

**BK PRECISION®**

# **Instruction Manual**

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**Model 1791 High Current Power Supply C€**

**Limited Two Year Warranty**

B & K Precision Corp. warrants to the original purchaser that its product and the component parts thereof, will be free from defects in workmanship and materials for a period of two years from the date of purchase.

B & K Precision Corp. will, without charge, repair or replace, at its' option, defective product or component parts. Returned product must be accompanied by proof of the purchase date in the form a sales receipt.

To obtain warranty coverage in the U.S.A., this product must be registered by completing and mailing the enclosed warranty card to B & K Precision Corp. 1031 Segovia Circle, Placentia, CA 92870 within fifteen (15) days from proof of purchase.

Exclusions: This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. It is void if the serial number is alternated, defaced or removed.

B & K Precision Corp. shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific right and you may have other rights, which vary from state-to-state.

Model Number: \_\_\_\_\_

Date Purchased: \_\_\_\_\_

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## SECTION 1 GENERAL INFORMATION

### 1.1 DESCRIPTION :

The 1791 High Current Regulated D.C. Power Supply is completely solid and suitable for bench operation or standard 19" rack operation. It is a well regulated constant voltage / constant current supply which delivers 0 - 64V at 0 - 10Amps and can be adjusted continuously throughout the output range. When the supply is used as a constant voltage source the front panel VOLTAGE controls can be used to limit the output voltage. When the unit is used as a constant current source, the front panel CURRENT controls can be used to limit the output current. The unit will automatically cross over from constant voltage to current mode and vice-versa if the output current or voltage exceeds these limits.

Output voltage and current are continuously monitored on two front panel meters. The load terminals and remote sense terminals are provided on the front panel. Either the positive or negative output terminal may be grounded or the power supply can be operated floating at upto a maximum of  $\pm 300\text{VDC}$  above ground.

### 1.2 OUTPUT ON/OFF SWITCH :

The output voltage and Current can be preset without connecting the power supply to the load. With the OUTPUT ON/OFF switch in the OFF position, the maximum voltage and current limits can be set. Pressing the OUTPUT ON switch connects the output of the power supply to the load.

### 1.3 LIMIT SETTING :

The voltage and current limits can be set when the output is not connected to the load. With the OUTPUT ON/OFF switch in the OFF position and the LIMIT switch pressed, the voltage and current limits can be set with the front panel VOLTAGE and CURRENT potentiometers.

### 1.4 REMOTE PROGRAMMING :

The output voltage of the unit can be programmed between 0 to 64V by means of an external remote programming voltage resistor. An external resistance programming selector link is provided on the rear panel for this purpose.

### 1.5 REMOTE SENSING :

The degradation in regulation which occurs at the load due to voltage drop in the load leads can be eliminated by using the power supply in the remote sensing mode operation. The remote sensing mode is selected by a push switch on the front panel.

## SECTION 2 SPECIFICATIONS

|                                                                            |                                                                                                                    |
|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>OUTPUT VOLTAGE</b>                                                      | : 0-64V DC continuously variable with coarse and fine voltage controls.                                            |
| <b>LOAD CURRENT</b>                                                        | : 0-10 Amp max., continuously variable with coarse and fine controls.                                              |
| <b>CONSTANT VOLTAGE MODE<br/>REGULATION</b>                                |                                                                                                                    |
| <b>LINE</b>                                                                | : Less than $\pm 0.01\% \pm 2\text{mV}$ for $\pm 10\%$ change in line voltage.                                     |
| <b>LOAD</b>                                                                | : Less than $\pm 0.01\% \pm 2\text{mV}$ for load change from zero to full load.                                    |
| <b>RIPPLE &amp; NOISE</b>                                                  | : Less than 1mV rms max.(20 Hz - 20 MHz)                                                                           |
| <b>CONSTANT CURRENT MODE<br/>REGULATION</b>                                |                                                                                                                    |
| <b>LINE</b>                                                                | : Less than $\pm 0.05\% \pm 10\text{mA}$ for $\pm 10\%$ change in line voltage.                                    |
| <b>LOAD</b>                                                                | : Less than $\pm 0.05\% \pm 10\text{mA}$ for change in output voltage from 0 volts to maximum output voltage.      |
| <b>RIPPLE &amp; NOISE</b>                                                  | : Less than 3mA rms.                                                                                               |
| <b>OVERLOAD PROTECTION</b>                                                 | : Automatic overload and short circuit protection.                                                                 |
| <b>TRANSIENT RESPONSE</b>                                                  | : 100 $\mu\text{secs}$ to within 10mV of set output voltage for load change from 10% to 90%.                       |
| <b>STABILITY :</b>                                                         |                                                                                                                    |
| Total drift within 8 hours,after warm up under constant line, load & temp. | : $\pm 0.2\% \pm 10\text{mV}$ in constant voltage mode.<br>: $\pm 0.5\% \pm 10\text{mA}$ in constant current mode. |
| <b>PANEL METERS</b>                                                        | : Digital panel meters(marked V for voltmeter and A for ammeter) are provided with an accuracy of $\pm 3$ counts.  |
| <b>MODE INDICATION</b>                                                     | : Respective LED lights up when the unit is working in CV or CC mode.                                              |
| <b>SET LIMIT/ ON-OFF<br/>CONTROLS</b>                                      | : Push Switches for Limit ( V & A ) and output ON/OFF setting.                                                     |
| <b>OUTPUT CONTROLS</b>                                                     | : Single turn coarse and fine voltage and current controls are provided on the front panel                         |
| <b>EXTERNAL PROGRAMMING</b>                                                | : Output voltage can be programmed by a variable resistance of 20K                                                 |
| <b>OPERATING TEMPERATURE</b>                                               | : 0-40°C.                                                                                                          |
| <b>INPUT VOLTAGE</b>                                                       | : 120/230V AC, $\pm 10\%$ 47 - 63Hz single phase.                                                                  |
| <b>DIMENSIONS</b>                                                          | : 19"(W) x 15.75"(D) x 5.24"(H).                                                                                   |
| <b>WEIGHT</b>                                                              | : 55 lbs.                                                                                                          |

## SECTION 3 INSTALLATION

### 3.1 INITIAL INSPECTION :

As soon as the power supply 1791 unit is unpacked, inspect for any damage that may have occurred during transit. Save all packing material until inspection is completed. If any damage is found, notify the carriers immediately. Our authorised representatives should also be notified.

### 3.2 PHYSICAL CHECK :

This check should confirm that there are no broken knobs or connectors, that the cabinet and panel surfaces are free of dents and scratches and the meters are not scratched and cracked.

### 3.3 ELECTRICAL CHECK :

The power supply unit 1791 should be checked against electrical specifications. An in-cabinet performance check will verify proper operation.

### 3.4 INSTALLATION DATA :

The power supply unit 1791 is shipped ready for bench operation. It is necessary only to connect the unit to a rated source of power (120V AC) and it is ready for operation.

### 3.5 LOCATION :

The power supply 1791 unit is fan cooled. Sufficient space should be kept around the unit while in operation, so that unit do not remain in confined space or close to another heating source. The ambient temperature of the area around the unit should be less than 40°C.

### 3.6 RACK MOUNTING :

The unit is in rack size and can be rack mounted in a conventional rack using standard mounting screws and the rack attachments optionally supplied.

### 3.7 INPUT POWER REQUIREMENTS :

The power supply 1791 unit may be operated continuously from input voltage of 120V or 230V AC 47 - 63Hz power source. It is factory wired for 120V AC operation.

### 3.8 REPACKAGING FOR SHIPMENT :

To ensure safe shipment of the power supply 1791 unit, it is recommended that the package designed for the unit be used. The original packaging material is reusable. Be sure to attach a tag to the unit specifying the owner, and the fault observed with a brief description.

## SECTION 4 OPERATING INSTRUCTIONS

### 4.1 TURN ON SETTING PROCEDURE :

The following procedure describes the use of controls and indicators for Constant Voltage and Constant Current Mode of Operation.

#### **CONSTANT VOLTAGE (CV) MODE :**

- a. Set 'POWER ON' Switch & keep the OUTPUT ON/OFF switch to OFF position.
- b. Press LIMIT switch and adjust the VOLTAGE controls till the desired voltage is indicated on Voltmeter.
- c. Press OUTPUT switch to ON position and observe that CV LED lights.

#### **CONSTANT CURRENT VOLTAGE (CC) MODE :**

- a. Turn off the supply. Short circuit the output terminals of the power supply & turn on the supply.
- b. Keep the OUTPUT ON/OFF switch in the OFF position.
- c. Press LIMIT switch and adjust the CURRENT controls till the desired current is indicated on Ammeter.
- d. Press OUTPUT switch ON position and observe that CC LED lights.
- e. Remove the short circuit.

### 4.2 SET LIMIT CONTROL (VOLTAGE AND CURRENT) :

To preset the output Voltage and Current, proceed as follows :

- a. Set the OUTPUT switch to OFF position.
- b. Press the LIMIT switch and adjust the desired output voltage with the VOLTAGE control potentiometers.
- c. Release the LIMIT switch, set the OUTPUT switch to ON position and check the output voltage on the voltmeter.
- d. Set the OUTPUT switch to OFF position.
- e. Press the LIMIT switch and adjust the desired output current limit with the CURRENT control potentiometers.
- f. Release the LIMIT switch, set the OUTPUT switch to ON position and check the output current on the ammeter.
- g. Set the OUTPUT switch to OFF position.
- h. Connect the load to the Output terminals and set the OUTPUT switch to ON position.

### 4.3 LOAD CONNECTIONS :

The load should be connected to the power supply output terminals using separate pairs of connecting wires. This will minimize mutual coupling effects between loads and will retain full advantage of the low output impedance of the power supply. Each pair of connecting wires should be as short as possible and twisted or shielded to reduce noise pick up. (If a shielded pair is used, connect one end of the shield to ground and leave the other end unconnected).

- 4.4** If load considerations require that the output power distribution terminals be remotely located from the power supply, then the power supply output terminals should be connected to the remote distribution terminals via a pair of shielded or twisted wires and each load should be separately connected to remote distribution terminals.
- 4.5** Positive or negative voltage can be obtained from this supply by grounding either one of the output terminals or one end of the load. Always use two leads to connect load to the supply, regardless of where the setup is grounded. This will eliminate any possibility of the output current return paths through the power source ground which would damage the line cord plug. This supply can also be operated upto  $\pm 300V$  DC above ground, if neither output terminal is grounded.
- 4.6 REMOTE SENSING :** 

**Warning :** Do not Operate the Unit in 'REMOTE SENSE' mode without ensuring proper 'REMOTE / 4 TERMINAL' Connections. Serious Damage to Unit or Equipment under test could result.

Remote sensing is used to maintain good regulation at the load and reduce the degradation of regulation which could occur due to the voltage drop in the leads between the power supply and the load. Remote sensing is accomplished by connecting the load to remote sense terminals on the front panel. The leads from the sensing( +S and -S) terminals to the load will carry much less current than the load leads and it is not required that these leads be as heavy as the load leads. However, they must be twisted or shielded to minimize noise pickup.

For reasonable lengths of load leads, remote sensing greatly improves the performance of the supply. However, if the load is located at a considerable distance from the supply, added precautions must be observed to obtain satisfactory operation. Notice that the voltage in the load leads subtracts directly from the available output voltage and also reduces the amplitude of the feedback error signals that are developed within the unit. Because of these factors, it is recommended that the drop in each load lead does not exceed 0.5Volts.

**NOTE :** Due to the voltage drop in load leads, it may be necessary to readjust the current limit in the remote sensing mode.

Observance of the precautions in para. 4.8 and 4.9 will result in a low dc output impedance at the load. However, another factor that must be considered is the inductance of long leads. This causes a high ac impedance and could affect the stability of the feed back loop seriously enough to cause oscillations. If this is the case, it is recommended that the following actions be taken:

- a) Adjust R145 to remove oscillations, or to achieve best possible transient response for given long load lead configuration.



- b) If performing adjustment in step (a) above does not remove oscillation, disconnect output capacitor C2(L-3220 B & K -TER/01 PCB) and connect a capacitor having similar characteristics (approximately the same capacitance, the same voltage rating or greater, and having good high frequency characteristics) directly across load using short leads.  
Readjust R145 as in step (a) above after making this change.

#### **4.7 OUTPUT CAPACITANCE :**

Internal capacitor C2 (L-3220 B & K -TER/01 PCB) connected across the output terminals of the power supply, helps to supply high current pulses of short duration during constant voltage operation. Any capacitance added externally will improve the pulse current capability, but will decrease the safety provided by the constant current circuit. A high current pulse may damage load components before the average output current is large enough to cause the constant current circuit to operate.

The effects of the output capacitor during constant current operation are as follows:

- a. The output impedance of the power supply decreases with increasing frequency
- b. The recovery time of the output voltage is longer for load resistance changes.
- c. A large surge current causing a high power dissipation in the load occurs when the load resistance is reduced rapidly.

#### **4.8 REVERSE VOLTAGE LOADING :**

A diode CR1 is connected across the output terminals. Under normal operation, the diode is reverse biased (anode connected to the negative terminal). If a reverse voltage is applied to the output terminals ( positive voltage applied to the negative terminal), the diode will conduct, shunting current across the output terminals to the forward voltage drop of the diode. This diode protects the series transistor and the output electrolytic capacitors.

#### **4.9 REVERSE CURRENT LOADING :**

Active loads connected to the power supply may actually deliver a reverse current to the power supply during a portion of its operating cycle.

An external source cannot be allowed to pump current into the supply without loss of regulation and possible damage to the output capacitor. To avoid these effects, it is necessary to preload the supply with a dummy load resistor so that the power supply delivers current through the entire operation cycle of the load device.

#### **4.10 EXTERNAL PROGRAMMING :**

Remote external programming can be achieved changing the external program link on rear panel and connecting a variable resistor of 20K across the terminals as shown on the rear panel.

SECTION 5  
PART LIST & SCHEMATICS

1. PRSR-0896 PCB ASSY

| Reference Designator | Part Description | Reference Designation | Part Description |
|----------------------|------------------|-----------------------|------------------|
| <u>RESISTORS</u>     |                  |                       |                  |
| R101                 | 4E7              | R129                  | Not Used         |
| R102                 | 1K5              | R130                  | 330K             |
| R103                 | 100K             | R131                  | Not Used         |
| R104                 | 3K9              | R132                  | 3K6              |
| R105                 | 10K              | R133                  | Not Used         |
| R106                 | 180K             | R134                  | 1K               |
| R107                 | 8K2              | R135                  | 4K7 (SEL)        |
| R108                 | 5K, Preset       | R136                  | Not Used         |
| R109                 | 390E             | R137                  | 15K              |
| R110                 | 10K              | R138                  | 2K               |
| R111                 | 3K3, 2W          | R139                  | Not Used         |
| R112                 | 10K              | R140                  | 5K1              |
| R113                 | 270E, 2W         | R141                  | 6K8              |
| R114                 | 10K              | R142                  | 5.6K             |
| R115                 | 150K (SEL)       | R143                  | 3.3K (SEL)       |
| R116                 | 6K8              | R144                  | 6.2K (SEL)       |
| R117                 | 390K (SEL)       | R145                  | 7.5K             |
| R118                 | 12K              | R146                  | 1K               |
| R119                 | 820E             | R147                  | 1K               |
| R120                 | 24E              | R148                  | 100E (SEL)       |
| R121                 | 65K (SEL)        | R149                  | 6K8              |
| R122                 | 3K9              | R150                  | Not Used         |
| R123                 | 680K (SEL)       | R151                  | 2K               |
| R124                 | 560E             | R152                  | 1K               |
| R125                 | 4K7              | R153                  | Not Used         |
| R126                 | 15E              | R154                  | Not Used         |
| R127                 | Not Used         | R155                  | Not Used         |
| R128                 | 1K               |                       |                  |
| <u>PRESETS</u>       |                  |                       |                  |
| PR101                | 500E, LIN, (H)   | R108                  | 5K, LIN, (H)     |
| PR102                | 500E, LIN, (H)   |                       |                  |
| <u>ZENERS</u>        |                  |                       |                  |
| Z101                 | 10V, 0.4W        | Z102                  | 4.7V, 0.4W       |
| <u>DIODES</u>        |                  |                       |                  |
| CR101                | 1N4007           | CR111                 | 1N4007           |
| CR102                | 1N4007           | CR112                 | 1N4007           |
| CR103                | 1N4007           | CR113                 | 1N4007           |
| CR104                | 1N4007           | CR114                 | 1N4007           |
| CR105                | 1N4007           | CR115                 | 1N4007           |
| CR106                | 1N4007           | CR116                 | 1N4007           |
| CR107                | 1N4007           | CR117                 | 1N4007           |
| CR108                | 1N4007           | CR118                 | 1N4007           |
| CR109                | 1N4007           | CR119                 | 1N4007           |

1. PRSR-0896 PCB ASSY

| Reference<br>Designator   | Part<br>Description  | Reference<br>Designation | Part<br>Description   |
|---------------------------|----------------------|--------------------------|-----------------------|
| CR120                     | 1N4007               | CR125                    | 1N4148                |
| CR121                     | 1N4007               | CR126                    | 1N4148                |
| CR122                     | 1N4007               | CR127                    | 1N4148                |
| CR123                     | 1N4007               | CR128                    | 1N4148                |
| CR124                     | 1N4007               | CR129                    | 1N4007                |
| <b><u>BRIDGE</u></b>      |                      |                          |                       |
| B101                      | CSB-1 (1A-100V) X 2  |                          |                       |
| <b><u>CAPACITORS</u></b>  |                      |                          |                       |
| C101                      | 0.1 $\mu$ F/50V, MP  | C114                     | 10 $\mu$ F/50V, ELE   |
| C102                      | 470 $\mu$ F/50V, ELE | C115                     | 470 $\mu$ F/50V, ELE  |
| C103                      | 33 $\mu$ F/50V, ELE  | C116                     | Not Used              |
| C104                      | 1 $\mu$ F/50V, ELE   | C117                     | 2.2 $\mu$ F/100V, ELE |
| C105                      | 10 $\mu$ F/50V, ELE  | C118                     | 220 $\mu$ F/50V, ELE  |
| C106                      | 4.7 $\mu$ F/50V, ELE | C119                     | Not Used              |
| C107                      | 100 $\mu$ F/50V, ELE | C120                     | 0.1 $\mu$ F/50V, CD   |
| C108                      | 470 $\mu$ F/35V, ELE | C121                     | 0.1 $\mu$ F/50V, CD   |
| C109                      | 0.1 $\mu$ F/50V, CD  | C122                     | 0.1 $\mu$ F/50V, CD   |
| C110                      | 0.1 $\mu$ F/50V, CD  | C123                     | 10 $\mu$ F/50V, ELE   |
| C111                      | 1KPF/50V, CD         | C124                     | 10 $\mu$ F/50V, ELE   |
| C112                      | 10 $\mu$ F/50V, ELE  | C125                     | 0.1 $\mu$ F/50V, CD   |
| C113                      | 1KPF/50V, CD         | C126                     | 0.1 $\mu$ F/50V, CD   |
| C127                      | 0.1 $\mu$ F/50V, CD  | C128                     | 10 $\mu$ F/50V, ELE   |
| <b><u>TRANSISTORS</u></b> |                      |                          |                       |
| Q101                      | MPSA 12              | Q104                     | BC557                 |
| Q102                      | BC109                | Q105                     | BC547                 |
| Q103                      | BC557                | Q106                     | NOT USED              |
| <b><u>IC</u></b>          |                      |                          |                       |
| IC101                     | LM324                | IC102                    | NOT USED              |
| <b><u>REGULATORS</u></b>  |                      |                          |                       |
| VR101                     | LM7812               | VR104                    | LM7812 / 7824         |
| VR102                     | TL431                | VR105                    | 79L05                 |
| VR103                     | TL431                | VR106                    | LM7805                |
| <b><u>CONNECTORS</u></b>  |                      |                          |                       |
| CON101                    | 2.54mm PITCH, 12 PIN | CON104                   | 2.54mm PITCH, 5PIN    |
| CON102                    | 2.54mm PITCH, 12 PIN | CON105                   | Not Used              |
| CON103                    | 2.54mm PITCH, 4 PIN  |                          |                       |

**2. HPS-PC /03. PCB ASSLY**

| <b>Reference Designator</b> | <b>Part Description</b> | <b>Reference Designation</b> | <b>Part Description</b> |
|-----------------------------|-------------------------|------------------------------|-------------------------|
| <b><u>RESISTORS</u></b>     |                         |                              |                         |
| R1                          | 270E/2W, CFR            | R3                           | 10E, 0.25W, 5%, MFR     |
| R2                          | 10E, 0.25W, 5%, MFR     |                              |                         |
| <b><u>CAPACITOR</u></b>     |                         |                              |                         |
| C1                          | 0.1μF/250V AC           |                              |                         |
| <b><u>DIODES</u></b>        |                         |                              |                         |
| CR1                         | 1N4007                  | CR2                          | 1N4007                  |
| <b><u>CONNECTORS</u></b>    |                         |                              |                         |
| CON1                        | 2.54mm PITCH, 4 PIN     | CON2                         | 2.54mm PITCH, 3 PIN     |
| <b><u>MISCILLANEOUS</u></b> |                         |                              |                         |
| L1                          | 10uH CHOKE              | TX1                          | PULSE X'MER             |

**3. Z-DPM/02 REV - 01 X 2**

| <b>Reference Designator</b> | <b>Part Description</b> | <b>Reference Designation</b> | <b>Part Description</b> |
|-----------------------------|-------------------------|------------------------------|-------------------------|
| <b><u>RESISTORS</u></b>     |                         |                              |                         |
| R1                          | 39K, 0.25W, 5%, MFR     | R6                           | 2K4, 0.25W, 5%, MFR     |
| R2                          | 470K, 0.25W, 5%, MFR    | R7                           | 330K, 0.25W, 5%, MFR    |
| R3                          | 1M, 0.25W, 5%, MFR      | R8                           | 330K, 0.25W, 5%, MFR    |
| R4                          | SEL (INPUT)             | R9                           | 6K8 , 0.25W, 5%, MFR    |
| R5                          | 10K, 0.25W, 5%, MFR     |                              |                         |
| <b><u>PRESETS</u></b>       |                         |                              |                         |
| PR1                         | 25K, LIN, VER (REF ADJ) |                              |                         |
| <b><u>CAPACITOR</u></b>     |                         |                              |                         |
| C1                          | 220uF/50V, CD           | C4                           | 0.1uF/100V, MP          |
| C2                          | 0.1uF/100V, MP          | C5                           | 0.1uF/100V, MP          |
| C3                          | 0.01uF/100V, MP         | C6                           | 0.1uF/100V, MP          |
| <b><u>IC's</u></b>          |                         |                              |                         |
| IC1                         | 7107 DECODER DRIVER     |                              |                         |
| VR1                         | TL - 431                |                              |                         |
| <b><u>FND's</u></b>         |                         |                              |                         |
| DS1 to DS3                  | TSD566 GREEN (V)        | DS4 to DS6                   | TSD566 RED (A)          |
| <b><u>MISCILLANEOUS</u></b> |                         |                              |                         |
| J1                          | 2.54 PITCH, 3 PIN M     | J3                           | 2.54 PITCH, 4 PIN M     |
| J2                          | Not Used                |                              |                         |

**L3220 B & K-TER/01. PCB ASSLY**

| Reference Designator     | Part Description | Reference Designation | Part Description |
|--------------------------|------------------|-----------------------|------------------|
| <b><u>RESISTORS</u></b>  |                  |                       |                  |
| R1                       | 1K, 10W          |                       |                  |
| <b><u>CAPACITORS</u></b> |                  |                       |                  |
| C1                       | 0.1μF/100V, CD   | C2                    | 2200μF, 80V, ELE |

**HSRECT/01. PCB ASSLY**

| Reference Designator | Part Description              | Reference Designation | Part Description |
|----------------------|-------------------------------|-----------------------|------------------|
| <b><u>DIODES</u></b> |                               |                       |                  |
| CR1                  | 70HFR20                       | CR3                   | 70HF20           |
| CR2                  | 70HFR20                       | CR4                   | 70HF20           |
| <b><u>SCR</u></b>    |                               |                       |                  |
| SCR1                 | SKKT 15/08 (BACK TO BACK SCR) |                       |                  |
| <b><u>FAN</u></b>    |                               |                       |                  |
| FAN1                 | 12V / 24V DC INNOVATIVE       |                       |                  |

**5. HSMFT/01. PCB ASSLY**

| Reference Designator | Part Description  | Reference Designation | Part Description |
|----------------------|-------------------|-----------------------|------------------|
| <u>FET</u>           |                   |                       |                  |
| Q*                   | 2 X IRFP 150      |                       |                  |
| <u>SHUNT</u>         |                   |                       |                  |
| R154                 | 0.05E/25W         |                       |                  |
| <u>ZENER</u>         |                   |                       |                  |
| Z1                   | 10V, 0.4W         |                       |                  |
| <u>FAN</u>           |                   |                       |                  |
| FAN2                 | 24V DC INNOVATIVE |                       |                  |

**6. FRONT PANEL ASSLY**

| Reference Designator | Part Description       | Reference Designation | Part Description |
|----------------------|------------------------|-----------------------|------------------|
| <b><u>POT</u></b>    |                        |                       |                  |
| VR1                  | 20K, WWPOT             | VR3                   | 1K, WWPOT        |
| VR2                  | 1K, WWPOT              | VR4                   | 50E, WWPOT       |
| <b><u>LED</u></b>    |                        |                       |                  |
| CV LED               | 3mm LED, GRN           | CC LED                | 3mm LED, RED     |
| <b><u>SWITCH</u></b> |                        |                       |                  |
| SW1                  | 16A/250V ON/OFF SWITCH |                       |                  |

**7. MAIN CHASSIS ASSLY**

| Reference Designator     | Part Description                | Reference Designation | Part Description |
|--------------------------|---------------------------------|-----------------------|------------------|
| <b><u>RESISTOR</u></b>   |                                 |                       |                  |
| R1                       | 4.7K/2W, MOR                    |                       |                  |
| <b><u>DIODES</u></b>     |                                 |                       |                  |
| CR1                      | U30D40C (30AMP/400V DUAL DIODE) |                       |                  |
| <b><u>CAPACITORS</u></b> |                                 |                       |                  |
| C1                       | 8 X 4700 $\mu$ F, ELE / 100V    |                       |                  |
| <b><u>FILTER</u></b>     |                                 |                       |                  |
|                          | 20A, RFI FILTER                 |                       |                  |
| <b><u>VARISTOR</u></b>   |                                 |                       |                  |
|                          | 130V                            |                       |                  |

**8. BACK TROUGH ASSLY**

| Reference Designator | Part Description | Reference Designation | Part Description |
|----------------------|------------------|-----------------------|------------------|
| <b><u>FUSE</u></b>   |                  |                       |                  |
| FUSE1                | 15AMP, TYPE F    |                       |                  |

**9. L3220RS/01 PCB ASSLY**

| Reference Designator     | Part Description     | Reference Designation | Part Description      |
|--------------------------|----------------------|-----------------------|-----------------------|
| <b><u>RESISTORS</u></b>  |                      |                       |                       |
| R1                       | SHORT                | R3                    | 68K, 0.25W, 5% MFR    |
| R2                       | SHORT                |                       |                       |
| <b><u>CAPACITORS</u></b> |                      |                       |                       |
| C1                       | 470 $\mu$ F/80V, ELE | C2                    | 100 $\mu$ F, 80V, ELE |

**10. 1790-PR/03 (030499) PCB ASSLY**

| Reference Designator    | Part Description    | Reference Designation | Part Description    |
|-------------------------|---------------------|-----------------------|---------------------|
| <b><u>RESISTORS</u></b> |                     |                       |                     |
| R1                      | SEL                 | R6 & 7                | SEL                 |
| R2                      | 2K, 0.25W, 5% MFR   | R8                    | 1K, 0.25W, 5% MFR   |
| R3                      | 91K, 0.25W, 5% MFR  | R9                    | 1K, 0.25W, 5% MFR   |
| R4                      | SEL                 | R10                   | 560E, 0.25W, 5% MFR |
| R5                      | 2K20, 0.25W, 5% MFR | R11                   | 510E, 0.25W, 5% MFR |
| <b><u>PRESETS</u></b>   |                     |                       |                     |
| PR1 to 4                | 100E (HORIZONTAL)   |                       |                     |

## SAFETY

INSULATION CLASS I, POLLUTION DEGREE 2 : IEC 1010 -1

This instrument has been built & tested as per IEC publications prepared by Technical Committee No. 66(Ref. No. CEI/ IEC 1010-1:1990) : Safety requirements for electrical equipment for measurement, control & laboratory use. This instructions manual provides information and warning data which must be taken into consideration by the user for safety of operator and instrument.

### SAFETY PRECAUTIONS TO BE TAKEN BEFORE SETTING THE INSTRUMENT INTO SERVICE :

**Warning : Any interruption of the safety lead inside or outside the unit or disconnection of the protection ground terminal may render the instrument dangerous. An intentional disconnection is prohibited.**

When the instrument is to be supplied via an auto-transformer, in order to reduce the supply voltage available, make sure the common terminal is connected to the neutral point (grounded) of the supply circuit. The jack should only be into a plug fitted with a grounding piece. The safety connection should never be interrupted by the use of an extension cord without a protection (ground) lead. The power supply cord must be connected to the mains network (with good value), before connecting the control of the measuring circuits.

### SYMBOLS (as marked on equipment or in this manual) :



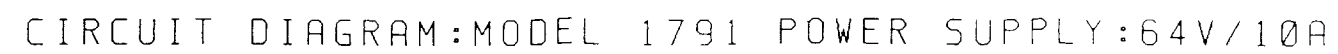
DANGER High Voltage.



Protective ground (earth) terminal.



ATTENTION - Refer to manual.  
This symbol involves a mandatory reference to the operating manual. The User is required to refer and follow the relevant instructions.





**Service Information**

**Warranty Service :** Please return the product in the original packaging with proof of purchase to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device.

**Non-Warranty Service :** Please return the product in the original packaging to the below address. Clearly state in writing the performance problem and return any leads, connectors and accessories that you are using with the device. Customers not on open account must include payment in the form of a money order or credit card. For the most current repair charges contact the factory before shipping the product.

Return all merchandise to B & K Precision Corp. with pre-paid shipping. The flat-rate repair charge includes return shipping to locations in North America. For overnight shipments and non-North America shipping fees contact B & K Precision Corp.

B & K Precision Corp.  
1031 Segovia Circle  
Placentia, CA 92870  
Phone: 714-237-09220  
Facsimile: 714-237-9214

Include with the instrument your complete return shipping address, contact name, phone number and description of problem.