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Introduction

Quick Install



- Power connected (12V DC)
- Solid = processor starting
Flashing = processor operating
- Solid = looking for GSM signal
Flashing fast = logging onto GSM network (1/sec)
Flashing slow = connected to GSM network (1/3 sec)



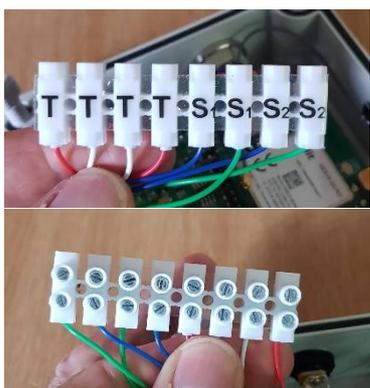
Tx-1

The lead shown plugs into a Select doser. Power and flow sensor info will be shared between the doser and Tx box. Connect the flow sensor to the socket marked "Flow Sensor". There are 6 spare glands for the addition of further sensors. Large black side gland is for extension GSM antenna if needed.



Tx-2

The Tx-2 is supplied with a 12V DC power supply. Connect the plug from the power supply into the black socket as shown. Any sensors are connected to the Tx box through the 6 grey glands.



You will find connectors inside the Tx box for the temperature (T), 2 x flow sensors (F1 and F2) and the two switches S1 and S2. A small screwdriver is supplied with the Tx box to assist you.



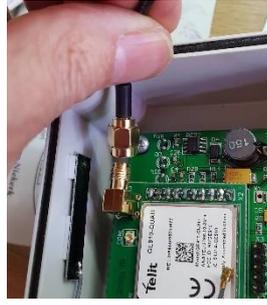
Use a Micro SIM (12mm x 15mm) and insert in the orientation shown.



If you have large fingers, you might find it useful to temporarily remove the screw (bottom right) when installing the SIM card.



If the green light continues to flash fast, GSM signal may be low. Lift off the internal antenna connector as shown.



Connect the external antenna as shown. Take care not to cross the threads. The antenna connector needs to be inserted into the Tx box through the black side gland.

Principles

The Tx box is a relatively simple device to operate, but it has a huge range of facilities to help with the management of your day-to-day processes.

From sending you an Alert message when a sensed temperature is too high, to sending recorded data to your computer for graphing and conformance purposes, THE TX BOX SIMPLY AND EFFICIENTLY PERFORMS THESE TASKS FOR YOU.

All communication with the Tx box is by SMS messages via GSM networks. This method is used as GSM networks have the best geographical coverage and SMS being the most robust transit method.

So that you know when an SMS has reached the Tx box, the blue light will flash fast a few times. It will flash fast again when it sends a message back to you.

The following instructions will guide you through the initial set-up and help you with configuring your Tx box to perform in the way you want it to.

A full list of SMS commands is at the end of these Instructions

The Tx Box

What is supplied:

Tx-1	Tx-2
The Tx box	The Tx box
Fitted lead to connect to a Select doser	12V DC power supply
Internal connections for:	Internal connections for:
❖ 1 x extra flow sensor	❖ 2 x flow sensor
❖ 1 x temperature sensor	❖ 1 x temperature sensor
❖ 2 x switches	❖ 2 x switches
SIM card holder	SIM card holder
Internal antenna	Internal antenna
Connector for external antenna	Connector for external antenna

The SIM Card

For the Tx box to function, you need to insert a **micro sized SIM card** (Standard = largest, Micro is the middle size at 12mm x 15mm, with the Nano size being the smallest. SIM cards are generally supplied pre-cut so that all sizes are possible by snapping out the size that you need.

It is recommended, if at all possible, to use a monthly paid contract SIM card from the GSM network provider that has the strongest signal in your area. There are occasionally transmission problems if pay-as-you-go SIM cards are used. Also, with pay-as-you-go cards, you will not know when your credit balance reaches zero.

When purchasing a SIM card, you need the cheapest possible deal. The Tx box needs to use only SMS. Purchasing talk time and data is unnecessary as these will not be used.

Once the SIM card is inserted as shown above (note the position of the cut-off corner of the SIM card) and the power connected (Tx-1 connected to an active Select-doser, TX-2 connected to a 12V DC power supply), the lights on the front of the box will show as here:



The red light will always be on when power is connected. There is no back-up battery installed inside the Tx box. Recharging emergency power supplies are available.

The blue light purely shows that the processor is operating correctly.

You will see (left) the position of the green light. After you fit a SIM card, if the green light continues to flash fast (1/sec), there could be one or more of the following issues:

- Power connected (12V DC)
- Solid = processor starting
- Flashing = processor operating
- ❖ The SIM card may not have been activated by your supplier
- ❖ The SIM card is inserted incorrectly
- ❖ The SIM has no credit (pay-as-you-go)
- ❖ There is no GSM signal available or a very low signal, in this case use an external antenna plus an extra extension

- Solid = looking for GSM signal
- Flashing fast = logging onto GSM network (1/sec)
- Flashing slow = connected to GSM network (1/3 sec)

cable to expose the antenna to the best chance of seeing a GSM signal

Time

A feature of the Tx box is that you do not need to supply the present time to the operating system. This is picked up automatically from the local GSM network. However, if you disconnect the power from the Tx box and then reconnect quickly, it may take some time for the correct time setting to be re-established.

Adjustments are automatically made to take daylight saving changes into account.

However, not all GSM networks function in the same way. If the Tx box is not able to get the present time from the GSM network on first power-up, Contact Number 1 will receive an SMS with the format:

TX System Serial Number 000100
Time Not Set!

To set the time on the Tx box manually, send an SMS to the Tx box with the format ***TXST,080319,1633** (*effectively Set the Time and date as 8 March 2019, 16.33pm.*)

The present date and time will be preserved in the Tx box using the fitted battery.

Establishment Step 1 – The 5 Contacts

The Tx box can store 5 telephone numbers for outgoing communications. These numbers can be for mobile telephones, or for modems attached to office computers. It is your choice which proportion of the 5 numbers are for telephones, and which for computers.

All contact with Tx is via SMS. All instructions you send to the Tx box will start with *TX (note capital letters need to be used). If the instruction you send to the Tx box is successful and has been understood correctly and processed well, you will receive an SMS response starting with TX.

The green light will flicker to show that a message has been received and is being processed.

To enter the telephone numbers of Contacts into the Tx box, send an SMS to the Tx box with the format ***TXON1,+447777123456** (*effectively establish the outgoing telephone number for Contact 1 as +44 (for a UK telephone number) 7777 123456*). A response will be received with the format:

TXON1 (For Contact 1)

To enter the telephone number for Contact 2, send an SMS with the format ***TXON2,+447788234567** (effectively establish the outgoing telephone number for Contact 2 as +44 (for a UK telephone number) 7788 234567)

The Outgoing Numbers for Contacts are entered in the same way whether the Contact is a person or the telephone number is a modem attached to an office computer.

NOTE – All entered telephone numbers must be in the format +country code followed by the telephone number without the leading zero. So for a South Africa telephone number being entered into a Tx box in South Africa, of 08112 345678, this has to be sent to the Tx box as *TXON1,+278112345678

If you wish to change the Contact 1 telephone number, simply resend the *TXON1 command with the new telephone number.

List All 5 Contact Numbers

After a time, you may find it useful to receive a summary of all of the Contact telephone numbers established in the Tx box. To do this send an SMS to the Tx box with the format ***TXLO** (effectively instruct the Tx box to list Outgoing Numbers) The response will be received with the format:

```
TXLO
1: +27888123456
2: +277621234567
3: +27711245678
4: +27766645678
5: +27665678111
```

Establishment Step 2 – The 5 Sensors

The Tx box is supplied as standard with connections for 5 sensors.

The 5 sensors are designated as Channel Numbers for ease of communications:

Channel 1	Temperature (T1)
Channel 2	Flow 1 (F1)
Channel 3	Flow 2 (F2)
Channel 4	Switch 1 (S1)
Channel 5	Switch 2 (S2)

If you have purchased a Tx-1 model, there is a pre-fitted lead connection that can be plugged into any Select doser. This connection will supply electric power to the Tx box, and also share the signal from the water flow sensor that was driving the Select doser. This water flow will be on Channel 2.

For the Tx-2 model, use the power supply that came with the Tx box. Any sensors will need to be connected to the Tx box.

Name a Channel (Sensor)

You can name each connection so that when Alerts for out of range messages are sent to you from the Tx box, they will be recognisable. To do this send an SMS to the Tx box in the format ***TXCN1, Temp House 4** (effectively instruct Tx to Change Name on Channel 1 to Temp House 4). You will receive a TX response to your phone with the format: (Note, you can use up to 20 characters for your channel name)

TXCN1

***TXCN2** will be the instruction for changing the name of Channel 2 etc.

Connection of Sensors

There are connector blocks already installed inside the Tx box marked with T1, F1 etc.

T1	There are 4 connections to be made each marked T1. Match the red and white leads to the existing wires coming from the board.	
F1	If you have a Tx-1, the connection lead to the Select doser will be pre-connected to F1. Note; generally, wires from the board: Green = Signal Blue = Ground Orange = Power	
F2	As for F1	
S1	There is a pair of wires coming from the board coloured blue and green. Nominally, the blue is ground and the green is signal. Connect your switch device across the blue and green.	
S2	As for S1	

Sensor Types

Temperature	Tx can only use PT100 type sensors. These are supplied in various forms (ceramic, stainless steel etc.) by Dosing Solutions Ltd. Although 2-wire temperature sensors are acceptable, it is recommended that 4-wire sensors are used so that the length of connecting cable can be allowed for in the calculation of temperature values.	
Flow	The Tx box needs to be told which type of flow sensor is attached. You do this by sending an SMS in the format *TXST2,3 (effectively tell TX the sensor type on Channel 2 is a sensor type 3)	
	Sensor Type 1	TBR10 Flows between 3 and 400 l/hr Green = signal Red = power Blue = ground (Supplied by Dosing Solutions Ltd)
	Sensor Type 2	VTY10 Flows between 20 and 1,500 l/hr Green = signal White = power Brown = ground (Supplied by Dosing Solutions Ltd)
	Sensor Type 3	VTH25 Flows between 200 and 10,000 l/hr Green = signal White = power Brown = ground (Supplied by Dosing Solutions Ltd)
	Sensor Type 4	K = 1 Water meter that gives 1 pulse/L
	Sensor Type 5	VTH40 Flows between 400 and 25,000 l/hr Green = signal White = power Brown = ground (Supplied by Dosing Solutions Ltd)
	Sensor Type 6	K = 10 Water meter that gives 1 pulse/10L
	Sensor Type 7	VTY20 Flows between 30 and 3,300 l/hr Green = signal White = power Brown = ground (Supplied by Dosing Solutions Ltd)
	Sensor Type 8	Mag20 MagFlo 20mm, flows between 300 and 6000 l/hr
	Sensor Type 9	Mag15 MagFlo 15mm, flows between 150 and 3000 l/hr
	Sensor Type 10	K = 0.25 Water meter that gives 1 pulse per 0.25L
	Sensor Type 11	K = 0.5 Water meter that gives 1 pulse per 0.5L
	Sensor Type 12	Mag8 MagFlo 8mm, flows between 60 and 1200 l/hr

	Sensor Type 13	K = 100	Water meter that gives 1 pulse per 100L
	Sensor Type 14		Spare
Switch	<p>You do not need to tell Tx which switch type is being used. Channels 4 and 5 (labelled S1 and S2 on the connector blocks inside the Tx box) are looking for an open or a closed circuit.</p> <p>Blue (ground) and green (signal) wires come from the Tx board. Connect the switch (float, contact, relay etc.) in either order to the S1 and S2 connections.</p>		

If you wish to check which sensor is set for a particular channel, send an SMS with the format ***TXSQ2** (effectively sensor query for Channel 2)

Establishment Step 3 – Daily Reports

The Daily Report is the message that is sent each day at a specified time to the mobile phones of Contacts.

The Daily Report will be received in this format:

<p>House 4 Flow</p> <p>03/2/19 2164L +2%</p> <p>04/2/19 2185L +1%</p> <p>05/2/19 2251L +3%</p> <p>06/2/19 1913L -15%</p>	<p>This shows the total water flows over the last 4 days and the percentage change in flows between each day and the day before. Significant benefit can be derived from having early warning of unexpected flow rates potentially signifying a serious problem.</p>
--	--

Who receives the Daily Report?

To tell the Tx box who should receive the Daily Report, send an SMS in the format ***TXRR,11000** (effectively, set Recipients to receive the Daily Report to Contacts 1 and 2 but not to Contacts 3, 4 and 5. Note; all five digits need to be sent, *TXRR,11 is not acceptable). A response will be received with the format:

TXRR,11000

At what time do you wish to receive the Daily Report?

For many people, receiving the Daily Report from each channel at 07.00 each day will be ideal, for others this will need to be changed. To set the receiving time, send an SMS with the format ***TXRH,08** (effectively change the reporting hour to 08.00). NOTE – the 24 hour clock is used. Two digits need to be used for time. A response will be received with the format:

TXRH,08

Daily Reports and Daily Updates (see below) are sent out from the Tx box at the same time of day.

Repeating Daily Reports (to all enabled recipients)

If you see that Daily Reports were not sent to established recipients at the normal time (possibly due to a poor GSM signal), you can request that Daily Reports are sent now to the normal recipients by sending an SMS to the Tx box with the format ***TXMR** (*effectively request a Manual sending of Daily Reports*)

Request a Daily Report

To get a Daily Report only to your phone for a particular Channel Number, send an SMS to the Tx box with the format ***TXDR3** (*effectively send me a Daily Report for Channel 3*)

In case the Daily Report was not sent correctly to all nominated recipients earlier in the day, you can request that all of the nominated people receive the Daily Report again by sending a message with the format ***TXMR** (*effectively call for a Manual resending of Reports*)

Establishment Step 4 – Daily Updates

The Daily Updates are SMS messages sent from the Tx box to GSM modems attached to office computers. These messages will contain a string of 24 hourly values that will be loaded into spreadsheets or databases. To specify which of the 5 contacts receives the Update messages, send an SMS to the Tx box with the format ***TXUR,00001** (*effectively only Contact 5 will receive the Daily Update messages*). A response will be received with the format:

TXUR,00001

NOTE; It is possible for any Contact to receive both Daily Reports and Daily Updates.

If you wish to see the hourly data values from a sensor until the present time, and not wait for the Daily Update report to be sent to a computer, you can do this by sending an SMS with the format ***TXDU1,2** (*effectively send a Daily Update report for Channel 3 for today so far to my phone*). The Report will be sent to you with the format:

1: Temp Top Shed,
24:02:19,12,13,12,14,12,12,12,13,14,14,na,na,na,na,na,na,na,na,
na,na,na,na
(where na is not yet available)

You can also see a copy of the Daily Update report for yesterday on your phone (this would normally have been sent to a modem attached to an office computer). To do this send an SMS to the Tx box with the format ***TXDU3,1** (*effectively send a Daily Update report for Channel 3 for yesterday*).

Repeating Daily Updates

If you see that Daily Updates were not sent earlier today to your office computer, you can request that Daily Updates are sent now to all enabled recipients by sending an SMS with the format ***TXMU** (*effectively request a Manual Update*)

List all recipients of Alerts, Daily Reports and Daily Updates

To get a summary of recipients of Alerts, Daily Reports and Daily Updates, send a message to the Tx box with the format ***TXVR** (effectively View Recipients of Alerts, Daily Reports and Daily Updates).

The response will be similar to:

SMS Recipients
 Alert 10000 (only Contact 1 is receiving Alerts)
 Report 10000 (only Contact 1 is receiving Daily Reports)
 Update 00001 (only Contact 5 (modem) is receiving Daily Updates)

Establishment Step 5 – Alarm levels

One of the great benefits of operating the Tx system is the ability to set limits on each of the connected sensors. Once that limit is exceeded, an Alert SMS is sent to specified recipients.

You can establish six Alarms for each sensor. This means you can have different limits on different days at different times.

What makes things a little complicated for setting up Alarms, is that there are some choices to be made – Above or below a limit? Who to receive the Alert message? Etc.

There is a difference between setting up an Alarm initially, compared with giving it a quick edit later. Initially, it is better to ask the Tx box for a full format message. You can then edit this message.

An example:

We want to set up Channel 2 (flow) to send an Alert message when there is a flow rate of greater than 1,217 l/hr. We want this Alarm only on weekend days between 07.00 and 14.00. We will use Alarm number 1 (out of 6) for this.

Send an SMS to the Tx box with the format ***TXSA2,1** (effectively send settings for Alarms on Channel 2 for Alarm Number 1).

This (or similar) will be returned to you by SMS – *TXSA2,1,0,2,0700,1100,1111111,0

This can be broken down as:

TXSA2	Channel 2
1	Alarm Number 1
0	Disabled (1 for Enabled)
2	Above limit Alarm (1 for below limit Alarm)
0700	Start time for the Alarm period
1100	Finish time for the Alarm period
1111111	The days of the week that the Alarm will be active, the first digit is Sunday.
0	This is the limit value

So, you can now edit this string of characters to give us the SMS to send to the Tx box. Use the Copy Text facility on your phone and paste the copy into the send area of the screen.

Edit the characters using the screen on your telephone to give:

***TXCA2,1,1,2,0700,1400,1000001,1217** (Effectively Change Alarm on Channel 2, Alarm number 1, activate it, set an above limit, have it active between 07.00 and 14.00, have it effective only on

Sundays and Saturdays, and make the limit level 1,217 litres per hour). Send this message to the Tx box. You will receive a confirmation response if your formatting is correct.

If you need to change just the limit value you can use a different, simpler, command. To change the limit in this example from 1,217 l/hr to 1,350 l/hr send an SMS to the Tx box with the format ***TXCL2,1,1350** (*effectively change the limit on channel 2, Alarm number 1 to 1350 l/hr*). A response will be received with the format:

TXCL2,1,1350

Establishment Step 6 - Alerts

When a limit is exceeded, if you are nominated to receive an Alert, it will be delivered to your phone. The Alert will be in this format:

Alert!
2:Flow Top Shed,1 (*Channel 2, flow sensor named Flow Top Shed on Alarm 1*)
Above limit,
Actual 520
Limit 35
At 19.09
On 19.02.19

Who Receives Alert Messages?

You need to decide who will receive Alert messages. Anyone nominated will receive all of the Alerts generated from a Tx box. Send a message to the Tx box with the format ***TXAR,11110** (*effectively Contacts 1 to 4 will be the Alert recipients. Contact 5 will not receive Alerts*)

Establish Number of Alert Messages

When a limit is exceeded, if you are nominated to receive Alerts from a particular Tx box, an Alert will be raised and sent to you within seconds. It will reach your phone as rapidly as allowed by the GSM network in your country. The Alert will be repeated each 30 minutes up to 5 times. You can limit the number of Alerts raised if you think that fewer than 5 Alerts will be sufficient.

Send an SMS to the Tx box with the format ***TXMS2,3** (*effectively manage SMS on Channel 2 and send only 3 SMS Alerts per event*). A response will be received with the format:

TXMS2,3

Obviously, if you receive an Alert, this signifies that there is a problem that has been detected by a sensor attached to the Tx box. To stop Alerts being generated, you would normally:

- ❖ Fix the problem that is causing an Alert to be generated
- ❖ Change the limit of the Alarm setting if that now needs to be done because of changed circumstances (use the ***TXCL** command described above)
- ❖ Disable the Alarm if it is no longer needed by using the command ***TXDA2,1** (*effectively disable the Alarm number 1 on Channel 2*). NOTE – Remember that you will need to re-enable the Alarm again to activate it again. To do this send an SMS to the Tx box with the format ***TXEA2,1** (*effectively enable the Alarm number 1 on Channel 2*)

Status Reports

The Daily Report is sent to nominated contacts each day, and the Daily update is sent to nominated computer modems each day, but you may need to contact the Tx box to get a Status Report to inspect the current level being seen by any sensor. You can do this by sending an SMS with the format ***TXSR1** (*effectively request a status report for Channel 1*). The Status Report will be delivered to your phone with the format:

```
1: TEMP  
Current Temperature  
26
```

Security

As the purchaser of a Tx box, the data generated by the Tx system remains your property. This data is transmitted directly from your Tx box to either telephones that you are aware of, or to computers that you have nominated. The telephone numbers of the SIM inside the Tx box and the telephone numbers of the SIM cards inside any computer modems are known to you and should not be divulged to others except as necessary. Regular data transmissions do not pass through any systems operated by either Dosing Solutions Ltd (the manufacturer) or your retail supplier. However, on initial power-up with a new SIM card, your Tx box will attempt to send a single Registration SMS to Dosing Solutions Ltd in the United Kingdom. The purpose of the Registration SMS is to allow Dosing Solutions Ltd to provide any back-up technical service as may be required from time-to-time. By operating the Tx system you agree that Dosing Solutions Ltd will have access to your Tx box(es) for the purposes of maintenance and technical service and that any data that comes into the possession of Dosing Solutions Ltd will be treated with the strictest confidence and will not be divulged to Third Parties without the permission of the owner of the Tx box from which the data was gleaned.

Parts List

Item	Code	Notes
Tx-1	10TX100	
Tx-2	10TX200	
External antenna	20TX05	5m lead
Antenna extension cable	21TX05	5m
Power supply 12V DC		
Temperature sensor	30TX01	Ceramic with 1m lead
	30TX05	Ceramic with 5m lead
	30TX10	Ceramic with 10m lead
	30TX--	Ceramic, customer specified lead length
	31TX01	Stainless steel with 1m lead
	31TX05	Stainless steel with 5m lead
	31TX10	Stainless steel with 10m lead
	31TX--	Stainless steel, customer specified lead length
Float switch		
Flow sensor	160CA07	TBR10 – 3 to 400 l/hr, 3/8" thread
	160CA03	VTY10 – 20 to 1,500 l/hr, 3/4" thread
	160CA20	VTY20 – 30 to 3,300 l/hr, 1" thread
	160CA05	VTH25 – 200 to 10,000 l/hr, 1.25" thread
	160CA08	VTH40 – 400 to 25,000 l/hr, 2" thread

Summary of SMS commands

SMS Command	See Page No.	Description
*TXST,080319,1633		Effectively Set the Time and date as 8 March 2019, 16.33pm.
*TXON1,+447777123456		Establish the outgoing telephone number for Contact 1 as +44 (for a UK telephone number) 7777 123456
*TXLO		Instruct the Tx box to list Outgoing Numbers
*TxCN1, Temp House 4		Instruct Tx to Change Name on Channel 1 to Temp House 4
*TXST2,3		Tell TX the sensor type on Channel 2 is a sensor type 3
*TXSQ2		Report the sensor type set for Channel 2
*TXRR,11000		Set Recipients to receive the Daily Report to Contacts 1 and 2 but not to Contacts 3, 4 and 5

*TXRE1		Enable the Daily Report on Channel 1
*TXRD1		Disable the Daily Report on Channel 1
*TXMR		Request a manual sending of Daily Reports to all recipients
*TXDR3		Request a Daily Report to you phone now
*TXMR		Request Daily Reports are resent to all nominated recipients manually now
*TXRH,08		Change the reporting hour to 08.00
*TXUR,00001		Only Contact 5 will receive the Daily Update messages
*TXUE1		Enable the Daily Update on Channel 1
*TXUD1		Disable the Daily Update on Channel 1
*TXDU3,2		send a Daily Update report for Channel 3 for today so far
*TXDU3,1		Send a Daily Update report for Channel 3 for yesterday
*TXMU		Request a manual sending of Daily Updates
*TXSA2,1		Send settings for Alarms on Channel 2 for Alarm Number 1
*TXCA2,1,1,2,0700,1400,1000001,1217		Change Alarm on Channel 2, Alarm number 1, activate it, set an above limit, have it active between 07.00 and 14.00, have it effective only on Sundays and Saturdays, and make the limit level 1,217 litres per hour
*TXCL2,1,1350		Change the limit on channel 2, Alarm number 1 to 1350 l/hr
*TXAR,11110		Contact Numbers 1 to 4 will receive Alert messages from the Tx box.
*TXMS2,3		Manage SMS on Channel 2 and send only 3 SMS Alerts per event
*TXDA2,1		Disable the Alarm number 1 on Channel 2
*TXEA2,1		Enable the Alarm number 1 on Channel 2
*TXSR2		Request a status report for Channel 2).
*TXVR		Effectively View Recipients of Alerts, Daily Reports and Daily Updates