AQUATEL™

INSTRUCTION MANUAL

Wireless Fluid Level Controller

MODEL M107-BT

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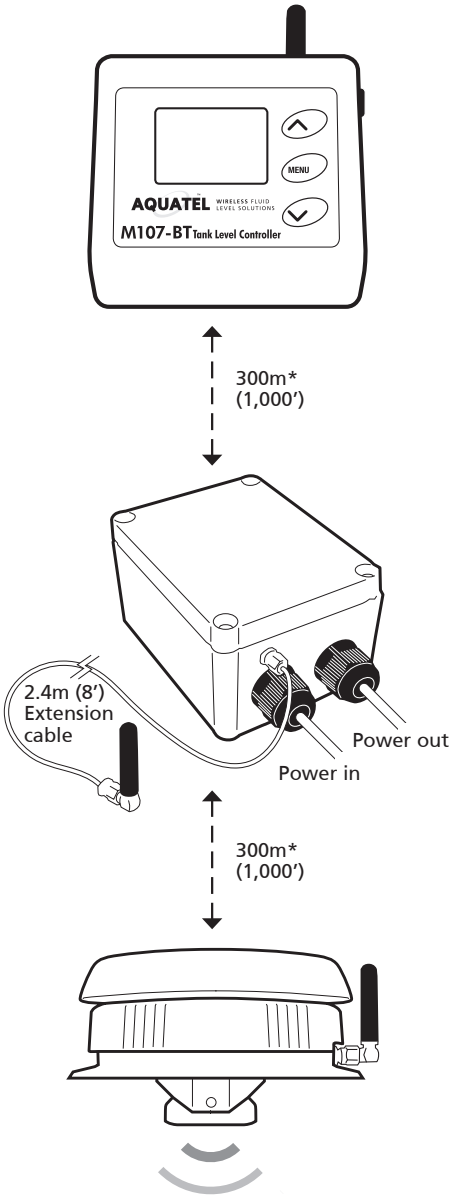


DISPLAY UNIT

- External Power Jack (Use Aquatel certified power pack. Part No. AQPP6)
  6V DC ⊖—◉—⊕
- ¼ Wave Whip Antenna
- 92mm W x 73mm D x 50mm H
  (3 5/8" W x 2 7/8" D x 2" H)

CONTROL UNIT

- Maximum switchable load 15A
- Available in 12V DC, 24 VAC, 115 VAC and 230 VAC versions
- ¼ Wave Whip Antenna with extension cable
- 90mm W x 120mm D x 65mm H
  (3 ½" W x 4 ¾" D x 2 ½" H)

TANK UNIT

- Use on any non-flammable fluid (water, diesel, septic)
- ¼ Wave Whip Antenna
- 135mm diameter x 80mm H
  (5 3/8" D x 3 1/8" H)
- Detection Range 0.1m to 4m (4"–13')

- Temperature range : -10 to +60°C (14 to 140°F)
- Individually Security coded sets
- Approval : AS/NZS 4268:2003 1:2005 CE FC
- Housing : ABS Plastic
- Circuit Boards : ROHS compliant
- Radio Frequency: Fixed 868Mhz EU, FHSS (Mhz) 915 US, 921 Australia, 925 NZ

*Range shown is line of sight. Objects between units will reduce range

The M107-BT is a versatile product for use with tank systems in a wide variety of applications.

It is a complete wireless control system that maintains the fluid level in a tank or cistern between set limits by switching a pump or valve on and off. If these limits are exceeded then an alarm sounds. The M107-BT can be installed on water tanks, in septic systems or on other tanks that contain liquids, providing they do not give off an explosive gas or is a chemical that will damage the device. If you require further information, please contact us prior to use.

Main features and benefits:

- Automatic – the M107-BT will switch the pump or valve on and off as required
- Wireless system – no need for control wires or trenching
- Ultrasonic level measurement - no holes in side of tank or mechanical floats
- Level Indication – know exactly how much fluid is in the tank all the time
- Adjustable – change the level settings at any time
- Manual Override – allows you to switch the pump on and off from the Display Unit if required
- Robust – designed and constructed in New Zealand, with materials to withstand even the harshest environment
- Built-in irrigation timer
- Back lit LCD Display

How it works:

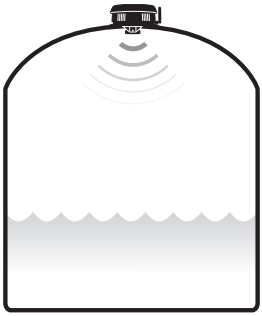
The Tank Unit is mounted on the top surface of the tank and uses ultrasonic signals to detect the fluid level inside. This is then wirelessly transmitted through the Control Unit and onto the Display Unit. The Display Unit displays the fluid level and system status on the LCD screen. The Display Unit is also used for setting the system settings such as level thresholds. This is sent back to the Control Unit to switch the pump or valve on and off depending on the tank fluid level.

Installation

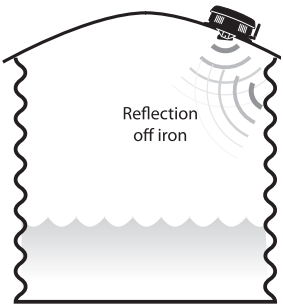
Installing Tank Unit

① Choose location for Tank Unit on the top of the tank or cistern, close to an inspection hatch is best in case you need to adjust the sensor cone.

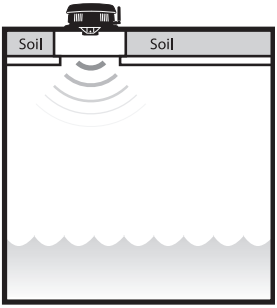
✔ **Ideal.** Mount within reach of access hole



✘ **Incorrect.** Mount unit away from ribbed walls to prevent signal reflection off walls



✔ **Correct.** For buried tanks mount unit in center of lid, or on bracket mounted in riser

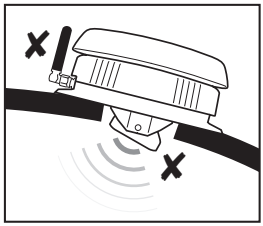


For tanks less than 1500mm (5') it's best to deep mount unit in center of tank

② Drill a 50mm (2") hole in tank. For thick concrete tanks make a 75mm (3") hole.

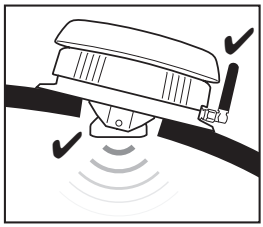
③ Measure the depth of tank to the base (or to the water outlet). Write this measurement down.

④ Insert Tank Unit in hole and rotate so tank antenna is on the lower side (to prevent water entering unit). Ensure that the transducer cone underneath is pointing directly at the surface of the water.



✘ Antenna should be mounted on the opposite side

✘ Transducer is not pointing at the surface of the water



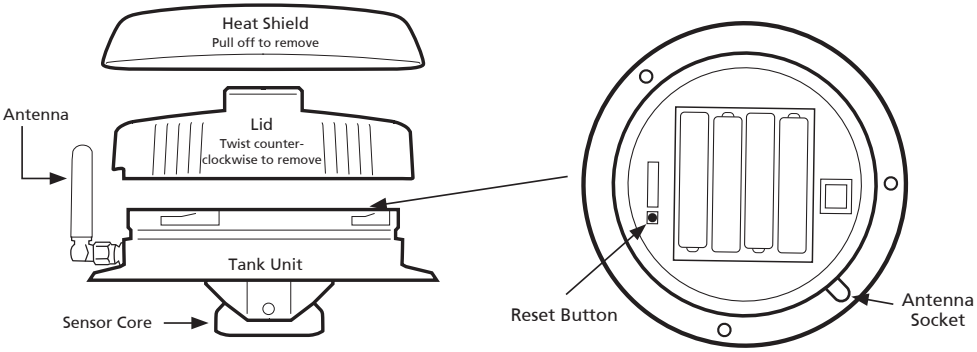
✔ Water will not enter antenna hole

✔ Transducer is parallel to water

For plastic tanks use the supplied screws to attach the Tank Unit to the tank.
For metal tanks first drill 3mm or ¼" holes, and then fasten using the screws.
For concrete tanks drill 6mm or ⅛" holes, insert the supplied plastic plugs and then fasten using the screws.

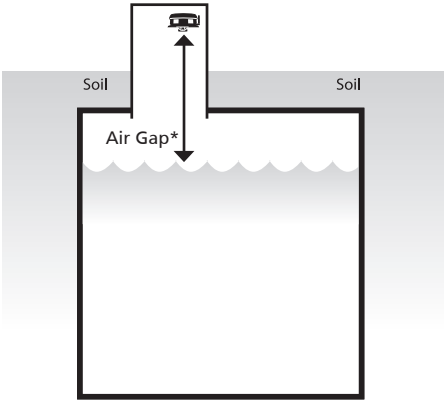
Setting up Tank Unit

⑤ Remove cap from Tank Unit by turning counter-clockwise and insert batteries. When the Control Unit and the Display Unit are installed (and powered up), check the Tank Unit is communicating with Control Unit by pressing the (MENU) button on Display Unit, which will request the latest tank fluid level from the Control Unit.



⑥ Set Depth. The Tank unit comes factory set in test mode. This mode takes a new reading and transmits this data every few seconds. Once you have checked that communication is working, as in ⑤, take the Tank Unit out of test mode. This is done via the "Tank Levels and Alarms" setup menu. To access the setup menu see ⑩. For the M107-BT to determine correct fluid levels, the depth of the tank/cistern from ③ must be input on the Display Unit via the "Tank Levels and Alarms" setup menu. To access the setup menu see ⑩.

⑦ Setting the Air Gap. Go to the "Tank Levels and Alarms" (refer to ⑩) setup menu, once you enter this menu scroll through to the "Air Gap" and then using the arrow up and arrow down buttons, select the required air gap.



*Air gap: Distance between where tank unit is installed and the maximum fluid level)
100mm (min) – 1000mm (max)
3.93" (min) – 39.37" (max)

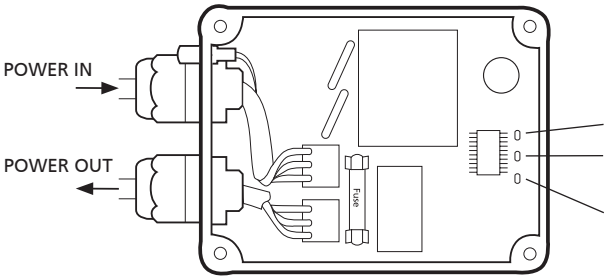
Installing Control Unit

⑧ If your Control Unit comes prewired with a plug and socket simply plug it in.

Note: Always check the voltage of your Control Unit. The Control Unit is available in 12V DC, 24 VAC, 115 VAC and 230 VAC versions.

If your unit does not come with prewired cables then remove lid from Control Unit and wire in power to the POWER terminal strip. Wire the pump or electric valve to the PUMP terminal strip. Replace lid on Control Unit.

Note: 115 VAC and 230 VAC power connections must be performed by a qualified electrician.



LED STATUS LIGHTS

Red. Power out to pump or valve is ON

Flashing Red. Wireless communication is active

Yellow. Power in to Control Unit is present

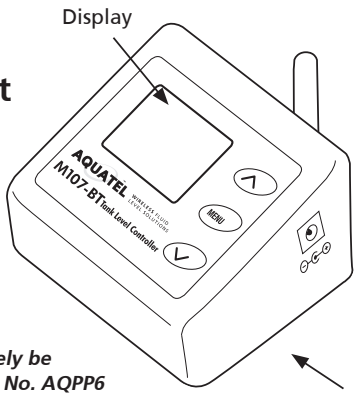
To obtain better signal strength, use the supplied antenna extension cable and mounting bracket to mount the antenna away from the power cables in the Control Unit. The M107-BT uses short range radio communications and works better with less obstructions between Aquatel units. The more obstructions there are, the lower the transmission range you will be able to achieve. For example locating the Display Unit by a window will give stronger communication signals than if it is behind a concrete or metal wall. Mounting Antennas on external walls as high as possible will achieve better range.

Note: The Control Unit must be powered on for the Tank Unit to relay the level information to the Display Unit

Setting up Display Unit

⑨ Insert batteries into the Display Unit. The display will turn on showing the startup message and then the standard information screen shown overleaf.

Note: Display Unit can alternatively be powered by a 6V DC supply, Part No. AQPP6



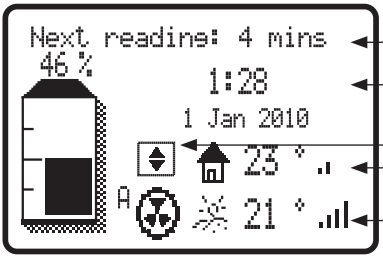
Up Button

Menu Button
Select option.
Request latest reading

Down Button
Silence alarm

Power Pack 6 Volts DC
300mA or higher
Center pin positive

Insert 4 x AA batteries in base of unit



Time to next level reading (Status messages)
Current time, Date
Irrigation Timer mode
Display Unit icon, temperature, signal strength to Control Unit
Tank Unit icon, temperature, signal strength to Control Unit

'A' : Auto Mode 'M' : Manual Mode : Pump On : Irrigation Timer mode off
: Irrigation Timer mode on

Note:
- If the Control Unit is not connected to a power source, or is out of range, there will be a communications error.
- No Tank Unit icon means the Tank Unit is not in range of the Control Unit.
- Signal strength and temperature are only updated when a new reading is made.

System Setup

⑩ Programming of the M107-BT Wireless Level Controller is done through the Display Unit menu. Enter the system setup menu by pressing and holding (MENU) for three seconds. Move up and down using (^) and (v) and press (MENU) to make a selection. Press (^) to increase and (v) to decrease a setting (tank level, number etc). Select Exit to return to the main display.

set clock and change how long display stays on for
set, change or delete timer mode
set the liquid direction, auto/manual mode for pump
set operating limits for the tank to stay within
set measurement interval, lock or reset unit

Note: ***Changes made in Display Unit are instantly transmitted to the Control Unit. However the Tank Unit will only update at the next scheduled reading interval. To force an update remove the Tank Unit lid and press the reset button.***

DISPLAY

CLOCK: Change date and time on clock. (Removing batteries resets the clock)

AUTO DISPLAY TURNOFF: Change the time the display remains on after the last button press. Pressing any button turns the display on.

When the display is off the M107-BT continues to operate and will audibly warn of any alarm conditions.

Note: If the Display Unit batteries are removed the Tank Unit and Control Unit will still continue to regulate the tank level. (You will receive no alarms or level indication)

IRRIGATION TIMER

SETTING THE IRRIGATION TIMER: Access and set the "Irrigation Timer" settings via the "System Setup" menu (see image on right). There are three timer programs that you can set independent of each other, however in most applications you will only need to use one. Once you have entered the "Irrigation Timer" menu, you can scroll through the settings using the ⓐ and ⓥ buttons. Set the required start time and then how long you wish the timer to power the pump output.

Once you have set the timers start time and run times, you can then scroll to the "Mode" option and select the required days that the timer is to activate the pump. Under the "Mode" scroll through the available day/week options using the ⓐ and ⓥ buttons, then select with the menu button (see image on right).

Ensure that you select the "OK" option to set the timer, select the "CANCEL" option to cancel and return to the "System Setup" menu or "DELETE" option to delete all timer program information you have entered. These options are located at the bottom of the screen once you have entered one of the three Irrigation Programs. If you have set more than one "Timer Program" and you wish to "OK" "CANCEL" or "DELETE" them, you will need to enter each "Timer Program" as they all run independent of each other.

NOTE: If any of the 3 Irrigation "Timer Programs", are set and active, these will override automatic level filling or draining settings. To resume automatic fluid level control, cancel or delete all Irrigation Programs.

Timer is active, automatic fluid level control is "OFF".

Timer is de-activated, automatic fluid level control is "ON" providing the "Pump/Valve Mode" is set to "AUTO" refer to "System Setup" ⑩ and scroll to the "Pump/Valve Mode" and select "AUTO".

PUMP

LIQUID DIRECTION:

Tank filling. When the set low fluid level is reached in the Tank/Cistern the controller switches the pump power output "ON", when the set high fluid level is reached the controller switches the pump power output "OFF". This setting is used mostly for the filling of remote farm tanks, roof top tanks etc.

Tank draining. When the set low fluid level is reached in the Tank/Cistern the controller switches the pump power output "OFF", when the set high fluid level is reached the controller switches the pump power output "ON". This setting is used mostly with septic grey water systems, storm water sumps etc.

PUMP/VALVE MODE: The power to the pump or valve can be configured in three states:

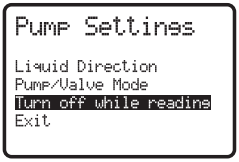
OFF – Manual override to turn OFF the power to the pump or valve.

ON – Manual override to turn ON the power to the pump or valve.
AUTO – the power to the pump is automatically turned on and off to maintain the tank level within the set limits. Providing the Irrigation Timer is off.

Note:
- To ensure robust operation the M107-BT checks new readings to verify that the measurements taken are plausible before deciding whether to turn the pump on or off
- As a safety measure the Control Unit power to the pump will be switched off if the Control Unit is unable to communicate with the Tank Unit after several attempts, or if the Tank Unit is unable to obtain a valid level reading

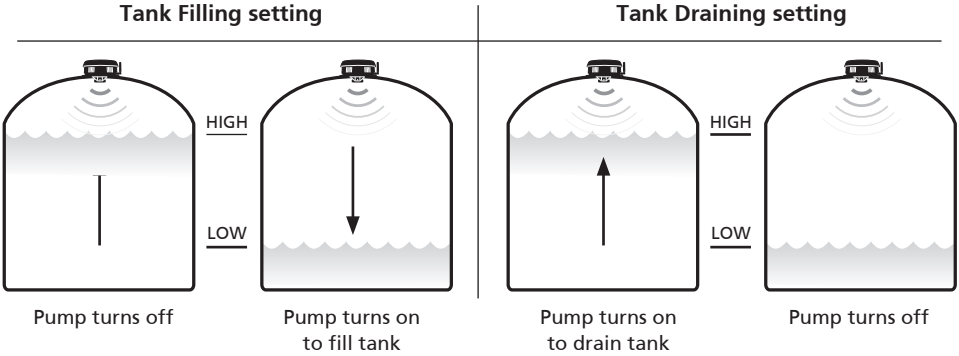
TURN OFF WHILE READING: This setting turns the pump or valve off ten seconds prior to taking a level measurement.

Use this feature if the tank is being filled from the top and the turbulence is causing incorrect readings.



TANK LEVELS & ALARMS

Set the tank fluid levels that the M107-BT is to maintain via the Display unit under the "Tank levels and Alarm" menu using ⋀ and ⋁. Scroll to the required level and press MENU to accept the value.



A typical configuration might consist of: High level: 80%, Low level: 20%, High Level Alarm: 90%, Low Level Alarm: 10%, Rapid Level Change Alarm: On (See Alarms section for more information)

SYSTEM

MEASUREMENT INTERVAL: Change how often the Tank Unit takes level measurements, from 1 minute to 30 minutes. Longer time increases Tank Unit battery life. Use shorter times when the level can change rapidly.

Note:
- When the Tank Unit is in test mode the level updates every 20 seconds
- The Tank Unit will update at the next scheduled reading interval. To force an update immediately, remove the Tank Unit lid and press the reset button.
- When the power from the Control Unit to the pump is ON the M107-BT will take extra readings to ensure the pump is turned OFF at the correct time. The measurement times are automatically calculated based on how fast the tank level is changing.

READING BEEPS: When set to ON the Display Unit beeps when a new reading is received, reading beeps can be turned off under the System Settings menu.

LOCK UNIT *(For Aquatel authorised installers only):* System installers can lock the unit to prevent tampering and changes to liquid direction and level settings. (Changes can still be made to the clock and measurement interval)

Note: Only Aquatel authorised installers are able to obtain unlock codes from the login section of the Aquatel website.

FACTORY RESET: Reset all settings to factory defaults.

Note: The unit can not be reset if the unit is locked.

Display Unit Beeps

The Display Unit will beep to advise you of an event, or alert you to something that needs your attention.

H – represents a high tone **M** – represents a medium tone **L** – represents a low tone

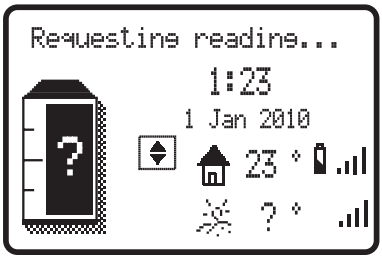
LH – A valid reading has been received from the Tank Unit. (This beep can be turned off in Settings.)

HH – New Display Unit settings have been received and acknowledged by the Control Unit.

HHL – Display Unit reads `Communication Failure!`, there are no signal strength bars and the Tank Unit icon displays ?. Display Unit can not communicate with Control Unit. Check power to Control Unit. Move Display Unit closer to Control Unit.

Alarms

Alarms display on the Display Unit screen and sound every six seconds for one minute. To silence the alarm press the ⓥ button – the Display Unit will beep (H L) to acknowledge. Then investigate the cause of the problem such as pump failure, pipe burst or weak communication signal.



H L Tank icon shows ? and Tank Unit temperature shows ?. (as shown in image). There is no communication with Tank Unit.

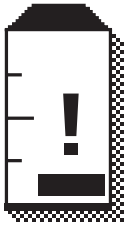
H L Tank icon shows ?, both Tank Unit temperature and signal strength are displayed. Tank Unit can communicate with Control Unit but cannot detect a valid level.

Battery icon beside Display Unit or Tank Unit signal strength icon. Battery levels low – replace batteries.

High Level Alarm

L M H

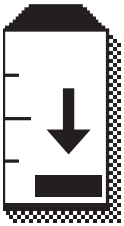
Fluid level is above 'High Level' setting. (This alarm is automatically cleared when the liquid level drops 3% lower than the 'High Level' setting.)



Low Level Alarm

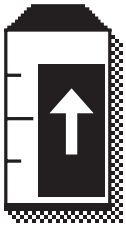
H M L

Fluid level is below 'Low Level' setting. (This alarm is automatically cleared when the liquid level rises 3% higher than the 'Low Level' setting.)



H M L

Rapid level drop. Activated when setting of 'Liquid direction' is set to 'Tank Fills' and there is a sustained drop of 3% per minute.



L M H

Rapid level rise. Activated when setting of 'Liquid direction' is set to 'Tank Drains and there is a sustained rise of 3% per minute.

FAQ

How do I Improve the range?

The range is affected by trees, sheds, walls, buildings etc between the units. Following are some suggestions for improving the range:

- Move the units closer together.
- Remove obstructions between the units. (Trees will reduce range, especially when wet or covered in snow)
- Remote mount Tank Unit antenna in a better location using a 2.4m (8 foot) extension cable. Aquatel Part: AQC24. A higher location is better as the ground absorbs the signal
- Replace Control Unit antenna with a high gain directional antenna. Aiming at the furthest unit will significantly increase the range (line of sight over 1000 meters, 3000 feet). To obtain the greatest range use two high gain antennas.

  Note: Check your local regulations regarding using this type of antenna (does not comply with EMC and may require a license). Aquatel Part: AQ433 for 433 MHz (Australasia, Europe) AQ920 for 920 MHz (USA, Asia)

Any other questions please email support@aquatel.co.nz

Warranty Terms and Conditions

(This warranty is subject to the provisions of the Trade Practices Act and Goods and Consumer Protection Legislation of various States and Countries)

1. iOT Verticals Ltd warrants this product will operate as designed for a period of 24 months from date of purchase from an authorized Aquatel re-seller. Subject to the conditions that follow, iOT Verticals Ltd will repair or replace any defective products free of charge upon return of the faulty product to the authorized Aquatel re-seller.
2. This warranty excludes transportation costs to return the faulty product to the authorized Aquatel re-seller. It excludes problems resulting from failure to comply with installation instructions, from neglect or misuse, from installation outside the specified operating temperature ranges, or operation for any purposes other than those specified.
3. This warranty applies only to the original owner and cannot be transferred to subsequent owners.
4. This warranty is subject to any consumer protection legislation in the government jurisdiction where the unit is installed.
5. Proof of purchase will be required for any warranty claims. Please record the date of purchase, dealer name, model, and serial number below and attach the sales receipt. Keep this document in a safe place.
6. Aquatel shall not be liable for any incidental or consequential damages resulting from the malfunctioning of its products or from any delays in repairing or replacing defective products.
7. Damage caused from defective leaking batteries is not considered a manufactures fault, repair or replacement costs are not covered under this warranty.

Date of Purchase: _____

Where you purchased: _____

Model: _____

Attach proof of purchase.

0221NZ

WARNING

Only use AA 1.5vdc Lithium batteries and ensure the batteries are inserted correctly (do not reverse polarity).
Do not use rechargeable batteries (the voltage is too low).
Do not mix old and new batteries, or different types of battery.
Do not expose the batteries to excessive heat or fire.
Remove batteries if they are exhausted or if the unit will not be used for a long time.