NEMTEK
GROUP OF COMPANIES

FG7B CONTROLLER for DRUID 25/28 NETWORKS

<u>INSTALLERS MANUAL</u>

Revision 1.4
12 September 2017

FG7B CONTROLLER: Table of Contents

FG7B CONTROLLER: Introduction

INTRODUCTION

The Nemtek FG7 platform is a platform used for providing a graphical interface and connectivity to a network of Nemtek Energizers and Input/Output Cards (IO Cards).

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.

OPENING THE FG7B

On the opposite side to the LCD display are two screws that need to be removed.
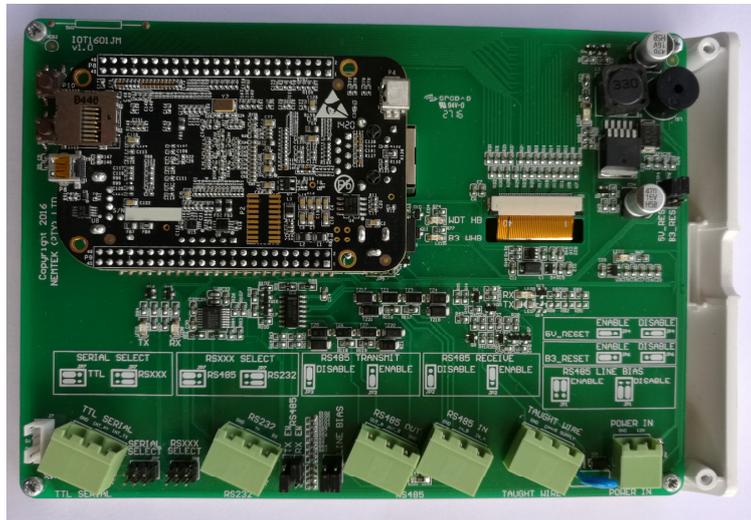With the LCD facing you, slide the LCD gently to one side by approximately 15mm.

Leverage the LCD out as shown in the picture.

A green printed circuit board IOT1601 JM and a dark blue control unit are inside the unit.

FG7B CONTROLLER: HARDWARE

The IOT1601 JM board is responsible for generating the different supply voltages. The input voltage is 12Vdc and is polarity protected. The board also monitors and process the different communication signals before sending the information to the control unit.
You will find jumpers, connecters and leds on the board for selecting, connecting and indicating.
The control unit host the software and has all communication ports on board.

FG7B CONTROLLER: Hardware
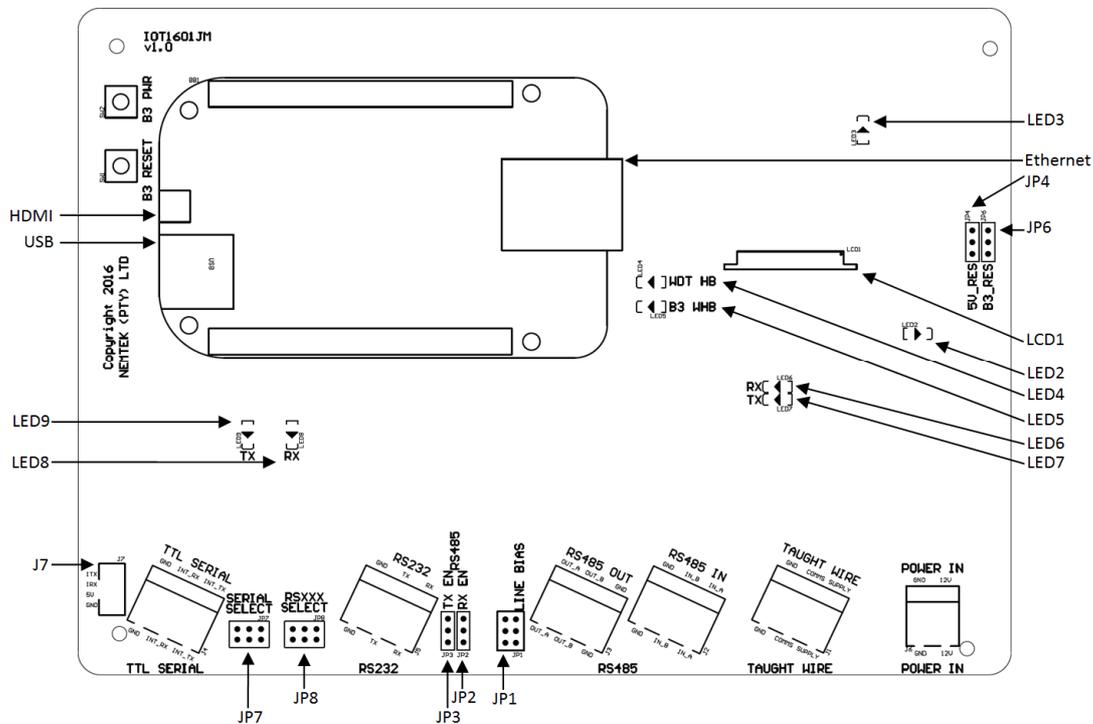
JUMPER SETTINGS

Jumper setting as viewed with terminals at the bottom.

TTL Serial	JP7 (2)	To the left if serial TTL is selected (For Nemlink communication) To the right if RS 485 or RS 232 communication is required
RS485/RS232	JP8 (2)	To the left for RS 485 communication To the right for RS 232 communication
RS485out	JP3 (1)	Down to enable RS 485 transmitting (standard) Up to disable RS 485 transmitting (nonstandard use)
RS485in	JP2 (1)	Up to enable RS485 receiving (standard) Down to disable RS485 receiving (nonstandard use)
Line Bias	JP1 (2)	Up to have line bias (star configurations) Down for no line bias (daisy chain configuration)
Watch Dog timer 1	JP6 (1)	Down for auto reset with transmission failure of the control unit Up for no auto reset of the control unit
Watch Dog timer 2	JP4 (1)	Down for auto reset of the power supply with transmission failure of the control unit Up for no auto reset of the power supply

CONNECTORS

The connectors on the IOT1601JM board are self-explanatory. However, if communication will be made through a NemLink card, then the connector J7 should be used with the comms cable supplied with the unit (jumper selection TTL Serial). Also note that the FG7-Druid does not support RS485 multidrop, only daisy chain – so there is a RS485 OUT and a RS485 IN terminal. The TAUT Wire terminal is not used in the FG7-Druid controller.

PUSH BUTTONS

There are two push buttons on the green board. The one is marked "B3 PWR" (Power) and the other "B3 RESET". The B3 PWR button is used to manually power the control unit on and off, this is usually required when programming the settings on the FG7-Druid. The B3 RESET button is used to manually reset the FG7-Druid Controller.

FG7B CONTROLLER: Hardware

LEDS

There are 8 LEDs on the green board.

LED9 – If flashing, indicates transmission of data from the control unit to TTL SERIAL/RS232/485
LED8 – If flashing, indicates that the control unit is receiving data from TTL SERIAL/RS232/485
LED7 – Not used in FG7-Druid
LED6 – Not used in FG7-Druid
LED5 – When on, indicates control board heartbeat
LED4 – When flashing, indicates that the watchdog timer is operational
LED3 – 5V supply indicator
LED2 – 3V3 supply indicator

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.

USB PORT

The USB port is used for upgrading software, uploading site images, 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. To activate the HDMI port a shell script has to be loaded (contact distributor for details) and the touchscreen ribbon cable has to be disconnected from connector LCD1 (brown ribbon cable). A USB mouse should be used for operating the system when using an HDMI display.

ETHERNET PORT

The Ethernet port is used for communication with Druid FenceProbe or third party software.

TOUCHSCREEN

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

FG7B CONTROLLER: Programming the FG7B

PROGRAMMING THE FG7B-DRUID

The FG7B-Druid should be programmed with the number of energizers as well as the IO cards in the system.
If required a graphic site image can be loaded on the FG7B-Druid and zones (sectors) as well as Gate lines can be drawn on the image.

CONFIGURE THE NUMBER OF ENERGIZERS 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 System tab on the top of the screen and use the ▼ and ▲ markers next to the number of energizers to select the correct number of energizers in the network.
   Press Save No of Energizers.
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 energizers is now correct.

CONFIGURE THE NUMBER OF IO CARDS 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 System tab on the top of the screen and use the ▼ and ▲ markers next to the number of IO cards to select the correct number of IO cards in the network.
   Press Save No of IO cards.
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.
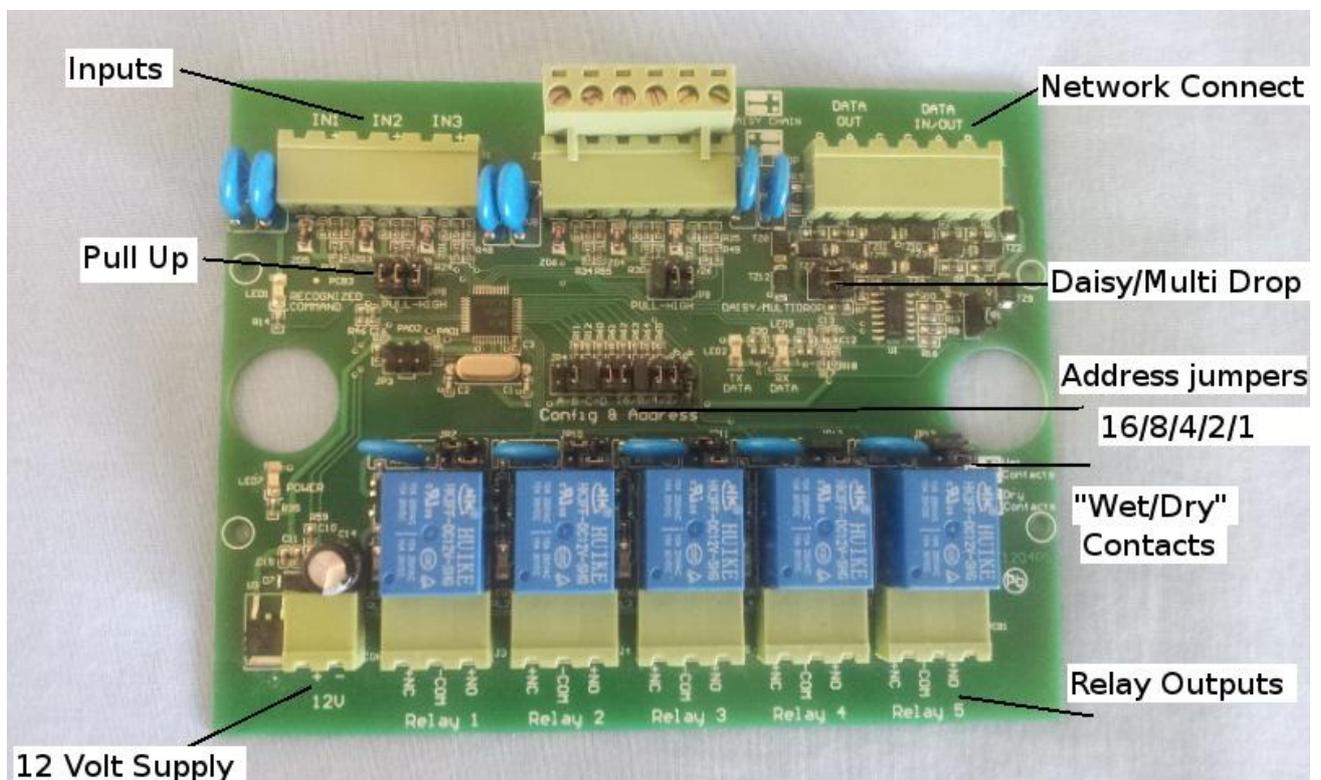4) Check under the system tab that the number of IO cards is now correct.

FG7B CONTROLLER: Programming the FG7B

Note 1:

1. IO Card addresses are to start at #33 and must be sequential.
2. Removing a jumper increments the address by the number screen-printed on the pcb. This address is added to an offset of 33. Example 1. If none of the 16/8/4/2/1 jumpers are removed then the card will have a net address of 33. Example 2. If jumper 1 of the 16/8/4/2/1 jumpers is removed then the IO card will have a net address of 34. Example 3. If jumper 2 of the 16/8/4/2/1 jumpers is removed then the IO card will have a net address of 35 etc.

Note 2:

- The FG7 scans through the network address at a rate of twenty addresses per second. The fewer the addresses utilised on the system, the faster the system response. Because an energizer only updates its own parameters once a second, there is little point in updating the FG7 display faster than that. A combination of twenty addresses on a FG7 network bus gives the optimal performance in terms of speed versus hardware utilization.
- The number of IO Cards used on the system can vary from zero to a maximum of 31.
- More than one energizer can be mapped to a single IO card. Example. One IO Card can be mapped to 19 Energizers. A Fence 1 alarm, from any energizer, can be mapped to one of the five relays on the IO card. This is useful for electrical contactors and lighting etc.
- Only five conditions per energizer can be mapped to a relay. (Use computer network to get full access to all the information.)
- Only the Installer can manually toggle the relay outputs.
-

FG7B CONTROLLER: Programming the FG7B

SYSTEM TAB SETTINGS

Under the system tab there are a number of settings which can be selected by clicking on the setting required and the tick box next to the setting will then show a tick indicating that the setting is selected. The following settings can be selected:
Audible alarm
Alarm Sensor mode
Show sync loss
Extended comms timeout
Proxy

AUDIBLE ALARM

The buzzer inside the FG7 is enabled when the Audible Alarm tick box is ticked. The buzzer will sound when there is an alarm or service condition. If unticked the buzzer is disabled.

ALARM SENSOR MODE

If the alarm sensor mode is ticked then alarm and service conditions will only show as long as the alarm or service condition is present. When the error clears the screen will show a good condition again. If Audible alarm is ticked the buzzer will sound but will require a manual energizer reset from the global screen.

SHOW SYNC LOSS

When ticked the FG7 will alarm, log and show under service that synchronization between energizers in the system has been lost.

EXTENDED COMMS TIMEOUT

This feature might sometimes be required especially if radio frequency/microwaves links are used in the system. They may show comms failures due to time delays in the links. By ticking extended comms time a longer time is available before the comms alarm is triggered.

PROXY

If the FG7 is used as a proxy controller for third party software or computer application and you do not want to display the site image on the screen of the FG7 then select proxy under the tab screen. When ticked the default screen will only show the IP address of the FG7 and the software version of the unit. There is also a tick box indicating that 3th party comms is taking place, the tick in the tick box will flash at half the integration frequency.

FG7B CONTROLLER: Programming the FG7B

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) Load nemshell7BIMAGE on an USB stick (nemshell7BIMAGE is available from Nemtek or its distributors)
2) Get a suitable image of your site and scale the image to about 370 x 370 pixels. Save the image in a png format and call it image.
3) Load the image on the USB stick.
4) If you can access the USB port without removing the unit from its base than start the unit otherwise remove the unit from its base for access to the USB port and then start the unit.
5) Go to the PIN tab and select Installer, enter the Installer code and press enter.
   Make sure it stays on Installer and does not go back to select
6) Place the USB stick in the USB port on the control board.
7) Go to the System tab and press firmware upgrade (the screen will go black and says system login).
8) 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.
9) Remove the stick and place the unit back in its base.

DRAWING THE ZONES AND GATES LINES

1) On the FG7B, 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 no revert back to Select.
2) Press the Image tab on the top of the screen.
3) Use the ▼ and ▲ keys under Energ# symbol to select the desired energizer.
4) Use the ▼ and ▲ keys under Zone# symbol to select the desired zone.
5) 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. Press "View" to see what your sector looks like. If unhappy with the result simply press "Start" and repeat the procedure.
   Please note that a USB mouse can be used to assist with drawing the lines.
6) A Gate can be associated with each energizer, but only has two points. Press "Gstrt" and touch the screen at the start point and end point of the gate. Press "View" to confirm your entry.

FG7B CONTROLLER: Programming the FG7B

7) You can randomly do all energizers, zones and gates using steps 3 to 6 above.
8) When you are happy with the zone and gate lines press "Save"
9) The system will automatically load this graphic layout on power-up. You may after entering Installer mode, edit any sector independently and then re-save.
10) The labels E1:Z1 (Energizer Address, Zone number) and E1:Z2 etc. are placed automatically at the start of each fence 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 System 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.
3) Press the Set IP Address button on the bottom of the screen and the new IP address will be programmed into the FG7.
4) To ensure that the setting is correct ping the new IP address from a computer.

LCD CALIBRATION

The touch screen display can be calibrated, this will be necessary if the screen is replaced or if it is difficult to touch the buttons on the screen. If the touch position on the screen is too far out to touch the LCD calibration button a USB mouse can also be used to recalibrate the screen otherwise a pen can be used.

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 system tab on the top of the screen and press the LCD calibration button. The Nemtek screen should appear followed by the calibration screen
3) Touch the crosshair and a second crosshair will appear. Touch the second crosshair.
4) Carry one until all five crosshair markers are done. The unit will then automatically reboot with the new calibration.

FG7B CONTROLLER   Mapping

MAPPING ENERGIZER ALARM(S) TO IO CARD

A text file, etoimapplus.txt, i.e. energizer to io card mapping file is used to map each energizer address to a relay card address.

This file can be made in notepad and has to be uploaded to the FG7B with the procedure for loading mapping files.

The notation used is that Energizer#4 corresponds to Energizer with address 4

Table 1: How the etoimap.txt file is structured

Line Number	Function associated with the line	Lines of etoimap.txt file	Explanation
1	The IO Card Address that Energizer#1 will communicate with	33	Energizer#1 alarms via IO Card 33
2	The combination of any alarm condition(note 1) that will activate relay 1	2	Only Fence 1 Alarm activates relay 1
3	The combination of any alarm condition(note 1) that will activate relay 2	6	Fence 1 or Fence 2 alarm activates relay 2 (2+4)
4	The combination of any alarm condition(note 1) that will activate relay 3	14	Fence 1 or Fence 2 or Gate Alarm activates relay3 (2+4+8)
5	The combination of any alarm condition(note 1) that will activate relay 4	32	Only Tamper Alarm activates relay 4
6	The combination of any alarm condition(note 1) that will activate relay 5	4	Only Fence 2 Alarm activates relay 5
7	The combination of any alarm condition(note 1) that will activate relay 6	2048	Mains present activates relay 6
8	The combination of any alarm condition(note 1) that will activate relay 7	65	Comms fail or Sync fail activates relay 7 (1+64)
9	The combination of any alarm condition(note 1) that will activate relay 8	4096	Panic alarm activates relay 8
10	Latching or not latching of relays with alarm condition	38	Fence 1, Fence 2 and Tamper Alarm conditions are not latched (2+4+32)
11	The IO Card Address that Energizer#2 will communicate with	34	Energizer#1 alarms via IO Card 34
12	The above sequence repeated etc. etc.		

Notes:
1) Table 2 has a number associated with each alarm condition on an energizer. Select the desired alarm condition(s) that can activate any relay and add the numbers together.

FG7B CONTROLLER   Mapping

2) If the relay must only be activated as long as the alarm condition persist (not latching) then select the energizer condition in table 2 and add the number together for all the relays which must not latch. Zero implies everything is latching and an alarm condition has to be reset manually after an alarm occurs.

3) There are two types of IO card available one with 5 programmable relays and one with 8 programmable relays. If the one with 5 relays is used then line 7,8 and 9 can be made 0.

Table 2: How the numbers are associated with each alarm state

Energizer State	Number
COMMS FAIL	1
FENCE 1 ALARM	2
FENCE 2 ALARM	4
GATE ALARM	8
SERVICE ALARM	16
TAMPER ALARM	32
SYNC FAILURE	64
ZONE 1 ON	128
ZONE 1 HIGH VOLTAGE	256
ZONE 2 ON	512
ZONE 2 HIGH VOLTAGE	1024
MAINS PRESENT	2048
PANIC ALARM	4096

Multiple energizers addresses can communicate with single IO card addresses i.e. a fence alarm on Zone 1 of any energizer could turn on a specific relay of one particular IO card and control perimeter lighting. In this case line 8 in Table 1 would have a 33. Both Energizer#1 and Energizer#2 would communicate with IO card #33.

The choice of relay number and energizer condition(s) is totally arbitrary. Not all the relays have to be configured.

FG7B CONTROLLER   Mapping

MAPPING NEMTEK IO CARDS TO ENERGIZER(S)

Inputs on a Nemtek IO card may be used to control a specific energizer or all i.e. global energizers on a network. A text file, itoemap.txt, i.e. io card to energizer mapping file, is used to map each IO card address to an energizer.

This file can be made in notepad and has to be uploaded to the FG7B with the procedure for loading mapping files.

TABLE 3: How the itoemap.txt file is structured

Line Number	Function Associated with the line	Lines of itoe.txt file	Explanation
1	The energizer address that IO card#33 will communicate with (unless global)	1	Energizer#1
2	Energizer specific inputs from this IO card (note 3 and 5)	131	Input 1 from IO card#33 will turn On/Off Zone 1. Input 2 will turn On/Off Zone 2 of energizer#1 (1+2+128)
3	Global Energizer inputs from this IO card (note 3 and 5)	176	Input 5 from IO card#33 will turn On/Off all energizers. Input 6 will turn all energizer in HV/LV mode (16+32+128)
4	Inputs that are valid on this IO card (note 4)	51	Inputs 1,2,5 and 6 are used (1+2+16+32)
5	The Energizer Address that IO card#34 will communicate with (unless global)	2	Energizer#2
6	The above sequence repeated etc. etc.		

Notes:
4) Table 4 has a number associated with each IO card input.
5) Select the appropriate numbers and add them for the inputs to be recognized. If the number is set to 0 the all inputs are ignored.
6) This number must be added when using either a Selective energizer control or Global energizer control in rows 2 and 3 of Table 3. I.e. if the total number is less than 128 for a given row, then that particular row will be ignored.
7) Global inputs and specific inputs cannot be used on the same IO card so either line 2 or line 3 should be zero.

FG7B CONTROLLER   Mapping

Warning
1) If multiple IO Cards are used, with multiple identical global inputs enabled you could end up with energizers turning On and Off every second. If the one global input dictates that all energizers should be On and the other global input on another IO card dictates that all energizers should be Off, you will have a non-functioning network.

TABLE 4: How the numbers relate to the IO Card Inputs

INPUT	INPUT FUNCTION	NUMBER
Input 1	ZONE 1 ON/OFF	1
Input 2	ZONE 2 ON/OFF	2
Input 3	ZONE 1 HIGH/LOW VOLTAGE	4
Input 4	ZONE 2 HIGH/LOW VOLTAGE	8
Input 5	GLOBAL ON/OFF	16
Input 6	GLOBAL HIGH/LOW VOLTAGE	32
ADD	SEE NOTE 5	128
Input 7	Can only be utilized through application software	
Input 8	Can only be utilized through application software	

LOADING A MAPPING FILE

Requirements:
Flash drive loaded with nemshell7BText1.sh and with folder NemText
Inside folder NemText place etoimapplus.txt and/or itoemap.txt (these two files should be made in Notepad)

Procedure:
1) Connect power to the FG7 unit.
2) Place the flash drive in the USB connector of the FG7 unit (make sure there is only one nemshell on the flash drive)
3) On the top of the screen go to PIN and enter installer pin
4) Go to the system tab.
5) Press upgrade
6) Press the PWR button on the FG7. Wait until the Nemtek logo has disappeared and the screen has gone black.
7) Press the PWR button on the FG7
8) Wait until the Display has come back on then remove the Flash drive.

FG7B CONTROLLER   Firmware upgrade

FIRMWARE UPGRADE

1) Load on a USB stick the latest available software for the FG7B control unit. The file normally is called nemtekfg7BDruid??? where ??? normally is a number indicating the version.
   The latest version will be available from Nemtek or its distributors.
2) If you can access the USB port without removing the unit from its base than start the unit otherwise remove the unit from its base for access to the USB port and then start the unit.
3) Go to the PIN tab and select Installer, enter the Installer code and press enter.
   Make sure it stays on Installer and does not go back to Select.
4) Place the USB stick in the USB port on the control board.
5) Go to the System tab and check the version number and then press firmware upgrade (the screen will go black and says system login).
6) 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.
7) Go back to the System tab and check that the new version has been loaded.
8) Remove the stick and place the unit back in its base.

FG7B CONTROLLER   Document Revision History

DOCUMENT REVISION HISTORY

Revision 1.0
10 Feb 2017

Revision 1.1
8 March 2017
Added IP addressing and screen calibration

Revision 1.2
9 May 2017
Mapping and procedures added

Revision 1.3
20 July 2017
Added Sync fail, Extended Comms timeout, Alarm sensor mode and proxy options
Changed IO mapping Global and specific on different IO cards.

Revision 1.4
12 September 2017
Changes to allow for an 8 input and 8 output relay card

End of document