

McMillan C.O.M.P.A.N.Y

REPAIRS / RETURNS

To return a product for repair to McMillan Company, please call first and request a RMA (Return Manufacturer Authorization) Number. No returns will be accepted without the RMA number clearly visible on the outside of the box. Call McMillan Company to request an RMA.

Include model number, serial number and reason for return - call (512)-863-0231 Or FAX the request to : (512)-863-0671

Once the product is received by Customer Service, the repairs will be analyzed and a fee for repair will be determined (if any). The customer will be informed and must authorize work to be done, if charges to the customer are involved.

Warranty : If at any time within one year after shipment, but not thereafter, it is proved that any part of the equipment furnished by us was defective when shipped by us, we will replace or repair the same free of charge, F.O.B. our factory. Notice of this claim must be made to us within one year after delivery. Our liability is limited to replacement of such defective parts or equipment. There are no guarantees or warranty expressed or implied other than those herein specifically mentioned. McMillan Company shall herein not in any event be liable for any consequential damages, secondary charges, expenses for erection or disconnecting, or losses resulting from any alleged defect in the apparatus. It is understood that corrosion or erosion of materials is not covered by our guarantee.

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MANUFACTURERS OF AFFORDABLE
FLOW SENSORS, METERS & CONTROLLERS

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INSTRUCTION MANUAL

MODEL 470 Series
Control Unit
(For Model 400 ONLY)

Operating Instructions

Patents: 4,467,660 ; 5,542,302 ; 5,728,949
DE 19680105 T1 ; GB 0163785
GB 2302175B ; GB 2332064B
Japan 1770103
Other Patents Pending

Section I. INTRODUCTION.....

1.e 470 Specifications

- Operating Temperature:** + 5°C to +40°C non-condensing atmosphere
- Performance: with 400L**
Accuracy is typically better than \pm 2% of FS, for 20 - 100% of range, including linearity.
Repeatability is generally \pm 0.25% of FS
Response times are generally 5 sec. for 25% to 100% flow change (to 98% of final value) (longer times for error conditions and low pressures)
- Input Power:** 115 or 230 VAC to Power Adapter Supplied
- Outputs:** 0 - 5 VDC, proportional to flow (non-isolated) Set Point / Flow Digital Display and LED Error
- LED:** ERROR (Red)
- INPUT: SET POINT** User can supply input control signal (0 - 5 VDC) or *Internal Set Point* Control may be selected.
- Mechanical Size:** Controller Unit Approx. 4.2 x 2.5 x 1.8 inches)
- Weight:** 0.5 Kg. (1 lb) (2 lb. shipping)

2.0 Operating Instructions Connect the cable to Model 400 Controller. Select your choice for the display using JUMPER "A", 1-2 for Setpoint , or 2-3 for Actual Flow from Flow Sensor. Select your choice of Control Input - either internal using the small 15 turn INTERNAL trimpot (JUMPER "B" set to 4-5), or select EXTERNAL input source using a cable 50-C-S to RED input connector (0 - 5 VDC) which corresponds to 0 to 100% of flow controller flow range - display is pre-set to indicate flow directly (example 0 to 100 mL/min), not voltage. Connect an optional cable to the WHITE connector for output signal from flow sensor - DO NOT short out these wires - minimum load resistance is 5000 ohms for this output.

3.0 Power Connections

Make this connection LAST so that other connections are already completed - especially the 400 Controller connector - also always disconnect the Power First before disconnecting other connectors. Use power adapter that is supplied.

1.a First things first

Your 470 was packed by the manufacturer in such a way that you should receive it with no damage. If external damage is noted upon receipt of the package, please contact the shipping company (*not McMillan Company*) immediately. McMillan Company will not be liable for damage to the device once it has left the manufacturing premises.

1.b Unpacking the 470 Control Unit

After external inspection of the package, proceed to open the package from the top, taking care not to cut too deep. Remove all documentation (if any) resting on top of the packing material. Inspect all products for concealed shipping damage. If damage is noted, please contact the shipping carrier and/or McMillan Company to resolve the problem.

When unpacking the products from the shipment, please take care to remove all products from the box. Check thoroughly for extra cables, adapters, and other options listed on the packing slip, if any.

1.c Cautions and warnings

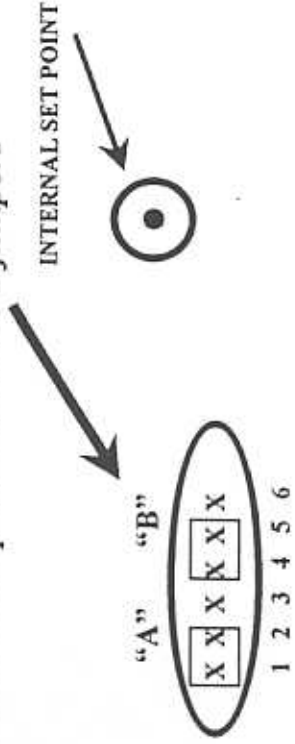
Take care not to **drop** your 470. Read the INSTALLATION section before providing power. Any damage inflicted by the customer will not be repaired under warranty by McMillan Company. Follow wiring suggestions.

1.d Product overview and principle of operation

The 470 with the Model 400 Liquid Flow Controller provides precision flow rate control for many low viscosity liquids. The 470 requires a Low Voltage supply (included). Internal circuits provide a flow sensor output which is compared to the SET POINT, supplied by the user (External) OR supplied by the Internal Set Point (Jumper selectable). Digital Display to indicate SET PT is included on Control Unit. Setpoint Input from a remote source may be 0 to 5 VDC. Also an output is provided (0 - 5 VDC) to indicate flow from the sensor. Flow control is automatically provided by means of a precision servo needle valve. Also a LED is provided which indicates that the Flow Controller has detected a failure or Error in flow control; **Errors may include:** insufficient liquid pressure available, flow is leaking, blocked or restricted. Also, wiring error, cable loose or valve problem may be cause of error.

Electrical connections are made to the small *Control Unit* which contains the Selectable jumper . Internal Set Point Adjustment. Connectors for IN/OUT Connections (use P/N 50-C-S cable(s)) , also the Connector which mates with the 400 Cable , and Power input.

Selector Jumpers - must use 2 jumpers



"A"

- 1-2 Jumper ON Display Setpoint * as shown
- 2-3 Jumper ON Display Actual Flow

"B"

- 4-5 Jumper ON Internal SETPOINT Active * as shown
- 5-6 Jumper ON External Setpoint Active

Connections

RED INPUT	WHITE OUTPUT	POWER IN (13 VDC)
External Input 0 - 5 VDC	Sensor Output 0 - 5 VDC	To power adapter 13 VDC, 500 mA