

## AKO-575xxx

### MODBUS map in AKOGas gas transmitters

## Introducción

This document is aimed at describing to the user the operation of the MODBUS RTU communications series protocol implemented by AKO in the AKOGas transmitters. We should take into account that we assume that the user who wants to interact with any of our equipment with communication capacity has some knowledge of the protocol.



**IMPORTANT:** The functions and parameters described below are available depending on the chosen unit, for more information consult the device's user manual.

## Technical specifications

### RS-485 communications

Physically speaking, the AKOGas devices can be connected to a RS-485 communications bus with other units. This is a multipoint connection where the maximum distance is 1200\* m. The configuration of this bus should be identical to the one presented in the following table:

RS-485 SERIES CONFIGURATION	
Baud Rate	9600**, 19200, 38400, 57600
Data length	8 bits
Parity bit	No
Stop Bits	1 bit

### Modbus protocol

The protocol defines a network configuration where a network manager device (master) coexists with one or several slaves, up to a maximum of 32 networked devices (247 in the case of placing repeaters in the RS-485 network).

Among the two transmission modes defined by the protocol: ASCII and RTU (Remote Terminal Unit), AKO adopts the RTU mode. It must be said that in a network of devices connected via the MODBUS protocol, devices cannot be shared using different transmission modes.

The datagram format in RTU format is:

Start frame	Address	Function	Data	CRC	End frame
3.5 T	1 byte (1 to 247)	1 integer	Max. 126 integers	1 integer	3.5 T

← Maximum length 255 bytes →

The maximum data unit is the integer (2 bytes)

T is the time of transition of one character.

## Defined MODBUS functions

AKO solves the management of its devices using several basic functions of the MODBUS protocol:

Function	Definition	Description of operation
03	Read holding registers	Reading of multiple logs
06	Preset single registers	Writing a log
16	Preset multiple registers	Writing of multiple logs

## Definitions

Types of log	
N	Numeric value.
Nx10	Numeric value multiplied by 10, it has to be divided by 10 to represent it correctly.
Nx100	Numeric value multiplied by 100, it has to be divided by 100 to represent it correctly.
UTF8	2 bytes utf8 (to represent texts)
BITS	Bit map, each bit represents a value, 0 = not active, 1 = active.
Types of access	
R	Read-only. (Parameters to display to the user in the parameter section)
W	Read and write. (Parameters to display to the user in the parameter section)

\* Maximum distance at 9600 baud, the distance is reduced on increasing the baud rate.

\*\*Default value.

## Parameters

It allows the user to display and edit the operating parameters.

### Alarm configuration

Register	Type	Access	Parameter	Description	Range	Min.	Def.	Max.	
200	N	W	AL1	Alarm levels	0: According to regulations 1: Set by user	0	1	1	
201	N	W	AL2	Pre-Alarm	0: Disabled 1: Enabled	0	1	1	
202	N	W <sup>(1)</sup>	AL3	Pre-alarm level	<b>AKO-575744</b> <b>Other models</b>	b02 - AL6	b02	3000 500	AL6
203	N	W	AL4	Pre-Alarm Differential	10 - 200	10	100	200	
204	N	W	AL5	Pre-Alarm Delay	0 - 15	0	0	15	
205	N	W <sup>(1)</sup>	AL6	Alarm Level	<b>AKO-575744</b> <b>Other models</b>	AL3 - 5000	AL3	4000 1000	5000 2000
206	N	W	AL7	Alarm Differential	0 - 200	0	100	200	
207	N	W	AL8	Alarm Delay	0 - 15	0	0	15	
208	N	W	AL9	Early leak detection	0: Disabled 1: Enabled	0	0	1	
205	N	W	AL10	Early leak detection activation	<b>AKO-575744</b> <b>Other models</b>	AL11 - AL3	AL11	1500 250	AL3
210	N	W	AL11	Early leak detection hysteresis	0 - 50	0	10	50	
211	N	W	AL12	Delay of early leak detection in minutes	0 - 15	0	0	15	

(1) R if AL1=0, W if AL1=1

### Basic configuration (bcn)

Register	Type	Access	Parameter	Description	Range	Min.	Def.	Max.
300	N	R	Gc0	Modbus Address of the Sensor	1 - 247	1	-	247
301	N	R	Gc1	Type of gas to be measured	0: None gas 1: All gas 2: R-22 3: R-123 4: R-125 5: R-134A 6: R-404A 7: R-407A 8: R-407C 9: R-407F 10: R-410A 11: R-422A 12: R-422D 13: R-427A 14: R-507 15: R-HFO-1234YF 16: R-HFO-1234ZE 17: R-448A 18: R-449A 19: R-450A 20: R-513A 21: R-452A 22: R-424A 23: R-442A 24: R-434A 25: R-453A 26: R-744 (CO2) 27: Broadband 28: R-32 29: R-23 30: R-455A	0	(2)	30
302	N	W <sup>(3)</sup>	Gc2	Gas to be measured with the Universal sensor	1: All gas 4: R-125 5: R-134A 6: R-404A 7: R-407A 9: R-407F 10: R-410A 17: R-448A 18: R-449A 20: R-513A 21: R-452A 28: R-32 29: R-23 30: R-455A	1	(4)	30
303	N	W	b01	Display	0: Measurement in PPM 1: Type of gas to be measured	0	0	1
304	N	W	b02	Minimum value to be shown on the display (Lower values are shown as 0). Does not affect the values shown by communication	0 - 250	0	0	250
305	N	W	b03	Function of the mute key	0: Disabled 1: Deactivate acoustic alarm 2: Deactivate relay 3: Deactivate both	0	1	3
306	N	W	b04	Audible alarm	0: Disabled; 1: Enabled	0	(4)	1

(2) Depending on the model; (3) R if Gc1 ≠ 27, W if Gc1=27, (4) According to initial wizard (InI)

### Basic configuration (bcn)

Register	Type	Access	Parameter	Description	Range	Min.	Def.	Max.
307	N	W	b10	Password function	0: Disabled 1: Block access to parameters 2: Block keypad	0	0	2
308	N	W	b11	Access code (password)	1 - 99	0	0	99
309	N	W	b20	MODBUS address	1 - 247	1	-	247
310	N	W	b21	Communication speed	0: 9600 bps 1: 19200 bps 2: 38400 bps 3: 57600 bps	0	0	3
311	N	R	Unt	Multiplier factor of the value displayed	1: x 1 10: x 10	1	1	10

### Input and output configuration (In0)

Register	Type	Access	Parameter	Description	Range	Min.	Def.	Max.
400	N	R	I00	Reset to zero of the sensor (only for calibration)	0: Disabled 1: Reset to zero activated	0	-	1
401	N	R	I01	Setting of the sensor (only for calibration)	0: Disabled 1: Setting activated	0	-	1
402	N	W	I11	Polarity digital input 1 (Remote mute)	0 = Activates on closing contact 1 = Activates on opening contact	0	0	1
403	N	W	I21	Polarity digital input 2 (Remote set hold)	0 = Activates on closing contact 1 = Activates on opening contact	0	0	1
404	N	R	o00	Type of output 4/20 mA (Read only)	0: Calibrated for alarm station 1: Linear	0	(4)	1

### Information (tid)

Register	Type	Access	Parameter	Description	Range	Min.	Def.	Max.
800	N	R	InI	Option chosen in the configuration wizard	0: Demo mode 1: Connection to alarm station 2: Independent operation	0	(4)	2
801	N	R	PU	Program version	-	-	-	-
802	N	R	Pr	Program revision	-	-	-	-
803	N	R	bU	Bootloader version	-	-	-	-
804	N	R	br	Bootloader revision	-	-	-	-
805	N	R	PAr	Parameter map revision	-	-	-	-

(4) According to initial wizard (InI)

## Unit status

Allows the user to consult the status of the unit.

### Alarms

Register	Type	Access	Description	Values
1547	BITS	R	Active alarms Bit 0 = Pre-Alarm Bit 1 = Alarm Bit 2 = Sensor error Bit 3 = Low temperature sensor error Bit 4 = High temperature sensor error	0 = Inactive; 1 = Active
1548	BITS	R	Alarms saved and not confirmed Bit 0 = Pre-Alarm Bit 1 = Alarm Bit 2 = Sensor error Bit 3 = Low temperature sensor error Bit 4 = High temperature sensor error	0 = Inactive; 1 = Active
1549	BITS	R	Silenced alarms Bit 0 = Pre-Alarm Bit 1 = Alarm Bit 2 = Sensor error Bit 3 = Low temperature sensor error Bit 4 = High temperature sensor error	0 = Inactive; 1 = Active
1550	BITS	R	Maintenance Mode	0 = Inactive; 1 = Active
1551	BITS	R	Set Hold mode	0 = Inactive; 1 = Active
1583	N	R	Early leak detection status	0 = Inactive; 1 = Active
5001	N	R	Pre-Alarm	0 = Inactive; 1 = Active
5003	N	R	Alarm	0 = Inactive; 1 = Active
5004	N	R	Sensor error	0 = Inactive; 1 = Active

### Reading of inputs and outputs

Register	Type	Access	Description	Values
1002	N	R	Pre-Alarm relay status	0 = Inactive; 1 = Active
1003	N	R	Alarm relay status	0 = Inactive; 1 = Active
1012	N	R	Acoustic alarm status	0 = Inactive; 1 = Active
1013	N	R	Reading of digital input 1 (Remote mute)	0 = Inactive; 1 = Active
1014	N	R	Reading of digital input 2 (Remote Set Hold)	0 = Inactive; 1 = Active
1019	N	R	Reading of output 4/20 mA	$\mu\text{A}$
1020	N	R	Reading of gas concentration	PPM
1021	Nx10	R	Reading of the internal temperature of sensor	Value in °C

### Keypad

Register	Type	Access	Description	Values
20000	BITS	W	Activation of functions Bit 0 = Activation of the Mute function Bit 1 = Activation of the Set Hold mode Bit 2 = Activation of the Wizard mode	0 = Inactive; 1 = Active
20001	BITS	R	Function status Bit 0 = Activation of the Mute function Bit 1 = Activation of the Set Hold mode Bit 2 = Activation of the Wizard mode	0 = Inactive; 1 = Active

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