DeltaV[™] Bulk Power Supplies



DeltaV 5 A, 10 A, 20 A and 40 A Bulk Power Supplies



DeltaV 20 A, 40 A and 80 A Bulk Power Supply Redundancy Modules.

- Easy to use
- Flexible and cost effective
- Low Footprint

Introduction

Power — your system won't operate without it. DeltaV $^{\text{\tiny M}}$ Bulk Power Supplies offer you the *most efficient and reliable power solution* for your money. The DeltaV Bulk Power Supply suite provides power to the system electronics and to the field. This is all the power required for your DeltaV system.

Benefits

Easy to use. The DeltaV Bulk Power Supplies provide reliable 12 and 24 VDC power for your DeltaV system power and bussed field power needs. They mount easily onto a T-type DIN rail—*easy!*

Flexible and cost effective. The DeltaV Bulk Power Supplies are flexible to use and cost effective, as external redundancy modules can be applied, for example, if load sharing is desired.

Low Footprint. The new DeltaV Bulk Power Supplies provide very competitive low footprints!





Hardware Specifications

Common Environmental Specifications		
Operational Temperature	-25°C to +70°C (-13 to 158°F) Output derating may be required.	
Storage Temperature	-40°C to + 85°C (-40 to 185°F)	
Relative Humidity	5 to 95%, non-condensing	
Protection Rating	IP20, NEMA 12	
Airborne Contaminants	ISA-S71.04-1985 airborne contaminants class G3, Conformal coating.	
Shock	15 g ½ sign wave for 6 ms, 10 g ½ sign wave for 11 ms.	
Vibration	1.6 mm peak to peak from 2-17.8 Hz; 2 g from 17.8 to 500 Hz.	
Mounting	Mount only on horizontally-oriented DIN Rail, with label text right-side up.	
Required Spacing	40 mm on top, 20 mm on the bottom, 5 mm on both sides.	
Required Spacing Between Multiple Units	15 mm on each side adjacent to another Bulk PS.	

DeltaV Bulk Power Supply 100-240 VAC to 12 VDC, 15 A

Description	DeltaV Bulk AC to 12 VDC, 15 A Power Supply Specifications	
Output Voltage	12 VDC	
Output Voltage Adjustment Range	12-15 VDC	
Output Current	15-13.5 A continuous 22.5-20.3 A for 4 seconds (typical)	
Output Power	180 W continuous 270 W for 4 seconds (typical)	
Output Ripple	< 50 mV peak-to-peak at 20 Hz to 20 MHz	
Output Hold-up Time	AC input - 72 ms typical at 100 VAC, 12V, 7.5 A - 31 ms typical at 100 VAC, 12V, 15 A - 72 ms typical at 120 VAC, 12V, 7.5 A - 32 ms typical at 120 VAC, 12V, 15 A - 72 ms typical at 230 VAC, 12V, 7.5 A - 32 ms typical at 230 VAC, 12V, 7.5 A - 31 ms typical at 110 VDC	
Operational Temperature Range	-25°C to +70°C	
Output Derating at Higher Temperature	5 W/°C at +60°C to +70°C	
AC Input Voltage	100-240 VAC ±15%, single-phase	
AC Mains Frequency	50-60 Hz ± 6%	
AC Input Current	1.65 A at 120 VAC 0.93 A at 230 VAC	
AC Power Factor	0.98 A at 120 VAC 0.92 A at 230 VAC	
AC Inrush Current (Over Entire Temperature Range)	10 A peak maximum at 100 VAC 5 A peak typical at 100 VAC 10 A peak maximum at 120 VAC 4 A peak typical at 120 VAC 10 A peak maximum at 230 VAC 7 A peak typical at 230 VAC	
AC Efficiency	91.5% at 120 VAC 91.8% at 230 VAC	
AC Losses	16.7 W at 120 VAC 16.1 W at 230 VAC	
DC Input Voltage	110 to 150 VDC -20%/+25% single-phase	
DC Input Current	1.78 A at 110 VDC	
DC Power Factor	1 or N/A at 110 VDC	
DC Inrush Current	10 A peak maximum 5 A peak typical	
DC Efficiency	91.0% at 110 VDC	

DC Losses	17.8 W at 110 VDC	
Input Protection	Internally fused, non-replaceable fuses. Note: The internal fuse is for an internal fault condition only. Shorts and overload will not cause the fuse to fail.	
Alarm Relay Contact Rating	60 VDC at 0.3 A, 30 VDC at 1 A, 30 VAC at 0.5 A	
Dimensions	Height (max): 12.4 cm (4.9 in.) Width (max): 6.0 cm (2.4 in.) Depth (max): 11.7 cm (4.6 in.)	
Weight	1.98 lb (0.9 kg)	
Approvals	CSA certified to C22.2 No. 60-950 CE EN61326 UL 508, ATEX, IEC-EX	



Wire Type	Input Spring-Clamp Terminals	Output Spring-Clamp Terminals	DC-OK-Signal Spring-Clamp Terminals
Solid Wire	0.5-6 mm ²	0.5-6 mm ²	0.5-6 mm ²
	20-10 AWG	20-10 AWG	20-10 AWG
Stranded Wire	0.5-4 mm ²	0.5-4 mm ²	0.5-4 mm ²
	20-10 AWG	20-10 AWG	20-10 AWG

DeltaV Bulk Power Supply 100-240 VAC to 24 VDC, 5 A

Description	DeltaV Bulk AC to 24 VDC, 5 A Power Supply Specifications	
Output Voltage	24 VDC	
Output Voltage Adjustment Range	24-28 VDC	
Output Current	5-4.5 A continuous 17.5-6.7 A for 4 seconds (typical)	
Output Power	120 W continuous 180 W for 4 seconds (typical)	
Output Ripple	< 50 mV peak-to-peak at 20 Hz to 20 MHz	
Output Hold-up Time	AC input - 66 ms typical at 100 VAC, 24 V, 2.5 A - 34 ms typical at 120 VAC, 24 V, 5 A - 66 ms typical at 120 VAC, 24 V, 2.5 A - 34 ms typical at 120 VAC, 24 V, 5 A - 127 ms typical at 230 VAC, 24 V, 2.5 A - 65 ms typical at 230 VAC, 24 V, 5 A DC input - 34 ms typical at 110 VDC	
Operational Temperature Range	-25°C to + 70°C	
Output Derating at Higher Temperature	3 W/°C at +60°C to +70°C	
AC Input Voltage	100-240 VAC -15% / +10%, single-phase	
AC Mains Frequency	50-60 Hz ± 6%	
AC Input Current	1.10 A at 120 VAC 0.62 A at 230 VAC	
AC Power Factor	0.99 A at 120 VAC 0.91 A at 230 VAC	
AC Inrush Current (Over Entire Temperature Range)	15 A peak maximum at 100 VAC 8 A peak typical at 100 VAC 15 A peak maximum at 120 VAC 9 A peak typical at 120 VAC 15 A peak maximum at 230 VAC 11 A peak typical at 230 VAC	
AC Efficiency	91.0% at 120 VAC 92.7% at 230 VAC	
AC Losses	11.0 W at 120 VAC 9.4 W at 230 VAC	
DC Input Voltage	110-300 VDC ±20%, single-phase	
DC Input Current	1.19 A at 110 VDC	
DC Power Factor	1 or N/A at 110 VDC	
DC Inrush Current	15 A peak maximum 8 A peak typical	
DC Efficiency	91.0% at 110 VDC	

DC Losses	11.9 W at 110 VDC	
Input Protection	Internally fused, non-replaceable fuses. Note: The internal fuse is for an internal fault condition only. Shorts and overload will not cause the fuse to fail.	
Alarm Relay Contact Rating	60 VDC at 0.3 A, 30 VDC at 1 A, 30 VAC at 0.5 A	
Dimensions	Height (max): 12.4 cm (4.9 in.) Width (max): 4 cm (1.6 in.) Depth (max): 11.7 cm (4.6 in.)	
Weight	1.37 lb (0.62 kg)	
Approvals	CSA certified to C22.2 No. 60-950 CE EN61326 UL 508, ATEX, IEC-EX	



Wire Type	Input Spring-Clamp Terminals	Output Spring-Clamp Terminals	DC-OK-Signal Spring-Clamp Terminals
Solid Wire	0.5-6 mm2	0.3-4 mm2	0.3-4 mm2
	20-10 AWG	26-12 AWG	26-12 AWG
Stranded Wire	0.5-4 mm2	0.3-2.5 mm2	0.3-2.5 mm2
	20-10 AWG	26-12 AWG	26-12 AWG

DeltaV Bulk Power Supply 100-240 VAC to 24 VDC, 10 A

Description	DeltaV Bulk AC to 24 VDC, 10 A Power Supply Specifications	
Output Voltage	24 VDC	
Output Voltage Adjustment Range	24-28 VDC	
Output Current	10-9 A continuous 15-13.5 A for 4 seconds (typical)	
Output Power	240 W continuous 360 W for 4 seconds (typical)	
Output Ripple	< 50 mV peak-to-peak at 20 Hz to 20 MHz	
Output Hold-Up Time	AC input - 51 ms typical at 100 VAC, 24 V, 5 A - 26 ms typical at 100 VAC, 24 V, 10 A - 53 ms typical at 120 VAC, 24 V, 5 A - 27 ms typical at 120 VAC, 24 V, 10 A - 55 ms typical at 230 VAC, 24 V, 5 A - 28 ms typical at 230 VAC, 24 V, 10 A DC input - 26 ms typical at 110 VDC	
Operational Temperature Range	-25°C to + 70°C	
Output Derating at Higher Temperature	6 W/°C at +60°C to +70°C	
AC Input Voltage	100-240 VAC ±15%, single-phase	
AC Mains Frequency	50-60 Hz ± 6%	
AC Input Current	2.22 A at 120 VAC 1.22 A at 230 VAC	
AC Power Factor	0.98 A at 120 VAC 0.92 A at 230 VAC	
AC Inrush Current (Over Entire Temperature Range)	10 A peak maximum at 100 VAC 5 A peak typical at 100 VAC 10 A peak maximum at 120 VAC 4 A peak typical at 120 VAC 10 A peak maximum at 230 VAC 7 A peak typical at 230 VAC	
AC Efficiency	92.6% at 120 VAC 93.5% at 230 VAC	
AC Losses	19.1 W at 120 VAC 16.7 W at 230 VAC	
DC Input Voltage	110-150 VDC -20%/+25%, single-phase	
DC Input Current	2.37 A at 110 VDC	
DC Power Factor	1 or N/A at 110 VDC	
DC Inrush Current	10 A peak maximum 5 A peak typical	

DC Efficiency	91.8% at 110 VDC	
DC Losses	21.4 W at 110 VDC	
Input Protection	Internally fused, non-replaceable fuses. Note: The internal fuse is for an internal fault condition only. Shorts and overload will not cause the fuse to fail.	
Alarm Relay Contact Rating	60 VDC at 0.3 A, 30 VDC at 1 A, 30 VAC at 0.5 A	
Dimensions	Height (max): 12.5 cm (4.9 in.) Width (max): 6 cm (2.3 in.) Depth (max): 11.7 cm (4.6 in.)	
Weight	1.98 lb (0.9 kg)	
Approvals	CSA certified to C22.2 No. 60-950 CE EN61326 UL 508, ATEX, IEC-EX	



Wire Type	Input Spring-Clamp Terminals	Output Spring-Clamp Terminals	DC-OK-Signal Spring-Clamp Terminals
Solid Wire	0.5-6 mm ²	0.5-6 mm ²	0.5-6 mm ²
	20-10 AWG	20-10 AWG	20-10 AWG
Stranded Wire	0.5-4 mm ²	0.5-4 mm ²	0.5-4 mm ²
	20-10 AWG	20-10 AWG	20-10 AWG

DeltaV Bulk Power Supply 100-240 VAC to 24 VDC, 20 A

Description	DeltaV Bulk AC to 24 VDC, 20 A Power Supply Specifications	
Output Voltage	24 VDC	
Output Voltage Adjustment Range	24-28 VDC	
Output Current	20-17 A continuous 30-26 A for 4 seconds (typical)	
Output Power	480 W continuous 720 W for 4 seconds (typical)	
Output Ripple	< 100 mV peak-to-peak at 20 Hz to 20 MHz	
Output Hold-Up Time	AC input - 64 ms typical at 100 VAC, 24 V, 10 A - 32 ms typical at 100 VAC, 24 V, 20 A - 64 ms typical at 120 VAC, 24 V, 10 A - 32 ms typical at 120 VAC, 24 V, 20 A - 99 ms typical at 230 VAC, 24 V, 10 A - 51 ms typical at 230 VAC, 24 V, 20 A DC input - 32 ms typical at 110 VDC	
Operational Temperature Range	-25°C to + 70°C	
Output Derating at Higher Temperature	12 W/°C at +60°C to +70°C	
AC Input Voltage	100-240 VAC ±15%, single-phase	
AC Mains Frequency	50-60 Hz ± 6%	
AC Input Current	4.56 A at 120 VAC 2.48 A at 230 VAC	
AC Power Factor	0.95 A at 120 VAC 0.90 A at 230 VAC	
AC Inrush Current (Over Entire Temperature Range)	13 A peak maximum at 100 VAC 11 A peak typical at 100 VAC 13 A peak maximum at 120 VAC 9 A peak typical at 120 VAC 13 A peak maximum at 230 VAC 7 A peak typical at 230 VAC	
AC Efficiency	92.4% at 120 VAC 93.9% at 230 VAC	
AC Losses	39.6 W at 120 VAC 31.4 W at 230 VAC	
DC Input Voltage	110-150 VDC -20%/+25%, single-phase	
DC Input Current	4.6 A at 110 VDC	
DC Power Factor	1 or N/A at 110 VDC	
DC Inrush Current	13 A peak maximum 10 A peak typical	

DC Efficiency	92% at 110 VDC	
DC Losses	41.8 W at 110 VDC	
Input Protection	Internally fused, non-replaceable fuses. Note: The internal fuse is for an internal fault condition only. Shorts and overload will not cause the fuse to fail.	
Alarm Relay Contact Rating	60 VDC at 0.3 A, 30 VDC at 1 A, 30 VAC at 0.5 A	
Dimensions	Height (max): 12.4 cm (4.9 in.) Width (max): 8.2 cm (3.2 in.) Depth (max): 12.7 cm (5 in.)	
Weight	2.65 lb (1.2 kg)	
Approvals	CSA certified to C22.2 No. 60-950 CE EN61326 UL 508, ATEX, IEC-EX	



Bistable, quick-connect spring-clamp terminals with IP20 finger-safe construction are used. The terminals are shipped in the open position and suitable for field installation.

Wire Type	Input Spring-Clamp Terminals	Output Spring-Clamp Terminals	DC-OK-Signal Spring-Clamp Terminals
Solid Wire	0.5-6 mm ²	0.5-6 mm ²	0.3-4 mm ²
	20-10 AWG	20-10 AWG	26-12 AWG
Stranded Wire	0.5-4 mm ²	0.5-4 mm ²	0.3-2.5 mm ²
	20-10 AWG	20-10 AWG	26-12 AWG

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DeltaV Bulk Power Supply 100-240 VAC to 24 VDC, 40 A

Description	DeltaV Bulk AC to 24 VDC, 40 A Power Supply Specifications
Output Voltage	24 VDC
Output Voltage Adjustment Range	24-28 VDC
Output Current	40-34.3 A continuous 60-51.5 A for 4 seconds (typical)
Output Power	960 W continuous 1440 W for 4 seconds (typical)
Output Ripple	< 100 mV peak-to-peak at 20 Hz to 20 MHz
Output Hold-Up Time	AC input - 54 ms typical at 100 VAC, 24 V, 20 A - 27 ms typical at 100 VAC, 24 V, 40 A - 54 ms typical at 120 VAC, 24 V, 20 A - 27 ms typical at 120 VAC, 24 V, 40 A - 54 ms typical at 230 VAC, 24 V, 20 A - 27 ms typical at 230 VAC, 24 V, 40 A
Operational Temperature Range	-25°C to + 70°C
Output Derating at Higher Temperature	24 W/°C at +60°C to +70°C
AC Input Voltage	100-240 VAC -15%/+10%, single-phase
AC Mains Frequency	50-60 Hz ± 6%
AC Input Current	8.6 A at 120 VAC 4.5 A at 230 VAC
AC Power Factor	0.99 A at 120 VAC 0.99 A at 230 VAC
AC Inrush Current (Over Entire Temperature Range)	25 A peak maximum at 100 VAC 18 A peak typical at 100 VAC 22 A peak maximum at 120 VAC 16 A peak typical at 120 VAC 16 A peak maximum at 230 VAC 9 A peak typical at 230 VAC
AC Efficiency	93.6% at 120 VAC 94.6% at 230 VAC
AC Losses	65.6 W at 120 VAC 54.8 W at 230 VAC
Input Protection	Internally fused, non-replaceable fuses. Note: The internal fuse is for an internal fault condition only. Shorts and overload will not cause the fuse to fail.
Alarm Relay Contact Rating	60 VDC at 0.3 A, 30 VDC at 1 A, 30 VAC at 0.5 A

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Dimensions	Height (max): 12.4 cm (4.9 in.) Width (max): 12.5 cm (4.92 in.) Depth (max): 12.7 cm (5 in.)
Weight	4.2 lb (1.9 kg)
Approvals	CSA certified to C22.2 No. 60-950 CE EN61326 UL 508, ATEX, IEC-EX



Wire Type	Input	Output	DC-OK-Signal
	Screw	Screw	Spring-Clamp
	Terminals	Terminals	Terminals
Solid Wire	0.5-6 mm ²	0.5-16 mm²	0.15-1.5 mm ²
	20-10 AWG	22-8 AWG	26-14 AWG
Stranded Wire	0.5-4 mm ²	0.5-10 mm ²	0.15-1.5 mm ²
	20-10 AWG	22-8 AWG	26-14 AWG

DeltaV Bulk Power Supply Redundancy Module, 12 VDC to 48 VDC, 20 A

Description	Redundancy Module 12 to 48 VDC, 20 A Specifications
Input Voltage	12-48 VDC ± 25%
Input Voltage Range	9-60 VDC
Input Current	2x 0-10 A continuous 2x 0-16 A for 5 seconds
Output Current	0-20 A continuous 20-32 A for 5 seconds 25 A continuous overload/short circuit
Input to Output Voltage Drop	0.78 VDC at 2x 5 A input (typical) 0.85 VDC at 1x 10 A input (typical) 0.85 VDC at 2x 10 A input (typical)
Power Losses	0 W at no load (typical) 7.8 W at 2x 5 A input (typical) 8.5 W at 1x 10 A input (typical) 17 W at 2x 10 A input (typical)
Temperature Range	-40°C to +70°C operational
Derating	0.5 A /°C at +60°C to +70°C
Dimensions	Height (max): 12.4 cm (4.9 in.) Width (max): 3.2 cm (1.25 in.) Depth (max): 10.2 cm (4.0 in.)
Weight	0.64 lb (0.29 kg)
Approvals	CSA certified to C22.2 No. 60-950 CE EN61326 UL 508, ATEX, IEC-EX



Terminals and wiring

Wire Type	Input Spring-Clamp Terminals	Output Spring-Clamp Terminals
Solid Wire	0.5-6 mm ² 20-10 AWG	0.5-6 mm ² 20-10 AWG
Stranded Wire	0.5-4 mm ² 20-10 AWG	0.5-4 mm ² 20-10 AWG

DeltaV Bulk Power Supply Redundancy Module, 12 VDC to 28 VDC, 40 A

Description	Redundancy Module 12 to 28 VDC, 40 A Specifications	
Input Voltage	12-28 VDC ± 30%	
Input Voltage Range	16.8-36.4 VDC	
Input Current	2x 0-20 A continuous	
	2x 0-20-32.5 A for 5 seconds	
Output Current	0-40 A continuous	
	40-65 A for 5 seconds	
	65 A continuous overload/short circuit	
Input to Output Voltage Drop	72 mV at 2x 10 A input (typical)	
	112 mV at 1x 20 A input (typical)	
	140 mV at 2x 20 A input (typical)	
Power Losses	700 mW at no load (typical)	
	2.15 W at 2x 10 A input (typical)	
	2.65 W at 1x 20 A input (typical)	
	6.3 W at 2x 20 A input (typical)	
Temperature Range	-40°C to +70°C operational, no derating required	
Dimensions	Height (max): 12.4 cm (4.9 in.)	
	Width (max): 3.6 cm (1.4 in.)	
	Depth (max): 12.7 cm (5.0 in.)	
Weight	0.75 lb (0.34 kg)	
Approvals	CSA certified to C22.2 No. 60-950	
	CE EN61326	
	UL 508, ATEX, IEC-EX	



Terminals and wiring

Wire Type	Input Screw Terminals	Output Screw Terminals
Solid Wire	0.5-6 mm ²	0.5-16 mm ²
	20-10 AWG	22-8 AWG
Stranded Wire	0.5-4 mm ²	0.5-10 mm ²
	20-10 AWG	22-8 AWG

DeltaV Bulk Power Supply Redundancy Module, 12 VDC to 28 VDC, 80 A

Description	Redundancy Module 12 to 28 VDC, 80 A Specifications	
Input Voltage	12-28 VDC ± 30%	
Input Voltage Range	16.8-36.4 VDC	
Input Current	2x 0-40 A continuous	
	2x 0-40-65 A for 5 seconds	
Output Current	0-80 A continuous	
	80-130 A for 5 seconds	
	130 A continuous overload/short circuit	
Input to Output Voltage Drop	49 mV at 2x 20 A input (typical)	
	85 mV at 1x 40 A input (typical)	
	95 mV at 2x 40 A input (typical)	
Power Losses	700 mW at no load (typical)	
	2.7 W at 2x 20 A input (typical)	
	3.6 W at 1x 40 A input (typical)	
	8.3 W at 2x 40 A input (typical)	
Temperature Range	-40°C to +70°C operational, no derating required	
Dimensions	Height (max): 12.4 cm (4.9 in.) Width (max): 4.6 cm (1.8 in.)	
	Depth (max): 12.7 cm (5.0 in.)	
Weight	0.97 lb (0.44 kg)	
Approvals	CSA certified to C22.2 No. 60-950	
	CE EN61326	
	UL 508, ATEX, IEC-EX	



Terminals and wiring

Bistable, quick-connect spring-clamp terminals with IP20 finger-safe construction are used. The terminals are shipped in the open position and suitable for field installation.

Terminals and wiring

Wire Type	Input Screw Terminals	Output Screw Terminals
Solid Wire	0.5-16 mm ² 22-8 AWG	0.5-35 mm ² 20-2 AWG
	22-8 AVVG	20-2 AVVG
Stranded Wire	0.5-10 mm ²	0.5-35 mm ²
	22-8 AWG	20-2 AWG

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Ordering Information

Description	Model Number
DeltaV Bulk Power Supply 100-240 VAC to 12 VDC,	VE5021
15 A with certifications for Hazardous Areas as well as Marine (GL)	KJ1503X1-BA1 (12P7632X012)
DeltaV Bulk Power Supply 100-240 VAC to 24 VDC,	VE5022
5 A with certifications for Hazardous Areas as well as Marine (GL)	KJ1503X1-BB1 (12P7633X012)
DeltaV Bulk Power Supply 100-240 VAC to 24 VDC,	VE5023
10 A with certifications for Marine (GL) (for Safe area installation only)	
DeltaV Bulk Power Supply 100-240 VAC to 24 VDC,	VE5024
10 A with certifications for Hazardous Areas as well as Marine (GL)	KJ1503X1-BB2 (12P7634X012)
DeltaV Bulk Power Supply 100-240 VAC to 24 VDC,	VE5026
20 A with certifications for Marine (GL) (for Safe area installation only)	
DeltaV Bulk Power Supply 100-240 VAC to 24 VDC,	VE5027
20 A with certifications for Hazardous Areas as well as Marine (GL)	KJ1503X1-BB3 (12P7635X012)
DeltaV Bulk Power Supply 100-240 VAC to 24 VDC,	VE5028
40 A with certifications for Marine (GL) (for Safe area installation only)	
DeltaV Bulk Power Supply 100-240 VAC to 24 VDC,	VE5029
40 A with certifications for Hazardous Areas as well as Marine (GL)	KJ1503X1-BB4 (12P7636X012)
DeltaV Bulk Power Supply Redundancy Module,	VE5031
12-48 VDC 20 A with certifications for Hazardous Areas as well as Marine (GL)	KJ1503X1-BC1 (12P7637X012)
DeltaV Bulk Power Supply Redundancy Module,	VE5032
12-28 VDC 40 A with certifications for Hazardous Areas as well as Marine (GL)	KJ1503X1-BD1 (12P7638X012)
DeltaV Bulk Power Supply Redundancy Module,	VE5033
12-28 VDC 80 A with certifications for Hazardous Areas as well as Marine (GL)	KJ1503X1-BD2 (12P7639X012)

Emerson Process Management

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