6000

SOURCE MODULES

HARDWARE REFERENCE MANUAL

Part No. 09-0301

REVISION A

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Document History

Rev A	**Preliminary**	**12/08/2009**	**J. A.**

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1. GENERAL INFORMATION

1.1 Overview

The S300 modular design offers a level of flexibility normally associated with custom design instruments. It has the revolutionary ability to control DC power supplies along with DC Dynamic loads within the same 5-¼ chassis. The S300 is ideally suited to support the diversified requirements of ATE systems.

The 6000 Series DC Modules easily install into one of the six available motherboard slots located in the S300 Power Subsystem Chassis. A maximum of 2,400 Watts can be delivered per chassis.

The 6000 Series DC Modules are a "Constant Power" design, meaning that the module delivers current up to 400w at any point within its operating envelope down to approximately 30% of full-scale voltage. Constant power operation automatically extends the number of output voltage and current combinations available within the maximum power rating of the module.

1.1.1 Topology

The 6000 Series DC Modules employ switching technology for high operational efficiency and power density. The filtering used achieves low noise performance comparable to linear converters.

1.1.2 Model Number Description

Model Number	NHR P/N	Description
6010	1106168	DC SOURCE 60A, 10V, 400W
6060	1105792	DC SOURCE 16A, 60V, 400W
6080	1106724	DC SOURCE 12A, 80V, 400W
6400	1106635	DC SOURCE 3A, 400V, 400W

1.2 S300 System Specifications

1.2.1 Remote Interlock

Each system includes a single rear panel connector for remote TTL output inhibit.

The DFI may be strapped to the interlock line to inhibit output when a fault occurs.

1.3 DC Source Module Specification

1.3.1 Module Selection

The following modules are available, each requiring one of the six available slots in the chassis:

DC SOURCES:

	OUTPUT POWER	VOLTAGE	CURRENT
LOW VOLTAGE MODULES	PER CHANNEL	RANGE	RANGE
Single output	400W	0-10VDC	0-60A
MID VOLTAGE MODULES			
Single output	400W	0-60VDC	0-16A
Single output	400W	0-80VDC	0-12A
HIGH VOLTAGE MODULES			
Single output	400W	0-+/- 400VDC	0-+/- 3A

1.3.2 Constant Power Output

The current profile of each module approximates a constant power curve. Thus, at low operating voltages higher currents are available. Maximum currents specified in the preceding paragraph are available up to approximately 30% of FS voltages.

1.3.3 Modes of Operation

Voltage Mode and Current Mode. Either of these modes may be selected under program control:

Current Mode:
Current Limit - Programmable between zero and full scale current.

Current Trip - Programmable between zero and 110% of full-scale current. Trip delay is programmable from 1 msec to 60 seconds (i.e., current trip condition occurs when current remains at trip level for greater than pre-programmed time). Default is 20 msec

Voltage Mode:
The ±400 VDC module can source as well as sink 100% of the rated current at the full voltage range. The 400V module cannot source current at negative output voltages or sink current at positive output voltages. Electrical Characteristics – Model 6010 (10V), 6060 (60V), 6080 (80V)

T_A = 25°C, chassis airflow unrestricted on all sides, nominal line input voltage unless otherwise noted. Tolerances apply between 10% and 100% of full-scale voltage. All measurements taken at rear connectors with modules using external sense. Operating ambient temperature 15°C to 45°C. Specifications subject to change without notice.

INPUT CHARACTERISTICS	NOTES AND CONDITIONS	SPECIFICATION
Standard Single Phase Power 115 VAC		
Input Voltage Range	1,200 watt max chassis power	103 to 132 VAC (115 VAC Nominal)
Input Frequency	1,200 watt max chassis power	47 to 440 Hz
Extended Single Phase Power 115 VAC		
Input Voltage Range	1,000 watt max chassis power	90 to 132 VAC (115 VAC Nominal)
Input Frequency	1,000 watt max chassis power	47 to 63 Hz
Standard Single Phase Power 230 VAC		
Input Voltage Range	2,400 watt max chassis power	208 to 264 VAC (230 VAC Nominal)
Input Frequency	2,400 watt max chassis power	47 to 440 Hz
Extended Single Phase Power 230 VAC		
Input Voltage Range	2,000 watt max chassis power	180 to 264 VAC (230 VAC Nominal)
Input Frequency	2,000 watt max chassis power	47 to 63 Hz
OUTPUT CHARACTERISTICS	**NOTES AND CONDITIONS**	**SPECIFICATION**
Model 6010 (10V)		
Output Voltage		0 to 10 VDC
Output Voltage	with optional reverse polarity relay module	-10 to 10 VDC
Output Current		0 to 60 A
Output Voltage RMS Noise		less than 4 mV
Output Voltage Peak-Peak Noise	20MHz bandwidth, 50 ohm terminated	less than 25 mV
Output Voltage Peak-Peak Noise	with optional reverse polarity relay module, 20MHz bandwidth, 50 ohm terminated	less than 50 mV
Model 6060 (60V)		
Output Voltage		0 to 60 VDC
Output Voltage	with optional reverse polarity relay module	-60 to 60 VDC
Output Current		0 to 16 A
Output Voltage RMS Noise		less than 4 mV
Output Voltage Peak-Peak Noise	20MHz bandwidth, 50 ohm terminated	less than 25 mV
Output Voltage Peak-Peak Noise	with optional reverse polarity relay module, 20MHz bandwidth, 50 ohm terminated	less than 50 mV

OUTPUT CHARACTERISTICS (CONTINUED)	NOTES AND CONDITIONS	SPECIFICATION
Model 6080 (80V)		
Output Voltage		0 to 80 V
Output Voltage	with optional reverse polarity relay module	-80 to 80 V
Output Current		0 to 12 A
Output Voltage RMS Noise		less than 7 mV
Output Voltage Peak-Peak Noise	20MHz bandwidth, 50 ohm terminated	less than 35 mV
Output Voltage Peak-Peak Noise	with optional reverse polarity relay module, 20MHz bandwidth, 50 ohm terminated	less than 70 mV
Common to All		
Output Power		0 to 400 W
Voltage Set Point Accuracy	no load	+/-0.016% FS
Voltage Set Point Resolution		14-bit
Current Set Point Accuracy		+/- 1% FS
Current Set Point Resolution		8-bit
Load Regulation	10% to 90% of FS current	+/-0.05% Set
Line Regulation	+/- 10% of nominal line	+/-0.05% Set
Temperature Regulation	per °C change over operating range	+/-0.05% Set
Time Regulation	over 24 hours, constant conditions	+/-0.05% Set
DYNAMIC CHARACTERISTICS	**NOTES AND CONDITIONS**	**SPECIFICATION**
Model 6010 (10V)		
Output Voltage Current Transient	50% to 75% to 50% of maximum current	+/-2% FS
Settling to within 0.4% FS	50% to 75% to 50% of maximum current	less than 12 mS
Model 6060 (60V)		
Output Voltage Current Transient	50% to 75% to 50% of maximum current	+/-1% FS
Settling to within 0.2% FS	50% to 75% to 50% of maximum current	less than 12 mS
Model 6080 (80V)		
Output Voltage Current Transient	50% to 75% to 50% of maximum current	+/-1% FS
Settling to within 0.2% FS	50% to 75% to 50% of maximum current	less than 12 mS
Common to All		
Output Voltage Response Time	Voltage change from 10% to 90% FS	less than 70 mS
MEASUREMENTS	**NOTES AND CONDITIONS**	**SPECIFICATION**
Common to All		
Voltage Measurement		+/- (0.1% Reading + 0.2% FS) V
Voltage Measurement Resolution		11-bit
Current Measurement		+/- (0.1% Reading + 0.2% FS) A
Current Measurement Resolution		11-bit

1.3.4 Electrical Characteristics – Model 6400 (400V)

T_A = 25°C, chassis airflow unrestricted on all sides, nominal line input voltage unless otherwise noted. Tolerances apply between 10% and 100% of full-scale voltage. All measurements taken at rear connectors with modules using external sense. Operating ambient temperature 15°C to 45°C. Specifications subject to change without notice.

INPUT CHARACTERISTICS	NOTES AND CONDITIONS	SPECIFICATION
Standard Single Phase Power 115 VAC		
Input Voltage Range	1,200 watt max chassis power	103 to 132 VAC (115 VAC Nominal)
Input Frequency	1,200 watt max chassis power	47 to 440 Hz
Standard Single Phase Power 230 VAC		
Input Voltage Range	2,400 watt max chassis power	208 to 264 VAC (230 VAC Nominal)
Input Frequency	2,400 watt max chassis power	47 to 440 Hz
OUTPUT CHARACTERISTICS	**NOTES AND CONDITIONS**	**SPECIFICATION**
Voltage		
Output Voltage		0 to 400 V
Voltage Set Point Accuracy	no load	+/-0.016% FS
Voltage Set Point Resolution		14-bit
Output Voltage RMS Noise		less than 40 mV
Output Voltage Peak-Peak Noise	20MHz bandwidth, 50 ohm terminated	less than 100 mV
Load Regulation	10% to 90% of FS current	+/-0.5% Set
Line Regulation	+/- 10% of nominal line	+/-0.5% Set
Temperature Regulation	per °C change over operating range	+/-0.5% Set
Time Regulation	over 24 hours, constant conditions	+/-0.5% Set
Current		
Output Current		0 to 3 A
Current Set Point Accuracy		+/- 1% FS
Current Set Point Resolution		8-bit
Power		
Output Power		0 to 400 W
DYNAMIC CHARACTERISTICS	**NOTES AND CONDITIONS**	**SPECIFICATION**
Output Voltage Current Transient	50% to 75% to 50% of maximum current	+/-1% FS
Settling to within 0.2% FS	50% to 75% to 50% of maximum current	less than 500 uS
Output Voltage Response Time	Voltage change from 10% to 90% FS	less than 4 mS
MEASUREMENTS	**NOTES AND CONDITIONS**	**SPECIFICATION**
Voltage Measurement		+/- (0.1% Reading + 0.2% FS) V
Voltage Measurement Resolution		11-bit
Current Measurement		+/- (0.1% Reading + 0.2% FS) A
Current Measurement Resolution		11-bit

1.3.5 Remote Sense

Each module contains local/remote sense relays. Remote sense operates with up to 2.0VDC drop in each output power lead at full output current.

1.3.6 Trigger Outputs

The trigger outputs consist of an open collector optocoupler, isolated up to 500v from the source common. These signals may be used for triggering external measurement devices, such as an oscilloscope.

1. DC Present (hardware) - (Close = Source ON)
2. Sync - pulse open for 1 mSec upon output voltage change. This may be enabled or disabled via software control.

1.3.7 Current Monitor Output

An analog current monitor signal is provided. The signal is referenced to the load output common (the low side) with a Kelvin sensed return lead.

Output Range: 0 to +5V for full scale
Accuracy: 10% FS

1.3.8 Isolation

The source is isolated from chassis ground so that any point in the isolated circuitry can be floated up to +/-500VDC from the chassis ground.

1.3.9 External Modulation

The DC modules can be externally modulated via an external function generator. A 0 to +20 volt wave form corresponds to a 0 to positive full scale voltage deflection. In addition on the 400V DC module a 0 to -20 volt wave form corresponds to a 0 to negative full scale voltage deflection.

NOTE: Modulation output shall vary from set voltage.

Vin Amplitude	The peak instantaneous input voltage is limited to +/- 20 VDC
Bandwidth	10, 60 & 80V Module DC to 25 Hz 400V Module DC to 440 Hz
Gain	Full Scale Voltage/20 +/-50%
Input Impedance	2.5 Kohms +/- 10%

1.3.10 Output Isolation Relays (optional on 10V DC Source)

The 60V, 80V & 400V Modules include output isolation relays to completely isolate the instrument from station wiring without removing power to the instrument. Isolation relays also switch remote sense lines.

Relays are independently controllable for each module. Circuitry is provided to not allow current switching when relays are engaged/disengaged. The use of isolation relays with the Low Voltage Modules (0-10 VDC) requires limiting output current to 30 amps per channel maximum.

1.3.11 Output Polarity Switching Relays (optional)

Relays are independently controllable for each module. Circuitry is provided to not allow current switching when relays are engaged/disengaged.

The use of polarity switching relays with the Low Voltage Modules (0-10 VDC) requires limiting output current to 30 amps per channel maximum.

The 400 VDC module can provide a ±400 VDC output without the use of a polarity switching relays.

1.3.12 Protection Circuit

The instrument provides the following protection capabilities:

Over Voltage	Limits can be programmed to "shut down" the module output if the voltage exceeds pre-programmed value (defaults to off).
Resolution	.4% FS (8 bits)
Under Voltage	Limits can be programmed to "shut down" the module output if the voltage drops below a pre-programmed value (defaults to off).
Resolution	.4%FS (8 bits)
Over Current Trip	Limits can be programmed to "shut down" the module output if the current exceeds pre-programmed value (defaults to 10% over maximum rated output current).
Accuracy	0.1% of reading +0.1% FS
Over Current Trip Delay	Limits can be programmed from 1 msec to 60 seconds to "shut down" the module output if the current remains at trip level for greater than pre-programmed value (default to 20 msec).
Over Temperature	Over temperature "shut down" occurs when the module heat sink temperature exceeds 90° C.
Accuracy	+/- 3°C
Local Lockout:	Allows programmer to disable all front panel controls remotely. Local Lockout does not disable channel select to allow for monitoring outputs.

Output Short Circuit:	Instrument will not damage itself or output harmful voltages in the event of (1) shorted output leads or (2) open sense lines.

1.3.13 SCR SHUT DOWN: (optional)

Modules may be purchased with output SCRs for crow bar protection. When overvoltage or other error conditions are detected the SCR is activated. The SCR can also be fired externally.

1.3.14 Isolation

Between input and output: 1500Vrms
Between input and control: 1500Vrms
Between output and control: 300Vrms/500VDC
Between outputs of each supply: 300Vrms/500VDC

1.3.15 Overvoltage Operation

The overvoltage function is a software programmable voltage trip point. Module output voltage is monitored and a latching trip occurs when this voltage exceeds that which was programmed.

After an overvoltage trip occurs, the tripped channel must be reset before it may be re-programmed.

Because overvoltage is tripped and latched by hardware, it must be calibrated. If no overvoltage trip point is programmed, it will be defaulted to 10% over the maximum rated output voltage of the module.

When using modules in parallel it would be wise to program the over voltage protection. If the control cabling is not properly installed there is potential for the output voltage to go above programmed level. Programming the overvoltage protection would prevent any damage from occurring in the event of a miswire.

1.3.16 Overcurrent Operation

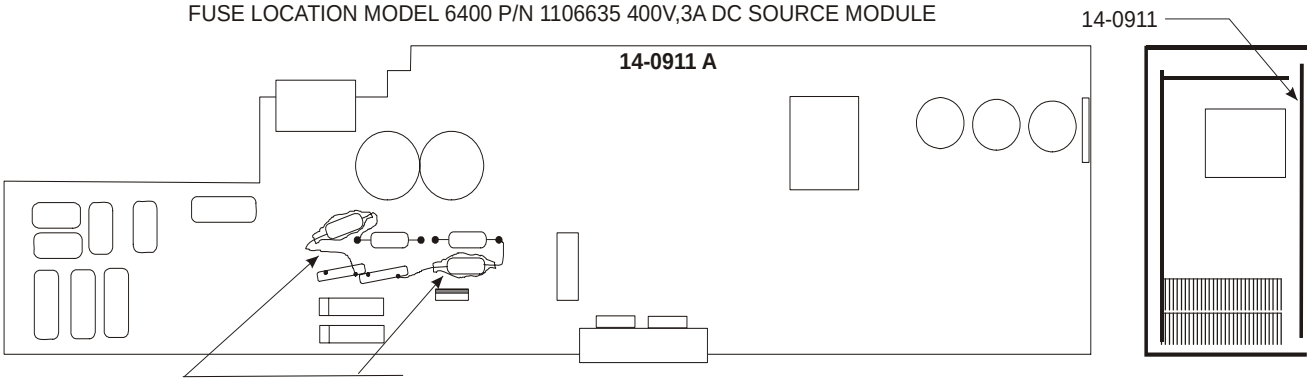
The overcurrent function is a software programmable current trip point. Module output current is monitored by software and a latching trip occurs when this current exceeds that which was programmed.

After an overcurrent trip occurs, the tripped channel must be reset before it may be re-programmed.
If no overcurrent trip point is programmed, it will be defaulted to 10% over the maximum rated output current of the module.

1.3.17 Model 6400 (NHR P/N 1106635) 3A, 400V Module Input Fuses

These two fuses are not held replaceable.

FUSE LOCATION MODEL 6400 P/N 1106635 400V,3A DC SOURCE MODULE



Fuse F1 & F2 5A 125VAC Slow Blow Radial Lead
NHR P/N 8292491 Little Fuse P/N 230005
Factory Replace Only

1.3.18 Firmware Capability

The S300 firmware contains an extensive command set for control of the instrument over the IEEE-488 bus interface and via an optional front panel interface. These commands include instrument settings as a stimulus, and readback instrumentation capability. Additionally, commands are available for diagnostics, software calibration and configuration/identification readings. Examples of configuration/identification functions are reading instrument model number, serial number and firmware version as well as define and/or review logical/physical settings. Refer to Section 4 for a description of front panel operation. Refer to sections 5, 6, and 7 for a description of SCPI commands.

1.3.19 Self-test and Built-In-Test

The instrument contains advanced on-command and continuous Built-in-test. Two levels of self-diagnostics are supported:

CONTINUOUS BIT

The instruments firmware continuously monitors numerous fault flags. Should any failure or out-of-tolerance condition result the instrument will automatically alert the host computer and turn off the output, thus providing protection to the UUT. If the optional isolation relay is installed the output will be switched to a high impedance state. The fault flags are:

Fault	Load	DC Source
Over current	No	Yes
Over voltage	Yes	Yes
Under Voltage	No	Yes
Over temperature	Yes	Yes

SELF-TEST

The self-test assures early detection of hardware problems and minimum time to repair when a failure does occur. A main status word (1 byte) summarizes the hardware status and firmware error detection flags. A discrete fault line is also provided. Should more detailed information be required, status registers provide complete status information on the performance and state of the hardware. All output voltages shall be isolated from the output terminals via the isolation relay option during testing. If this option is not installed the set voltage and overvoltage tests are not performed. The test runs in less than 3 minutes and identifies over 90% of all possible faults.

1.3.20 Closed Cover Calibration

Software calibration is provided for the DC Source modules. The DC Source may be fully calibrated through the IEEE-488 interface bus - no internal adjustments are required.

Load calibration requires a Load Calibrator due to the high accuracy tolerance of the load.

Calibration parameters are stored on EEPROM, which resides on each module. Thus, replacing failed modules does not require recalibration of the instrument.

1.4 Design and Construction

The instrument is designed and built to MIL-STD-28800C Type III hardware requirements for commercial off-the-shelf hardware as well as MIL-STD-45208 quality assurance standards.

1.4.1 Reliability

The fully loaded instrument with six 400W modules installed has a total system MTBF of 15,000 hours as a minimum.

1.4.2 Vibration and Environmental

The S300 meets the following requirements:

Temperature:

Temp (op): -10 to 50 deg C (Max inlet air temperature)
Temp (non-op): -40 to 85 deg C

Humidity:

95% @ 50 deg C, (Non condensing environments only)

Altitude:

Altitude (op): 6,000 ft
Altitude (non-op): 40,000 ft

Vibration:

3 g's in three planes for 15 minutes as follows:

Freq: 10-2000 Hz
Excursion: 0.015 inches

Shock:

15g's on three axis for 11mSec duration using half sinewave shock waveforms.

EMI/RFI:

The instrument is compliant with MIL-STD-461C.

1.5 Deliverable Documentation

NH Research delivers a manual with each instrument:

The User's Manual includes all documentation and procedures to install and interface the instrument. Included are initial inspection procedures, power and grounding requirements, safety and hazard warnings, environmental information and operating instructions.

1.6 Quality Provisions

NH Research designs and manufactures its instrumentation products to normal commercial practices and conforms to MIL-I-45208A quality assurance standards and MIL-STD-28800C performance requirements. Each instrument undergoes 100 hours of elevated temperature burn-in testing (50 deg C) prior to final acceptance testing and delivery. Written verification and performance data are delivered with each unit.

1.7 Applicable Specifications

The instrument complies with the following specifications:

MIL-STD-28800D Type III, Class 3	MIL-STD-45208 Quality Standards
MATE Spec 2806763C	VDE Compliant
UL Compliant	CSA Compliant
IEC 435 Safety and Isolation	IEC 380 Safety Requirements

MIL-STD-461C EMI Part 7 (for commercial test equip.)

2. CONTROL CABLING HOOKUP

2.1 DC Source Module Connections

Power:

Connection to the load (UUT) is made via a cable attached to the power connector labeled "OUTPUT" located on the rear of a DC module.

DC SOURCE MODULE "OUTPUT" CONNECTOR

PIN #	DESCRIPTION	PIN #	DESCRIPTION
1	VSENSE-	5	VSENSE+
2	VOUT+	6	VOUT+
3*	VOUT+	7*	VOUT-
4	VOUT-	8	VOUT-

* NOTE: Pins 3 and 7 are not connected on 400Vdc Source Module

Auxiliary Output Connection:

Auxiliary connections are made through the female 25 pin D-sub connector labeled "INTERFACE" on the rear of a DC module.

DC SOURCE MODULE INTERFACE CONNECTOR

PIN #	DESCRIPTION	PIN #	DESCRIPTION
1	SYNC_O-	14	DC_PRESENT+
2	SYNC_O+	15	DC_PRESENT-
3	-	16	-
4	ISHARE_OUT+	17	-
5	ISHARE_IN+	18	-
6	ISHARE_IN-	19	V_MODULATE+
7	-	20	ISHARE_OUT-
8	CAPPSOUT-	21	V_MODULATE-
9	CAPPSOUT+	22	-
10	-	23	-
11	EXT_ISO	24	FTO_SET
12	SHT_SET	25	POL_REV
13	-		

SYNC_O consists of an open collector optocoupler, isolated up to 500v from the source common. This is normally closed and will go open for 1 millisecond upon voltage change. A maximum of 1 milliamp and 20 volts are allowed.

CAPPSOUT is an analog signal 0 to 5 volts representing 0 full scale output current. **This signal is not isolated**; it is referenced to the DC Source output common.

DC_PRESENT consists of an open collector optocoupler, isolated up to 500v from the source common. This is normally open and will close while the output is on. A maximum of 1 milliamp and 20 volts are allowed.

V_MODULATE The peak instantaneous input voltage is limited to +/- 20 VDC Input impedance is 2.5Kohms. **This input is not isolated**, it is referenced the DC Source output common.20 Volts in equals FS Voltage out. The modulation output will vary from set voltage. All other pins are used internally.

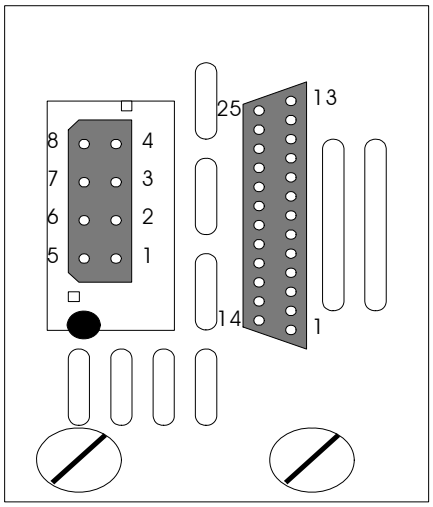
ISHARE pins are defined in 2.5 Parallel Modules Connections.

400 WATT DC MODULE

REAR VIEW

DESCRIPTION	PIN #
- VOUT SENSE	1
+VOUT SENSE	5
- VOUT	4
+VOUT **	3
- VOUT **	7
+VOUT	6
- VOUT	8
+VOUT	2

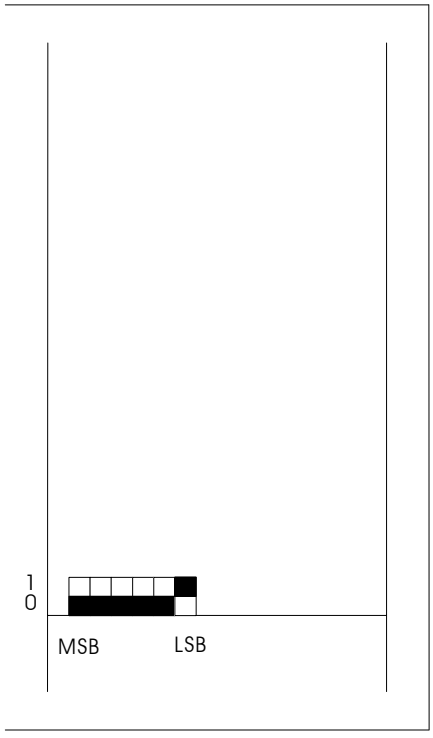
** THESE TWO PINS ARE BLANK ON THE 400V



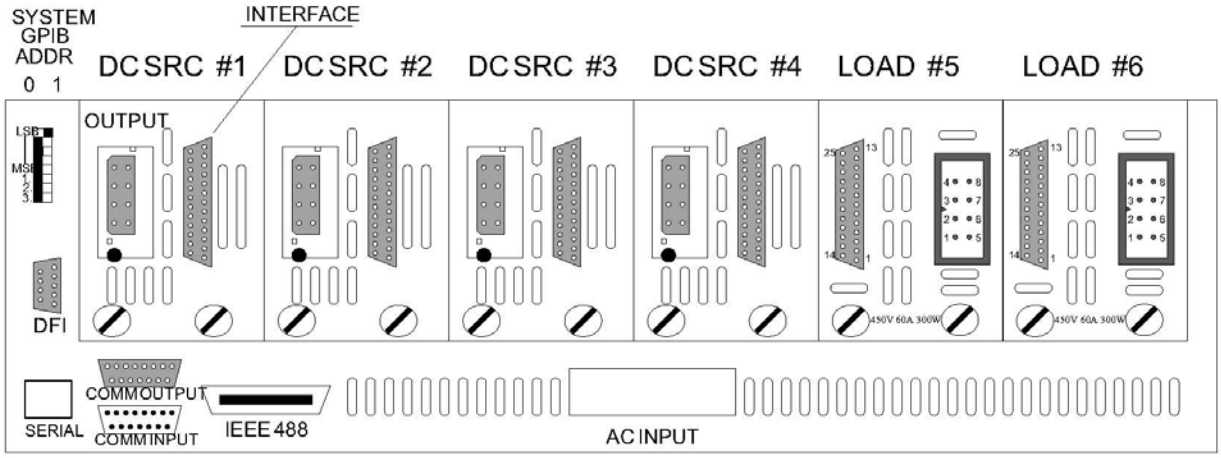
DESCRIPTION	PIN #
- SYNC OUTPUT *	1
+ SYNC OUTPUT *	2
+I SHARE OUTPUT	4
+ I SHARE INPUT	5
- I SHARE INPUT	6
+ CURRENT SIG. OUT	9
- CURRENT SIG. OUT	8
+ DC PRESENT *	14
- DC PRESENT *	15
+ VOLTAGE MOD.	19
- I SHARE OUTPUT	20
- VOLTAGE MOD.(GND)	21

* OPEN COLLECTOR TRANSISTOR ACTIVE LOW
20V MAXIMUM VOLTAGE W/ 20K EXTERNAL PULL UP RESISTOR

FRONT VIEW

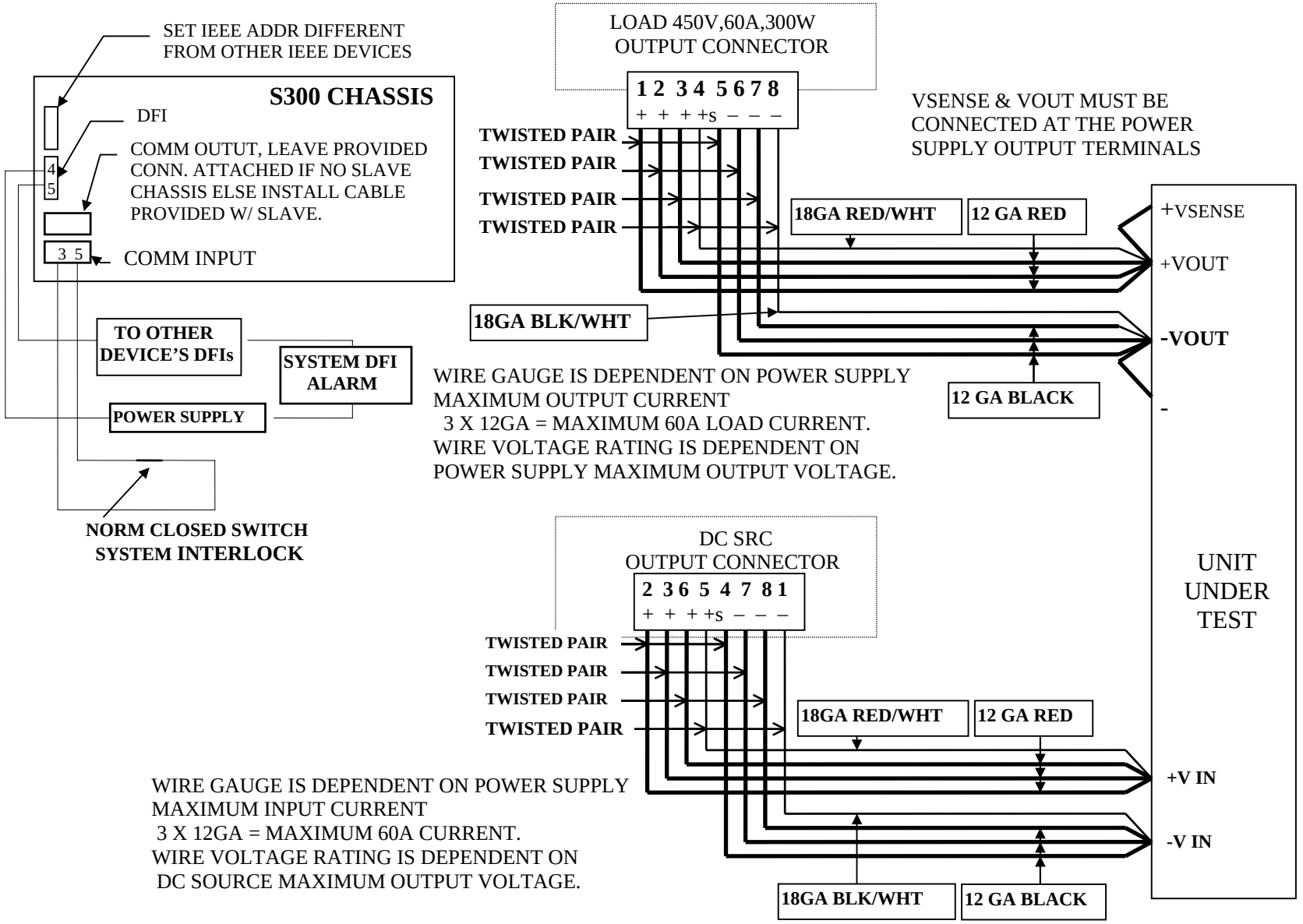


MODULE ADDRESS SWITCH



NOTE: SYSTEM INTERLOCK OF THE COMM INPUT
PINS 3 & 5 MUST BE SHORTED TOGETHER
TO ALLOW SYSTEM OPERATION.

1. S6000 Emulation Mode Enable
2. Macro Operator Mode
3. Flash download and Calibrate Enable


SET IEEE ADDR DIFFERENT
FROM OTHER IEEE DEVICES
S300 CHASSIS
DFI
COMM OUTUT, LEAVE PROVIDED
CONN. ATTACHED IF NO SLAVE
CHASSIS ELSE INSTALL CABLE
PROVIDED W/ SLAVE.
4
5
3 5
COMM INPUT
TO OTHER
DEVICE'S DFIs
SYSTEM DFI
ALARM
POWER SUPPLY
NORM CLOSED SWITCH
SYSTEM INTERLOCK
LOAD 450V,60A,300W
OUTPUT CONNECTOR
1 2 3 4 5 6 7 8
+ + + +s – – –
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
18GA BLK/WHT
18GA RED/WHT
12 GA RED
12 GA BLACK
VSENSE & VOUT MUST BE
CONNECTED AT THE POWER
SUPPLY OUTPUT TERMINALS
+VSENSE
+VOUT
-VOUT
-
WIRE GAUGE IS DEPENDENT ON POWER SUPPLY
MAXIMUM OUTPUT CURRENT
3 X 12GA = MAXIMUM 60A LOAD CURRENT.
WIRE VOLTAGE RATING IS DEPENDENT ON
POWER SUPPLY MAXIMUM OUTPUT VOLTAGE.
DC SRC
OUTPUT CONNECTOR
2 3 6 5 4 7 8 1
+ + + +s – – –
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
18GA RED/WHT
12 GA RED
18GA BLK/WHT
12 GA BLACK
+V IN
-V IN
UNIT
UNDER
TEST
WIRE GAUGE IS DEPENDENT ON POWER SUPPLY
MAXIMUM INPUT CURRENT
3 X 12GA = MAXIMUM 60A CURRENT.
WIRE VOLTAGE RATING IS DEPENDENT ON
DC SOURCE MAXIMUM OUTPUT VOLTAGE.

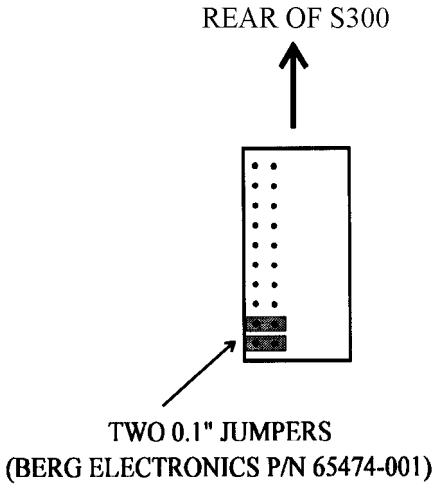
2.2 Module Installation and Removal

Before a module is inserted into the S300 chassis, the MODULE ADDRESS needs to be set. The address must be a unique number (for a given controller chassis) between hexadecimal 1 and 3F (decimal 1 and 63). This address is programmed into the module using the dipswitch. On DC source modules, this switch is located in the front (air entry end) of the module; on load modules it is located near the rear of the module, at the bottom edge. To set a binary zero, press the corresponding switch down, to set a one, leave the switch up.

Each S300 module has two connectors which plug into the motherboard inside the S300 chassis. Mate modules with the motherboard from the rightmost slot toward the leftmost with respect to the S300 front panel. If there is a filler panel in that slot, remove it first by unscrewing the two holding screws. Once the module has been placed firmly into the S300 slot, align and tighten the thumbscrews located on the rear of the DC module.

If it is desired to leave a slot blank, two bus continuation connectors must be placed in each slot that is to be skipped.

NOTE: You must not leave a blank slot between paralleled load modules.



2.3 Parallel Modules Connections

2.3.1 DC Sources

Like module types may be connected in parallel. The paralleled modules become one Logical Source. The maximum power and maximum current of the Logical Source is the sum of the individual module power and current ratings. The current and power are equally shared between all paralleled modules. The Logical Source may be calibrated as a Logical Source to improve the current limit accuracy.

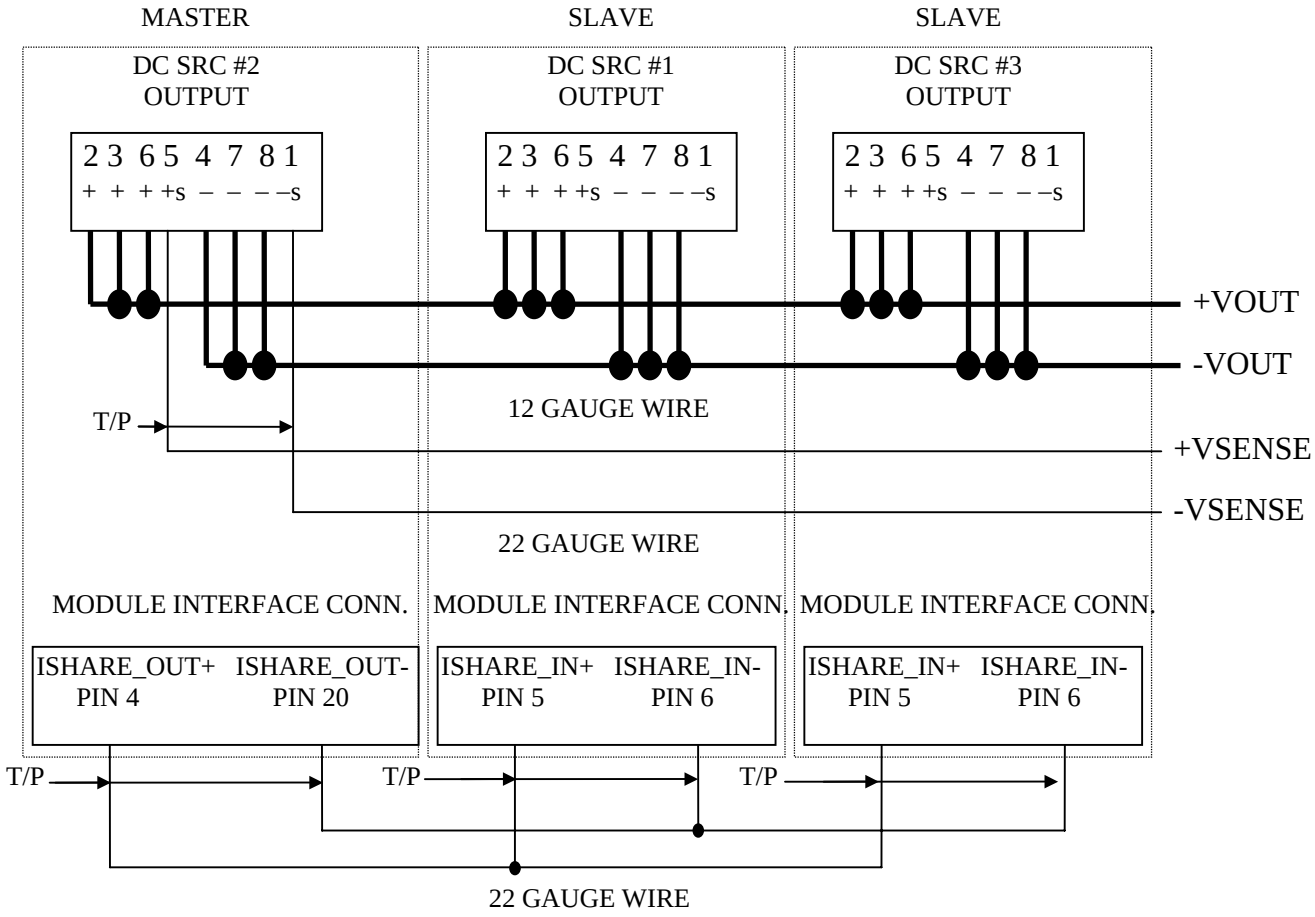
The module, which has been designated as the master, provides the control signal to the slave modules. The ISHARE_OUT pins of the master module interface connector must be connected to the ISHARE_IN pins of the slave modules. Refer to Section 4.4.3 Chassis Configuration for further details on paralleling and unparalleling modules from the front panel set up.

*******WARNING*******

When using modules in the Parallel Mode this cable absolutely must be connected. Without this cable the slave module will attempt to go to full-scale voltage.

The module outputs must also be connected in parallel. Only the master module external voltage sense need be connected if external sense is desired.

PARALLEL CONNECTION ADDR. #2.



2.4 Mating Connector Part Descriptions

2.4.1 DC Source Module **(KIT N.H. Part Number 1106718)**

N.H. P/N	DESCRIPTION	QTY	COMMERCIAL PART NUMBER	MANUFACTURER.
6202864	PWR-LOK 8P MALE	1	PLB08M0O5O	POSITRONICS
6202975	PWR-LOK MALE CONTACT	8	MS112N	POSITRONICS
6200644	DSUB 25PIN SOCKET	1	DB25P	ITT CANNON
6201298	DSUB SHELL	1	DB24659	ITT CANNON
6201309	DSUB SCREW LOCK	2	D20419-21	ITT CANNON
	EXTRACTION TOOL		9081	POSITRONICS
	INSERTION TOOL		9099	POSITRONICS

2.4.2 Manufacturers Description

POSITRONICS INDUSTRIES, INC.
423 N. CAMPBELL AVE.
P.O. BOX 8247
SPRINGFIELD, MO. 65801
PH# 417-866-2322 FAX# 417-866-4115

CANNON ITT
10550 TALBERT AVE.
P.O. BOX 8040
FOUNTAIN VALLEY, CA. 92708
PH# 714-964-7400

3. RESET AND SELF-TEST FUNCTIONAL DESCRIPTION

3.1 DC Source Reset operation

clear input and output buffers

set protection flag for over current and over voltage only

reset relays”

clear flags

set output to off

set sense to remote

reset set functions

set over current and over voltage DACs to FS

program voltage to initialization value

10,60,80 - ~90 mV

400 - full scale negative

enable calibration factor correction

reset metering

reset OV FF

reset flags and counters

set over temp trip to 0x0970

set programmed current trip to FS

reset status

reset status buffers

3.4 DC Source Self-test Operation

Reset DC Source

self-test - only if optional output relay is installed (standard on 60, 80 & 400v sources)

EPROM checksum test

EEPROM checksum test

calibration factor test

voltage test

set voltage to initialization value

turn off PWM

set sense to LOCAL
turn off output (note output was turned off earlier)
set OV trip to FS
set voltage to calibrated 0
turn on PWM
test voltage at 25%, 50%, 100%
OV DAC test
set voltage to initialization
disable OV trip
set voltage to 20% FS
test for OV between range 0x40 to 0x00
repeat test at 80% FS voltage
reset OV FF
set voltage to initialization value
turn off pwm
turn off output relay
set protection flag for over current and over voltage only

4. AVAILABLE OPTIONS

4.1 Module Types

Type	Voltage (V)	Current (A)	Power (W)	Description
1	10	60	400	DC Source Module
2	60	16	400	DC Source Module
3	80	12	400	DC Source Module
4	400	3	400	DC Source Module
11*	10	30	200	DC Source Module
12*	60	8	200	DC Source Module
13*	80	6	200	DC Source Module
14*	400	1.5	200	DC Source Module

* These module types have been discontinued.

4.2 Module Options

The following factory installed options for DC modules exist:

Bit	Name	Description
0	SCR Shutdown	Provides quick removal of voltage from module output
1	Polarity Reversal Relay	Allows for reversal of output voltage polarity
2	Isolation Relay	Isolates DC source output from externally connected UUT
3-15	Reserved	

Any or all of the DC module options defined above may be specified for a given module. For each installed option, the corresponding option bit must be set in the "MODULE OPTIONS" option of the system configuration. The remaining option bits are cleared.