Voltage-Dip Proofing Inverters™ & Voltage-Dip Compensators™

prevent production down time caused by momentary voltage sags and interruptions.

switching systems
ELECTRONIC ENGINEERS

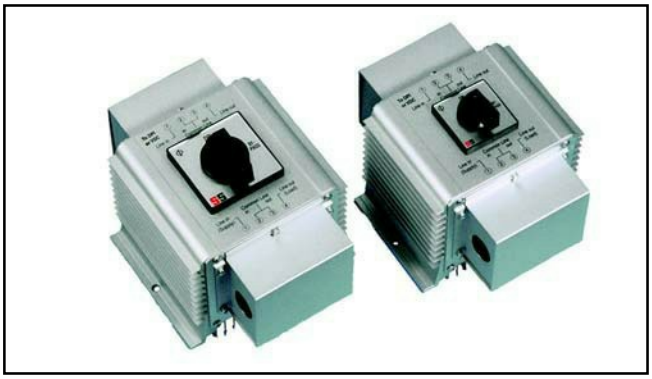
Leaders in :

Voltage-Dip Proofing

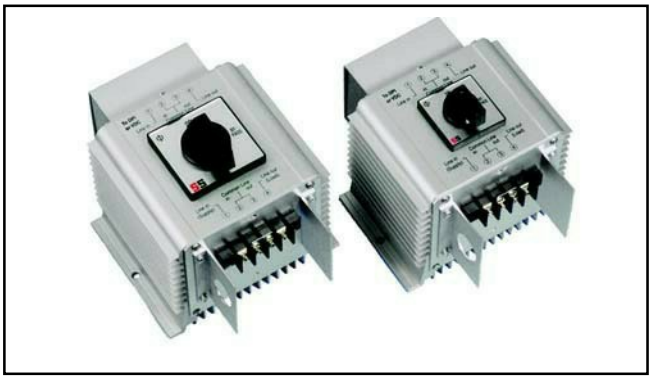
Earth Continuity Monitoring

Contents

Accessories



Bypass Switches 4 term, 40 & 10 amp



Bypass Switches 4 term, 40 & 10 amp

Voltage Sag Simulator

Foreword

Switching Systems was founded in 1971 by F.V. Fischer. Over the past three decades we have established ourselves as leading designers and manufacturers of intrinsically safe, ground continuity monitors and voltage-dip proofing systems.

All our products are manufactured to comply with various industry standards. We have a sophisticated research and development laboratory for application specific projects.

Our staff is a team dedicated to providing product quality and service excellence. An innovative spirit and continuous product improvement ensures the reliability of all our products.

Switching Systems is represented in the U.S.A. by Dip-Proofing Technologies Inc. who manage exports, North American sales, technical support and service for our range of Voltage-Dip Proofing Inverters & Voltage-Dip Compensators. Dip-Proofing Technologies Inc. is dedicated to providing cost effective solutions to power quality problems caused by sags and momentary power interruptions.

We look forward to being of service to you.

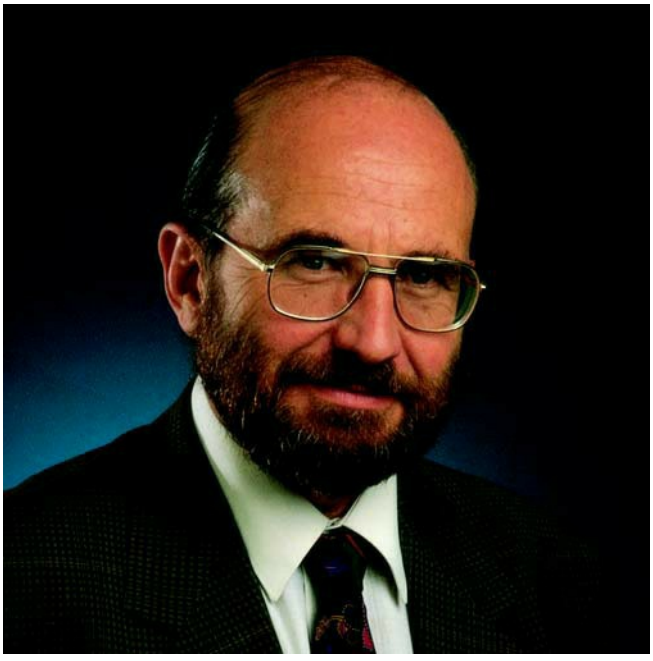
F. V. Fischer
Managing Director

Your representative is :

Other products

Ground Continuity Monitor & Filter

Pilot Wire Control Relays & Accessories



F. V. Fischer Managing Director Switching Systems

Power Quality Problems

A brief introduction

Voltage dips/sags & momentary interruptions defined.

An interconnected power system will, in the normal course of operation, experience short duration voltage dips/sags and momentary interruptions. A momentary voltage dip or sag can be defined as a reduction in the rms value of the supply voltage with duration of up to 3 seconds. A momentary interruption can be defined as a complete loss of supply voltage with duration of up to 3 seconds.

Causes of momentary Voltage Dips/ Sags & Interruptions.

These events may occur naturally as a result of lightning strikes on high tension lines, flashovers caused by fires under the line, dirty insulators, snow storms, overgrown vegetation or animals. Disconnecting the supply to extinguish the arc and then reconnecting normally clears these types of fault. This process is known as auto re-closing and results in a momentary supply interruption. The most common artificial causes are heavy load switching, starting large motors and internal short circuits.

SEMI F47 standard.

The semiconductor industry formulated the F47 standard in order to define a common level of voltage sag immunity for semiconductor manufacturing equipment. The standard requires the equipment to function correctly when subjected to a variable depth supply voltage sag with a maximum depth of 50% and a duration of 1 second. Manufacturers of semiconductor tools design the equipment to meet the F47 sag immunity standard.

The ITIC Curve

The Computer and Business Equipment Manufacturers Association (CBEMA) collected data and a curve was developed as a reference for the ride through capability of data processing equipment. Subsequently The Information Technology Industry Council (ITIC) updated this curve. The curve shows that a voltage sag of 30% (supply drops to 70% of nominal value) will adversely affect equipment operation.

Problem overview

Power Quality studies have been carried out for some time and a large volume of data has been collected and analyzed. Briefly, the data shows that a distribution customer experiences over 50 events per annum where the supply voltage sags below 90% of nominal. The majority of sags have a duration of 166ms (10Hz) or less with a depth of 20 to 30% (supply drops to 80-70% of nominal value). It should be noted that the number and magnitude of events experienced can vary greatly from one location to another also distribution customers will be subjected to considerably more events than a customer fed directly from the transmission grid or via a premium grid. It is important to note that even premium grid users experience momentary sags and interruptions. Faults anywhere in the power system will cause momentary sags with a duration determined by fault clearing devices. Circuit breakers can take up to 100ms to clear a fault in a transmission system and auto re closing from 300ms to 3 seconds. Fault clearing in a distribution system can take considerably longer, the actual time depending on the substation protection equipment settings. It is clear that all power users will experience power quality events and if their business depends on continuous production processes they can expect process disruptions due to voltage dips and momentary interruptions.

We offer cost effective solutions to these problems!

Power Quality Solutions:

Voltage Dip Proofing Inverter

Our Voltage-Dip Proofing Inverters offer a low cost *maintenance free* solution to production line stoppages caused by short power interruptions. Energy storage capacitors eliminate the need for battery maintenance and hazardous waste disoposal.

The inverters can withstand large surge currents and are therefore ideally suited for contactor operation. When specifying an inverter only the nominal load VA needs to be considered, in contrast a UPS system must be specified for the peak load.

With a power factor range of cosF from 1 to 0 the inverters can supply highly inductive loads such as contactors, starters and relays.

The inverters are easy to incorporate during the manufacture of new switchgear and, due to their small physical size, existing switchgear can be retrofitted without difficulty.

The Voltage-Dip Proofing Inverter can be used in any continuous process plant which is susceptible to short power interruptions or voltage dips and, in particular, when the restart of such process is complex and costly.

A single phase voltage dip on a three phase system would have little effect on the motors, however if the motor controls are fed by this phase, then the contactors would drop out causing the plant to shut down unnecessarrily.

When compared to other products that offer a solution, such as PLC's or DC contactors, the Voltage-Dip Proofing Inverter is up to five times more cost effective and offers much simpler integration into existing systems. Compared to a UPS system, long term costs are lower, the DPI is more robust and better suited to coping with industrial enviornments. Compared to CVT's, the DPI is more tolerant of variable loads, provides longer ride-through and more accurate control.

Voltage Dip Compensator

The reliability of electrical power to industry is in general very high, nevertheless, voltage sags or dips do occur. These instabilities are caused by short circuits, lightning strikes on overhead power lines and heavy load switching. The duration of such faults is generally shorter than one second. Power Quality data shows that voltage sags with a maximum depth of around 50% constitute 92% of all events.

Most plant can ride through such voltage dips by virtue of their mechanical and electrical inertia. However, this is not the case with electrically held-in contactors and relays that control the machinery. Contactors typically drop out from 5ms to 20ms after power is removed. Each short voltage dip now becomes a power failure and the plant must be restarted. This can be complicated, time-consuming and costly.

Our Voltage Dip Compensators are designed to maintain the switchgear control voltage during voltage sags, effectively keeping the plant connected. The stored electrical and magnetic energy is allowed to flow, supporting the mechanical inertia of the machinery. When the supply recovers after a short voltage dip, the plant is still running at near synchronous speed, the inrush currents will be small and the stress to the system minimal. The VDC provides an economic solution for users who need their equipment to comply with the Semi F47 standard for voltage sag immunity.

Historically, this problem has been addressed by using DC contactors, latched contactors and intelligent controls such as PLC's. These systems are complex and expensive and do not provide a solution for equipment already in service. The current approach to this problem has been to employ intelligent control systems that provide a curative solution. In contrast, the Voltage Dip Compensator, is a preventative solution.

DPI Specifications

	120V MODELS												
	DPI53S6.6mF120V2A	DPI53S13.2mF120V4A	DPI53S19.8mF120V6A	DPI53S39.6mF120V8A	DPI53L33mF120V25A	DPI53L66mF120V25A	DPI53L99mF120V25A	DPI53L198mF120V25A	DPI53L297mF120V25A	DPI53L396mF120V25A	DPI53L495mF120V25A	DPI53L594mF120V25A	DPI53L693mF120V25A
AC INPUT SUPPLY													
Single phase supply voltage:	120V 50/60Hz												
Maximum input voltage:	+10%												
Full load current (A):	2A	4A	6A	8A	25A								
STATIC SWITCH													
Nominal off-state voltage:	150Vac RMS												
Peak off-state voltage:	800V												
Nominal current (A):	2A	4A	6A	8A	25A								
Short time overload current (<100ms):	30A				60A								
Non-repetitive peak on-state current (10ms):	170A				700A								
INVERTER													
Nominal output voltage:	120Vac RMS												
Voltage fluctuations over full operating range:	±10%												
Nominal load current (A):	2A	4A	6A	8A	25A								
Overload current (A):	9A				30A								
Power factor range:	cos Φ from 1 to 0												
Wave shape:	Stepped square												
Nominal load (VA):	240	480	720	960	3000								
Storage capacitors (F):	.0066	.0132	.0198	.0396	.033	.066	.099	.198	.297	.396	.495	.594	.693
Usable stored energy factor ( ):	0.47				0.52								
Minimum up-time as function of the load (t):	t = (η*Ccap*Vsupply) / (Iload*cos Φ)												
Output frequency:	50/60Hz ±1%												
Maximum recovery time of capacitors to 95% Vin:	0.5s	1.1s	1.6s	2.4s	0.6s	1.2s	1.8s	3.6s	5.4s	7.3s	9s	10.8s	12s
SETTINGS													
Timer range & setting:	0.05 to 3.15s in 0.05s steps												
Transfer level range & setting:	90% to 65% of calibrated supply voltage V_{cal} in 5% steps												
INDICATORS													
System OK:	green LED												
Inverter running:	red LED												
TEMPERATURE													
Maximum ambient working temperature:	45°C (113°F)												
CUBICLE													
Construction:	Extruded Aluminum												
Height (mm) (Dim. L3 on p13):	190	190	190	306	284	284	284	454	544	634	724	814	904
Height (in) (Dim. L3 on p13):	7.48	7.48	7.48	12.05	11.18	11.18	11.18	17.87	21.42	24.96	28.5	32.05	35.59
Width mm (in):	150 (5.90)				350 (13.78)								
Depth mm (in):	110 (4.33)				231 (9.09)								
Mass (kg):	1.6	1.8	2.0	3.9	8.7	10	11.5	19	25	31	37	43	49
Mass (lbs):	3.50	3.90	4.40	8.60	19.1	22	25.3	41.8	55	68.2	81.4	94.6	108
CONNECTION													
Cable, Copper panel wire:	$2mm^2$ (14 AWG)				$5mm^2$ (10AWG)								
Screw terminal torque:	1.76 Nm (15.6 lb-in)												
LISTINGS													

WARNING

Risk of electric shock! Dangerously high voltages can be present up to 2 hours after the DPI has been disconnected. NEVER attempt maintainance on the DPI during this period unless storage capacitors have been manually discharged.

DPI Specifications

	208 / 230V MODELS													
	DPI53S2.04mF230V2A	DPI53S4.08mF230V4A	DPI53S6.12mF230V6A	DPI53S12.24mF230V8A	DPI53L15mF230V25A	DPI53L30mF230V25A	DPI53L45mF230V25A	DPI53L90mF230V25A	DPI53L135mF230V25A	DPI53L180mF230V25A	DPI53L225mF230V25A	DPI53L270mF230V25A	DPI53L315mF230V25A	
AC INPUT SUPPLY														
Single phase supply voltage:	230V 50/60Hz													
Maximum input voltage:	+10%													
Full load current (A):	2A	4A	6A	8A	25A									
STATIC SWITCH														
Nominal off-state voltage:	250Vac RMS													
Peak off-state voltage:	800V													
Nominal current (A):	2A	4A	6A	8A	25A									
Short time overload current (<100ms):	30A				60A									
Non-repetitive peak on-state current (10ms):	170A				700A									
INVERTER														
Nominal output voltage:	230Vac RMS													
Voltage fluctuations over full operating range:	±10%													
Nominal load current (A):	2A	4A	6A	8A	25A									
Overload current (A):	9A				30A									
Power factor range:	cos Φ from 1 to 0													
Wave shape:	Stepped square													
Nominal load (VA):	460	920	1380	1840	5750									
Storage capacitors (F):	.00204	.00408	.00612	.01224	.015	.030	.045	.090	.135	.180	.225	.270	.315	
Usable stored energy factor ( ):	0.53				0.55									
Minimum up-time as function of the load (t):	t = (η*Ccap*Vsupply) / (Iload*cos Φ)													
Output frequency:	50/60Hz ±1%													
Maximum recovery time of capacitors to 95% Vin:	0.6s	1.4s	2.0s	3.0s	1.0s	2.1s	3.2s	8.0s	8.0s					
SETTINGS														
Timer range & setting:	0.05 to 3.15s in 0.05s steps													
Transfer level range & setting:	90% to 65% of calibrated supply voltage V_{cal} in 5% steps													
INDICATORS														
System OK:	green LED													
Inverter running:	red LED													
TEMPERATURE														
Maximum ambient working temperature:	45°C (113°F)													
CUBICLE														
Construction:	Extruded Aluminum													
Height (mm) (Dim. L3 on p13):	190	190	190	306	284	284	284	454	544	634	724	814	904	
Height (in) (Dim. L3 on p13):	7.48	7.48	7.48	12.05	11.18	1.18	11.18	17.87	21.42	24.96	28.50	32.05	35.59	
Width mm (in):	150 (5.90)				350 (13.78)									
Depth mm (in):	110 (4.33)				231 (9.09)									
Mass (kg):	1.6	1.8	2.0	3.9	9	11	12	21	28	35	41	48	55	
Mass (lbs):	3.5	3.9	4.4	8.6	19.8	24.2	26.4	46.2	61.6	77	90.2	105.6	121	
CONNECTION														
Cable, Copper panel wire:	$2mm^2$ (14 AWG)				$5mm^2$ (10AWG)									
Screw terminal torque:	1.76 Nm (15.6 lb-in)													
LISTINGS														

WARNING

Risk of electric shock! Dangerously high voltages can be present up to 2 hours after the DPI has been disconnected.
NEVER attempt maintainance on the DPI during this period unless storage capacitors have been manually discharged.

VDC Specifications

	120V MODELS													
	VDC S4T1K120		VDC S6T1K120		VDC L4T3K120		VDC L6T3K120							
AC INPUT SUPPLY														
Single phase supply voltage 50/60Hz:	120V													
Maximum input voltage:	+10%													
Minimum input voltage:	-50%		-64%		-50%		-64%							
Full load current (A RMS):	8.5A		8.5A		24A		24A							
Maximum surge current for 3 seconds duration:	550A													
AC OUTPUT														
Nominal output voltage:	120V													
Voltage fluctuations over full operating range:	± 10%													
Nominal load current (A):	8.5A		8.5A		24A		24A							
Power factor range:	cos from 1 to 0													
Wave shape:	Sinusoidal													
Nominal load (VA):	1000		1000		3000		3000							
Maximum up-time (sec):														
Timer control:	3.15s													
I^2t control:	See Figs 9 & 10 p12													
Overload current limit (A RMS):	12A		12A		35A		35A							
Short circuit current limit (A RMS):	30A		30A		75A		75A							
TIMER														
Range:	0.05 to 3.15s													
Setting:	0.05s steps													
INDICATORS														
System OK:	green LED													
Compensator running:	red LED													
TEMPERATURE														
Maximum ambient working temperature:	45°C (113°F)													
CUBICLE														
Construction:	Extruded Aluminum													
Height (mm) (Dim. L3 on p10):	280		305		273		273							
Height (in) (Dim. L3 on p10):	11.02		12.07		10.75		10.75							
Width mm (in):	150 (5.90)				311 (12.24)									
Depth mm (in):	110 (4.33)				162 (6.38)									
Mass (kg):	5.0		5.0		9.0		9.0							
Mass (lbs):	11.0		11.0		19.8		19.8							
CONNECTION														
Cable, Copper panel wire; size mm^2:	$2mm^2$				$5mm^2$									
Cable, Copper panel wire; size AWG:	14 AWG				10 AWG									
Screw terminal torque Nm (lb-in):	1.76Nm (15.6lb-n)													
LISTINGS														
STANDARDS SUPPORTED														
SEMI F47:	Semiconductor processing equipment voltage sag immunity.													

The VDC family is designed for applications that must meet the SEMI F47 Voltage Sag Immunity Standard for Semiconductor Processing Equipment and where size and cost are critical factors.

VDC Specifications

	208 / 220 /230V MODELS													
	VDC S4T1K208	VDC S6T1K208	VDC L4T5K208	VDC L6T5K208	VDC S4T1K220	VDC S6T1K220	VDC L4T5K220	VDC L6T5K220	VDC S4T1K230	VDC S6T1K230	VDC L4T5K230	VDC L6T5K230		
AC INPUT SUPPLY														
Single phase supply voltage 50/60Hz:	208V				220V				230V					
Maximum input voltage:	+10%													
Minimum input voltage:	-50%	-64%	-50%	-64%	-50%	-64%	-50%	-64%	-50%	-64%	-50%	-64%		
Full load current (A RMS):	4.8A		24A		4.6A		22.7A		4.3A		21.7A			
Maximum surge current for 3 cycles duration:	550A													
AC OUTPUT														
Nominal output voltage (V):	208V				220V				230V					
Voltage fluctuations over full operating range:	± 10%													
Nominal load current (A):	4.8A		24A		4.6A		22.7A		4.3A		21.7A			
Power factor range:	cos from 1 to 0													
Wave shape:	Sinusoidal													
Nominal load (VA):	1000		5000		1000		5000		1000		5000			
Maximum up-time (sec):														
Timer control:	3.15s													
I^2t control:	See Figs 9 & 10 p12													
Overload current limit (A RMS):	12A		28A		12A		28A		12A		28A			
Short circuit current limit (A RMS):	35A		75A		35A		75A		35A		75A			
TIMER														
Range:	0.05 to 3.15s													
Setting:	0.05s steps													
INDICATORS														
System OK:	green LED													
Compensator running:	red LED													
TEMPERATURE														
Maximum ambient working temperature:	45°C (113°F)													
CUBICLE														
Construction:	Extruded Aluminum													
Height (mm) (Dim. L3 on p10):	280	304	293		280	304	293		280	304	293			
Height (in) (Dim. L3 on p10):	11.02	11.97	11.54		11.02	11.97	11.54		11.02	11.97	11.54			
Width mm (in):	150 (5.90)		311 (12.24)		150 (5.90)		311 (12.24)		150 (5.90)		311 (12.24)			
Depth mm (in):	110 (4.33)		162 (6.38)		110 (4.33)		162 (6.38)		110 (4.33)		162 (6.38)			
Mass (kg):	5.0		9.0		5.0		9.0		5.0		9.0			
Mass (lbs):	11.0		19.8		11.0		19.8		11.0		19.8			
CONNECTION														
Cable, Copper panel wire; size mm^2:	$2mm^2$		$5mm^2$		$2mm^2$		$5mm^2$		$2mm^2$		$5mm^2$			
Cable, Copper panel wire; size AWG:	14AWG		10AWG		14AWG		10AWG		14AWG		10AWG			
Screw terminal torque Nm (lb-in):	1.76Nm (15.6lb-in)													
LISTINGS														
STANDARDS SUPPORTED														
SEMI F47:	Semiconductor processing equipment voltage sag immunity.													

The VDC S6T & L6T series should be used for critical applications where support down to 37% of nominal supply voltage is needed.

DPI Specifications:

Mechanical

Mechanical Construction

53 S series - The DPI case is made from extruded aluminium sections. The four parts that make up the case are interlocked and secured by screws. To remove the front cover unscrew four screws : the two top screws from the end plate where the terminal block is located and the two bottom screws from the other end plate. Slide the front cover away from the terminal block. Note that there are no userservicable parts inside the unit. All adjustment points are marked on the top cover plate and can be reached by removing the two screws securing the main label.

53 L series - The DPI case is made from extruded aluminium sections. The six parts that make up the case are interlocked and secured by screws. To remove the front cover unscrew five screws : one from the front cover and two each from the top and bottom end plates. Units are supplied with four or six mounting brackets depending on the case length. The bracket positions are adjustable along the length of the case (Dim. L1 & L6). Note that there are no userservicable parts inside the unit. All adjustment points are marked on the top cover plate and can be reached by removing the two screws securing the main label.

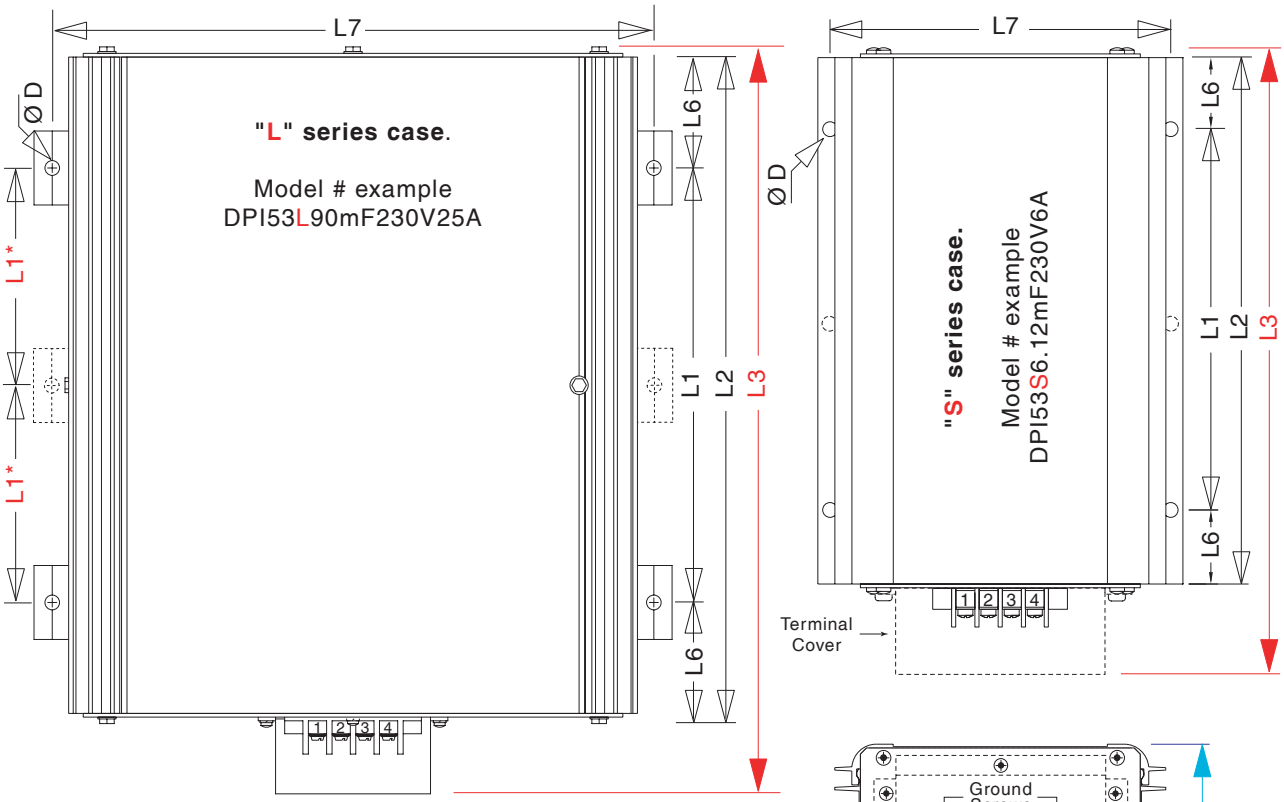
Dimension Table

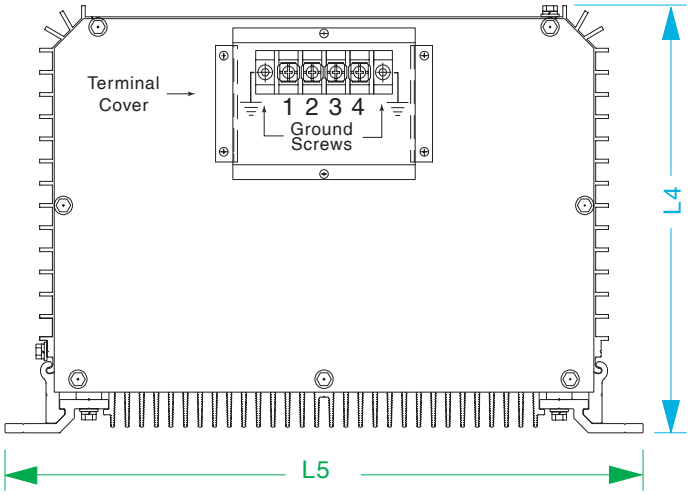
Model	DPI53 Series Dimensions mm (inches)							
	L1	L2	L3	L4	L5	L6	L7	D
DPI53S6.6mF120V2A	0 (0)	141 (5.55)	190 (7.48)	110 (4.33)	150 (5.90)	70.5 (2.78)	140 (5.50)	6.0 (0.24)
DPI53S13.2mF120V4A	0 (0)	141 (5.55)	190 (7.48)					
DPI53S19.8mF120V6A	0 (0)	141 (5.55)	190 (7.48)					
DPI53S39.6mF120V8A	197 (7.76)	257 (10.12)	306 (12.05)			30 (1.18)		
DPI53L33mF120V25A	115 (4.53)	235 (9.25)	284 (11.18)	231 (9.09)	350 (13.78)	60 (2.36)	330 (12.99)	8.0 (0.31)
DPI53L66mF120V25A								
DPI53L99mF120V25A								
DPI53L198mF120V25A	240 (9.45)	360 (14.17)	409 (16.10)					
DPI53L297mF120V25A	331 (13.03)	451 (17.76)	500 (19.69)					
DPI53L396mF120V25A	422 (16.61)	542 (21.33)	591 (23.27)					
DPI53L495mF120V25A	513 (20.20)*	633 (24.92)	682 (26.85)					
DPI53L594mF120V25A	604 (23.78)*	724 (28.50)	773 (30.43)					
DPI53L693mF120V25A	695 (27.36)*	815 (32.08)	864 (34.02)					
DPI53S2.04mF230V2A	0 (0)	141 (5.55)	190 (7.48)	110 (4.33)	150 (5.90)	70.5 (2.78)	140 (5.50)	6.0 (0.24)
DPI53S4.08mF230V4A	0 (0)	141 (5.55)	190 (7.48)					
DPI53S6.12mF230V6A	0 (0)	141 (5.55)	190 (7.48)					
DPI53S12.24mF230V8A	197(7.76)	257 (10.12)	306 (12.05)			30 (1.18)		
DPI53L15mF230V25A	115 (4.53)	235 (9.25)	284 (11.18)	231 (9.09)	350 (13.78)	60 (2.36)	330 (12.99)	8.0 (0.31)
DPI53L30mF230V25A								
DPI53L45mF230V25A								
DPI53L90mF230V25A	240 (9.45)	360 (14.17)	409 (16.10)					
DPI53L135mF230V25A	331 (13.03)	451 (17.76)	500 (19.69)					
DPI53L180mF230V25A	422 (16.61)	542 (21.33)	591 (23.27)					
DPI53L225mF230V25A	513 (20.20)*	633 (24.92)	682 (26.85)					
DPI53L270mF230V25A	604 (23.78)*	724 (28.50)	773 (30.43)					
DPI53L315mF230V25A	695 (27.36)*	815 (32.08)	864 (34.02)					

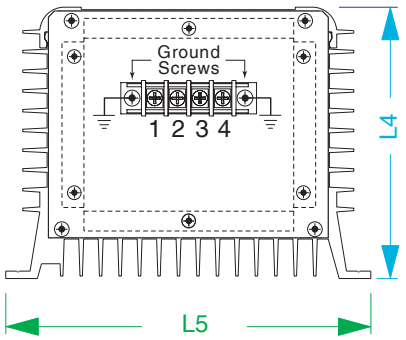
* Indicates 6 mounting brackets; dimension L1* = L1/2

DPI Specifications:

Mechanical outline

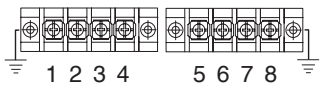






Note 1:
Terminal cover shown dashed.
Note 2:
Terminal #1 - Line in (Supply)
Terminal #2 - Common line in
Terminal #3 - Common line out
Terminal #4 - Line out (Load)
Note 3:
Mounting bracket spacing is adjustable.
Some longer units are supplied with 6.

Terminal block for 53L series options.



Terminal #1 - Line in (Supply)
Terminal #2 - Common line in
Terminal #3 - Common line out
Terminal #4 - Line out (Load)
Terminal #5 - Unit Faulty n/o
Terminal #6 - Unit Faulty n/o
Terminal #7 - Event Detection n/o
Terminal #8 - Event Detection n/o

Terminal block for 53S series option.

Terminal #1 - Line in (Supply)
Terminal #2 - Common line in / out
Terminal #3 - Line out (Load)
Terminal #4 - Unit Faulty n/o
Terminal #5 - Unit Faulty n/o

VDC Specifications:

Mechanical

Mechanical Construction

VDC S series - The VDC case is made from extruded aluminium sections. The four parts that make up the case are interlocked and secured by screws. To remove the front cover unscrew four screws : the two top screws from the end plate where the terminal block is located and the two bottom screws from the other end plate. Slide the front cover away from the terminal block to access adjustment area.

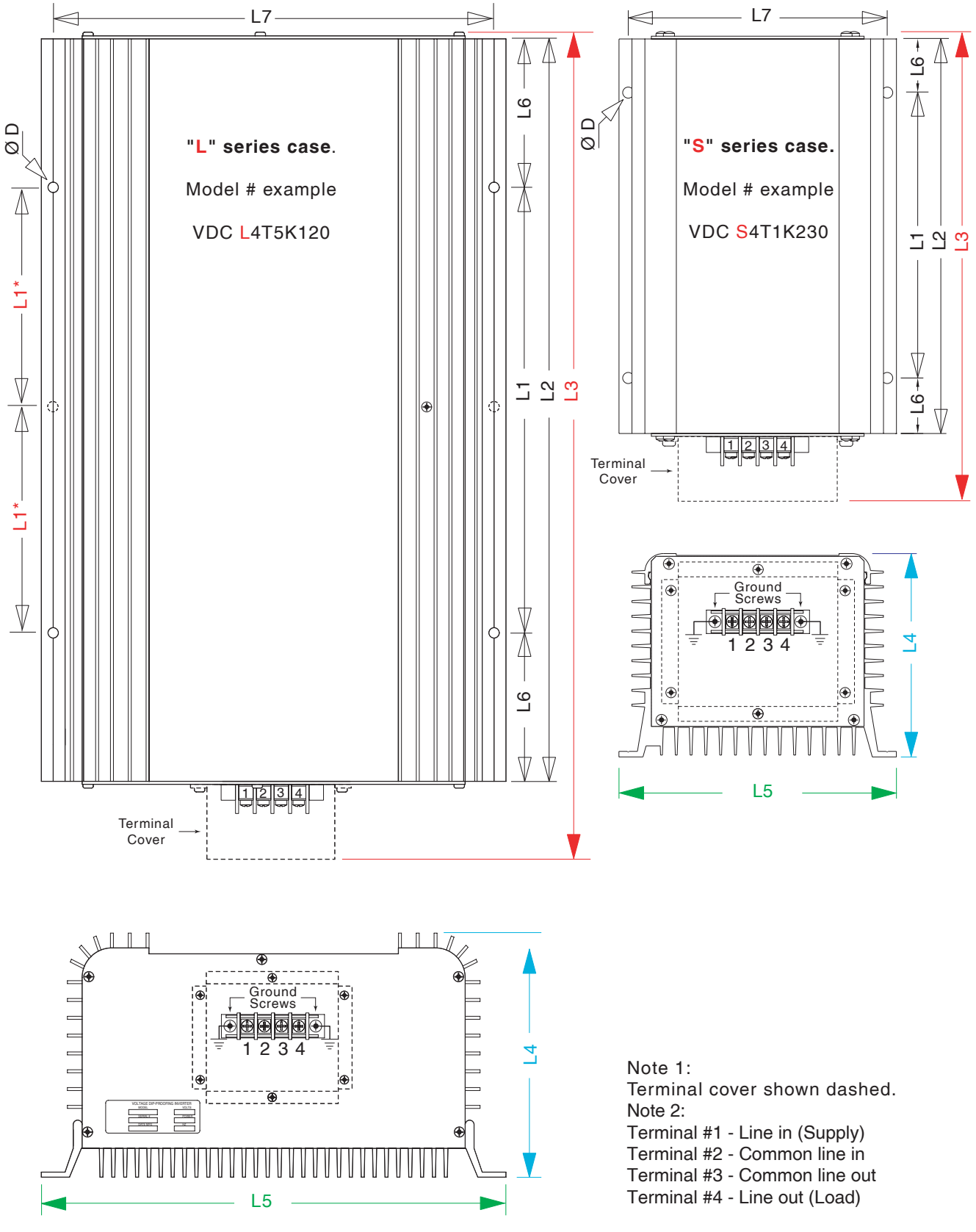
VDC L series - The VDC case is made from extruded aluminium sections. The six parts that make up the case are interlocked and secured by screws. To remove the front cover unscrew three screws : one from the front cover and one each from the top and bottom end plates.

Dimension Table

Model	VDC Dimensions mm (in)							
	L1	L2	L3	L4	L5	L6	L7	D
VDC S4T1K120	177 (6.97)	237 (9.33)	280 (11.02)	110 (4.33)	150 (5.90)	30 (1.18)	140 (5.50)	6.0 (0.24)
VDC S6T1K120	200 (7.87)	260 (10.24)	303 (11.93)					
VDC L4T3K120	170 (6.69)	250 (9.84)	293 (11.54)	162 (6.38)	311 (12.24)	40 (1.57)	296 (11.65)	8.0 (0.31)
VDC L6T3K120								
VDC S4T1K208	177 (6.97)	237 (9.33)	280 (11.02)	110 (4.33)	150 (5.90)	30 (1.18)	140 (5.50)	6.0 (0.24)
VDC S6T1K208	200 (7.87)	260 (10.24)	303 (11.93)					
VDC L4T5K208	170 (6.69)	250 (9.84)	293 (11.54)	162 (6.38)	311 (12.24)	40 (1.57)	296 (11.65)	8.0 (0.31)
VDC L6T5K208								
VDC S4T1K220	177 (6.97)	237 (9.33)	280 (11.02)	110 (4.33)	150 (5.90)	30 (1.18)	140 (5.50)	6.0 (0.24)
VDC S6T1K220	200 (7.87)	260 (10.24)	303 (11.93)					
VDC L4T5K220	170 (6.69)	250 (9.84)	293 (11.54)	162 (6.38)	311 (12.24)	40 (1.57)	296 (11.65)	8.0 (0.31)
VDC L6T5K220								
VDC S4T1K230	177 (6.97)	237 (9.33)	280 (11.02)	110 (4.33)	150 (5.90)	30 (1.18)	140 (5.50)	6.0 (0.24)
VDC S6T1K230	200 (7.87)	260 (10.24)	303 (11.93)					
VDC L4T5K230	170 (6.69)	250 (9.84)	293 (11.54)	162 (6.38)	311 (12.24)	40 (1.57)	296 (11.65)	8.0 (0.31)
VDC L6T5K230								

VDC Specifications:

Mechanical outline



Note 1:
Terminal cover shown dashed.
Note 2:
Terminal #1 - Line in (Supply)
Terminal #2 - Common line in
Terminal #3 - Common line out
Terminal #4 - Line out (Load)

VDC support for SEMI F47

Voltage Sag Immunity Standard

VDC supports the SEMI F47 standard

This standard was drafted by the Semiconductor Industry to specify Voltage Sag Immunity requirements for semiconductor processing equipment. The profile for the F47 standard is shown in Fig 1.

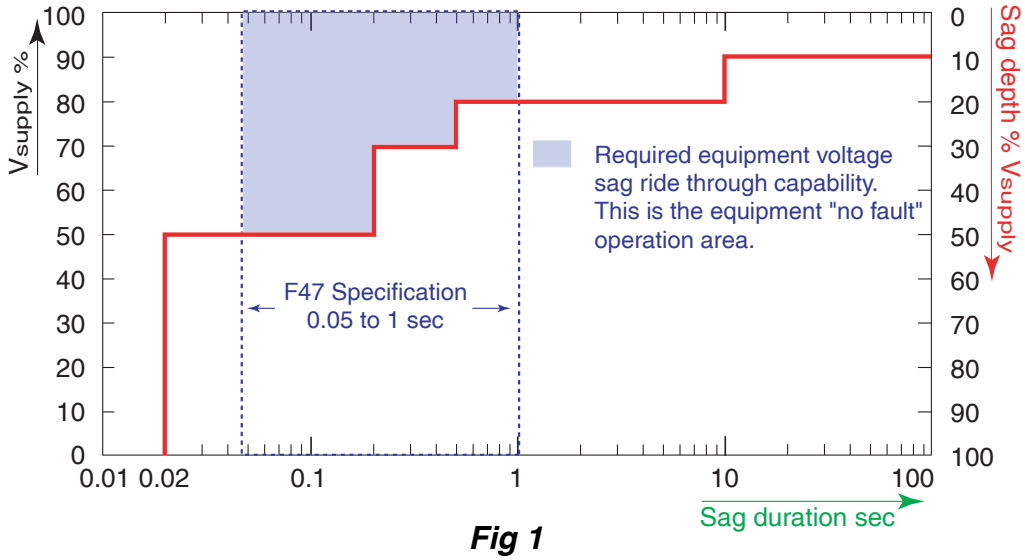


Fig 1

SEMI F47 Standard.

The blue zone represents the operation area where no equipment faults must occur due to voltage sags on the supply. The “no fault” window is from 50ms to 1 second with variable depth sag to a maximum of 50% of the nominal supply voltage.

The VDC family is designed for applications that must meet the SEMI F47 Voltage Sag Immunity Standard for Semiconductor Processing Equipment and where size and cost are critical factors.

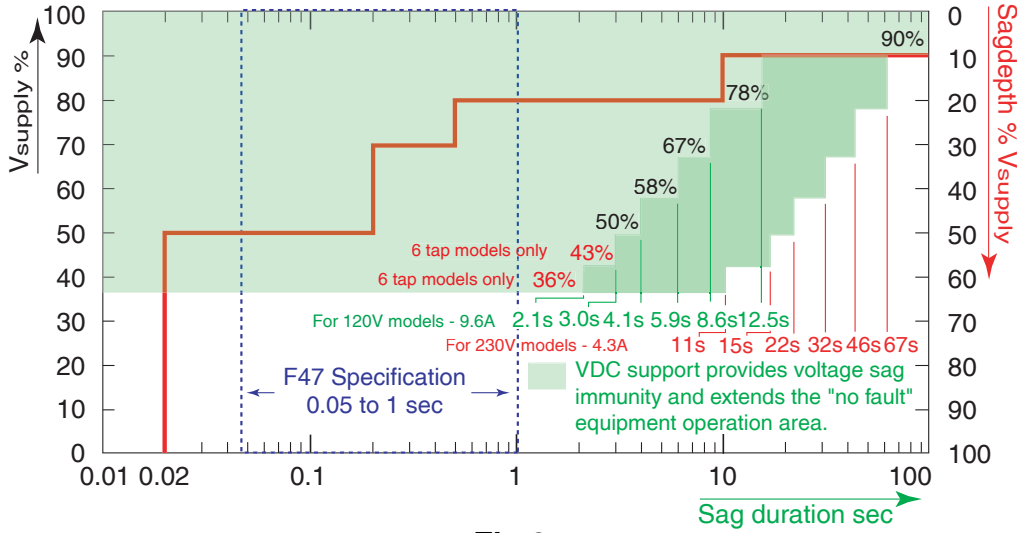


Fig 2

VDC extended support for the SEMI F47 Standard. Times shown are for the VDC S4T/6T series with Iload = 9.6A for 120V models, Iload = 4.3A for 230V models & duty cycle 1 maximum length event every 20 minutes.

The green area in Fig 2 shows the extended support provided by the VDC S4T/6T series. Support times are shown in green for 120V models at a load current of 9.6 amps and in red for 230 models at a load current of 4.3 amps.The “no fault” window is extended from 50ms to 4.1 &

VDC support for SEMI F47

Voltage Sag Immunity Standard

12.5 seconds respectively with a maximum continuous sag depth of 50%. VDC L4T3K/5K & VDC L6T3K/5K support times are shown in Fig 3.

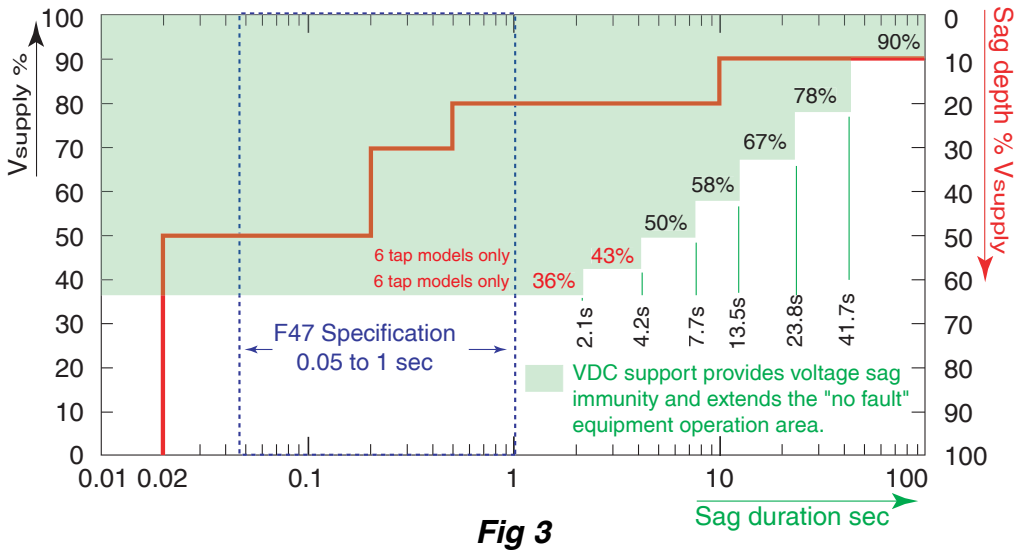


Fig 3

VDC extended support for the SEMI F47 Standard. Times shown are for the VDC L4T/6T 3K/5K series with Iload = 24A & duty cycle 1 maximum length event every 7 minutes.

The VDC S6T & L6T series should be used for critical applications where support down to 37% of nominal supply voltage is needed. The Fig 3 shows the extended support area. The “no fault” window is extended from 50ms to 2.1 seconds with a maximum continuous sag depth of 63%.

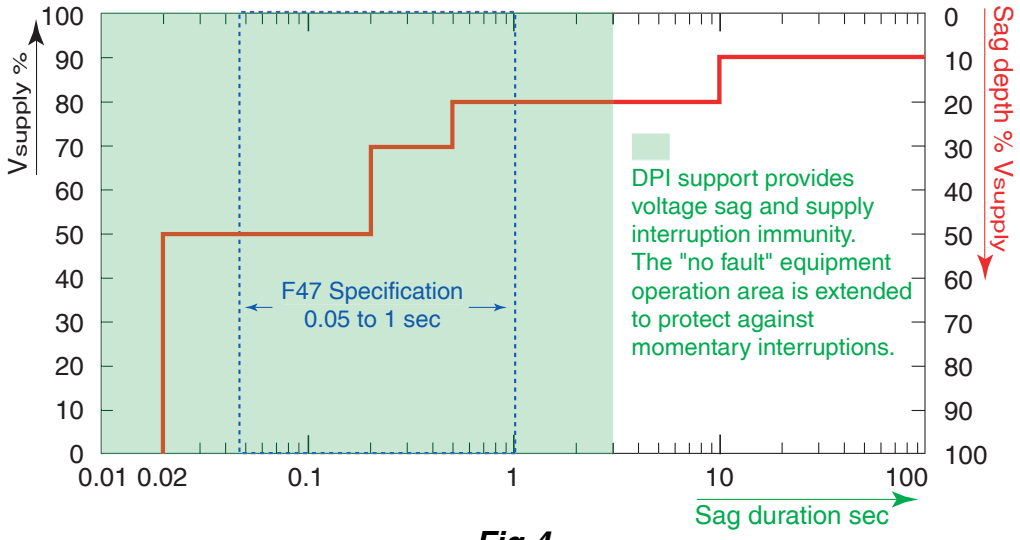


Fig 4

DPI support for the SEMI F47 Standard.

For applications that require protection against momentary interruptions and sags refer to our **Voltage Dip Proofing Inverter (DPI)** product line for a simple cost effective solution that is easy to intergate into OEM products or retrofit to existing equipment. The DPI support profile is shown together with the F47 curve in Fig 4. It can be seen that the DPI provides complete protection for all sag depths and interruptions from 0 to 3 seconds.

DPI & VDC Accessories :

For use with all models

Voltage Sag Simulator Description

The Sag Simulator is an effective tool to evaluate the effects of momentary voltage sags and interruptions on industrial controls. When used in conjunction with a Voltage Dip-Proofing Inverter or a Voltage Dip Compensator and Bypass switch, it may be used to prove the effectiveness of the DPI or VDC as a solution for these power quality problems.

The Sag Simulator is designed for 120/208/240Vac operation. The controls consist of a variac to set the sag depth, an LCD display to indicate the sag voltage value and program status, four programming keys to set up and operate the simulator. A variable interrupt timer sets the duration of the voltage sag and the point in the cycle at which it begins. Both variables are set using the programming keys and are indicated on the LCD display.

Simulator output is short circuit and overload protected. A 5V synchronization pulse is provided to trigger an oscilloscope. A photograph appears on page 1; the specifications are shown below.

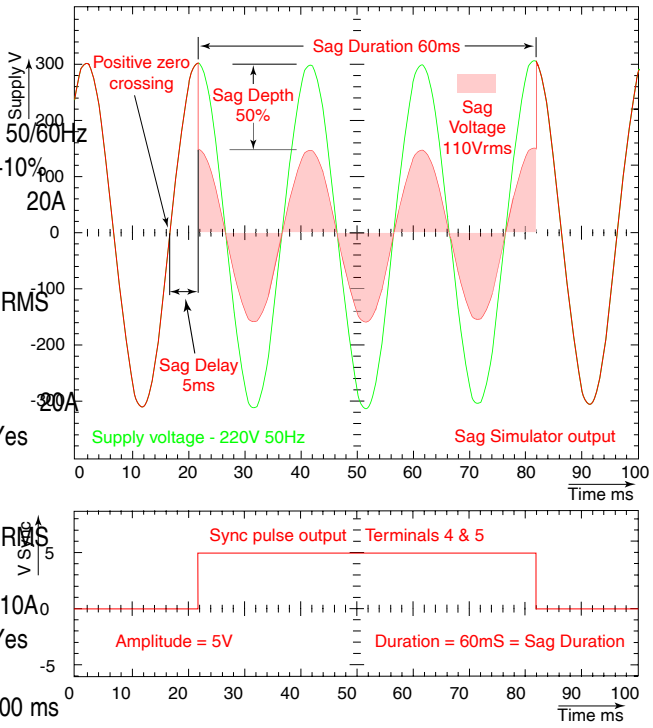
Sag Simulator Specifications

AC INPUT SUPPLY	
Supply voltage:	120/208/240Vac 50/60Hz
Maximum input voltage:	+10%
Full load current:	20A
VARIAC CONTROL	
Variac range:	0-240Vac RMS
Maximum power:	1200VA @ 120V / 2400VA @ 240V
Maximum continuous current:	10A Maximum short term current for 3 seconds: 20A
Overload & short circuit protection:	Yes
DIRECT VARIAC OUTPUT	
Variac range:	0-240Vac RMS
Maximum power:	1200VA @ 120V / 2400VA @ 240V
Maximum continuous current:	10A
Overload & short circuit protection:	Yes
SAG DELAY TIMER	
Range:	0.00 to 20.00 ms
Setting:	0.01 ms
SAG DURATION TIMER	
Range:	0.010 to 9.999 second
Setting:	0.001 second ste
CONTROLS & INDICATORS	
Programming:	Four push switches
Menu/parameter indicaton:	4 x 20 LCD display
SYNC PULSE OUTPUT	
Amplitude:	
Polarity:	Positive
Electrically isolated output:	Yes
Duration:	Equal to sag duration
TEMPERATURE	
Maximum ambient working temperature:	45°C (113°F)
HOUSING	
Construction:	Extruded aluminium
Height:	390mm (15.35in)
Width:	311mm (12.24in)
Depth:	162mm (6.38in)
Mass:	15kg (33lb)

ORDERING

Stock no	Description
5003-085	Voltage Sag Simulator

Simulated Sag Profile



DPI & VDC Accessories :

For use with all models

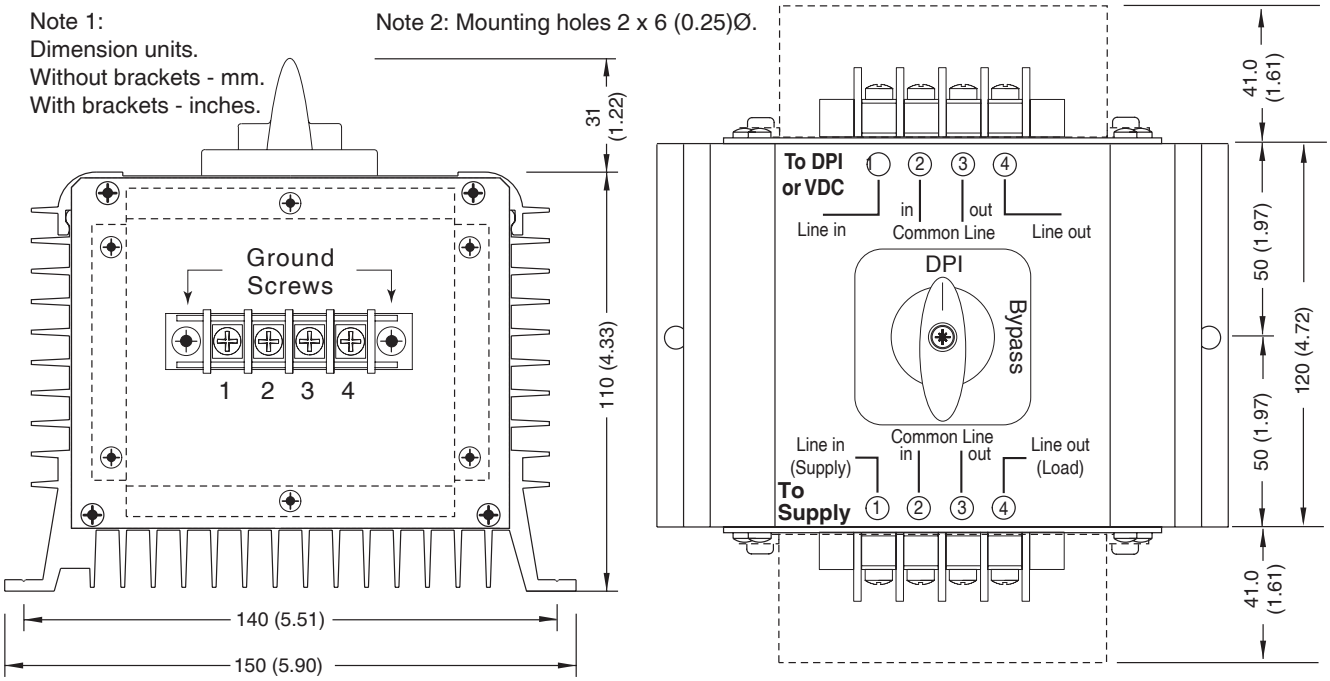
Housed Bypass Switch
Description

Where no-break maintenance is required a by pass switch must be installed. It connects the supply directly to the load, "Bypass" position, and disconnects the power terminals of the inverter without interrupting the supply. When in "DPI" position the load is connected to the supply via the inverter.

Specifications

MODEL	BPSW25A
ELECTRICAL	
Maximum current:	25A
Maximum input voltage:	600Vac
TEMPERATURE	
Maximum working temperature:	45°C (113°F)
HOUSING	
Construction:	Extruded Aluminum
Height:	202mm (7.95in)
Width:	150mm (5.9in)
Depth:	141mm (5.55in)
Mass:	1kg (2.2lbs)

Mechanical outline

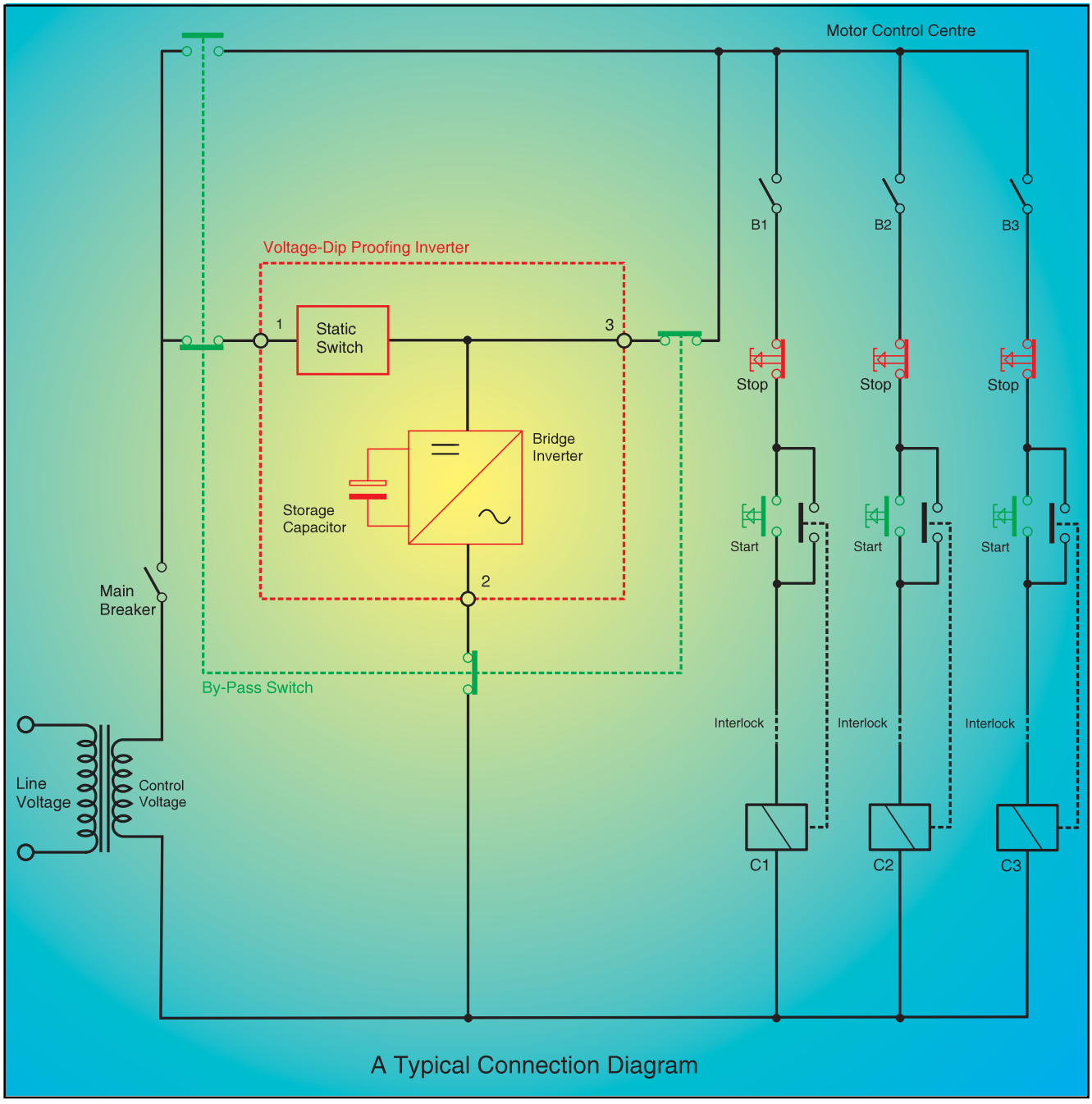


Ordering

Stock No:	Description
5003-006	Housed By-Pass Switch 25Amp

Voltage-Dip Proofing Inverters™ & Voltage-Dip Compensators™

prevent production down time caused by momentary voltage sags and interruptions.



A Typical Connection Diagram

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