Access Control

**Common Access Control Systems
& Supporting Cables (including OSDP)**

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To additional Doors

Systems

Access Control Systems

An Access Control System is an integration of hardware, software and management tools that electronically monitor and control access through doors, gates, elevators, and many other entry points.

Access Control Systems are found virtually everywhere. They can be found in hotels, hospitals, airports, banks, prisons, military facilities, social clubs, residential complexes, libraries, factories, and many other places where access security is a premium.

The Access Control Systems of today are becoming more sophisticated. Many other security applications are being integrated with the Access Control System to make it a complete security system. Some security systems being integrated are: CCTV, intrusion detection, HVAC, and time & attendance reporting.

Reader Technology:

There are many choices in Reader Technology; the most common technologies for card access control are:

- Barcode
- Magnetic Stripe
- Wiegand
- Proximity

Barcode:

Barcode is very common in non-security applications, but it seldom is the technology of choice for security and access control.

Magnetic Stripe:

Magnetic stripe is the most widely used technology worldwide for access control applications. Most people are familiar with the technology because of its widespread use by bank and credit card operations. This technology only provides medium security level because it is possible to duplicate cards. But because of the low cost of the cards and readers, this technology is an attractive choice for many applications.

Wiegand:

Wiegand was originally created to provide a permanently encoded card when magnetic stripe cards were so sensitive to magnetic fields. This technology was the most common choice for high security applications before the advent of lower cost proximity technology, and high density magnetic stripe.

Proximity:

Proximity is the fastest growing technology for card access control applications. The proximity technology reader constantly transmits a low-level fixed RF signal that provides energy to the card. When the card is held at a certain distance from the reader, the RF signal is absorbed by the card, which contains a unique identification code. The main advantage is there is no wear, no slots, no moving parts, and no read heads to maintain. Proximity technology is based on a frequency of 125kHz, which has a longer read-range than smart card technology.

Open Supervised Device Protocol (OSDP) is the newest kind of access control system. OSDP is more secure than most common access control communication protocols.

Access Control System Design

D Access Control Cables

E LAN/Networking Cables:

F RS-485 Control Cables:
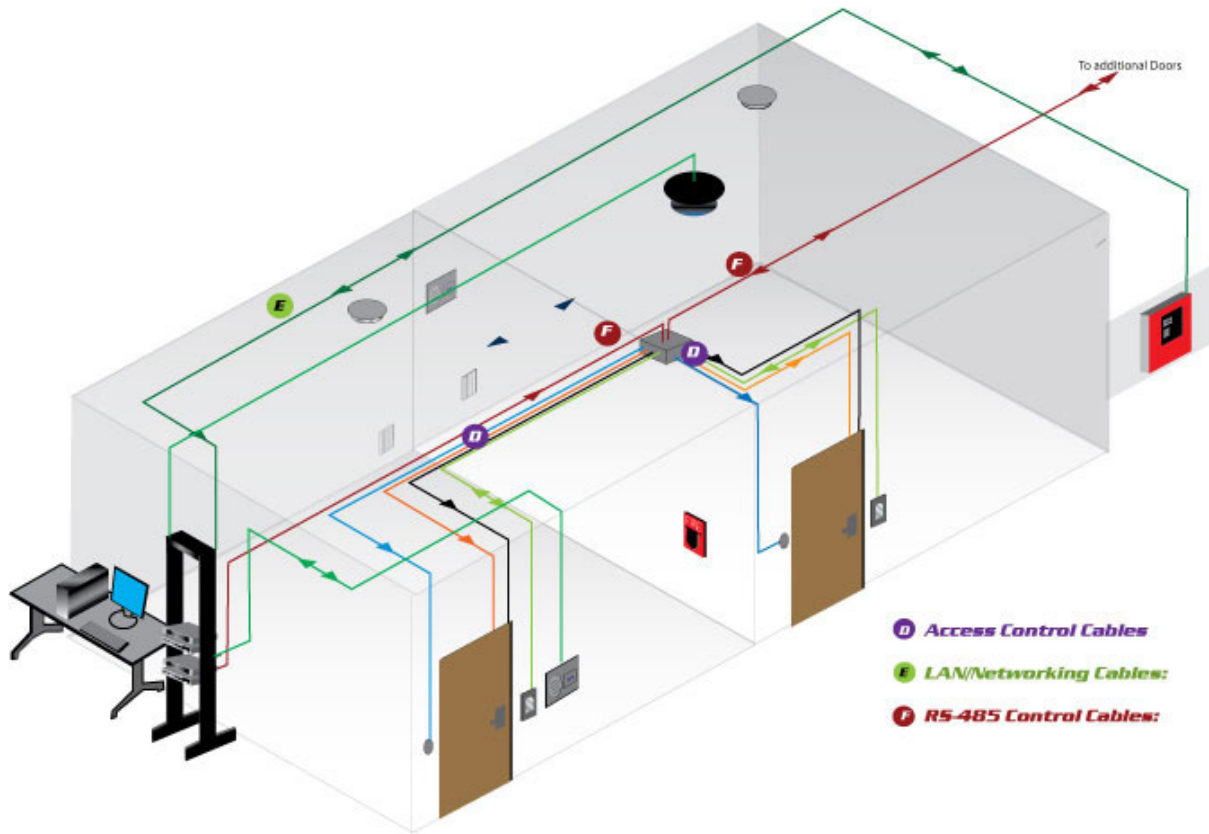
Access Control System and Cables

A conventional Access Control System can range from the environment, the type and control of access, and to control the security of access. All Access Control Systems have a type of reader, control panel, software, and other peripheral devices.

Access Control Cables

Reader Cables: Dependent on the type of reader (barcode, magnetic stripe, computer chip, biometric, and many others)

Door Contact Cables
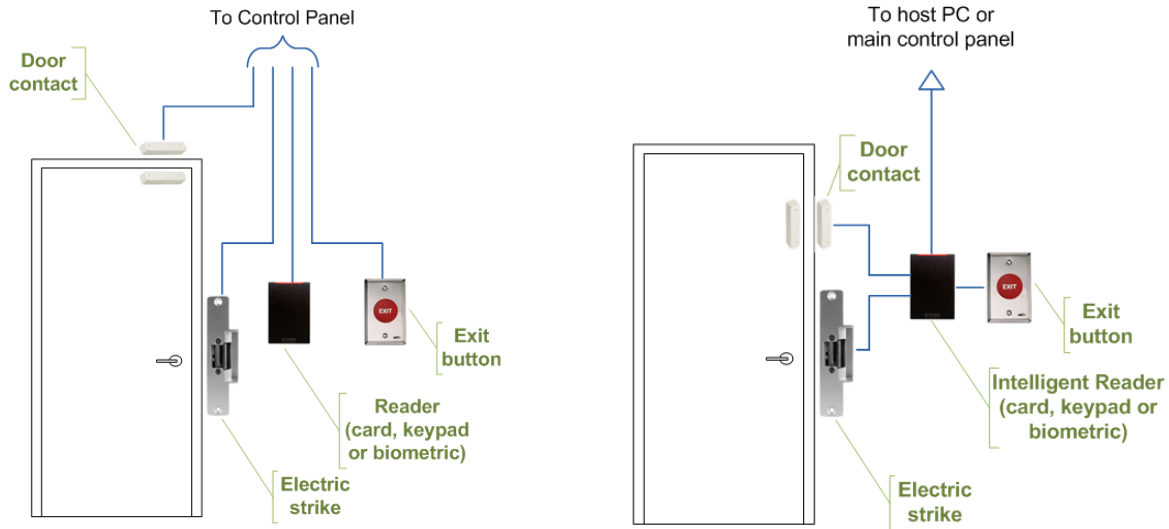
Request to Exit Cables

Lock Power Cables

RS-485 Cables: Communication cables for low streaming data to the control panels

LAN/Networking Cables: Communication for low/medium/high data rates for data transfer
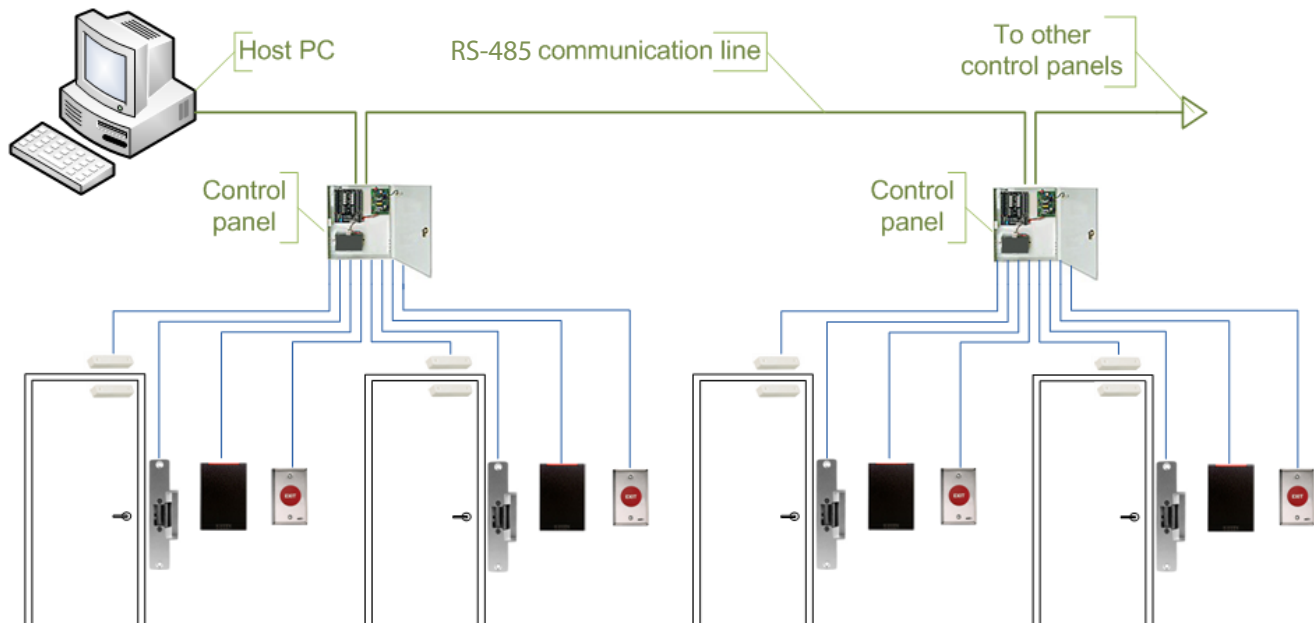
Access Control Design

There are many types of Access Control Designs.

Typical Access Control Door Wiring

To Control Panel

Door contact

Exit button

Reader (card, keypad or biometric)

Electric strike

To host PC or main control panel

Door contact

Exit button

Intelligent Reader (card, keypad or biometric)

Electric strike

Access Control Systems Using Serial Controllers
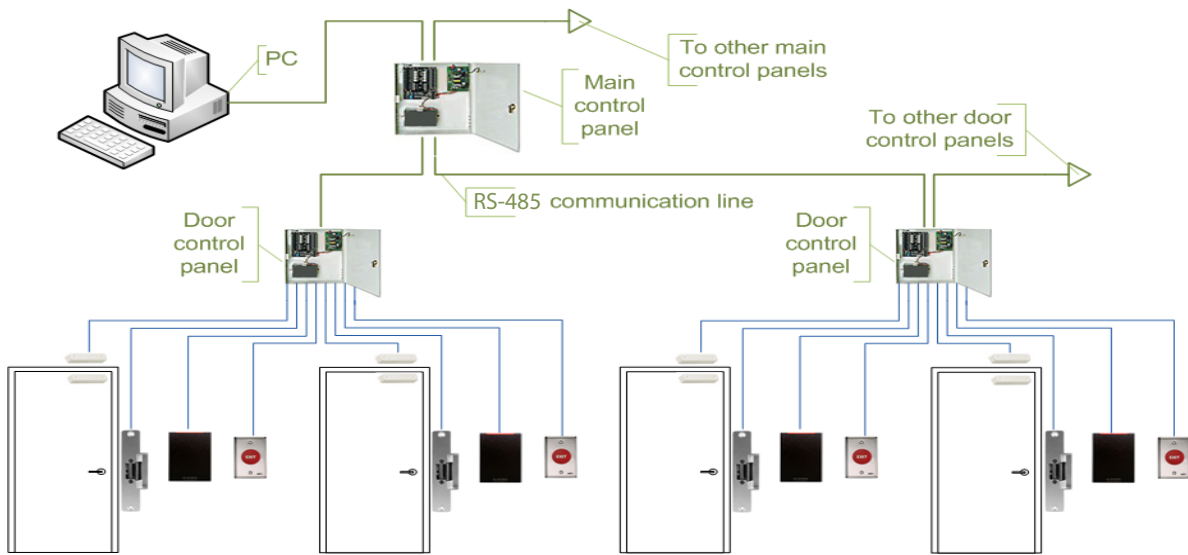

Host PC

RS-485 communication line

To other control panels
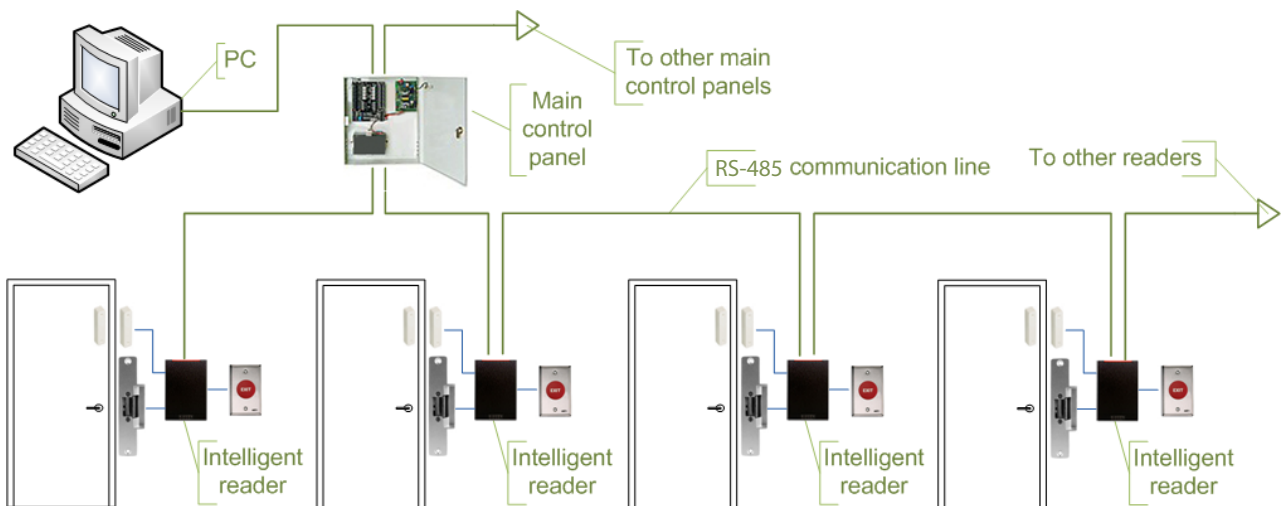
Control panel

Control panel

Access Control Design

Access Control System Using Serial Main and Subcontrollers

PC

To other main control panels

Main control panel

To other door control panels

Door control panel

RS-485 communication line

Door control panel

Access Control Systems Using Serial Main Controller and Intelligent Readers

PC

To other main control panels

Main control panel

RS-485 communication line

To other readers

Intelligent reader

Intelligent reader

Intelligent reader

Intelligent reader

Access Control Design

Access Control Systems Using Serial Controllers and Terminal Servers
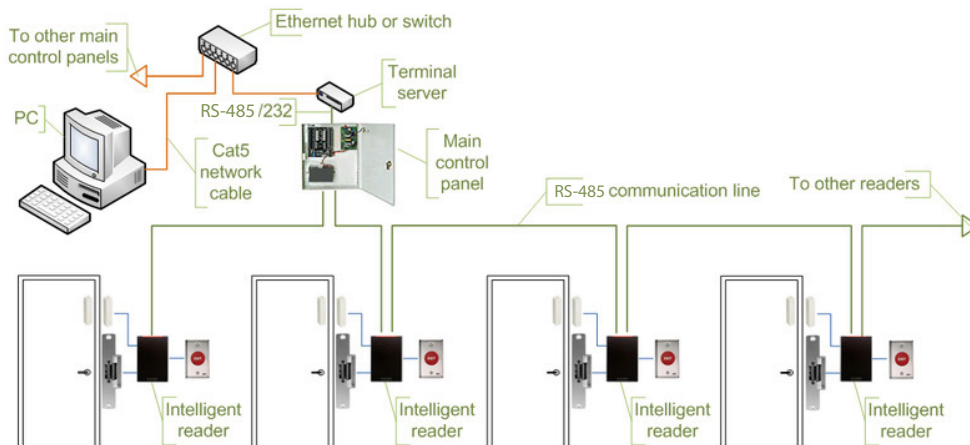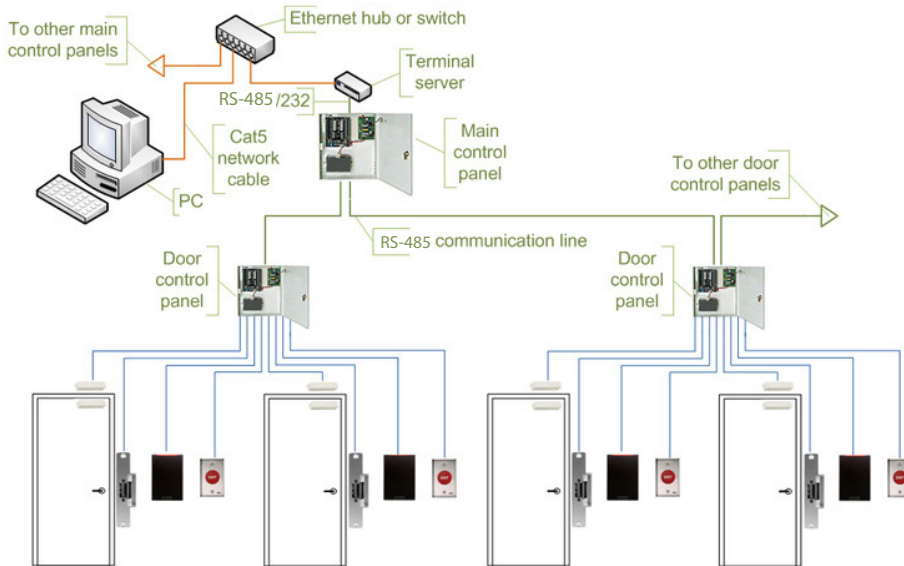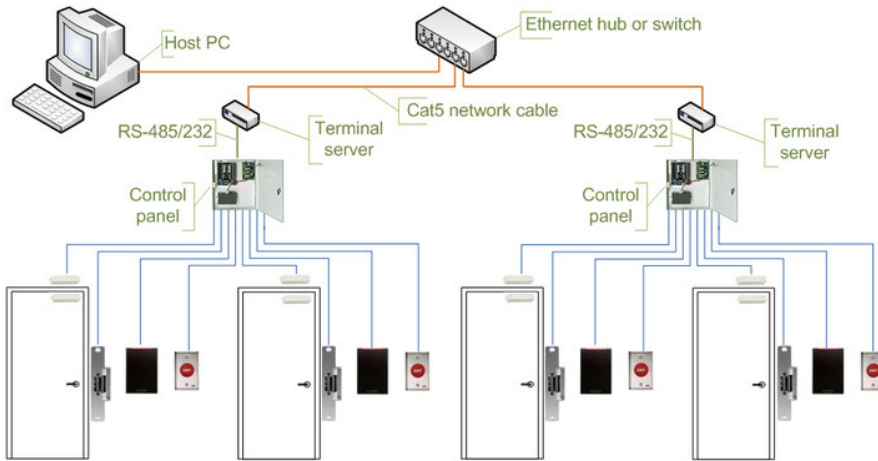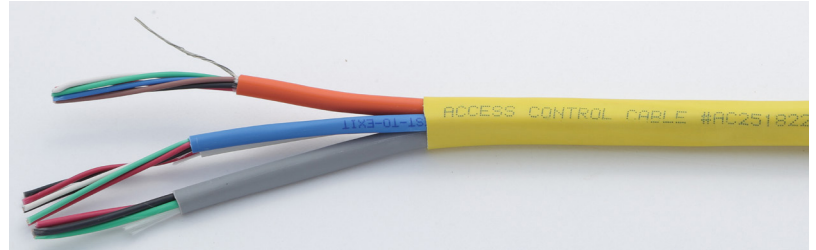
Access Control Composite Cables - All-In-One

West Penn Wire's all-in-one composite
Access Control Cables incorporate 4 cables.

Reader Cable:
22/6 Shielded
or
3 Pair 22 AWG Shielded - Longer Run
Orange Jacket

Door Contact Cable:
22/2 Unshielded
White Jacket

Lock Power Cable:
18/4 Unshielded
Gray Jacket

Request-to-Exit (REX):
22/4 Unshielded
Blue Jacket

The Access Control All-In-One Cable Is Available in 3 Types of Designs:

Cable Type	AWG Size	Pair	CM	CMP	Aquaseal Indoor/ Outdoor	All-Shielded CMP
Reader	22	6 or 3		AC251822B		
Door Contact	22	2	AC1822	AC251822B3P	AQC1822	AC253PSH
Lock Power	18	4		BP251822B		BP253PSH
REX	22	4		BP251822B3P (3 Pair)		

AC1822 - Overall blue jacket CM rated

AC251822B - Overall yellow jacket CMP rated

AC251822B3P - Overall yellow jacket CMP rated (3 Pair reader cable)

AQC1822 - Indoor/Outdoor CM Rated

AC253PSH - Overall yellow jacket CMP

BP251822B - Banana Peel Design CMP

BP251822B3P - Banana Peel Design CMP (3 Pair reader cable)

BP253PSH - Banana Peel Design CMP (All Shielded Cables)

All the reader cables in the all-in-one cabledesign can reach up to 250 ft from panel to reader.
Our 3 Pair design can reach up to 290 ft.

Access Control Individual Cables

West Penn Wire provides the individual cables for each of the components of an access control design.

Reader Cable:

The reader cables range from 6 thru 15 conductors. Most systems are Weigand or proximity readers, which utilize 6 conductors. Keypads and other devices may require a higher conductor count. The AWG size is normally between 22-18 AWG stranded conductors.

The insulation of standard reader cables are normally PVC (flame retardant) or PP. The reader cable is a low data signal design and doesn't require an extremely low capacitance. Reader cables signals are susceptible to low frequency noise. Therefore, a foil shield is normally required for the overall cable design.
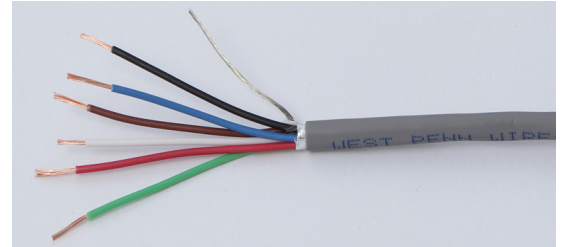

Door Contact Cable:

The door contact cable is utilized to open/close door contact closures. The cable conductor and AWG is normally 22-18 AWG with 2 to 4 conductors. The insulation is either PVC (flame retardant) or PP. The capacitance of the cable is not an important characteristic of the door contact cable.
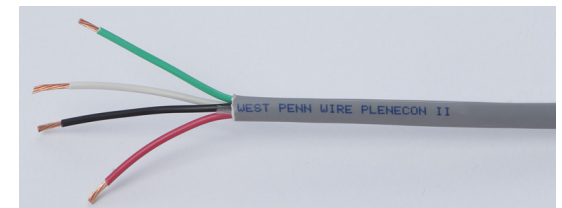

Lock Power Cable:

The lock power cable is used for the electronic locking device. The cable conductor and AWG is normally 18-14 AWG and 2 to 4 conductors.
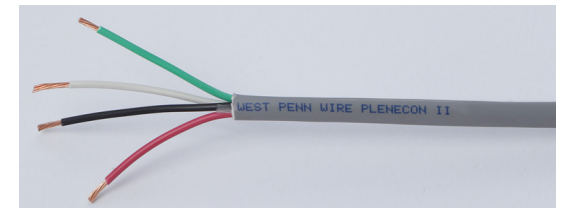
Request-to-Exit (REX):

The REX cable is used where REX is required in an Access Control System. REX can be push-button or motion detection. The cable conductor and AWG is normally 22-18 AWG and 2 to 4 conductors.

Access Control RS-485 Communication

Serial controllers are connected to a host PC via a
serial RS-485 communication line. External RS-232/485
converters or internal RS-485 cards have to be installed,
as standard PCs do not have RS-485 communication ports.

Advantages:
• RS-485 standard allows long cable runs, up to 4000 ft (1200m)

• Relatively short response time. The maximum number of devices on an
  RS-485 line is limited to 32, which means that the host can frequently request
  status updates from each device, and display events almost in real time.

• High reliability and security as the communication line is not shared with any other systems.

Disadvantages:
• RS-485 is not well suited for transferring large amounts of data (i.e. confguration and users).

  The highest possible throughput is 115.2 kbit/sec, but in most systems it's downgraded to 56.2 kbit/sec
  or less to increase reliability.

• RS-485 doesn't allow the host PC to simultaneously communicate with several controllers to the same port.
  Therefore, in large systems, transfers of configuration and users to controllers may take a very long time,
  interfering with normal operations.

RS-485 Cables:
    Conductor
    22-24 AWG Tinned Copper

Insulation:
Low Loss Insulation - Polypropylene (PP) or Polyethylene (PE) for non-plenum and FEP (Tefon)
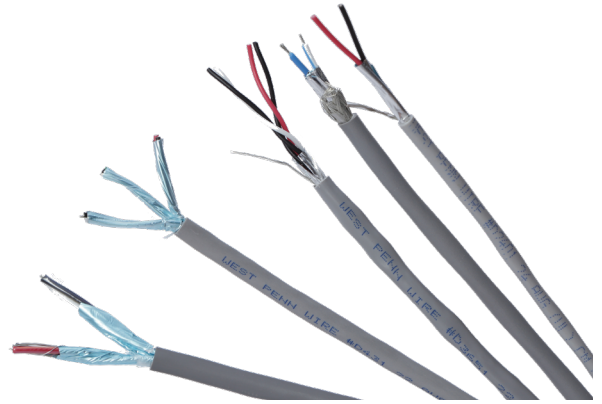for plenum-rated cables Impedance:

    100-120 Ω
    Capacitance: 12-16 pf/f

Shield:
RS-485 cables require a shield to help in reducing the EMI/RFI interference.
An overall shield 100% foil or overall shield 100% foil + high percentage braid.

Jacket:
The jacket depends on the environment the installation is in.

OSDP - Open Supervised Device Protocol

RS-485 Communication with Power

RS-485 Communication & Power

| Catalog No.	Pair	Cond. Type & Nom. DCR	Insulation Type & Thickness	Shielding	Jacket Type & Thickness	Nom. OD	NEC Type	Nom. Capacitance & Impedance	Jacket Colors
			Inches		Inches	Inches			
1PR2418P	1	24 AWG (7 x 32) TC	Foam FEP .025	Overall 100% Foil	Overall Flex Plenum PVC .020	.244	CMP	12.8pf/ft 120 Ω	Black White/Orange Strip
	2	18 AWG (7x26) BC	Plenum PVC .010	None				23pf/ft	
1PR2416P	1	22 AWG (7x30) TC	Foam FEP .030	Overall 100% Foil	Overall Flex Plenum PVC .020	.280	CMP	13.5pf/ft 120 Ω	Black
	2	16 AWG (19x29) BC	Plenum PVC .008	None				23pf/ft	

RS-485 Communication Outdoor

Catalog No.	Pair	Cond. Type & Nom. DCR	Insulation Type & Thickness	Shielding	Jacket Type & Thickness	Nom. OD	NEC Type	Nom. Capacitance & Impedance	Jacket Colors
			Inches		Inches	Inches			
DRS485DB	1	22 AWG (7 x 30) TC 17 Ω/Mft	Foam PE .025	Overall 100% Foil	PE .020	.339	Outdoor Direct Burial	11 pf/ft 20.9 pft/ft 120 Ω	Black

Insulation Color Code

| Catalog No.	Color Code
D4851 D254851 1PR24P DRS485DB	1 Pair: Blue/White, White/Blue
D2401 D352401	1 Pair: Black, Red
1PR2418P 1PR2216P	Data Pair: Blue/White, Whire/Blue Power: Black, Red
D25222P	1: White/Green 2. Orange/Brown

OSDP - Open Supervised Device Protocol
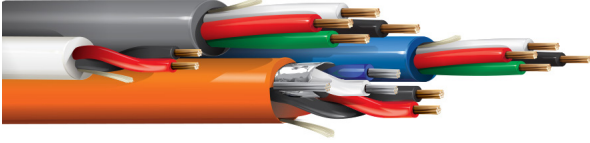
Composite Banana Peel - 4 Components

Catalog No.	Components	No. of Conductors	Condutor Type	Insulation Type	Shielding	NEC Type	Nom. Capacitance & Impedance
BPOSDP	OSDP Reader	(4) 1 Pair Data, 2 Cond. PWR	24 AWG 7x32 TC Data, 18 AWG 7x26 PWR	FEP Data, PVC PWR	100% AL Foil Data, None PWR	CMP	13.5 pf/ft 120 Ω Data
	Door Contact	2 Cond.	22 AWG BC	PVC	None		
	Lock Power	4 Cond.	18 AWG BC	PVC	None		
	REX/Spare	4 Cond.	22 AWG BC	PVC	None		

Components	Insulation Color Code	Individual Cable Jacket Color Code
OSDP Reader	Data: White/Blue, PWR: Black, Red	Orange
Door Contact	Black, Red	White
Lock Power	Black, Red, White, Green	Gray
REX/Spare	Black, Red, White, Green	Blue

Overall Cable Construction	
Jacket Type	None- Banana Peel Design
Cable OD	.455 in

AQUASEAL - Indoor/Outdoor Cables

Water Resistant Cables
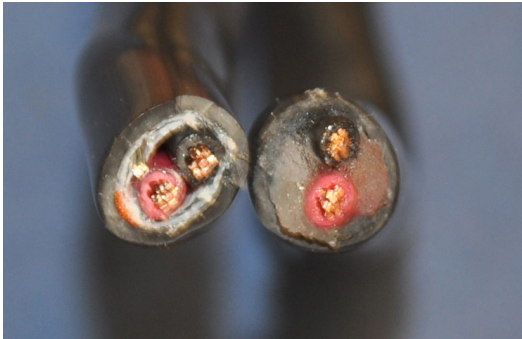
Aquaseal power-limited water-resistant cables are designed to be used for indoor/outdoor fire alarm system. The Aquaseal products are manufactured using a premium grade jacket compound. These cables are flame retardant, sunlight and water resistant, and employ an abrasion and crush resistant construction. This durability allows the Aquaseal power-limited water-resistant cables to be direct burial.

The internal cable construction employs a dry water-blocking barrier instead of a messy gel, unlike many other outdoor cables, which can't be placed indoors due to the inability to pass flame tests.

Aquaseal cable retains consistent electrical characteristics compared to standard cable when immersed in water. The moisture-blocking barrier used in this cable has proven itself in various tests where standard outdoor cable has failed. This can be verified by monitoring the capacitance levels of both cables. Aquaseal water-resistant cables will consistently have lower capacitance values and remain stable over the long haul enabling the lowest signal loss.
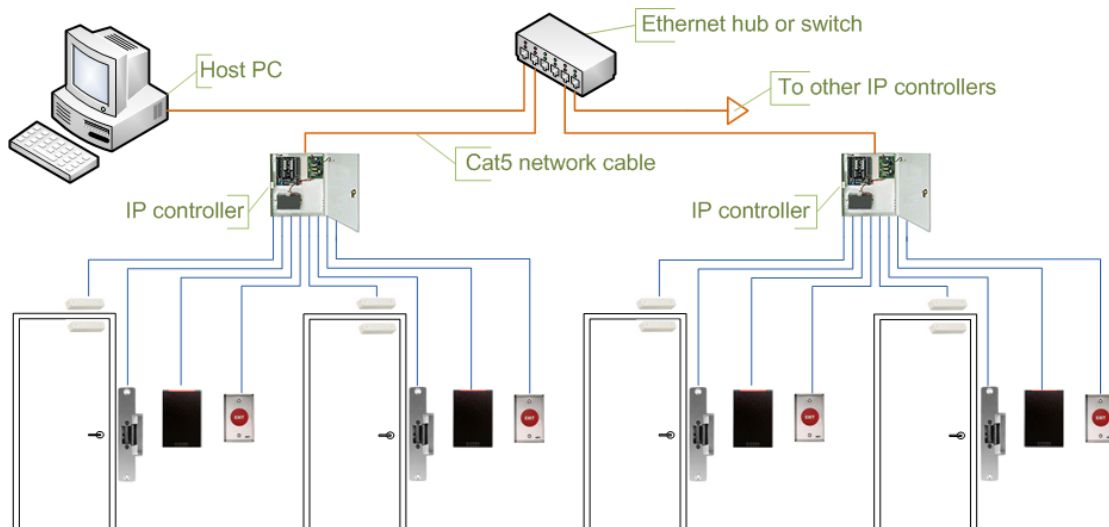
Aquaseal is UL listed, NEC type FPL or PLTC rated and utilizes 18 AWG to 12 AWG, which makes this cable excellent for low voltage Conventional and Addressable systems.
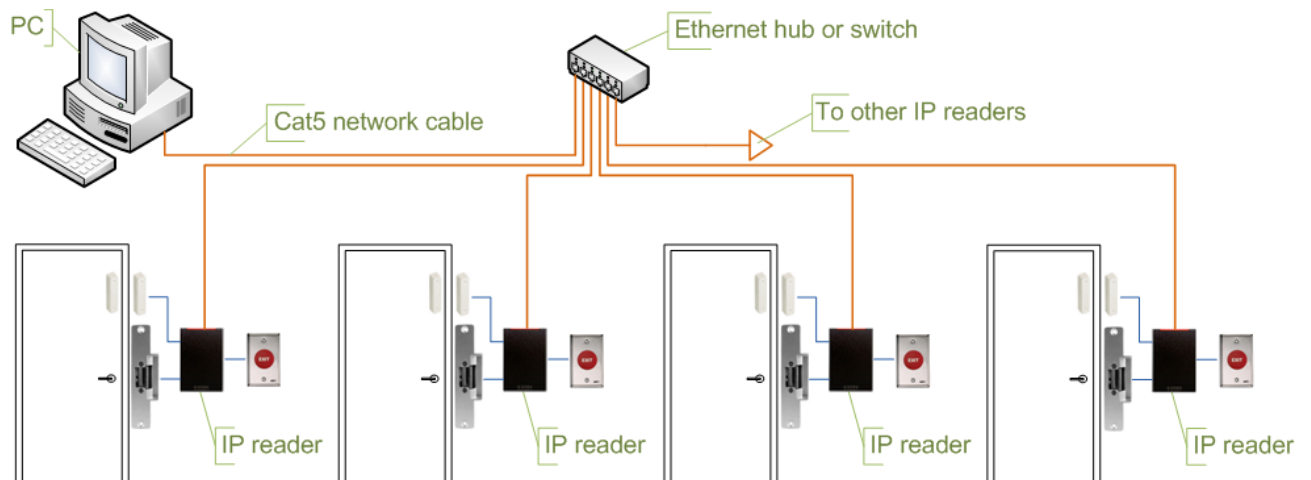
Access Control Cable List

Environment	Reader Cables	Door Contact	Lock Power Cable	REX Cables	RS-485 Cables
NON PLENUM	3270 3271 3272 3263 3021	221 224 241	244 245	241 244	D2401 D4851 D2402 D4852
PLENUM	253270 253271	25221B 25224B 25241B	25244B 25245B	25241B 25244B	D252401 D254851 D252402 D254852
INDOOR/OUTDOOR	AQC3270 AQC3186 AQC3274	AQC224 AQ224	AQC44	AQ244	—

Access Control IP Design

Access Control System Using IP Controllers

Host PC

Ethernet hub or switch

To other IP controllers

Cat5 network cable

IP controller

IP controller

Access Control Sysem Using IP Readers

PC

Ethernet hub or switch

Cat5 network cable

To other IP readers

IP reader

IP reader

IP reader

IP reader

Access Control IP Design
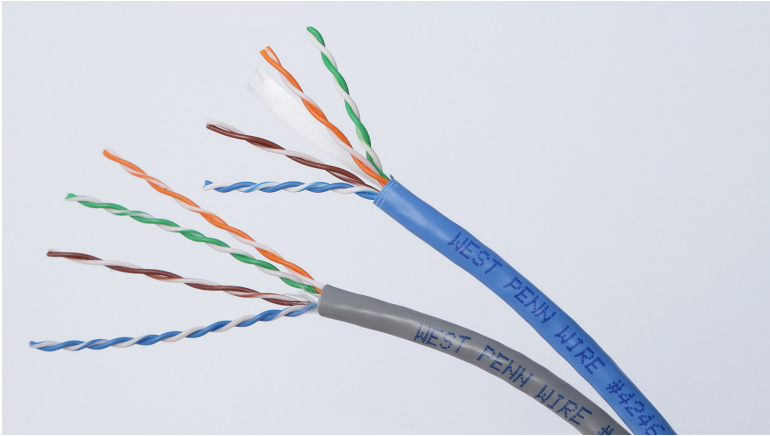
IP readers are connnected to a host PC via Ethernet LAN or WAN.

Advantages:

• Most IP readers are PoE capable. This feature makes it very easy to provide battery-backed power to the entire system, including the locks and various types of detectors (if used).
• IP readers eliminate the need for controller enclosures.
• IP reader systems scale easily: there is no need to install new main or subcontrollers.

Disadvantages:

• In order to be used in high-security areas, IP readers require special input/output modules to eliminate the possibility of intrusion by accessing lock and/or exit button wiring. Not all IP reader manufacturers have such modules available.
• Being more sophisticated than basic readers, IP readers are also more expensive and sensitive. Therefore, they should not be installed outdoors in areas with harsh weather conditions or high probability of vandalism, unless specifically designed fo exterior installation. A few manufacturers make such models.

Cables:

Category 5e and/or Category 6

Environment	Category 5e UTP	Category 5e F/UTP	Category 6 UTP	Category 6 F/UTP	Category 6A UTP	Category 6A F/UTP
Non Plenum	4245	4245F	4246	4236F	4346F	4346AF
Plenum	254245	254245F	254246	254236F	254346A	254346AF
Indoor/Outdoor	4245IO	—	4246IO	4246FIO	—	4246AFIO
Outside Plant	4245OSP	—	4246OSP	—	—	—
Armored	M57562	—	—	—	—	—

About West Penn Wire

West Penn Wire designs and manufactures wires, cables, harnesses and related products for small, mid-size and Fortune 500 companies worldwide, as well as for higher education, healthcare and government organizations, and houses of worship.

Our design, engineering and manufacturing excellence enable customers to obtain solutions that meet the most demanding requirements for audio, video, security and networking applications. To help meet customers' wire and cabling needs, we also offer value-added services, including custom labeling (barcodes, logos, private labeling), special packaging and custom kitting. With distribution centers located strategically throughout the country, West Penn Wire products can reach customers' places of business or jobsites quickly.

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