

subBOX Tilt™ DATA SHEET

General Features

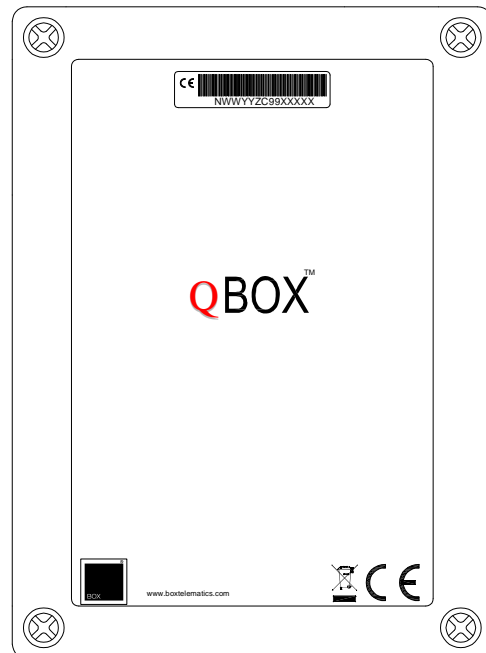
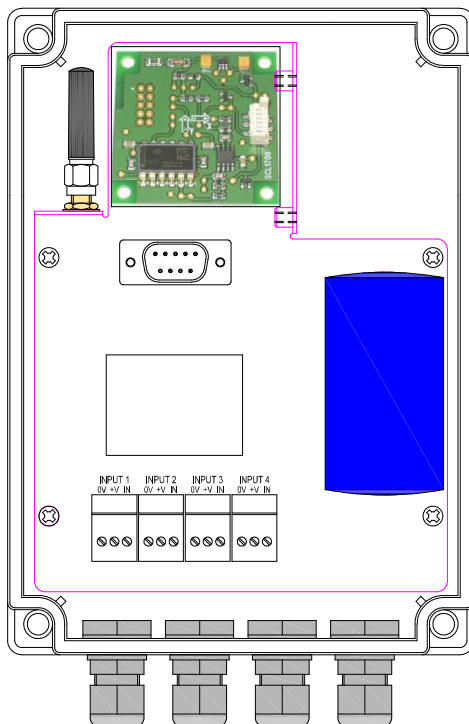
- Ability to interface with up to four 0-10V or 4-20mA sensors
- On-board excitation
- Typically > 5 year battery life
- LCD Display to help with on-site setup
- Tri-band operation
- Direct RS232 connection / pc port for onsite firmware upgrades / setup
- Low /high threshold alarming on analogues

Hardware Features

- +3.6 VDC operation
- Low Standby Current
- Sleep Mode

Typical Applications

- Building Subsidence Monitor
- Environmental Monitoring
- Condition Monitoring



Electrical Characteristics

Parameter	Conditions	Min	Typ	Max	Units
Battery	Battery Life	1	5	-	Years
	Battery Voltage		3.6		Volts
	Supply Current		0.5		Amps
	Sleep		50		uA
	Active		6		mA
	Transmitting	12		250	mA
Inputs	Ch1 to Ch4 Selectable Excitation voltage	3.6		21	Volts
	Excitation Current	0.5		0.12	mA
	Input Impedance (0-10V)		33		KΩ
	Resolution		10		bit
	Ch1 to Ch4 type 1	0		10	Volts
	Ch1 to Ch4 type 2	4		20	mA
Environmental	Temperature	-15		+45	°C
Form Factor	Enclosure, Polycarbonate		67		IP
	Dimensions	180	130	76	mm
	Weight		0.7		Kg
Connectors	9 Way D-Type Male (internal use only)		1		
	2.54mm Molex Power Connector		1		
	SMA Antenna Connector		1		
	3 Pin 3.81mm Pitch / Sensor		4		

As the subBOX Tilt™ is a battery powered device it has been designed in such a way to extend this life to a maximum. This means during normal operation the display will be off, the sensors excitation will be off and the GSM engine will be powered down. As required these are switched on by the processor and when finished with they are switched off.

Setup

NAVIGATION BASICS

A common method is used throughout the menu system for navigation.

To move up within a menu – You must use the top button to the left of the screen (*UP*) to move up if you are navigating in a menu.

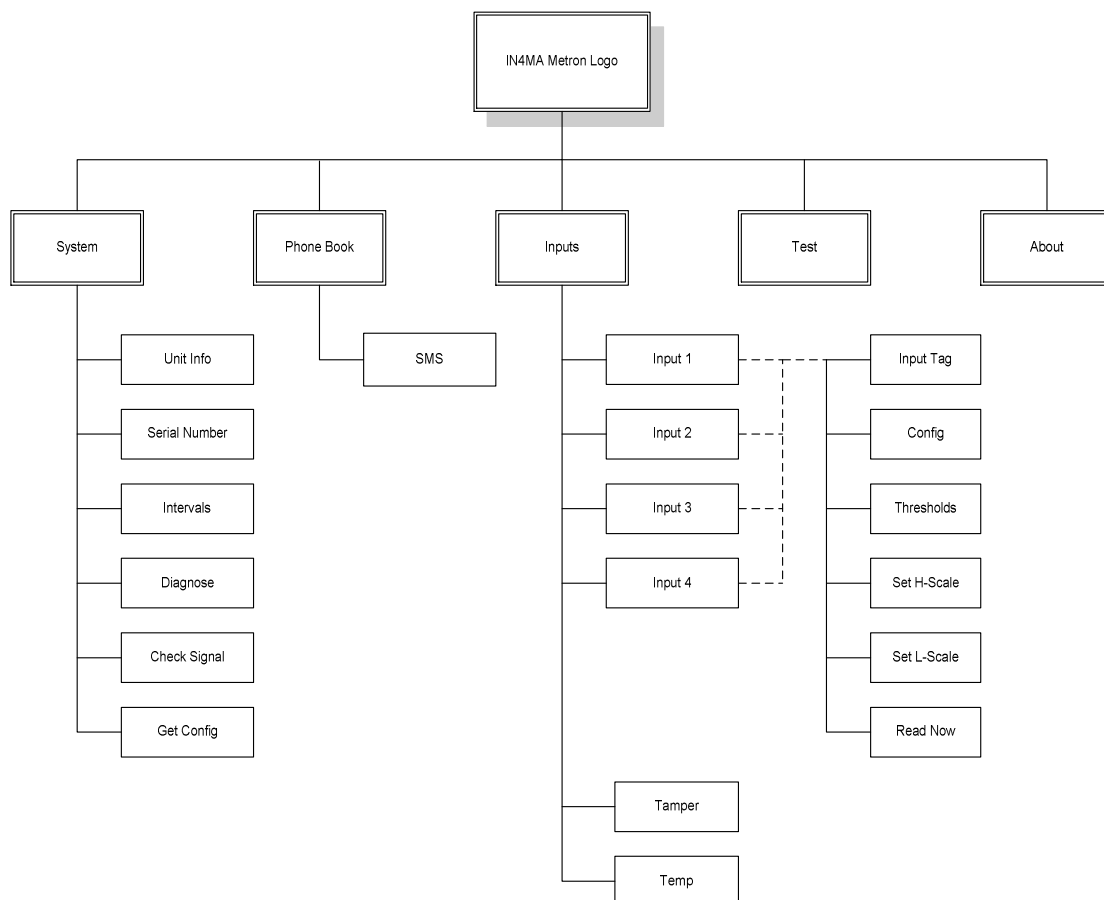
To move down within a menu – You must use the bottom button to the left of the screen (*DOWN*) to move down if you are navigating within a menu.

To select an item on a menu – You must press the central button to the left of the screen (*ENTER*) for less than one second to select an item if you are within a menu.

To go to the previous menu – You must press the central button to the left of the screen for more than one second to return to the previous menu. You should continue to hold until the previous menu appears.

To return to the previous menu when displaying information – If the subBOX Tilt™ is just displaying information, you can return to the previous menu by simply pressing the central button to the left of the screen briefly.

Below is a diagram of how the menu system is structured. Each menu item has its function described in the table below the diagram.



Setup

Menu Item	Function
Unit Info	Displays the Unit Name and the Firmware Version.
Serial Number	Displays the serial number of the unit.
Intervals	Displays the wakeup and transmit interval.
Diagnose	<p>A self diagnostic function that allows the user to determine if there are any problems and where they may lie. For each of the checks, it will return 'Pass' or 'Fail'.</p> <p>SIM: This checks to see if the SIM card is present and if the SIM card has PIN protection.</p> <p>REG: This checks for correct network registration. If it is on the home network or on a roaming network and is connected correctly, it will return 'Pass'.</p> <p>SIG: This checks the signal strength and returns 'Pass' if the signal is strong enough for the subBOX Tilt™ to operate reliably.</p> <p>IMEI #: The IMEI number is displayed for your reference.</p>
Check Signal	<p>This feature logs onto the network and monitors the signal strength. It displays the signal (0 – 31 or 99) and an interpretation of this so you can evaluate if the signal will be adequate or not.</p> <p>No Signal: There is extremely little or no signal available to the subBOX Tilt™. It will be unable to operate in these circumstances.</p> <p>Very Poor: There is a poor signal available to the subBOX Tilt™ and the ability to operate successfully may vary according to weather conditions.</p> <p>Marginal: There is a signal available that can generally allow reliable operation of the subBOX Tilt™.</p> <p>Signal OK: The signal is well above operational levels.</p> <p>Excellent: The signal is very good – optimum conditions for successful subBOX Tilt™ operation.</p> <p>Note: If you do not have a SIM card present in the subBOX Tilt™, this function will still operate but instead will read the signal strength of the strongest operator signal present.</p>
Get Config	To configure the subBOX Tilt™ via text message, you must first put the subBOX Tilt™ into configuration mode. By selecting 'Get Config', it will do this and interpret any text messages that are received.
SMS	When selecting the SMS Phonebook, it will display the four numbers that are present in the subBOX Tilt™ phonebook. If a number has not been programmed, it will show 'No Number' by the corresponding entry.
Input 1, 2, 3, 4	When selecting any of the inputs, it will bring up a sub-menu that directly corresponds to the input that has been selected.
Input Tag	This will display the name that has been given to the input. It will also confirm that the input is enabled.
Config	This will display what voltage the output is set to (3.6V or 21V), what the input type is set to (0-10V or 4-20mA) and the value of the settle time.

Thresholds	<p>The four thresholds (hihi, hi, lo, lolo) and hysteresis will be displayed. You can then edit the value of each by using the up and down buttons. When you have finished modifying the value, by pressing enter you will move onto the next value. Once you have modified all of the values, press enter again to return to the previous menu.</p> <p>Each threshold can be used to set points that trigger alarms. They are described below.</p> <p>HiHi and Hi: These are triggered when the reading crosses from below to above the threshold.</p> <p>LoLo and Lo: These are triggered when the reading crosses from above to below</p> <p>Hysteresis: See separate section for details.</p>
Set H-Scale	The high scale value will be displayed with the ability to adjust its value by pressing the up and down buttons.
Set L-Scale	The low scale value will be displayed with the ability to adjust its value by pressing the up and down buttons.
Read Now	This allows real time monitoring in an oscilloscope style format – The scaled value (based on the high scale and low scale) is displayed in the upper left hand corner. This can be useful for resolving and testing scaling issues.
Tamper	This will display the state of the tamper detection. It should be used to determine if the light levels in its environment are suitable for using the tamper detection.
Temp	This will display the temperature of the current environment.
Test	The test function will take raw readings and then scale them on all enabled channels.

Installation

The SubBOX Tilt™ comes pre-assembled with the appropriate battery fitted, but not connected.

To achieve optimum performance from the unit, it is advised that the following guidelines are followed during the installation:

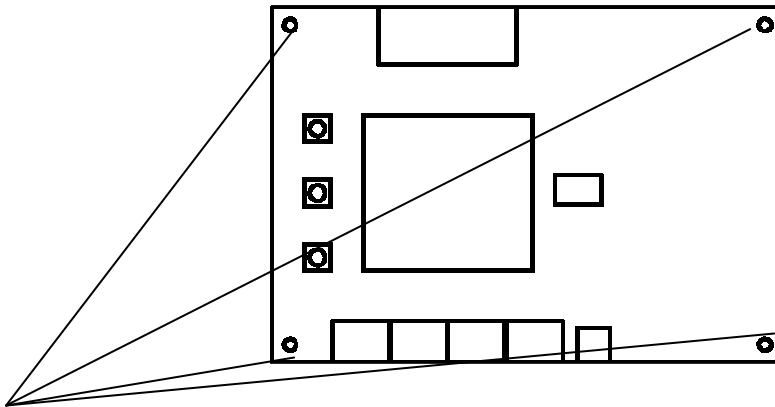
- To achieve optimum signal strength, the SubBOX Tilt™ must be mounted upright, with the label reading the correct way up
- Large metal objects that are in the transmission path of the SubBOX Tilt™ may hinder the performance
- Check that the glands are tightened and any blanking plugs are fitted tightly. The inside of the unit must remain dry, as water ingress may damage the SubBOX Tilt™.

ANTENNA

The SubBOX Tilt™ comes with an antenna attached. The system has been designed to gain optimum signal strength to the mobile phone network but it is possible to use an external antenna. The SubBOX Tilt™ presents an SMA type connector for the antenna and the cable can be connected into the enclosure via one of the glands.

SIM CARD

The SIM card holder is located beneath the circuit board and can only be accessed by removing the circuit board. The circuit board is removed by unscrewing the 4 outer Alan screws. These screws need to be removed in order to gain access to the SIM card holder. When removing the circuit board, remove the antenna cable carefully with a firm grip.

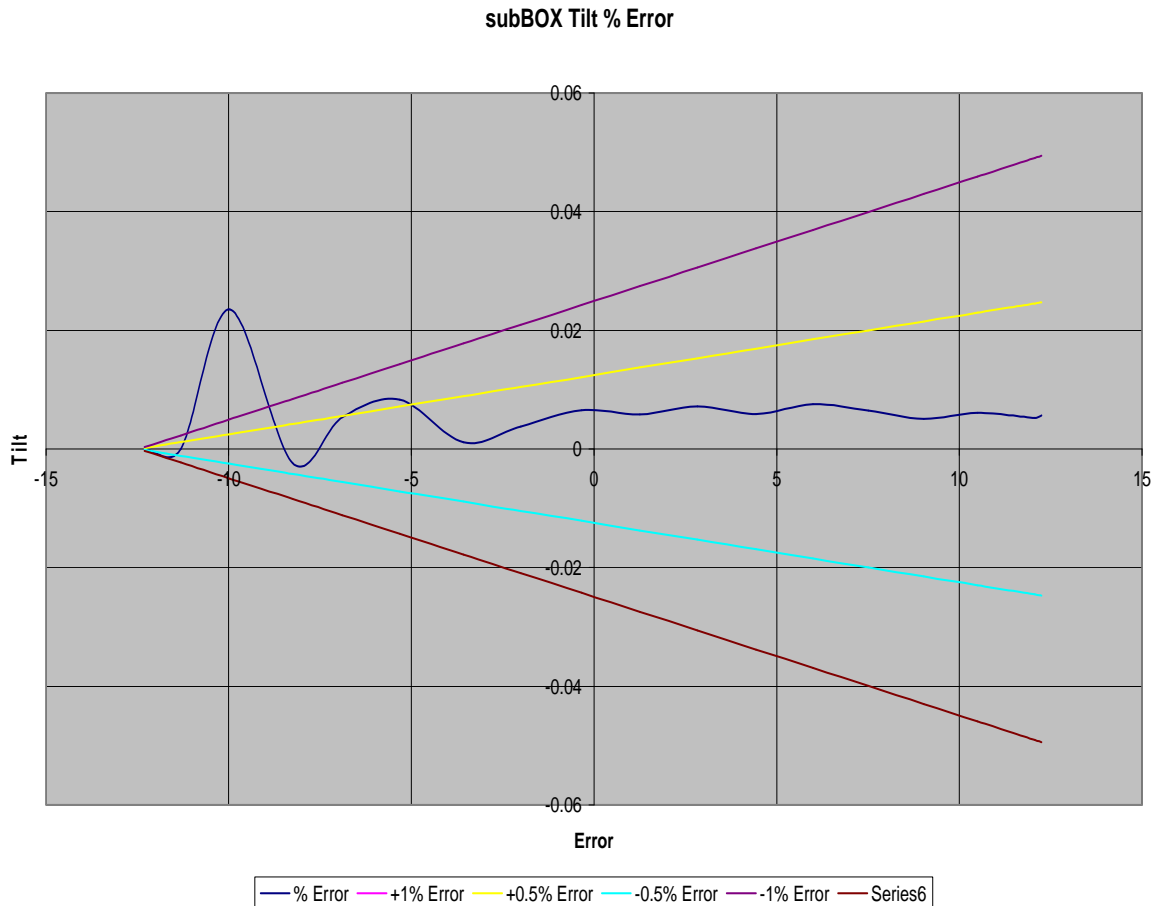


Check with your GSM provider if your SIM is enabled for data and fax traffic, if not ask them for this service, they will give you other two numbers (one for data calls and the other for fax calls). If you are using 'pay as you go' ensure that you have credit on your SIM, and that you do not have a minimum usage to maintain operation.

Performance

Graph below showing the linearity of the subBOX Tilt unit. The Linearity is expressed as the error or deviation from the true sensor output voltage when a certain angle of tilt is present subtracted from the measured reading taken from the LCD display of the subBOX Tilt unit.

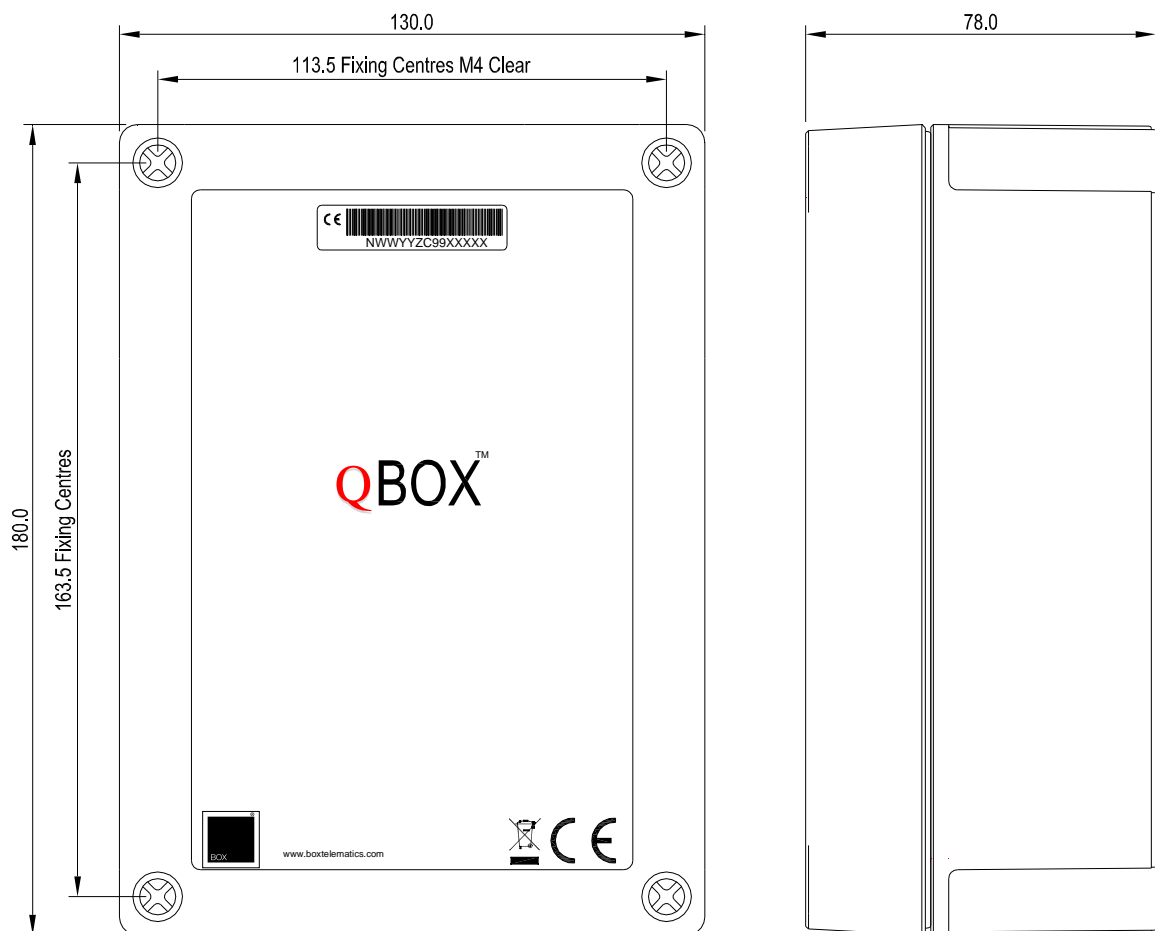
The subBOX Tilt is calibrated within the range of $\pm 1^\circ$ over the specified range of -8.8° to $+12.2^\circ$ giving a total span of 20° tilt.



Ordering Information

Description	Product Code
subBOX Tilt™	B90000/01
Replacement Battery	E20003

Mechanical Details



Safety

Read carefully data sheet / user installation notes before using the subBOX Tilt™.

For each situation please follow the specific instructions or consult your onsite safety executive for approval of use within the environment.

The subBOX Tilt™ is a GSM radio transmitter and receiver. When it is powered, it will send and receive radio frequency (RF) signals operating on the 900 and 1800MHz frequency bands. Operating the subBOX Tilt™ close to other electrical equipment such as television, phone, radios and personal computer, may cause interference.

Interference

The subBOX Tilt™, like all wireless devices, is subject to interferences that may reduce its performance for the reliable transmission of data at all times and can be adversely affected by weather conditions and other temporary or permanent phenomena or obstructions that are outside of the control of Box

Data Collection Servers (DCS)

The DCS is not guaranteed to be continuously available at all times and is liable to interruptions that are outside of the control of Box telematics limited.

Hospital Safety

Do not use the subBOX Tilt™ near health equipment, especially pacemaker and hearing aids, to avoid potential interferences. The subBOX Tilt™ is a not mobile phone; do not use it in direct contact with the human body. Remove Power to the subBOX Tilt™ in hospitals, and in any other type of medical centres. Hospitals or health care facilities may be using equipment that could be sensitive to external RF energy.

Explosive Materials

Do not use the subBOX Tilt™ in refuelling points, near fuel or chemicals. Do not use the subBOX Tilt™ where blasting is in progress. Observe restrictions, and follow any regulation or instruction. Use approved accessories and replacement parts only. Do not connect incompatible products.

Included Battery

- Do not use if the casing appears damaged
- Do not attempt to recharge the battery
- Do not short circuit
- Only use supplied battery with the subBOX Tilt™.