

Door Interlock Systems Installation & Operation Manual

(DIS-4X; DIS-4SV; DIS-2X)

Door Interlock Systems revised
Ver. 1.01 on date 16 Feb 2012

Due to continuous technology up-gradation, product specifications and features are subject to change without notice at any time.

It is Smart I's goal to supply accurate and reliable documentation. If you discover a discrepancy in this document or Need Help, please e-mail your comments to

support@smartisystems.com

Smart-I Electronics Systems Pvt. Ltd.

119, Neha Industrial Estate,

Opp. Tata Steel, Dattapada Road,

Borivali (East) Mumbai – 400 066.

Tel: + 91-22-40744444 / Telefax: +91-22-40744455

Email- enquiry@smartisystems.com

TABLE OF CONTENT

WARNING & CAUTION	3
INTRODUCTION:-	4
PRODUCT FEATURE	4
PRODUCT SPECIFICATION:-	5
BLOCK DIAGRAM FOR 2 DOORS DIS:-	6
GENERAL ARRANGEMENT DIAGRAM OF SYSTEM FOR 4DIS SYSTEM:-	8
MASTER 2-DIS BOARD CONNECTION DETAILS:	9
MASTER 4-DIS MASTER BOARD CONNECTION DETAILS:-	10
SLAVE 4-DIS SLAVE BOARD CONNECTION DETAILS:-	11
4 DIS PCB CONNECTOR DETAILS:-	12
4 DIS PCB LED DETAILS:-	15
DOOR CONNECTIONS FOR EML AND STRIKE LOCK:-	15
DOOR CONNECTIONS FORMAGNETIC CONTAC:-	15
FACIA PLATE CONNECTION DETAILS:-	16
SYSTEM OPERATION:-	17
PROGRAM DOORS LOGICALLY USING KEYPAD:-	18
KEYPAD FUNCTION DETAILS FOR 4 DIS SYSTEM:-	18
DIS INTEGRATION WITH ACCESS CONTROLLER SYSTEM	20

WARNING & CAUTION

- Ø Do not open system or place it near other heavy electrical equipments. The system is sensitive to Electro Static Discharge (ESD)
- Ø Do not power on the system without reading this manual. Ensure proper power supply with Earthing.
- Ø Note down the serial number and model no. of the device for future reference and quote in all support and service requests.
- Ø Mounting the unit in strong sunlight may affect user visibility of the LCD. Ensure that the LCD and LED's are clearly visible in all lighting conditions.
- Ø Do not use this unit near water.
- Ø Never insert objects of any kind into the unit or through the cabinet slots as they may touch voltage points and/or short circuit parts possibly resulting in fire or electric shock. Never spill liquid of any kind on the unit.
- Ø Power up the controller only when installation is complete.

Important instructions:

- 1. Care should be taken identifying the wires. Improper wiring may render permanent damage to the device or personal injury.**
- 2. Check the earthing at the site before installing the controllers. Normally the earthing should be between 1V to 2V only. Earthing on the higher side may damage the controller or its various other components.**
- 3. Max allowable cable distance between Master DIS & Slave DIS is up to 1.5 mtr to 2 mtr**

Introduction:-

DIS is designed and manufactured state-of-the-art door interlock/access systems for clean rooms, containment suites, laboratories - in fact any critical area that requires door access control with additional security.

It is an USER PROGRAMMABLE Door Interlock System, This system is designed to suit modern door interlocking requirements.

DIS has Master-Slave Configuration and can be configured up to maximum 8 doors in loop.

The unit is flexible and can be configured on site by the user for required door locking logic

Product Feature

1. Programmable Micro controller based Door Interlock unit
2. One "4 - DIS Master" system can control up to 4 Doors
3. By adding "4-DIS Slave" system can control up to 8 Doors
4. Master & slave configuration. (Max. slaves 1 no.)
Each Master & slave control 4 Doors in DIS (i.e. totally 8 Doors)
5. One Emergency / Fire input is used to open all doors automatically on following events
 - Fire input activated by alarm output of fire panel, connected to only at Master unit
 - Emergency input activated by user, using Emergency button connected to only Master unit
6. Different modes of operation
 - Inter-lock logic standard / programmed selected by Pro-keypad on Master
7. Status of individual door is also indicated on Door Facia Plate.
 - "OPEN" ----- Door Opened
 - "LOCK" ----- Door is Lock

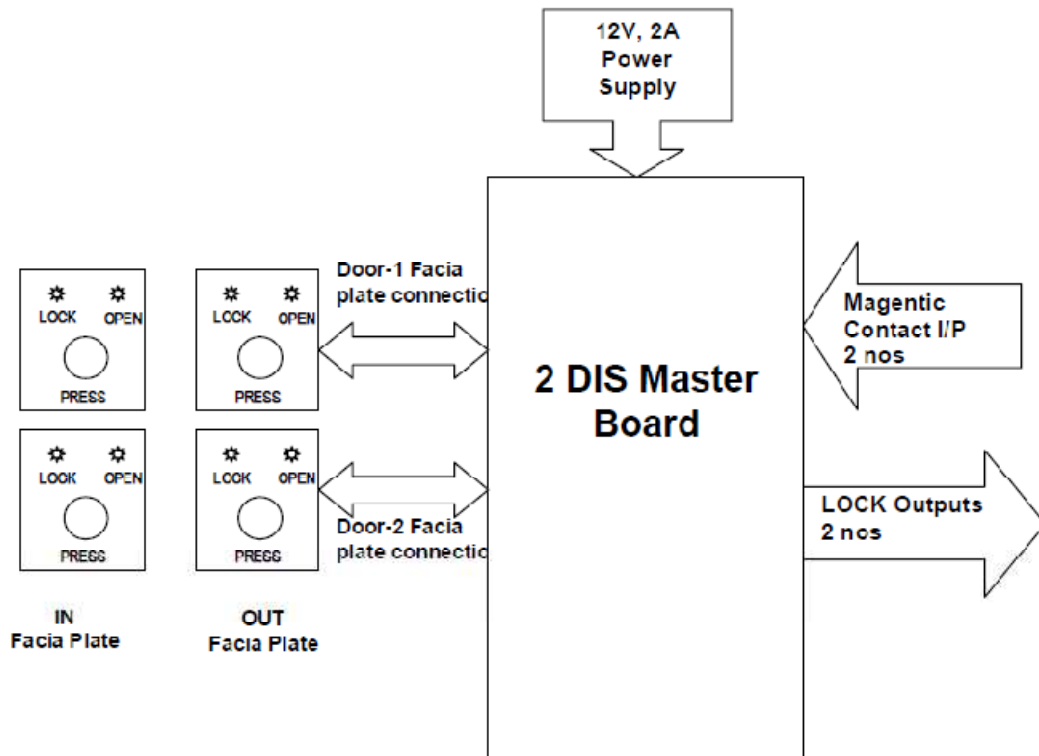
Product Specification:-

A) Specifications of 4 Door DIS MASTER	
Type	Microcontroller based 4 Door DIS system
Display & Keypad	16 X 2 Alphanumeric display & 12 Keys Keypad using Pro Keypad (Used only in Programming Logic mode)
Outputs	Potential free o/p X4 nos for Lock Contact Rating : 0.5 amp for 230 V AC 1.0 amp for 24 V DC
	Door LOCK LED indication X 4 nos
	Door OPEN LED indication X 4 nos
	DOTL Buzzer X 4nos
Inputs	Total 9 Optically Isolated inputs
	Magnetic contact X 4 nos
	Egress Switch X 4 nos
	Fire / Emergency I/P X 1nos
Max. Slave Output	One with Parallel Interface (To make 8 door DIS)
Power supply	12V @ 5A
Fitting type	DIN Rail mounting
Dimensions in mm	390 mm (L) X 90 mm (W) X 320 mm (H)
Weight	Approx 3kg

B) Specifications of 4 Door DIS SLAVE	
Type	Digitally control based 4 Door DIS system
Out puts	Potential free o/p X4 nos for Lock Contact Rating 0.5 amp for 230 V AC 1.0 amp for 24 V DC
	Door LOCK LED indication X 4 nos
	Door OPEN LED indication X 4 nos
	DOTL Buzzer X 4nos
In Puts	Total 8 Optically Isolated inputs
	Magnetic contact X 4 nos
	Egress Switch X 4 nos
Power supply	12V @ 5A
Fitting type	DIN Rail mounting
Dimensions in mm	390 mm (L) X 90 mm (W) X 320 mm (H)
Weight	Approx 3kg

C) Facia plate	Technical Specifications
LED Indication	Door Open LED (Green)
	Door Lock LED (Red)
Facia Plate Dimension	90mm (L) X 35mm (W) x 90mm (H)
Wall cutout Dimension	48mm (L) X 35mm (W) X 70mm (H)
Alarm Output	1 Buzzer o/p for Alarms
Input	Door Open Switch or Egress Switch

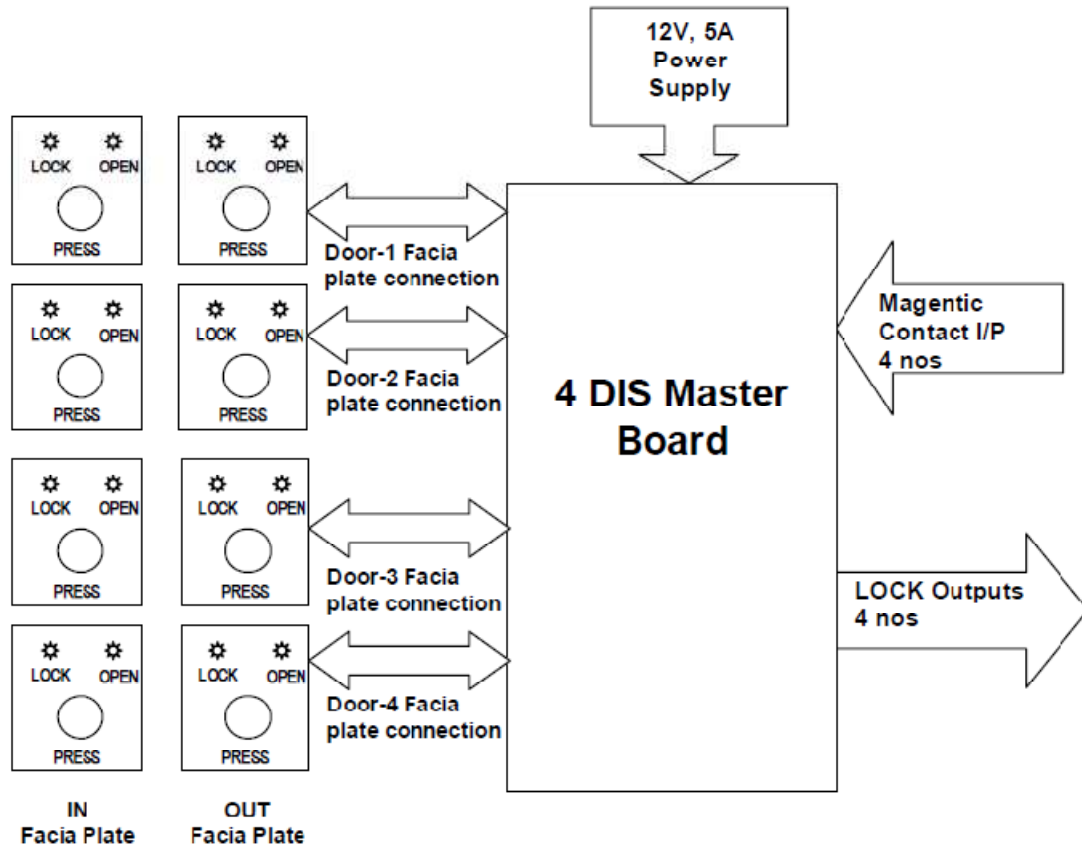
Block Diagram for 2 Doors DIS:-



System Requirement for 2 Doors

DIS Board	: 1 No
Power Supply	: 12VDC, @2A
Switch Plate (Door Plate)	: 4 No's (for IN & OUT)
Magnetic contact Switch	: 2 No
Electro-magnetic Lock	: 2 No

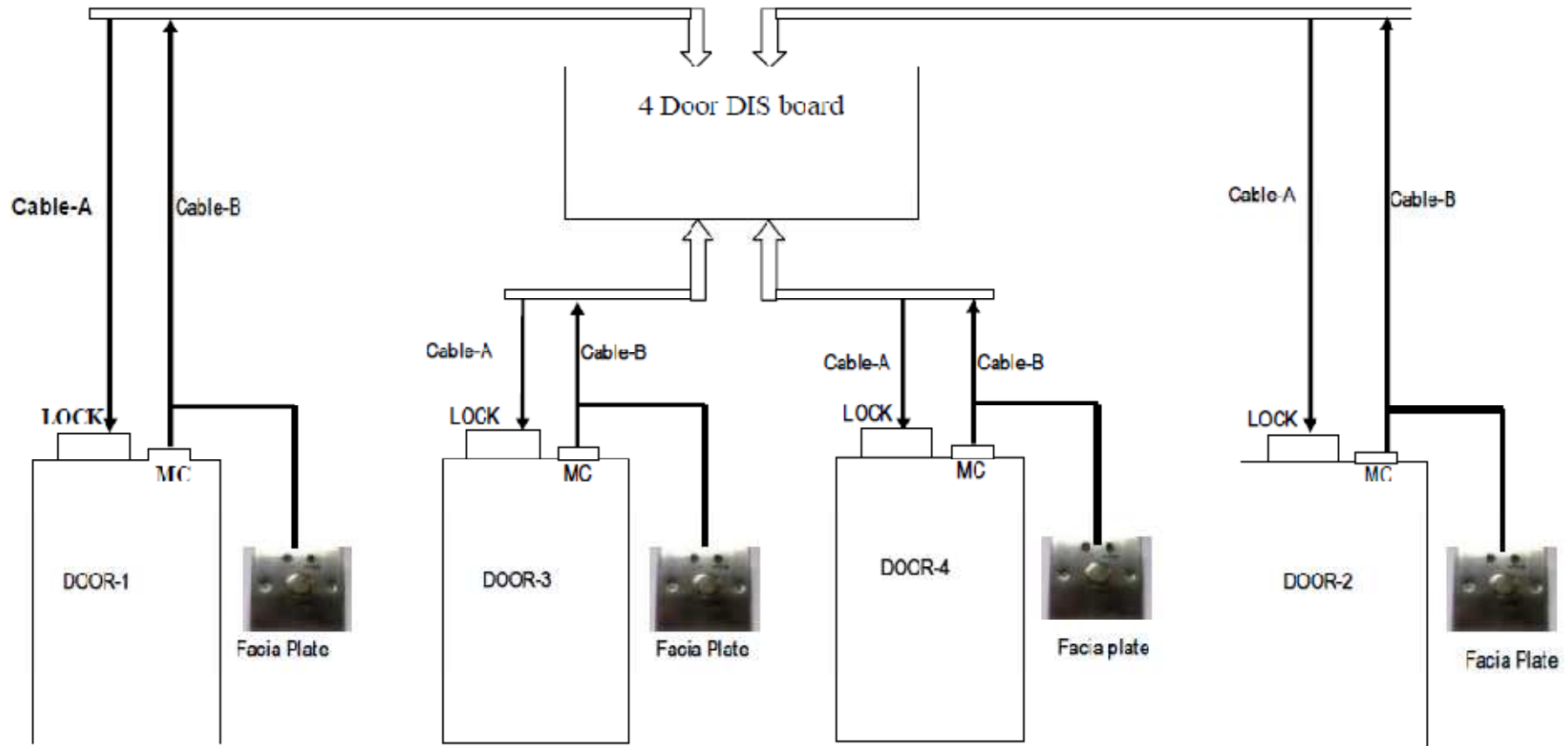
Block Diagram for 4 Doors DIS:-



System Requirement for 4 Doors

DIS Board	: 1 No
Power Supply	: 12VDC, @5A
Switch Plate (Door Plate)	: 8 Nos (for IN & OUT)
Magnetic contact Switch	: 4 No
Electro-magnetic Lock	: 4 No

General Arrangement Diagram of system for 4DIS system:-

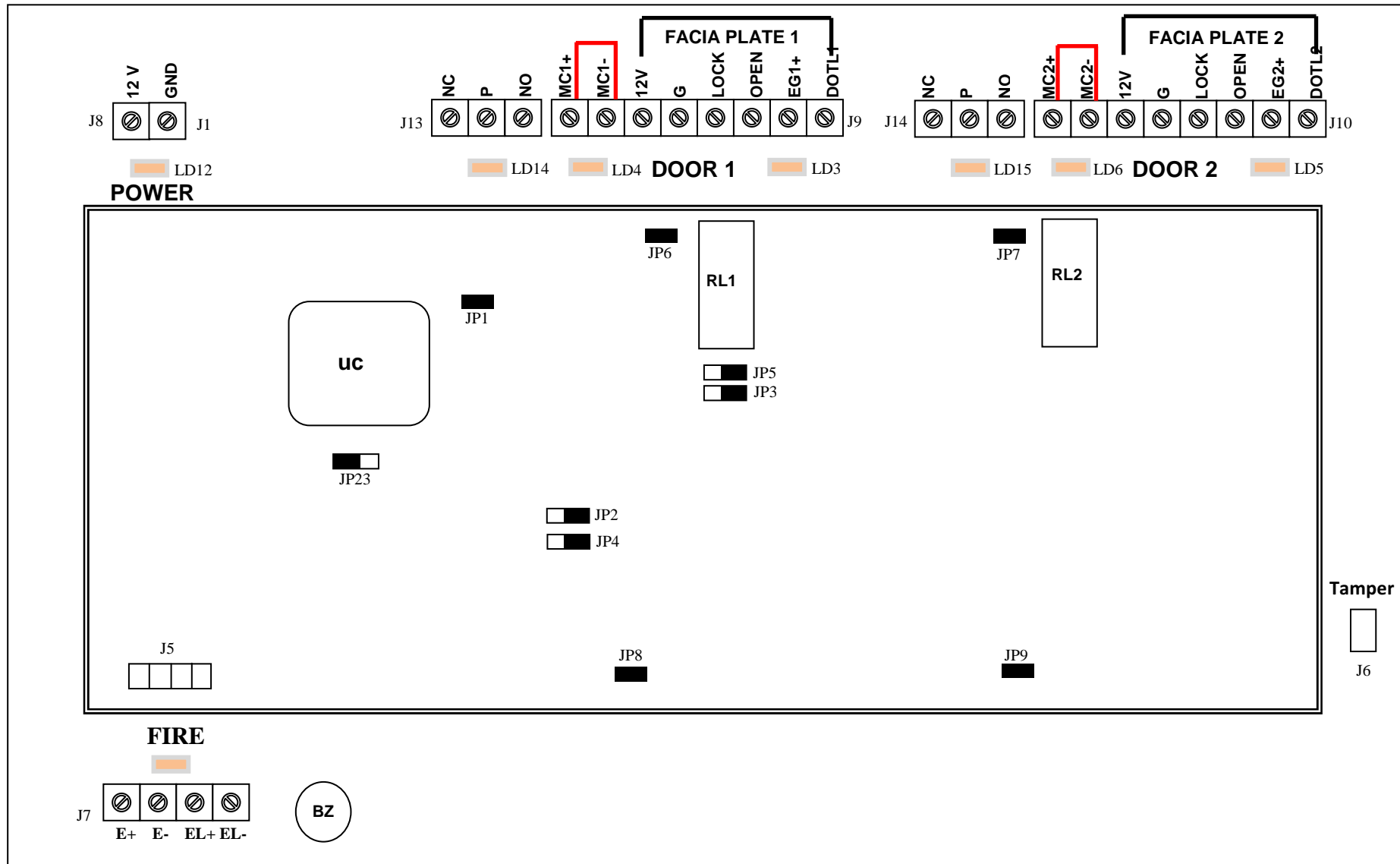


Cable Specification

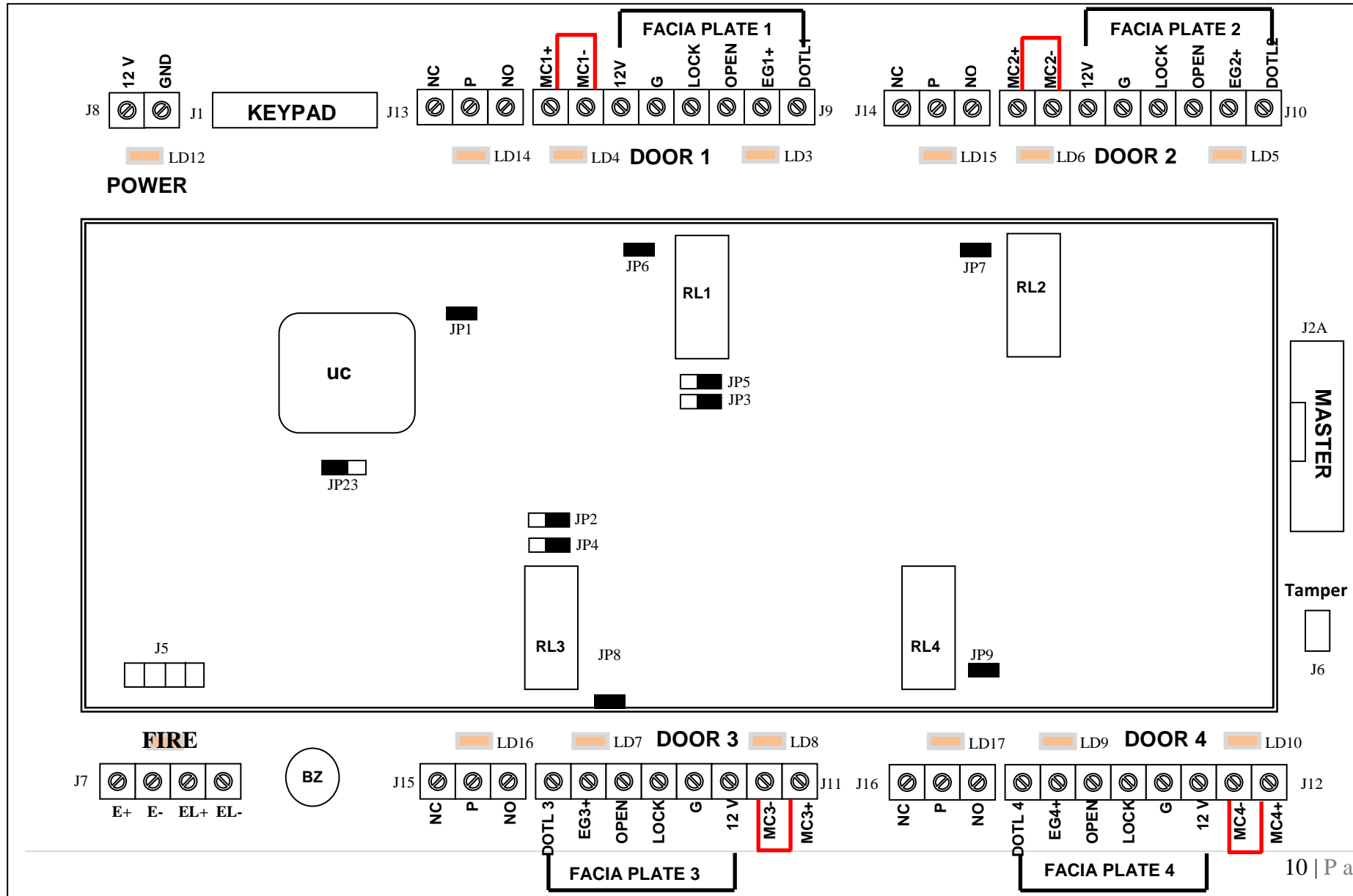
Cable-A (Lock Cable) => 2 core cable (14/36; 22AWG) max 100 meter

Cable-B (Facia plate and MC Cable) => 8 core cable (14/36; 22AWG) max 100 meter

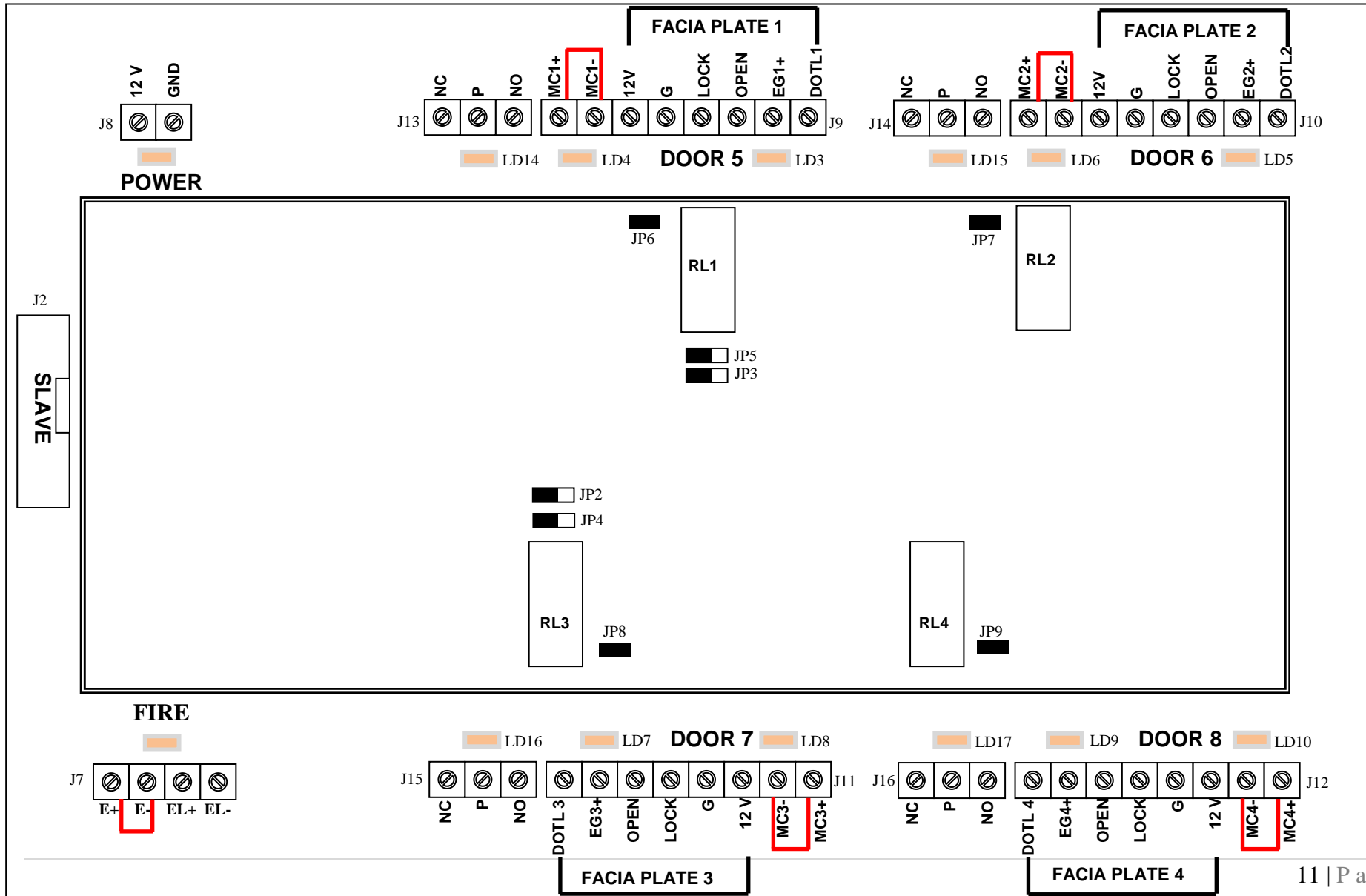
Master 2-DIS Board Connection Details:-



Master 4-DIS Master Board Connection Details:-



Slave 4-DIS Slave Board Connection Details:-



4 DIS PCB Connector Details:-

J1 Connection Details:- (Keypad and Display)	
Pin No.	Description
1 to 16	KEYPAD and DISPLAY

J2 Connection Details:- (Slave)		
Pin No.	Legend	Description
1 to 16	-	FRC cable is connected here which comes from Master board when we have to use it as 8-DIS.(Slave pin) Max distance slave to master 1.5 to 2 meter.

J2A Connection Details:- (Master)		
Pin No.	Legend	Description
1 to 16	-	FRC cable is connected here which other end is connected at Slave board when we have to use it as 8-DIS.(Master pin)

J6 Connection Details:- (Tamper)		
Pin No	Legend	Description
1 to 2	-	TAMPER switch is Connection

J7 Connection Details:- (Fire)		
Pin No.	Legend	Description
	E+	Emergency Switch or Fire Button is Connected or it is Short Circuited using wire for Slave purpose.
	E-	
	EL+	
	EL-	

J8 Connection Details:- (Power Supply)		
Pin No.	Legend	Description
1	VCC	For Power Supply purpose. 12V @ 5A
2	GND	

J9 Connection Details:- (Door 1)		
Pin No.	Legend	Description
1	MC1+	Short Circuited using wire.
2	MC1-	
3	12V	For power supply purpose.
4	GND	
5	Lock	Door Lock LED indication.
6	Open	Door Open LED indication.
7	EG1+	Egress Switch Connection.
8	DOTL1	DOTL buzzer indication.

J10 Connection Details:- (Door 2)		
Pin No.	Legend	Description
1	MC2+	Short Circuited using wire.
2	MC2-	
3	12V	For power supply purpose.
4	GND	
5	Lock	Door Lock LED indication.
6	Open	Door Open LED indication.
7	EG2+	Egress Switch Connection.
8	DOTL2	DOTL buzzer indication.

J11 Connection Details:- (Door 3)		
Pin No.	Legend	Description
1	MC3+	Short Circuited using wire.
2	MC3-	
3	12V	For power supply purpose
4	GND	
5	Lock	Door Lock LED indication.
6	Open	Door Open LED indication.
7	EG3+	Egress Switch Connection.
8	DOTL3	DOTL buzzer indication.

J12 Connection Details:- (Door 4)		
Pin No.	Legend	Description
1	MC4+	Short Circuited using wire.
2	MC4-	
3	12V	For power supply purpose
4	GND	
5	Lock	Door Lock LED indication.
6	Open	Door Open LED indication.
7	EG4+	Egress Switch Connection.
8	DOTL4	DOTL buzzer indication.

J13 Connection Details:- (Door 1)		
Pin No.	Legend	Description
1	NC	Potential free contacts of Relay1.
2	P	
3	NO	

J14 Connection Details:- (Door 2)		
Pin No.	Legend	Description
1	NC	Potential free contacts of Relay2.
2	P	
3	NO	

J15 Connection Details:- (Door 3)		
Pin No.	Legend	Description
1	NO	Potential free contacts of Relay3.
2	P	
3	NC	

J16 Connection Details:- (Door 4)		
Pin No.	Legend	Description
1	NO	Potential free contacts of Relay4.
2	P	
3	NC	

Note-

All Magnetic Contacts (MC+ and MC-) should be short circuited using wire for proper functioning of DIS Board when not using magnetic contacts.

Door 1, Door 2, Door 3 and Door4 will act as Door 5, Door 6, Door7 and Door 8 respectively when it is used as Slave Board.

Use 4-DIS Master Connection and Jumper details for 2-DIS Board.

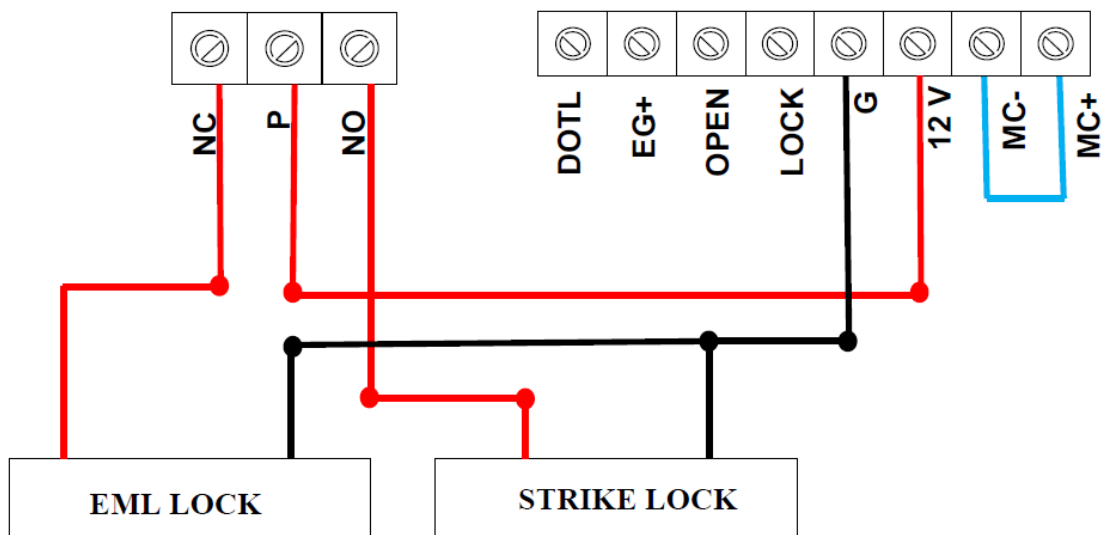
We are using same board with less connector and jumper for 2-DIS Board

4 DIS PCB LED Details:-

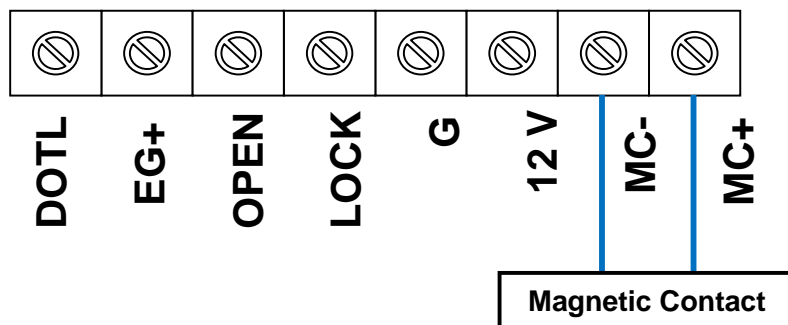
LED'S NUMBER	LABEL	FUNCTION	DESCRIPTION
LD14,LD15, LD16,LD17	LOCK Led's	Door 1, 2, 3, 4 Open	Normally off when door opened then it turns to green
LD3,LD5, LD7,LD9	EGREES	Door 1, 2, 3, 4 Open	Normally off By pressing egress switch it turns to red
LD4,LD6, LD8,LD10	Magnetic contact	Door 1, 2, 3, 4 Open	Magnetic contact present= Red
LD11	FIRE	FIRE	Normally OFF, When Fire Activated then it turns to Red
LD12	12V	Power Indication	Continuous On

For trouble shooting you can check this led's indications on DIS board.

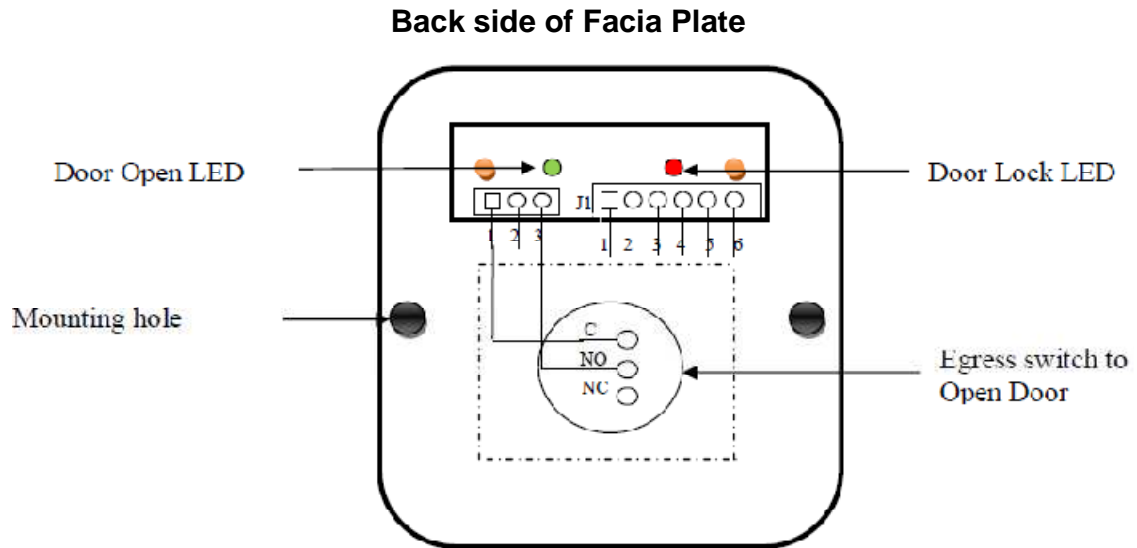
DOOR CONNECTION FOR EML AND STRIKE LOCK:-



Door Connection for Magnetic Contact:-



Facia Plate Connection Details:-



6 Pin Connector Details of Facia plate PCB

J1 Pin No.	Pin Details	Wire color
1	12V	Green
2	GND	Yellow
3	Door LOCK	Orange
4	Door Open	Red
5	Exit switch	Brown
6	DOTL Buzzer	Black

Facia Plate connection with 4 Door DIS Board

Facia Relimate Plate Connector			To 4 Door DIS Board Door-1 to Door-4		
J1 Pin	Pin Details	Wire color	Facia Pin	Pin Details	Wire
1	12V	Green		12V	
2	GND	Yellow		GND	
3	Door LOCK	Orange		LOCK	
4	Door Open	Red		Open	
5	Exit switch	Brown		EG	
6	DOTL Buzzer	Black		DOTL	

System Operation:-

Door Interlock System is designed for door interlocking requirements. The system consists of one Master & one slave connected parallel to control total 8 Doors. Each Master & slave control 4 doors. It also has Facia plate connection for 4 Doors. Facia plate consists of Egress switch for opening door and LED indications for Door status. Door Open (GREEN LED), Door Locked (RED LED).

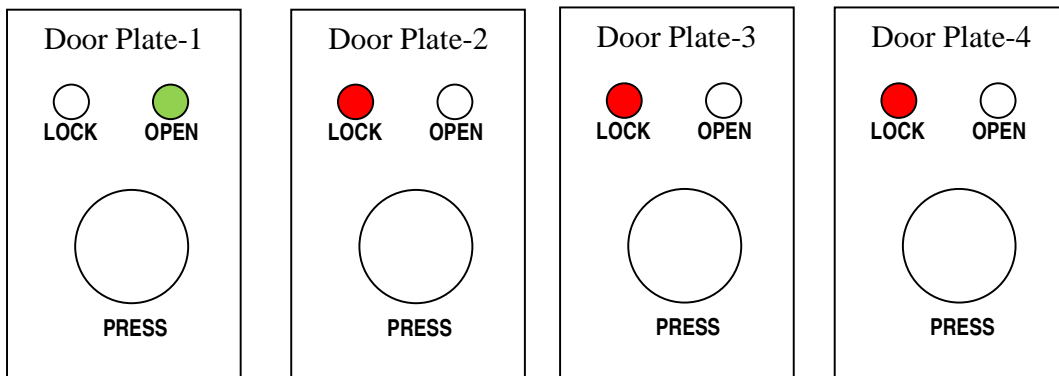
Unit can be operated on two logics:-

1. **Standard Logic (Default Logic)** - where only one Door opens at a time.
2. **Programmed Logic (User Logic)** - A flexible interlock logic configured by user onsite by external keypad.

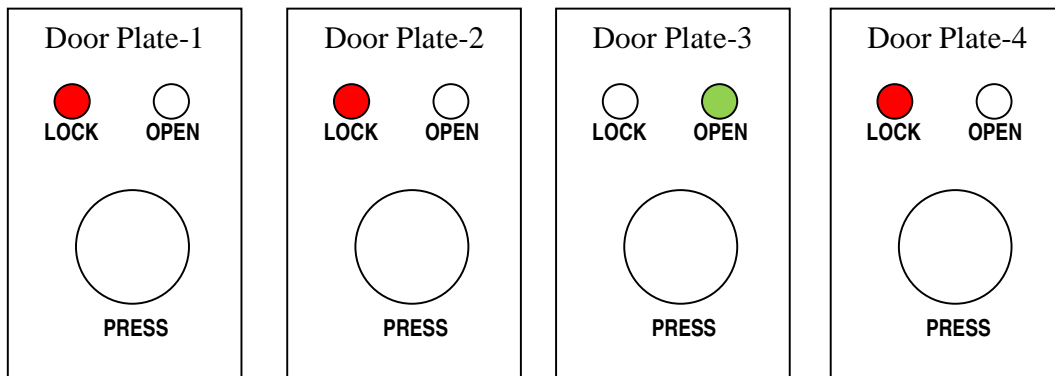
- Normally all door LEDs are off.
- When Egress button pressed to open, the door Green LED turns ON for 5 seconds to indicate Door is released.
- For those 5 seconds RED LED turns on for other doors which are not allowed to open.
- In case of Emergency / Fire, press Emergency button connected to Master, it allows to open all Doors simultaneously, in spite of other door status. (i.e. all Facia plate OPEN LED will be ON).
To come out from emergency, Switch OFF & Switch ON the Door Interlock system before that release the Emergency Switch/ Button.

LED indications for Standard Logic Operation:

1. When Door 1 released:



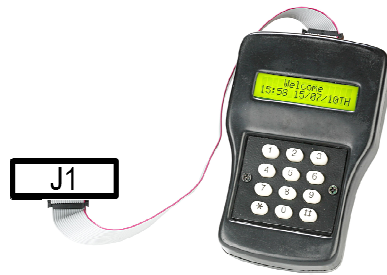
2. When Door 3 released:



Program Doors Logically Using Keypad:-

Note:

- Programming is always done on Master Controller.
- We have to connect external Keypad to J1 connector on master DIS board.



- The firmware is only for Master Controller.
- Press key *2 enter User ID (11111) and then enter password (12345) and then press # key.
- Press key *4 enter configuration for various doors as per as user needs it and then press # key.
- Press key *3 and then press key 2 to select User logic to use DIS in "Program Logic".

Keypad Function Details for 4 DIS system:-

Sr. No.	Function	How to go?	Note	Observation
1.	Normal Mode	Key- *0		
2.	Admin Mode	Key- *2 Enter User ID(11111) Press # key Enter Password(12345) Press # Key	To come out from Admin mode press Key – *2 Key – # (Auto logoff after 60sec)	
3.	Select Mode	Key- *3 Press- 1 for Default logic Press- 2 for User logic	We can select any one of the logic, depending upon used of it.	

4.	Configure Door	Key- *4 Press- 1 for not allowing other door to be used simultaneously. Press- 0 for allowing other door to be used simultaneously. Press- # to enter	We can configure 4 or 8 door, depending upon the units configuration	Refer Annexure:1
5	Fire Tamper	Key- *5 Press-0 for Disable Fire-Tamper Press-1 for Enable Fire Press-2 for Enable Tamper Press-3 for Enable Fire-Tamper Press -# to enter		
6	Help Menu	Key – *8 Press – 1 for INC Press – 3 for DEC Press – # to enter	We can directly go in to any menu by pressing “#” key.	
7	Initialize System	Key – *90 Press – 1 for Yes Press – 3 for No Press– # to enter	It initializes the system. All data will deleted	
8	Door open time	Key – *95 Enter door open time Key – #	Door open time can be set → 1 to 98 sec. And DOTL sense time is equal to Door open time + 1 sec.	

Annexure: 1 (*4 menu)

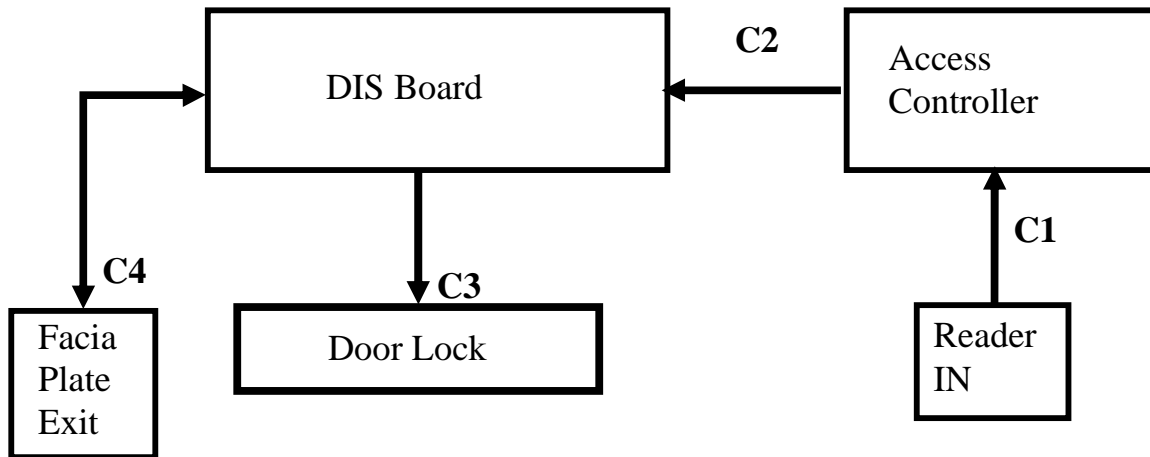
0 = Door Open by Egress (Indication by Green LED) on latch.

1 = Door Locked (Indication by Red LED) on latch

* = Door programming

	Door1	Door2	Door3	Door4	Door5	Door6	Door7	Door8
1	*	1	0	1	0	1	0	1
2	1	*	1	0	1	0	1	0
3	0	1	*	1	0	1	0	1
4	1	0	1	*	1	0	1	0
5	0	1	0	1	*	1	0	1
6	1	0	1	0	1	*	1	0
7	0	1	0	1	0	1	*	1
8	1	0	1	0	1	0	1	*

DIS Integration with Access Controller System



1. C1: Reader is connected to Access controller (as IN Reader).
2. **C2: Potential free contact o/p of Lock from Access controller is connected to egress I/P of DIS system.**
3. C3: Lock output from DIS system is connected to Door Lock.
4. C4: Facia plate is connected to DIS system (as Egress switch for Exit).

Connection DIS with Access Control:-

