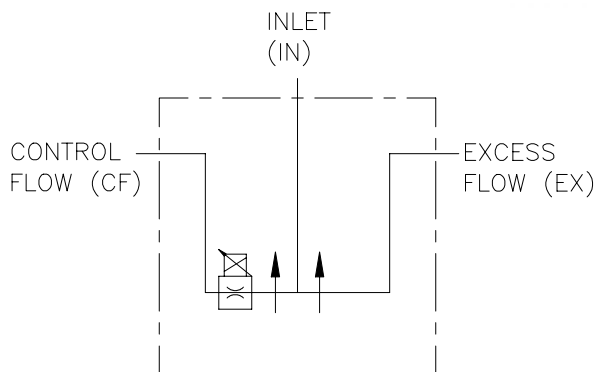


## ELECTRONICALLY ADJUSTABLE PROPORTIONAL PRESSURE COMPENSATED FLOW CONTROL “EFC”



### FEATURES:

- **DIAMOND LAPPED SPOOL BORE** provides consistent spool fit with low leakage.
- **O’RING PORTS** to eliminate leakage.
- **EVERY EFC IS TESTED** for shutoff, linearity, max. flow, crack open flow and pressure compensation.
- **STANDARD 3-PORT** allows for pressure compensated flow out of two ports.
- **OPTIONAL 2-PORT** allows for pressure compensated flow out of one port.
- **OPTIONAL FREE REVERSE FLOW** allows fluid to move from the CF (control flow) port to the inlet.
- **MANUAL OVERRIDE** when electrical power is lost.

### SPECIFICATIONS:

- See flow chart for capacity.
- **3000 psi (207 bar) rating.**
- **Weighs 8-1/2 lbs. (3.9 kg).**
- **Standard Port size #12SAE (1-1/16 – 12).**
- **10-Micron Filtration Recommended.**
- **Coil**
  - 12 volts DC standard.
  - 9.6 ohms.
  - 15 watts.
  - 1.0 amp max.
- **Pulse Frequency (90 to 115 hz).**
- **Response Time**
  - 0.035 (375 ms).
  - 0.020 (900 ms).
  - 0.093 (175 ms to 350 ms depending on flow).
- **Spool leakage (50 ml/min. @1000 psi on EX port).**

### MATERIALS:

- **Cast Iron Body**
- **Heat Treated Steel Spools**
- **Buna N O’Rings**
- **Heat Treated Free Reverse Check Seat**

## EFC – GENERAL INFORMATION

The Brand, electronically adjustable proportional pressure compensated flow control is an electronically controlled version of the original FC51 style flow control valve. The EFC performance as a flow control is very similar to the FC51 because they both use the same spring and compensator spool. Thus, the control flow port (CF) and the excess flow port (EX) remain usable and pressure compensated.

The main advantage of the EFC over the FC51 is that the flow can be adjusted proportionally with a solenoid instead of manually. As the current to the solenoid increases the variable orifice moves and proportionally opens an orifice in the valve (similar to positioning the rotary side lever on the manual FC's). The solenoid is connected to our EC – series controls which can be sold with the EFC. We also give the choice of a dashpot size, which allows the customer to select a valve that responds to the control box at different rates. A few other options are 2-port and free reverse flow.

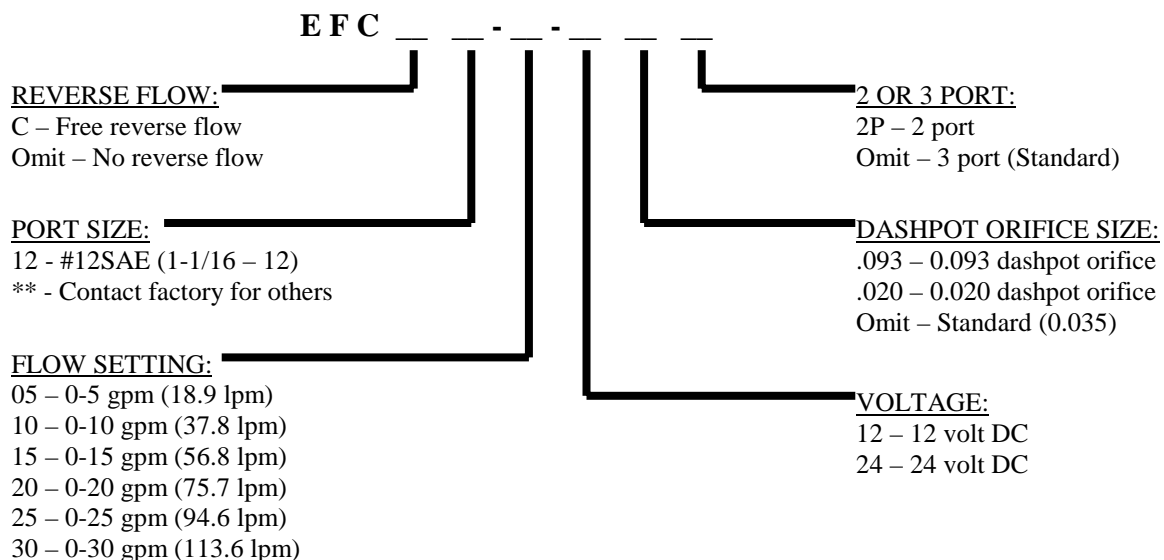
**2-PORT-** The 2-port (2P) option is a modified version of the standard 3-port EFC. This option lets the customer use the control flow port while the excess port is plugged. A special compensator spool was designed to eliminate hunting that can occur between pressure compensated valves and pumps. To use the EFC 2-port a pressure compensated pump is required because the fluid is not able to return to tank when the control flow port is shut off. The 2-port can be converted to a 3-port (by removing the EX plug), but it will not have the same characteristics as the standard 3-port. (See chart on next page for 2-port EFC)

**FREE REVERSE FLOW-** The free reverse flow option was designed to be used primarily where cylinders and motors are needed to go in reverse. The flow can only go in reverse from controlled flow (CF) to the inlet (IN). Flow is not metered when it goes in reverse. The non metered flow travels into the compensator spool, past the guided ball check and then through the inlet. The steel ball seat inside the compensator spool is heat treated to assure a long life.

## EFC – EXAMPLES OF COMMON MODEL CODES:

**EFC12-10-12.....** 10 gpm 3-port with 12 volt coil  
**EFC12-10-122P.....** 10 gpm 2-port with 12 volt coil  
**CEP1000.....** 10 gpm 3-port with EC-12-01 control

## EFC – CREATING A MODEL CODE FOR EFC'S:



### EFC WITH ELECTRONIC CONTROL:

C E P 0 0

#### REVERSE FLOW:

C – Free reverse flow  
Omit – No reverse flow

#### CONTROLS:

D – EC-12-02 (Dashmount)  
Omit – EC -12-01 (Weather proof box)

#### FLOW SETTING:

05 – 0-5 gpm (18.9 lpm)  
10 – 0-10 gpm (37.8 lpm)  
15 – 0-15 gpm (56.8 lpm)  
20 – 0-20 gpm (75.7 lpm)  
25 – 0-25 gpm (94.6 lpm)  
30 – 0-30 gpm (113.6 lpm)

#### 2 OR 3 PORT:

2P – 2 port  
Omit – 3 port (Standard)

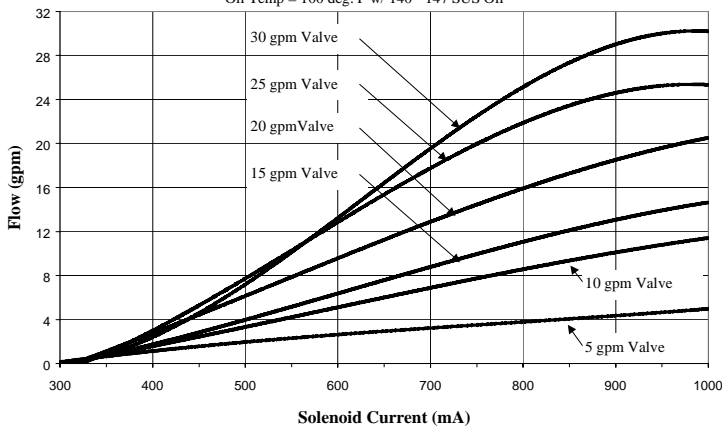
#### DASHPOT ORIFICE SIZE:

.093 – 0.093 dashpot orifice  
.020 – 0.020 dashpot orifice  
Omit – Standard (0.035)

### EFC FLOW & SOLENOID CURRENT INFO FOR 2-PORT AND 3-PORT:

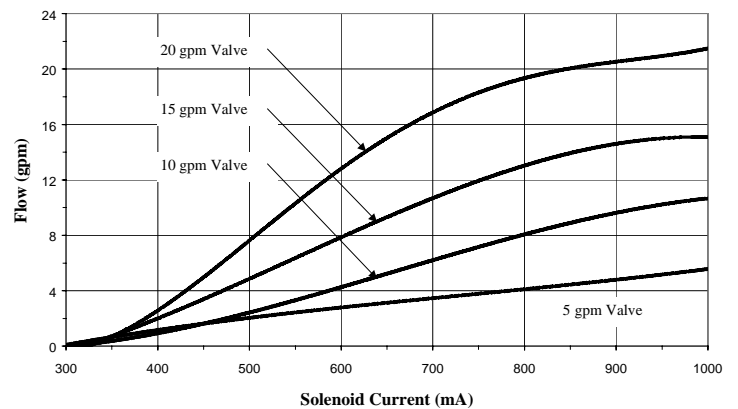
Flow vs. Solenoid Current for EFC 3-Port

Oil Temp = 100 deg. F w/ 140 - 147 SUS Oil

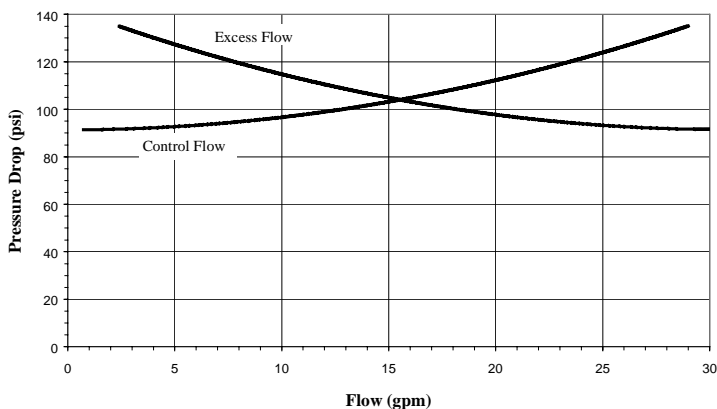


Flow vs. Solenoid Current for EFC 2-Port

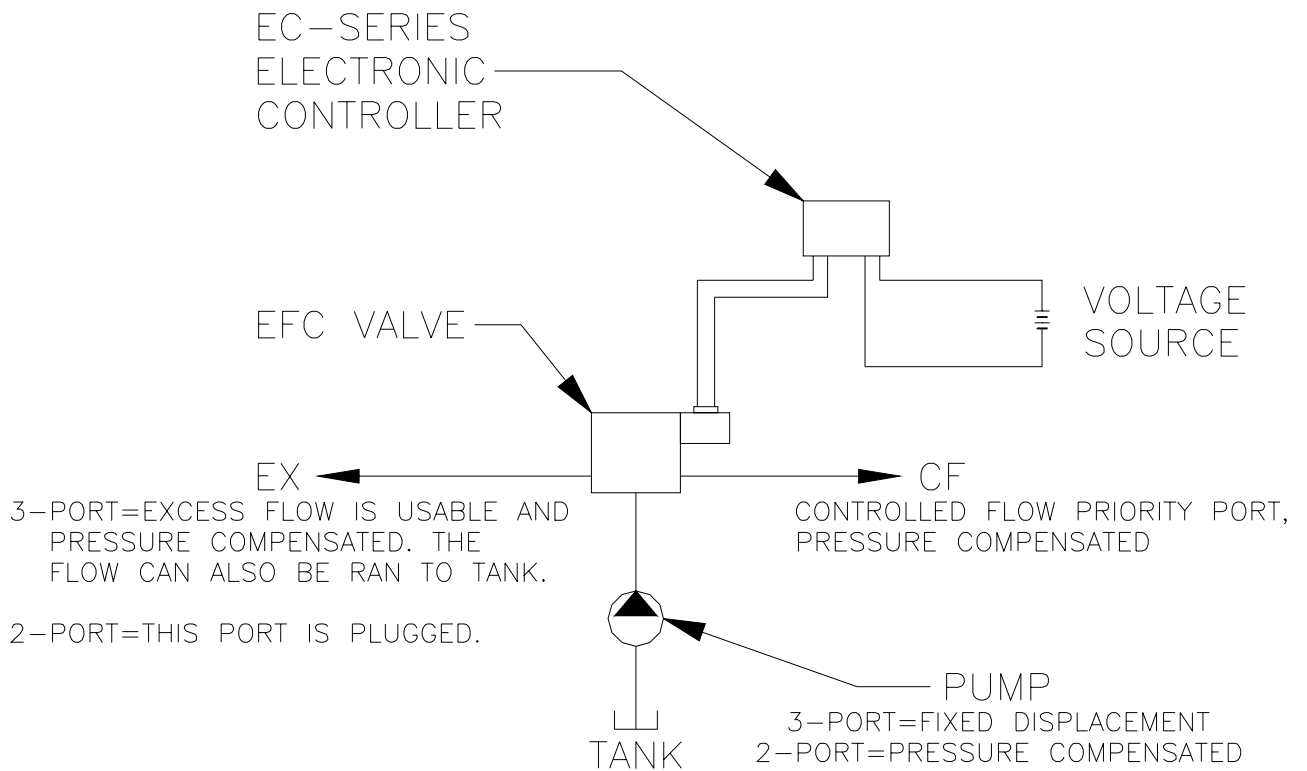
Oil Temp = 100 deg. F w/ 140 - 147 SUS Oil



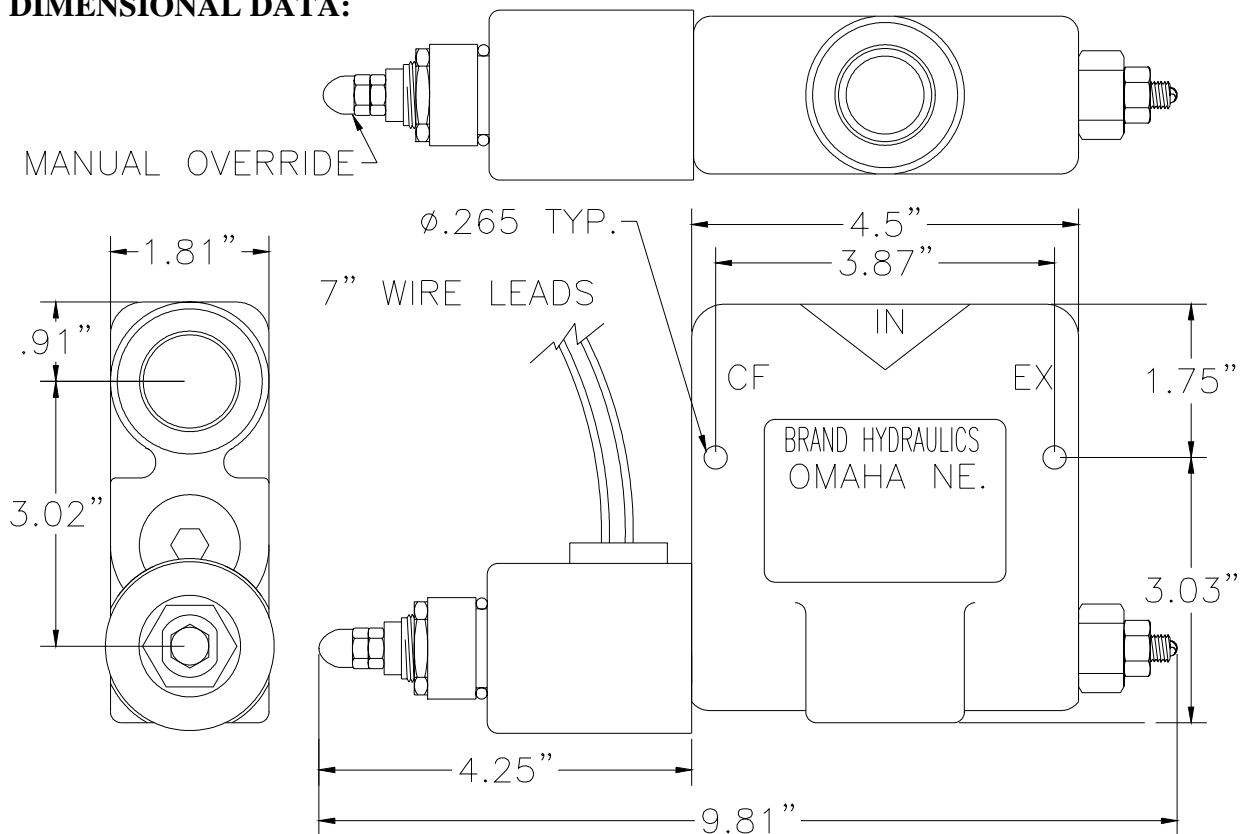
Pressure Drop vs. Flow for EFC Series



### 2 & 3 PORT SCHEMATIC DRAWING:

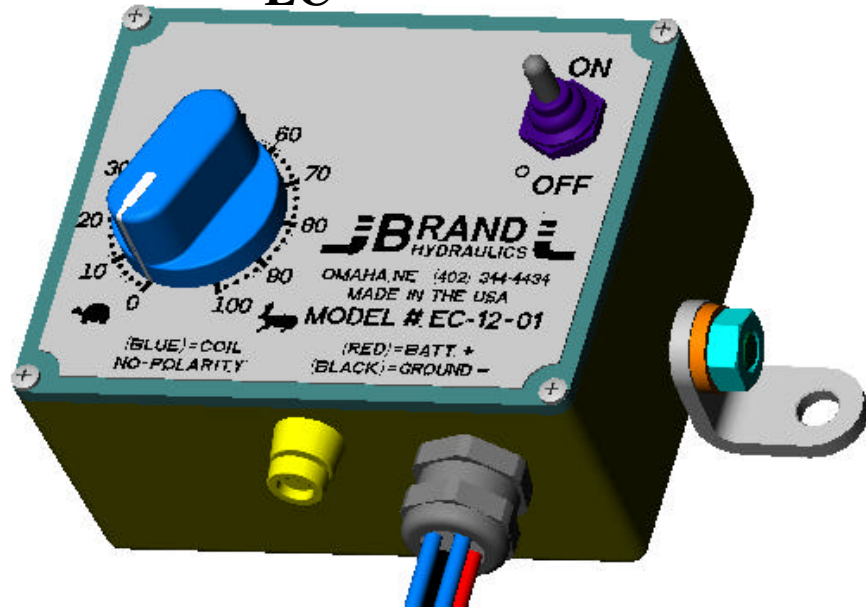


### DIMENSIONAL DATA:



## ELECTRONIC CONTROL BOX “EC”

EC-12-01



### FEATURES:

- **RUGGED ALUMINUM BOX CONSTRUCTION** to help prevent impact damage.
- **HEAVY-DUTY FOOT BRACKETS** for quick and secure mounting.
- **COLOR KEYED WIRE LEADS** for easy wiring and identification.
- **STANDARD 18 INCHES LONG BY 18-AWG** wire (Consult factory for special leads).
- **PULSE WIDTH MODULATED (PWM)** output to help reduce the effects of hysteresis.
- **WEATHERPROOF SEALS** on power switch, potentiometer, fuse holder, wire bushing and box lid.
- **EXTERNALLY MOUNTED FUSE HOLDER** for quick and easy fuse change.
- **SHORT CIRCUIT PROTECTION** to guard against over current conditions.
- **SMOOTH RAMP THERMAL OVERLOAD PROTECTION** to help protect against overheating.
- **INPUT PROTECTION** from voltage transients, load dumps, 2-battery jumps and reverse polarity hook-ups.
- **POWER SWITCH** is separate from main control knob for turning valve on and off without loss of flow setting.
- **CIRCUIT BOARD** is coated with a special conformal coating to guard against moisture.
- **OPTIONAL HIGH VISIBILITY LED** for indicating that the power switch is on.

### SPECIFICATIONS:

- **Supply Voltage:** 12.70-18.00 VDC.
- **Output Voltage:** 12 VDC, regardless of input supply voltage between 12.70-18.00 VDC.
- **Output Current:** 1.5 A Max. 1.0 A Nominal.
- **PWM Frequency:** 100 hz Average.
- **Efficiency:** without “L” option: 90% @ 1.0 A.
- **Efficiency:** with “L” option: 85% @ 1.0 amp.
- **Operating Temp:** -40° to 176°F (-40° to 80°C)
- **Storage Temp:** -85° to 194°F (-65° to 90°C)
- **Approximate Weight:** 1.4 lbs. (0.64 kg).

### MATERIALS:

- All metal parts are stainless steel, nickel-plated and zinc plated to help prevent corrosion.
- The control knob is a unique thermal plastic rubber that provides a soft grip with a contemporary look.

#### EC – GENERAL INFORMATION:

The Brand, electronic control box is designed to proportionally adjust the Brand EFC-Series valves and other proportional valves that meet the appropriate specifications. The controller's design makes it suitable for use in harsh environments as well as protected installations. The box has extensive weather proofing features to help it stand up against everyday use in sun, rain, snow or anything else that Mother Nature can dish out.

The main control knob is used to linearly adjust the current going through the solenoid on the valve. A large knob and a single turn potentiometer with a large degree of rotation gives smooth and precise adjustments. The controller is Pulse Width Modulated (PWM), which helps reduce the effects of hysteresis.

Each controller produced is burned-in for 24 hours after assembly to assure the controller is operating properly and meets all specifications. There are also many other quality assurance procedures that our controllers go through before they are shipped. All tests are performed with up to date, state of the art test equipment that is calibrated to NIST standards by an independent laboratory on a yearly basis.

#### EC – COMPLETE LIST OF COMMON MODEL CODES:

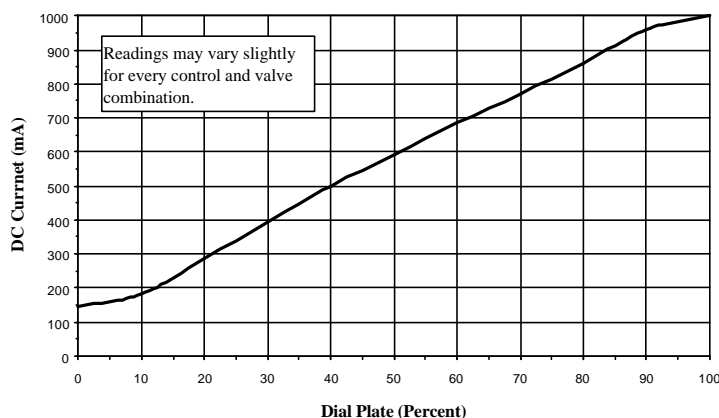
EC-12-01.....Electronic control box.  
EC-12-01L.....Electronic control box with LED.

#### EC – COMPLETE LIST OF OPTIONS AND ACCESSORIES:

E1002.....Fuse 1.5 amp.  
E1023.....Switch boot seal.  
E1028.....Surface mount standoff.  
E1049.....Panel mount fuse holder.  
E1053.....Red wire (16 awg).  
E1054.....Black wire (16 awg).  
E1055.....Blue wire (16 awg).  
E1056.....Power switch.  
E1071.....Potentiometer shaft seal.  
E1118.....Wall-mount power supply with 6 ft. cord.  
WP001.....Female weather-pack (Packard part no. 12015792).  
WP002.....Male weather-pack (Packard part no. 12010973).

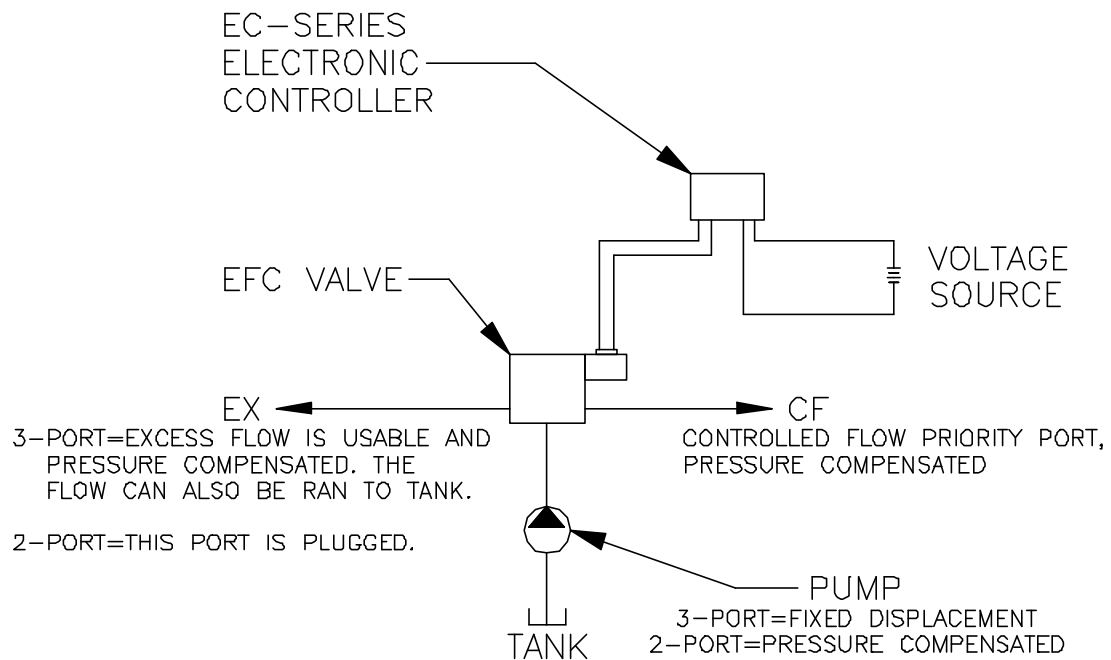
#### EC CURRENT VS. DIAL PLATE:

Current vs. Dial Plate for EC-12-01, EC-12-01L and EC-12-02



## EC/EFC – SERIES SCHEMATIC DRAWING:

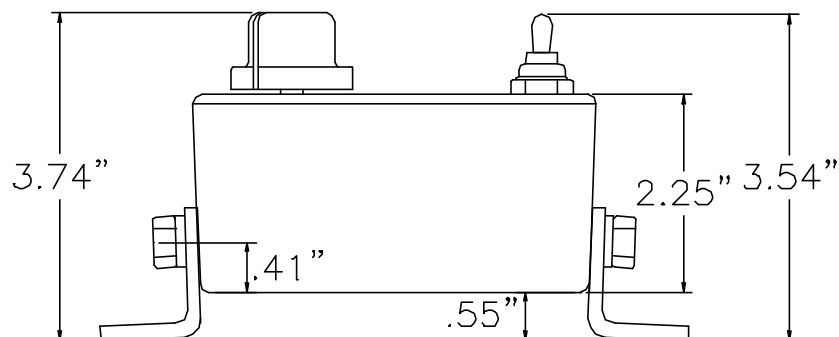
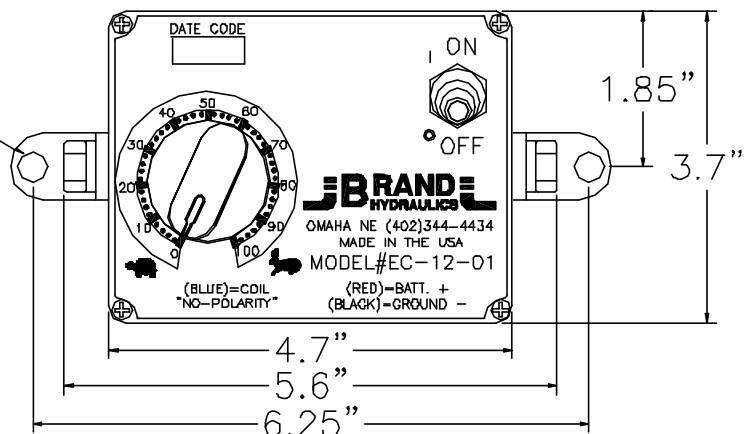
### EC/EFC–SERIES SCHEMATIC DRAWING:



## DIMENSIONAL DATA:

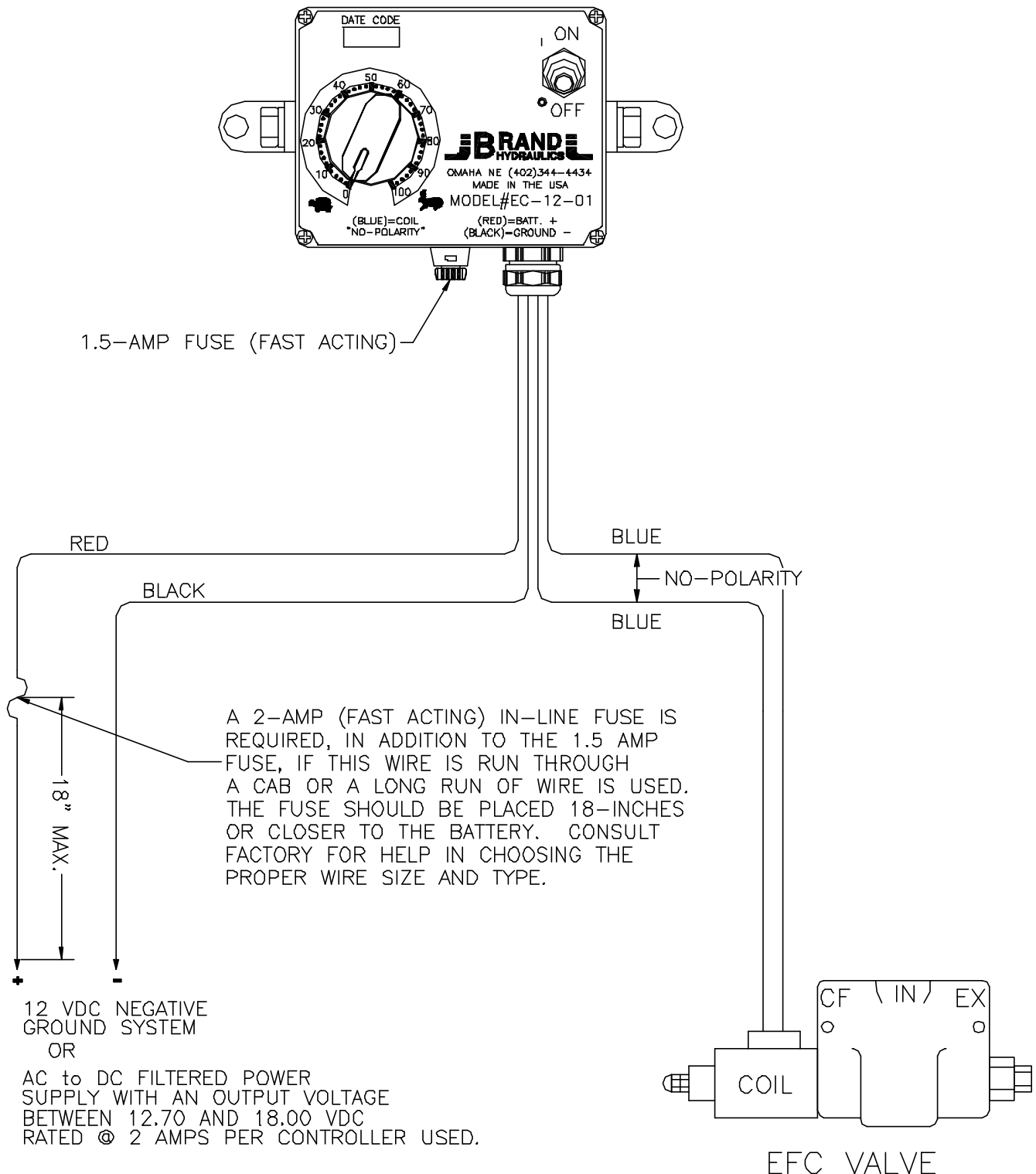
EC-12-01

Ø1 11/32"  
(2 PLACES)



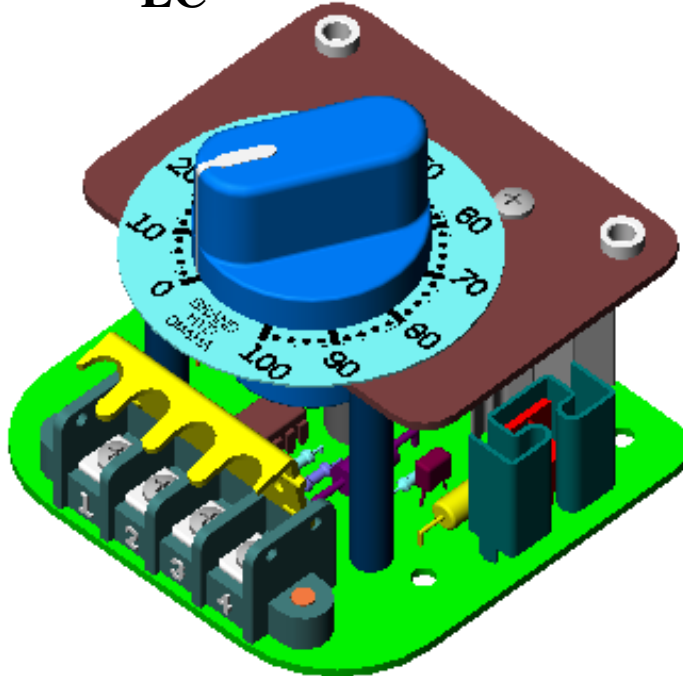
### EC-12-01 AND EC-12-01L WIRING DIAGRAM:

WIRING DIAGRAM IS FOR EC-12-01 AND EC-12-01L





## ELECTRONIC PANEL MOUNT CONTROL “EC”



### FEATURES:

- **LIGHTWEIGHT IN DESIGN** to minimize panel fatigue.
- **SMALL IN SIZE** to minimize space requirements.
- **PULSE WIDTH MODULATION OUTPUT** to reduce the effects of hysteresis.
- **SHORT CIRCUIT PROTECTION** to guard against over current conditions. (When wired to factory instructions)
- **SMOOTH RAMP THERMAL OVERLOAD SHUTDOWN** to help protect against overheating. Input protection for transients, load dumps, 2-battery jumps, and reverse polarity hook-ups.
- **TERMINAL BLOCK HAS PRINTED NUMBERS AND A HINGE COVER** for easy wiring and accidental short circuit prevention.
- **OPTIONAL POWER SWITCH AND FUSE** can be installed separate from the control.
- **THE CIRCUIT BOARD IS COATED WITH A SPECIAL CONFORMAL COATING** to guard against moisture, dust and other contaminants.
- **ONLY THREE SMALL HOLES** are required for mounting to panel.
- **FOUR PREDRILLED HOLES** may be used to surface mount to panel.

### SPECIFICATIONS:

- **Supply Voltage:** 12.70-18.00 VDC.
- **Approximate Weight:** 6.25 oz (178 g).
- **Output Current:** 1.5 amp Max. 1.0 amp Nominal.
- **PWM Frequency:** 100 hz Average.
- **Efficiency:** 92% @ 1.0 amp.
- **Operating Temperature:** -40° to 176°F (-40° to 80°C)
- **Storage Temperature:** -85° to 194°F (-65° to 90°C)
- **Output Voltage:** 12 VDC, regardless of input supply voltage between 12.70-18.00 VDC.
- **Approximate volume required behind panel:** 16 in<sup>3</sup>

### MATERIALS:

- All metal parts are stainless steel, anodized aluminum and zinc plated steel to help prevent corrosion.
- The control knob is a unique thermal plastic rubber that provides a soft grip with a contemporary look.

#### EC – GENERAL INFORMATION:

The Brand, electronic panel mount control is designed to proportionally adjust the Brand EFC-Series valves and other proportional valves that meet the appropriate solenoid specifications. The panel mount control is designed to mount behind a control panel in an industrial setting, behind the dash panel of mobile equipment, or in any other mounting location.

The main control knob is used to linearly adjust the current going through the solenoid on the valve. A large knob and a single turn potentiometer with a large degree of rotation gives smooth and precise adjustments. The controller is Pulse Width Modulated (PWM), which helps reduce the effects of hysteresis.

Each controller produced is burned-in for 24 hours to assure the controller is operating properly and meets all specifications. There are also many other quality assurance procedures that our controllers go through before they are shipped. All tests are performed with up to date, state of the art test equipment that is calibrated to NIST standards by an independent laboratory on a yearly basis.

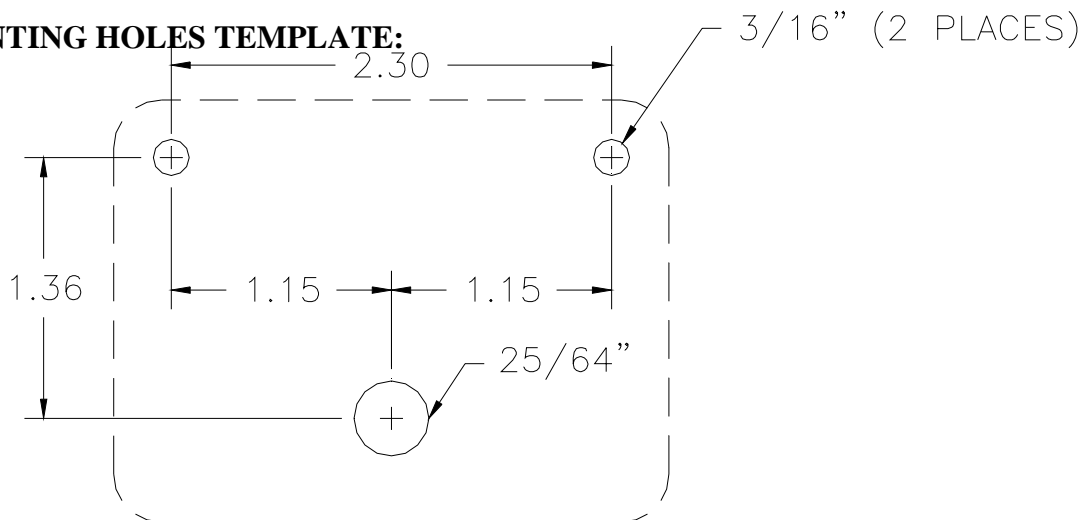
#### EC – COMPLETE LIST OF COMMON MODEL CODES:

**EC-12-02**..... Electronic panel mount.

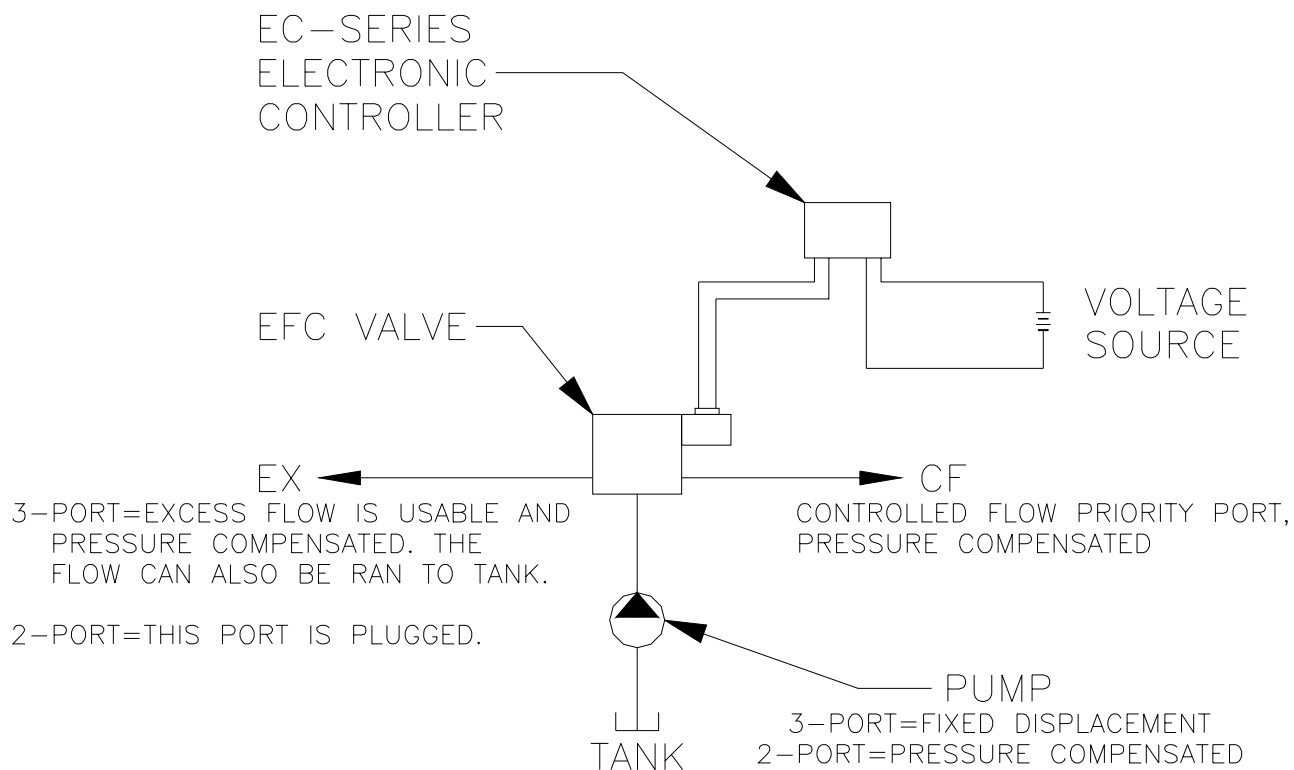
#### EC – COMPLETE LIST OF OPTIONS AND ACCESSORIES:

**E1002**..... Fuse 1.5 amp.  
**E1023**..... Switch boot seal.  
**E1028**..... Surface mount standoff.  
**E1130**..... Seal screw.  
**E1049**..... Panel mount fuse holder.  
**E1053**..... Red wire (16 awg).  
**E1054**..... Black wire (16 awg).  
**E1055**..... Blue wire (16 awg).  
**E1056**..... Power switch.  
**E1071**..... Potentiometer shaft seal.  
**E1118**..... Wall-mount power supply with 6 ft. cord.  
**E1130**..... Pan head phillips seal screw 10-32 x 3/8"  
**WP001**..... Female weather-pack (Packard part no. 12015792).  
**WP002**..... Male weather-pack (Packard part no. 12010973).

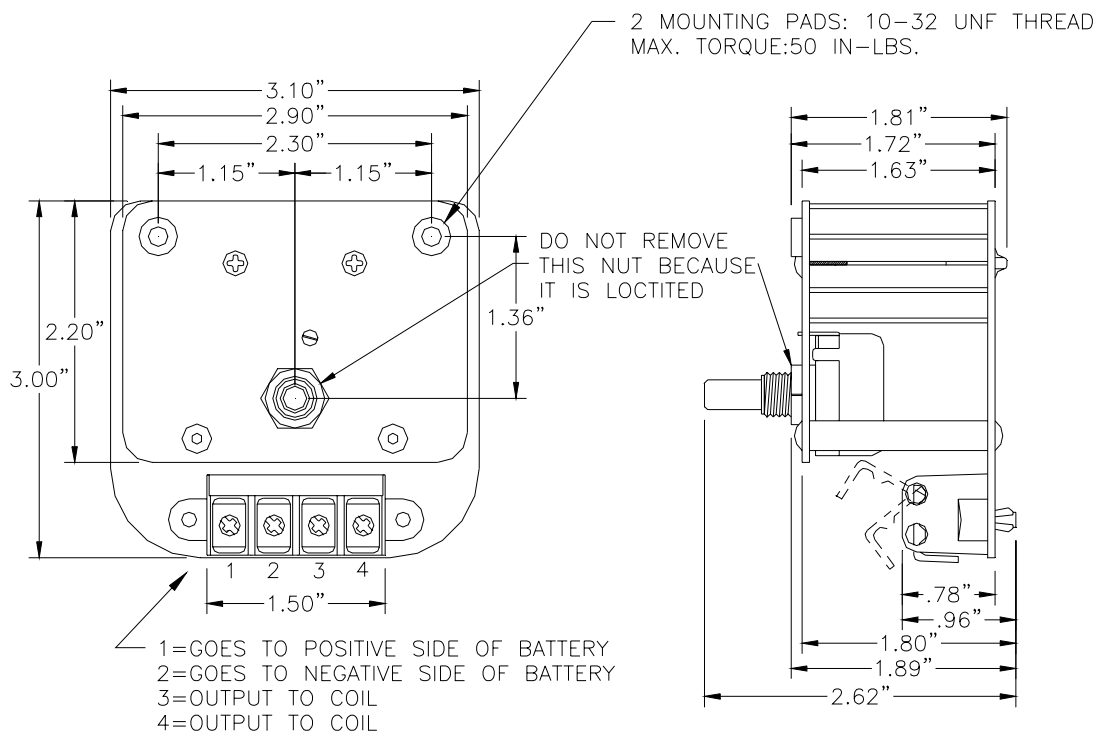
#### EC – MOUNTING HOLES TEMPLATE:



#### EC/EFC – SERIES SCHEMATIC DRAWING:



#### DIMENSIONAL DATA:



(TERMINALS 3 & 4 HAVE NO POLARITY)  
(MAXIMUM WIRE SIZE IS 12-AWG PER TERMINAL)

### EC-12-02 WIRING DIAGRAM:

