



INSTALLATION AND OPERATION MANUAL

FDW1000 / EXP101

OPTICAL WIEGAND, MAGSTRIPE & F/2F DATA EXTENDER AND EXPANSION MODULE

This manual serves the following ComNet Model Numbers:

FDW1000M/C
FDW1000M/R
FDW1000S/C
FDW1000S/R
EXP101/C
EXP101/R
EXP100/C
EXP100/R

The ComNet FDW1000 Series and EXP101 Series of transceivers makes it possible to install card readers farther from the access control panel by providing a long-range fiber optic connection between the door or gate readers and most manufacturers' access control panels. The series includes both a remote (door/gate) device and a central (access control panel) device. The FDW1000 devices are compatible with the EXP101 expansion modules that allow up to seven additional readers to share the optical link created by the FDW1000/C (central) and FDW1000/R (remote) devices.

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General Information - FDW1000 and EXP101 Series

Device description

The ComNet FDW1000 Series and EXP101 Series of transceivers makes it possible to install card readers farther from the access control panel by providing a long-range fiber optic connection between the door or gate readers and most manufacturers' access control panels. The series includes both a remote (door/gate) device and a central (access control panel) device. The FDW1000 devices are compatible with the EXP101 expansion modules that allow up to seven additional readers to share the optical link created by the FDW1000/C (central) and FDW1000/R (remote) devices.

Items in this series

FDW1000M/C - Wiegand transceiver, central side, multimode

FDW1000M/R - Wiegand transceiver, remote side, multimode

FDW1000S/C - Wiegand transceiver, central side, singlemode

FDW1000S/R - Wiegand transceiver, remote side, singlemode

EXP101/C - expansion module, central side

EXP101/R - expansion module, remote side

Specifications

The following specifications apply to all of the items in this series

Power

- operating voltage range = DC 8 to 12 V,
- power consumption < 6 W each
- hardened power supply item number PS-AMR5-12 as needed

Inputs and outputs

Data

- Wiegand (max 248 bits pass through, filter the first eight bits unless Wiegand No Filter is active)
- strobed (clock and data)
- F/2F unsupervised

LED

- DC 0 to 30 V

Contact closure (relay) channels

Relay Channels 1 and 2

- FDW1000/C and EXP101/C central units will each accept up to two dry contact closures as inputs - RELAY 1 IN and RELAY 2 IN - and pass the status of each contact to corresponding FDW1000/R and EXP101/R remote units, each containing two single-pole, double-throw relays - RELAY 1 OUT and RELAY 2 OUT.

Relay Channels 3 and 4

- FDW1000/R and EXP101/R remote unit will each accept up to two dry contact closures as inputs - RELAY 3 IN and RELAY 4 IN - and pass the status of each contact to corresponding FDW1000/C and EXP101/C central units, each containing two single-pole, double-throw relays - RELAY 3 OUT and RELAY 4 OUT.

Relay Contact Ratings

- DC 30 V, 1.0 A, resistive loads only, 1×10^5 operations at +room temperature (+20°C or +68°F)
- AC 125 V, 0.3 A, resistive loads only, 1×10^5 operations at +room temperature (+20°C or +68°F)

Preparation

Tools

- #1 tip Phillips head screwdriver to remove metal covers
- small flat blade screwdriver to set the DIP switches

Before beginning

- determine the communications format for each reader;
 - » Wiegand with data words that are at least 8 bits (most readers), or;
 - » Wiegand with data words that are less than 8 bits (typical of reader / keypad combination units), or;
 - » unsupervised F/2F (Casi Rusco systems)
- determine the number of expansion module pairs - if any - that will be needed (this quantity will be one less than the number of readers in the link);
- determine whether Relay 3 will be reserved to monitor the status of the optical link;
- locate the STATUS indicator LED (between the 2-pin power connector and the 8-pin terminal strip - see Figures 1 and 2 below)
- with the cover removed, locate the eight DIP switches (OFF is toward the edge of the circuit board and Switch 8 is closest to the power connector - see Figures 1, 2, and 3 below).



Figure 1 - FDW1000



Figure 2 - EXP101



Figure 3 - expanded view of DIP switches

Configuring Devices

The FDW1000, EXP100, and EXP101 series of devices have undergone hardware and firmware revisions over time. Older revisions of FDW1000 and EXP100 may not be backward compatible with newer revisions. The revision designation is written by hand on each circuit board near the DIP switch package.

Current version FDW1000s have a revision designation in the .3xx range while older FDW1000s have a revision designation in the .2xx range. An FDW1000 with a revision designation in the .2xx range must be used with another FDW1000 with a revision designations in the .2xx range. Initialization and programming for the two ranges differ, as well. Instructions for the two ranges are included with this document.

Current version expansion modules are labeled EXP101/C or EXP101/R and have revision designations in the .4xx range. The older versions of the expansion modules are labeled EXP100 instead of EXP101 and have revision designations in the .3xx range. Old EXP100s and new EXP101s are backward compatible with all FDW1000s however, if more than two readers will be used, the new EXP101s should be used. As with the FDW1000s, initialization and programming for the two ranges differ, as well. Instructions for the two ranges are included with this document.

Revision designation written on the circuit board

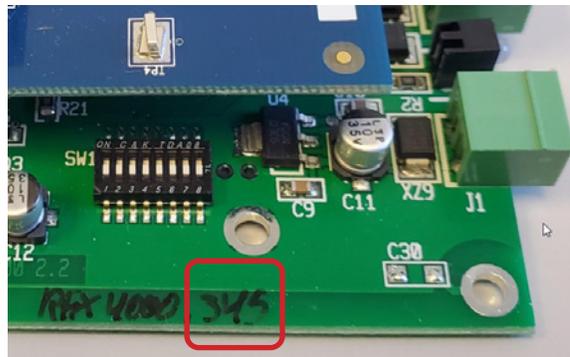


Figure 4 - Revision designation showing a current .3xx series FDW1000

Revision designation written on the circuit board



Figure 5 - Revision designation showing a current .4xx series EXP101

Configuring an FDW1000 - current version - (rev .3xx range)

Initialization

- Do not apply power to the FDW1000. Remove all fiber and signal connections. Remove the metal housing to expose the DIP switches.
- Turn DIP Switches 1 and 4 ON, all others OFF.
- Using DIP Switches 6, 7, and 8, set the communications format using the following table:

Communications Format	DIP Switch 6	DIP Switch 7	DIP Switch 8
not used during initialization	OFF	OFF	OFF
Wiegand	OFF	OFF	ON
Wiegand, no filter	OFF	ON	OFF
strobed rising edge (MR-5)	OFF	ON	ON
strobed rising edge (Dorado 644)	ON	OFF	OFF
strobed rising edge (Mag-Tek)	ON	OFF	ON
strobed falling edge	ON	ON	OFF
unsupervised F/2F	ON	ON	ON

- Apply power to the FDW1000.
- The STATUS indicator LED near the power connector should very quickly become solid green.
- If the STATUS indicator LED quickly becomes solid green, the unit is now initialized. Continue to the Programming section below.
- If the STATUS indicator LED fails to quickly become solid green, repeat the steps above. If still unsuccessful, consider the unit bad.

Programming

- Remove power from the FDW1000.
- Turn all DIP switches OFF.
- Continue to set Central / Remote (Switch 3), Supervision Relay Mode (Switch 4), Pull-Up Resistor Mode (Switch 5), and number of EXP101 pairs (Switches 6, 7, and 8) using the following table:

DIP Switch Number	DIP Switch Setting
1 - not used during programming	OFF
2 - not used during programming	OFF
3 - Central / Remote	OFF = Remote unit ON = Central unit
4 - Supervision Relay	OFF = disables supervision relay - allows Relay Channel 3 to operate as an independent dry contact closure channel ON = enables supervision relay - allows Relay Channel 3 to be used to monitor the status of the optical link
5 - Pull-Up Resistor	OFF = disables pull-up resistor ON = enables pull-up resistor (for copper paths > 200 ft or when using F/2F Casi Rusco 941)
6, 7, and 8 - Number of EXP101 Pairs	OFF OFF OFF = no expansion modules OFF OFF ON = one pair of expansion modules OFF ON OFF = two pairs of expansion modules OFF ON ON = three pairs of expansion modules ON OFF OFF = four pairs of expansion modules ON OFF ON = five pairs of expansion modules ON ON OFF = six pairs of expansion modules ON ON ON = seven pairs of expansion modules

- Apply power to the FDW1000. The device is now ready to use.

A common ground connection is critical for proper operation. At each remote location, a common ground must exist between the reader(s), the FDW1000/R, and any EXP101/Rs. At the central location, a common ground must exist between the panel, the FDW1000/C, and any EXP101/Cs.

Configuring an EXP101 - current version - (rev .4xx range)

- Do not apply power to the EXP101. Remove all copper and signal connections. Remove the metal housing to expose the DIP switches.
- Turn all DIP switches OFF.
- DIP Switch 1 on the EXP101 is used during factory testing but is not used during configuration and should remain OFF.
- Using DIP Switch 2, set each unit as an EXP101/C (Central unit) or as an EXP101/R (Remote unit).
- Turn DIP Switch 2 ON to make the unit an EXP101/C (Central unit).
- Leave DIP Switch 2 OFF to make the unit an EXP101/R (Remote unit).
- Using DIP Switches 3, 4, and 5, set the communications format using the following table:

Communications Format	DIP Switch 3	DIP Switch 4	DIP Switch 5
Not used	OFF	OFF	OFF
Wiegand	OFF	OFF	ON
Wiegand, no filter	OFF	ON	OFF
strobed rising edge (MR-5)	OFF	ON	ON
strobed rising edge (Dorado 644)	ON	OFF	OFF
strobed rising edge (Mag-Tek)	ON	OFF	ON
strobed falling edge	ON	ON	OFF
unsupervised F/2F	ON	ON	ON

- Using DIP Switches 6, 7, and 8, set the polling address of each pair of EXP101s using the table below.
- If only one pair of EXP101s will be used, set the EXP101/C and the EXP101/R to polling address 1.
- If more than one pair of EXP101s will be used, set one pair of EXP101/C and EXP101/R to polling address 1. Address the next pair using polling address 2 and continue sequentially as needed.

Number of EXP101 Pairs	DIP Switch 6	DIP Switch 7	DIP Switch 8
Not used	OFF	OFF	OFF
one pair of EXP101s - polling address 1	OFF	OFF	ON
two pairs of EXP101s - polling address 2	OFF	ON	OFF
three pairs of EXP101s - polling address 3	OFF	ON	ON
four pairs of EXP101s - polling address 4	ON	OFF	OFF
five pairs of EXP101s - polling address 5	ON	OFF	ON
six pairs of EXP101s - polling address 6	ON	ON	OFF
seven pairs of EXP101s - polling address 7	ON	ON	ON

- Apply power to the EXP101. The unit is now ready to use.

A common ground connection is critical for proper operation. At each remote location, a common ground must exist between the reader(s), the FDW1000/R, and any EXP101/Rs. At the central location, a common ground must exist between the panel, the FDW1000/C, and any EXP101/Cs.

Configuring an FDW1000/C - old version - (rev .2xx range)

Initialization

- Do not apply power to the FDW1000/C. Remove all fiber and signal connections. Remove the metal housing to expose the DIP switches.
- Turn DIP Switches 1 and 4 ON, all others OFF.
- Using DIP Switches 6, 7, and 8, set the polling address of each pair of EXP100s using the table below.
- If only one pair of EXP100s will be used, set the EXP100/C and the EXP100/R to polling address 1.
- If more than one pair of EXP100s will be used, set one pair of EXP100/C and EXP100/R to polling address 1. Address the next pair using polling address 2 and continue sequentially as needed.

Number of EXP100 Pairs	DIP Switch 6	DIP Switch 7	DIP Switch 8
no EXP100 pairs	OFF	OFF	OFF
one pair of EXP100s - polling address 1	OFF	OFF	ON
two pairs of EXP100s - polling address 2	OFF	ON	OFF
three pairs of EXP100s - polling address 3	OFF	ON	ON
four pairs of EXP100s - polling address 4	ON	OFF	OFF
five pairs of EXP100s - polling address 5	ON	OFF	ON
six pairs of EXP100s - polling address 6	ON	ON	OFF
seven pairs of EXP100s - polling address 7	ON	ON	ON

- Apply power to the FDW1000/C.
- The STATUS indicator LED near the power connector should very quickly become solid green.
- If the STATUS indicator LED quickly becomes solid green, the unit is now initialized. Continue to the Programming section below.
- If the STATUS indicator LED fails to quickly become solid green, repeat the steps above. If still unsuccessful, consider the unit bad.

Programming

- Remove power from the FDW1000/C.
- Turn all DIP switches OFF.
- Using DIP Switches 6, 7, and 8, set the communications format using the following table:

Communications Format	DIP Switch 6	DIP Switch 7	DIP Switch 8
not used during programming	OFF	OFF	OFF
Wiegand	OFF	OFF	ON
Wiegand, no filter	OFF	ON	OFF
strobed rising edge (MR-5)	OFF	ON	ON
strobed rising edge (Dorado 644)	ON	OFF	OFF
strobed rising edge (Mag-Tek)	ON	OFF	ON
strobed falling edge	ON	ON	OFF
unsupervised F/2F	ON	ON	ON

- Apply power to the FDW1000/C. The device is now ready to use.

A common ground connection is critical for proper operation. At each remote location, a common ground must exist between the reader(s), the FDW1000/R, and any EXP100/Rs. At the central location, a common ground must exist between the panel, the FDW1000/C, and any EXP100/Cs.

Configuring an FDW1000/R - old version - (rev .2xx range)

Initialization

- Do not apply power to the FDW1000/R. Remove all fiber and signal connections. Remove the metal housing to expose the DIP switches.
- Turn DIP Switches 1 and 4 ON, all others OFF.
- Using DIP Switches 6, 7, and 8, set the polling address of each pair of EXP100s using the table below.
- If only one pair of EXP100s will be used, set the EXP100/C and the EXP100/R to polling address 1.
- If more than one pair of EXP100 will be used, set one pair of EXP100/C and EXP100/R to polling address 1. Address the next pair using polling address 2 and continue sequentially as needed.

Number of EXP100 Pairs	DIP Switch 6	DIP Switch 7	DIP Switch 8
no EXP100 pairs	OFF	OFF	OFF
one pair of EXP100s - polling address 1	OFF	OFF	ON
two pairs of EXP100s - polling address 2	OFF	ON	OFF
three pairs of EXP100s - polling address 3	OFF	ON	ON
four pairs of EXP100s - polling address 4	ON	OFF	OFF
five pairs of EXP100s - polling address 5	ON	OFF	ON
six pairs of EXP100s - polling address 6	ON	ON	OFF
seven pairs of EXP100s - polling address 7	ON	ON	ON

- Apply power to the FDW1000/R.
- The STATUS indicator LED near the power connector should very quickly become solid green.
- If the STATUS indicator LED quickly becomes solid green, the unit is now initialized. Continue to the Programming section below.
- If the STATUS indicator LED fails to quickly become solid green, repeat the steps above. If still unsuccessful, consider the unit bad.

Programming

- Remove power from the FDW1000/R.
- Turn all DIP switches OFF.
- Using DIP Switches 6, 7, and 8, set the communications format using the following table:

Communications Format	DIP Switch 6	DIP Switch 7	DIP Switch 8
not used during programming	OFF	OFF	OFF
Wiegand	OFF	OFF	ON
Wiegand, no filter	OFF	ON	OFF
strobed rising edge (MR-5)	OFF	ON	ON
strobed rising edge (Dorado 644)	ON	OFF	OFF
strobed rising edge (Mag-Tek)	ON	OFF	ON
strobed falling edge	ON	ON	OFF
unsupervised F/2F	ON	ON	ON

- Apply power to the FDW1000/R. The device is now ready to use.

A common ground connection is critical for proper operation. At each remote location, a common ground must exist between the reader(s), the FDW1000/R, and any EXP100/Rs. At the central location, a common ground must exist between the panel, the FDW1000/C, and any EXP100/Cs.

Configuring an EXP100 - old version - (rev .3xx range)

Initialization

- Do not apply power to the EXP100. Remove all copper and signal connections. Remove the metal housing to expose the DIP switches.
- Turn DIP Switch 1 ON, all others OFF.
- Apply power to the EXP100.
- The STATUS indicator LED near the power connector should very quickly become solid green.
- If the STATUS indicator LED quickly becomes solid green, the unit is now initialized. Continue to the Programming section below.
- If the STATUS indicator LED fails to quickly become solid green, repeat the steps above. If still unsuccessful, consider the unit bad.

Programming

- Remove power from the EXP100.
- Turn all DIP switches OFF.
- Using DIP Switch 2, set each unit as an EXP100/C (Central unit) or as an EXP100/R (Remote unit).
- Turn DIP Switch 2 ON to make the unit an EXP100/C (Central unit).
- Leave DIP Switch 2 OFF to make the unit an EXP100/R (Remote unit).
- Using DIP Switches 6, 7, and 8, set the polling address of each pair of EXP100s using the table below.
- If only one pair of EXP100s will be used, set the EXP100/C and the EXP100/R to polling address 1.
- If more than one pair of EXP100s will be used, set one pair of EXP100/C and EXP100/R to polling address 1. Address the next pair using polling address 2 and continue sequentially as needed.

Number of EXP100 Pairs	DIP Switch 6	DIP Switch 7	DIP Switch 8
Not used	OFF	OFF	OFF
one pair of EXP100s - polling address 1	OFF	OFF	ON
two pairs of EXP100s - polling address 2	OFF	ON	OFF
three pairs of EXP100s - polling address 3	OFF	ON	ON
four pairs of EXP100s - polling address 4	ON	OFF	OFF
five pairs of EXP100s - polling address 5	ON	OFF	ON
six pairs of EXP100s - polling address 6	ON	ON	OFF
seven pairs of EXP100s - polling address 7	ON	ON	ON

- Apply power to the EXP100. The unit is now ready to use.

A common ground connection is critical for proper operation. At each remote location, a common ground must exist between the reader(s), the FDW1000/R, and any EXP100/Rs. At the central location, a common ground must exist between the panel, the FDW1000/C, and any EXP100/Cs.

Wiring and Wiring Examples

Recommendations for new wire installation

Power

PVC - Belden 8461 - 18 AWG 1 pair, 25 feet max.

Plenum - Belden 82740 - 18 AWG 1 pair, 25 feet max.

Wiegand / LED

PVC - Belden 9942 or 8777 - 22 AWG 3 pair shielded, 250 feet max.

Plenum - Belden 82777 - 22 AWG 3 pair shielded, 250 feet max.

PVC - Belden 9873 - 20 AWG 3 pair shielded, 500 feet max.

Plenum - Belden 83606 or 85164 - 20 AWG 3 pair shielded, 500 feet max.

Inputs and Outputs

PVC - Belden 8451 - 22 AWG 1 pair, 1,000 feet max.

Plenum - Belden 82761 - 22 AWG 1 pair, 1,000 feet max.

RS-485

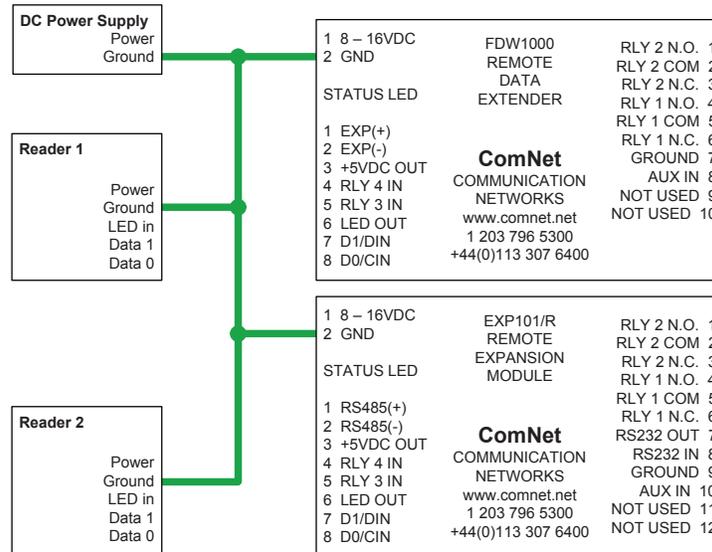
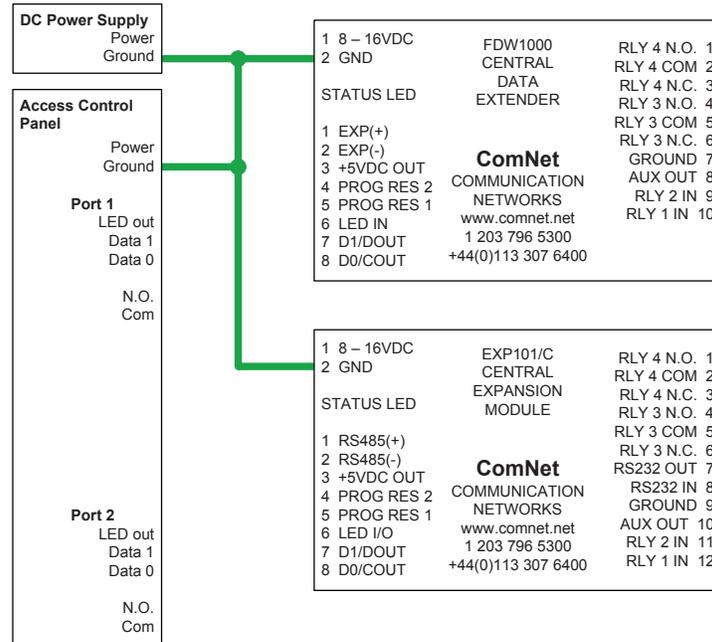
PVC - Belden 9744 - 22 AWG 2 twisted pair, 4,000 feet max.

Plenum - Belden 82741 - 22 AWG 2 twisted pair, 4,000 feet max.

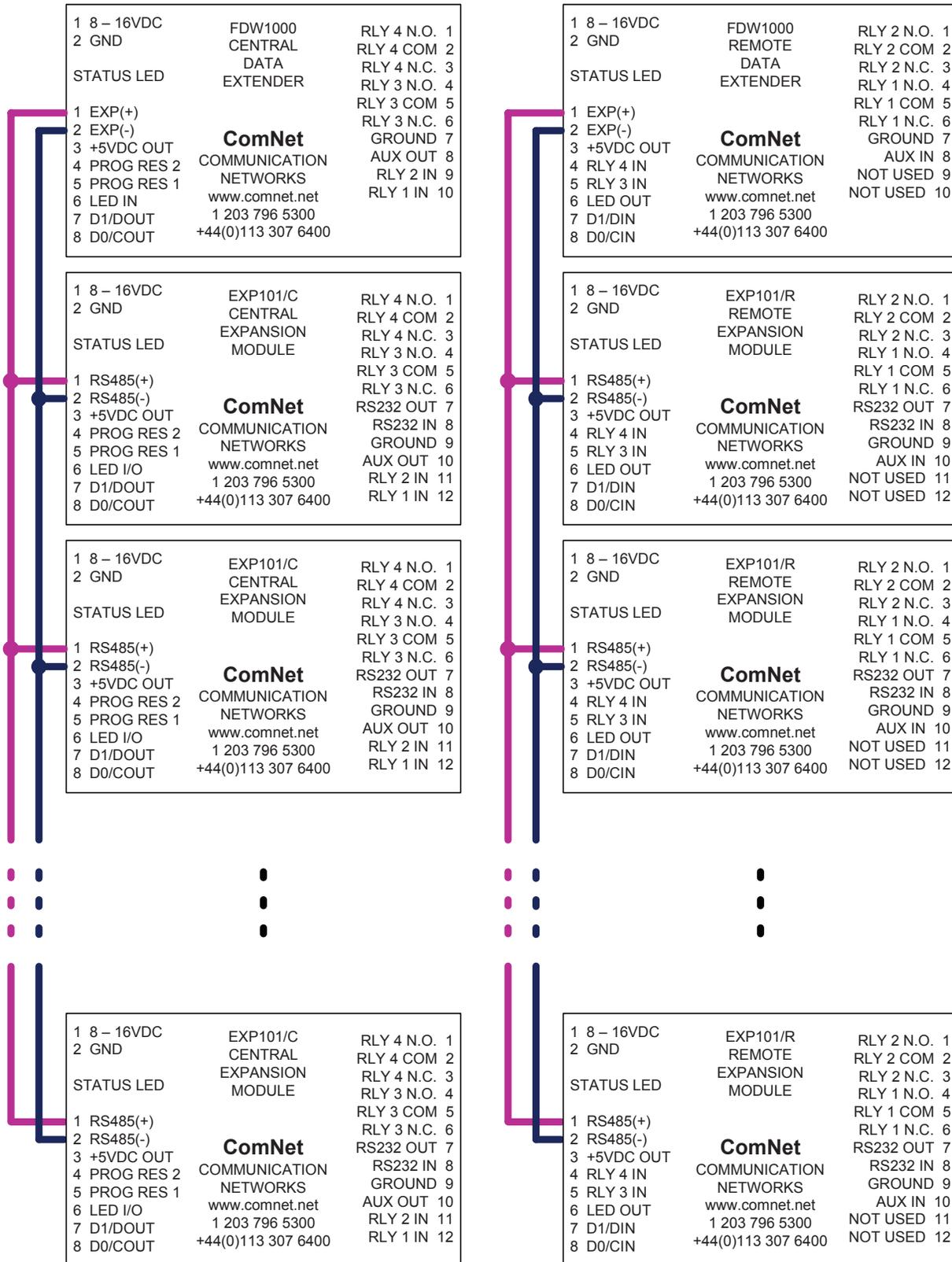
Typical wiring diagrams

The following diagrams show some typical wiring examples. For simplicity, each diagram shows only the connections that are relevant to the diagram's purpose.

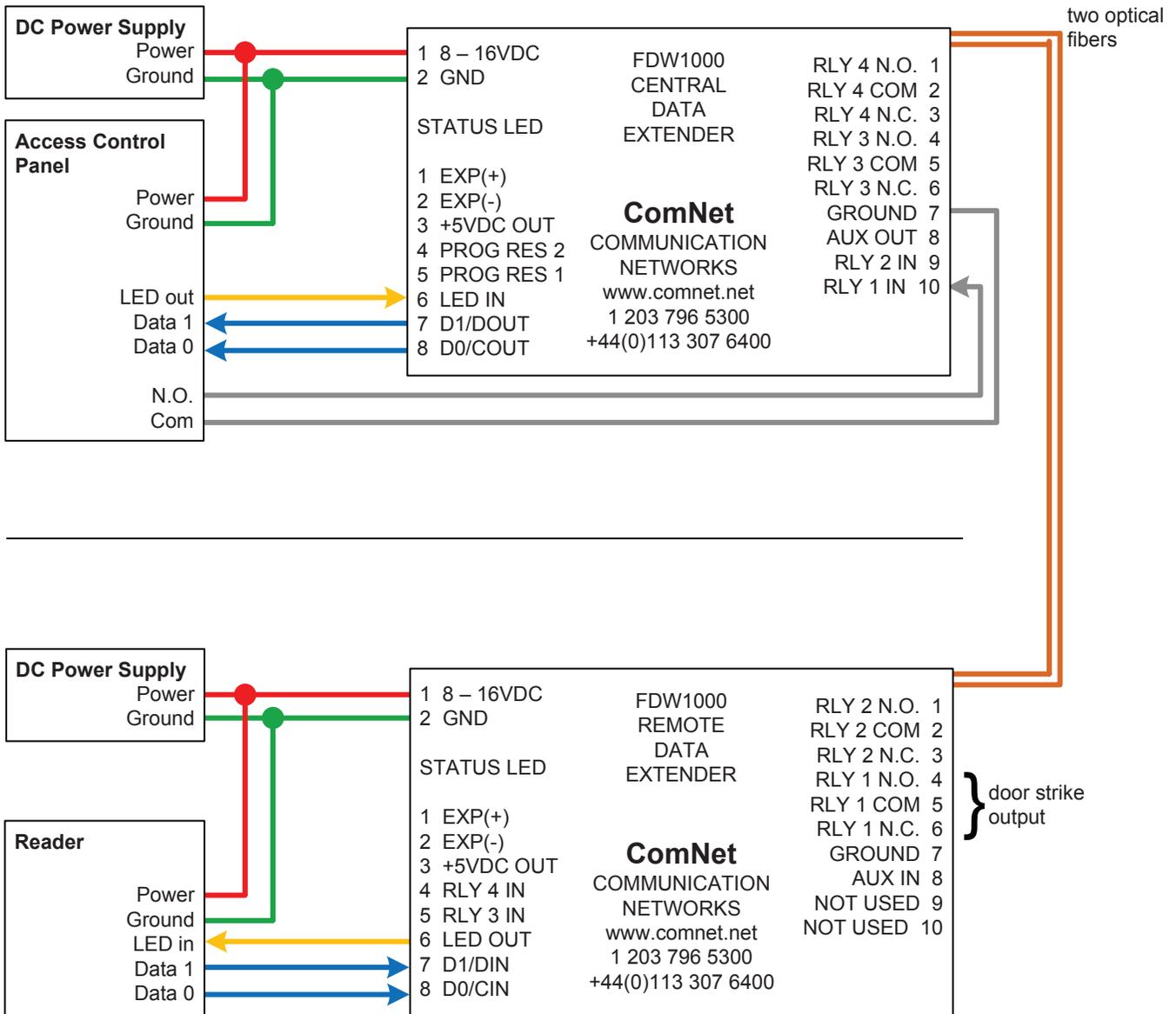
Wiring common grounds



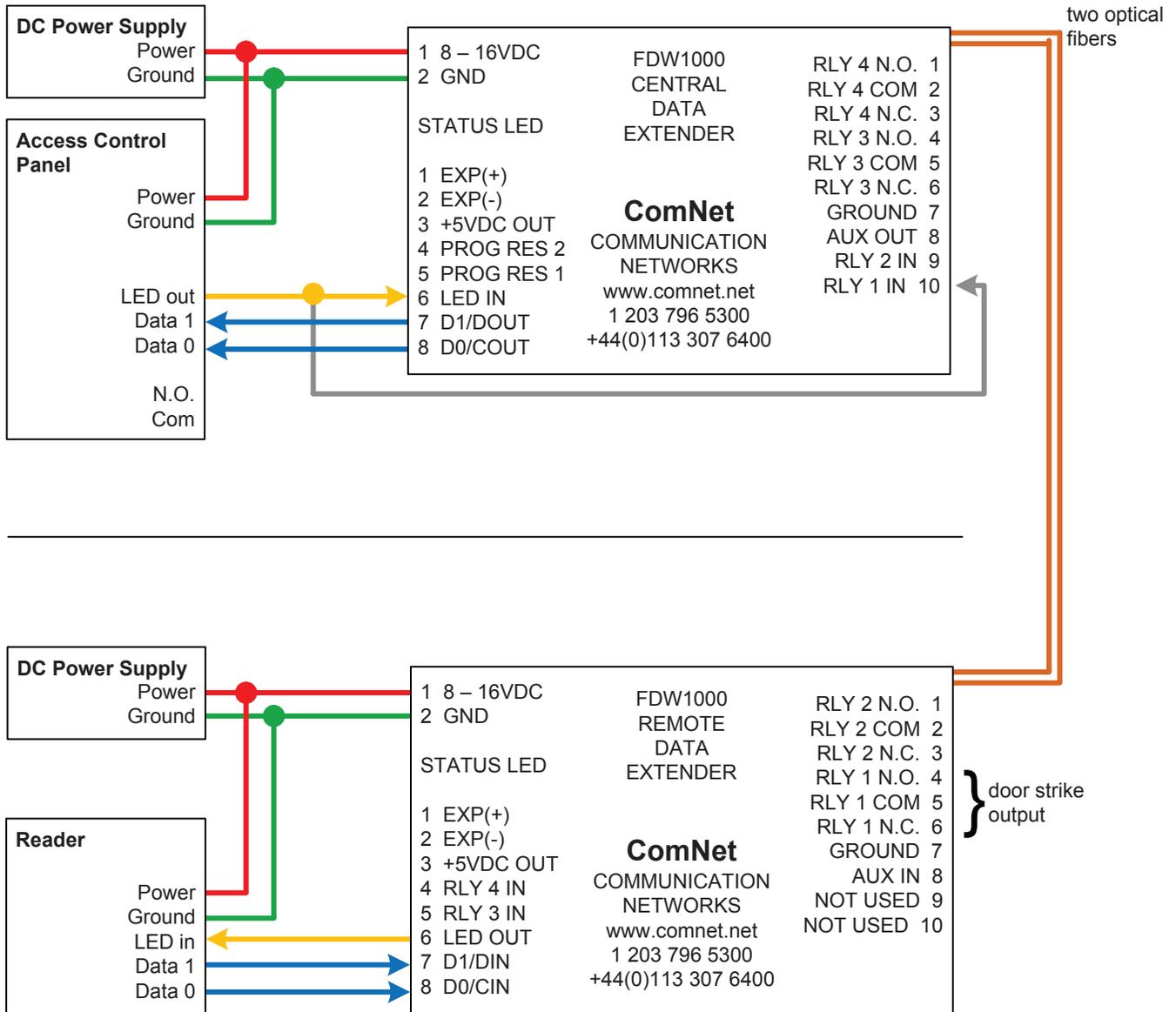
2-wire RS-485 bus wiring for EXP101 expansion modules



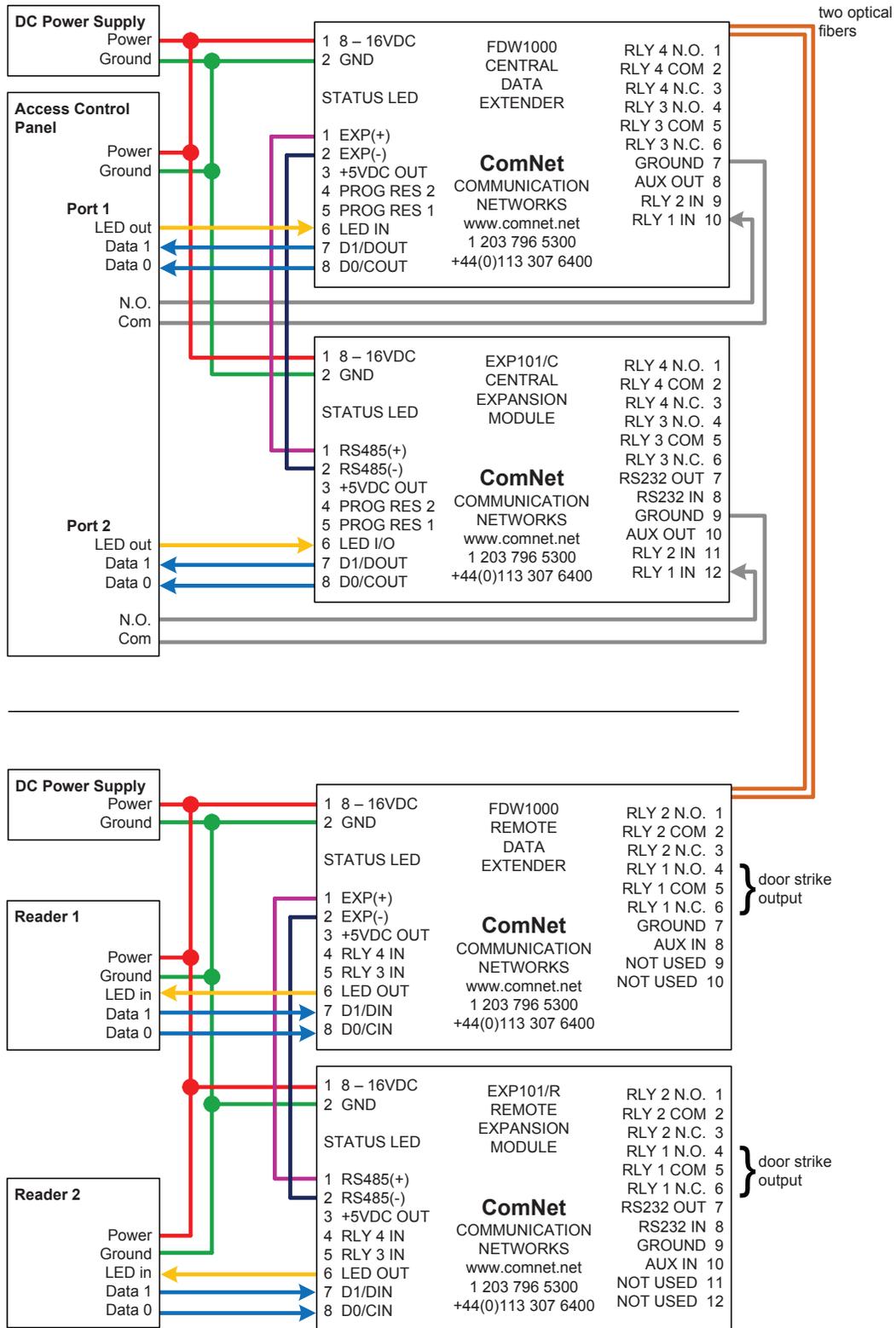
Door strike follows dry contact closure, one reader



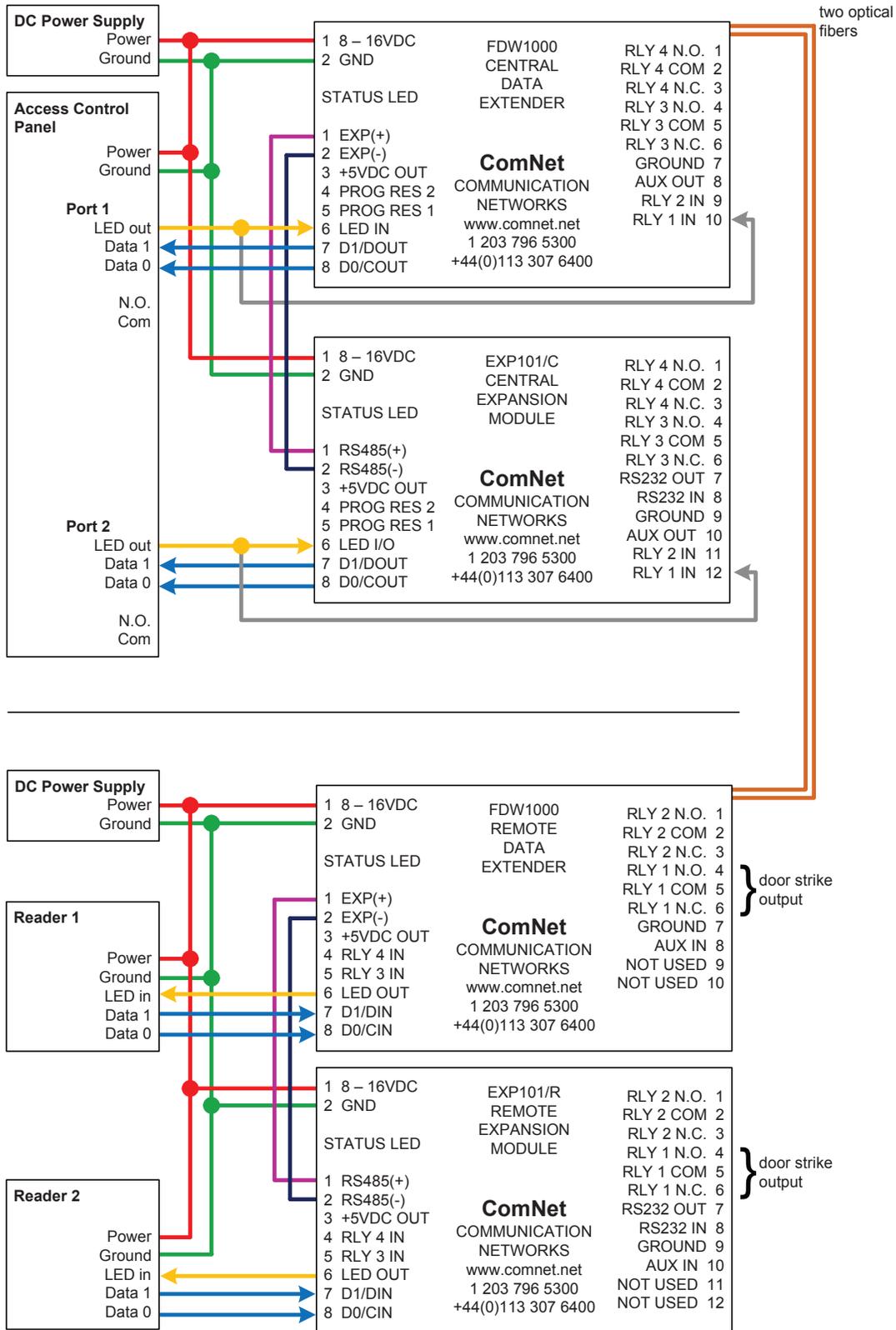
Door strike follows LED, one reader



Door strike follows dry contact closure, two readers



Door strike follows LED, two readers



References

LED status

FDW1000

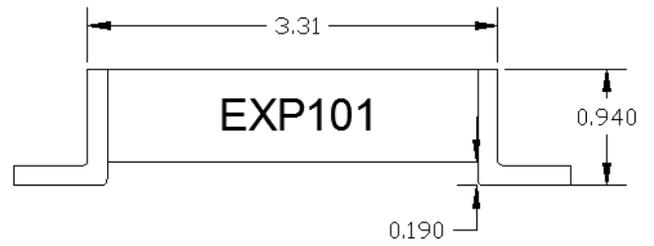
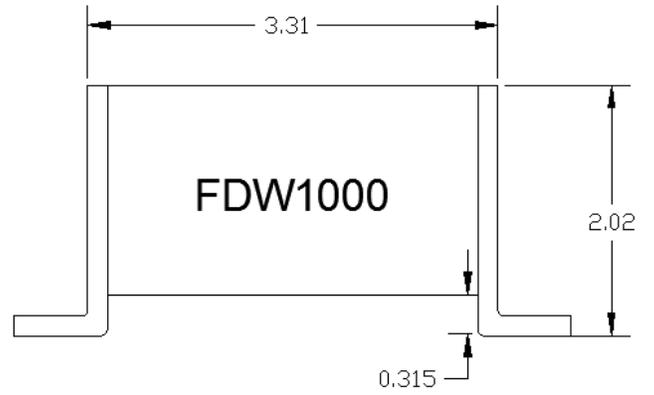
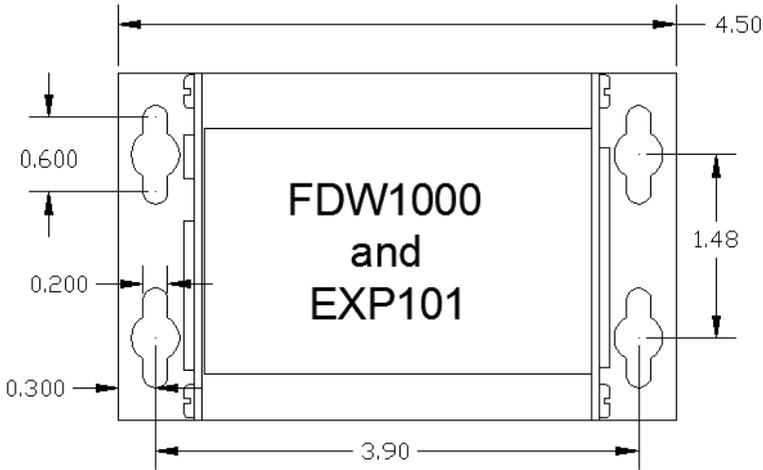
- During initialization:
- A solid green STATUS LED on power up indicates that the unit has accepted the settings and that it is ready to be programmed.
- After successful initialization and programming:
- An alternating green / red STATUS LED indicates that there is no optical link between the FDW1000s.
- If using expansion modules, a solid green STATUS LED indicates a problem with at least one expansion module connected to the FDW1000 at the opposite end.
- A rapidly flashing green STATUS LED indicates that there is communication between the Central and the Remote units and - if using expansion modules - all expansions modules are operating properly. The STATUS LED's will flash green after each polling cycle. The frequency of the flashing will depending on the number of expansion modules being used. With only one pair of FDW1000s connected - no expansion modules - the STATUS LED should flash several times per second. With seven sets of expansion modules, the STATUS LED could flash as slowly as one flash per second.

EXP101

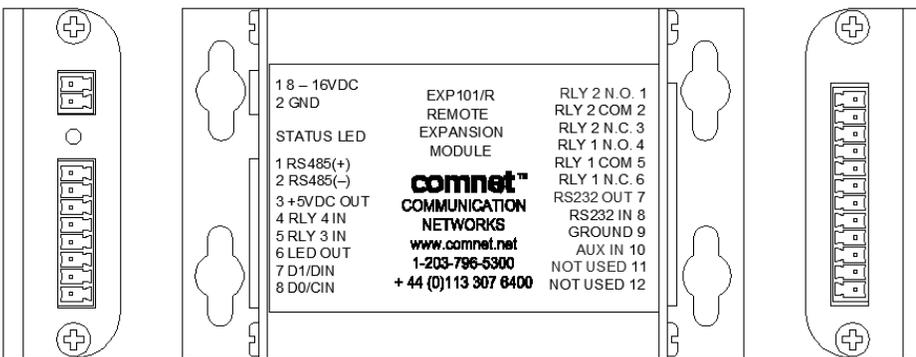
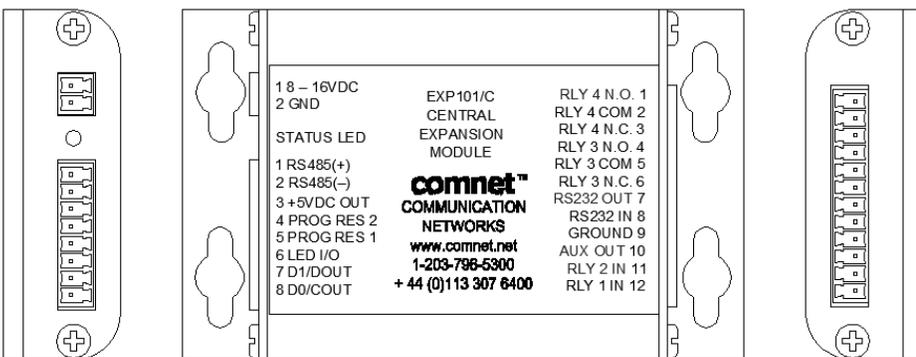
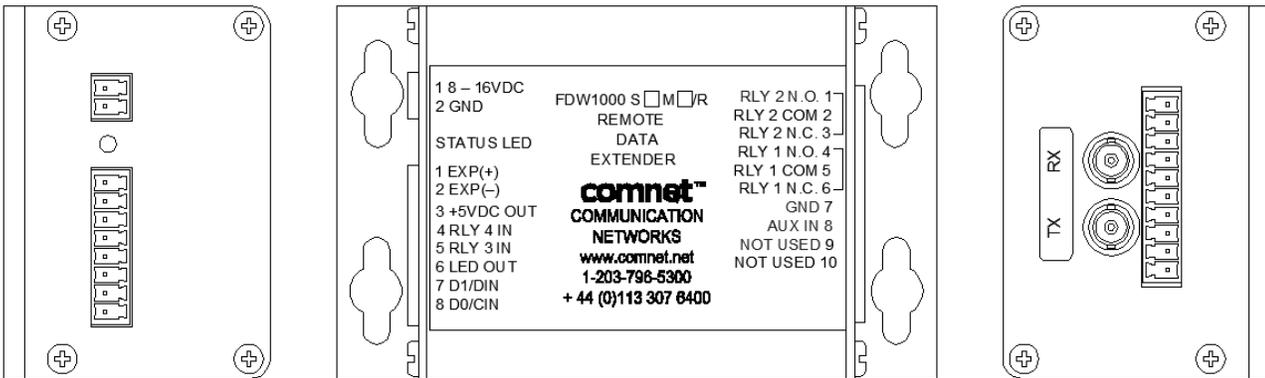
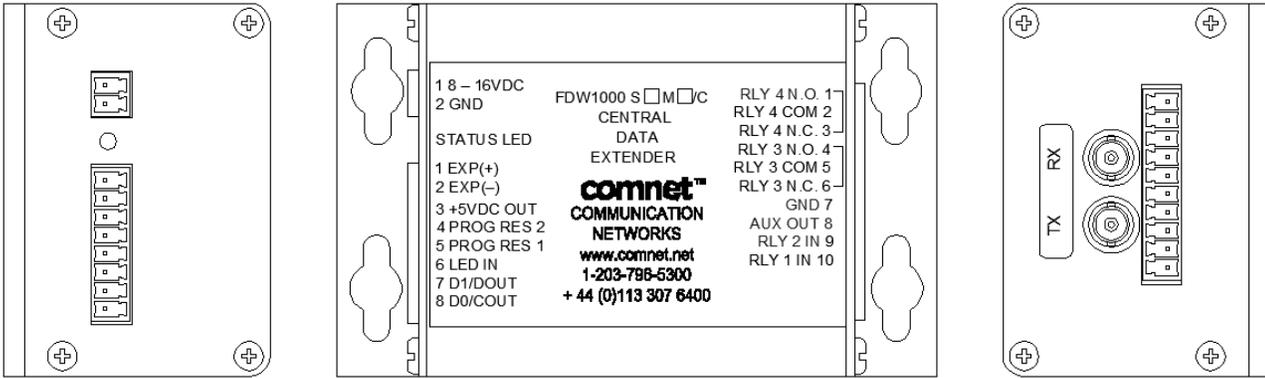
- Once a Central / Remote pair of FDW1000s and the pair(s) of EXP101s have been successfully initialized and programmed:
- A STATUS LED-flashing green slowly indicates that there is no optical link between the FDW1000s.
- A solid red STATUS indicator LED indicates that the unit is properly powered but there is no 2-wire RS-485 link.
- A rapidly flashing green STATUS LED indicates that there is communication between the Central and the Remote units and that there is a good 2-wire RS-485 link. The STATUS LED will flash green after each polling cycle. The frequency of the flashing will depending on the number of expansion modules being used. With only one pair of FDW1000s connected - no expansion modules - the STATUS LED's should flash several times per second. With seven sets of expansion modules, the STATUS LED could flash as slowly as one flash per second.

LED Status			
STATUS LED	FDW (during initialization)	FDW (initialized and programmed)	EXP101 (programmed)
Off	not properly powered	not properly powered	not properly powered
Green, solid	ready to be programmed	opposite side expansion module failure	not used
Green, flashing slowly	not used	not used	optical link failure
Green, flashing rapidly	not used	good optical link	good optical link and good 2-wire RS-485 link
Red, solid	not used	not used	no 2-wire RS-485 link
Red, flashing	not used	not used	not used
Red / Green, alternating	not used	optical link failure	not used

Dimensions



AutoCAD drawings



DIP switch maps

Current FDW1000s (.3xx Revision Designations) and Current EXP101s (.4xx Revision Designations) Only



DIP Switches 6, 7, and 8 set the data interface.

DIP Switches 2, 3, and 5 are not used during initialization.

DIP Switches 1 and 4 put the FDW into initialization mode.

FDW Initialization

Data Interface Select			
6	7	8	
0	0	0	not used
0	0	1	Wiegand
0	1	0	Wiegand No Filter
0	1	1	Strobed Rising (MR5)
1	0	0	Strobed Rising (Dorado 644)
1	0	1	Strobed Rising (Mag-Tek)
1	1	0	Strobed Falling
1	1	1	Unsupervised F/2F



DIP Switches 6, 7, and 8 set the number of expansion module pairs.

DIP Switch 4 sets the Relay Channel 3 function.

DIP Switch 3 sets the FDW to Central or Remote mode.

DIP switches 1, 2, and 5 are not used in programming mode.

FDW Programming

Number of Pairs of Expansion Modules			
6	7	8	
0	0	0	not used
0	0	1	1 pair
0	1	0	2 pairs
0	1	1	3 pairs
1	0	0	4 pairs
1	0	1	5 pairs
1	1	0	6 pairs
1	1	1	7 pairs

Relay Channel 3 Function Select	
4	
ON	Monitors the status of the optical link
OFF	Independent contact closure channel

Central / Remote Select	
3	
ON	Central
OFF	Remote



DIP Switches 6, 7, and 8 set the polling address.

DIP Switches 3, 4, and 5 set the data interface.

DIP Switch 2 sets the EXP to Central or Remote mode.

DIP Switch 1 is reserved for factory use.

EXP101 Programming

Polling Address Select			
6	7	8	
0	0	0	not used
0	0	1	Address 1
0	1	0	Address 2
0	1	1	Address 3
1	0	0	Address 4
1	0	1	Address 5
1	1	0	Address 6
1	1	1	Address 7

Data Interface Select			
3	4	5	
0	0	0	not used
0	0	1	Wiegand
0	1	0	Wiegand No Filter
0	1	1	Strobed Rising (MR5)
1	0	0	Strobed Rising (Dorado 644)
1	0	1	Strobed Rising (Mag-Tek)
1	1	0	Strobed Falling
1	1	1	Unsupervised F/2F

Central / Remote Select	
2	
ON	Central
OFF	Remote

ComNet Customer Service

Customer Care is ComNet Technology's global service center, where our professional staff is ready to answer your questions at any time.

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