

# DC Power Solutions - North America



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# Contents

## **Eaton® Telecommunications Power Solutions - Capabilities Overview**

### **Product Selection Chart**

#### **DC Power Solutions**

- Enterprise 3G Power Solutions - EPS2-3G
- Enterprise Extended Battery Module
- Access 3G Power Solutions - APS3-400 (48V)
- APS6-3G Access Power Solutions (UL Series)
- DV2-3G Metro Power Solutions (UL listed)
- DV2-3G Metro Extension Battery Cabinet (UL listed)

#### **Inverter Power Solutions**

- Matrix™ 2000 Standalone Inverter

#### **Software and Communications**

- DCTools™ Configuration Software

#### **Rectifier Modules**

- Enterprise 3G Power Rectifier - EPR48-3G
- Access 3G Power Rectifier (48V) - APR48-3G
- Access Power Energy Saver Rectifier – APR48-ES

#### **Control and Monitoring**

- SC200 System Controller
- SiteSure-3G Management Solution

#### **Distributions**

- DCD1M – 1U DC Distribution (19")

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# Eaton's Telecommunications Power Solutions Business



## Our Business

Eaton Corporation is a global diversified industrial manufacturer and a leader in electrical power quality, distribution and control. Eaton serves the needs of customers located in over 125 countries.

Eaton's telecommunications power solutions business provides telecommunications and related sectors with world-leading infrastructure products and services.

## Global Presence

Headquarters are located in Raleigh, North Carolina and regional sales headquarters are located in USA, Asia and Europe with offices in over 30 additional countries and with representation in over 100 countries it is one of the few telecommunications infrastructure providers with a truly global presence.

## Environmental Standards

Eaton strives for the highest environmental standards across both our operations and products and our commitment goes beyond compliance with existing regulations. We wish to become recognized as an industry leader in creating safe workplaces and conserving world resources.

Eaton is committed to environmental stewardship and participates in a number of volunteer government partnership programs worldwide.

We were among the first diversified industrial companies to pursue global ISO 14001 certification - a rigorous standard for managing and improving environmental performance. Today, virtually all of Eaton's facilities worldwide have earned this designation.

We've also set tough performance goals for ourselves, like reducing our greenhouse gas emissions by 18 percent (adjusted for production) by 2012.

## Unsurpassed Experience

Eaton has in excess of 40 years experience of working closely with customers to deliver tailored power management solutions for communications networks around the world.

## Customer led Solutions

Eaton's insight into customer needs is demonstrated through its products in terms of reliability, efficiency, smart energy features, power density, and ease of installation,

Intelligent monitoring and control capabilities add flexibility, precision, reliability, and automation - without added complexity.

## Comprehensive Range

Our telecom power solution range includes AC and DC power systems, power and ancillary equipment management software, cabinets and enclosures, and other products. Eaton also offers a wide range of DC services including design, installation and commissioning remote monitoring, turnkey integration and site support, to provide a seamless solution.

## Delivery

Eaton's global scale manufacturing and logistic capability means that products and services can be delivered with maximum cost-effectiveness and with the delivery speed and flexibility that you expect.



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# Application and Product Selection Guide for Eaton DC Power Solutions

Eaton DC Power Solutions

Application		Enterprise Power Solutions	Access Power Solutions <sup>1</sup>	Metro Power Solutions <sup>2</sup>
			1-744A, 24V or 48V	Up to 1500A, 24V or 48V
<b>Customer Premises Equipment</b>	PBX/VoIP	✓	✓	
	Wireless Access	✓	✓	
<b>Wireless</b>	Mini/metro sites		✓	
	Base transceiver stations (BTS)		✓	✓
	Base station controllers (BSC)		✓	✓
	Main switches			✓
<b>Wireline</b>	Fiber transmission systems	✓	✓	✓
	Digital microwave radio		✓	✓
	Broadband voice data services	✓	✓	✓
	Satellite earth stations			✓

1, 2. Including DV2 (Data-Voice-Video) Power Solutions with APR rectifier modules.

3. Systems with higher output are also available



# 3G Enterprise Power Solutions - EPS2 Series



The **Eaton® 3G Enterprise Power Solutions** are the ideal solution for converged data networks and low power tele-communications applications requiring compact, efficient and flexible DC power supplies.

This EPS2 series is a 19" rack mounted system and is available with up to two of the Eaton 3G Enterprise or Access 48V rectifier modules providing a total output of up to 4000W.

The versatile SC200 system controller features a front access USB port for ease of system setup along with a RS232 rear port and a 10BaseT Ethernet port for remote networking and communications.

Communication features of the SC200 system controller include TCP/IP, SNMP and an onboard web server allowing access with standard web browsers. The SC200 also supports GSM cellular (including text messaging) and standard PSTN modems.

The Enterprise systems include an integral DC distribution panel with easy to fit push-in circuit breakers and low voltage disconnect contactor to prevent over discharging of the optional backup batteries.

Typical applications include providing secure power for customer premises equipment, roadside cabinets, converged VoIP/data networks, PoE, IP routers and small PABX's.



## Features

- 19" rack mounting
- High power density
- Intelligent system controls
- Pre-configured software
- Onboard secure web server
- Push-in easy to fit circuit breakers
- Low voltage disconnect
- Fast on-line expansion of rectifiers (hot-swap)
- High efficiency and unity power factor
- Easy to use menu & full color display
- Optional batteries
- Compatible with Eaton's Energy Saver (ES) rectifier



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# Technical Specification

## Input

AC Supply	Nominal: 120V, 240V Operating Range: 90V – 275V
Power Factor †	>0.99 (50 – 100% Output Current)
Efficiency †	>96% peak >95% (20% to 100% load, 230Vac)

## Output

DC Output Voltage Range	43 – 57.5V
DC Output Power (maximum*) †	240V AC: APR48-ES: 4.0kW APR48-3G: 3.6kW EPR48-3G: 1.8kW 120V AC: APR48-ES: 2.3kW APR48-3G: 2.2kW EPR48-3G: 1.1kW
	* Based on two rectifiers fitted, refer to rectifier data sheets.

## Environmental

Operating Temperature Range	Rated: -10°C to +50°C [-14°F to +122°F] Extended*: -40°C to +70°C [-40°F to +158°F]
	*Output current is derated above 50°C [122°F]

## Mechanical

Dimensions H,W,D	2U , 19" mounting, 14.1" [360mm]*
	* Additional clear depth space is required for exhaust air.

## System

System Controller	SC200
DC Distribution Module	12-way circuit breakers (2 x Battery, 10 x Load) Circuit breaker type: Magnetic/Hydraulic, push fit  Battery circuit breakers: Heinemann AC1R Series Typical ranges available: 30A, 40A, 50A, 60A, 70A  Load circuit Breakers: Heinemann JC1S Series Typical ranges available: 6A,10A, 15A, 20A, 25A, 30A
Communication Features	USB direct 10BaseT Ethernet, TCP/IP, SNMP, Modbus-TCP, Modbus-RTU and on board web server RS232 to external PSTN or GSM modem (modem not included)
Rectifier Blank Panels	For unused rectifier positions

## Software

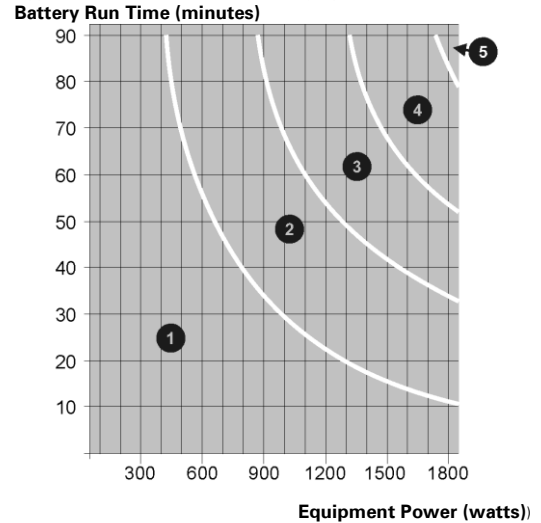
DCTools	Configuration software. Free download from: <a href="http://www.powerware.com/downloads">www.powerware.com/downloads</a>
Power Xpert	Remote control and monitoring software

† Power factor, efficiency and DC output power are dependent on rectifier model fitted. Refer to the rectifier data sheet for further details.

## Options

Battery*	Eaton Extended Battery Module (EBM) 5PX version - 5PXEBM48RT (available globally) 5130 version - 103006587-6591 (EMEA only) Weight: 29.5kg [65lb] Dimensions (H,W,D*): 85mm (2U), 432mm (19" mounting), 487mm * Additional space is required at the rear for cables.
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Typical Run time values\* (see graph).



\*Battery times are approximate and vary depending on factors such as: - load configuration  
- battery charge  
- battery age and temperature.

\* Other battery options available - consult your local Eaton agent.

Battery Cables	CKBATT-02 Eaton EBM 5130 connection cable, 2000mm long or CKBATT-01 'other batteries' connection cable, 2000mm long
Equipment Cable	Customer Equipment Connection Cable CKLOAD-00 10-way connection loom, 1000mm long
EBM Rack Mounting Kit	Included with the EBM as standard

## Certifications

All products comply with International Standards.

North America	UL (Canada, USA), FCC Class B
Europe	CE
Australia and New Zealand	C-Tick

In the interests of continual product improvement all specifications are subject to change without notice.



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EPS2\_F

# Enterprise Battery Module



*Eaton 5PX version pictured*

The **Eaton® 3G Enterprise Extended Battery Module (EBM)** is designed as an optional integrated backup power source to the 3G Enterprise Power Systems, providing secure power during AC grid failure for anything from orderly shutdowns through to extended runtimes for continuity of service.

Multiple battery modules can be connected together to achieve increased backup capacity for a given output demand.

This module is slim and rack mountable to suit the likely applications for these systems such as server room racks.

The battery modules use simple 'plug and play' cables for connecting the Enterprise Power Solution. No specialized tools are required, thus making installation very easy in an IT environment.

The scalability of the EBM ensures that your investment is protected into the future as the demands of your network increase. Simply add more EBM modules as your network grows.

EBM has an 18Ahr capacity and is service maintenance free for the life of the battery module. Battery function is monitored and controlled by the power system controller for complete battery protection.

## Features

- Easy to install
- Slimline 19" rack mounting
- Extended runtime -18Ahr capacity
- Modular and scalable
- Service maintenance free VLRA batteries



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# Technical Specification

## Output

DC Output Voltage	48V nominal
DC Output Capacity	18Ahr
	Maximum input/output current should not exceed 55Amps

## Mechanical

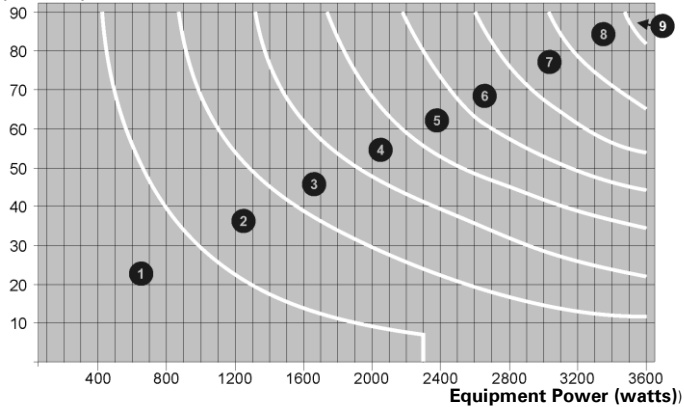
Weight	29.5kg
Dimensions H,W,D	85mm (2U), 432mm (19" mounting), 487mm*

\* Additional space is required at the rear for cables.

## Battery

Typical Run Time Values\*

### Battery Run Time (minutes)



● = Required number of battery modules.

\*Battery times are approximate and vary depending

on factors such as:

- load configuration
- battery charge
- battery age and temperature.

Order Number	Eaton Extended Battery Module (EBM) 5PX version - 5PXEBM48RT (available globally) 5130 version - 103006587-6591 (EMEA only)
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## Certifications

All products comply with international standards. Contact your local Eaton DC representative for details on the specific product versions available with these safety and EMC approvals:

North America	UL listed
Europe	CE

In the interests of continual product improvement all specifications are subject to change without notice.



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# 3G Access Power Solutions - APS3-400 Series



## Features

- Compact and scalable 19" sub-rack solution
- High power density (5.4kW @ 48V/3U, 19")
- Easy plug-and-go rectifier set-up
- Fast on-line rectifier expansion (hot-plug)
- High efficiency and unity power factor
- Single AC input or individual rectifier feeds
- Intelligent system management features
- Remote access (TCP/IP, web browser, SNMP)
- Pre-configured software for quick & simple deployment
- Onboard energy management software optimizes operating efficiency for lower OPEX



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The **Eaton® 3G Access Power Solutions** are ideal for low to medium power telecommunications applications requiring compact, efficient and flexible DC power supplies with or without batteries.

This Eaton 3G Access Power Solution 400 series has UL and FCC standards certifications. A technician friendly user-interface includes a full color menu screen and is preconfigured for fast install and easy commissioning. All system settings are fully adjustable in software and stored in transferable configuration files for repeatable one-step system set-up.

With up to 6kW of power output, it features state-of-the-art 48V 3G or Energy Saver (ES) Access Power Rectifiers for superior operating efficiency (>96%). The DC distribution panel, simple to use hydraulic magnetic circuit breakers, and optional low voltage disconnect (LVD) modules are fully integrated.

The advanced SC200 system controller offers high-level communications capability for real time information. It also has built-in intelligence for optimizing system efficiency, and comprehensive alarm and system status notifications, which are all designed to minimize operational expenses.

A comprehensive range of other controller features ensures maximum battery life and optimum system performance under a wide range of environmental conditions.

The 19" rack mount system is ideal for rapid deployment into customer facilities or enclosures.

Typical applications include standby power for customer premises equipment, outdoor power plants, data networks and IP routers.

# Technical Specification

## Input

AC Supply†	Nominal:	120V, 208-240V
	Operating Range:	90V – 275V*

\* Output power derates below 175V AC.

Power Factor†	>0.99 (50 – 100% Output Current)
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Efficiency†	APR48-3G : 92% (50 – 100% Output Current)
	APR48-ES : >96% peak, >95% (20% to 100% load, 230Vac)

Total Harmonic Distortion	<5% THD from 50% to 100% at load.
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## Output

DC Output	43 – 57.5V
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Voltage Range	
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DC Output	APR48-3G : 120V AC: 3.3kW @ 48V
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Power	208-240V AC: 5.4kW @ 48V
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(maximum)†	APR48-ES : 120V AC: 3.45kW @ 48V
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	208-240V AC: 6kW @ 48V
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## Environmental

Temperature	Rated:	-10°C – +50°C [14°F – +122°F]
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Range	Extended:	-40°C – +65°C [-40°F – 149°F]*
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\* Output current is derated above 50°C [122°F]

## Mechanical

Dimensions	3U [5.25", 133mm], 19" [483mm] mounting, H,W,D 14" [356mm]*
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\* Additional clear space is required for exhaust air.  
Rear access is required for cable terminations.

## System

System	SC200 as standard.
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Controller	SC100 optional.
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DC Distribution	10-way circuit breakers (2 x Battery, 8 x Load).
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Module	Load circuit breakers: Heinemann AMIR Series
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	5A, 10A, 20A, 30A, 40A, 50A, 70A, 80A, 100A.
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	Battery circuit breakers: Heinemann AMIR 100A or
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	AMIP 120A.
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Communication	USB direct*
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Features	10BaseT Ethernet*, TCP/IP*, SNMP*, Modbus-
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	TCP*, Modbus-RTU* and on board web server*
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	RS232 to external PSTN or GSM modem (modem
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	not included)
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	*SC200 only
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Low Voltage	Battery disconnect: 200A internal.
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Disconnect	
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(LVD)	
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Rectifier Blank	For unused rectifier positions.
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Panels	
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Options	Relay Rack
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	Batteries.
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† Power factor, efficiency, AC voltage range and output power is dependant on rectifier module fitted. Refer to the rectifier data sheet for more information.

## Software

DCTools	Configuration software.
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Free download from:

[www.powerware.com/downloads](http://www.powerware.com/downloads)

Power Xpert	Remote control and monitoring software
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## Certifications

All products comply with International Standards including UL (US and Canada) and FCC (Class B) Verification.

In the interests of continual product improvement all specifications are subject to change without notice.



# 3G Access Power Solutions - APS6-400 Series



## Features

- High power density (12kW @ 48V/6U, 19")
- Suitable for both 19" relay rack or enclosed cabinet
- High efficiency and unity power factor
- Easy fit plug-in hydraulic/magnetic circuit breakers.
- 20-way load and 6-way battery distributions
- Single or dual low voltage disconnect (LVD) options
- SC200 or SC100 intelligent system controller
- Onboard energy management software optimizes operating efficiency for lower OPEX
- Pre-configured software for quick & simple deployment
- Remote access (TCP/IP, web browser, SNMP)
- Easy plug-and-go rectifier set-up
- Fast on-line rectifier expansion (hot-plug)



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The **Eaton® 3G Access Power Solutions** are ideal for low to medium power telecommunications applications requiring compact, efficient and flexible DC power supplies with or without batteries. Typical applications include standby DC power for customer premises equipment, outdoor power plants, data networks and IP routers.

A technician friendly user-interface includes a full color menu screen and is preconfigured for fast install and easy commissioning.

The 19" rack mount system is ideal for rapid deployment into customer facilities or enclosures.

All system settings are fully adjustable in software and stored in transferable configuration files for repeatable one-step system set-up.

The APS6-400 series has up to 12kW of power output, it features state-of-the-art 48 volt 3G Access Power Rectifiers, an integral DC distribution panel, easy to fit plug-in hydraulic magnetic circuit breakers, and optional low voltage disconnect (LVD) modules for battery and non priority loads.

The advanced system controller offers high-level communications capability for real time information. It also has built-in intelligence for optimizing system efficiency, and comprehensive alarm and system status notifications, which are all designed to minimize operational expenses.

Other features include temperature compensated voltage output, automated equalize charging, and integrated battery testing, for maximum battery life under a wide range of environmental conditions.

# Technical Specification

## Input

AC Supply†	Nominal:	120V, 208-240V	
	Operating Range:	90V – 275V*	
	* <i>Output power derates below 175V AC.</i>		
Power Factor†	>0.99 (50 – 100% Output Current)		
Efficiency†	By system rectifier type: APR48-ES: >95% (20 - 100% output current) APR48-3G: 92% (50 - 100% output current)		
Total Harmonic Distortion	<5% THD from 50% to 100% at load.		

## Output

DC Output Voltage Range	43 – 57.5V		
DC Output Power (maximum)	Rectifier type:	<b>APR48-3G</b>	<b>APR48-ES</b>
	110/120V AC:	6.6kW @ 48V	6.9kW @ 48V
	208-240V AC:	10.8kW @ 48V	12kW @ 48V

## Environmental

Temperature Range	Rated: -10°C to +45°C [14°F to +122°F]
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## Mechanical

Dimensions H,W,D	6U [10.5", 267mm], 19" [483mm] mounting, 15.3" [390mm]*
	* <i>Additional clear space is required for exhaust air. Rear access is required for cable terminations.</i>

## System

System Controller	SC200 as standard. SC100 optional.
DC Distribution Module	26-way circuit breakers (6 x Battery, 20 x Load). Load circuit breakers: Heinemann AMIR Series 5A, 10A, 20A, 30A, 40A, 50A, 70A, 80A, 100A, 120A (2-pole). Battery circuit breakers: 6 x Heinemann AMIR 80A, 100A or 3 x Heinemann AMIP 120A, 150A, 200A.
Communication Features of SC200	USB direct. 10BaseT Ethernet, TCP/IP, SNMP, On board web server. RS232 to external PSTN or GSM modem (modem not included).
Low Voltage Disconnect (LVD) (Optional)	Battery disconnect: 400A internal. Non priority load: 200A internal.
Rectifier Blank Panels	For unused rectifier positions.
Options	Relay Rack Batteries.

† Power factor, efficiency, AC voltage range and output power is dependant on rectifier module fitted. Refer to the rectifier data sheet for more information.

## Software

DCTools	Configuration software. Free download from: <a href="http://www.powerware.com/downloads">www.powerware.com/downloads</a>
PowerManagerII	Remote control and monitoring software

## Certifications

North America:	UL listed 1801, cUL, FCC
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In the interests of continual product improvement all specifications are subject to change without notice.



# DV2-3G Metro Power Solutions (UL Listed)



**48Vdc systems up to 600A maximum load current.**

**24Vdc systems up to 500A maximum load current.**

**Eaton DV2-3G Metro Power Solutions** are ideal for low to medium power telecommunications applications requiring compact, efficient and flexible DC power. Typical applications include standby DC power for customer premises equipment, outdoor shelters, VoIP, PABX, data networks and IP routers.

The DV2-3G Metro series has up to 40kW of output for load and battery recharge. It features state-of-the-art Access 3G, or Energy Saver rectifiers, an integral DC distribution panel with easy to fit plug-in hydraulic magnetic circuit breakers, and optional low voltage disconnects (LVD) for battery and non priority loads. Each cabinet has fitted integrated battery shelves for up to 4 strings of 48V, or 8 strings of 24V, high capacity VRLA batteries. Optional battery cabinets for extended back-up time are also available.

A technician friendly user-interface includes a full color menu screen and is pre-configured for fast installation and easy commissioning. System settings are fully adjustable in software and stored in transferable configuration files for repeatable one-step system set-up.

The advanced SC200 system controller offers high-level communications capability for real time information, including an Ethernet port for connecting directly to the Internet. It also has built-in intelligence for optimizing system efficiency, and comprehensive alarm and system status notifications, which are all designed to minimize operational expenses.

Other features include temperature compensated voltage output, automated equalize charging, and integrated battery testing, for maximum battery life under a wide range of environmental conditions.

## Features

- High power density.
- High efficiency and unity power factor.
- Fast on-line expansion of rectifiers (hot-swap).
- Integrated batteries.
- Low voltage disconnects for battery and non priority loads.
- Easy fit plug-in hydraulic/magnetic circuit breakers.
- Flexible AC input.
- Intelligent system management features.
- Pre-configured software for quick & simple deployment.
- Automatic battery condition testing.
- Remote access (TCP/IP, web browser, SNMP).
- Energy management software optimizes operating efficiency for lower OPEX.
- All cabling top entry with optional rear cable duct extension for raised floor cable access.



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# Technical Specification

## Input

AC Supply Voltage*	North America: 3P 208Vac nominal 2P 240Vac nominal
	Global: 3P + N 230/400Vac nominal 1P + N 230Vac nominal
AC Input Frequency	50/60 Hz

## System

Rectifier Module*	APR24-3G	APR48-3G	APR48-ES
Nominal Output Voltage	24Vdc	48Vdc	48Vdc
Output Voltage range	20–30Vdc	40–58Vdc	40–58Vdc
Max Number of Rectifiers	10	20	20
Maximum DC Power†	14.4kW	36kW	40kW
Maximum Load Current	500A	600A	600A
Efficiency	>91%	>92%	>96%

† Maximum DC power includes load and battery recharge.

Supervisory Module	SC200
Communications	10 baseT Ethernet port, web server, SNMP agent
Batteries	Type: Front access VRLA 48V: Up to 600Ahr per cabinet using four strings of 150Ahr batteries. 24V: Up to 1200Ahr per cabinet using eight strings of 150Ahr batteries.
Extension Battery Cabinets	Up to six extension battery cabinets fitted with either four strings of 48V or eight strings of 24V in each cabinet

## DC Distribution

Load circuit Breakers	20-way total
Single Width Circuit Breakers	Heinemann AMIR Series 5A, 10A, 20A, 30A, 40A, 50A, 70A, 80A, 100A
Dual Width Circuit Breakers	Heinemann AMIP 120A, 150A, 200A
Triple Width Circuit Breakers	Heinemann AMIP 250A

Battery Circuit Breakers	Heinemann AM1P, 200A integrated into battery shelf
Low Volt Disconnect Options	1 x battery disconnect, 1 x 400A non-priority load (10 positions for non priority, 10 positions for priority).

## Mechanical

Dimensions H,W,D	2000mm [78.7"], 600mm [23.6"], 600mm [23.6"]
With rear cable duct extension H,W,D	2000mm [78.7"], 600mm [23.6"], 750mm [29.6"]
Weight	DV2-A20B-xxxx: 900kg [1980lb] typical maximum with 20 rectifier modules and 4 x 48V/150Ah battery strings.

## Environmental

Operating Temperature Range	-25°C [-13°F] to 40°C [104°F]*
Humidity	<95% non-condensing
Altitude	<2000m (6500'). Thermally de-rates above this altitude, to a maximum altitude of 4000m

## Certifications

All products comply with International Standards. Contact your local Eaton Power Quality representative for details on the specific product versions available with these safety and EMC approvals:

North America: UL Listed 1801, cUL, FCC

\*Refer to rectifier specifications for more information. System capacity will vary depending on number of rectifiers and batteries selected.

In the interests of continual product improvement all specifications are subject to change without notice.



# DV2-3G Metro Power Solutions Extension Battery Cabinet (UL Listed)



#### **48Vdc : 4 strings**

#### **24Vdc : 8 strings**

**Eaton 3G Metro Power Solutions** are ideal for low to medium power telecommunications applications requiring compact, efficient and flexible DC power. Typical applications include standby DC power for customer premises equipment, outdoor shelters, VoIP, PABX, data networks and IP routers.

The Extension Battery cabinet allows customers to easily configure and install additional battery back-up time for critical telecom and IT equipment. Up to six Extension Battery Cabinets can be installed in addition to the DV2-3G Metro cabinet. This gives a total battery capacity of up to 4200Ahr in 48Vdc solutions, or 8400Ahr in 24Vdc solutions.

The Extension Battery Cabinet can be fitted with an optional DC Distribution, extending the number of output circuits available from the power cabinet. These distributions utilise easy fit, plug-in hydraulic-magnetic breakers

When connected back to a DV2-3G Metro power cabinet, features include automatic temperature compensation, Battery MCB alarm monitoring, automatic equalizing and fast charging, and automatic battery testing.

All cable entry is top access. An optional rear cable duct extension is available to allow cables to be run to the top of the cabinet in raised floor situations.

#### **Features**

- 24" x 24" cabinet
- 4 Battery Shelves
- Optional DC distribution with easy fit plug-in hydraulic/magnetic circuit breakers.
- UL Listed



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# Technical Specification

## System Interconnections

Communications	Screw terminals
Power	Direct onto busbars

## DC Distribution (Optional)\*

Load Circuit Breakers	20-way total
Single Width Circuit Breakers	Heinemann AMIR Series 5A, 10A, 20A, 30A, 40A, 50A, 70A, 80A, 100A.
Dual Width Circuit Breakers	Heinemann AMIP 120A, 150A, 200A,
Triple Width Circuit Breakers	Heinemann AMIP 250A,

\*Power is feed to the optional DC distribution from a load circuit in the Power Cabinet. See power system documentation for more details.

## Batteries\*

Type	Front access VRLA
48V Batteries	Up to 600Ahr per cabinet using four strings of 150Ahr batteries.
24V Batteries:	Up to 1200Ahr per cabinet using eight strings of 150Ahr batteries.

\*Maximum of 6 battery cabinets added to the power cabinet per system

## Mechanical

Dimensions	
H, W, D	2000mm [78.7"], 600mm [23.6"], 600mm [23.6"]
With rear cable duct extension	
H,W,D	2000mm [78.7"], 600mm [23.6"], 750mm [29.6"]
Weight	DV2-EBC4-xxxx: 850kg [1870lb]. Typical maximum with 4 x 48V/150Ah battery strings.
Operating Temperature Range	-25°C [-13°F] to 40°C [104°F]
Humidity	<95% non-condensing
Altitude	<2000m (6500'). Thermally de-rates above this altitude, to a maximum altitude of 4000m

## Certifications (Pending)

All products comply with international standards. Contact your local Eaton DC representative for details on the specific product versions available with these safety and EMC approvals:

North America: UL Listed 1801, cUL, FCC

In the interests of continual product improvement all specifications are subject to change without notice.



# Matrix™ 2000 Standalone Inverter



## Features

- Designed for telecom applications
- Pure sine wave output
- Unity power factor (full 2000 watt output power)
- Significant overload capability, 120% continuously, 200% for 5 seconds
- High efficiency, >91 %
- High power density
- Built in Static Transfer Switch (STS)
- DSP design for improved reliability and performance
- Single phase 120Vac or 230Vac output options
- Comprehensive LCD/LED with keypad
- USB interface for connecting to PC
- Wide selection of configurable parameters.
- International certifications

The **Eaton® Matrix™ 2000 Standalone Inverter** is designed for use in telecommunications applications where a very reliable AC supply is required. The high efficiency and compact size makes the Matrix 2000 Inverter an outstanding solution for powering all types of critical AC equipment.

The Matrix 2000 Standalone Inverter provides 2000W of reliable AC power in a 1U x 19" rack mount package that includes a built-in Static Transfer Switch (STS). The STS automatically and instantaneously switches the AC output, from the DC inverter to an alternative source such as AC mains (and back again), providing extra security of the AC supply to the load equipment.

The Matrix 2000 solution uses digital microprocessor control to provide maximum performance under all operating conditions. The built-in controller gives real-time system status through comprehensive LCD/LED displays, and allows program setting through a keypad panel.

The Matrix 2000 Standalone Inverter includes a built in USB interface for monitoring and control.



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# Technical Specification

## DC Input

Operating Range 48V: 40Vdc ~ 60Vdc

## AC Input (to Transfer Switch)

Voltage Range: INV-4820SA: 89Vac to 138Vac  
(50/60Hz) INV-4820ESA: 176Vac to 276Vac  
Transfer Time <10ms

## AC Output

Power Output 2000VA / 2000W  
Wave Form Pure sine wave  
Power Factor 1.0  
Nominal Output INV-4820SA: 110/115/120Vac  
Voltage INV-4820ESA: 208/220/230/240Vac  
(selectable)  
Output 50,60Hz  
Frequency  
Efficiency >91% at rated load  
Over Load 2\*Inom, 5sec max  
Protection 1.5\*Inom, 10sec max  
1.25\*Inom, temperature controlled

## Environmental Requirements

Operating Temperature -20°C to 60°C (-4°F to 140°F)  
Range -20°C to 50 °C (-4°F to 122°F), full performance  
Cooling Fan Cooled

## Certifications

All products comply with international standards.

Safety EN60950-1 / UL60950-1

Europe CE

In the interests of continual product improvement all specifications are subject to change without notice.



# DCTools™ Configuration Software



**Eaton® DCTools** is the new configuration software for field technicians installing and maintaining Eaton DC power systems. It is supplied at no charge by download from the Internet and simplifies the setup and operation of all Eaton DC power systems.

Frontline staff will find DCTools is a major benefit during the installation, troubleshooting and support of any Eaton DC power system, CellWatch battery monitoring systems and SiteSure ancillary monitoring and control systems.

For added flexibility DCTools can connect to an Eaton DC power system in three ways; directly through an RS232 serial connection; through a dialup or cellular modem, or through an Ethernet LAN/WAN.

DCTools is the ideal setup and diagnostic tool for field technicians. It provides a very easy way for them to configure an Eaton DC product, and view status and alarm conditions.

Among the advantages of using DCTools are reduced installation times, lower fault response times, less need to visit sites and better access to operating data for fault analysis and operating conditions such as load growth.

These make the processes of power system installation and operation more efficient with the potential for real operating cost savings.

DCTools is available for download at [www.powerware.com/downloads](http://www.powerware.com/downloads)

## Features

- DC power system configuration software
- Windows® compatible
- Easy to use graphical display
- Operates with all Eaton DC power systems, CellWatch™ and SiteSure™
- Local (RS232 serial) or remote (dialup modem or Ethernet) connection
- Downloadable from the Internet at no charge



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# Technical Specification

## Computer Minimum Requirements

Operating System	Windows 98, Windows NT 4.0 or later
RAM	16Mb Ram Windows 98, 24Mb Windows NT

Connection	Standard serial port (Com port)
Internet connection	Required for download only

## Interfaces

Communications interfaces supported	RS232, Ethernet, or modem
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## Availability

Free download	<a href="http://www.powerware.com/downloads">www.powerware.com/downloads</a>
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# EPR48-3G Rectifier Module



The **Eaton® EPR48-3G Enterprise Power Rectifiers** are designed specifically for enterprise applications such as PoE and VoIP converged data networks, customer premises equipment and also tele-communications roadside cabinet installations.

The EPR48-3G is a telecom network grade rectifier with 900W output. It is designed for operation at up to 70°C (158°F) and under a wide range of AC power conditions.

The EPR48-3G rectifier is microprocessor controlled and includes intelligent features such as automatic set up during installation, temperature dependant variable speed fans for lowest audible noise and automatic self protection over wide ranging environmental conditions.

The EPR48-3G also has power factor correction and is up to 91% efficient, with optimum performance available at typical load currents. Together these give the EPR48-3G some of the lowest running costs for any DC power system of its type available.

The EPR48-3G rectifier module will provide years of costeffective, and trouble free service for your 48V enterprise access equipment.

## Typical Applications:

- PoE equipment
- VoIP/IP converged data networks
- PABX for any business network
- Telecom roadside cabinets

## Features

- Fast on-line expansion of rectifiers (hot-swap)
- Automatic set-up from system controller
- Intelligent microprocessor controlled
- High efficiency and unity power factor
- Universal AC supply input
- Wide output voltage ranges
- Constant power output
- Compliance with international standards



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# Technical Specification

## Input

AC Supply	Nominal: 220/240V, 50/60Hz Extended Operating Range: 90V – 275V
Power Factor	>0.98 (50 – 100% Output Current)
Efficiency	91% (50 – 100% Output Current)

## Output

DC Output Voltage Range	48V: 43 – 57.5V
DC Output (maximum)	900W (240V AC nominal) 550W (120V AC nominal)

## Environmental

Operating Temperature Range	-40°C – +70°C [-40°F – +158°F] Output current is derated above 50°C [122°F]
Cooling	Temperature controlled, variable speed, high reliability fans

## Mechanical

Dimensions	3U: 133mm [5.25"], 42mm [1.65"], H,W,D 266mm [10.45"] overall
Weight	1.7kg [3.7 lb]

## Certifications

North America	UL, FCC Verification
Europe	CE
Australia / New Zealand	C-tick, Telepermit

In the interests of continual product improvement all specifications are subject to change without notice. Performance ratings are valid with all other variables at Nominal. Specifications guaranteed over rated operating range.



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# APR48-3G Rectifier Module



The **Eaton® APR48-3G Access Power Rectifiers** are designed specifically for network access applications such as cellular base stations, customer premises equipment and road-side cabinet installations.

The new generation 3G architecture is reliable, power dense and compact. The high power density allows as little as 1U of rack space to be occupied by power, therefore, maximizing space available for telco equipment.

The APR48-3G rectifier incorporates a combination of leading-edge high frequency switch mode technology for a flexible and efficient DC power source, with high reliability fan cooling which further contributes to its high overall reliability.

The APR48-3G is a high powered rectifier with 1800W output. It is designed for operation at up to 70°C (158°F) and under a wide range of AC power conditions.

These features make the APR48-3G perfectly suited to the wide variety of equipment and demanding environmental conditions found in network access applications.

The APR48-3G also has power factor correction and is up to 92% efficient, with optimum performance available at typical load currents. Together these give the APR48-3G some of the lowest running costs for any DC power system of its type available.

Operating with the Eaton SC100 or SC200 system controller, the APR48-3G rectifier modules will provide years of cost-effective, and trouble free service for your 48V network access equipment.

## Features

- Fast on-line expansion of rectifiers (hot-swap)
- Automatic set-up from system controller
- Intelligent microprocessor controlled
- Industry leading power density
- High efficiency and unity power factor
- Wide AC supply conditions
- Wide output voltage ranges
- Constant power output
- Compliance with international standards



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# Technical Specification

## Input

AC Supply	220/240V, 50/60Hz (nominal) 175-275V full output power up to 50°C [122°F]
Power Factor	>0.99 (50 – 100% Output Current)
Efficiency	92% (50 – 100% Output Current)

## Output

DC Output	48V: 43 – 57.5V
Voltage Range	
DC Output (maximum)	1800W @ 48V

## Environmental

Operating Temperature Range	-40°C – +70°C [-40°F – +158°F] Output current is derated above 50°C [122°F] and below -10°C [14°F]
Cooling	Temperature controlled, high reliability fans

## Mechanical

Dimensions	3U: 133mm [5.25"], 42mm [1.65"], H,W,D
H,W,D	266mm [10.45"] overall
Weight	1.7kg [3.7 lb]

## Certifications

North America	UL, FCC Verification, CSA, IC
Europe	CE
Australia / New Zealand	C-tick, Telepermit

In the interests of continual product improvement all specifications are subject to change without notice. Performance ratings are valid with all other variables at Nominal. Specifications guaranteed over rated operating range.



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# APR48-ES Energy Saver Rectifier



The **Eaton® APR48-ES Energy Saver Rectifier** is designed for communications network operators who are striving to cut energy costs across the network, and/or to meet aggressive carbon footprint reduction targets.

Operating with well over 96% efficiency, it produces at least 50% less waste energy than most other modern rectifiers, and with potentially greater savings over older infrastructure.

The 2kW Energy Saver Rectifier is the ideal module size for powering access applications within a telecom network such as cellular base stations, ADSL equipment, and fibre nodes.

This rectifier features intelligent digital signal processing for enhanced control, producing peak efficiency in excess of 96% for typical operating loads, while also maintaining a very high minimum operating efficiency of 95 to 96%, over a very wide range of loads (from 30% to 100% of the 2kW capacity).

The high power density, short depth and flexible mounting options makes the Energy Saver Rectifier well suited to limited space applications such as ETSI and road side cabinets.

The Energy Saver Rectifier is fully compatible with existing Eaton 3G systems and it is one of the easiest rectifiers to use, with a simple plug-and-go insertion. It operates under a wide range of AC power conditions and in temperatures at up to 70°C (158°F).

## Features

- 2000W output power
- Energy saving efficiency greater than 96%
- Wide efficiency curve
- Industry leading power density
- Fast on-line expansion of rectifiers (hot-swap)
- Simple 'plug and go' insert
- Unity power factor
- Digital signal processing for enhanced control
- Wide AC supply conditions
- Wide output voltage range
- Constant power output
- Compliance with international standards



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**An Eaton Green Product**

# Technical Specification

## Input

AC Supply	120V/208-240V, 50/60Hz (nominal) 185-275V full output power up to 50°C [122°F] 90-185V reduced output power
Power Factor	>0.99 (50 – 100% output current)
Efficiency	>96% peak >95% (30 – 100% output power)

## Output

DC Output Voltage Range	43 – 57.5V
DC Output (maximum)	2000W @ 48V

## Environmental

Operating Temperature Range	-40°C – +70°C [-40°F – +158°F] Output power derates above 50°C [122°F]
Cooling	Temperature controlled, variable speed, high reliability fan <50dBA ambient temperature 25°C

## Mechanical

Dimensions H,W,D	3U: 133mm [5.25"], 42mm [1.65"], 266mm [10.45"] overall
Weight	1.7kg [3.7 lb]

## Certifications

North America	UL, FCC Verification, CSA, IC
Europe	CE

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# SC200 System Controller



The **Eaton® SC200 System Controller** is an advanced control and monitoring solution for Eaton Enterprise, Access, Metro and Core Power Solutions.

It provides a full suite of advanced communications options, including built-in Ethernet interface, Web server, and SNMP agent.

Alarm notifications may be by SNMP traps, email, SMS, dial-out to PowerManagerII remote monitoring software, or relay contact closures.

An intelligent “Smart Alarms” feature provides highly configurable control and alarms to automated site management and improve performance – e.g. disconnect loads during peak AC grid loading, run outdoor cabinets in low noise mode at night, manage cooling, or customise site alarms to network requirements.

The SC200 provides full generator control and fuel metering capability for off-grid, hybrid generator, battery, solar and wind applications.

The SC200 is supplied preconfigured with a default configuration file, or factory customized for a particular

application, ensuring fast and problem free installation. On-site changes are easily made from the front panel or with a Windows PC using DCTools configuration software.

The high-resolution color LCD display is easy to read and has an easy to use menu structure. All system values and alarms can be displayed, with easy keypad access to check or edit settings.

The SC200 works with separate system I/O boards for powerful and user-friendly interfacing. Easy, low cost I/O expansion is possible by adding additional I/O boards.

## Typical Applications:

- 24V & 48V power systems
- Wireless cell sites & switches
- Transmission terminals
- Local & central office switching

## Options:

- External GSM or PSTN modem
- Additional I/O boards for system expansion
- SiteSure-3G modules for site management

## Features

- Ethernet interface built-in
- SNMP agent V1, V2c, V3
- Battery mid-point monitoring & discharge time remaining
- Generator control & fuel metering
- Alternative energy input metering
- SMS & email alarm messages (with GSM modem)
- Comprehensive system control functions
- Complies with international standards
- Setup via web, keypad or DCTools configuration software
- Language options
- Optional extra I/O boards or SiteSure-3G modules for expansion
- Smart alarms
- Modbus



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# Technical Specification

## Operation

Supply Voltage Range	18 to 60Vdc
Operating Range	Standard: -10 to +50°C [14 to 122 °F] Extended: -25 to 70°C [-13 to 158 °F]

## Input/Output Standard

Analog inputs	Current sensor (3), Bus voltage (1), Temperature (2)
Digital inputs	4 Internal (pre-defined), 6 external (user-defined)
LVD contactor outputs	2 with one IOBGP module Up to 16 with additional IOBGP modules
Relay outputs	6 Voltage free, NO-C-NC, 0.1A @ 60VDC Screwless terminal block, 0.5mm <sup>2</sup> - 2.0mm <sup>2</sup> conductors

## Communications Interfaces

Physical	Ethernet, USB and RS232
Software	IP, http, https (secure web), S3P, modbus, SMTP (email)
Management software	DCTools configuration / local management software. Power Xpert remote management software. SNMP version V1, V2c or V3. Supports standard Network Management System software including HP OpenView Network Node Manager.

## User Interface

Display	Back-lit color dot matrix LCD 160 x 128 pixel Adjustable viewing angle
Keypad	6 keys
Language	English: Standard
Options	Spanish, German and Chinese available on request. Other language software upgrades by arrangement.
Indicators	Power on, Critical/Major alarm, Minor alarm

## Mechanical

Dimensions H,W,D	SC200: 133.5mm (3U), 44.5mm, 70mm IOBGP: 106mm, 175mm, 18mm
Mounting	SC200: rectifier slot or flush panel mount Orientation: vertical or horizontal IOBGP: panel mount

## Datalogging

Event Log	10,000 records
Data Log	10,000 records

## Options

Input/Output	With IOBSS module (SiteSure-3G): Analog inputs: 48 Digital inputs: 108 Digital outputs: 32
Modem communications	PSTN or GSM. Requires external modem.

## Certifications

China	MII
North America	UL, FCC Verification, IC
Europe	CE
Australia / New Zealand	C-tick

In the interests of continual product improvement all specifications are subject to change without notice.



# SiteSure-3G™



The **Eaton® SiteSure-3G** adds on to the SC200 Controller to provide control and monitoring of a wide range of external devices. It uses the communications capability of an Eaton DC power system to monitor and control security, air conditioning, engine alternators and other building services, or sense DC currents for load metering.

SiteSure-3G modules can be remotely controlled and configured using the Power Xpert remote control and monitoring software or with DCTools local craft terminal.

SiteSure-3G is also compatible with Network Management Systems using SNMP.

Additional SiteSure-3G modules can be added as required to provide the number of inputs and outputs needed for a particular application.

## Features

- Remote control and monitoring
- Expandable
- Modular
- Real time data collection
- Compliance with international standards



# Technical Specification

## Operation

Supply Voltage Range	19 to 60V
Rated Operating Range	-10°C to +80°C [+14°F to +176°F]

## Input/Output

Bus voltage input	Number:	1
	Range:	-60V to +60V
Current inputs	Number:	3
	Range:	-50mV to +50mV
Temperature inputs	Number:	2
	Range:	2.53V to 3.23V (-20°C to +70°C with TS02 temperature sensor)
Digital inputs	Number:	10
General purpose analog inputs	Number:	4
	Range:	0V to +10V
Digital Outputs (Relays)	Number:	6
	Type:	Voltage free, NO-C-NC 0.3A @ 60VDC / 1A @ 30VDC

## Certifications

All products comply with international standards. Contact your local Eaton DC representative for details on the specific product versions available with these safety and EMC approvals:

North America	UL, FCC Verification, IC
Europe	CE
Australia / New Zealand	C-tick

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# 3G DC Distribution Module - DCD1M Series



## Features

- 1U High
- 19" rack mounting
- Battery & load circuits
- Easy to fit push-in circuit breakers
- Optional low voltage disconnect
- Integrated current sensor
- Cabinet or relay rack mounting

The Eaton 3G DCD1M Series of DC Distribution Module is a 1U high, 19" rack mount 48V DC distribution module, an ideal solution for converged data networks and low power telecommunications applications requiring compact, efficient and flexible DC power supplies.

The DCD1M series is available with up to two battery circuits and 10 individual load circuits. It may be used with either the Eaton 3G series of secure DC power systems or as 'standalone' for use with 3rd party equipment.

The high interrupt rating of the battery circuit breakers make the DCD1M series suitable for use as a primary protection module with a wide range of batteries.

This module features front access, easy to fit, push-in circuit breakers for ease of installation and servicing in the field.

The DCD1M is available with an optional low voltage disconnect contactor to prevent over discharging of backup batteries, an onboard current sensor and MCB trip detection monitoring for use with the Eaton 3G series of secure DC power systems.

Typical applications include providing DC distribution for customer premises equipment, roadside cabinets, converged VoIP/data networks, IP routers and small PABX's.



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# Technical Specification

DC Voltage Range	48V (nominal) 43V - 58V
DC Power (maximum)	4080W (85A @ 48V)
Efficiency	92% (50 – 100% Output Current) †

## Output

DC Output Voltage Range	20V – 58V
DC Distribution Circuits	12-way circuit breakers (2 x Battery, 10 x Load) Circuit breaker type: magnetic/hydraulic, push fit type <b>Battery circuit breakers:</b> Heinemann AC1R Series Typical ranges available: 40A, 50A, 60A Interrupt rating: 5000A <b>Load circuit breakers:</b> Heinemann JC1S Series Typical ranges available: 5A, 10A, 20A, 30A(max)
DC Circuit Connections	<b>Load:</b> 10way terminal barrier strips (screw terminals, max 10AWG/4mm <sup>2</sup> cable) <b>Battery:</b> Anderson Powerpole, PP45 (max 10AWG/4mm <sup>2</sup> cable)
Polarity /Grounding	Positive ground or floating (in-field selectable)
Operating Temperature Range	-10°C to +50°C [14°F to +122°F]
Dimensions H,W,D	1U , 19" mounting*, 11" [280mm]** * Optional 23" mounting brackets available ** Additional access space is required see installation guide for details.
Weight	DCD1M-00 4.1kg [9.1lb] DCD1M-01 4.4kg [9.8lb]
System Controller	Compatible with SC200 & SC100 based systems (when LVD included, onboard current sensor and MCB trip detection features required)

## Optional

Low Voltage Disconnect (LVD)	Battery disconnect: 100A internal contactor
Load Circuit Cable	CKLOAD-00 10sets, 1500mm long, 10AWG/4mm <sup>2</sup>
Battery Input Connection Cable	CKBATT-00 2000mm long, for connection to Powerware EBM module CKBATT-01 2000mm long, for connection to generic battery
23" rack mounting brackets	621-04998-29 23" mounting bracket (2 required)
Rectifier Blank Panels	For unused rectifier positions

## Part Numbers

DCD1M-00	1U, 19" rack mount DCD distribution module.
DCD1M-01	1U, 19" rack mount DCD distribution module. c/w low voltage disconnect and onboard current sensor

## Certifications

All products comply with international standards.

North America	UL (Canada, USA)
Europe	CE

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