48900 Series USER CONFIGURED INTERLOCK CONTROLLER

The 48900 series PLC interlock controller is a cost-effective method for operating door interlock and mantrap systems with up to nine doors. The fully integrated controller is a one-board solution that gives the user complete control over the operational logic. Doors may be normally locked or unlocked, fail safe or fail secure. They may be selectively interlocked or operated independently of the other doors. Lock relays can be set for either powered or unpowered (dry) contacts.

Switches and jumpers are used to configure the controller for the specific application required. No programming skills are needed. There are three adjustable on-board timing functions. One timer energizes the door alarm relay if a door is propped open. A second timer controls the unlock time when enabled. A third timer controls the time that doors remain unlocked during an emergency egress.

The complete system includes a 10 Amp 12 - 24 Volt DC power supply with a supervised Fire Alarm Interface in a lockable metal enclosure. The Fire Alarm Interface will shut down power at the terminals when the fire alarm input is either shorted or open (such as the activation of a pull box). The fire alarm DIP switch must be set to "enable",

IMPORTANT: The supervised fire alarm interface cannot be connected in series or parallel with other power supplies. Each supply requires a separate fire alarm circuit.
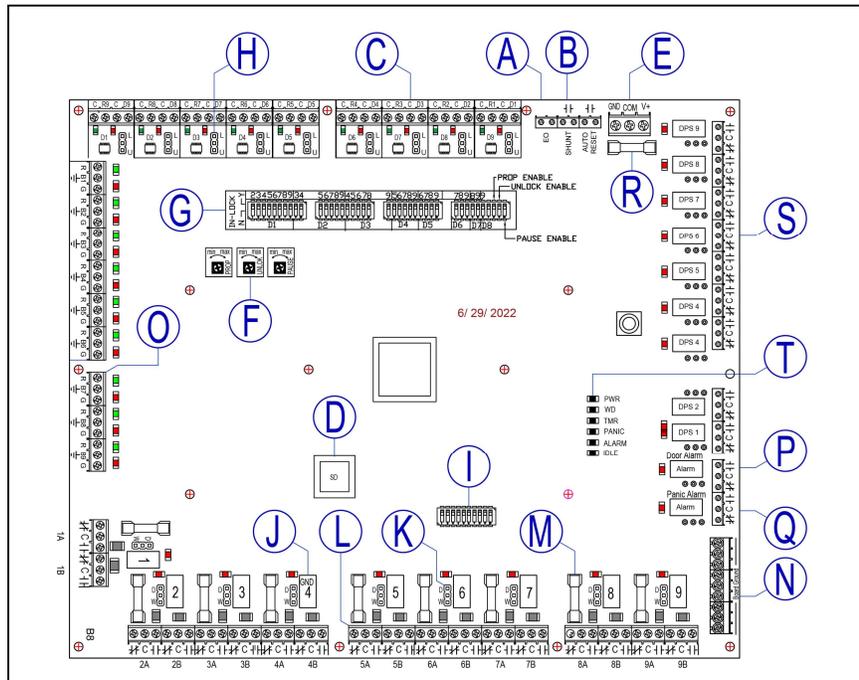

48901 shown

FIG. 1

A	Emergency Unlock Input	H	Door Configuration Jumper
B	Interlock Shunt Input	I	Output Configuration Switches
C	Door and Access Control Inputs	J	Lock Control Relays
D	SD Memory Card Slot	K	Lock Output Wet Dry Select
E	System Power Input	L	Lock Control Outputs
F	Timer Adjustment Controls	M	Lock Power Fuse 2 Amps
G	Interlock Setting Switch Block	N	Lock Ground Return Terminals

O	Red-Green Traffic Light Outputs
P	Door Alarm Output
Q	Panic Alarm Output
R	Master Fuse
S	Door Status Out – Dry
T	System Status Lights

OVERVIEW

The 48900 controller allows for any combination of up to nine doors to be interlocked by setting the appropriate switches.

The user may set doors for normally unlocked, or normally locked operation, requiring an access control signal to unlock when interlocked doors are secure.

There are nine lock control relays that can power locks directly (wet contact). Each can also operate as dry contact to switch power by others and for for automatic doors.

The user may select fail secure (relay energizes to unlock the door) or fail safe (relay energizes to lock the door) operation.

There are nine dry contact outputs to mirror door status back to access control devices when needed.

Nine powered outputs are provided to light door or lock status red and green LEDs. Locked door indicating lights show door status (green when locked but available and red when locked but not available because an interlocked door is in use). Lights for unlocked doors show lock status (red when locked, green when unlocked).
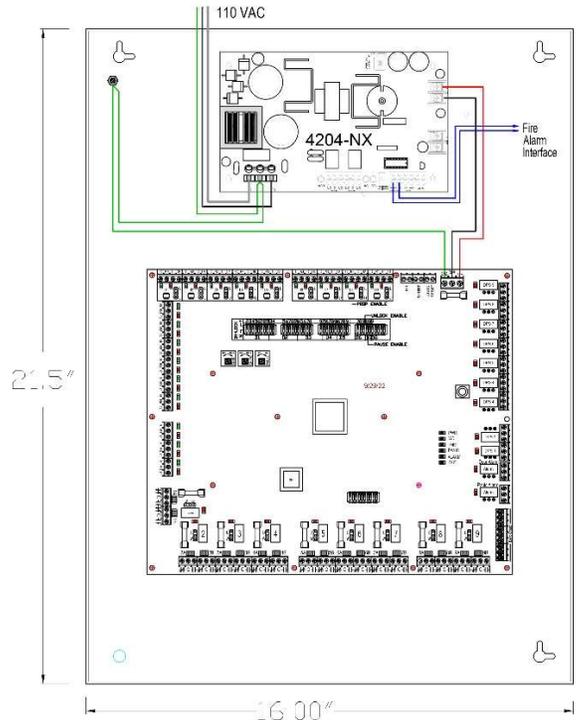
QUICK START GUIDE

1 SET DOOR TYPE

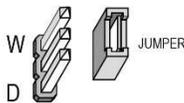Set each door: Normally Locked or Unlocked
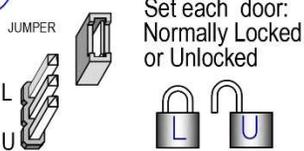
2 SET INTERLOCKS

2 - 9 doors can be interlocked.

3 TRAFFIC LIGHTS

Connections: red and green

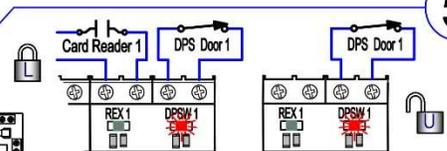Use the Wet contact jumper to power locks - remove for Dry contacts.

4 SELECT WET OR DRY

Safe - relay ON to lock
Secure - relay ON to unlock

9 SET FAIL SAFE OR SECURE

5 DOOR CONNECTIONS

Door connections - contacts close when the door closes. Locked doors require a REX to unlock: card reader, pushbutton, keypad etc.
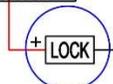
6 DOOR STATUS OUT

Door Status out to Access control doors or to guard console

7 DOOR ALARM
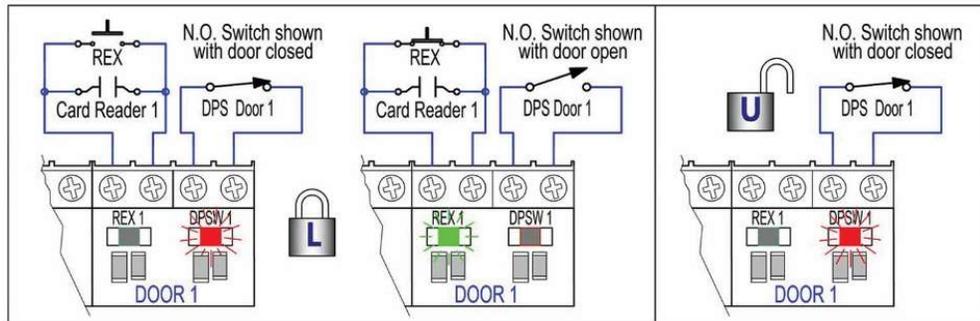
Door violation alarm relay select wet or dry contacts.

8 LOCK CONNECTIONS

HOOKUP

STEP	ITEM	I/O	AWG	REMARKS
1	Door Position Switches	IN	22 -18	**Contacts must close when door closes – IMPORTANT!**
2	Access Control	IN	22-18	For normally locked doors. Dry contact only: pushbutton, motion detector, card reader, key pad or similar. Contacts close to request access.
3	Door Control Relay: Locks	OUT	16-14	Powered locks use the fused contacts. Positive goes from "0" (NO) or "I" (NC) to lock. Lock ground return goes to Ground return terminals - fig 1 **N**.
4	Door Control Relay: Automatic Doors	OUT	22-18	Relay either mirrors REX input (locked door setting) or interrupts "OPEN" request circuit (unlocked setting) - dry contact only.
5	Traffic Lights	OUT	20-18	For LEDs, connect anode to R or G and cathode(s) to the center terminal.
6	DPS Out	OUT	22-18	The door position can be output to access control or to remote console. Both normally closed and normally open contacts are available.
7	Emergency Unlock	IN	22-18	Connects to dry contact pushbutton, pull box, or other device used to unlock all doors for an emergency egress.
8	Shunt and Reset	IN	22–18	Short the Shunt input to override the interlock function. Use wire jumper to enable alarm auto-reset or connect to momentary switch such as a keyed switch for manual rest.
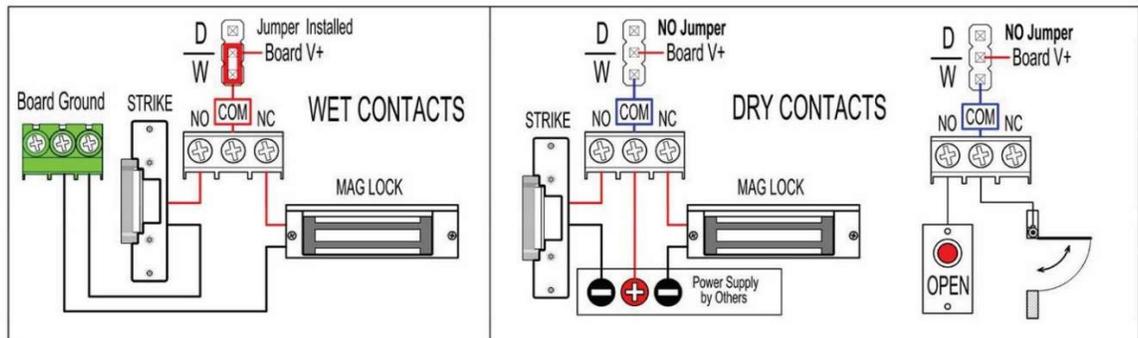
FACTORY DEFAULT SETTINGS – AS SHIPPED

No interlocks are selected.   Lock relays energize to lock (Fail Safe)   Doors are unlocked
No timers are enabled   EO triggers on contact closure   Outputs are dry contact
Forced door set to off

CONFIGURE THE INTERLOCK

STEP	ITEM		REMARKS
1	Set Locked or Unlocked		Locked doors require a request: pushbutton or access control to open
2	Set Interlocks		Use switch settings to interlock sets of doors
3	Set Wet or Dry Contacts		Door control relays can power locks directly or can be dry contact.
4	Set Safe or Secure		Relay energizes to lock (safe) or energizes to unlock (secure)
OPTIONAL SETTINGS			
5	Enable Timers as Needed		Enable: door unlock time, allowed open time, and emergency unlock time
6	Adjust Timers Used		Rotate trim pots to adjust delay for each enabled timer
7	Select Forced Door on/off		Turn off for access-controlled doors with crash bars or levers for free egress.

1. LOCKED/UNLOCKED

A normally locked door needs a REX input to unlock.

TO SET:
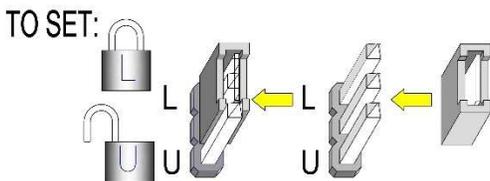
⚠ Jumper required for **normally locked** doors

LOCKED DOORS (Fig 1 C)

Any door requiring a request to open (REX) is treated as a locked door. Closed contacts at the REX will unlock the door for access or signal automatic door open to operate.

UNLOCKED DOORS

Doors that are normally unlocked unless an interlocked door is open do not need a request to open. REX input is ignored.

2. INTERLOCKS
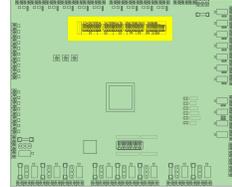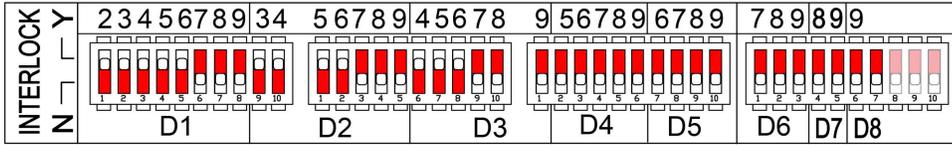
| DOOR	INTERLOCKS
1	2, 3, 4, 5, 6
2	1, 3, 4, 5, 6
3	1, 2, 4, 5, 6
4	1, 2, 3
5	1, 2, 3
6	1, 2, 3
7	No interlocks
8	No interlocks
9	No interlocks

INTERLOCKING DOORS (Fig 1 G)

In the example shown, the switch is moved to the yes (Y) position to interlock two doors. A table is helpful to visualize relationships. See last page notes section for blank interlock tables that can be filled out.

Important: one switch is used to interlock two doors. For that reason, door 2 interlock choices start with door 3 since doors 1 and 2 are already selected under door 1 choices. Door 8 has only a single choice (9) for that reason.

3. WET OR DRY CONTACTS

⚠ Do not short wet contacts!

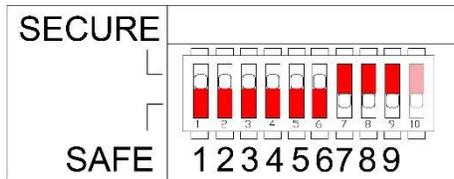Install Jumper to connect V+ to relay contacts.
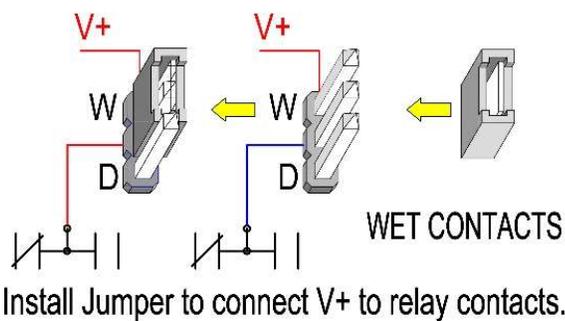
POWER JUMPER (Fig 1 K)

To power devices such as locks, lights, strobes and sounders directly from the door control relays, install a jumper on the **W** pins.

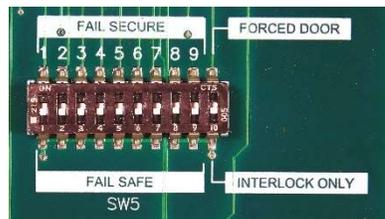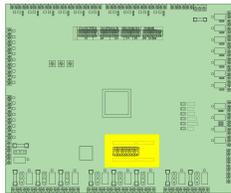With no jumper or with the jumper on the **D** pins, relay contacts are dry.

Each door control relay can be set for wet or dry.
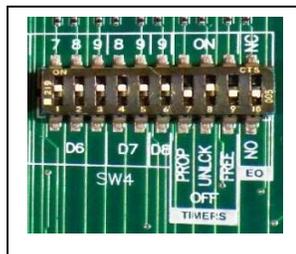
4. SAFE OR SECURE

SAFE OR SECURE (Fig 1 I)

In the example shown, doors 1-6 are SECURE position. Relay will **energize to unlock**. Doors 7, 8 and 9 are SAFE. Relay energizes to lock or inhibit access.

OPTIONAL SETTINGS
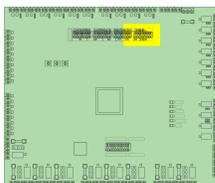
5. ENABLE TIMERS

ARM TIMERS (Fig 1 G)

Timers for door propped alarm (PROP), door unlock time (UNLCK) and emergency unlock time (FREE) have to be armed to enable timers.

Set timer switch ON to arm or OFF to disable the timer

6. ADJUST TIME VALUE
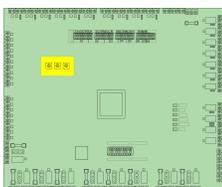
ADJUST TIMERS (Fig 1 F)

Set time to alarm on propped door. Set time doors will unlock with a valid REX and set time that doors remain unlocked for emergency release.

Propped open: rotate trim pot for any value between 6 seconds and 5 minutes.

Door unlock time between 1 second and 15 seconds.

Emergency Unlock (FREE) between 30 seconds and 10 minutes

7. FORCED DOOR ALARM ON/OFF

FORCED DOOR (Fig 1 I)

Select forced door on or off for door violation alarm. When off, only an interlock violation energizes the door alarm relay. When ON, opening a locked door without valid REX sounds alarm. Set to OFF for locked doors with mechanical exit hardware.

VERIFY CONFIGURATION

SYSTEM STATUS (Fig 1 T)

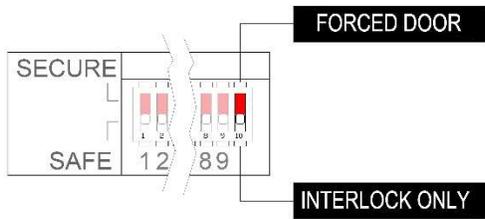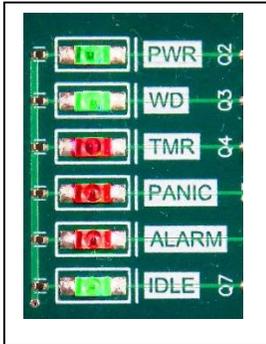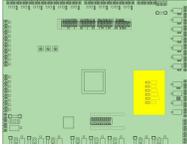**PWR** - The power LED lights when the board is connected to 12 – 24 VDC. Verify power is on.

WD – The Watch Dog LED blinks at a constant rate of 3 times per second to indicate that the program is executing correctly. If the WD stops flashing or flashes at a different rate, call Dortronics Technical Support.

TMR - When lit, indicates that one of the three timers is running.

PANIC – When lit, indicates that the emergency unlock function is active. All doors are unlocked.

ALARM – When lit, indicates that the system is in door violation alarm. Make sure all interlocked doors are closed. For test purposes, jump DPS inputs with wire.

IDLE – When lit, indicates all interlocked doors are closed and the system is waiting.

RUNNING THE INTERLOCK

INTERLOCKED DOORS

When the system is idle, all doors are closed, no alarms or timers are active and the idle light is lit. When an unlocked door is opened or a locked door is unlocked and/or opened, interlocked doors lock and remain unavailable for access.

TRAFFIC LIGHTS

Traffic lights for locked doors show door availability: green when locked but available for access and red when locked but not available because an interlocked door is in use or a violation alarm is active.

For unlocked doors lights show lock status: red when locked and green when unlocked.

For Emergency Unlock (EO) green lights flash to indicate free egress.

When a door is propped open beyond the allowed time, the red light for that door will flash.

EO - EMERGENCY UNLOCK

The emergency override (EO) unlocks all doors, and disables the interlock. All doors may be opened for immediate egress. The door violation alarm is disabled while the system is in override.
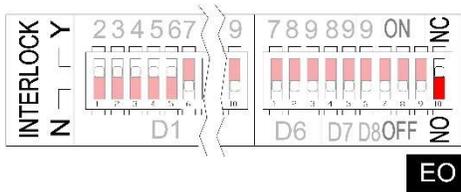
IMPORTANT:

Override can be triggered by either normally closed or normally open contacts at the EO input. Select desired trigger by setting EO switch on interlock switch bank Fig 1G

AUTOMATIC DOORS
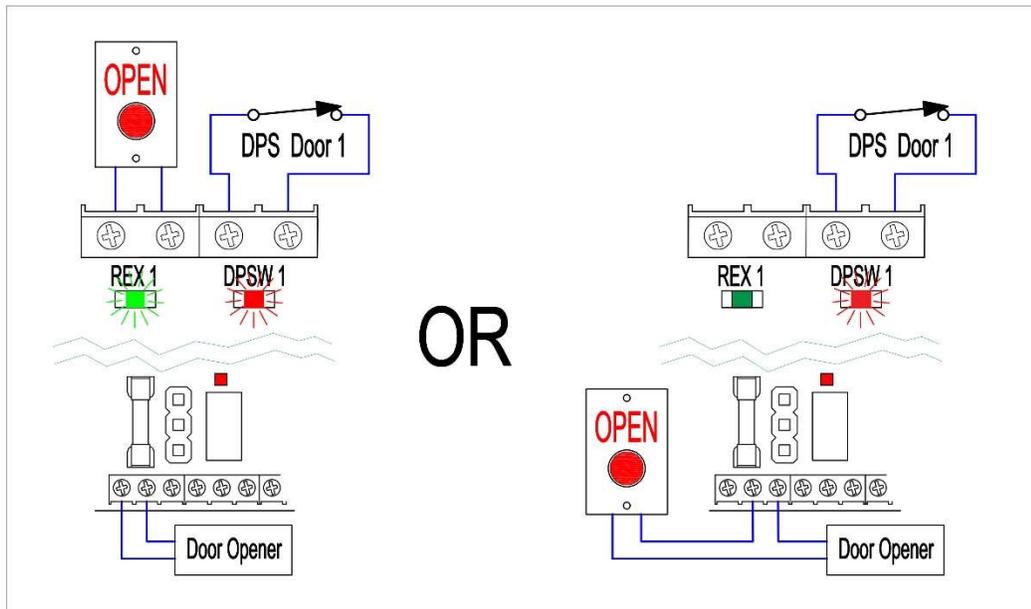
Automatic doors, rollups and motorized sliding doors can be configured as locked doors (the output follows the REX input if no interlocked doors are open) or they can be treated as unlocked doors where the relay breaks the "OPEN" request circuit inhibiting the opener when an interlocked door is open.

NOTE: Automatic doors using the locked configuration will open when the emergency override is active. When configured as unlocked and fail safe, auto doors will not be inhibited or interlocked when the override is active and will only open when requested. Consult local safety and containment guidance.

ALARM RELAYS

Interlock Violation Alarm: if two interlocked doors are open at the same time, the violation alarm relay energizes. The violation alarm can be used dry contact or wet contact with a jumper.

When the Forced Door option is enabled, the alarm relay will energize if any locked door opens without a valid REX.

When the Door Propped option is enabled, the alarm relay energizes when any door is open for a time that exceeds the Door Propped Timer setting.

Emergency Override Alarm: when the EO input is triggered and/or if the EO timer is running, the panic alarm relay is energized. Panic relay is dry contact. It may be used to switch power or send an alarm signal to other equipment.

PROPPED DOOR TIMER

The **Door Propped** timer, when enabled, begins counting down as soon as any door is open. If the door is open when the timer expires, the door alarm output relay energizes. Use the rotary control to set the time delay to any value between 6 seconds to 5 minutes.

EMERGENCY UNLOCK TIMER

The **Interlock** timer, when enabled, begins timing when the Emergency Unlock input is activated. All doors remain unlocked and automatic doors remain enabled or open (see page 8) until the timer expires. Set to any value between 30 seconds and 10 minutes. Emergency unlock overrides System Pause and unlocks all doors. Door/lock lights go green.

UNLOCK PAUSE TIMER

This is typically used when a momentary REX device is located some distance from the door. The timer allows the user time to get to the door and open it after making a request for access. The **Pause** timer, when enabled, determines the time a locked door remains unlocked after a valid request by access control, a pushbutton, motion detector or similar device. This only applies to doors that are set as normally locked. Use the rotary control to adjust the unlock time between 1 and 15 seconds.

DOOR STATUS OUTPUTS (S)

Door Status relays are energized when the associated door is closed. Contacts are dry.

INPUT STATUS INDICATORS (C)

When an input is grounded the input is active, indicated by a lighted LED. The inputs for the 48900 programmable controller are opto-isolated for protection against interference.

Door **P**osition **S**witches, Magnetic Bond Sensors and similar devices communicate door status - **when the door is closed the switch contacts are closed**.

When a door is closed the red input LED for the door will be lighted. This makes it easy to verify interlock operation and to troubleshoot a new installation. When the door opens, the LED should turn off.

For other REX devices such as Bio-sensors, card readers, motion detectors, pushbuttons, pneumatic switches and the like, the green input LED should be on when the REX is active.

LOCK RELAY STATUS INDICATOR LED (J)

LEDs indicate that an output relay is energized. With the output set for **FAIL SECURE**, the relay energizes to unlock or enable the door. Set for **FAIL SAFE** the relay energizes to lock or disable the door. Make connections accordingly.

For verifying desired operation, compare lighted inputs to the lighted relay indicators.

OTHER FEATURES
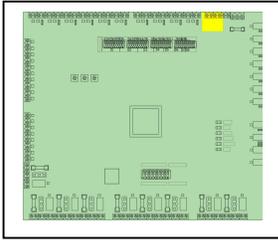
INTERLOCK BYPASS - SH

Closed contacts at the shunt input bypasses the interlock function. Door alarms for forced door, interlock violation and propped open are disabled when interlock is shunted. Locked doors remain locked and require valid request for access, but there are no interlock restrictions for use.

AUTO ALARM RESET - AR

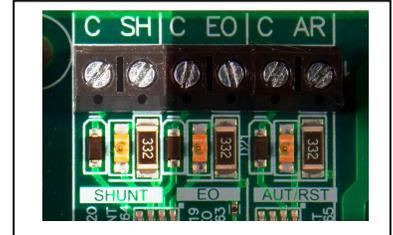Closed contacts at the auto-reset input allows the door violation alarm to end when the violation is corrected. For manual reset, connect a momentary, normally open switch. The alarm state will end when the violation is corrected and the reset button is pressed. A keyed switch can be used to select either auto or manual reset as required. Jumper the input with wire to make auto reset fixed (as shipped from factory).


EMERGENCY OVERRIDE - EO

Closed contacts at the override input unlock all doors for immediate egress. The interlock function and the door alarm functions are disabled. This is in addition to the Fire Alarm input of the 4204-NX power supply, which drops power to the entire system when triggered.

TROUBLE SHOOTING THE INSTALLATION

Visual indication of all inputs, outputs and system status is provided for verification of all conditions and settings. If the installation does not operate as desired, check the following in the sequence shown:
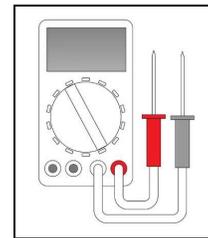
NOTHING WORKS

1. **POWER LIGHT** - The controller requires 12 – 24 VDC to operate. Verify the green POWER LED is lit. If not:

    a. Check the power supply connections

    b. Check the power supply output terminals

    c. Check the Power Supply fuse

    d. Check the Mains connection and the fuse at the 110 VAC terminal.

2. **WATCHDOG LIGHT** - If power connections are correct and the POWER LED is lit, verify that the Watchdog LED is blinking at a constant rate of 3 blinks per second. If it is not blinking, call Dortronics Technical Assistance.

3. **DOOR INPUT LIGHTS -** Verify that each interlocked door is closed and that the input LED for each interlocked door is lit. Unused door inputs can be jumped out if needed.

4. **REX INPUT LIGHTS – For Locked Doors Only:**
    a. Verify that no REX inputs are active and that no rex input lights are lit.
    b. Make sure door is correctly configured. Verify that the door configuration jumper is installed in the Locked position.
    c. To test a REX input, use a short piece of wire to jump the two REX input terminals. Verify that when a designated REX input is active, the corresponding lock relay changes state (shown by the relay LED for the lock relay being tested). Door 1 REX operates Door 1 lock and so on.

5. **LOCK RELAY "ON" LIGHTS**
    a. When the system is **IDLE** and the idle light is on, verify that all normally unlocked fail secure doors show a lit (energized) relay.
    b. Are the relays on when they are supposed to be?
    c. Verify that all normally locked fail secure relays are not energized (relay LED is off).
    d. For Fail Safe settings, the relays should be ON when locked and off when unlocked at idle.

6. If the relays do not reflect the desired state check:
    a. The door configuration is correct for the desired operation.
    b. The door position inputs for all doors in the interlock are closed – the input LED is on.
    c. That no REX inputs are active – REX LEDs are all off.

> Make sure the doors are correctly set for the desired operation. For a normally locked door set switch corresponding to the door to the "on" or up position. For Fail Safe lock operation, set the switch corresponding to the door in the up or "ON" position.

NO LOCK POWER

1. Check the lock relay fuse.
2. If the controller supplies power to the locks check that the jumper is on the **W** position. Use a multi-meter to verify that lock relay common is at the supply voltage.
3. Check that the lock is connected to the correct output. For Fail Secure operation the mag lock connects to N.C. contacts. Strikes connect to N.O. contacts.
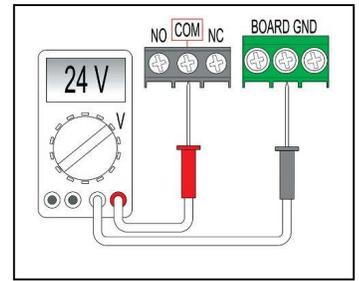
STAYS IN DOOR ALARM

1. Check that all interlocked doors are closed - door inputs are "ON". If there is any doubt that a door position switch is operating correctly, use a piece of wire to jumper the input. Remember: DPS inputs show red and REX inputs show green input LEDs.
2. Check that the Panic (emergency unlock timer) is not set and running. System Idle light should be lit.

DOOR LOCKS WHEN IT SHOULD UNLOCK

1. Make sure the lock is connected to the correct contacts on the lock relay. Some locks can be set for either Fail Safe or Fail secure operation. Make sure the lock type matches the controller lock logic. Fail secure lock relays energize to unlock.
2. Check that the Fail Safe – Fail Secure setting is correct for the application.

DOORS REMAIN UNLOCKED AT ALL TIMES

1. Check Panic relay and System Status Panic light. If they are on, check that the Panic N.C. – N.O. switch (SW3) is set correctly. If the switch is set to N.C. and there is no Panic input, the doors will remain unlocked. If the switch is set to N.O. and the panic input is closed (light is lit) the doors will remain unlocked.
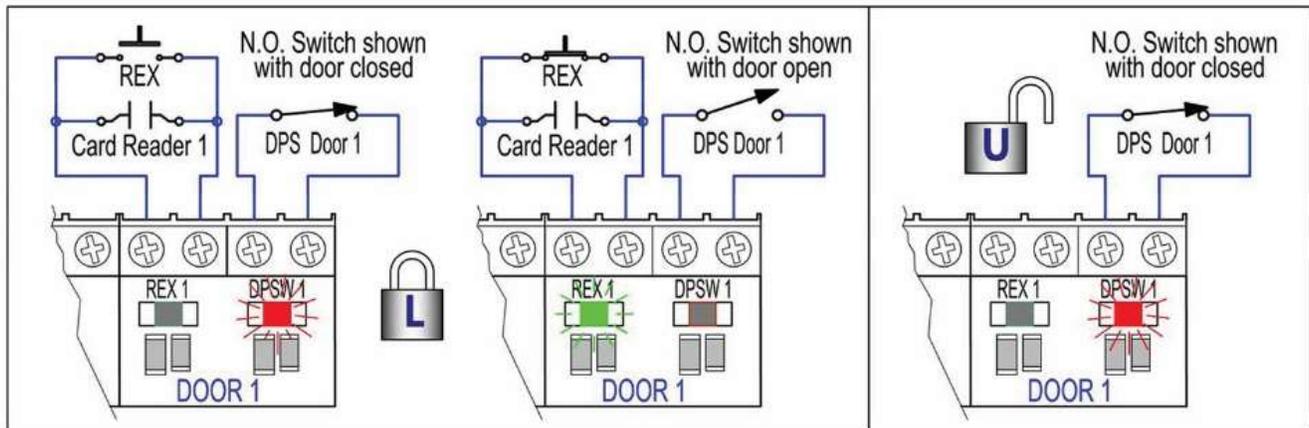
Verify the input light is lit for every interlocked door. Remember, door switch closes when door is closed.

UNLOCKED DOORS
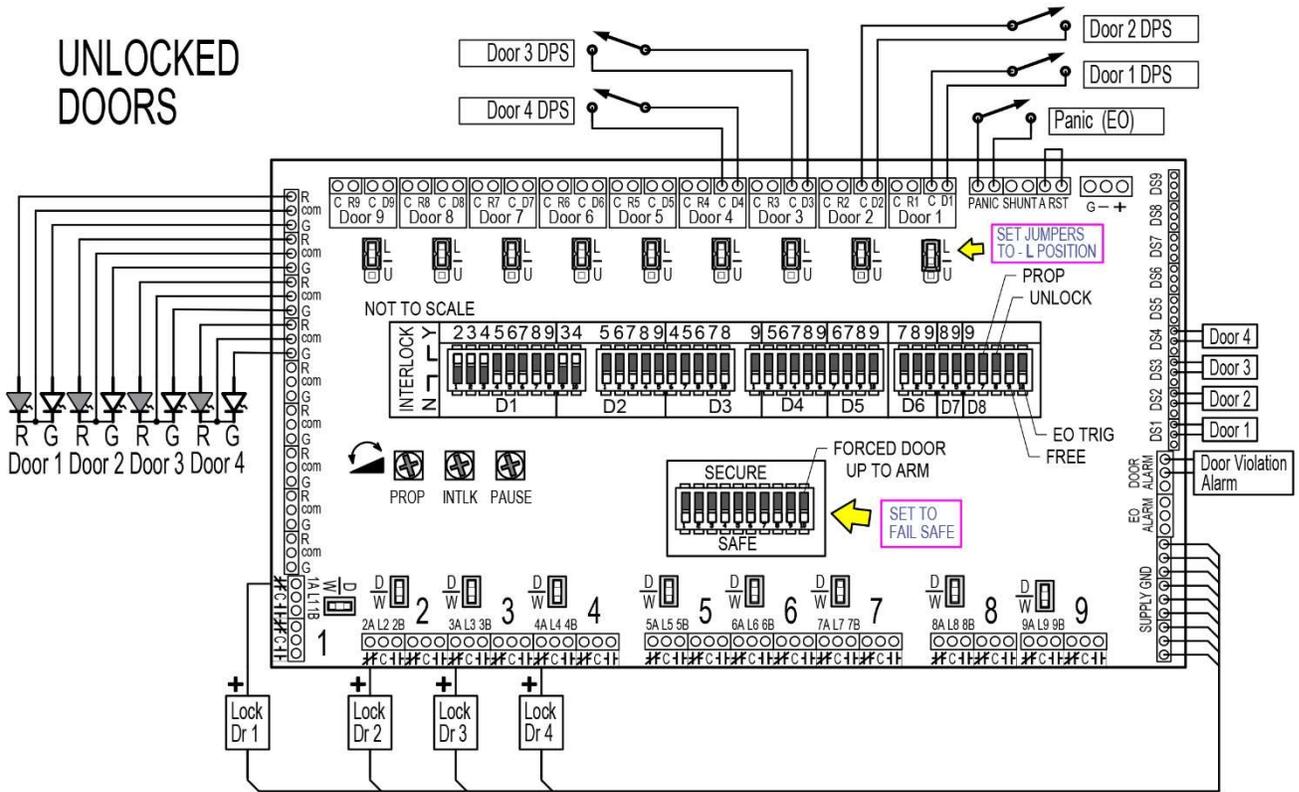
LOCKED DOORS
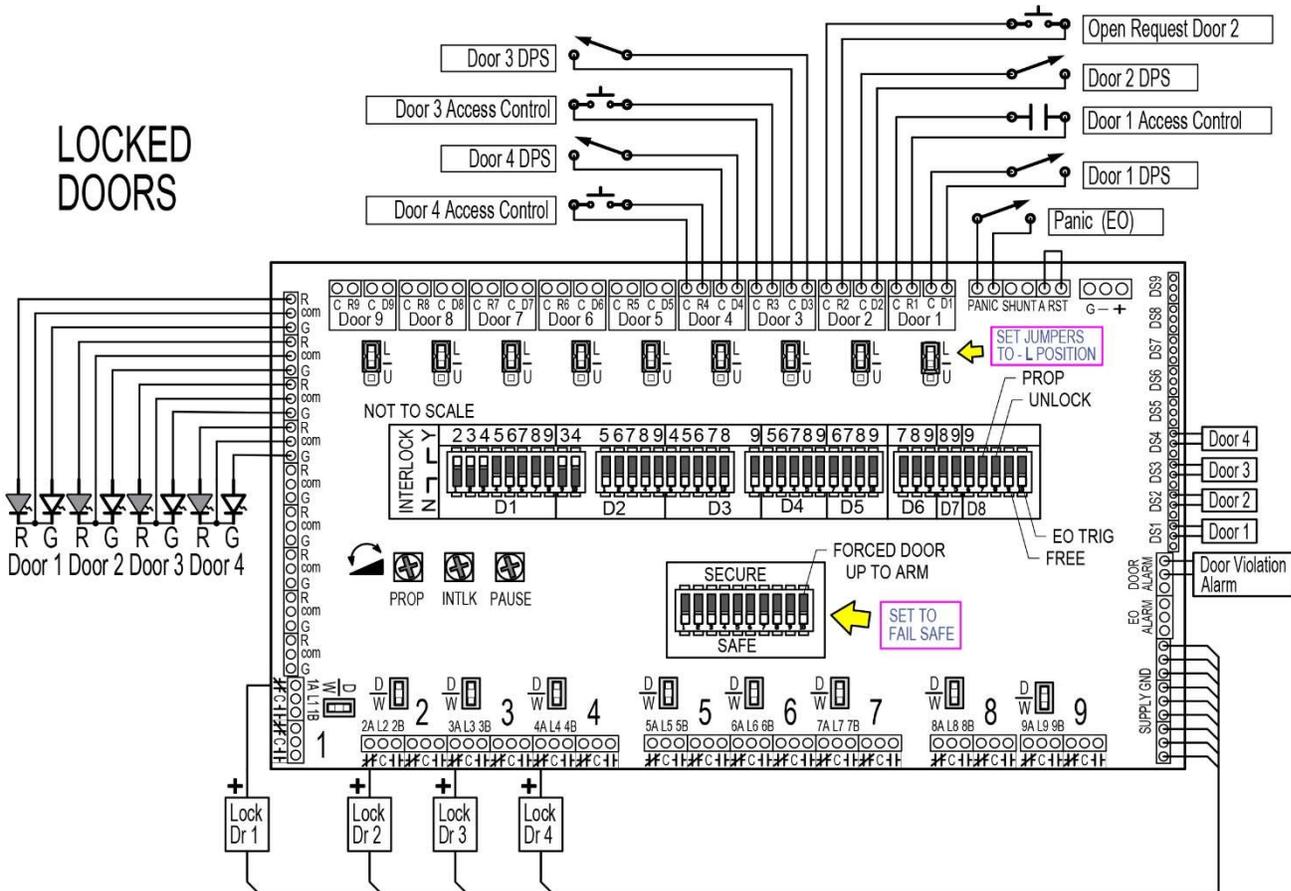
AUTO DOORS WITHOUT REX
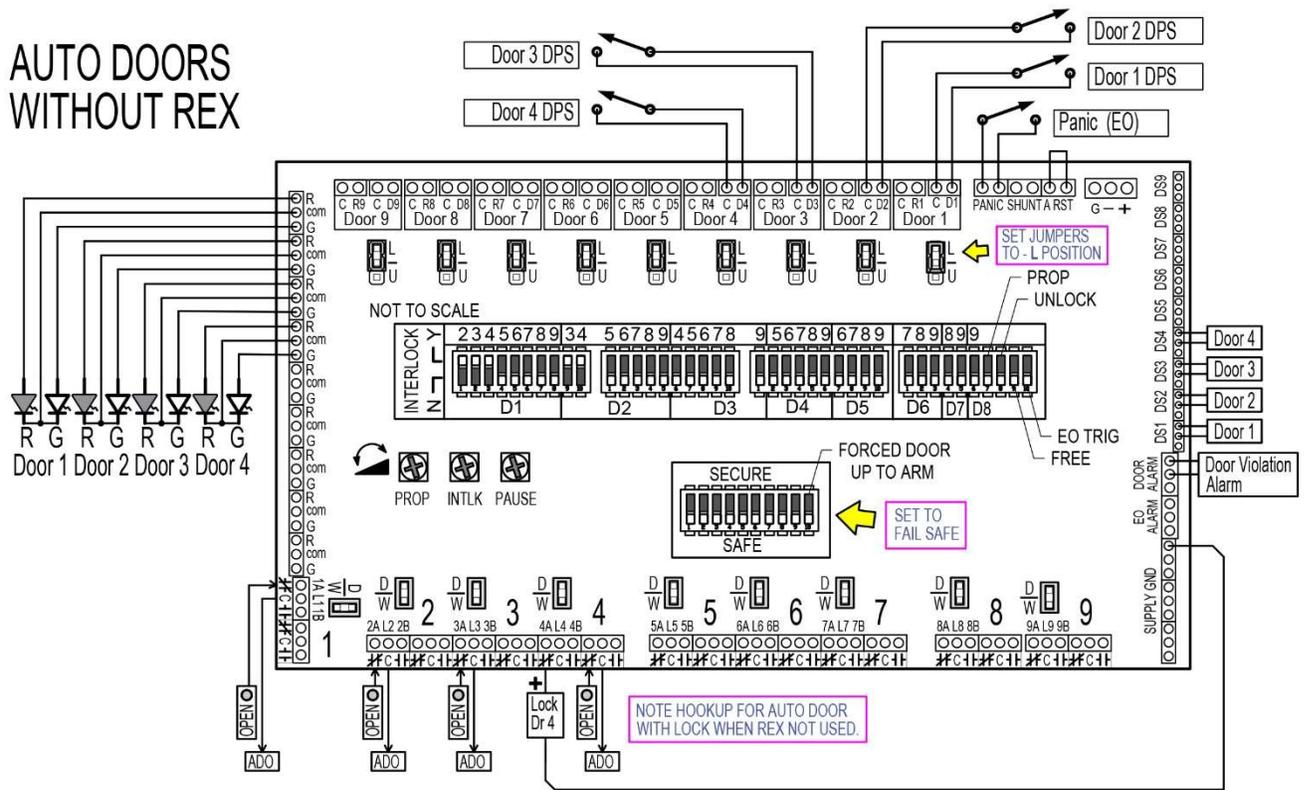
AUTO DOORS USING REX
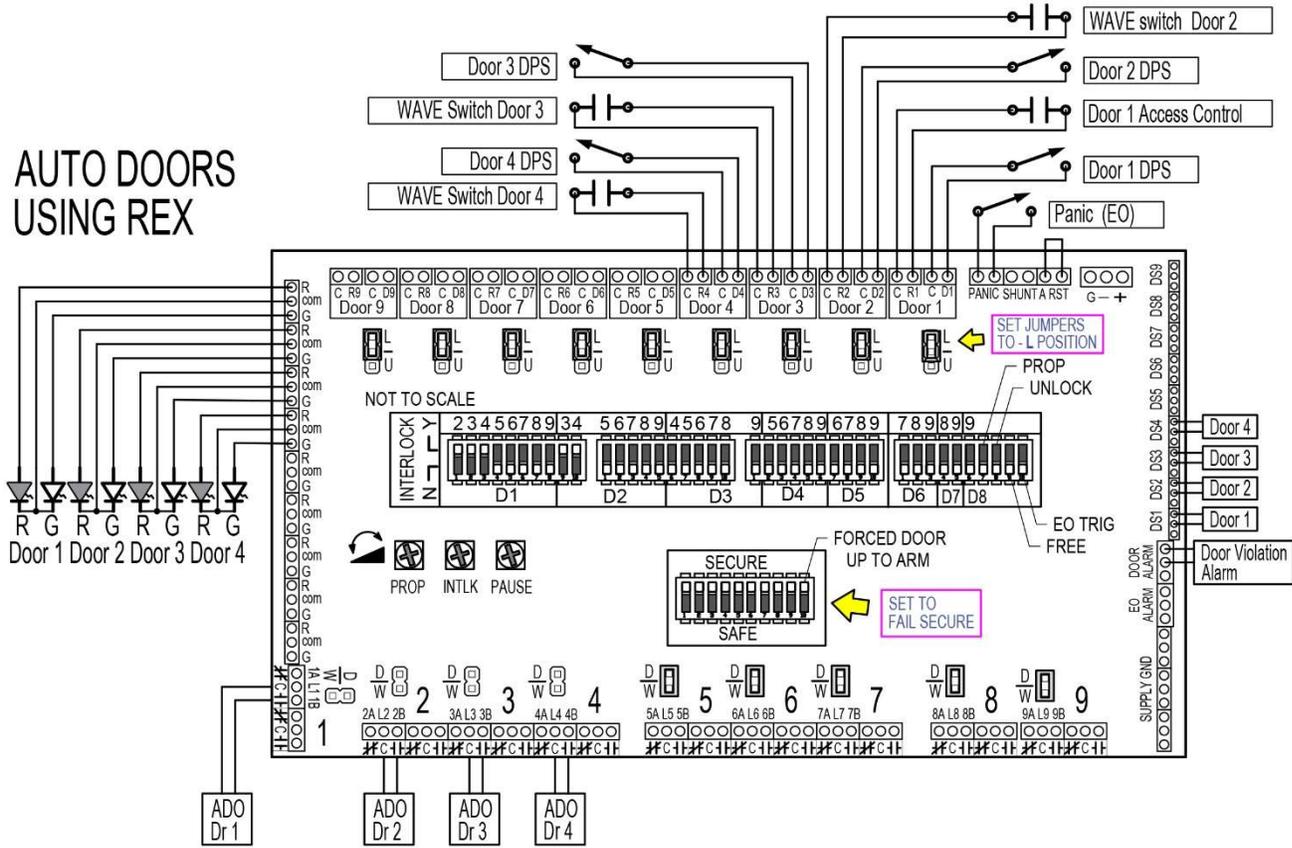
SAMPLE INTERLOCK SETTINGS
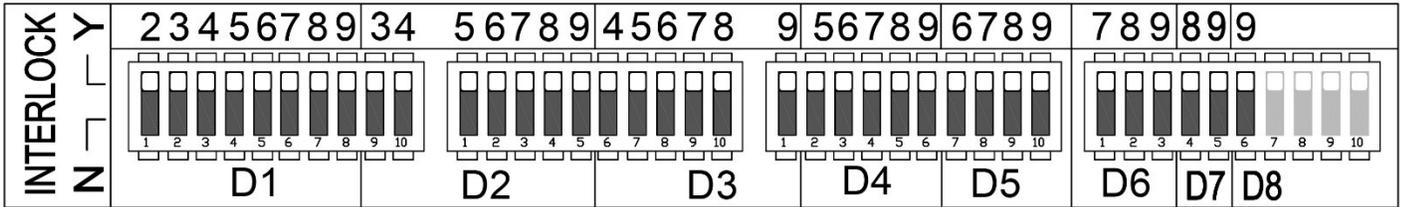
If any door opens, all other doors remain locked or inhibited
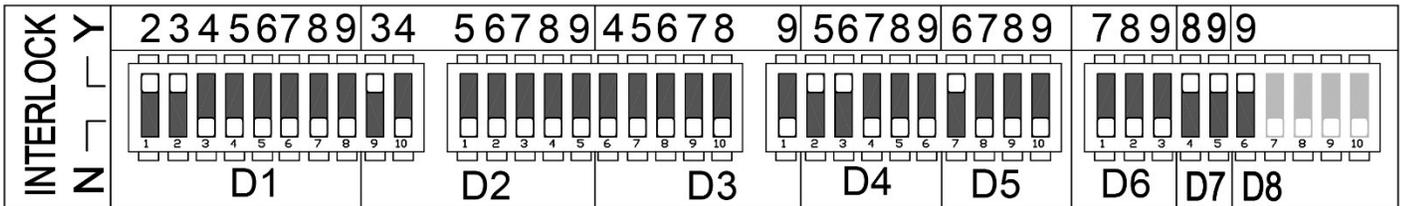
Three independent three door interlocks - Doors 1, 2, 3 are interlocked. Doors 4, 5, 6 are interlocked
Doors 7, 8, 9 are interlocked.
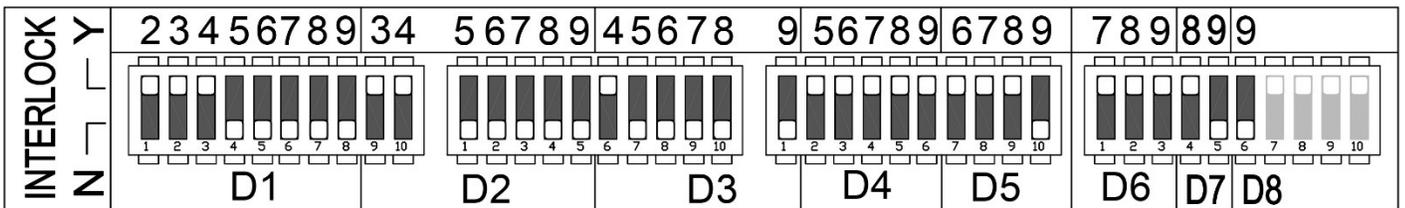
Two zones with a shared door. Zone A = doors 1, 2, 3, 4. Zone B = doors 5, 6, 7, 8. Door 4 is shared
between the two zones. Door 9 is not used.

POWER SUPPLY SPECIFICATIONS

The 4204NX power supply/charger converts a 120VAC 60Hz input into a single PTC protected Class 2 power-limited output. Output is selectable for 12VDC or 24VDC with a total of 4A max. It also offers a suite of features that includes fire alarm disconnect, overvoltage protection, and low power disconnect which prevents deep discharge of stand-by batteries.

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Input Voltage 120VAC, 60Hz, 3.5A max. Fusing 5A / 250V. **Outputs** Voltage 12VDC or 24VDC selectable. Current 4A continuous max. Protection Fused 2.5A / PTC 2A. Auxiliary Class 2 power-limited @ 1A (unswitched). Other Overvoltage protection. Filtered and regulated. **Back-up Battery** *(not included)* Capacity 7AH / 12VDC (1 or 2 within enclosure). Type Sealed lead acid or gel type. Fuse Rating 5A @ 32VDC. Failover Upon AC loss, instantaneous.	**Fire Alarm Disconnect** Supervised Latching or non-latching. EOL 10K Resistor. **Supervision** AC Failure Form "C" contacts. Battery Form "C" contacts. Low DC Power Shutdown Shuts down DC output terminals if battery voltage drops below 71-73% for 12V units and 70-75% for 24V units to prevent deep battery discharge. **Indicators (LED)** Input 120VAC is present. DC Output Powered. Battery Discharged or not connected.

CONTROLLER SPECIFICATIONS

	Qty	Description	Remarks
Power In		**12** or **24VDC** regulated - plus, common and earth ground	3 - Screw Terminals
Inputs	21	9 DPS, 9 REX, 1 Panic and 1 Shunt	Screw Terminals
Outputs	28	9 Fused Lock Relays, 9 Door Status Out, 9 R/G Light Powered Outputs	Screw Terminals
Timers	3	Single Turn Rotary Adjusters to set Time Delay	
Temperature		Operating 0-60° C	
Mounting		Standoffs	
Dimensions		10" W x 12" L x 1 ¼" H without	
Fuses	10	2 Amp @ 250 Volts – quick blow	

Current Draw - Condition	Current in mA	Volts
Controller with traffic lights DPS all relays off	100	12
with all relays on – all indicator lights lit	410	12
Controller with traffic lights DPS all relays off	80	24
with all relays on – all indicator lights lit	290	24

RECOMMENDED EQUIPMENT

DORTRONICS PART#	DESCRIPTION
Dortronics #1110xDxB	1200 lb electromagnetic 12/24 VDC maglocks with built-in door position and bond sense switches.
Dortronics #7201xL2-H	High intensity Red / Green LEDs on single gang S/S wall plate.
Dortronics #7202xL2-HxCS	High intensity Red / Green LEDs with Piezo sounder on double gang S/S wall plate. (Optional for use with security breach alarm output.)
Dortronics #5216 MP23PP/RXE2	Panic mushroom switch latching push, pull.

SALES - WARRANTIES

Contact (Sales):

Mike Palermo – Sales/Customer Service

Sales/Applications Specialist Bryan Sanderford - National Sales Manager

Contact (Technical): Stuart Arthur

Joe Hanna – Engineer/Applications Specialist

Contact (Credit): Janice Wilson – Accounting; New Customer Accounts

Product Warranties:

All electromagnetic locks have a **LIFETIME GUARANTEE** against defects in material and workmanship. Defective units will be replaced or repaired based upon incoming evaluation and inspection.

All other Dortronics components of the Electric Locking System shall be similarly warranted for a period of one year. Expressed warranties are conditionally based on the requirement that the items covered within the guarantee are used and maintained in accordance with the manufacturer's recommendations. The full warranty policy is accessible on our website. https://dortronics.com/sales-policies-and-procedures/

A Return Authorization Number must be obtained and accompany all returns within 14 days of issue. Unused items returned for credit must be complete and packed in original unit box and are subject to a 15% restocking fee. Any shipping or order discrepancies must be reported within 5 days of receipt.

www.dortronics.com

DORTRONICS SYSTEMS, INC.

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INSTALLATION AND OPERATION NOTES

INTERLOCK SCHEDULE FOR
_____

Door ID	Door Use	Prohibits Doors
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	

Date _____/_____/_____

INTERLOCK SCHEDULE FOR
_____

Door ID	Door Use	Prohibits Doors
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	

Date _____/_____/_____