WIRELESS-T24-HA
Advanced Handheld Display
User Manual

1. OVERVIEW

The WIRELESS-T24-HA is an advanced handheld display. This allows wireless remote viewing of multiple inputs such as strain gauge or voltage etc. using 2.4GHz radio.

The WIRELESS-T24-HA also performs the function of optionally waking the remote modules when it is turned on and sending them to deep sleep mode when it is turned off.

The handheld can operate in two modes. The operation of the buttons and the automatic sleep/wake functions are dependent on these modes.

Result Mode

This is the default mode in which multiple transmitter modules are used to create a result which is displayed. Currently the WIRELESS-T24-HA only provides a **sum** of the remote modules but this function may be added to in future versions. Although the handheld usually shows the result (sum) there is an option of viewing the discrete values that make up the result.

Item Mode

In this mode each transmitter module is treated as a separate reading and the handheld is used to cycle through the available items and the value of each can be viewed.

1.1. Order Codes

WIRELESS-T24-HA

Handheld display for use with multiple transmitters and with advanced functionality.

1.2. Connections

1.2.1. Power

The handheld module is powered by two alkaline AA batteries.

For battery information please refer to Appendix D – Battery Selection

> ⓘ *Due to the higher voltage requirements of this module NiMh and NiCad batteries are not recommended.*

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1.3. Operation

The handheld can operate in two modes and the button operation is dependent on these modes.

1.3.1. Item Mode

Up to 12 individual modules can be connected to and the user can step through each one in sequence.
If DoSleepWake is set then the handheld will wake transmitters when turned on and send them all to sleep again when turned off. When the handheld wakes modules this is achieved through the transmission of a broadcast wake. i.e. all modules on the same channel and with the same group key will wake.

1.3.1.1. Keys

 Sleep key - Send the currently selected module to sleep.

 Wake Key - Will attempt to wake the currently selected module.

 Tare Key - This will toggle between gross and zeroed net mode. i.e. If the display shows gross then pressing the key will zero the display. Pressing the key when in net mode will return the display to gross mode. The Gross and Net modes are indicated as described below. Gross and Net are retained through power off.

 Next Key - Step to the next module. A brief prompt will be displayed before the value is shown.
i.e. 'Input 1', 'Input 2' etc. Also see Prompts

F1

If motion detection is activated then the reading must be steady to enable this key. Pressing this key with an unstable reading will do nothing.
Function Key - This transmits a Data Provider packet marked with a Data Tag held in **F1DataTag** and can also contain data as defined by **F1Data**. This can be used to trigger external actions such as a printout.

 Power Key - Press and hold the power key until the display shows BUSY then release the key. Can also be used, by giving a quick press, to reset the Auto-Sleep delay.

Up to 12 individual modules can be summed and the result displayed.

If **DoSleepWake** is set then the handheld will wake all modules when turned on and send them to sleep again when turned off. When the handheld wakes modules this is achieved through the transmission of a broadcast wake. i.e. all modules on the same channel and with the same group key will wake.

In this mode there is an option of retrieving a system zero value from an external source. This is activated by supplying the Data Tag to the **ExtZeroDataTag** parameter. When activated the value supplied by the Data Provider packet marked with this tag will be used as the system zero and will be subtracted from the sum of all contributing inputs.

Usually in this mode only the result is displayed (sum) but holding the **Next** key for a configurable number of seconds will activate the ability to step through each contributing input using the **Next** key.

1.3.1.2.   Keys when viewing Result

Sleep Key - No effect.

Wake Key - Will attempt to wake any sleeping modules.
This uses a broadcast wake so any modules on the same channel with the same group key will wake.

Tare Key - Toggle between displaying gross sum or tared sum.

Next Key - No effect unless held for a number of seconds to activate individual item view.
This can be disabled. See Allow Next Key
Newer versions also allow customised prompt messages to replace the default 'Input 1', 'Input 2' etc. See Prompts

F1

Function Key - If motion detection is activated then the reading must be steady to enable this key. Pressing this key with an unstable reading will do nothing.
This transmits a Data Provider packet marked with a Data Tag held in **F1 DataTag** and can also contain data as defined by **F1 Data (See Mode and Communications** later **)**. This can be used to trigger external actions such as a printout or a relay operation. This would require suitable relay or printer WIRELESS-T24 modules.

Power Key - Toggles between on and off. Hold for 2 seconds to activate.

1.3.1.3. Keys when viewing an individual item

Sleep Key - No effect.

Wake Key - Will attempt to wake the currently selected module.

Tare Key - If sum was currently tared then this key will toggle between displaying gross or tared value of current module. If sum view was displaying gross then this key has no effect.
If an external system zero is used then only gross values actually supplied to the handheld can be displayed.

Next Key - Selects next input item to view.

F1

Function Key - If motion detection (See settings in Display Format later) is activated then the reading must be steady to enable this key. Pressing this key with an unstable reading will do nothing.
This transmits a Data Provider packet marked with a Data Tag held in **F1DataTag** and can also contain data as defined by **F1Data**. This can be used to trigger external actions such as a printout.

Power Key - Toggles between on and off. Hold for 2 seconds to activate.

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1.4.1. All Modes

1.4.1.1. Indicators

G	The display is showing Gross weight.
NET	The display is showing Net weight.
SIG LOW	The radio signal from the transmitter module is low. The module is still functioning but the limit of the range may be near. Communications may start to deteriorate when this indicator is visible. Until ------ is displayed the communications is still OK and the display can be relied on for accuracy.

> *Even with a degraded signal the display value will always be correct.*

BATT LOW	The batteries in the handheld are low and need to be replaced.
REMOTE ERROR	The transmitter module has an error that the handheld does not recognise.
REMOTE BATT LOW	The battery or supply to the transmitter module is low.

Errors
Displayed on handheld LCD.

|	
Error 1	The transmitter module has a strain gauge input and is in shunt calibration mode. An external module has placed the transmitter module in Shunt Calibration mode so rather than display a misleading reading this error is displayed instead. Modules such as the WIRELESS-T24-SA support this error type.
Error 2	Input integrity error. The transmitter module has found a problem with the input. There may be open or short circuits. Rather than display a misleading reading this error is displayed instead. Only certain transmitter modules support this error such as the WIRELESS-T24-SA.
Overload	The overload limit set by the user has been exceeded.
{Display Flashing}	The motion detection has been enabled and the reading is deemed in motion or unstable.

Other Functions

System Zero	If enabled, holding the Tare key for a number of seconds will perform a system zero.
Pairing	See Field Transmitter Module Replacement later

2. CONFIGURATION

The WIRELESS-T24 Toolkit provides a means of simple configuration of the handheld module along with useful tools to aid integration.

Launch the WIRELESS-T24 Toolkit software application and pair to this module to enable the connection to the Toolkit to allow configuration to take place. See Common Toolkit Pages - Home

2.1. Mode and Communications
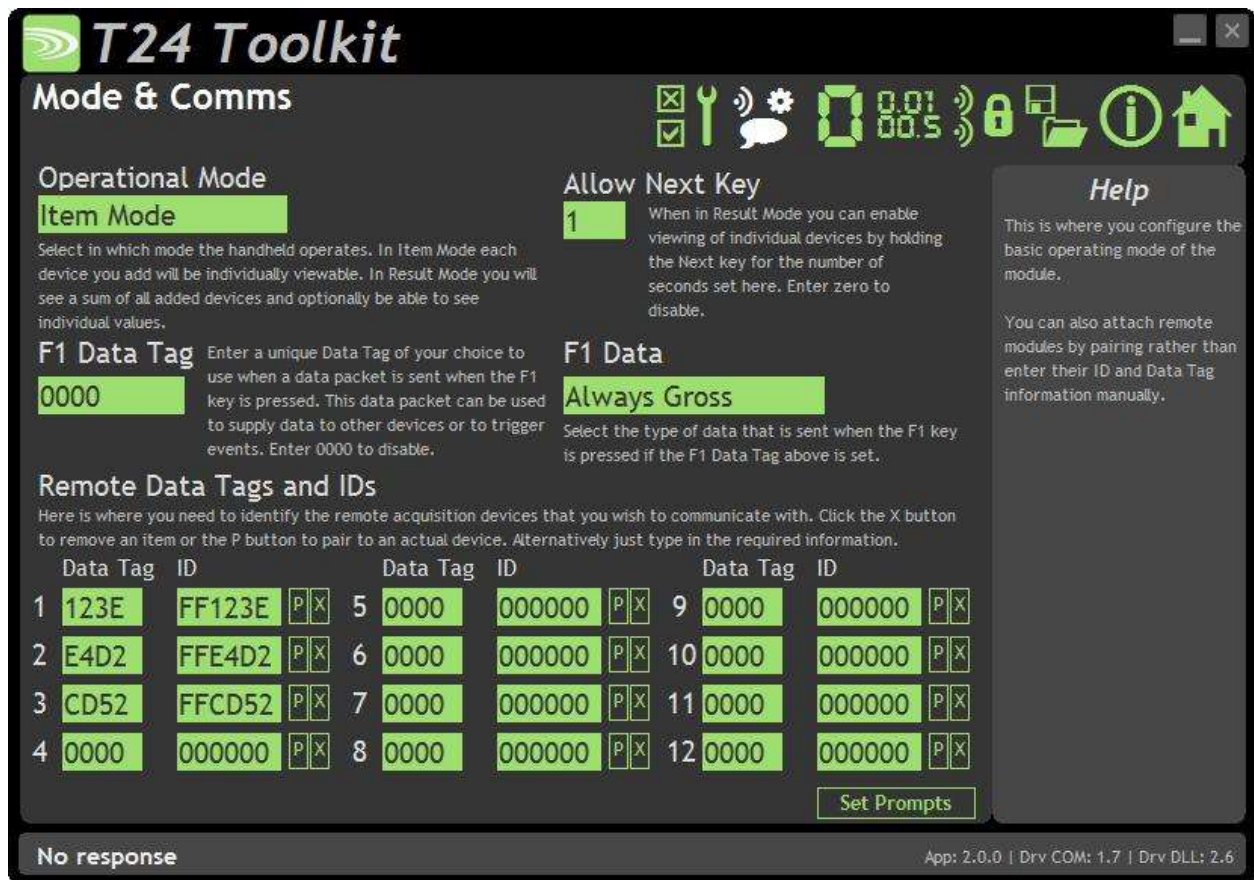
This page allows you to set the operational mode of the module and configure which external transmitter modules the handheld will connect to.

Items you can change:

Operational Mode	Select in which mode the handheld will operate.
	Result Mode
	Up to 12 individual transmitter modules can be summed and displayed. Optionally the operator can view the individual module values (See Allow Next Key).
	Item Mode
	Up to 12 individual modules can be displayed and the user can step through each one in sequence.

Allow Next Key	Only used in Result Mode. Usually in Result mode only the result (sum) of the individual modules is shown. By entering a non-zero value here this will define the number of seconds that the **Next** key needs to be held down to enable individual item values to be viewed. Once available the **Next** key will cycle between all the individual values and the result. This will remain available until the handheld is powered off.
	Each time the **Next** key is pressed the display will show a brief message indicating what will be displayed; **Input 1**, **Input 2**, **Result** etc. From firmware version 1.2 onwards the handheld allow customised prompt messages. See Prompts

F1 Data Tag provide

The **F1** key can be used to trigger other modules such as a WIRELESS-T24-SO module to printer services etc. This key will generate a Data Provider message which other modules can use.

Set this value to non zero to enable this function and to define the Data Tag that will identify the message sent.

The content of the message is defined by the **F1 Data** parameter.

> ⓘ *If motion detection is configured then this key will have no effect while the reading is not steady.*

F1 Data

Define what data is carried in the Data Provider message when the **F1** key is pressed.

Select **Always Gross** to transmit the gross value regardless of whether the Tare key has been pressed.

Select **As Displayed** to transmit either the gross or net value depending on the currently displayed data.

Remote Data Tags and IDs

Data Tag   Enter the Data Tag of the message to use for the specified input item.

ID   Enter the ID of the module used to supply the specified input item.

> ⓘ *This is only necessary for **Item Mode** where individual items are to be woken using the **Wake** key as opposed to letting the handheld wake all modules.*

If you are not using Item mode then you are not required to enter the ID although it will be filled in automatically if you pair to a module to retrieve its settings.

P   Click this then perform pairing on a remote transmitter to automatically provide the ID and Data Tag. Usually pairing is activated by removing and replacing the power supply on the remote transmitter. You must perform pairing within 5 seconds of clicking the button.

X   Click this to reset the Data Tag and ID to zero (disabling the input item).

Set Prompts   For modules with a firmware revision of 1.2 and newer this button will be visible. This displays a page where the message labels shown before switching between channels can be set by the user.

2.2. Prompts
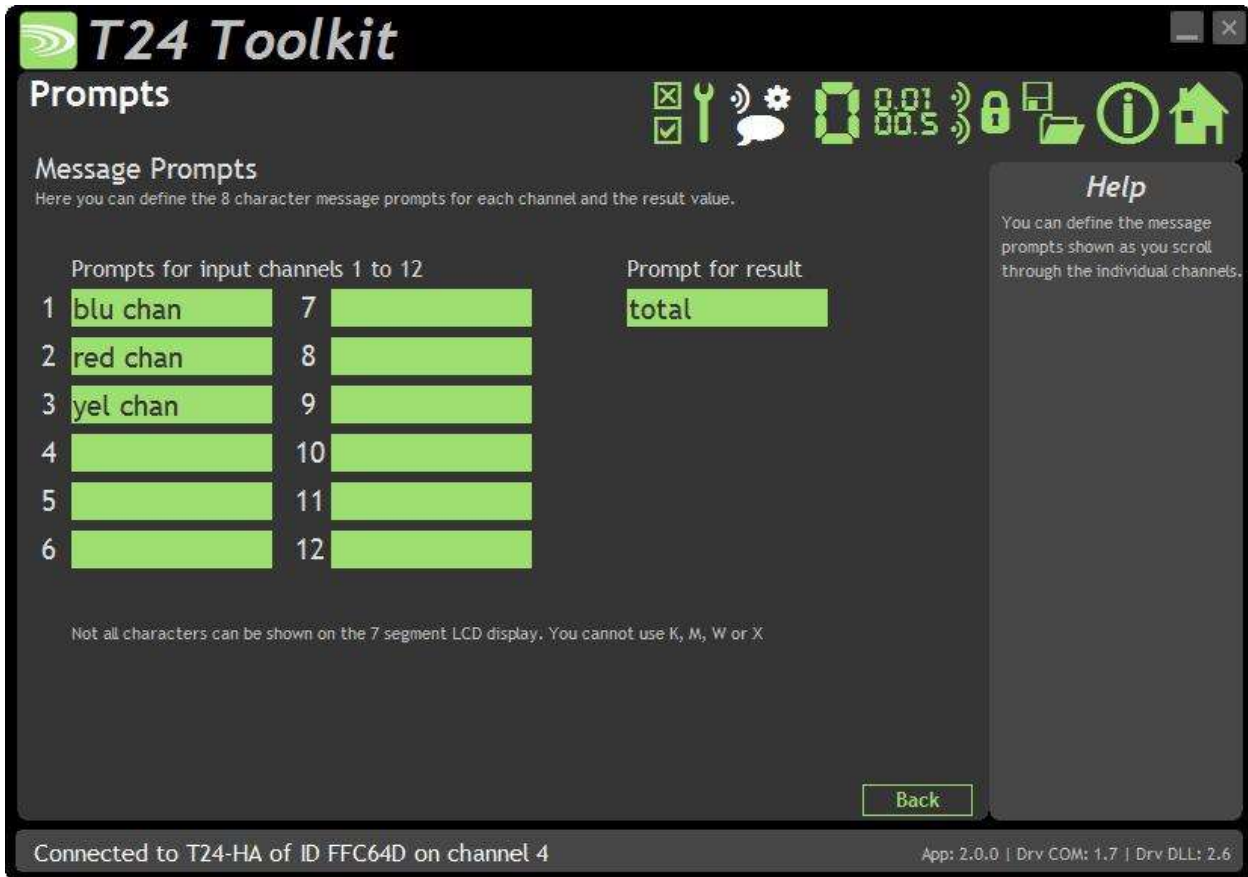
Here you can adjust the messages shown when switching between input channels in Item Mode..

Items you can change:

Prompts 1 to 12

These prompts are briefly shown when switching between inputs. They default to 'input 1', 'input 2' etc

Leave the prompt blank to display the Data Tag of the module supplying data to the current item.

> *The displayed prompts are limited to 8 characters and be aware that the 7 segment LCD display is very limited in how it can represent letters. Some letters cannot be displayed. These include K, M, W, X*

Prompt for result

Enter the prompt to display before the total result is displayed.

2.3. Zero Settings

Here you can adjust settings that affect the display of zero.

Items you can change:

Power On Auto Zero Here you can determine whether the WIRELESS-T24-HA performs automatic zero when it is powered on.

Enter zero to disable this function.

If you enter a non-zero value then when the handheld is first turned on it checks the value read from the transmitter module. If this falls within ± of this value then the display will be altered so this reads zero.

Example: A strain gauge transmitter module (WIRELESS-T24-SA) is calibrated in kg and measures the weight of boxes on a platform. The weight of the platform itself has been removed using system zero on the transmitter module.

Sometimes there is debris on the platform which you do not want to see when viewing the weight of boxes that will be placed on the platform later.

The minimum weight of a box is 5 kg so you could set the Power On Auto Zero to 2 kg.

When you turn on the handheld, if the weight on the platform is between -2 and +2kg then the handheld will tare this weight off and so read zero.

Zero Indication Band	Using this setting you can mask tiny changes in input after you press the Tare button. Entering zero will disable this function. Entering a non-zero value will provide a band within which the display will always read zero. Once the reading exceeds this value the real weight will be displayed as no taring is taking place.

Example: You are adding boxes to a platform and you press tare between adding each one so you can see the weight of each box.
Without this setting activated each time you tare the display will be around zero but not exactly zero (By setting the display resolution you may hide this difference) by setting a small value here such as 0.2kg the display will show a stable zero while actual weight is fluctuating less than ± 0.2kg.

Allow System Zero	Entering a non-zero value here will enable system zero to be performed by holding down the Tare key for a number of seconds. The value entered here represents the number of seconds the Tare key needs to be held.

Perform System Zero	This section allows the user to apply or remove a system zero. This will require that the transmitter modules are configured and attached to the handheld and the entire system is ready for zeroing.

2.4. Zero Settings Advanced

T24 Toolkit

Zero Settings Advanced

External System Zero

An external device can supply a system zero value. To use this feature enter the Data Tag of the data to use and the ID of the device supplying it. For this feature to work you will require a special device capable of transmitting the required system zero value. Enter a Data Tag of 0000 to disable.

Data Tag   ID
`0000`   `000000` P X

Help

Advanced settings. You will not need to alter these settings under normal operation.

Back

Connected to T24-HA of ID FF79BD on channel 1   App: 2.0.0 | Drv COM: 1.7 | Drv DLL: 2.6

This advanced section allows the use of a specially configured external module to supply the system zero value for the handheld to use.

Example:

The same handheld is used with a truck that picks up different trailers and is required to display the sum of 4 strain gauges connected to each trailer (Using WIRELESS-T24-SAs).

Because each trailer will have a different system zero requirement you would add a further module to each trailer set to transmit the system zero value. It is the Data Tag that is entered here.

On all trailers the transmitter module sets would share the same Data Tags.

Items you can change:

Data Tag   Enter the **Data Tag** of the message to use for the external system zero.

ID   Contains the ID of the module used to supply the external system zero. This is only necessary to provide a visible record of the remote module and is shown to keep compatibility with the **Mode and Communications** page.
            You do not need to enter anything here although it will be filled in automatically if you perform a pair to retrieve data.

P   Click this then perform pairing on a remote transmitter to automatically provide the ID and Data Tag. Usually pairing is activated by removing and replacing the power supply on the remote transmitter. You must perform pairing within 5 seconds of clicking the button.

X   Click this to reset the Data Tag and ID to zero (disabling the external system zero function).

2.5. Display Format

Here you can adjust the display.

Items you can change:

Format & Resolution — Here you can define how the values are displayed on the LCD. There are 7 digits available and you can define where the decimal point is shown by entering numerals where a zero indicates a numeric digit position.

When the data is being displayed the number of decimal places you define may be overridden as the display will always show the correct number of integer digits.

Example: If you set the format to 000.0000 and the value to display is 1000.1234 the display will show 1000.123

You can also define the resolution, which is the block size of changes to the display.

Example: If you enter the format as 000.0005 the display will only change in steps of 0.0005 which can be used to mask noisy digits at high resolutions.

Leading Zero Suppression — This can be turned on or off and will suppress leading zeroes when on.
Example: If the display reads 000.123 with leading zero suppression turned off it will display 0.123 when leading zero suppression is turned on.

Overload Limit — You can enter a limit here above which **Overload** will be shown on the display

instead of the actual value.
Enter zero to disable this feature.

Advanced   This opens the advanced page where you can scale the displayed data.otion Band
                                  By entering a non-zero value here you activate the motion detection.
If, within the Motion Time, the displayed value changes by more than the amount
entered the reading will be deemed in motion or unstable and the display will
flash. The F1 key will be disabled while the reading is in motion.

Motion Time   Enter a time in seconds within which the displayed value must not change more
                                  than the Motion Band amount set above.

2.6. Display Format Advanced Settings

Here you can adjust the display update rate and also scale the displayed data. This may be used, for example, to convert the data from a WIRELESS-T24-SA calibrated in kg so that the handheld display shows lb.

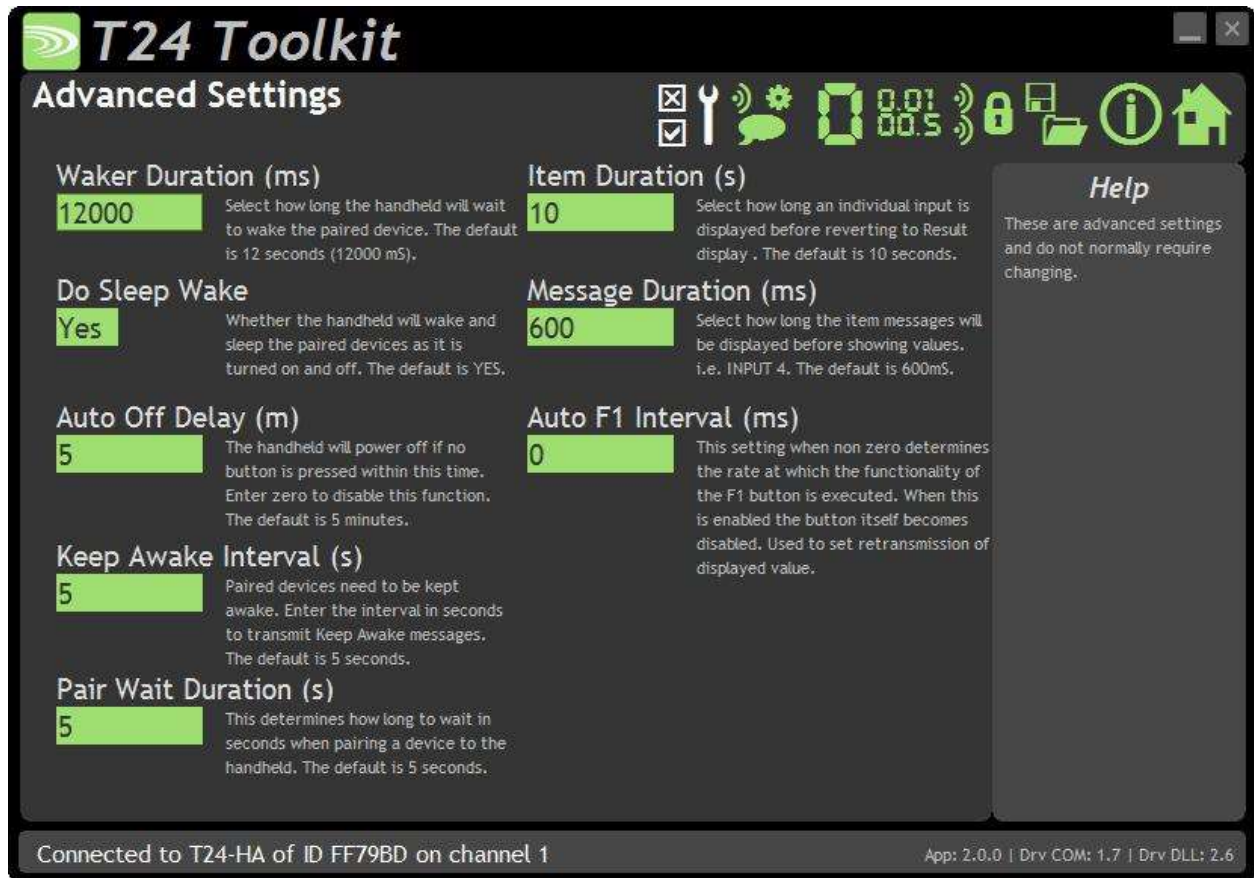**Items you can change:**

Display Update Rate — Enter the interval in milliseconds between display updates. The default is 300 milliseconds. i.e. approximately 3 updates per second.

Custom Display Scaling — This can be used to change the displayed value to a different unit or to otherwise scale it. You simply enter the original and required values at a low and high point. Example: If a WIRELESS-T24-SA was supplying data in kg and you wanted to show tonnes.
You would keep both the low points at zero. Enter **At High Input Value** of 1000 and **Display Should Read** Value of 1.

2.7. Advanced Settings

You should not normally need to change these settings.

Items you can change:

Waker Duration — When the handheld is turned on it may attempt to wake the paired transmitter modules. This setting allows you to adjust the time it will wait to wake the remote modules in milliseconds. The default is 12000.

Do Sleep Wake — You can select whether the handheld wakes the remote transmitter modules on power up and sends them to sleep on power down.
Select No to disable this function. The default is Yes.

Auto Off Delay — Here you can specify the delay in minutes after which the handheld will automatically turn off after no button is pressed.
Enter zero to disable this function. The default is 5 minutes.

Keep Awake Interval — While the handheld is retrieving data from the transmitter module it periodically sends out a **Keep Awake** packet. This will stop the transmitter module from going to sleep while the handheld is in use. The default is 5 seconds.

Pair Wait Duration — Here you can set the duration that the handheld will wait to achieve successful pairing when it is turned on in Pairing mode. The default is 5 seconds.

Item Duration — Used when in Result Mode and the Next key has been enabled to allow viewing of discrete inputs. Enter a time in seconds that the individual item value will be displayed for before the display is automatically switched back to showing the result.

Message Duration

Each time the **Next** key is used to step through available items the display shows a brief description of the data about to be displayed. **Input 1**, **Input 2**, **Result** etc.

The time you enter here in milliseconds is the time that this message will be displayed before the actual value is shown.

Newer versions of the handheld allow the user to define these message prompts. See Prompts

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3. ANTENNAS

These modules have the antenna already fitted inside the enclosure so there are no specific mounting requirements.

4. SPECIFICATION

Electrical	Min	Typical	Max	Units
Power Supply voltage	2.5	3.0	3.6	Vdc

Power Supply	Min	Typical	Max	Units
Active		35	40	mA
Low power mode		120	160	µA
Estimated Battery life using 2Ahr batteries:				
Standby mode (Powered off)		1.5		Years
Continuous operation		35		Hours

Environmental	Min	Typical	Max	Units
IP rating		IP67		
Operating Temperature Range	-10		+50	C
Storage Temperature	-40		+85	C
Humidity	0		95	%RH

Physical				
Hand Held Dimensions		90 mm x 152 mm x 34 mm		