



# S300

Series

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## S300-DIN-RDR2S

### Hardware Installation Manual

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#### Federal Communications Commissions Notice

This equipment, S300-DIN-RDR2S, has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The user is cautioned that changes and modifications made to the equipment without approval of the manufacturer could void the user's authority to operate this equipment.

#### Canadian Notice

This Class B digital apparatus, S300-DIN-RDR2S, complies with Canadian ICES-003.

Cet appareil numerique de la classe B, S300-DIN-RDR2S, est conforme à la norme NMB-003 du Canada.

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#### Declaration of Conformity

This product complies with the requirements of the European Council Electromagnetic Compatibility directive 89/336/EEC and amending Directive 92/31/EEC, the CE Marking Directive 93/68/EEC and the Low Voltage Directive 73/23/EEC.

This equipment must not be modified for any reason and it must be installed as stated in the Manufacturer's instruction.

If this shipment (or any part thereof) is supplied as second-hand equipment, equipment for sale outside the European Economic Area or as spare parts for either a single unit or system, it is not covered by the Directives.

## **UNDERWRITERS LABORATORIES COMPLIANCE VERIFICATION SHEET**

The following model numbers are listed under Underwriters Laboratories UL 1076 for Proprietary Burglar Alarm Units and Systems and UL 294 for Access Control Systems Units.

### **S300-DIN-RDR2S**

When installed at the site the following requirements must be met to comply with these standards.

1. The S300-DIN-RDR2S shall be mounted in subassembly S300-DIN-L or S300-DIN-S.
2. The S300-DIN-RDR2S in combination with the S300-DIN-L or S300-DIN-S must be connected to a UL Listed Uninterruptible Power Supply that provides a minimum of 24 hours of AC emergency power.
3. The tamper switch must be enabled at all times.
4. Transient protection devices that are installed must not be removed or defeated.
5. Do not connect equipment to an AC power source that is controlled by a switch.

# HARDWARE INSTALLATION

## INTRODUCTION

The S300-DIN-RDR2S module provides interface control for access and security devices associated with a door.

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### NOTE

*Throughout this manual the S300-DIN-RDR2S module is also referred to as the RDR2S.*

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The key features of the RDR2S include:

- Support for RS-485 bus communications at 9600 or 19200 (Auto baud rate detection 9600/19200 baud)
- Improved RS-485 bus polling algorithm
- Two door access control input/output interface, each consisting of:
  - Supervised door monitor switch input (normally open or normally closed, based on the external network configuration)
  - Supervised auxiliary access or exit request switch input (normally open)
  - Wiegand Data0 and Data1 interface
  - Door strike relay (SPDT)
  - Alarm shunt relay driver (open collector)
  - Red lamp driver (open collector)
  - Green lamp driver (open collector)

## APPLICATION

The S300-DIN-RDR2S module is an interface for CK722, CK721, and CK720/CK705 controllers using standard RS-485 communications and can support up to two doors per unit.

The RDR2S provides the ability to configure supervised 4-state inputs and unsupervised 2-state inputs. When interfacing to a single door, the unused points can be configured as general purpose input/output (I/O) points, possibly eliminating the need to purchase additional I/O modules for certain installations.

The RDR2S provides power for card readers and door locking hardware.

## INSTALLATION

### Unpacking the Equipment

Carefully inspect the S300-DIN-RDR2S shipping containers as soon as you receive them (with the delivery agent present). Some shipping companies want to have an agent present when a damaged container is opened. If a container is damaged, open it immediately, inspect the contents, and have the agent make note on the shipping document. Check the purchase order against the packing slips to ensure the order is complete. If the contents of a container are damaged in any way, notify the carrier and your Johnson Controls representative immediately. Report any discrepancies to your Johnson Controls representative. Save the packing materials for possible return shipments.

### Package Contents

- S300-DIN-RDR2S module
- Cable for use with CK720/CK705 controllers, S300-RDR2 modules, or S300 input/output modules
- This manual

### Tools Needed

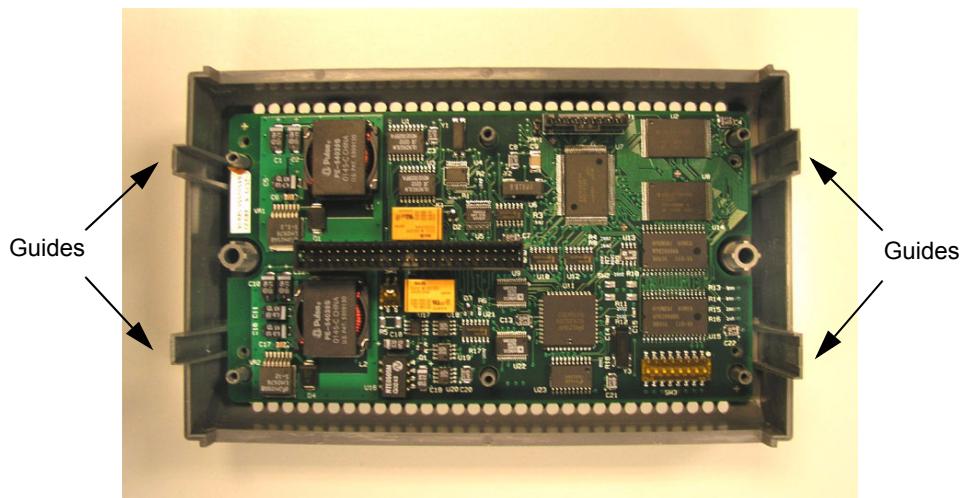
Small, straight-blade screwdriver for securing wires in the terminal blocks.

### RDR2S Module Components

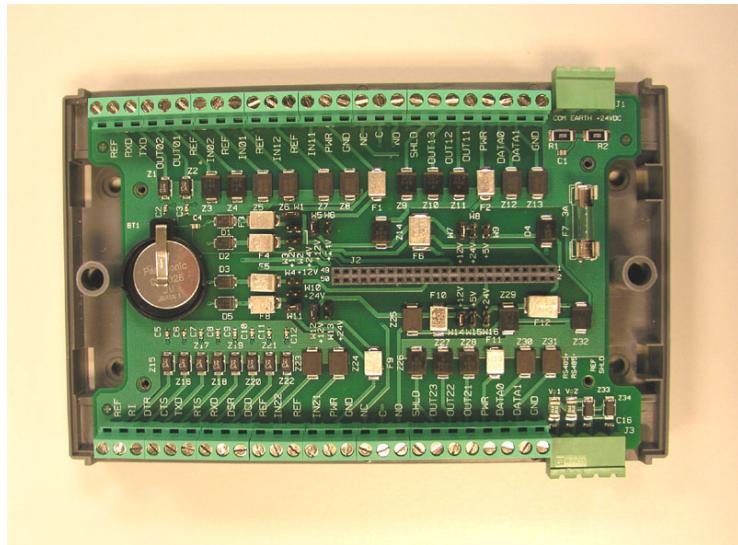
The RDR2S module consists of two electrical printed circuit boards (PCBs) in a plastic enclosure. The bottom PCB is a wiring base and the top PCB is an electronics board.

The electrical printed circuit boards are interconnected via a 2x25 pin header. The bottom board (wiring base) is mounted onto the bottom enclosure with four No 3 screws. The top board (electronics board) is mounted onto the top enclosure with four No 3 screws. The separation between the two boards is approximately 1 inch. The RDR2S module is shipped fully assembled.

Electronics Board



Wiring Base



If DC power has already been connected to the unit, disconnect the DC power before separating the electronics board from the wiring base.

**► To separate the electronics board from the wiring base:**

1. Unscrew the two screws holding the top and bottom parts of the enclosure.
2. Separate the components.

**► To mate the electronics board to the wiring base:**

1. Using the guides, properly orient the electronics module.
2. Secure the top and bottom parts with the two screws.

## Acceptable Switch/Relay Contacts

**Important:** Use only fine gold, gold flash, or reed switch/relay contacts. Do NOT use silver, coin silver, or nickel contacts, as these may oxidize and degrade over time, thereby causing the circuit to fail.

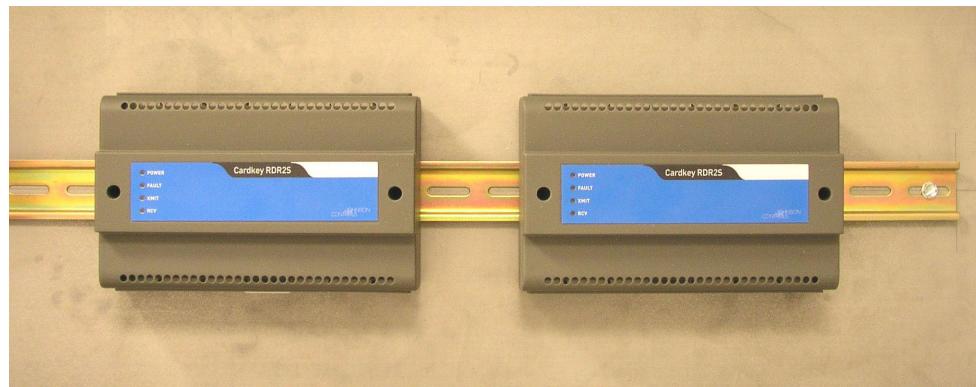
## MOUNTING (No ENCLOSURE)

The S300-DIN-RDR2S can be mounted on a flat surface, DIN rail, or in an S300-DIN enclosure.

For information on mounting the S300-DIN-RDR2S in an S300-DIN enclosure, including power information associated with the S300-DIN-L-PS and S300-DIN-S-PS model power supplies, refer to the *S300-DIN-L Hardware Installation Manual* and the *S300-DIN-S Hardware Installation Manual*.

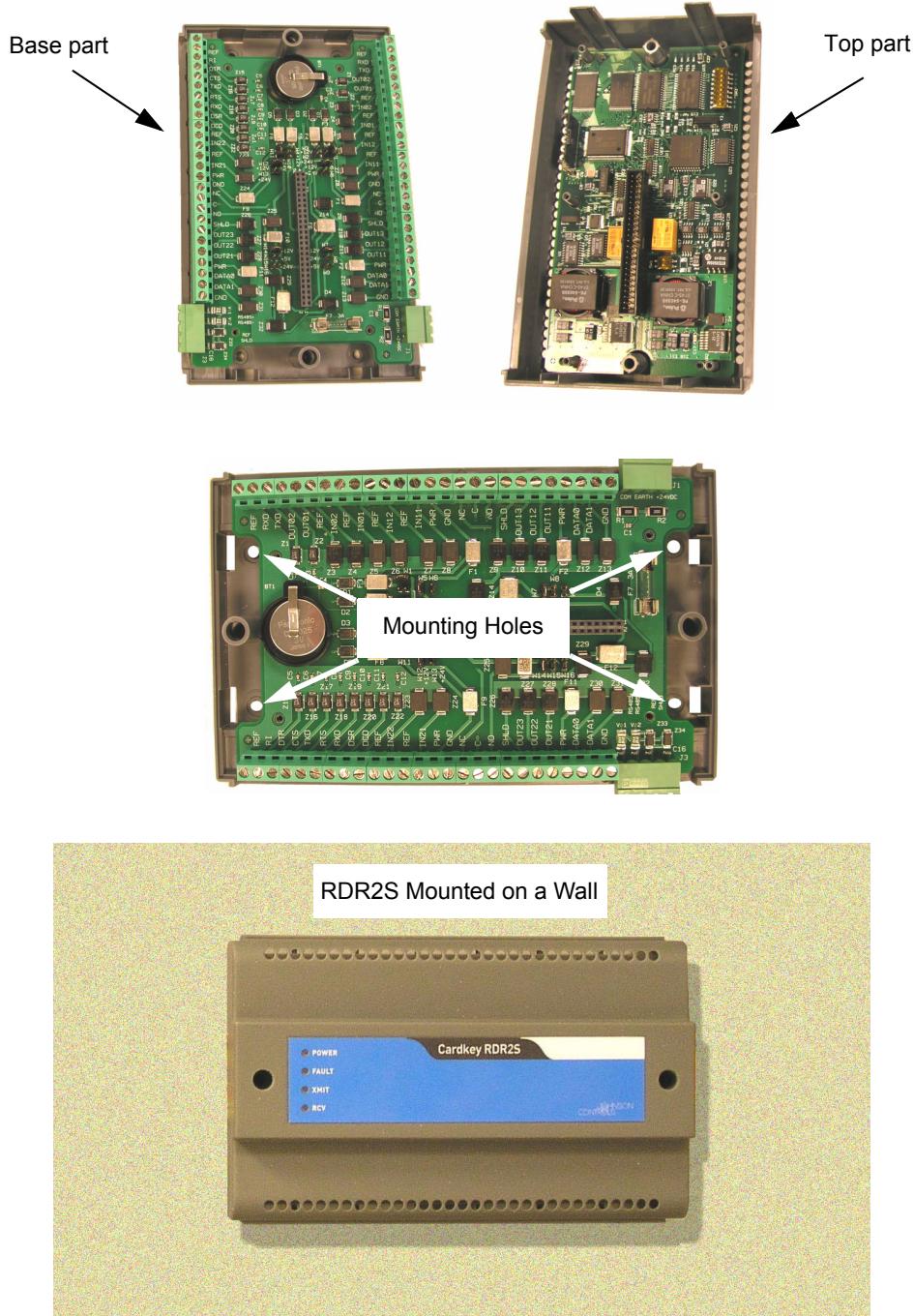
### DIN Rail Mounting

To mount an RDR2S module on a DIN rail, align it with the rail and snap on. To remove a module, pull down the white clip located on the bottom of the module, then pull the bottom of the module out and lift it up.



## Flat Surface Mounting

For flat surface mounting, the RDR2S needs to be disassembled. The base part of the plastic enclosure has four mounting holes that are used for securing the enclosure to the wall.



## DC Power Source

Parameter	Value
Power	36 W
Nominal Voltage	24 VDC
Amperage	1.5 A

## Chassis Grounding

Chassis ground connects to the earth of the S300-DIN-RDR2S (middle connection of the 3-position terminal block).



Chassis ground and logic ground must be connected together at the RDR2S power connector.

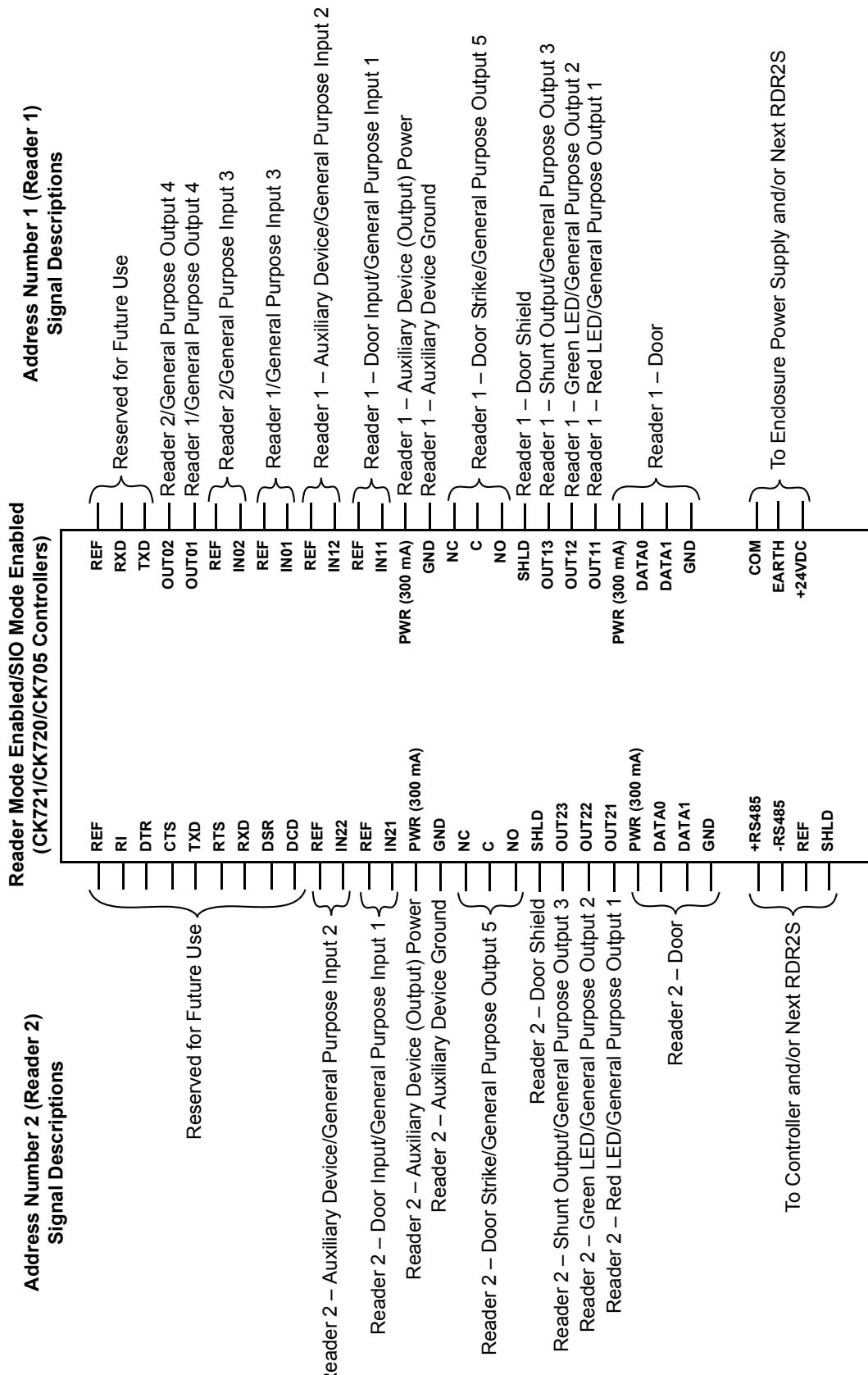
CAUTION

## WIRING

All field wiring connects to the bottom PCB connectors and terminal blocks. This board does not contain electronic components beside protection devices. The connections are centered at 0.2 in. (5 mm) intervals and may accommodate up to two 18 gauge wires.

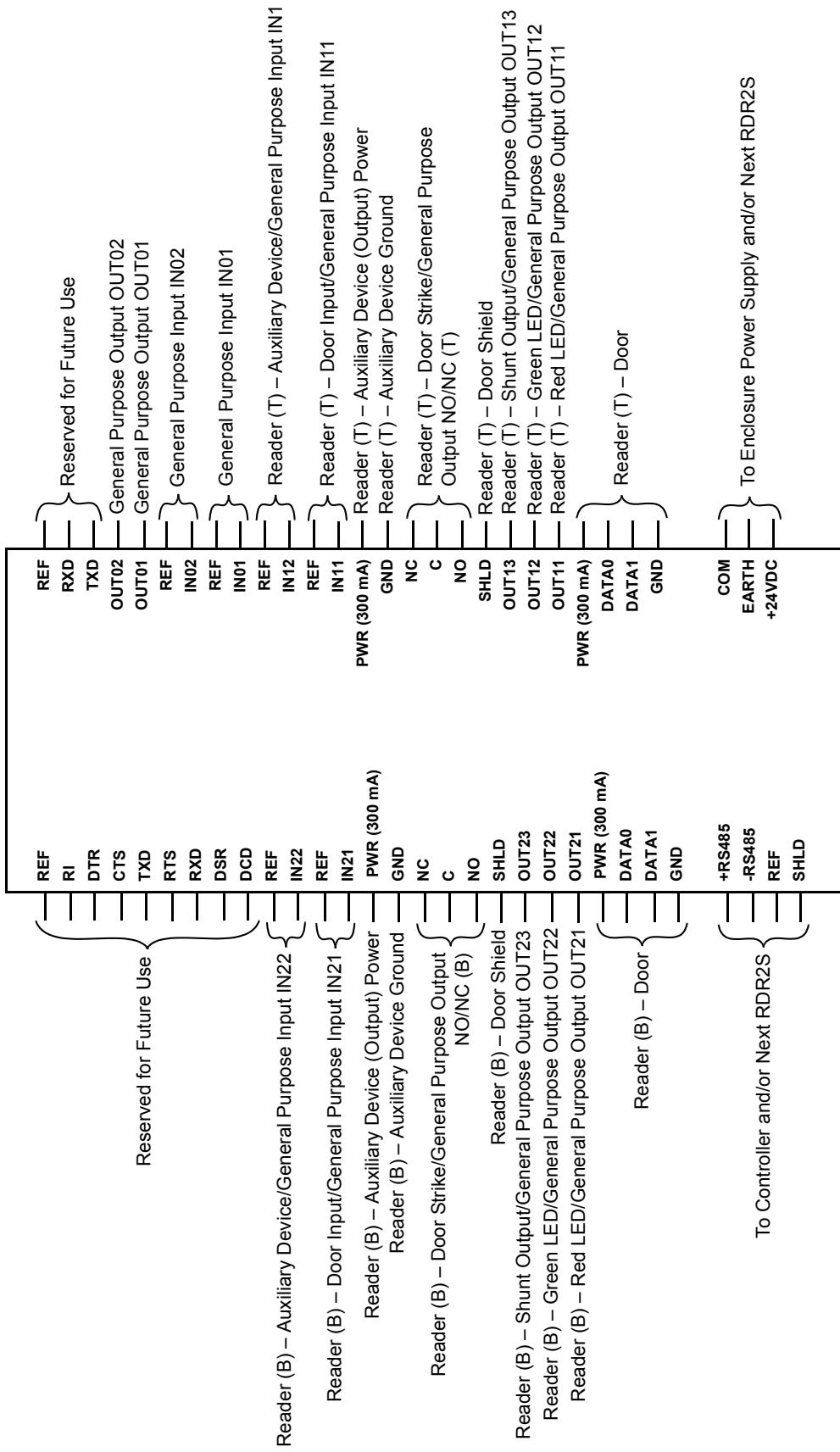
## Description of Signals

All interface signals are connected via plug-in connectors and terminal blocks. For a description of the RDR2S I/O interface signals, see “Modes of Operation” on page 27.



(T) = Top  
(B) = Bottom

**Reader Terminal Object Defined/Reader Terminal Object NOT Defined  
(CK722 Controllers)**



### ***Wiegand Input***

**Description of Signals** – DATA0 and DATA1, complying with the Wiegand interface specification, from each reader. These signals are pulled up to 5 VDC by internal 3.92 K Ohm resistors.

**Reference** – These signals are referenced to logic ground (GND).

**Protection** – Each signal has a 6 volt transient voltage suppressor between it and chassis ground.

### ***Inputs Points***

**Description of Signals** – IN01, IN02, IN11, IN12, IN21, and IN22 are internally pulled up inputs. The allowable voltage range for these signals is 0-5V.

**Reference** – These signals are referenced to their associated REF input.

**Protection** – Each signal has a 6 volt transient voltage suppressor between it and chassis ground.

**External Circuits** – An external resistor and switch circuit connected between INx and REF is required for 4-state operation. An external switch connected between INx and REF is required for 2-state operation.

### ***Output Points***

**Description of Signals** – OUT01, OUT02, OUT11, OUT12, OUT13, OUT21, OUT22, and OUT23 are open collector outputs. The allowable voltage range for these signals is 0-24V.

**Reference** – These signals are referenced to logic ground (GND).

**Protection** – Each signal has a 30 volt transient voltage suppressor between it and chassis ground.

### ***Relay Output Points***

**Description of Signals** – NC, NO, and C are the three connections to a single pole, double throw relay. The allowable voltage range for these signals is 0-24V.

**Reference** – When 12 VDC or 24 VDC is selected, then these signals are referenced to logic ground (GND). When DRY is selected, the relay is a dry contact relay rated at 2 A at 12 VDC.

**Protection** – 12 VDC has a 750 mA re-settable fuse. 24 VDC has a 500 mA re-settable fuse.

**Configuration Jumpers** – See “Configuration Jumpers” on page 22.

### **External Device Power**

**Description of Signals** – Either 12 VDC or 24 VDC may be selected. The 12 VDC is developed internally by a switching power supply. The 24 VDC is taken from the external power source.

**Protection** – Each signal has a 300 mA re-settable fuse.

**Configuration Jumpers** – See “Configuration Jumpers” on page 22.

### **Reader Power**

**Description of Signals** – 5 VDC, 12 VDC, or 24 VDC may be selected. The 5 VDC is developed internally by a switching power supply. The 12 VDC is developed internally by a switching power supply. The 24 VDC is taken from the external power source.

**Protection** – Each signal has a 300 mA re-settable fuse.

**Configuration Jumpers** – See “Configuration Jumpers” on page 22.

## **Cable Requirements**

<b>Description</b>	<b>Recommended Cable Type</b>	<b>Maximum Segment Length</b>
RDR2S to Power Supply <sup>1</sup>	Listed, 18 AWG, hook-up wire	Wire should fit within the enclosure.
RDR2S to Controller	Listed, 18 AWG, 1 twisted pair	4000 feet (1219 m) maximum. All RDR2S modules connected to a single controller must be within 4000 feet of the controller.
RDR2S to RDR2S	Listed, 18 AWG, 1 twisted pair	4000 feet (1219 m) maximum
Door Strike	Belden 8760, 1 twisted, shielded pair, 18 AWG	Depends on power requirements of the door strike. Voltage to the strike must not be reduced more than 10% over the 18 AWG wire.
Door Open	Belden 8761, 1 twisted, shielded pair, 22 AWG	500 feet (152 m)
Auxiliary Access	Belden 8761, 1 twisted, shielded pair, 22 AWG	500 feet (152 m)
Reader (Power)	Belden 8760, 1 twisted, shielded pair, 18 AWG	Refer to reader manufacturer's specification for power requirements.
Reader (Data)	Belden 8761, 1 twisted, shielded pair, 22 AWG	500 feet (152 m). Refer to reader manufacturer's specification for data requirements.

Description	Recommended Cable Type	Maximum Segment Length
Alarm Input	Belden 8761, 1 twisted, shielded pair, 22 AWG to each detector	500 feet (152 m)
Output Point	Belden 8760, 1 twisted, shielded pair, 18 AWG to each relay	Depends on load.

1. When wiring more than one RDR2S, use the same type of hook-up wire and communications wire to connect subsequent modules.

### Cable Routing

All low-level input cables, such as system data and reader cables, must be shielded types. The cables should run in grounded conduit or at least two feet from AC power, fluorescent lights, or other high energy sources.



All data cables should be physically separated from power lines. If conduit is used, do not run data cables in the same conduit as power cables or certain door strike cables, e.g. strike voltage greater than 42V or Magnetic door locks without EMI suppression.

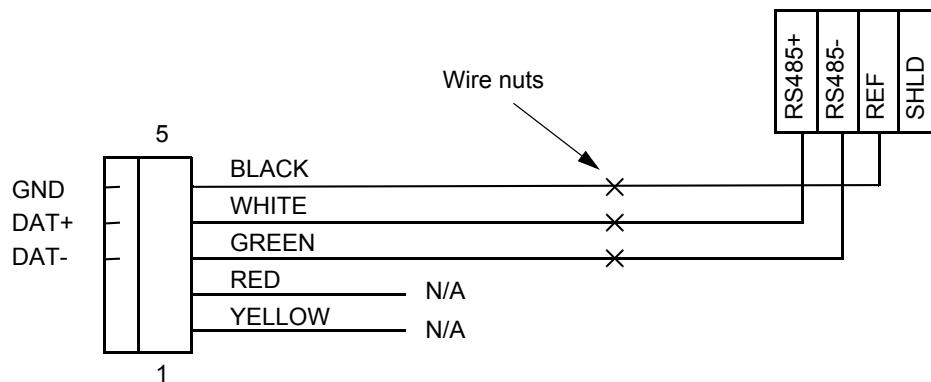
All cables must conform with the following regulations:

- National Electrical Code
- NFPA 70
- Local electrical codes
- Canadian Electric Code C22.1 (installations in Canada)
- BSI Standard BS7671, latest edition (installations in Great Britain)

Cabling should be made using good wiring practices and should be long enough to allow service loops at their terminations in the enclosure.

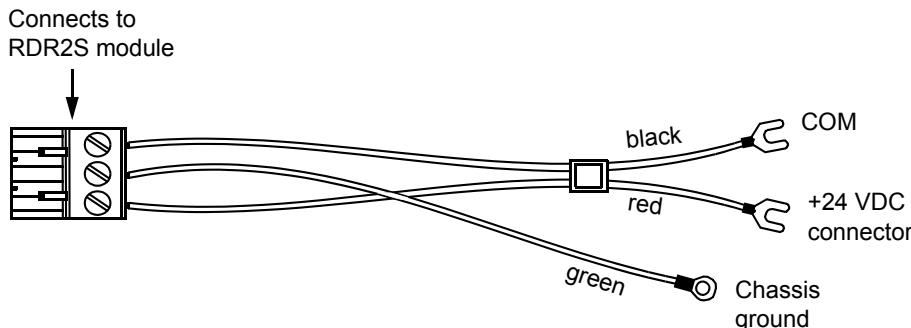
### CK720 to RDR2S Cable

A cable (part number 25-2360-8) is included with the RDR2S. Use this cable to fabricate the cable between a CK720 and the RDR2S. Cut the cable in half and extend the wiring from the CK720 enclosure to the RDR2S.

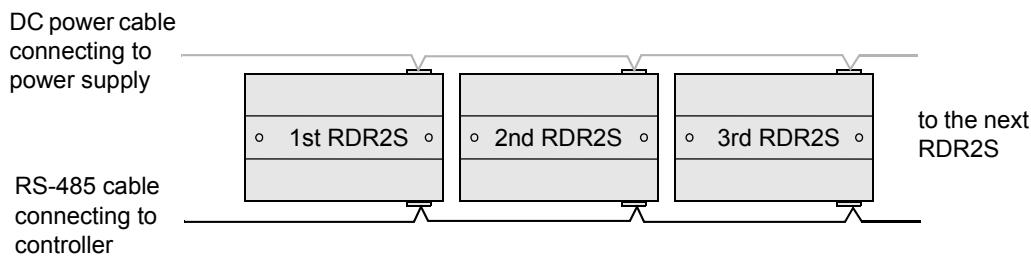


## Power Supply

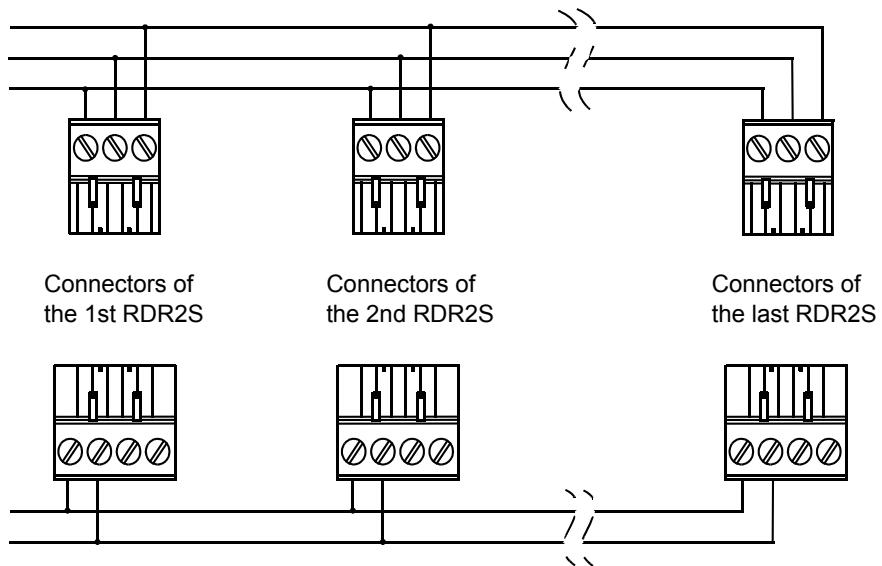
For power wiring with either the large or small enclosure, use the cable assembly shown in the following figure. Refer also to the *S300-DIN-L Hardware Installation Manual* and the *S300-DIN-S Hardware Installation Manual*.



When connecting multiple RDR2S modules, wire the modules in parallel following the “daisy chain” pattern as shown in the following figures. To construct the power wiring, use listed 18 AWG wires.



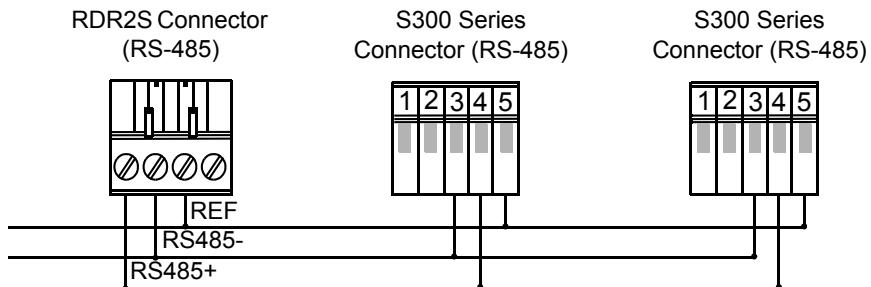
**CAUTION** Make sure each wire is connected to the same corresponding connector position in the subsequent RDR2S module. See the following figure for details.



Do not connect the DC power cable to the RDR2S until all wiring is complete.

CAUTION

If daisy-chain connecting an RDR2S with an S300 Series module (e.g. S300-RDR2, S300-SI8, S300-SIO8, S300-IO8, and S300-I16), wire the devices according to the following illustration.



When daisy-chain connecting an RDR2S to an S300 Series module, you must wire REF (Ground) from the controller via the RDR2S to the next S300 Series module in the chain.

## **Power Requirements**

See the following table for general power requirements. For power requirements for input and output points, see “External Device Power” on page 10 and “Reader Power” on page 10.

Parameter	Value
Input voltage	15 VDC min to 28 VDC max.
Nominal voltage	24 VDC
Maximum power needed	36 W
Output ratings (total for the RDR2S)	5 VDC at 3 W; 12 VDC at 16 W; 24 VDC at 14.4 W

## **Line Voltage Information**

If the facility is located in an area where power lines are subject to frequent lightning strikes, verify with the electric company that the building transformer is equipped with surge protectors. These, as well as a “crowbar” type of protection, can be installed at the main service entrance if the building transformer is not equipped with lightning protection.

While lightening is one cause of power line transients, others can be internal or external to the building environment. The general application of transient surge suppression is low-cost insurance to ensure long life of the equipment being installed.

## **Wiring Input/Output Devices**

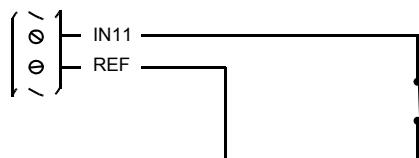
### **Tamper Switch Wiring**

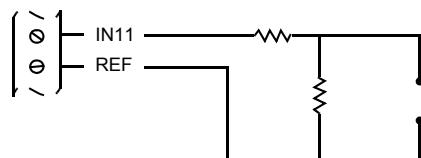
The tamper switch connects to a general purpose input point. To be operational, the tamper switch must be wired to one of the unused input points on any RDR2S in the enclosure, and programmed in the controller.

### **General Input Wiring**

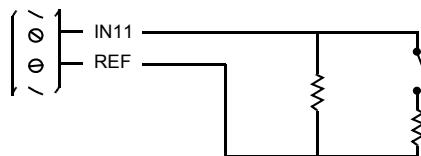
Depending on programming, there are either 2-state or 4-state inputs. You should define the inputs depending on the needs of your site.

#### **2-State Inputs Wiring**



**4-State Inputs Wiring: N/C Switch**

**Note:** The 4-state wiring requires two resistors of the same value. The resistors can be 150-2000 Ohms, 5%, 1/4W. The recommended resistor is **1200 Ohms**.

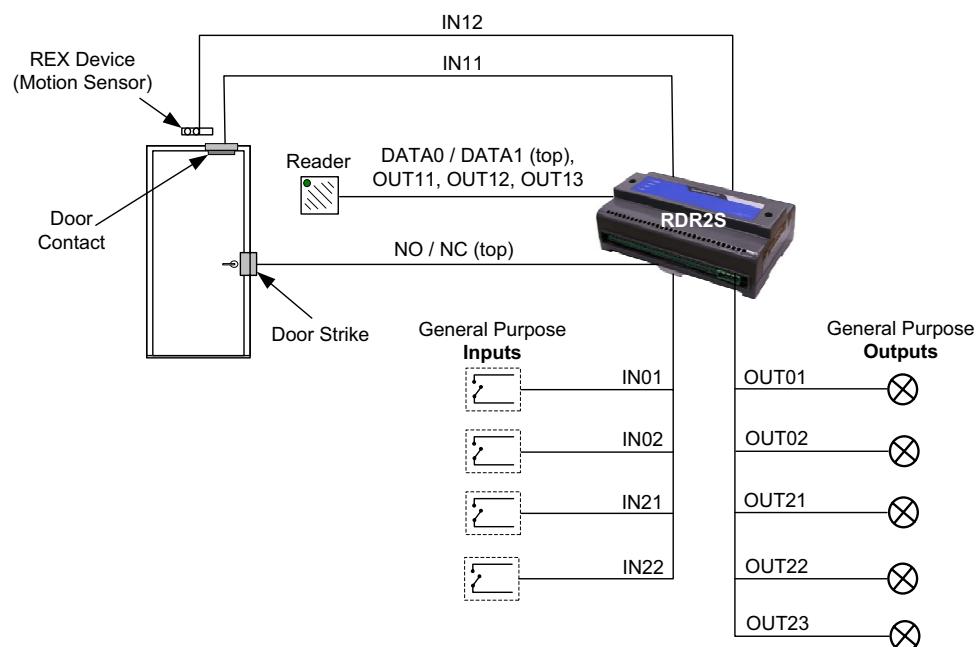
**4-State Inputs Wiring: N/O Switch**

**Note:** The 4-state wiring requires two resistors of the same value. The resistors can be 150-2000 Ohms, 5%, 1/4W. The recommended resistor is **1200 Ohms**.

## Sample Application Diagrams

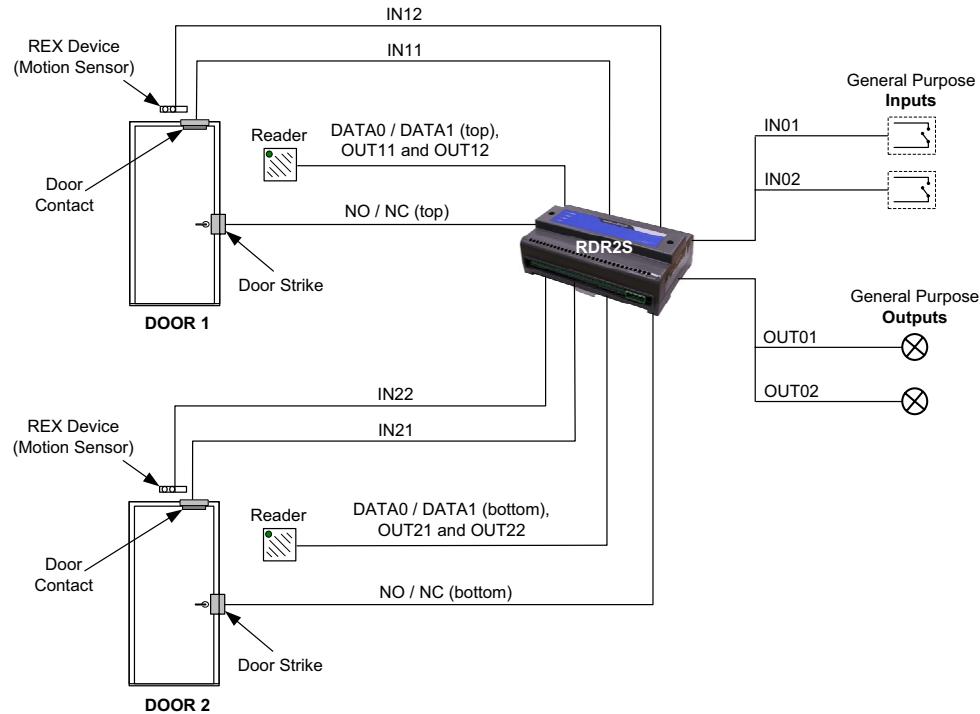
### One Door Application

This application is designed for the RDR2S with Reader 1 (Top) enabled for use with a single, fully configured door (single strike – single reader). The remaining input/output points are designated as general purpose I/Os, meaning you can use these I/Os for other applications, such as a reader with a tamper switch (input) or alarm annunciation output (siren, lights).



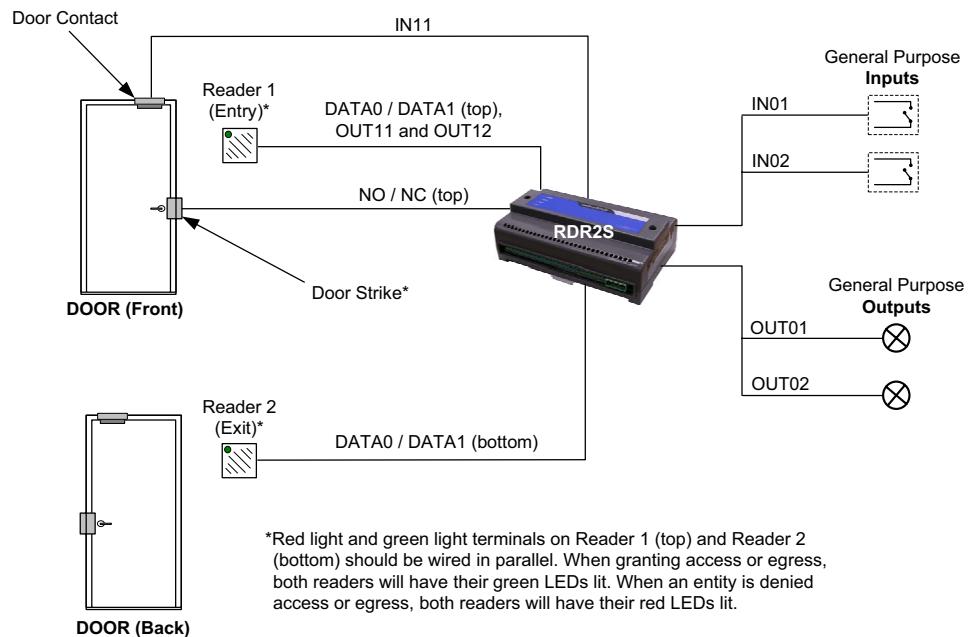
## Two Door Application

This application is designed for the RDR2S with Reader 1 (Top) and Reader 2 (Bottom) enabled for use with two separate, fully configured doors (not an entry/exit door). There are two remaining input points and two output points for use as general purpose I/Os.



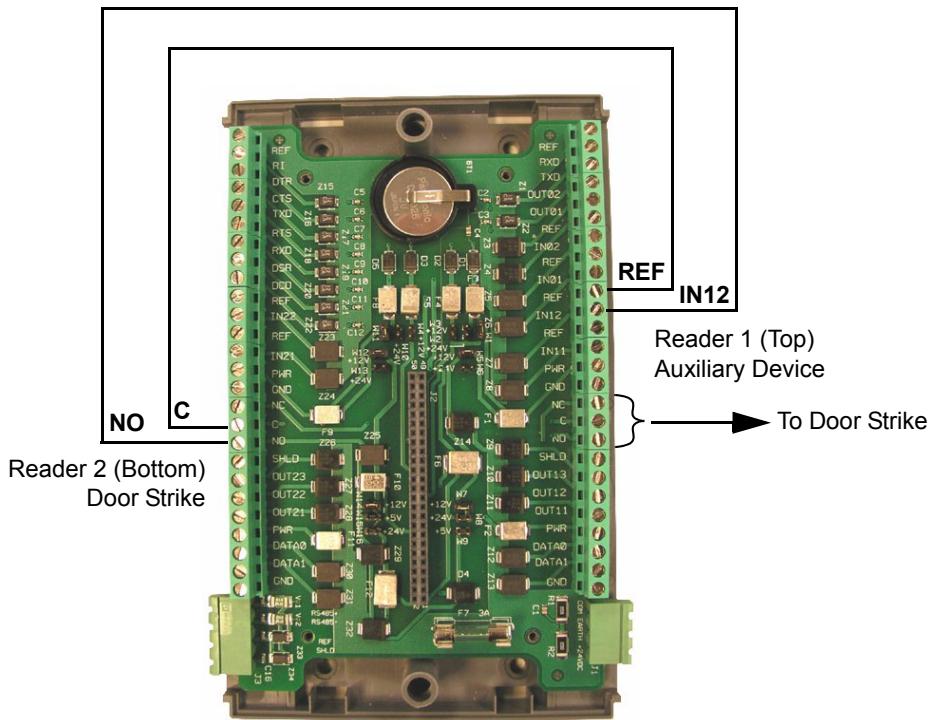
### Entry-Exit Application (One Door, One Strike, Two Readers)

This template is designed for the RDR2S with Reader 1 and Reader 2 enabled for use with a single door (entry/exit). There are two remaining input points and two output points for use as general purpose I/Os.



**Wiring One Strike Shared By Two Readers**

For applications with two readers sharing a single door strike, wire the Reader 2 (Bottom) Door Strike to Reader 1 (Top) Auxiliary Device according to the following diagram.

**Ground and Grounding Cable Shields*****Ground***

Every metal DIN enclosure in a Johnson Controls installation must have its chassis bonded to a verified electrical ground (earth).



Conduit ground, cold water pipes, unbrazed joints or dissimilar metals are unacceptable in the path of either building or supplemental ground. Where grounding is required, connect only to the proven building electrical system ground (earth).

***Grounding Cable Shields***

This section gives instructions for grounding cable shields at data and low voltage installations. Follow these guidelines for electromagnetic compatibility (EMC) conformity and to improve system reliability.

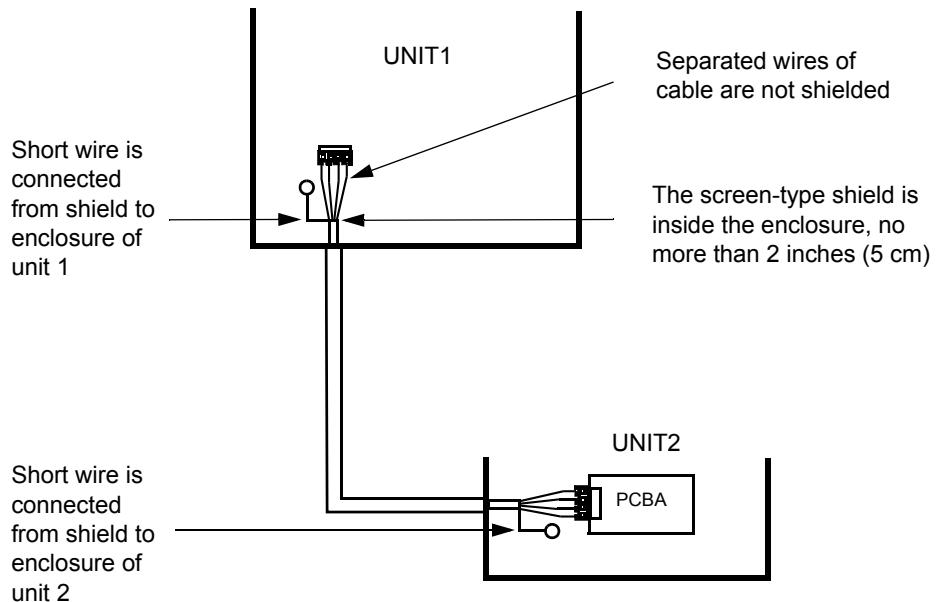
The following key points will help ensure a good ground for cable shields:

- Shield must be connected to chassis ground.
- Grounding points should be free from paint and corrosion.
- Keep the cable's shield as short as possible. Ideally, the length of exposed shield should not exceed 3 inches (76 mm). This length includes any crimp-type terminal lug used to connect the shield to chassis ground.
- Do not connect the cable shield to any existing internal ground (earth) bonding straps.

The following information will help you decide how best to terminate the shield.

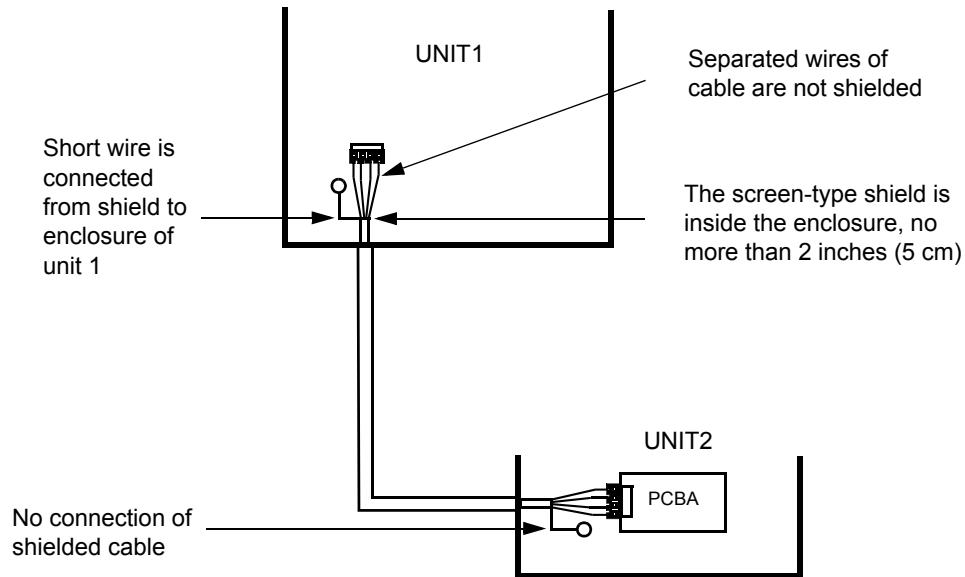
**The equipment to be interconnected is at the same ground voltage potential (zero volts).**

This scenario is typically used when the units are in close proximity to each other. Connect the cable's shield at both ends of the cable to the closest chassis ground point.



**The equipment to be interconnected is at different ground voltage potential.**

This scenario is typically used when the units are not in close proximity. Only connect the cable's shield at one end. The termination point is generally at the higher end of the system hierarchy.

**Card Reader Unit Grounding**

If the card reader unit ground is not mounted on a metal surface, connect a grounding wire to the card reader unit housing. Run the wire to the associated unit, connect the cable shield to the grounding bus. The screws for the ground bus are bagged separately for installation.

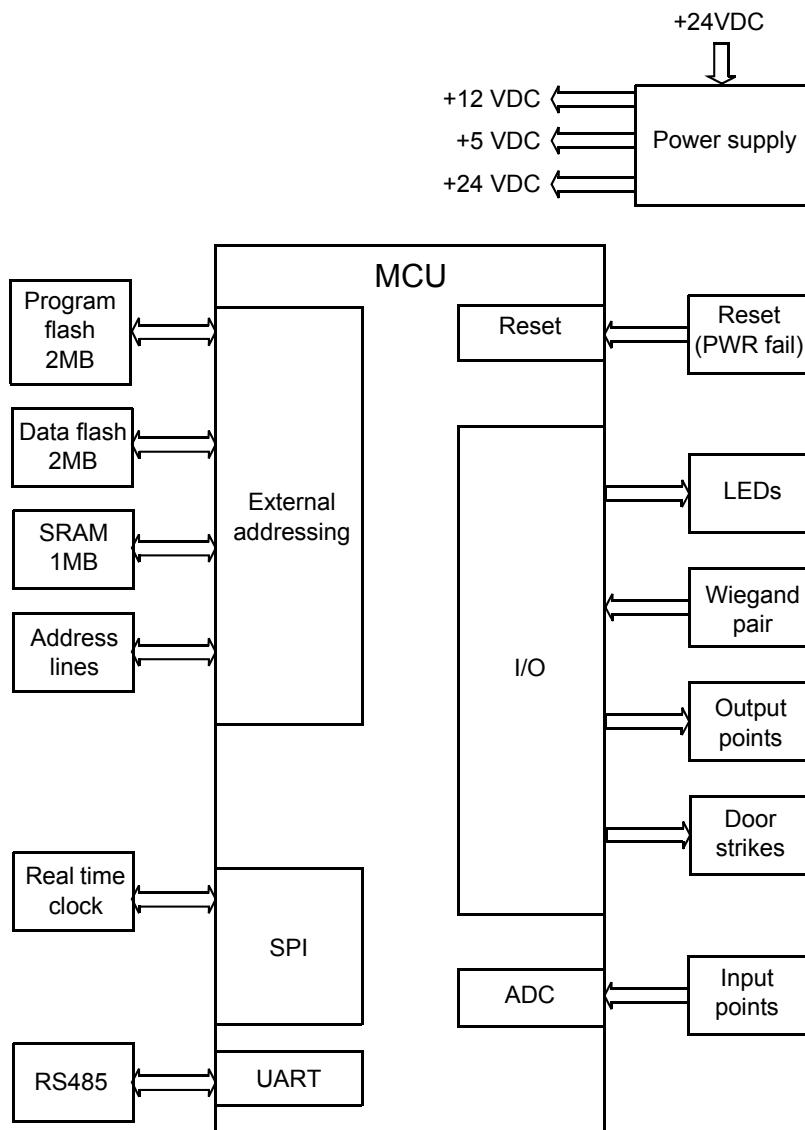
If the card reader unit *is mounted on a metal surface which may contact ground*, select either one of two options:

- Insulate the card reader unit from the metal surface and connect the grounding wire described above.
- Leave the card reader attached to the metal surface if insulating it is not practical, and do **not** connect the grounding wire described above. This will prevent a possible ground loop or other problems, since building framework or structural metal is often subject to stray AC or DC voltages and transients.

## SETUP AND ADJUSTMENTS

### Electronics Board

All electronics are contained in a plug-in module, which may be removed without disturbing the field wiring.



## Configuration Jumpers

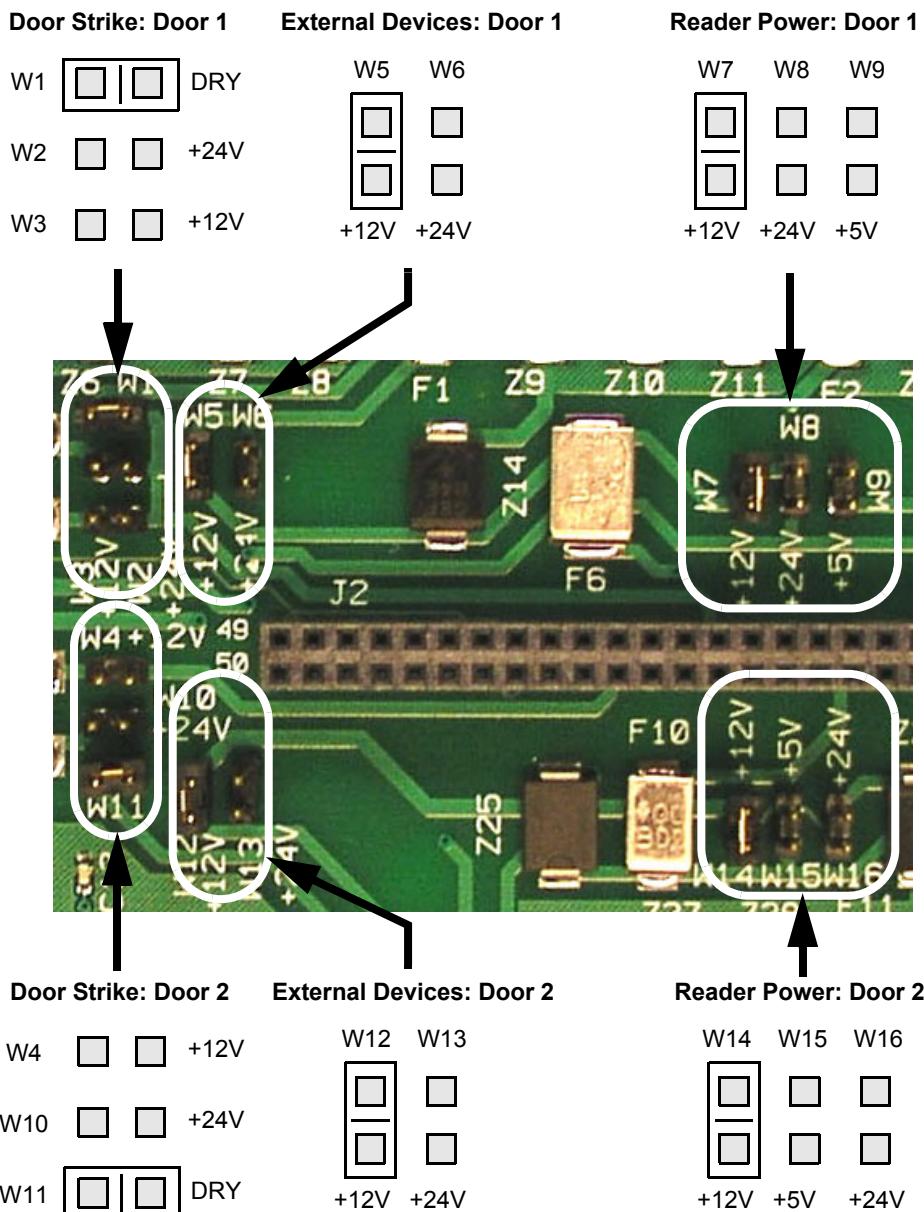
The following figure illustrates the positioning of configuration jumpers for reader power, external devices (e.g. PIR), door strike, input points, and output points.



Read the silk screen carefully to select the correct reader power. Incorrect selection may result in damage to the equipment.



One and only one jumper is allowed for each bank.

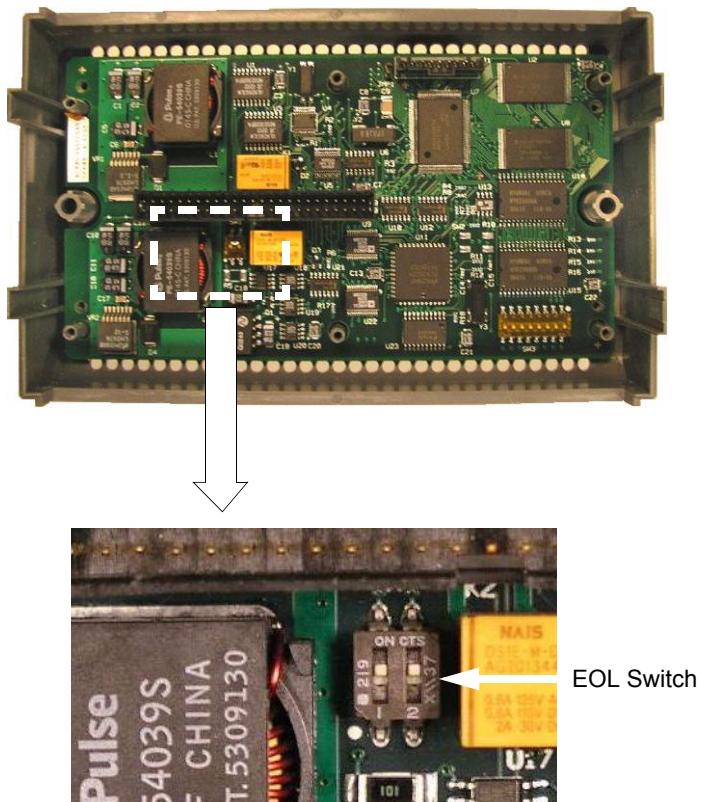


## RS485 Connection

### **Setting the End-of-Line Switch (SW1)**

Network devices at either end of the RS485 network must be set as network terminated devices. This is done with the use of the End-of-Line (EOL) switch. The S300-DIN-RDR2S module has one End-of-Line switch consisting of two resistors. Turn them both on (up) or both off (down) according to the position of the RDR2S module on the RS485 bus.

**Factory Default:** ON (both up)



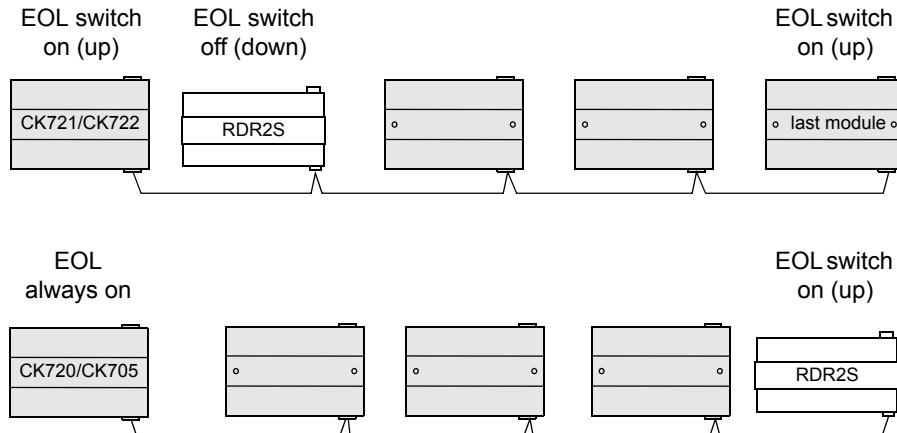
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### **NOTE**

*Before changing the EOL position, remove the 24 VDC supply power to the RDR2S and wait for the Power LED to go off.*

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S300-DIN-RDR2S modules follow the same rules as other terminated devices. See the following figure to determine the appropriate EOL switch setting for all S300-DIN-RDR2S modules in your network and set the EOL switch to the appropriate position for each S300-DIN-RDR2S.



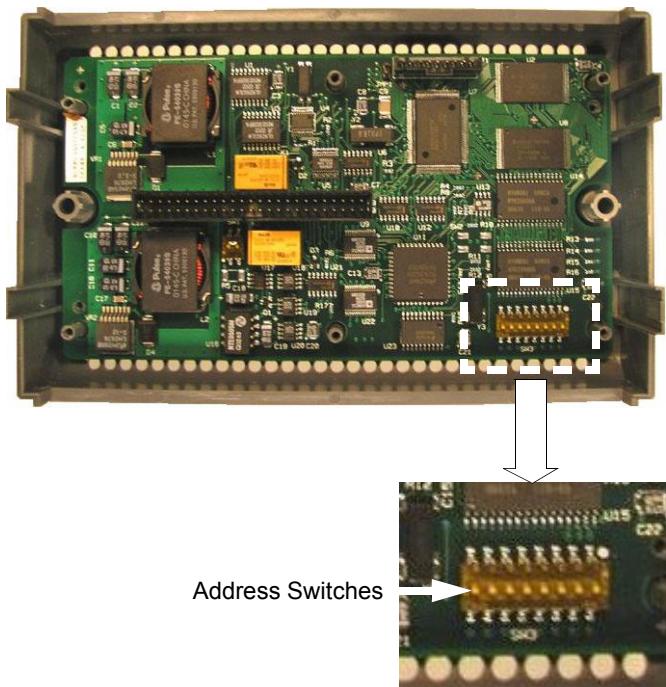
### Baud Rates

The RDR2S module supports autobaud operation between 9600 and 19200 bps and does not require any switch settings.

### Address Switches (SW3)

The RDR2S module has an 8-position SW3 switch (see “Terminal Addressing” on page 25).

- (CK721/CK720/CK705 Controllers) Position 1 to 3: Reader address
- (CK722 Controllers) Position 1 to 5: Reader address



**Terminal Addressing**

CK721/CK720/CK705 Controllers

Terminal Number	RDR2S SW3 Settings							
	Address			RDR 1	I/O 1	RDR 2	I/O 2	N/A
	1	2	3	4	5	6	7	8
1 & 2	Off	Off	Off	See “Input Point Signals (CK721/CK720/CK705 Controllers)” on page 28 and “Output Point Signals (CK721/CK720/CK705 Controllers)” on page 30 for details	Unused			
3 & 4	On	Off	Off					
5 & 6	Off	On	Off					
7 & 8	On	On	Off					
9 & 10	Off	Off	On					
11 & 12	On	Off	On					
13 & 14	Off	On	On					
15 & 16	On	On	On					

## CK722 Controllers

Hardware Module Number	RDR2S SW3 Settings							
	Address					N/A		
	1	2	3	4	5	6	7	8
0	Off	Off	Off	Off	Off	Unused		
1	On	Off	Off	Off	Off			
2	Off	On	Off	Off	Off			
3	On	On	Off	Off	Off			
4	Off	Off	On	Off	Off			
5	On	Off	On	Off	Off			
6	Off	On	On	Off	Off			
7	On	On	On	Off	Off			
8	Off	Off	Off	On	Off			
9	On	Off	Off	On	Off			
10	Off	On	Off	On	Off			
11	On	On	Off	On	Off			
12	Off	Off	On	On	Off			
13	On	Off	On	On	Off			
14	Off	On	On	On	Off			
15	On	On	On	On	Off			
16	Off	Off	Off	Off	On			
17	On	Off	Off	Off	On			
18	Off	On	Off	Off	On			
19	On	On	Off	Off	On			
20	Off	Off	On	Off	On			
21	On	Off	On	Off	On			
22	Off	On	On	Off	On			
23	On	On	On	Off	On			
24	Off	Off	Off	On	On			
25	On	Off	Off	On	On			
26	Off	On	Off	On	On			
27	On	On	Off	On	On			
28	Off	Off	On	On	On			
29	On	Off	On	On	On			
30	Off	On	On	On	On			
31	On	On	On	On	On			

### **RS-485 Isolation and Protection**

Isolation and protection is provided by the following components:

- Three optical isolators (optocouplers)
- Two re-settable switch thermistors
- Two transient voltage suppressors (TVSSs)

## **Modes of Operation**

### **Mode Switches**

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#### **NOTE**

*Mode switches apply only to CK720/CK705 controllers. For information on configuring the RDR2S for use with CK722 controllers, refer to the CK722 Commissioning Guide.*

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The RDR2S module has an 8-position SW3 switch (see “Terminal Addressing” on page 25). The mode switches are as follows:

- Position 4: Reader 1 Enable
- Position 5: I/O 1 Enable
- Position 6: Reader 2 Enable
- Position 7: I/O 2 Enable
- Position 8: Not Used

The RDR2S terminal maps its input points differently, based on its SIO switch configuration. If the reader 1 or reader 2 switch is set to enabled, then the input map is as described under the RDR column of the I/O table. If the reader 1 I/O or reader 2 I/O switch is set to enabled, then the input map is as described under the SIO column of the I/O table. If both reader enabled and I/O enabled switches are set for a specific reader, then the RDR mapping has precedence over the SIO mapping.

### **Reader Enabled versus I/O Enabled**

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#### **NOTE**

*This section applies only to CK720/CK705 controllers. For information on configuring the RDR2S for use with CK722 controllers, refer to the CK722 Commissioning Guide.*

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RDR Enabled	I/O Enabled	Description
Off	Off	RDR map and I/O map disabled
Off	On	RDR map disabled, I/O map enabled
On	Off	RDR map enabled, I/O map disabled
On	On	RDR map, general purpose output, and general purpose input enabled

The mapping table for both readers is shown in the “Input and Output Point Signals” section.

## Input and Output Point Signals

### *Input Point Signals (CK721/CK720/CK705 Controllers)*

Signal Names	RDR Mode Enabled	SIO Mode Enabled
IN11, REF	Reader 1  Door Input  Configuration can be 2-state or 4-state.  Input is associated with input point 18 (forced door) and 24 (propped door).	SIO 1  General Purpose Input 1  Input is logically mapped to input point 1.  Configuration can be 2-state or 4-state.
IN12, REF	Reader 1  Auxiliary Input  Configuration can be 2-state or 4-state.  2-state auxiliary input is closed for request to exit state.  4-state auxiliary input must be calibrated in the quiescent or non request to exit state.	SIO 1  General Purpose Input 2  Input is logically mapped to input point 2.  Configuration can be 2-state or 4-state.
IN01, REF	N/A	SIO 1  General Purpose Input 3  Input is logically mapped to input point 3.  Configuration can be 2-state or 4-state.
IN21, REF	Reader 2  Door Input  Configuration can be 2-state or 4-state.  Input is associated with input point 18 (forced door) and 24 (propped door).	SIO 2  General Purpose Input 1  Input is logically mapped to input point 1.  Configuration can be 2-state or 4-state.

Signal Names	RDR Mode Enabled	SIO Mode Enabled
IN22, REF	Reader 2 Auxiliary Input Configuration can be 2-state or 4-state. 2-state auxiliary input is closed for request to exit state. 4-state auxiliary input must be calibrated in the quiescent or non request to exit state.	SIO 2 General Purpose Input 2. Input is logically mapped to input point 2. Configuration can be 2-state or 4-state.
IN02, REF	N/A	SIO 2 General Purpose Input 3 Input is logically mapped to input point 3. Configuration can be 2-state or 4-state.

### ***Input Point Signals (CK722 Controllers)***

Signal Names	Reader Terminal Object Defined	Reader Terminal Object NOT Defined
IN11, REF	Reader (Top) Door Input Input is logically mapped to connector IN11. Configuration can be 2-state or 4-state.	General Purpose Input IN11 Input is logically mapped to connector IN11. Configuration can be 2-state or 4-state.
IN12, REF	Reader (Top) Auxiliary Input Input is logically mapped to connector IN12. Configuration can be 2-state or 4-state. 2-state auxiliary input is closed for request to exit state. 4-state auxiliary input must be calibrated in the quiescent or non request to exit state.	General Purpose Input IN12 Input is logically mapped to connector IN12. Configuration can be 2-state or 4-state.
IN01, REF	General Purpose Input IN01 Input is logically mapped to connector IN01. Configuration can be 2-state or 4-state.	General Purpose Input IN01 Input is logically mapped to connector IN01. Configuration can be 2-state or 4-state.

<b>Signal Names</b>	<b>Reader Terminal Object Defined</b>	<b>Reader Terminal Object NOT Defined</b>
IN21, REF	Reader (Bottom) Door Input Input is logically mapped to connector IN21. Configuration can be 2-state or 4-state.	General Purpose Input IN21 Input is logically mapped to connector IN21. Configuration can be 2-state or 4-state.
IN22, REF	Reader (Bottom) Auxiliary Input Input is logically mapped to connector IN22. Configuration can be 2-state or 4-state. 2-state auxiliary input is closed for request to exit state. 4-state auxiliary input must be calibrated in the quiescent or non request to exit state.	General Purpose Input IN22. Input is logically mapped to connector IN22. Configuration can be 2-state or 4-state.
IN02, REF	General Purpose Input IN02 Input is logically mapped to connector IN02. Configuration can be 2-state or 4-state.	General Purpose Input IN02 Input is logically mapped to connector IN02. Configuration can be 2-state or 4-state.

### ***Output Point Signals (CK721/CK720/CK705 Controllers)***

<b>Signal Names</b>	<b>RDR Mode Enabled</b>	<b>SIO Mode Enabled</b>
OUT11	Reader 1 Red Light Output Output is set every time an access deny occurs.	SIO 1 General Purpose Output 1 Output is logically mapped to output point 1. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
OUT12	Reader 1 Green Light Output Output is set every time an access grant occurs.	SIO 1 General Purpose Output 2 Output is logically mapped to output point 2. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.

<b>Signal Names</b>	<b>RDR Mode Enabled</b>	<b>SIO Mode Enabled</b>
OUT13	Reader 1 Shunt Output Output is set every time an access grant occurs.	SIO 1 General Purpose Output 3 Output is logically mapped to output point 3. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
OUT01	N/A	SIO 1 General Purpose Output 4 Output is logically mapped to output point 4. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
NC or NO	Reader 1 Door Strike Output is set every time an access grant or auxiliary access occurs.	SIO 1 General Purpose Output 5 Output is logically mapped to output point 5. It can be timed, set, reset, fast flash, or slow flash.
OUT21	Reader 2 Red Light Output Output is set every time an access deny occurs.	SIO 2 General Purpose Output 1 Output is logically mapped to output point 1. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
OUT22	Reader 2 Green Light Output Output is set every time an access grant occurs.	SIO 2 General Purpose Output 2 Output is logically mapped to output point 2. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
OUT23	Reader 2 Shunt Output Output is set every time an access grant or auxiliary access occurs.	SIO 2 General Purpose Output 3 Output is logically mapped to output point 3. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
OUT02	N/A	SIO 2 General Purpose Output 4 Output is logically mapped to output point 4. It can be timed, set, reset, fast flag, or slow flash. Output is an open collector that switches to ground.

<b>Signal Names</b>	<b>RDR Mode Enabled</b>	<b>SIO Mode Enabled</b>
NC or NO	Reader 2 Door Strike Output is set every time an access grant or auxiliary access occurs.	SIO 2 General Purpose Output 5 Output is logically mapped to output point 5. It can be timed, set, reset, fast flash, or slow flash.

***Output Point Signals (CK722 Controllers)***

<b>Signal Names</b>	<b>Reader Terminal Object Defined</b>	<b>Reader Terminal Object NOT Defined</b>
OUT11	Reader (Top) Red Light Output Output is set every time an access deny occurs.	General Purpose Output OUT11 Output is logically mapped to connector OUT11. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
OUT12	Reader (Top) Green Light Output Output is set every time an access grant occurs.	General Purpose Output OUT12 Output is logically mapped to connector OUT12. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
OUT13	Reader (Top) Shunt Output Output is set every time an access grant occurs.	General Purpose Output OUT13 Output is logically mapped to connector OUT13. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
OUT01	General Purpose Output OUT01 Output is logically mapped to connector OUT01. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.	General Purpose Output OUT01 Output is logically mapped to connector OUT01. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
NC or NO	Reader (Top) Door Strike Output is set every time an access grant or auxiliary access occurs.	General Purpose Output 5 Output is logically mapped to connector NO/NC (Top). It can be timed, set, reset, fast flash, or slow flash.
OUT21	Reader (Bottom) Red Light Output Output is set every time an access deny occurs.	General Purpose Output OUT21 Output is logically mapped to connector OUT21. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.

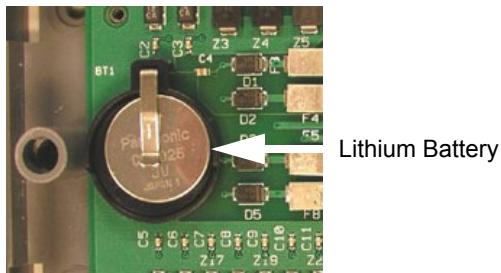
Signal Names	Reader Terminal Object Defined	Reader Terminal Object NOT Defined
OUT22	Reader (Bottom) Green Light Output Output is set every time an access grant occurs.	General Purpose Output OUT22 Output is logically mapped to connector OUT22. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
OUT23	Reader (Bottom) Shunt Output Output is set every time an access grant or auxiliary access occurs.	General Purpose Output OUT23 Output is logically mapped to connector OUT23. It can be timed, set, reset, fast flash, or slow flash. Output is an open collector that switches to ground.
OUT02	General Purpose Output OUT02 Output is logically mapped to connector OUT02. It can be timed, set, reset, fast flag, or slow flash. Output is an open collector that switches to ground.	General Purpose Output OUT02 Output is logically mapped to connector OUT02. It can be timed, set, reset, fast flag, or slow flash. Output is an open collector that switches to ground.
NC or NO	Reader (Bottom) Door Strike Output is set every time an access grant or auxiliary access occurs.	General Purpose Output NO/NC (Bottom) Output is logically mapped to connector NO/NC (Bottom). It can be timed, set, reset, fast flash, or slow flash.

## Input Point Calibration

Termination resistance ranges from 150ohm to 2000ohm (**1200 Ohms recommended**). Calibration command is launched from the host. Inputs can only be calibrated if proper external resistor network is connected and the input is in the secure state. See “General Input Wiring” on page 14 for reference.

## Real Time Clock Battery (Lithium Battery)

The battery used is a lithium 3V Coin Cell.



Parameter	Value
Nominal voltage	3V
Nominal capacity	150 mAh
Size	0.787" x 0.098" (20 mm x 2.5 mm)
Operating temperature	-30° C to +60° C

► **To activate the lithium battery:**

1. The lithium battery is shipped from the factory charged and operational. A Mylar strip should have been removed from the battery at the factory. If not, it should be removed. Simply peel it off of the battery.
2. If there are no power outages, the battery should be changed every five years. If a power outage occurs, the battery life is approximately 30 days. Replace with Panasonic® part number CR2025 or equivalent.

## LEDs

The RDR2S module has 4 LEDs:

- |           |   |
|-----------|---|
| Power:    | On during normal operation.                   |
| Status:   | Blinks every second when unit is operational. |
| Transmit: | Blinks when a character is transmitted.       |
| Receive:  | Blinks when a character is received.          |

## TECHNICAL SPECIFICATIONS

The environment class for the RDR2S product controller is class 2. The terminal is expected to operate at moderate temperature variation, non-condensing humidity variation, moderate vibration, and possible dust contamination.

Item	Specification
Input Power	24 VDC @ 1.5 amps maximum
Lock Output	12/24 VDC (up to 8 W)
Reader Interface	<ul style="list-style-type: none"> <li>• 2-wire Wiegand (up to 256 bits)</li> <li>• 5/12/24 VDC (up to 5 W)</li> <li>• Red indicator</li> <li>• Green indicator</li> </ul>
General Purpose Inputs	Resistive load
General Purpose Outputs	0-12 VDC
Communications	2-wire RS-485

Item	Specification
Certifications	<ul style="list-style-type: none"> <li>UL 294 (Access control)</li> <li>UL 1076 (Proprietary alarm unit)</li> <li>CSA/CUL C22.2 No. 205</li> <li>FCC, Class B</li> <li>CE Mark</li> <li>C-Tick</li> </ul>
Mounting Specifications	<ul style="list-style-type: none"> <li>DIN rail</li> <li>Flat surface</li> <li>Field wiring assembly and control electronics are on separate panels to aid in ease of installation</li> </ul>
Dimensions	7 H x 4.5 W x 2.25 D inches (17.5 cm x 11.25 cm x 5.5 cm)
Ambient Temperature	32° to 122° F (0° to 50°C)
Humidity	10 to 90% non-condensing
Ventilation	Cabinets require free movement of air over all exposed surfaces

## MAINTENANCE

This chapter provides maintenance instructions, operational testing procedures, troubleshooting guidelines, and information on replacement parts.

### Routine Maintenance

► **Perform the following routine maintenance for the RDR2S:**

1. Periodically check the continuity of the grounding circuit.
2. Perform operational testing monthly (see “Testing Procedure” on page 36).
3. Replace the lithium battery every five years or after extended (five days) power interruption (Panasonic CR 2025 or equivalent). See “Real Time Clock Battery (Lithium Battery) Replacement” on page 36.
4. If installed, replace the lead-acid backup battery every three years (Power Sonic PS-1270, 12 VDC, 7 Ah for the large enclosure; Power Sonic PS-1228, 12 VDC, 2.8 Ah for the small enclosure).

### Impaired Performance Conditions

The following table lists conditions that may cause impaired performance, with reference pages for additional information.

Condition	Information Location
Unit environment not as specified	See “Technical Specifications” on page 34.

Condition	Information Location
Unit power and grounding not as specified	See “Power Supply” on page 12 and “Ground and Grounding Cable Shields” on page 18.
Cable length or type not as specified	See “Cable Requirements” on page 10.
Fuses not replaced correctly	See “Fuses” on page 39.

## Testing Procedure

► **To check for proper operation of the S300-DIN-RDR2S, on the RDR2S:**

1. Verify that the “Power” LED is ON.
2. Verify that the “Fault” LED flashes once per second.
3. Verify that the “Xmit” and “Rcv” LEDs blink.
4. Present a valid card to each reader connected to the RDR2S reader interface and then verify that access is granted (green lamp lights).
5. Present an invalid card to each reader connected to the RDR2S reader interface and then verify that access is denied (red lamp lights).

## Real Time Clock Battery (Lithium Battery) Replacement

► **To replace the lithium battery:**

1. Disconnect the 24 VDC power from the RSR2S.
2. Separate the electronics board from the base board via the two captive screws in the plastic enclosure.
3. With a narrow blade (1/8 in. blade) carefully pry up the battery until a portion of the battery is out of the plastic holder.
4. With your free hand gently move the battery out of the holder while keeping the battery pried up.
5. Dispose of the old battery according to local requirements.
6. Insert the new battery into holder.



The lithium battery is polarized. Ensure the side marked ‘+’ faces out or towards you.



Danger of explosion if battery is incorrectly replaced.

WARNING

7. Mate the top of the plastic enclosure to the base.

8. Re-connect the 24 VDC power to the RSR2S.

## Field Servicing

Troubleshoot the RDR2S by substituting the suspected defective module with a new component.

All replaceable parts are available from Johnson Controls, Inc.

Consult your Customer Success Center representative at (800) 482-2778 for domestic orders or for instructions on how to obtain replaceable parts.

## Replacement Parts

For instructions on how to obtain order replacement parts, consult your Customer Success Center representative at (800) 482-2778.

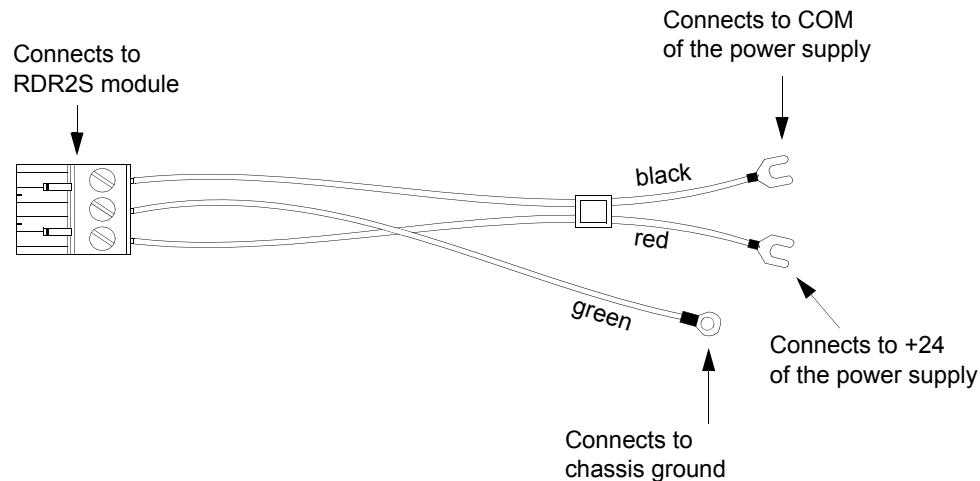
For more information on the parts listed, refer to the applicable product bulletin.

Model No.	Description
S300-DIN-L	Large enclosure, DIN rails, 5A power supply.
S300-DIN-S	Small enclosure, DIN rail, 1.5A power supply.
S300-DIN-RDR2S	2-door interface terminal with 4-state inputs.
S300-DIN-PA1	Accessory kit. See the "S300-DIN Parts Accessory Kit" section.
S300-BAT	12V, 7.2AH battery for S300-DIN-L.
S300-BAT-2.8H	12V, 2.8AH battery for S300-DIN-S.
S300-DIN-BRK	Battery bracket kit for either enclosure.
S300-DIN-L-PS	Power supply, 24 VDC out, 110 VAC in.
S300-DIN-S-PS	Power supply, 24 VDC out, 24 VAC in.
S300-XFMR	Plug-in transformer, 24 VAC, 50VA.

### S300-DIN Parts Accessory Kit

This kit (S300-DIN-PA1), which must be ordered separately, contains the following items:

- A DC power harness
- A lock
- A tamper switch
- Spare connectors: 3-position and 4-position

**The DC Power Harness****► To replace the DC power harness:**

1. Switch the power off.
2. Disconnect the DC power harness cables.
3. Replace the harness and reconnect the cables according to the previous figure.
4. Switch the power on.

***Replacing the Lock***

To replace the lock, follow the instructions included with the hardware.

***Replacing the Tamper Switch*****► To replace the tamper switch:**

1. Disconnect the tamper switch wires from the RDR2S input point.
2. Remove the nut securing the switch to the bracket.
3. Replace the switch and secure it with the nut.
4. Wire the tamper switch to a RDR2S input point.

***Spare Connectors***

Two spare connectors are provided:

- 4-position terminal block, 12-24 AWG, to be used to connect the RS-485 to the RDR2S module.
- 3-position terminal block, 12-24 AWG, to be used to connect the power supply to the RDR2S module.

## Fuses

For the RDR2S, use Listed 3 A, 250 VAC, 5x20 mm, fast-acting glass body fuse.

## TROUBLESHOOTING

Use the following table to quickly assess problems you may have with your access control system.

Issue	Possible Causes
Red light or no reader light illuminates when card is used at reader, and access is not granted.	<ul style="list-style-type: none"> <li>• Invalid Time zone/Reader/Issue Level/Facility Code</li> <li>• Card no longer in database</li> <li>• Incorrect card type</li> <li>• Card is being swiped backwards</li> <li>• Reader inoperative</li> <li>• Damaged card</li> <li>• Bad cabling</li> <li>• Failed PCB</li> <li>• Multiple proximity cards in reader antenna field</li> </ul>
Door will not go into "Override Mode" but grants access when a card is used.	<ul style="list-style-type: none"> <li>• Override time zone is incorrectly programmed, or not programmed</li> <li>• Override option not set</li> </ul>
Reader down	<ul style="list-style-type: none"> <li>• Incorrect wiring from reader to RDR2 or RDR2S</li> <li>• Reader is unassigned</li> <li>• Defective RDR2 or RDR2S</li> </ul>
Alarm not reporting	<ul style="list-style-type: none"> <li>• Alarm is suppressed (i.e., not in an active time zone)</li> <li>• Associated input point not defined</li> <li>• Bad wiring or input device</li> </ul>
PIN Code function not operating	<ul style="list-style-type: none"> <li>• PIN is not programmed as part of the access condition</li> <li>• Broken wire or incorrect wiring from the keypad to PCBA</li> <li>• Defective keypad</li> </ul>
Card or data loss from database	<ul style="list-style-type: none"> <li>• Noise on power line</li> <li>• Improper grounding</li> <li>• Defective CK720 board</li> </ul>
System restarts continuously	<ul style="list-style-type: none"> <li>• System improperly grounded</li> <li>• Severe power variations</li> <li>• Defective CK720 board</li> </ul>
Red or Green lamp does not illuminate, but access is denied or granted if card is used.	<ul style="list-style-type: none"> <li>• Open wire at lamp connection</li> <li>• Burned out lamp bulb</li> <li>• Defective Reader Add-on board</li> </ul>
Holiday time zones not followed	<ul style="list-style-type: none"> <li>• Improperly programmed Holiday time zones or Holiday dates.</li> </ul>

