FLEXVALVE

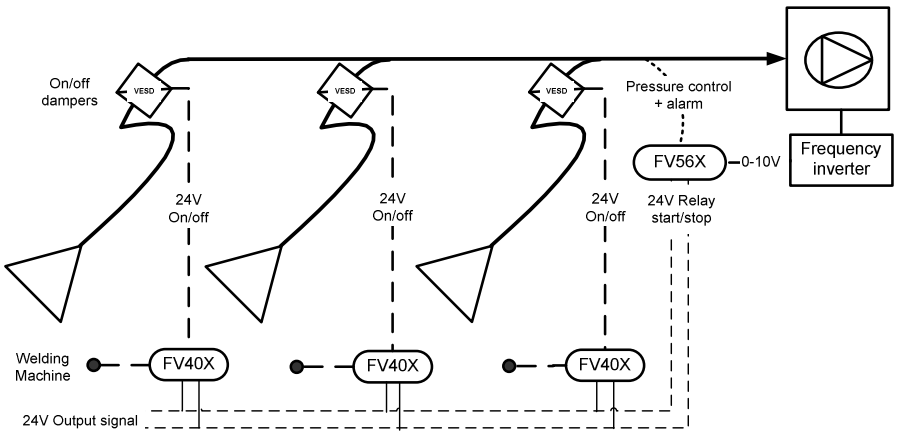
Preliminary Manual for:

CEE Power Socket with Damper controller FV40X

for on/off control and 24V DC supply for damper motors in

Lean Process Ventilation

Model FV40X is applied for automatic on/off control of electric or pneumatic dampers in plants for Lean Process Ventilation and it is also utilised as 24V DC power supply (12 VA) for the damper.
The controller is activated by a build-in power sensor or push bottom, and closes automatically with delay.



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1. Lean Process Ventilation

Process ventilation has 2 main objectives:

- remove dust and fumes at the source
- provide fresh clean air for the operators.

Both objectives must be met at minimum investment costs and operation costs.
Flow rates for extraction air and substitute inlet air and heating and energy consumption are minimized.
No air or energy is wasted.

We call this **Lean Process Ventilation**.

Lean Process Ventilation plants have the following **characteristics:**

- All dust and fume are extracted at source
- Air extractions are only active when necessary
- Air flows are controlled according to demand
- Air pressures are controlled to minimum level
- Balanced Room air and inlet air
- Plant capacity is designed for average necessary extraction flow, after demand
- Air extractions are monitored with alarm limits.

Lean Process ventilation plants are designed according to an approved simultaneity factor that again is based on a calculated demand factor for the plant.
Many plants have a demand factor below 25% because the operator or machine only is polluting (e.g. welding) less than 25% of the time.

Lean Process ventilation also has a number of **secondary advantages**, such as

- minimum size for ventilation components
- minimum air noise
- minimum draught in operation zones

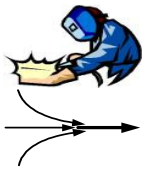
because of much lower air volumes and velocities.

The extra control elements for energy saving are normally compensated by the savings in plant size and component size. Investments in efficient control elements pay for it!
A Lean Process Ventilation plant is cheaper in both investment and operation than a conventional plant!

2. Applications

The principles of Lean Process Ventilation is applied for various industrial applications, such as:

Automotive exhaust gas extraction from personal cars and commercial vehicles.



Welding Fume and grinding fume extraction in production facilities

Material Transport of powder and dust and chips within metal and wood industries

Fume Hood and spot extraction in pharmaceutical and food industry laboratories

Exhaust gas extraction from modern cars and vehicles becomes increasingly complex and requires still more specialised **extraction nozzles**, with various openings and activation methods, to ensure a good grip. Process extractions in vehicle repair workshops or in car inspections are controlled according to demand, with signal from hose reel or suction rail.

For welding extraction the demand factor is typically 20-25%, and the simultaneity factor often 30-40%.
This implies that a plant for 10 welders only requires 3-4000 m^3/h extraction against a standard 10.000 m^3/h!
Fans, frequency inverters, filters, dampers and air ducting only need to be about 35% of standard size.

In **Laboratory Fume Hoods** the extraction flow is regulated to maintain a constant face velocity independent of actual sash height. This implies large variations in flow rates, which must be balanced by room extraction and fresh inlet air.

Most process extraction plants are controlled to constant suction pressure, by means of frequency inverter or regulation damper with fixed setpoint. **Inlet air** and **room air** extractions are balanced with process extractions by means of slave control or feedback regulation**,** with variable setpoint, calculated from 0-10V signals from one or more process extraction flows.

FV40X CEE Power Socket with 24V Damper Controller

3.1. Applications for FV40 Power Socket

Model FV40X **Power Socket** is a combined 24V DC *power supply* and *on/off controller* for electric or pneumatic dampers. It is applied for on/off control of process extractions with electric or pneumatic dampers, and it also serves as 24V power supply (12VA) for electric dampers. It is activated by a build-in power sensor with an adjustable setpoint, or by pressing a push-button, and closes after delay time adjusted on a timer pot-meter.

Diagrams on the following page shows the installation principles for a welding extraction application.

3.2. Installation of High-voltage

The following installation procedure is recommended:

- Remove the front cover.
- The actual socket is removed from the socket base by pushing the release tap.
- The socket base is fixed to the wall or the like.
- The high voltage cable is fed through the socket inlet connection at the top right side.
- Phase N and L1 are connected to main PCB (right side).
- Phase PE, L2 and L3 are connected directly to the socket.
- Re-assemble socket and base.

The high-voltage must be made according to local High-Voltage regulations, including colour coding of cables. FlexValve does not take any responsibility for compliance with local High Voltage regulations.

3.3. Installation of Low-voltage

- The low voltage cable (24V DC) is fed through the socket outlet connection at the top left side to the damper motor.
- Connect the GND and 24V phases from the socket to the damper motor (terminal 1 and 2) and 24V socket signal to the motor ON/OFF switch (terminal 6).
- The socket relay output can be connected in parallel to the start/stop relay on a fan control (e.g. terminal T4 on LV56X Process Airflow Controller).
- Re-assemble the CEE-socket, which is now ready for use.
- The damper can now be operated with a short press on the push button on the front panel or by starting the welding work or equivalent after adjusting the current sensor set-point.

3.4. Start up procedure

- During start-up the indicator diode on the front panel *flashes red*. The power sensor setpoint can now be initiated when the (welding) machine is on stand-by, by pressing the push-button (for 2 seconds) on the socket front panel.
- The indicator diode will now lighten *constant in red* colour, as long as the damper is closed.
- The indicator diode will lighten *constant in green* colour when the damper is open.

3.5. Operation and Adjustment

After start-up the following adjustments are possible:

- *The Timer* is adjusted to the desired delay time, by turning the screw in pot-meter on the socket top-print.
- *The power sensor* setpoint can be adjusted when the (welding) machine is on stand-by, by pressing the push-button (for 2 seconds) on the socket front panel.
- The damper can be *opened* by pressing (short time) the push-button on the socket front panel. The indicator diode will now lighten constant green.
- The damper can be *closed* by pressing (shot time) the push-button on the socket front panel. The indicator diode will now lighten constant red colour.
- The damper opens automatically when the (welding) machine starts, and the damper will now lighten green.
- The damper closes automatically, after the specified delay time, when the (welding) machine is in stand-by. During the delay time the indicator diode will flash green.

3.6. Technical data

- Power Supply: 3*400V AC + N + PE
- Standard cable coding:
  Phase 1: Brown
  Phase 2-3: Black
  Neutral N: Blue
  Earth PE: Yellow/Green
- Max Current: 16 Amp.
- Damper power supply: 24V DC (12 VA)
- Damper start signal: 24V DC
- Delay time for damper closure: 0 sec - 60 sec.
- Leakage proof: IP 44
- Indicator lamp colours:
  Constant red: Damper closed
  Flash red: Power sensor setpoint is not adjusted
  Constant green: Damper open
  Flash green: Damper waiting for closure (delay time)

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