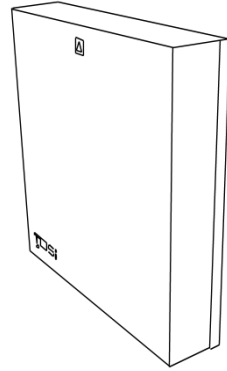




# Installation Guide

## EX-Series

### Networked Door Controllers



Models 5002-3002/5002-3012/  
5002-3022/5002-3032/5002-3042/  
5002-3082/5002-3092

To Register your Product, Visit  
<http://www.tdsi-product-registration.co.uk>

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#### NOTICES

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##### Compliance

This product complies with the following European Directives:

- Low Voltage 2014/35/EU
- EMC 2014/30/EU
- RoHS 2011/65/EC



#### 1 OVERVIEW

Thank you for purchasing this EX-series product from TDSi. This product features a fully featured, high quality power supply unit providing a regulated 13.8 VDC output supplying continuous full rated current to the access control unit and locks and an additional 0.5 A for trickle charging a standby battery. The load output features full electronic short circuit protection under mains operation. LEDs are provided to indicate mains present and fault conditions. For fully-detailed installation instruction, please refer to the User Manual available from <https://www.tdsi.co.uk/>

#### 2 INSTALLING THE CONTROLLER

**Note: It is essential to observe anti-static precautions when working inside the cabinet.**  
**Note: This product is NOT SUITABLE for external installation and must be installed according to all relevant safety regulations applicable to the application.**

##### 2.1 MAINS INSTALLATION

This product must be fed from a mains power source having a separate (approved) disconnect device and fitted with a fuse or other over-current protection device rated at 3 A maximum. Ensure that the disconnect device used has appropriate earth fault protection to the applicable standard.

- Fix the PSU to the wall or other support structure in the correct orientation i.e. with the transformer and space for the standby battery at the bottom of the unit using the screws supplied. Allow clearance to for the lid of the product to be fitted and removed. **Note: The product is to be installed in an area with free air movement and with a minimum of 100 mm clearance between the sides and lid of the power supply case and any adjacent surface (wall, ceiling or other partition).**
- This equipment **MUST** be earthed.
- Stand offs are provided so the case can be mounted away from the surface and cable entry can be achieved from the rear of the case.
- The mains input cable must be to the applicable standard with a 3 A or greater current capacity, i.e. 0.5 mm<sup>2</sup> nominal conductor area, having a minimum operating voltage of 300/500 Vac.
- The mains cable should be routed to use different entry/exit holes in the case to those used for other connected equipment (e.g. readers, locks, network cables, inputs, outputs etc.)
- Grommets should be used to protect cable sheaths from chaffing. These should meet a minimum flammability specification of UL94 HB and should be correctly sized i.e. close fitting with respect to the cable sizing.
- The mains input cable should be securely fastened to the case saddle in position using a cable tie.

#### 2.2 INSTALLATION OF OTHER SERVICES

- Refer to the tables in this guide for connection of other items e.g. readers, locks, communications, inputs, outputs, etc.
- Suppressors **MUST** be fitted across all inductive loads as close as possible to the device itself. These devices include (but not limited to) motors, locks, auxiliary relays and sounders. Suitable suppressors are included in the installation kit supplied with this controller.
- Solder and tape all connections. DO NOT use crimps, B-connectors, wire nuts or punch-down blocks.
- All cable runs must be at least 2 m in length to allow any induced static to dissipate before it reaches the controller electronics.
- The screen braid of the cables must be terminated to the earthing clamps (10) on the side of the chassis plate unless the peripheral is connected to ground. Any portion of the unscreened cable should be kept as short as possible and not be allowed to protrude into the area of the electronics (see figure 1 and figure 2)
- Screen braids of cables are to be connected at one end only, usually at the controller end. Exceptions to this are if the equipment (reader, lock etc.) are metal cased and mounted on a metal surface (such as a door frame) and in this case the screen should be connected at the equipment end.
- When using RS-485 ensure that the screen of the cable serving the communications is connected at the point at which it enters the controller only. Insulate the screen of the cable that leaves the controller and connect the screen of that cable at the next controller. Repeat this until all connections are made. It is important to screen the cable at one end only.
- It is the responsibility of the installer to follow all local and national electrical codes that may apply.
- Never install any access control system until approval has been obtained from the local fire authority. In particular note that the use of an Exit (egress) button may not be legal. Single-action Exits may be required.

#### 2.3 CONTROLLERS WITH IN-BUILT ETHERNET PORTS

Some models are supplied with an Ethernet (TCP/IP) port. When installing these models, please note the following points.

- If you are connecting the controller to an Existing network, contact the network administrator to be allocated a suitable IP address.
- Before connecting the Ethernet port, reposition the 5 DIP-switches accordingly. Switch 1 should be ON (in the up position). Switches 2, 3, 4 and 5 provide RS-485 end of line termination. Termination is required when connecting multiple controllers using RS-485 from the IP connected controller. **Note: Only one controller needs to have its termination switches set for the entire RS-485 communication line.**
- Install the ferrite core (supplied) to the Ethernet patch lead, fitted as closely as possible to the plug as possible.
- Connect the controller to the network or computer, using a lead with a ferrite sleeve installed. If there is more than one controller, they can be connected at this stage.
- Note the UID number of each controller and each unit to assist in the identification during commissioning.
- During commissioning, you may find it useful to observe the diagnostic lights on the Ethernet port. A steady light shows that a connection exists. A flashing light shows that there is data on that communications line (although this does not necessarily mean that this data is directed at the controller).
- For communications using a separate serial to Ethernet converter or serial to RS-485 converter, please refer to the documentation supplied with those devices.

#### 3 COMMISSIONING

**Caution: Risk of Explosion if the battery fitted is of an incorrect type.**  
**Note: Dispose of used batteries in accordance with the battery manufacturer's instructions and to comply with all local and national regulations.**

- Disconnect the plug connector that supplies power to the controller circuit board.
- Make the mains connection to the fused mains terminal block observing the wiring information on the power supply. Ensure that the mains isolator (disconnect device) is open.
- Apply mains voltage to the input. Ensure that the green power supply LED is illuminated.
- Disconnect the mains by opening the mains isolator.
- Reconnect the plug connector that supplies power to the controller circuit board.
- Reconnect the mains by closing the mains isolator. Ensure that the green power supply LED is illuminated.
- Connect the standby battery (not supplied), red cable to BATT+ terminal and black cable to BATT- terminal and fit the battery into the space provided.
- If the battery has little or no charge, allow it to charge for a short period of time. Refer to section 10 for battery recharge times.
- Disconnect the mains by opening the mains isolator. Ensure that the green power supply LED is extinguished.
- Reconnect the mains by closing the mains isolator. Ensure that the green power supply LED is illuminated.
- Place the controller into commission mode by pressing and holding the tamper switch for 5 seconds and then releasing it for 5 seconds. Repeat this for a further 2 times until a bleep is heard from the on-board sounder. Note that it is only possible to plate the controller into commission mode if there are no card IDs loaded into the controller memory.
- Check that the LEDs on the readers are flashing at a rate of approximately twice per second.
- If there is a Door Sensor fitted for Door 1, the on-board sounder may operate after around 15 seconds. If this should happen, temporarily refit the jumper link across the door sensor connection.
- Present or swipe a card to one of the readers. The flashing rate should change to on flash every 2 seconds.
- Present or swipe the card again. Relays 1 and 2 should be energised for 5 seconds. You will find at this stage that any card of the correct technology will trigger both relays.
- If an egress button is fitted, press it. The associated lock should operate for as long as the button is pressed and remain operated for 5 seconds after the button is released.
- Ensure that the Memory Battery Link (9) jumper is fitted.
- Note all UID Numbers (2) of the controllers to assist with set-up of the controllers
- Perform a final check on the security of all wiring
- Close the case ensuring that all 4 lugs are located correctly in their respective cut-outs in the case saddle and that no cables are trapped by the cover.
- Secure the cover in place using the screws provided.

#### 4 OPERATING INSTRUCTIONS

- Once all connections have been correctly made, there are no further operations required. All configuration of the door controller is achieved through either the use of EXgarde EXpress or EXgarde PRO PC software. In addition, EXper<sup>2</sup> master controllers allow the connection of a local programming device to the 25-way port on the front of the controller.
- The green LED will be illuminated whilst the mains supply is present.

#### 5 MAINTENANCE

**Note: Reference should be made to the battery manufacturer's documentation to determine typical/expected battery life with a view to periodic replacement of the battery.**

- There is no regular maintenance required other than periodic testing and replacement of the standby battery.
- If the output of the PSU fails the cause of the failure should be investigated e.g. short circuit load etc. The fault should be rectified before restoring the power to the PSU. The fuses may need to be replaced. Ensure that the replacement fuse is of the correct type and rating.



Figure 1 - Incorrect Screening Method (Tails Left Long)



Figure 2 - Correct Screening Method (Tails Kept Short)

#### 6 LAYOUT OF EX-SERIES ACCESS CONTROL UNITS

The following diagram shows the layout of the controller. Please familiarise yourself with the layout of the product before attempting installation.

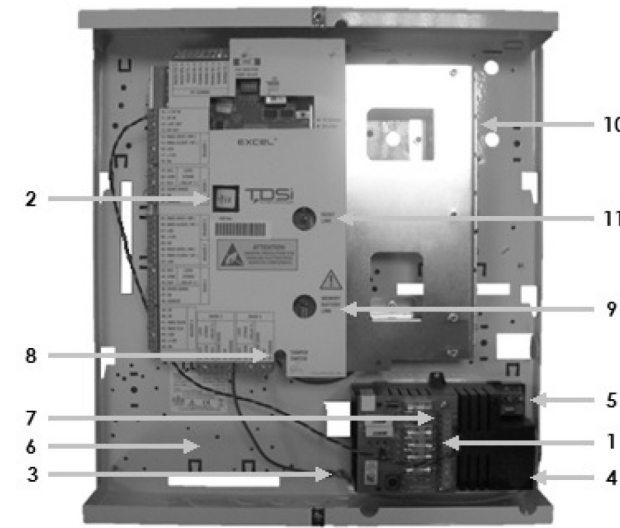


Figure 3 - Layout of EX-Series (EXcel<sup>4</sup> Shown)

1	Output distribution board and fuses
2	Controller UID
3	Earthing connection
4	Power Supply Unit
5	Fused Mains Terminal Block
6	Standby Battery (not supplied)
7	Standby Battery connection cables
8	Tamper switch without spring
9	Memory Battery Link
10	Cable Screen Braid Earthing Clamps
11	Reset Link

\*certain models only

#### 7 CABLE SPECIFICATION TABLES

Please refer to the cable below for suitable cable types.

Function	Recommended Cable Type	Cores	Maximum Distance (m)
Analogue MICROcard (IR) Reader	Belden 9729	4	140
	FBOS2P24	4	100
	0S2P22/Alpha 5902/ Belden 9502	4	60
	OS4C24/Alpha 5094/ BICC H8123	4	40m
Magnetic Swipe Reader	Screened Alarm Cable	8	Up to 30m
	Belden 9730	6	60m
	Belden 9503	6	25m
EXprox and Optica	OS6C24/Alpha 5096/ BICC H8124	6	20m
	Screened Alarm Cable	8	Up to 30m
	Belden 9730	6	150m
	Belden 9503	6	60m
Dateline Keypad	OS6C24/Alpha 5096/ BICC H8124	6	50m
	Screened Alarm Cable	8	Up to 30m
	Belden 9729	4	140m
	FBOS2P24	4	100m
Communications (RS-232)	0S2P22/Alpha 5902/ Belden 9502	4	60m
	OS4C24/Alpha 5094/ BICC H8123	4	40m
	Screened Alarm Cable	8	Up to 20m
	Belden 9534 or 7/0.2mm (Screened)	4	15m
Communications (RS-485)	Belden 9729	4	1200m
	FBOS2P24	4	900m
	0S2P22/Alpha 5902/ Belden 9502	4	530m
	OS4C24/Alpha 5094/ BICC H8123	4	400m
	Screened Alarm Cable	8	300m
Input	7/0.2mm (Screened)	2	300m
Relay	7/0.2mm or 16/0.2mm (Screened)	2	Dependant on load and cable choice

8.1 EXPERT AND EXCEL2 READER CONNECTIONS

Controller Terminal	Reader Connection	Reader Wire Colour
23	Reader 1 IR Data	Yellow
26	Reader 1 IR Source	Blue
27	Reader 1 LED	Green
28	Reader 1 +5 V	Red
		White
		Black
37	Reader 2 IR Data	Yellow
40	Reader 2 IR Source	Blue
41	Reader 2 LED	Green
42	Reader 2 +5 V	Red
		White
		Black

Table 1 – EXpert and EXcel<sup>2</sup> to Microcard Reader 5002-0035

Controller Terminal	Reader Connection	Reader Wire Colour
24	Reader 1 Data/D0	Yellow
25	Reader 1 Clock/D1	White
27	Reader 1 LED	Blue
29	Reader 1 0V	Black
30	Reader 1 +12 V	Red
30	Reader 2 +12 V	
38	Reader 2 Data/D0	Yellow
39	Reader 2 Clock/D1	White
41	Reader 2 LED	Blue
43	Reader 2 0 V	Black

Table 2 – EXpert and EXcel<sup>2</sup> to EXprox 5002-035x and Optica 5002-039x

Controller Terminal	Reader Connection	Reader Wire Colour
24	Reader 1 Data	Yellow
25	Reader 1 Clock	White
27	Reader 1 LED	Blue
28	Reader 1 +5 V	Red
		Green
29	Reader 1 0V	Black
38	Reader 2 Data/D0	Yellow
39	Reader 2 Clock/D1	White
41	Reader 2 LED	Blue
42	Reader 2 +5 V	Red
		Green
43	Reader 2 0 V	Black

Table 3 – EXpert and EXcel<sup>2</sup> to Magnetic Swipe Reader 5002-0360

8.5 EXCEL4 READER CONNECTIONS

Controller Terminal	Reader Connection	Reader Wire Colour
14	Reader 1 Data/D0	Yellow
15	Reader 1 Clock/D1	White
16	Reader 1 LED	Blue
17	Reader 1 +12 V	Red
18	Reader 1 0V	Black
25	Reader 2 Data/D0	Yellow
26	Reader 2 Clock/D1	White
27	Reader 2 LED	Blue
28	Reader 2 +12 V	Red
29	Reader 2 0 V	Black
30	Reader 3 Data/D0	Yellow
31	Reader 3 Clock/D1	White
32	Reader 3 LED	Blue
28	Reader 3 +12 V	Red
29	Reader 3 0 V	Black
41	Reader 4 Data/D0	Yellow
42	Reader 4 Clock/D1	White
43	Reader 4 LED	Blue
44	Reader 4 +12 V	Red
45	Reader 4 0 V	Black

Table 13 – EXcel<sup>4</sup> to EXprox 5002-035x, Optica 5002-039x and Digital IR 5002-1781

Controller Terminal	Reader Connection	Reader Wire Colour
14	Reader 1 Data/D0	Yellow
15	Reader 1 Clock/D1	White
16	Reader 1 LED	Blue
12	Reader 1 +5 V	Red
18	Reader 1 0V	Black
25	Reader 2 Data/D0	Yellow
26	Reader 2 Clock/D1	White
27	Reader 2 LED	Blue
29	Reader 2 +5 V	Red
29	Reader 2 0 V	Black
30	Reader 3 Data/D0	Yellow
31	Reader 3 Clock/D1	White
32	Reader 3 LED	Blue
39	Reader 3 +5 V	Red
29	Reader 3 0 V	Black
41	Reader 4 Data/D0	Yellow
42	Reader 4 Clock/D1	White
43	Reader 4 LED	Blue
40	Reader 4 +5 V	Red
45	Reader 4 0 V	Black

Table 14 – EXcel<sup>4</sup> to Magnetic Swipe Reader 5002-0360

8.2 EXPERT AND EXCEL2 DOOR FURNITURE CONNECTIONS

Controller Terminal	Equipment Connection
18	Door 1 lock relay pole
19	Door 1 lock relay n/o
32	Door 2 lock relay pole
33	Door 2 lock relay n/o

Table 4 - EXpert and EXcel<sup>2</sup> connections to lock (fail-locked condition)

Controller Terminal	Equipment Connection
17	Door 1 lock relay n/c
18	Door 1 lock relay pole
31	Door 2 lock relay n/c
32	Door 2 lock relay pole

Table 5 - EXpert and EXcel<sup>2</sup> connections to lock (fail-open condition)

Controller Terminal	Equipment Connection
2+	Door lock Supply (1 A max.)
2-	Door lock 0 V
3+	Door lock Supply (1 A max.)
3-	Door lock 0 V

Table 6 - EXpert and EXcel<sup>2</sup> connections for power supply for locks

Controller Terminal	Equipment Connection
20	Door 1 door sense input
21	Door 1 door sense 0 V
34	Door 2 door sense input
35	Door 2 door sense 0 V

Table 7 - EXpert and EXcel<sup>2</sup> connections for door sensors

Controller Terminal	Equipment Connection
21	Door 1 door egress 0 V
22	Door 1 door egress input
35	Door 2 door egress 0 V
36	Door 2 door egress input

Table 8 - EXpert and EXcel<sup>2</sup> connections for egress buttons

8.6 EXCEL4 DOOR FURNITURE CONNECTIONS

Controller Terminal	Equipment Connection
20	Door 1 lock relay pole
21	Door 1 lock relay n/o
34	Door 2 lock relay pole
35	Door 2 lock relay n/o
47	Door 3 lock relay pole
48	Door 3 lock relay n/o
53	Door 4 lock relay pole
54	Door 4 lock relay n/o

Table 15 – EXcel<sup>4</sup> connections to lock (fail-locked condition)

Controller Terminal	Equipment Connection
19	Door 1 lock relay n/c
20	Door 1 lock relay pole
33	Door 2 lock relay n/c
34	Door 2 lock relay pole
46	Door 3 lock relay n/c
47	Door 3 lock relay pole
52	Door 4 lock relay n/c
53	Door 4 lock relay pole

Table 16 – EXcel<sup>4</sup> connections to lock (fail-open condition)

Controller Terminal	Equipment Connection
2+	Door lock Supply (1 A max.)
2-	Door lock 0 V
3+	Door lock Supply (1 A max.)
3-	Door lock 0 V

Table 17 – EXcel<sup>4</sup> connections for power supply for locks

Controller Terminal	Equipment Connection
22	Door 1 door sense input
23	Door 1 door sense 0 V
36	Door 2 door sense input
37	Door 2 door sense 0 V
49	Door 3 door sense input
50	Door 3 door sense 0 V
55	Door 4 door sense input
56	Door 4 door sense 0 V

Table 18 – EXcel<sup>4</sup> connections for door sensors

8.3 EXPERT AND EXCEL2 INPUT AND RELAY CONNECTIONS

Controller Terminal	Equipment Connection
34	Input 3
35	0 V (for inputs 3 & 4)
36	Input 4
50	Input 5
51	0 V (for inputs 5 & 6)
52	Input 6
53	Input 7
54	0 V (for inputs 7 & 8)
55	Input 8

Table 9 – EXpert and EXcel<sup>2</sup> Input Connections

Controller Terminal	Equipment Connection
31	Relay 2 n/c
32	Relay 2 pole
33	Relay 2 n/o
44	Relay 3 n/c
45	Relay 3 pole
46	Relay 3 n/o
47	Relay 4 n/c
48	Relay 4 pole
49	Relay 4 n/o

Table 10 – EXpert and EXcel<sup>2</sup> Relay Connections

Controller Terminal	Equipment Connection
23	Door 1 door egress 0 V
24	Door 1 door egress input
37	Door 2 door egress 0 V
38	Door 2 door egress input
50	Door 3 door egress 0 V
51	Door 3 door egress input
56	Door 4 door egress 0 V
57	Door 4 door egress input

Table 19 – EXcel<sup>4</sup> connections for egress buttons

8.7 EXCEL4 COMMUNICATIONS CONNECTIONS

PC 9-way	PC 25-way	Controller Terminal	Function
2	3	7	Receive Data (Rx)
3	2	6	Transmit Data (TX)
5	7	5	Ground

Table 20 – EXcel<sup>4</sup> RS-232 Connections (Direct Communications)

9 WIRING INPUTS FOR SUPERVISION

All models can detect and report tampering with an input, if one of the two configurations below is used. The two methods are referred to as US and UK because of the countries in which each type is most prevalent. The resistor(s) should be installed as close to the switch as possible to provide maximum protection.

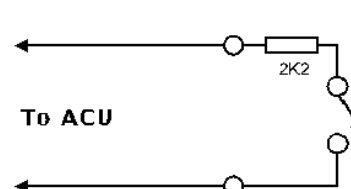


Figure 4 - 1-resistor supervision (US) for short-circuit tamper detection

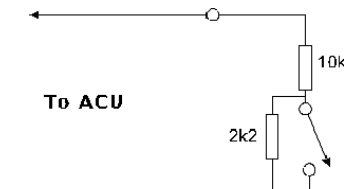


Figure 5 - 2-resistor supervision (UK) for short-circuit and open-circuit tamper detection

8.4 EXPERT AND EXCEL2 COMMUNICATIONS CONNECTIONS

PC 9-way	PC 25-way	Controller Terminal	Function
2	3	7	Receive (Rx) Data
3	2	6	Transmit (TX) Data
5	7	5	Ground

Table 11 - EXpert and EXcel<sup>2</sup> RS-232 Connections (Direct Communications)

IP Connected Controller	RS-485 Controller	Connected	Function
1	1		RS-485 Rx B
2	2		RS-485 Rx A
3	3		RS-485 TX B
4	4		RS-485 TX A
Controller Chassis		Controller Chassis	Cable Screen

Table 12 - Connection when using an IP Enabled Controller as an Ethernet Converter

For communications using a separate serial to Ethernet converter or serial to RS-485 converter, please refer to the documentation supplied with those devices.

10 TECHNICAL SPECIFICATION

Input Voltage	100 - 240 Vac nominal ±10 %
Input Frequency	50/60 Hz
Mains Input Fuse	T3.15A 20 mm 230 v HRC
Output Voltage	13.4 to 14.2 VDC (13.8 VDC nom) on mains power 10.0 to 12.3 VDC on battery standby
Output Load Current	4 A maximum
Output Ripple	150 mV <sub>pk-pk</sub> max
Load Output Fuse	F4 A 20 mm
Overload Protection	Electronic shutdown until overload/short circuit removed
Standby Battery Capacity/Recharge Time	1 x 7 Ah Sealed Lead Acid/13 hours (to 80% capacity)
Standby Battery Charge Current	0.5 A
Standby Battery Fuse Protection	F1 A 20 mm
Visual Indications	Green LED   Mains Present
Storage Temperature Range	-20 °C to +80 °C
Operating Temperature Range	-5 °C to +45 °C
Operating Humidity	<95 %RH, non-condensing
Dimensions	390 x 410 x 90 mm
Weight	5.7 kg (unpacked)
Card Capacity	EXcel <sup>1</sup> : 18,000 EXcel <sup>2</sup> : 24,000 EXpert <sup>2</sup> : (2 door mode) 48,000
Door/Control Relay	Changeover volt-free contact 30 V, 2 A rating
Time Groups	64
Anti-Passback	Timed And True
TCP/IP Communications <sup>1</sup>	Ethernet 10Base-T or 100Base-Tx (Auto-Switching), RJ45, with indication LEDs for 10Base-T connection, T-Base-TX connection, link and activity

<sup>1</sup>certain models only

Table 21 – Technical Specification