

WGW410 - Wireless Modbus Gateway with Analog Outputs



INTRODUCTION

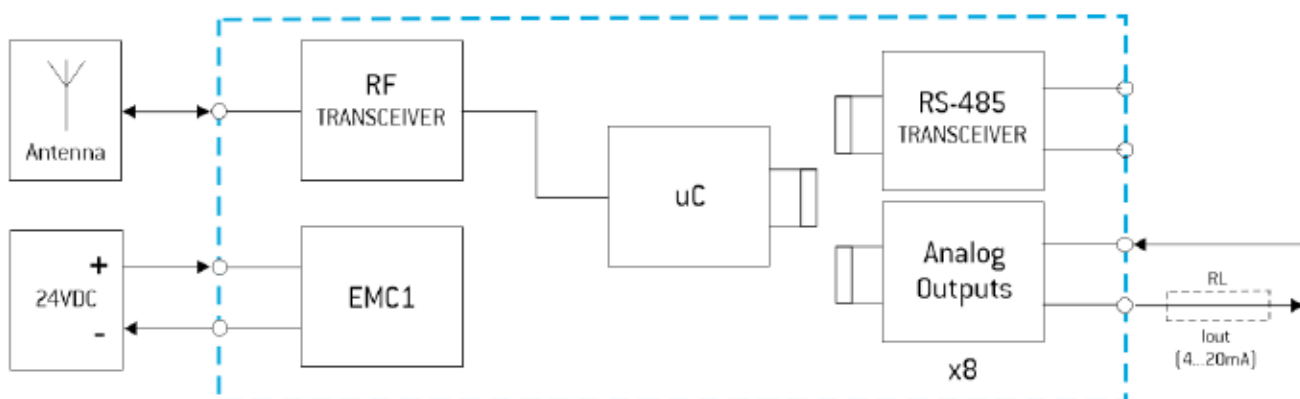
The Tekon Electronics WGW410 Wireless Modbus Gateway is specifically designed to meet the most rigorous requirements of operation in the industrial process environments. Due to their reduced dimensions they can be easily installed in junction boxes or in the control cabinet.

The WGW410 Wireless Modbus Gateway receives the information transmitted by the THW401 Universal Wireless Temperature Transmitters and makes it available on the RS485 interface with Modbus protocol. Additionally, the first 8 addressed wireless transmitters can be read through the 4 to 20mA analog outputs. Each WGW410 Wireless Modbus Gateway supports up to 16 THW401 transmitters ensuring a network refresh time less than one second. For each THW401 transmitter the following information is provided in the Modbus registers: sensor temperature, ambient temperature, RF signal strength (RSSI), battery level, sensor probe type, transmission interval and information life time. The configuration parameters like the sensor probe type and transmission interval can be easily configured using the OTA - Over The Air setup and configuration function.

KEY FEATURES

- Supports up to 16 THW401 Temperature Transmitters
- Long distance range communication (up to 3.5 Km Line of Sight - LoS)
- Real time transmission of sensor probe temperature, ambient temperature, RF signal strength and battery level
- 1 second network refresh time
- High measurement accuracy
- Sensor status monitoring
- RS-485 interface with Modbus protocol
- 8x Analog Outputs (4...20mA)
- Over The Air setup and configuration
- On site battery and RF signal strength verification

BLOCK DIAGRAM



TECHNICAL SPECIFICATIONS

Power supply

Voltage supply	12 VDC to 24 VDC +/- 10%
Current consumption	70 mA @ 12 VDC / 45 mA @ 24 VDC (@ 25 °C)
Power consumption	0.85 W @ 12 VDC / 1.1 W @ 24 VDC (@ 25 °C)
Power up time	900 ms

RF transmission

Transmission frequency	2.4 GHz (worldwide)
Transmission interval	60 ms per remote node
Maximum output power	18 dBm
Sensitivity	-108 dBm
Open air range	3.5 Km LoS



RS-485 interface

Protocol	Modbus RTU
Baud rate	[4800; 115200] Kbps
Galvanic isolation	1KV

Analog Outputs

Output signal	4 to 20 mA
Max. load	360 Ω @ 12VDC / 1 K Ω @ 24VDC
Out of range	[3.2;4.0] mA and [20.0;20.2] mA
Fault signal (e.g. sensor fault)	3.1.mA or 20.4 mA
Sample cycle	1s to 24h (configurable)
Protection	Against reversed polarity Surge protection
Power on or reset initial value	Last written value

Factory settings

Net ID	0x01
RS-485	0x01
Baud rate	9600 Kbps
Sensor probe type	2 (Pt100 – 3 wires)
Sensor transmission interval	10s

Casing

Material	PA – UL 94 V0
Color	RAL 7035
Weight	120 g
Cross-section of cables	2.5mm ²
Protection type	IP40
Antenna connection	SMA Reverse Polarity



Ambient conditions

Ambient temperature range	-20 to 80 °C (-4 to 176 °F)
Storage temperature range	-20 to 80 °C (-4 to 176 °F)
Relative humidity	≤ 95 %, without condensation

Certificates and approvals

EN 61326	Electrical equipment for measurement, control and laboratory use. EMC requirements.
IEC 61000-4-2	Electrostatic discharge immunity test
IEC 61000-4-3	Radiated, Radio-Frequency, Electromagnetic Field Immunity test
IEC 61000-4-4	Electrical fast transient/burst immunity test
IEC 61000-4-5	Surge Immunity Test
EN 300 228	Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive
EN 300 440	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive



**Modbus Holding Register Table (Function 0x03 – Read holding register;
Function 0x10 – Write Holding Register) for OTA (Over the Air configuration) - THW401**

Description	Sensor temperature in °C x 100	Transmission interval in seconds	Sensor probe type (see table below)	Node Model (see table below)	Battery Voltage in Volts x 100	RSSI in dBm	Information life time in seconds	Board temperature in °C x 100
Variable type	INT32	UINT32	UINT16	UINT16	UINT16	UINT16	UINT32	INT16
Address	Node Offset ⁽¹⁾	Node Offset + 18	Node Offset + 20	Node Offset +21	Node Offset + 22	Node Offset + 23	Node Offset + 24	Node Offset + 26
Permissions	Read	Read/Write	Read/Write	Read	Read	Read	Read	Read
Range	According to sensor type	[0 to 86400]	[1 to 99]	[1 to 99]	[3.00 to 20.00]	[70 to 180]	[0 to 86400]	[-20.00 to 80.00]
Node 0	0	18	20	21	22	23	24	26
Node 1	27	45	47	48	49	50	51	53
Node 2	54	72	74	75	76	77	78	80
Node 3	81	99	101	102	103	104	105	107
Node 4	108	126	128	129	130	131	132	134
Node 5	135	153	155	156	157	158	159	161
Node 6	162	180	182	183	184	185	186	188
Node 7	189	207	209	210	211	212	213	215
Node 8	216	234	236	237	238	239	240	242
Node 9	243	261	263	264	265	266	267	269
Node 10	270	288	290	291	292	293	294	296
Node 11	297	315	317	318	319	320	321	323
Node 12	324	342	344	345	346	347	348	350
Node 13	351	369	371	372	373	374	375	377
Node 14	378	396	398	399	400	401	402	404
Node 15	405	423	425	426	427	428	429	431

(1) Node Offset = [NodeID x 27]



Sensor probe type	Code
PT100 - 2 Wires	1
PT100 - 3 Wires	2
PT100 - 4 Wires	3
PT500 - 2 Wires	4
PT500 - 3 Wires	5
PT500 - 4 Wires	6
PT1000 - 2 Wires	7
PT1000 - 3 Wires	8
PT1000 - 4 Wires	9
Thermocouple K	10
Thermocouple J	11
Thermocouple T	12
Thermocouple S	13
Thermocouple R	14
Thermocouple N	15
Thermocouple B	16
Thermocouple E	17

End Node Models	Code
THW401	2



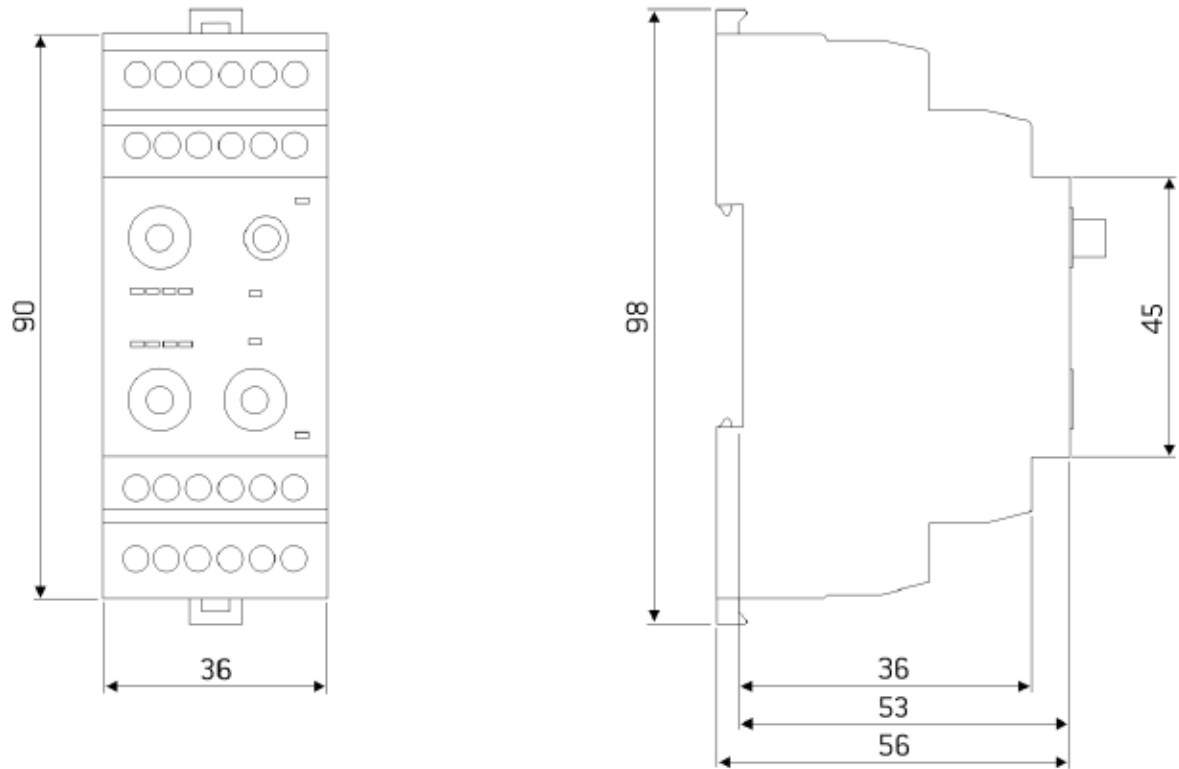
Modbus Holding Register Table (Function 0x03 – Read holding register; Function 0x10 – Write Holding Register) for Analog Output configuration

Description	Input Minimum Value	Input Maximum Value	Number of failed messages to alarm	Modbus Output Address Link	Alarms	Damaged Sensor current signal	Communication failure current signal	Device Status	Temperature *100	Output current
Variable type	INT16	INT16	UINT16	UINT16	UINT16	UINT16	UINT16	UINT16	INT32	UINT16
Address	Analog Offset ⁽²⁾	Analog Offset + 1	Analog Offset + 2	Analog Offset +3	Analog Offset + 4	Analog Offset + 5	Analog Offset + 6	Analog Offset + 7	Analog Offset + 8	Analog Offset + 10
Permissions	Read/Write	Read/Write	Read/Write	Read only	Read only	Read only	Read only	Read only	Read only	Read only
Range	Temperature that defines 4mA	Temperature that defines 20mA	2 ... 10	N/A	0 ... 3	204 (20.4mA)	310 (3.10mA)	1 ... 4	N/A	N/A
Info	Min. temperature read (°C)	Max. temperature read (°C)	Time refresh cycles to alarm	Additional Modbus Address to read temperature	0: All Off 1: Sensor On +Com. Fail Off 2: Sensor Off + Com Fail On 3: Sensor On + Com Fail On	Output current when sensor is damaged (mA) x 100	Output current when communication alarm condition is reached (mA) x 100	Device status code: 1 – Normal Operation; 2 – Sensor Damaged 3 – Sensor OK but temperature out of range 4 - Com. error	Sensor read temperature (converted to °C x 100)	Output current equivalent to given temperature (mA) x 100
Default Values	0	100	3		3	204	310	N/A	N/A	N/A
Output 0	432	433	434	435	436	437	438	439	440	442
Output 1	443	444	445	446	447	448	449	450	451	453
Output 2	454	455	456	457	458	459	460	461	462	464
Output 3	465	466	467	468	469	470	471	472	473	475
Output 4	476	477	478	479	480	481	482	483	484	486
Output 5	487	488	489	490	491	492	493	494	495	497
Output 6	498	499	500	501	502	503	504	505	506	508
Output 7	509	510	511	512	513	514	515	516	517	519

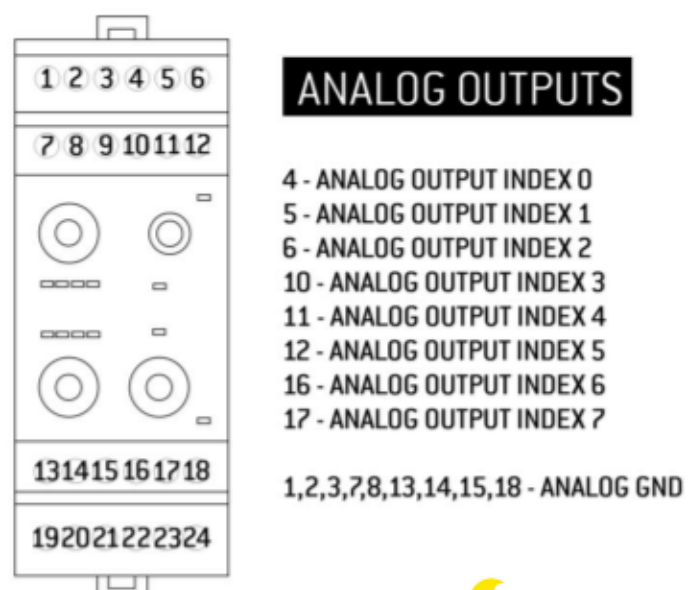
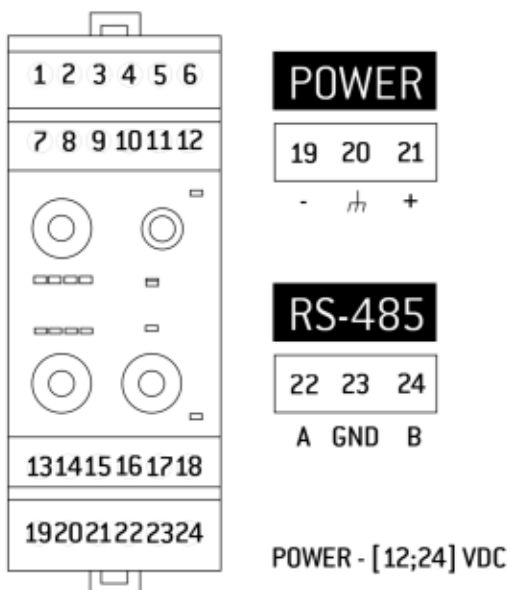
(2) Analog Offset = [432 + Analog IDx11]



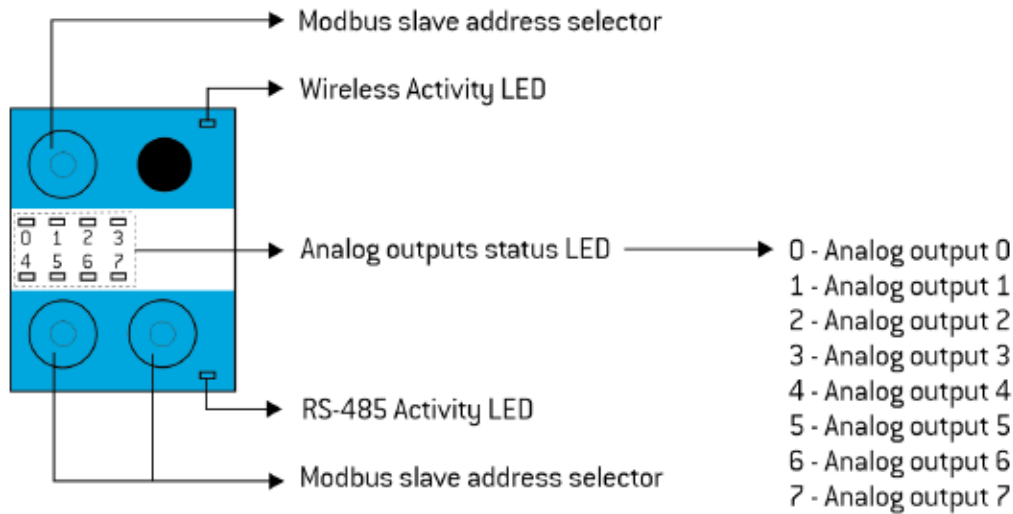
DIMENSIONAL DRAWINGS



ELECTRICAL CONNECTIONS



INTERFACE DIAGRAM



ANALOG OUTPUTS TO NODES ADDRESS MATCHING

The first eight node addresses are directly addressable to analog outputs (0x00 to 0x07).

Examples

Node configured with address 0 corresponds to Analog Output 1, node configured with address 1 corresponds to Analog Output 2... node configured with address 7 corresponds to Analog Output 8.

ANALOG OUTPUT LED CODING

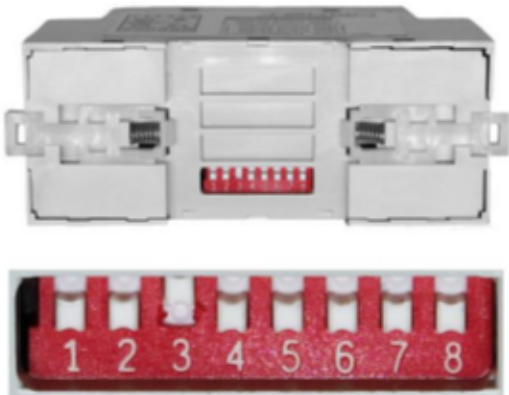
Analog Output Led signaling

Led State	Color	Meaning
Fixed	RED	Analog current loop is open
Blinking	GREEN	The output is in error. Could be out of range temperature, sensor damaged or communication lost. Please see the device status values over the Modbus.
Fixed	GREEN	Correct operation. Current loop is closed, communication between node and gateway OK and range temperature configured and measured is OK.



MODBUS CONFIGURATION

Modbus port configuration switch:



Baudrate (bps)	Pin 1	Pin 2	Pin 3
4800	OFF	OFF	OFF
9600	OFF	OFF	ON
14400	OFF	ON	OFF
19200	OFF	ON	ON
38400	ON	OFF	OFF
56000	ON	OFF	ON
57600	ON	ON	OFF
115200	ON	ON	ON

Parity	Pin 4	Pin 5
None	OFF	OFF
Even	OFF	ON
Odd	ON	OFF
None	ON	ON

Stop Bits	Pin 6
One	ON
Two	OFF

Note:

1. Pin 7 is reserved for future use.
2. Pin 8 at ON state connects an internal 120Ω resistance for line adaptation.

SELECTION AND ORDERING DATA

Partnumber	Partname
	WIRELESS TEMPERATURE TRANSMITTER DUOS 868MHz
Related Products	
	WIRELESS GATEWAY DUOS 868MHz
	WIRELESS REPEATER DUOS 868MHz



CONTROL Y REGULACIÓN TÉRMICA,S.L.
 Camí vell de Russafa,713
 46470 CATARROJA (VALENCIA)
 Telf. 96 3 74 72 71
 coreterm@coreterm.es