

Programmable Static Change Over Switch

For use with all DPI's & VDC's
120/208/240V 50/60Hz



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Description - Programmable Static Change Over Switch (PSCOS)

The PSCOS is intended to be used as a 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 PSCOS incorporates a Soak Test function selected via the Function Select menu, that may be used to perform repetitive testing.

The PSCOS is designed for 120/208/240Vac operation. The main controls and their functions are listed below, refer to Fig 7 page 12 for their locations :-

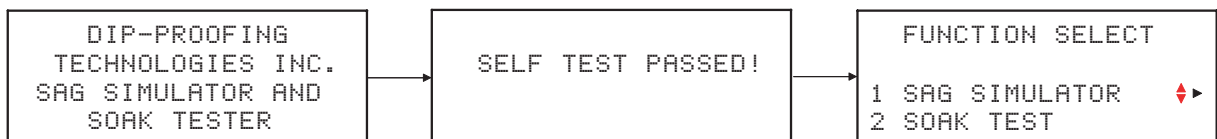
1. The sag level set by an external variac or transformer (the sag source) is indicated on the LCD display.
2. A variable interrupt timer that is used to set the duration and Interval of the voltage sag. Both parameters are set using the programming keys and indicated on the LCD display. Refer to the menu flow chart and programming key function table in Fig 3 p6 for Sag Simulation and Fig 4 p9 for Soak Test.

Operation

Sag Simulation

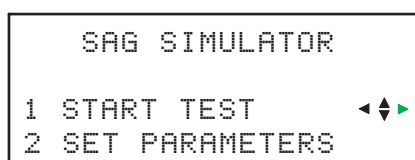
Follow the steps outlined below to set up and operate the PSCOS. Refer to Fig 3 on page 6 for information on menu layout and programming key functions.

1. Connect the supply, external Sag Source, Voltage Dip-Proofing Inverter or Voltage Dip Compensator, Bypass Switch and load to the PSCOS; see Fig 8 page 13.
2. Set the sag source to zero output and the Bypass Switch to *Inverter Bypassed*.
3. Switch on the power to the PSCOS; the display will show:



Note: If an error message is displayed and the Simulator shuts down please refer to *Error conditions* at the end of this section on page 8.

4. Press the \blacktriangleright key to reach the Sag Simulator menu; the display will show:



5. Press the \blacktriangleright key to reach the *Start Test* display; the display will show:

```
START TEST ◀ ▶  
VOLTAGE:    000Vac  
DURATION:   0.100s
```

6. The Sag Depth may be adjusted using the an external variac prior to performing the test. The value is shown on the Voltage readout. In this case a preset value is used for the Sag Duration (100ms). The simulator will store the value used for the last test and use it as the default for the next test.
7. Press the ▶ key to Start Test or press the ◀ key to return to the Sag Simulator menu.
8. To set the Sag Parameters to values different to the defaults navigate to the Sag Simulator menu, press the ▼ key to select Set Parameters then press the ▶ key to reach the adjustment menus. The *Sag Depth* is set using the external variac and then the interrupt timer should be programmed to set the duration of the voltage sag to be generated. The two parameters are adjusted as follows :-
 - 8.1 *Set Sag Depth*: At the Set Sag Depth Menu press the ▶ key to reach the Adjust Variac menu. Adjust the external variac until desired voltage is indicated on the display. If a tapped transformer is used as a sag source connect the desired tap.
 - 8.2 *Set Sag Duration*: From the Set Sag Depth menu press ▼ key to select the *Set Sag Duration* menu. Press the ▶ key to program the Sag Duration value. Use the ▶ and ◀ keys to select the digit to adjust. The active digit will flash. Use the ▲ ▼ keys to increment or decrement the digit to the desired value.
9. *Start Test*: When the *Sag Voltage* and *Duration* have been set navigate back to the Sag Simulator menu by pressing the ◀ key. Press the ▶ key to reach the Start Test menu. At this point the variac may be used to readjust the sag voltage. The voltage setting will be indicated on the display. The supply voltage can be interrupted by pressing the ▶ key. The effect of the programmed sag can be seen on the unprotected load; one or more contactors or relays will drop out. The sag profile can be observed using a power monitor or an oscilloscope if these are available. The simulation can be tried with various settings (sag depth and duration) as often as desired to pinpoint sensitive components in the control system.
10. *Test with DPI or VDC in circuit*: The Bypass Switch should now be set to *Inverter in Circuit* and the sag simulations repeated to evaluate the effectiveness of using the Voltage Dip-Proofing Inverter or Voltage Dip Compensator to harden the controls against momentary sags and interruptions.

11. *Sync pulse output:* A synchronization pulse is available at terminals 5 & 6. This pulse may be used to trigger an oscilloscope in order to display the sag profile. The output remains at zero volts until a sag is initiated at which time the output rises to 5 volts and remains at this level until the end of the sag duration period. The output then returns to zero volts. The sync pulse output is electrically isolated.

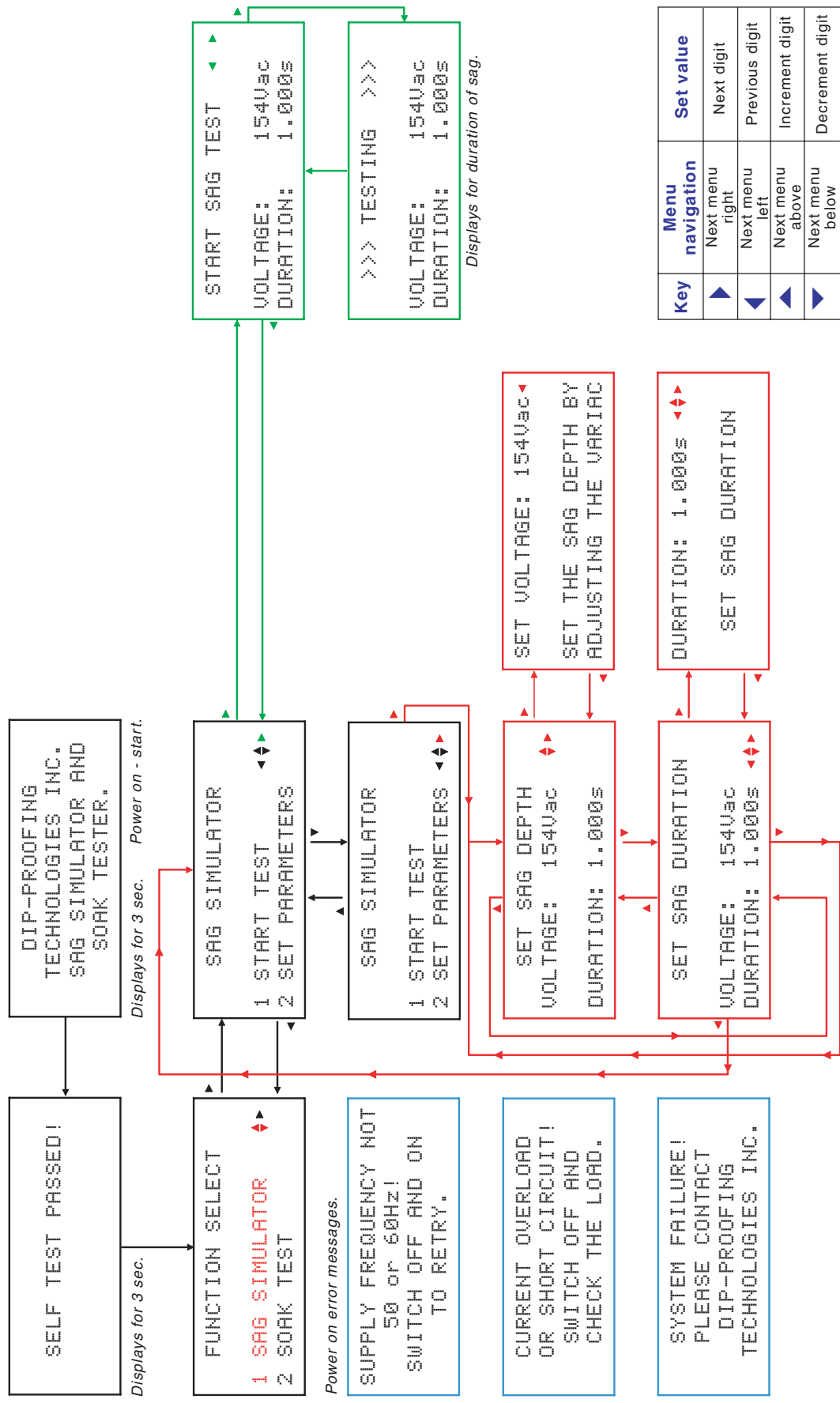


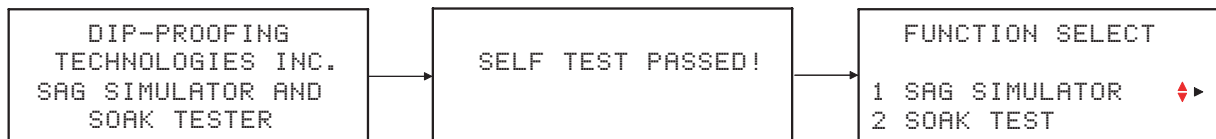
Fig 3 Programming key function table & Sag Simulator menu flowchart.

Key	Menu navigation	Set value
▶	Next menu right	Next digit
◀	Next menu left	Previous digit
▲	Next menu above	Increment digit
▼	Next menu below	Decrement digit

Soak Test

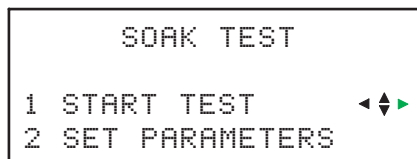
Follow the steps outlined below to set up and operate in Soak Tester mode. Refer to Fig 4 on page 9 for information on menu layout and programming key functions.

1. Connect the supply, Voltage Dip-Proofing Inverter or Voltage Dip Compensator, Bypass Switch and load to the PSCOS as shown in Fig 8 page 13.
2. Set the variac to zero output and the Bypass Switch to *Inverter in circuit*.
3. Switch on the power to the PSCOS; the display will show:

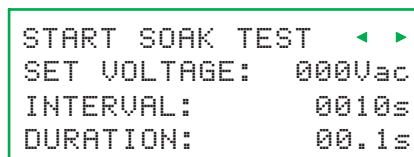


Note: If an error message is displayed and the Simulator shuts down please refer to *Error conditions* at the end of this section on page 8.

4. Press the \blacktriangledown key to select Soak Test then Press the \blacktriangleright key to reach the Soak Test menu; the display will show:



5. Press the \blacktriangleright key to reach the *Start Test* display; the display will show:



6. The Sag Depth may be adjusted using the external variac prior to performing the test. The value is shown on the Voltage readout. Stored values are used for :
 - 6.1 Interval - Interval between consecutive dips - initial default = 10 seconds
 - 6.2 Sag Duration - Duration of the test sag - initial default = 100ms
 - 6.3 Note that the values shown above are factory settings for “first use”. When parameters are set up for a test the new values are stored and will become the default values for the next test.
7. Press the \blacktriangleright key to Start Test or press the \blacktriangleleft key to return to the Soak Test menu.
8. To set the Soak Test Parameters to values different to the defaults navigate to the Soak Test menu, press the \blacktriangledown key to select Set Parameters then press the \blacktriangleright key to reach the adjustment menus. Three parameters may be adjusted as follows :-

- 8.1 *Set Dip Interval:* At the Set Dip Interval menu press the ▶ key to program the Dip Interval value. Use the ▶ and ◀ keys to select the digit to adjust. The active digit will flash. Use the ▲ ▼ keys to increment or decrement the digit to the desired value.
 - 8.2 *Set Dip Duration :* At the Set Dip Interval menu press the ▼ key to select the *Set Dip Duration* menu. Press the ▶ key to program the Start Dip length value. Use the ▶ and ◀ keys to select the digit to adjust. The active digit will flash. Use the ▲ ▼ keys to increment or decrement the digit to the desired value.
 - 8.3 *Set Sag Depth:* The Set Sag Depth is set from the Start Soak Test Menu. Set Voltage will flash and the current sag level voltage will be displayed. Adjust the external variac to the desired Sag Depth value. The value may be adjusted at any time during testing.
9. *Start Test:* When the parameters have been set navigate back to the Soak Test menu by pressing the ◀ key. Press the ▶ key to reach the Start Soak Test menu. Set Voltage will flash; use the variac to adjust the Sag Depth voltage (see 8.3 above). Start the Soak Test by pressing the ▶ key. The display will show:

```
>>>SOAK TESTING >>>▶  
VOLTAGE:      000Vac  
NEXT DIP IN:  0000s  
TOTAL DIPS:   0000
```

10. Stop or interrupt the test by pressing the ▶ key. The display will show:

```
SOAK TEST STOPPED!  
CONTINUE TEST?  ◆▶  
SET UP NEW TEST?
```

Use the ▲ ▼ keys to select Continue Test or Set Up New Test then press the ▶ key to go to the selected option.

Start up error conditions

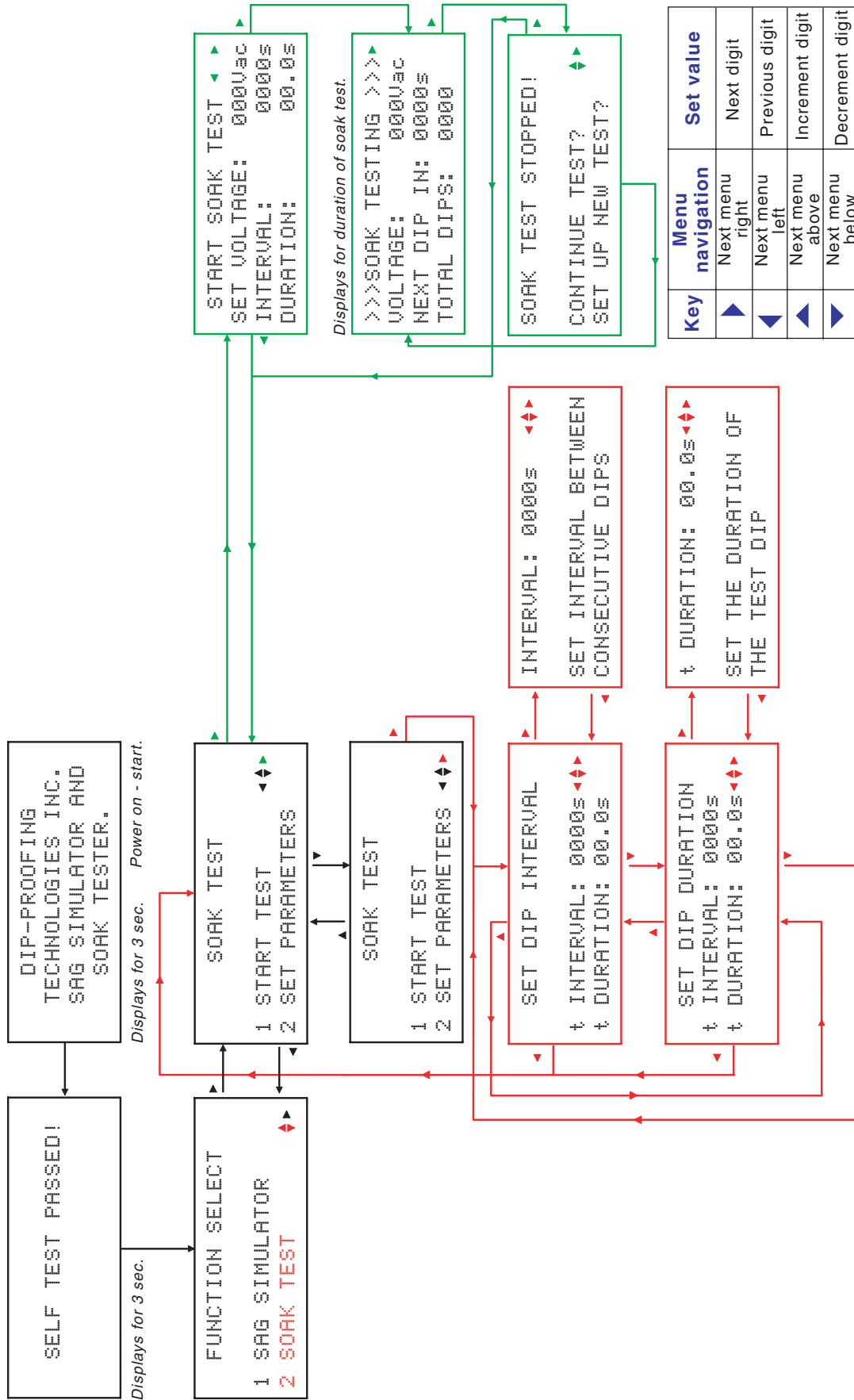
1. *Error conditions:* The simulator will perform a power on test to check the supply frequency and the load current. If the supply frequency is not 50 or 60Hz or if there is an overload then one of the error messages below will be displayed:

```
SUPPLY FREQUENCY NOT  
50 or 60Hz!  
SWITCH OFF AND ON  
TO RETRY.
```

or

```
CURRENT OVERLOAD  
OR SHORT CIRCUIT!  
SWITCH OFF AND  
CHECK THE LOAD.
```

When an error condition is detected the simulator will shut down automatically and the error message will remain on the display. Check the test setup for the source of the problem. To reset the simulator switch the power off and then back on again.



Key	Menu navigation	Set value
▶	Next menu right	Next digit
◀	Next menu left	Previous digit
◀◀	Next menu above	Increment digit
▶▶	Next menu below	Decrement digit

Fig 4 Programming key function table & Soak Tester flowchart.

Simulated Sag Profile

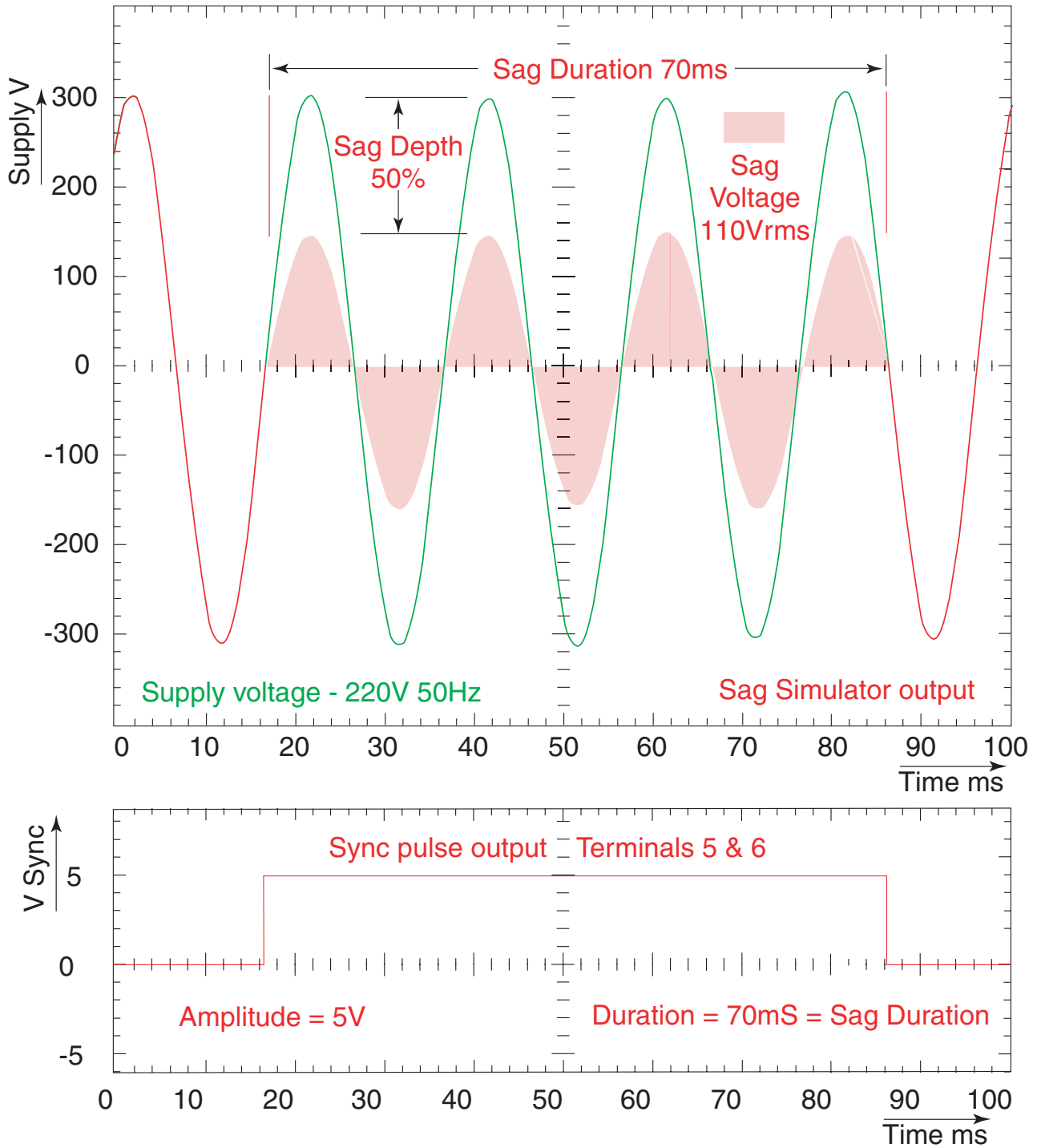


Fig 5
Profile of simulated sag output & sync pulse from simulator.

Programmable Static Change Over Switch Specifications

AC INPUT SUPPLY

Supply voltage:	120/208/240Vac 50/60Hz
Maximum input voltage:	+10%
Full load current:	25A

SAG SOURCE CONTROL

Dependent on external variac or tapped transformer characteristics.

SAG DURATION TIMER - Sag Test

Range:	0.001 to 9.999 seconds
Setting:	0.001 second steps

SAG DURATION TIMER - Soak Test

Range:	0.1 to 99.9 seconds
Setting:	0.1 second steps

SAG INTERVAL TIMER - Soak Test

Range:	0 to 9999 s
Setting:	1 s steps

CONTROLS & INDICATORS

Programming:	Four push switches
Menu/parameter indication:	4 x 20 LCD display

SYNC PULSE OUTPUT

Amplitude:	5V
Polarity:	Positive
Electrically isolated output:	Yes
Duration:	Equal to sag duration

TEMPERATURE

Maximum ambient working temperature:	45°C (113°F)
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HOUSING

Construction:	Extruded aluminium
Height:	220mm (8.66in)
Width:	311mm (12.24in)
Depth:	162mm (6.38in)
Mass:	6kg (2.7lb)

Programmable Static Change Over Switch block diagram

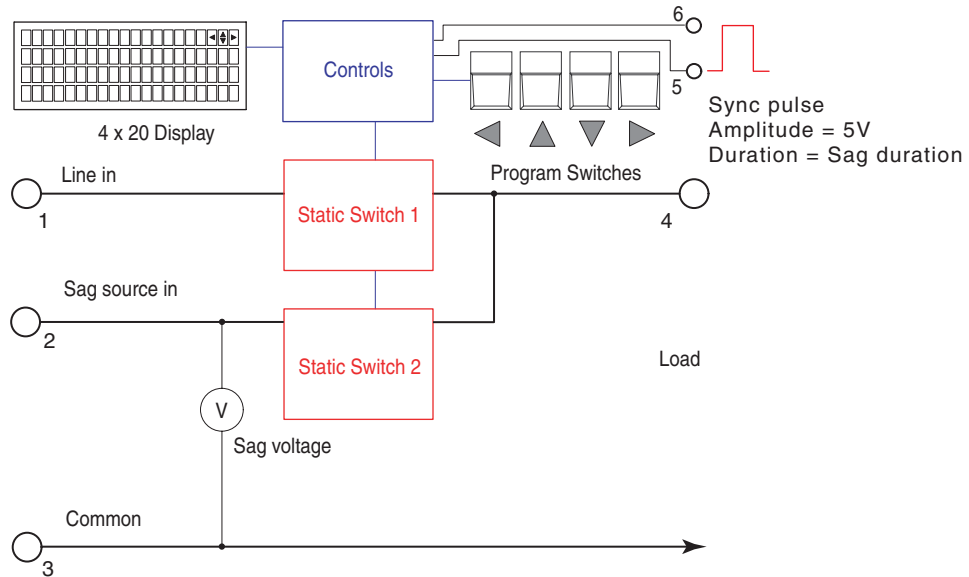


Fig 6
Block diagram

Controls & indicators

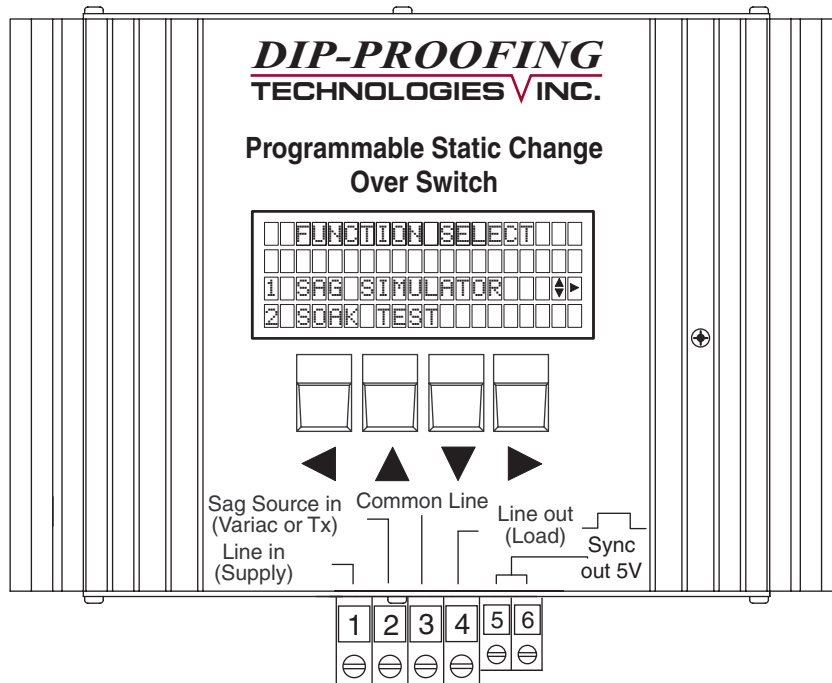


Fig 7
Controls & indicators

Typical test setup

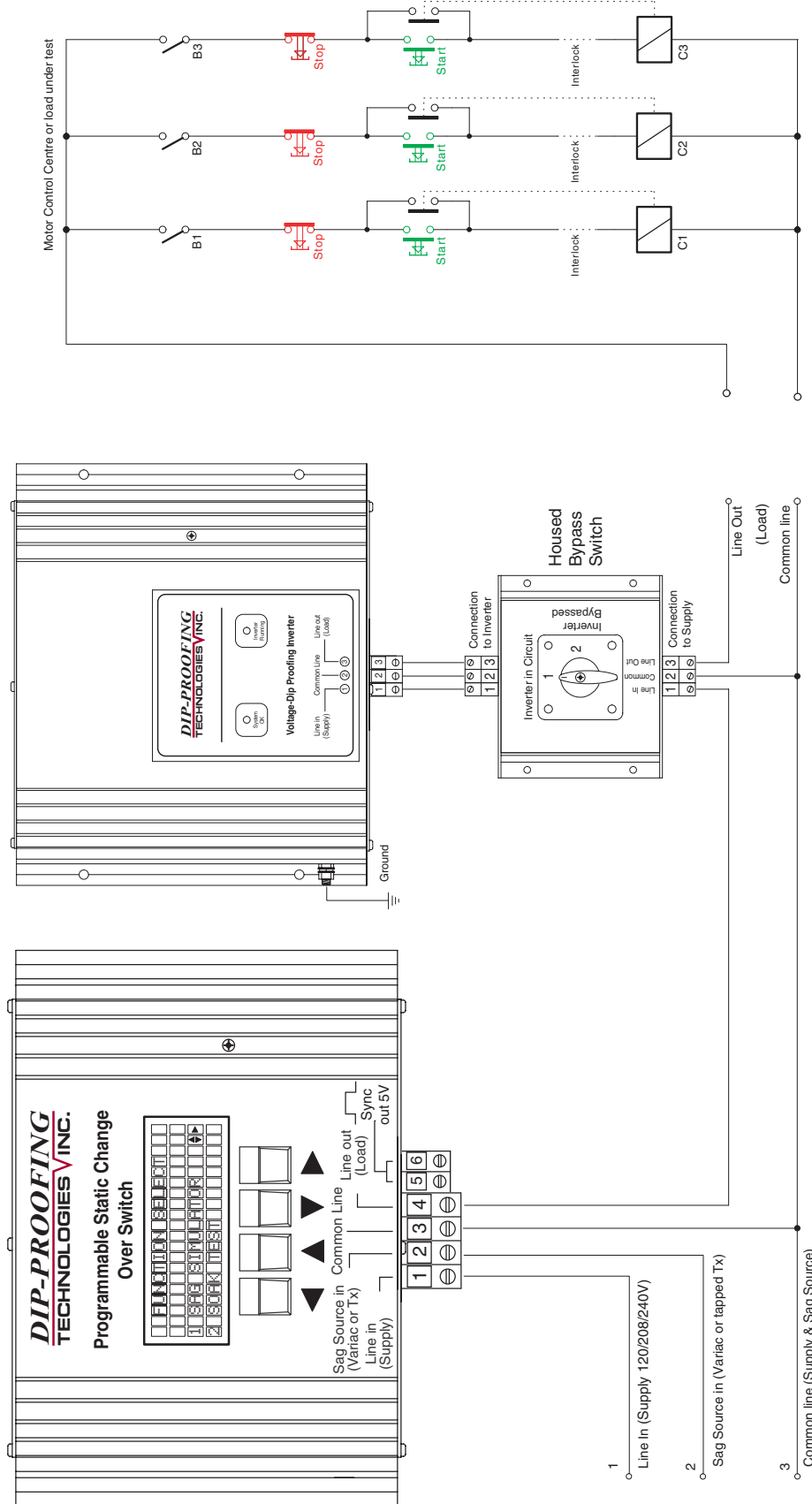


Fig 8
Typical connection diagram.

Mechanical Outline

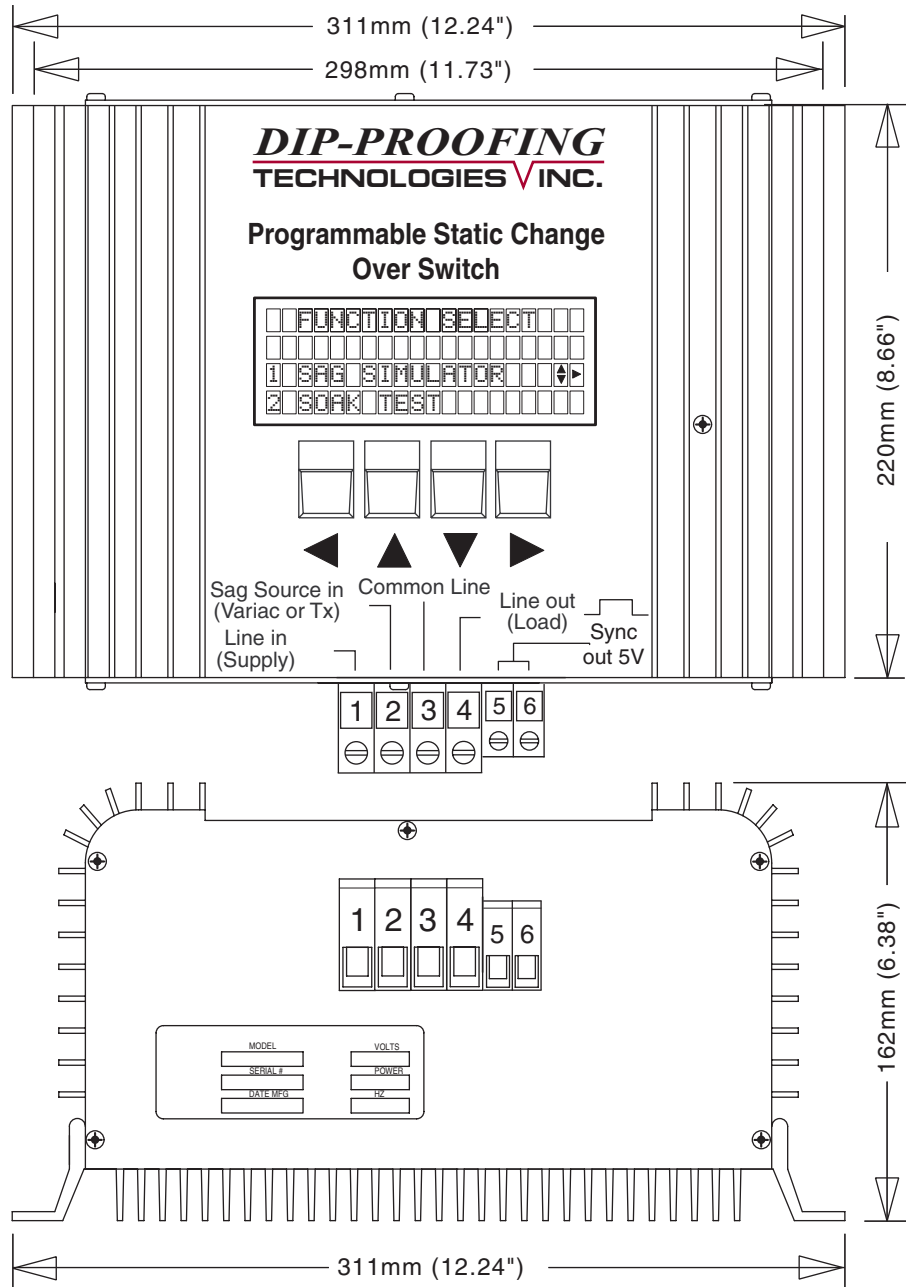


Fig 9
Dimensions (in mm/inches)

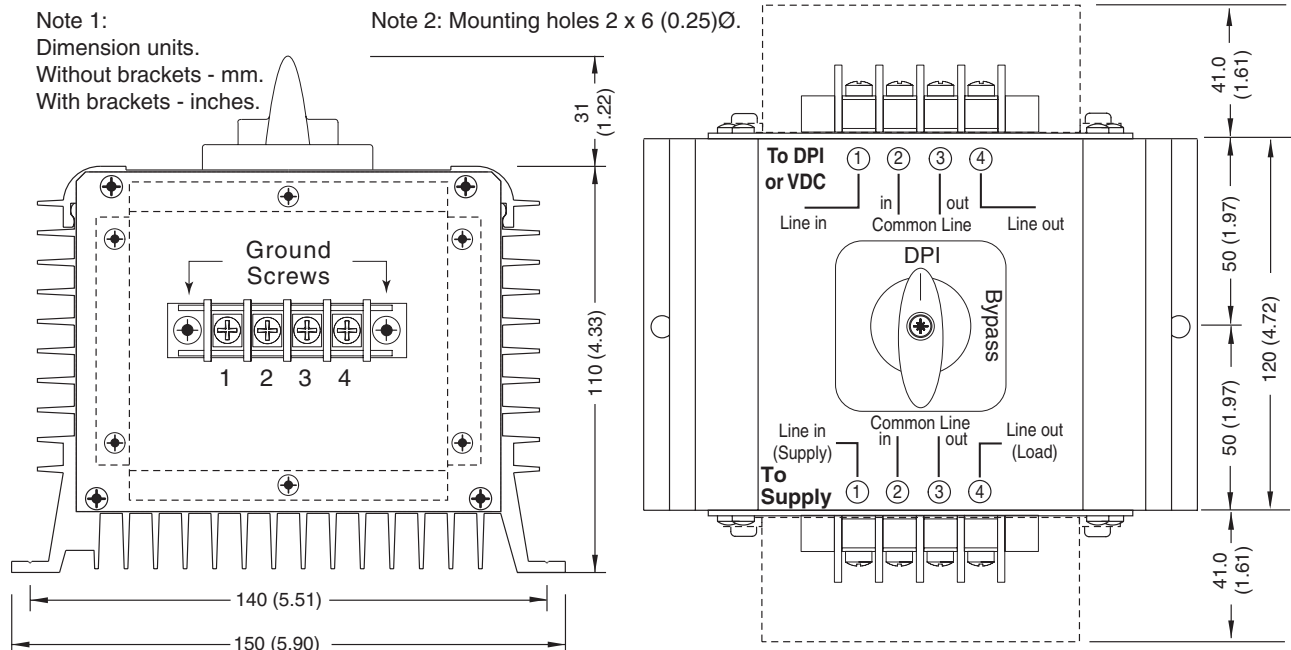
Housed Bypass Switch Description

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

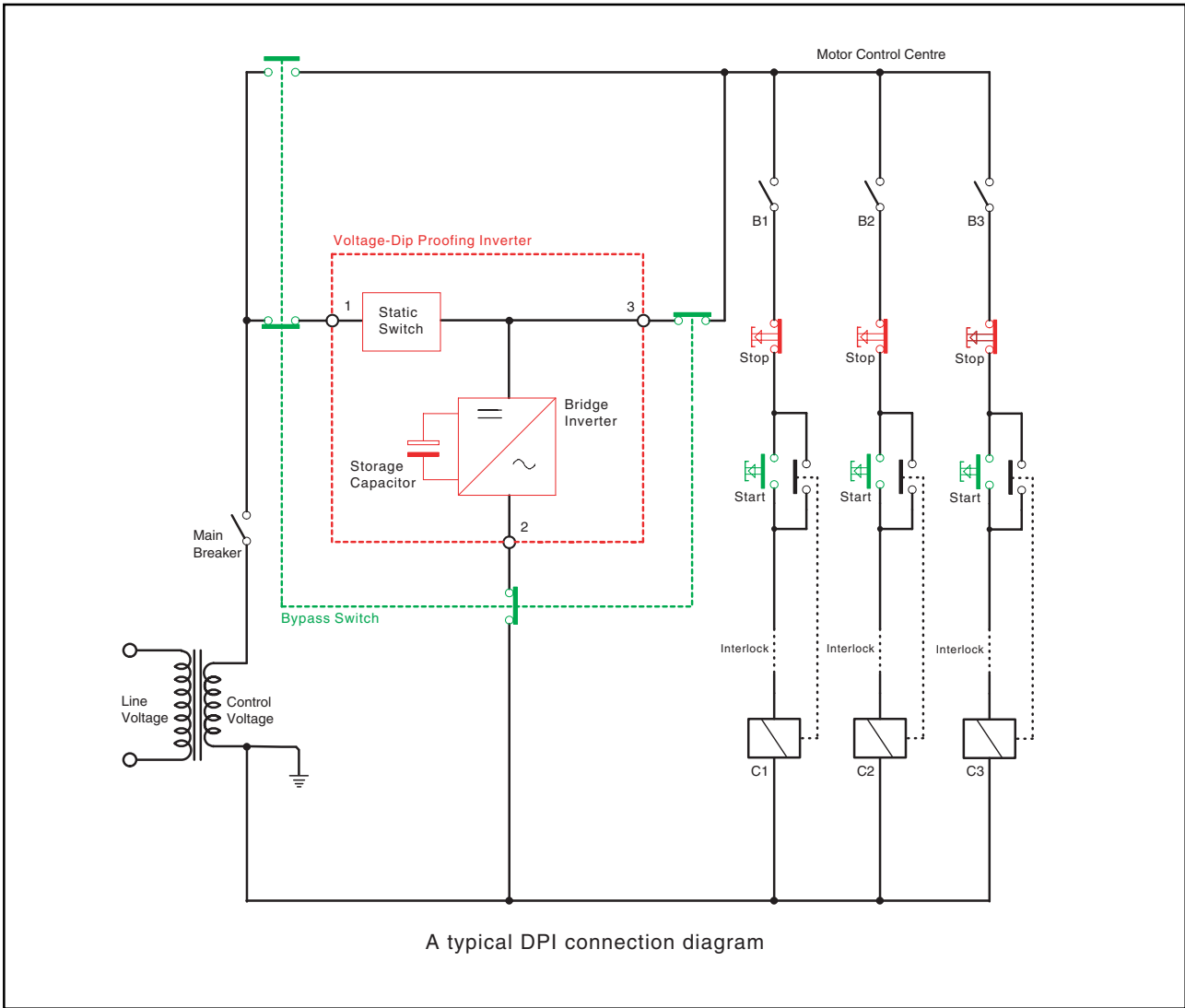


Ordering

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

Programmable Static Change Over Switch

For use with all DPI's & VDC's
120/208/240V 50/60Hz



A typical DPI connection diagram

DIP-PROOFING
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