



BLADDER TANK PROPORTIONING SYSTEM

DESCRIPTION

Bladder Tank is designed to inject foam concentrate into the water supply of a fire protection system. During operation the foam concentrate is discharged from the tank by the water supply, collapsing the bladder around a perforated center tube until the concentrate is depleted.

SPECIFICATION

- Designed for maximum agent discharge
- Tank Material -Carbon Steel
- The horizontal tanks are supported by two saddles welded to the tank and drilled for anchoring.
- The vertical tank assembly is supported by legs welded to tank with provision for anchoring.
- Permanently welded lifting lugs for easy tank movement and positioning

APPLICATION

Without outside power source other than an adequate water supply bladder tank foam proportioning system is used to inject foam concentrate into water supply and automatically proportions foam concentrate over wide range of flow and pressure, with very low pressure drop.

LISTING & APPROVAL

Bladder tank proportioning system is UL Listed or FM Approved as pre-piped system.

TECHNICAL DATA

CONCENTRATE STORAGE CAPACITY	For Vertical Tank 140 liters to 7500 liters (36 TO 2000 Gallon (US)) For Horizontal Tank 140 liters to 15000 liters (36 to 4000 Gallon)
MATERIAL	Carbon Steel/Stainless Steel(ASME Standard)
ASME "U" STAMP	Optional
BLADDER	Buna-N
AVAILABLE MOUNTING TYPE	Vertical and Horizontal bladder tanks
DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH	ASME Code Section VIII Div.1
MAXIMUM WORKING PRESSURE	12 Bar (175 PSI).
FACTORY HYDRO	As per ASME code TEST PRESSURE
VENT AND DRAIN	Ball valve
RATIO CONTROLLER	Wafer type with Stainless Steel 304/CF8 standard supply Optional: Stainless Steel 316/CF8M or Bronze Optional - Flanged Type
CE MARK	Optional
FINISH	Red
FOAM PROPORTIONING RATIO	1%, 3%, 6% with AFFF foam concentrate

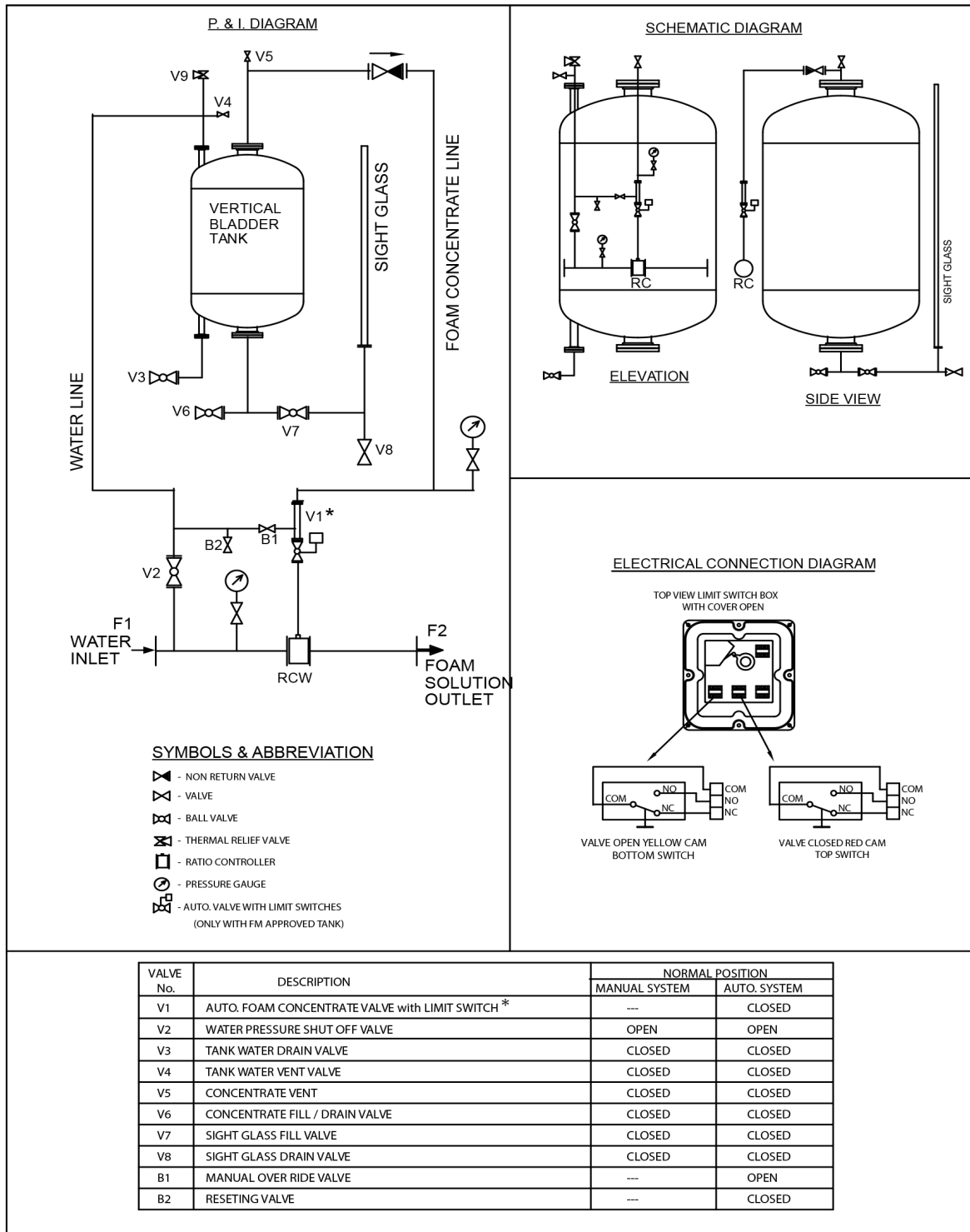
INSTALLATION, INSPECTION AND MAINTENANCE

After few initial successful tests an authorised person must be trained to perform inspection and testing of the system. It is recommended to carry out physical inspection of the system regularly, the inspection should verify that no damages have taken place to any component and all the valves are in their proper position as per the system requirement. The system should be fully tested at least once in a year and in accordance with applicable NFPA code or in accordance to the guidelines of the organisation having local jurisdiction. Do not turn off the system or any valve to repair or test the system, without placing a roving Fire Patrol in the area covered by the system. The patrol should continue until the system is put back in service. Also inform the local security personnel and the control room so that a false alarm is not signalled.

CAUTION

- Release pressure before an inspection and maintenance of the system.
- Do not weld on the tank as it may damage the bladder fitted inside the tank.
- The bladder tank is to be installed under a shade to avoid direct sunlight on the equipment.
- Sight gauge is not pressure tight, so before taking concentrate level reading, tank pressure must be released.
- Foam concentrate filling procedure must be followed. Incorrect filling procedure may damage the bladder. EMACO product have limited warranty and incorrect fill procedure will void the warranty.
- ASME Code may require over pressure protection before pressurising the system. EMACO does not supply an over pressure relief valve with the tanks. It shall be the owner's responsibility to provide over pressure protection for the tank in accordance to ASME Code.
- While designing a foam system, step shall be taken to allow for removal of the internal centre tube(s). The centre tubes are full length and/or height of the bladder tank.

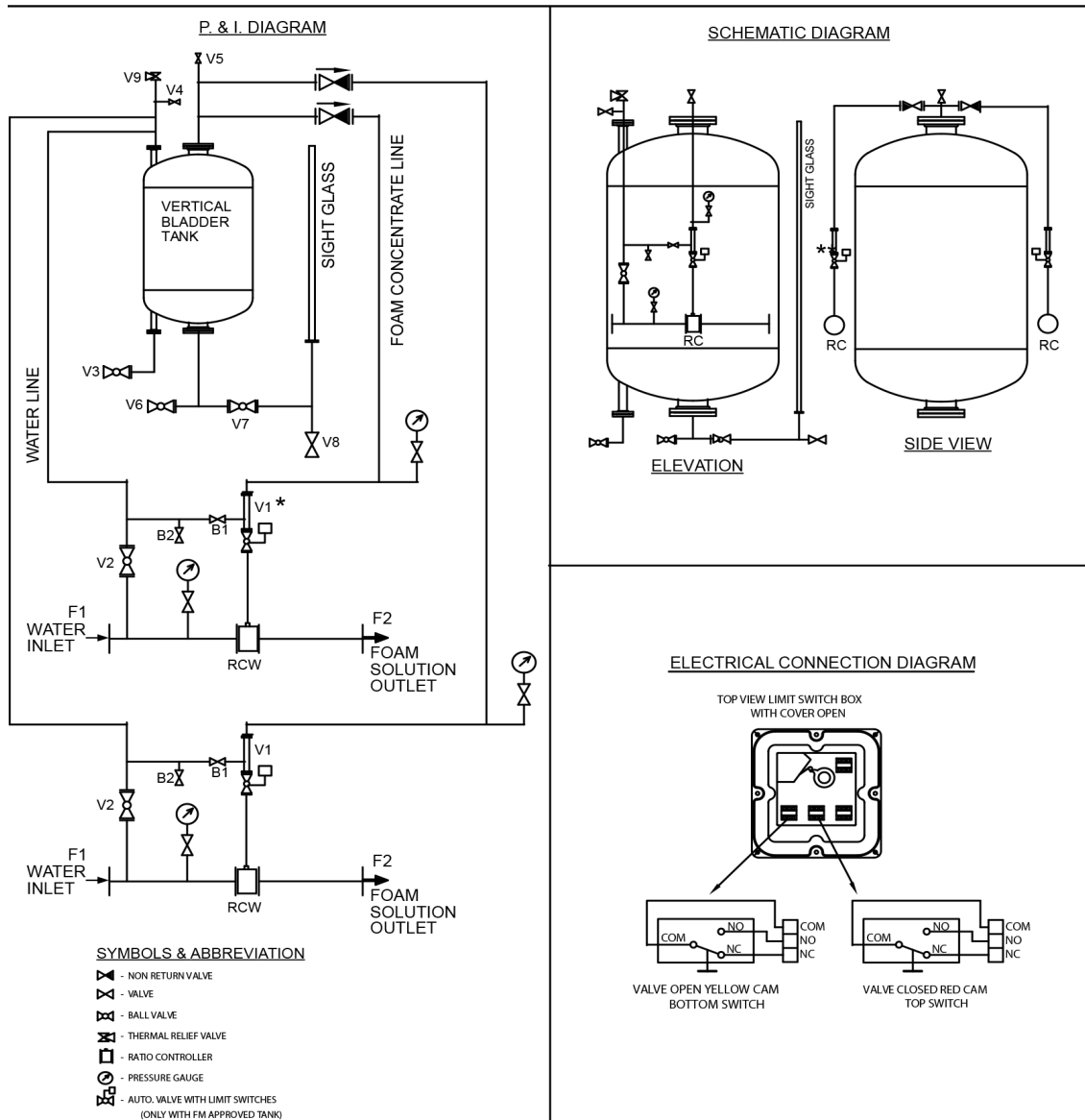
VERTICAL BLADDER TANK WITH SINGLE RATIO CONTROLLER WITH UL OR FM APPROVAL



VALVE No.	DESCRIPTION	NORMAL POSITION	
		MANUAL SYSTEM	AUTO. SYSTEM
V1	AUTO. FOAM CONCENTRATE VALVE with LIMIT SWITCH *	---	CLOSED
V2	WATER PRESSURE SHUT OFF VALVE	OPEN	OPEN
V3	TANK WATER DRAIN VALVE	CLOSED	CLOSED
V4	TANK WATER VENT VALVE	CLOSED	CLOSED
V5	CONCENTRATE VENT	CLOSED	CLOSED
V6	CONCENTRATE FILL / DRAIN VALVE	CLOSED	CLOSED
V7	SIGHT GLASS FILL VALVE	CLOSED	CLOSED
V8	SIGHT GLASS DRAIN VALVE	CLOSED	CLOSED
B1	MANUAL OVER RIDE VALVE	---	OPEN
B2	RESETTING VALVE	---	CLOSED

* Concentrate control valve is standard supply with FM Approved Bladder tank and not supplied with UL Listed as UL do not allow Concentrate control valve.

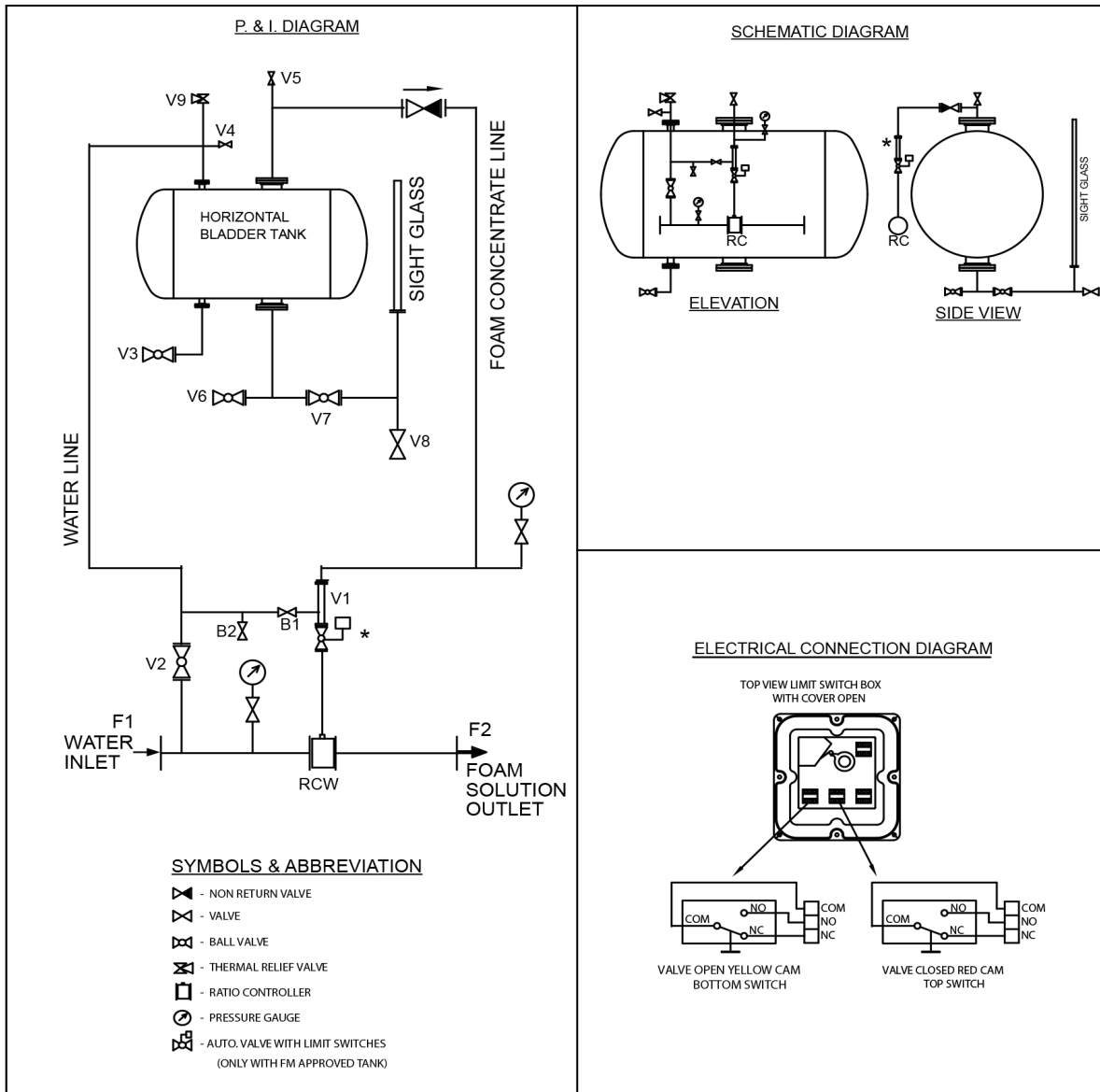
VERTICAL BLADDER TANK WITH TWO RATIO CONTROLLER WITH UL OR FM APPROVAL



VALVE No.	DESCRIPTION	NORMAL POSITION	
		MANUAL SYSTEM	AUTO. SYSTEM
V1	AUTO. FOAM CONCENTRATE VALVE with LIMIT SWITCH *	---	CLOSED
V2	WATER PRESSURE SHUT OFF VALVE	OPEN	OPEN
V3	TANK WATER DRAIN VALVE	CLOSED	CLOSED
V4	TANK WATER VENT VALVE	CLOSED	CLOSED
V5	CONCENTRATE VENT	CLOSED	CLOSED
V6	CONCENTRATE FILL / DRAIN VALVE	CLOSED	CLOSED
V7	SIGHT GLASS FILL VALVE	CLOSED	CLOSED
V8	SIGHT GLASS DRAIN VALVE	CLOSED	CLOSED
B1	MANUAL OVER RIDE VALVE	---	OPEN
B2	RESETTING VALVE	---	CLOSED

entrate control valve is standard supply with FM Approved Bladder tank and not supplied with UL Listed to not allow Concentrate control valve.

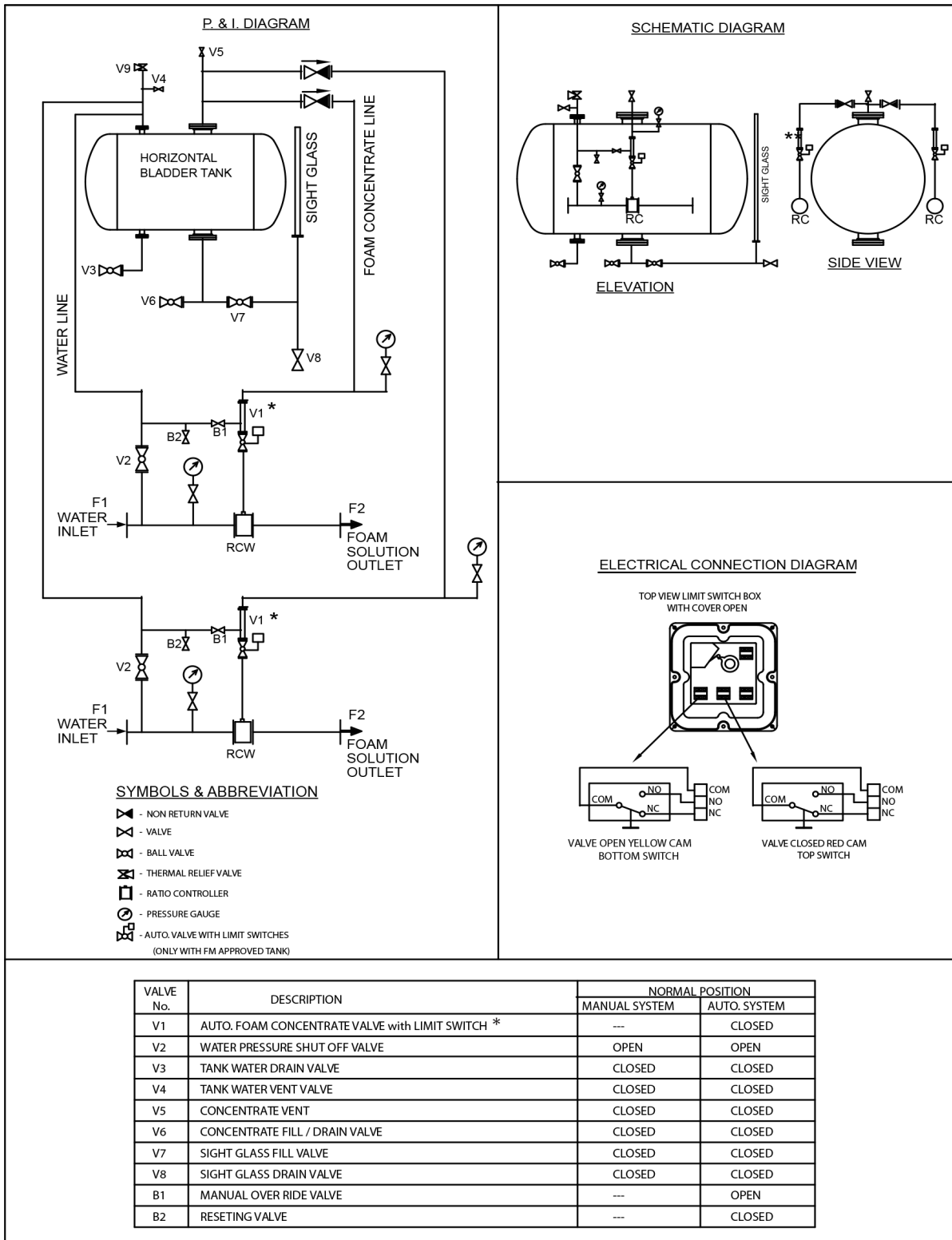
HORIZONTAL BLADDER TANK WITH SINGLE RATIO CONTROLLER WITH UL OR FM APPROVAL



VALVE No.	DESCRIPTION	NORMAL POSITION	
		MANUAL SYSTEM	AUTO.SYSTEM
V1	AUTO. FOAM CONCENTRATE VALVE with LIMIT SWITCH *	---	CLOSED
V2	WATER PRESSURE SHUT OFF VALVE	OPEN	OPEN
V3	TANK WATER DRAIN VALVE	CLOSED	CLOSED
V4	TANK WATER VENT VALVE	CLOSED	CLOSED
V5	CONCENTRATE VENT	CLOSED	CLOSED
V6	CONCENTRATE FILL / DRAIN VALVE	CLOSED	CLOSED
V7	SIGHT GLASS FILL VALVE	CLOSED	CLOSED
V8	SIGHT GLASS DRAIN VALVE	CLOSED	CLOSED
B1	MANUAL OVER RIDE VALVE	---	OPEN
B2	RESETTING VALVE	---	CLOSED

* V1 is standard supply with FM Approval and not supplied with UL Listed as UL do not allow Concentrate control valve.

VERTICAL BLADDER TANK WITH TWO RATIO CONTROLLER WITH ONLY FM APPROVAL



* V1 is standard supply with FM Approval and not supplied with UL Listed as UL do not allow Concentrate control valve.

ORDERING INFORMATION

SPECIFY

- Tank type, vertical or horizontal
- Storage capacity
- Model number, size of ratio controller with flow and pressure
- Type of foam concentrate to be used and percentage of induction required
- Optional items
- UL or FM Approval Requirement

NOTICE

Full system procedure should be installed in accordance with the latest or other publication standards of NFPA similar organization and also with the provision of government codes or ordinances wherever applicable.

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DELUGE VALVE

DUCTILE IRON

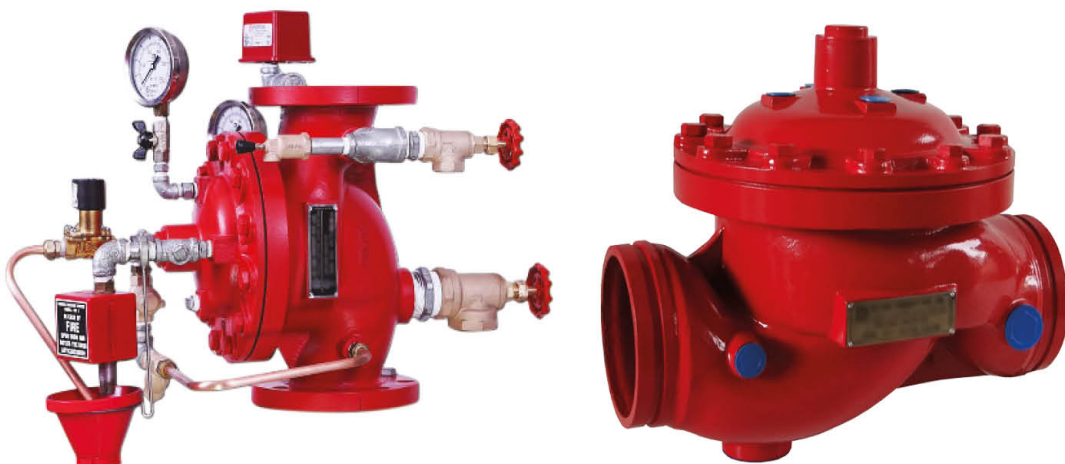
MODEL : EN0302-DH3

DESCRIPTION

Deluge systems deliver large quantities of water, over a large area, in a relatively short period of time. Deluge valve is one type of system control valve in a deluge system. Deluge Valve is a quick release, hydraulically operated diaphragm valve. It is used for fast application of water in a spray system. This type valve preserve the zones like industrial application, storage tank, conveyor protection, power transformer installation etc. Additional extension of foaming agent deluge valve can be deployed to inflammable liquid fire and aircraft hanger.

APPLICATION

Deluge systems are used in places that are considered high hazard areas such as power plants, aircraft hangars and chemical storage or processing facilities.



GENERAL DIMENSION

MODEL	EN0302-DH3-Ductile Iron	
NOMINAL SIZE	200, 150, 100, 80 and 50NB	
SERVICE PRESSURE	1.4 to 17.5 Bar (20 to 250 PSI)	
END CONNECTION	Flange X Flange Groove X Groove	
THREADED OPENING	BSPT	
MOUNTING	Vertical or Horizontal	
FACTORY HYDROSTATIC TEST PRESSURE	35 Kg./sq.cm. (500 PSI)	
FLANGE CONNECTION	ANSI B 16.5 #150 FF is standard supply	
WET PILOT SPRINKLER HEIGHT LIMITATION	As per graph in the catalogue	
NET WEIGHT WITHOUT TRIM		FXF GXG
	200 NB -	153 Kg 143 Kg
	150 NB -	79 Kg 68 Kg
	100 NB -	50 Kg 42 Kg
	80 NB -	35 Kg 29 Kg
	50 NB -	32 Kg 27 Kg
GROOVE PIPE SIZE	NOMINAL SIZE Pipe OD in MM	
	2" (50 NB)	60.3
	3" (80 NB)	89.0
	4" (100 NB)	114.3
	6" (150 NB)	165.1
	6" (150 NB)	168.3
	8" (200 NB)	219.1
FINISH	Red to RAL	3001

OPERATION OF PRINCIPLE

The Deluge valve is maintained closed by pressure applied to the control chamber through a restricted priming line. In the SET position, the water pressure supplied through the deluge valve control chamber via a check valve and through the normally closed release device. Deluge valve has three chambers, isolated from each other by the diaphragm operated clapper and seat seal. While in SET position, water pressure is transmitted through an external bypass check valve and restriction orifice from the system supply side to the top chamber, so that supply pressure in the top chamber act across the diaphragm operated clapper which holds the seat against the inlet supply pressure, because of the differential pressure design. On detection of fire, the top chamber is vented to atmosphere through the outlet port via opened actuation devices. The top chamber pressure cannot be replenished through the restricted inlet port, and the upward force of the supply pressure lifts the clapper allowing the water flow to the system piping network and alarm devices.

The trims are functionally termed as Dry Pilot Trim, Wet Pilot Trim, Electric Trim and Test and Alarm Trim as per the method of actuation of the deluge valve. Trim means to make something tidier or more level by cutting a small amount off it.

- A) ELECTRIC RELEASE TRIM
- B) WET PILOT TRIM (HYDRAULIC RELEASE)
- C) DRY PILOT TRIM (PNEUMATIC RELEASE)
- D) TEST AND ALARM TRIM
- E) DRAIN AND DRIP TRIM

TRIM TYPES

The trims are designated as:

W =Wet Pilot trim. D = Dry Pilot Trim

A) ET-W and ET-D

This type of trim is basic trim required to operate the deluge valve. A solenoid valve for electric remote actuation and pressure switch for sensing & annunciation are optional.

B) ETW-D and ETD-D

This trim type is a combination of components of the ET trim along with the drip and drain trim. A solenoid valve for electric remote actuation and pressure switch for sensing & annunciation are optional.

C) ETW-T and ETD-T

This trim type is a combination of components of the ET trims along with the test and alarm trim. In dry pilot trim, an actuator DPA-H1 is provided with optional Pneumatic Reset Device (PRD-1). A solenoid valve for electric remote actuation and pressure switch for sensing & annunciation are optional.

D) NT-W and NT-D

This trim type is a combination of components of the ET trim along with the test and alarm trim as well as the drip and drain trim. A solenoid valve for electric remote actuation and pressure switch for sensing & annunciation are optional.

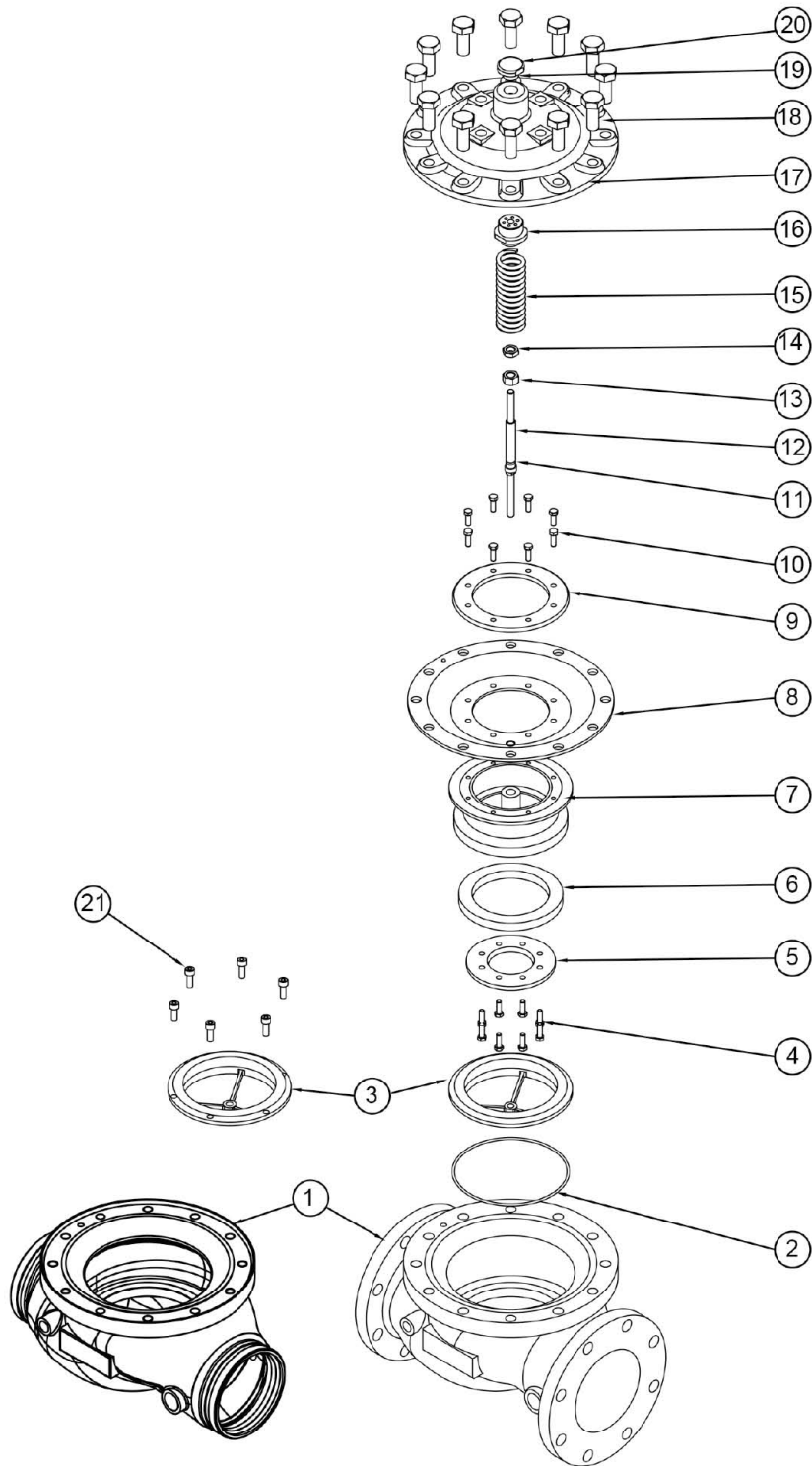
A. WHEN PRIMING CONNECTION IS FROM THE INLET OF DELUGE VALVE (AUTO RESETTING)

- The deluge valve will reset automatically when release devices which were responsible for deluge valve opening are closed or restored back to their original status, (i.e closing of ERS or replacing the damaged Sprinkler if release was through Sprinkler/ QB Detector or closing of Solenoid valve). The reset time may be long or cause vibration while closing depending upon the system back pressure at the outlet of the valve.
- If priming shut of valve (optional) is provided, then the pressure in the priming shutoff valve is to be relieved by turning 3-way valve provided in the trim to reset deluge valve.

B. WHEN PRIMING CONNECTION IS BELOW THE UPSTREAM VALVE (STOP VALVE)

- Close the upstream side stop valve provided below the deluge valve to cease the flow of water.
- Open both the drain valves/ drain plugs and close when the flow of water has ceased.
- Close the release device/replace the Sprinkler if release was through Sprinkler/ QB Detector.
- Inspect and restore/ replace/ repair if required, the section of the detection system subjected to "Fire Condition".
- In case of dry pilot detection system, open the air supply valve to build-up air pressure. Open the priming valve fully. When top chamber pressure is more than 50% of the inlet pressure, open the upstream side of the stop valve provided below the Deluge valve. No water should flow into the system.
- When priming shut off valve (optional) is provided for resetting, then the water need to be drained from upstream side of valve.

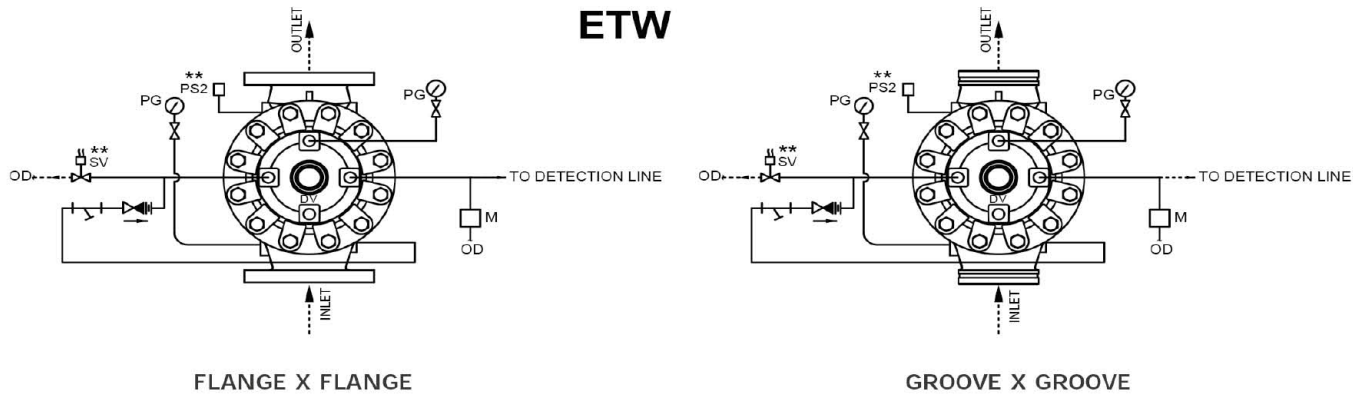
DELUGE VALVE MODEL - EN0302-DH3 SIZE 200 / 150 / 100 / 80/ 50 NB



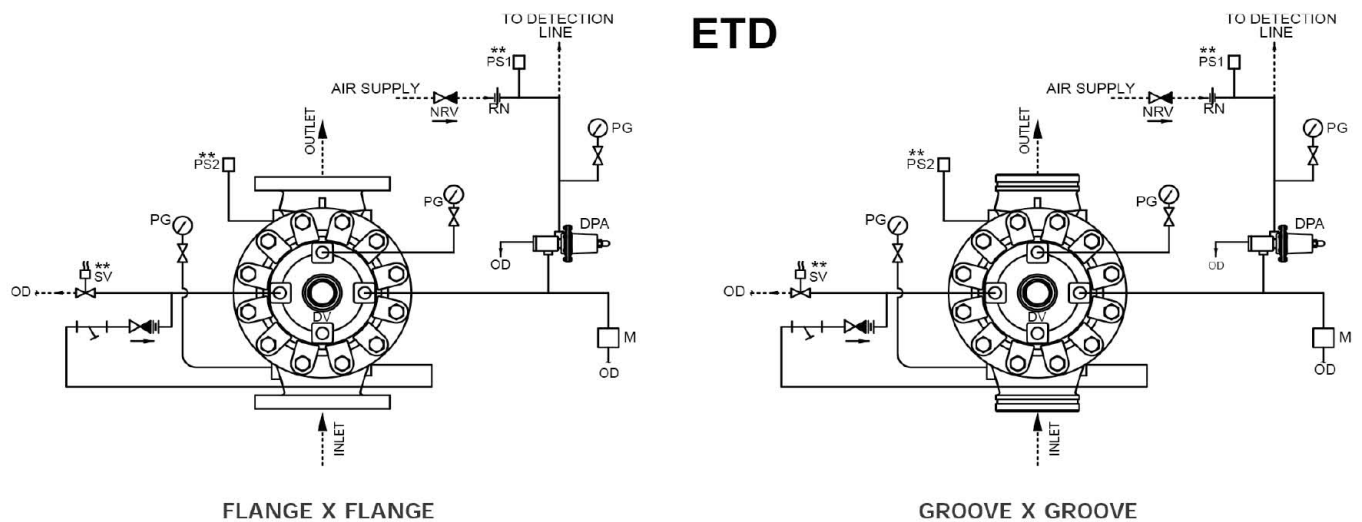
Groove X Groove

Flange to Flange

SCHEMATIC FOR WET PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR VERTICAL MOUNTING



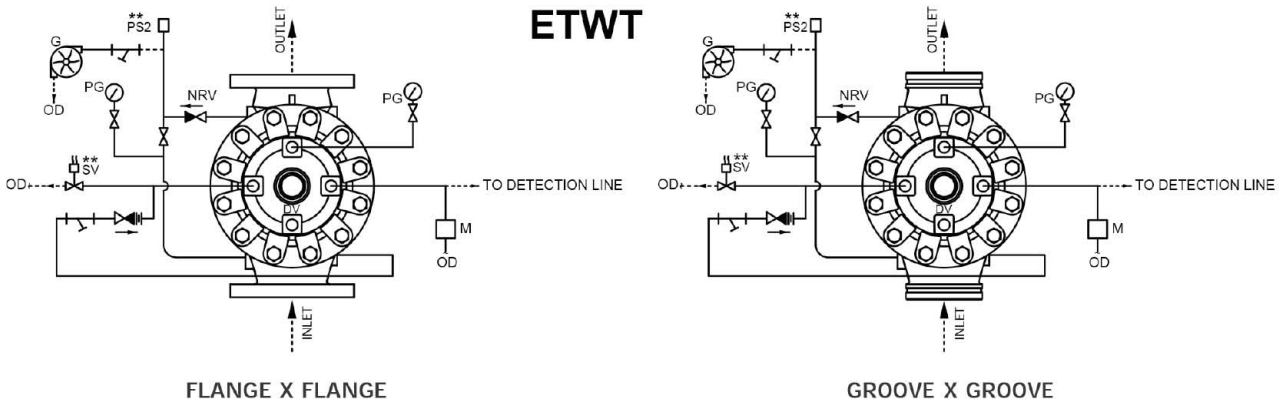
SCHEMATIC FOR DRY PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR VERTICAL MOUNTING



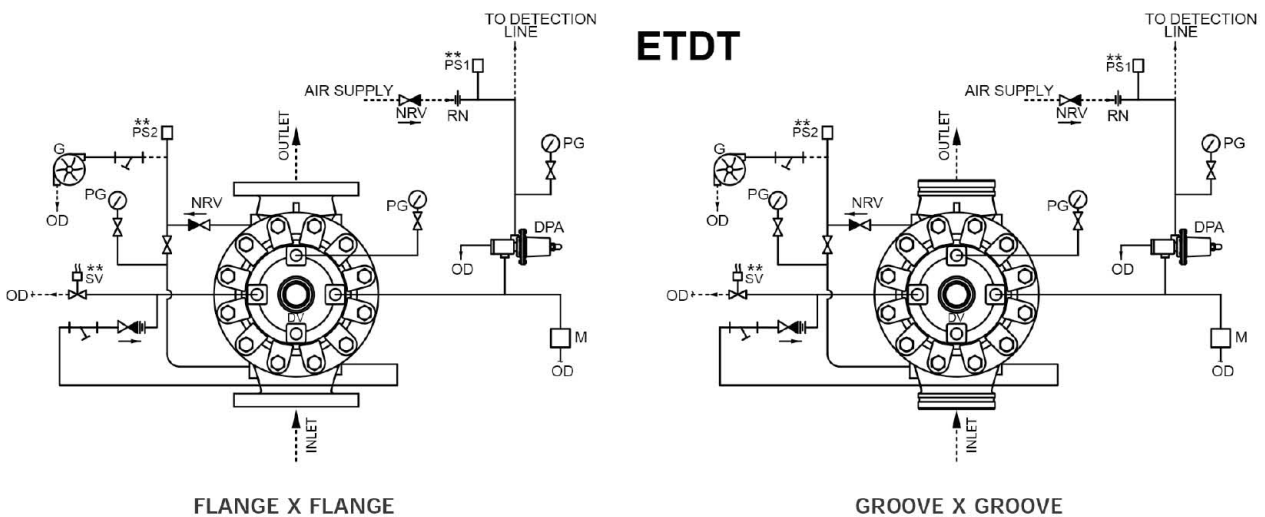
ABBREVIATION & SYMBOLS

DV	DELUGE VALVE	G	SPRINKLER ALARM (WVG)		NRV WITH RESTRICTION HEX NIPPLE
M	EMERGENCY RELEASE STATION	PG	PRESSURE GAUGE		VALVE
RN	RESTRICTION NOZZLE (AIR LINE)	OD	OPEN DRAIN		STRAINER
SV	SOLENOID VALVE	DPA	DRY PILOT ACTUATOR	--	BY USER
PS1	LOW AIR ALARM PRESSURE SWITCH	NRV	NON RETURN VALVE		
PS2	WATER FLOW PRESSURE ALARM SWITCH	**	OPTIONAL		

SCHEMATIC FOR WET PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR VERTICAL MOUNTING



SCHEMATIC FOR DRY PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR VERTICAL MOUNTING



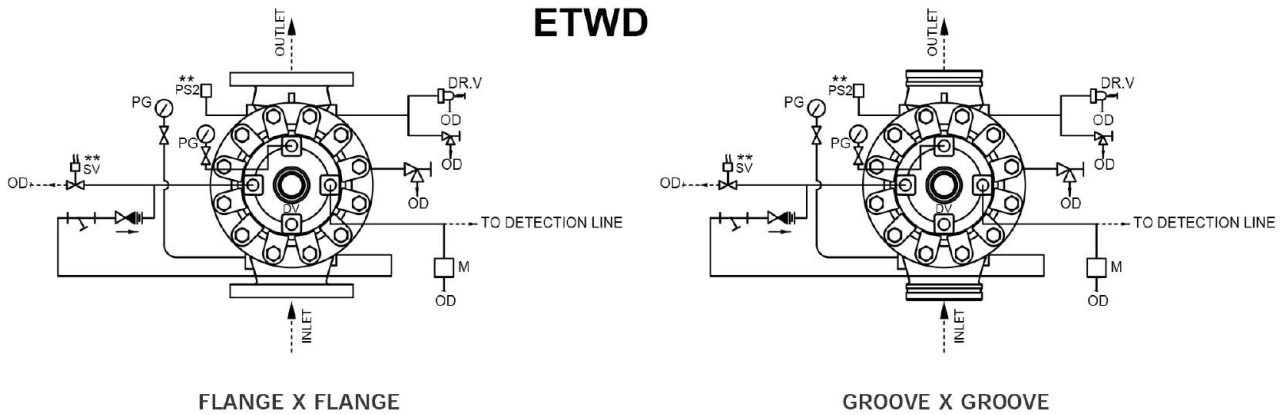
ABBREVIATION & SYMBOLS

DV DELUGE VALVE
M EMERGENCY RELEASE STATION
RN RRESTRICTION NOZZLE (AIR LINE)
SV SOLENOID VALVE
PS1 LOW AIR ALARM PRESSURE SWITCH
PS2 WATER FLOW PRESSURE ALARM SWITCH

G SPRINKLER ALARM (WMG)
PG PRESSURE GAUGE
OD OPEN DRAIN
DPA DRY PILOT ACTUATOR
NRV NON RETURN VALVE
** OPTIONAL

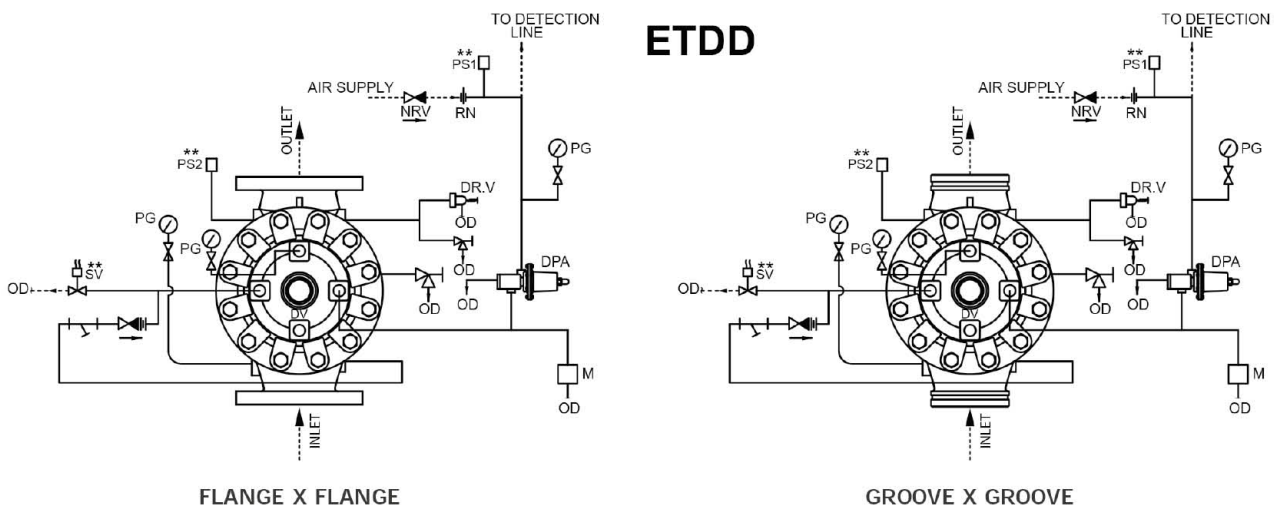
NRV WITH RESTRICTION HEX NIPPLE
 VALVE
 STRAINER
--- BY USER

SCHEMATIC FOR WET PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR VERTICAL MOUNTING



SCHEMATIC 5

SCHEMATIC FOR DRY PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR VERTICAL MOUNTING

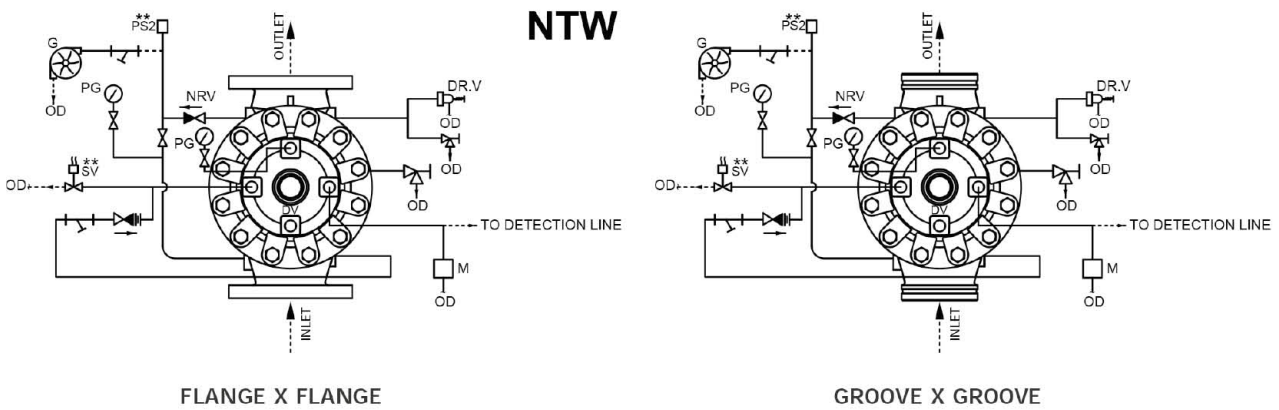


SCHEMATIC 6

ABBREVIATION & SYMBOLS

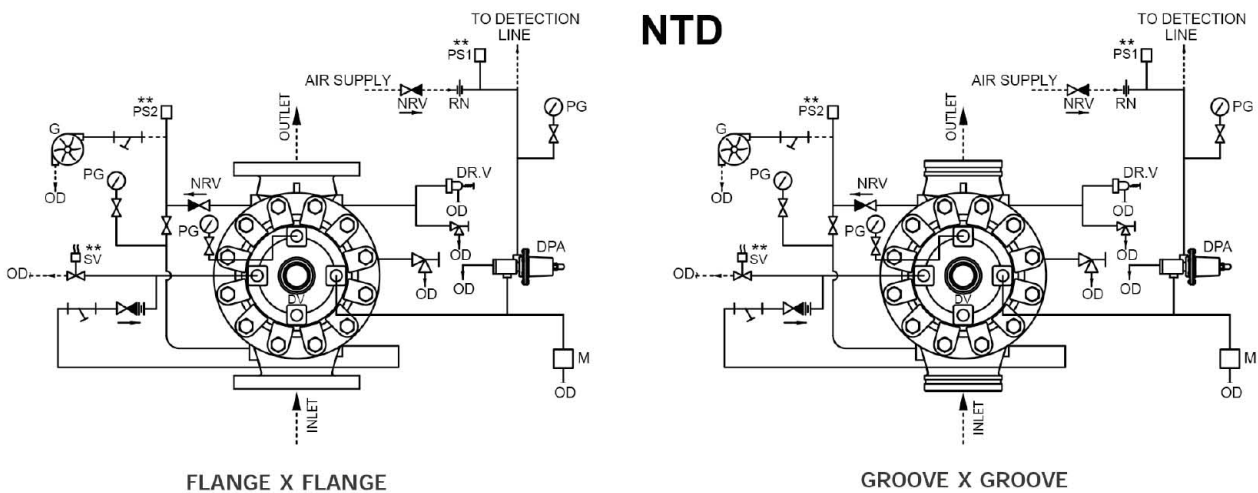
DV	DELUGE VALVE	G	SPRINKLER ALARM (WMG)		NRV WITH RESTRICTION HEX NIPPLE
M	EMERGENCY RELEASE STATION	PG	PRESSURE GAUGE		VALVE
RN	RESTRICTION NOZZLE (AIR LINE)	OD	OPEN DRAIN		STRAINER
SV	SOLENOID VALVE	DPA	DRY PILOT ACTUATOR		ANGLE VALVE
PS1	LOW AIR ALARM PRESSURE SWITCH	DR.V	DRIIP VALVE	---	BY USER
PS2	WATER FLOW PRESSURE ALARM SWITCH	NRV	NON RETURN VALVE	**	OPTIONAL

SCHEMATIC FOR WET PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR VERTICAL MOUNTING



SCHEMATIC 7

SCHEMATIC FOR DRY PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR VERTICAL MOUNTING



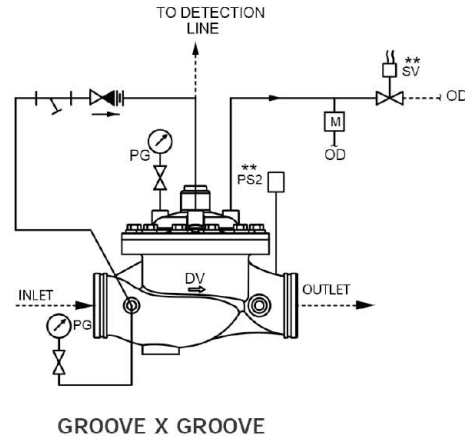
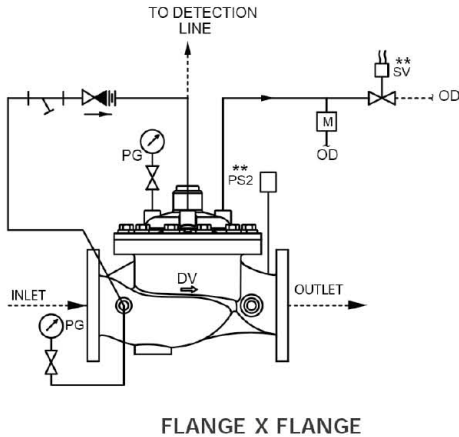
SCHEMATIC 8

ABBREVIATION & SYMBOLS

DV	DELUGE VALVE	G	SPRINKLER ALARM (WMG)		NRV WITH RESTRICTION HEX NIPPLE
M	EMERGENCY RELEASE STATION	PG	PRESSURE GAUGE		VALVE
RN	RESTRICTION NOZZLE (AIR LINE)	OD	OPEN DRAIN		STRAINER
SV	SOLENOID VALVE	DPA	DRY PILOT ACTUATOR		ANGLE VALVE
PS1	LOW AIR ALARM PRESSURE SWITCH	DR.V	DRIIP VALVE	---	BY USER
PS2	WATER FLOW PRESSURE ALARM SWITCH	NRV	NON RETURN VALVE	**	OPTIONAL

SCHEMATIC FOR WET PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR HORIZONTAL MOUNTING

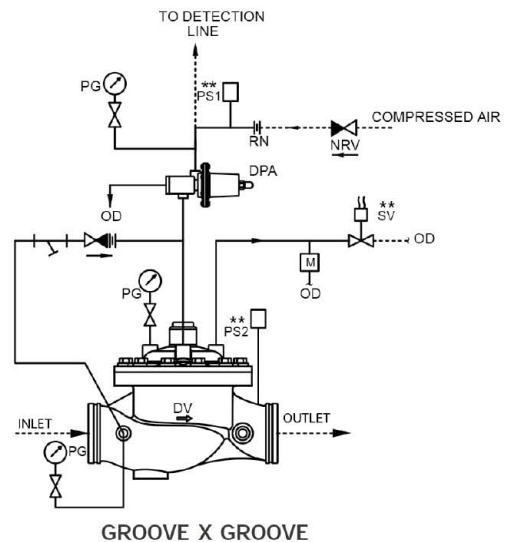
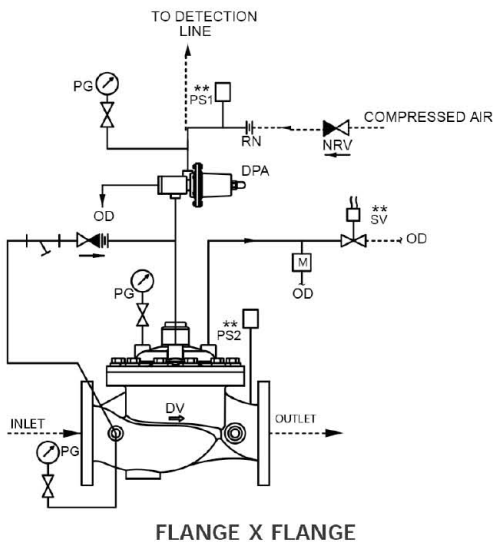
ETW



SCHEMATIC 9

SCHEMATIC FOR DRY PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR HORIZONTAL MOUNTING

ETD



SCHEMATIC 10

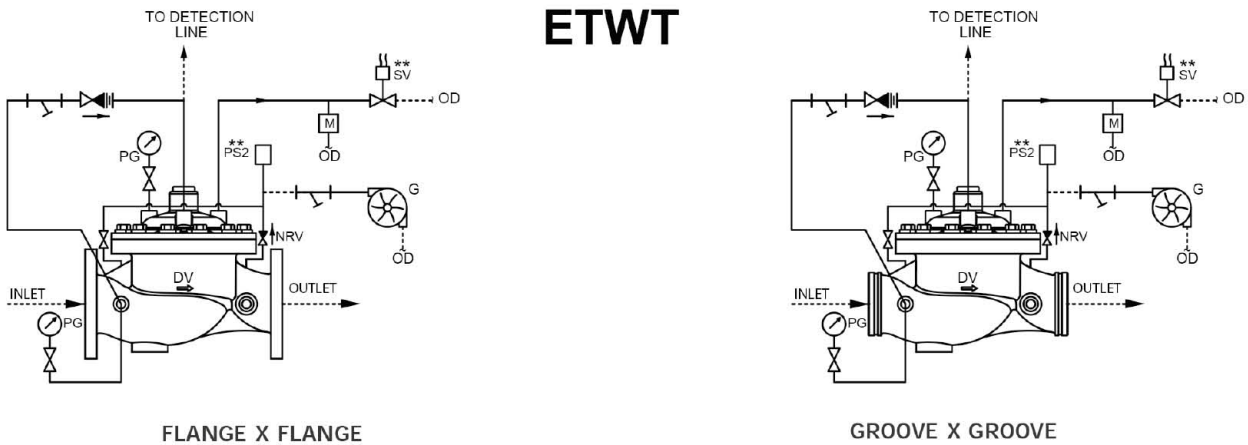
ABBREVIATION & SYMBOLS

DV DELUGE VALVE
M EMERGENCY RELEASE STATION
RN RRESTRICTION NOZZLE (AIR LINE)
SV SOLENOID VALVE
PS1 LOW AIR ALARM PRESSURE SWITCH
PS2 WATER FLOW PRESSURE ALARM SWITCH

G SPRINKLER ALARM (W/MG)
PG PRESSURE GAUGE
OD OPEN DRAIN
DPA DRY PILOT ACTUATOR
NRV NON RETURN VALVE
** OPTIONAL

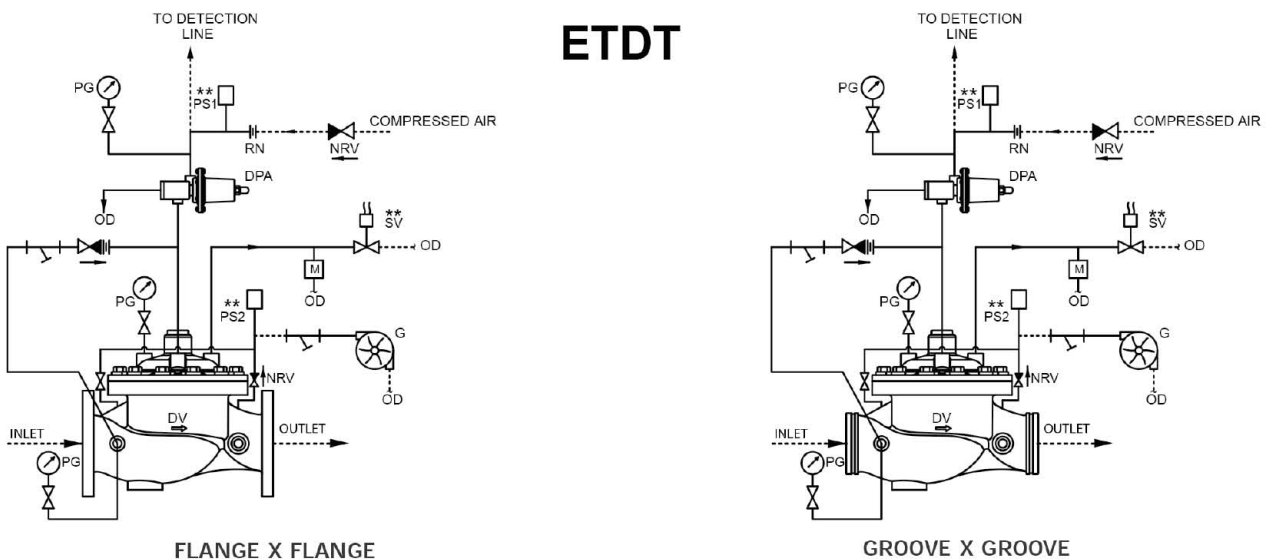
NRV WITH RESTRICTION HEX NIPPLE
VALVE
STRAINER
--- BY USER

SCHEMATIC FOR WET PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR HORIZONTAL MOUNTING



SCHEMATIC 11

SCHEMATIC FOR DRY PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR HORIZONTAL MOUNTING



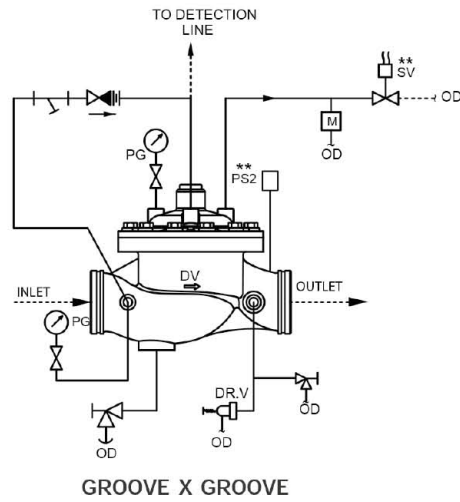
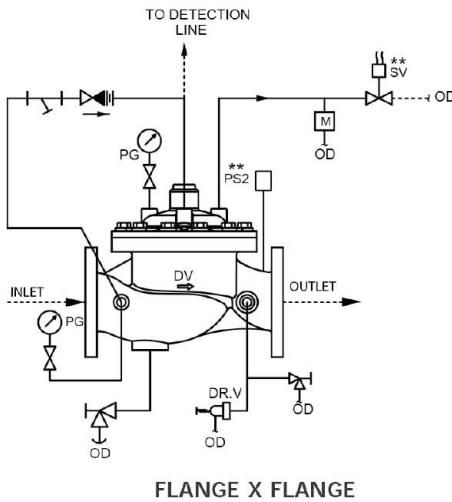
SCHEMATIC 12

ABBREVIATION & SYMBOLS

DV	DELUGE VALVE	G	SPRINKLER ALARM (WMG)		NRV WITH RESTRICTION HEX NIPPLE
M	EMERGENCY RELEASE STATION	PG	PRESSURE GAUGE		VALVE
RN	RESTRICTION NOZZLE (AIR LINE)	OD	OPEN DRAIN		STRAINER
SV	SOLENOID VALVE	DPA	DRY PILOT ACTUATOR	---	BY USER
PS1	LOW AIR ALARM PRESSURE SWITCH	NRV	NON RETURN VALVE		
PS2	WATER FLOW PRESSURE ALARM SWITCH	**	OPTIONAL		

SCHEMATIC FOR WET PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR HORIZONTAL MOUNTING

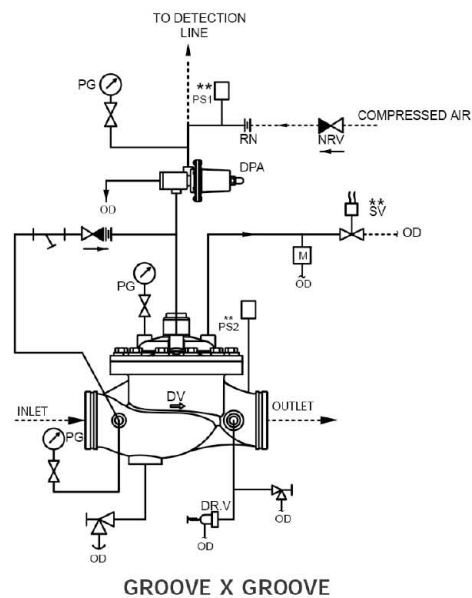
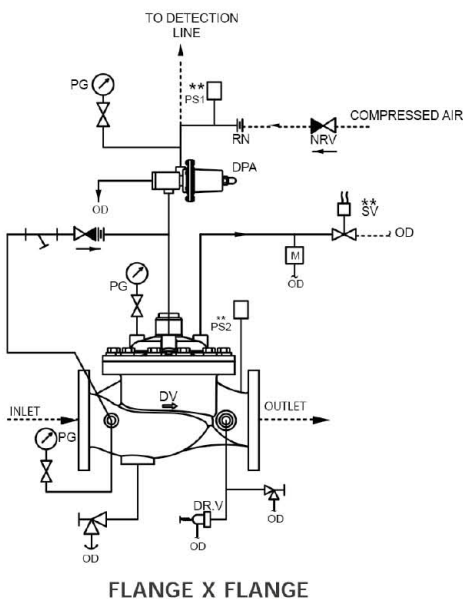
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SCHEMATIC 13

SCHEMATIC FOR DRY PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR HORIZONTAL MOUNTING

ETDD

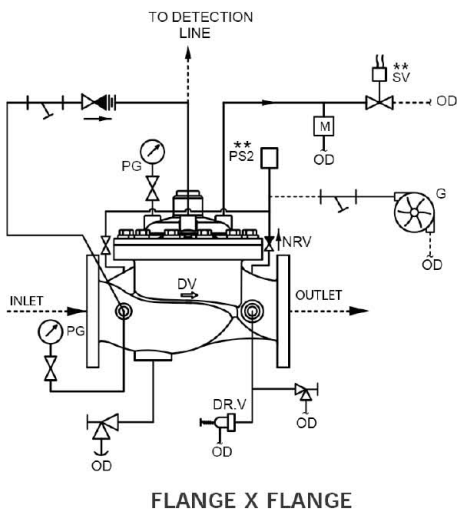


SCHEMATIC 14

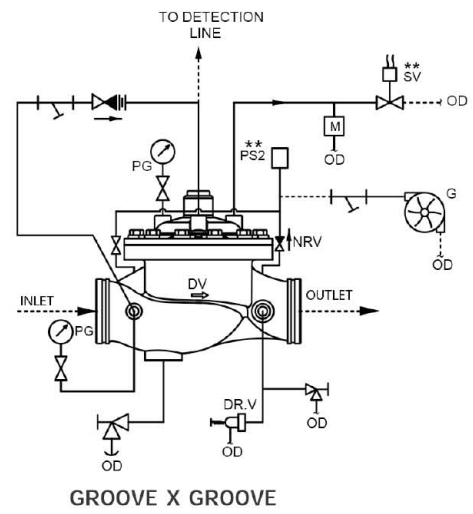
ABBREVIATION & SYMBOLS

DV	DELUGE VALVE	G	SPRINKLER ALARM (WMG)		NRV WITH RESTRICTION HEX NIPPLE
M	EMERGENCY RELEASE STATION	PG	PRESSURE GAUGE		VALVE
RN	RESTRICTION NOZZLE (AIR LINE)	OD	OPEN DRAIN		STRAINER
SV	SOLENOID VALVE	DPA	DRY PILOT ACTUATOR		ANGLE VALVE
PS1	LOW AIR ALARM PRESSURE SWITCH	DR.V	DRIIP VALVE	---	BY USER
PS2	WATER FLOW PRESSURE ALARM SWITCH	NRV	NON RETURN VALVE	**	OPTIONAL

SCHEMATIC FOR WET PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR HORIZONTAL MOUNTING

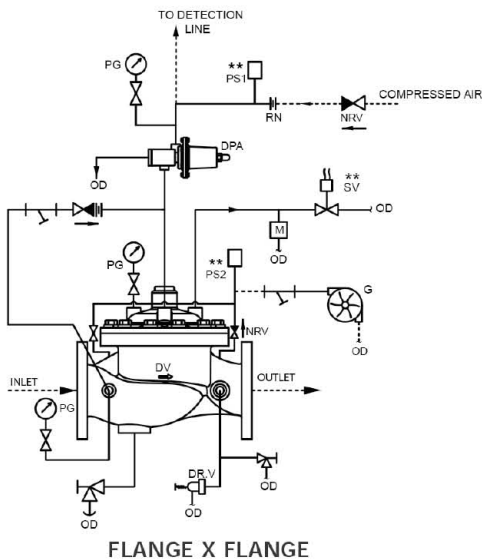


NTW

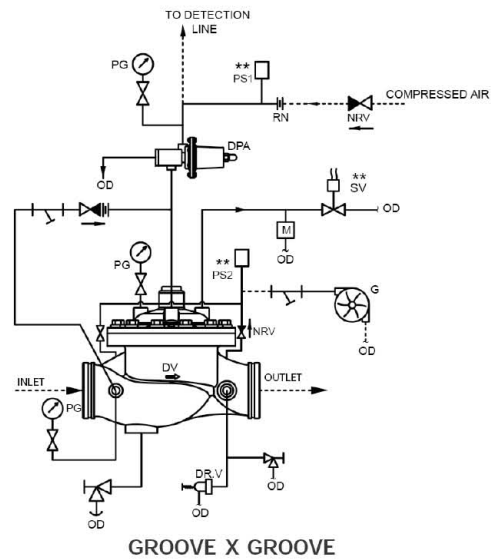


SCHEMATIC 15

SCHEMATIC FOR DRY PILOT BASIC TRIM FOR DELUGE VALVE MODEL - EN0302-DH3 FOR HORIZONTAL MOUNTING



NTD



SCHEMATIC 16

ABBREVIATION & SYMBOLS

DV	DELUGE VALVE
M	EMERGENCY RELEASE STATION
RN	RESTRICTION NOZZLE (AIR LINE)
SV	SOLENOID VALVE
PS1	LOW AIR ALARM PRESSURE SWITCH
PS2	WATER FLOW PRESSURE ALARM SWITCH

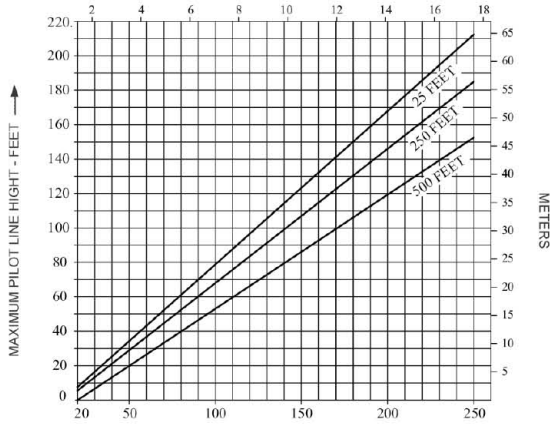
G	SPRINKLER ALARM (WMG)
PG	PRESSURE GAUGE
OD	OPEN DRAIN
DPA	DRY PILOT ACTUATOR
DR.V	DRIP VALVE
NRV	NON RETURN VALVE

	NRV WITH RESTRICTION HEX NIPPLE
	VALVE
	STRAINER
	ANGLE VALVE
	BY USER
	OPTIONAL

SPRINKLER HEIGHT LIMITATION

DV 200NB

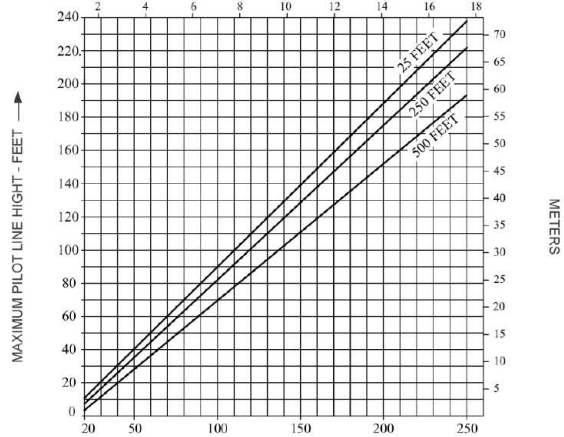
KG/SQCM



SYSTEM SUPPLY PRESSURE - PSI →
EQUIVALENT LENGTH BASED ON 1/2" SCHEDULE 40 PIPE WITH C=120

DV 150NB

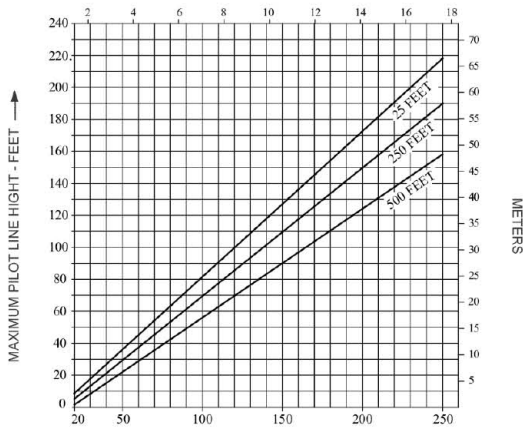
KG/SQCM



SYSTEM SUPPLY PRESSURE - PSI →
EQUIVALENT LENGTH BASED ON 1/2" SCHEDULE 40 PIPE WITH C=120

DV 100NB

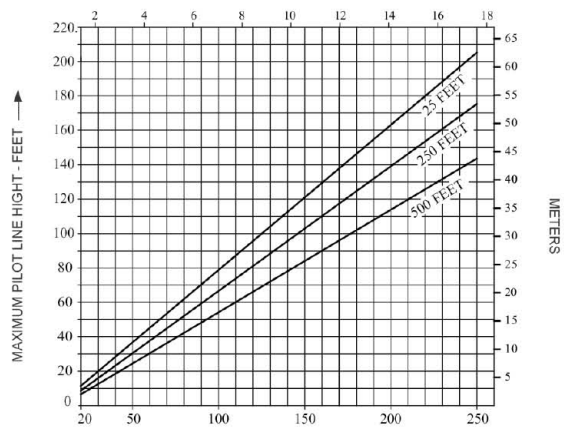
KG/SQCM



SYSTEM SUPPLY PRESSURE - PSI →
EQUIVALENT LENGTH BASED ON 1/2" SCHEDULE 40 PIPE WITH C=120

DV 80NB

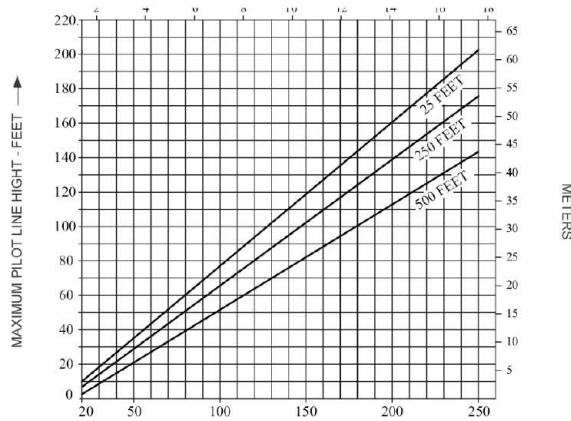
KG/SQCM



SYSTEM SUPPLY PRESSURE - PSI →
EQUIVALENT LENGTH BASED ON 1/2" SCHEDULE 40 PIPE WITH C=120

DV - 50NB

KG/SQCM

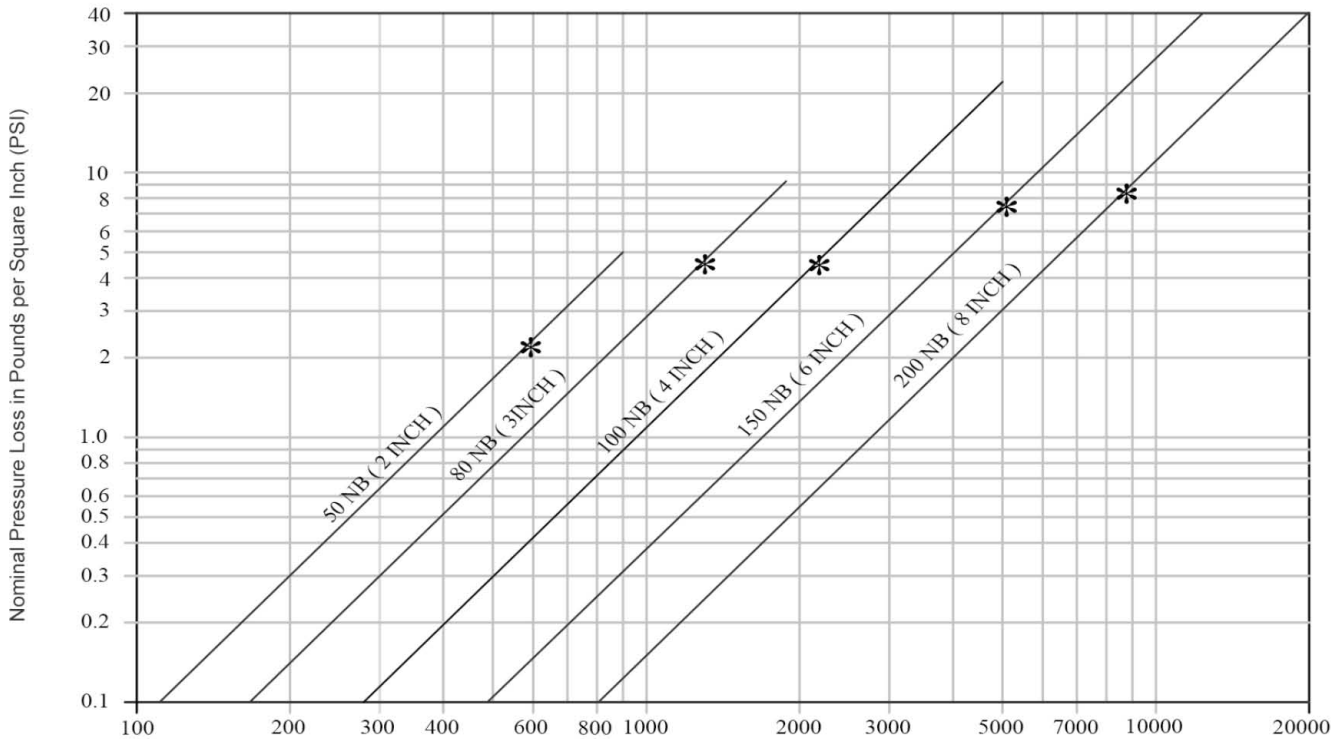


SYSTEM SUPPLY PRESSURE - PSI →
EQUIVALENT LENGTH BASED ON 1/2" SCHEDULE 40 PIPE WITH C=120

DELUGE VALVE MODEL EN0302-DH3

Nominal Pressure Loss vs Flow

(* Flow at 15 feet per second [4.57 meter per second])



ORDERING INFORMATION

SPECIFY

- Model Number
- Nominal Size
- End Connection Type
- Trim Type
- Working Pressure
- Material Standard

NOTICE

Full system procedure should be installed in accordance with the latest or other publication standards of NFPA similar organization and also with the provision of government codes or ordinances wherever applicable.

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