

# AR407

# 16-CHANNEL RADIO AND WIRED DATA RECORDER

The AR407 allows the creation of a radio and wire based measurement network based on Apar production equipment (AR43x radio sensors, AR182 / AR183 temperature probe, or any RS485 or Ethernet interface). The system enables remote measurement and recording of temperature and humidity or other physical quantities (pressure, level, speed, etc.) processed into a standard electrical signal (0/4 ÷ 20 mA, 0 ÷ 10 V, 0 ÷ 60 mV).

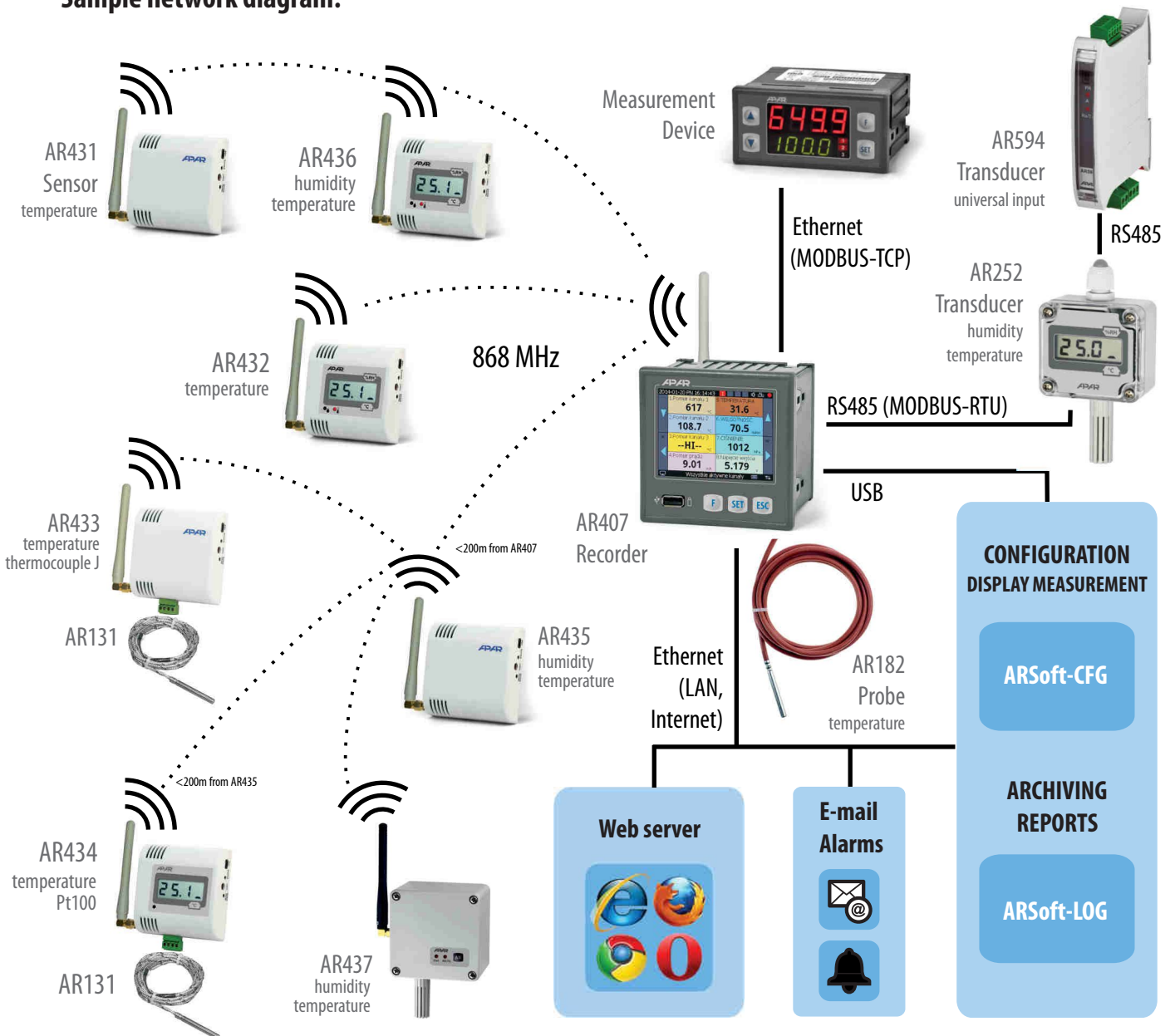
AR407 base station allows simultaneous presentation of up to 16 measuring channels, both radio and wired (devices connected via RS485 interface with MODBUS-RTU protocol or Ethernet with MODBUS-TCP or AR18x temperature probe).

Radio transmissions are in the ISM 868 MHz band with FSK modulation up to 200 m (or 400 m) in open space. In buildings, the range depends on structural elements such as the type and thickness of walls, ceilings, doors, etc. For up to a maximum of 400 meters, any sensor that communicates directly with the AR407 base station can be programmed to retransmit measurements from other sensors located in its range. The retransmitter function requires a power supply with a standard mini USB plug. There may be up to 3 retransmitters per network. Seven radio channels allow the independent operation of neighboring AR407 sets with sensors, which together allows up to 112 measurement channels to be registered.

Measurements from related devices are transmitted radio or wire to AR407, which can record this data in internal memory or USB. Access to the AR407 base station is via Ethernet, USB or RS485. The AR407 recorder also has a built-in web server so you can view current measurements on the LAN and the Internet, additionally the ability to generate e-mail alerts.

Free software enables configuration and monitoring of devices (ARSoft-CFG) and archiving of measurement data and report generation (ARSoft-LOG).

## Sample network diagram:



AR431/1  
AR435/1



AR432/1  
AR436/1



For these models, it is possible to place the measuring element in external probe



AR433



AR434



AR437/1



## Characteristics

- 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 consisting of recorder (AR407/AR406) with sensors
- available models:
  - , **AR431- AR432**
    - temperature measurement in the range of: -30÷80 °C or -20÷70 °C, 1-channel sensor
  - **AR433, AR434**
    - universal thermometer and analogue input (Pt100, Ni100, J, K, S, B, R, T, E, N, 0÷20mA, 4÷20mA, 0÷10V, 0÷60mV, 0÷700# and built-in ambient temperature measurement (-20÷70°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÷80°C or -20÷70°C), 2-channel
- temperature and humidity sensors integrated in the housing or in the external probe (note: do not flood the measuring probe with water and avoid condensation in the unit)
- **AR432: AR434, AR436,**
  - CD indicating measured values, message and errors
  - alarms: lower, upper, in the band and outside the band, LED indicators
- 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
- protection against reverse battery insertion
- high, long-term stability of measurement, accuracy and immunity to interferences
- compliance with RED directive (2014/53/UE)
- **AR437** -protection rating IP65 provided by the housing and improving its reliability by high resistance to water, dust and condensation inside the unit

### Contents of the set:

- a recorder with an antenna for the 868MHz band
- a USB cable for connecting the device to a computer, 2 m long
- a user instruction and a warranty card

### Available accessories:

- SMA antenna cable, socket and plug, impedance 50 #, length 2 m.
- 3.6V lithium battery type AA (R6), 2450mAh
- stabilized power supply adapter 5V/150m

## TECHNICAL DATA

<b>Measuring range of probes</b> (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
<b>Measurement accuracy of probes</b>	temperature	±0,5°C in the range of -10÷80°C or ±0,5÷1,5°C the remaining range, for AR435/436: ±0,5°C for 20÷30°C or ±0,5÷1,8°C in the remaining range
	humidity	±3 %RH in the range of 20÷80 %RH, ±3÷5 %RH in the remaining range
<b>Measurement input in AR433 and AR434</b> (1 universal, programmable via USB interface)	thermo-resistive (RTD) and resistive	<b>Pt100</b> (measurement range -200÷850°C), <b>Ni100</b> (-50÷170°C), <b>0÷700 Ω</b> , 3- or 2-wire, wire resistance Rd < 25 Ω (for each line), polarity current ~480 µA (pulse)
	thermocouple (TC)	<b>J</b> (-40÷800 °C), <b>K</b> (-40÷1200 °C), <b>S</b> (-40÷1600 °C), <b>B</b> (300÷1800 °C), <b>R</b> (-40÷1600 °C), <b>T</b> (-25÷350 °C), <b>E</b> (-25÷680 °C), <b>N</b> (-35÷1300 °C)
	current	0/4÷20 mA (Rwe = 110 Ω)
	voltage	0÷10 V (Rwe = 110 kΩ), 0÷60 mV (Rwe > 2 MΩ)
- processing errors (AR433/434 at temperature of 25°C)		- basic: 0,1 % (0,2 % for TC) of the measurement range ±1 digit - add. for thermocouples: <2 °C (thermocouple cold junction temp. compensation) - due to ambient temperature changes: < 0,005 % of input range /°C
- range of indications (for analogue inputs)		-9999 ÷ 19999, programmable (for mA, V, mV and Ω)
<b>Measurement resolution</b>		temperature 0,1 °C, humidity 0,1 %RH, 16 bit analogue input
<b>Measurement and update period</b>		programmable with AR40x recorder: 1 min ÷ 4 hr. (5s when powered from USB)
<b>Radio track</b>	ISM band	868 MHz, FSK modulation, modulation bandwidth ±45kHz
	number of channels	7 (programmable from range 868,0 ÷ 870,0 MHz)
	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, height 97mm, vertical polarization, impedance 50 Ω, gain 2,15 dBi, VSWR ≤ 1,5, band 850 ÷ 880 MHz)
<b>Interface for computer communication</b>		USB, drivers for Windows 7/8/10
<b>LCD</b> (AR432, AR434, AR436)		7 segments, 4 digits, 10mm height
<b>Power supply</b> (lithium battery)		3,6V typ AA (R6), 2450mAh (SAFT LS14500), up to ~4 years (tjote)
<b>Rated operating conditions</b>		-20 ÷ 70 °C, <100 %RH (non-condensing), o not flood with water
<b>Operating environment</b>		air and neutral gases, no dust
<b>Weight</b> (with battery and antenna)		~110g (version with LCD: AR432/434/436), ~90g (without LCD: AR431/433/435), ~230g (AR437)

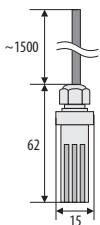
(1) the operating time depends on the measuring period, the presence of the LCD and ambient temperature. Exemplary, approximate operating times at 20÷30°C, with undisturbed radio transmission and inactive retransmitter function (increasing the range):

measurement period	1 min	5 min	10 min	30 min	60 min
working time with /without LCD	7/5 months	12/8 months	20/11 months	40/14 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)

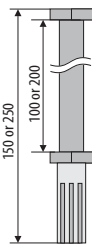
## External measuring probes

AR435/2, AR436/2, AR437/2



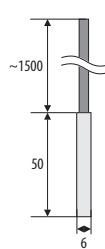
External probe with a cable

AR437/L150 AR437/L250



Probe on stainless steel tube

AR431/2, AR432/2



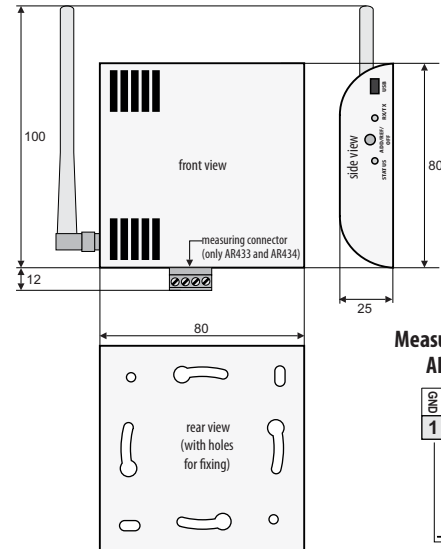
External probe with a cable

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

Dimensions in mm

## INSTALLATION DATA AR431, AR432, AR433, AR434, AR435, AR436

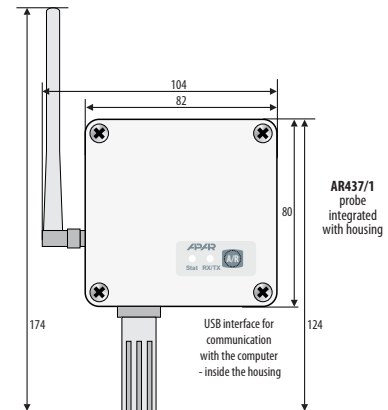
<b>Enclosure</b>	wall mounted IP20, ABS UL94-V0, white color, 80x80x25mm
<b>Mounting</b>	holes in the back of the housing - for screwing or hanging
<b>Operating position</b>	any or cover the measuring element downwards when probe is exposed to direct contact with water



Dimensions in mm

## INSTALLATION DATA AR437

<b>Enclosure</b>	industrial IP65, polycarbonate, dimensions 82x80x55mm sensor cover IP40 - ABS, slot width of 1mm
<b>Mounting</b>	4 holes Ø4,2mm, spacing 70x50mm, available after removing the front cover or hang on the 2 upper holes on the back of the housing
<b>Operating position</b>	any or cover the measuring element downwards when probe is exposed to direct contact with water



## Ordering procedure

AR431, AR432, AR435, AR436, AR437 / □

Type of measuring probe	Code
integrated with housing (standard)	1
external with cable 1,5m	2
on stainless steel pipe, length 150 mm	L150
on stainless steel pipe, length 250 mm	L250

only AR437  
only AR437

## AR433, AR434

For example: AR437 / 1

Temperature and humidity sensor with built-in measuring element without LCD display