



TS0866 Four-Door Controller Installation Manual

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ACMA compliance	 N4131 Notice! This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.
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Important information

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Installation in accordance with this manual, applicable codes, and the instructions of the authority having jurisdiction is mandatory.

While every precaution has been taken during the preparation of this manual to ensure the accuracy of its contents, Interlogix assumes no responsibility for errors or omissions.

Agency compliance

This product conforms to the standards set by Standards Australia on behalf of the Australian Communications and Media Authority (ACMA). Interlogix recommend enclosure covers remain fitted to maintain C-Tick compliance.

Notice! This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Product overview

This manual applies to TS0866 Four-Door Controller (without Wiegand interfaces). The TS0866 is also known as Intelligent Access Controller, controller, or DGP.

Up to 12 Intelligent Access Controllers can be connected to a Challenger panel's RS-485 system LAN. Challenger10 panels have two RS-485 system LANs, so can have 24 Intelligent Access Controllers.

Intelligent Access Controllers also have a local LAN to connect readers for doors.

Intelligent Access Controllers provide enhanced access control functionality to the Challenger system. This manual describes:

- How to install the Intelligent Access Controller
- How to connect other equipment to the Intelligent Access Controller
- Programming required for basic system setup

This manual is intended for use only by trained Challenger installation and configuration technicians.

Mechanical and environmental specifications

Enclosure dimensions (W x H x D)	345 x 450 x 73 mm
Storage temperature	-20 to +80°C
Operating environment	
Temperature	0 to 50°C
Relative humidity	0 to 95% noncondensing

Product contents

Inspect the package and contents for visible damage. If any components are damaged or missing, do not use the unit; contact the supplier immediately. If you need to return the unit, you must ship it in the original box.

Table 1 below lists the items that are shipped with a TS0866 Four-Door Controller (without Wiegand interfaces).

Table 1: TS0866 shipping list

Quantity	Item
1	TS0866 board
1	Intelligent Access Controller Installation Manual
1	Universal Enclosure (with four spring standoffs fitted)
1	Universal Enclosure Installation Instructions
1	Mains transformer, 2A, with mains power cord
1	Tamper switch
1	Tamper switch metal bracket

Quantity	Item
1	Ring terminal
1	M4 x 12 Allen head cap screw
6	M3 x 10 pan head screws
12	3-way plug-on screw terminal connectors
12	2-way plug-on screw terminal connectors
2	Red battery lead with QC terminal
2	Black battery lead with QC terminal
4	Link jumpers
1	1K 1/4 watt resistor
29	10K 1/4 watt resistors

Related documentation

The *Four-Door & Four Lift Controller Programming Manual* provides detailed information about configuring and programming Four-Door and Four-Lift Controller models TS0866, TS0867, and TS0869.

The *Challenger Installation Manual (Challenger10 Installation and Quick Programming Manual or Challenger V8 & V9 Installation and Quick Programming Manual, as applicable)* provides detailed information about configuring a Challenger system. Details provided about configuring a Challenger panel's system LANs apply also to an Intelligent Access Controller's local LAN.

The *Challenger Programming Manual (Challenger10 Programming Manual or Challenger V8 & V9 Programming Manual, as applicable)*, provides detailed information about Challenger system configuration and programming.

The Challenger system is modular. Refer also to the documentation that is shipped with each module that you intend to use.

Before you begin

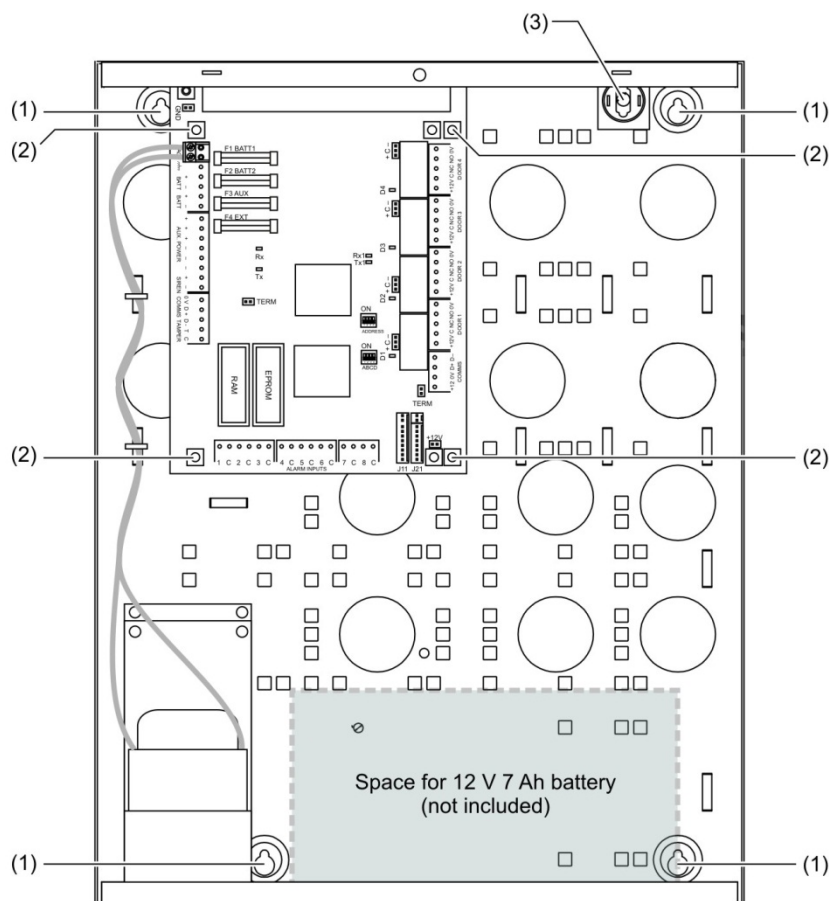
When installing an Intelligent Access Controller, or any other parts of the system, you need to be aware of requirements for cabling and earthing, and plan accordingly. Refer to “Cabling requirements” on page 17.

Notice! A qualified service person, complying with all applicable codes, should perform all required hardware installation.

Installing the Intelligent Access Controller

See Figure 1 below for overall details of a TS0866 Four-Door Controller installed in a TS0307 Universal Enclosure (supplied).

Figure 1: TS0866 board mounted in enclosure



1. Enclosure mounting points
2. Board mounting points

3. Location of tamper switch

Installation guidelines

Intelligent Access Controllers are designed, assembled and tested to meet the requirements related to safety, emission and immunity with respect to environmental electrical and electromagnetic interference, as of current relevant standards.

In addition to the general installation guidelines, installers must adhere to any country dependent requirements of local applicable standards. Only a qualified electrician or other suitably trained and qualified person should attempt to wire this system to the mains.

- Mount the unit using screws or bolts through the four mounting holes in the base. Ensure that the unit is mounted on a flat, solid, vertical surface so that the base will not flex or warp when the mounting screws or bolts are tightened.

- Allow 50 mm clearance between the equipment enclosures mounted side by side, and 25 mm between the enclosure and any side wall or ceiling.
- Each Challenger10 system device that has an earth terminal must be earthed according to the recommendations in the *Challenger10 Installation and Quick Programming Manual*.
- Each Challenger V8 system device that has an earth terminal must be earthed according to the recommendations in the *Challenger V8 & V9 Installation and Quick Programming Manual*.
- The Intelligent Access Controller has an internal transformer that is powered from 240 V mains (cable supplied). A power outlet (GPO) must be in proximity to the panel. The socket-outlet shall be installed near the equipment and shall be easily accessible. Only qualified Electricians should provide a GPO.
- If the upper and/or lower cabinet entry cable holes are used to route wiring into the control panel, always use a proper pipe fitting system by means of an appropriate conduit and junction box. For this purpose, use only materials of suitable flammability class.
- Avoid loops of wire inside the enclosure, and route cables so that they do not lie on top or underneath the printed circuit board. The use of cable ties is recommended and improves neatness of the wiring within the box.
- The batteries used with this unit must be made of materials of suitable flammability class (HB or better).
- Only use units in a clean environment and not in humid air.

Installation procedures

To mount the enclosure:

1. Fix the enclosure to the wall via the enclosure's four mounting holes (1) in Figure 1 on page 4.

Make sure the enclosure is level, and the rear tamper switch (3) location isn't sitting over a line of mortar if you're installing the enclosure on a brick wall.

To mount the tamper switch:

The two-way tamper switch detects removal of the cover from the enclosure, and removal of the enclosure from the wall.

1. Insert the tamper switch into its metal bracket.
2. Insert the bracket with tamper switch into the 1 cm slot on top right-hand side of the enclosure (3) in Figure 1 on page 4.

To mount the printed circuit board to the enclosure:

1. Remove the board from its antistatic bag.
2. Use four M3 x 10 pan head screws to fix the board to the enclosure's standoffs.

3. Slide the board's terminal connectors together and mount them to the board.

To set the LAN address:

Configure the DGP address in the range 1 to 12 using the Address DIP switch. Refer to "DIP switch settings" below.

DIP switch settings

Intelligent Access Controllers must be addressed as a DGP in the range 1 to 12. Use the four-segment Address DIP switch to set the address (the four-segment ABCD DIP switch is not used).

Set all switches to OFF to disable the controller.

Figure 2: Address DIP switch

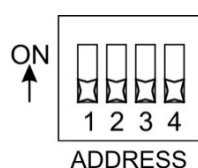


Table 2: DIP switch settings (LAN 2 applies to Challenger10 only)

LAN	Address	Polled as	S1-1	S1-2	S1-3	S1-4
LAN 1	1	DGP 1	I	O	O	O
LAN 1	2	DGP 2	O	I	O	O
LAN 1	3	DGP 3	I	I	O	O
LAN 1	4	DGP 4	O	O	I	O
LAN 1	5	DGP 5	I	O	I	O
LAN 1	6	DGP 6	O	I	I	O
LAN 1	7	DGP 7	I	I	I	O
LAN 1	8	DGP 8	O	O	O	I
LAN 1	9	DGP 9	I	O	O	I
LAN 1	10	DGP 10	O	I	O	I
LAN 1	11	DGP 11	I	I	O	I
LAN 1	12	DGP 12	O	O	I	I
LAN 2	1	DGP 17	I	O	O	O
LAN 2	2	DGP 18	O	I	O	O
LAN 2	3	DGP 19	I	I	O	O
LAN 2	4	DGP 20	O	O	I	O
LAN 2	5	DGP 21	I	O	I	O
LAN 2	6	DGP 22	O	I	I	O
LAN 2	7	DGP 23	I	I	I	O
LAN 2	8	DGP 24	O	O	O	I

LAN	Address	Polled as	S1-1	S1-2	S1-3	S1-4
LAN 2	9	DGP 25	I	O	O	I
LAN 2	10	DGP 26	O	I	O	I
LAN 2	11	DGP 27	I	I	O	I
LAN 2	12	DGP 28	O	O	I	I

Legend: I = ON, O = OFF

Connections

See below for the locations of connectors and other items. See “Cabling requirements” on page 17 for recommendations for the application and wiring of Challenger equipment.

Figure 3: TS0866 board details

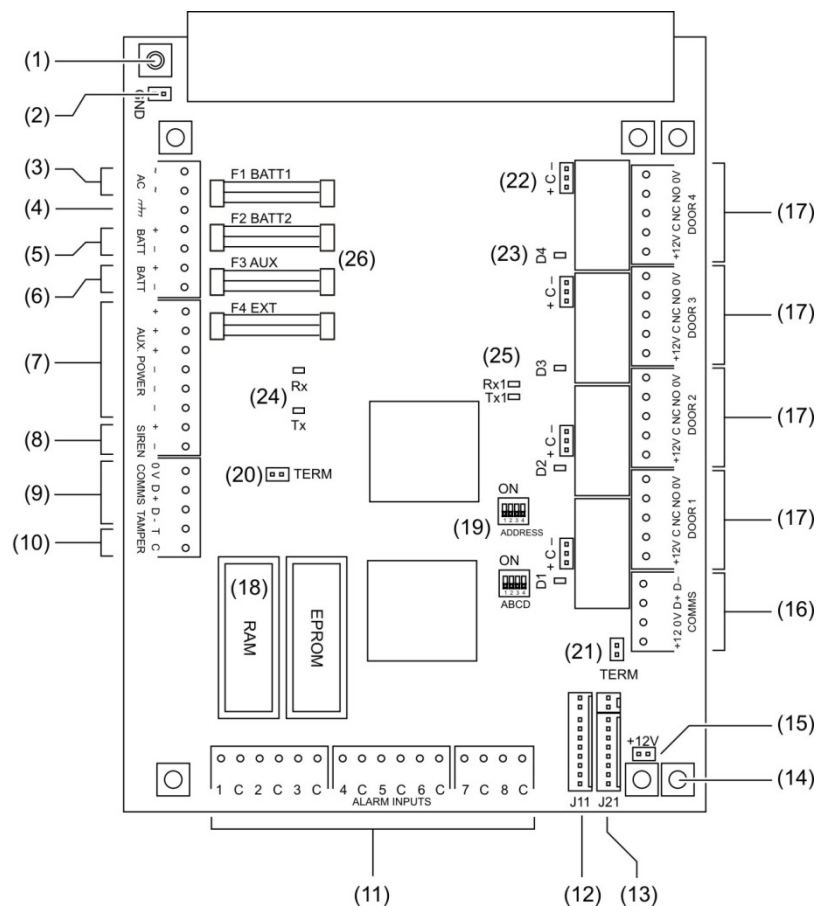


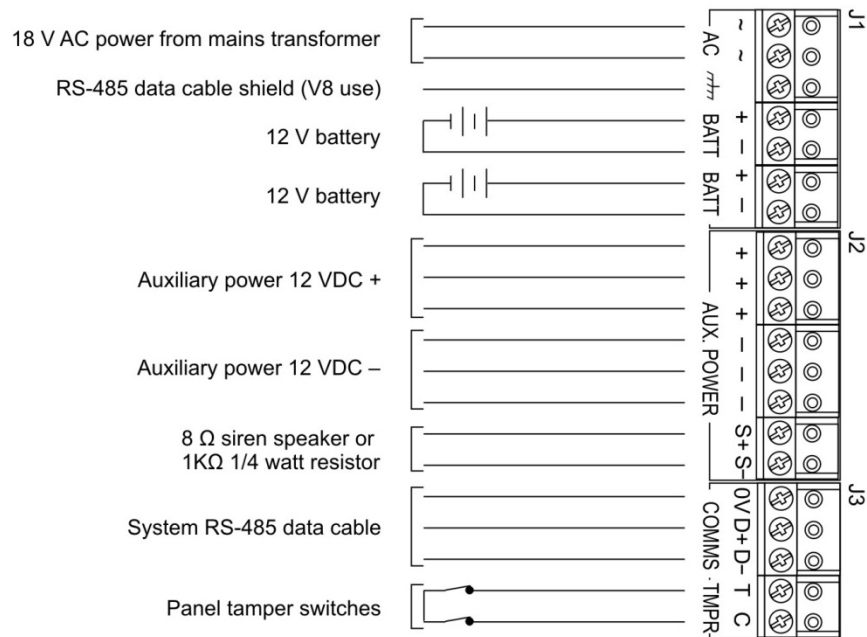
Figure 3 legend

Item	Description
1.	Challenger10 application: Connect the board's earth terminal (or lug) to one end only of the RS-485 data cable shield. Challenger V8 application: Connect the board's earth terminal (or lug) via minimum 2.5mm² GNYE earth cable (not exceeding 1 Ω) to a Communications Earth Terminal (CET).

Item	Description
2.	Challenger10 application: The board's ground link must be removed (if fitted). Challenger V8 application: The board's ground link must remain fitted.
3.	The AC terminals are connected to the transformer (supplied) at the factory (for models shipped with enclosure).
4.	Challenger10 application: This connection is not used. Challenger V8 application: Connect the J1 connector's earth terminal to the system LAN's RS-485 data cable shield. See "RS-485 LAN cabling" on page 17.
5.	Connect the + and – terminals to a 12 V sealed lead acid battery (7.0 Ah maximum), not supplied.
6.	Optionally, connect the second set of + and – terminals to a second 12 V sealed lead acid battery (7.0 Ah maximum), not supplied.
7.	Connect the + and – auxiliary power output terminals to devices that require 12 Volt DC power, such as detectors. See "Auxiliary power terminals" on page 9.
8.	Connect the S+ and S– terminals to an 8 Ω siren speaker. Alternatively, connect a 1k Ω resistor across S+ and S– terminals if a siren is not connected. If a siren is used, consider the current draw as part of the auxiliary power output. See "Auxiliary power terminals" on page 9.
9.	Connect the 0V, D+ and D– terminals to the system RS-485 LAN.
10.	Connect the T and C terminals to the panel tamper switch (supplied). Short circuit for sealed, open circuit for unsealed. Must be sealed if not used. Can only be used with normally closed contacts such as the panel tamper switches.
11.	Zone input terminals. See "Zone inputs" on page 11.
12.	Connector for optional TS0021 8-input expansion module to increase the number of inputs from 8 to 16.
13.	10-way cable socket for TS0840, TS0841, or TS0842 relay or output expansion modules.
14.	Connect the earth terminal (or lug) near J14 to the local LAN's RS-485 data cable shield.
15.	+ 12 V link. This link enables the panel to power a relay card connected to J14 (CLKOUT). Remove this link if the relay card is powered from an external 12 V supply.
16.	Connect the +12, 0V, D+ and D– terminals to the local LAN's RS-485 data cable.
17.	J4 to J7: relay connections for four doors. Refer to "Door lock relay wiring" on page 11. A suppression diode (such as 1N4004) must be fitted across door locks.
18.	Socket for TS0882, TS0883, or TS0884 memory expansion modules.
19.	Address selection DIP switch. Configure the DGP address in the range 1 to 12 using the four-segment DIP switch. Refer to "DIP switch settings" on page 6.
20.	TERM link for the system LAN. See "Terminating the RS-485 LAN" on page 10.
21.	TERM link for the local LAN. See "Terminating the RS-485 LAN" on page 10.
22.	Lock supply voltage links (one set for each relay). Link + to C to supply 12 V to the relay's C (common) contact. Link – to C to ground the relay's C (common) contact.
23.	D1 to D4 LEDs indicate that the associated lock relay is active.
24.	Rx and Tx LEDs to indicate system LAN activity. See "LED indications" on page 14.
25.	Rx1 and Tx1 LEDs to indicate local LAN activity. See "LED indications" on page 14.
26.	F1, F2, F3, F4 over-current protection. See "Over-current protection" on page 15.

Figure 4 below details the wiring for terminal blocks J1 to J3.

Figure 4: Connection details for terminal blocks J1 to J3



Auxiliary power terminals

Connect the + and – auxiliary power output terminals to devices that require 12 VDC power, such as detectors. Three sets of auxiliary power output terminals are provided: if you need more than three connections you can use a TS0844 Power Distribution Board to increase the number of terminals.

Note: The auxiliary power output and siren speaker are supplied from one circuit. The maximum current draw for all auxiliary devices, local LAN (J22), and the siren speaker, must not exceed 700 mA.

RS-485 system LAN

Use 2-pair twisted shielded data cable such as Belden 8723 to connect the controller to the Challenger panel.

- Connect the 0V terminal to the black wire.
- Connect the D+ terminal to the white wire. The D+ terminal is data positive.
- Connect the D– terminal to the green wire. The D– terminal is data negative.
- Connect the data cable shield to the LAN earth connection (Figure 3 on page 7, item 4).

RS-485 local LAN

TS0866 Four-Door Controllers can have up to 16 RAS devices such as keypads, card readers, arming stations, or Smart Door Controllers on the local LAN. Sixteen devices might be required for four doors where each door has an in reader, an in keypad, an out reader, and an out keypad.

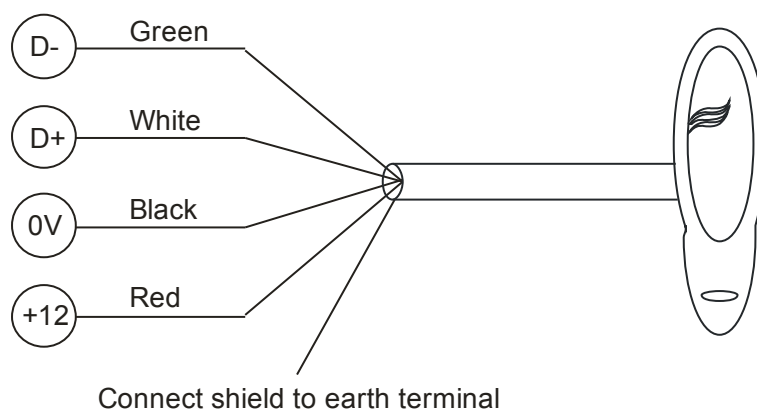
Use 2-pair twisted shielded data cable such as Belden 8723 to connect the controller to RASs.

- Connect the +12 terminal to the red wire. The +12 terminal provides +12 V to LAN devices such as RASs (within 100 m cabling distance).
- Connect the 0V terminal to the black wire. The 0V terminal provides -ve DC to LAN devices such as RASs, and common 0 V for the RS-485 LAN.
- Connect the D+ terminal to the white wire. The D+ terminal is data positive.
- Connect the D– terminal to the green wire. The D– terminal is data negative.
- Connect the data cable shield to the LAN earth connection (Figure 3 on page 7, item 14).

The RS-485 LAN may be used to power devices up to 100 m cabling distance from the controller. See “Power supply to LAN devices” on page 17 for details.

One set of LAN terminals is provided, if you need more than one connection you can use a TS0844 Power Distribution Board to increase the number of terminals.

Figure 5: Connecting a Smart Card Reader to the local LAN



Terminating the RS-485 LAN

All Challenger LAN devices (including the panel) use a 470 Ω LAN termination resistor where required. LAN termination resistors are used to set the impedance of the LAN to around 220 Ω in order to minimise noise. The termination resistor may be external or onboard (devices with an onboard resistor use a link to set the LAN termination to ON).

A Challenger LAN should have only two devices with the LAN termination set to ON (or the LAN termination resistor fitted):

- In a straight LAN configuration the TERM links are ON at the Challenger panel and the most distant device.
- In a star LAN configuration the TERM links are ON at the two devices that are the furthest apart (and OFF at the Challenger panel).

In a completely-connected (but powered down) system, you can check for correct LAN termination by measuring the resistance across the D+ and D– terminals:

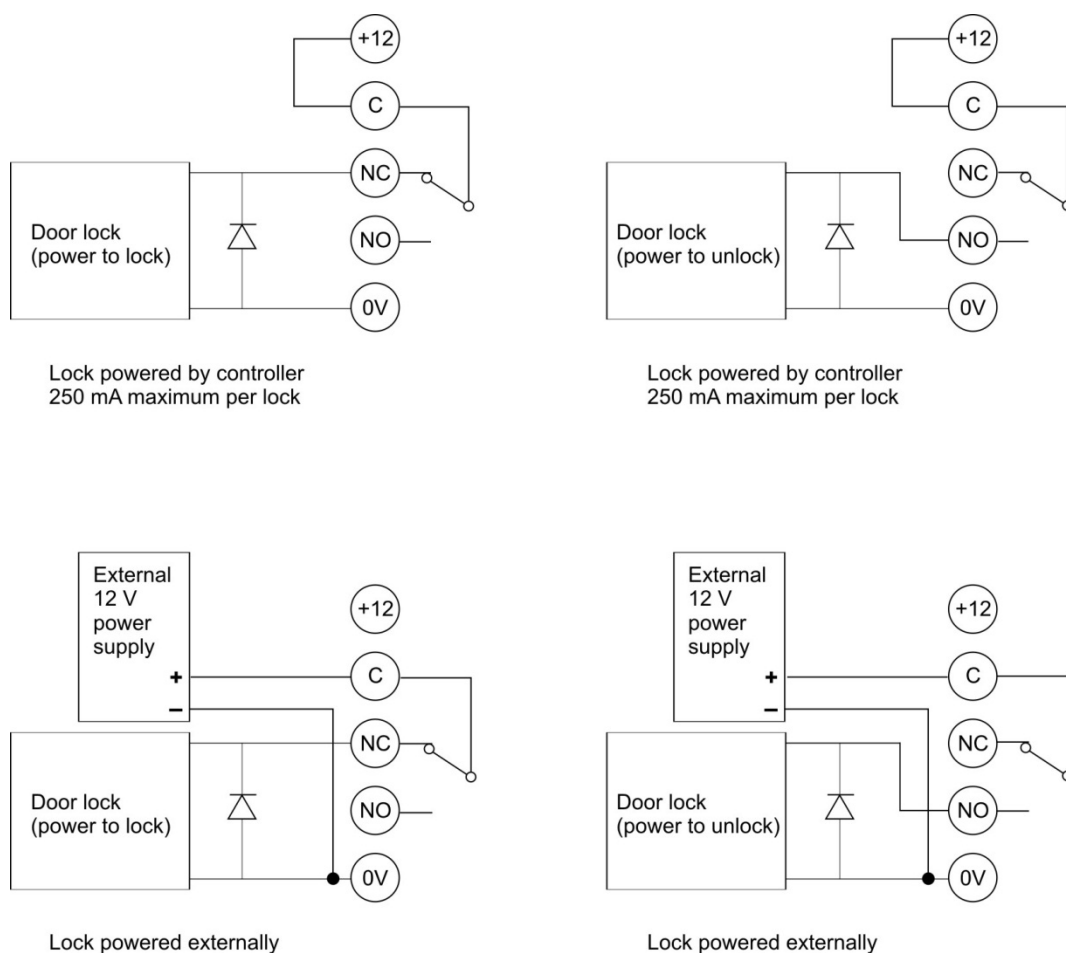
- 0 Ω indicates a short circuit in the cabling

- 160 Ω or less indicates that three or more devices are terminated
- 220 Ω is good (two devices are terminated)
- 470 Ω or more indicates that less than two devices are terminated

Door lock relay wiring

Figure 6 below details the wiring for terminal blocks J4 to J7.

Figure 6: Door lock wiring options (relay shown deenergised)



Notes

- Use a suppression diode such as 1N4004 in door lock circuits.
- Lock fault monitoring is not available on TS0866.

Zone inputs

Zone inputs are also known as alarm inputs. Each pair of input terminals may be connected to an alarm system device, such as a detector or reed switch.

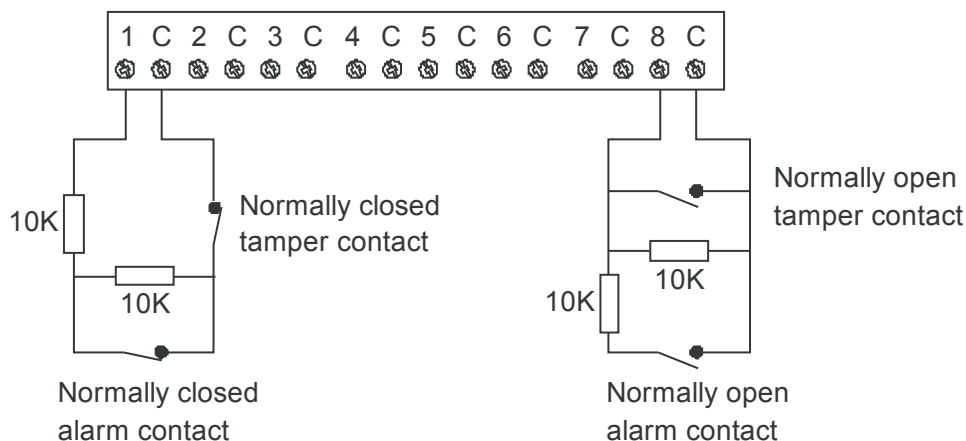
The controller can monitor its input circuits for four states (sealed, unsealed, open circuit, and short circuit). This is accomplished by using two 10 k Ω end-of-line (EOL) resistors in each zone input circuit, as shown in Figure 7 on page 12.

Note: A Challenger10 panel can have various end-of-line (EOL) resistor values for input tamper monitoring (default is 10 k Ω). Intelligent Access Controllers use only 10 k Ω EOL resistors to detect the state of alarm input circuits.

Install EOL resistors in zone input circuits at the end of the circuit. If an alarm device is connected, place the EOL resistors at the device's connections. If a zone input is not used, you don't need to connect an EOL resistor if you program the corresponding input number as type 10 (spare).

Tip: Use sleeves on the resistor leads to prevent accidental shorting.

Figure 7: Four-state monitored zone input circuits



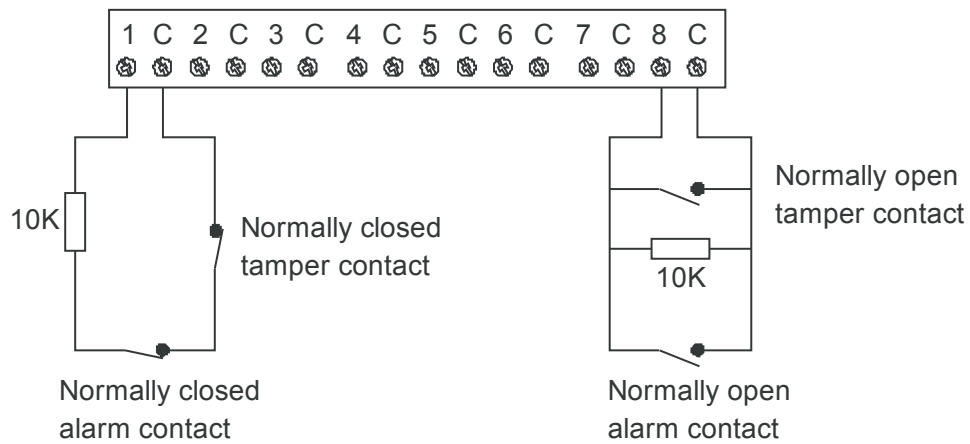
When four-state monitoring is used, the panel uses the circuit's resistance to determine the state of the zone input:

- 10 k Ω indicates sealed
- 5 k Ω or 20 k Ω indicates unsealed
- Open circuit indicates input tamper
- Short circuit indicates input tamper

To use four-state monitoring, input tamper monitoring must be set to Yes (Install menu option 7, System Options) for the Challenger panel, and tamper monitoring must be set to Yes (controller menu option 1, Controller Options) for the controller.

Alternatively, the Challenger system can be configured to monitor inputs for two states (sealed and unsealed). This is accomplished by using one 10 k Ω resistor in each circuit, as shown in Figure 8 on page 13.

Figure 8: Two-state monitored zone input circuits



The panel uses the circuit's resistance to determine the state of the zone input:

- 10 kΩ indicates sealed
- Open circuit or short circuit indicates unsealed

To use two-state monitoring, tamper monitoring must be set to No (controller menu option 1, Controller Options) for the controller.

Note: Two-state monitoring is not compatible with input types 33 or 40. See the *Challenger Programming Manual* for details.

Default inputs and relays

Door contacts and egress buttons associated with each door are wired to the Four-Door Controller's inputs.

Spare inputs are provided for alarm devices such as PIRs.

DOTL inputs must not have any wiring connected to them.

Table 3: Four-Door Controller zone input and relay defaults

	First door	Second door	Third door	Fourth door
Door contact	1	4	7	10*
Spare input	2	5	8	11*
Egress input	3	6	9*	12*
DOTL input	16*	15*	14*	13*
Door relay	First	Second	Third	Fourth

* Physical connection of inputs 9 to 16 require the use of a TS0021 8-Input Expansion Module (see "Input expansion" on page 14).

The input numbers in this section refer to the physical input numbers on the controller's PCB. Refer to the *Four-Door & Four Lift Controller Programming Manual* for the system input numbers relating to these functions.

Connecting expansion modules

Relay and output expansion

The Intelligent Access Controller has four onboard relays that are assigned the first four relay numbers for the DGP address. For a Challenger V8 panel's DGP 1 these would be relays 17, 18, 19, and 20.

If relay expansion cards are used, additional relays are numbered according to their physical address, starting at 5. A DGP macro logic program would be used to map the Challenger system's DGP relay number (e.g. 21) to the Intelligent Access Controller's physical relay number (e.g. 5). There are 48 DGP macro logic programs available.

One TS0840 Four-Way Relay Expansion Board may be connected to J21 to add four relays. Alternatively, TS0841 Eight-Way Clocked Relay Expansion Boards or TS0842 16-Way Clocked Open Collector Expansion Boards may be connected to J21 individually or daisy-chained to add eight relays per card (for TS0841) or 16 open collector outputs per card (for TS0842).

Note: If TS0841 and/or TS0842 boards are used, then a Relay Controllers value must be programmed in Controller Options, where 1 represents each eight relays or open collector outputs. Refer to the *Four-Door & Four Lift Controller Programming Manual* for details.

Input expansion

TS0866 Four-Door Controllers have eight zone input circuits. One TS0021 Eight-Input Expansion Module may be connected at J11 to expand the capacity to 16 zone inputs.

LED indications

LEDs on the PCB indicate the state of the system LAN, the local LAN, and relay activity.

- Rx flashing indicates polling data being received from the Challenger panel on the system LAN.
- Tx flashing indicates the controller is replying to polling from the Challenger panel on the system LAN. Tx off indicates that the controller is not correctly addressed, and/or that the Challenger panel is not programmed to poll the DGP address.
- Rx1 flashing indicates remote units, such as readers, replying to polling on the local LAN.
- Tx1 rapid flashing if a RAS is connected to the local LAN.
- Tx1 off if no RAS is connected to the local LAN.

Over-current protection

- **F1.** 3A fuse for battery 1 to limit current when unit is running on the battery.
- **F2.** 3A fuse for battery 2 to limit current when unit is running on the battery.
- **F3.** 1A fuse to limit auxiliary output current and siren.
- **F4.** 2A fuse to limit external output current (local LAN J22).

Powering up the controller

Before applying power, check the following:

- The DGP address is correctly set (Address DIP switch).
- The memory configuration of the controller matches the Challenger panel (refer to the respective *Challenger Programming Manual* for memory configuration options).
- The DGP type is correctly programmed as a “Door Controller” in the Challenger Install menu option 4, DGP Database.
- The controller is connected to the Challenger system LAN at J3.

After power-up, check the Rx, Tx, Rx1, and Tx1 LEDs. See “LED indications” on page 14.

After initial power-up, before programming the controller, use an LCD RAS on the Challenger system LAN to initialise the controller’s database. This ensures that the programming is in the default state.

To initialise the controller’s database:

1. Use the Install menu option 28 Remote Controllers to connect to the controller.
2. Select option 3 Initialise Database. When selected, the display shows what doors will be initialised.
3. Press [*] or [MENU*] to start the initialisation process.
4. Refer to the *Four-Door & Four Lift Controller Programming Manual* for details.

Note: Menu option 3 Initialise Database, defaults the Intelligent Access Controller database, resetting all programming options to the factory defaults.

Appendix A: Reference

Cabling requirements

This section contains recommendations for installers and electricians for the application and wiring of Challenger equipment with respect to:

- System earthing
- RS-485 data cable (LAN) cabling
- Power supply from LAN or from external 12 V supply

System earthing

TS0866 Four-Door Controllers can be connected to either a Challenger V8 or a Challenger10 control panel.

Note: Follow the system earthing recommendations provided in the applicable control panel's Installation and Quick Programming Manual.

RS-485 LAN cabling

The cabling recommendations for the system LAN or local LAN are:

- Use 2-pair twisted shielded data cable such as Belden 8723.
- In each segment of LAN cabling, connect one end only of the data cable shield to a device's LAN earth terminal. Join data cable shields where cable extends past a device that doesn't have a LAN earth connection.
- The length of the LAN cable run must not exceed 1.5 km, unless LAN isolation devices are used to extend the distance.

Power supply to LAN devices

Devices on the controller's local LAN may be supplied from the controller's 12 VDC LAN output. Use an external 12 V power supply (such as TS0073 2 A Power Supply) when:

- the device is more than 100 m (data cable length) from the panel
- electrical isolation is required
- more power is needed than can be provided by the LAN

When powering a LAN device from an external 12 V power supply:

- Connect the external power supply's '+' terminal to the device's '+' terminal. Do not connect the power supply + to the LAN +.
- Connect the external power supply's '-' terminal to the device '-' terminal.
- Connect the LAN cable black wire '-' to the device '-' terminal.