Hoyles Electronic Developments Ltd

IGUIC-4T

Universal Interlocking Door System

Installation Manual v1

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Contents

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1. System overview

The IGUIC4 is an interlock controller designed to handle any situation where up to 4 doors need to be connected and controlled.

Programming is via an LCD screen, there are preprogramed easy setup interlocks, or the option fully customise each interlock and door.

The parameters for each door on the interlock can be programmed individually allowing for normally open & normally closed doors, automatic doors and roller shutters on the same interlock. Timers for each door can also be programmed individually.

2. System parts

- IGUIC-4 Control Panel
  - Up to 4 doors per controller.
- Maglock
  - One per door
- Lock monitor or Door contact
  - To monitor state of each door or lock
- Door plate
  - Request to exit button with traffic light indication to display state of door
- Emergency break glass / E-stop
  - Will physically cut power to the lock and signal to the controller it has been used

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3. Power and cable requirements

3.1 Power

The Control Panel(s) require a 240vac mains supply from a fused spur rated at 5A. The control panel includes an integral power supply unit (PSU) which delivers 12 or 24vdc 5A to power the system, dependant on model.

3.2 Cable connections

Two standard 8-core cables per door should be suitable most applications, however for longer cable runs or high-power locks extra consideration should be given to the cable from the controller to the locks and BGU's.

3.3 Cable lengths

When considering placement of doors, it is important to calculate the volt drop across the cable then consult the locks datasheet to ensure the remaining voltage is sufficient to power the lock.

The maximum length of cable is dependent on the lock being used. Cat5 cable has a resistance of approximately 10Ω per 100meters:

$$V_{drop} = I_{lock} \times R_{cable}$$

$$V_{drop} = 500mA \times 10\Omega \Rightarrow 0.5 \times 10$$

$$V_{drop} = 5$$

Equation 1.

Equation 1 demonstrates the volt drop across a 100m cable run with lock that require 500mA. Therefore, in this scenario 5 volts would be dropped across the cable, a standard 24V PSU has a 27V output leaving 22V to power the lock.

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4. Control panel overview

4.1 4 Door Panel Layout

Below is the lay out of the 4-door control panel, it contains the control PCB and a 12V 5A PSU, the enclosure is 400x300x100mm.

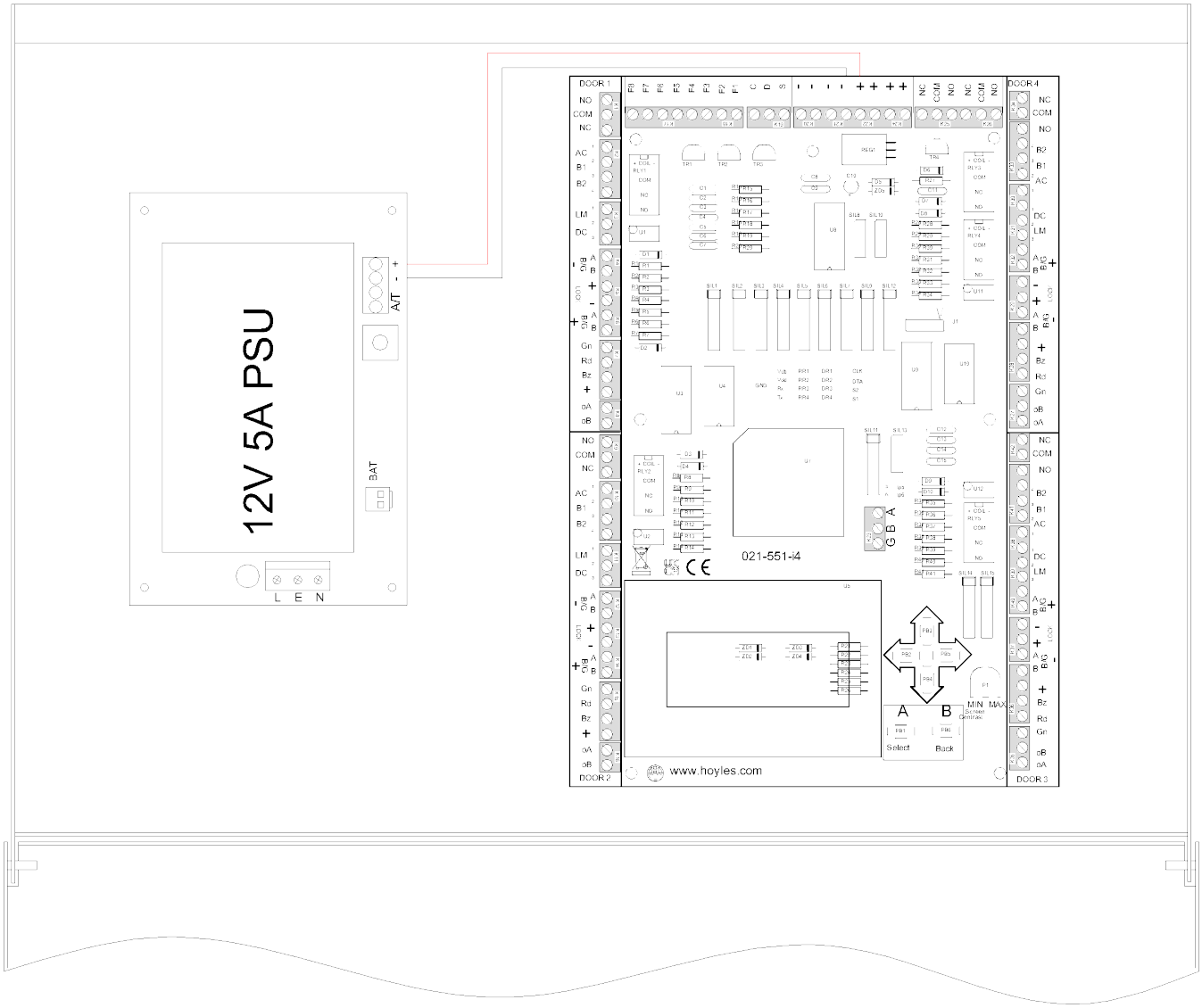

Figure 1

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4.2 4 Door Control PCB Layout

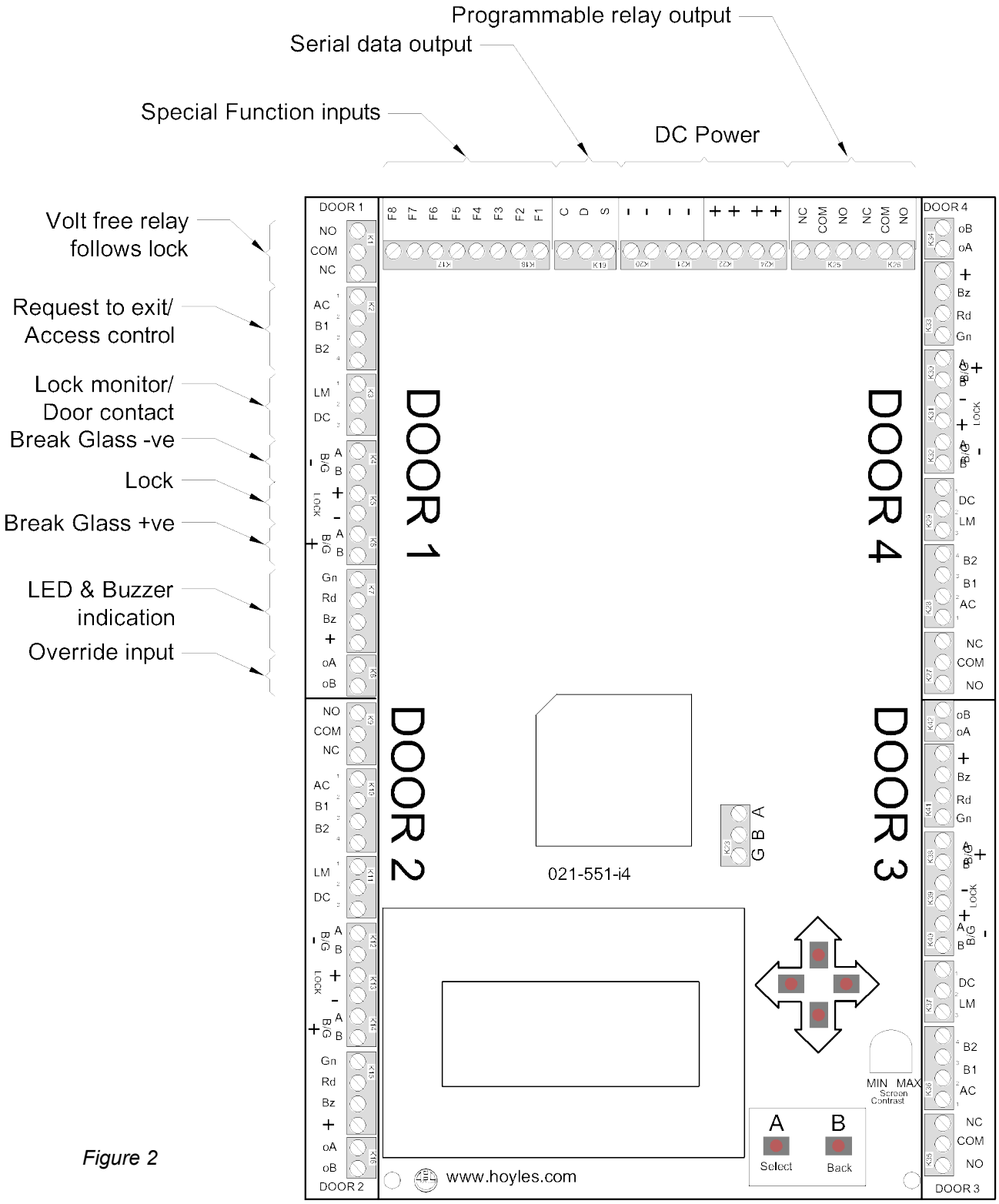

Figure 2

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4.3 PCB Screw terminal list

Access/Indication		Lock	
AC	Normally open access control input	Lock	Lock power, permanent +ve, switch -ve
B1	Normally open pair from push button 1		
B2	Normally open pair from push button 2	DC	Normally open door contact
Gn	Green LED switch -ve	LM	Lock monitor, closed when locked
Rd	Red LED switch -ve	B/G	Normally closed break glass/E-stop
Bz	Buzzer switch -ve	+	12V or 24V
+	12V or 24V	-	0 volts
-	0 volts	Relay	2A double pole relay, energises with lock

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5. Door Wiring Details

5.1 3rd Party equipment

To ensure compatibility and ease of use it is strongly recommended to use Hoyles made and Hoyles approved parts and devices with the IGUIC, however it is possible to interface 3rd party devices with the IGUIC, a full list of Hoyles devices for use with the IGUIC is provided at the end of this manual.

If using 3rd party devices any push buttons or access control devices must give a volt free normally open contact. Indicators should be driven by a switch negative.

Emergency break glass units must be normally closed going open when pressed, if not used put a link across the B/G terminals on the junction box.

Door contacts must be closed going open when the door opens with no internal resistors.

Lock monitors must have a volt free pair that close when the lock is locked and open when the lock is unlocked.

The locks will have a permanent positive and the controller will switch the negative to control the lock. There is a 2A relay that energises when the lock should lock.

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5.2 Wiring detail, locked doors with monitored locks, Access Control and RTE

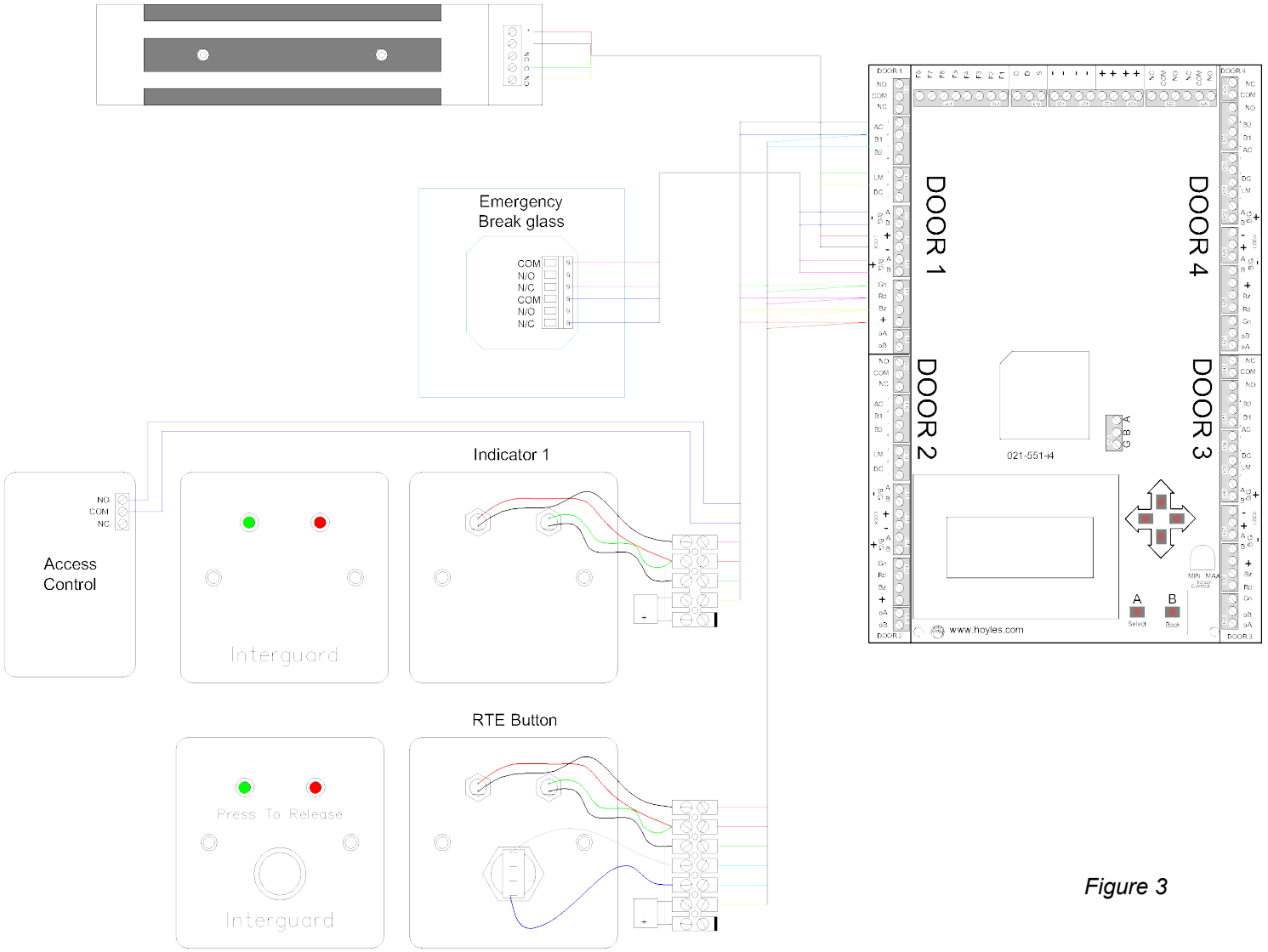

Figure 3

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5.3 Wiring detail for normally locked doors with RTE buttons and door contacts

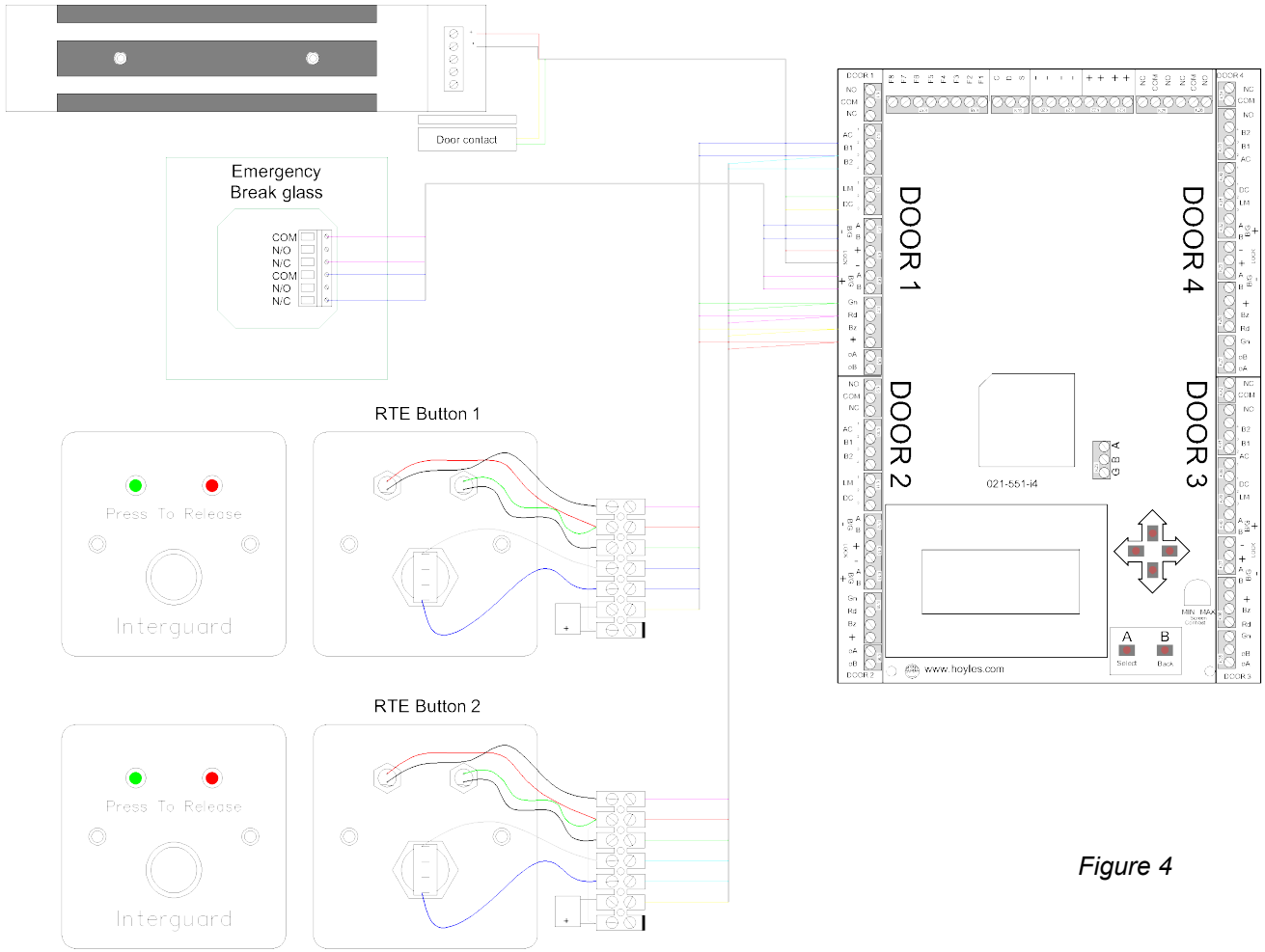

Figure 4

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5.4 Wiring detail for normally unlocked doors with door contacts

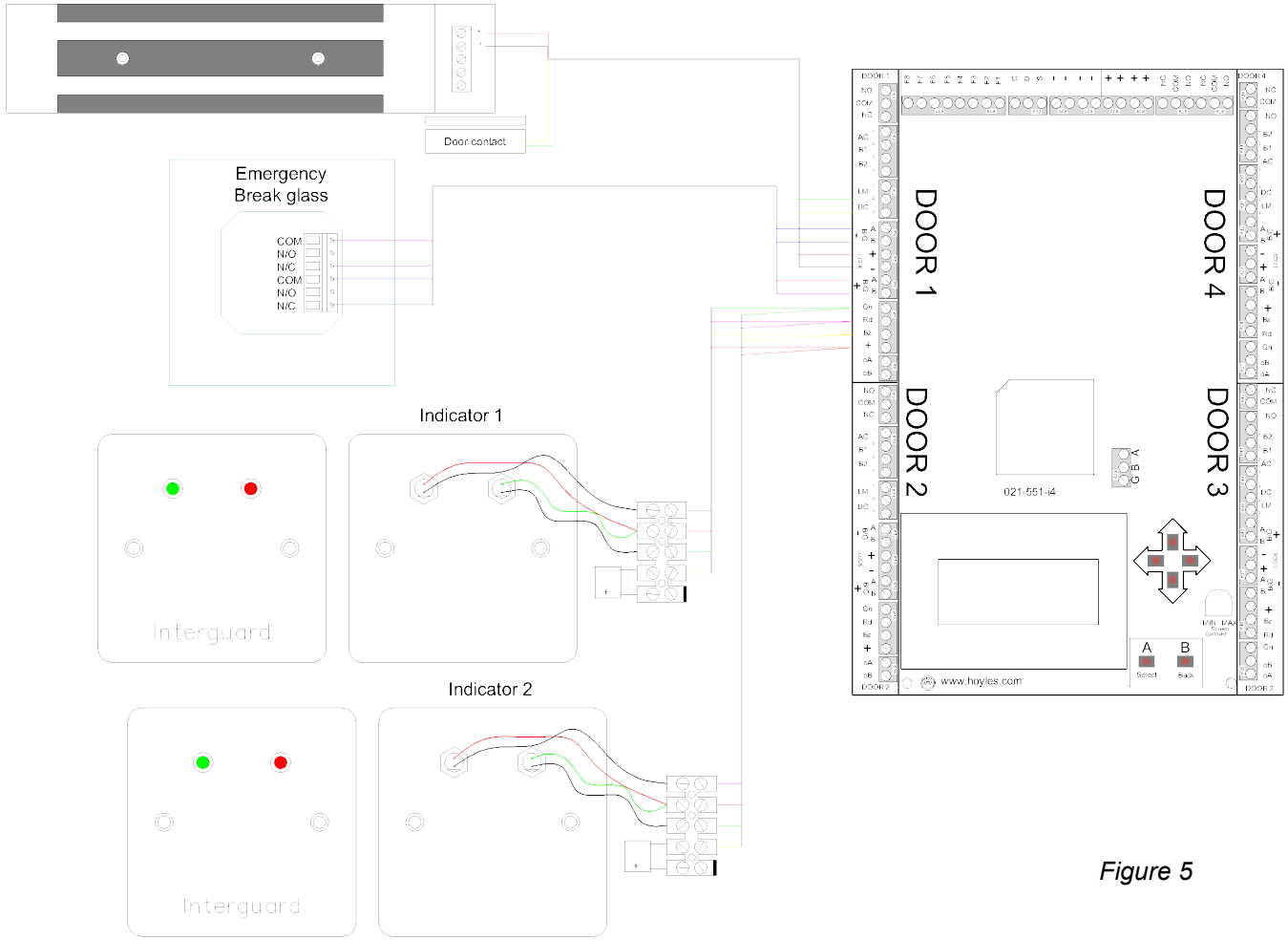

Figure 5

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5.5 Wiring detail for roller shutters and auto doors

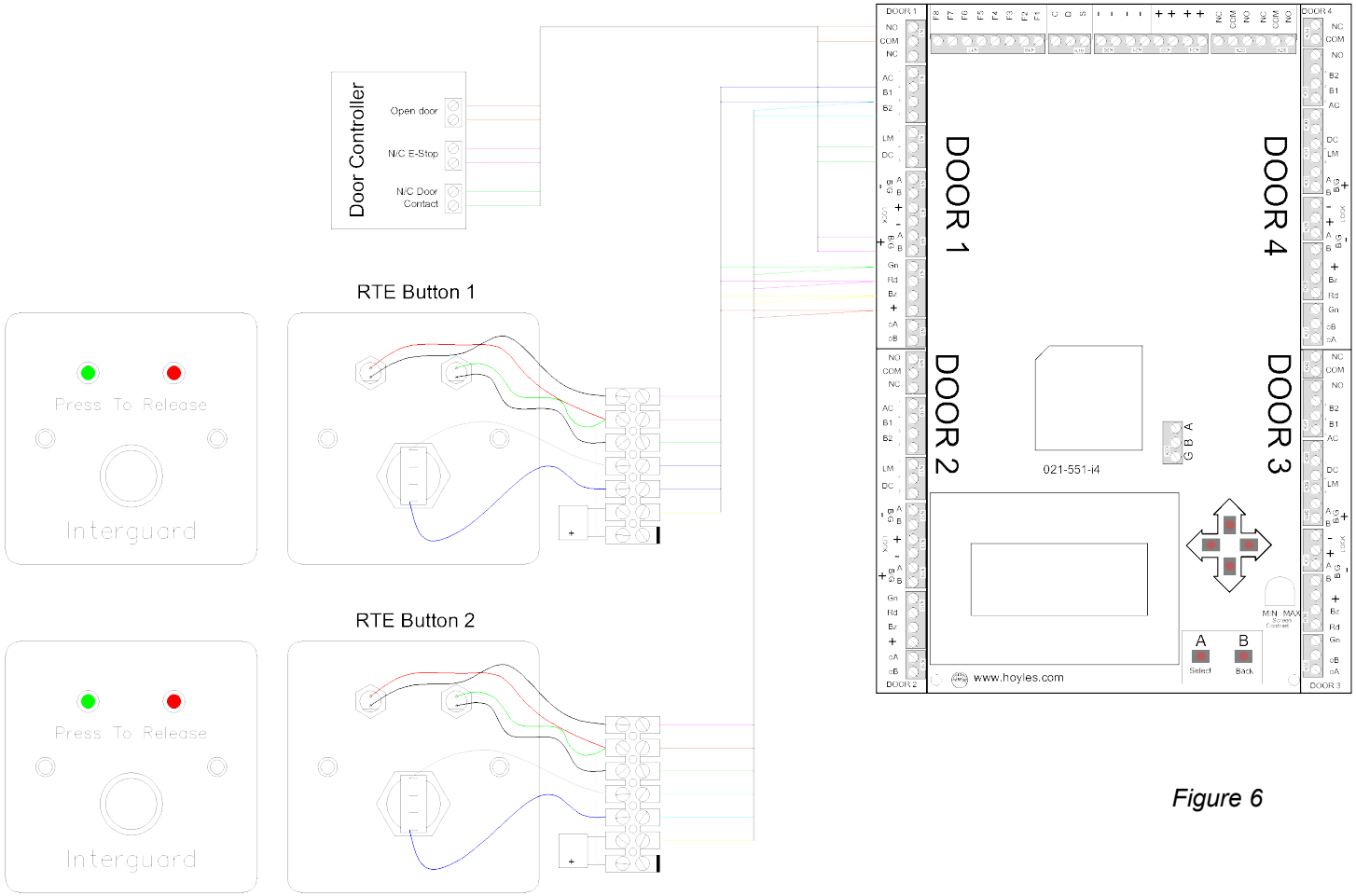

Figure 6

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6. Operation

6.1 Default Parameters

When the IGUIC is first powered up or restored to factory settings it will contain the following parameters:

- All doors interlocked
- All doors normally locked with monitored locks
- Dwell time 5 seconds
- DOTL time 1 minute
- F1 = Fire alarm input unlock all doors
- F2 = Lockdown input time 5 minutes but disabled
- LAU time 10 seconds but disabled
- Privacy timer 5 minutes but disabled
- Passcode disabled
- Global relay output with switch when system is in breach
- Relay card will switch when a door is open

6.2 Default operation

To access a door, press the RTE button associated with that door, if the door is available there will be no LED indication, Green will illuminate upon a successful request, the door must be opened within the dwell time.

If a door is blocked it will have a red LED illuminated.

When the door is used and closed again the next door will become available.

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6.3 Home screen

When the interlock is in normal operation the home screen will show the state of all doors or roller shutters and links.

If a door is displayed but there is no state displayed at the side of it there is no door connected or the controller does not recognise the door that is connected which would indicate a fault.

The following table shows the states of the doors that can be displayed on the home screen and what they mean:

	Display	Meaning
1	Override	This door's override input is active
2	B/G	Break glass has been pressed
3	B/G 2	A door interlocked with that door's break glass is pressed
4	B/G Link	A break glass on a controller linked to this door is pressed
5	Breach	That door is in a breach condition
6	Breach 2	A door interlocked with that door is in breach
7	Breach L	A door on a controller linked to this door is in breach
8	Fumigate	The fumigate input is active affecting this door
9	Privacy	That door is in privacy mode
10	Linked	One of the links associated with that door is active
11	Blocked	One of the doors interlocked with that door is active
12	A/C	That doors access control has been triggered
13	RTE B1	Button 1 has been pressed for that door
14	RTE B2	Button 2 has been pressed for that door
15	Released	The door has been released but not opened
16	Locked	The lock contact for that door is active
17	Closed	The door contact for that door is closed
18	Open	The door is open (lock contact or door contact not closed)

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6.4 Breaches and indications

- When the system is completely at rest no LED's will be illuminated ant any door
- When the subject door is requested and accepted that door will illuminate solid green
- When the subject door is blocked it will illuminate solid red
- When the subject door is in breach it will buzz and illuminate alternate flashing red and green
- When the subject door is not in breach but another door on it's interlock is, the subject door will flash red and buzz

Common causes of a breach:

- Door forced open
- Door open too long
- Door open at the same time as a door it is interlocked with
- Break glass/E-stop pressed

When the system is in breach the offending door can still be requested any other doors not causing the breach will have a request ignored.

All doors on an interlock must be closed to clear the breach condition.

6.5 Break glass

The door where the break glass is pressed it will indicate the same as a breach but with 5 second intervals between the buzzer sounding.

The operation of the break glass can be programmed as per section 11.6.

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7. Interlock setup

7.1 Menu

To access the main menu from the home screen, press the “A” button. When accessing the menu all door functions will be paused. Appendix IV contains an illustration of the menu tree.

7.2 Pre-sets

The main menu contains 3 preprogramed door setups and 4 preprogramed interlocks for easy setup, the door setups will just change features of the door and not affect the interlock and the pre-set interlock will not change any door setups:

- 1. Setup 1: All locked, Monitored Locks
    - All doors are normally locked and require a request to exit via button, access control or similar.
    - All doors use lock monitors, not door contacts.
- 2. Setup 2: All locked, Door Contacts
    - All doors are normally locked and require a request to exit via button, access control or similar.
    - All doors use door contacts, not lock monitors.
- 3. Setup 3: All unlocked
    - All doors are normally unlocked. When a door is opened all other doors are locked
    - All doors use door contacts, not lock monitors.
- 4. Setup 4: All Auto Doors
    - All Auto doors use door contacts, not lock monitors.
    - Connect the common and normally open of the relay.
    - When a auto door is requested the relay will switch for the dwell time activating the that door.
- 5. Setup 5: All 3rd Party Auto Doors
    - All auto doors use door contacts, not lock monitors.
    - Connect the common and normally open of the relay.

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    - When another door/roller is in use the relay will switch blocking the auto door from opening.

- 6. Interlock 1: 8 Door
    - All doors on the controller are interlocked with each other, only 1 door can be open at any time.

- 7. Interlock 2: 4 Door
    - All doors are interlocked
        - D1 + D2 + D3 + D4

- 8. Interlock 3: 2 Door – 3 Door
    - There are two separate 2 door – 3 door combination interlocks:
        - D1 + D2 | D2 + D3 + D4

- 9. Interlock 4: 2 Door
    - There are 2 separate 2 door interlocks:
        - D1 + D2
        - D3 + D4

7.3 Custom interlock

If none of the pre-set interlocks are suitable for the application the IGUIC has the functionality to program a completely custom interlock with up to 255 interlock combinations per controller.

To program the custom interlock access option 10 in the main menu, then scroll to option “5. Clear all interlocks” and press “A”, this will remove the interlock that is currently programmed into the controller.

Once the current interlock is clear scroll to option “1. Programme Interlock” in the custom interlock menu.

The screen will display `Door 1 with 2` / `Door 1 interlock` Door 1 is the subject door and door 2 is the target door to be interlocked with door 1, any currently interlocked doors will be displayed below.

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To interlock door 1 with door 2 press “A” and “2” will appear below. To remove door press “A” again.

Press up and down to cycle subject door. Press left and right to cycle the target door.

When all required doors have been associated press “B” to exit.

8. Settings

To access the settings menu from the home screen Press “A” for main menu the cycle to option “11. Settings” then press “A” to select the menu.

8.1 Timers

To enable Privacy, lockdown and LAU timers refer to 11.5.

1. DOTL time

The DOTL time is a Door Open Too Long timer, this specifies how long a door can be open before the controller indicates a breach condition. It can be programmed from 1 second to 59 minutes 59 seconds.

It has three options:

- Global Timers - This will program one timer for all doors.
- Individual timers – This allows each door to have a different time
- Off – Turns off the DOTL timer

2. Dwell time

The dwell time is how long a user has to open a door once an RTE button has been pressed. If a door is not opened within the dwell time it will re-lock and revert to its steady state. Once a door is open and the dwell time expires the door will re-lock when closed. It can be programmed from 1 second to 59 minutes 59 seconds. Doors can be programmed individually or globally.

3. Lockdown time

If enabled a +ve input is presented to “F2” this will trigger a lockdown time, all doors on the controller will lock and stay locked for this time period. It can be programmed from 1 second to 59 minutes 59 seconds.

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4. Privacy time

If enabled RTE button 2 will invoke privacy mode. It can be programmed from 1 second to 59 minutes 59 seconds. Doors can be programmed individually or globally.

5. LAU Time

If enabled the LAU timer will lockdown a door for a programmed time after it has been used. It can be programmed from 1 second to 59 minutes 59 seconds. Doors can be programmed individually or globally.

8.2 Door Type

In the settings menu option 2 allows the user to set whether individual doors are normally locked or normally unlocked or roller shutters, it contains 5 options 1. All doors locked, 2. All doors unlocked, 3. All Auto Doors, 4, All 3rd Party Auto Doors, 5. Setup Individual Doors.

When setting individual doors, the second line on the screen will display the subject door and its current setting, and the third line will display the setting to change it to.

Press left and right to cycle doors, left and right to toggle locked/unlocked/roller, press “A” to save the state and press “B” to exit.

8.3 Fire Alarm

Option 3 in the settings menu allows the F1 input to be programmed for the fire alarm input, there are three options for programming:

1. When a +ve is applied to F1 all doors will unlock.
2. When a +ve is applied to F1 will isolate all doors from the interlock so they remain locked, but whenever a RTE is pressed access will always be granted.
3. Each door can be individually set to either unlock or isolate.

8.4 Special Funtions

Option 4 of the settings menu allows special functions to be configured.

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Privacy

When the privacy function is enabled pressing RTE button two for 5 seconds on specified doors will invoke privacy. To set privacy timer refer to 11.1.

Privacy locks down doors that are linked together for a programmed time period or until RTE button 2 is pressed again. This is used for changing rooms on the entrance to clean rooms. RTE button 2 must be the internal button to the change room on all doors.

The options for privacy are to enable it for all interlocked doors, disable it or create custom privacy links.

In “2. Setup privacy” links between doors are created, the second line of the screen displays the subject door and the target door, the bottom of the screen displays the doors the subject door is linked to.

To Link a door with another door press “A” and the linked door will appear below.

To remove the linked door simultaneously press up and down.

Press up and down to cycle subject door.

Press left and right to cycle the target door.

When all required doors have been associated press “B” to exit.

Example

Doors 1 and 2 are linked with privacy and Doors 3 and 4 are linked with privacy both with a 5-minute privacy timer.

Pressing RTE button 2 on door 2 for 5 seconds will lock door 1 and 2 for 5 minutes or until RTE button 2 is pressed again.

While doors 1 and 2 are locked down doors 3 and 4 are still free to use.

Lockdown

Screw terminal F2 can be configured as either a lock down input or lockdown timer. To configure the timer refer to 11.1.

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If configured as a lockdown input whilst a +ve trigger is applied to F2 all doors will remain locked.

If configured as a lockdown timer when a momentary +ve trigger is applied to F2 all doors will lockdown for a programmable time.

This function may also be disabled.

LAU (lockdown after use)

The LAU feature is to lock down doors once they have been used for a programmable length of time. To configure LAU timer refer to 11.1.

The options for this feature are:

- LAU on all interlocked doors. If a door is used when it is closed again that door and all doors interlocked with it will lockdown for a programmed time period.
- Link Doors to lockdown. The setting allows for any door to be linked to any other door to lockdown after use.
- Delete LAU. This deletes all previously programmed lockdown after use functions disabling the feature.

In “2. Link Doors To Lockdown” links between doors are created, the first line of the screen displays the subject door and the target door, the bottom of the screen displays the doors the subject door is linked to.

To Link a door with another door for LAU press “A” and the linked door will appear below.

To remove the linked door simultaneously press up and down.

Press up and down to cycle subject door.

Press left and right to cycle the target door.

When all required doors have been associated press “B” to exit.

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Global relay output

There is a double pole relay output on the IGUIC controller that can be configured to one of the following 5 options.

- De-energise in breach
    - Relay is normally energised and will de-energise when there is a breach condition.
- Energise if any door is active
    - Relay normally de-energised, energises when a door is active
- Program doors to energise
    - The relay will energise when specific doors are active, see below for programming
- Fire alarm relay
    - The relay will energise when a fire alarm input is detected
- De-energise on break glass
    - The relay is normally energised, when any break glass is pressed it will de-energise until the break glass is reset

In “3. Program doors to energise” doors are selected to energise the relay, the second line of the screen displays the subject door, the bottom of the screen displays the doors that currently energise the relay.

To select a door press “A” and the selected door will appear below.

To remove the linked door simultaneously press up and down.

Press up and down to cycle the door.

When all required doors have been selected press “B” to exit.

F2 Input Release All

If a +ve input is applied to the F2 terminal all doors will release.

F3 Fumigate

Fumigate allows some doors to be locked and some unlocked when a +ve input is applied to F3.

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In this menu the user can select which doors are to lock and which are to unlock.

F4 Special Fire Setup

When configured the F4 terminal allows only specified doors to be affected by the fire alarm.

Setup how the doors are to operate when the fire alarm is active as per section 11.3, then in this menu option select which doors are then affected by applying a +ve to the F4 terminal.

8.5 Passcode

Option 5 in the settings menu allows a passcode to be programmed into the controller restricting access to the menu.

When setting a passcode use a combination of up, down, left, right to create a 4-digit passcode to access the main menu from the home screen.

8.6 Lock Type

In the settings menu option 6 allows the user to set the type of lock to be used, it contains 3 options 1. All doors monitored locks, 2. All door unmonitored locks with door contacts, 3. Setup individual doors.

When setting individual doors, the second line on the screen will display the subject door and its current setting, and the third line will display the setting to change it to.

Press left and right to cycle doors, left and right to toggle monitored lock/door contact, press “A” to save the state and press “B” to exit.

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8.7 Break Glass

Option 7 allows the emergency break glass function to be programmed.

The break glass will physically drop power locally to the lock, the controller will also be notified that the break glass has been activated. When the controller receives this input, it can be programmed to operate in one of the following ways:

1. Unlock all interlocked doors,

   This when selected will unlock all doors that are interlocked with the doors who's break glass has been pressed.

2. Unlock all doors,

   This when selected will unlock all doors that are connected to the panel.

3. Unlock single doors.

   This when selected will not unlock any other doors, only the door who's break glass has been pressed will unlock.

4. Disable Interlock.

   This when selected will release the door where the break glass has been pressed and all other doors will accept a request regardless of the state of other doors on the interlock.

8.8 Relay Cards

This allows the order win which the relay card will give an output, either relay card 1 as a door monitor and relay card 2 as a breach monitor or vice versa.

8.9 Set Modbus Address

This option allows a Modbus address to be assigned to this controller, the Modbus address is a number between 1 & 32. If used, please ensure each controller has a unique Modbus address.

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8.10 Door Override

When terminals B + C next to the RJ45 sockets for the doors on the controller are shorted together, it will override this door. On override each door can be programmed to either lockdown or unlock.

8.11 Factory reset

Option 9 in the settings menu allows for a factory reset, this will wipe all programmed settings and data and restore the controller to an as new state. Once this option is selected cycle the power to complete the reset.

9. Hard Reset

To perform a hard reset:

- Remove power to the controller for a minimum of 5 seconds.
- Connect F2 to positive.
- Hold the left and right buttons.
- Re-apply power.
- Remove link to F2.

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10. Test mode

To enter test mode at the main menu, select option “10. Test Mode”, the home screen will now display “Hold ‘B’ To Exit Test Mode’ and the indicators at each door will give the following indications:

- Flashing green – power on to lock, lock contact closed.
- Steady green – power on to lock, lock contact not closed.
- Flashing red – power off to lock, door contact closed.
- Steady red – power off to lock, door contact not closed.
- Flashing red and green simultaneously – estop/break glass pressed.
- Buzzer to beep when changing from green to red.

Pressing both buttons or activating access control will toggle between locked and unlocked.

Holding “B” will exit test mode.

When test mode is deactivated whatever interlocking schedule and door settings that were previously programmed will be restored.

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Appendix I - Parts List

IGUIC8-12	12V 8 Door controller
IGUIC4-12	12V 4 Door controller
IGUIC8-24	24V 8 Door controller
IGUIC4-24	24V 4 Door controller
IGUIC-JB	12V Junction box
IGUIC-JB24	24V Junction box
S1718BS	request to release button with status LEDs and sounder
S1718BSNT	Touchless request to release button with status LEDs and sounder
S1719S	maintenance key switch
MCP-GS-11-DPCO	DPCO emergency release
S1717SJM	Door status indicator, Red / Green jumbo LEDs and sounder
H-ML600-M	Mini Maglock
H-ML1200-M	Maglock

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Appendix II - Glossary of terms

A/C	- Access Control
BG	- Break Glass
Breach	- A condition contrary to normal operation
COM	- Common
Door contact	- A closed contact that open as a door opens
DOTL	- Door open too long timer
Dwell	- Time period in which a door must open before it re-locks
LAU	- Lockdown after use
Lockdown	- Door will lock and not reopen for this period
Monitored lock	- A contact the changes as a lock locks and unlocks
NC	- Normally closed
NO	- Normally open
Privacy	- A type of lockdown
RTE	- Request to exit
Subject door	- The door that's settings are being altered
Target door	- To door to be associated with the subject door

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Appendix III – Door Parameter Table

Door Number	Doors interlocked with								Links[1]				Door Type		Lock Type		Dwell Time[2]	DOTL Time[3]	LAU Time[4]	Privacy Time	Fire Alarm
	1	2	3	4	5	6	7	8	L1	L2	L3	L4	Locked	Unlocked	Monitored	Door Contact					
Default	x	x	x	x	x	x	x	x					x		x		5 sec	1 min	N/A	N/A	Release
Door 1																					
Door 2																					
Door 3																					
Door 4																					
Door 5																					
Door 6																					
Door 7																					
Door 8																					

[1] Door linked to separate interlock controller
[2] Time door will release for after request
[3] Time door is allowed to be open for
[4] Lock down after use time

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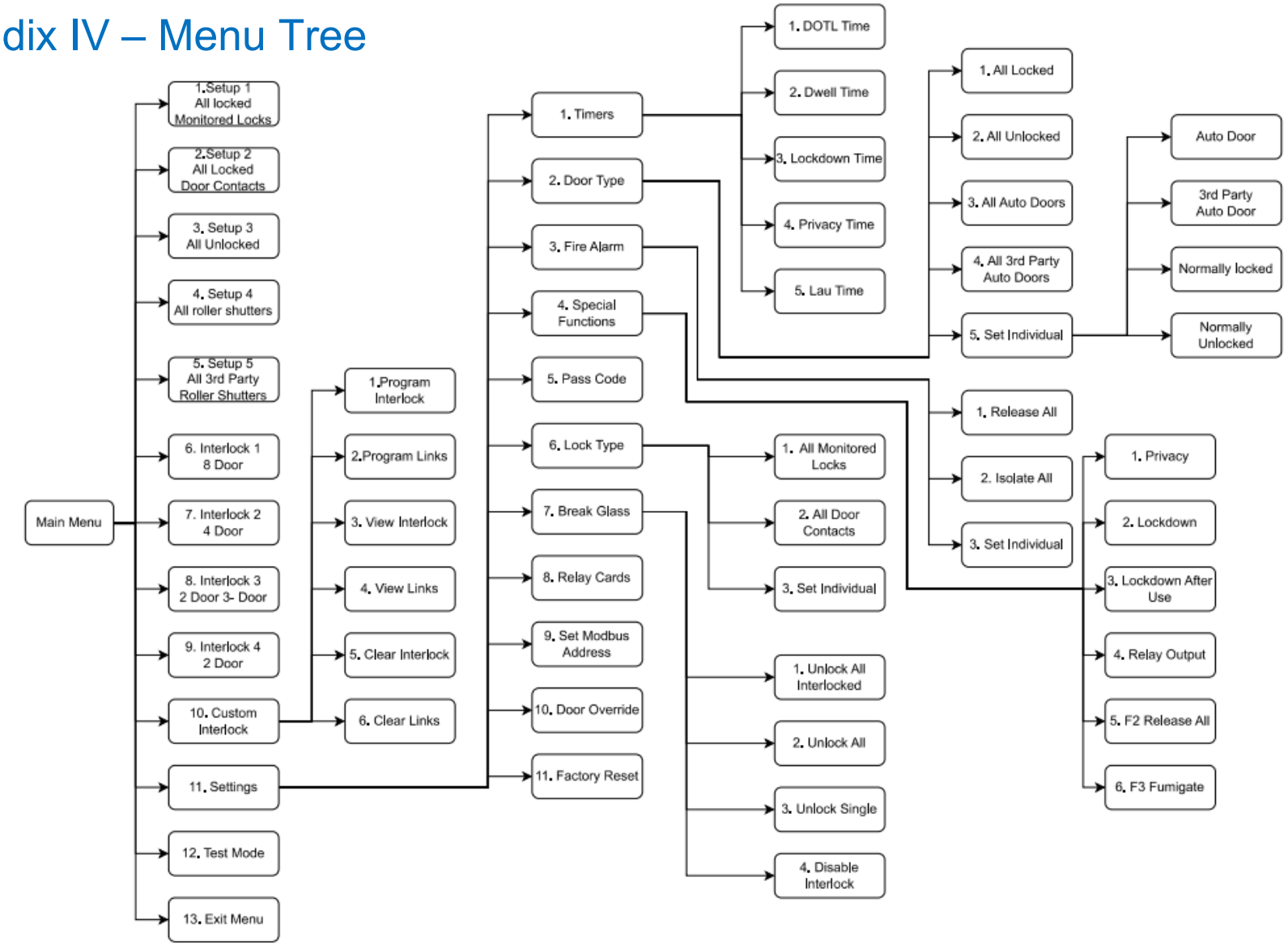
Appendix IV – Menu Tree



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