mpec

SA380TX-L

USER GUIDE ISSUE 1.6

Version control

Version	Date	Amendments
1.0	9th Aug 2011	Initial version
1.1	23rd Sep 2011	dPanel Installation Instructions
1.2	10th Feb 2012	Revised for dPanel v1
1.3	24th Feb 2012	Revised for dPanel v2
1.4	14th Mar 2012	Correction (pg27) regarding unit "standalone" mode Clarification on config reset behaviour (pg29)
1.5	27th Apr 2012	Back Panel Layout Correction Isolation ratings up-spec'ed to 10MOhm at 1,000V DC
1.6	21st June 2012	Revised for dPanel v3

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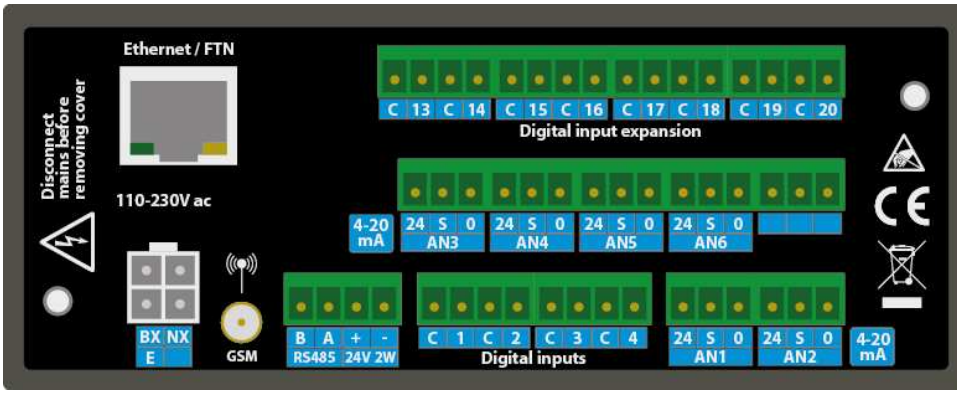
Hardware



The basic TX-L unit features:

- 4 digital inputs
- 2 analogue inputs
- 1 RS485 port
- 24v 2W auxiliary power supply
- GSM modem.

An Ethernet port can be fitted as an option when ordering.

Up to two expansion cards can be added; these cards may either add an additional 4 analogue or 8 digital inputs.

Configuration	Analogue Inputs	Digital Inputs
Base Unit (No Cards)	2	4
Base Unit + 1 Digital Card	2	12
Base Unit + 2 Digital Cards	2	20
Base Unit + 1 Analogue Cards	6	4
Base Unit + 2 Analogue Cards	10	4
Base Unit + 1 Analogue Card + 1 Digital Card	6	12

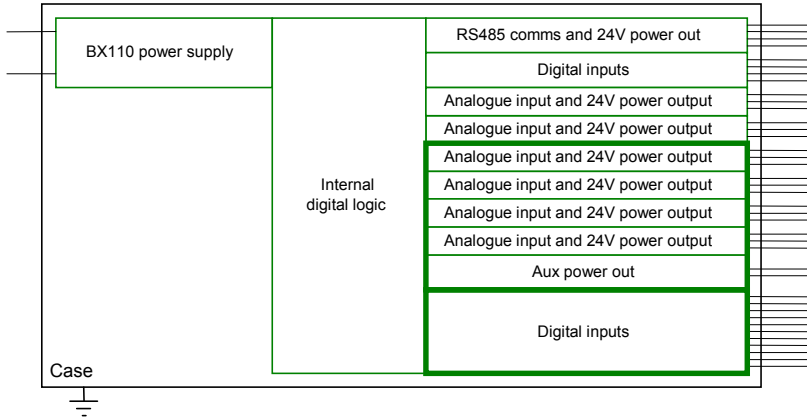
The diagram above shows a TX-L with one analogue expansion card and one digital expansion card installed.

Contact MPEC for more information regarding the purchase of additional cards.

Block diagram and isolation policy

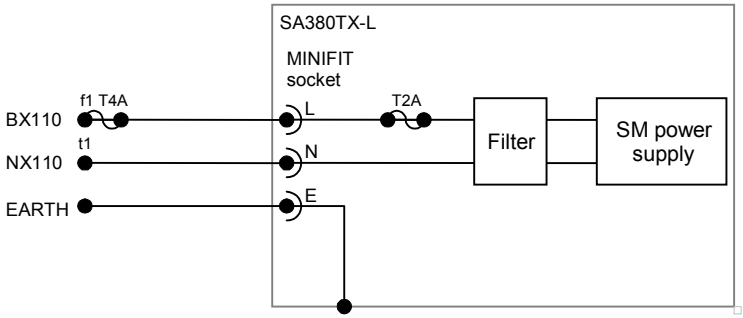
All of the green lines in the diagram below denote an isolation barrier. Every block of the TX-L shown is isolated from every other block and from the case. All of the individual analogue inputs are isolated from each other and from the auxiliary power supplies. Isolation barriers are to a minimum of 10M Ohms at 1,000V DC.

The thick green lines denote two expansion cards that may be fitted. In this case one analogue and one digital card are shown.



Power supply

The “universal input” power supply accepts any voltage from 85 to 264V ac. A suggested connection is shown below.



The power supply is internally isolated from earth and the rest of the SA380TX-L. Power can therefore be taken directly from the signalling 110V supply and no additional isolating transformer is required. The earth pin of the MINIFIT socket is connected to the case only.

Note that the TX-L does not have internal battery backup and so is not suitable for monitoring equipment such as level crossings where there is a long battery backup time, unless either:

- The TXL is powered from the level crossing B24 battery (not currently permitted in the UK), or
- An external UPS (uninterruptible power supply) is provided with enough standby reserve to power the TX-L as long as the level crossing.

An internal 2A slow-blow fuse is provided. The external fuse must also be a minimum of 2A slow-blow (often marked T2A). Slow blow is required because of the inrush current of the power supply at start-up.

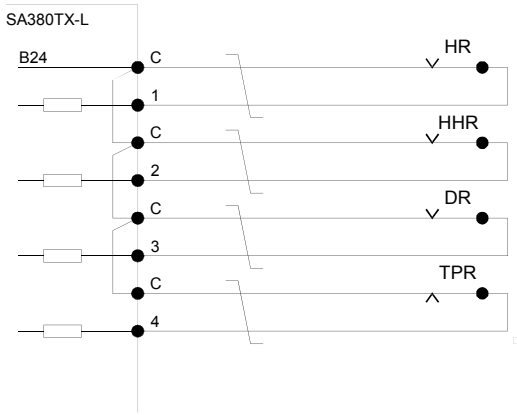
Power consumption and external equipment

Power consumption of the unit is between 2-10W. If the unit has to supply external equipment, for instance current clamps or network routers, then power consumption will rise accordingly.

Maximum rated consumption is 40W. At 110V, this is 0.36A.

Digital inputs

Four digital inputs are provided to monitor spare contacts of signalling relays. These inputs are connected as follows:



All of the terminals marked “C” are connected together internally. This allows easy wiring to signalling relays using twisted pair cable, as specified in railway standards.

Internal resistors limit the sense current to a few milliamps at 24V.

The digital inputs are fully isolated to a minimum of 10M Ohm at 1,000V DC. This isolation ensures that the inputs are fully separate from earth, the logger’s internal logic and the analogue inputs.

Digital inputs must never be connected into a live circuit (e.g. across a contact that is already in use by the signalling system). They must only ever be connected to spare relay contacts.

Note that extra care must be taken when monitoring geographical type relay interlockings, as there are internal connections within the relay sets which are not obvious just from the plugboard positions.

We recommend that full signal works testing procedures are used for geographical interlockings, not just Instrumentation Engineer. Also the original interlocking diagrams should be updated – if overlay diagrams are used, there is a risk if other persons change the interlocking circuitry in future.

These inputs are for use with volt-free relay contacts only. Do not apply voltages to these inputs.

Analogue inputs

Analogue inputs are designed to accept industry standard 4-20mA sensors. Many types of external sensor are available with a 4-20mA output, including current clamps, temperature sensors, pressure sensors and voltage transducers.

Each analogue card has four isolated channels, which are capable of powering 4-20mA current clamps. The terminals are:

24:	24V out
S:	Signal input
0:	0V

The input impedance between S and 0 terminals is 200Ω.
The maximum output power of the 24V sensor power feed is 2W, or 83mA, per analogue input.

Auxiliary power out

Each card can be factory fitted with an auxiliary power output on request. For instance a +12V output could be used to power an Ethernet router or a fibre-Ethernet converter, or to power sensors that require their own power supply.

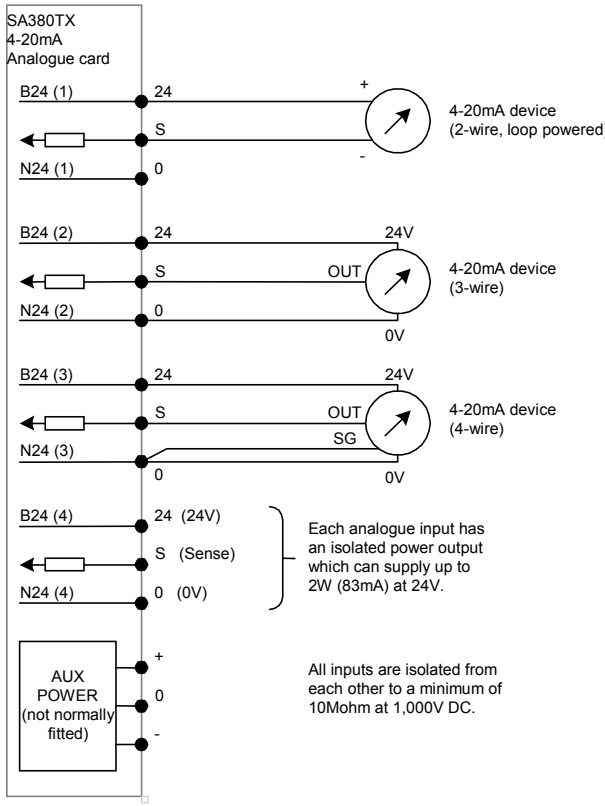
Note that:

Analogue inputs must never be connected directly to any signalling supplies or circuits.

This includes (but is not limited to) B24, B50, BX110, track circuits and signalling line circuits.

The simplest 4-20mA sensors only have two connections and take their power entirely from the loop. Others have three or four wires. The four wire types use a separate signal and power ground to avoid interference between the power supply and measurement currents.

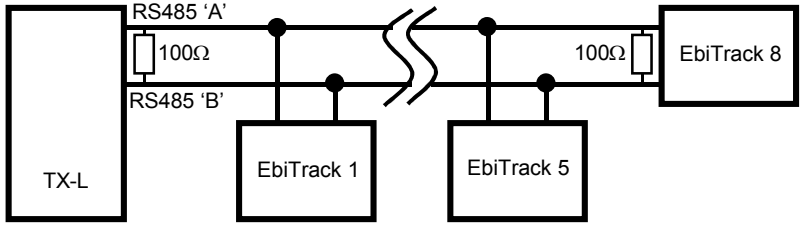
Example wiring to the different types is shown below:



RS485 (EbiTrack®)

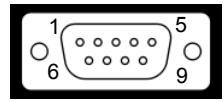
The isolated RS485 communications port may be used to monitor the Bombardier EbiTrack 200 range of digital track circuit receivers.

Up to eight EbiTrack units may be monitored using a single TX-L using a multi-drop RS485 network. Configure the network as shown below using twisted pair cable. Note the use of termination resistors at each end of the link.



The EbiTrack units' RS485 interface utilises a 9-pin D-sub connector. The connector must be wired as follows:

Pin 1: RS485 Mode Select (Connect to Pin 9)
Pin 2: Signal Pair (Connect to RS485 line B)
Pin 6: Signal Pair (Connect to RS485 line A)
Pin 9: 5V DC (Connect to Pin 1)



DE-9 Connector (Front)

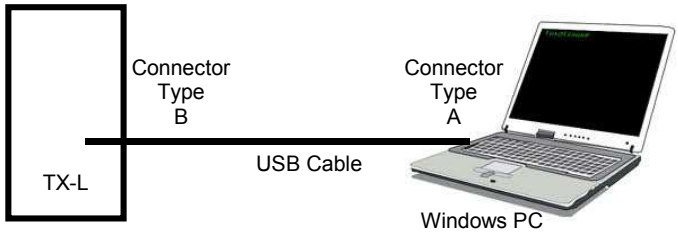
Front panel

USB Diagnostics

On-site configuration, diagnostics and data interrogation is performed by connecting a laptop to the TX-L using the supplied USB cable.

The USB port is electrically isolated from the signalling inputs of the TX-L.

Your laptop must be running MPEC's dPanel software in order to communicate with the TX-L (see Configuration and Diagnostics section).



LED's

The TX-L front panel features 8 LEDs. The meaning of these LEDs is detailed in the table below:

LED	Indication	Meaning
Server	Steady On	Connected to the Central Data Server
Comm	Steady On	Connected to the GSM Network
GSM	Steady On	Modem Powered On
Master/Slave	Slow Flash (1 sec)	Normal Operation
Master/Slave	Fast Flash (0.25 sec)	Processor Sync Error*
Master/Slave	Steady On or Off	Processor Error
Storage	Blinking	Data Read/Write from database
Storage	Steady On	Database Error
Input	Blinking	Analogue or Digital Input Event Detected
RS485	Blinking	Data Transmit/Receive on RS485 Port

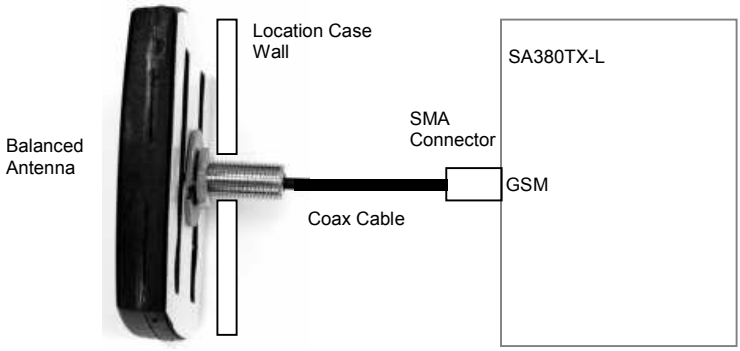
It is normal to observe a "Processor Sync Error" during initial boot and during firmware upgrade.

Restart Comms Button

Pressing this button forces the modem to immediately power-cycle and attempt reconnection with the GSM service provider and the central data server.

GSM antenna

The supplied GSM antenna, unlike many antennas, is an “impedance matched, balanced antenna”. Such antennas do not need a ground plane reference (such as the metalwork of a location case) to function. As such they are inherently safer and more immune to interference.



The antenna is to always be fitted to the exterior of the location case or equipment room and connects to the rear of the logger with a screw-fit connector. A suitable aperture is to be usually found on the side of most location cases.

To further mitigate against the unlikely event of a right-side failure, it is recommended that the length of the antenna cable is not altered and that the cable is routed separately to other cabling susceptible to interference, such as EbiTrack track circuit feeds, or SSI data links.

Maintenance

The SA380TX-L is designed to be maintenance free for its entire service life.

The SA380TX-L contains no user serviceable parts.

In case of fault, please contact MPEC technical support.

Applications

Digital acquisition

Digital event recording allows you to determine the present state of any relay (picked or dropped) and any change in state of any relay.

Front and Back Contacts

The TX-L allows you to monitor spare front (normally open) and spare back (normally closed) relay contacts. Where back contacts are monitored the state of the relay will be the inverse of the state of the contacts.

To account for this discrepancy the TX-L gives you the option to configure a digital input as a front or back contact; the TX-L then automatically ensures the true state of the relay (picked or dropped) is captured.

State Changes

All digital inputs are continuously monitored for any change in state, whenever a change is detected the nature of the change is captured (UP to DN, or DN to UP) along with a timestamp accurate to within 10 mS.

Initial States

When the TX-L first boots, or restarts, it will capture the “initial state” of every digital input, this way you can see the present state of all monitored digital inputs at all times, even if no change in state has taken place on a particular channel.

Initial states are clearly indicated in the historical log, and are marked “UP” or “DN”. Initial states are not transmitted to the central server system.

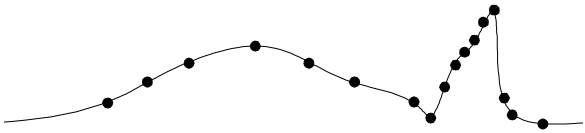
Analogue acquisition

Acquire-on-Change

All analogue input channels are logged using a process known as “Acquire-on-change”.

A sample is acquired when the measured value changes by more than a certain amount. If there is no change, there is no sample acquired.

Consider the following waveform. The acquired samples are shown as dots.



The waveform first changes at a fairly leisurely pace, then there is a spike. Each time the input changes by a given percentage, a sample is acquired. It can be seen that more data points are acquired around the spike.

Acquire-on-change is an excellent match for many railway applications. Where there are long periods without much change, very little data is acquired. Where there is more detail in the waveform, more points are acquired.

After the data has been acquired it is possible to go back and just “join the dots” and we have an accurate representation of the entire waveform, with the minimum amount of data logged and transmitted.

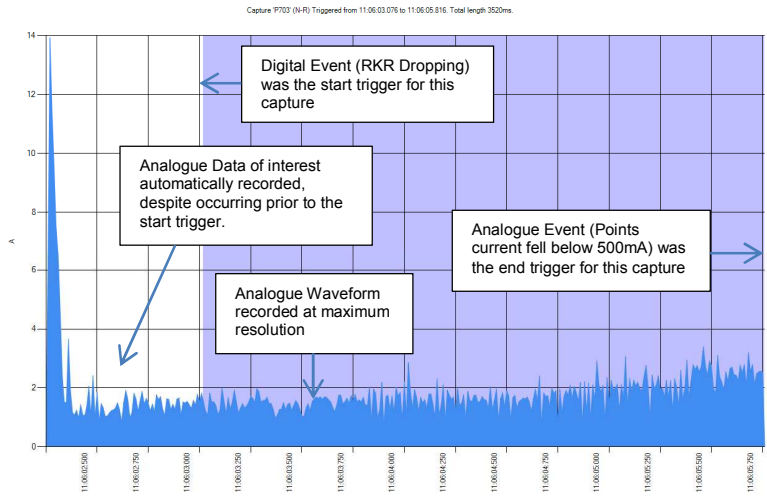
Example Applications:

- Rail Temperature Monitoring
- Track Circuit Monitoring
- Overhead Line Force and Displacement Monitoring
- Insulation Resistance Monitoring
- Power Consumption Monitoring

Triggered Capture

In addition to Acquire-on-Change you may also capture analogue data using a method known as “Triggered Capture”. Triggered Captures are the method of choice when you want to record intermittent railway events at maximum resolution.

A triggered capture will begin recording when a “start trigger event” is detected. Analogue data on the selected channel will then be recorded at maximum resolution until a “stop trigger event” is detected.



A trigger event can be fired by a change in state of a digital input, or by an analogue input transitioning through a pre-determined threshold level.

Sometimes analogue data of interest can lie just outside the time-window defined by the start and end trigger events. To combat this, the TX-L will automatically include analogue data of interest up to 1 second either side of the start and end trigger events in the final triggered capture waveform.

Where you are monitoring assets that may move in two directions, you may also assign a direction (Normal to Reverse or Reverse to Normal) to a triggered capture. In the event that the logger cannot determine direction, the direction will be labelled invalid.

Example Applications:

- Point Condition Monitoring
- Powered Mechanical Signal Monitoring
- Level Crossing Barrier Monitoring
- Boom / Wig-Wag Lamp Monitoring

EbiTrack® 200 Digital Receiver Acquisition

Each EbiTrack receiver reports a mixture of analogue data, digital data, and error state information, roughly once per second.

Digital
The following digital data is captured in the same manner as regular digital inputs:

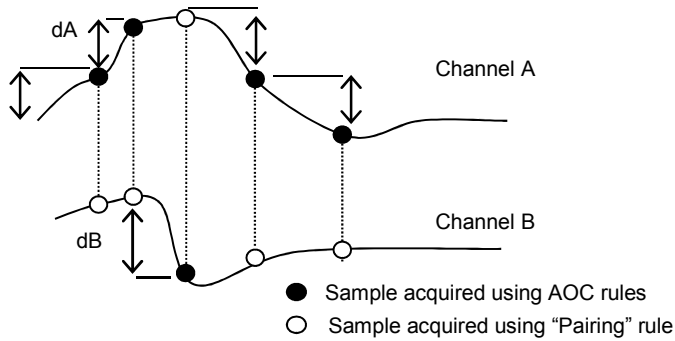
- Receiver Error State
- RS485 Connection State

Analogue
The following analogue data is captured by the TX-L in exactly the same manner as regular analogue inputs

- Temperature
- Supply Voltage
- Average Current

Paired Analogue
The following analogue data is captured by the TX-L following “Acquire-on-change” rules, however, when data is captured on one analogue channel, data is also simultaneously captured on a paired “sister” channel (see below)

- Lower Sideband Current, paired with Upper Sideband Current
- Relay Output Voltage, paired with Relay Output Current



Diagrammatic representation of a “Paired” capture

Error Data
Whenever a receiver reports error data, the following information is recorded.

- Error Code
- Serial Number
- Mod State
- Frequency Code
- Key Number
- Autoset Key Number
- Current Threshold

Storage and transmission

Storage

All data recorded by the TX-L is stored on a non-volatile disk internal to the logger. The TX-L guarantees to store all captured data for a minimum period of 31 days.

When the disk becomes full, old data is written over and permanently erased, however it is always the oldest data that is deleted first.

The SA380TX-L does not feature duplicated data storage and as such cannot be classed as a "Digital Event Recorder" as per Network Rail standards. This means that the TX-L is unsuitable for use as a judicial event recorder on Network Rail infrastructure.

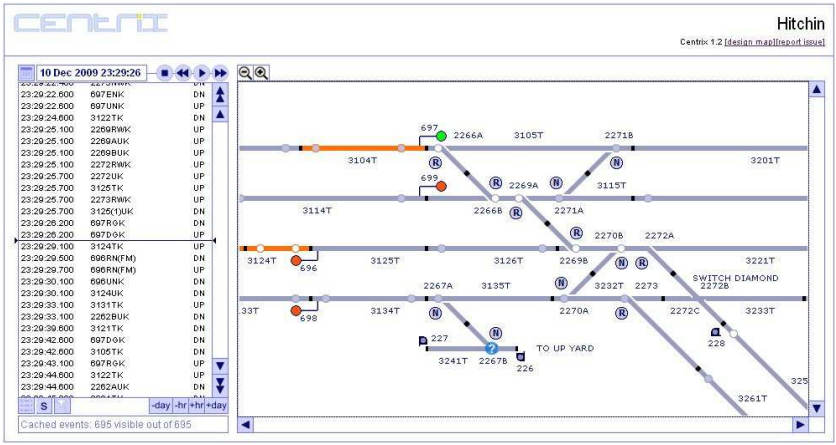
Transmission

The TX-L is designed to be used in conjunction with a central data storage server and offers two mediums that allow data recorded trackside to be transmitted to a central repository.

At present two data storage server systems support the TX-L logger:

- The Network Rail Intelligent Infrastructure "Wonderware" server. This is presently preferred by Network Rail for all Intelligent Infrastructure data loggers.

- The MPEC "Centrix" Server. For other organisations or for NR infrastructure not within scope of the NR II program please contact MPEC for more information about Centrix.



Centrix Web-based RCM software

GPRS

In locations where no physical telecoms infrastructure exists then data can be sent over-air using the in-built GSM modem. The modem uses GPRS to transmit the data.

Ethernet

Where physical telecoms infrastructure is supported higher data rates and better reliability can be achieved by connecting the logger over Ethernet. The units' 24v DC 2W auxiliary power supply is designed to power an external modem or router to allow the TX-L to connect to a wide array of telecoms infrastructure via Ethernet.

Contact MPEC or your telecoms engineer to discuss an Ethernet installation.

Configuration & diagnostics software

Configuration and viewing of data on-site is carried out via the “dPanel”, MPEC’s diagnostics and configuration tool designed specifically for the TX-L. This is a Windows application that communicates with the TX-L over USB, Ethernet or GPRS. The information presented below relates to version 3 of the software.

Installing “SA380TX-L dPanel”

There are two ways of obtaining MPEC dPanel:

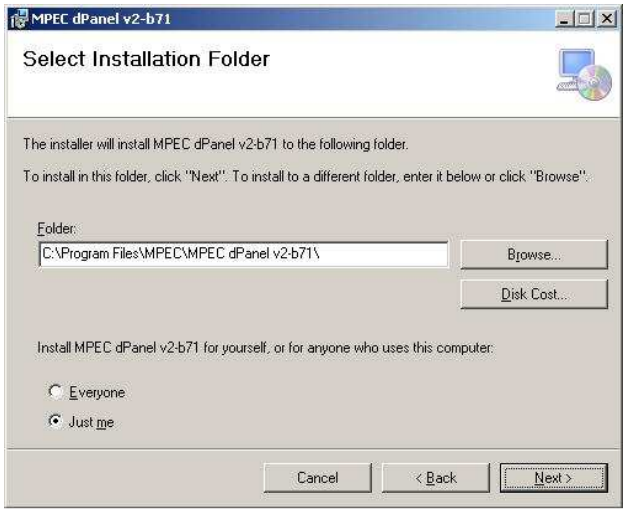
1) Download the software from the MPEC web site (www.mpec.co.uk)
2) Arrange automated installation with your IT department

Admin rights are required to perform installation

Run “setup.exe” to begin installation

When prompted with the following screen you may change the default install path.

If your normal Windows user account is not the administrators account, then ensure that “Everyone” is selected in this screen.



When installation is complete, just select “close”.
The “dPanel” software will now appear in your “Start” menu inside an MPEC folder.

Troubleshooting

dPanel requires a recent version of Microsoft's .NET framework.

Windows should detect and download the required software should your PC be out of date, however, due to the complexity of the Windows operating system this download and subsequent installation can sometimes fail.

The .NET framework can be downloaded manually at the following web site:

http://www.microsoft.com/net/download/

Installing the SA380TX-L USB driver

When you first connect a TX-L to your PC the Windows "New Hardware Wizard" should automatically install the TX-L driver. If it does not, please follow these steps.

1) Power up the TX-L and connect the TX-L to the PC on a spare USB port with the cable provided.

Windows will auto-detect the TX-L and launch the "found new hardware" wizard.

2) Select "No, not this time" when asked if you would like to use Windows Update to search for the driver; then click "Next"…

3) On the next screen select “Install the software automatically (Recommended)”; then click “Next”…

4) If prompted with this screen click “Continue Anyway”. This software poses no threat to your computer.

5) The installation will now complete. Click “Finish” when presented with the final dialog. Your SA380TX-L is now ready to use.

Connecting to the SA380TX-L

USB Connection

For local diagnostics, plug the TX-L into your PC using a standard USB cable, select the “USB” button on the tool bar, followed by “SA380TXL USB Communications Port” in the drop-down box. Click “Connect” to establish a connection to the data logger.

TCP Connection

dPanel supports remote diagnostics over your chosen network, be it GSM/GPRS or Ethernet. When using dPanel on GPRS networks, please bear in mind that dPanel will behave slowly due to the low bandwidth of such data links.

To interact with a remote data logger, your TX-L must be assigned a fixed IP address, and you must know what that IP address is.

Contact your local IT support if you are unsure of your data loggers IP address

To connect to a remote TX-L, select the “TCP” button on the tool bar, followed by the IP address of your data logger in the neighbouring text field.

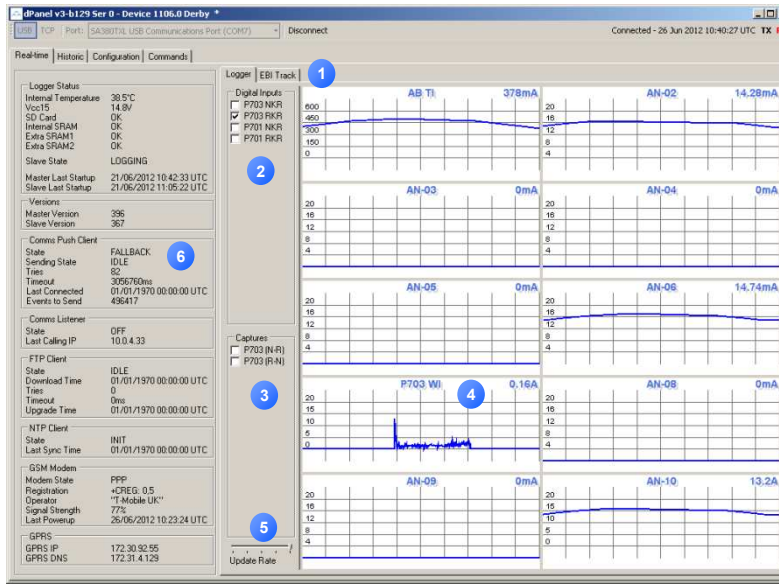
Clicking “Connect” will prompt you to enter a user name and password before permitting connection. Enter the credentials below then press “OK”.

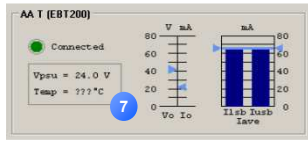
Username: **sa380user**
Password: **sa380user**

Upon successful connection the “Device ID” and “Site Name” are displayed on the title bar of dPanel to let you know you are connected to the correct TX-L.

Real-time data

These screens give an indication of the present state of all the inputs to the data logger. It is best used to check for correct installation or to quickly verify the status of a piece of equipment. For detailed data output, use the “historic” data functions of dPanel.



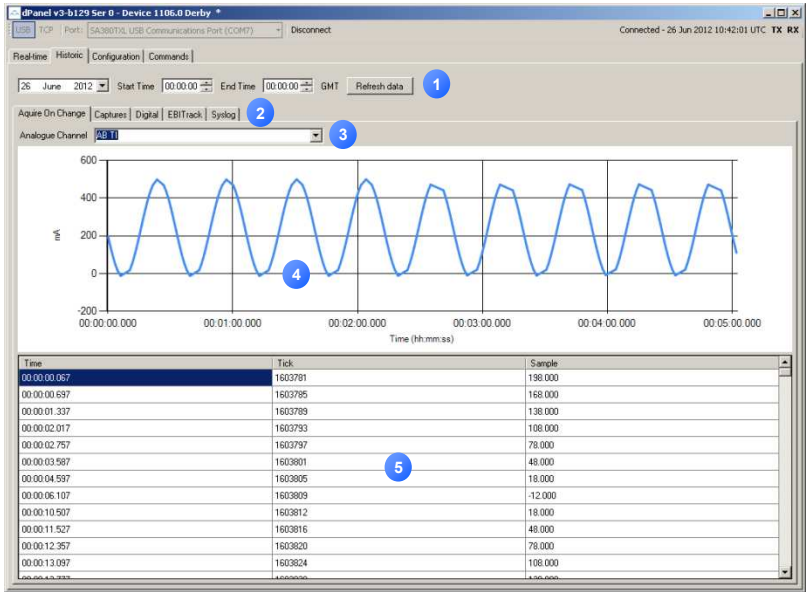


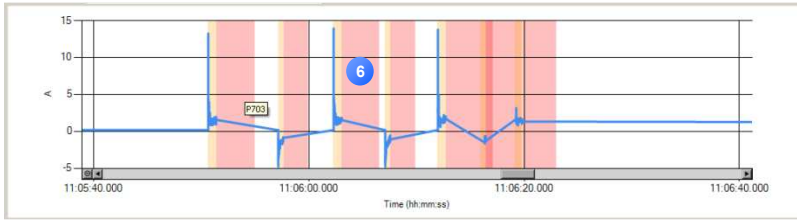
1. Select either Real-Time Analogue & Digital or Real-Time EbiTrack display.
2. Real-Time state of digital inputs (Up or Down).
3. Shows if a “Triggered Capture” waveform is being recorded at present.
4. Real-Time Analogue output. **(For indication only – Use historical data view for precision monitoring.)**
5. Graph Update Slider – If poor performance is experienced try reducing the graph update rate using this slider.
6. Logger Diagnostics Data.
7. Real-Time EbiTrack Output. **(Please note that this display is only updates when a CHANGE in input is detected)**

Historic data

The historic data tab lets you explore the detailed data history of all input channels present on the TX-L.

Acquire-on-Change





1. You can retrieve up to 24 hours' worth of data at a time. Select the desired date and time ranges here followed by a click on "refresh" to update the data display.

2. Data views are available for Acquire-on-Change, Triggered Capture, Digital and EbiTrac inputs. The "Syslog" tab displays the TX-L's system log.

3. Acquire-on-Change data is displayed one channel at a time. Use these drop-down boxes to select which channel you wish to view.

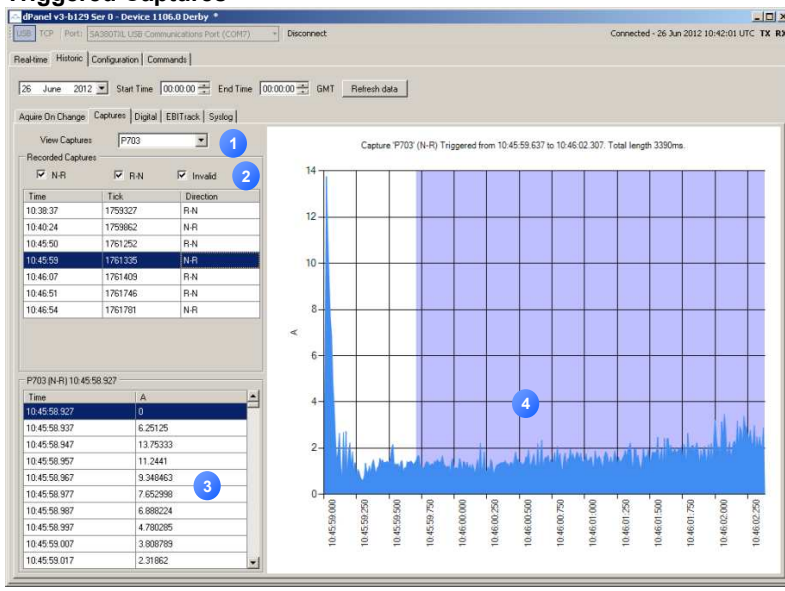
4. Graphical representation of the data. You may select a portion of the graph to zoom in on data of interest. Clicking a point on the graph will automatically scroll the data table to your selected point in time.

5 Data is displayed in tabulated form detailing the exact timing of the event, the absolute sequence number of the event (or “tick”) and the value of the measurement. Copy and paste this data into 3rd party software (Excel, Notepad etc.) to export the data.

6 When a triggered capture event takes place, the logger is unable to also record acquire-on-change data at the same time on the same channel; due to the limited write speed of the TX-L memory. Data is not lost, as the triggered capture will always contain more information than the acquire-on-change waveform.

To make this behaviour apparent to the user, the affected periods of the acquire-on-change waveform are highlighted to draw your attention to this fact. The tooltip text will point you to the appropriate triggered capture channel to find the apparent missing data.

Triggered Captures



1 Select which capture you wish to view data from in this drop-down menu.

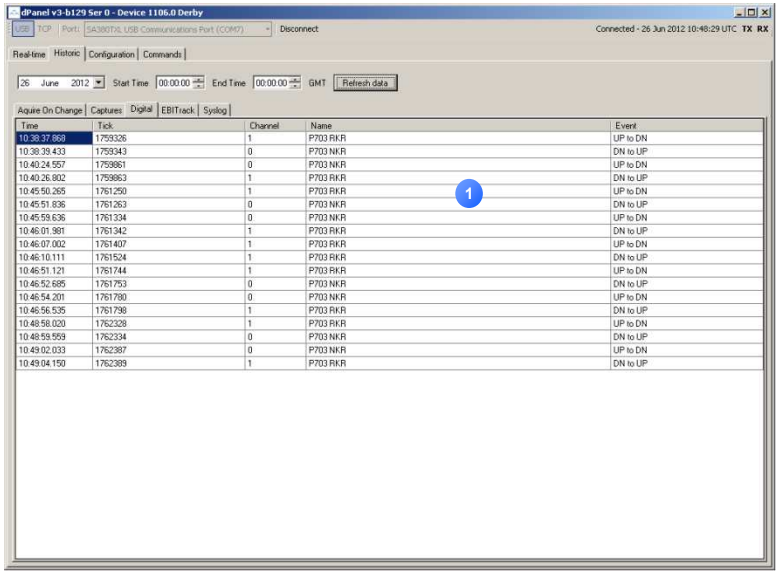
2 A list of the individual triggered capture waveforms are listed in this table. You may filter waveforms based on thier direction using the check boxes. The time-stamp reflects the timing of the start trigger.

Double click on a waveform to load it into the capture display area.

3 A tabulated read-out of the triggered capture waveform is displayed in this table. The time-stamp reflects the time of the first sample. Copy and paste this data into 3rd party software (Excel, Notepad etc.) to export the data.

4 The selected triggered capture waveform is displayed in graphical form. The light blue region highlights the trigger window.

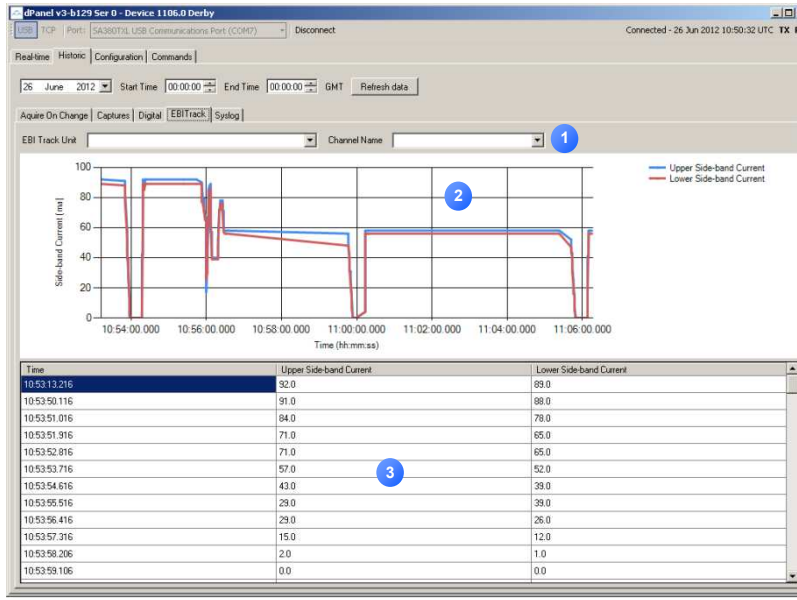
Digital



Time	Tick	Channel	Name	Event
10:38:37.868	1759326	1	P703 RKR	UP to DN
10:38:39.433	1759343	0	P703 NKR	DN to UP
10:40:24.557	1759861	0	P703 NKR	UP to DN
10:40:26.802	1759863	1	P703 RKR	DN to UP
10:45:50.265	1761250	1	P703 RKR	UP to DN
10:45:51.836	1761263	0	P703 NKR	DN to UP
10:45:59.636	1761334	0	P703 NKR	UP to DN
10:46:01.981	1761342	1	P703 RKR	DN to UP
10:46:07.002	1761407	1	P703 RKR	UP to DN
10:46:10.111	1761524	1	P703 RKR	DN to UP
10:46:51.121	1761744	1	P703 RKR	UP to DN
10:46:52.685	1761753	0	P703 NKR	DN to UP
10:46:54.201	1761780	0	P703 NKR	UP to DN
10:46:56.535	1761798	1	P703 RKR	DN to UP
10:48:58.020	1762328	1	P703 RKR	UP to DN
10:48:59.559	1762334	0	P703 NKR	DN to UP
10:49:02.033	1762387	0	P703 NKR	UP to DN
10:49:04.150	1762389	1	P703 RKR	DN to UP

1 Digital data from all channels is listed in tabular form. You can click on the column headings to sort by differing criteria. Copy and paste this data into 3rd party software (Excel, Notepad etc.) to export the data.

EbiTrack®

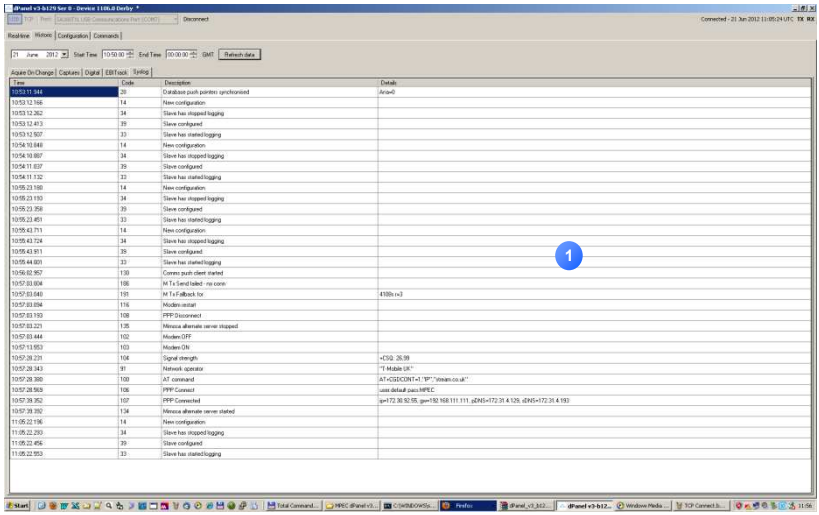


1 Select the EbiTrack for which you wish to view historic data using the left hend drop-down menu. As numerous channels are monitored on EbiTrack digital receivers, you must also select the channel(s) you wish to view using the right hand drop-down menu.

2 Where appropriate, a graphical representation of the data will be visable in this area. Some channels display two data series, some one, and some – none at all.

3 A tabulated read-out of the selected EbiTrack channel(s) is displayed in this table. Copy and paste this data into 3rd party software (Excel, Notepad etc.) to export the data.

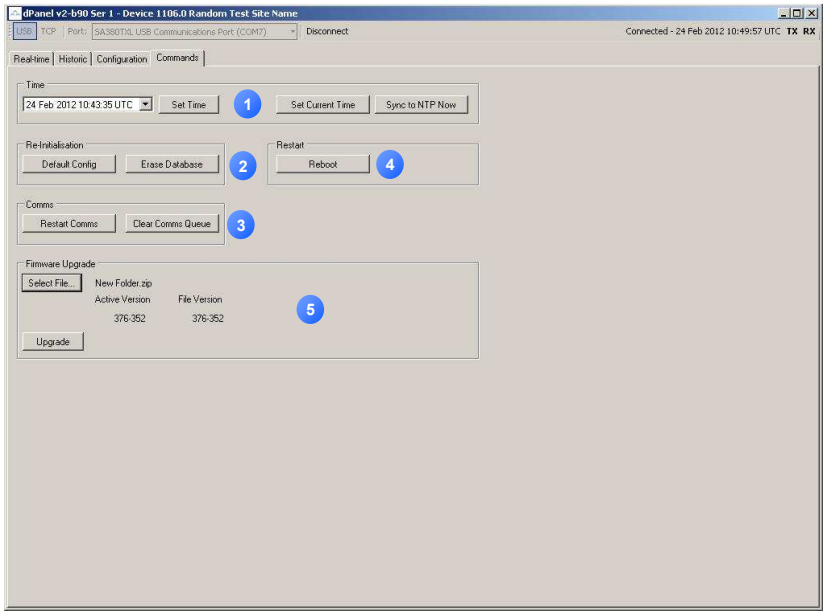
Syslog



1 The “Syslog” displays the diagnostic system log of the datalogger itself. This can be a usefull aid in diagnosing configuration and communiaction problems as well as detecting logger fualt conditions. You can click on the column headings to sort by differing criteria. Copy and paste this data into 3rd party software (Excel, Notepad etc.) to export the data.

Commands

A selection of useful commands for troubleshooting the TX-L. Use with caution – There is no “Undo”.



1 Time

Set Time
Allows you to set the logger time to any arbitrary time or date.

Set Current Time
Set the TX-L time using your computers clock.

Sync to NTP Now
Force the TX-L to attempt synchronisation with a remote timeserver.
The Central data server sets the location of the timeserver; hence the logger must be connected to a central server system for this command to take effect.

2 Re-Initialisation

Default Config
Returns the TX-L configuration to its factory setting.

Quick Format SD
The will re-format the internal memory and will ***erase all data*** from the database ***forever.***

3 Comms

Restart Comms
Forces the modem to immediately power-cycle and attempt reconnection with the GSM service provider and the central data server.

Clear Comms Queue
Clears any backlog of data that is pending sending to the central server system.
It ***does not*** erase this data from the database.

4 Reboot
Restarts the datalogger without a power-cycle.

5 Upgrade Firmware

Select File
Opens a file dialog to enable you to select a valid SA380TX-L firmware file.

When a valid file is selected the firmware version found in the file is displayed alongside the “active” version presently running on the TX-L. This is to help the user determine that the correct file has been selected.

Upgrade
This commences firmware upgrade.

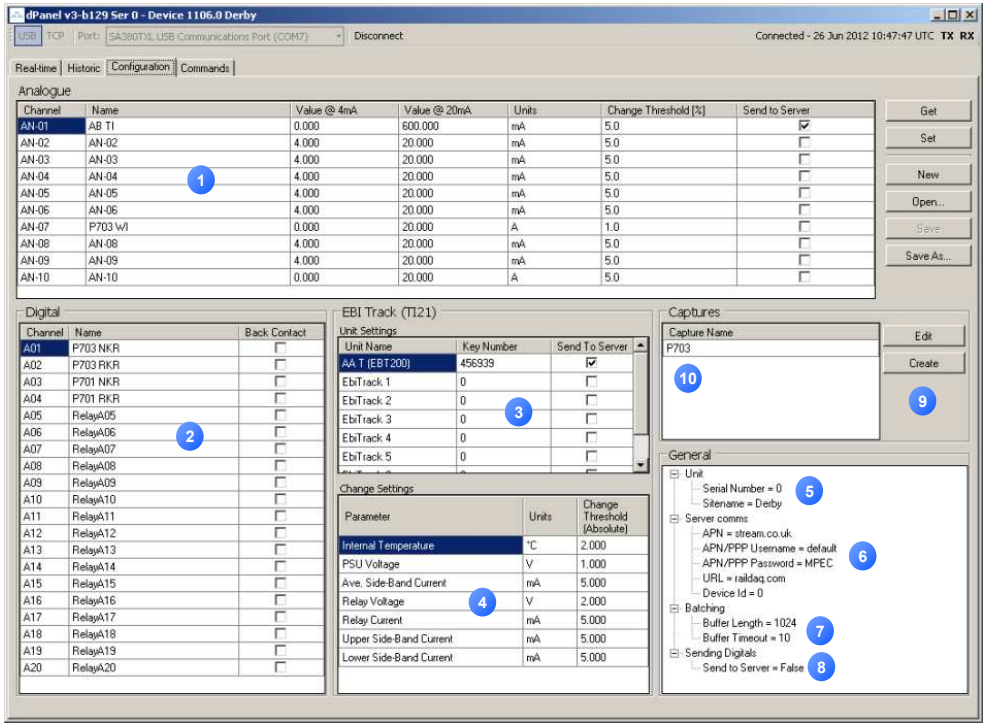
You may upgrade or downgrade the logger and even “over-install” the present firmware version.

The TX-L will reboot and drop its USB connection when firmware upgrade is complete. You must manually reconnect to the TX-L when the logger has completed its boot sequence.

Upgrading firmware may force a complete database erase, so it is advisable to save any data you wish to keep before commencing an upgrade.

Unit Configuration

All unit configuration is performed using this screen.



1 Analogue

Analogue Channel Name
A descriptive name for the channel. E.g. “AA T" for AA tracks circuit, or “701 WI” for 701 points motor current.

For NR II monitoring use the naming scheme suggested above.

Sensor Scaling
Calibrates the logger input for a particular sensor type.

Value @ 4mA
The measurement value when your sensor is outputting 4mA. (Typically the lowest measured value.)

Value @ 20mA
The measurement value when your sensor is outputting 20mA. (Typically the highest measured value.)

For a RoweHankins 600 mA CT, enter “0” and “600” in these two fields respectively.
For a LEM 20 A CT, enter “0” and “20” in these two fields respectively.

Units
Enter the Engineering units of the sensor you are using:
E.g. (V for Volts, mA for milliamps, N for Newtons etc.)

For a RoweHankins 600mA CT, enter “mA” in this field
For a LEM 20 A CT, enter “A” in this field

Change Threshold
Determines the percentage change in signal level that is required to trigger the recording of a sample. Hovering over the field will display the absolute change that will trigger acquisition for a given percentage.

For NR II track circuit monitoring a change threshold of 1% has been suggested.

Send To Sever
When unchecked data is stored locally. When checked data is sent to the designated server *and* data is stored locally.

*For NR II track circuit monitoring “Send to Server” **must** be **checked** on active channels.*
*For NR II point monitoring “Send to Server” **should** be **unchecked** on active channels.*

2 Digital

Digital Channel Name
A descriptive name for the channel. E.g. “701 NKR” for 701 points normal detection relay.

Back Contact
Leave unchecked if monitoring a spare *front* relay contact.
Check the box if monitoring a spare *back* relay contact.

EBI Track

3 Unit Settings:
Tell the TX-L what EBI Track receivers are connected to the data logger.

Unit Name
A descriptive name for the EbiTrack unit. E.g. “AA T Rx" for AA track circuit receiver.

For NR II track circuit monitoring use the naming scheme suggested above.

Key Number
EbiTrack units are “addressed” via the key serial number printed on the data key inserted into each EbiTrack unit. Entering a key number here instructs the TX-L to monitor the EbiTrack unit that matches this key number. A key number of “zero” instructs the TX-L not to monitor any EbiTrack unit.

For NR II track circuit monitoring enter the key number of the EbiTrack receiver that matches the name in the “Unit Name” field.

Send to Server
When unchecked data is stored locally. When checked data is sent to the designated server *and* data is stored locally.

*For NR II track circuit monitoring “Send to Server” **must** be checked on active EbiTrack receivers.*

4 Change Settings:
These settings dictate how sensitive the “Acquire-on-change” settings are for all monitored EbiTracks.

Parameter / Units
These fields are fixed for EbiTrack monitoring and cannot be changed

Change Threshold
Change the acquisition sensitivity of each channel in these fields. The change settings are absolute and ***not*** a percentage change.

The default settings are suitable for NR II applications.

General

5 Unit:
High level unit settings for the TX-L

Serial Number
Identifies the unit serial number. **This value is read-only.**

Site Name
Human readable identifier of the TX-L's location.

6 Server Comms:
Settings to allow the logger to communicate with the data collection server.

APN / APN Username / APN Password
These fields contain settings to allow GPRS network connection.

The default settings are compatible with present NR II SIM cards.

Server URL
The web address of your data collection server.

The default setting points to the present NR II server.

Device ID
A numeric ID unique to this logger on the condition monitoring network.

Contact the NR II team for advice on selecting a device ID.

7 Batching
Settings to economise how analogue data is sent to the server.

Buffer Length
How many samples can be stored in memory prior to transmission to the server. If this limit is reached *before* the timeout period elapses, samples are sent to the server immediately.

A length of 1024 samples is recommended for NR II track circuit monitoring.

Buffer Timeout
"Buffer timeout " sets how long to wait (in seconds) before sending a new sample to the server. Subsequent samples recorded during this time period are "batched" together prior to sending, economising data traffic.

A timeout of 60 s is recommended for NR II track circuit monitoring.

8 Sending Digitals
Toggles the transmission of digital events on or off.

At present NR II forbid the sending of digital data, set to "False".

9 Configuration Control

The ability to save configs allows configuration management of all of your TX-L loggers and allows you to prepare configs prior to commissioning.

Get and Set

Click "*Get*" to retrieve the configuration from the connected logger.
Click "*Set*" to send the displayed configuration to the connected logger.

Open & Save

Click "*Open*" to open a previously saved configuration from file.
Click "*Save / Save As*" to save the displayed configuration to file.

10 Triggered Captures Overview

Settings to allow you to create or edit "triggered captures".

Edit

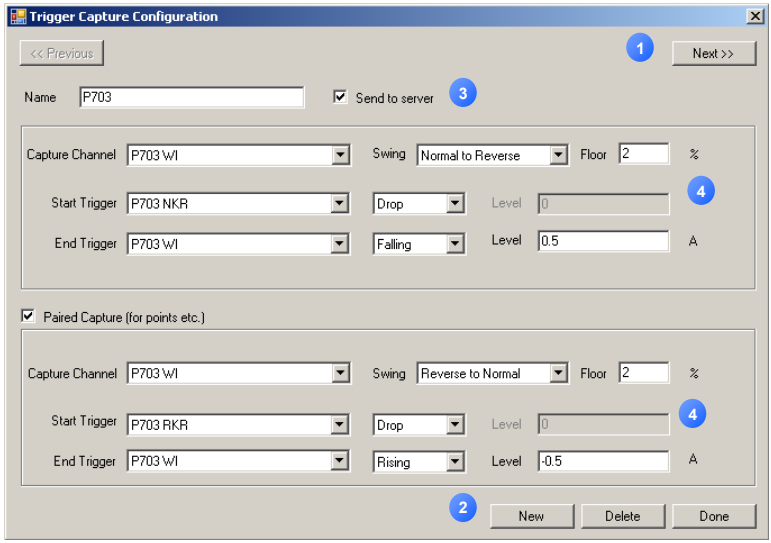
Edit an existing capture by double-clicking on the capture name, or by selecting a capture with a single click, and then click "edit". This will bring up the "Triggered Capture" settings dialog, which is described in detail later.

Create

Clicking create will create a new "Triggered Capture" should there be free captures available. Up to 8 triggered captures may be configured on the logger. This will also bring up the "Triggered Capture" settings dialog, which is described in detail later.

Triggered Capture Configuration

Use this dialog to configure your Triggered Capture Settings



1 Previous & Next
Cycle through any Triggered Captures that you have created.

2 New, Delete & Done
General management functions for your Triggered Captures.

New
Creates a new capture if one is available. The logger supports up to 8 captures.
Please note that a "paired" capture will use up 2 available captures.

Delete
Deletes the displayed capture(s).

Done
Saves any changes you have made to capture settings and closes the dialog.

3 General Settings

Name your capture, select if it is to be transmitted to the central server and whether or not the capture is “paired”

Name

A descriptive name for the capture, e.g. “P701” for 701 points.

For NR II point monitoring use the naming scheme suggested above.

Send to Server

When unchecked data is stored locally. When checked data is sent to the designated server *and* data is stored locally.

*For NR II point monitoring “Send to Server” **must** be checked.*

Paired Capture

A “paired” capture is required where the direction of movement of the monitored asset is deemed important. A paired capture consists of two otherwise independent captures that are logically linked together.

A paired capture will consume 2 of the 8 available captures on the logger.

An example of an asset requiring a non-paired capture would be a level crossing barrier, as the barrier only ever motors in one direction.

An example of an asset requiring a paired capture would be a point machine, as the points move in two distinct directions.

For NR II point monitoring, all captures must be “paired”.

4 Capture Settings

These settings define how the capture is generated. Where a “paired” capture has been selected, these settings are duplicated with the upper settings controlling one capture; whilst the lower settings control the paired “sister” capture.

Capture Channel

Select the analogue channel from which the waveform will be captured.

Note that the TX-L will automatically detect and invert any negative waveforms for you, allowing you to employ bi-directional CT’s.

For NR II point monitoring select the motor CT that generates a waveform when moving in the selected “swing” direction (N-R or R-N) .This will often be the same for both N-R and R-N direction moves.

Swing
Select if this capture is recording a move in the Normal to Reverse (N-R) or Reverse to Normal (R-N) direction.

Note that swing direction is irrelevant if your capture is not “paired”

For NR II point monitoring select N-R for the top capture and R-N for the bottom capture.

Floor
Prevent undesirable sensor noise from disrupting your capture by setting a “noise floor” level.

“Floor” is specified as a percentage of full-scale-deflection of the capture channel.

For NR II point monitoring a “floor” value of 2.5% is suggested.

Start Trigger
When the start trigger becomes true, data recording commences.

Note that data of interest will be automatically recorded up to 1 second prior to the start trigger.

The start trigger can be an analogue or digital event as described further below.

For NR II point monitoring the start trigger can be either digital inputs such as command (NWR/RWR) or detection (NKR/RKR) relays; or analogue inputs such the motor CT’s or valve CT’s. The start triggers will ***always*** *need to be different for the N-R direction and R-N direction captures.*

Stop Trigger
When the stop trigger becomes true, data recording ceases.

Note that data of interest will be automatically recorded up to 1 second after the stop trigger.

The stop trigger can be an analogue or digital event as described further below.

For NR II point monitoring the stop trigger can be either digital inputs such detection (NKR/RKR) relays; or analogue inputs such as the motor CT’s.

Digital Triggers Explained
Digital triggers can be set to fire on a transition from “Down to Up” or “Up to Down”.

Analogue Triggers Explained
Analogue triggers can be set to fire when the incoming signal is seen to rise above a set level (Greater Than), or when the incoming signal is seen to fall below a set level (Less Than). The set level is to be entered in the neighbouring text box.

Specifications

Technical specifications

General	
Digital inputs per unit	4, 12 or 20
Analogue inputs per unit	2, 6 or 10
Fixings	To fit standard BR930 relay rack
Size	135 x 57 x 175mm - 1 relay position
Processor	80MHz dual
RAM	256K
Internal flash storage	2GB
Communication ports	
Ethernet	10baseT
Internal modem	GSM/GPRS
RS485	
Protocols	PPP, TCP/IP, HTTP, FTP, MIMOSA, RailDAQ
Digital input ports	
Type	Volt-free relay contacts
Isolation Barrier	10MOhm at 1,000V DC min
Max differential DC voltage	55V
Analogue input ports	
Range	4-20mA
Resolution	10 bit
Sampling rate	1000 Hz Max.
Isolation Barrier	10MOhm at 1,000V DC min
Power supply ports	
Power supply	90-264Vac
Isolation Barrier	10MOhm at 1,000V DC min
Power consumption no inputs	3W
Power consumption absolute max	40W (0.36A at 110V)

MIMOSA parameter offsets

Main Offsets

Offset	Type	Meaning
0	-	Base ID of logger
1	DABLOBData	SNTP time server domain name
2	DABLOBData	FTP Server domain name
3	DABLOBData	Primary server domain name
4	DABLOBData	Secondary server domain name
5	DABool	Heartbeat
6	DAInt	Heartbeat interval
7	DABLOBData	FTP download request
8	DABLOBData	FTP download report
9	DABLOBData	Firmware update request
10-31	-	Reserved
32	DABool	System reset
34	DABool	Restart comms
128-147	DABool	Digital inputs
576-585	DADataSeq	Analogue inputs 1-10 using Acquire-on-Change
1536-1643	DAWaveform	Triggered captures 1-8 recorded waveforms
1792-1799	DAInt	Triggered captures 1-8 direction indicators
2048-2303	Various	EbiTrack 0
2404-2559	Various	EbiTrack 1
2560-2815	Various	EbiTrack 2
2816-3071	Various	EbiTrack 3
3072-3327	Various	EbiTrack 4
3328-3583	Various	EbiTrack 5
3584-3839	Various	EbiTrack 6
3840-4095	Various	EbiTrack 7

EbiTrack Offsets

Offset	Type	Meaning
+0	DABool	Connection Status
+1	DADataSeq	Temperature (TEMP)
+2	DADataSeq	Supply Voltage (VPSU)
+15	DABOLBData	Serial No. (SERN)
+16	DAInt	Mod State (MODS)
+17	DABOLBData	Frequency Code (FREQ)
+19	DABOLBData	Key No. (KYSN)
+20	DAInt	Error Code
+24	DABOLBData	Autoset Key No. (ASSN)
+26	DAInt	Current Threshold (ITHR)
+27	DADataSeq	Relay Output Voltage (VOUT)
+28	DADataSeq	Relay Output Current (IOUT)
+29	DADataSeq	Upper Sideband Current (IUSB)
+30	DADataSeq	Lower Sideband Current (ILSB)
+31	DADataSeq	Average Sideband Current (IAVE)
+32	DABool	Unit Error (Bit 6 of STAT)

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