# NEMTEK
## www.nemtek.com

## Tension Sensing System & FG7C LCD Platform

# Installation Guide

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# INTRODUCTION

Thank you for choosing our product! The NEMTEK Tension Sensing system and FG7C LCD Platform is designed and manufactured to provide many years of reliable use, if installed and maintained correctly. The guidelines provided in this manual will assist you with the basic operation and maintenance of your Taut-Wire System.

Currently this product is designed and manufactured in South Africa for the South African and international markets. More information on our products and general information are available on our web site at: http://www.nemtek.com.

# COMPANY PROFILE

The NEMTEK Group of Companies manufacture and distribute intelligent electronic agricultural fencing systems, security and perimeter control systems and have been involved in the security industry since 1990.

We have our own research and development team, designing and manufacturing a full range of globally competitive electric fence energizers and related products.

NEMTEK is continually updating its products according to South African and international standards in order to ensure the highest quality products and continuous customer satisfaction.

Electric fencing can be lethal. Avoid head contact with the fence. When installing please take careful note of the options available for current limiting resistors, the programmable output energy levels as well as the low-voltage operation of the energizer.

## GUARANTEE

The Tension Sensing System and FG7 LCD Platform, manufactured by IO Tech Manufacturing (Pty) Ltd, is guaranteed for a period of two years from date of sale against defects due to faulty workmanship or materials.

IO Tech Manufacturing (Pty) Ltd will, at its discretion, either repair or replace a product that proves to be defective.

IO Tech Manufacturing (Pty) Ltd guarantees that the product, when properly installed and used in line with the specification as determined by IO Tech Manufacturing (Pty) Ltd from time to time, will execute its function of generating a suitable potential. IO Tech Manufacturing (Pty) Ltd does not guarantee that the operation of the product will be uninterrupted and totally error free. Faulty units must be returned to one of the Nemtek Group outlets. The buyer shall pay all shipping and other charges for the return of the product to Nemtek or Nemtek Security Warehouse.

## LIMITATION OF GUARANTEE

The guarantee does not apply to defects resulting from acts of God, modifications made by the buyer or any third party, misuse, neglect, abuse, accident and mishandling.

## EXCLUSIVE REMEDIES

The remedies provided herein are IO Tech Manufacturing (Pty) Ltd.'s sole liability and the buyer's sole and exclusive remedies for breach of guarantee. IO Tech Manufacturing (Pty) Ltd shall not be liable for any special, incidental, consequential, direct or indirect damages, whether based on contact, tort, or any other legal theory. The foregoing guarantee is in lieu of any and all other guarantees, whether expressed, implied, or statutory, including but not limited to warranties of merchantability and suitability for a particular purpose.

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# Introduction to the Tension Sensing System

The Nemtek FG7C LCD platform is used for providing a graphical interface and connectivity to a network of Nemtek Energizers and Input/Output Cards
(IO Cards) and Tension Sensors.

The platform may be configured with different internal printed circuit boards and software to provide the required functionality.

**Warning:**
Test the functionality of the system after configuration and before commissioning.

# Purpose of the Tension Sensing System

The purpose of the Tension Sensing System is to provide another layer of perimeter security that is independent of any other security system. It provides a means of detecting any change in tension on a wire by using Tension sensor/s. An on-screen image of the perimeter is displayed. Lines are drawn on the image to represent each of the sectors that are being monitored. Up to 31 sensors may be used. Any sensor may be associated with any sector and any number of sensors can be used per sector.

Under normal operation each sector will be shown as a green line. Should any sensor assigned to that sector be deflected the line will change colour to red. The sensor will remain in alarm condition for a minimum of ten seconds. The "Active Alarms:" indicator will revert to green. If an appropriate personal identification number (PIN) is entered, the "Clr" button can be pressed and the alarm indication will be reset. Both the PIN activation and alarm event will be recorded in the system log.

Users 1 to 3 may only reset the alarm indication on the screen.

The Administrator is able change PIN details, view the logs, and download the logs to a USB stick. The Installer, in addition to the Administrator permissions, can do firmware upgrades, assign sectors and TW sensors to sectors, the number of sensors on the system, and adjust the parameters of each TW sensor.

Each TW sensor has a unique address that can be configured by the Installer. Operational parameters of each TW sensor can be altered by the Installer. This allows each sensor to have unique sensing capabilities. However, the default values are normally adequate. These configuration settings can be done from the FG7C screen.

If a Nemtek Network IO card is attached to the FG7C, Sector 1 will activate Relay 1 on the card, Sector 2 will activate Relay 2 etc. up to four sectors. Relay 5 will activate on any alarm condition of any of the four sectors. When the alarm condition(s) no longer persists, and the "Clr" button is pressed, the associated relay(s) will be reset.

If more than four sectors are envisaged, a second or more relay cards can be added to indicate the alarm conditions. Alternatively the data corresponding to each sensor can be accessed via the TCP protocol.

## Panel mount type

On one of the long sides of the FG7C are two slots. Insert a 6.5mm screw driver into one of the slots and turn the screw driver until the lid with the display pops up on that side. Now repeat this with the other slot. You should now be able to carefully remove the lid.



## Wall mount type

On one of the long sides of the FG7C are two openings with retaining clips. Insert a 6.5mm screw driver into the bottom part of one of the openings and push the retainer clip back until the lid with the display pops up on that side. Now repeat this with the other opening. You should now be able to carefully remove the lid.

## HARDWARE

The lid of the FG7C contains a green printed circuit board IOT1711JM and a dark blue control unit as well as the touch screen.

The IOT1711JM board is responsible for generating the supply voltage for the control unit as well as the display. The board also monitors and process the different communication signals before sending the information to the control unit.

Under the dark blue control unit is the battery which is required for the clock during power failures.

You will find jumpers, connectors and led's on the board for selecting, connecting and indicating. The control unit host the software and has all communication ports on board.

The touchscreen is the standard display used on the stand-alone units, without Druid FenceProbe or third party software.
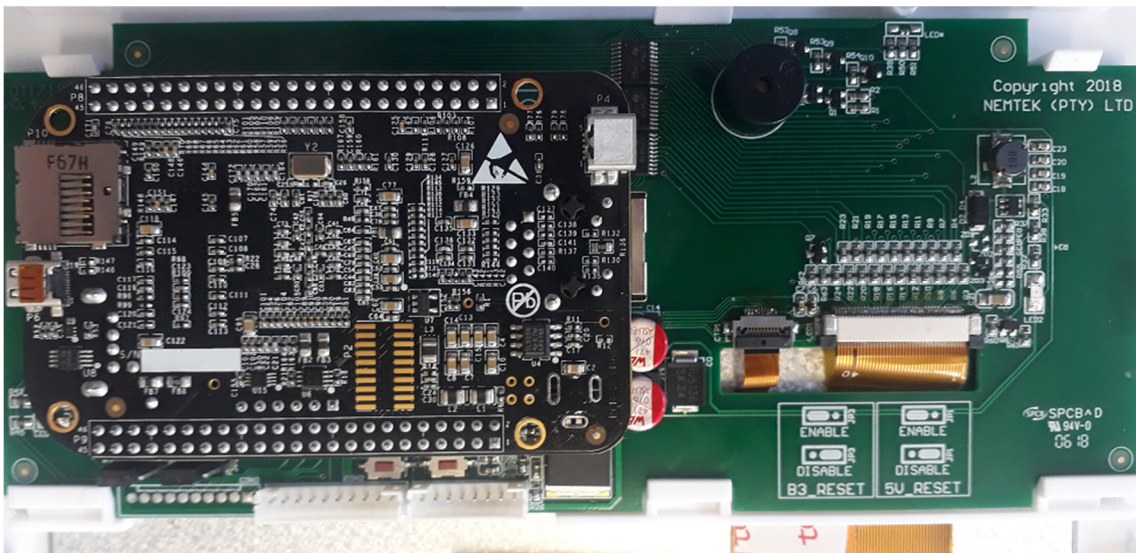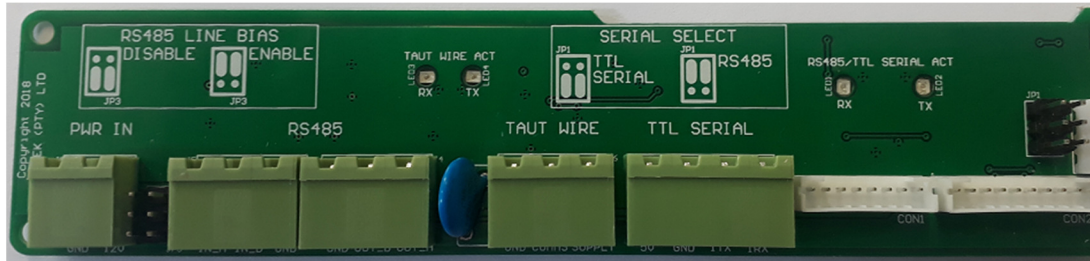


In the base of the FG7C a communication board has to be installed, there are two communication boards available.

The FG7C communication board with Nemlink/Taut wire

The FG7C communication board with RS485/Taut wire/TTL



## INSTALLING THE COMMUNICATION BOARD

The communication board should be mounted in the bottom of the base of the FG7C with the screws supplied with the board. The terminals on the board should be facing inwards once mounted.
After mounting, the ribbon cables of the display board should be connected to the two white terminals on the communication board (con1 and con2)

## INSTALLING THE WALL MOUNT FG7C

The base of the FG7C has several counter sunk mounting holes at bottom of the unit, these can be used to mount the unit on a wall with 4mm screws. The holes are spaced 100 x100 mm or 75 x 75 mm so that the unit can also be mounted at the back of HD monitor if so required.

Cable entries are available by means of a pushout at the bottom of the base or two cut outs on the side of the base.

## INSTALLING THE PANEL MOUNT FG7C

The panel mount FG7C is designed to be mounted flush in wooden walls or dry walling. A cut out has to be made in these walls of 195mm x 130 mm.
Before installing the base of the FG7C into the wall make sure that all cut outs required for the wiring are done on the base, that the wiring to the FG7C is fully tested and that the communication board is installed.
The base is supplied with two wing clamps (see picture), make sure that they are positioned in their base cavities. Place the base into the opening in the wall making sure that the cabling will not get in the way of the wing clamps. Turn the top wing clamp screw a quarter turn anti clockwise before turning it clockwise until the clamp is tight. Repeat this for the bottom clamp. The base should now be securely clamped into the wall. Before closing the lid ensure that all programming and all wiring to the control board and communication board is completed.

If removal of the base is required then first remove the lid from the base and disconnect the wiring between the lid and the base, so that it can be fully removed. Turn the top wing clamp screw anti clockwise until the wing clamp comes back into its base cavity (do not fully unscrew the wing clamp screw since it will detach and can fall inside the wall). Repeat for the bottom wing clamp and remove the base from the wall opening.



Wing clamp and Wing clamp screw

## THE DISPLAY BOARD
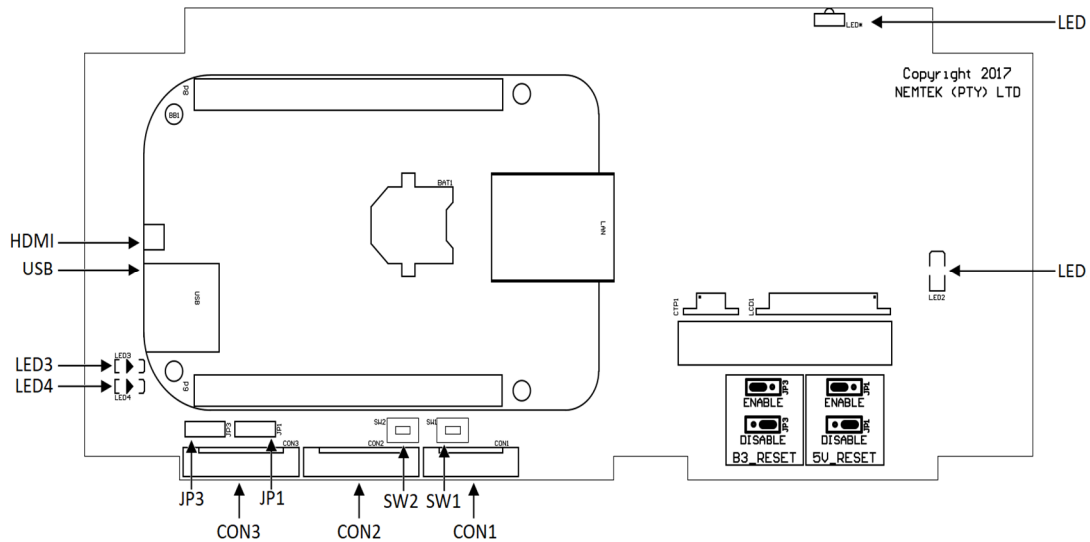


## JUMPER SETTINGS DISPLAY BOARD

Jumper setting as viewed with connectors at the bottom.

| | | |
|---|---|---|
| Watch Dog timer 1 | JP1 (1) | Positioned to the left for auto reset of the power supply with transmission failure of the control unit |
| | | Positioned to the right for no auto reset of the power supply |
| Watch Dog timer 2 | JP3 (1) | Positioned to the left for auto reset with transmission failure of the control unit |
| | | Positioned to the right for no auto reset of the control unit |

## PUSH BUTTONS ON DISPLAY BOARD

There are two push buttons on the green board. The one is marked SW2 "5V_RESET" and the other SW1 "B3_RESET". The 5V_RESET button is used to manually power the control unit on and off, this is usually required when programming the settings on the FG7C. The B3 RESET button is used to manually reset the FG7C control unit.

## LED'S ON DISPLAY BOARD

LED1              Shows that the FG7C is On
LED2              5V supply indicator
LED3              When flashing, indicates that the watchdog timer is operational
LED4              Not in use

## CONNECTORS

Con 1             Ribbon cable connection to Con1 of communication board
Con 2             Ribbon cable connection to Con2 of communication board
Con 3             Not in use

## USB PORT

The USB port is used for downloading logs and can also be used for a mouse, so that a pointer can be used on the touch screen display.

## HDMI PORT

The HDMI port is a standard micro-HDMI connector. The HDMI port can be activated via the web interface (see the FG7 web interface). A USB mouse connected to the USB port of the FG7 should be used for operating the system when using an HDMI display or the USB port can be used for the touch screen part of a touch screen monitor. The resolution of the display if possible should be set to 1920 x 1080. The picture of the site image should be 1000 x 650 pixels.

## ETHERNET PORT

The Ethernet port is used for communication with a computer loaded with Druid FenceProbe or third party software and it is also used for connecting to the web interface of the FG7.

Note:
The control unit hosts the software and gives outputs via the touch screen, HDMI, Ethernet or USB port. All other ports should not be used by the installer.

## THE NEMLINK/TAUT WIRE COMMUNICATION BOARD
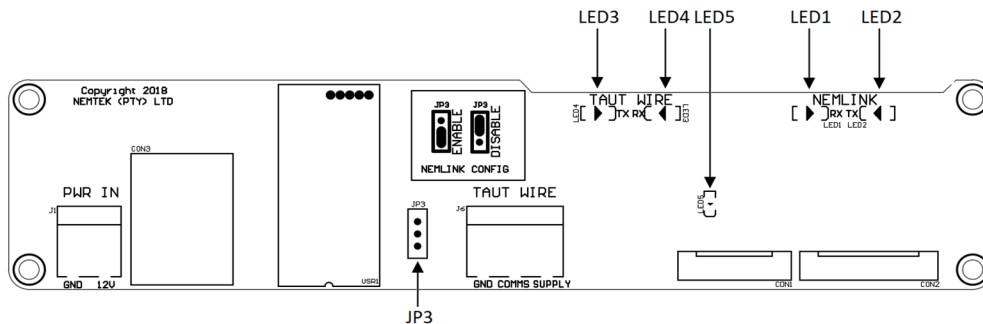


## JUMPER SETTINGS COMMUNICATION BOARD

Jumper setting as viewed with connectors at the bottom.


Nemlink programming    JP3 (1)    Down to enable programming of the Nemlink
                                  Up standard operational mode


## LED'S ON COMMUNICATION BOARD

| | |
|---|---|
| LED1 | If flashing, indicates receiving of data from the Nemlink to the control unit. |
| LED2 | If flashing, indicates transmission of data from the control unit to the Nemlink |
| LED3 | If flashing, indicates receiving of data from the taut wire to the control unit |
| LED4 | If flashing, indicates transmission of data from the control unit to the taut wire |
| LED5 | 5V supply indicator |


## CONNECTORS

| | |
|---|---|
| Con 1 | Ribbon cable connection to Con1 of display board |
| Con 2 | Ribbon cable connection to Con2 of display board |
| Con 3 | Ethernet port for connection to data network |
| J1 | Two way connector for 12Vdc supply |
| J6 | Three way connector for connection to the taut wire system |

## THE RS485/TAUTWIRE/TTL COMMUNICATION BOARD
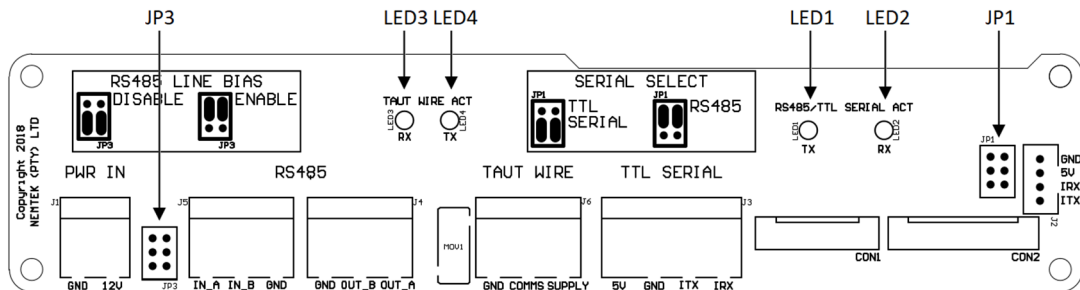


## JUMPER SETTINGS COMMUNICATION BOARD

Jumper setting as viewed with connectors at the bottom.

| TTL Serial | JP1 (2) | Down if serial TTL is selected (For Nemlink communication) Up if RS 485 or RS 232 communication is required |
|---|---|---|
| Line Bias | JP3 (2) | Up to have line bias (star configurations) Down for no line bias (daisy chain configuration) |

## LED'S ON COMMUNICATION BOARD

| LED1 | If flashing, indicates transmission of data from RS485 or TTL lines to the control unit. |
|---|---|
| LED2 | If flashing, indicates receiving of data from the control unit to the RS 485 or TTL lines |
| LED3 | If flashing, indicates receiving of data from the taut wire to the control unit |
| LED4 | If flashing, indicates transmission of data from the control unit to the taut wire |

## CONNECTORS

| Con 1 | Ribbon cable connection to Con1 of display board |
|---|---|
| Con 2 | Ribbon cable connection to Con2 of display board |
| J1 | Two way connector for 12Vdc supply |
| J2 | Four way connector for TTL connection to a Nemlink card |
| J3 | Four way connector for TTL connection |
| J4 | Three way connector for RS 485 (out) |
| J5 | Three way connector for RS 485 (in) |
| J6 | Three way connector for connection to the taut wire system |

The connectors on the communication board are self-explanatory. However, if communication will be made through a separate NemLink card, then the connector J2 should be used (jumper selection TTL Serial). Also note that the FG7-Druid does not support RS485 multidrop, only daisy chain, so there are RS485 OUT and RS485 IN terminals. The TAUT Wire terminal is not used in the FG7 Druid controller but only with FG7 Taut wire controllers.

### 1. Tension- Sensors

## Electrical Connection:

The TS sensors sometimes TW (Taut-wire) sensors are connected via a three wire interface plus shield that is responsible for power as well as bi-directional communications. The wiring can be multidropped, i.e. three wires from the FG7 to the first sensor and then onto the second sensor etc.

- The red wire of the sensor goes to "supply" on the Taut-wire connector of the FG7C communication board.
- The green wire of the sensor goes to "comms" on the Taut-wire connector of the FG7C communication board.
- The blue wire together with the screen goes to the "GND" on the Taut-wire connector of the FG7C communication board.

**Caveat:** if the wiring diameter is too small, or the distance is too far, then the wire resistance will be too high and some sensors will not operate. Ideally the wiring will form a loop back to the FG7. This helps with power reticulation to the sensors and allows for twice the distance.

## Mechanical Connection:

Ideally a tension sensor is mounted in the middle of a linear span of wire. The maximum span is 100m and the wire must be free to move in a horizontal direction. Tension sensors operate effectively when there is no residual deflection of the sensor. The wire should be installed and tensioned, but not clamped at the tension sensor. All wires should be installed and tensioned in a given sector before the tension sensor is clamped onto the wire

### 2. Nemtek IO Network Card

A Nemtek IO Network card can be connected to the FG7. The Nemtek Network card must have all its address jumpers inserted. Communication with the Network IO card can be via RS232 from the FG7, via some media converter, to RS422 and the Network card or alternatively via the RS 485 terminals (RS 422) on the FG7 direct to data terminals on the Network IO card. (Obviously, from RS422 media converter/s and back to RS422 is also acceptable. Fibre-optic cable is the preferred media).
An Ethernet connection could also be made between the FG7 and the IO card with the use of the Nemtek Nemlink and Nemlink IO card.
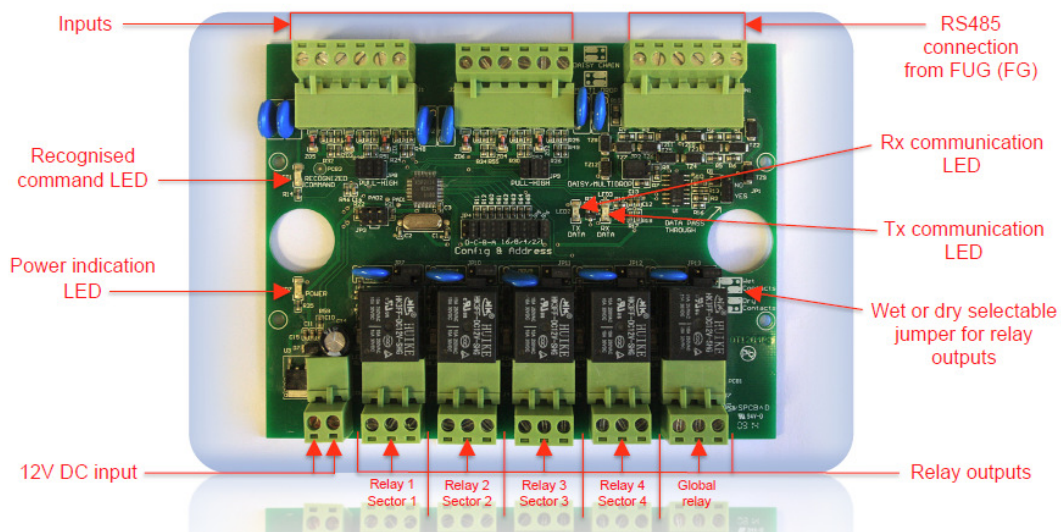
## PROGRAMMING THE FG7C-TW

The FG7B-TW should be programmed with the number of Taut-wire (tension) sensors.
If required a graphic site image can be loaded on the FG7C-TW and zones (sectors) can be drawn on the image.

## CONFIGURE THE NUMBER OF SENSORS ON THE NETWORK

1) On the FG7, press the PIN tab on the top screen and select▼ Installer, enter the appropriate PIN number and press Enter. Check that Installer stays on the screen and has not revert back to select.
2) Press the Image tab, followed by the System tab on the top of the screen and use the ▼ and ▲ markers next to the No. of TW Sensors to select the correct number of sensors in the network.
Press Save No of TW sensors.
3) If jumper 4 and 6 are set to auto reset (normal operation), then after about two minutes the application will restart. Otherwise one can push the B3-PWR button and this will close the application and after the Nemtek logo has disappeared from the screen you press the B3-PWR button again to restart the unit.
4) Check under the System tab that the number of sensors is now correct.

## CONFIGURE THE IO CARD ON THE NETWORK

**JUMPER SETTINGS:**

| | |
|---|---|
| JP 1 | Data Pass Through set to No |
| JP2 | Daisy/Multidrop set to Daisy |
| JP3 | Not Used |
| JP4/JP5/JP6 | Config & Address set all in except D out |
| JP8/JP9 | Not Used |
| JP7/JP10/JP11/JP/JP12/JP13 | Wet/Dry contacts set for customer requirements |

## AUDIBLE ALARM

Under the System Tab you can select for the FG7 giving an audible alarm when there is an alarm or service condition on the energizers by clicking on the word audible next to the audible tick box.

## FACTORY DEFAULT

Under the System Tab you can reset the FG7 to Factory default settings by pressing the default button the IP address will be reset to 10.0.0.20 and all pin setting will default back to the numbers as stated in the user manual.

## LOADING A GRAPHIC SITE IMAGE

1) Get a suitable image of your site and scale the image to about 370 x 370 pixels. Call the image: image13r370 and save the image in a .png format.
2) The graphic site image has to be loaded via the FG7 web interface (see the FG7 web interface).

## **DRAWING SECTOR LINES AND ALLOCATING SENSORS TO SECTORS**

1. On the FG7 press the PIN tab on the top of the screen and "**Select▼**" "**Installer**". Type in the appropriate PIN number and press "**ENTER**".
2. Press the "**Image**" tab on the top of the screen.
3. Use the "**▲**" and "**▼**" keys under the "**Sector#**" label to select the desired sector. The maximum number of sectors is equal to the maximum number of TW sensors in the system. The absolute maximum is 31 TW sensors. See TW Installation Notes.
4. Press "**Start**" and touch the screen at the desired points corresponding to that sector. Once the last point is reached press "**Stop**". A maximum of eight points is permissible but typically only two will be used. Press "**View**" to see what your sector looks like. If unhappy with the result, simply press "**Start**" and repeat the exercise.
5. You can randomly do all the sectors repeating the steps 3 and 4 above.
6. You may arbitrarily assign any TW Sensor number to any perimeter Sector. Therefore you may choose to have only one Sector with all the TW sensors, or only one TW Sensor per Sector, or for example, 4 Sectors with three TW Sensors on each sector. It is the responsibility of the installer to do the allocation of any TW Sensor to any Sector. Select the appropriate Sector by using the "**▲**" and "**▼**" keys under the "**Sector#**" label. Select the appropriate TW Sensor by using the "**▲**" and "**▼**" keys under the "**TW#**" label. Press the "**+TW**" button. If more than one TW Sensor is associated with that same Sector, then select the next appropriate TW Sensor number and press the "**+TW**" button again.
7. The installer must press "**Save**" when you have done all your allocations. Failure to do so will result in a loss of all the information on a reset or power down.
8. The system will automatically load this graphical layout on power-up.
9. You may, after entering Installer mode, edit any individual Sector and/or TW Sensor at any time and re-save.
10. The labels "**Sector1**" etc. are placed automatically at the start of each Sector on the graphical image. These labels are at a fixed position at the start of the Sector.

## SETTING THE IP ADDRESS

1) On the FG7, press the PIN tab on the top screen and select▼ Installer, enter the appropriate PIN number and press enter. Check that Installer stays on the screen and has not revert back to select.
2) Press the "Image" tab on the top of the screen.
3) Press the NET tab on the top of the screen and use the ▼ and ▲ markers next to the address boxes to set the correct IP address, Network Mask and Gateway address.
4) Press the Set IP Address button on the bottom of the screen and the new IP address will be programmed into the FG7.
5) To ensure that the setting is correct ping the new IP address from a computer.

## FIRMWARE UPGRADE

A firmware upgrade file called tautwiree can be loaded through the web interface (see the FG7 web interface). The latest version should be available from Nemtek or one of its distributors.

## THE FG7 WEB INTERFACE

The FG7 has a web interface which can be used for:
1) Viewing mapping files loaded in the FG7
2) Uploading new mapping files
3) Uploading new site images
4) Switching between LCD touchscreen and HDMI display
5) Up loading new program files

To use the web interface you will need the IP address of the control unit in the FG7 which is displayed under the NET tab in the FG7 as well as the installer pass word and a computer set to the correct IP range for the IP address of the control unit.

## CONNECTING TO THE WEB INTERFACE

1) Open the FG7 and connect a network cable from the computer to the network connector on the control board inside the FG7.
2) Open the internet browser on the computer and enter on the address bar the IP address which is displayed under the NET tab of the FG7 (make sure the that the computers IP range is suitable for this IP address)
3) The FG7 configuration screen should now show on the computer

## LOADING OF FILES

To load files through the web interface enter on the address bar in the browser the IP address followed by /nemupload.cgi.
As an example with the IP address of the control unit being 10.0.0.20 one would enter in the browser 10.0.0.20/nemupload.cgi
The FG7 installer configuration screen will appear on the computer screen.

1) Enter the installer password and a new screen will appear
2) Under select a file use the browse button to find the required file on the computer. Be aware that not always all files are shown, to see all files select the custom tab on the bottom right of the screen and then select all files.
   You can only load guf5e files for firmware updates, image13r370.png files for site images and the mapping files itoemap.txt or etoimapplus.txt
3) Once the file is selected you have two options:
   Press "Get File" and re-enter the installer password and the selected file will be down loaded into the FG7 or
   Click on "View File Only" and press "Get File". In this case the file chosen will be displayed on the computer screen but not downloaded to the FG7. If you are satisfied with the file, press the back button on your browser un-tick the "View File Only" and press the "Get File". Enter the installer password and the file will be uploaded to the FG7.
4) After the file is loaded one has to reset the FG7 and this can be accomplished by pressing "Reset FG7 and Use Files". The FG7 will reset and after restarting ready for use.

## LCD TOUCHSCREEN OR HDMI

Through the web interface one can change the LCD touchscreen display to an HDMI display or vice versa.
1) Enter on the address bar of the browser after the IP address /nemupload.cgi.
   As an example with the IP address of the control unit being 10.0.0.20 one would enter in the browser 10.0.0.20/nemupload.cgi
2) Enter the installer password
   The installer configuration screen will appear.
3) Click on HDMI or LCD screen as required. The display will change to HDMI or LCD touchscreen. A computer mouse or HDMI Touch screen should be used if HDMI is selected

## ENERG APP / TW APP / TWNODE APP

It is possible to toggle the application in the FG7 through the web interface. The FG7 should have been set for the use with Tension sensors (TW APP) but by clicking on ENERG APP or TWNODE APP it can set for a different application.

## Individual Tension Sensor Parameters:

Each TW Sensor has its own unique address 0-31 that can be programmed. Address 0 is reserved for un-programmed sensors.

Each TW Sensor has its own micro-controller that has certain parameters that may be set by the installer. In reality a perimeter wire is a very dynamic entity subjected to many physical elements, wind, rain, temperature fluctuations, fencing posts that gradually move, or a kid's soccer ball being kicked into the fence. By having built-in intelligence into each sensor the number of false alarms and maintenance requirements can be dramatically reduced. However, under normal operation the default settings will be adequate. If need be, the response of the TW sensor can be tailored for unique circumstances.

The "**TW#**" tab gives an installer access to the sensor parameters. Note, when on this TW# screen, the FG7 will only communicate with one specific sensor. All other sensors are ignored and no alarm conditions will occur. As soon as the tab is changed, or the system times out, all sensors will be communicated with.

**TW Sensor#:**   the number of the sensor being interrogated or the desired address of the sensor to be programmed.

**Alarm Trig:**   "**alarm trip threshold**" 1 - 255. The lower the value, the more sensitive the TW Sensor. Default 50.

**Filter Aver:**   "frequency response and alarm rate adjustment" 1 - 100. Technically: 100/(Filter Aver) = number of alarm decisions per second. Default 49 => 2 decisions per second. This is neither a harmonic of 50 or 60 Hz.

Once any of the listed parameters have been changed, apart from the address, press the "**ZeroPWM**" for the sensor to be updated with the new parameters. Change the sensor address and then revert to the previous address and your new parameters will be displayed in the "**Alarm Trig: ...**" values.

The above settings do not work independently. If you need to experiment, change one setting at a time. Be realistic and allow this remarkable sensor to "**track**" what is happening on your fence.

The TW Sensor, once triggered, will maintain its alarm state for ten seconds. This will be displayed in the "**Active Alarm:**" label on the LHS of the screen. It will be logged, and the associated sector will change colour on the "**Image**" screen.

## How to set a sensor address:

You can only assign a sensor address, apart from the address zero, for a sensor with an address of zero that is in an alarm condition. This enables you to wire all the new sensors with default address zero on the TW communication bus and start programming.

1.  **New Sensor with a default address of zero:** Change the **TW Sensor#** with the ▲ or ▼ buttons to the desired sensor address (even if the desired address is 1, you must change it to another value and back to 1 again). Sensor addresses must start at 1 and be contiguous. Deflect the sensor slightly, and within ten seconds press the "**SetAddr**" button on the FG7. The sensor must be in alarm before its address can be programmed. Change the **TW Sensor#** address to some other value and then back to your chosen value. The **PWM: Strain:** and **SetP:** bar graphs should be near midpoint. The sensor has been successfully programmed. A slight deflection on the sensor should be indicated by a change in the **Strain:** bar graph. Default factory sensor parameters will be initiated.

    Repeat with new sensors and different sensor addresses.

2.  **Revert a sensor address to zero:** Change the **TW Sensor#** address to the address of the sensor that must be changed. Press "**RstAddr**". This sensor will now have the address zero. (Firmware Issue: even once the address is set to zero, the bar graphs will be deflected. When the FG7 is powered down and up again it will be apparent that this old address is no longer valid).

    The sensor can now be re-assigned a new address by following the steps in 1 above.

## Routine Maintenance

TW sensors will be attached to sectors of wire whose tension will change over time. If a TW sensor is being constantly deflected it will attempt to cancel that deflection by an internally generated electronic signal. It can only do this up to a point. At this point a service alarm will be given.

The installer can then select the appropriate TW sensor address from the FG7 and **TW#** screen, and simply press the "**ZeroPWM**" button without having changed any of the other sensor parameters. This may be sufficient to clear the service condition. If not, the wire attached to that particular sensor must be loosened, the wire must be tensioned, then clamped at the sensor, and then the "**ZeroPWM**" button pressed. **Verify alarm activation**

## Known Issues

- When an **RstAddr** is pressed on the **TW#** screen the bar graph indication should be cleared.

- The TW **Sensor#** must be changed before it is valid. The implication is the system must have at least two sensors on it.

## Document Revision history

**Rev 1.0          12 December 2018**