AMETEK®
PROGRAMMABLE POWER

Sorensen
DLM 600W Series
Power Supplies

M51A Option Isolated Analog
Programming Manual

About AMETEK

AMETEK Programmable Power, Inc., a Division of AMETEK, Inc., is a global leader in the design and manufacture of precision, programmable power supplies for R&D, test and measurement, process control, power bus simulation and power conditioning applications across diverse industrial segments. From bench top supplies to rack-mounted industrial power subsystems, AMETEK Programmable Power is the proud manufacturer of Elgar, Sorensen, California Instruments and Power Ten brand power supplies.

AMETEK, Inc. is a leading global manufacturer of electronic instruments and electromechanical devices with annualized sales of $2.5 billion. The Company has over 11,000 colleagues working at more than 80 manufacturing facilities and more than 80 sales and service centers in the United States and around the world.

Trademarks

AMETEK is a registered trademark of AMETEK, Inc. Sorensen is a trademark owned by AMETEK, Inc. Other trademarks, registered trademarks, and product names are the property of their respective owners and are used herein for identification purposes only.

Notice of Copyright

DLM 600W Series Power Supplies M51A Option Isolated Analog Programming Manual © 2002 AMETEK Programmable Power, Inc. All rights reserved.

Exclusion for Documentation

UNLESS SPECIFICALLY AGREED TO IN WRITING, AMETEK PROGRAMMABLE POWER, INC. ("AMETEK"):

(a) MAKES NO WARRANTY AS TO THE ACCURACY, SUFFICIENCY OR SUITABILITY OF ANY TECHNICAL OR OTHER INFORMATION PROVIDED IN ITS MANUALS OR OTHER DOCUMENTATION.

(b) ASSUMES NO RESPONSIBILITY OR LIABILITY FOR LOSSES, DAMAGES, COSTS OR EXPENSES, WHETHER SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL, WHICH MIGHT ARISE OUT OF THE USE OF SUCH INFORMATION. THE USE OF ANY SUCH INFORMATION WILL BE ENTIRELY AT THE USER'S RISK, AND

(c) REMINDS YOU THAT IF THIS MANUAL IS IN ANY LANGUAGE OTHER THAN ENGLISH, ALTHOUGH STEPS HAVE BEEN TAKEN TO MAINTAIN THE ACCURACY OF THE TRANSLATION, THE ACCURACY CANNOT BE GUARANTEED. APPROVED AMETEK CONTENT IS CONTAINED WITH THE ENGLISH LANGUAGE VERSION, WHICH IS POSTED AT WWW.PROGRAMMABLEPOWER.COM.

Date and Revision
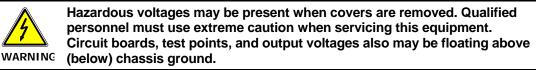
December 2008 Revision B

Part Number

M362299-01

Contact Information

Telephone: 800 733 5427 (toll free in North America)
              858 450 0085 (direct)
Fax: 858 458 0267
Email: sales@programmablepower.com
              service@programmablepower.com
Web: www.programmablepower.com

This page intentionally left blank.

Important Safety Instructions

Before applying power to the system, verify that your product is configured properly for your particular application.

⚠️ **WARNING**	**Hazardous voltages may be present when covers are removed. Qualified personnel must use extreme caution when servicing this equipment. Circuit boards, test points, and output voltages also may be floating above (below) chassis ground.**
⚠️ **WARNING**	**The equipment used contains ESD sensitive parts. When installing equipment, follow ESD Safety Procedures. Electrostatic discharges might cause damage to the equipment.**

Only *qualified personnel* who deal with attendant hazards in power supplies, are allowed to perform installation and servicing.

Ensure that the AC power line ground is connected properly to the Power Rack input connector or chassis. Similarly, other power ground lines including those to application and maintenance equipment *must* be grounded properly for both personnel and equipment safety.
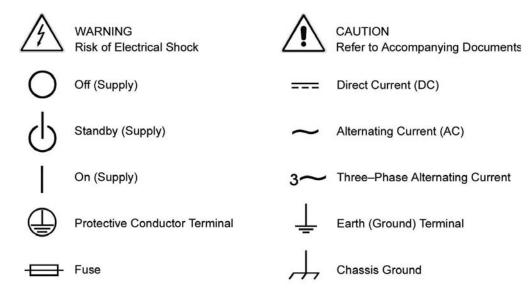
Always ensure that facility AC input power is de-energized prior to connecting or disconnecting any cable.

In normal operation, the operator does not have access to hazardous voltages within the chassis. However, depending on the user's application configuration, **HIGH VOLTAGES HAZARDOUS TO HUMAN SAFETY** may be normally generated on the output terminals. The customer/user must ensure that the output power lines are labeled properly as to the safety hazards and that any inadvertent contact with hazardous voltages is eliminated.

Guard against risks of electrical shock during open cover checks by not touching any portion of the electrical circuits. Even when power is off, capacitors may retain an electrical charge. Use safety glasses during open cover checks to avoid personal injury by any sudden component failure.

Neither AMETEK Programmable Power Inc., San Diego, California, USA, nor any of the subsidiary sales organizations can accept any responsibility for personnel, material or inconsequential injury, loss or damage that results from improper use of the equipment and accessories.

SAFETY SYMBOLS

Symbol	Meaning	Symbol	Meaning
⚠️	WARNING Risk of Electrical Shock	⚠️	CAUTION Refer to Accompanying Documents
○	Off (Supply)	⎓	Direct Current (DC)
⏻	Standby (Supply)	∼	Alternating Current (AC)
│	On (Supply)	3∼	Three–Phase Alternating Current
⏚	Protective Conductor Terminal	⏚	Earth (Ground) Terminal
⎓	Fuse	⏚	Chassis Ground

This page intentionally left blank.

WARRANTY TERMS

AMETEK Programmable Power, Inc. ("AMETEK"), provides this written warranty covering the Product stated above, and if the Buyer discovers and notifies AMETEK in writing of any defect in material or workmanship within the applicable warranty period stated above, then AMETEK may, at its option: repair or replace the Product; or issue a credit note for the defective Product; or provide the Buyer with replacement parts for the Product.

The Buyer will, at its expense, return the defective Product or parts thereof to AMETEK in accordance with the return procedure specified below. AMETEK will, at its expense, deliver the repaired or replaced Product or parts to the Buyer. Any warranty of AMETEK will not apply if the Buyer is in default under the Purchase Order Agreement or where the Product or any part thereof:

- is damaged by misuse, accident, negligence or failure to maintain the same as specified or required by AMETEK;
- is damaged by modifications, alterations or attachments thereto which are not authorized by AMETEK;
- is installed or operated contrary to the instructions of AMETEK;
- is opened, modified or disassembled in any way without AMETEK's consent; or
- is used in combination with items, articles or materials not authorized by AMETEK.

The Buyer may not assert any claim that the Products are not in conformity with any warranty until the Buyer has made all payments to AMETEK provided for in the Purchase Order Agreement.

PRODUCT RETURN PROCEDURE

1. Request a Return Material Authorization (RMA) number from the repair facility (**must be done in the country in which it was purchased**):

    - **In the USA**, contact the AMETEK Repair Department prior to the return of the product to AMETEK for repair:

        Telephone: 800-733-5427, ext. 2295 or ext. 2463 (toll free North America)
        858-450-0085, ext. 2295 or ext. 2463 (direct)

    - **Outside the United States**, contact the nearest Authorized Service Center (ASC). A full listing can be found either through your local distributor or our website, www.programmablepower.com, by clicking Support and going to the Service Centers tab.

2. When requesting an RMA, have the following information ready:

    - Model number
    - Serial number
    - Description of the problem

NOTE: Unauthorized returns will not be accepted and will be returned at the shipper's expense.

NOTE: A returned product found upon inspection by AMETEK, to be in specification is subject to an evaluation fee and applicable freight charges.

This page intentionally left blank.

CONTENTS

SECTION 1 M51A OPTION OVERVIEW

SECTION 2 ISOLATED REMOTE ANALOG INTERFACE OPERATION

LIST OF TABLES

LIST OF FIGURES

SECTION 1
M51A OPTION OVERVIEW

1.1   Introduction

This addendum is to be used in conjunction with the *DLM 600W Series Power Supplies Operation Manual,* Sorensen Document No. M362161-01.

The Sorensen M51A Option for the DLM 600W Series power supplies provides a remote analog interface, which has safety isolation from the output terminals. This allows the remote analog interface to be connected to user accessible (SELV) control circuits, even though the output terminals were floated at a high potential with respect to the chassis.

1.2   General Description

The M51A Option provides isolation for all programming, monitoring, and digital I/O signals that are available through the remote analog interface. This isolation barrier eliminates the connection that exists in the standard DLM models between the non-isolated remote interface circuits and the output return (negative) terminal. The M51A Option remote analog signals are referenced to chassis, and could be user accessible irrespective of the float potentials that exist at the output terminals.

The M51A Option provides a full complement of programming, monitoring, and control methods. Remote programming is available for output voltage, current, and overvoltage protection (OVP). Analog output monitor signals are available for the output voltage and current. Digital I/O signals provide indication of the operational state, and a means of enabling the remote interface and the output.

The type and range of the control and monitor signals are user-selectable with a rear panel setup switch.   The output voltage, current, and OVP could be programmed with a 0-5VDC, 0-10VDC, or 0-5kΩ resistance; in addition, the output voltage and current could be programmed with 4-20mA signals. The output voltage and current monitors could produce 0-5VDC, 0-10VDC, or 4-20mA signals. Isolated 1mA current sources are provided to facilitate the utilization of 0-5kΩ programming resistances.

Except for the isolated remote analog interface, the installation and operation of the DLM 600W Series power supplies remains as presented in the Operation Manual. The following sections provide a detailed description of the new features and the differences in operation.

1.3   Specifications

1.3.1   Electrical Specifications

Remote Voltage Programming Accuracy, 0-5/10V Inputs:
Output Voltage: 0.5% of Vmax
Output Current: 0.75% of Imax
OVP: 1.0% of 1.1 X Vmax

Remote 4-20mA Programming Accuracy:
Output Voltage: 0.75% of Vmax
Output Current: 1.0% of Imax

1.3.2   Supplemental Characteristics

Remote Resistance Programming Accuracy, 0-5kΩ Input:
Output Voltage: 1.0% of Vmax
Output Current: 1.5% of Imax
OVP: 1.5% of 1.1 X Vmax

Remote Monitor Accuracy:
Output Voltage, 0-5/10V ranges: 0.5% of Vmax
Output Voltage, 4-20mA: 0.75% of Vmax
Output Current, 0-5/10V ranges: 0.75% of Imax
Output Current, 4-20mA: 1.0% of Imax

SECTION 2
ISOLATED REMOTE ANALOG INTERFACE OPERATION

2.1   INTFC SETUP Switch

The INTFC SETUP (Interface Setup) switch is accessible from the rear panel of the unit. It provides user selectability of the programming/monitoring ranges and signal types, as well as configuring the power supply for operation under remote control.   Setting a switch to the UP position enables a function. The factory default settings are all switch positions OFF (down).

See Figure 2–1 for a rear panel view of low-voltage models DLM5–75M51A, DLM 8–75M51A, DLM 20–30M51A, DLM 40–15M51A, and DLM 60–10M51A. Refer to Figure 2–2 for a rear panel view of high-voltage models DLM 80–7.5M51A, DLM 150–4M51A, and DLM 300–2M51A.

Switch Position	Function	OFF (Down) Position	ON (Up) Position
1	V, 10V or 4-20mA Select	0-5VDC	0-10VDC or 4-20mA
2	I, 10V or 4-20mA Select	0-5VDC	0-10VDC or 4-20mA
3	OVP, 10V Select	0-5VDC	0-10VDC
4	VMON, 10V Select	0-5VDC or 4-20mA	0-10VDC
5	IMON, 10V Select	0-5VDC or 4-20mA	0-10VDC
6	EXT-OFF, Active-Low Select	Active-High Logic Level	Active-Low Logic Level
7	LCK-OUT	Enable Front Panel Controls	Lockout Front Panel
8	Not Used	—	—

Table 2–1. INTFC SETUP Switch

2.1.1   INTFC SETUP Switch Functions

The following sections describe the functions of the various switch positions:

V, 10V or 4-20mA Select: Position-1, when ON, selects 0-10VDC programming of the output voltage. Also, must be set to ON position when the ISOLATED ANALOG INTERFACE connector is wired for 4-20mA output voltage programming. When OFF, selects 0-5VDC programming of the output voltage.

I, 10V or 4-20mA Select: Position-2, when ON, selects 0-10VDC programming of the output current. Also, must be set to ON position when the ISOLATED ANALOG INTERFACE connector is wired for 4-20mA output current programming. When OFF, selects 0-5VDC programming of the output current.

OVP, 10V Select: Position-3, when ON, selects 0-10VDC programming of OVP threshold. When OFF, selects 0-5VDC programming of OVP threshold.

VMON, 10V Select: Position-4, when ON, selects 0-10VDC range for readback of output voltage. When OFF, selects 0-5VDC readback of output voltage. Also, must be set to OFF position when the ISOLATED ANALOG INTERFACE connector is wired for 4-20mA output voltage readback.

IMON, 10V Select: Position-5, when ON, selects 0-10VDC range for readback of output current. When OFF, selects 0-5VDC readback of output current. Also, must be set to OFF position when the ISOLATED ANALOG INTERFACE connector is wired for 4-20mA output current readback.

EXT-OFF, Active-Low Select: Position-6, when ON, selects the ACTIVE-LOW logic level for disabling the output with the EXTERNAL-OFF signal of the ISOLATED ANALOG INTERFACE connector. When OFF, selects the ACTIVE-HIGH logic level for disabling the output with the EXTERNAL-OFF signal of the Isolated Analog Interface connector.

LCK-OUT: Position-7, when ON, disables the front panel controls; the front panel LOCAL(REMOTE) switch will not toggle between the front panel and remote control.

Position-8: Not used

2.2   SETUP Switch

Only two positions of the SETUP switch remain functional: Position-1, REM SNS, for remote sensing selection; Position-2, SLAVE, for master/slave selection. Their operation is the same as presented in the Operation Manual. The other switch positions, Position-3 through Position-8, are not used.
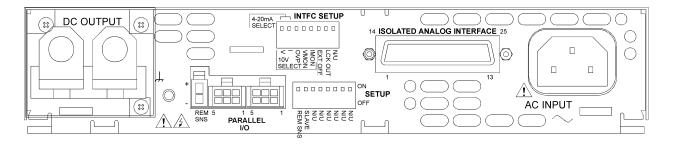
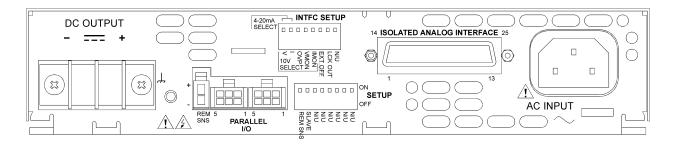*Figure 2–1. Rear Panel View, Low–Voltage Models*

Figure 2–2. Rear Panel View, High–Voltage Models

2.3   Isolated Analog Interface Connector

The ISOLATED ANALOG INTERFACE connector is a 25-position female Subminiature-D type.

Pin	Function
1	ANALOG-CONTROL input
2	Return for 0-5/10V monitor outputs and EXTERNAL-OFF
3	OVP programming input
4	Voltage monitor output, 4-20mA
5	VOLTAGE-MODE status output
6	Return for 4-20mA monitor outputs, Auxiliary 5VDC, and digital I/O
7	Current monitor output, 0-5/10V
8	1.25VDC output for 4-20mA voltage programming signal
9	Voltage programming input
10	Current programming input
11	1.25VDC output for 4-20mA current programming signal
12	Return for 0-5/10V or resistance programming signals
13	Return for 4-20mA current programming signal
14	EXTERNAL-OFF input
15	Auxiliary 5VDC output (+)
16	OVP resistance programming output, 1mA source
17	OVP status output
18	FAULT status output
19	Voltage monitor output, 0-5/10V
20	1.25V input for 4-20mA voltage programming signal
21	Voltage resistance programming output, 1mA source
22	Current resistance programming output, 1mA source
23	1.25V input for 4-20mA current programming signal
24	Current monitor output, 4-20mA
25	Return for 4-20mA voltage programming

Table 2–2. ISOLATED ANALOG INTERFACE Connector Pinout

CAUTION
The signals of the ISOLATED ANALOG INTERFACE have an internal connection to chassis ground. Damage could result if the voltage from signal returns, Pin-2, 6, 12, 13, and 25, to chassis ground exceeds 15VDC.

2.3.1   ISOLATED ANALOG INTERFACE Functions

The following sections describe the functions of the various signals of the ISOLATED ANALOG INTERFACE. Pin numbers correspond to the connector pinout of Table 2–2.

Digital Control Input Signals

ANALOG-CONTROL: Pin-1, enables remote analog programming with an active-high logic level of 3-15VDC. An internal 100kΩ pull-down resistor is provided. When ANALOG-CONTROL is asserted, the power supply will power-up with the analog interface in control of the output voltage. Signal is referenced to Pin-6. Circuit is SELV, and has electrical isolation from the output of the unit.

EXTERNAL-OFF: Pin-14, disables the output when asserted. Active logic level could be selected with the INTFC SETUP switch to be high (3-30VDC) or low. An internal 100kΩ pull-down resistor is provided. Signal is referenced to Pin-2. Circuit is SELV, and has electrical isolation from the output of the unit.

Digital Control Output Signals

VOLTAGE-MODE: Pin-5, nominal 5VDC logic level indicates operation in constant-voltage mode. Source resistance is 2kΩ. Signal is referenced to Pin-6. Circuit is SELV, and has electrical isolation from the output of the unit.

OVP: Pin-17, nominal 5VDC logic level indicates that the output has been disabled because of overvoltage protection. Source resistance is 2kΩ. Signal is referenced to Pin-6. Circuit is SELV, and has electrical isolation from the output of the unit.

 FAULT: Pin-18, nominal 5VDC logic level indicates that the output is disabled because of overtemperature or summary fault. Source resistance is 2kΩ. Signal is referenced to Pin-6. Circuit is SELV, and has electrical isolation from the output of the unit.

Analog Monitor Signals

VOLTAGE MONITOR, 0-5/10V: Pin-19, readback of the output voltage is provided with a 0-5VDC or 0-10VDC signal (user selectable with INTFC SETUP switch) indicating 0-100% of full scale output. Signal is referenced to Pin-2. Circuit is SELV, and has electrical isolation from the output of the unit.

VOLTAGE MONITOR, 4-20mA: Pin-4, readback of the output voltage is provided with a 4-20mA signal indicating 0-100% of full scale output. Signal return for the 4-20mA current is Pin-6. Circuit is SELV, and has electrical isolation from the output of the unit.

CURRENT MONITOR, 0-5/10V: Pin-7, readback of the output current is provided with a 0-5VDC or 0-10VDC signal (user selectable with INTFC SETUP switch) indicating 0-100% of full scale output. Signal is referenced to Pin-2. Circuit is SELV, and has electrical isolation from the output of the unit.

CURRENT MONITOR, 4-20mA: Pin-24, readback of the output current is provided with a 4-20mA signal indicating 0-100% of full scale output. Signal return for the 4-20mA current is Pin-6. Circuit is SELV, and has electrical isolation from the output of the unit.

Analog Programming Signals

OVP PROGRAMMING INPUT: Pin-3, an input signal of 0-5 volts or 0-10 volts (user selectable with INTFC SETUP switch) programs the OVP threshold from 5-110% of full scale output voltage. Signal is referenced to Pin-12. Circuit is SELV, and has electrical isolation from the output of the unit.

VOLTAGE PROGRAMMING INPUT: Pin-9, an input signal for two methods of programming the output voltage: 0-5/10V voltage source or 4-20mA current source.

An input signal of 0-5VDC or 0-10VDC (user selectable with INTFC SETUP switch) to Pin-9 programs the output voltage 0-100% of full scale. Signal is referenced to Pin-12.

An input signal of 4-20mA (user selectable with INTFC SETUP switch) to Pin-9 programs the output voltage 0-100% of full scale. Two jumpers are also required:

Pin-20 to Pin-8; Pin-25 to Pin-12. Signal return for the 4-20mA current is Pin-25; resultant burden voltage is referenced to Pin-12.

Circuits are SELV, and have electrical isolation from the output of the unit.

CURRENT PROGRAMMING INPUT: Pin-10, an input signal for two methods of programming the output current: 0-5/10V voltage source or 4-20mA current source.

An input signal of 0-5VDC or 0-10VDC (user selectable with INTFC SETUP switch) to Pin-10 programs the output current 0-100% of full scale. Signal is referenced to Pin-12.

An input signal of 4-20mA (user selectable with INTFC SETUP switch) to Pin-10 programs the output current 0-100% of full scale. Two jumpers are also required:

Pin-23 to Pin-11; Pin-13 to Pin-12. Signal return for the 4-20mA current is Pin-13; resultant burden voltage is referenced to Pin-12.

Circuits are SELV, and have electrical isolation from the output of the unit.

OVP RESISTANCE PROGRAMMING OUTPUT: Pin-16 provides a 1mA current source which would be connected to Pin-3, OVP PROGRAMMING INPUT, with a 0-5kΩ external resistor connected between Pin-16 to Pin-12, to program the OVP threshold from 5-110% of full scale output voltage. The INTFC SETUP switch Position-3, OVP, must be set to OFF (down) to select 0-5VDC input range. Circuit is SELV, and has electrical isolation from the output of the unit.

VOLTAGE RESISTANCE PROGRAMMING OUTPUT: Pin-21 provides a 1mA current source which would be connected to Pin-9, VOLTAGE PROGRAMMING INPUT, with a 0-5kΩ external resistor connected between Pin-21 to Pin-12, to program the output voltage from 0-100% of full scale output. The INTFC SETUP switch Position-1, V, must be set to OFF (down) to select 0-5VDC input range. Circuit is SELV, and has electrical isolation from the output of the unit.

CURRENT RESISTANCE PROGRAMMING OUTPUT: Pin-22 provides a 1mA current source which would be connected to Pin-10, CURRENT PROGRAMMING INPUT, with a 0-5kΩ external resistor connected between Pin-22 to Pin-12, to program the output current from 0-100% of full scale output. The INTFC SETUP switch Position-2, I, must be set to OFF (down) to select 0-5VDC input range. Circuit is SELV, and has electrical isolation from the output of the unit.

<u>Auxiliary Sources</u>

AUXILIARY 5VDC OUTPUT: Pin-15, 5VDC source output for use with logic and programming circuits. Source capability is adequate to provide for full scale programming of output voltage, current, or OVP when the user connects it to the appropriate programming input(s). Source is referenced to Pin-6. Maximum output current is 15mA. Circuit is SELV, and has electrical isolation from the output of the unit.

AUXILIARY 5VDC RETURN: Pin-6, return of 5VDC AUXILIARY source output. Circuit is SELV, and has electrical isolation from the output of the unit.

1.25VDC REFERENCE FOR 4-20mA VOLTAGE PROGRAMMING: Pin-20, provides a 1.25VDC reference utilized by internal circuits associated with 4-20mA programming of output voltage.

1.25VDC REFERENCE FOR 4-20mA CURRENT PROGRAMMING: Pin-11, provides a 1.25VDC reference utilized by internal circuits associated with 4-20mA programming of output current.

2.4   Remote Programming Configuration

Table 2–3 presents the options for remote control operation. Pin numbers refer to the ISOLATED ANALOG INTERFACE connector. Switch position numbers refer to the INTFC SETUP switch on the rear panel.

Mode of Operation	ANALOG-CONTROL Signal, Pin-1	LCK-OUT, INTFC Setup Switch Position-7	Power-Up State	Local/Remote Toggling
Remote Only	High Level	ON (Up)	Remote	No
Local Only	Low or Open	Off (Down)	Local	No
Local/Remote	High Level	OFF (Down)	Remote	Yes

Table 2–3. Remote Programming Configuration Options

2.4.1   Voltage Source Programming of Output Voltage

Setting up for voltage source programming of the output voltage is as follows:

1.   Set Position-1, V, of the INTFC SETUP switch to OFF (down) for 0-5VDC programming range.

2.   Set Position-1, V, of the INTFC SETUP switch ON (up) for 0-10VDC programming range.

3.   Connect the external programming voltage source to the ISOLATED ANALOG INTERFACE connector, with positive to Pin-9 and negative to Pin-12.

4.   Program the other parameters to the desired limit values: CURRENT PROGRAMMING INPUT, Pin-10, and the OVP PROGRAMMING INPUT, Pin-3, with respect to pin-12.

5.   Connect Pin-1, ANALOG-CONTROL, of the ISOLATED ANALOG INTERFACE connector to Pin-15.

2.4.2   Voltage Source Programming of Output Current

Setting up for voltage source programming of the output current is as follows:

1.   Set Position-2, I, of the INTFC SETUP switch to OFF (down) for 0-5VDC programming range.

2.   Set Position-2, I, of the INTFC SETUP switch ON (up) for 0-10VDC programming range.

3.   Connect the external programming voltage source to the ISOLATED ANALOG INTERFACE connector, with positive to Pin-10 and negative to Pin-12.

4.   Program the other parameters to the desired limit values: VOLTAGE PROGRAMMING INPUT, Pin-10, and the OVP PROGRAMMING INPUT, Pin-3, with respect to pin-12.

5.   Connect Pin-1, ANALOG-CONTROL, of the ISOLATED ANALOG INTERFACE connector to Pin-15.

2.4.3   Voltage Source Programming of OVP

Setting up for voltage source programming of OVP is as follows:

1.   Set Position-3, OVP, of the INTFC SETUP switch to OFF (down) for 0-5VDC programming range.
2.   Set Position-3, OVP, of the INTFC SETUP switch ON (up) for 0-10VDC programming range.

3.   Connect the external programming voltage source to the ISOLATED ANALOG INTERFACE connector, with positive to Pin-3 and negative to Pin-12.

4.   Program the other parameters to the desired limit values: VOLTAGE PROGRAMMING
        INPUT, Pin-9, and the CURRENT PROGRAMMING INPUT, Pin-10, with respect to
        Pin-12.

5.   Connect Pin-1, ANALOG-CONTROL, of the ISOLATED ANALOG INTERFACE
        connector to Pin-15.

2.4.4   Resistance Programming of Output Voltage

Setting up for resistance programming of the output voltage is as follows:

1.   Set Position-1, V, of the INTFC SETUP switch to OFF (down) for 0-5VDC programming
        range.

2.   Connect the external programming resistance, 0-5kΩ, to the ISOLATED ANALOG
        INTERFACE connector, from Pin-21 to Pin-12.

3.   Connect a jumper from Pin-21 to Pin-9.

4.   Program the other parameters to the desired limit values: CURRENT PROGRAMMING
        INPUT, Pin-10, and the OVP PROGRAMMING INPUT, Pin-3, with respect to Pin-12.

5.   Connect Pin-1, ANALOG-CONTROL, of the ISOLATED ANALOG INTERFACE
        connector to Pin-15.

2.4.5   Resistance Programming of Output Current

Setting up for resistance programing of the output current is as follows:

1.   Set Position-2, I, of the INTFC SETUP switch to OFF (down) for 0-5VDC programming
        range.

2.   Connect the external programming resistance, 0-5kΩ, to the ISOLATED ANALOG
        INTERFACE connector, from Pin-22 to Pin-12.

3.   Connect a jumper from Pin-22 to Pin-10.

4.   Program the other parameters to the desired limit values: VOLTAGE PROGRAMMING
        INPUT, Pin-9, and the OVP PROGRAMMING INPUT, Pin-3, with respect to Pin-12.
5.   Connect Pin-1, ANALOG-CONTROL, of the ISOLATED ANALOG INTERFACE
        connector to Pin-15.

2.4.6   Resistance Programming of OVP

Setting up for resistance programming OVP is as follows:

1.   Set Position-3, OVP, of the INTFC SETUP switch to OFF (down) for 0-5VDC programming range.

2.   Connect the external programming resistance, 0-5kΩ, to the ISOLATED ANALOG INTERFACE connector, from Pin-16 to Pin-12.

3.   Connect a jumper from Pin-16 to Pin-3.

4.   Program the other parameters to the desired limit values: VOLTAGE PROGRAMMING INPUT, Pin-9, and the CURRENT PROGRAMMING INPUT, Pin-10, with respect to pin-12.

5.   Connect Pin-1, ANALOG-CONTROL, of the ISOLATED ANALOG INTERFACE connector to Pin-15.

2.4.7   4-20mA Current Source Programming of Output Voltage

Setting up for 4-20mA programming of the output voltage is as follows:

1.   Set Position-1, V, of the INTFC SETUP switch to OFF (down) for 0-5VDC programming range.

2.   Connect the external 4-20mA programming current source to the ISOLATED ANALOG INTERFACE connector, with source at Pin-9 and return at Pin-25.

3.   Connect a jumper from Pin-25 to Pin-12.

4.   Connect a jumper from Pin-8 to Pin-20.

5.   Program the other parameters to the desired limit values: CURRENT PROGRAMMING INPUT, Pin-10, and the OVP PROGRAMMING INPUT, Pin-3, with respect to pin-12.

6.   Connect Pin-1, ANALOG-CONTROL, of the ISOLATED ANALOG INTERFACE connector to Pin-15.

2.4.8   4-20mA Current Source Programming of Output Current

Setting up for 4-20mA programming of the output current is as follows:

1.   Set Position-2, I, of the INTFC SETUP switch to OFF (down) for 0-5VDC programming range.

2.   Connect the external 4-20mA programming current source to the ISOLATED ANALOG INTERFACE connector, with source at Pin-10 and return at Pin-13.

3.   Connect a jumper from Pin-13 to Pin-12.

4.   Connect a jumper from Pin-11 to Pin-23.

5.   Program the other parameters to the desired limit values: VOLTAGE PROGRAMMING INPUT, Pin-9, and the OVP PROGRAMMING INPUT, Pin-3, with respect to pin-12.

6.   Connect Pin-1, ANALOG-CONTROL, of the ISOLATED ANALOG INTERFACE connector to Pin-15.

2.5   EXTERNAL-OFF Control

The EXTERNAL-OFF control input provides the same functionality as the OUTPUT switch on the front panel. When asserted, it will turn off the output converter, discharge the output capacitors with the downprogrammer, and reset the OVP and FAULT monitors. The signal could be configured to be either active-low or active-high with the INTFC SETUP switch on the rear panel.

Set Position-6, /EXT-OFF, to the OFF (down) position to select the active-high logic level for asserting EXTERNAL-OFF. Set Position-6, /EXT-OFF, to the ON (up) position to select the active-low logic level for asserting EXTERNAL-OFF. The logic-high level could be produced with a voltage source within the range of 3-30VDC, and would be connected to Pin14, positive, and Pin-2, return. The circuit is SELV, and has electrical isolation from the output of the unit.

2.6   Remote Monitoring

Analog signals are available for monitoring the output voltage and current. These signals vary proportionally to the output parameters, and have user selectable ranges of 0-5VDC, 0-10VDC, or 4-20mA for an output change from zero to full scale. Refer to Table 2–4 for information on configuring the monitors.

Output Monitor Signal	ISOLATED ANALOG INTERFACE Connections		INTFC SETUP Switch		Signal Range
	Signal	Return	Position	Setting	
Voltage	Pin-19	Pin-2	4, VMON	OFF (down)	0-5VDC
Voltage	Pin-19	Pin-2	4, VMON	ON (up)	0-10VDC
Voltage	Pin-4	Pin-6	4, VMON	OFF (down)	4-20mA
Current	Pin-7	Pin-2	5, IMON	OFF (down)	0-5VDC
Current	Pin-7	Pin-2	5, IMON	ON (up)	0-10VDC
Current	Pin-24	Pin-6	5, IMON	OFF (down)	4-20mA

Table 2–4.   Remote Monitoring

2.7   Remote Digital Status Signals

Digital signals are available for remote monitoring the operational status of the unit. Refer to Table 2–5 for information on the characteristics of the signals.

Status Indicator Signal	ISOLATED ANALOG INTERFACE Connections		Logic Levels (with No Signal Output Current)		Output Resistance
	Signal	Return	Asserted	Not Asserted	
VOLTAGE-MODE	Pin-5	Pin-6	5V	0V	2kΩ
OVP	Pin-17	Pin-6	5V	0V	2kΩ
FAULT	Pin-18	Pin-6	5V	0V	2kΩ

Table 2–5.   Remote Digital Status Signals