Technical Catalogue

for

Deluge Valve

Attention:

This document has been issued for general information of equipment and may be changed as per client request or by GPE during of proposal stage. (Complete information has been issued in Design Data Sheet document).

Rev.	Date	Status	Description	Prepared	Checked	Approved
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Contents

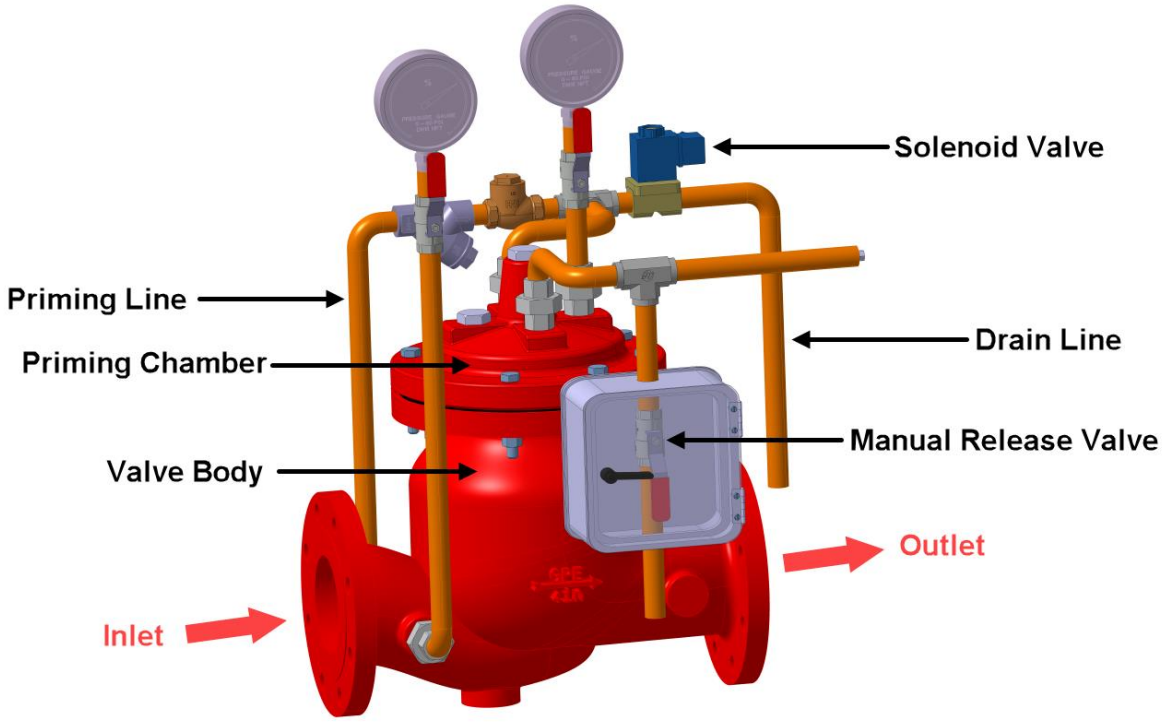
1. Definitions:

- **DELUGE VALVE (DV)**: A deluge valve is a type of system control valve utilized in deluge systems to rapidly apply water in a spray pattern. It serves as a protective measure for various areas, including power transformer installations, storage tanks, conveyor systems, and other industrial applications. The deluge valve can also be employed to safeguard aircraft hangars and combat fires involving flammable liquids by incorporating a foaming agent.
- **TRIM**: The trim on valves is the network of pipes, valves, gauges, and switches comprising a valve assembly.
- **PILOT LINE**: A passage in a fluid power system that is used to transport a fluid at a pressure lower than the normal operating pressure
- **DRY PILOT TRIM (PNEUMATIC RELEASE)**: The dry pilot operation utilizes a closed system of sprinklers or quartzoid bulb detectors connected by a pilot line containing pressurized air. This setup requires a regulated supply of dry air, which is delivered through a restricted orifice from the main supply point. The air pressure must be maintained according to the specifications outlined in the dry pilot actuator catalog. The pilot line is connected to the air inlet side of the actuator, while the top chamber of the deluge valve is connected to the water inlet side of the actuator. When there is a drop in air pressure or when any of the releasing devices detect a fire, the diaphragm of the actuator is lifted, allowing water to drain. This action releases the water pressure in the top chamber of the deluge valve, causing it to open and allowing water to flow into the system piping and alarm devices. For the dry pilot trim system, it is recommended to maintain an air supply pressure of 3.5 kg/cm2. Additionally, it is important for the user to install a non-return valve at the air supply connection to the deluge valve trim. In the dry pilot trim configuration, a dry pilot actuator is provided, and there is an option to include a pneumatic reset device .
- **WET PILOT TRIM (HYDRAULIC RELEASE)**: Wet pilot operation involves a pilot line consisting of closed sprinklers or quartzoid bulb detectors that are filled with pressurized water. This water is supplied through the upstream side of the deluge valve via a restricted orifice. When any of the releasing devices is activated, causing a decrease in water pressure in the top chamber of the deluge valve, the valve opens.
- **ELECTRIC RELEASE TRIM**: In order to electrically activate a deluge valve, a solenoid valve is included to release water from the upper chamber of the valve. A pressure switch installed to trigger an electric alarm, shut down specific equipment, or indicate that the deluge valve has been tripped. When used in a dry pilot air line, the pressure switch can also monitor low air pressure and detect fire conditions.
- **TEST AND ALARM TRIM**: This trim comes with a test valve that allows you to check if the sprinkler alarm bell is functioning properly. You have the option to include a sprinkler alarm that rings when the deluge valve is activated.
- **DRAIN AND DRIP TRIM**: This trim consists of main drain and system drain valve in addition with drip valve.
- **SPRINKLER/QUARTZOID BULB DETECTOR (QBD)**: A sprinkler is the component of a fire sprinkler system which incorporates a quartzoid bulb filled with a highly expansive colored liquid having different expansion rates and discharges water onto fires as a jet of water to put them out when the effects of a fire have been detected, such as when a predetermined temperature has been exceeded .

- **DRY PILOT ACTUATOR (DPA)**: dry pilot actuator is a device utilized in the dry pilot trim system and operates by using the compressed air from the detection line to keep the diaphragm pressed against the spring pressure. When the detection line air is released and the air pressure decreases, a plunger connected to the diaphragm assembly is triggered. This action pushes the clapper, leading to the release of water from the diaphragm chamber and as a result, the deluge valve is activated.
- **PNEUMATIC RESET DEVICE (PRD)**: The pneumatic reset device serves as a manual reset device within the dry pilot line.
- **SOLENOID VALVE (SV)**: A solenoid valve is an electromechanically operated valve which is the most frequently used control element in fluidics. Its task is either to shut off or allow fluid flow.
- **PRESSURE SWITCH (PS)**: A pressure switch is a form of switch that operates an electrical contact when a certain set for fluid pressure has been reached on its input. The switch may be designed to make contact either on pressure rise or on pressure fall.
- **DRIP VALVE (DRV)**: Drip valves are designed to drain water automatically, which may leak past a normally closed dry valve or deluge valve. They close, however, against an increase in flow pressure and will open automatically at a predetermined decrease in pressure. The devices are used to drain any water that may seep by the valve clapper. This device is also usually installed horizontally at the low point of the system and where water accumulation is anticipated. A manual release push stem enables testing as to confirm drainage of the piping.
- **SET POSITION**: When the valve is in SET position then there is a passage of water through the primary chamber but it does not flow through the outlet chamber instead it bypasses to the priming chamber via a priming line.
- **EMERGENCY RELEASE SYSTEM (ERS)**: The emergency release system is a normally closed release device, used for manually opening a deluge valve. It can be mounted on the wet or dry pilot line, as a remote manual operated station.
- **NON-RETURN VALVE (NRV)**: A non-return valve allows a medium to flow in only one direction and is fitted to ensure that the medium flows through a pipe in the right direction, where pressure conditions may otherwise cause reversed flow.
- **RESTRICTION NOZZLE (RN)**: The restriction nozzle is a device used for measuring flow rate, for reducing pressure or for restricting flow which is supplied with dry pilot actuation trim. The pneumatic system must have restricted orifice at air supply point .
- **STRAINER**: A strainer is a device that is used to retain solid pieces when fluid passes through it in a piping system. A strainer makes the fluid pass through a straining element that has very small holes. The smaller the holes, the smaller the solid particles that will be trapped.
- **PRESSURE GAUGE (PG)**: Pressure gauges are commonplace measuring devices used to monitor pressure in pipelines and ensure the safe movement of gases, fluids, and steam. The performances of pumps, conveying systems, and various types of spray nozzles are evaluated using pressure gauges.
- **OPEN DRAIN (OD)**: The open drain system is an open channel used to collect and transport drainage water from any source, equipment and piping.
- **ANGLE VALVE**: An angle valve is a device used to regulate the flow of fluids or gas in a piping system. An angle valve has an inlet and an outlet port which are perpendicular to each other. It is sorted as the manual valves and usually used to prevent or control the flow of a liquid in a pipe.

2. Description:

The GPE deluge valve is a diaphragm valve that operates hydraulically and allows for quick release. It consists of three chambers including inlet, outlet and top/priming chamber which are separated from each other by the diaphragm-operated clapper and seat seal. When in the SET position, water pressure is transmitted from the system supply side to the top chamber through an external bypass check valve and restriction orifice. This allows the supply pressure in the top chamber act on the diaphragm-operated clapper, which holds the seat against the inlet supply pressure due to the differential pressure design. In the event of a fire detection, the top chamber is released through the outlet port by opening the actuation devices. The pressure in the top chamber cannot be refilled through the restricted inlet port, and the upward force of the supply pressure lifts the clapper, enabling water flow to the system piping network and alarm devices.



3. Standards:

- NFPA 15: Standard for Water Spray Fixed Systems for Fire Protection
- UL 260: UL Standard for Safety for Dry Pipe and Deluge Valves for Fire-Protection Service

4. Technical Data:

4.1. General:

4.1.1. Deluge Valve Trim Types:

The trims are classified as dry pilot trim, wet pilot trim, electric trim, drain and drip trim as well as test and alarm trim based on how the deluge valve is activated.

ID	TRIM COMBINATION	MOUNTING POSITION	SCHEMATIC NO.
V-WB	Wet Pilot Trim + Solenoid Valve* + Pressure Switch*	Vertical	Schematic 1
H-WB		Horizontal	
V-DB	Dry Pilot Trim + Solenoid Valve* + Pressure Switch*	Vertical	Schematic 2
H-DB		Horizontal	
V-WT	Wet Pilot Trim + Test & Alarm Trim + Solenoid Valve* + Pressure Switch*	Vertical	Schematic 3
H-WT		Horizontal	
V-DT	Dry Pilot Trim + Test & Alarm Trim + Solenoid Valve* + Pressure Switch*	Vertical	Schematic 4
H-DT		Horizontal	
V-WD	Wet Pilot Trim + Drip & Drain Trim + Solenoid Valve* + Pressure Switch*	Vertical	Schematic 5
H-WD		Horizontal	
V-DD	Dry Pilot Trim + Drip & Drain Trim + Solenoid Valve* + Pressure Switch*	Vertical	Schematic 6
H-DD		Horizontal	
V-WTD	Wet Pilot Trim + Test & Alarm Trim + Drip & Drain Trim + Solenoid Valve* + Pressure Switch*	Vertical	Schematic 7
H-WTD		Horizontal	
V-DTD	Dry Pilot Trim + Test & Alarm Trim + Drip & Drain Trim + Solenoid Valve* + Pressure Switch*	Vertical	Schematic 8
W-DTD		Horizontal	

*Optional

4.1.1.1. Trim ID: V-WB/H-WB/V-DB/H-DB:

The wet and dry pilot trims are the essential basic trims needed to operate the deluge valve. The inclusion of an electric solenoid valve for remote actuation and a pressure switch for sensing and notification are not mandatory but can be added as optional features.

4.1.1.2. Trim ID: V-WT/H-WT/V-DT/H-DT:

These types of trims are a combination of basic wet and dry pilot trims together with the drip and drain trim. The inclusion of an electric solenoid valve for remote actuation and a pressure switch for sensing and notification are not mandatory but can be added as optional features.

4.1.1.3. Trim ID: V-WD/H-WD/V-DD/H-DD:

These types of trims are a combination of basic wet and dry pilot trims together with the test and alarm trim. The inclusion of an electric solenoid valve for remote actuation and a pressure switch for sensing and notification are not mandatory but can be added as optional features.

4.1.1.4. Trim ID: V-WTD/H-WTD/V-DTD/H-DTD:

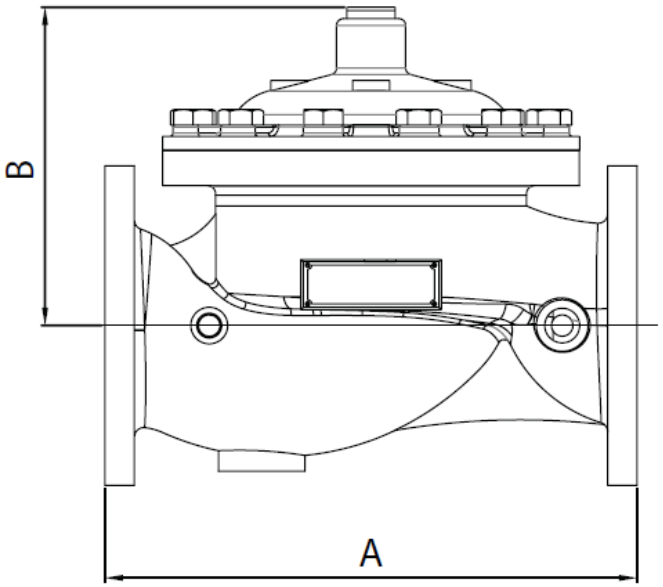
These types of trims are a combination of basic wet and dry pilot trims together with the test and alarm trim as well as the drip and drain trim. The inclusion of an electric solenoid valve for remote actuation and a pressure switch for sensing and notification are not mandatory but can be added as optional features.

4.2. Dimensions and Weight:

4.2.1. General:

Model	4920	
Nominal Pipe Size	200, 150, 100, 80, 50 NB	
Operating Pressure Range	1.4 to 17.5 kg/cm^2 (20 to 250 psi)	
End Connection Type	Flange × Flange	
THREADED OPENING TYPE	BSPT	
MOUNTING TYPE	Vertical/Horizontal	
HYDROSTATIC TEST PRESSURE	35 kg/cm^2 (500 psi)	
FLANGE CONNECTION TYPE	ANSI B 16.5 #150 RF and FF is Standard Supply (Contact GPE Sales for other options)	
WET PILOT SPRINKLER HEIGHT LIMITATION	See Section 5.3.2	
NET WEIGHT (WITHOUT TRIM)	200 NB	336 kg
	150 NB	134 kg
	100 NB	82 kg
	80 NB	59 kg
	50 NB	28 kg
FINISH COLOR	Red to RAL 3001	

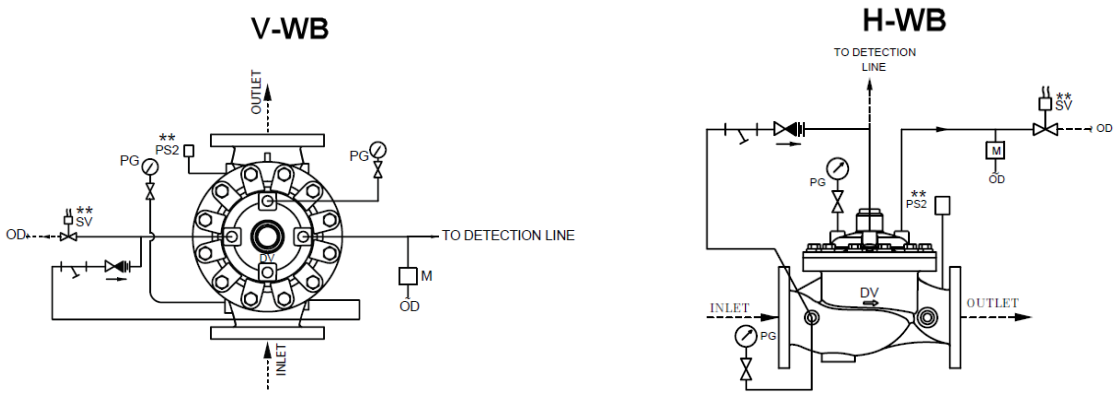
4.2.2. Deluge Valve Dimensions:



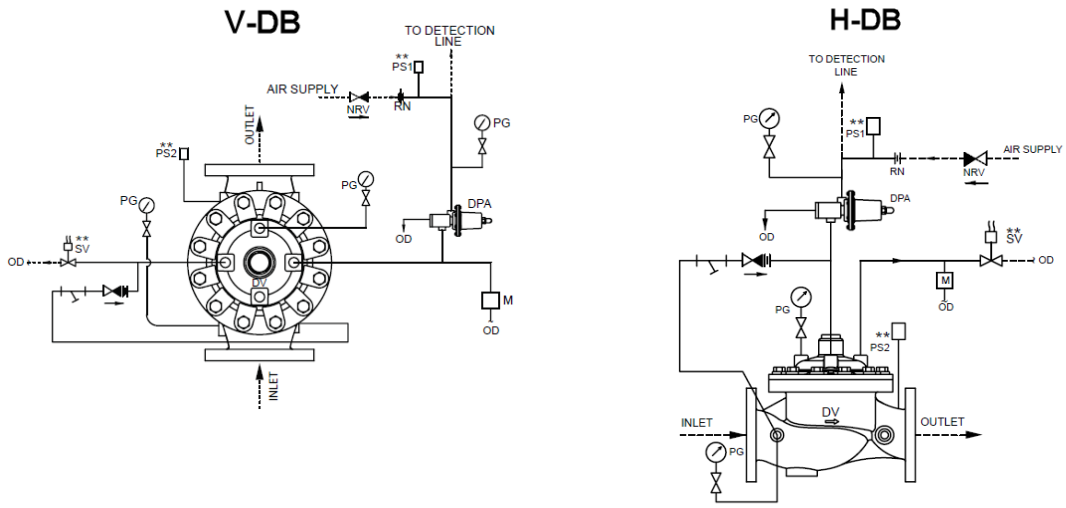
Valve Nominal Size (mm)	A	B
200 NB	552	531
150 NB	462	404
100 NB	436	352
80 NB	360	314
50 NB	300	269

4.3. Diagrams:

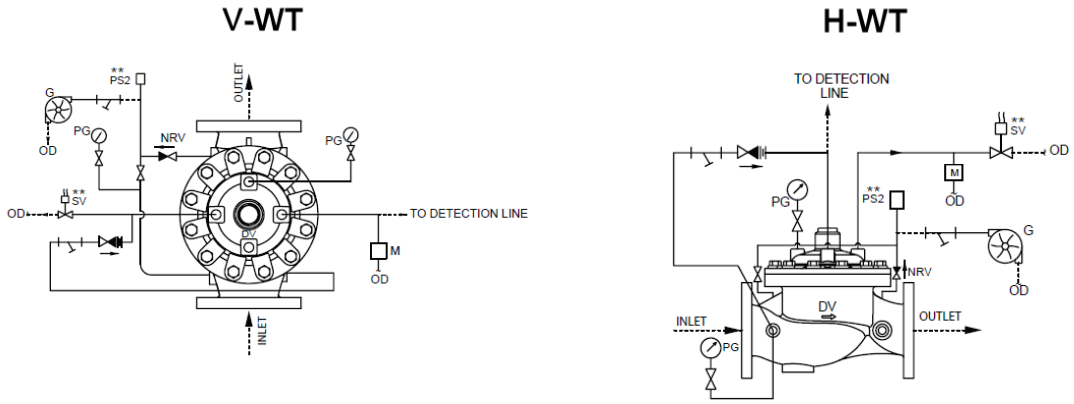
4.3.1. Schematic Diagrams of Deluge Valve Trims:



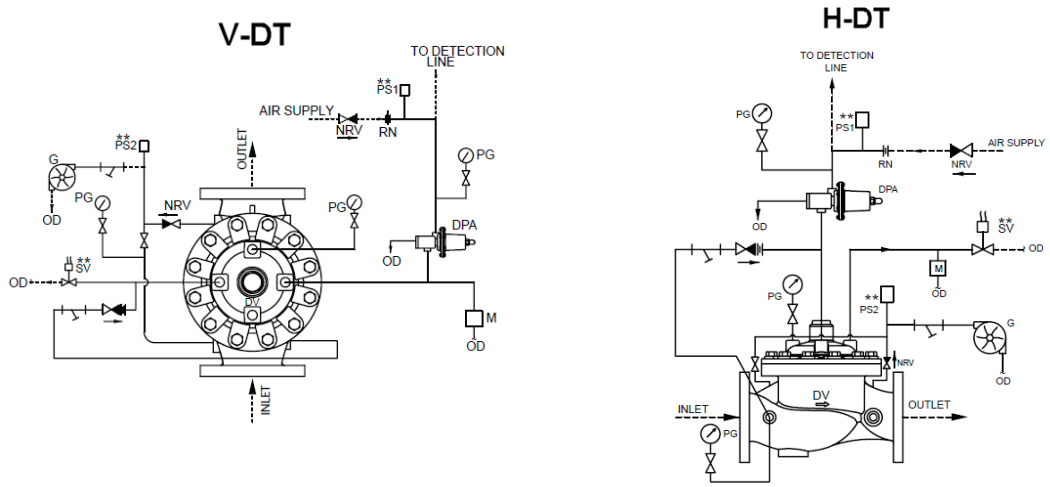
Schematic 1. Basic wet pilot trim for vertical and horizontal mounting



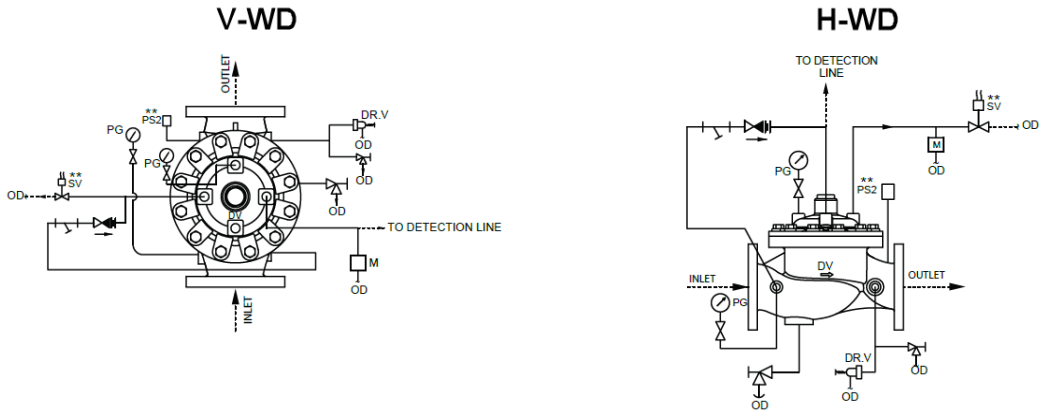
Schematic 2. Basic dry pilot trim for vertical and horizontal mounting



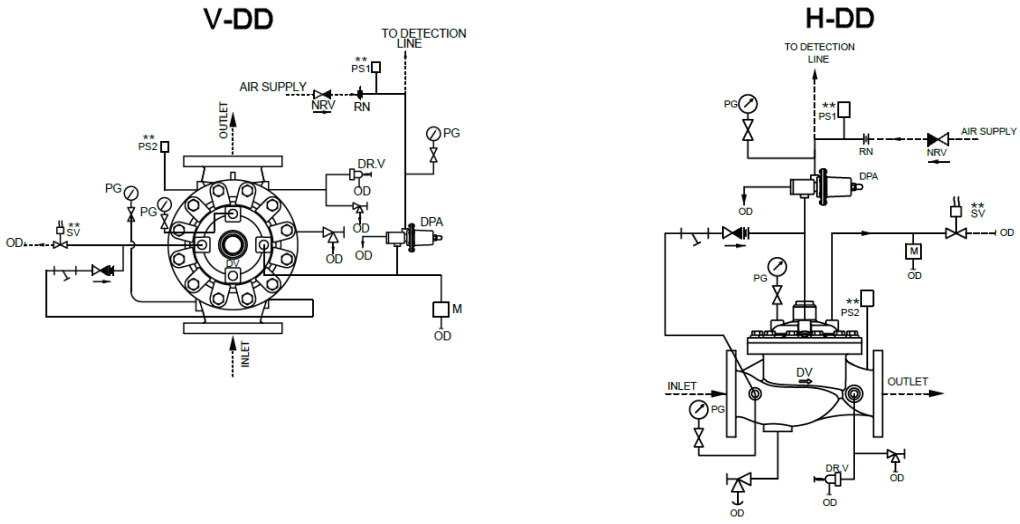
Schematic 3. Basic wet pilot trim with test & alarm trim for vertical and horizontal mounting



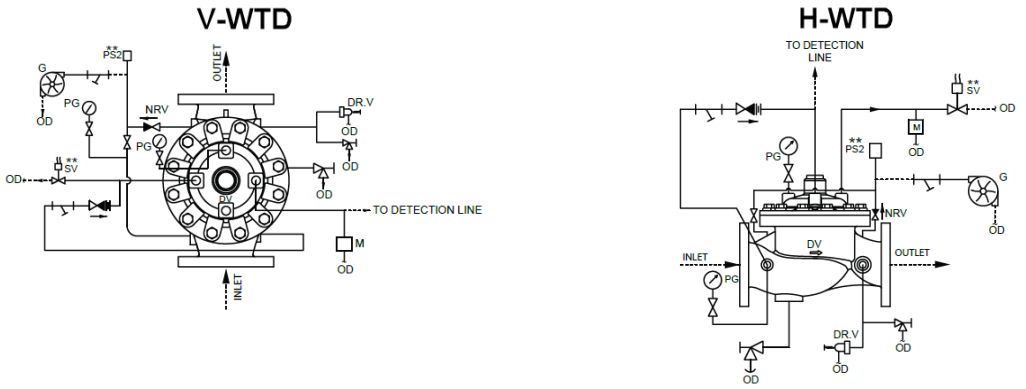
Schematic 4. Basic dry pilot trim with test & alarm trim for vertical and horizontal mounting



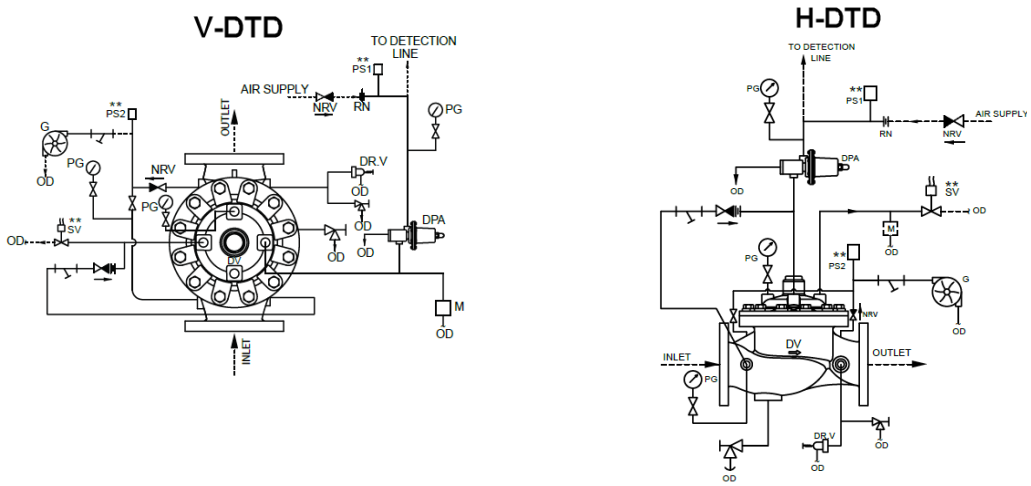
Schematic 5. Basic wet pilot trim with drip & drain trim for vertical and horizontal mounting



Schematic 6. Basic dry pilot trim with drip & drain trim for vertical and horizontal mounting



Schematic 7. Basic wet pilot trim with test & alarm trim and drip & drain trim for vertical and horizontal mounting

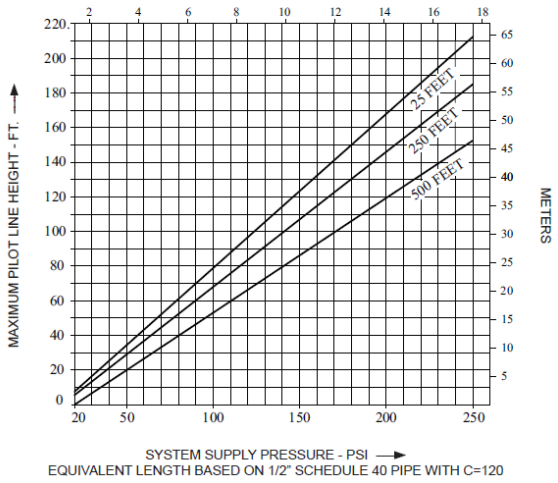


Schematic 8. Basic dry pilot trim with test & alarm trim and drip & drain trim for vertical and horizontal mounting

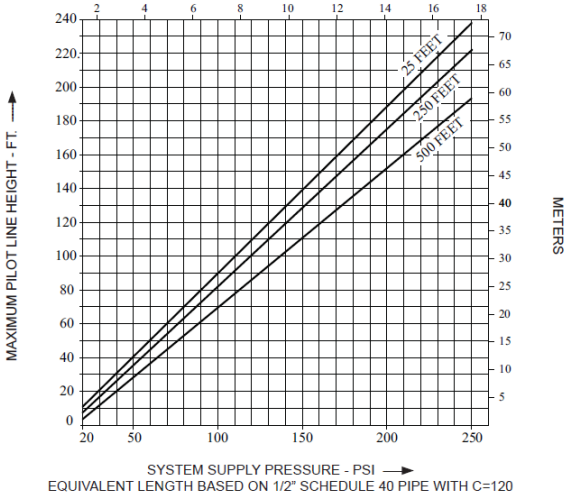
Abbreviation		Symbols	
DPA	Dry Pilot Actuator	---	By User
DV	Deluge Valve		Angle Valve
DRV	Drip Valve		NRV With Restriction Hex Nipple
ERS	Emergency Release System	**	Optional
G	Sprinkler Alarm		Strainer
M	Emergency Release Station		Valve
NRV	Non-Return Valve		
OD	Open Drain		
PG	Pressure Gauge		
PS1	Low Air Alarm Pressure Switch		
PS2	Water Flow Pressure Alarm Switch		
RN	Restriction Nozzle (Air Line)		
SV	Solenoid Valve		

4.3.2. Sprinkler Height Limitation Diagram:

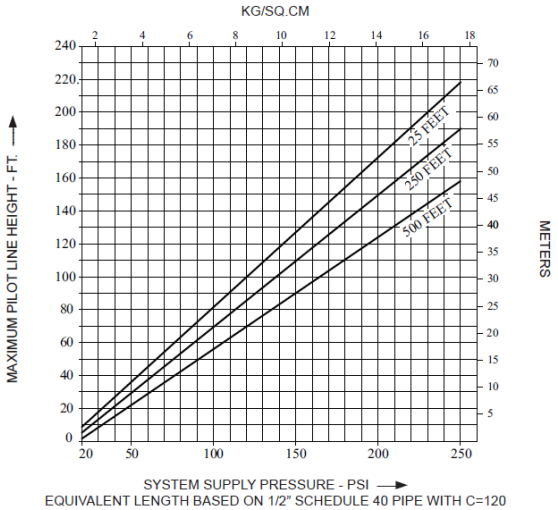
DV 200 NB



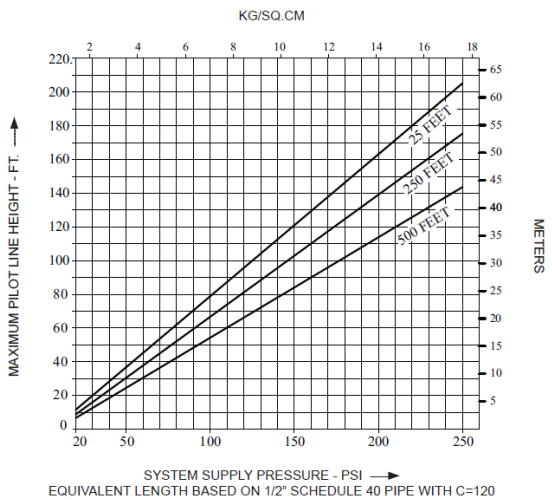
DV 150 NB

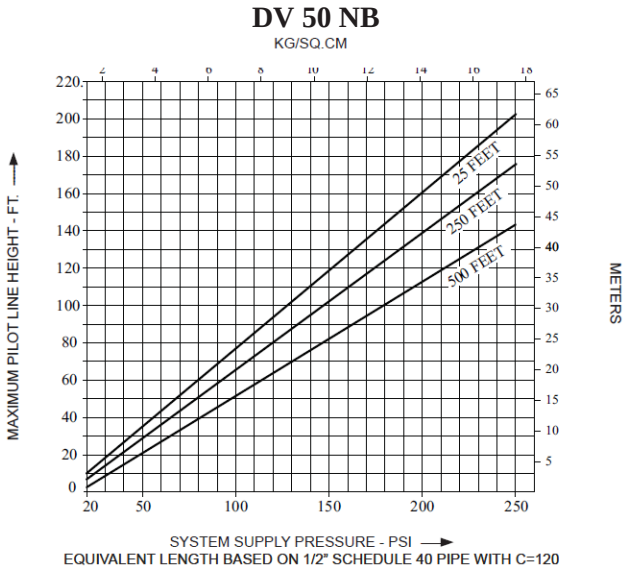


DV 100 NB

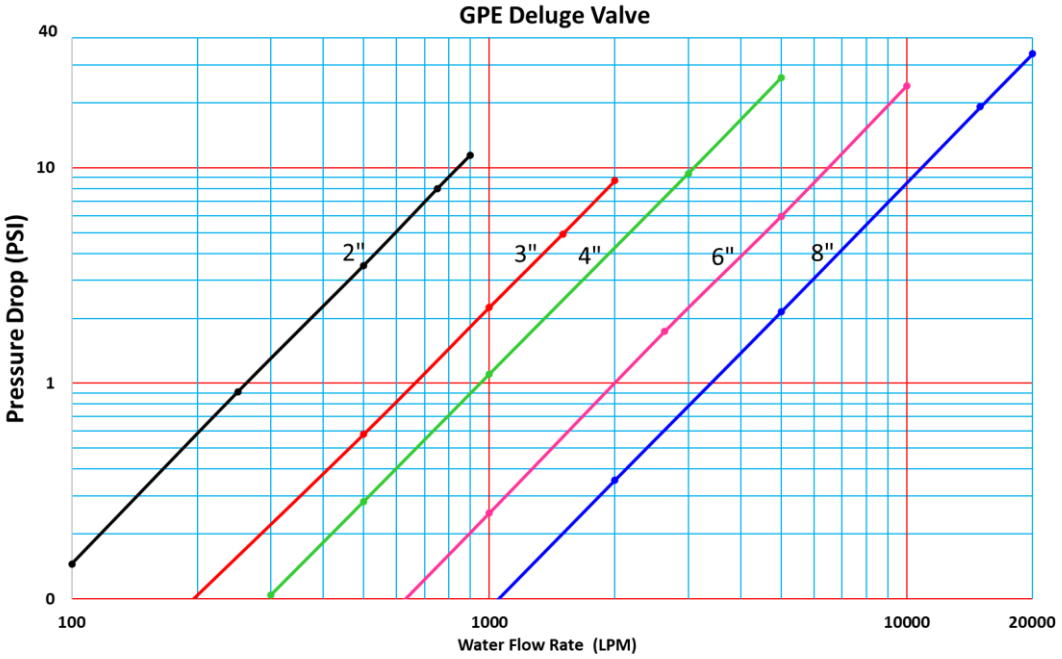


DV 80 NB





4.3.3. Pressure Drop Diagram:



Pressure Drop vs Water Flow Rate for 2”, 3”, 4”, 6” and 8” DV sizes at Velocity of 15 ft/s (4.57 m/s)

5. System Operations and Maintenance:

5.1. Procedure To Reset The Deluge Valve System:

5.1.1. Stop Valve (priming line below the upstream valve):

a) Shut the upstream side stop valve below the deluge valve to stop water flow.
b) Open both drain valves and drain plugs and close after water flow stops.
c) Close the release system or replace the sprinkler if activated through a sprinkler or quartzoid bulb detector.
d) Inspect and restore, replace, or repair the section of the detection system exposed to "Fire Condition" if necessary.
e) For dry pilot trim (pneumatic release), open the air supply valve to provide air pressure. Then, fully open the priming line valve. Open the stop valve below the deluge valve when the pressure of priming chamber exceeds half of the inlet pressure. Water should not flow into the system.
f) The water needs to be drained from valve's upstream side if priming shut-off valve option is used to reset the deluge valve.

5.1.2. Automatic Reset (priming line from the deluge valve inlet):

a) The deluge valve will automatically reset if the releasing devices used to trip the deluge valve are closed or restored back to their original status (i.e. emergency release closing or sprinkler replacing, or solenoid valve closing). Based on the system back pressure at the valve outlet, the reset time may be long or cause vibration during closing.

5.2. Caution:

a) Do not close the priming line, downstream and upstream stop valves while system is in service.
b) If anti shut-off valve is not used, the releasing device must be kept in the open position under actuation condition in order to prevent the closing of deluge valve.
c) For wet pilot trim (hydraulic release), the detection line height should be set as shown in the wet pilot sprinkler height limitation graph.
d) Avoid connecting the outlet drain line of sprinkler alarm to a common drain since the sprinkler alarm may not operate due to back pressure.
e) The deluge valve should be equipped with proper support to dampen abrupt vibration shock resulting from its opening or closing, in order to protect the piping system from potential damage.
f) It is important to take precautions when opening the main control valve of water supply in order to prevent damage, as water will flow from all open system valves.
g) The owner of the system is responsible for maintenance of the protection devices in proper operating condition.
h) Maintain the deluge valve and its trims at a minimum temperature of 4℃. Heat tracing is not allowed.
i) Deluge valve must be used in pressurized system.

5.3. Procedure To Test the Deluge Valve System:

a) Maintain the upstream side stop valve in a partially open position. Shut the system side stop valve in order to prevent water flow into the system (This valve should remain open after testing is finished).
b) Allow all the release devices to be activated which results in a sudden water pressure drop in the top chamber of deluge valve and consequently, the deluge valve will be opened. Subsequently, close the upstream side stop valve immediately.
c) Reset the valve as per the procedure given under heading “Procedure To Reset The Deluge Valve System”

5.4. Inspection and Maintenance:

The system pipeline must be thoroughly flushed before putting the deluge valve into service. The system should be commissioned by a qualified and trained individual. Following several initial successful tests, training for system inspection and testing must be provided to an authorized person. Regular system inspections and testing, in accordance with NFPA guidelines or local jurisdiction regulations, are recommended.

5.5. Warning:

Only authorized and trained personnel are permitted to conduct inspection and testing. Under no circumstances should the water supply or any valves be shut off for repairs or testing without presence a roving security and fire watch team in the area. Additionally, local security personnel and the central alarm station should be notified to prevent false alarm signals.

It is recommended to visually inspect the system at least twice a week. During the inspection, make sure all control valves are correctly positioned according to system requirements and check for any signs of damage to components.

inspections need to be more frequent when there are contaminated water supplies, corrosive/scaling water supplies, and corrosive atmospheres.

5.6. Normal Operation:

a) All main valves are in open position and sealed with tamper proof seal.
b) Drain valves must be maintained in closed position.
c) There is no sign of leak or drip from the drip valve.
d) The required pressure should be shown by all gauges, except the system side water pressure gauge.
e) No leak is detected in the system.

5.7. Normal Operation Test:

a) The system should undergo a weekly check to ensure it is in a normal operation condition.
b) The sprinkler alarm bell or electric alarm should be weekly tested by turning the alarm test valve to the test position to make sound.

c) Press down the drip valve knob. If there is a notable amount of accumulation, it could indicate a potential leakage from the seat.
d) It is important to carry out the water flow test according to the system testing procedure on a monthly basis.

5.8. Regular Inspection:

It is advised to perform the water flow test every three months by activating some of system release devices and clean all strainers and restriction nipples.

5.9. Abnormal Operation:

5.9.1. Alarm Fails To Sound:

a) Make sure there are no obstacles blocking the alarm test line, ensuring that the sprinkler alarm is able to operate freely.
b) Inspect the wiring and electrical connections of the alarm system if there is an electric alarm.

5.9.2. False Trip:

a) Inspect the clogging in priming line, restriction orifice check valve, priming valve and strainer.
b) There is leakage in the release system.
c) There is clogging in the restriction orifice of air line.
d) There is insufficient pressure supply.

5.9.3. Leakage From Deluge Valve:

a) The seat is damaged or there is obstruction on the seat face caused by a foreign object.
b) There is leakage in the release system.
c) The priming line check valve is partly clogged.
d) There is low air pressure in release line or leakage in release system.

5.10. Note:

a) The deluge valve trip time relies on detection network size. it can be significantly shortened using check valve in release line.
b) The pneumatic system must be equipped with restricted orifice at supply point and a restriction nozzle is used at dry pilot actuation line.
c) 300 psi pressure gauges is used as standard supply for water pressure up to 175 psi. for higher pressures, 600 psi pressure gauge should be ordered.

5.11. Installation Notice:

The equipment presented in this bulletin is to be installed in accordance with the latest publication standards of NFPA or other similar organizations and also with the provision of government codes or ordinances wherever applicable. The information provided by us is to the best of our knowledge and belief, and consist of general guidelines only. Site handling and installation control is not in our scope. Hence, we give no guarantee for result and take no liability for damages, loss or penalties whatsoever, resulting from our suggestion, information, recommendation or damages due to our product. Product development is a continuous program of company and hence the right to modify any specification without prior notice is reserved with the company.

6. How to Order:

49	Firefighting Valve					
	Code	Valve				
	20	Deluge Valve (Horizontal Type)				
	25	Deluge Valve (Angle Type)				
		Code	Connection Size			
		02	2”			
		03	3”			
		04	4”			
		06	6”			
		08	8”			
		10	10”			
			Code	Body & Cover Material		
			1	Ductile Cast Iron (GGG40)		
			2	Carbon Steel (A216 WCB)		
			3	Ni-Al-Bronze		
				Code	Release Type	
				1	Hydraulic (Wet)	
				2	Pneumatic (Dry)	
					Code	External Trims
					001	Base Trim
					010	Test & Alarm Trim
					100	Drip & Drain Trim
						Code / Connection Type & Class
						1 — ANSI CL#150 Flat Face Flange
						2 — ANSI CL#150 Raised Face Flange
						3 — ANSI CL#300 Flat Face Flange
						4 — ANSI CL#300 Raised Face Flange

Sample:

4920 - 06 - 1 - 1 - 111 - 1

It indicates a 6" Ductile Cast Iron Hydraulic Horizontal Deluge Valve with Flat Face Flange CL#150 including Base/Test & Alarm/Drip & Drain Trims.

7. Contact Information:

Central Office:
Tell: +9821-88513495-96
Fax: +9821-88526805
E-mail: info@gpeco.com
Sales E-mail: sales@gpeco.com
CEO: Dr. Khosro Kahrizi
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Design & Development Manager: Hossein Kahrizi

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