4900 SERIES PLC INTERLOCK SYSTEM

The 4900 series PLC interlock controller is a cost effective method for operating door interlock and mantrap systems of up to 120 doors. The basic system consists of a controller and one or more I/O (Input Output) modules. The I-O Modules are available as an 8X8 or a 16X8X8 configuration depending on the number of inputs and outputs required. Outputs are a combination of DPDT and SPDT relays. The 16X8X8 controller includes 8 open collector powered auxiliary outputs able to drive low voltage loads directly, up to 40 mA per channel. The 4900 controller is pre-programmed for many applications and ships from stock. It can be programmed at the factory for custom application requiring timed sequences (such as airlock, wash down etc.) or Interlocks involving multiple rooms and up to 100 doors. Figure 1 below shows both types of I-O module.

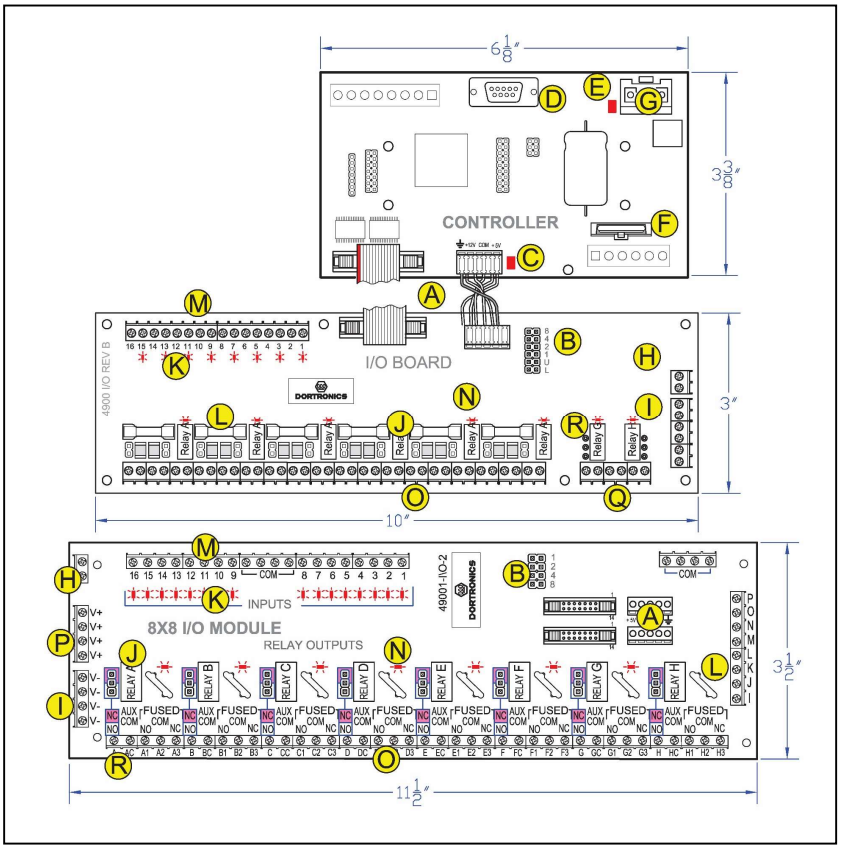


FIG. 1

A	Inter-board Connectors	G	Power Connector 12-24 VDC	M	Input Terminals - Dry Contact
B	I-O Address Jumper Matrix	H	Module Power In – Factory Wired	N	Output Relay Status Indicating LED
C	Watch Dog blink rate 3 times/sec	I	Ground Return Terminals	O	Relay Contact Terminals
D	Connector	J	Output Relays – switch 3 Amp Max	P	VDC+ Supply Voltage Out
E	Power Indicating LED	K	Input Status Indicating LEDs	Q	Dry Contact Signal Relays
F	Memory Backup Coin Cell	L	Output Fuse – In series with Com	R	Auxiliary Relay Contacts

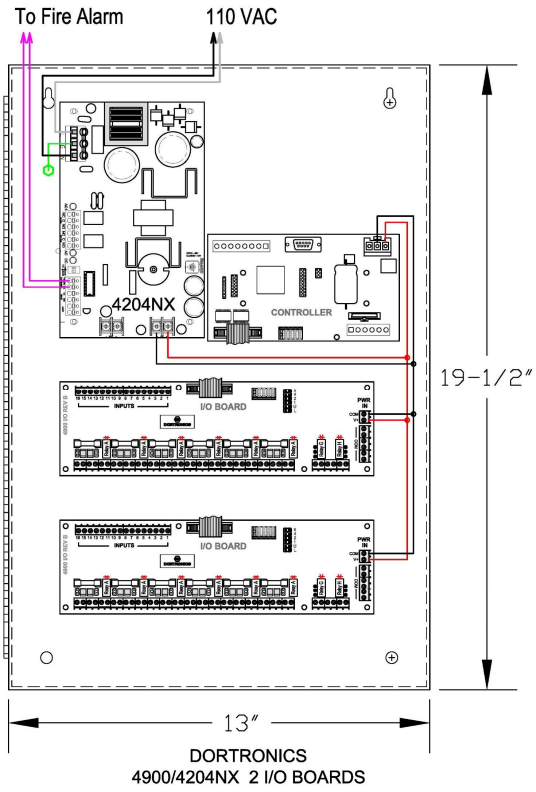
HOOKUP

The standard 4900 controller comes mounted in a locked NEMA enclosure with one or more Input/Output (I/O) relay modules and a 4 Amp power supply with user selectable output of 12 or 24 VDC.

The 8X8 I/O module (see Figure 1) has 8 input channels and 8 outputs comprised of 6 DPDT relay contact sets (one of each is fused) and 2 dry contact SPDT relays.

The power supply has a supervised Fire Alarm Interface. A short or an open at the fire alarm input (such as the activation of a pull box) will shut down power at the terminals. 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.



DOOR POSITION SWITCH

Door switch contacts must close when the door is closed – corresponding Input LED lights to indicate closed contacts at the input. Twisted pair wiring – AWG gauge 22 or larger is recommended for all signal inputs.

REQUEST FOR ACCESS DEVICES

Unless otherwise specified, controller door control relay follows access control device unlock time (typically a card reader). Inputs are dry contact only. Use an isolation relay for non-dry contact connections (such as an output from an intercom). AWG gauge 22 twisted pair or larger is recommended. Use sufficient wire diameter to minimize voltage drop for long wire runs. Use shielded wire in proximity to sources of interference such as large motors, network servers, and sources of electromagnetic radiation.

Momentary switches used to request access may require a timed output to allow time to open the door. This must be specified prior to production.

Automatic door momentary "OPEN" switches are typically connected to the REX input for an automatic door. The output is connected to the door opener. Unless an interlocked door is open, the output follows the input as if the pushbutton were connected directly to the door opener. When access is not allowed, the pushbutton request is ignored and the output does not change state.

DOOR LOCKS

Mag locks and strikes are connected to the designated relay contacts by labeled screw terminals. Relay outputs are selectable for dry or wet contacts. Power for maglocks, strikes and indicators may be external or sourced from the I-O Module using a wet contact jumper for relays A - F. Relays G and H are dry contact only. See Figure 1 (I). Jumpers connect relay common to supply positive (+). When relays are operated with wet contacts shorting the output to ground **will blow the fuse and may damage the I-O board!**

NOTE: Use a wire of sufficient diameter and rating to minimize voltage drop, especially over long wire runs. AWG 18 gauge is recommended for power circuits. Use 16 gauge for longer wire runs.

TRAFFIC AND LOCK STATUS LIGHTS

LED and incandescent indicator lights, typically red to show a locked or inaccessible condition and green to show an unlocked or freely accessible condition, may be connected as shown in Figure 2.

AWG 22 gauge or larger is recommended for signaling and low-power indicator circuits.

DOOR ALARM

A relay output is provided on most, but not all, 4900 interlock systems, to indicate an interlock violation. Refer to the hookup drawing supplied with the mantrap as built. The Door Alarm relay energizes when a door has been opened without a valid request for access, or in the case of normally unlocked systems, when 2 doors are open simultaneously. Wiring should be sized according to the signaling load.

PANIC EGRESS OPTION

Most 4900 interlock systems have an emergency egress function. This is in addition to the Fire Alarm Relay. The Panic release unlocks all doors regardless of door status in case of a door position switch failure, a stuck door, an environmental emergency or any other reason that requires immediate egress.

To enable the emergency egress, install a maintained contact normally open switch at the terminals shown on the drawing for the system being installed. When actuated, the doors will unlock for as long as the switch contacts remain closed. The Door Alarm Relay (on all 2 & 3 door systems) will be energized to alert others to the unsecured condition.

Building codes vary by location. The installer is responsible for understanding and working in compliance with all local codes and regulations as defined by the local governing authority.

INTER-BOARD CONNECTORS (A)

Up to sixteen standard I-O modules and eight double density I-O modules can be connected to a single controller.

ADDRESS JUMPER MATRIX (B)

Each I-O Module connected to the controller must have a unique address. Jumpers are used to select a binary code representing the address of each I-O Module.

WATCHDOG LED (C)

The PLC status is continually monitored by a watchdog function. The watchdog LED (see Fig 1) blinks rapidly (at a rate of 3 times per second) to indicate that a program is loaded and is being executed correctly. If the watchdog indicator is not blinking, verify that there is 12 or 24 VDC at the correct power terminals. If power is present and the watchdog indicator is not blinking, or blinking slowly, contact Dortronics for technical assistance.

POWER OUT TERMINALS (I)

For convenience, power supply connections are available via terminal blocks on the I-O Board. The standard model has six ground potential terminals with supply positive available by jumper through each output. The double density module has only dry contact outputs with supply positive available via terminal blocks to distribute power supply voltage to the locks and other powered devices.

RELAY OUTPUTS (J)

The output relays have contacts rated for 2 Amp holding current at 30 VDC. When connected to inductive loads (including almost all electric strikes and magnetic locks) a protection diode or TVS (Transient Voltage Suppressor) is required (standard I-O includes them). "Kickback" from a coil can cause arcing and damage to the contacts if not protected. Dortronics locks have an integral TVS. If a single relay is used to switch power to a pair of locks, connect the 2nd lock to the second set of contacts to distribute the load.

INPUT STATUS INDICATORS (K)

When an input is grounded (closed dry contacts) the input is active. This is indicated by a lighted LED. The inputs for the 4900 series I-O modules are opto-isolated for protection against most kinds of interference.

For Door Position Switches (DPS), Magnetic Bond Sensors (MBS) and similar devices used to signal door status, Normally Open contacts should be used so that **when the door is closed the contacts are closed**. Remember, when the switch is in the resting state, the contacts are open and this is shown on hookup diagrams.

For easy trouble shooting, when a door is closed the input LED for the door will be lighted. 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 input LED should be on when the REX is active.

NOTE: The standard I-O module has a pair of terminals for each input. The odd numbered terminal is common (ground). The 8X8 module has only four common terminals grouped together. In either case, when the input circuit is completed to ground, the input is on.

FUSED OUTPUT CONTACTS (L)

One set of contacts on each output relay (DPDT) is fused. The standard I-O module has six user replaceable BUS type fuses (3 Amp quick blow). Always replace a blown fuse with the same type and rating. The 16X8X8 I-O Module has eight resettable Polyfuses. These open the circuit when the current flow exceeds a threshold and they automatically begin to conduct again when the over-current is corrected. These are not user replaceable.

Each DPDT output has a fused set of contacts. The other set are not fused.

OUTPUT RELAY STATUS INDICATOR LED (N)

When an output relay is energized, the LED indicator for that relay is on. For Fail Secure operation, magnetic locks are connected to the Normally Closed relay contacts and electric strikes are connected to the normally open contacts. T**he relay energizes to unlock the door**. Fail secure is the default output. Fail Safe operation – the relay energizes to lock the door, must be requested at the time of the order.

For verifying correct operation, compare lighted inputs to the lighted relay indicators. A common wiring error is to fail to match the input to the correct relay output.

RELAY CONTACT TERMINAL STRIP (O)

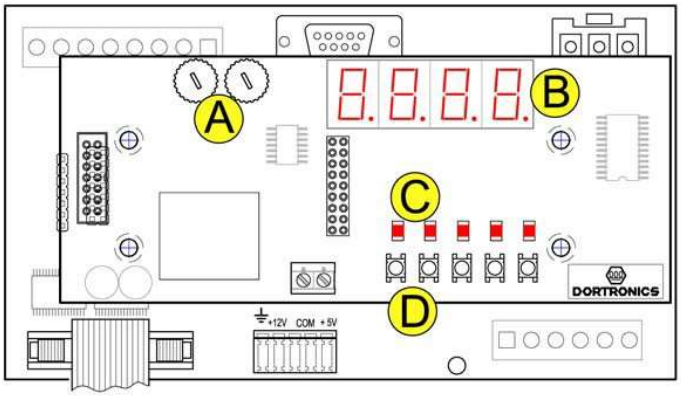
The standard I-O module provides a terminal for each relay contact and common. The 16X8X8 I-O Module provides a terminal for each primary (fused) contact and common, but uses a jumper to select the desired operation of the auxiliary non-fused set of relay contacts, either normally open or normally closed. If no jumper is present the auxiliary contacts are disabled.

PROGRAMMABLE POWERED OUTPUTS (P)

Programmable powered auxiliary outputs are provided on the 16X8X8 I-O module. When programmed, these may be used to power lights, beepers or off-board relay coils. Check with the specifications for a particular installation to see if the powered outputs have been enabled.

DISPLAY MODULE OPTION

Some applications require the ability to adjust program variables on-site. The optional Display Module features a four digit, seven segment display and 5 programmable pushbuttons. The stacking design of the Controller with Display Module has the same footprint as a standard Controller.



ANALOG INPUT (A)

Two programmable analog adjustment wheels are available. When programmed, the system allows for essentially endlessly variable adjustments for one or two values such as two different time delays.

SEVEN SEGMENT, FOUR CHARACTER DISPLAY (B)

A programmable four character display is available for user feedback. It can be programmed to show changes in user adjusted variables, the status of count down or count up timers, or which setting is currently operable.

PROGRAMMABLE STATUS LEDs (C)

There are five programmable status lights. These are typically used to alert the user that a programming step has been completed or that a programming pushbutton is active.

PROGRAMMABLE PUSHBUTTONS (D)

There are five programmable pushbuttons that may be used to enter changes to variable, store variables in memory, recall stored values, increase or decrease the value of stored values, set delay times and reset or clear pending actions.

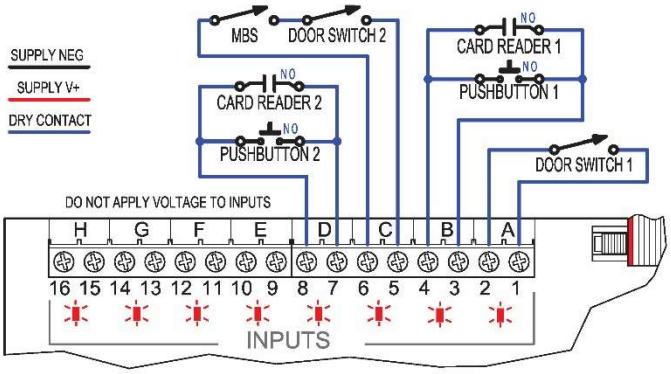
SUGGESTED APPLICATIONS

The ability to adjust variables on site makes it possible to easily:

- Sequence multi-stage functions such as airlock equalization followed by deflation of door seals;
- Set and adjust timing variables such as unlock time, grace time before alarm sounds, timed system reset;
- Save event count to memory, retrieve count from memory and clear memory;
- Change to one or more alternate Interlock Patterns, or other logic functions;
- Event triggered camera “on” time.

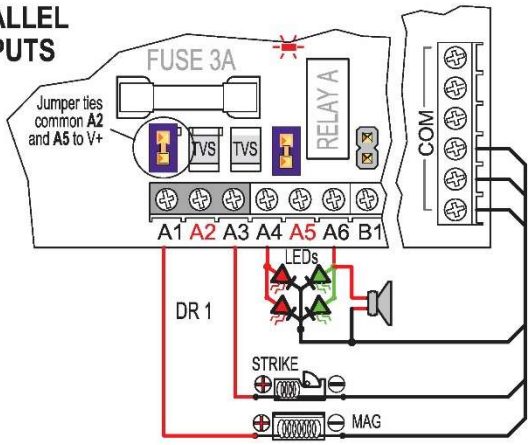
CONNECTIONS FOR SPECIAL CONDITIONS

PARALLEL and SERIES INPUTS



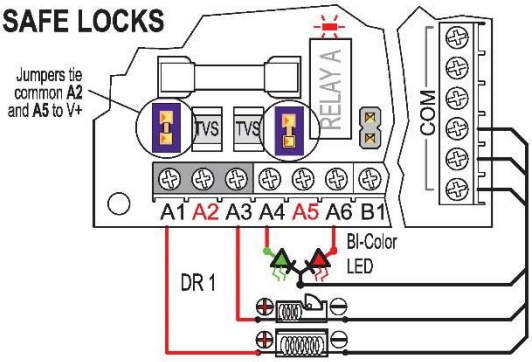
Two or more normally open **dry contact** switches can be connected in parallel at any input. Similarly, Door Position Switches and Magnetic Bond Sensors (or other sensor outputs) can be connected in series as long as the contacts are dry.

PARALLEL OUTPUTS



Use Parallel connections to operate multiple devices from a single DPDT relay output. Wet contact jumpers eliminate having to connect relay common back to V+ out terminals. Though fused for 3 Amps, do not exceed 2 Amp holding current per set of contacts to ensure optimum service life.

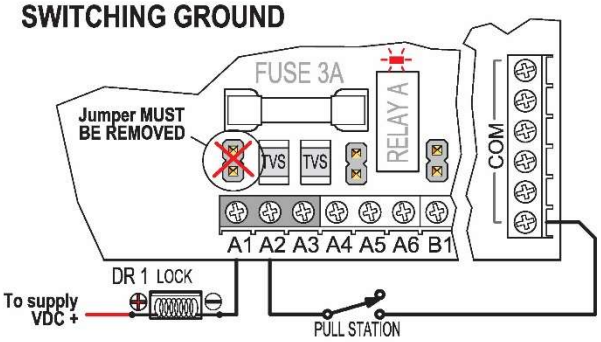
FAIL SAFE LOCKS



The convention for Dortronics controllers is fail safe - the relay energizes to lock the door. Connect mag locks to the normally open contacts. Connect other lock types for the desired operation.

Fail secure operation - the relay energizes to unlock - is available by request.

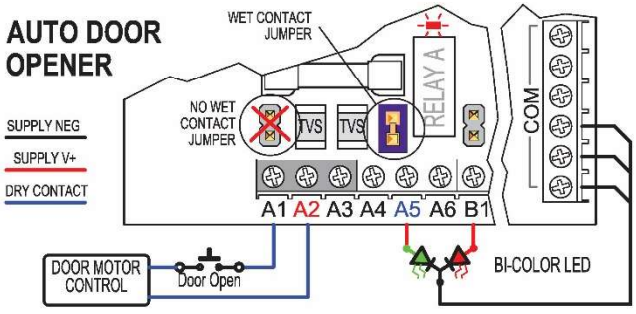
SWITCHING GROUND



Some installations require that the lock relay switches the lock ground lead. Relay common must be wired to the ground and the WET CONTACT jumper must be removed to prevent a short circuit and possible damage to the board.

Shown with Pull Station for emergency exit by cutting lock power at the door.

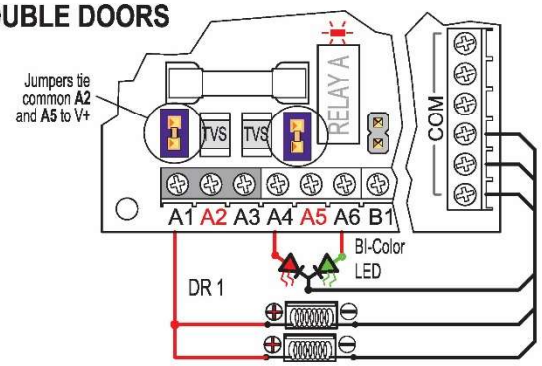
AUTO DOOR OPENER



When the relay is energized the door OPEN request circuit is enabled. The LED turns green to indicate that the door may be opened. When the relay is not energized, the door OPEN request circuit is interrupted. The red LED shows that the door is not available for access.

NOTE: a wet contact jumper is used to tie A Common (**A2**) to V+. There is no jumper at **A5** because dry contacts are required.

DOUBLE DOORS



For double doors, connect locks in parallel to the fused contacts. The LED for lock status indication can be connected to the second set of contacts. Current for both locks should not exceed 1.5 Amps for maximum reliability.

NOTE: Wet contact jumpers are used to tie common (A2 & A5) to V+ to eliminate having to connect relay common to VDC+.

5-21-18

RECOMMENDED EQUIPMENT

DORTRONICS PART#	DESCRIPTION
#1110xDxB	1200 lb electromagnetic 12/24 VDC maglocks with built-in door position switch.
#7201xL2-H	High intensity Red / Green LEDs on single gang S/S wall plate.
#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.)
#5216 MP23PPXE2	Panic mushroom switch latching push, pull.

OPTIONS (AVAILABLE AT EXTRA COST) –

- Lock Status Indicators – Use **Dortronics #7201xL2-H** at either side of each controlled door. LEDs follow lock status (Red when secure & Green when unlocked for access). LED indicators can share low voltage (12 or 24 VDC) lock power & control relays.
- Door Prop Alarm – Use **Dortronics #7281-EA** Local Door Alarm or #7286-PT5 Door Prop Alarm.
- Security Breach Alarm – Contact factory for additional relay outputs to operate Dortronics sounder. Use **Dortronics #7201xCS** Piezo Sounder on single gang S/S wall plate (or add xCS option to LED Indicators).
- Custom Functions – Contact factory for special customer specified operations. Additional charges for engineering may apply.
- Fused power distribution board. **Dortronics # xFO**
- Auxiliary Relay Pack **4900-RLY**

SPECIFICATIONS

	Qty	Description	Remarks
Power In		**12** or **24VDC** regulated - plus, common and earth ground	3 - Screw Terminals
Inputs	8 or 16	Single or Dual I-O Module – dry contact only	Screw Terminals
Outputs	6	DPDT wet or dry relay outputs standard I-O one set of contacts fused - one set of contacts	Screw Terminals
	2	SPDT dry contact relay outputs standard I-O	Screw Terminals
	8	Modified* DPDT Relays rated 2 Amps @ 30 VDC Dual I-O Module - one set of contacts	
	8	Dual I-O module only – open collector powered outputs	
Temperature		Operating 0-60° C	
Current		See table below.	
		* normally closed or normally open contacts are selectable by jumper - one set of contacts	

Current Draw - Condition	Current in mA	Volts
Controller only	45	12
with 1 I/O board quiet	65	12
With 1 I/O board all driven	170	12
With 2 (or dual) I/O boards quiet	< 100	12
With 2 (or dual) I/O boards all driven	< 300	12
Controller only	35	24
with 1 I/O board quiet	60	24
With 1 I/O board all driven	240	24
With 2 (or dual) I/O boards quiet	< 90	24
With 2(or dual) I/O boards all driven	< 330	24

DORTRONICS SYSTEMS, INC.
1668 SAG HARBOR TPK. SAG HARBOR NY 11963 Tel 631-725-0505 • 800-906-0137 Fx 631-725-8148

SALES - WARRANTIES

Contact (Sales):

Mike Palermo – Sales/Customer Service

Stuart Arthur – Sales/Applications Specialist

Bryan Sanderford - National Sales Manager

Contact (Technical):

Joe Hanna – Engineer/Applications Specialist

Kevin King – Engineering Support

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.

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

INSTALLATION AND OPERATION NOTES