rate zone. **HR visible to other device:** Choose **On** or **Off**. If you choose **On**, other compatible devices (e.g. gym equipment) can detect your heart rate.
- **Bike power settings:** **Power view:** Set how you want to view your power data (**Watts (W)**, **Watts/kg (W/kg)** or **% of FTP**). **Power, rolling average:** Choose 1, 3, 5, 10, 15, 30 or 60 second rolling average of power data. **Set FTP value:** Set your FTP (Functional Threshold Power) value. The setting range is 60 to 600 watts. **Check power zone limits:** Check your power zone limits.

 *Bike power settings are visible only if you have paired the sensor. For more information on calibration, see [Polar LOOK Kéo Power Sensor Bluetooth® Smart](#).*

- **GPS recording:** Choose **Off** or **On**.
- **Calibrate power sensor:** Power sensor calibration is visible only if you have paired the sensor. For more information on calibration, see [Polar LOOK Kéo Power Sensor Bluetooth® Smart](#).
- **Bike settings: Used sensors:** View all the sensors you have linked to the bike.
- **Calibrate altitude:** Set the correct altitude. It is recommended to always manually calibrate altitude when you know your current altitude.

- **Speed settings: Speed view:** Choose **km/h** (kilometers per hour) or **min/km** (minutes per kilometer). If you have chosen imperial units, choose **mph** (miles per hour) or **min/mi** (minutes per mile). **Check speed zone limits:** Check the limits for each speed zone.
- **Automatic pause sett.: Automatic pause:** Choose **On** or **Off**. If you set the automatic pause **On**, your session is automatically paused when you stop moving. **Activation speed:** set the speed at which recording is paused.
- **Automatic lap:** Choose **Off**, **Lap distance** or **Lap duration**. If you choose **Lap distance**, set the distance after which each lap is taken. If you choose **Lap duration**, set the duration after which each lap is taken.

In training view, press and hold LIGHT to enter **Quick menu**. You'll find:


- **Lock buttons:** Press START to lock buttons. To unlock, press and hold LIGHT.
- **Set front light on or off.**
- **Set backlight on or off.**
- **Calibrate power sensor:** Power sensor calibration is visible only if you have paired the sensor. For more information on calibration, see [Polar LOOK Kéo Power Sensor Bluetooth® Smart](#).
- **Calibrate altitude:** Set the correct altitude. It is recommended to always manually calibrate altitude when you know your current altitude.
- **Interval timer:** Create time and/or distance based interval timers to precisely time work and recovery phases in your interval training sessions.
- **Current location info*:** Current location and the number of visible satellites.
- Choose **Set location guide on***, and press START. **Location guide arrow view set on** is displayed, and M450 goes to **Back to Start** view.

**This selection is only available if GPS is set on for the sport profile.*


In pause mode, press and hold LIGHT to enter **Quick menu**. You'll find:

- **Lock buttons:** Press START to lock buttons. To unlock, press and hold LIGHT.
- **Set front light on or off.**
- **Training sounds:** Choose **Off**, **Soft**, **Loud** or **Very loud**.
- **Heart rate settings: Heart rate view:** Choose **Beats per minute (bpm)** or **% of maximum**. **Check HR zone limits:** Check the limits for each heart rate zone. **HR visible to other device:** Choose **On** or **Off**. If you choose **On**, other compatible devices (e.g. gym equipment) can detect your heart rate.
- **Bike power settings: Power view:** Set how you want to view your power data (**Watts (W)**, **Watts/kg (W/kg)** or **% of FTP**). **Power, rolling average:** Choose 1, 3, 5, 10, 15, 30 or 60 second rolling average of power data. **Set FTP value:** Set your FTP (Functional Threshold Power) value. The

setting range is 60 to 600 watts. **Check power zone limits:** Check your power zone limits.

 *Bike power settings are visible only if you have paired the sensor. For more information on calibration, see [Polar LOOK Kéo Power Sensor Bluetooth® Smart](#).*

- **GPS recording:** Choose **Off** or **On**.
- **Calibrate power sensor:** Power sensor calibration is visible only if you have paired the sensor. For more information on calibration, see [Polar LOOK Kéo Power Sensor Bluetooth® Smart](#).
- **Bike settings: Used sensors:** View all the sensors you have linked to the bike.
- **Calibrate altitude:** Set the correct altitude. It is recommended to always manually calibrate altitude when you know your current altitude.
- **Speed settings: Speed view:** Choose **km/h** (kilometers per hour) or **min/km** (minutes per kilometer). If you have chosen imperial units, choose **mph** (miles per hour) or **min/mi** (minutes per mile). **Check speed zone limits:** Check the limits for each speed zone.
- **Automatic pause sett.: Automatic pause:** Choose **On** or **Off**. If you set the automatic pause **On**, your session is automatically paused when you stop moving. **Activation speed:** set the speed at which recording is paused.
- **Automatic lap:** Choose **Off**, **Lap distance** or **Lap duration**. If you choose **Lap distance**, set the distance after which each lap is taken. If you choose **Lap duration**, set the duration after which each lap is taken.

 *To use automatic pause or distance-based automatic lap, you must have the GPS function on or Polar Speed Sensor Bluetooth® Smart in use.*

FIRMWARE UPDATE


The firmware of your M450 can be updated. Any time a new firmware version is available, FlowSync will notify you when connecting M450 to your computer with the USB cable. The firmware updates are downloaded via the USB cable and FlowSync software. Flow app will also notify you when new firmware is available.

Firmware updates are performed to improve the functionality of your M450. They can include improvements to existing features, completely new features or bug fixes, for example.

HOW TO UPDATE FIRMWARE


To update the firmware of your M450, you must have:

- A Flow web service account
- Installed FlowSync software
- Registered your M450 in the Flow web service

 Go to flow.polar.com/start, and create your Polar account in the Polar Flow web service and download and install FlowSync software onto your PC.

To update the firmware:

1. Plug the micro USB connector into the USB port in the M450, and plug the other end of the cable into your PC.
2. FlowSync starts syncing your data.
3. After syncing, you are asked to update the firmware.
4. Choose Yes. New firmware is installed (this may take some time), and M450 restarts.

 Before updating the firmware, the most important data from your M450 is synced to the Flow web service. Therefore you will not lose important data when updating.

INSTALL BIKE MOUNT

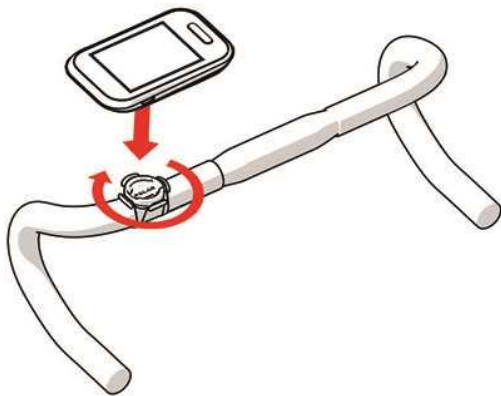
POLAR ADJUSTABLE BIKE MOUNT

You can install the Polar Adjustable Bike Mount either on the stem of your bike, or on the left or right hand side of the handle bar.

1. Place the rubber base on the stem/handlebar.
2. Position the bike mount on the rubber base so that the POLAR logo is in line with the handlebar.
3. Secure the bike mount onto the stem/handlebar with the O-ring.



4. Align the ledges on the back of the M450 with the slots on the bike mount and turn clockwise until the M450 is in place.



i For the best GPS performance, make sure the display is facing up.

COMPATIBLE SENSORS

POLAR H7 HEART RATE SENSOR BLUETOOTH® SMART

Polar heart rate sensor consists of comfortable strap and connector. It detects your heart rate accurately and sends the data to the M450 in real time.

Heart rate data gives you an insight into your physical condition and how your body responds to training. Although there are many subjective clues as to how your body is doing during exercise (perceived exertion, breathing rate, physical sensations), none is as reliable as measuring heart rate. It is objective and is affected by both internal and external factors - meaning you will have a dependable measure of your physical state.

PAIR HEART RATE SENSOR WITH M450

Wear your heart rate sensor as instructed in [Wear Heart Rate Sensor](#). There are two ways to pair a heart rate sensor with your M450:

1. Go to **General Settings > Pair and sync > Pair other device** and press START.
2. M450 starts searching for your heart rate sensor.
3. Once the heart rate sensor is found, the device ID, for example, **Pair Polar H7 xxxxxxxx**, is displayed. Choose the heart rate sensor you want to pair.
4. Press START, **Pairing** is displayed.
5. **Pairing completed** is displayed when you are done.

or

1. Press START in time view to enter pre-training mode.
2. **To pair, touch your sensor with M450** is displayed, touch your heart rate sensor with M450, and wait for it to be found.
3. M450 lists the heart rate sensors it finds. The device ID, for example, **Pair Polar H7 xxxxxxxx**, is displayed. Choose the heart rate sensor you want to pair and then choose **Yes**.
4. **Pairing completed** is shown when you are done.

POLAR SPEED SENSOR BLUETOOTH® SMART

There are a range of factors that can affect your cycling speed. Obviously fitness is one of them, however, weather conditions and the varying gradients of the road play a huge part too. The most advanced way of measuring how these factors affect your performance speed is with the aerodynamic speed sensor.


- Measures your current, average and maximum speeds
- Track your average speed to see your progress and performance improve
- Light yet tough, and easy to attach

PAIR A SPEED SENSOR WITH M450

Make sure the speed sensor has been correctly installed. For more information on installing the speed sensor refer to the user manual of the speed sensor.

There are two ways to pair a speed sensor with your M450:

1. Go to **General Settings > Pair and sync > Pair other device** and press START.
2. M450 starts searching for the speed sensor. Rotate the wheel a few times to activate the sensor. The flashing red light on the sensor indicates that the sensor is activated.
3. Once the speed sensor is found, **Polar SPD xxxxxxxx** is displayed.
4. Press START, **Pairing** is displayed.
5. **Pairing completed** is displayed when the pairing is ready.
6. **Sensor linked to:** is displayed. Choose **Bike 1, Bike 2** or **Bike 3**. Confirm with START.
7. **Set wheel size** is displayed. Set the size and press START.

 *The first cycling sensor you pair will automatically be linked to **Bike 1**.*

or

1. Press START in time view to enter pre-training mode.
2. M450 starts searching for your speed sensor. Rotate the wheel a few times to activate the sensor. The flashing red light on the sensor indicates that the sensor is activated.
3. The device ID **Pair Polar SPD xxxxxxxx** is displayed. Choose **Yes**.
4. **Pairing completed** is displayed when the pairing is ready.
5. **Sensor linked to:** is displayed. Choose **Bike 1, Bike 2** or **Bike 3**. Confirm with START.
6. **Set wheel size** is displayed. Set the size and press START.

MEASURING WHEEL SIZE


Wheel size settings are a prerequisite for correct cycling information. There are two ways of determining the wheel size of your bike:

Method 1

Look for the diameter in inches or in ETRTO printed on the wheel. Match it to the wheel size in millimeters in the right column of the chart.

| ETRTO | Wheel size diameter (inches) | Wheel size setting (mm) |
|--------|------------------------------|-------------------------|
| 25-559 | 26 x 1.0 | 1884 |
| 23-571 | 650 x 23C | 1909 |
| 35-559 | 26 x 1.50 | 1947 |
| 37-622 | 700 x 35C | 1958 |
| 52-559 | 26 x 1.95 | 2022 |

| ETRTO | Wheel size diameter (inches) | Wheel size setting (mm) |
|--------|------------------------------|-------------------------|
| 20-622 | 700 x 20C | 2051 |
| 52-559 | 26 x 2.0 | 2054 |
| 23-622 | 700 x 23C | 2070 |
| 25-622 | 700 x 25C | 2080 |
| 28-622 | 700 x 28 | 2101 |
| 32-622 | 700 x 32C | 2126 |
| 42-622 | 700 x 40C | 2189 |
| 47-622 | 700 x 47C | 2220 |

 *Wheel sizes on the chart are advisory as wheel size depends on the wheel type and air pressure.*

Method 2

- Measure the wheel manually for the most accurate result.
- Use the valve to mark the point where the wheel touches the ground. Draw a line on the ground to mark that point. Move your bike forward on a flat surface for one complete rotation. The tire should be perpendicular to the ground. Draw another line on the ground at the valve to mark a full rotation. Measure the distance between the two lines.
- Subtract 4 mm to account for your weight on the bike to get your wheel circumference.

POLAR CADENCE SENSOR BLUETOOTH® SMART

The most practical way of measuring your cycling session is with our advanced wireless cadence sensor. It measures your real-time, average and maximum cycling cadence as revolutions per minute so you can compare the technique of your ride against previous rides.

- Improves your cycling technique and identifies your optimal cadence
- Interference-free cadence data lets you evaluate your individual performance
- Designed to be aerodynamic and light

PAIR CADENCE SENSOR WITH M450

Make sure the cadence sensor has been correctly installed. For more information on installing the cadence sensor refer to the user manual of the cadence sensor.

There are two ways to pair a cadence sensor with your M450:

1. Go to **General Settings > Pair and sync > Pair other device** and press START.
2. M450 starts searching for the cadence sensor. Rotate the crank a few times to activate the sensor. The flashing red light on the sensor indicates that the sensor is activated.
3. Once the cadence sensor is found, **Polar CAD xxxxxxxx** is displayed.
4. Press START, **Pairing** is displayed.
5. **Pairing completed** is displayed when the pairing is ready.
6. **Sensor linked to:** is displayed. Choose **Bike 1**, **Bike 2** or **Bike 3**. Confirm with START.

 *The first cycling sensor you pair will automatically be linked to **Bike 1**.*

or

1. Press START in time view to enter pre-training mode.
2. M450 starts searching for your cadence sensor. Rotate the crank a few times to activate the sensor. The flashing red light on the sensor indicates that the sensor is activated.
3. The device ID **Pair Polar CAD xxxxxxxx** is displayed. Choose **Yes**.
4. **Pairing completed** is displayed when the pairing is ready.
5. **Sensor linked to:** is displayed. Choose **Bike 1**, **Bike 2** or **Bike 3**. Confirm with START.

POLAR LOOK KÉO POWER SENSOR *BLUETOOTH*® SMART

With Polar LOOK Kéo Power, you can truly develop your cycling performance and technique. Perfect for ambitious cyclists, this system uses *Bluetooth*® Smart technology and consumes only a little energy.

- Measures your power output (in Watts) and force (in Newton).
- Easy to set up and switch between bikes.
- M450 shows your power output in Watts, Watts/kg or % of FTP (functional threshold power).
- M450 shows your left/right balance and current, average and maximum cadence.

Kéo Power *Bluetooth*® Smart set includes two pedals and two power transmitters.

Kéo Power Essential *Bluetooth*® Smart is an economical choice for basic power measurement. It measures your power output and force with the left hand pedal and provides your total power/force by multiplying the measurement by two. The set includes two pedals and one power transmitter.


PAIR KÉO POWER WITH M450

Before pairing Kéo Power make sure you have installed it correctly. For information on mounting the pedals and installing the transmitters see the Polar LOOK Kéo Power user manual that came in the product box, or the video tutorial.

If you have two power transmitters, you need to pair the transmitters one at a time. After pairing the first transmitter, you can immediately pair the second one. Check the device ID on the backside of each transmitter to make sure you find the correct transmitters from the list.

There are two ways to pair Keó Power with your M450:

1. Go to **General Settings > Pair and sync > Pair other device** and press START.
2. Rotate the cranks to wake up the transmitters. M450 starts searching for Kéo Power.
3. Once the it is found, **Polar PWR xxxxxxxx** is displayed.
4. Press START, **Pairing** is displayed.
5. **Pairing completed** is displayed when you are done.
6. **Sensor linked to:** is displayed. Choose **Bike 1, Bike 2** or **Bike 3**. Confirm with START. **Do you have another pedal to pair?** is displayed. If you have two transmitters, choose **Yes** to pair the other one.
7. **Set crank length:** Set the crank length in millimeters.

 *The first cycling sensor you pair will automatically be linked to **Bike 1**.*

or

1. Press START in time view to enter pre-training mode.
2. Rotate the cranks to wake up the transmitters.
3. The device ID **Pair Polar PWR xxxxxxxx** is displayed. Choose **Yes**.
4. **Pairing completed** is shown when you are done.
5. **Sensor linked to:** is displayed. Choose **Bike 1, Bike 2** or **Bike 3**. Confirm with START. **Do you have another pedal to pair?** is displayed. If you have two transmitters, choose **Yes** to pair the other one.
6. **Set crank length:** Set the crank length in millimeters.

POWER SETTINGS ON M450

Adjust the power settings to best suit your training needs. Edit the power settings in **Settings > Sport profiles**. Choose the profile you want to edit, and then choose **Bike power settings**.

In the **Bike power settings**, you'll find:

- **Power view:** Choose **Watts (W)**, **Watts/kg (W/kg)** or **% of FTP**.
- **Power, rolling average:** Choose 1, 3, 5, 10, 15, 30 or 60 second rolling average of power data.
- **Set FTP value:** Set your FTP value. The setting range is 60 to 600 watts.
- **Check power zone limits:** Check your power zone limits.

CALIBRATE KÉO POWER BEFORE STARTING A TRAINING SESSION

To calibrate Kéo power:


1. Wake up the transmitters by rotating the cranks.
2. In M450 time mode, press START to enter pre-training mode, and then choose one of the cycling sport profiles.

3. **Accuracy of power changed. Recalibrate?** is displayed on your M450. Choose **Yes** to start calibration.
4. Keep the bike upright and cranks in place until calibration is completed. The calibration takes a couple of seconds.
5. When the calibration is complete a green LED will blink on the transmitters, and you can start your session.

To ensure the calibration is done properly:

- Do not put any weight on the pedals during calibration.
- Do not interrupt the calibration.

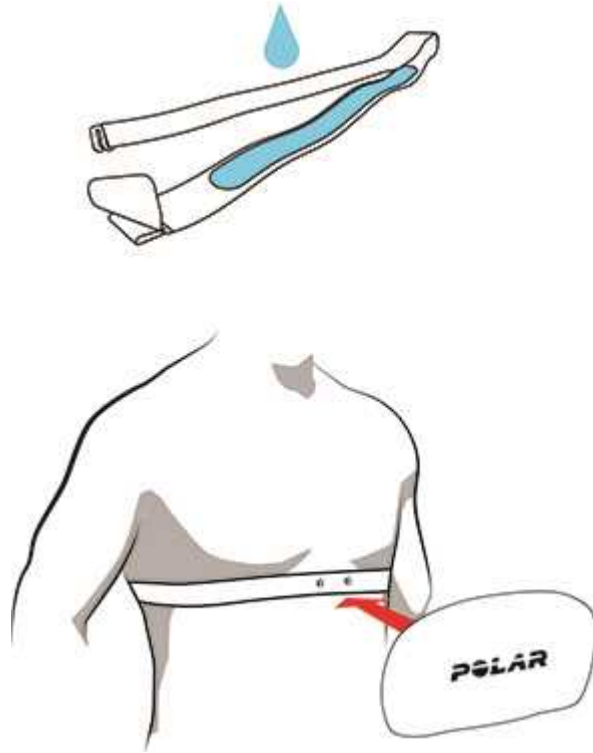
When the calibration is complete a green LED will blink on the transmitters, and you can start your session.

 *The temperature of your training environment affects calibration accuracy. If you're going to train outdoors, for example, take your bike outdoors half an hour before doing the calibration. This way your bike's temperature is about the same as that of your training environment.*

TRAINING

WEAR HEART RATE SENSOR

1. Moisten the electrode areas of the strap.
2. Attach the connector to the strap.
3. Adjust the strap length to fit tightly but comfortably. Tie the strap around your chest, just below the chest muscles, and attach the hook to the other end of the strap.
4. Check that the moist electrode areas are firmly against your skin and that the Polar logo of the connector is in a central and upright position.

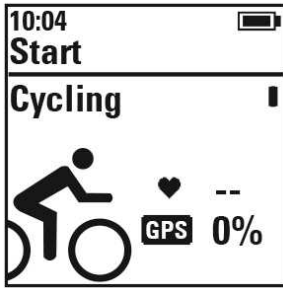


i Detach the connector from the strap, and rinse the strap under running water after every training session. Sweat and moisture may keep the heart rate sensor activated, so also remember to wipe it dry.

START A TRAINING SESSION

1. In time view, press **START** to enter pre-training mode.
2. In pre-training mode, choose the sport profile you want to use with **UP/DOWN**.

i To change the sport profile settings before starting your session in pre-training mode, press and hold **LIGHT** to enter the **Quick Menu**. To return to the pre-training mode, press **BACK**.



If you have set the GPS function on in this sport profile and/or a compatible [Bluetooth® Smart sensor](#) in use, M450 will automatically start searching for the signals.

Stay in the pre-training mode until M450 has found the GPS and sensor signals and your heart rate to make sure your training data is accurate. To catch the GPS satellite signals, go outdoors and away from tall buildings and trees. Keep your M450 still with the display facing upwards during the search. Hold the position until M450 has found the satellite signals.

Finding GPS satellite signals is faster with the help of assisted GPS (A-GPS). The A-GPS data file is automatically updated to your M450 when you sync your M450 with the Flow web service via the FlowSync software. If the A-GPS data file has expired or you haven't synced your M450 yet, more time may be needed for finding the satellite signals. For more information, see [Assisted GPS \(A-GPS\)](#).

3. When M450 has found all the signals, press START. Recording started is displayed and you can start training.



Heart rate: M450 has found your heart rate sensor signal, when your heart rate is shown.

GPS: The percentage value shown next to the GPS icon indicates when the GPS is ready. When it reaches 100 %, OK is displayed.

Cycling sensors: OK is shown next to the bike icon when M450 has found the sensor signals. If you have linked sensors to more than one bike, you'll see a number next to the bike icon indicating the bike in use. M450 chooses the bike to which the nearest sensor is linked.

Example:

You've linked a speed sensor to **Bike 1**, and another speed sensor to **Bike 2**. Both bikes are nearby when you enter the pre-training mode in M450. The speed sensor linked to **Bike 1** is closer to the M450. Therefore, M450 chooses **Bike 1** for the ride. Number 1 is show next to the bike icon.

If you wanted to use **Bike 2** instead, do either of the following:

- Return to the time mode. Then, increase the distance between M450 and **Bike 1** so that **Bike 2** is the one nearest to M450. Enter the pre-training mode again.
- Touch the sensor in **Bike 2** with M450.

START A SESSION WITH TRAINING TARGET

You can create detailed training targets in the Flow web service and sync them to your M450 via Flowsync software or Flow app. During training you can easily follow the guidance on your device.

To start a training session with a training target, do as follows:

1. Begin by going to **Diary** or **Favorites**.
2. In **Diary**, choose the day the target is scheduled and press **START**, and then choose the target from the list and press **START**. Any notes you have added to the target are displayed.

or


In **Favorites**, choose the target from the list and press **START**. Any notes you have added to the target are displayed.
3. Press **START** to enter the pre-training mode, and choose the sport profile you want to use.
4. When M450 has found all the signals, press **START**. **Recording started** is displayed and you can start training.

For more information on training targets, see [Training Targets](#).

START A SESSION WITH INTERVAL TIMER

You can set one repeating or two alternating time and/or distance based timers for guiding your work and recovery phases in interval training.

1. Begin by going to **Timers > Interval timer**. Choose **Set timer(s)** to create new timers.
2. Choose **Time-based** or **Distance-based**:
 - **Time-based**: Define minutes and seconds for the timer and press **START**.
 - **Distance-based**: Set the distance for the timer and press **START**.
3. **Set another timer?** is shown. To set another timer, choose **Yes** and repeat step 2.
4. When completed, choose **Start X.XX km / XX:XX** and press **START** to enter the pre-training mode, and then choose the sport profile you want to use.
5. When M450 has found all the signals, press **START**. **Recording started** is displayed and you can start training.

 You can also start the **Interval timer** during the session, for example after warm-up. Press and hold **LIGHT** to enter **Quick menu**, and then choose **Interval timer**.


FUNCTIONS DURING TRAINING

TAKE A LAP

Press **START** to record a lap. Laps can also be taken automatically. In sport profile settings, set **Automatic lap** to **Lap distance** or **Lap duration**. If you choose **Lap distance**, set the distance after which each lap is taken. If you choose **Lap duration**, set the duration after each lap is taken.


LOCK A HEART RATE, SPEED OR POWER ZONE

Press and hold **START** to lock the heart rate, speed or power zone you are currently in. To lock/unlock the zone, press and hold **START**. If your heart rate, speed or power goes beyond the locked zone, you will be notified with audio feedback.

 The heart rate, speed and power zones can be activated in the Flow web service. You can individually customize the zones for each sport profile they're available in. To edit the zones, sign in to the Flow web service, and click your name in the upper right corner. Choose **Sport Profiles**, and the sport profile you want to edit. The zones can be set under **Heart rate**, **Speed/Pace** and **Power Settings**. After editing the zones, sync them to your training device via **FlowSync**.




RELATED TO SPORT

| | |
|---|---|
| BASICS | |
| HEART RATE | |
| SPEED/PACE SETTINGS | |
| SPEED/PACE VIEW | ZONE LOCK AVAILABLE  |
| <input type="radio"/> km/h | <input type="radio"/> Off |
| <input checked="" type="radio"/> min/km | <input checked="" type="radio"/> On |

CHANGE PHASE DURING A PHASED SESSION

Press and hold LIGHT. **Quick menu** is displayed. Choose **Start next phase** from the list, and press START. If you have chosen automatic phase change, the phase will change automatically when you have finished a phase. You will be notified with audio feedback.

 You can create phased training targets in the Flow web service. For more information, see [Training Targets](#).

CHANGE SETTINGS IN QUICK MENU

Press and hold LIGHT. **Quick menu** is displayed. You can change certain settings without pausing your training session. For more information, see [Quick Menu](#).

PAUSE/STOP A TRAINING SESSION

1. To pause a training session, press the BACK button. **Recording paused** is displayed and the M450 goes to pause mode. To continue your training session, press START.
2. To stop a training session, press and hold the BACK button for three seconds during training recording or in pause mode until **Recording ended** is displayed.




 *Pause time is not included in the total training time.*





AFTER TRAINING




Get instant analysis and in-depth insights into your training with M450, Flow app and Flow web service.

TRAINING SUMMARY ON YOUR M450

After each training session, you'll get an instant training summary of your session. To view your training summary later, go to **Diary** and choose the day, and then choose the summary of the session you want to view.

| | |
|---|---|
| <div style="border: 1px solid black; padding: 5px;"> <p>Summary</p>  <p>Longest distance 34.20 km!</p> </div> | <p>M450 rewards you every time you reach your Personal best result in average speed/pace, distance or calories. The Personal best results are separate for each sport profile.</p> |
| <div style="border: 1px solid black; padding: 5px;"> <p>Summary</p> <p>Start time 10:42 AM</p> <p>Duration 01:18:44.3</p> <p>Distance 34.20 km</p> </div> | <p>Time when you started the session, duration of the session and distance covered during the session.</p> <p> <i>Distance is visible if the GPS function was on or Polar Speed Sensor Bluetooth® Smart in use.</i></p> |
| <div style="border: 1px solid black; padding: 5px;"> <p>Summary</p> <p>Training benefit Steady state training</p> </div> | <p>Textual feedback on your performance. The feedback is based on training time distribution on heart rate zones, calorie expenditure and duration of the session.</p> <p>Press START for more details.</p> <p> <i>Training benefit is shown if you used a heart rate sensor and trained for at least a total of 10 minutes in the heart rate zones.</i></p> |

| | | | | | | | | | | | |
|--|---|----------|---|----------|---|----------|---|----------|---|----------|---|
| <p>Summary</p> <p>HR zones</p> <table border="1"> <tr><td>5</td><td>00:01:27</td></tr> <tr><td>4</td><td>00:11:20</td></tr> <tr><td>3</td><td>00:22:02</td></tr> <tr><td>2</td><td>00:08:11</td></tr> <tr><td>1</td><td>00:07:20</td></tr> </table> | 5 | 00:01:27 | 4 | 00:11:20 | 3 | 00:22:02 | 2 | 00:08:11 | 1 | 00:07:20 | <p>Time you spent on each heart rate zone.</p> <p> <i>Visible if you used a heart rate sensor.</i></p> |
| 5 | 00:01:27 | | | | | | | | | | |
| 4 | 00:11:20 | | | | | | | | | | |
| 3 | 00:22:02 | | | | | | | | | | |
| 2 | 00:08:11 | | | | | | | | | | |
| 1 | 00:07:20 | | | | | | | | | | |
| <p>Summary</p> <p>Avg heart rate 138</p> <p>Max heart rate 162</p> | <p>Your average and maximum heart rate are shown in beats per minute and percentage of maximum heart rate.</p> <p> <i>Visible if you used a heart rate sensor.</i></p> | | | | | | | | | | |
| <p>Summary</p> <p>Calories 764 kcal</p> <p>Fat burn % of calories 30%</p> | <p>Calories burned during the session and fat burn % of calories.</p> | | | | | | | | | | |
| <p>Summary</p> <p>Speed zones</p> <table border="1"> <tr><td>5</td><td>00:00:00</td></tr> <tr><td>4</td><td>00:13:39</td></tr> <tr><td>3</td><td>00:36:25</td></tr> <tr><td>2</td><td>00:25:24</td></tr> <tr><td>1</td><td>00:00:42</td></tr> </table> | 5 | 00:00:00 | 4 | 00:13:39 | 3 | 00:36:25 | 2 | 00:25:24 | 1 | 00:00:42 | <p>Time you spent in each speed zone.</p> <p> <i>Visible if the GPS function was on or Polar Speed Sensor Bluetooth® Smart in use.</i></p> |
| 5 | 00:00:00 | | | | | | | | | | |
| 4 | 00:13:39 | | | | | | | | | | |
| 3 | 00:36:25 | | | | | | | | | | |
| 2 | 00:25:24 | | | | | | | | | | |
| 1 | 00:00:42 | | | | | | | | | | |
| <p>Summary</p> <p>Average speed 30.4 km/h</p> <p>Maximum speed 42.7 km/h</p> | <p>Average and maximum speed/pace of the session.</p> <p> <i>Visible if the GPS function was on or Polar Speed Sensor Bluetooth® Smart in use.</i></p> | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|--|------------------------|--|------------------------|------------------------|------------------------|------------------------|--|------------------------|--|-------------------|--|-----------------|----------|-----------------|---|
| <table border="1"> <tr><td colspan="2">Summary</td></tr> <tr><td>Average cadence</td><td>86</td></tr> <tr><td>Maximum cadence</td><td>108</td></tr> </table> | Summary | | Average cadence | 86 | Maximum cadence | 108 | <p>Average and maximum cadence of the session.</p> <p> <i>Visible if Polar LOOK Kéo Power sensor or Polar Cadence Sensor Bluetooth® Smart in use.</i></p> | | | | | | | | |
| Summary | | | | | | | | | | | | | | | |
| Average cadence | 86 | | | | | | | | | | | | | | |
| Maximum cadence | 108 | | | | | | | | | | | | | | |
| <table border="1"> <tr><td colspan="2">Summary</td></tr> <tr><td>Avg power</td><td>230_w</td></tr> <tr><td>Max power</td><td>269_w</td></tr> </table> | Summary | | Avg power | 230_w | Max power | 269_w | <p>Average and maximum power of the session.</p> <p> <i>Visible if Polar LOOK Kéo Power sensor in use.</i></p> | | | | | | | | |
| Summary | | | | | | | | | | | | | | | |
| Avg power | 230_w | | | | | | | | | | | | | | |
| Max power | 269_w | | | | | | | | | | | | | | |
| <table border="1"> <tr><td colspan="2">Summary</td></tr> <tr><td colspan="2">Power zones</td></tr> <tr><td>5</td><td>00:00:00</td></tr> <tr><td>4</td><td>00:18:05</td></tr> <tr><td>3</td><td>00:40:06</td></tr> <tr><td>2</td><td>00:15:52</td></tr> <tr><td>1</td><td>00:05:45</td></tr> </table> | Summary | | Power zones | | 5 | 00:00:00 | 4 | 00:18:05 | 3 | 00:40:06 | 2 | 00:15:52 | 1 | 00:05:45 | <p>Time you spent on each power zone.</p> <p> <i>Visible if Polar LOOK Kéo Power sensor in use.</i></p> |
| Summary | | | | | | | | | | | | | | | |
| Power zones | | | | | | | | | | | | | | | |
| 5 | 00:00:00 | | | | | | | | | | | | | | |
| 4 | 00:18:05 | | | | | | | | | | | | | | |
| 3 | 00:40:06 | | | | | | | | | | | | | | |
| 2 | 00:15:52 | | | | | | | | | | | | | | |
| 1 | 00:05:45 | | | | | | | | | | | | | | |
| <table border="1"> <tr><td colspan="2">Summary</td></tr> <tr><td>Max altitude</td><td>148_m</td></tr> <tr><td>Ascent</td><td>418_m</td></tr> <tr><td>Descent</td><td>390_m</td></tr> </table> | Summary | | Max altitude | 148_m | Ascent | 418_m | Descent | 390_m | <p>Maximum altitude, ascended meters/feet and descended meters/feet.</p> | | | | | | |
| Summary | | | | | | | | | | | | | | | |
| Max altitude | 148_m | | | | | | | | | | | | | | |
| Ascent | 418_m | | | | | | | | | | | | | | |
| Descent | 390_m | | | | | | | | | | | | | | |
| <table border="1"> <tr><td colspan="2">Summary</td></tr> <tr><td colspan="2">Laps</td></tr> <tr><td colspan="2"><small>(2)</small></td></tr> <tr><td>Best lap</td><td>00:19:00.5</td></tr> <tr><td>Average lap</td><td>00:19:00.5</td></tr> </table> | Summary | | Laps | | <small>(2)</small> | | Best lap | 00:19:00.5 | Average lap | 00:19:00.5 | <p>The number of laps and the best and average duration of a lap.</p> <p>Press START for more details.</p> | | | | |
| Summary | | | | | | | | | | | | | | | |
| Laps | | | | | | | | | | | | | | | |
| <small>(2)</small> | | | | | | | | | | | | | | | |
| Best lap | 00:19:00.5 | | | | | | | | | | | | | | |
| Average lap | 00:19:00.5 | | | | | | | | | | | | | | |

| | |
|---|---|
| <p>Summary</p> <hr/> <p>Automatic laps (5)</p> <p>Best lap 00:09:06.0</p> <p>Average lap 00:09:44.5 ■</p> | <p>The number of automatic laps and the best and average duration of an automatic lap.</p> <p>Press START for more details.</p> |
|---|---|

POLAR FLOW APP

Sync your M450 with Flow app to analyze your data at a glance after each session. The Flow app allows you to see a quick overview of your training data.

For information, see [Polar Flow App](#).

POLAR FLOW WEB SERVICE

The Polar Flow web service allows you to analyze every detail of your training and learn more about your performance. Follow your progress and also share your best sessions with others.

For more information, see [Polar Flow Web Service](#).

FEATURES

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ASSISTED GPS (A-GPS)

The M450 has built-in GPS that provides accurate speed and distance measurement for a range of outdoor sports, and allows you to see your route on map in the Flow app and web service after your session.

M450 uses AssistNow® Offline service to acquire a fast satellite fix. The AssistNow Offline service provides A-GPS data that tells your M450 the predicted positions of the GPS satellites. This way the M450 knows where to search for the satellites and thus is able to acquire signals from them within seconds, even under difficult signal conditions.

The A-GPS data updates once a day. The latest A-GPS data file is automatically updated to your M450 when you sync your M450 with the Flow web service via the FlowSync software.

A-GPS EXPIRY DATE

The A-GPS data file is valid for up to 14 days. Finding GPS satellite signals is relatively fast during the first three days. Time needed for the satellite fix progressively increases during the 10th-14th days. Regular updates help to ensure a fast satellite fix.

You can check the expiry date for the current A-GPS data file from your M450. In M450, go to **Settings > General settings > About your product > A-GPS exp. date**. If the data file has expired, sync your M450 with the Flow web service via the FlowSync software to update A-GPS data.

Once the A-GPS data file has expired, more time may be needed for finding the satellite signals.

GPS FEATURES

M450 includes the following GPS features:

- **Distance:** Accurate distance during and after your session.
- **Speed/Pace:** Accurate speed/pace information during and after your session.
- **Back to start:** Directs you to your starting point in the shortest distance possible, as well as shows the distance to your starting point. Now you can check out more adventurous routes and explore them safely, knowing that you're only a touch of a button away from seeing the direction to where you started.

BACK TO START


The back to start feature guides you back to the starting point of your session.

To use the back to start feature:

1. Press and hold LIGHT. **Quick menu** is displayed.
2. Choose **Set location guide on**, **Location guide arrow view set on** is displayed, and M450 goes to **Back to Start** view.

To return to your starting point:

- Keep moving in order for M450 to determine which direction you are going. An arrow will point in the direction of your starting point.
- To get back to the starting point, always turn in the direction of the arrow.
- The M450 also shows the bearing and the direct distance (beeline) between you and the starting point.

 *When in unfamiliar surroundings, always keep a map at hand in case the M450 loses the satellite signal or the battery runs out.*

BAROMETER


The barometer features include:

- Altitude, ascent and descent
- Temperature during training (can be viewed on the display)
- Inclinator (Requires Speed Sensor Bluetooth® Smart)
- Real time VAM (mean ascent velocity)
- Altitude-compensated calories

M450 measures altitude with an atmospheric air pressure sensor and converts the measured air pressure into an altitude reading. This is the most accurate way to measure altitude and altitude changes (ascent / descent) after calibration. Ascent and descent are shown in meters/feet. Uphill/downhill steepness is shown in percentages and grade, and is only visible during training when using a Speed Sensor Bluetooth® Smart.

To make sure that the altitude reading remains accurate, it needs to be calibrated whenever a reliable reference, such as a peak or a topographic map, is available or when at sea level. Pressure variations due to weather conditions, or indoor air-conditioning, may affect altitude readings.

The temperature shown is the temperature of your M450.

 *Altitude is automatically calibrated with GPS, and it will be shown in gray until it's calibrated. To get the most accurate altitude readings, it's recommended to always calibrate altitude manually when you know your current altitude. Manual calibration can be done in the pre-training view or in the training view quick menu. For more information, see [Quick Menu](#).*

SMART COACHING

Whether it's assessing your day-to-day fitness levels, creating individual training plans, working out at the right intensity or receiving instant feedback, Smart Coaching offers a choice of unique, easy-to-use features, personalized to your needs and designed for maximum enjoyment and motivation when training.

M450 includes the following Smart Coaching features:

- Training Benefit
- Training Load and Recovery (this feature is available in the Polar Flow web service)
- Fitness Test
- Orthostatic Test
- Heart rate zones
- Smart calories

TRAINING BENEFIT

The Training Benefit feature helps you better understand the effectiveness of your training. This feature requires the use of the heart rate sensor. After each training session you get textual feedback on your performance providing that you have trained at least a total of 10 minutes in the sport zones. The feedback is based on training time distribution on sport zones, calorie expenditure and duration. In Training Files you get the feedback in more detail. The descriptions of different training benefit options are listed in the table below

| Feedback | Benefit |
|-------------------|---|
| Maximum training+ | That was a hard session! You improved your sprint speed and |

| Feedback | Benefit |
|-------------------------------------|---|
| | the nervous system of your muscles, which make you more efficient. This session also increased your resistance to fatigue. |
| Maximum training | That was a hard session! You improved your sprint speed and the nervous system of your muscles, which make you more efficient. |
| Maximum & Tempo training | What a session! You improved your speed and efficiency. This session also significantly developed your aerobic fitness and your ability to sustain high intensity effort for longer. |
| Tempo & Maximum training | What a session! You significantly improved your aerobic fitness and your ability to sustain high intensity effort for longer. This session also developed your speed and efficiency. |
| Tempo training+ | Great pace in a long session! You improved your aerobic fitness, speed, and ability to sustain high intensity effort for longer. This session also increased your resistance to fatigue. |
| Tempo training | Great pace! You improved your aerobic fitness, speed, and ability to sustain high intensity effort for longer. |
| Tempo & Steady state training | Good pace! You improved your ability to sustain high intensity effort for longer. This session also developed your aerobic fitness and the endurance of your muscles. |
| Steady state & Tempo training | Good pace! You improved your aerobic fitness and the endurance of your muscles. This session also developed your ability to sustain high intensity effort for longer. |
| Steady state training + | Excellent! This long session improved the endurance of your muscles and your aerobic fitness. It also increased your resistance to fatigue. |
| Steady state training | Excellent! You improved the endurance of your muscles and your aerobic fitness. |
| Steady state & Basic training, long | Excellent! This long session improved the endurance of your muscles and your aerobic fitness. It also developed your basic endurance and your body's ability to burn fat during exercise. |
| Steady state & Basic training | Excellent! You improved the endurance of your muscles and your aerobic fitness. This session also developed your basic endurance and your body's ability to burn fat during exercise. |

| Feedback | Benefit |
|-------------------------------------|---|
| Basic & Steady state training, long | Great! This long session improved your basic endurance and your body's ability to burn fat during exercise. It also developed the endurance of your muscles and your aerobic fitness. |
| Basic & Steady state training | Great! You improved your basic endurance and your body's ability to burn fat during exercise. This session also developed the endurance of your muscles and your aerobic fitness. |
| Basic training, long | Great! This long, low intensity session improved your basic endurance and your body's ability to burn fat during exercise. |
| Basic training | Well done! This low intensity session improved your basic endurance and your body's ability to burn fat during exercise. |
| Recovery training | Very nice session for your recovery. Light exercise like this allows your body to adapt to your training. |

TRAINING LOAD AND RECOVERY

The training load feature in the Diary in Polar Flow web service will conveniently tell you how hard your training session was, and how much time is needed for complete recovery. This feature tells you if you have recovered enough for your next session, helping you find the balance between rest and training. In Polar Flow web service you can control your total workload, optimize your training, and monitor your performance development.

Training load takes into consideration different factors which affect your training load and recovery time, such as heart rate during training, duration of training, and your individual factors, e.g. sex, age, height, and weight. Continuous monitoring of training load and recovery will help you recognize personal limits, avoid over or under training, and adjust training intensity and duration according to your daily and weekly targets.

Training Load feature helps you to control total workload, optimize your training, and monitor your performance development. The feature makes different kinds of training sessions comparable with each other, and helps you to find the perfect balance between rest and training.

FITNESS TEST

The Polar Fitness Test is an easy, safe and quick way to estimate your aerobic (cardiovascular) fitness at rest. The result, Polar OwnIndex, is comparable to maximal oxygen uptake (VO_{2max}), which is commonly used to evaluate aerobic fitness. Your long-term training background, heart rate, heart rate variability at rest, gender, age, height, and body weight all influence OwnIndex. The Polar Fitness Test is developed for use by healthy adults.

Aerobic fitness relates to how well your cardiovascular system works to transport oxygen to your body. The better your aerobic fitness, the stronger and more efficient your heart is. Good aerobic fitness has many health benefits. For example, it helps in decreasing the risk of high blood pressure and your risk of cardiovascular diseases and stroke. If you want to improve your aerobic fitness it takes, on average, six weeks of regular training to see a noticeable change in your OwnIndex. Less fit individuals see progress even more rapidly. The better your aerobic fitness, the smaller the improvements in your OwnIndex.

Aerobic fitness is best improved by training types that use large muscle groups. Such activities include running, cycling, walking, rowing, swimming, skating, and cross-country skiing. To monitor your progress, start by measuring your OwnIndex a couple of times during the first two weeks in order to get a baseline value, and then repeat the test approximately once a month.

To make sure the test results are reliable, the following basic requirements apply:

- You can perform the test anywhere - at home, at the office, at a health club - provided the testing environment is peaceful. There should be no disturbing noises (e.g. television, radio, or telephone) and no other people talking to you.
- Always take the test in the same environment and at the same hour.
- Avoid eating a heavy meal or smoking 2-3 hours prior to testing.
- Avoid heavy physical exertion, alcohol, and pharmaceutical stimulants on the test day and the previous day.
- You should be relaxed and calm. Lie down and relax for 1-3 minutes before starting the test.

BEFORE THE TEST

Wear your heart rate sensor. For more information, see [Wear Heart Rate Sensor](#).

Before starting the test, make sure your physical settings including training background are accurate in **Settings > Physical settings**

PERFORMING THE TEST

To perform the fitness test, go to **Tests > Fitness Test > Relax and start the test**.

- **Searching for heart rate** is displayed. When heart rate is found, a heart rate graph, your current heart rate and **Lie down & relax** is shown on the display. Stay relaxed and limit body movements and communication with other people.
- You can interrupt the test in any phase by pressing **BACK**. **Test canceled** is displayed.

If M450 cannot receive your heart rate signal, the message **Test failed** is displayed. In which case, you should check that the heart rate sensor electrodes are wet and that the textile strap fits snugly.

TEST RESULTS

When the test is over, you hear two beeps along with a description of your fitness test result and your estimated VO_{2max} is displayed.

Update to VO2max to physical settings? is displayed.

- Select **Yes** to save the value to your **Physical settings**.
- Select **No** only if you know your recently measured VO_{2max} value, and if it differs more than one fitness level class from the result.

Your latest test result is shown in **Tests > Fitness test > Latest result**. Only your most recently performed test result is shown.

For a visual analysis of your Fitness test results, go to the Flow web service and select the test from your Diary to view details from it.

Fitness Level Classes

Men

| Age / Years | Very low | Low | Fair | Moderate | Good | Very good | Elite |
|-------------|----------|-------|-------|----------|-------|-----------|-------|
| 20-24 | < 32 | 32-37 | 38-43 | 44-50 | 51-56 | 57-62 | > 62 |
| 25-29 | < 31 | 31-35 | 36-42 | 43-48 | 49-53 | 54-59 | > 59 |
| 30-34 | < 29 | 29-34 | 35-40 | 41-45 | 46-51 | 52-56 | > 56 |
| 35-39 | < 28 | 28-32 | 33-38 | 39-43 | 44-48 | 49-54 | > 54 |
| 40-44 | < 26 | 26-31 | 32-35 | 36-41 | 42-46 | 47-51 | > 51 |
| 45-49 | < 25 | 25-29 | 30-34 | 35-39 | 40-43 | 44-48 | > 48 |
| 50-54 | < 24 | 24-27 | 28-32 | 33-36 | 37-41 | 42-46 | > 46 |
| 55-59 | < 22 | 22-26 | 27-30 | 31-34 | 35-39 | 40-43 | > 43 |
| 60-65 | < 21 | 21-24 | 25-28 | 29-32 | 33-36 | 37-40 | > 40 |

Women

| Age / Years | Very low | Low | Fair | Moderate | Good | Very good | Elite |
|-------------|----------|-------|-------|----------|-------|-----------|-------|
| 20-24 | < 27 | 27-31 | 32-36 | 37-41 | 42-46 | 47-51 | > 51 |
| 25-29 | < 26 | 26-30 | 31-35 | 36-40 | 41-44 | 45-49 | > 49 |
| 30-34 | < 25 | 25-29 | 30-33 | 34-37 | 38-42 | 43-46 | > 46 |

| Age / Years | Very low | Low | Fair | Moderate | Good | Very good | Elite |
|-------------|----------|-------|-------|----------|-------|-----------|-------|
| 35-39 | < 24 | 24-27 | 28-31 | 32-35 | 36-40 | 41-44 | > 44 |
| 40-44 | < 22 | 22-25 | 26-29 | 30-33 | 34-37 | 38-41 | > 41 |
| 45-49 | < 21 | 21-23 | 24-27 | 28-31 | 32-35 | 36-38 | > 38 |
| 50-54 | < 19 | 19-22 | 23-25 | 26-29 | 30-32 | 33-36 | > 36 |
| 55-59 | < 18 | 18-20 | 21-23 | 24-27 | 28-30 | 31-33 | > 33 |
| 60-65 | < 16 | 16-18 | 19-21 | 22-24 | 25-27 | 28-30 | > 30 |

The classification is based on a literature review of 62 studies where VO_{2max} was measured directly in healthy adult subjects in the USA, Canada and 7 European countries. Reference: Shvartz E, Reibold RC. Aerobic fitness norms for males and females aged 6 to 75 years: a review. *Aviat Space Environ Med*; 61:3-11, 1990.

VO_{2MAX}

A clear link exists between maximal oxygen consumption (VO_{2max}) of the body and cardiorespiratory fitness because oxygen delivery to tissues is dependent on lung and heart function. VO_{2max} (maximal oxygen uptake, maximal aerobic power) is the maximal rate at which oxygen can be used by the body during maximal exercise; it is related directly to the maximal capacity of the heart to deliver blood to the muscles. VO_{2max} can be measured or predicted by fitness tests (e.g. maximal exercise tests, submaximal exercise tests, Polar Fitness Test). VO_{2max} is a good index of cardiorespiratory fitness and a good predictor of performance capability in endurance events such as distance running, cycling, cross-country skiing, and swimming.

VO_{2max} can be expressed either as milliliters per minute ($ml/min = ml \cdot min^{-1}$) or this value can be divided by the person's body weight in kilograms ($ml/kg/min = ml \cdot kg^{-1} \cdot min^{-1}$).

ORTHOSTATIC TEST

Orthostatic test is a generally used tool for monitoring the balance between training and recovery. It is based on the training-induced changes in the function of your autonomic nervous system. Orthostatic test results are affected by several external factors, such as mental stress, sleep, latent illness, environmental changes (temperature, altitude), and others. Long term follow-up helps you to optimize your training and prevent overtraining.

Orthostatic test is based on the measurement of heart rate and heart rate variability. Changes in heart rate and heart rate variability reflect the changes in autonomic regulation of the cardiovascular system. During the test HR_{rest} , HR_{stand} and HR_{peak} are measured. Heart rate and heart rate variability measured during orthostatic test are good indicators of disturbances in the autonomic nervous system, for example fatigue or overtraining. However, heart rate responses to fatigue and overtraining are always individual, and require longer term follow-up.

BEFORE THE TEST

When you perform the test for the first time, six baseline tests should be conducted over a period of two weeks to determine your personal baseline value. These baseline measurements should be taken during two typical basic training weeks, not during heavy training weeks. The baseline measurements should include tests taken both after training days and after recovery days.

After the baseline recordings, you should continue to perform the test 2-3 times a week. Test yourself weekly in the morning following both a recovery day and a heavy training day (or a series of heavy training days). An optional third test can be performed after a normal training day. The test may not provide reliable information during detraining or in a very irregular training period. If you take a break from exercise for 14 days or longer, you should consider resetting your long-term averages and perform the baseline tests again

The test should always be taken in standardized/similar conditions in order to get the most reliable results. It is recommended that you take the test in the morning before breakfast. The following basic requirements apply:

Wear the heart rate sensor.

- You should be relaxed and calm.

You can be seated in a relaxed position or lying in bed. The position should always be the same when you do the test.

The test can take place anywhere – at home, in the office, at a health club – as long as the test environment is peaceful. There should be no disturbing noises (for example, television, radio or telephone) or other people talking to you.

Avoid eating, drinking and smoking 2-3 hours prior to the test.

- It is recommended to perform the test regularly and at the same time of day to get comparable test results, preferably in the morning after waking up.

PERFORMING THE TEST

Choose **Tests > Orthostatic test > Relax and start the test. Searching for heart rate** is displayed. When heart rate is found **Lie down & relax** is shown on the display.

- Your heart rate graph is shown on the display. Do not move during this first part of the test, which lasts 3 minutes.
- After 3 minutes, the M450 will beep and **Stand up** is displayed. Stand up and remain standing still for 3 minutes.
- After 3 minutes, the M450 will beep again and the test is finished.
- You can interrupt the test in any phase by pressing **BACK**. **Test canceled** is displayed.

If M450 cannot receive your heart rate signal, the message **Test failed** is displayed. In which case, you should check that the heart rate sensor electrodes are wet and that the textile strap fits snugly.

TEST RESULTS


As a result you see your HR_{rest}, HR_{stand} and HR_{peak} values compared with the average of your previous results.


Your latest test result is shown in **Tests > Orthostatic test > Latest result**. Only your most recently performed test result is shown.


In the Flow web service you can follow your test results in the long-term. For a visual analysis of your Orthostatic test results, go to the Flow web service and select the test from your Diary to view details from it.

HEART RATE ZONES

Polar heart rate zones introduce a new level of effectiveness in heart rate-based training. Training is divided into five heart rate zones based on percentages of maximum heart rate. With heart rate zones, you can easily select and monitor training intensities.

| Target zone | Intensity % of HR _{max} HR _{max} = Maximum heart rate (220-age). | Example: Heart rate zones (in beats per minute) for a 30-years-old person, whose maximum heart rate is 190 bpm (220-30). | Example durations | Training effect |
|--|---|--|---------------------|--|
| MAXIMUM  | 90-100% | 171-190 bpm | less than 5 minutes | Benefits: Maximal or near maximal effort for breathing and muscles. Feels like: Very exhausting for breathing and muscles. Recommend |

| Target zone | Intensity % of HR _{max} HR _{max} = Maximum heart rate (220-age). | Example: Heart rate zones (in beats per minute) for a 30-years-old person, whose maximum heart rate is 190 bpm (220-30). | Example durations | Training effect |
|---|---|--|-------------------|---|
| | | | | ed for: Very experienced and fit athletes. Short intervals only, usually in final preparation for short events. |
| <p>HARD</p>  | 80-90% | 152-172 bpm | 2-10 minutes | <p>Benefits: Increased ability to sustain high speed endurance.</p> <p>Feels like: Causes muscular fatigue and heavy breathing.</p> <p>Recommended for: Experienced athletes for year-round training, and</p> |

| Target zone | Intensity % of HR _{max} HR _{max} = Maximum heart rate (220-age). | Example: Heart rate zones (in beats per minute) for a 30-years-old person, whose maximum heart rate is 190 bpm (220-30). | Example durations | Training effect |
|--|---|--|-------------------|--|
| | | | | for various durations. Becomes more important during pre competition season. |
| MODERATE  | 70-80% 133-152 bpm | | 10-40 minutes | Benefits: Enhances general training pace, makes moderate intensity efforts easier and improves efficiency. Feels like: Steady, controlled, fast breathing. Recommended for: Athletes training for |

| Target zone | Intensity % of HR _{max} HR _{max} = Maximum heart rate (220-age). | Example: Heart rate zones (in beats per minute) for a 30-years-old person, whose maximum heart rate is 190 bpm (220-30). | Example durations | Training effect |
|---|---|--|-------------------|--|
| | | | | events, or looking for performance gains. |
| LIGHT  | 60-70% | 114-133 bpm | 40-80 minutes | <p>Benefits: Improves general base fitness, improves recovery and boosts metabolism.</p> <p>Feels like: Comfortable and easy, low muscle and cardiovascular load.</p> <p>Recommended for: Everybody for long training sessions during base training periods and for recovery exercises</p> |

| Target zone | Intensity % of HR _{max} HR _{max} = Maximum heart rate (220-age). | Example: Heart rate zones (in beats per minute) for a 30-years-old person, whose maximum heart rate is 190 bpm (220-30). | Example durations | Training effect |
|--|---|--|-------------------|--|
| | | | | during competition season. |
| VERY LIGHT  | 50-60% | 104-114 bpm | 20-40 minutes | Benefits: Helps to warm up and cool down and assists recovery. Feels like: Very easy, little strain. Recommended for: For recovery and cool-down, throughout training season. |

Training in heart rate zone 1 is done at a very low intensity. The main training principle is that performance improves when recovering after, and not only during training. Accelerate the recovery process with very light intensity training.

Training in heart rate zone 2 is for endurance training, an essential part of any training program. Training sessions in this zone are easy and aerobic. Long-duration training in this light zone results in effective energy expenditure. Progress will require persistence.

Aerobic power is enhanced in heart rate zone 3. The training intensity is higher than in sport zones 1 and 2, but still mainly aerobic. Training in sport zone 3 may, for example, consist of intervals followed by recovery. Training in this zone is especially effective for improving the efficiency of blood circulation in the heart and skeletal muscles.

If your goal is to compete at top potential, you will have to train in heart rate zones 4 and 5. In these zones, you exercise anaerobically in intervals of up to 10 minutes. The shorter the interval, the higher the intensity. Sufficient recovery between intervals is very important. The training pattern in zones 4 and 5 is designed to produce peak performance.

The Polar target heart rate zones can be personalized by using a laboratory measured HRmax value, or by taking a field test to measure the value yourself. When training in a target heart rate zone, try to make use of the entire zone. The mid-zone is a good target, but keeping your heart rate at that exact level all the time is not necessary. Heart rate gradually adjusts to training intensity. For instance, when crossing from heart rate target zone 1 to 3, the circulatory system and heart rate will adjust in 3-5 minutes.

Heart rate responds to training intensity depending on factors such as fitness and recovery levels, as well as environmental factors. It is important to look out for subjective feelings of fatigue, and to adjust your training program accordingly.

SMART CALORIES

The most accurate calorie counter on the market calculates the number of calories burned. The energy expenditure calculation is based on:

- Body weight, height, age, gender
- Individual maximum heart rate (HR_{max})
- Heart rate during training
- Individual maximal oxygen uptake ($VO2_{max}$)
- Altitude

SPEED AND POWER ZONES

With the speed and power zones you can easily monitor speed or power during your session, and adjust your speed or power to achieve the targeted training effect. The zones can be used to guide the efficiency of your training during sessions, and help you mix different training intensities for optimal results.

SETTINGS


The speed and power zone settings can be adjusted in the Flow web service. They can be turned on or off in the sport profiles they are available in. There are five different zones, and the zone limits can be manually adjusted or you can use the default ones. They are sport specific, allowing you to adjust the zones to best suit each sport. The zones are available in running sports (including team sports that involve running), cycling sports as well as rowing and canoeing.

Default

If you choose **Default**, you cannot change the limits. The default zones are optimized for a person with a relatively high fitness level.

Free

If you choose **Free**, all limits can be changed. For example, if you have tested your actual thresholds, such as the anaerobic and aerobic thresholds, or the upper and lower lactate thresholds, you can train with the zones based on your individual threshold speed or pace. We recommend that you set your anaerobic threshold speed and pace as the minimum for zone 5. If you also use the aerobic threshold, set that as the minimum of zone 3.

 *You can create training targets based on speed zones. After synchronizing the targets via FlowSync, you'll receive guidance from your training device during training.*

DURING TRAINING

During your training you can view which zone you are currently training in and the time spent in each zone.

AFTER TRAINING

In the training summary on M450, you'll see an overview of the time spent in each speed or power zone. After syncing, detailed visual speed or power zone information can be viewed in the Flow web service.

SPORT PROFILES

Lets you list all your favorite sports and define specific settings for each one of them. For example, you can create tailored views for each sport you do and choose what data you want to see when you train: just your heart rate or just speed and distance – whatever suits you and your training needs and requirements best.

For more information, see [Sport Profiles Settings](#) and [Sport Profiles in Flow Web Service](#).



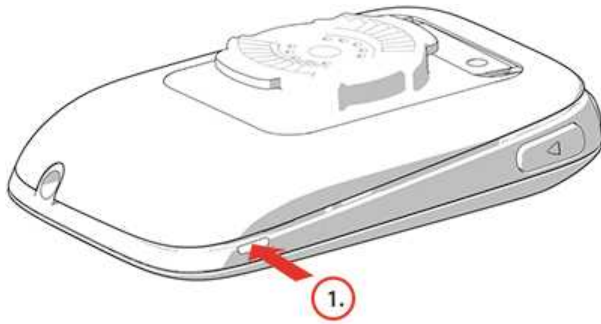
Please note that in a number of indoor sports, group sports and team sports profiles the **HR visible to other devices** setting is enabled by default. This means that compatible devices using Bluetooth Smart wireless technology, e.g. gym equipment, can detect your heart rate. You can check which sport profiles have Bluetooth broadcasting enabled by default from the [Polar Sport profiles list](#). You can enable or disable Bluetooth broadcasting from [sport profile settings](#).

CHANGEABLE COVER

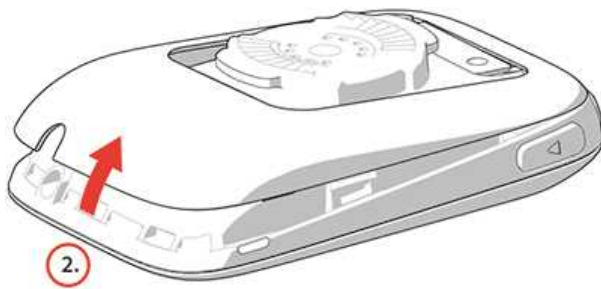
Change the M450 back cover to match the colors of your bike perfectly! You can buy additional back covers in different colors separately.

To change the cover

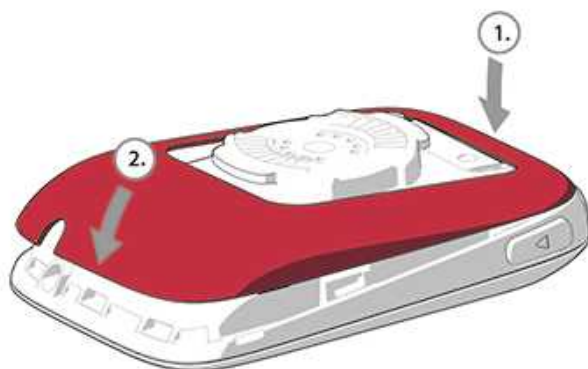
At the top right corner of M450, put your thumbnail in the groove between the case and the back cover to open the cover slightly.



Using your other thumbnail, open the cover a bit more from the top of M450. Then, lift the cover off.



Place the bottom edge of the color back cover against the bottom edge of M450 (1). Then press the top of the cover until it snaps into place (2).



POLAR FLOW WEB SERVICE

The Polar Flow web service allows you to plan and analyze every detail of your training and learn more about your performance. Set up and customize M450 to perfectly fit your training needs by adding sports and tailoring settings and training views. Follow and visually analyze your progress, create training targets, and add them to your favorites.

With the Flow web service you can:

- Analyze all of your training details with visual graphs and a route view
- Compare specific data with others like laps or speed vs. heart rate
- See how your training load affects your cumulative recovery status
- See long-term progress by following the trends and details which matter to you the most
- Follow your progress with sports specific weekly or monthly reports
- Share highlights with your followers
- Relive your and other users' sessions afterward

To start using the Flow web service, go to flow.polar.com/start, and create your Polar account if you do not already have one. Download and install FlowSync software from the same place to allow you to sync data between M450 and Flow web service.

Feed

In **Feed** you can see what you've been up to lately, plus you can see your friends' activities and comments.

Explore

In **Explore** you can discover training sessions and routes by browsing the map. You can add routes to your favorites but they will not be synced to the M450. See public training sessions that other users have shared, and relive your own or other people's routes and see where the highlights happened.

Diary

In **Diary** you can see your scheduled training sessions, as well as review past results. Information shown includes: training plans in day, week or month view, individual sessions, tests and weekly summaries.

Progress


In **Progress** you can follow your development with reports. Reports are a handy way to follow your progress in training over longer periods. In week, month and year reports you can choose the sport for the report. In custom period, you can choose both the period and the sport. Choose the time period and sport for report from the drop down lists, and press the wheel icon to choose what data you want to view in the report graph.

For support and more information about using the Flow web service, go to, www.polar.com/en/support/flow

TRAINING TARGETS

Create detailed training targets in the Flow web service and sync them to your M450 via Flowsync software or Flow app. During training you can easily follow the guidance on your device.


- **Quick Target:** Fill in one value. Choose a duration, distance or calorie target.
- **Phased Target:** You can split your training into phases and create a different target duration or distance and intensity for each of them. This one is for e.g. creating an interval training session, and adding proper warmup and cool down phases to it.
- **Favorites:** Create a target, and add it to **Favorites** to easily access it every time want to perform it again.

 Remember to sync your training targets to your M450 from the Flow web service via FlowSync or Flow App. If you do not sync them, they are only visible in your Flow web service Diary or Favorites list.


CREATE A TRAINING TARGET

1. Go to **Diary**, and click **Add > Training target**.
2. In the **Add training target** view, choose **Quick**, **Phased** or **Favorite** (**Race Pace** target is not available for Polar M450).

QUICK TARGET

1. Choose **Quick**.
2. Choose **Sport**, enter **Target name** (required), **Date** (optional) and **Time**(optional) and any **Notes** (optional) you want to add.
3. Fill in one of the following values: duration, distance or calories . You can only fill in one of the values.
4. Click **Save** to add the target to your **Diary**, or the favorites icon  to add it to your **Favorites**.

PHASED TARGET

1. Choose **Phased**.
2. Choose **Sport**, enter **Target name** (required), **Date** (optional) and **Time**(optional) and any **Notes** (optional) you want to add.
3. Add phases to your target. Choose distance or duration for each phase, manual or automatic next phase start and the intensity.
4. Click **Save** to add the target to your **Diary**, or the favorites icon  to add it to your **Favorites**.

FAVORITES

If you have created a target, and added it to your favorites you can use it as a scheduled target.

1. Choose **Favorites**. Your training target favorites are shown.
2. Click the favorite you want to use as a template for your target.
3. Choose **Sport**, enter **Target name** (required), **Date** (optional) and **Time** (optional) and any **Notes** (optional) you want to add.
4. You can edit the target if you wish, or leave it as it is.
5. Click **Update changes** to save changes made to the favorite. Click **Add to diary** to add the target to your **Diary** without updating the favorite.

After syncing your training targets to your M450, you can find:

- Scheduled training targets in **Diary** (current week and the next 4 weeks)
- Training targets listed as favorites in **Favorites**

When starting your session, access your target from **Diary** or **Favorites**.


For information on starting a training target session, see "Start a Training Session" on page 32

FAVORITES


In **Favorites**, you can store and manage your favorite training targets in the Flow web service and the Flow mobile app. You can use your favorites as scheduled targets on your watch. For more information, see [Plan your training in the Flow web service](#).

You can see the maximum number of your watch. The number of favorites in the Flow web service is not limited. If you have over 20 favorites in the Flow web service, the first 20 in the list are transferred to your watch when syncing. You can change the order of your favorites by dragging and dropping them. Choose the favorite you want to move and drag it into the place you want to put it in the list.


ADD A TRAINING TARGET TO FAVORITES:

1. [Create a training target](#).
2. Click the favorites icon  on the lower right corner of the page.
3. The target is added to your favorites.

or


1. Open an existing target you've created from your **Diary**.
2. Click the favorites icon  on the lower right corner of the page.
3. The target is added to your favorites.

EDIT A FAVORITE

1. Click the favorites icon  on the upper right corner next to your name. All your favorite training targets are shown.
2. Click the favorite you want to edit, then click **Edit**.

3. You can change the sport, the target name, and you can add notes. You can alter the training details of the target under **Quick** or **Phased**. (For more information, see the chapter on [planning your training](#).) After you've done all the needed changes, click **Update changes**.

REMOVE A FAVORITE

1. Click the favorites icon  on the upper right corner next to your name. All your favorite training targets are shown.
2. Click the delete icon in upper right corner of the training target to remove it from the favorites list.

SPORT PROFILES IN FLOW WEB SERVICE

There are six sport profiles on your M450 by default. In the Flow web service you can add new sport profiles to your sports list, as well as edit them and existing profiles. Your M450 can contain a maximum of 20 sport profiles. The number of sport profiles in the Flow web service is not limited. If you have over 20 sport profiles in the Flow web service, the first 20 in the list are transferred to your M450 when syncing.

You can change the order of your sport profiles by dragging and dropping them. Choose the sport you want to move and drag it into the place you want to put it in the list.

ADD A SPORT PROFILE

In the Flow web service:

1. Click your name/profile photo in the upper right corner.
2. Choose **Sport Profiles**.
3. Click **Add sport profile**, and choose the sport from the list.
4. The sport is added to your sport list.

EDIT A SPORT PROFILE

In the Flow web service:

1. Click your name/profile photo in the upper right corner.
2. Choose **Sport profiles**.
3. Click **Edit** under the sport you want to edit.

In each sport profile, you can edit the following information:

BASICS

- Automatic lap (Can be set to duration or distance-based)
- Training sounds
- Speed view

HEART RATE

- Heart rate view (choose beats per minute (bpm) or % of maximum.)
- Heart rate visible to other devices (Other compatible devices using Bluetooth ® Smart wireless technology (e.g. gym equipment) can detect your heart rate.)
- Heart rate zone settings (With the heart rate zones you can easily select and monitor training intensities. If you choose Default, you cannot change heart rate limits. If you choose Free, all limits can be changed. Default heart rate zone limits are calculated from your maximum heart rate.

TRAINING VIEWS


Choose what information you see on your training views during your sessions. You can have a total of eight different training views for each sport profile. Each training view can have a maximum of four different data fields.

Click the pencil icon on an existing view to edit it, or add a new view. You can select one to four items for your view from seven categories:

| TIME | ENVIRONMENT | BODY MEASUREMENT | DISTANCE |
|--|---|---|--|
| <ul style="list-style-type: none"> • Time of day • Duration • Lap time • Automatic lap time • Last lap time | <ul style="list-style-type: none"> • Altitude • Ascent • Lap ascent • Automatic lap ascent • Descent • Lap descent • Automatic lap descent • Lap VAM • Inclinometer • Temperature | <ul style="list-style-type: none"> • Heart rate • Average heart rate • Lap HR average • Automatic lap average heart rate • Last lap average heart rate • Maximum heart rate • Lap maximum heart rate • Automatic lap maximum heart rate • Last lap maximum heart rate • Calories • HR zone pointer • Time in HR zones | <ul style="list-style-type: none"> • Distance • Lap distance • Automatic lap distance |

| TIME | ENVIRONMENT | BODY MEASUREMENT | DISTANCE |
|------|-------------|---|----------|
| | | <ul style="list-style-type: none"> • HR limits | |

| SPEED | CADENCE | POWER |
|--|--|---|
| <ul style="list-style-type: none"> • Speed/pace • Average speed/pace • Lap average speed/pace • Automatic lap average speed/pace • Last lap average speed/pace • Maximum speed/pace • Lap maximum speed/pace • Automatic lap max speed/pace • Last lap maximum speed/pace • Speed/pace zone pointer • Distance in speed/pace zones • Time in speed/pace zones • Speed/pace limits | <ul style="list-style-type: none"> • Cadence • Average cadence • Lap average cadence • Automatic lap average cadence • Last lap average cadence • Maximum cadence • Lap maximum cadence | <ul style="list-style-type: none"> • Power • Average power • Lap average power • Automatic lap average power • Last lap average power • Maximum power • Lap maximum power • Automatic lap maximum power • Last lap maximum power • Power zone pointer • Force max of revolution • Left/right balance • Average left/right balance • Lap average left/right balance • Automatic lap average left/right balance • Last lap average left/right balance |

 Depending on your power view selection in [Sport profile settings](#), the power output is shown in **W** (Watts), **W/kg** (Watts/kg) or **FTP %** (% of functional threshold power).

When you are done with the sport profile settings, click save. To sync the settings to your M450, press synchronize in FlowSync.



Please note that in a number of indoor sports, group sports and team sports profiles the **HR visible to other devices** setting is enabled by default. This means that compatible devices using Bluetooth Smart wireless technology, e.g. gym equipment, can detect your heart rate.




You can check which sport profiles have Bluetooth broadcasting enabled by default from the [Polar Sport profiles list](#). You can enable or disable Bluetooth broadcasting from sport profile settings.

POLAR FLOW APP

Polar Flow app allows you to see an instant visual interpretation of your training data straight after your session. It lets you easily access your training targets and view test results. Flow app is the easiest way to sync your training data from your M450 with the Flow web service.

When using the app with your M450, you can:

- Get a quick overview of your training and analyze every detail of your performance right away
 - Route view on a map
 - Training Benefit
 - Training Load and recovery time
 - Start time and duration of your session
 - Average and maximum speed/pace and distance
 - Average and maximum heart rate, cumulative heart rate zones
 - Calories and fat burn % of calories
 - Maximum altitude, ascent and descent
 - Lap details
- See your progress with weekly summaries in the calendar

 Before you can start using the Flow app, you need have your M450 registered in the Flow web service. The registration takes place when you set up your M450 at flow.polar.com/start. For more information, see [Set Up Your M450](#).

To start using the Flow app, download it from the App Store or Google Play onto your mobile device. For support and more information on using the Polar Flow app, go to www.polar.com/en/support/Flow_app. Before taking a new mobile device (smartphone, tablet) into use, you need to pair it with your M450. For more information, see [Pairing](#).

To see your training data in the Flow app, you must sync your M450 with it after your session. For information on syncing M450 with the Flow app, see [Syncing](#).

SYNCING

You can transfer data from your M450 via the USB cable with the FlowSync software or wirelessly via Bluetooth Smart® with the Polar Flow app. To be able sync data between your M450 and the Flow web service and app, you need to have a Polar account and the FlowSync software. Go to flow.polar.com/start, and create your Polar account in the Polar Flow web service and download and install the FlowSync software onto your PC. Download the Flow app onto your mobile from the App Store or Google Play.


Remember to sync and keep your data up-to-date between your M450, the web service and the mobile app wherever you are.

SYNC WITH FLOW WEB SERVICE VIA FLOWSYNC

To sync data with the Flow web service you need FlowSync software. Go to flow.polar.com/start, and download and install it before trying to sync.

1. Plug the micro USB connector into the USB port in the M450, and plug the other end of the cable into your PC. Make sure FlowSync software is running.
2. The FlowSync window opens on your computer, and the syncing starts.
3. Completed is displayed when you are done.

Every time you plug in your M450 to your computer, the Polar FlowSync software will transfer your data to the Polar Flow web service and sync any settings you may have changed. If the syncing does not automatically start, start FlowSync from the desktop icon (Windows) or from the applications folder (Mac OS X). Every time a firmware update is available, FlowSync will notify you, and request you to install it.

 *If you change settings in the Flow web service while your M450 is plugged into your computer, press the synchronize button on FlowSync to transfer to the settings to your M450.*

For support and more information about using the Flow web service, go to www.polar.com/en/support/flow.

For support and more information about using FlowSync software, go to www.polar.com/en/support/FlowSync.

SYNC WITH FLOW APP

Before syncing make sure:

- You have a Polar account and Flow app
- You have registered your M450 in the Flow web service and synced data via FlowSync software at least once.


- Your mobile device has Bluetooth turned on, and airplane mode/flight mode is not turned on.
- You have paired your M450 with your mobile. For more information , "[Pairing](#)"

There are two ways to sync your data:

1. Sign into Flow app and press and hold the BACK button on your M450.
2. **Connecting to device** is displayed, followed by **Connecting to app**.
3. **Syncing completed** is displayed when you are done.

or

1. Sign into Flow app and go to **Settings > General settings > Pair and sync > Sync data** and press the START button on your M450.
2. **Connecting to device** is displayed, followed by **Connecting to app**.
3. **Syncing completed** is displayed when you are done.

 *When you sync your M450 with the Flow app, your training data is also synced automatically via an internet connection to the Flow web service.*

For support and more information about using Polar Flow app, go to www.polar.com/en/support/Flow_app.

CARING FOR YOUR M450


Like any electronic device, the Polar M450 should be kept clean and treated with care. The instructions below will help you fulfill the guarantee obligations, keep the device in peak condition and avoid any issues in charging or syncing.

M450

Keep your training device clean. Use a damp paper towel to wipe dirt from the training device. To maintain the water resistance, do not wash the training device with a pressure washer. Do not immerse the training device in water. Never use alcohol or any abrasive material such as steel wool or cleaning chemicals.

The USB cable must be connected carefully to avoid damaging the device's USB port.

After each time of using the USB port of the training device, check visually that there is no hair, dust or other dirt on the sealing surface area of the lid/back case. Gently wipe to remove any dirt. Do not use any sharp tools or equipment for cleaning, which could cause scratches to the plastic parts.

 *Not suitable for bathing or swimming. Protected against wash splashes and raindrops. Do not immerse the training device in water. Using the training device in excessive rainfall may cause interference on GPS reception.*

Do not leave the device in extreme cold (below -10 °C/14 °F) and heat (above 50 °C/120 °F) or under direct sunlight.

HEART RATE SENSOR

Connector: Detach the connector from the strap after every use and dry the connector with a soft towel. Clean the connector with a mild soap and water solution when needed. Never use alcohol or any abrasive material (e.g. steel wool or cleaning chemicals).

Strap: Rinse the strap under running water after every use and hang to dry. Clean the strap gently with a mild soap and water solution when needed. Do not use moisturizing soaps, because they can leave residue on the strap. Do not soak, iron, dry clean or bleach the strap. Do not stretch the strap or bend the electrode areas sharply.

 *Check the washing instructions on the label of the strap.*

STORING

M450: Keep your training device in a cool and dry place. Do not keep it in a damp environment, in non-breathable material (a plastic bag or a sports bag) nor with conductive material (a wet towel). Do not expose the training device to direct sunlight for extended periods, such as by leaving it in a car or mounted on the bike mount. It is recommended to store the training device partially or fully charged.

The battery slowly loses its charge when it is stored. If you are going to store the training device for several months, it is recommended to recharge it after a few months. This will prolong the battery lifetime.

Heart rate sensor: Dry and store the heart rate sensor strap and the connector separately to maximize the battery lifetime. Keep the heart rate sensor in a cool and dry place. To prevent snap oxidation, do not store the heart rate sensor wet in non-breathing material, such as a sports bag. Do not expose the heart rate sensor to direct sunlight for extended periods.

SERVICE

During the two-year guarantee/warranty period we recommend that you have service done by an authorized Polar Service Center only. The warranty does not cover damage or consequential damage caused by service not authorized by Polar Electro. For further information, see Limited International Polar Guarantee.

For contact information and all Polar Service Center addresses, visit www.polar.com/support and country-specific websites.

The username for your Polar Account is always your email address. The same username and password are valid for Polar product registration, Polar Flow web service and app, Polar discussion forum and newsletter registration.

IMPORTANT INFORMATION

BATTERIES

The Polar M450 has an internal, rechargeable battery. Rechargeable batteries have a limited number of charge cycles. You can charge and discharge the battery over 300 times before a notable decrease in its capacity. The number of charge cycles also varies according to use and operating conditions.

At the end of the working life of the product Polar encourages you to minimize possible effects of waste on the environment and human health by following local waste disposal regulations and, where possible, utilizing separate collection of electronic devices. Do not dispose of this product as unsorted municipal waste.

The Polar H7 heart rate sensor has a user changeable battery. To change the battery yourself, please follow the instructions carefully as instructed in [Changing Heart Rate Sensor Battery](#).

Keep the batteries away from children. If swallowed, contact a doctor immediately. Batteries should be disposed of properly according to local regulations.

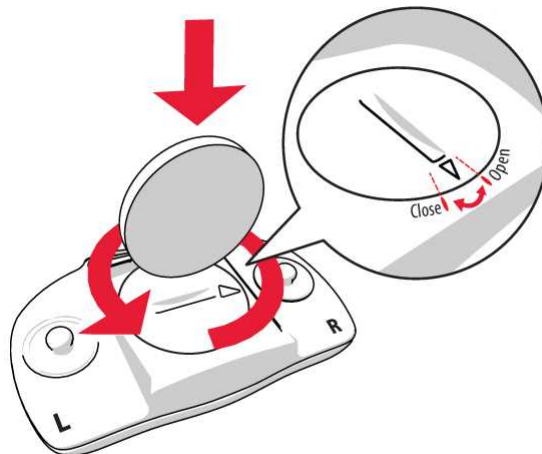
CHANGING HEART RATE SENSOR BATTERY

To change the battery of the heart rate sensor yourself, carefully follow the instructions below:

When changing the battery, make sure the sealing ring is not damaged, in which case you should replace it with a new one. You can purchase the sealing ring/battery kits at well-equipped Polar retailers and authorized Polar Services. In the USA and Canada, the additional sealing rings are available at authorized Polar Service Centers. In the USA the sealing ring/battery kits are also available at www.polar.com/us-en.

When handling a new, fully charged battery, avoid clasp-like contact, i.e. simultaneously from both sides, with metal or electrically conducting tools, like tweezers. This may short circuit the battery, causing it to discharge more rapidly. Typically, short circuiting does not damage the battery, but it may decrease the capacity and the lifetime of the battery.

1. Using a coin, open the battery cover by turning it counterclockwise to OPEN.
2. Insert the battery (CR 2025) inside the cover with the positive (+) side against the cover. Make sure the sealing ring is in the groove to ensure water resistance.
3. Press the cover back into the connector.
4. Use the coin to turn the cover clockwise to CLOSE.



 Danger of explosion if the battery is replaced with wrong type.

PRECAUTIONS

The Polar M450 training device shows your performance indicators. The training device is designed to indicate the level of physiological strain and recovery during and after an exercise session. It measures heart rate, speed and distance. It also measures cycling cadence when used with a cadence sensor and power output when used with Kéo Power *Bluetooth*® Smart. No other use is intended or implied.

The training device should not be used for obtaining environmental measurements that require professional or industrial precision.

INTERFERENCE DURING TRAINING

Electromagnetic Interference and Training Equipment

Disturbance may occur near electrical devices. Also WLAN base stations may cause interference when training with the training device. To avoid erratic reading or misbehavior, move away from possible sources of disturbance.

Training equipment with electronic or electrical components such as LED displays, motors and electrical brakes may cause interfering stray signals. To solve these problems, try the following:

1. Remove the heart rate sensor strap from your chest and use the training equipment as you would normally.
2. Move the training device around until you find an area in which it displays no stray reading or does not flash the heart symbol. Interference is often worst directly in front of the display panel of the equipment, while the left or right side of the display is relatively free of disturbance.

3. Put the heart rate sensor strap back on your chest and keep the training device in this interference-free area as much as possible.

If the training device still does not work with the training equipment, it may be electrically too noisy for wireless heart rate measurement.

HEALTH AND TRAINING

Training may include some risk. Before beginning a regular training program, it is recommended that you answer the following questions concerning your health status. If you answer yes to any of these questions, we recommend that you consult a doctor before starting any training program.

- Have you been physically inactive for the past 5 years?
- Do you have high blood pressure or high blood cholesterol?
- Are you taking any blood pressure or heart medication?
- Do you have a history of breathing problems?
- Do you have symptoms of any disease?
- Are you recovering from a serious illness or medical treatment?
- Do you use a pacemaker or other implanted electronic device?
- Do you smoke?
- Are you pregnant?

Note that in addition to training intensity, medications for heart conditions, blood pressure, psychological conditions, asthma, breathing, etc., as well as some energy drinks, alcohol, and nicotine may also affect heart rate.

It is important to be sensitive to your body's responses during training. **If you feel unexpected pain or excessive fatigue when training, it is recommended that you stop the training or continue at a lighter intensity.**

Note! If you are using a pacemaker or other implanted electronic device, you can use Polar products. In theory interference to pacemaker caused by Polar products should not be possible. In practice no reports exist to suggest anyone ever having experienced interference. We cannot however issue an official guarantee on our products' suitability with all pacemakers or other implanted devices due to the variety of devices available. If you have any doubts, or if you experience any unusual sensations while using Polar products, please consult your physician or contact the implanted electronic device manufacturer to determine safety in your case.

If you are allergic to any substance that comes into contact with your skin or if you suspect an allergic reaction due to using the product, check the listed materials in [Technical Specifications](#). If you experience any skin reaction, stop using the product and consult your physician. Also inform Polar Customer Care about your skin reaction. To avoid any skin reaction to the heart rate sensor, wear it over a shirt, but moisten the shirt well under the electrodes to ensure flawless operation.



The combined impact of moisture and intense abrasion may cause color to come off the heart rate sensor's or wristband's surface, possibly staining light-colored clothes. It may also



cause a darker color to come off clothing, possibly staining lighter-colored training devices. To keep a light-colored training device glowing for years to come, please make sure the clothing you wear while training does not bleed color. If you use perfume, lotion, suntan/sunscreen or insect repellent on your skin, you must ensure that it does not come into contact with the training device or the heart rate sensor. If you train in cold conditions (-20 °C to -10 °C / -4 °F to 14 °F) we recommend that you wear the training device under the sleeve of your jacket, directly on your skin.

WARNING - KEEP BATTERIES OUT OF REACH OF CHILDREN

Polar heart rate sensors (for example H10 and H9) contain a button cell battery. If the button cell battery is swallowed, it can cause severe internal burns in as little as 2 hours and can lead to death. **Keep new and used batteries away from children.** If the battery compartment does not close securely, stop using the product and keep it away from children. **If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.**

TECHNICAL SPECIFICATION

M450

| | |
|----------------------------|--|
| Battery type: | Rechargeable 400mAh, 4,35V battery |
| Operating time: | Up to 16 hours with GPS and heart rate sensor |
| Operating temperature: | -10 °C to +50 °C / 14 °F to 122 °F Using or storing your M450 in an environment where temperature is not within this temperature range may permanently damage the battery capacity - especially if the temperature is higher. |
| Training device materials: | PC+GF, ABS, PC, PMMA, TPU |
| Watch accuracy: | Better than ± 0.5 seconds / day at 25 °C / 77 °F temperature |
| GPS accuracy: | Distance $\pm 2\%$, speed ± 2 km/h |

| | |
|---------------------------------|---|
| Altitude resolution: | 1 m |
| Ascent/Descent resolution: | 5 m |
| Maximum altitude: | 9000 m / 29525 ft |
| Sample rate: | 1 s |
| Accuracy of heart rate monitor: | ± 1% or 1 bpm, whichever larger. Definition applies to stable conditions. |
| Heart rate measuring range: | 15-240 bpm |
| Current speed display range: | 0-399 km/h 247.9 mph |
| Water resistance: | IPX7 (rainproof, not suitable for swimming) |
| Memory capacity: | 70 h training with GPS and heart rate depending on your language settings |
| Display resolution: | 128 x 128 |

H7 HEART RATE SENSOR

| | |
|------------------------|--|
| Battery life: | 200 h |
| Battery type: | CR 2025 |
| Battery sealing ring: | O-ring 20.0 x 1.0 Material FPM |
| Operating temperature: | -10 °C to +50 °C/14 °F to 122 °F |
| Connector material: | Polyamide |
| Strap material: | 38% Polyamide, 29% Polyurethane, 20% Elastane, 13% Polyester |
| Water resistance: | 30 m |

Uses Bluetooth® Smart wireless technology.

POLAR FLOWSYNC SOFTWARE

To use FlowSync software you need a computer with Microsoft Windows or Mac operating system with an internet connection and a free USB port.

Check the latest compatibility information from support.polar.com.

POLAR FLOW MOBILE APPLICATION COMPATIBILITY

Check the latest compatibility information from support.polar.com.

WATER RESISTANCE OF POLAR PRODUCTS

Most Polar products can be worn when swimming. They are not, however, diving instruments. To maintain water resistance, do not press the buttons of the device under water.

Polar devices with wrist-based heart rate measurement are suitable for swimming and bathing. They will collect your activity data from your wrist movements also when swimming. In our tests, however, we found that the wrist-based heart rate measurement doesn't work optimally in water, so we cannot recommend wrist-based heart rate measurement for swimming.

In the watch industry, water resistance is generally indicated as meters, which means the static water pressure of that depth. Polar uses this same indication system. Water resistance of Polar products is tested according to International Standard **ISO 22810** or **IEC60529**. Every Polar device that has water resistance indication is tested before the delivery to stand water pressure.

Polar products are divided into four different categories according to their water resistance. Check the back of your Polar product for the water resistance category, and compare it to the chart below. Please note that these definitions do not necessarily apply to products of other manufacturers.

When performing any underwater activity, the dynamic pressure generated by moving in water is greater than the static pressure. This means that moving the product under water subjects it to a greater pressure than if the product were stationary.

| Marking on the back of the product | Wash splashes, sweat, raindrops etc. | Bathing and swimming | Skin diving with snorkel (no air tanks) | SCUBA diving (with air tanks) | Water resistant characteristics |
|------------------------------------|--------------------------------------|----------------------|---|-------------------------------|--|
| Water resistant IPX7 | OK | - | - | - | Do not wash with a pressure washer. Protected against splashes, raindrops etc. Reference standard: IEC60529. |
| Water resistant IPX8 | OK | OK | - | - | Minimum for bathing and swimming. Reference standard: IEC60529. |
| Water resistant Water resistant | OK | OK | - | - | Minimum for bathing and swimming. |

| | | | | | |
|--|----|----|----|---|---|
| 20/30/50 meters Suitable for swimming | | | | | Reference standard: ISO22810. |
| Water resistant 100 meters | OK | OK | OK | - | For frequent use in water but not SCUBA diving. Reference standard: ISO22810. |

LIMITED INTERNATIONAL POLAR GUARANTEE

- Polar Electro Oy issues a limited international guarantee for Polar products. For products which have been sold in the USA or Canada, guarantee is issued by Polar Electro, Inc.
- Polar Electro Oy/Polar Electro Inc. guarantees the original consumer/purchaser of the Polar product that the product will be free from defects in material or workmanship for two (2) years from the date of purchase, with the exception of wristbands made of silicone or plastic, which are subject to a guarantee period of one (1) year from the date of purchase.
- The guarantee does not cover normal wear and tear of the battery, or other normal wear and tear, damage due to misuse, abuse, accidents or non-compliance with the precautions; improper maintenance, commercial use, cracked, broken or scratched cases/displays, textile armband or textile or leather wristband, elastic strap (e.g. heart rate sensor chest strap) and Polar apparel.
- The guarantee does also not cover any damage/s, losses, costs or expenses, direct, indirect or incidental, consequential or special, arising out of, or related to the product.
- Guarantee does not cover products which have been purchased second hand.
- During the guarantee period, the product will be either repaired or replaced at any authorized Polar Central Service regardless of the country of purchase.
- Guarantee issued by Polar Electro Oy/Inc. does not affect the consumer's statutory rights under applicable national or state laws in force, or the consumer's rights against the dealer arising from their sales/purchase contract.
- You should keep the receipt as a proof of purchase!
- Guarantee with respect to any product will be limited to countries where the product has been initially marketed by Polar Electro Oy/Inc.

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REGULATORY INFORMATION




This product is compliant with Directives 2014/53/EU, 2011/65/EU and 2015/863/EU. The relevant Declaration of Conformity and other regulatory information for each product are available at www.polar.com/en/regulatory_information.



This crossed out wheeled bin marking shows that Polar products are electronic devices and are in the scope of Directive 2012/19/EU of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE) and batteries and accumulators used in products are in the scope of Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators. These products and batteries/accumulators inside Polar products should thus be disposed of separately in EU countries. Polar encourages you to minimize possible effects of waste on the environment and human health also outside the European Union by following local waste disposal regulations and, where possible, utilize separate collection of electronic devices for products, and battery and accumulator collection for batteries and accumulators.

To see the M450-specific regulatory labels, go to **Settings > General settings > About your product**.

 *Regulatory markings printed on the device can be found on the back of the case, under the back cover. For instructions on removing the back cover, see [Changeable cover](#).*

RF EXPOSURE INFORMATION

Polar M450 device was evaluated for body-worn operations with the separation distance of 1 cm (0.39 inches) between the user's body and the device.

To comply with FCC and Industry Canada RF exposure requirements, a minimum separation distance of 1 cm (0.39 inches) must be maintained between the user's body and the device.

If positioned less than 10 mm from the body the SAR measurement of the device may exceed the FCC and Industry Canada exposure guidelines for body-worn operations.

DISCLAIMER

- The material in this manual is for informational purposes only. The products it describes are subject to change without prior notice, due to the manufacturer's continuous development program.

- Polar Electro Inc./Polar Electro Oy makes no representations or warranties with respect to this manual or with respect to the products described herein.
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