

SL Options Explained

Revision A

AOL* Adjustable Overload Trip

A control board jumper is moved to make the power supply shut down if it ever operates in current mode. This allows the user to set the current programming level as a trip point that will turn the power supply off with an Over Current fault if it ever tries to operate in Current Mode.

SL MANUAL CONTENT:

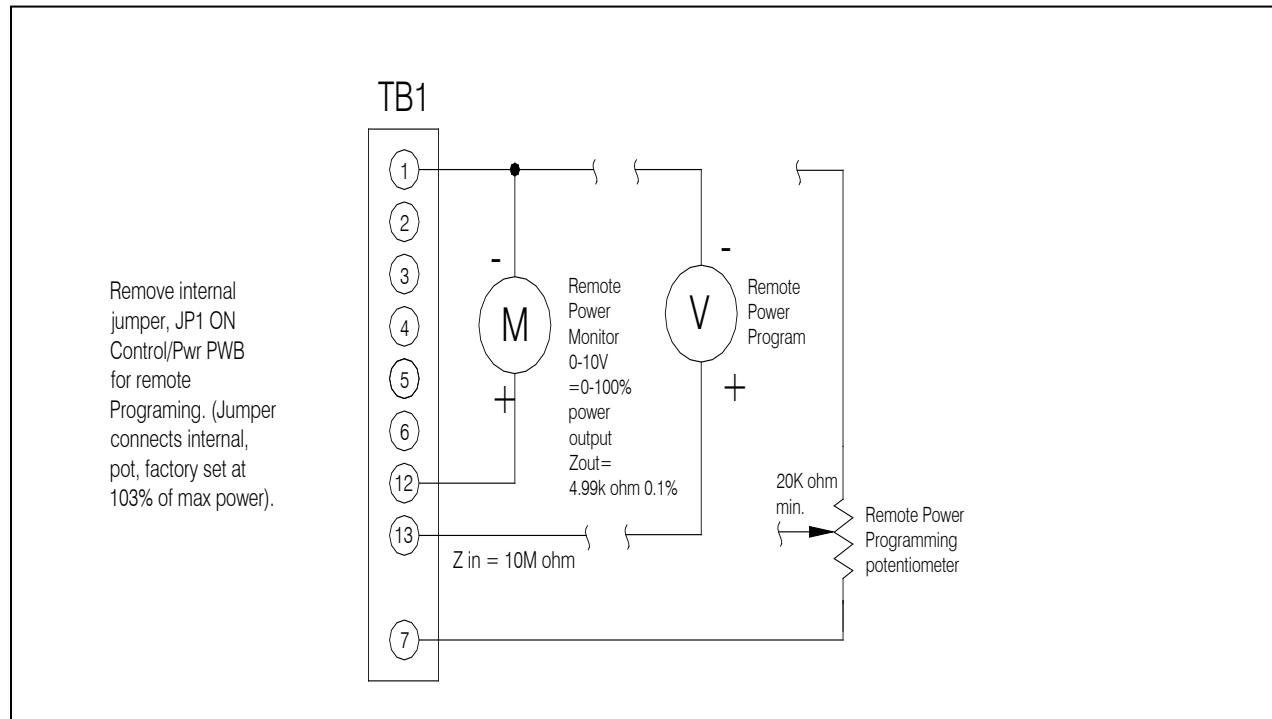
The overload trip protection feature rapidly shuts down the high voltage output when the current exceeds the limit set by the current control dial on the front panel. A fast acting circuit inhibits the generation of high voltage and reverts the unit to POWER DOWN mode, illuminating the OVER CURRENT indicator. When adjustable overload trip is provided, it replaces the standard current regulation feature.

APT Adjustable Power Trip

A third control loop is installed in the power supply, a power loop. This power loop uses an analog multiplier chip to multiply the voltage and current feedback signals to create a power feedback signal. Programming and feedback scaling is 0-10Vdc = 0-100% of rated power. The circuit is configured to trip the power supply off with an Over Power fault if the power loop ever tries to regulate.

SL MANUAL CONTENT:

The power control options allow monitoring and control of the power supply output power. The APT option allows the user to remotely adjust the power limit for the power supply. If the power limit is exceeded, the unit will shut down with an OVERPOWER fault. The CPC option allows power regulation via an internal preset potentiometer, or a remote program source. When the unit is in power regulation, the POWER CONTROL status indicator will be illuminated. See Figure below for remote interface.



AT* Arc Trip

A control board jumper is moved such that the first arc sensed will shut the power supply off with an ARC fault.

SL MANUAL CONTENT:

When this option is ordered, the Arc Count circuit is set so the unit trips to Standby after 1 count. One of the applications for this option is for sensing a material breakdown under an applied high voltage.

CMS Current Mode Select

A front panel switch is provided to allow the power supply to either regulate in current mode or create an over current fault when operated in current mode, which will shut down the supply. This is basically a switch selectable AOL option.

CPC Constant Power Control

Identical to the APT Option with the exception the power supply will run and regulate when the power loop becomes active.

DPM4 Digital Panel Meter, 4.5 digits

The standard 3.5 digit front panel meters are replaced with 4.5 digit panel meters.

EFR External Fault Relay

A set of relay contacts are provided via the rear panel interface that will change state if the power supply shuts down due to a fault condition.

SL MANUAL CONTENT:

The external fault relay option provides a set of customer accessible relay contacts that are controlled by the fault status circuitry of the applicable SL Series power supply. A standard SL power supply will revert to the “power down” mode with a visual front panel indication if any of the following fault conditions occur:

- **Overvoltage:** Greater than 110% of maximum output voltage was produced by the power supply.
- **Overcurrent:** Greater than 104% of maximum output current was produced by the power supply or the AOL circuitry was activated.
- **Overtemperature:** Excessive temperature has been sensed within the chassis.
- **Regulation Error:** Lack of required output power to maintain regulation
- **Arc (Shutdown):** Arc sensing circuit has shut down the supply due to excessive arcing.
- **Overpower:** The power supply has exceeded the internally set power limit level if such circuitry is installed.

With the installation of the EFR option for TB1, if any of these faults occur, a relay will be activated to provide a remote indication that the power supply has reverted to the “power down” mode. The common, normally open and normally closed set of contacts are provided. Relay contacts are rated at 1A at 30Vdc or 0.5A at 48Vac.

Connections on the rear panel Terminal Block (TB1) can be made as follows:

TB1-23	(J5-12)	Relay Common
TB1-24	(J5-NA)	Normally Closed
TB1-25	(J5-13)	Normally Open

Resetting the front panel and EFR relay is accomplished by depressing the green front panel HV OFF push-button switch, which reverts the power supply back to the “standby” mode. Removal and reapplication of the AC line input voltage will also reset any fault. The circuitry and components required for the EFR option are installed at the factory when this option is ordered.

eSL Ethernet Connectivity/VFD Front Panel

The eSL Option provides a vacuum fluorescent front panel display, Ethernet connectivity and comprehensive front panel controls.

FCV Fine Control Voltage

This option adds a second potentiometer to the front panel of the unit. This allows for a finer local adjustment of the output voltage setting.

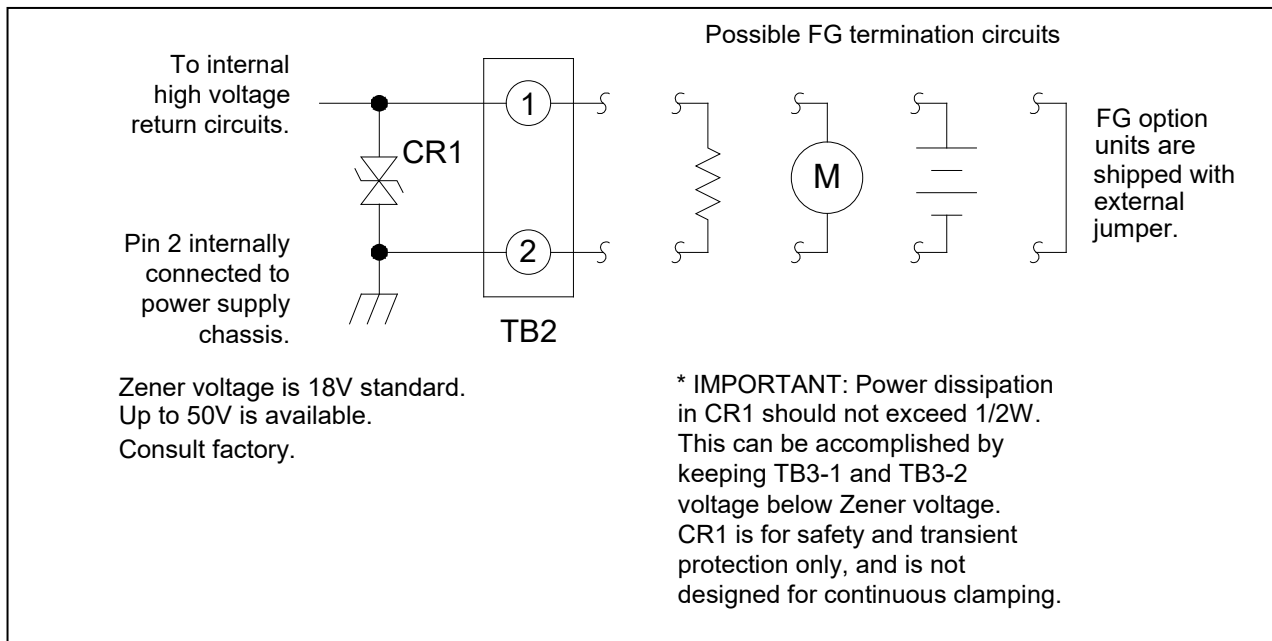
FG Floating Ground

All the analog returns inside the power supply are isolated from chassis and brought to one point on the rear panel. Any current that flows out of the power supply via the HV cable/connector on the high side must return back to the multiplier via the load return on the low side. With only one path to flow through on the low side, a current meter can be inserted in series and a safe ground referenced measurement can be made of the actual high voltage output current.

SL MANUAL CONTENT:

The floating ground option allows isolation of the power supply common from the chassis ground. TB2 located on the rear panel provides connection to the power supply common circuit and to the chassis ground. This signal can be used for a variety of applications. A typical application for FG is for connection of an external meter or circuit into the FG signal point. This circuit can monitor actual current flow at a low voltage level. See Figure below for typical connection to the floating ground terminal.

NOTE: On standard units, TB2-1 and TB2-2 are connected to the chassis grounded internally. Maximum floating ground voltage is 15V. Typically, the total leakage current of the floating terminal to the chassis terminal is less than $1\mu\text{A}$. It is important to realize there are two separate components to this leakage current. The first component is leakage current caused by the coupling of the 60Hz line magnetics to the power supply circuitry. This component can be measured when the power supply is ON and in the HIGH VOLTAGE OFF mode. The second component is the leakage current caused by the coupling of the HVDC circuits to the chassis. The component can be measured by first recording the leakage current in the HV OFF mode, and then recording the leakage at the desired HV setting. The difference between the two values is the HVDC leakage current.



FGLL Floating Ground Low Leakage

Identical functionality as the FG Option but a shield is placed around the high voltage multiplier to capture any leakage current inside the power supply and return it to the top of the current sense resistor. This negates any internal leakage currents from effecting measurements being made.

SL MANUAL CONTENT:

The Low Leakage floating ground option also provides isolation of the power supply common from the chassis ground with a maximum leakage current of 10nA. The typical connections are the same as for the regular Floating Ground Option described in Section 5.6. As stated above in the FG Option description, the FGLL leakage current is also comprised of two components. The 60Hz component is the same as the FG option (<1μA). However, in the FGLL option the HVDC leakage current is less than 10 nanoAmps.

IMPORTANT

The power supply common must be connected to the chassis ground through a low impedance circuit. The power supply common is clamped to the chassis ground using a power zener diode. This diode is not intended to clamp under continuous operation. On higher current units the power dissipation within the zener diode can be excessive if allowed to clamp.

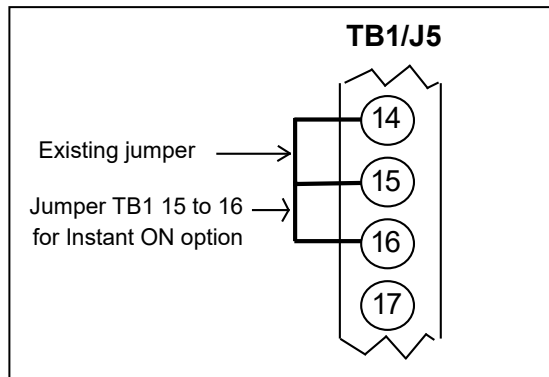
IO* Instant On

A jumper is placed between TB1-15 and TB1-16 on the rear panel, causing the power supply to automatically toggle into HV ON whenever the line voltage is applied.

SL MANUAL CONTENT:

When the Instant On Option is ordered, the High Voltage is enabled as soon as line voltage is applied when the circuit breaker is in the ON position. See Figure below.

To enable Instant On, keep the jumper between TB1-14 and TB1-15 attached. Connect an additional jumper from TB1-15 to TB1-16 as shown in Figure below.



CAUTION

The Power Supply will generate programmed High Voltage whenever the circuit breaker is in the ON position, and line voltage is applied.

LL(X) Lead Length

Extra long high voltage output cable. 20, 40, 60 and 100 feet are standard lengths.

SL MANUAL CONTENT:

Standard output cable is 10 feet of shielded high voltage cable. Other lengths may be specified in multiples of 10 feet.

LR Low Ripple

Done on a case by case basis, the standard unit is evaluated, and modifications are done to improve the output ripple to 0.05% peak to peak. The operating frequency might be increased, or additional filtering may be added to the HV multiplier.

NAD* No Arc Detect

This option removes the arc intervention circuitry from the power supply. Care must be exercised when using this option as damage to the HV multiplier could occur.

NSS No Slow Start

The standard 6 second long linear ramp of output voltage is removed allowing the high voltage to “step” to its set point when enabled.

SL MANUAL CONTENT:

The no slow start option causes the output voltage of the power supply to rise (within 50 msec) to the rated voltage upon depressing the HIGH VOLTAGE ON switch.

PN Positive/Negative

Reversible polarity option. Units that are not inherently reversible by design (10kV to 130kV) can have their output polarity reversed by the process of exchanging the high voltage multiplier section.

SL MANUAL CONTENT:

For units from 1 kV to 8kV, the polarity may be reversed in the field by following the procedures shown in the SL manual.

For units from 10kV to 130kV when this option is ordered, a second multiplier is provided to permit the user to replace the existing multiplier with another of reverse polarity. See the SL manual for a step by step procedure.

RFR Remote Fault Reset

This option provides the ability to reset any power supply faults that might occur via toggling a signal on the rear panel interface.

ROV Remote Over Voltage

The programming signal for the over voltage comparator circuit is made available to the customer remotely, allowing the power supply to be set to trip the OVP circuit anywhere from 0 -110% of rated output voltage.

SL Slides

Industry standard rack mounted slides are installed on the power supply.

SS(X) Slow Start(X)

The standard slow start is modified to provide a time of (X) seconds. Time frames of 0.1 seconds to 120 seconds can be accommodated.

SL MANUAL CONTENT:

The non-standard slow start option allows the gradual rise time of the output voltage to be different from the standard of six seconds. To order the option place the time desired in seconds after the suffix letter, i.e. SS (10) denotes a 10 second rise time.

There may be some restrictions on multiple option combinations. Please contact our Sales department for more details.

* Option available with the Quick Delivery program