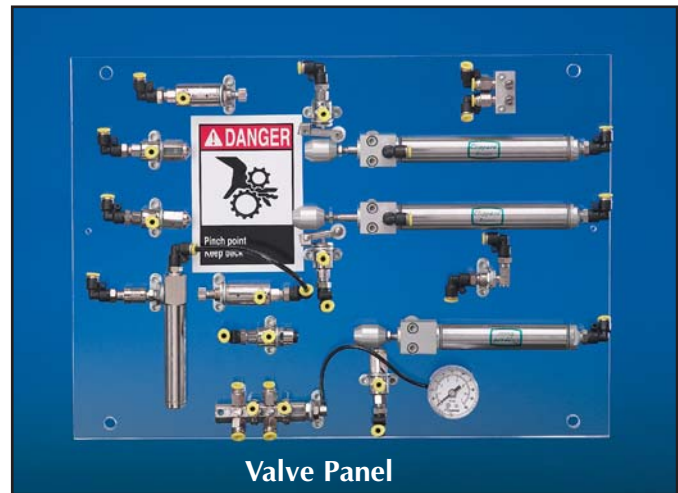




**Cylinder Panel**



**Valve Panel**

Clippard's Fluid Power Educational Kits are designed to help provide a practical understanding of the basic concepts of fluid power. They consist of many components, the same components used in industry today to provide control and work in thousands of different applications.

These kits are designed to work in conjunction with the Fluid Power Education Foundation's standard curriculum which may be downloaded at no charge at [www.fpef.org](http://www.fpef.org).



**Parts Kit**

### **Order #EK-2 Educational Training Kit, Components Only**

#### **Includes:**

- All Clippard Pneumatic components as illustrated on the following page
- Templates for use in making mounting boards for assembly of the components
- Parts in plastic storage box
- "Unit Study" Curriculum\*

### **Order #EK-3 Educational Training Kit, Components Mounted on Acrylic Boards (as shown above)**

#### **Includes:**

- All Clippard Pneumatic components as illustrated on the following page
- Parts in plastic storage box
- "Unit Study" Curriculum\*

### **Order #CS-2690 "L" Mounting Bracket for EK-3**

- For ease of use on a tabletop

## **Features**

- Learn basic Fluid Power concepts and practice "real" applications
- Lessons may be tailored to individual expertise levels
- Design complex circuitry
- Push-Quick fittings allow for easy connections and disconnections
- Available pre-mounted on acrylic boards or by component only with mounting templates
- Boards may be wall-mounted or adapted to mount on a benchtop

\* Curriculum produced by Fluid Power Education Foundation

An air supply of at least 40 psig must be provided (not to exceed 125 psig). These kits are equipped with two pressure regulators, both with a pressure range of 0 to 40 psig, but can operate with an input supply up to 125 psig.

## Cylinder Kit Components

- 1 BFC-2AK, 2-Station Block Flow Control, Meter Out with Adjustable Knob
- 1 CS-2569, Pressure Gauge
- 3 CS-2570-2, Connectors
- 2 FDR-12-4, 3/4" Bore Double-Acting S/S Cylinders, 4" Stroke
- 1 FSR-12-2, 3/4" Bore Single-Acting, S/S Cylinder, 2" Stroke
- 1 MAF-1-ENP, Air Filter
- 1 MAN-12-ENP, 12-Port Manifold
- 2 MAR-1-4-ENP, Pressure Regulators, #10-32
- 6 MAV-3-ENP, Poppet Valves, #10-32
- 3 MBA-1-ENP, Ball Cam Actuators
- 1 MEV-2-ENP, Poppet Type Quick Exhaust Valve, #10-32
- 1 PC-1B-ENP, Captivated Push Button, 1/8" dia., Black
- 16 PQ-MC05N, Male Connector Push-Quick Fittings, 5/32" Tube, #10-32 Thread
- 13 PQ-ME05N, Male Elbow Push-Quick Fittings, 5/32" Tube, #10-32 Thread
- 6 PQ-ME05P, Male Elbow Push-Quick Fittings, 5/32" Tube, 1/8" NPT
- 1 SLV-3, 2-Position, 3-Way Sleeve Valve, #10-32
- 1 SP0-2-BLK, #10-32 to 1/16 ID "L" Slip-On Fitting
- 1 Miscellaneous Hose & Tubing
- 3 0107-33, Hex Nuts
- 1 0107-15-ENP, Nut
- 2 0107-18-ENP, Nuts
- 22 0026-51, Cap Screws
- 6 0026-52, Cap Screws
- 2 0026-53, Cap Screws
- 1 15027-ENP, #10-32 Bulkhead Fitting
- 1 15453, Male Coupling, #10-32
- 1 17535, Pinch Point Label
- 1 11750-2-ENP, #3-56 to 1/16" ID Hose Barb Fitting
- 6 11755-ENP, Screw Plugs, #10-32
- 19 11761-2, Buna-N Gaskets
- 11 11918-1, 90° Mounting Brackets
- 2 11925, Roller Cam Follower Actuators
- 1 CS-2568-2, Acrylic Mounting Board\*

\* Only included with Order No. EK-3



## Valve Kit Components

- 1 BFC-2AK, 2-Station Block Flow Control, Meter Out with Adjustable Knob
- 1 CS-2569, Pressure Gauge
- 1 FV-5-ENP, Plunger-Actuated Spring Return Valve, #10-32
- 2 FV-5D-ENP, 2-Position Double Plunger Valves, #10-32
- 1 MAN-12-ENP, 12-Port Manifold
- 1 MAT-2.0-ENP, In-Line Volume Chamber
- 4 MAV-3-ENP, Poppet Valves, #10-32
- 1 MAVO-3-ENP, Normally-Open Spool Valve, #10-32
- 1 MJTV-5-ENP, 2-Position Spool Valve, Brass Toggle, 1/8" NPT
- 5 MPA-3-ENP, Single Acting, Spring Return Actuators, #10-32
- 2 MPA-5-ENP, Single-Acting, Spring Return Actuators, #10-32
- 1 MSV-1-ENP, Shuttle Valve, #10-32 Male Outlet, #10-32 Female Inlets
- 2 PC-1G-ENP, Captivated Push Buttons, 1/8" dia., Green
- 1 PC-1R-ENP, Captivated Push Button, 1/8" dia., Red
- 9 PQ-MC05N, Male Connector Push-Quick Fittings, 5/32" Tube, #10-32 Thread
- 30 PQ-ME05N, Male Elbow Push-Quick Fittings, 5/32" Tube, #10-32 Thread
- 3 PQ-ME05P, Male Elbow Push-Quick Fittings, 5/32" Tube, 1/8" NPT
- 1 PV-1-ENP, Pulse Valve, #10-32
- 1 SP0-2-BLK, #10-32 to 1/16 ID "L" Slip-On Fitting
- 1 TV-3SF-ENP, 2-Position Spool Valve, #10-32 Thread
- 1 Miscellaneous Hose & Tubing
- 1 0107-15-ENP, Nut
- 1 0107-18-ENP, Nut
- 4 0019-4, Screws
- 26 0026-51, Screws
- 1 15027-ENP, #10-32 Bulkhead Fitting
- 1 11750-2-ENP, #3-56 to 1/16" ID Hose Barb
- 31 11761-2, Buna-N Gaskets
- 15 11918-1, 90° Mounting Brackets
- 1 3822-1, Steel Clamp
- 1 CS-2567-2, Acrylic Mounting Board\*

\* Only included with Order No. EK-3

# CONVERSION FACTORS



## Length

| To Convert |       | inch       |       | To    | millimeter |       | Multiply By |       | 25.40   |       |        |
|------------|-------|------------|-------|-------|------------|-------|-------------|-------|---------|-------|--------|
|            |       | millimeter |       |       | inch       |       |             |       | 0.03937 |       |        |
| in         | mm    | in         | mm    | in    | mm         | in    | mm          | in    | mm      | in    | mm     |
| 0.025      | 0.635 | 0.200      | 5.080 | 0.375 | 9.525      | 0.550 | 13.970      | 0.725 | 18.415  | 0.900 | 22.860 |
| 0.050      | 1.270 | 0.225      | 5.715 | 0.400 | 10.160     | 0.575 | 14.605      | 0.750 | 19.050  | 0.925 | 23.495 |
| 0.075      | 1.905 | 0.250      | 6.350 | 0.425 | 10.795     | 0.600 | 15.240      | 0.775 | 19.685  | 0.950 | 24.130 |
| 0.100      | 2.540 | 0.275      | 6.985 | 0.450 | 11.430     | 0.625 | 15.875      | 0.800 | 20.320  | 0.975 | 24.765 |
| 0.125      | 3.175 | 0.300      | 7.620 | 0.475 | 12.065     | 0.650 | 16.510      | 0.825 | 20.955  | 1.000 | 25.400 |
| 0.150      | 3.810 | 0.325      | 8.255 | 0.500 | 12.700     | 0.675 | 17.145      | 0.850 | 21.590  |       |        |
| 0.175      | 4.445 | 0.350      | 8.890 | 0.525 | 13.335     | 0.700 | 17.780      | 0.875 | 22.225  |       |        |

## Flow

| To Convert |         | cfm (cubic ft./min.)  |         | To   | L / min (liters/min.) |      | Multiply By |      | 28.317  |      |         |
|------------|---------|-----------------------|---------|------|-----------------------|------|-------------|------|---------|------|---------|
|            |         | L / min (liters/min.) |         |      | cfm (cubic ft./min.)  |      |             |      | 0.03531 |      |         |
| cfm        | L / min | cfm                   | L / min | cfm  | L / min               | cfm  | L / min     | cfm  | L / min | cfm  | L / min |
| 0.5        | 14.159  | 4.0                   | 113.268 | 7.5  | 212.380               | 11.0 | 311.493     | 14.5 | 410.606 | 21.0 | 594.66  |
| 1.0        | 28.317  | 4.5                   | 127.427 | 8.0  | 226.539               | 11.5 | 325.652     | 15.0 | 438.924 | 22.0 | 622.97  |
| 1.5        | 42.476  | 5.0                   | 141.585 | 8.5  | 240.698               | 12.0 | 339.811     | 16.0 | 453.07  | 23.0 | 651.29  |
| 2.0        | 56.634  | 5.5                   | 155.744 | 9.0  | 254.857               | 12.5 | 353.970     | 17.0 | 481.39  | 24.0 | 679.61  |
| 2.5        | 70.793  | 6.0                   | 169.903 | 9.5  | 269.016               | 13.0 | 368.129     | 18.0 | 509.71  | 25.0 | 707.93  |
| 3.0        | 84.951  | 6.5                   | 184.062 | 10.0 | 283.175               | 13.5 | 382.288     | 19.0 | 538.02  |      |         |
| 3.5        | 99.110  | 7.0                   | 198.221 | 10.5 | 297.334               | 14.0 | 396.447     | 20.0 | 566.34  |      |         |

## Pressure

| To Convert |      | psig (lbs./sq.inch) |      | To   | bars                |      | Multiply By |      | 0.06895 |       |      |
|------------|------|---------------------|------|------|---------------------|------|-------------|------|---------|-------|------|
|            |      | bars                |      |      | psig (lbs./sq.inch) |      |             |      | 14.50   |       |      |
| psig       | bars | psig                | bars | psig | bars                | psig | bars        | psig | bars    | psig  | bars |
| 2.5        | 0.17 | 20.0                | 1.38 | 37.5 | 2.59                | 55.0 | 3.79        | 72.5 | 5.00    | 90.0  | 6.21 |
| 5.0        | 0.34 | 22.5                | 1.55 | 40.0 | 2.76                | 57.5 | 3.96        | 75.0 | 5.17    | 92.5  | 6.38 |
| 7.5        | 0.52 | 25.0                | 1.72 | 42.5 | 2.93                | 60.0 | 4.14        | 77.5 | 5.34    | 95.0  | 6.55 |
| 10.0       | 0.69 | 27.5                | 1.90 | 45.0 | 3.10                | 62.5 | 4.31        | 80.0 | 5.52    | 97.5  | 6.72 |
| 12.5       | 0.86 | 30.0                | 2.07 | 47.5 | 3.28                | 65.0 | 4.48        | 82.5 | 5.69    | 100.0 | 6.90 |
| 15.0       | 1.03 | 32.5                | 2.24 | 50.0 | 3.45                | 67.5 | 4.65        | 85.0 | 5.86    |       |      |
| 17.5       | 1.21 | 35.0                | 2.41 | 52.5 | 3.62                | 70.0 | 4.83        | 87.5 | 6.03    |       |      |

## Force

| To Convert |     | pounds (lbs.) |      | To   | newtons (N)   |      | Multiply By |      | 4.448  |       |      |
|------------|-----|---------------|------|------|---------------|------|-------------|------|--------|-------|------|
|            |     | newtons (N)   |      |      | pounds (lbs.) |      |             |      | 0.2248 |       |      |
| lbs.       | N   | lbs.          | N    | lbs. | N             | lbs. | N           | lbs. | N      | lbs.  | N    |
| 0.25       | 1.1 | 2.00          | 8.9  | 3.75 | 16.7          | 5.50 | 24.5        | 7.25 | 32.2   | 9.00  | 40.0 |
| 0.50       | 2.2 | 2.25          | 10.0 | 4.00 | 17.8          | 5.75 | 25.6        | 7.50 | 33.4   | 9.25  | 41.1 |
| 0.75       | 3.3 | 2.50          | 11.1 | 4.25 | 18.9          | 6.00 | 26.7        | 7.75 | 34.5   | 9.50  | 42.3 |
| 1.00       | 4.4 | 2.75          | 12.2 | 4.50 | 20.0          | 6.25 | 27.8        | 8.00 | 35.6   | 9.75  | 43.4 |
| 1.25       | 5.6 | 3.00          | 13.3 | 4.75 | 21.1          | 6.50 | 28.9        | 8.25 | 36.7   | 10.00 | 44.5 |
| 1.50       | 6.7 | 3.25          | 14.5 | 5.00 | 22.2          | 6.75 | 30.0        | 8.50 | 37.8   |       |      |
| 1.75       | 7.8 | 3.50          | 15.6 | 5.25 | 23.4          | 7.00 | 31.1        | 8.75 | 38.9   |       |      |

## Temperature

| To Convert |       | Fahrenheit (°F) |       | To  | Celsius (°C)    |     | Multiply By |     | (°F - 32) / 1.8 |     |      |
|------------|-------|-----------------|-------|-----|-----------------|-----|-------------|-----|-----------------|-----|------|
|            |       | Celsius (°C)    |       |     | Fahrenheit (°F) |     |             |     | 1.8°C + 32      |     |      |
| °F         | °C    | °F              | °C    | °F  | °C              | °F  | °C          | °F  | °C              | °F  | °C   |
| 5          | -15.0 | 40              | +4.4  | 75  | 23.9            | 110 | 43.3        | 145 | 62.8            | 180 | 82.2 |
| 10         | -12.2 | 45              | +7.2  | 80  | 26.7            | 115 | 46.1        | 150 | 65.6            | 185 | 85.0 |
| 15         | -9.4  | 50              | +10.0 | 85  | 18.9            | 120 | 48.9        | 155 | 68.3            | 190 | 87.8 |
| 20         | -6.7  | 55              | +12.8 | 90  | 32.2            | 125 | 51.7        | 160 | 71.1            | 195 | 90.6 |
| 25         | -3.9  | 60              | 15.6  | 95  | 35.0            | 130 | 54.4        | 165 | 73.9            | 200 | 93.3 |
| 30         | -1.1  | 65              | 18.3  | 100 | 37.8            | 135 | 57.2        | 170 | 76.7            |     |      |
| 35         | +1.7  | 70              | 21.1  | 105 | +40.6           | 140 | 60.0        | 175 | 79.4            |     |      |



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| X32-       | Minimatic Slip-On Fittings | 295      |
| X33-       | Minimatic Slip-On Fittings | 295      |
| X42-       | Minimatic Slip-On Fittings | 295      |
| X43-       | Minimatic Slip-On Fittings | 295      |
| X44-       | Minimatic Slip-On Fittings | 295      |
| XT2-       | Minimatic Slip-On Fittings | 295      |
| XT4-       | Minimatic Slip-On Fittings | 295      |

## Limited Warranty

Clippard Instrument Laboratory, Inc. (seller) warrants its products to be free from defects in material and workmanship for a period of one (1) year from the date of sale. Seller's liability shall be limited at seller's option to repair, replacement or refund of purchase price of product found by seller's examination to be defective. All claims under this warranty must be made in writing to seller's factory sales department giving full details, prior to return of product, postpaid, to factory. Seller shall not be responsible for product failure due to normal wear, accident, buyer's misapplication, abuse, neglect or alteration of product. Seller will not be responsible for any consequential damages. Clippard Instrument Laboratory, Inc. makes no other warranty of any kind, expressed or implied. Circuits shown in this catalog are for instructional purposes only. All circuits used on equipment and machinery should be thoroughly tested by qualified personnel under actual working conditions to determine their suitability for buyer's intended use. All technical data and operations are average values based on standard production models. Some deviations can be expected and considerations should be given during initial design stages. All operating characteristics are based on new equipment, under normal conditions of use and environments and oil free air supply.

All dimensions shown are subject to change without notice. When design makes a dimension critical, consult Clippard for confirmation.