Installation and Operation Instruction

The actuator types **FlowCon FH, FH-BUS** and **FH.1** are electrical, high force actuators.

- **FH** is all-in-one including 24V modulating, 3-point floating and 2-position.
- **FH-BUS** is equal to FH, but includes Modbus and BACnet communication.
- **FH.1 is** 24V modulating and 2-position fail safe version.

Fitting and Re-fitting

Do not connect power to the actuator unless the actuator is already fitted on the valve and NEVER install the actuator in closed position - this may damage the valve. Actuator is supplied in open position to ensure easy commissioning of the system.

Mount the actuator on the valve and finger tighten the connection union. Do not use additional tools.

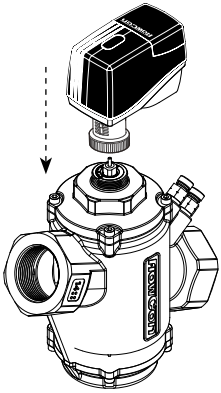


Figure 1

In case the actuator will have to be removed, it is recommended for FH and FH.1 to electrically open the actuator for easier removal. Hereafter disconnect power and finger loosen the connection union. For FH-BUS set DIP switches #1-6 to OFF and wait until the LED indicator is blincking green. Again, no need for additional tools.
Please make sure that the actuator is electrically opened, before re-fitting it on the valve.

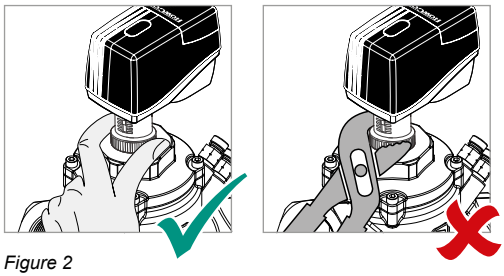


Figure 2

Orientation

Upside-down installation is allowed along with the standard horizontal and vertical installation.

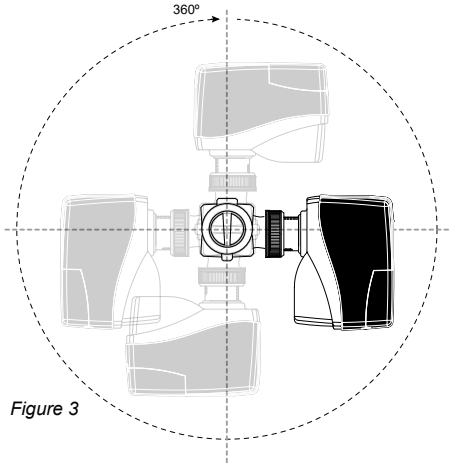
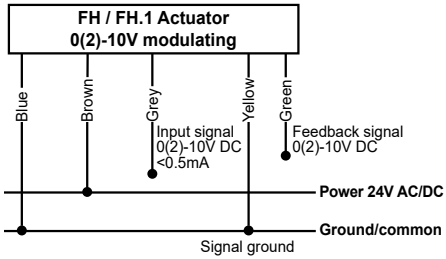


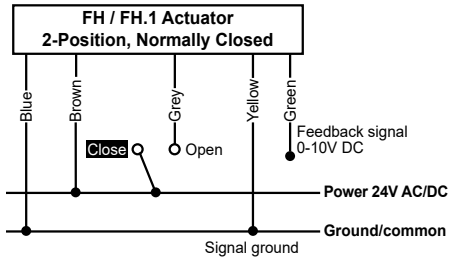
Figure 3

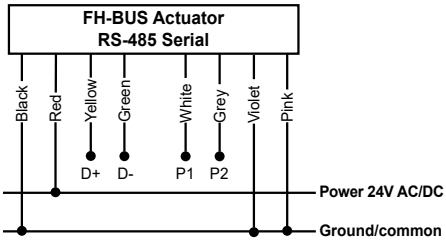
Wiring

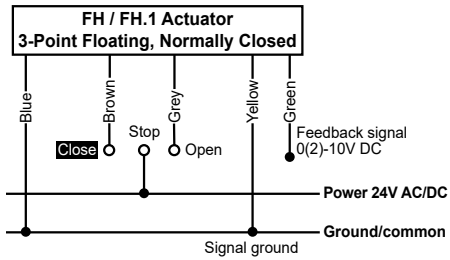
FlowCon FH (analog)



FlowCon FH (digital)







Start-up Sequence

When power to the actuator is turned on, the actuator will automatically calibrate to determine closing point. Hereafter it will proceed to normal operation mode (according to control signal).

For FH-BUS, bus address configuration is required and must be done immediate after first power on. Calibration mode and then normal operation mode will follow thereafter.

For the failsafe version (FH.1), capacitor charging will be prioritized (max. 215 sec depending on capacitor energy level) during start-up and re-powering. After completion of charging mode followed by calibration mode, the actuator will proceed to normal operation mode.

Auto Cycle Sequence

Auto Cycle can be activated during commissioning. It prevents the valve from jamming when the valve is not moved for a longer period of inactivity. For FH and FH.1, Auto Cycle is activated by moving DIP switch #1 from OFF to ON. The actuator will then perform 50% stroke cycle every 3 weeks if no stroke movement has occured.

For FH-BUS Auto Cycle is activated and cycle time configured via the bus (Modbus register 136 and BACnet AV.10; 0= not activated).

Re-Calibration (FlowCon FH)

By flipping DIP switch #6 from one setting to the other (starting position indifferent) re-calibration is activated. After completed re-calibration the actuator will automatically go into normal operation. During re-calibration mode the LED will blink green.

Override

For FH, manual override is performed after power supply is turned off. Lift the silicone cap on the top of the actuator to get access to manual override. Manual override is performed by a 4 mm (~5/32") hex key. Clockwise turning will open the valve and counter-clockwise turning will close the valve.

For FH.1 electrical override is activated by moving DIP switch #6 from OFF to ON. Then the valve will open fully. During override mode the LED indicator will blink red and green. When DIP switch #6 is moved back to OFF, the actuator will re-calibrate and thereafter go into normal operation mode. Electrical override is performed with power supply on.

When performing the manual override procedure on the FH-BUS, set DIP switches 1 to 6 to OFF and the spindle will fully retract, and the LED will rapidly blink green. In this state the valve can be manually close or opened using a magnet.

To extend actuator spindle and fully close the valve, briefly swipe the magnet along the right-hand side of the actuator (top view and wires downwards). LED indicator is blinking yellow during this 'manual spindle adjustment' mode. To retract the actuator spindle and open the valve fully (mounting position), again briefly swipe the magnet along the right-hand side of the actuator. LED is blinking rapidly green to indicate 'mounting position' mode. Manual override can be repeated as often as necessary.

Failsafe Mode (FlowCon FH.1)

When power is lost, the actuator will go into failsafe mode after a few seconds, mandatory that capacitor charging and start-up sequence are completed. The actuator will perform failsafe action (open or close) and stay in failsafe final position until return of power. Upon power, the actuator remains in the final failsafe position until charging mode is reached (max. 215 sec). Hereafter the actuator will return to normal operation mode.

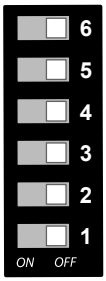
Flush Mode (FH-BUS)

The automatic Flush Mode is activated and cycle time configured via the bus (Modbus register 132 and BACnet AV.35; 0= not activated). In Flush Mode, the valve is temporarily fully opened independent of the control signal to allow easy system flushing.

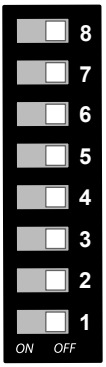
DIP Switch Settings

The valve functions are set on DIP switches found under the connection cover. PCB mounted electrical components will not be directly exposed when DIP switches are to be set. Factory setting for all switches is OFF.

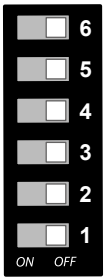
FlowCon FH Actuator

DIP switch	Function ON		Function OFF
#6	Re-calibration		Re-calibration
#5	No function		No function
#4	Equal percentage		Linear
#3	Normally Open		Normally Closed
#2	2-10V Control signal 2-10V		0-10V Control signal 0-10V
#1	Auto cycle ON		Auto cycle OFF

FlowCon FH-BUS Actuator

DIP switch	Function ON		Function OFF
#8	Terminal resistor active		Terminal resistor inactive
#7	Modbus Modbus		BACnet BACnet
#6	1 BIT 5 = 1		0 BIT 5 = 0
#5	1 BIT 4 = 1		0 BIT 4 = 0
#4	1 BIT 3 = 1		0 BIT 3 = 0
#3	1 BIT 2 = 1		0 BIT 2 = 0
#2	1 BIT 1 = 1		0 BIT 1 = 0
#1	1 BIT 0 = 1		0 BIT 0 = 0

FlowCon FH.1 Actuator

DIP switch	Function ON		Function OFF
#6	Electrical override ON		Electrical override OFF
#5	Failsafe open		Failsafe close
#4	Equal percentage		Linear
#3	Normally Open		Normally Closed
#2	Control signal 2-10V		Control signal 0-10V
#1	Auto cycle ON		Auto cycle OFF

LED Status

The LED indicator is visible through the dark colored transparent connection cover. The LED indication will give the following statuses.

	FH	FH-BUS	FH.1
Normal operation mode	Full on green	Full on green	Full on green
Charging mode (200 sec)	n/a	n/a	Blinking red
Calibration mode (closing point adjustment)	Blinking green	Blinking green	Blinking green
Bus communication mode	n/a	Flickering green	n/a
Mounting position mode	n/a	Rapid blinking green	n/a
Electrical override mode	n/a	n/a	Blinking red/green
Failsafe mode	n/a	n/a	OFF
Manuel spindle adjustment	n/a	Blinking yellow	n/a
Perpetual failure mode	Full on red	Full on red	Full on red

Re-Calibration

FlowCon FH / FH.1

Re-calibration can be achieved in one of 2 ways:

1. Forced individual actuator re-calibration can also be performed by flipping DIP switch #6 from OFF to ON and back to OFF on the relevant actuator.
2. Forced concurrent re-calibration for all actuators is electrically possible. Within 60 sec. provide the following electrical control signal sequence to the grey wire: 10V-2V-10V-2V-10V-2V to achieve re-calibration.

After re-calibration the actuator will go into normal operation mode.

FlowCon FH-BUS

For FH-BUS change MSV.1 to 2 (BACnet) or register 138 to 1 (Modbus).
After re-calibration the actuator will go into normal operation mode.

Bus programming of FlowCon FH-BUS

When using FH-BUS actuator and bus communication, setting on the Green.3 **MUST** be 5.0.

In this instruction default values are underlined. Please see FlowCon FH-BUS Modbus Data Point List or BACnet PICS for more detailed information.

Initiate by setting **Baud Rate** (register 105 or MSV.7). Set actuator DIP switches 1-6 to writeable mode, i.e. 1-1-1-1-1-1-1 and set **MAC Address** via bus communication (register 104 or AV.28) and proceed by selecting your **PICV valve** in register 110 or MSV.8:

Reg. 110	MSV.8	Selected valve
0	1	(generic linear)
1	2	Green.3
2	3	(generic EQ%)
3	4	user valve

And select your **PICV control mode** in register 103 or MSV.13:

Reg. 103	MSV.13	Selected control mode
0	0	(linear)
1	1	Equal%

Set **Operating Mode** in register 200=0 or MSV.4=1 and provide Control Signal in register 400 or AV.1 (0% to 100%).

Condition of the FH-BUS through bus

Check the **Current Flow** (not measured) in register 402 or AI.7.
Status Information is available in BI.3 and **Error Information** is available in BI.4, BI.5, BI.6 and BI.7. This is combined for Modbus in register 318 and 407.
Service Commands and resetting is available in register 138 or MSV.1