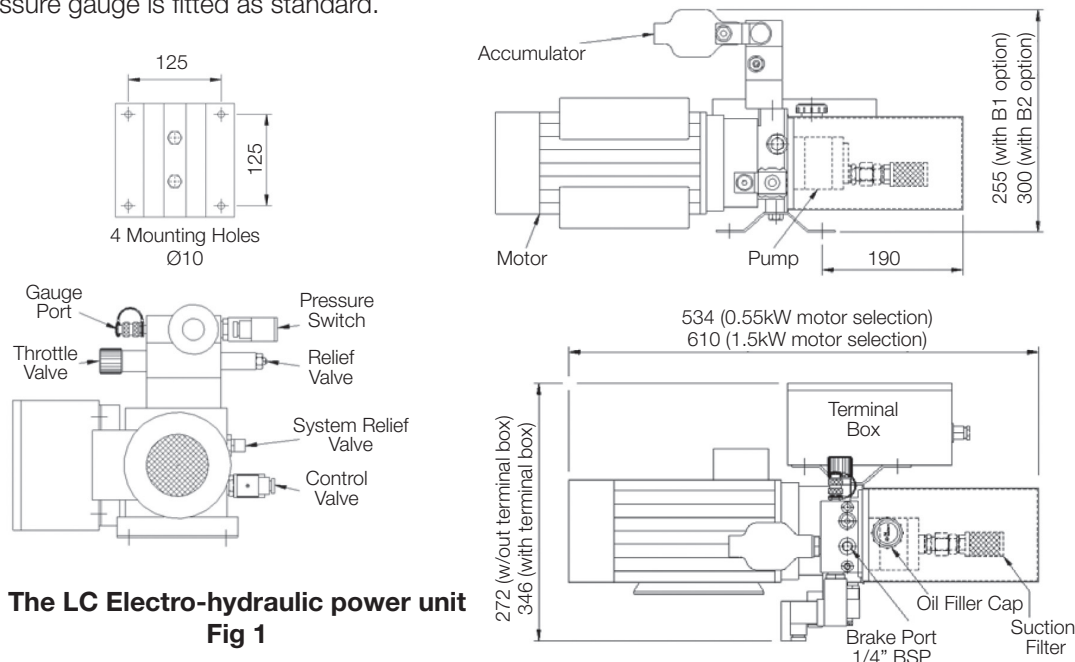


“LC” Electro Hydraulic Power Units

1. General Description

The “LC” range of Electro-Hydraulic Power Units are designed to provide a basic brake on / off control system for the Twiflex MR, MX, GMX, GMR and VCS spring applied hydraulically released calipers.

The basic hydraulic circuit essentially utilises a single 2/2 Poppet solenoid valve which when de-energised, will apply the brakes. The valve is designed to fail safe, meaning the brake will be fully applied in the event of electrical power failure. The 0.075 litre accumulator is fitted as standard and is used to minimise the effect of pressure fluctuations and to reduce pump cycling. A pressure gauge is fitted as standard.



The LC Electro-hydraulic power unit
Fig 1

The circuit can be upgraded with an additional slice to facilitate a fast approach soft braking system. This option enables the operator to control the rate at which the brake is applied, and incorporates a “fast approach” element to ensure the pads make immediate contact with the disc.

There are various options available including circuit type, a range of operating and motor voltages and terminal boxes. By rotating the oil tank through 90°, the unit can be horizontally or vertically mounted.

All Twiflex power units are pre-set for the intended braking systems. Hydraulic test certificates are available upon request.

2. General Operation

The basic circuit (Fig 2.)

The LC Electro power pack includes a motor, gear pump, oil tank, filler breather, system accumulator, pressure switch, relief valve and a 2/2 solenoid valve. The pressure is provided by a motor/pump combination, which charges the accumulator to a pre-set pressure switch setting. The inherent 15% hysteresis of the pressure switch ensures that pressure is maintained in the accumulator. Flow from the accumulator passes to the system pressure relief valve and to the pressure test point. A normally open 2/2 valve connects the caliper to the tank.

Brake operation.

When the 2/2 valve is de-energised, (i.e. brake switched on) oil pressure drops immediately and the brake is immediately applied. When the 2/2 valve is energised, (i.e. brake switched off) the motor starts and the brake is released.

Fast approach soft braking (Fig 3.)

When the 2/2 valve is de-energised, (i.e. brake on) oil pressure drops immediately to the pressure set at the relief valve. This back pressure will allow the brake pads to make immediate contact with the disc but without applying any braking force, (fast approach facility). The remaining pressure is returned to the tank through a throttle valve set by the customer, to allow a controlled rate of application up to full braking (soft braking).

“LC” Electro Hydraulic Power Units

3. Hydraulic Circuits

The hydraulic circuits below show the standard brake on / off control and optional fast approach soft braking control .

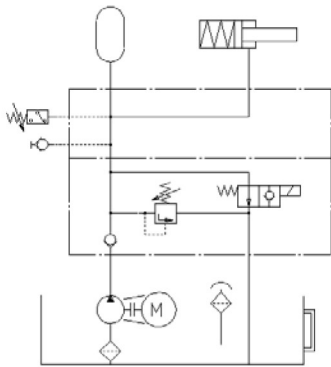


Fig 2. Basic on/off Braking

Top module: Test point, pressure switch and accumulator.

Middle module: (fig. 3 only) Optional 'fast-approach braking

Main manifold: Solenoid valve, safety valve and check valve

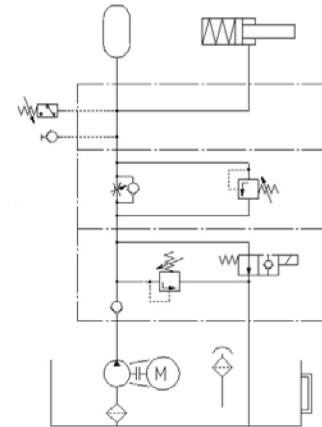


Fig 3. Fast Approach Soft Braking

4. Motor/Pump Combinations

Twiflex have selected the following two combinations of motor / pump assemblies to suit the range of caliper assemblies listed in section 7a. If two or more calipers are to be operated, contact Twiflex for advice.

| Motor pump Assy | Motor size (kW) | Pump size (cc / rev) | Flow rate (litres / min) | Max pressure (Bar) |
|-----------------|-------------------|------------------------|----------------------------|----------------------|
| BM 1 | 0.55 | 1.2 | 1.7 | 190 |
| BM 2 | 1.5 | 3.2 | 4.6 | 210 |

Note: The MR and MX spring applied hydraulically released calipers are self-adjusting. It is therefore important that the full retraction pressure is achieved to ensure the self-adjusting mechanism operates. Please contact Twiflex for advice on the optimum combination.

5. Hydraulic Oil

Operating Fluid: DIN 51524 part 2 and should be selected according to the operating and ambient temperatures.

Volume: The effective volume of oil in the tank is 5.0 litres, with a usable volume of 0.7 litres.

Viscosity: Min viscosity 10 CSt, max viscosity 380 CSt. For frequent brake application, the optimum viscosity range should be 12 – 200 CSt. Max initial viscosity 800 CSt.

Filtration: When filling the tank, oil should be filtered through a filter with a minimum retention rate of $\beta_{10} \geq 75$

Temperature: The LC Power pack is suitable for minimum start up temperatures of -15°C and max operating temperatures of 60°C .

6. Installation

The LC power pack has a mounting bracket attached to the centre of the manifold block, see fig 1, and should be mounted in a horizontal or vertical position adjacent to the brake to reduce the length of hydraulic pipe runs. The out put brake port is 1/4" BSP. The terminal box is wired according to the following table. **Note: Connections shown are for a terminal box without contactor. For the contactor option, pressure switch is pre-wired.**

| Terminal Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----------------|---------|-----------|---------------------|---------------------|------------------------|-----------------|--------------------|---------|
| Connection | Valve + | Valve N/O | Pressure Switch N/C | Pressure Switch N/O | Pressure Switch Common | Motor U or Live | Motor V or Neutral | Motor W |

“LC” Electro Hydraulic Power Units

7. Service and Maintenance

The power pack is essentially maintenance free. The oil level must be checked at appropriate intervals. The tank should be drained once a year, and filled with filtered oil. Change the suction filter if the oil looks contaminated. Warning: A high standard of cleanliness is essential when dealing with hydraulics.

8. Ordering you “LC” Power Unit

Choosing a suitable hydraulic power pack to operate the selected caliper disc brake can seem at first glance a daunting task. The following pages contain a guide for both the novice and the expert, giving a step-by-step process by working through an example of how to order.

Example: A basic hydraulic power pack is required to apply and release two off GMR-SH11 brake assemblies. Motor supply 240V at 50Hz with a solenoid voltage of 24V DC. Terminal box required.

LC - A235 - B1 - C3 - D4 - E2

| | | | |
|----------|------------------|---------------------|-------|
| A | Brake type | Refer to Section 8a | _____ |
| B | Circuit | Refer to Section 8b | _____ |
| C | Motor voltage | Refer to Section 8c | _____ |
| D | Solenoid Voltage | Refer to Section 8d | _____ |
| E | Terminal box | Refer to Section 8e | _____ |

8a. Standard Brake Range

Table below shows the Twiflex brake range that can be operated by the LC hydraulic power unit. The number of calipers to be operated by the power should be entered in place of the brackets. Note that the response time will increase if more calipers are operated. Please contact Twiflex for more information.

| Ref. No | Caliper Type | Thruster type (kN.) | Vol. per stroke (ml) | Max No of thrusters / power unit | Release Pressure (Bar) | Full retraction pressure (Bar) | Motor (kW) / Pump (cc/rev) / Flow (L/m) |
|---------|----------------|---------------------|------------------------|----------------------------------|--------------------------|----------------------------------|-----------------------------------------|
| A()11 | MS MR MX | L 1.4 | 5 | 4 | 14 | 17 | 0.55 / 1.2 / 1.7 |
| A()12 | | L 2.9 | 5 | 4 | 26 | 33 | 0.55 / 1.2 / 1.7 |
| A()13 | | L 4.4 | 5 | 4 | 40 | 50 | 0.55 / 1.2 / 1.7 |
| A()21 | MX GMX | XSH 4.6 | 9 | 4 | 33 | 43 | 0.55 / 1.2 / 1.7 |
| A()22 | | XSHS 4.6 | 21 | 4 | 15 | 19 | 0.55 / 1.2 / 1.7 |
| A()23 | | XSH 7.5 | 9 | 2 | 54 | 65 | 0.55 / 1.2 / 1.7 |
| A()24 | | XSHS 7.5 | 21 | 2 | 24 | 29 | 0.55 / 1.2 / 1.7 |
| A()25 | | XSH 9.6 | 9 | 2 | 69 | 94 | 0.55 / 1.2 / 1.7 |
| A()26 | | XSHS 9.6 | 21 | 2 | 29 | 42 | 0.55 / 1.2 / 1.7 |
| A()31 | GMR | SH 2.5 | 40 | 2 | 16 | 21 | 1.5 / 1.2 / 1.7 |
| A()32 | | SH 4.5 | 40 | 2 | 28 | 38 | 1.5 / 3.2 / 4.6 |
| A()33 | | SH 7 | 40 | 2 | 44 | 59 | 1.5 / 3.2 / 4.6 |
| A()34 | | SH 8.4 | 40 | 2 | 53 | 65 | 1.5 / 3.2 / 4.6 |
| A()35 | | SH 11 | 40 | 2 | 70 | 92 | 1.5 / 3.2 / 4.6 |
| A()36 | | SH 12.9 | 40 | 2 | 82 | 100 | 1.5 / 3.2 / 4.6 |
| A()37 | | SH 15 | 40 | 2 | 95 | 120 | 1.5 / 3.2 / 4.6 |
| A()41 | VCS | 22 | 13.4 | 2 | 27 | 44 | 1.5 / 3.2 / 4.6 |
| A()42 | | 25 | 13.4 | 2 | 38 | 54 | 1.5 / 3.2 / 4.6 |
| A()43 | | 40 | 13.5 | 2 | 65 | 77 | 1.5 / 3.2 / 4.6 |
| A()44 | | 50 | 13.5 | 2 | 72 | 94 | 1.5 / 3.2 / 4.6 |
| A()45 | | 55 | 13.5 | 2 | 82 | 106 | 1.5 / 3.2 / 4.6 |
| A()46 | | 60 | 13.5 | 2 | 95 | 138 | 1.5 / 3.2 / 4.6 |
| A()47 | | 72 | 13.5 | 2 | 118 | 162 | 1.5 / 3.2 / 4.6 |

8b. Hydraulic Circuit

The Fast Approach "Soft Braking" is described in section 2 and is particularly useful when a small degree of brake control is required.

| Order code | Description |
|------------|------------------------------------|
| B1 | No, "Soft Braking" is not required |
| B2 | Yes, "Soft Braking" is required |

8c. Motor Connection Voltage

Connection voltages for the motor have been given the following codes:

| Order code | Phase | Voltage V | Hertz Hz |
|------------|-------|-----------|----------|
| C1 | 3 | 380 - 420 | 50 |
| C2 | 3 | 440 - 460 | 60 |
| C3 | 1 | 220 - 240 | 50 |
| C4 | 1 | 220 | 60 |

8d. Auxillary Connection Voltage

Connection voltages for the pressure switch, solenoid valves and other optional extras have been given the following code.

| Order code | Phase | Voltage | Hertz |
|------------|-------|-----------|-------|
| D1 | 1 | 220 - 240 | 50 |
| D2 | 1 | 220 | 60 |
| D3 | 1 | 115 | 60 |
| D4 | DC | 24 | DC |

8e. Electrical Terminal Box

The LC hydraulic power pack can be supplied with a terminal box mounted to the side of the pack. The box, 170 x 105 x 82 (mm) is constructed of Polycarbonate and is environmentally protected to IP55. The Terminal box contains a terminal rail where all control and supply leads are terminated. Also contained are the fuses. Motor and brake on / off control cables need only be connected to the terminal box.

A larger terminal box can be supplied if an optional motor contactor is selected.

Note: The terminal box does not include an auxiliary power supply. The customer is required to supply the correct voltages and any necessary control signals.

| Order code | Description |
|------------|-------------------------------------------|
| E1 | No, box is not required |
| E2 | Yes, box is required |
| E3 | Yes, box is required with motor contactor |