CF/CFM Series

Automatic Engine Overspeed Shut Down Valve and Air Cleaner Assembly with Manual Shut Down Option

Easily installed range of diesel engine automatic air intake valves with integrated cleaner and manual shut down option.
The Fluid Power Energy (FPE) CF and CFM Series combined manual and automatic overspeed shut down valves are designed for situations where flammable gas or vapor may enter the atmosphere in an area in which a diesel engine is operating.

Should such flammable material be drawn into the engine intake, this may result in uncontrolled engine overspeed, and a situation in which shut down of the diesel fuel supply may fail to stop the engine. Under these circumstances, a rapid shut down of the engine is required by immediate closure of the engine air intake thereby reducing the potential for significant damage and possible ignition of the flammable material in the surrounding atmosphere.

The FPE CF and CFM Series automatic engine air intake shut down valves are suitable for installation in the intakes of either naturally aspirated or turbocharged engines. Once installed and set, the repeatability of the actual engine automatic shut down speed has a greater scatter in the case of turbocharged engines than for naturally aspirated types. However, unless there is an individual requirement for an exact shut down speed, adequate protection from excessive engine overspeed is achieved.

**Application**

**Principle of Operation**

The actuation force to close the valve is derived from the engine intake air flow passing through the valve. As the air flow increases, this actuation force also increases. The actuation force is resisted by an internal valve spring, the pre-load of which is adjusted via the “Trip Adjuster Screw.”

Once the actuation force exceeds the resisting force of the valve spring, the valve rapidly moves to the closed position. Once closed, the CF and CFM Series valve remains shut until the engine has entirely stopped. The valve then resets to the open position after a slight delay.

The CF and CFM Series automatic overspeed intake shut down valve kit includes a manual actuator connected to the valve via a mechanical cable, this is to enable emergency valve closure.
On page 5 is an illustration of the typical CF and CFM series valve and a table for the overall dimensional range of the valve.

The rubber adapter is designed to slide over and clamp onto the intake pipe of the engine. The adapter is selected in consultation with the customer from the available range. It is sized to suit typical engine intakes in the power band covered by the CF and CFM series valves (see dimensions “A” and in the data on page 5).

For CFM valve types, the manual emergency stop actuator is connected to the valve via a mechanical cable. The length of this cable may be selected from the standard stocked range list (page 6). Alternative cable lengths may be available upon request.

### Imperial and Metric Dimensions

#### Imperial Table

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MIN</th>
<th>MAX</th>
<th>A  (IN)</th>
<th>B  (IN)</th>
<th>CFM</th>
<th>MASS (LB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF035</td>
<td>24</td>
<td>27</td>
<td>4.59</td>
<td>5.14</td>
<td>1.38</td>
<td>1.8</td>
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<tr>
<td>CF038</td>
<td>30</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CF040</td>
<td>34</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CF042</td>
<td>38</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CF044</td>
<td>42</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

#### Metric Table

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MIN</th>
<th>MAX</th>
<th>A  (MM)</th>
<th>B  (MM)</th>
<th>CFM</th>
<th>MASS (KG)</th>
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</thead>
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<tr>
<td>CF035</td>
<td>3</td>
<td>20</td>
<td>117</td>
<td>121</td>
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<td>0.8</td>
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<tr>
<td>CF038</td>
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<td>22</td>
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<td>38</td>
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<tr>
<td>CF040</td>
<td>3</td>
<td>24</td>
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<tr>
<td>CF042</td>
<td>3</td>
<td>26</td>
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<tr>
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<td>28</td>
<td></td>
<td></td>
<td>44</td>
<td></td>
</tr>
</tbody>
</table>

Note: Data subject to change.
Valve Selection

The following data is required for FPE to select the most suitable valve for your application:

- Engine type and model
- Engine rating and/or application details
- The external diameter of the intake system pipe at the position the valve is to be fitted
- If applicable, the cable length for the manual shut down

**FPE Coding**

<table>
<thead>
<tr>
<th>CF/CFM Series</th>
<th>CF</th>
<th>CFM XXX</th>
<th>T or L</th>
<th>XX</th>
<th>SXXX</th>
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</table>

**Adapter Bore Size (MM)**

<table>
<thead>
<tr>
<th>CF/CFM Series</th>
<th>Adapter Bore Size (MM)</th>
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</table>

**Manual Close Handle Style**

<table>
<thead>
<tr>
<th>CF/CFM Series</th>
<th>Manual Close Handle Style</th>
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</thead>
</table>

**Manual Shut Down Cable Length (Meters)**

<table>
<thead>
<tr>
<th>CF/CFM Series</th>
<th>Manual Shut Down Cable Length (Meters)</th>
</tr>
</thead>
</table>

**Special Features Code**

Use metric value for adapter code, add zero to make 3 digit code (e.g. 25 = 025).

Combine inlet and outlet adapter, if the same.

Special features by arrangement with FPE.

**STANDARD CABLE LENGTHS**

<table>
<thead>
<tr>
<th>Cable Code</th>
<th>Length (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>1.5</td>
</tr>
<tr>
<td>10</td>
<td>1.0</td>
</tr>
<tr>
<td>15</td>
<td>1.5</td>
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</tr>
<tr>
<td>25</td>
<td>2.5</td>
</tr>
<tr>
<td>30</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**General Usage & Instruction**

Valve Installation

The FPE CF and CFM valve/air cleaner assemblies are designed to fit in place of the existing engine air cleaner assembly.

CFM valves are supplied complete with the manual shut down pull handle and selected length of shut down cable fitted and adjusted. It is not recommended to separate the pull handle and cable from the valve during installation.

Ideally, the CF and CFM valves should be fitted so that the air cleaner cover can be removed to enable element change and valve setting can be adjusted, without the need to detach the complete CF assembly from the engine. The valve assembly may be fitted vertically (with the air cleaner cover in an upward position) or horizontally. In the case of a CFM, ensure that there is a suitable run for the shutdown cable is accommodated for once fitted onto the engine.

The pipe and associated hoses onto which the valve is fitted should be adequate to fully support the valve while not permitting excessive vibration of the valve. Consider support brackets if necessary. Generally, ensure that there is sufficient flexibility in the finalized intake system installation to allow for the relative movement. This occurs between the system components over the full range of engine operating conditions, allowing movement will help avoid excessive mechanical stresses.
Crankcase Breathers

Any engine crankcase breather arrangement, venting directly into the intake ports or the air intake system downstream of the FPE CF valve, must be sealed and replaced by an external breather system vented into the atmosphere.

Manual Close Handles

In the case of CFM valves, fit the pull handle for the manual emergency stop in a convenient position ensuring that it can be easily accessed during an emergency. With reference to the diagram (page 9), the pull handle assembly may be located in a suitable bulkhead or mounting bracket by providing an 18 mm diameter through hole. To fit the pull handle assembly release the handle locknut and remove the handle. Remove the body upper locknut and washer and push the handle body through the hole provided in the bulkhead/bracket. Refit the upper locknut and washer. Adjust and tighten the upper and lower locknuts as required. Refit the handle locknut and then handle, tighten.

Important Note

Always retain the standard fuel stop provided with the engine. The CFM manual stop should never be used as the primary way to stop the engine. It is intended for emergency operation only or when checking it is correctly functioning.
Adjusting the Valve Trip Speed Setting

The FPE CF and CFM Series valve will generally be set to trip at a speed below that required. To adjust the trip speed use the trip adjuster screw and associated lock nut, see diagram below and instructions on the following page.

Rotating the adjuster screw clockwise increases the trip speed. Before attempting to set the trip speed, check that the manual emergency stop pull handle is in the run condition, i.e. fully pushed in. To set:

1. Make sure the adjuster screw locknut is tight and that the intake system from the valve assembly (including air cleaner element and cover), to the intake manifold, is fitted, secured, and leak free.

2. Start engine and slowly increase speed until shut down occurs. (Note: If no shut down occurs up to the maximum available engine speed with the maximum throttle, remove air cleaner cover and cleaner element from the FPE valve assembly to gain access to the setting screw and locknut. Release the setting screw locknut and rotate the setting screw two turns anticlockwise. Tighten locknut, refit air cleaner and cover, and recheck for shutdown).

3. Following the shutdown, remove air cleaner cover and cleaner element to gain access to the setting screw and locknut.

4. Release setting screw locknut and rotate the setting screw one turn clockwise.

5. Tighten locknut, refit air cleaner, and cover. Start the engine and slowly increase speed up to the maximum available.

6. Repeat steps 3, 4, and 5, until the first time that no shut down occurs up to the highest speed available. Then adjust the setting screw a further half turn clockwise and tighten the lock nut. With the intake system fully fitted and the engine fully warmed up, slowly run up and down the engine speed range numerous times to make sure that no further shut down occurs. If a further shut down does occur, reset the adjuster screw another half turn clockwise and check again until no shut down occurs.
Finally, in the case of the CFM valves, restart the engine and run at about half maximum speed (or higher, if needed). Operate the manual emergency stop pull to ensure engine stops within a few seconds.

Note: In the case of a turbocharged engine, it is essential that the final check above is carried out with the engine under load. A more precise method to set the trip speed is achieved by monitoring and recording the engine speed adjustment and by temporarily raising the engine’s high idle speed (if safe to do so). Raising the high idle speed allows the final trip setting speed to be measured. Once the trip speed is set, the high idle must be reset to its standard setting.

Follow the maintenance schedule below. Subject to the unique operating condition of your CF/CFM Series valve workload, the frequency of the maintenance requirements may need to be varied.

**Daily:** (CFM VALVES ONLY)

1. Run engine at mid-range speed (or higher, if needed). Operate the emergency pull stop. The engine should stop within a few seconds.

**Monthly:**

1. Check intake pipework between valve and engine to ensure all pipe fixings, and any support brackets are correctly fitted and secure. Make sure that the engine intake is leak free and shows no signs of significant damage.
2. Check the shutdown trip speed setting is correct by either:
   a). Carrying out the trip speed adjustment as outlined herein, under “Adjusting the Valve Trip Speed Setting.”
   b). Temporarily raise the engine high idle and check trip speed using an engine tachometer.
Quarterly:

1. Remove the valve.

2. Clean the valve as necessary using a soft brush or compressed air, plus white spirit or similar, take all standard precautions.

3. Allow valve to dry thoroughly.

4. Check that the valve moves smoothly over its complete operating stroke. Also, check there are no signs of significant damage or excessive wear - do not lubricate.

5. Refit valve and complete “Monthly” check, as previously mentioned.

Notes:

A). Carry out the above maintenance while the engine is in a non-hazardous area or state of operation.

B). Ensure that the high idle speed of the engine is reset to the correct value, if applicable.

C). Any problems identified must be rectified before returning the equipment to a hazardous area.

D). Air cleaner elements should be serviced in accordance with the engine manufacturers instructions.
In 1975 Fluid Power Energy (FPE) was established as a family business by Richard Bayerlein and his son Doug. FPE is the world’s largest manufacturer of industrial thermostatic control valves (TCV) and serves customers on all continents, with plants and offices around the globe.

FPE continues to relentlessly pursue the same corporate values its founders established over 40 years ago:

- Customer Service,
- Highest Quality at the Best Price
- Fastest Lead Times
- Innovation: product & process

FPE continually collaborates, this allows our company to become an integrated engineering and manufacturing extension for many of our customers thereby allowing them to focus on their core mission. FPE can hold inventory, private labels and develop customized thermostatic temperature control valves solutions for maximum performance, cost reduction, and packaging integration.

In 1980, the Bayerlein’s founded Filtration Systems, Inc. (FSI), as a sister company to FPE, to manufacture a wide range of industrial filtration solutions. Recognized as one of the world’s leading industrial filter manufacturers, FSI builds and delivers standard, non-standard and competitor filters at any quantity for global distribution.

FSI is recognized for having created and patented “Swirl Flow” technology which combines high flow rates and exceptional dirt holding capacity in a depth-type filtration cartridge. As with all the Bayerlein family of companies, FSI continues to relentlessly pursue the protection of engines and equipment worldwide - as a customer first company built upon family values, we hope you will join us in that pursuit.