

USER MANUAL



AR431

AR435



AR432

AR436



AR433



AR434



AR437

WIRELESS SENSORS



Thank you for choosing our product.

This manual will help you to operate the device correctly, safely and to use all its capabilities.

*Please read and understand the manual of the sensor and AR407/AR406 (AR40x) recorder
before installation and commissioning.*

If you have any questions, please contact our technical adviser.

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Pay special attention to the texts marked with this sign

The manufacturer reserves the right to introduce changes to the design and the software (firmware) of the device without any deterioration of technical parameters (some functions may not be available in older versions).

1. INSTALLATION RECOMMENDATIONS



The device has been designed to provide adequate levels of immunity to most of the disturbances that may occur in working environments. In environments with an unknown level of interference, the following measures are recommended to prevent possible interference of the device operation:

- use the shielding of sensor and signal wires, whereas grounding of the screening should be a single-point, made as close as possible to the device,
- avoid arranging the measurement (signal) wires in the immediate vicinity and in parallel to the high voltage cables and power supply cables
- it is advisable to twist signal cables in pairs
- use identical cables for resistance sensors in a 3-wire connection
- avoid proximity of remotely controlled devices, electromagnetic meters, high power loads, the loads with phase or group power regulation, and other devices generating high impulse disturbances
- ground or neutralize metal rails used for mounting terminal devices

Before starting the work on the device, remove the protective film securing the LCD display window (if present).


AR431/432/433/434/435/436: the devices may be hung using the holes in the rear wall; in case of wall mounting - to make the fixing holes, you may remove the rear wall of the housing (chapter 13) and use it as a template.

AR437: the device may be screwed to the ground via 4 holes $\Phi 4.2\text{mm}$, spaced at $70 \times 50\text{mm}$, available after removing the front cover or it may be hung using the top 2 holes at the rear of the housing. To obtain IP65, the housing cover must be precisely tightened.

2. GENERAL CHARACTERISTICS OF SENSORS

- series of wireless sensors designed to work with AR407/AR406 (AR40x) recorder
- radio transmission in the ISM 868MHz band, open space range up to 200 m (or 400 m) - dependent on local conditions of radio wave propagation: type and thickness of walls, ceilings, etc.
- **option of increasing radio coverage to 400 m** by enabling retransmission function of measurements from other sensors (retransmission requires power supply via USB, the network may include up to 3 re-transmitters located within the range of AR407/AR406)
- seven radio channels allowing the independent operation of seven neighbouring AR40x sets (AR407/AR406) with sensors
- available models:
 - **AR431, AR432 :**
 - temperature measurement in the range of: $-30 \div 80^\circ\text{C}$ or $-20 \div 70^\circ\text{C}$, 1-channel sensor
 - **AR433, AR434 :**
 - universal thermometer and analogue input (Pt100, Ni100, J, K, S, B, R, T, E, N, $0 \div 20\text{mA}$, $4 \div 20\text{mA}$, $0 \div 10\text{V}$, $0 \div 60\text{mV}$, $0 \div 700\Omega$)
 - built-in ambient temperature measurement ($-20 \div 70^\circ\text{C}$), 2-channel sensor
 - line resistance compensation for resistive sensors and temperature of cold thermocouple ends (automatic or fixed)
 - **AR435, AR436, AR437 :**
 - measurement of relative humidity and temperature ($-30 \div 80^\circ\text{C}$ or $-20 \div 70^\circ\text{C}$), 2-channel
- temperature and humidity sensors integrated in the housing or in the external probe
- **AR432, AR434, AR436:**
 - LCD indicating measured values, messages and errors
 - alarms: lower, upper, in the band and outside the band, LED indicators

- **AR437** - protection rating IP65 provided by the housing and improving its reliability by high resistance to water, dust and condensation inside the unit.
- possibility of presenting and recording data from up to 16 measurement channels in a single AR407/AR406 recorder (from any 1- or 2-channel sensors)
- portable housing adapted for wall mounting
- battery power supply, with the battery replaced by the user
- long operation with a new battery (approx. up to 4 years without using LCD display, at room temperature, with measurement period > 30 min and undisturbed radio transmission)
- free software provided for configuration of device parameters and graphic or text presentation and printing of recorded results (AR407 / AR406)
- programmable display resolution, calibration parameters, alarms, ID numbers of sensor and re-transmitter, input type and measurement range for analogue signals (AR433/434) and other configuration parameter
- parameter configuration via USB serial interface
- option of manual updating the sensor's firmware
- high, long-term stability of measurement, accuracy and immunity to interferences
- compliance with RED directive (2014/53/UE)
- protection against reverse battery insertion
- available accessories:
 - SMA antenna cable, socket and plug, impedance 50 Ω , length 2 m
 - 3.6V lithium battery type AA (R6), 2450mAh (e.g. SAFT LS14500)
 - stabilized power supply adapter 5V/150mA
 - IP50 filter with a metal mesh for protecting the humidity sensor against dust for AR437 and for external probes for AR431, AR432, AR435, AR436, AR437

NOTE: 

- before operating the device, please read this manual and manual for AR407/AR406 base recorder (AR40x). Then, perform proper configurations of parameters, connection of the measurement signal (for AR433 / 434) and add the sensor to the displayed measurement list of AR40x recorder.
- **do not flood the measuring probe with water and avoid condensation in the unit**

3. PACKAGE CONTENT

- sensor with antenna for 868MHz band and 3.6V lithium battery of AA type (e.g. SAFT LS14500)
- USB cable (A4-miniA4) for connecting with a computer, length 2m
- the content of CD with drivers and software (Windows XP/Vista/7/8/10)
- user manual
- guarantee card

NOTE: 

Antenna or antenna cable should be screwed manually without tools, to avoid damaging the socket.

4. TECHNICAL DATA

Measuring range of probes (external and built-in)	temperature	-30÷80°C (-20÷70°C for internal probes with LCD)							
	humidity	0÷100%RH, hysteresis ±1% RH, long-term stability <0,5% RH/year, do not flood the measuring probe with water							
Measurement accuracy of probes	temperature	±0.5°C in the range of -10÷80°C and ±0.5÷1.5°C in the remaining range, for AR435/436/437: ±0.5°C in the range of 20÷30°C and ±0.5÷1,8°C in the remaining range							
	humidity	± 3% RH for 20 ÷ 80% RH and ± 3 ÷ 5% RH in the remaining range							
Measurement input in AR433 and AR434 (1 universal, programmable via USB interface)	thermo-resistive (RTD) and resistive	Pt100 (measurement range -200÷850°C), Ni100 (-50÷170°C), 0÷700 Ω , 3- or 2-wire connection, wire resistance $R_w < 25 \Omega$ (for each line), polarity current ~480 μA (pulse)							
	thermocouple (TC)	J (-40÷800°C), K (-40÷1200°C), S (-40÷1600°C), B (300÷1800°C), R (-40÷1600°C), T (-25÷350°C), E (-25÷680°C), N (-35÷1300°C)							
	current	0/4 ÷ 20 mA ($R_{in} = 110 \Omega$)							
	Voltage	0 ÷ 10 V ($R_{in} = 110 \text{ k}\Omega$), 0 ÷ 60 mV ($R_{in} > 2 \text{ M}\Omega$)							
- processing errors (AR433/434 at temperature of 25°C)	basic	0.1 % (0.2 % for TC) of the measurement range ±1 digit							
	additional	for thermocouples: < 2 °C (temperature of cold ends) due to ambient temperature changes: < 0.005% of input range /°C							
- range of indications (resolution of analogue inputs)	-9999 ÷ 19999, programmable (for mA, V and Ω)								
Measurement resolution	temperature 0.1°C, humidity 0.1% RH, 16 bit analogue input								
Measurement and update period	programmable with AR40x recorder: 1 min ÷ 4 hr.								
Radio track	ISM band	868 MHz, FSK modulation, modulation bandwidth ± 45kHz							
	Number of channels	7 (programmable from range 868.0÷870.0 MHz)							
	frequency of channel operation	channel	0	1	2	3	4	5	6
		MHz	869.955	869.77	869.445	869.605	868.05	868.3	868.55
	transmission path parameters	4.8 kbit/s, output power <5 dBm, receiver sensitivity -106 dBm							
	range(open space)	<200m (maximum 400m with retransmission function), in buildings it depends on local conditions							
antenna (SMA-JW connector, band 850 ÷ 880 MHz)	height 97mm, vertical polarization , impedance 50 Ω , gain 2,15 dBi, VSWR ≤ 1.5								
Interface for computer communication	USB, drivers for Windows XP/Vista/7/8/10								
Optical signalling (LEDs)	"Status", "RX/TX", in addition to AR432/434/436: 1 or 2 alarms								
LCD (AR432, AR434, AR436)	7 segments, 4 digits, 10mm height								
Power supply and working time on a new battery (lithium)	3.6V type AA (R6), 2450mAh (SAFT LS14500), up to 6 years (note 1)								
Rated operating conditions	-20 ÷ 70 °C, <100% RH (no condensation), do not flood with water								
Operating environment	air and neutral gases, no dust								
Operating position (sensor or measurement probe)	any chosen position or with cover downward when the probe has direct contact with water								
Housing	AR431/432/433/434/435/436	wall-mounted IP20, ABS UL94-V0, white, 80x80x25mm							
	AR437	industrial IP65, polycarbonate, 82x80x55mm, IP40 or IP50 probe							
Weight (with battery and antenna)	~90g (AR431/433/435), ~110g (AR432/434/436), ~230g (AR437)								

(1) the operating time depends on the measuring period, the presence of the LCD and ambient temperature. Exemplary, approximate operating times at 20÷30°C, with undisturbed radio transmission and **inactive retransmitter function** (increasing the range):

Measurement period	1 min	5 min	10 min	20 min	40 min	60 min
working time with / without LCD	7/5 months (also when no communication with AR40x)	12/8 months	20/11 months	32/13 months	45/14 months	51/16 months

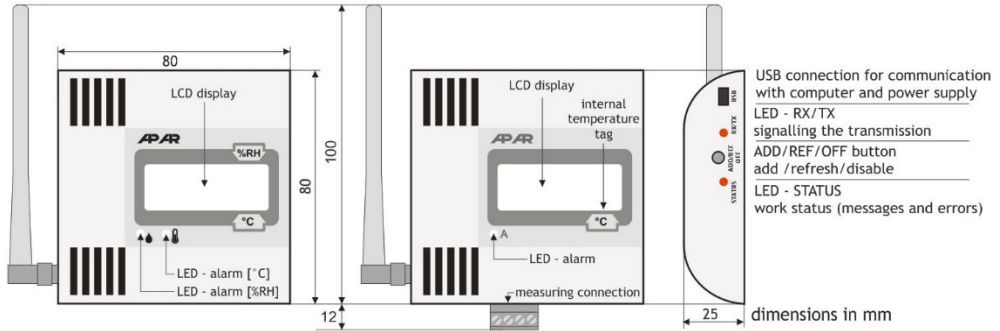
- using an accessory USB power adapter may extend the battery life of up to 8 years. **The USB power adapter should be also used in retransmitter mode** (increasing the range), then the battery operates only as a standby power supply (sufficient for 1÷3 weeks of continuous operation)

5. DESCRIPTION OF ELEMENTS. EXTERNAL MEASURING PROBES. ACCESSORIES.

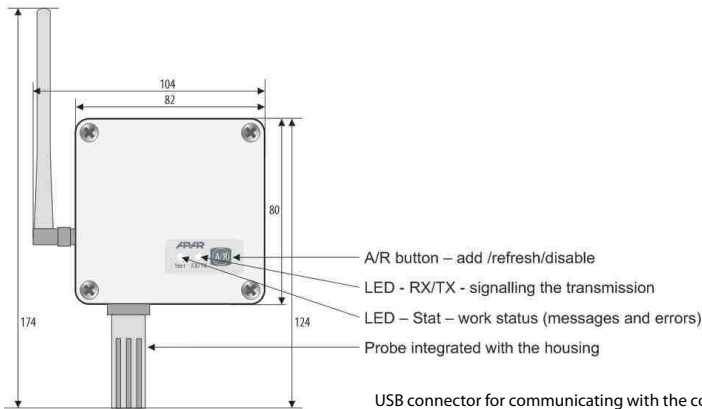
a) front view of AR432/436 and AR431/435 (without LCD and LED-alarm)

b) front view of AR434 and AR433 (without LCD and LED-alarm)

c) side view

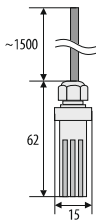


d) AR437/1



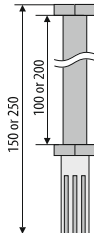
e) external measuring probes

AR435/2, AR436/2,
AR437/2



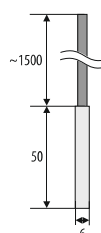
External probe
with a cable

AR437/L150
AR437/L250



Probe on stainless
steel tube

AR431/2,
AR432/2



External probe
with a cable

For the measuring element, shield made of ABS with a slot width of 1mm and internal stainless steel with the mesh of 0.15mm.

5.1. FUNCTION OF ADD/REF/OFF (A/R) BUTTON. TESTING THE RANGE.

Function of **ADD/REF/OFF** button (**A/R** in AR437, add/refresh/disable) depends on the base recorder AR40x.

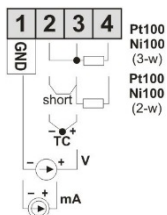
- AR40x connected to power supply, the sensor has not yet been added to the measurement list: short pressing of the button initiates the procedure of obtaining ID index for the sensor (chapter 9).
- AR40x connected to power supply, the sensor is present on the measurement list: short pressing of the button refreshes (updates) the measurement data from the sensor
- AR40x not connected to power supply or outside the range: pressing button for about 10s turns off the sensor (max. after approx. 35 seconds, unused sensors should be turned off to save the battery and eliminate their impact on the operating system, chapters 9 and 11, sub-p. b).

This button may be used to test the radio range at the target location, but if the sensor is **OFF**, then it will always be added to AR40x list as a new device, even if it was previously listed. Therefore, after completing the test, you should rearrange this list or create a new one (using methods described in the operating manual of AR40x i.e. AR407/AR406).

To improve or extend the radio range - read the operating notes in chapter 12.

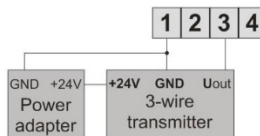
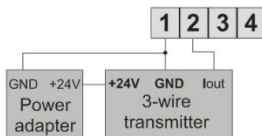
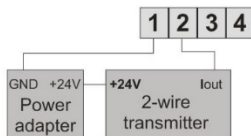
6. DESCRIPTION OF THE MEASUREMENT CONNECTOR IN AR433/434

a) numbering of the connector and the method of connecting sensors and measuring signals



Terminals	Description
2-3-4	Input Pt100, Ni100, resistive, (2- and 3-wire)
2-3	thermocouple input TC (J, K, S, B, R, T, E, N) and voltage input 0÷60mV
1-2	current input 0/4÷20 mA
1-3	voltage input 0÷10 V

b) connection of 2- and 3-wire transducers (**I_{out}** - current, **U_{out}** - output voltage)



7. CONNECTING TO A COMPUTER AND INSTALLATION OF DRIVERS

After you connect the device for the first time, the Windows system (XP/Vista/7/8/10) detects the sensor as "APAR USB DEVICE" and demands installation of drivers of the virtual COM serial port (MODBUS-RTU protocol, also used by ARSOFT-CFG-WZ1 software). Use the device manager or the wizard to add new hardware - manually specify the location that contains the drivers (CD-ROM, DRIVERS directory, or downloaded from www.apar.com). For Windows 7/10 you can use automatic downloading of the driver software from the Windows Update website.

In Windows 7, you may enter the Device Manager and perform the installation in the following manner:

- Right-click "**APAR USB DEVICE**" and select "**Update driver software**", then "**Browse my computer for driver software**"
- Use button "**Browse...**" to indicate the location (DRIVERS folder) containing the drivers and click "**Next**"
- Install the virtual COM port "**CDC USB to UART**", press "**Close**"

After the installation is complete, the sensor is shown in the system as a virtual port COMx (x-port number: 1.2 ...).



In AR437 the USB is available after removing the front cover.

Do not disconnect the sensor from the computer before completing the installation of the drivers.

8. INSTALLATION OF SOFTWARE

The supplied CD-ROM contains "**SOFTWARE**" folder with a free software installation set for the sensor operation, identical as for AR40x base recorder (AR407 / AR406).

The installation set includes the following applications:

- **ARSOFT-CFG-WZ1** - displaying current measurement data and battery voltage
 - configuration of parameters such as resolution, calibration of measurements, ID numbers of sensor and retransmitter, input type and indication range for analogue signals (AR433/434), options for alarms, display, access, etc. (chapter 10), the software requires communication with the sensor via USB port
- **ARSOFT-LOG-WZ3** - graphic or text presentation of results recorded by AR40x with print-out option, input data are downloaded each time from the text file with "csv" extension, created in the internal memory logger, USB or SD/MMC card

The **latest** versions of the aforementioned software are also available at the website (www.apar.pl in section *Download*). The detailed descriptions of the aforementioned applications can be found in the installation folders.

9. ADDING AND REMOVING MEASUREMENT SENSORS FROM AR407/406 LIST

By default, the sensor is supplied in "off" state (parameter ID=16, chapters 10 and 10.1). To display measurement data in AR40x base recorder, add the sensor to the measurement list. In a properly configured system, each sensor has its own unique identification number (**ID** parameter). Before starting the procedure of adding the sensors, make sure that all devices in the configured system are running on the same radio channel number, which is different than the number of neighbouring radio networks (by default the channel number is 6, the higher numbers are preferred). **The procedure of adding/removing sensors to/from the measurement list is described in the manual for AR40x recorder** (for AR407 chapter 12.5, for AR406 chapter 11)



- sensors **must** be indexed individually!
- each sensor operating in the system **must** have a different ID number (**ID** parameter)!

For optimum system operation and in case of communication problems (between sensors and AR40x base station) **please refer to the operating notes in chapter 12.**

10. SETTING THE CONFIGURATION PARAMETERS

All sensor configuration parameters are contained in non-volatile (permanent) internal memory.

AR434 sensor may display a failure error signal on the display, due to a lack of sensor or attaching a sensor other than the factory-programmed. In such a situation the proper sensor or analogue signal must be connected and the configuration must be programmed.

Parameter configuration is done via USB port and ARSOFT-CFG-WZ1 computer software:

- connect the device to a computer port and start and ARSOFT-CFG-WZ1 application
- when the connection is made, the program window displays current measured values, voltage of the battery and ID number of the sensor, **RX/TX** LED indicates the presence of the transmission
- setting and viewing parameters of the device is possible in the parameter configuration window
- new parameter values must be approved with the **Submit changes** button
- the current configuration may be saved to a file or set with values read from a file
- the sensor saves the configuration after disconnecting from the computer's USB (provided that battery voltage is > 3.0V)

NOTE:

- before disconnecting the device from a computer, press the **Disconnect device** button
- in the event of no response:
 - check the number of COM port in **Program options**
 - make sure that the serial port drivers have been installed correctly (chapter 7)
 - disconnect the sensor for a few seconds and then reconnect it to the USB port
 - restart the computer
 - remove the battery from the sensor for a few seconds (as described in chapter 13)

When indications differ from the actual value of the measured signal, it is possible to adjust the zero and sensitivity to the sensor using the calibration parameters.

10.1. PARAMETERS COMMON FOR ALL SENSORS

Table 10.1. Common configuration parameters for options of access, identification, and radio channel

Parameter	Range of parameter variation and description		Factory settings
1. bloc (1)	lock of ADD/REF/OFF button: disabled or enabled		disabled
2. RFChan	0 ÷ 6	radio channel - must be set separately on each device operating in the system (sensors and AR407/AR406 recorder)	6
3. ID	0 ÷ 16	D number (index), 16 = sensor off	16
4. RetrID (2)	0 ÷ 3	re-transmitter number (index), 0 = retransmission function disabled	0

Notes: (1) – this function prevents unintentional or unauthorized use of the button

(2) – this function allows you to extend the radio range (USB adapter required, chapter 12)

10.2. SPECIFIC PARAMETERS FOR AR431/432/435/436/437

Table 10.2. Calibration and alarm parameters

Parameter	Range of parameter variation and description		Factory settings
1. dot (1)	0 ÷ 1	resolution of indications : 0 =1°C and 1 %RH, 1 =0.1°C and 0.1 %RH	1
2. coHum	-5.0 ÷ 5.0 %RH	Zero offset (calibration) for humidity (applies only to AR435/436)	0.0 %RH
3. coTem	-2.0 ÷ 2.0 °C	Zero offset (calibration) for temperature	0.0 °C
ALARM CONFIGURATION (chapter 10.4) - applies only to AR432/436			
4. AHiHum	0 ÷ 100.0 %RH	Upper alarm for humidity	100.0 %RH
5. ALoHum	0 ÷ 100.0 %RH	Lower alarm for humidity	0.0 %RH
6. AHiTem	-40.0 ÷ 100.0 °C	Upper alarm for temperature	100.0 °C
7. ALoTem	-40.0 ÷ 100.0 °C	Lower alarm for temperature	-40.0 °C

Notes: (1) – applies to displaying data in AR40x, ARSOFT-CFG and on the sensor's LCD

10.3. SPECIFIC PARAMETERS FOR AR433/434

Table 10.3. Configuration parameters of the measurement input and other

Parameter	Range of parameter variation and description		Factory settings
1. <i>inp</i> Measurement input type	Pt100	thermo-resistance sensor (RTD) Pt100 (-200 ÷ 850°C)	Pt100
	Ni100	thermo-resistance sensor (RTD) Ni100 (-50 ÷ 170°C)	
	J (Fe-CuNi)	thermoelectric sensor (thermocouple) type J (-40 ÷ 800°C)	
	K (NiCr-NiAl)	thermoelectric sensor (thermocouple) type K (-40 ÷ 1200°C)	
	S (PtRh 10-Pt)	thermoelectric sensor (thermocouple) type S (-40 ÷ 1600°C)	
	B (PtRh30PtRh6)	thermoelectric sensor (thermocouple) type B (300÷ 1800°C)	
	R (PtRh 13-Pt)	thermoelectric sensor (thermocouple) type R (-40 ÷ 1600°C)	
	T (Cu-CuNi)	thermoelectric sensor (thermocouple) type T (-25 ÷ 350°C)	
	E (NiCr-CuNi)	thermoelectric sensor (thermocouple) type E (-25 ÷ 850°C)	
	N (NiCrSi-NiSi)	thermoelectric sensor (thermocouple) type N (-35÷ 1300°C)	
	4-20 mA	current signal 4...20 mA	
	0-20 mA	current signal 0..20 mA	
	0-10 V	voltage signal 0...10 V	
0-60 mV	voltage signal 0..60 mV		
0-700 ohm	resistance signal 0..700 Ω		
2. <i>rrtd</i> Line resistance (1)	0 ÷ 50.00 Ω	total resistance of leads for 2-wire RTD sensors and 700Ω	0.00 Ω
2. <i>cjtc</i> temp. of cold ends of thermocouples	-20 ÷ 70.0°C 0 = automat.	automatic (0°C) or constant compensation of temperature of the cold junction of thermocouples	0°C automat.
3. <i>dot</i> position of dot /resolution (refers to display in AR40x, ARSOFT-CFG-WZ1 and on LCD)	0	no dot (2) or resolution 1°C for temperature	1 (0.0/0.1°C)
	1	0.0 (2) or resolution 0.1°C for temperature	
	2	0.00 (2)	
	3	0.000 (2)	
4. <i>rbot</i> bottom of display range	-1999 ÷ 9999 units (2) – indication for 0mA, 4mA, 0V, 0mV, 0Ω - start of the input scale		0.0°C
5. <i>rtop</i> top of the indication range	-1999 ÷ 9999 units (2) – indication for 20mA, 10V, 60mV, 700Ω - end of the input scale		100.0°C
6. <i>cal0</i> zero calibration	zero offset: -50.0÷50.0°C or -500÷500 units (2)		0.0°C
7. <i>calG</i> slope calibration	sensitivity (gain): 85.0 ÷ 115.0 %		100.0 %
DISPLAY AND ALARM CONFIGURATION (chapter 10.4) - applies only to AR434			
8. <i>LCDch</i> values for display	measurement and internal temperature		measurement and intern. temp.
	only measurement		
9. <i>AHigh</i> upper alarm for measured value	-199.9 ÷ 1800 °C or -1999 ÷ 18000 units (2)		1800.0°C
10. <i>ALow</i> lower alarm for measured value	-199.9 ÷ 1800 °C or -1999 ÷ 18000 units (2)		-199.9 °C

Notes: (1) – for 3-wire sensors, the line resistance and parameter are automatically compensated

2.rrtd must be equal to 0.00 Ω

(2) – applies to analogue inputs (mA, V, mV, Ω)

10.4. ALARM CONFIGURATION (APPLIES TO AR432/434/436)

When displaying the measured values, the sensor also enables the alarm signalling with short blinking of "LED - alarm" LEDs repeated every 1 second. The alarm characteristics and values of alarm thresholds for the measured value define the lower and upper alarms (chapters 10.2 and 10.3). To obtain lower, upper, outside the band alarm - set the lower alarm at the value **lower** than the upper alarm - Fig.10.4.1. Alarm in the specified band occurs when the value of the lower alarm is **higher** than the upper alarm - Fig.10.4.2.

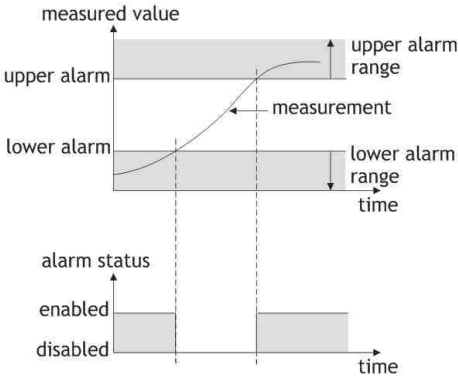


Fig.10.4.1. Upper, lower or off-band alarm

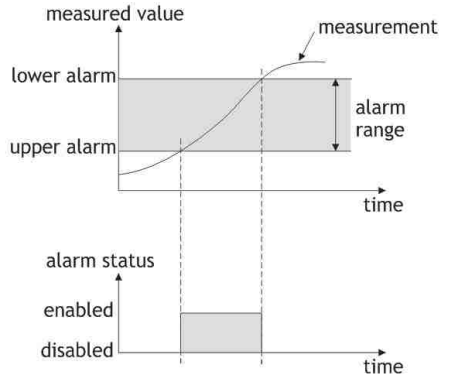


Fig.10.4.2 Alarm in the band

11. MESSAGE AND ERROR SIGNALLING

a) measuring errors indicated on the LCD:

Code	Possible causes of the error
---	<ul style="list-style-type: none"> - exceeding the measuring range of the sensor from above - sensor damage - attached sensor is different than the one set in configuration (chapter 10.3, parameter 1.inp)
---	<ul style="list-style-type: none"> - exceeding the measuring range of the sensor from below - sensor damage - attached sensor is different than the one set in configuration (chapter 10.3, parameter 1.inp)

b) events signalled by LEDs on the side of the housing and on the LCD

LED	Description of the message
RX/TX	radio transmission or via USB and ARSOFT-CFG-WZ1 (chapter 10)
STATUS	no communication with the base recorder – flash with duration of 5s every 1min and measured value alternating with message noBr on the LCD, possible causes ->chapter 12
	too low battery voltage (below 3.35V) - short flash during measurement and measured value alternating with message LBRL on the LCD (battery change -> chapter 13)



For the trouble-free and optimum operation of the measuring set consisting of wireless sensors and AR40x base unit (AR407/AR406), carefully read the operating instructions for these devices.

In case of normal, undisturbed transmission, the sensors activate cyclically to send the current measurement data at the request of AR40x. The activation period is set in the AR40x recorder (for AR407 it is **Radio scan interval** parameter in **Communication options**, for AR406 it is **Recording/Scan interval** parameter in **Recording options**). After switching on, AR40x waits for the measurement data and indicates it by message "-----" in the field for measurement values for a maximum time equal to scan interval. When the sensor is powered from USB port, updating the measurements in AR40x base station is performed always every 5 seconds (and data recording in AR406 still takes place according to parameter **Recording/Scan interval**, whereas in AR407 according to parameter **Data recording interval** - set in **Recording settings** menu).

In case of communication problems between the sensor and AR40x recorder (signalled by the sensor as described in chapter 11 b), proceed as follows:

- a.1)** check whether AR40x base recorder is turned on and operates on the appropriate radio channel
- b.1)** reduce the distance or change the location of devices or antennas relative to each other (using the antenna cable from accessories) to avoid obstacles such as walls, ceilings, furniture, etc.
- c.1)** change (disturbed) radio channel in all system devices (in each separately) to another
- d.1)** consider enabling retransmitter function (chapter 10.1, parameter 4.**RetriD**), where:
 - the retransmitter requires external USB power supply (battery only as backup power)
 - the retransmitter must also be registered in the system as a sensor (parameter 3.**ID**)
 - the retransmitter must be within radio range of AR40x recorder (AR407/AR406)
 - up to 3 retransmitters may be present in the system (each must have a different number)
 - retransmitter updates measurements of AR40x base station every 5 seconds

In order to achieve the longest possible working time without replacing the battery, remember to:


- a.2)** set the highest possible value of scanning period in AR40x recorder (recommended >10min)
- b.2)** provide continuous and uninterrupted communication with AR40x (do not turn off the recorder)
- c.2)** disable alarms when they are not needed (set lower and upper alarm set at the ends of the measuring range, chapter 10.4)

If the estimated battery life (as described in note 1, chapter 4) is unsatisfactory, consider using the USB power adapter (from accessories), which may extend this time to approximately 8 years.

In addition, it is advised to not disconnect the device from the computer during communication via the USB interface, which is indicated by the "**RX/TX**" and in ARSOFT-CFG-WZ1 software.

If the sensor is not responding, remove the battery briefly for a while and check its voltage level (if it is less than 3.3V the battery needs to be replaced).

13. BATTERY CHANGE

NOTE:  During the battery change, the real time clock (RTC) is reset and requires re-setting with ARSOFT-CFG-WZ1 software - the remaining parameters remain unchanged.

AR431/432/433/434/435/436 (prepare a flat screwdriver)

- remove the rear wall of the housing (as shown in Fig. 13.1), successively prying the latches
- carefully remove the sensor control board from the housing (Fig. 13.2)
- replace the battery with a new one of suitable type (chapter 4), observing the polarity shown in the handle
- re-assemble the unit by placing the cover and the back wall in its original position



Fig.13.1. Disassembly of the rear wall

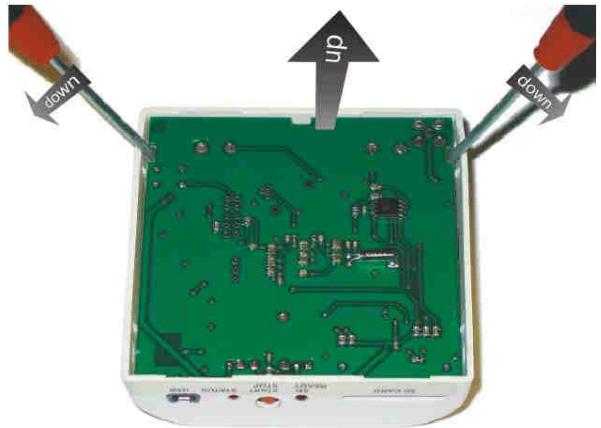


Fig.13.2. Disassembly of the control board

AR437

- unscrew 4 screws in the front panel and remove them from the device
- carefully slide the display plate out of the mounting sockets
- the battery compartment becomes accessible
- replace the battery with a new one of suitable type (chapter 3), observing the polarity shown in the handle
- after replacing the battery slide in the display plate into the mounting sockets
- assemble the device in reverse order to this described above
- to avoid any mechanical and electrostatic damage pay particular attention when handling the display plate
- to obtain IP65 tightness the housing cover must be precisely tightened

