

# ELECTRONIC CONTROL VALVE

## WW-718-03 – Control Logic

### General:

This document describes the operation and control logic of BERMAD WW-718-03 Electronic Control Valve and provides common guidelines for the parameters (commands, inputs, timers, etc.) required for best integration with the control of the water supply system, allowing efficiency, management capabilities and ease of operation.



### Attention:

This document and the information enclosed within it contain restricted and/or privileged information that is intended only for usage by the customer's qualified engineers, electricians or programmers and should serve only as guidelines for implementing proper control for the WW-718-03 Electronic Control Valve.

Accordingly, only qualified and trained personnel shall take any action in reliance on this document, including installation, connection, operation and maintenance of WW-718-03 Electronic Control Valve, and must do so in full compliance with all applicable regulations, standards and safety instructions related to this type of work. The WW-718-03 Electronic Control Valve should be properly sized, selected, installed and operated.

### Valve's application:

The WW-718-03 is double chambered, diaphragm actuated, hydraulically operated valve. It combines the advantages of an excellent modulating, line pressure driven, hydraulic control valve with those of electronic control. In response to signals from the electronic controller, the valve changes its opening position per preset values programmed into the controller. Both the valve's opening and closing speeds are hydraulically controllable and are on-site adjustable.

For further understanding of the application and the operation it is recommended to refer to [WWW.BERMAD.COM](http://WWW.BERMAD.COM) for general information and training on hydraulic control valves, as well as product page, IOM and videos suitable for the specific type and size of the WW-718-03.

### Main relevant accessories:

- ❖ The WW-718-03 has two (2) solenoid valves
  - Closing Solenoid (S1):  
Which in response to an electric command, either directs the control pressure into the control chamber of the WW-718-03 to increase throttling degree, or it closes to block the control pressure.
  - Opening Solenoid (S2):  
Which in response to an electric command, either vents pressure and water from the control chamber of the WW-718-03 to decrease throttling degree, or it closes to block the pressure from venting.

WW-718-03-B is a variation of the WW-718-03, and is an Active Double Chamber actuation which has four (4) solenoid valves:

- Solenoids S1 + S4 are controlled simultaneously to increase throttling degree (closing)
- Solenoids S2 + S3 are controlled simultaneously to decrease throttling degree (opening)

**Note:** Refer to Control and Installation illustrations at end of this document.

**Definitions:**

❖ Valve “Normally” type:

Relates to the position of the WW-718-03 when the solenoids are deactivated (not energized).

Main Valve		Closing Solenoid [S1]		Opening Solenoid [S2]	
L.P.	Last Position	N.C.	Normally Closed	N.C.	Normally Closed
N.C.	Normally Closed	N.O.	Normally Open	N.C.	Normally Closed
N.O.	Normally Open	N.C.	Normally Closed	N.O.	Normally Open

❖ Commands:

Controller outputs for solenoids of the WW-718-03.

Valve Type \ Action		Closing		Opening		Holding	
		[S1]	[S2]	[S1]	[S2]	[S1]	[S2]
L.P.	Last Position	On	Off	Off	On	Off	Off
N.C.	Normally Closed	Off	Off	On	On	On	Off
N.O.	Normally Open	On	On	Off	Off	Off	On

❖ Modes of Operation:

- Fixed: The setpoint remains the same regardless of time or conditions.  
For example: Pressure Sustaining with upstream pressure set to 6.0 bars.
- Time Related: The setpoint is changed as function of time.  
For example: Pressure Reducing set to 2.5 bars at night and to 4.0 bars during the day.
- Variable Related: The setpoint is changed as function of a value input from specific variable.  
For example: Flow Control as function of the water Level in a reservoir.
- Other: Any other option possible to achieve with the controller.

❖ Dead Band:

- Acceptable tolerance
- Normally 0.5-2.0 %

**Control Concept:**

- ❖ The purpose of the WW-718-03 is to maintain a controlled variable at its setpoint value.
  - Common variables: downstream pressure, upstream pressure, flow, level, etc.
- ❖ Setpoint value can be fixed or it can be changed, as described in "Modes of Operation" under "Definitions".
- ❖ Commands are given according to "Commands" table under "Definitions".
- ❖ Commands are given to activate the Closing Solenoid (S1) and/or Opening Solenoid (S2) as function of distance of the present value of the controlled variable from its setpoint value.
  - No commands are required when the present value of controlled variable is within the Dead Band.
  - When the present value of controlled variable is just outside the Dead Band, then commands will be given in shorter pulses, and with longer delays (holds) between the pulses.
  - When the present value of controlled variable is further from the setpoint value, then commands will be given in longer pulses, and the delays (holds) between the pulses can be shorter.

## Requirements, recommendations and more:

### ❖ Inputs:

- Present Value of the controlled variable
  - Upstream pressure, downstream pressure, flow, water level, etc.
- Present Value of a reference variable for "Variable Related" mode of operation
  - Upstream pressure, downstream pressure, flow, water level, temperature, etc.
- Digital or analog

### ❖ Outputs:

- Closing Solenoid Activation
- Opening Solenoid Activation

### ❖ Timers:

- Command pulse (output) length:
  - Short = 10-200 milliseconds
  - Long = 1.0-2.0 seconds
- Delays (holds):
  - Long = 1-10 seconds, but at least until next reading of controlled variable
  - Short = 0.5-5 seconds
- Checks
  - Maximum time to reach the setpoint value

Note: Ranges are initial guidelines and will vary according to valve size, pressures, flows, etc.

### ❖ Parameters:

- Valve's "Normally" type
- Mode of Operation
- Set value of the controlled variable
- Dead Band

### ❖ Alarms:

- Set value was not reached within a specific time
  - Stop adjusting and send an alarm
  - Time depends on valve size, pressures, flows, etc.
- Electrical checks:
  - Power supply is not available
  - Solenoid coil is disconnected
  - Solenoid coil is overcurrent (short)

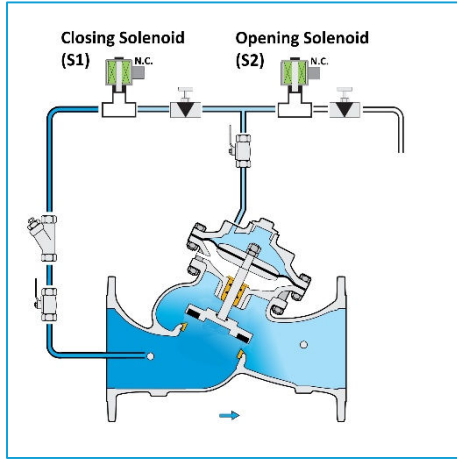
### ❖ Tips/notes/remarks:

- Avoid a situation where both solenoids are open at the same time
  - Consider a minimal delay time to open a solenoid after the other one was closed
- On site fine-tuning is required for the command pulse lengths and the delay timers
  - Some parameters that affect activation times:
    - Pressures and pressure differentials
    - Reading frequency of input value
    - Valves' size
    - Solenoids' type and size

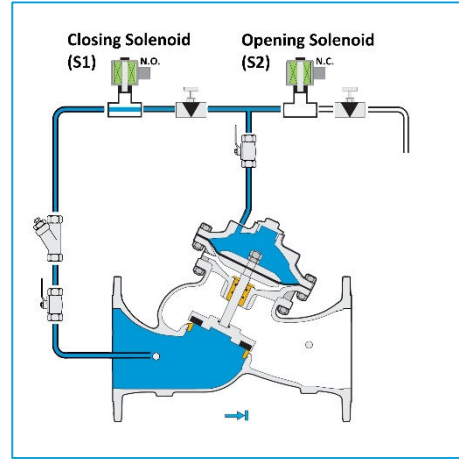
**Control and Installation illustrations:**

**Typical control diagrams**

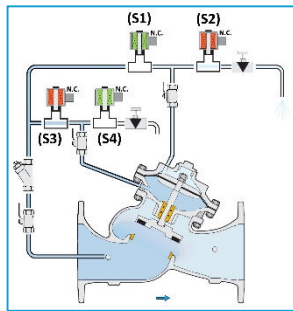
(Examples only, 700 Sigma series)



Last Position (L.P.) – Regulating

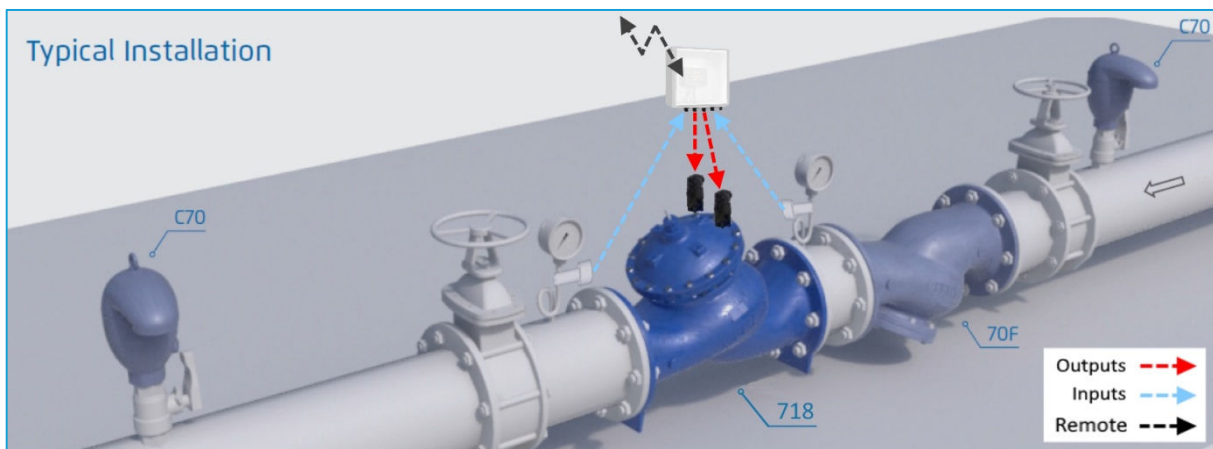


Normally closed (N.C.) - Closed



WW-718-03-B  
Last Position (L.P.) – Opening

**Typical installation of an Electronic Control Valve (example only)**



**Disclaimer:**

BERMAD accepts no liability whatsoever regarding the information provided in this document and it assumes that all users understand risks involved within this file and/or its attached materials and therefore they comply with all the regulations and safety instructions related to this type of work.