Distributed Antenna System Application Guide

PANDUIT®

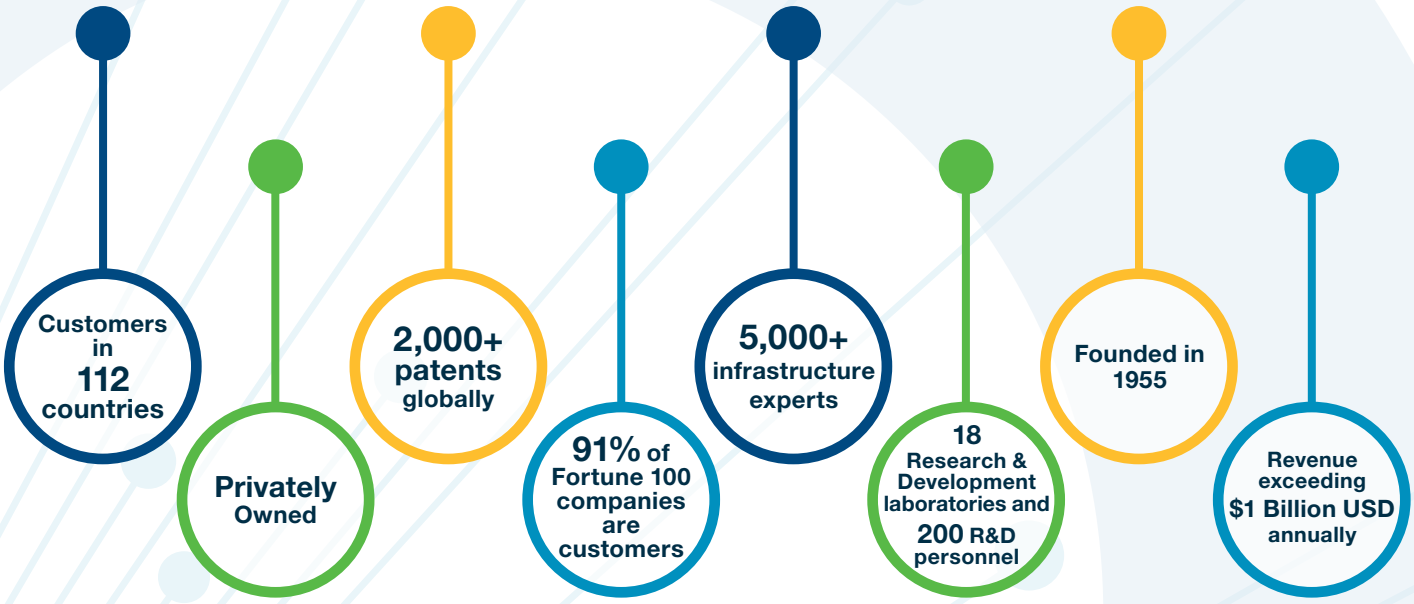
infrastructure for a connected world

Wireless connectivity continues to make meaningful penetration into enterprise networks unlocking performance and transforming the way people work. Partner with Panduit for best-in-class solutions throughout your enterprise environments that scale around the globe. Panduit In-Building Wireless solutions supports your business, so you can effectively and efficiently support your customers.

In this application guide, you will learn about a distributed antenna system (DAS), what it is, how it works, where it is used, and how Panduit can help create the right system for you!

A culture of curiosity, a history of innovation

From the first product, a panel conduit that gave us our name, we understood the value of thinking differently. Here's where it's gotten us:



World Class Global Manufacturing and Distribution Ecosystem

The Panduit global support structure for manufacturing, warehousing, sales, technical, and customer service enables real-time responses within each region.

500+ sales & technical employees

9 manufacturing locations

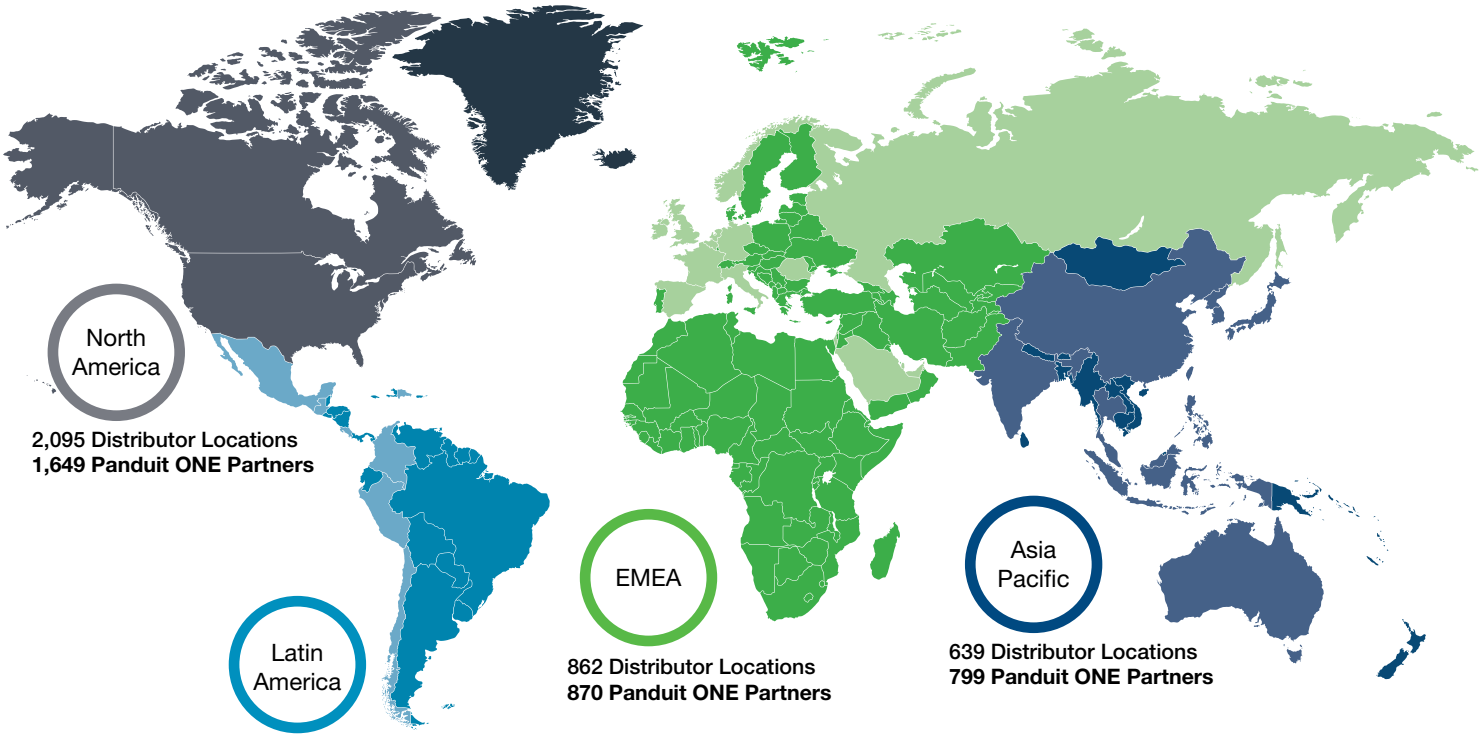
10 warehouse sites

62 offices

9 customer briefing centers

18 laboratories

1 research & development facility



A World of Connections

When it's your vision to connect technology, systems, and people on a global scale, you don't go it alone. That's why we built a support team that is committed to earning your trust and providing a superior customer experience the world over, and a partner ecosystem that spans the project lifecycle, from planning and design to delivery, deployment, maintenance, and operation.

Partner Smarter

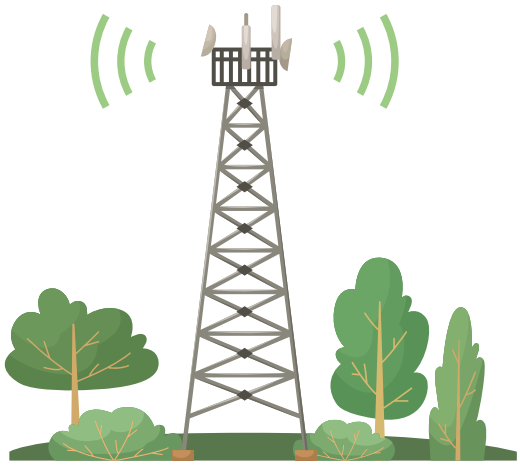
Our global network of distributors provides local inventory, product support, and logistics services so our customers can expect to receive exactly what they need when they need it.

PANDUIT ONE PARTNER PROGRAM

Our Panduit One partners include highly skilled installers, contractors, and system integrators who are trained and certified to design, develop, and deploy high-performance electrical and network infrastructures.

WHAT is a Distributed Antenna System (DAS)?

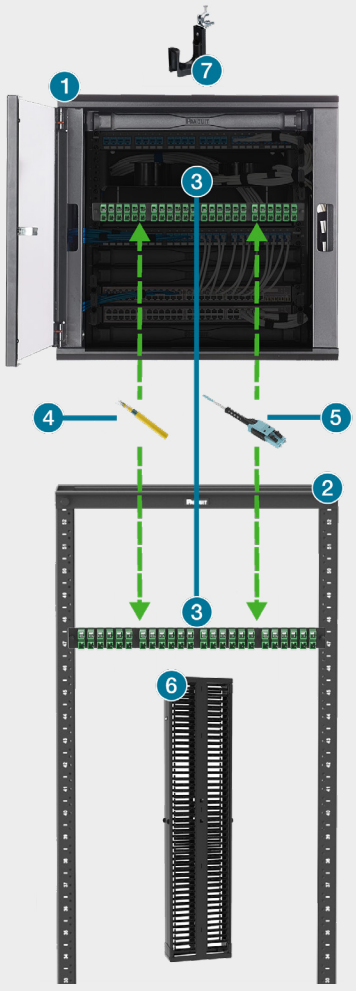
In-Building Wireless (IBW) involves the distribution of wireless signals inside buildings to provide end users with both data and voice connectivity.



IBW can provide a direct wireless signal from cellphone carriers into the building using small cells or a Distributed Antenna System (DAS).

A DAS is a system used to enhance wireless coverage in large buildings. Since all DAS designs are unique, you need robust network infrastructure that enables your DAS solution.

1. **PanZone®** Wall Mounted Cabinet
2. Adjustable 4-Post Rack
3. **Opticom®** Fiber Optic Adapter Panels (FAPS)
4. Fiber Optic Distribution Cable
5. Fiber Optic Patch Cords
6. **PatchRunner®** Vertical Cable Manager
7. **J-Pro™** Cable Hook



HOW does a DAS work?

Signal Sources

The signal source for an IBW system is one of the most important factors in determining both the coverage area and capacity. No matter how well the distribution system performs, an IBW is always limited by the performance of the signal supplying the network. The three main signal sources are:

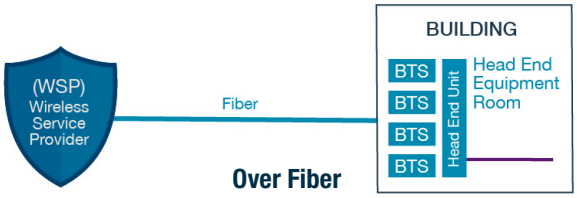
Off-Air

A DAS that uses an off-air signal utilizes a donor antenna on the roof to receive and transmit signals from a cell carrier. Off-air signals are the most common signal sources for a small-building DAS.

Off-Air

BTS

The connection between a cell carrier's BTS and the core network typically requires a dedicated fiber connection that is usually installed by the carrier. A DAS in a large stadium or airport may even connect to multiple BTSs – one for each carrier – to handle the load of tens of thousands of users calling, texting, and using data simultaneously.



Over Fiber

DAS Signal Distribution System

Regardless of the signal source a system uses, a DAS is required to distribute the cellular signal throughout the building. There are three main types of distribution systems:

Active

An active DAS converts analog radio frequency cellular information from the cellular signal source in the Headend room to an analog or digital optical signal transmitted over fiber to the ER. In an IBW active DAS architecture, the active antennas are powered from the equipment room (ER), which is known as distributed power. There are two variations of distributing power.

Passive

A passive DAS amplifies a Radio Frequency (RF) signal at the head end room and uses passive RF components such as coaxial cable, splitters, taps, and couplers to distribute the signal inside a building.

Hybrid

A hybrid DAS combines characteristics of passive and active systems. The system uses fiber optic cable to transmit signals to remote radio units located in the Equipment Room (ER). The signal is converted back to an RF signal and is distributed using coaxial cable throughout the building to passive antennas.

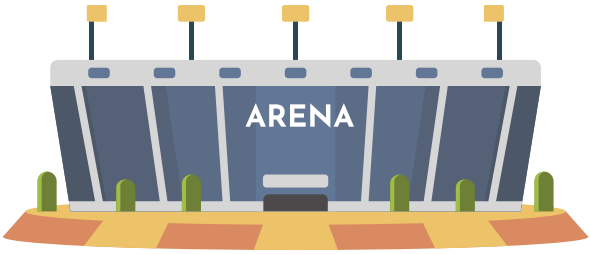
Learn more about how DAS works in our In-Building Wireless Reference Architecture Guide

WHERE is a DAS used?

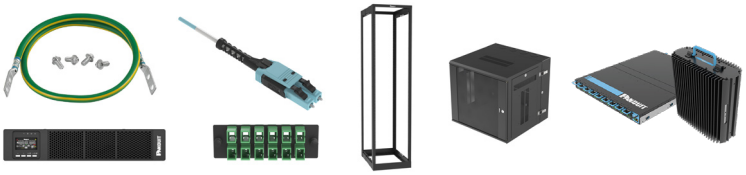
Panduit supports your DAS and Wireless Installations with superior physical infrastructure and Class 4 Power distribution.

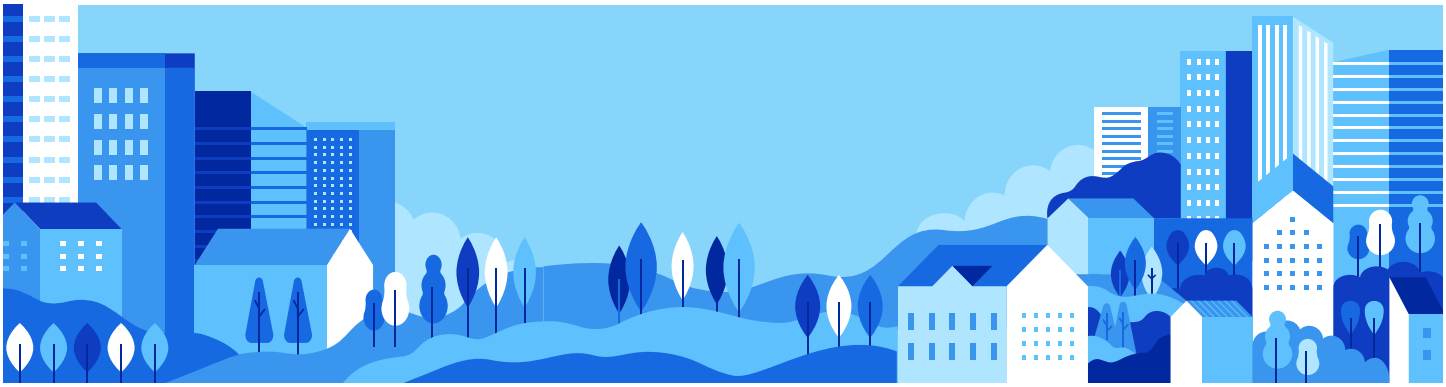
The need for dependable wireless connectivity has never been more important. With workers often bringing their own portable devices into the office and hotdesking being commonplace, there absolutely must be campus-wide Wi-Fi and cellular connectivity. To achieve this, the networking infrastructure must consist of strategically placed Wi-Fi range extenders and distributed antenna systems, the latter of which can extend both Wi-Fi and cellular ranges.

Modern distribution centers and fulfillment centers use the latest automation and smart building technologies to improve productivity, delivery response, and competitiveness in fast-paced retail environments, driving the need for a robust and reliable infrastructure. When your name is on the box, you want to know that the work is right. That's when it is important to rely on network infrastructure solutions from Panduit.

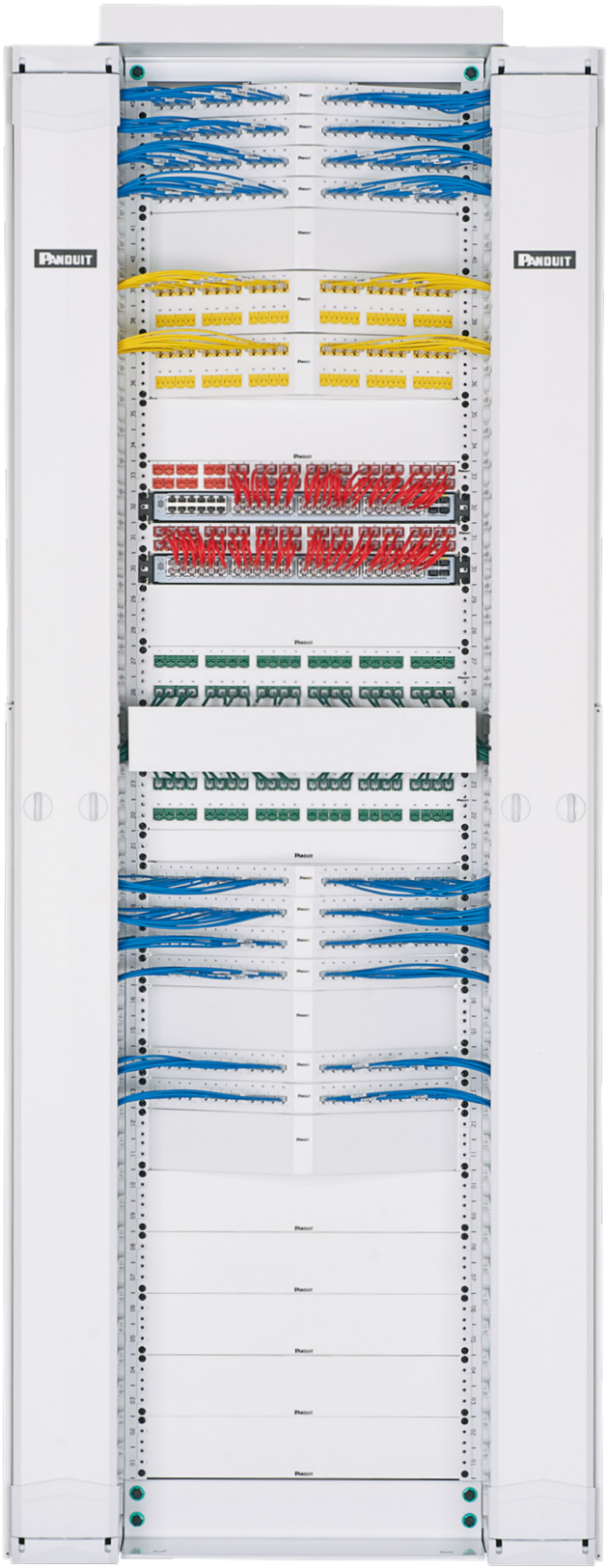


Panduit power distribution, environmental, and connectivity hardware products improve availability, scalability, power, cooling efficiency, and product quality leading to a decrease in network downtime and increase in data center productivity. Monitoring power to your data center environment for electrical circuit overloads and physical environmental conditions can elevate critical risks to IT equipment.





Panduit solutions for DAS applications…



Panduit Fault Managed Power System

Higher Power. Longer Distance. Superior Safety.

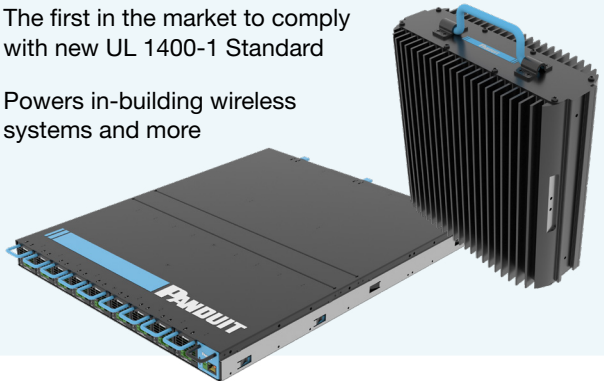
Overview

The Panduit Fault Managed Power System (FMPS) is a novel remote power delivery system that allows System Integrators to safely and easily deliver power to wireless systems. The Panduit FMPS is the first in the market to comply with the new UL 1400-1 Standard for a safer, more reliable, and easy-to-install power alternative for wireless systems and eliminates many complicated requirements for traditional power. It delivers significant power over longer distances using standard multi-conductor cables without the need for conduit, junction boxes, breaker panels, or permits. Such innovations simplify installation, and increase deployment speed while reducing deployment costs. This is ideal for larger venues or complex installations that require centralized power management.

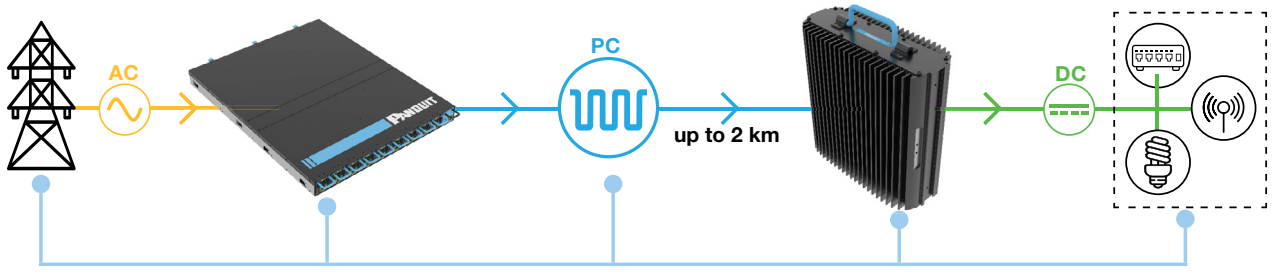
The Panduit FMPS offers remote monitoring and control capabilities that provide total visibility into power usage to manage and troubleshoot remotely. The plug-and-play configuration is flexible and scalable allowing for growth with increasing wireless demands while a hot-swappable configuration minimizes equipment downtime and business interruptions.

The Panduit Fault Managed Power System is a safe, efficient, reliable, and practical remote power delivery system that will go the distance.

- Redundant fault management for ultimate safety making it safe to handle like Class 2 power
- Substantially more power over long distances using less copper
- Hot-Swappable configuration for ultimate flexibility and upgradability
- Simple to install, startup, and troubleshoot
- Endless remote monitoring and control capabilities
- Novel remote power delivery system
- The first in the market to comply with new UL 1400-1 Standard
- Powers in-building wireless systems and more



How does the Panduit FMPS Work?



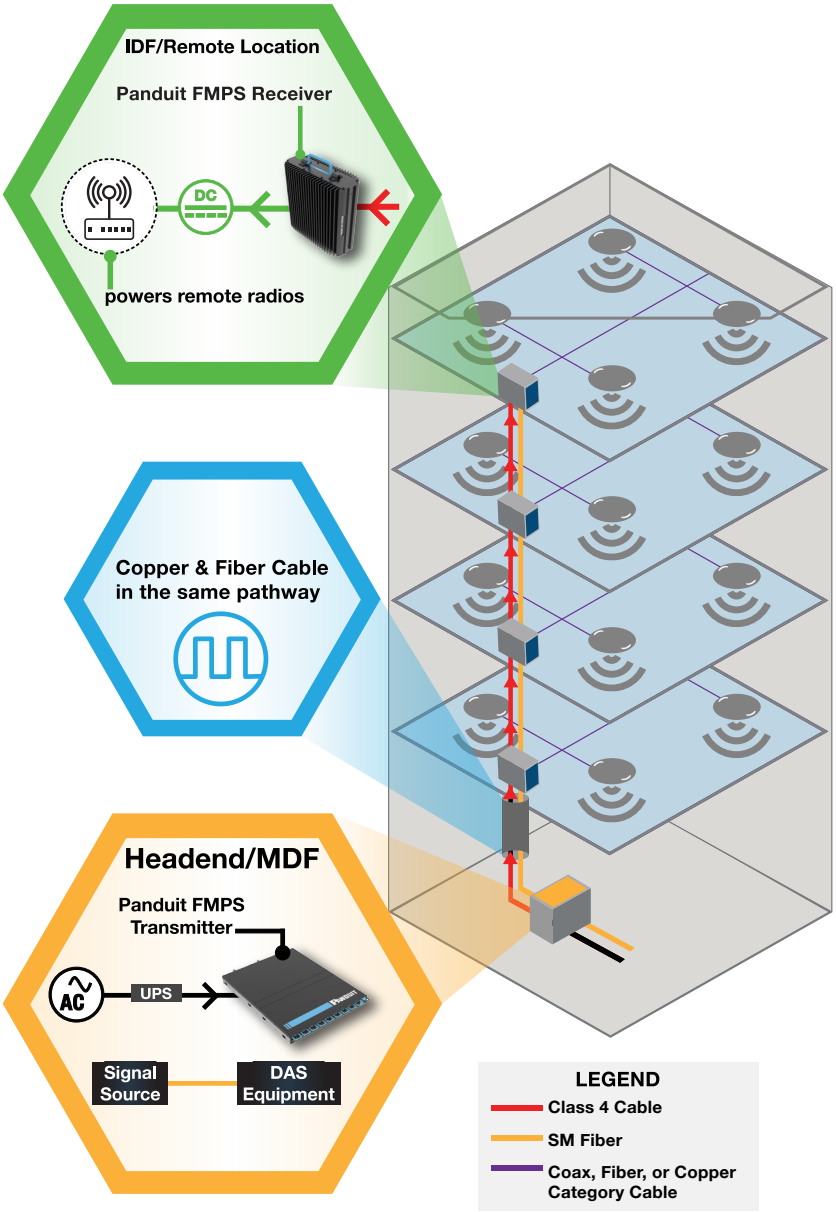
The Panduit FMPS uses Pulse Current as its power delivery method. The Transmitter converts standard AC power into high voltage DC power, which is further converted into a Pulse Current waveform delivered over a Class 4 multi-conductor copper cable to the Receiver. The Receiver converts the pulse current waveform into +/- 48 VDC power, which can power multiple end devices. With the ability to monitor faults, the system can safely use higher voltage to deliver power compared to low-voltage systems (Class 2). This allows the FMPS system to have all the safety benefits of low-voltage installations while delivering significantly more power over longer distances than Class 2 systems.

Where is the Panduit FMPS Used?

The Panduit Fault Managed Power System provides safe, sustainable, and reliable power distribution anywhere you need it. The Panduit FMPS serves as a backbone for power distribution deployment for any venue or technology. Centralized for ease of back-up, monitoring and control for added resiliency, and scalable to grow with your technological demands.

Panduit FMPS with In-Building Wireless

Wireless connectivity continues to make meaningful penetration into enterprise networks unlocking performance and transforming the way people work. Reliable connections, secure access to data, and on-demand communication capacity are mainstays of modern business. These resources are the fourth-utility that people rely on to get through their day. Partner with Panduit for best-in-class solutions throughout your enterprise environments that scale around the globe and optimize connectivity with a single source provider of all network and physical infrastructure solutions. In any Distributed Antenna System (DAS), Distributed-Ran (D-RAN), or small cell architecture, the Panduit FMPS provides safe power anywhere it is needed to power remote radios. Run fiber and copper in the same pathways for a faster installation and centralize power distribution with the Panduit FMPS for easy power back-up, monitoring, and control in a more reliable wireless network.



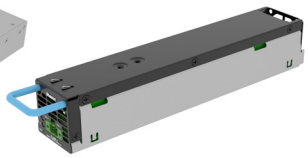
Ordering Information:

Part Number	Description
PXTC1ARA	Transmitter Chassis
PXU1AJANNNXX	Power Supply Module
PXTM1AF	Transmitter Module
PXR1AJD	Receiver
PXM1ARGRBL	Mini-Com® Power Connector Module
PXUP316A**-UQ	Class 4 Unshielded 3x16AWG Copper Cable

**Color: BU (Blue), BL (Black), WH (White), RD (Red), OR (Orange), GR (Green), IG (International Gray), YL (Yellow), or VL (Violet)

PXTC1ARA

PXU1AJANNNXX



PXTM1AF

PXR1AJD

PXM1ARGRBL

PXUP316ABU-UQ

Uninterruptible Power Supply

Highly Efficient and Reliable Power Production and Backup

The Uninterruptible Power Supply (UPS) delivers highly efficient and reliable power protection and backup power for your Computer IT equipment. To continually meet the growing power demands of Data Center, Enterprise and Edge IT equipment, the UPS provides:

- Excellent electrical performance
- Intelligent battery management
- Enhanced intelligent monitoring
- Secure network functions
- A long lifespan for lithium units

Quality & Reliability

Verified and validated using robust premium components

High Efficiency

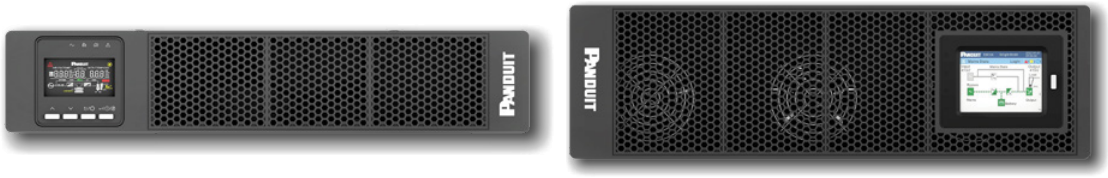
Up to 98% in ECO mode and 98.5% efficiency in Line-interactive therefore reducing energy waste and the cost of operation

Intelligent Battery Management

Intelligent algorithm provides fast charging for the battery while and maximizing its lifespan

Integrated Wifi

Provides wireless network connectivity as well as direct connectivity for quick and easy configuration and activation for large deployments



Green Design

RoHS and Reach, CE/UL/ENERGY STAR® 2.0 compliant for North American units

Secure Remote Monitoring

Intelligent network card with PEN certification best industry security practice and intelligent swinghandle integration

Lithium Batteries

5x Energy Density in 1/3 space, 3x Lifespan & Faster Charging than VRLA

Programmable Outlet Group

Smartload shed features with agentless shutdown saving more energy and extending the runtime for critical load

The also comply with ENERGY STAR® 2.0, EMC and safety standards and has been integrated with DCIM Cloud-based Software. Integrated Wi-Fi provides wireless network connectivity as well as direct connectivity for quick and easy configuration. The Panduit factory warranty for VRLA (Lead-Acid) UPS is three years for the UPS unit and two years for the battery. The factory warranty for the Lithium-Ion UPS is five years for the UPS unit and battery.

G5 Intelligent PDUs

High Density. Different Configurations. Real-Time Monitoring.

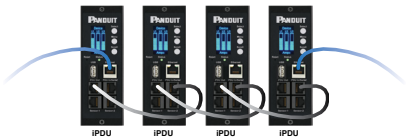
The G5 iPDUs monitor the data center power and the environment by continuously scanning for electrical circuit overloads and physical environmental conditions that place critical IT equipment at risk. By monitoring physical access points, the PDUs increase cabinet security to protect your systems and data. With some of the highest outlet densities and the smallest form factors available in the market, your cabinets will be functioning at their most resourceful state.

Power and Energy Metering
+/- 1% billing-grade accuracy

Low Profile Design
saves rack space
Increase airflow

High Operating Temperature
140°F (60°C) with full load rating

High Density
Best-in-Class outlet density to match the increased density of rack IT equipment



Daisy Chain Capabilities
Up to 4 PDUs
And 32 sensors

Hot Swappable Network Module with Power Share

SZ Handle
Ready with sensor support and HID card access

1GB Ethernet with Redundant Network Access (RNA)

USB Port
Firmware upgrade and automatic rack light

Premium Hydraulic-Magnetic Circuit Breakers
Stable trip characteristics at extreme temperatures

Locking IEC Outlets
With power cords

Color Coded Outlets and Circuit Breakers
For load balancing

Ordering Information

Part Number	Form Factor	# of CB's	Apparent Power (kVA)	Input Current per Phase	Input Phase	Input Plug Type	Input Voltage Range	Phase Connection	Outlet Count	Outlet Type
Basic Power Distribution Units (Non-Network)										
P12B01M	1U	0	1.4	15	1	NEMA 5-15P	100-120VAC	Single Phase, L-N	12	(12)5-20R
P22B10M	0U HALF	0	3.3	20	1	NEMA L6-20P	100-120VAC	Single Phase, L-L or L-N	22	(20)C13, (2)C19
Monitored Input (MI) Power Distribution Units										
P24D07M	0U MID	2	5.0	30	1	NEMA L6-30P	100-120VAC	Single Phase, L-L	24	(20)C13, (4)C19
P38D28M	0U FULL	3	8.6		3	NEMA L21-30P	100-120/200-240VAC,WYE	3 Phase Wye, L-L, L-N	38	(30)C13, (6)C19, (2)5-20R
P24D05M		6	17.3			IEC 60309 3P+N+E 6h 30A (IP44)	415VAC	3 Phase Wye, L-L	24	(12)C13, (12)C19
P36D03M									36	(24)C13, (12)C19
P24D34M			17.3	60		IEC 60309 3P+E 9h 60A	200-240VAC, DELTA	3 Phase Delta, L-L	24	(12)C13, (12)C19
Monitored Switch (MS) Power Distribution Units										
P36E35M	0U FULL	3	8.6	30	3	NEMA L21-30P	100-120/200-240VAC,WYE	3 Phase Wye, L-L	16	(30)C13, (6)C19
P24E09M		6	17.3			IEC 60309 3P+N+E 6h 30A (IP44)	415VAC		24	(12)C13, (12)C19
P36E04M	0U FULL - Wide								36	(24)C13, (12)C19
P24E32M	0U FULL		17.3	60		IEC 60309 3P+E 9h 60A	200-240VAC, DELTA	3 Phase Delta, L-L	24	(12)C13, (12)C19

For the complete offering of power distribution units, including Monitored per Outlet (MPO) and Monitored and Switched per Outlet (MSPO) reference the iPDU Selection Guide found at www.panduit.com/pdu
To configure your own power distribution unit part number, visit www.panduit.com/configure-pdu

Locking Power Cords

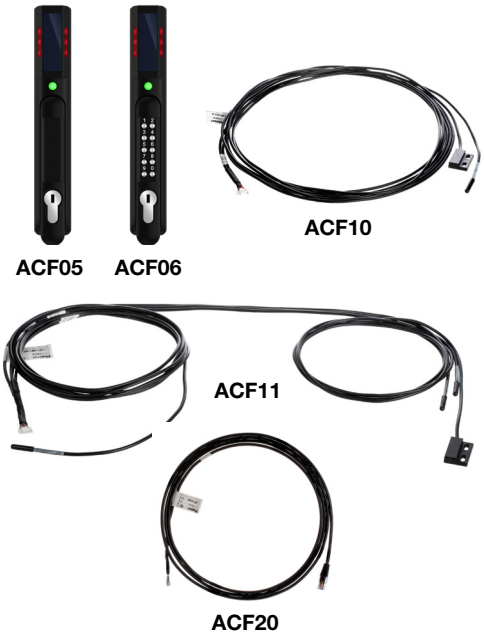
Part Number	Description	Length (ft.)
LPCA11-X	Dual Locking Power Cord, IEC C14 to IEC C13, 10 Pack, Black.	2
LPCA12-X		4
LPCA13-X		6
LPCA14-X		8
LPCB11-X	Dual Locking Power Cord, IEC C20 to IEC C19, 10 Pack, Black.	2
LPCB12-X		4
LPCB13-X		6
LPCB14-X		8

LPCA11-X

-X indicates bulk packaged with 10 pieces per package to reduce single-use plastic
Visit www.panduit.com for other colors and lengths

G5 Accessories

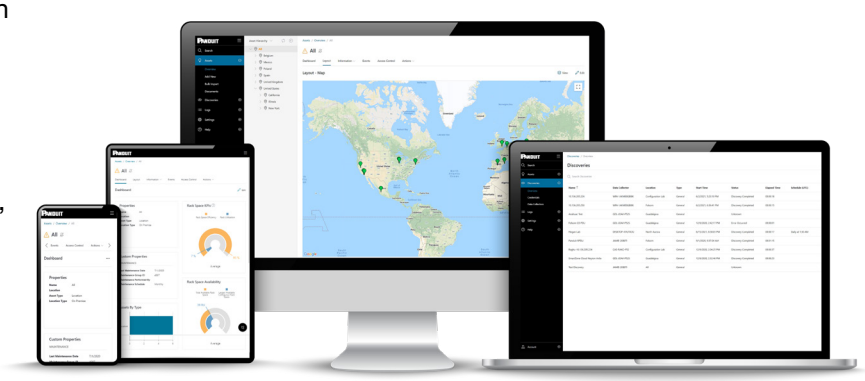
Part Number	Description
ACF05	Security Handle with dual frequency (125 kHz and 13.56 MHz) card reader and integral humidity sensor. All handles feature the base tumbler (TU020X) pre-installed at the factory
ACF06	Security Handle with dual frequency (125 kHz and 13.56 MHz) card reader, integral humidity sensor, and keypad for dual authentication. All handles feature the base tumbler (TU020X) pre-installed at the factory
ACF10	Security Handle Temperature and Door Sensor. Connects only to ACF05 and ACF06
ACF11	Security Handle (3) Temperature and Door Sensor. Connects only to ACF05 and ACF06
ACF20	Security Handle to Panduit G5 iPDU harness (JST to RJ45 male)
MA030	Security Handle Patch Cord Extension (RJ45 female to RJ45 male)
MA031	G5 iPDU Power Share Patch Cord (RJ45 male to RJ45 male)
EC001	G5 Three Temperature and One Humidity Sensor for cold aisle applications, for use with PDU controller only
EA001	G5 Temperature Sensor for hot aisle applications, for use with PDU controller only



To learn more about G5 Intelligent PDU, visit **www.panduit.com/pdu**

Data Center Infrastructure Management for the Hybrid IT

DCIM Cloud-based Software is our next generation DCIM solution. A true cloud-native platform, built from the ground up to take advantage of cloud flexibility and scalability as well as enhanced manageability, security, and operations ease of use and efficiency to manage Data Center, Enterprise, and Edge infrastructures. Supports the management, monitoring, and alerting for power, cooling, environmental, IT, and connectivity.



Although DCIM Cloud-based Software is agnostic and supports multiple vendor IT and facilities devices, it tightly aligns with G5 Intelligent PDU and UPS product lines, to visualize rack-level power, environment, and cabinet physical security access, enabling a single pane of glass to manage the entire data center infrastructure resources. In addition to floorplan layout and rack elevation, power path visualization enables operators to identify a single point of failure, reduce overprovisioning, and assess risk.

DCIM Cloud-based Software is a self-serviced solution which eliminates the need for professional services and with our open REST APIs that have all product functionality documented, customers can easily integrate with existing applications such as CMDB, ITSM, BMS, and ticketing system. This ensures a solution that is quick to deploy, intuitive to use, and simple to maintain.

APPLICATION | ASSET TRACKING | POWER ACCESS | CABINET ACCESS | ENVIRONMENTAL MONITORING

Part Number	Description
SZC-PEIA3Y	3-year subscription per power and environmental infrastructure asset (UPS, RPP/PDU, rack POU, cooling, etc.)
SZC-ITIA1Y	1-year subscription per IT infrastructure asset (IT rack, server, storage, network, etc.)
SZC-ITIA3Y	3-year subscription per IT infrastructure asset (IT rack, server, storage, network, etc.)
SZC-QSTART	Quick Start Service, 12-hour remote service

To learn more about DCIM Cloud-based Software, visit **www.panduit.com/dcim**

Racks and Cable Management

Our comprehensive offerings of cabinets, thermal management, racks, enclosures for data centers, telecommunications equipment rooms, and enterprise cabling applications help to reduce energy consumption, enhance network reliability, and optimize space.

4-Post Cable Management Rack System

- Independent adjustable front and rear mounting rails can be adjusted while the rack is secured to the floor
- Printed rack space identification on all equipment rails allows for quick location of rack spaces (shipped numbers up per TIA606 specifications; can be set to number down by flipping the rails)
- Multiple mounting holes in top flanges for securing overhead pathways
- Weld nut construction eliminates the need for a second wrench increasing speed and ease of assembly
- Vertical cable managers mount directly to the 4-Post Rack at any of the four corners
- Paint piercing washers included to electrically bond rack for simplified grounding

Part Number	Height in. (mm)	Width in. (mm)	Depth in. (mm)	No. of Rack Units	Equipment Rails	Load Capacity lbs.	Color
R4P	84.0 (2134)	23.3 (591)	30.0 (762)	45	#12–24 Threaded	2500	Black
R4PCN					Cage Nut		
R4P23CN			23.0 (584)				
R4P36			36.0 (914)		#12–24 Threaded		
R4P36CN					Cage Nut		
R4P42CN			42.0 (1054)				

R4PCN

Adjustable Depth 4-Post Racks

- Supports equipment mounting depths from 23 inches to 42 inches in 0.5 inch increments
- Constructed from heavy-duty steel which provides a sturdy and durable platform for equipment
- Compatible with accessories including: power distribution, unit brackets, vertical tie-off panels, and shelving
- Includes grounding and bonding features that prevent damage from electrical surges and ensure equipment operates reliably

Part Number	Height in. (mm)	Width in. (mm)	Depth in. (mm)	No. of Rack Units	Equipment Rails	Color
AR4P	84.13 (2136.9)	20.31 (515.9)	23.00 to 42.00 (584.2 to 1066.8)	45	#12–24 Threaded	Black
AR4P96	96.13 (2441.7)			52		
AR4PCN	84.13 (2136.9)			45	Cage Nut	
AR4PCN96	96.13 (2441.7)			52		

AR4P

To learn more about 4-Post Racks, visit **www.panduit.com/4-post-rack**

2-Post Cable Management Rack System

- Printed rack space identification on all equipment rails allows for quick location of rack spaces; numbers up per TIA606 specifications
- Double-sided #12–24 EIA universal mounting hole spacing
- 24 #12–24 mounting screws included
- When mounting NetRunner Managers to channel rack R2P6S, utilize side mount kit WMPVSMK
- Multiple mounting hole locations in each base angle
- Can be used with all cable management and patch panel products in addition to any industry standard 19" components
- Paint piercing washers included to electrically bond rack for simplified grounding; for the complete grounding solution, use StructuredGround Kits for racks

Part Number	Height in. (mm)	Width in. (mm)	Depth in. (mm)	No. of Rack Units	Equipment Rails	Load Capacity lbs.	Color
R2P	84.0 (2134)	20.3 (516)	3.0 (76)	45	#12–24 Threaded	1000	Black
R2P6S			6.0 (152)			1500	

To learn more about 2-Post Racks, visit **www.panduit.com/2-post-rack**

R2P

Rack Filler Panels

- Direct airflow in cabinet applications
- Mount to standard EIA 19" racks or cabinets
- Reserve rack unit space for future use

Part Number	Height in. (mm)	Width in. (mm)	No. of Rack Units	Color
DPFP1	1.7 (44)	19.0 (483)	1	Black
DPFP2	3.5 (88)		2	

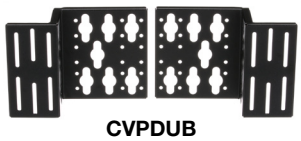
DPFP1

Brackets and Blanking Panels

Part Number	Description	No. of Rack Units	Color
Panel Extender Brackets			
PEB1	Set of two brackets, allows 19" rack mountable accessories to mount to 23" wide rack	1	Black
PEB2		2	

PEB1

Part Number	Description	Color
4-Post PDU Bracket		
CVPDUB	PDU bracket kit vertically mounts power distribution units (PDUs) to the back of 4-Post Racks	Black
2-Post PDU Bracket		
R2PPDUB	Mounts power distribution units (PDUs) to the back of 2-Post Racks	Black
Blanking Panel		
BR1B	Brush seal blanking panel with front to back cable pass-through 1 RU	Black



CVPDUB

PatchRunner™ 2 Vertical Cable Management System

- A "push-to-close" door design allows for easy operation
- The doors ship with managers which simplifies the ordering process with less packaging waste
- There are no brackets to install, providing faster installation while reducing labor costs
- Managers and doors are available in black and white
- Individual fingers align with rack spaces to simplify cable routing changes
- The integral bend radius control ensures network performance and system reliability
- An optional snap on vertical retainer can be placed on the fingers to help retain cables in channel for improved cable management and appearance
- An optional slack management spool helps organize and manage patch cord slack allowing for standardization of patch cord lengths

Part Number	Height in. (mm)	Width in. (mm)	Depth in. (mm)	No. of Rack Units	Single or Dual Sided	No. of Doors Included	Color
PR2VD06	84.0 (2130)	6.0 (152)	20.6 (523)	45	Dual	2	Black
PR2VD08		8.0 (203)					
PR2VD10		10.0 (254)					
PR2VD12		12.0 (305)					
PR2VFD06		6.0 (152)	12.0 (304.8)		Single	1	
PR2VFD08		8.0 (203)					
PR2VSD06		6.0 (152)	20.6 (523)		Dual		
PR2VSD08		8.0 (203)					

PR2VD08

PatchRunner™ 2 Horizontal Cable Management System

Part Number	Height in. (mm)	Width in. (mm)	Depth in. (mm)	No. of Rack Units	Single or Dual Sided	No. of Doors Included	Color
PR2HF1	1.8 (45)	19.0 (484)	7.9 (202)	1	Single	1	Black
PR2HF2	3.6 (90)			2			
PR2HF3	5.41 (135)			3			
PR2HF4	7.1 (179)			4			

PR2HF2

PanZone® Wall Mount Cabinets

- Holds 12, 18, or 26 RU of active and passive network equipment plus two additional rack units for power strips and small electronic devices (modems, routers, power strips, etc.)
- Thermal management design (vents, perforated doors, and optional fan) optimizes air flow for improved heat dissipation
- Installed as hinged right or hinged left
- Conduit and wireless access point antenna knockouts provided
- Rear hinging access manages the back of the cabinet
- Accessories include horizontal slack manager, bend radius posts, rear equipment rail kit, and exhaust fan
- Working load rating of 250 lbs. (12 RU), 300 lbs. (18RU) or 350 lbs. (26RU)
- Adjustable rails mount at 1-inch increments to accommodate various depths of network equipment including PoE switches
- Individual rack spaces are identified for ease of equipment mounting
- Keys to secure front and rear doors and side panels

Part Number	Width in. (mm)	Depth in. (mm)	Height in. (mm)	No. of Rack Units	Material	Door Type	Color
PZWMC12P	25.0 (635)	25.0 (635)	23.8 (605)	12	Steel	Perforated	Black
PZWMC12W						Window	
PZWMC18W			34.0 (864)	18			
PZWMC26W			48.2 (1224)	26			
PZWMC1230W		30.0 (762)	23.8 (605)	12			
PZWMC1830W			34.0 (864)	18			
PZWMC2630W			48.2 (1224)	26			
Accessories							
PZWMC12RR	PanZone Wall Mount Cabinet 12 RU Rear Rails Kit						

PZWMC12W

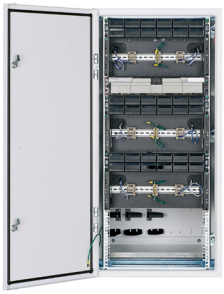
PZWMC1230W

Universal Distribution Frames

- Engineered to deploy and protect Industrial Ethernet DIN mount switches in industrial applications
- Pre-configured, wall mount design delivers up to 75% faster implementation
- Pre-engineered power infrastructure with redundant power supplies, optional UPS, wiring, labels, terminal blocks, and disconnects
- Defined cable routings incorporate best practices in connectivity, cable management, wiring and grounding
- Additional back-end space allows for 3X the cooling capacity over typical deployments
- Key-locking handle limits access to authorized personnel for a secure network
- Detailed installation guide provides easy instructions assuring consistency and saving time on the job-site
- UL Type 4/12 or 4X, UL 508A Listed, CE Approved, IP66 Rated

Part Number	Enclosure Material	Included Accessories	Power Infrastructure
12U Universal Distribution Frame for Industrial DIN Mount Switches			
ZDF24-S25	Mild Steel	(1) 48-Port Patch Panel and (1) 4 RU DIN Mount Bracket to Support (2) Switches	(1) Maintenance Free UPS, Redundant Power Supplies AC to DC, Terminal Blocks and Wiring for 120 V AC Input
26U Universal Distribution Frame for Industrial DIN Mount Switches			
ZDF48-S65	Mild Steel	(3) 48-Port Patch Panels, (3) 4 RU DIN Mount Brackets to Support (6) Switches	(3) Maintenance-Free UPS, Redundant Power Supplies AC to DC, Terminal Blocks and Wiring for 120 V AC Input

ZDF24-S25



ZDF48-S65

Opticom® QuickNet™ Rack Mount Fiber Cassette Enclosures

- Support up to 96 LC fiber connections per RU
- Mount to standard 19" rack rails
- Holds QuickNet Fiber Optic Cassettes for Opticom Fiber Adapter Panels
- Holds HD Flex Fiber Optic Cassettes with FLEX-OPTI-1RU Bracket Adapter
- Suitable for all pre-terminated, field-terminated, or field-splice applications
- Slide-out, tilt-down drawer provides full front access to all fibers and cables
- Integral bend radius control and cable management for fiber patch cords
- Innovative rear cable management for proper slacking/spooling
- Multiple cable entry locations

Part Number	Description	Cassette/FAP/ FOSM Openings	Color**
BEST SELLER FCE1U** ●	Rack mount fiber enclosure 1 RU, with sliding/tilt drawers	4	Black (BL), White (WH)
FCE2U** ●	Rack mount fiber enclosure 2 RU, with sliding/tilt drawers	8	
FCE4U** ●	Rack mount fiber enclosure 4 RU, with sliding/tilt drawers	12	

FCE1U FCE2U

FCE4U

Opticom® QuickNet™ Rack Mount Fiber Enclosures

- Supports up to 96 LC fiber connections per rack unit
- Mount to standard 19" or 23" EIA rack or cabinet
- Holds QuickNet or Opticom Fiber Adapter Panels (FAPs)
- Holds HD Flex Fiber Optic Cassettes with FLEX-OPTI-1RU Bracket Adapter
- Front and rear access on all models via durable molded-hinge doors
- Integral bend radius control and cable management for fiber patch cords
- Multiple trunk cable entry locations
- Include fiber optic cable routing kit (grommets, cable ties, saddle clips, strain relief bracket, and ID/caution labels) for various cable management solutions
- Extends 4.9 inches from rack

Part Number	No. of Rack Spaces	Cassette/FAP/ FOSM Openings	Color**
FRME1U** ●	1	3	Black (BL), White (WH)
FRME2U** ●	2	6	
FRME4** ●	4	12	

FRME1U

FRME4

FRME2U

Opticom® QuickNet™ Wall Mount Enclosures

- Holds Opticom Fiber Adapter Panels (FAPs)
- Rugged all metal construction for fiber protection and secure mounting
- Compact design allows instillation in tight areas
- Separate doors for service side and user side with optional keyed locks for added security includes fiber optic routing kit (grommets, cable ties, spools, strain relief bracket and ID/caution labels) for various cable management solutions

Part Number	FAP/FMP Openings
FWME2 ●	2
FWME4 ●	4
FWME8 ●	8

FWME2

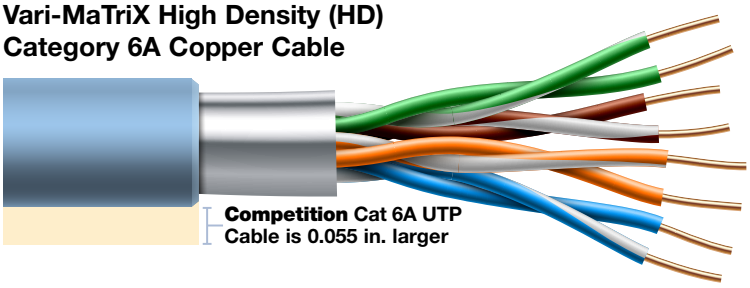
● = Fusion Splice Ready

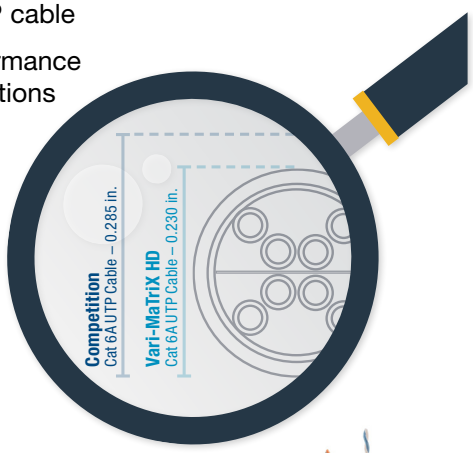
Copper Systems

TX6A™ Category 6A Unshielded Copper Cable

- Cable designed with small diameter to improve cable fill and simplify upgrades from Category 6
- Lighter weight cables, smaller bend radius and increased flexibility ease installation
- Best-in-class alien crosstalk mitigation
- Vari-MaTriX HD Cables offer the best EMI immunity in a UTP cable
- Exceptional performance for PoE++ applications – LP rated

Vari-MaTriX High Density (HD) Category 6A Copper Cable





Part Number	Flame Rating	Performance Level	AXT Barrier Tape	Nominal Cable Diameter in. (m)	LP Rating	Packaging	Color
BEST SELLER PUP6AHD04BU-G	Plenum (CMP, FT-6)	Category 6A UTP Premium	Vari-MaTriX HD Cables	0.230 (5.8)	CMP-LP (0.7A)	Reel	Blue
PUR6AHD04BU-G	Riser (CMR, FT-4)			0.245 (6.2)	—		

PUP6AHD04BU-G

Copper Patch Cords

- Each patch cord is 100% performance tested to component limits
- Tangle-free latch on all plugs
- Supports IEEE 802.3af, 802.3at, and 802.3bt type 3 and 4 for PoE applications up to 100 W
- 28 AWG patch cords support up to 96m of channel length when using 6m of patch cord; De-rating factor: 1.9
- 26 AWG patch cords support full 100-meter channel length; De-rating factor: 1.5
- 24 AWG patch cords support full 100-meter channel length; De-rating factor: 1.2
- Pre-labeled with the RapidID™ Network Mapping System to enable faster tracing, placing, and network documentation
- Eco-friendly packing minimizes single-use plastics and eases cleanup on the job site

Unshielded Patch Cords

BEST SELLER **Best Sellers are blue and white, 1, 3, 5, 7, 10 feet for immediate delivery.**

PANDUIT RAPIDID enabled

Part Number	Performance Level	Cable Type	AWG	Nominal Cable Diameter in. (m)	Flammability Rating	Length ft.^	Color*
UTP28X^* ●	Category 6A	Unshielded	28	0.19 (4.7)	CM/LSZH	0.67, 1.0, 3.0, 5.0, 7.0, 10.0, 15.0	Off White (Leave Blank), Black (BL), Blue (BU), Green (GR), Red (RD), Yellow (YL)
UTP28SP^* ●	Category 6			0.15 (3.8)			
UTP6AX^* ●	Category 6A		24	0.25 (6.4)	CM	1.0, 3.0, 5.0, 7.0, 10.0, 15.0	
UTPSP^*Y ●	Category 6			0.24 (6.0)			

UTP28X^BU

All combinations listed above ship within two days for orders up to 500 cords

Shielded Patch Cords

Part Number	Performance Level	Cable Type	AWG	Nominal Cable Diameter in. (m)	Flammability Rating	Length m^	Color*
STP28X^M* ●	Category 6A	Shielded	28	0.19 (4.7)	CM/LSZH	0.2, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 5.0	International Gray (IG), Black (BL), Blue (BU), Green (GR)
STP6X^M* ●			26	0.25 (6.3)			

STP28X^MIG

● = Packaged with reduced Single-Use Plastic

*Rapid*ID™ Network Mapping System

The *Rapid*ID Network Mapping System automates labor-intensive and error-prone cable documentation, resulting in a faster, easier way to place and trace cables and patch cords. It is a practical alternative to traditionally manual approaches that is ideally suited for building a new telecommunications room, locating installed cabling, or replacing a network switch.

Reduce the time and cost of patch cord documentation by up to 50%. With *Rapid*ID, the painstaking labeling process is already done. Now network engineers can easily, quickly, and accurately place and trace cables to focus on more strategic initiatives.

Minimize the risk of a network outage. Network documentation can drastically reduce downtime during an outage, but documenting physical infrastructure is extremely time-consuming and often overlooked or outdated. *Rapid*ID makes the documentation process less painful and reduces human error by eliminating the need for manual data entry.

*Rapid*ID: EASY AS 1, 2, 3...

1 INSTALL

Install Panduit Copper & Fiber Patch cables pre-labeled with unique *Rapid*ID barcode labels.

2 DOWNLOAD

Download the *RapidID* application to your device (Mobile, Tablet, or Windows® OS desktop).

3 SCAN

Scan barcodes using a Bluetooth-enabled handheld scanner to:

- Quickly and accurately capture and document new cable installations without the need for manual data entry
- Find cable endpoints without disconnecting or disrupting connections, reducing risk of causing a network outage
- Easily verify and audit existing patch cord mapping against previously saved results

RPDSCN

It is a practical alternative to traditional manual approaches that is ideally suited for data center audits, enterprise environments, and remote locations.

Part Number	Description
RPDSCN	*Rapid*ID Network Mapping System handheld Bluetooth® barcode scanner with isolation shield

To learn more about *Rapid*ID Network Mapping System, visit **www.panduit.com/RapidID**

Mini-Com® TX6A™ and TX6™ PLUS Jack Modules

Part Number	Jack Type	Performance Level	Termination Style	Color*
CJ6X88TG*+	Unshielded Standard	Category 6A	TG-Style	Black (BL), Blue (BU), Electric Ivory (EI), Green (GR), International Gray (IG), Off White (IW), Orange (OR), Red (RD), Violet (VL), White (WH), Yellow (YL)
CJ688TG*+		Category 6		

*Replace with color initials
+Add -24 to indicate bulk packaged with 24 pieces per package or -C to indicate 100 pieces per package to reduce single use plastic

TX6A™ Unshielded and Shielded Field Term Plugs

Part Number	Type	Performance Level	Termination Style	Color
FP6X88MTG+	Unshielded Straight	Category 6A	TG-Style	Black (BL)

+Add -X to indicate bulk packaged with 10 pieces per package to reduce single use plastic

Mini-Com® Flush Mount Modular Patch Panel

Part Number	No. of Rack Units	Style	Identification	Ports	Color
CPP24FMWBLY	1	Flat	Adhesive	24	Black (BL)

IndustrialNet DIN Rail Mount Copper Patch Panel

Part Number	Description	Color
CDPP8RG	8-Port Patch Panel, DIN Rail Mount	International Gray (IG)

DIN Rail Bracket

Part Number	Description	Color
IABDIN4	The industrial automation bracket installs DIN-mountable equipment into a standard EIA 19” (483mm) rack or cabinet. This bracket is made of steel, is 4 RU	Black (BL)

Fiber Optic Systems

Opti-Core® Fiber Optic Indoor Distribution Cable (Bulk Fiber Cable)

Part Number	Fiber Type	Fiber Count
FSDP912Y	9µm Singlemode OS2	6, 12, and 24

Fiber Optic Patch Cord and Pigtail Assemblies

Part Number	Fiber Type	Connector Type	Fiber Count	Jacket in. (mm)	Flame Rating	Performance	Length ft. (m)*
F923RSNSNSNM003	OS2	SC Duplex	2	0.12 (3.0)	Riser	Standard IL	9.8 (3.0)

HD Flex™ Fiber Optic Indoor Small Diameter Trunks

Part Number	Fiber Type	Connector Type	Flame Rating	Polarity	Performance	Pulling Eye	Length ft. (m)
FY9TP77A001F015	OS2	PanMPO Female with 1m breakout to PanMPO Female with 1m breakout	Plenum	Polarity A	Standard IL	Pulling Eye End A	15.0 (381.0)
FY9UP77A001F015							
FY9WP77A001F015							

Fusion Splice Fiber Optic Connectors

Part Number	Connector Type	Cable Type Fiber	Fiber Type	Color
FSCS2/9SOCA9AG	SC	900µm Tight Buffered or 250µm Loose Tube	Singlemode	Green

Opticom® Fiber Optic Adapter Panels (FAPs)

Part Number	No. of Ports	Adapter Type	Fibers	Split Sleeve	Color
FAP12WAGSCZ	3	Simplex SC/APC	24	Zirconia	Green

Grounding and Bonding

Auxiliary Cable Bracket Jumper Kit

Part Number	Description
GACBJ618U	Auxiliary cable bracket jumper for bonding pathway sections; #6 AWG (16mm²); 18.0 (457mm) length; factory terminated on both ends with straight, two-hole, long barrel compression lugs; provided with .16 oz. (5cc) of antioxidant and four mounting screws

StructuredGround™ GJ672UH Equipment Bonding Jumper

Part Number	Description
GJ672UH	One 72 length #6 AWG green wire with yellow horizontal stripe. Jumper is pre-terminated on one end with LCC6-14JAWH-L and the other end with LCC6-14JAW-L

To learn more about In-Building Wireless Solutions, read our **In-Building Wireless Solution Guide**

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