DSM Dynamic Shunt 401-30286-00

Installation Manual

Part Number 108-31058-00

Giddings & Lewis

Giddings & Lewis
Controls, Measurement & Sensing

NOTE

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108-31058-00

Version 4799

Table of Contents

NOTES

Product Review

Important Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Giddings & Lewis does not assume liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Throughout this manual notes are used to make you aware of safety considerations. For example:

This symbol identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

The micro DSM sized drives do not have an internal shunt circuit to dissipated any excess energy and overvoltage faults could result. To ensure the smooth braking of large inertial loads, the use of a shunt regulator is recommended. The Dynamic Shunt Module is used in systems that see significant DC voltage regeneration from large intertial load applications. The Dynamic Shunt Module monitors the DC bus voltage of the drive and, if the voltage reaches the activation level, the Dynamic Shunt Module drops the DC bus voltage and dissipates the energy as heat. Figure 1 illustrates this drop in DC bus voltage.

FIGURE 1: Shunt Activation on DC Bus Voltage

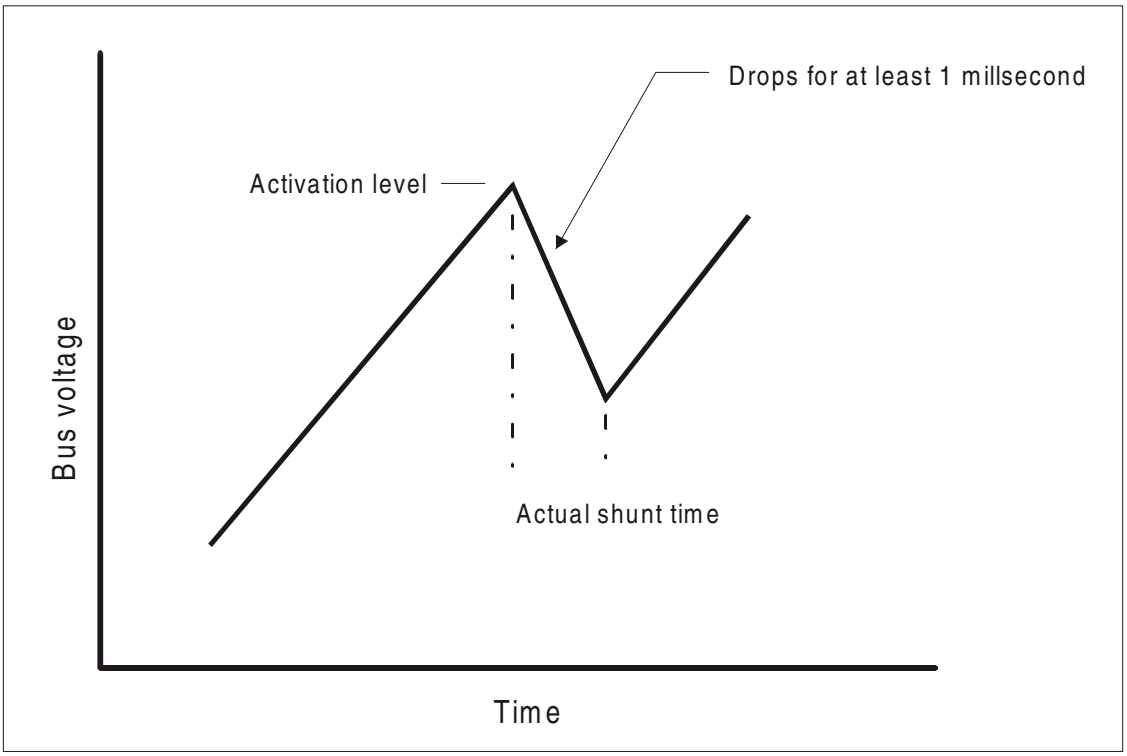
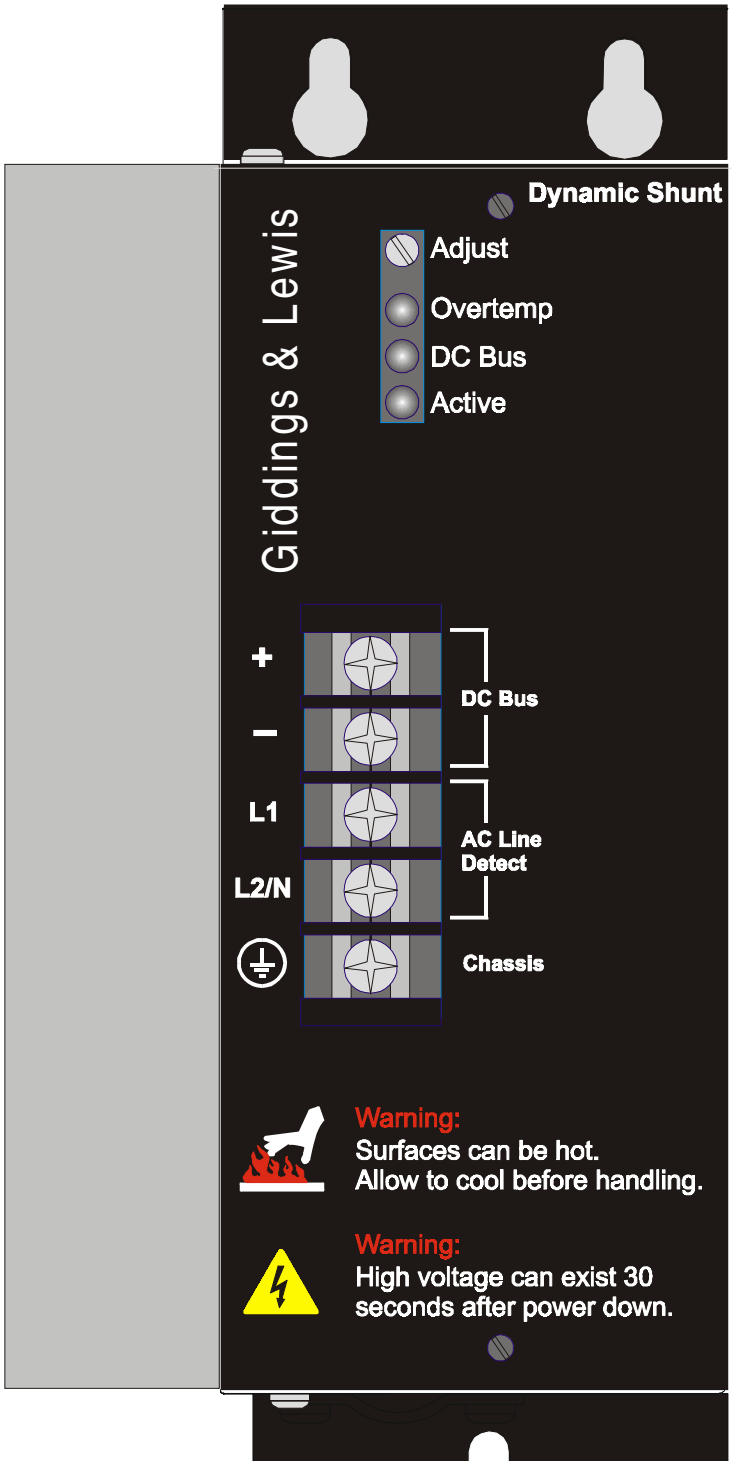


Figure 2 shows information relating to the adjust screw and the LEDs that show shunt activity. Also see Figure 7 for more information.

FIGURE 2: Dynamic Shunt Module Adjustment Screw and LEDs



Adjust (screw)
The Adjust screw is used to set the activation level of the Dynamic Shunt. It is set at the factory and will not ordinarily need any further adjustment.

Overtemp (LED)
The Overtemp yellow LED will illuminate when the unit's thermostat has tripped. While the thermostat is tripped, the unit will not shunt excess voltage (the bus-drop feature will still work) and this will usually cause the host drive to fault on overvoltage. Once the LED turns on, only removing power will shut it off, even if the active shunt unit has cooled and is functioning again.

DC Bus (LED)
The DC Bus green LED will be on when there is sufficient bus voltage. The higher the bus voltage, the brighter the LED will glow.

Active (LED)
The active green LED will be on while the Dynamic Shunt is actually shunting. This LED indicates not only that the Dynamic Shunt is functioning, but can also be used to quickly see how much the shunt is running.

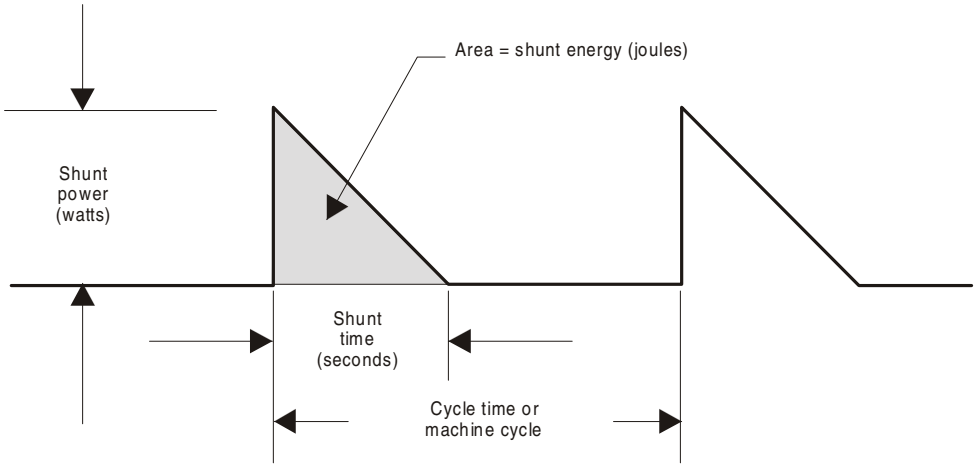
The peak shunting capability is a direct result of using a 36 ohm shunt resistor. The peak shunt power can be calculated by dividing bus voltage squared, by 36. For example, if the bus voltage is 380V when the shunt comes on, the shunt power at that time is 4011watts or:

$$\frac{380 volts^2}{36 ohms} = 4011 watts$$

Continuous Shunt Capability

A shunt regeneration profile is defined by shunt time, cycle time, and peak power level. Figure 3 depicts a profile of regeneration during a machine cycle.

FIGURE 3: Shunt Regeneration Profile



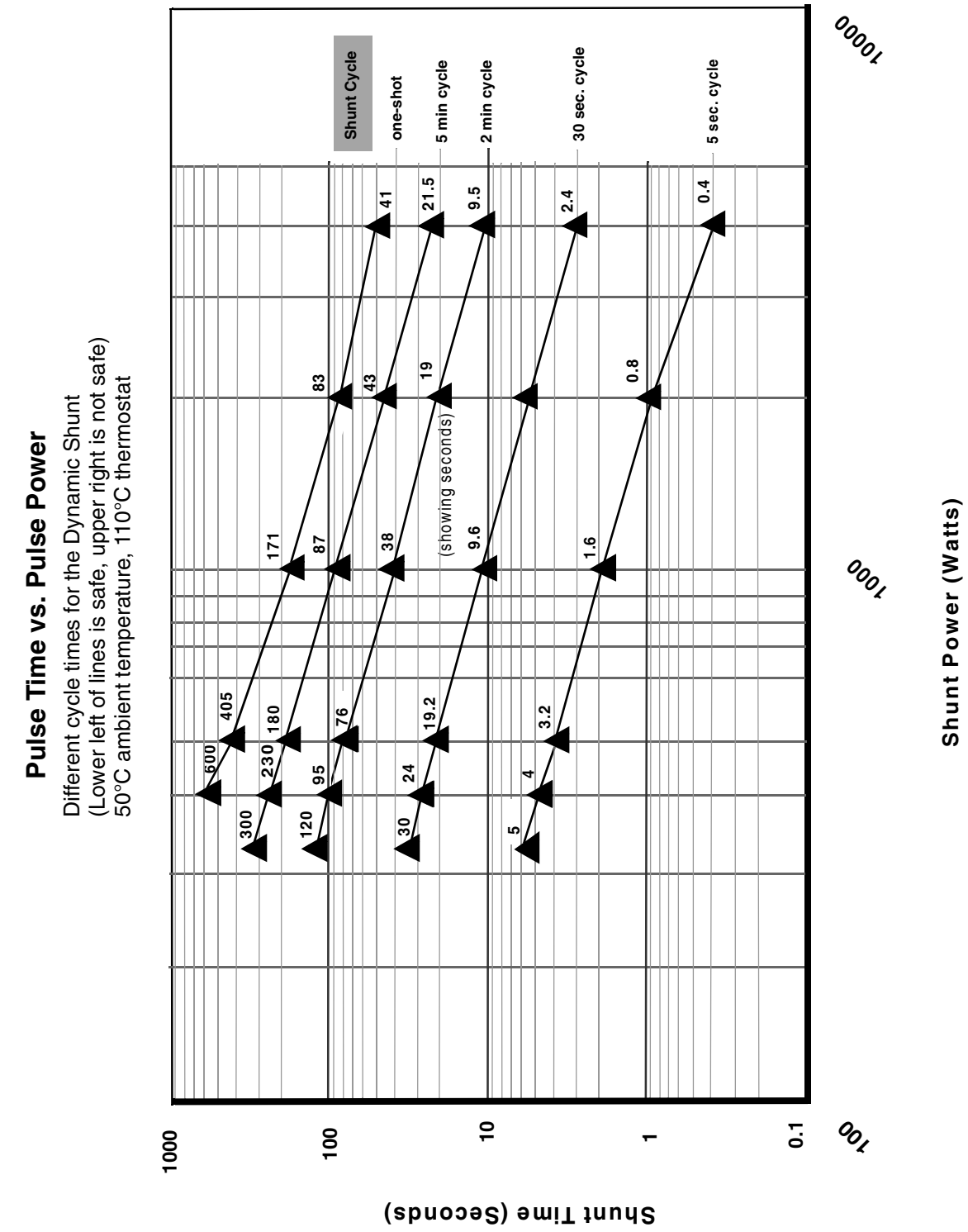
Shunt power is the peak shunt power during the shunt time. Shunt time is the time the power pulse is dissipated by the shunt. The cycle time is the time from the beginning of one shunt to the beginning of the next shunt time.

If the required average shunt power over the machine cycle is $\leq$ 300 seconds, the Dynamic Shunt Module can handle the application. Figure 4 depicts the capability of a Dynamic Shunt Module at 50°C ambient temperature. The different lines represent different cycle times (rates). The X-axis is the shunt power during the shunt time and the Y-axis is the maximum shunt time. for that power and cycle time.

For example, the bottom line is a 5 second cycle time (meaning the shunt pulse comes every 5 seconds) and it intersects the 800 watt pulse for 2 seconds every five seconds in a 50°C or less ambient temperature. This means that the shunt can handle an 800 watt pulse lasting for two seconds, every 5 seconds if the ambient temperature is not above 50°C.

Note: The limiting factor on how much average power can be dissipated is temperature. The shunt power capability increases about 5.5 watts for every 1°C drop in ambient temperature (3.1 watts/°F). Increasing the air flow across the heat sink can increase the continuous shunt capability significantly. Obstructing air flow can decrease it significantly.

FIGURE 4: Dynamic Shunt Module Thermal Capacity



Installation

Mechanical Requirements

Mount the unit in an enclosure providing IP54 protection (protected against dust and splashing water), or IP65 protection (dust free and protected against water jets) as the work environment dictates.

Warning: Avoid contaminating electronic components.

Provide a quality air source to cabinets; free of debris, oil, corrosives, or electrically conductive contaminates. All cabinets should have scheduled inspections and be cleaned as needed.

Failure to observe these safety procedures could result in breakdown and damage to equipment.

Many NEMA (National Electrical Manufacturers Association) Type 4 cabinets provide this level of protection.

Provide adequate clearance and ventilation to dissipate heat generated by the shunt module. The minimum recommended space surrounding the shunt module for cooling air intake and fan exhaust is:

- 5 cm (2 in) above,
- 5 cm (2 in) below,
- 1.25 cm (0.5 in) sides, and
- 2.5 cm (1.0 in) in front which includes additional cable clearance

Position the shunt module on a flat, solid, grounded surface. Bolt the unit to the cabinet using the mounting slots in the case. Mounting dimensions are shown in Figure 5. The surface and mounting hardware should meet or exceed the specified requirements for vibration and shock, altitude and humidity, air flow clearance, temperature, and size (see the following tables).

Table 1: Vibration and shock, altitude, humidity, temperature, and air flow limits

Environmental Condition	Value
Vibration	2g at 10 to 2000 Hz
Shock	15g 11 msec half sine
Altitude	1500 m (5000 ft)
Humidity	5% to 95% non-condensing
Ambient operating temperature[1]	0 **°** to 50**°** C (32**°** to 140**°** F)
Air flow clearances	50 mm (2 in) above and below unit for air flow

1. Power performance increases about 5.5 W for every 1°C drop in ambient temperature.

Table 2: Recommended mounting hardware

Mounting Hardware	Size
Metal Screws	#10
Hex Cap Screws	1/4”-20
Hex Cap Screws (Metric)	M5

Table 3: Wiring

Wiring	Size
75°C copper wire	12 AWG (4.0mm^2) or 14 AWG (2.5mm^2)

Table 4: Terminal Block

Screws	Torque
Chrome plated brass	11 in-lbs. (1.2 Nm)

Table 5: Unit Weight ASM-300

Product	Unit Weights
DSM Dynamic Shunt	1.23 kg (3.3 lbs.)

Table 6: Ferrites for CE radiated emissions compliance

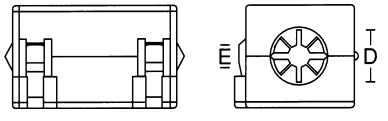
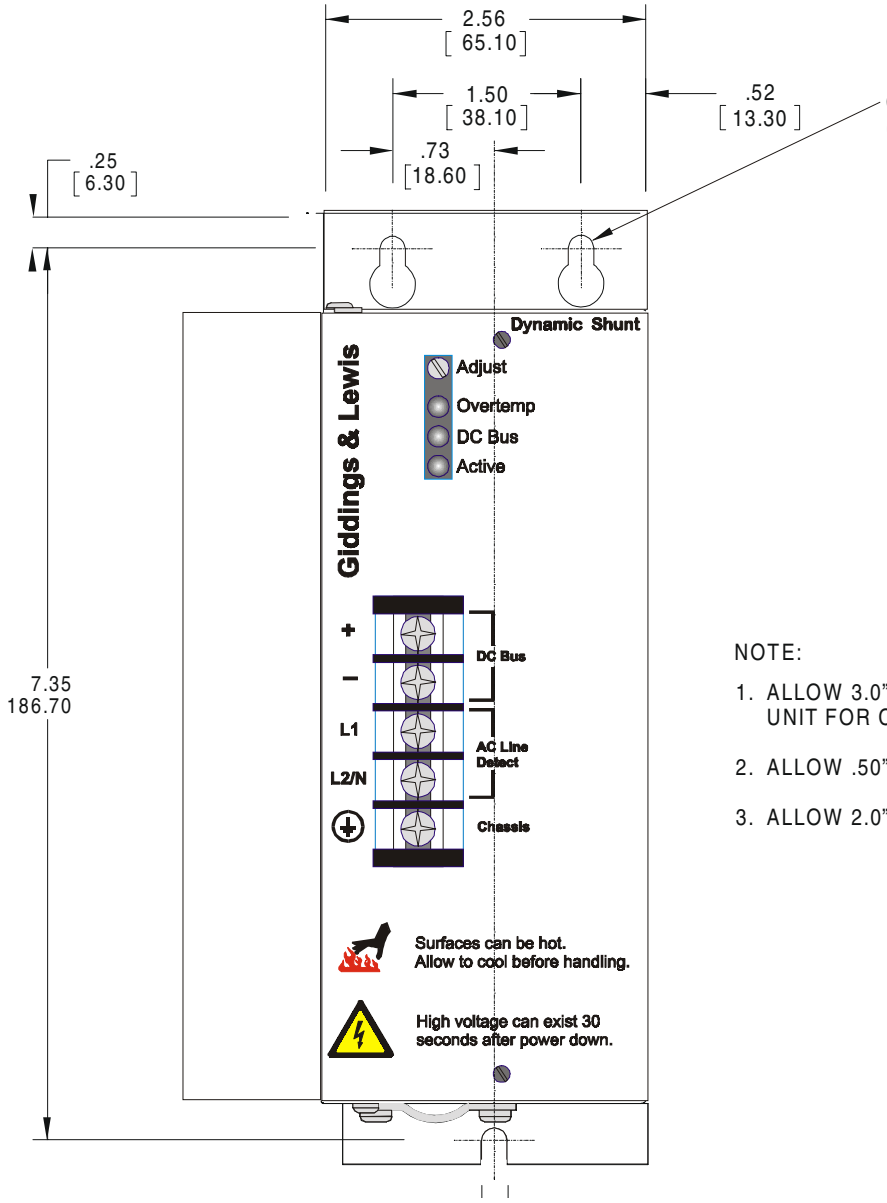
Mfg. Part/No.	D	E	Impedance
SS28B2034	0.250	0.120	125 Ω
SS28B2037	0.350	0.200	154 Ω
SS28B2032	0.500	0.200	230 Ω
Box shaped ferrite assembly in fully enclosed nylon case. End ports are surrounded with flexible spring flutes to grip a range of cable diameters from.125 to.500” (3.2 to 12.7mm). FerriShield, Inc. 350 Fifth Avenue, Suite 7310 New York, NY 10118-7591			

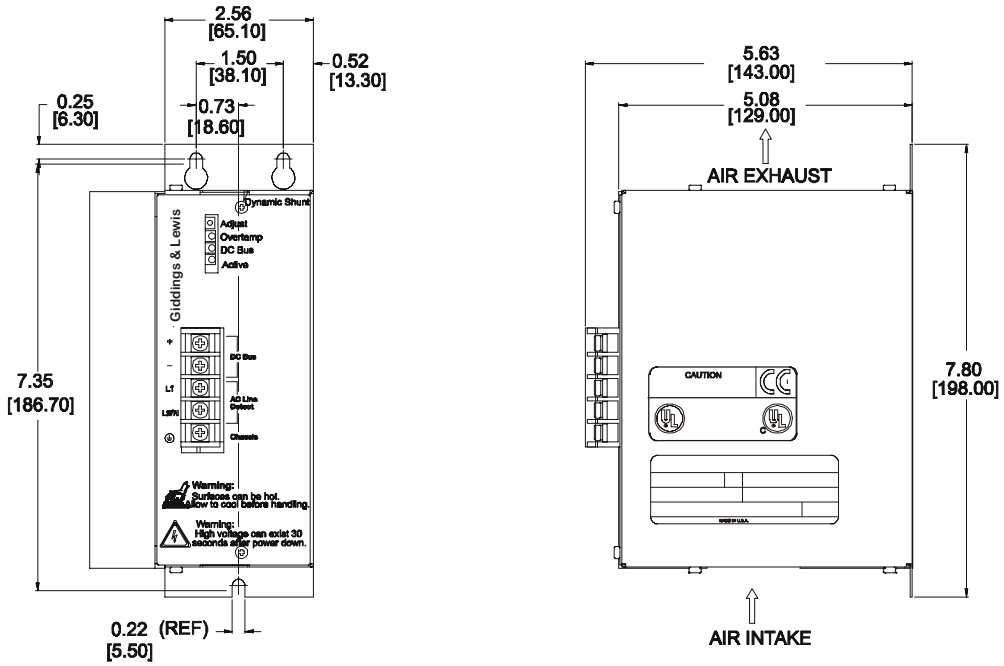
FIGURE 5: Mounting Dimensions - Front View



NOTE:

1. ALLOW 3.0” (76.2 mm) CLEARANCE IN FRONT OF UNIT FOR CABLES.
2. ALLOW .50” (12.7 mm) ON BOTH SIDES OF UNIT
3. ALLOW 2.0” (5 cm) ABOVE AND BELOW

FIGURE 6: Mounting Dimensions



NOTES:

1. MUST CONFORM TO SPEC. 7058-9978.
2. MINIMUM UNOBSTRUCTED SURROUNDING SPACE FOR COOLING AIR INTAKE AND FAN EXHAUST ARE:
   - 5 cm (2 in.) ABOVE
   - 5 cm (2 in.) BELOW
   - 1.25 cm (0.5 in.) SIDES
   - 2.5 cm (1.0 in.) IN FRONT FOR WIRE CLEARANCE

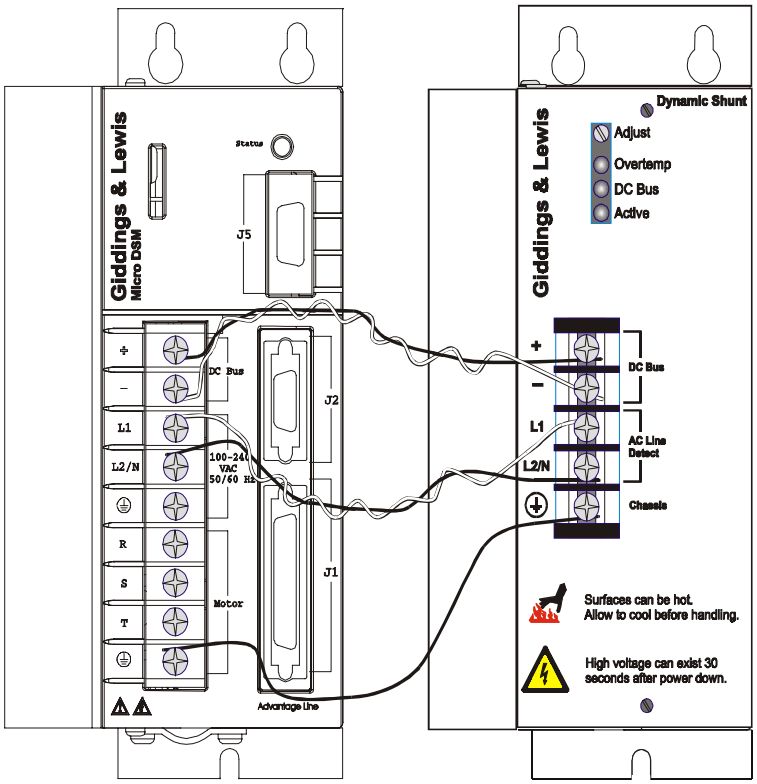
The Bus (+) connection (the topmost pin of the main connector) on the Dynamic Shunt must be connected to the Bus (+) connection of the micro DSM size Drive. Likewise, the Bus (-) connection (the next one down) must be connected to the Bus (-) connection of the micro DSM size Drive. Use 12 AWG (4.0mm^2) or 14 AWG (2.5mm^2) twisted 75°C, copper wire for wiring and tighten the terminal block screws to 11 in-lbs. (1.2 Nm). The wire should not be longer than 10 feet (3m).

The AC inputs can be wired to the AC terminals of the micro DSM size Drive or the same AC power source. If used, the shunt module will sense when the AC is lost to the drive and, after 0.25/sec, will drop the bus. Use 12 AWG (4.0mm^2) or 14 AWG (2.5mm^2) twisted 75°C, copper wire for wiring and tighten the terminal block screws to 11 in-lbs. (1.2 Nm).

The chassis ground should be connected to earth ground.

To comply with the CE radiated emissions standards, ferrites must be added to the ends of the DC bus wires. Route both twisted wires through the ferrites. Ferrites with an impedance at 100 MHz between 100 Ω to 200 Ω were found to be effective. Table 6 lists some readily available ferrites with effective impedance ratings.

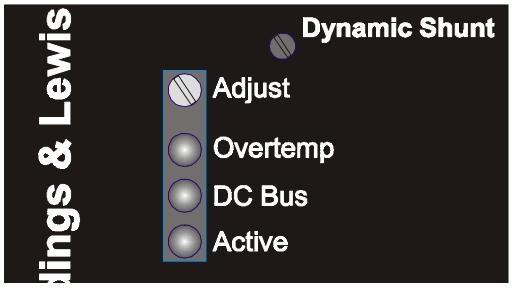
FIGURE 7: Dynamic Shunt Module Cabinet Layout



NOTE:

1. ALLOW 1.0" (2.5 cm) CLEARANCE IN FRONT OF UNIT FOR CABLES.
2. ALLOW .50" (1.25 cm) ON BOTH SIDES OF UNITS
3. ALLOW 2.0" (5 cm) ABOVE AND BELOW

FIGURE 8: Troubleshooting Symptoms, Diagnosis, and Solution



Symptom	Diagnosis and Solution
Overtemp light is on	The internal thermostat in the shunt unit is getting too hot. To fix this problem: Reduce the average shunt power, Reduce the ambient temperature of the air around the shunt, or Increase the amount of air passing over the heat-sink fins. Once the LED turns on, only removing power will shut it off, even if the dynamic shunt unit has cooled and is functioning again.
Bus Overvoltage faults from the drive with the Dynamic Shunt functioning and the Overtemp light off	There are two situations where this can happen. 1. First, if the Bus Overvoltage trip level on the drive is too low. Since this is not adjustable the solution is to reduce the “activate” level on the Dynamic Shunt. This is done be turning the Adjust pot counter-clockwise. 2. Second, if the regeneration power exceeds the shunt power for too long. It is possible for the drive to generate more power than the Dynamic Shunt can handle. There are two possible solutions to this situation. The first is to adjust the regeneration profile so that the drive generates less power for a longer time. The drive current limit parameters may be useful here. The second is to reduce the shunt “activate” level. This turns on the shunt earlier in the regeneration profile and may help.

Product Support

Giddings & Lewis product support is available over the phone. When you call, you should be at your computer and have the hardware and software manuals at hand. Be prepared to give the following information:

- The version numbers of the hardware and software products.
- The type of hardware that you are using.
- The fault indicators and the exact wording of any messages that appears on your screen.
- How you have tried to solve the problem.

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The applications engineers can also be reached via fax at 1-920-906-7669. The fax machine is open 24 hours 7 days a week. Faxes will be answered during regular business hours only.

In Europe, support can be obtained through Giddings & Lewis. The support staff may be reached by telephone between 8:30 and 17:30 local time, Monday through Friday at 011-44-15154-62010, or via fax at 011-44-15154-72801.

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