

USER'S MANUAL

EPO CONTROL



PROPRIETARY

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Section 1

WARNINGS

REFER TO WARNINGS BELOW BEFORE USING THE EPO CONTROL

1.1 - Personal Safety



NEVER SERVICE ALONE. The EPO Control switches high voltages and currents that are potentially lethal. Do not perform service to the EPO Control System and associated components unless another person is present who is capable of rendering first aid. **To avoid serious injury or death, it is strongly recommended that all servicing be completed with ALL power cables disconnected.**



Never operate the EPO Control with any protective covers removed. Do not operate the system if any of the power input / output terminals or cables are damaged.

1.2 - Current Connections



Special care should be taken to insure that the power connections are secure and do not work loose during operation. Local heating at the terminations can cause rapid oxidation leading to a high contact resistance and high power dissipation at the terminals. If left unchecked this can cause enough local heating to damage or destroy the current connection terminals. Ensure that all connections are properly strain relieved or otherwise secured.

1.3 - Interlocks

Aside from the 'Emergency Power Off' functionality, the EPO Control also has the capability of providing for interlock connections on equipment. Refer to Section X.X for more information.

Section 2

SPECIFICATIONS

Table 1. EPO Control Specifications

Electrical

Power Input

Input Connector 120VAC, 30A maximum
NEMA Type L5-30R
Input Protection: Carling Thermal / Hydraulic Panel Breaker, 30A

Power Outputs

Uncontrolled 120VAC, 15A maximum
Output Connector 8 x IEC 60320-F
Output Protection: Carling Thermal Breaker, 15A

Controlled

Output Connector 120VAC, 15A maximum
8 x IEC 60320-F
Output Protection: Carling Thermal Breaker, 15A

Control Power

Input Protection: 24VDC, 25A
Fuse, Slow Blow, 10A
Output Protection: Carling Thermal Breaker, 20A

Remote Output Connectors

4 x Amphenol Type 97-3102A-16S-1S

EPO Status Connection

Closed on Power Enabled Switchcraft Type 112BX ¼" Stereo Jack

Mechanical

Form Factor 3U rack mount fully enclosed chassis
Overall Dimensions 482mm (19") wide x 132.5mm (5.2") high x 594mm (23.4") deep
Weight 11 kg (25lbs)

Section 3

INSTALLATION

Caution: In many cases, the EPO Control and related equipment will be pre-installed by GMW into a 19" EIA equipment rack. If it is not, care should be taken during rack mounting to avoid personal injury or damage to the equipment.

3.1 - Unpacking Instructions and Damage Inspection

3.1.1 - Systems Shipped with a GMW Supplied Rack:

1. Remove all eight of the lag bolts located at the lower edge of all the side panels of the crate top cover.
2. Gently rock the crate top cover to work it loose from the shipping crate base.
3. Use one person on each side of the shipping crate grip, the side panels of the crate top cover. Lift the crate top cover high enough to clear top of the rack, walk the cover sideways to a clear area and place it upon the floor.
4. Inspect the rack and its contents to ensure that no damage has occurred during shipment. If any damage is evident report the damage in detail to the shipper for claim and simultaneously notify GMW in case an assessment of the damage must be made. If no damage is found, proceed with the unpacking and installation.
5. Cut the straps that secure the rack to the pallet base.
6. Remove the wood block at the bottom front edge of the rack.
7. Carefully slide the rack forward and off of the pallet base.
8. Unpack any other system components as per their instruction manuals.

3.1.2 - Systems Shipped without a GMW Supplied Rack:

1. Open the outer shipping carton by cutting the packing tape along the joints.
2. Remove the inner shipping carton by carefully lifting it out.
3. Open the inner shipping carton by cutting the packing tape along the joints.
4. Carefully lift the EPO Control clear of the shipping carton.
5. Inspect the EPO Control for any damage.
6. Retain all packing materials for future shipping needs.

3.2 - Rack Mounting

When rack mounting the EPO Control and related accessories it is important to note that the vertical mounting flanges alone are not strong enough to support the weight of the EPO Control. Support angles on each side, beneath the EPO Control, must also be used. Failure to use adequate support angles will result in equipment damage.

Take care when selecting a rack that it has enough depth to completely house the EPO Control and related equipment. The RC-351930 Bench Height Rack offered by GMW has an internal depth of 762mm (30"). Typical installations would put the heaviest items at the bottom of the rack, with the EPO Control higher in the rack to allow easy access to the Emergency Stop Button. Other equipment may then be installed in to the rack as required.

Note: Telco style racks are NOT appropriate.

3.3 – Equipment Power Connections

Even if the EPO Control was ordered as a complete system and assembled into a rack by GMW, it is still recommended to follow and verify the following section as connections may have loosened during shipment. A typical system would consist of the EPO Control, EPO Remote Slave and a Magnet Power Supply and possibly a 5971-160 Current Reversal Switch.

Refer to drawing 13907-0035-0, Rev. A for a typical connection diagram.

3.3.1 – EPO Uncontrolled Outputs

Determine which equipment in the rack that should NOT be shut down in the event of an ‘Emergency Stop’. This would typically include control computers, controllers and data acquisition equipment. This equipment should total no more than 15A total load and should be connected to the ‘Uncontrolled’ outputs of the EPO Control.

3.3.2 – EPO Controlled Outputs

Equipment that should be shut down in the event of an emergency should be connected to the ‘Controlled’ output of the EPO Control. Again, ensure that the total load is not more than 15 amps.

NOTE: The input of the EPO Control is protected by a 30A breaker. The internal power 24VDC power supply requires about 8 amps when operating. This leaves only 22 amps for the total combined maximum load for the EPO outputs.

3.3.3 – Controlling High Power Devices

If the device to be controlled requires a higher voltage or current input than the EPO Control is capable of, a Remote Slave Control will be used to provide Control. The power input and output connectors, and circuit protection devices (if any) will be appropriate to the load to be connected. If the load current requirements are greater than 50 amps, the power connections may be ‘direct wire’ terminations and this connection should be carried out by a qualified electrician.

The Remote Slave Control may be either rack mounted or a wall mount box.

3.4 – Equipment Grounding

In many installations, it may be required that the power equipment (reversal switches and power supplies) have a separate ground bonding connection to the equipment rack. Contact the facilities manager for specific requirements.

Section 4

SYSTEM DESCRIPTION

4.1 - System Description

The GMW EPO Control is a modular system to provide Emergency Power Off protection for magnet systems and components. A single Master EPO Control provides protected and un-protected power outputs for critical equipment such as computers, control systems and data acquisition systems.

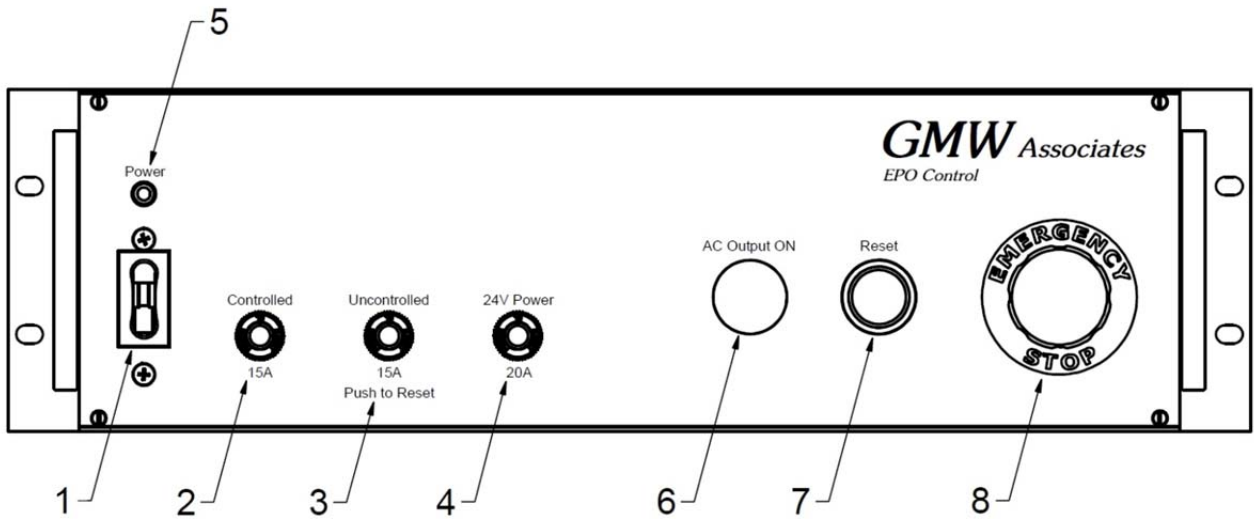
For high power requirements up to 480VAC, 50A, 3 phase, remote 'Slave' units must be used. Slaves may be rack mounted or may be in a NEMA rated wall mounting enclosure. Slaves are controlled by a single cable and may be located up to 30 meters away from the Master EPO Control.

Remote 'Emergency Power Off' switch boxes are available to provide access to Emergency Off control in any location and may connect to the Master EPO Control or to any slave via a pass-through control connector.

All unused control connections must be equipped with a termination plug.

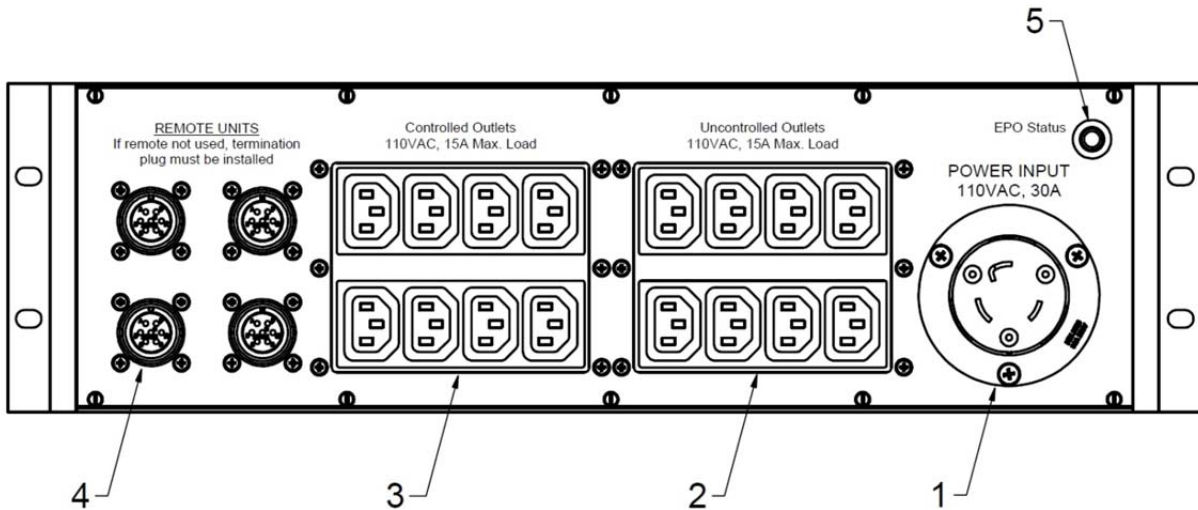
An EPO Status output is provided on the Master Control to allow monitoring of the EPO Status by a control computer.

4.1.1 - Front Panel



1. Main Power Switch / Breaker, 30A
2. Controlled Power Outlet Breaker, 15A
3. Uncontrolled Power Outlet Breaker, 15A
4. 24V Control Power Breaker, 20A
5. Control Power Indicator
6. AC Output 'ON' Indicator
7. Reset Button and Indicator
8. Emergency Stop Button, Twist to Clear

4.1.2 - Rear Panel



1. AC Mains Input – 110VAC, 30A
2. Uncontrolled Outlets
3. Controlled Outlets
4. Remote Slave Control Connectors
5. EPO Status Output Connector – Normally Open Relay Contact

4.2 - Initial Power-Up

Once all of the control and power cables are connected and verified to be correct, it is time to switch on the components. Start by switching on the EPO Control main power switch / breaker. The power and reset indicators should illuminate. In addition, the power and reset indicators in any remote slave accessories should also illuminate. Next switch on the 'Uncontrolled' equipment, computers, controllers, etc. Verify that the output of any power supplies are programmed to zero or otherwise inhibited before continuing on.

After all the uncontrolled equipment is powered up, it is time to power 'Controlled' equipment. Verify that the power switches on the controlled equipment are all off. Next switch on the breakers (if any) on the slave controllers. Now it is time to apply power to the various controlled equipment. Press the green 'Reset' button, and the power contactors should energize and the 'AC Output ON' indicator should illuminate. If the contactor remains in the OFF state, verify that all of the Emergency Stop buttons are released (twist to release) and try again.

Once the AC power is on, it is time to switch on all of the various controlled equipment via its own power switch. At this point, everything should be on and ready to use.

4.3 – Emergency Stop Operation

Should an emergency arise, pushing in any one the 'Emergency Stop' buttons will result in the immediate removal of power and shut down of all controlled equipment. Once the condition that initiated the emergency has been cleared and everything has been checked for safety, power may once again be applied by simply releasing the Emergency Stop button that was initially pressed by twisting it in the indicated direction and pressing any of the 'Reset' buttons.

NOTE: KEPCO BOP power supplies have magnetic breakers that control the power input. Each KEPCO power supply in the system will need to be manually switched back on.

Section 5

ACCESSORIES

The EPO Control System includes several remote accessories and options as detailed below. Remote Slaves do not include the Emergency Stop or Reset buttons, however they are available as an option. The option must be included at the time of ordering. Also available is a remote Switch Box that may be located in areas where easy access to the Emergency Stop button is desirable.

Remote Rack Mount Slave for 4 x Kepco BOP Power Supplies: This 3U rack case provides mains power switching for up to 4 x Kepco 1kW BOP power supplies. It may be located in the same rack as the master EPO controller or in a separate rack.



Remote Rack Mount Slave for 240V, 30A 3 Phase: This 3U rack case provides mains power switching for a single Sorenson SGA power supply. It may be located in the same rack as the master EPO controller or in a separate rack.



Remote Wall Mount Slave for 240V, 30A 3 Phase: This all metal NEMA rated enclosure provides mains power switching for a single Sorenson SGA power supply or other equipment.



Remote Switch Box: The Remote Switch Box includes the Emergency Stop and Reset buttons in an impact resistant polycarbonate enclosure. The cable connection is via an Amphenol circular connector allowing for custom cable lengths. Optional mounting brackets are available.



Section 6

MAINTENANCE

The EPO Control should operate for many years without any trouble provided that the following basic maintenance points are observed. Always remember that the AC power should be disconnected before performing any maintenance procedure. The EPO Control switches power at lethal voltages and must not be operated with damaged components, protective covers or cable insulation. For more information, please refer to Section 2, Warnings.

1. Electrical Connections: Ensure that all electrical connections are clean and tight. Ensure that the insulation of all electrical cables is undamaged and repair or replace if necessary. All electrical termination covers must be in place and firmly secured.

2. Warning Labels: Ensure that all protective covers on the system and the magnet are in place. There are warning labels on all removable covers.

4. Cleaning: To clean wipe the case with a soft cloth with a mild detergent or plain water. Do not use any solvents as they may damage the finish.

Section 7

DRAWINGS

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PHOTOGRAPHS

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TROUBLE SHOOTING

Section 10

WARRANTY