WIRELESS SENSORS TECHNOLOGY

TK-UGW-ALU

UNIVERSAL IoT GATEWAY

Universal IoT Gateway connects sensors and other devices to the cloud. This allows you to view applications and devices status in an IoT platform to get real-time insights and notifications.

Accelerate your business digitalization and quick access to data without complexity and high technical expertise. This versatile gateway is your go-to solution to speed up Industrial IoT applications.

	Product References	
	with GSM	without GSM
868MHz	PA222410202	PA222410200
915MHz	PA222410203	PA222410201

KEY FEATURES

WIRELESS COMMUNICATION
WI-FI AND 3G/4G

INDUSTRIAL COMMUNICATION
MODBUS RS485 AND MODBUS TCP/IP

TEKON WIRELESS SOLUTIONS
NETWORKS WITH DUOS AND PLUS TRANSMITTERS

IOT PLATFORMS
NATIVE INTEGRATION WITH TEKON IOT PLATFORM AND THIRD-PARTY SOLUTIONS

DATA INTEGRATION
MQTT AND NODE-RED

DATA LOGGING
MEMORY FOR DATA STORAGE

ALUMINIUM CASE
READY FOR INDUSTRIAL ENVIRONMENTS

REMOTE UPDATE

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TECHNICAL SPECIFICATIONS

RADIO SPECIFICATIONS	868MHZ	915MHZ
Range[1]	Up to 4 Km LoS	
Minimum communication distance	3 m @ 27 dBm	3 m @ 27 dBm
Radio transmit power[2]	0 to 27 dBm	8 to 27 dBm
Radio receiver sensitivity[2]	-97 to -110 dBm	
Frequency band[2]	868 to 869 MHz	902 to 928 MHz [3]
Radio channels	16	50 [4]
Radio transmission rate[2]	1,2 to 76,8 kbit/s	
Modulation	GFSK	
Encryption method	AES 128 (Advanced Encryption Standard)	

WIRELESS NETWORK	
Maximum devices	55 for DUOS family + 55 for PLUS family
Maximum hops	13

ANTENNA	868MHZ	915MHZ
Range	¼ λ dipole with SMA connector, 50 Ohms and +3 dBi gain	

SUPPLY VOLTAGE
External power supply from 12 to 30 V DC
Minimum current draw of 300 mA at 12V / Maximum current draw of 600 mA at 12V [2]

INTERFACE	
Serial Port	1x 3-input RS485 terminal block
Ethernet Communication	2x RJ45 ports
Display	1x 1.8" TFT LCD 128 x 160 color pixels
Power Supply	1x 2-input terminal block
Wireless Connection	1x WiFi Access Point
Reset button	hold during 3 seconds
Cellular Connection	1x Nano SIM Card for 3G/4G

USER INTERFACE
Device configuration
Network settings
Cloud settings
Cellular settings
Modbus (RTU and TCP/IP) settings
Data visualization and analysis
Alarms and notifications
FW and SW updates

SYSTEM	
CPU	Arm Quad Core Cortex-A72 64-bit SoC
Memory	16 GB eMMC flash
Mobile	3G/4G cellular Modem (optional)

SERIAL COMMUNICATION (RS-485)	
Protocol	Modbus RTU: master (optional) and slave modes
Interface	2-wire RS-485
Baud rates	4,8k to 115,2k
Data format	8 data bits, no parity/even/odd, 1/2 stop bit
Available modbus addresses	1 to 247

ETHERNET PORT 0	
Interface	RJ45
Speed	1 Gbps
IP address	Dynamic (provided by network DHCP server)
HTTP/HTTPS Proxy	Configurable
NTP	Configurable
DNS	Configurable

ETHERNET PORT 1	
Protocol	Modbus TCP/IP: client (optional) and server modes
Interface	RJ45
Speed	100 Mbps
IP address	Dynamic (provided by network DHCP server)

CELLULAR COMMUNICATION (OPTIONAL)
Nano SIM card port available
APN, username and password configurable in the user interface
3G and 4G available
Worldwide compatible

WI-FI COMMUNICATION
SSID and password configurable in the user interface
AP and client moves available and configurable in the user interface

IOT CONNECTIVITY
Integration with Tekon IoT Platform via REST API
Integration with third-party IoT platforms via MQTT broker and Node-Red (optional
Data sent by Ethernet, Wi-Fi or GSM

DEVICE STORAGE
Integrated memory for data storage
Data from Tekon DUOS and PLUS wireless systems
Generic data from third-party equipment (via Modbus)

CASING	
Dimensions	151 x 150 x 61 mm
Weight	695 g
Material	Extruded Aluminium A6063S-T5
Protection index	IP40

OPERATING ENVIRONMENT
–10°C to 50 °C
95% maximum relative humidity (non-condensing)

FACTORY DEFAULT SETTINGS	868MHZ	915MHZ
Frequency	869,525 MHz	915,000 MHz
Radio Transmit Power	27 dBm	
Radio Transmission Rate	76,8 kbit/s	
Wireless Channel	13	26
Wireless Network ID	Device serial number	
Serial Communication	RS-485 / Modbus	
Modbus RTU over RS485 (slave mode)		
PLUS slave address	2	
DUOS slave address	1	
Baudrate(config)|Bits|Parity|Stop bits	19200 | 8 | None | 2	
Modbus TCP/IP (server mode)		
IP address	192.168.100.1	
PLUS port	503	
DUOS port	502	
ETH0		
IP Address	DHCP	
HTTP/HTTPS proxy	none	
NTP server	time3.google.com	

WEB INTERFACE ACCESS	
Login	admin
Password	tekon

WI-FI ACCESS POINT	
IP	192.168.128.1
SSID	TekonGTW_<serialNumber>
DHCP	Enabled

CERTIFICATIONS AND APPROVALS
2014/53/EU (RED Directive)
2011/65/EU (RoHS2 Directive)
2014/30/EU (EMC Directive)
Validation standards:
EN 61000-4-2:2012
EN 61000-4-3:2012
EN 61000-4-4:2012
EN 61000-4-5:2012
EN 61000-4-6:2012

MODBUS REGISTER CONFIGURATION - DUOS WIRELESS SOLUTION

The following table presents the MODBUS register configuration and the presented values can be changed in accordance with the transmitter model in use.

	DESCRIPTION	ADDRESS	NUMBER OF WORDS	DATA TYPE	DATA
TRANSMITTER 0	Transmitter model	0	1	UINT16	**868MHz**: 03 - DUOS Temp | 11 - DUOS Hygrotemp | 12 - DUOS DI+Temp | 13 - DUOS CO_2 **868MHz**: 59 - DUOS inHygrotemp | 60 - DUOS inCO_2 | 61 - DUOS inAir | 62 - DUOS inTemp | 67 - DUOS uTemp **915MHz**: 29 - DUOS Temp | 30 - DUOS Hygrotemp | 31 - DUOS DI+Temp | 32 - DUOS CO_2 **915MHz**: 63 - DUOS inHygrotemp | 64 - DUOS inCO_2 | 65 - DUOS inAir | 66 - DUOS inTemp | 68 - DUOS uTemp
	Probe sensor model	1	1	UINT16	01 - TK9808 | 02 - TK07 | 03 - TK939 | 04 - TK871 | 255 - UNKNOWN 8 - TK280 | 9 - TK895 | 10 - PT100 2W | 11 - PT100 3W | 12 - PT100 4W | 13 - PT500 2W | 14 - PT500 3W | 15 - PT500 4W | 16 - PT1000 2W | 17 - PT1000 3W | 18 - PT1000 4W | 19 - TC J | 20 - TC K | 21 - TC R | 22 - TC S | 23 - TC T | 24 - TC N | 25 - TC C | 26 - Ohm | 27 - mV | 28 - TK8095 | 29 - TK30 | 255 - UNKNOWN
	RSSI	2	1	UINT16	RSSI | RSSI in dBm = RSSI/-2
	Communication period	3	1	UINT16	Transmitter' communication period in seconds
	Elapsed time	4	1	UINT16	Transmitter' time without communicating (in seconds)
	Power supply voltage	5	1	UINT16	Power supply voltage | Volts = Power supply voltage/10
	FW version Major | Minor	6	1	UINT8 | UINT8	Firmware version Major | Minor
	FW Version Revision	7	1	UINT16	Firmware version Revision (LSB)
	HW Version Major | Minor	8	1	UINT8 | UINT8	MAJOR | MINOR
	Data 0	9	2	DOUBLE 32	Internal temperature [°C]
	Data 1	11	2	DOUBLE 32	**DUOS Temp, DUOS Hygrotemp, DUOS DI+Temp** - External temperature [°C] **DUOS CO_2, DUOS inCO_2** - CO_2 [ppm] **DUOS uTemp** - External temperature [°C] (if sensor model ID between 10 and 25); Ohm [Ω] (if sensor model ID = 26); mV [mV] (if sensor model ID = 27) **DUOS inHygrotemp, DUOS inAir** - Relative humidity [%] **DUOS inTemp** - Digital Input [0|1|2|3|4|5] Little endian byte swap format
	Data 2	13	2	DOUBLE 32	**DUOS Hygrotemp** - Relative humidity [%] **DUOS DI+Temp, DUOS uTemp, DUOS inHygrotemp** - Digital Input [0|1|2|3|4|5] **DUOS CO_2, DUOS inCO_2** - Average CO_2 [ppm] **DUOS inAir** - CO_2 [ppm] Little endian byte swap format
	Data 3	15	2	DOUBLE 32	**DUOS inCO_2** - Barometric pressure [mbar] **DUOS inAir** - Average CO_2 [ppm]
	Data 4	17	2	DOUBLE 32	**DUOS inCO_2** - Digital Input [0|1|2|3|4|5] **DUOS inAir** - Barometric pressure [mbar]
	Data 5	19	2	DOUBLE 32	**DUOS inAir** - Digital Input [0|1|2|3|4|5]

MODBUS ADDRESSING CONVENTION - DUOS WIRELESS SOLUTION

MEASUREMENTS	FORMULA
Transmitter model	(Transmitter Device ID * - 1) x 21
Probe sensor model	(Transmitter Device ID - 1) x 21+1
RSSI	(Transmitter Device ID - 1) x 21+2
Communication period	(Transmitter Device ID - 1) x 21+3
Elapsed time	(Transmitter Device ID - 1) x 21+4
Supply voltage	(Transmitter Device ID - 1) x 21+5
Firmware Major | Minor	(Transmitter Device ID - 1) x 21+6
Firmware Revision	(Transmitter Device ID - 1) x 21+7
Hardware version Major | Minor	(Transmitter Device ID - 1) x 21+8
Data 0	(Transmitter Device ID - 1) x 21+9
Data 1	(Transmitter Device ID - 1) x 21+ 11
Data 2	(Transmitter Device ID - 1) x 21+ 13
Data 3	(Transmitter Device ID - 1) x 21+ 15
Data 4	(Transmitter Device ID - 1) x 21+ 17
Data 5	(Transmitter Device ID - 1) x 21+ 19

* Transmitter Device ID [1-55]

MODBUS REGISTER CONFIGURATION - PLUS WIRELESS SOLUTION

HOLDING REGISTERS - TWP4AI TRANSMITTER DATA

DESCRIPTION	ADDRESS (Transmitter Modbus Index-1) x 20+x	NUMBER OF WORDS	DATA TYPE	DATA
Serial Number	0	2	UINT32 [5]	Transmitter serial number
Transmitter Model	2	1	UINT16	**868 MHZ** - 09 - TWP4AI [6] **915 MHZ** - 26 - TWP4AI [6]
RSSI	3	1	UINT16	RSSI in dBm = RSSI / -2
Communication Period	4	1	UINT16	Communication Period (seconds)
Elapsed Time	5	1	UINT16	Elapsed Time since last communication (seconds)
Power Voltage	6	1	UINT16	Volts = Power Voltage / 10
Data 0	7	2	FLOAT32 [5]	Internal temperature [°C] [7]
Data 1	9	2	FLOAT32 [5]	Analog Input value 1 [8]
Data 2	11	2	FLOAT32 [5]	Analog Input value 2 [8]
Data 3	13	2	FLOAT32 [5]	Analog Input value 3 [8]
Data 4	15	2	FLOAT32 [5]	Analog Input value 4 [8]
FW Version Major |Minor	17	1	UINT16	Transmitter Firmware Version [9]
FW Version Revision	18	1	UINT16	Transmitter Firmware Version [9]
HW Version Major | Minor	19	1	UINT16	Transmitter Hardware Version [10]

HOLDING REGISTERS - TWP-1AI | TWP-2AI TRANSMITTERS DATA

DESCRIPTION	ADDRESS (Transmitter Modbus Index-1) x 20+x	NUMBER OF WORDS	DATA TYPE	DATA
Serial Number	0	2	UINT32 [1]	Transmitter serial number

Transmitter Model	2	1	UINT16	**868 MHZ** - 47 - TWP-1AI | 48 - TWP-2AI [6] **915 MHZ** - 53 - TWP-1AI | 54 - TWP-2AI [6]
RSSI	3	1	UINT16	RSSI in dBm = RSSI / -2
Communication Period	4	1	UINT16	Communication Period (seconds)
Elapsed Time	5	1	UINT16	Elapsed Time since last communication (seconds)
Power Voltage	6	1	UINT16	Volts = Power Voltage / 10
Data 0	7	2	FLOAT32 [5]	Internal temperature [°C] [7]
Data 1	9	2	FLOAT32 [5]	Analog Input value 1 [8]
Data 2	11	2	FLOAT32 [5]	Analog Input value 2 (*) [8]
Data 3	13	2	FLOAT32 [5]	-
Data 4	15	2	FLOAT32 [5]	-
FW Version Major |Minor	17	1	UINT16	Transmitter Firmware Version [9]
FW Version Revision	18	1	UINT16	Transmitter Firmware Version [9]
HW Version Major | Minor	19	1	UINT16	Transmitter Hardware Version [10]

(*) Only available on TWP-2AI

HOLDING REGISTERS - TWP-4AI4DI1UT TRANSMITTER DATA

DESCRIPTION	ADDRESS **(Transmitter Modbus Index-1) x 20+x**	NUMBER OF WORDS	DATA TYPE	DATA
Serial Number	0	2	UINT32 [5]	Transmitter serial number
Transmitter Model	2	1	UINT16	**868 MHZ** - 37 - TWP4AI/4DI/1UT [6] **915 MHZ** - 38 - TWP4AI/4DI/1UT [6]
RSSI	3	1	UINT16	RSSI in dBm = RSSI / -2
Communication Period	4	1	UINT16	Communication Period (seconds)
Elapsed Time	5	1	UINT16	Elapsed Time since last communication (seconds)
Power Voltage	6	1	UINT16	Volts = Power Voltage / 10
Data 0	7	2	FLOAT32 [5]	External temperature [°C]
Data 1	9	2	FLOAT32 [5]	Analog Input value 1 [8]
Data 2	11	2	FLOAT32 [5]	Analog Input value 2 [8]
Data 3	13	2	FLOAT32 [5]	Analog Input value 3 [8]
Data 4	15	2	FLOAT32 [5]	Analog Input value 4 [8]
FW Version Major |Minor	17	1	UINT16	Transmitter Firmware Version [9]
FW Version Revision	18	1	UINT16	Transmitter Firmware Version [9]
HW Version Major | Minor	19	1	UINT16	Transmitter Hardware Version [10]

HOLDING REGISTERS - TWP-1DI | TWP-2DI TRANSMITTERS DATA

DESCRIPTION	ADDRESS **(Transmitter Modbus Index-1) x 20+x**	NUMBER OF WORDS	DATA TYPE	DATA
Serial Number	0	2	UINT32 [5]	Transmitter serial number
Transmitter Model	2	1	UINT16	**868 MHZ** - 49 - TWP-1DI | 50 - TWP-2DI [6] **915 MHZ** - 55 - TWP-1DI | 56 - TWP-2DI [6]
RSSI	3	1	UINT16	RSSI in dBm = RSSI / -2
Communication Period	4	1	UINT16	Communication Period (seconds)
Elapsed Time	5	1	UINT16	Elapsed Time since last communication (seconds)
Power Voltage	6	1	UINT16	Volts = Power Voltage / 10
Data 0	7	2	FLOAT32 [5]	Internal temperature [°C] [7]
Data 1	9	2	FLOAT32 [5]	Pulse counter 1
Data 2	11	2	FLOAT32 [5]	Pulse counter 2 (*)

Data 3	13	2	FLOAT32 [5]	-
Data 4	15	2	FLOAT32 [5]	-
FW Version Major |Minor	17	1	UINT16	Transmitter Firmware Version [9]
FW Version Revision	18	1	UINT16	Transmitter Firmware Version [9]
HW Version Major | Minor	19	1	UINT16	Transmitter Hardware Version [10]

(*) Only available on TWP-2DI

HOLDING REGISTERS - TWPH-1UT TRANSMITTER DATA

DESCRIPTION	ADDRESS (Transmitter Modbus Index-1) x 20+x	NUMBER OF WORDS	DATA TYPE	DATA
Serial Number	0	2	UINT32 [5]	Transmitter serial number
Transmitter Model	2	1	UINT16	**868 MHZ** - 24 - TWPH-1UT [6] **915 MHZ** - 28 - TWPH-1UT [6]
RSSI	3	1	UINT16	RSSI in dBm = RSSI / -2
Communication Period	4	1	UINT16	Communication Period (seconds)
Elapsed Time	5	1	UINT16	Elapsed Time since last communication (seconds)
Power Voltage	6	1	UINT16	Volts = Power Voltage / 10
Data 0	7	2	FLOAT32 [5]	Internal temperature [ºC] [7]
Data 1	9	2	FLOAT32 [5]	External temperature 1 [ºC]
Data 2	11	2	FLOAT32 [5]	-
Data 3	13	2	FLOAT32 [5]	-
Data 4	15	2	FLOAT32 [5]	-
FW Version Major |Minor	17	1	UINT16	Transmitter Firmware Version [9]
FW Version Revision	18	1	UINT16	Transmitter Firmware Version [9]
HW Version Major | Minor	19	1	UINT16	Transmitter Hardware Version [10]

HOLDING REGISTERS - TWP-1UT | TWP-2UT TRANSMITTERS DATA

DESCRIPTION	ADDRESS (Transmitter Modbus Index-1) x 20+x	NUMBER OF WORDS	DATA TYPE	DATA
Serial Number	0	2	UINT32 [5]	Transmitter serial number
Transmitter Model	2	1	UINT16	**868 MHZ** - 45 - TWP-1UT | 46 - TWP-2UT [6] **915 MHZ** - 51 - TWP-1UT | 52 - TWP-2UT [6]
RSSI	3	1	UINT16	RSSI in dBm = RSSI / -2
Communication Period	4	1	UINT16	Communication Period (seconds)
Elapsed Time	5	1	UINT16	Elapsed Time since last communication (seconds)
Power Voltage	6	1	UINT16	Volts = Power Voltage / 10
Data 0	7	2	FLOAT32 [5]	Internal temperature [ºC] [7]
Data 1	9	2	FLOAT32 [5]	External temperature 1 [ºC]
Data 2	11	2	FLOAT32 [5]	External temperature 2 [ºC] (*)
Data 3	13	2	FLOAT32 [5]	-
Data 4	15	2	FLOAT32 [5]	-
FW Version Major |Minor	17	1	UINT16	Transmitter Firmware Version [9]
FW Version Revision	18	1	UINT16	Transmitter Firmware Version [9]
HW Version Major | Minor	19	1	UINT16	Transmitter Hardware Version [10]

(*) Only available on TWP-2UT

COILS REGISTERS - PLUS WIRELESS SOLUTIONS

TWP4AI		
DESCRIPTION	ADDRESS **(Transmitter Modbus Index-1) x 16+x**	DATA
Coil 0	0	Transmitter Remote control output controlled through Gateway
Coil 1	1	State of External Power Activation output to enable power-on of external devices
Coil 2	2	State of Trigger Input
Coil 3	3	-
Coil 4	4	-
Coil 5	5	-
Coil 6	6	-
Coil 7	7	-
Coil 8	8	-
Coil 9	9	-
Coil 10	10	-
Coil 11	11	-
Coil 12	12	-
Coil 13	13	-
Coil 14	14	-
Coil 15	15	-

TWP-1AI | TWP-2AI		
DESCRIPTION	ADDRESS **(Transmitter Modbus Index-1) x 16+x**	DATA
Coil 0	0	Transmitter Remote control output controlled through Gateway
Coil 1	1	-
Coil 2	2	-
Coil 3	3	-
Coil 4	4	-
Coil 5	5	-
Coil 6	6	-
Coil 7	7	-
Coil 8	8	-
Coil 9	9	-
Coil 10	10	-
Coil 11	11	-
Coil 12	12	-
Coil 13	13	-
Coil 14	14	-
Coil 15	15	-

TWP-4AI4DI1UT		
DESCRIPTION	ADDRESS **(Transmitter Modbus Index-1) x 16+x**	DATA
Coil 0	0	Transmitter Remote control output controlled through Gateway

Coil 1	1	State of External Power Activation output to enable power-on of external devices
Coil 2	2	State of Trigger Input
Coil 3	3	Digital Input 1 state
Coil 4	4	Digital Input 2 state
Coil 5	5	Digital Input 3 state
Coil 6	6	Digital Input 4 state
Coil 7	7	-
Coil 8	8	-
Coil 9	9	-
Coil 10	10	-
Coil 11	11	-
Coil 12	12	-
Coil 13	13	-
Coil 14	14	-
Coil 15	15	-

TWP-1DI | TWP-2DI		
DESCRIPTION	ADDRESS **(Transmitter Modbus Index-1) x 16+x**	DATA
Coil 0	0	Transmitter Remote control output controlled through Gateway
Coil 1	1	Reset Pulse Counter 1
Coil 2	2	Reset Pulse Counter 2
Coil 3	3	Digital Input 1 state
Coil 4	4	Digital Input 2 state
Coil 5	5	-
Coil 6	6	-
Coil 7	7	-
Coil 8	8	-
Coil 9	9	-
Coil 10	10	-
Coil 11	11	-
Coil 12	12	-
Coil 13	13	-
Coil 14	14	-
Coil 15	15	-

TWP-1UT | TWP-2UT		
DESCRIPTION	ADDRESS **(Transmitter Modbus Index-1) x 16+x**	DATA
Coil 0	0	Transmitter Remote control output controlled through Gateway
Coil 1	1	-
Coil 2	2	-
Coil 3	3	-
Coil 4	4	-
Coil 5	5	-
Coil 6	6	-

Coil 7	7	-
Coil 8	8	-
Coil 9	9	-
Coil 10	10	-
Coil 11	11	-
Coil 12	12	-
Coil 13	13	-
Coil 14	14	-
Coil 15	15	-

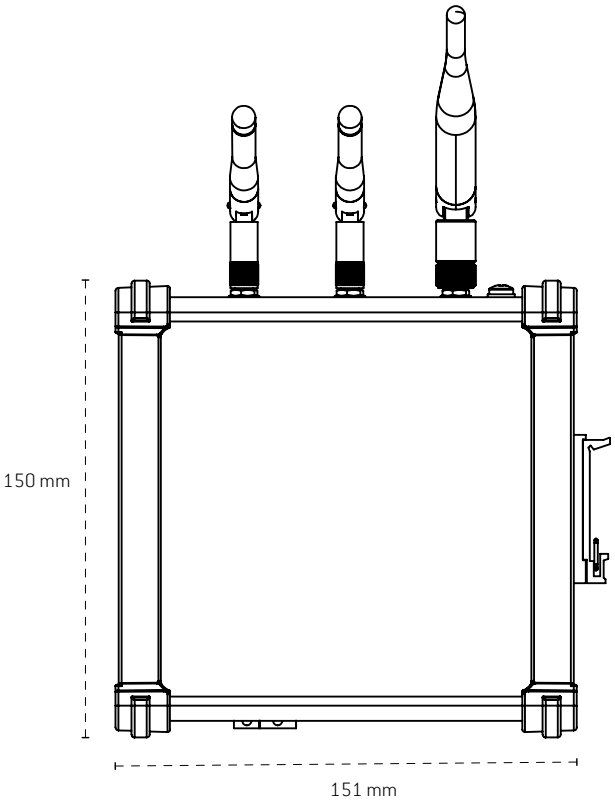
[1] Range depends on the RF propagation environment by performing a Site Survey.
[2] According to the radio channel selection
[3] In some countries, the frequency band admitted is not so extended as the default range.
[4] The radio frequencies admitted in Australia are available from channel 26 to channel 50.
[5] The data types UNIT32 and FLOAT32 have the Mid-Little Endian (CDAB) format.
[6] Each transmitter model is codified with a unique ID number. Consult specified mapping tables for every transmitter model.
[7] Transmitter internal temperature in degrees Celsius.
[8] Current in µA; Voltage in mV.
[9] Firmware version: Major.Minor.Revision = 8 MSB.8 LSB.8 LSB
[10] Hardware version: Major.Minor = 8 MSB.8 LSB

SOFTWARE PACKAGES

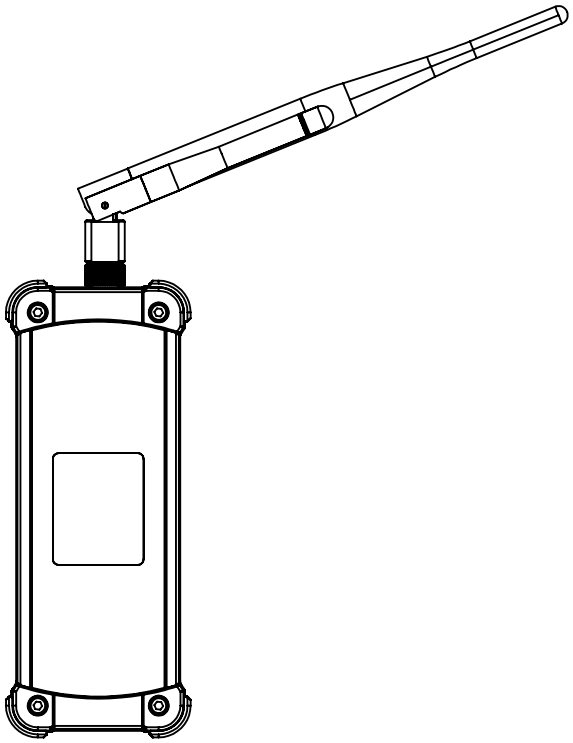
FEATURE	REFERENCE
TK-UGW SW PACK MODBUS MASTER/CLIENT	SW222410100
TK-UGW SW PACK ALARMS AND NOTIFICATIONS	SW222410200
TK-UGW SW PACK NODE-RED	SW222410300
TK-UGW SW PACK DASHBOARDS	SW222410400

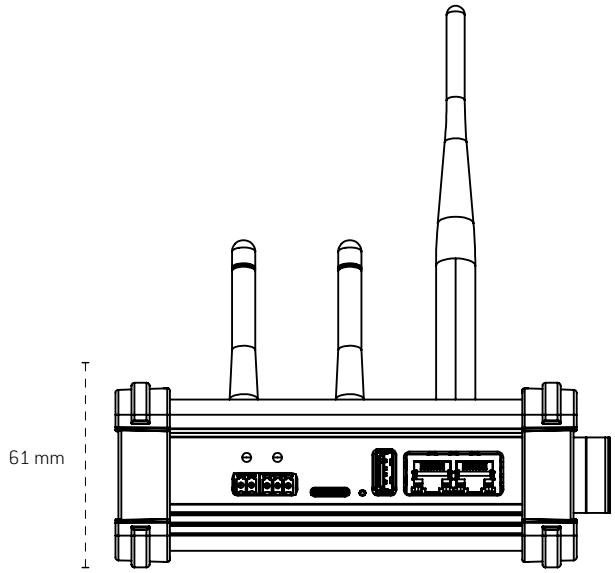
TECHNICAL DRAWINGS

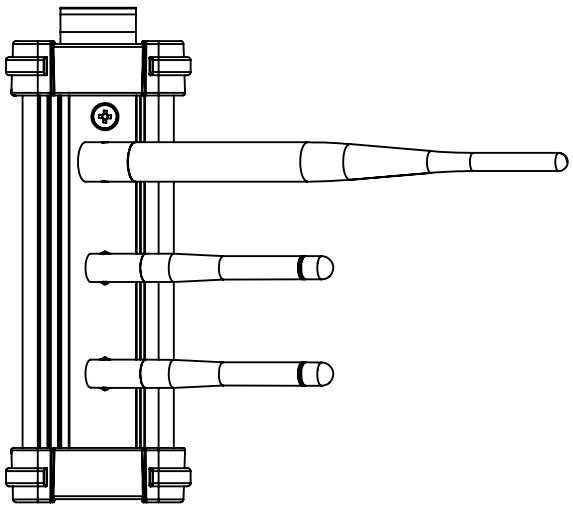
DIMENSIONAL DRAWINGS, INTERFACE DESIGN

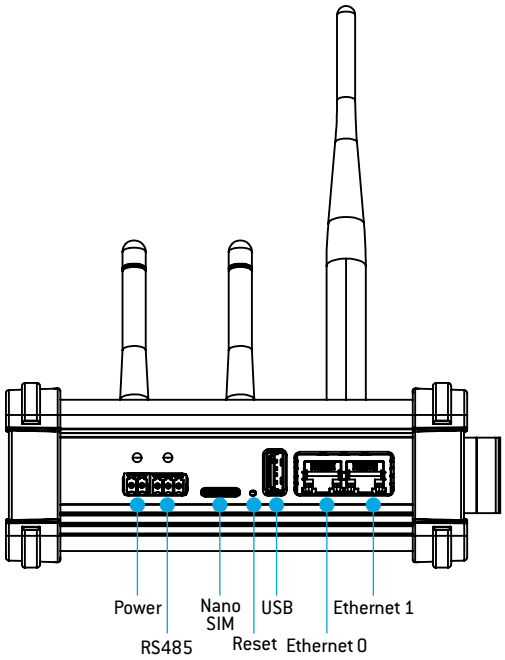


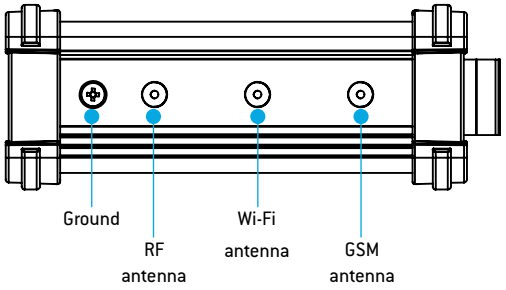
POWER SUPPLY AND COMMUNICATIONS CONNECTOR











REVISION HISTORY

VERSION	DATE (MM.YY)	CHANGES
E01B	02.25	Addition of software packages table, including the new "Dashboards" additional feature.

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