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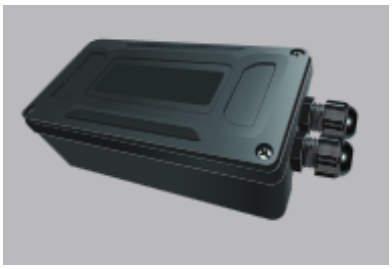
SW-GW1 – User Manual



Overview

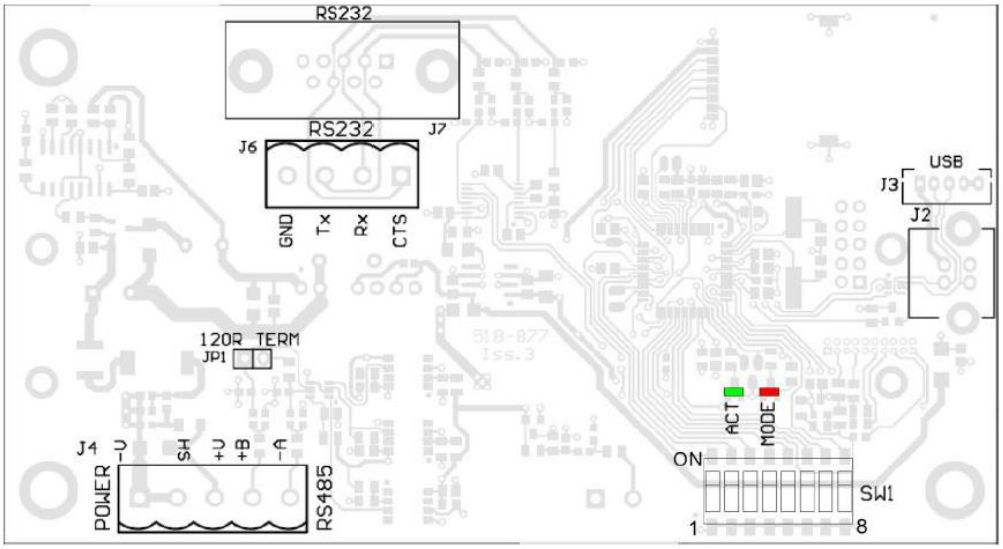
The SW-GW1 is a gateway that provides a simple interface for users to gather serial data from up to 100 transmitter modules in a radio network using either the standard Modbus RTU protocol or a simple ASCII protocol.

Some simple commands are available to wake, sleep, and keep awake radio transmitter modules.

The SW-GW will NOT act as a base station and cannot be used to configure radio modules. It will support all transmitter modules that deliver a single value in their Data Provider packets.

Connections

This diagram shows the available connections, switches and LEDs.



The interface baud rate can be selected from the DIP switches **SW1**.

SW1 Settings

Baud Rate: Switch positions 1 to 4 are not used and can be in any position. Switch positons 5 to 7 select the baud rate for the serial interface.

	5	6	7
Baud rate / USB			
9600	On	Off	Off
19200	Off	On	Off
38400	On	On	Off
57600	Off	Off	On
115200	On	Off	On
230400	Off	On	On
460800	On	On	On

Whether the serial interface is RS485 or RS232 is selected by switch position 8.

	8
232/485	
RS232	Off
RS485	On

Power

The SW-GW1 requires an external power supply of 9-32VDC to be connected to J4 on the –V and +V pins.

LED Indication

Two LEDS indicate Power/Mode and Activity.
The red LED indicates mode and should flash at a 2Hz rate. If any errors are detected with the radio, then the LED will remain lit.
The green LED flashes once for each packet received via radio.

Communications Overview

In SW-GW1 there are 2 communications protocols are available, RS232 & RS485.Selection is as per the requirement.

1.RS232

The RS232 interface uses TX, RX and GND to connect to a PC, PLC etc. and uses standard RS232 voltage levels. The baud rate can be selected by setting the DIP switches stated above.

Note: *The SW-GW1 will require power cycling to utilise a baud rate change.*

Connection to a PC 9-way D serial connector.

PC 9 Way D Plug Pin	Signal Direction	Signal	Base Station Connection
3 (TX)	->	RX	J6 RX or J7 Pin 3
2 (RX)	<-	TX	J6 TX or J7 Pin 2
5 (Gnd)		GND	J6 GND or J7 Pin 5
8 (CTS)	<-	CTS	J6 CTS or J7 Pin 8

ASCII Communication

The SW-GW1 ASCII mode provides a very simple interface for gathering data from radio modules. When a packet is received from any transmitter module on the same RF channel an ASCII string is sent from the gateway in the format:
DataTag=Value,LQI,B,E <CR>
DataTag – The four digit data tag of the module that the reading has come from
Value - an ASCII representation of the module reading
LQI – Link quality indicator between 0 – 100
B – Set to 1 if low battery error
E – Set to 1 if integrity error
Example: FE56=123.156,100,0,0 <CR>

Commands

Sending ASCII commands to the gateway will cause the gateway to handle the request but no feedback on the result is available. The commands will act on all transmitter modules on the same RF channel and group key as the gateway.
SLEEP <CR> - Sleep all modules that data providers are received from for the sleep duration period. The sleep duration is set in the T24-Toolkit.

WAKE <CR> - Wake all modules that request to wake for the wake duration period. Sleeping transmitter modules transmit wake requests every 5 seconds. The wake duration is set in the T24-Toolkit.
STAYAWAKE <CR> - Issue a stay awake packet to all modules seen for 5 seconds following this command being executed.

2.RS-485

The RS485 interface (This is a 2 wire 485 interface and will not work with 4 wire 485 buses) uses TX, RX and GND to connect to a PC, PLC etc. and uses standard RS485 voltage levels.
The baud rate can be selected by setting the DIP switches stated above.

Note: *The SW-GW1 will require power cycling to utilise a baud rate change*

Depending on the RS485 interface or hardware the connections vary and are not standard therefore we can only show the connections to the SW-GW1. You must refer to the user manual regarding your RS485 connection to ascertain the correct connections.

PC / PLC Connection	Signal	Base Station Connection
Refer to RS485 Device User Manual	A	J4 -A
Refer to RS485 Device User Manual	B	J4 +B
Refer to RS485 Device User Manual	GND	J4 SH

MODBUS Communication

The SW-GW1 operates on Modbus RTU communication 8, N 1 (8 data bits, No Parity, 1 stop bit). The following Modbus Function codes are supported

- Function 03 'Read Holding Registers'
- Function 06 'Write Single Register'
- Function 16 'Write Multiple Registers'

The gateway has a single Modbus address, 1 is the default address but this can be changed via register 41001 or via the T24-Toolkit.

Control Registers

41001 – Read / Write
Set the MODBUS slave module ID, module ID will be 1 as default. Valid values 0-255.

41004 – Read / Write
Set to the T24 RF channel the gateway is working on. Valid values 1-15.

41005 – Read / Write
Set to the number of cells to be programmed into the table of data tags default = 0. Valid values 0-100

41006 – Read / Write
Set the Time out Value (seconds), if a channel does not update with in the timeout time the value register will be set to either the default value or last value received, see Toolkit – General Settings. Valid values 0-255.

41007 – Read / Write
Set the Sleep time (seconds), this is the period for which the gateway will sleep any module it sees after the broadcast sleep register (41002) has been set to 1. The T24-GW1 will only sleep modules listed in the Data Tag registers. Valid Values 0-255.

41008 – Read / Write
This register Enables or disables the functionality to keep awake the modules specified in Data Tag Registers. Valid values 0 or 1.

Commands

Writing a 1 to the following registers will execute the following commands:

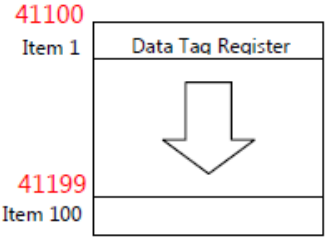
41002 – Read / Write
Set to 1 to perform broadcast sleep to all modules, it will set back to zero when the sleep timer value has been reached.

41003 – Read / Write
Set to 1 to perform broadcast wake to all modules, it will set back to zero when the waker duration has been reached, the default waker duration is 12 seconds but can be set using the T24-Toolkit, see Toolkit – General Settings.

41009 – Read / Write
Set to 1 to perform module save to save all the current settings and data tags in the module. It will set back to zero once the save is complete.

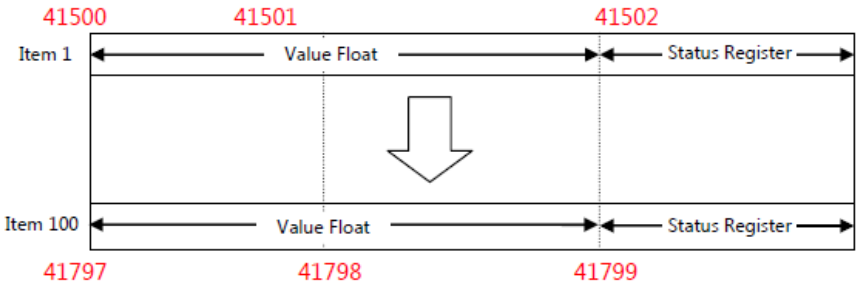
Data Tag Holding Registers

41100 - 41199 – 100 registers containing the unique data tags of the modules to be read from. Each data tag is a 2 byte HEX code unique to each transmitter module. The data tag registers can be written to individually and as a block. These are the same data tags that can be configured via the T24-Toolkit



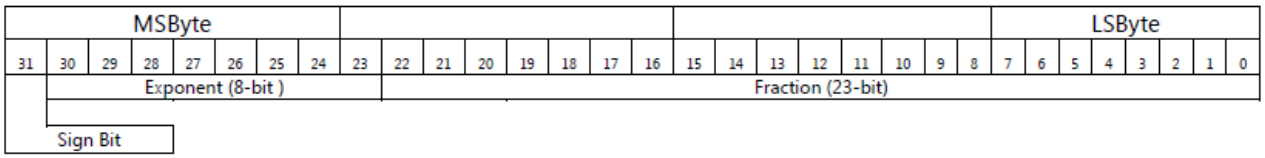
Value & Status Registers

41500 - 41799 – 300 registers containing the values from each transmitter module as well as the status and LQI (Link Quality Indicator). The 4 Byte floating point values from each transmitter module are contained within two consecutive registers followed by a single register containing the LQI and status of the same transmitter modules. The data tag registers and value registers correspond such that the values and status from the data tag specified in register 41100 are contained within 41500 to 41502 and the value and status for the data tag specified in register 41199 are contained within registers 41797 to 41799.



When reading registers containing the floating point data the register pairs must be read at the same time otherwise incorrect values could result because of partial updates during reading.

The two register presents a numeric value from n to n and consist of a 4 byte 32 bit float in IEEE 754 format.

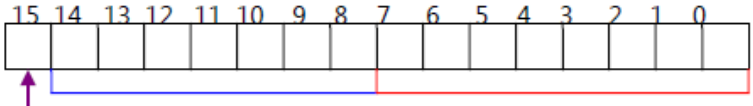


The byte containing the sign and exponent is sent first, with the LS byte of the mantissa being last.
The value of the number is thus

```
(-1)Sign * 2(Exponent-127) * 1.Mantissa
```

Note the 'assumed 1' before the mantissa. The exception to this is the special value 0.0, which is represented as 4 zeroes.
The precision of this format is to 7 digits.
eg. a floating-point number of -12345.678 is represented as – [hex] C640E6B6

The status register contains the status byte, LQI and Time Out indicator in the format shown below:



LQI
Link Quality Indicator
0-100 % Signal Strength

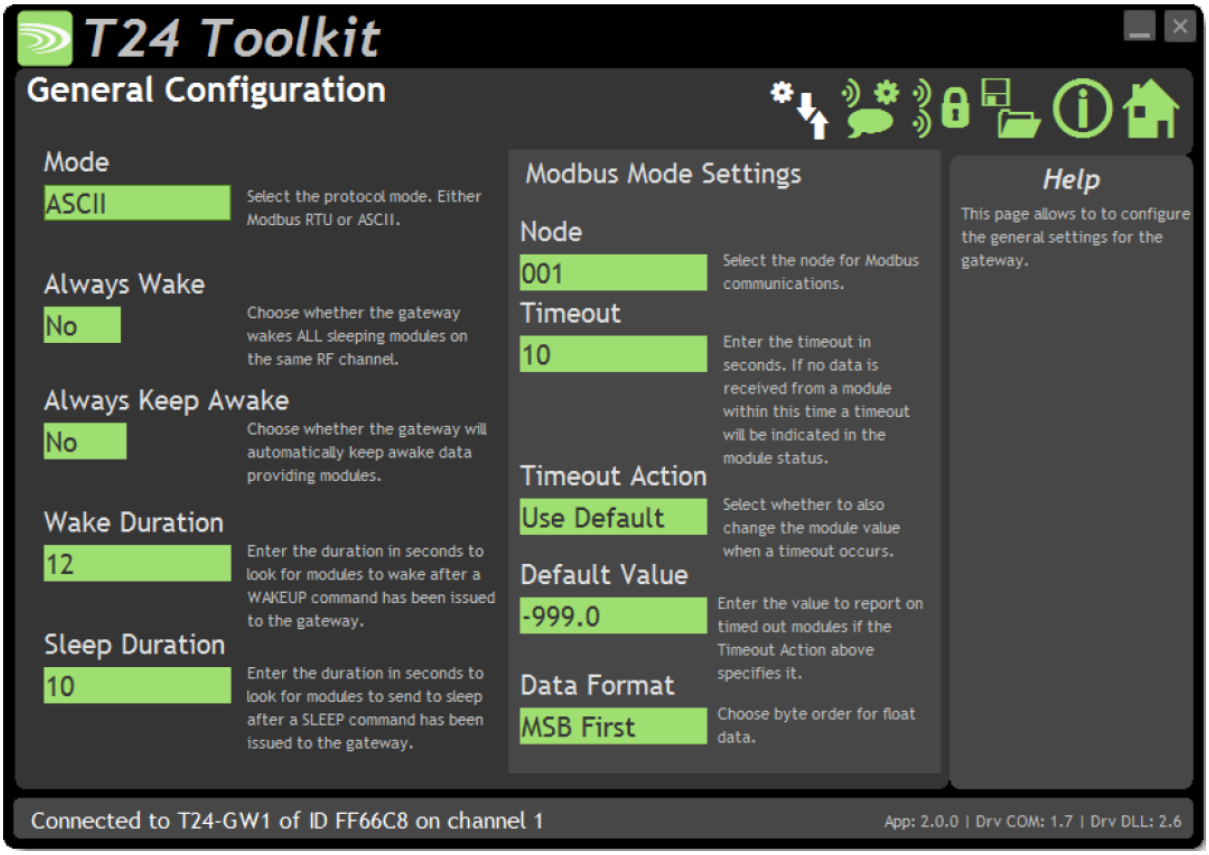
Time Out Bit
Set to 1 on Time out

STATUS BYTE
0 – Shunt Cal
1 – Integrity Error on Input
2 – Reserved
3 – Reserved
4 – Power up *
5 – Battery low
6 – Digital Input Active
7 – Digital Output Active

Configuration

The T24 Toolkit provides a means of simple configuration of the gateway module along with useful tools to aid integration.
Launch the T24 Toolkit software application and pair to this module to enable the connection to the Toolkit to allow configuration to take place.

General Settings



Here you can set how the module is configured to operate.

Items you can change:

Mode — Defines which serial interface the gateway is operating on.

- Modbus
- ASCII

Always Wake — If set to Yes the gateway will wake ALL sleeping modules on the same RF channel and group key as the gateway module.

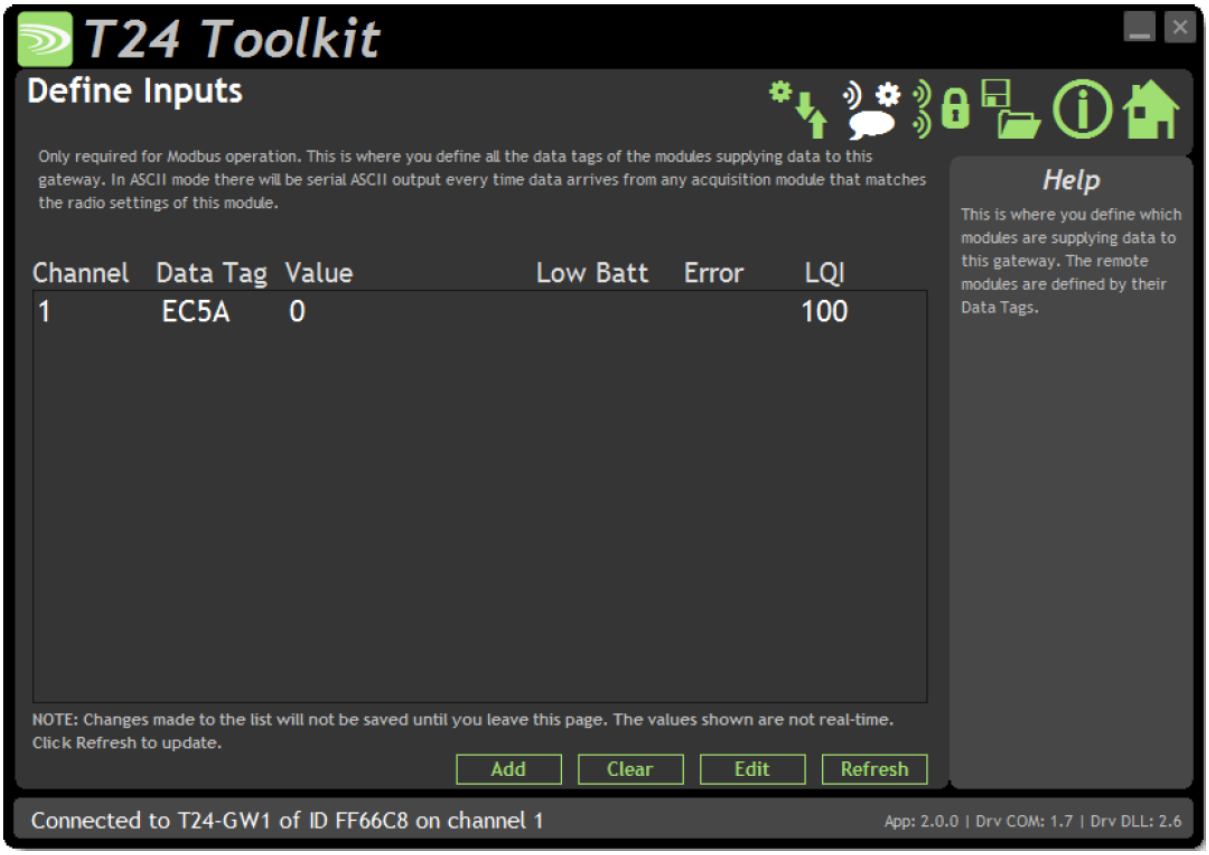
Always Keep Awake — If set to Yes the gateway will automatically keep awake data providing modules.

Wake Duration — The duration in seconds to look for modules after a WAKEUP command has been issued.

Modbus Node Settings

Node:	Is the Modbus station number or node address of the SW-GW1
Time out:	The time in seconds that if no data is received from a module the gateway will indicate as timed out.
Time out Action:	Defines what value will be reported in the register when a timeout occurs. • Use Default – the value specified as default value will be reported. • Use Last Value – the last value received from the module will be reported
Default Value:	This is the value that will be reported in the MODBUS register if a transmitter module has timed out AND the Timeout Action is set to Use Default.
Data Format:	In Modbus mode the data from the value register can be displayed in two formats: • MSB – Most Significant Byte First • LSB – Least Significant Byte First

Define Inputs



This is where you define which transmitter modules are to be providing data to this module when **in Modbus mode**. You can add the channels by entering the Data Tag of the transmitter modules you want to receive data from. The list will show the last value delivered by each channel or the word **Timeout!** if no data has arrived for longer than the T24 Timeout setting. The LQI (Link Quality Indicator) provides a measurement of the RF reception for the last packet received from each input. The Low Batt and Error marks display if a module has a low battery or integrity alert.

Items you can change:

Add Button	Clicking this will allow you to specify a new Data Tag to add.
Clear Button	This clears ALL the currently configured channels.
Edit Button	Changes the display to show a simple list of Data Tags. This allows quick bulk entry of tags from an external source. You can simply paste a list of tags into the list or type them manually.
Refresh Button	Refreshes the list.

Note: *When using this 'define input' page ensure you are in **Modbus mode** for values to be updated live.*