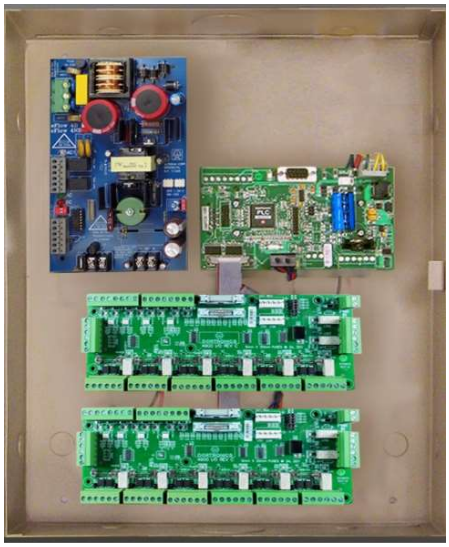
4900 SERIES PLC INTERLOCK SYSTEM

The 4900 series PLC interlock controller is a cost-effective method for operating door interlock and mantrap systems of up to 50 doors. The basic system consists of power supply, a controller and one or more I/O (Input Output) modules. The I-O Modules are available as an 8 in 8out with pluggable terminal blocks. Outputs are a combination of six fused DPDT and two SPDT relays. The 4900 controller is available pre-programmed for typical applications. It is programmed at the factory for custom application requiring unique or unusual operations, or for Interlocks involving multiple rooms and up to 30 - 50 doors depending on configuration.



The standard interlock controller includes a lockable metal enclosure, a 4 Amp power supply with Fire Alarm Interface and one or more I-O boards depending on the inputs and outputs required.

A 10 Amp supply is also available. Controller is available without supply or enclosure.

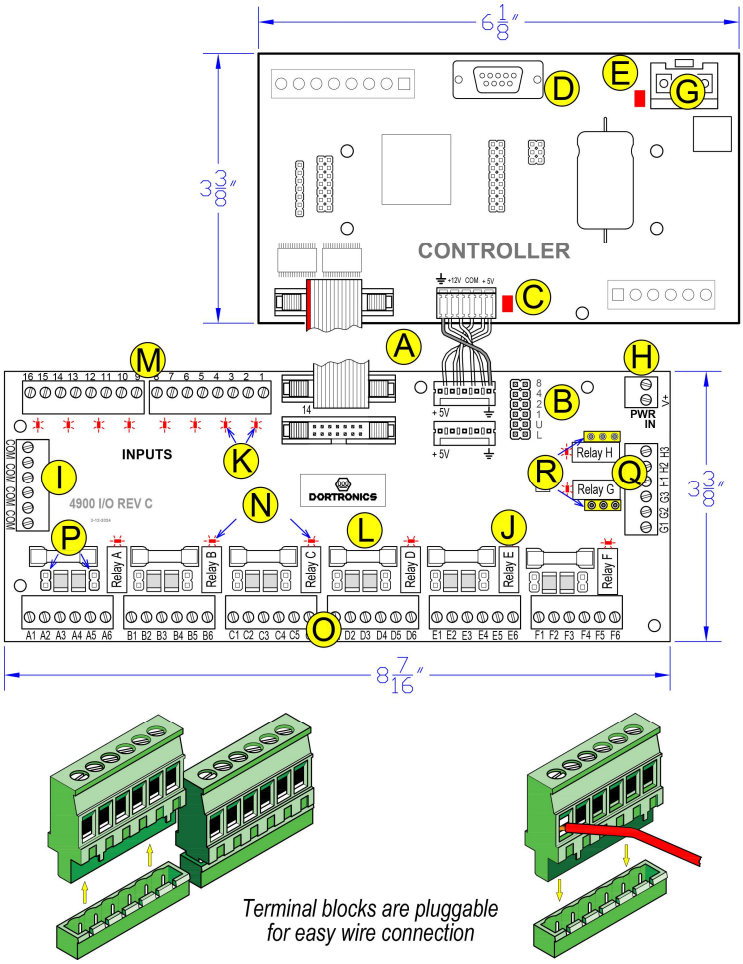


FIG. 1

A	Inter-board Connectors	G	Power Connector 12-24 VDC	M	Input Terminals
B	I-O Address Jumper Matrix	H	Module Power In – Factory Wired	N	Output Relay Status 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	Wet/Dry Jumper
E	Power Indicating LED	K	Input Status LEDs	Q	Dry Contact Signal Relays
F	N/A	L	Output Fuse – In series with Com	R	Auxiliary Relay Contacts

HOOKUP

The standard 4900 controller comes ready to mount and wire.

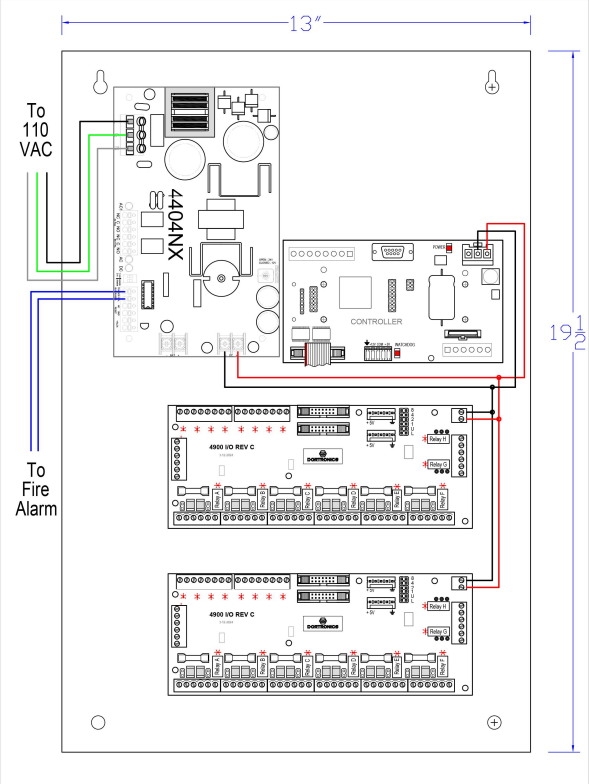


FIG 2

FIRE ALARM INTERFACE

The power supply has a supervised Fire Alarm Interface. A short or an open at the fire alarm input shuts down power at the terminals. The fire alarm DIP switch must be set to "enable". See power supply user's manual for important details.

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

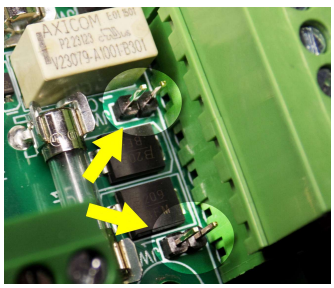
Unless otherwise specified, door control relay follows REX input (unlock time or auto door operator OPEN pulse). Inputs are dry contact only. Use an isolation relay for non-dry contact connections (such as an output from an intercom). AWG gauge 22 twisted pair or larger is recommended. Use sufficient 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 other sources of electromagnetic radiation such as hospital equipment.

Momentary switches used to request access may require a timed unlock to allow the door to open before re-locking. Special timing functions must be specified prior to quote.

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.

IMPORTANT: If automatic doors are required to stay closed in an emergency unlock, to contain smoke or contaminants, this must be specified prior to the quote.

DOOR LOCKS



Connect locks to the desired relay contacts (N.C. or N.O.) by pluggable terminals See Figure 1 (I). Relay outputs A-F are selectable for dry or wet contacts. Install jumper at 2 pin header (shown at right) to power locks and lights directly. If external power is to be switched, **remove all wet contact jumpers.** Relays G and H are dry contact only. Unplug terminal block for better view.

Jumpers tie relay common to supply positive (+). **Do not short wet contacts.**

NOTE: Use correct wire gauge and rating to minimize voltage drop, especially over long wire runs. AWG 18 gauge is recommended for power circuits. Use 16 gauge for long 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 on the supplied wiring diagram.

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 (forced), or when 2 interlocked doors are open simultaneously. **For card in, free egress doors** (crash bar or lever release) **specify no forced door alarm.** Wiring should be sized according to the load.

EMERGENCY OVERRIDE 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. For auto doors with locks, separate relays are suggested to keep doors unlocked but closed until requested for smoke and contamination control during an emergency. 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 I-O modules can be connected to a controller. For reasons of cost, complexity and reliability, we recommend limiting I-O modules to eight. That would control twenty locked doors or up to forty unlocked doors.

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 starting with zero upper (U) followed by zero lower (L).

WATCHDOG LED (C)

The PLC status is continually monitored. A watchdog LED (see Fig 1 - C) 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.

GROUND RETURN (COMMON) TERMINALS (I)

There are six ground returns in a pluggable terminal block. When switching power from a supply not connected to the controller, **do not use the board mounted ground returns.**

RELAY OUTPUTS (J)

The output relays have contacts rated for 2 Amp holding current at 30 VDC. When switching an inductive load (including electric strikes and magnetic locks) a protection diode or TVS (Transient Voltage Suppressor) is required. Relays A – F are protected by onboard TVS. Relays G & H have no onboard protection. “Kickback” from a coil can cause arcing and damage to the contacts if not protected. Dortronics locks have an integral TVS.

Do not switch alternating current. For 110 VAC loads, an isolation relay (contactor) must be used!

INPUT STATUS INDICATORS (K)

The I-O module has a pair of terminals for each input. The odd numbered terminal is common (ground). When the input circuit is grounded by closed dry contacts across the terminals, the input is active the input LED illuminates. This is helpful when trouble-shooting the system. Status of all doors is shown at a glance. The inputs for the 4900 series I-O modules are opto-isolated for protection from most kinds of interference.

Door Position Switches (DPS), Magnetic Bond Sensors (MBS) and similar devices used to signal door status, use normally open contacts. W**hen the door is closed the contacts are closed**. The contacts are open when the switch is not actuated as shown in hookup diagrams.

For access control devices such as Bio-sensors, card readers, motion detectors, pushbuttons, pneumatic switches and the like, the REX input LED should be ON when the request is active.

FUSED OUTPUT CONTACTS (L)

One set of contacts on each output relay (DPDT) is fused. Relays A – F have six user-replaceable BUS type fuses (3 Amp quick blow). Always replace a blown fuse with the correct type and rating.

Each DPDT output has a primary set of contacts protected by a fuse. The secondary contacts are not fused.

OUTPUT RELAY STATUS INDICATOR LED (N)

When an output relay is energized, the LED indicator lights. 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.

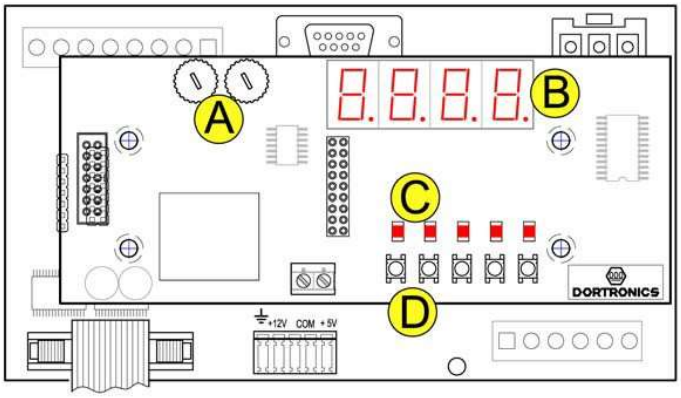
For verifying correct operation, compare lighted inputs to the lighted relay indicators. A common wiring error is to match an input to the wrong relay output.

RELAY CONTACT TERMINAL STRIP (O)

Relays A – F have a terminal for both primary and secondary relay contacts (six) on a pluggable terminal block. Relays G and H have terminals for the primary contacts (N.O. COM and N.C.) only.

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

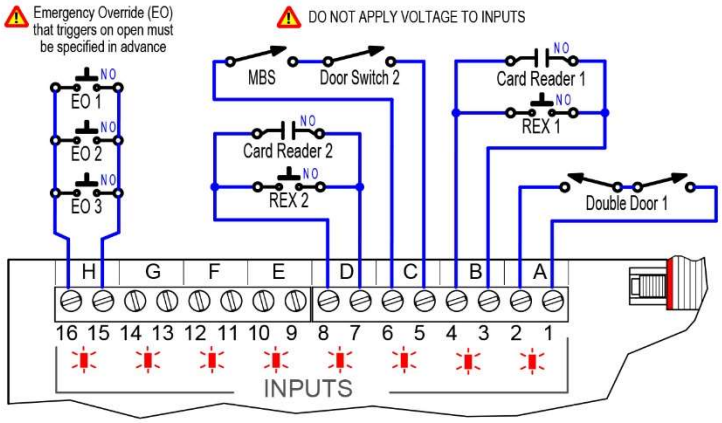
The ability to adjust variables on site makes it possible to easily:

- 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.

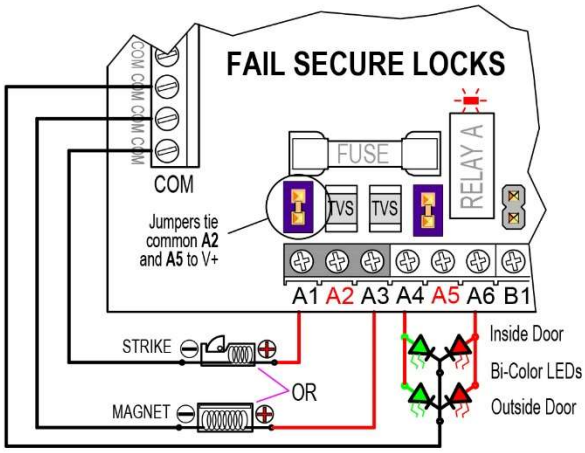
SUPPLY NEG
SUPPLY V+
DRY CONTACT

CONNECTIONS FOR SPECIAL CONDITIONS

PARALLEL and SERIES INPUTS

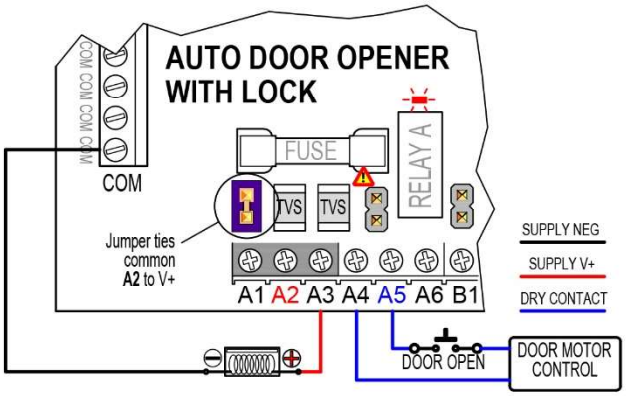


Two or more normally open **dry contact** switches can be connected in parallel at any input. Similarly, Double Door Position Switches and Magnetic Bond Sensors (or other sensor outputs) can be connected in series as long as the contacts are dry.



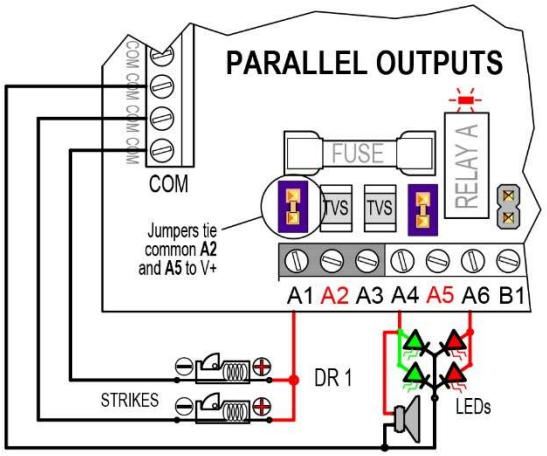
The convention for Dortronics controllers is **Fail Secure**. The relay energizes to unlock the door. Connect Mag lock to normally closed contacts.

Fail Safe operation should be requested and noted on the quote.

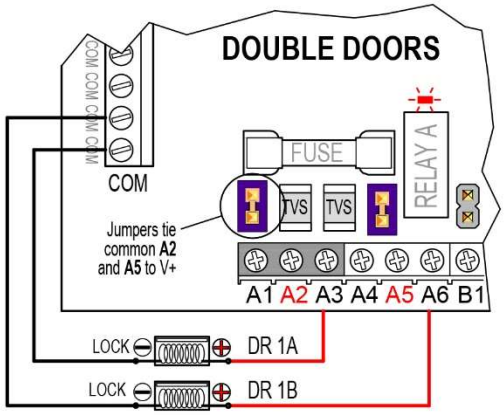


If no separate output is available for a door with both a lock and an auto opener, use the second set of relay contacts (A4 & A5 shown) to interrupt the request to open signal whenever the lock is energized. For emergency override, the lock will release, but the door will only open if requested. This may be required for smoke or contaminant containment during emergency egress.

NOTE: There is no jumper at **A5** because dry contacts are required.

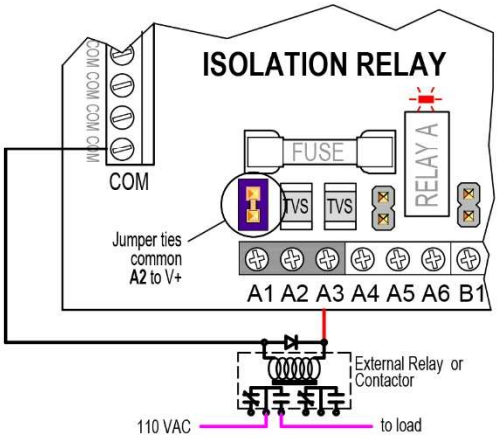


Use Parallel connections to operate multiple devices from a single DPDT relay output. Wet contact jumpers connect relay common to V+.



For locks requiring more than $\frac{1}{2}$ Amp connect each lock to one set of the DPDT contacts to distribute the load.

NOTE: Only the A1 and A3 contacts are have a protection fuse.



For high voltage switching, or high current loads (exceeding 2 Amps at 30 VDC) an external relay or contactor should be used. If the external relay coil is rated for 12 - 24 Volts DC, it can be driven directly by the I-O board with the jumper installed for wet contacts. Observe correct polarity. External relay should have kickback protection diode.

3-20-24

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

INSTALLATION AND OPERATION NOTES