

Caribbean Utilities Company, Ltd. Fire Suppression Basis of Design



Prepared for:

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**July 31, 2015
Revision 1**

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TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 SUMMARY OF WORK	2
3.0 APPLICABLE STANDARDS	5
4.0 SYSTEM REQUIREMENTS	6
4.1 Classification of Occupancy	6
4.2 Automatic Sprinklers and Deluge Spray Nozzles	6
4.2.1 Automatic Sprinklers.....	6
4.2.1.1 Automatic Sprinkler Spacing.....	6
4.2.2 Deluge Spray Nozzles	6
4.2.2.1 Spray Nozzle Spacing.....	6
4.3 Hydraulic Information.....	7
4.3.1 Fire Pump House.....	7
4.3.2 Cable Spreading Rooms	7
4.3.3 Compressor Rooms.....	7
4.3.4 Oil Filled Equipment Rooms	7
4.3.5 Localized Protection of Turbine Engines	7
4.4 F-500 Encapsulator Agent.....	8
4.4.1 Fire Suppression Agent	8
4.4.2 System Equipment	8
4.4.3 Service.....	9
4.5 Piping.....	9
4.5.1 Aboveground	9
4.5.2 Underground.....	10
4.6 Valves.....	10
4.6.1 General Valves	10
4.6.2 Underground Valves.....	10
4.6.3 Deluge Valves	10
4.7 Fire Alarm System Requirements.....	10
4.8 Painting.....	11
4.8.1 Sprinkler Systems.....	11
4.9 Pumps/Water Supply	11

4.10	Area Diking and Spill Protection	12
4.11	Demolition.....	12
4.12	Systems Migration	12
5.0	BID REQUIREMENTS	13
5.1	System Commissioning	14
5.2	System Acceptance.....	14
5.3	System Inspection, Testing and Maintenance.....	14
A.	APPENDIX	A-1
A.1.	International Fog, Inc. Industrial Containment System 1.5-Inch RC150A Cut Sheet	A-1
A.2.	International Fog, Inc. Industrial Containment System 1.5-Inch RC150D Cut Sheet	A-2
A.3.	Tyco DV-5 Deluge Valve with Remote-Resetting Trim Cut Sheet	A-3

1.0 INTRODUCTION

The Fire & Risk Alliance, LLC (FRA) was requested by the Caribbean Utilities Company, LTD (CUC) to design fire suppression and associated fire alarm system upgrades to protect the existing engine rooms, compressor rooms, and fire pump room at the Caribbean Utilities Company Production Facilities. A complete design package has been prepared for CUC to submit for bid. Any changes to the bid design drawings/package shall be submitted to CUC as a “request for change” for approval prior to commencement of the work.

CUC has requested that fire suppression system designs be prepared for the protection of the existing engine rooms (Engine Rooms 1, 4 and 5), compressor rooms, and fire pump house at the CUC Plant. These rooms and equipment are currently either not protected or protected by limited foam suppression systems. In particular, the engine rooms present a risk of fire involving the engine and other lube oil and diesel filled equipment. The engine rooms, compressor rooms, and fire pump house are comprised of non combustible construction. The engine rooms are necessary to maintain CUC’s power infrastructure.

Electrical production facilities are part of a larger network designed to distribute high voltage electric cables and electricity to various locations throughout the Cayman Islands. If an equipment malfunction occurs where a fire starts, there can be a potential of lube oil and diesel spills accompanied by fire. Without proper fire protection, a fire could spread and potentially destroy equipment not involved in the initial fire incident (pressurized oil and diesel spills).

Based on a review of the hazards associated with the engine rooms and with direction from CUC, the installation of new manual deluge water spray fire suppression systems with supplemental F-500 has been identified as a fire protection solution. This is an appropriate solution as the layout of the engine room allows for an arrangement of piping that does not interfere with the engine rooms and an adequate water supply is available. The water supply will be provided via a connection to the fire protection underground ring mains and supplemented with the existing three fire pumps (2 electric pumps and 1 diesel pump).

This Basis of Design (BOD) has been prepared to provide information to bidding contractors. Each contractor is requested to provide a proposal for the design and installation of: A turnkey manual deluge water spray system for each of the eleven total engines located in Engine Rooms 1, 4, and 5; manual deluge water spray systems for the north and south mechanical annex areas in Engine Room 5; manual deluge water spray systems for the north and south cable spreading areas located in Engine Room 5; a manual deluge water spray system for the protection of the basement mechanical annex/cable spreading area located in Engine Room 4; a manual deluge water spray system for the cable trays located in Engine Room 1; automatic closed head sprinkler systems in the two compressor rooms in Engine Room 5; an automatic closed head sprinkler system in the Engine Room 4 compressor room; and a closed head automatic sprinkler system in the Fire Pump Room. Each contractor is required to provide all work necessary for complete and operational systems. Note that fire alarm system upgrades will be provided as part of a separate project. It is intended that all systems will be code compliant and will be accepted by CUC.

2.0 SUMMARY OF WORK

At the CUC Plant, the fire protection upgrades shall include the installation of supervised fire suppression systems for the fire pump house, Engine Room 1, Engine Room 4, and Engine Room 5 installed in accordance with the requirements of NFPA. A deluge water spray system shall be installed for each engine utilizing the International Fog Inc. 150A or 150D type nozzles as identified on the design drawings. A deluge water spray system shall be installed for the north and south cable spreading areas and mechanical annex areas in Engine Room 5 utilizing the International Fog Inc. 150A or 150D type nozzles as identified on the design drawings. A deluge water spray system shall be installed for the basement/mechanical annex/cable spreading area in Engine Room 4 utilizing the International Fog Inc. 150A or 150D type nozzles as identified on the design drawings. A deluge water spray system shall be installed for the cable trays in Engine Room 1 utilizing the International Fog Inc. 150A or 150D type nozzles as identified on the design drawings. Automatic sprinkler systems shall be installed in the Compressor Rooms and the fire pump house. The scope of work also includes the complete demolition and removal of the fire protection systems to be decommissioned.

As part of the work, the Contractor is responsible for commissioning the new systems for monitoring and releasing as described in the design package. Separate fire alarm system upgrades will provide new initiating devices and notification appliances throughout each fire protection system zones as shown on the drawings and shall be installed in accordance with applicable codes. The contractor is required to coordinate with the fire alarm contractor.

Monitoring and releasing provisions for the new suppression system shall be provided under a separate contract via interconnection to the existing fire alarm control panel located in each specific control building.

The contractor shall be responsible for as-built drawings in accordance with CUC standards as part of the scope of work. At the completion and final acceptance it shall be the contractor's responsibility to ensure that all system drawings created or modified as part of this project be provided to CUC and FRA for drawing document management and to be checked into CUC's Document Management System (DMS).

The following is a summary of the proposed scope of work:

Pump House:

- Provide complete demolition and removal of the existing overhead sprinkler system.
- Provide complete and operational automatic sprinkler system for the protection of the pump house as indicated on the plans.
- Provide coordination with the fire alarm contractor for the new waterflow alarm and tamper switch to be connected to the existing fire alarm system.

Engine Room 1:

- Provide complete demolition and removal of all existing foam sprinkler systems.
- Provide complete and operational manual deluge water spray systems for the localized protection of the 4 engines as well as floor protection around the engines and for the

adjacent oil filled equipment as indicated on the plans. Systems to include connection to supplemental F-500 system.

- Provide complete and operational manual deluge water spray system for the localized protection of the cable trays in the engine room as indicated on the plans.
- Provide new enclosure for the housing of the new fire protection valves as indicated on the plans.
- Provide coordination with the fire alarm contractor for the upgrades to the existing addressable fire alarm and detection system and connection to the new suppression systems as indicated on the plans.

Engine Room 4:

- Provide complete demolition and removal of all existing foam sprinkler systems. Note that demolition and removal of the complete existing system shall not take place until Engine Room 3 has been decommissioned.
- Provide complete and operational manual deluge water spray systems for the localized protection of the 2 engines and for the adjacent oil filled equipment (Mechanical Annex) on the working floor as indicated on the plans. Systems to include connection to supplemental F-500 system.
- Provide complete and operational manual deluge water spray system for the protection of the basement floor/mechanical annex/cable spreading area as indicated on the plans. Systems to include connection to supplemental F-500 system.
- Provide interconnection of deluge valve operation such that activation of one of the engine deluge water spray systems will cause the activation of the basement deluge water spray system due to the potential of hot/burning fuel to fall from the engine, through the grated floor to the basement mechanical annex area.
- Provide complete and operational automatic sprinkler system for the protection of the compressor room as indicated on the plans.
- Provide new enclosure for the housing of the new fire protection valves as indicated on the plans.
- Provide coordination with the fire alarm contractor for the upgrades to the existing addressable fire alarm and detection system and connection to the new suppression systems as indicated on the plans.

Engine Room 5:

- Provide complete demolition and removal of all existing foam sprinkler systems.
- Provide complete and operational manual deluge water spray system for the localized protection of the 5 engines as well as floor protection around the engines as indicated on the plans. Systems to include connection to supplemental F-500 system.
- Provide complete and operational manual deluge water spray system for the localized protection of the north and south mechanical annex areas as indicated on the plans. Systems to include connection to supplemental F-500 system.

- Provide complete and operational manual deluge water spray system for the localized protection of the north and south cable spreading areas as indicated on the plans.
- Provide a diking system between the Engine Hall and the Cable Spreading Area as indicated on the plans.
- Provide complete and operational automatic sprinkler systems for the protection of the 2 levels of the compressor room as indicated on the plans.
- Provide new enclosure for the housing of the new fire protection valves as indicated on the plans.
- Provide coordination with the fire alarm contractor for the upgrades to the existing addressable fire alarm and detection system and connection to the new suppression systems as indicated on the plans.

General:

- Provide shop drawings to CUC for review.
- Provide as-built drawings in PDF and DWG format to CUC at the completion of the project.
- Provide all required safety precautions within buildings during construction.
- Provide all restoration services for areas affected during construction.

3.0 APPLICABLE STANDARDS

The Cayman Islands require sprinklers and water spray system designs and installations to comply with standards published by the National Fire Protection Association (NFPA). Specifically, water spray systems are required to conform to the requirements of NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2012 edition and automatic sprinkler systems are required to conform to the requirements of NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2013 edition. The fire protection system designs are intended to comply with the following reference codes and standards:

1. CUC Engineering Practices
2. NFPA 13, *Standard for the Installation of Sprinkler Systems* – 2013 Edition
3. NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection* – 2012 Edition
4. NFPA 18, *Standard on Wetting Agents* – 2011 Edition
5. NFPA 18A, *Standard on Water Additives for Fire Control and Vapor Mitigation* – 2011 Edition
6. NFPA 20, *Standard for the Installation of Stationary Fire Pumps for Fire Protection* – 2013 Edition
7. NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances* – 2013 Edition
8. NFPA 25, *Standard for Inspection, Testing and Maintenance of Water-Based Fire Protection Systems* – 2014 Edition
9. NFPA 30, *Flammable and Combustible Liquids Code* – 2015 Edition
10. NFPA 37, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines* – 2015 Edition
11. NFPA 72, *National Fire Alarm and Signaling Code* – 2013 Edition
12. NFPA 850, *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations* – 2015 Edition
13. IEEE 979, *Guide for Substation Fire Protection* – 2012 Edition

4.0 SYSTEM REQUIREMENTS

4.1 Classification of Occupancy

NFPA 37 and NFPA 850 provide design and installation requirements for the protection of stationary combustion engines and gas turbines. The codes required that water spray system coverage be provided to all areas of the engines including within 20 feet of the engine, lubricating oil systems, and the fuel systems.

NFPA 13 and NFPA 850 also provide design and installation requirements for the protection of turbine generator areas, compressor rooms and cable spreading areas. NFPA 13 provides code requirements for Fire Pump Rooms

4.2 Automatic Sprinklers and Deluge Spray Nozzles

4.2.1 Automatic Sprinklers

Automatic Sprinklers to be installed in the Compressor Rooms and the Fire Pump Room shall be of the intermediate temperature rating and listed for use in Extra Hazard Group 1 occupancies. Standard response sprinklers with a K-factor of 8.0 shall be installed throughout. All automatic sprinklers shall be UL Listed or Factory Mutual Approved.

4.2.1.1 Automatic Sprinkler Spacing

Maximum coverage areas for sprinklers in extra hazard occupancies are limited to an area of 100 ft² with a maximum spacing of 12 feet between sprinklers. Sprinkler protection, spaced in accordance with extra hazard criteria, will be provided throughout the fire pump house and compressor rooms.

See drawings for placement and spacing of all automatic sprinklers.

4.2.2 Deluge Spray Nozzles

Deluge spray nozzles installed for the protection of the engine room, mechanical annex areas and cable spreading areas shall be open type with a nominal K-factor of 7.3 (RC150A) to 9.0 (RC150D). Spray nozzles shall be International Fog Inc. Industrial Containment System 1.5-inch. Part numbers for the two specified nozzles are RC150D and RC150A (see appendices for additional information). All spray nozzles shall be Factory Mutual Approved.

4.2.2.1 Spray Nozzle Spacing

Maximum coverage areas for the spray nozzles are limited to the manufacturer cut sheets. Spray nozzles shall be installed with spacing and orientation to provide protection in all areas where fuel or oil might spray, flow, or collect in the engine rooms.

For protection of engines, spray nozzles shall be placed to ensure full coverage on the combustion engine such that it is completely enveloped. In addition, nozzles shall be provided for coverage of the surrounding floor for twenty feet from the engine. Sufficient nozzles shall be provided to ensure that the minimum density is achieved.

For protection of the generators, spray nozzles shall be placed to ensure coverage, with wash down, of the generator shell. In addition, a single nozzle shall be provided for coverage of the bearing on either side of each generator per the requirements of NFPA 850.

For protection of mechanical annex areas, spray nozzles shall be placed to ensure full coverage of the equipment and surrounding floor. Sufficient nozzles shall be provided to ensure that the minimum density is achieved.

For protection of the cable spreading areas, spray nozzles shall be placed to ensure full coverage on both the cables/cable trays and the floor below. To achieve this, nozzles shall be installed oriented at the ground for floor coverage and oriented at the ceiling for cables/cable tray protection. Sufficient nozzles shall be provided to ensure that the minimum density is achieved.

See drawings for placement and spacing of all automatic sprinklers.

4.3 Hydraulic Information

Sufficient water supply shall be provided for the automatic sprinkler and deluge spray nozzle networks to meet the minimum pressure and flow requirements for proper spray pattern development as detailed by the automatic sprinkler and deluge spray nozzle manufacturers.

For each RC150A and RC150D nozzle, a minimum of 50 PSI shall be provided as an end-head condition (see Section 6.0 and 7.0 for additional nozzle information).

Minimum end head condition of 7 psi shall be achieved for all automatic sprinklers per NFPA and manufacturer requirements.

Contractor shall install a placard at each sprinkler and deluge system riser. These placards shall outline the hydraulic design details for each individual system.

4.3.1 Fire Pump House

Per NFPA 13, Section 22.27.1.7, the fire pump house shall have a design area of 0.25 gpm/ft² for the entire area. This area is defined as Extra Hazard Group 1 occupancy classification.

4.3.2 Cable Spreading Rooms

Per NFPA 13, Section 22.27.1.4, and NFPA 850, Section 7.8.2.1, the Engine Hall/Cable Area of Engine Room 5 shall have a design density 0.3 gpm/ft² covering an area of 2,500 ft². Nozzles shall be provided to protect both the cable spreading area floor as well as the cable trays.

4.3.3 Compressor Rooms

Per NFPA 13, Section 22.29.1.5, compressor rooms shall have a design area of 0.25 gpm/ft² for the entire area. This area is defined as Extra Hazard Group 1 occupancy classification.

4.3.4 Oil Filled Equipment Rooms

Rooms that houses lubricating oil reservoirs and handling equipment shall be protected per NFPA 850, Section 7.7.4.1.3. These rooms, such as the Mechanical Annex Areas and the basement of Engine Room 4 shall have a design density 0.3 gpm/ft² covering an area of 5,000 ft².

4.3.5 Localized Protection of Turbine Engines

Per NFPA 37, Section 11.4.5.1, the combustion engine will have a design density of 0.3 gpm/ft² with a remote area of 2,500 ft². All floor areas located within 20 feet of the engine, lubricating oil systems, and the fuel systems must be protected with spray nozzles. The design density for the floor areas shall be 0.3 gpm/ft² with an area of 5,000 ft² per NFPA 13, Section 13.27.1.5. The combustion engine will be protected with spray nozzles that will completely envelop the engine with water and F-500 solution.

The generator bearings (both sides) will be protected with a directional nozzle. The design density for the bearings will be at least 0.25 gpm/ft².

4.4 F-500 Encapsulator Agent

4.4.1 Fire Suppression Agent

The new fire suppression systems that are protecting equipment containing lube oil, diesel fuel or other hydrocarbons shall be equipped with F-500 Encapsulator Agent proportioning systems. These systems include the manual deluge systems for the engines, mechanical annex areas and the basement for Engine Room 4.

The agent shall be proportioned directly at the deluge valve using listed proportioning equipment at a concentration of 3%. The contractor shall supply sufficient foam to ensure that 30 minutes of discharge can be achieved at the design concentration. See the fire suppression drawing package for equipment size, configuration and location.

The fire suppression agent shall meet all of the following requirements.

- Fire suppression agent shall be F-500 Encapsulator Agent, manufactured by Hazard Control Technologies Inc. or equivalent.
- The agent shall be UL Listed and/or FM Approved for Class A and Class B applications.
- The agent shall be listed and/or approved as a water additive to be mixed with waters from rivers, lakes and sea without compromising the agent's fire suppression efficiency.
- The agent shall be 100% bio-degradable.
- The agent shall be free of PFOS/PFOA.
- The agent shall have a corrosion rate no greater than 200µm/yr as confirmed by a test following EPA SW-846 1110 or equivalent.
- The agent shall be listed and/or approved by internationally recognizable agencies, such as U.S. EPA, as a non-toxic agent.
- The agent shall be able to extinguish Class A fires without the need for aerating equipment such as compressed air systems or aerating nozzles.
- The agent shall be able to extinguish Class B fires without the need for creating/maintaining a foam blanket (i.e. "aqueous film") or aerating equipment such as compressed air systems or aerating nozzles.
- The agent shall be capable of suppressing three dimensional fires.
- The agent shall have the capability to form micelles to trap hydrocarbons and render them non-flammable as proven by successfully passing the Emulsification Test described in NFPA 18A - Section 7.6.
- The agent shall be liquid at normal operating conditions.

4.4.2 System Equipment

The fire suppression agent equipment shall meet all of the following requirements:

- Agent tank and bladder shall follow UL Standard for Safety for Foam Equipment and Liquid Concentrates, UL 162.
- Agent tank shall be design, constructed, tested, inspected and marked in accordance with Section VIII, Division 1 of the ASME Boiler and pressure Vessels Code, 1986.
- Agent tank shall be made of steel with minimum design working pressure of 175 PSI, hydrostatically tested at 1.5 times the design pressure.
- The inner concentrate bladder shall be made of flexible vulcanized rubber other than silicone rubber with a minimum tensile strength of 1500 PSI and a minimum ultimate elongation of 150 percent.
- The seams, outlets, end caps and nozzles on the inner concentrate bladder shall be made of the same material as the bladder and shall not use adhesives (e.g. glue, cement, vinyl chloride) being the only permitted form of bond through heat and pressure.
- The tank shall be fitted with a pressure relief valve designed to relief tank pressure by discharging water at or below the design working pressure of the tank.
- All the equipment, including but not limited to tank, bladder, control valves and proportioning devices shall be compatible with the chosen agent as specified by the agent manufacturer.

4.4.3 Service

The fire suppression agent system shall be inspected by a technician appointed by the agent manufacturer prior to commissioning, who shall provide the customer with a signed report containing at least the items verified and their compliance with manufacturer's specifications.

The system shall be commissioned according to agent manufacturer's specification and a signed report shall be provided to the customer containing at least the agent type and quantity used, the proportioning test results and their compliance to the design specifications.

4.5 Piping

4.5.1 Aboveground

All portions of the system shall be schedule 40 hot-dip galvanized throughout as indicated on the drawings with factory- or field-formed flanged ends. Roll grooved pipe shall not be installed. Victaulic Grooved fittings shall not be used. Threaded ends may be used in certain areas with approval from CUC. Flanged piping is desired.

All elbows at nozzle connections shall be threaded to allow for adjustment of the nozzle angle in the horizontal direction. All nozzles shall be pointed in the horizontal direction or directly up or down to ensure that the nozzle does not move in the vertical position and become out of alignment for coverage purposes. Contractor to ensure that proper supports and hangers are provided for the deluge and sprinkler systems piping per the requirements of NFPA 13.

All pipe shall be factory painted red and treated for installation in corrosive atmospheres.

All piping shall be clearly labeled with snap-around pipe markers that read "FIRE PROTECTION WATER". The labels shall be firmly secured to the piping with 1-1/2" red pipe banding tape every 10 feet (where feasible).

4.5.2 Underground

As part of the project, the Contractor shall provide all necessary trenching, piping, and fittings to provide new connections to the existing underground firewater system. All new underground piping shall be of the HDPE pipe type with proper steel to HDPE transitions. Epoxy or glue fittings shall not be used at HDPE to steel transitions.

Underground piping shall have a minimum depth of cover of 48". A minimum of 12" vertical clearance shall be maintained between top/bottom of new firewater main and top/bottom of existing utilities. A minimum of 12" of sand coverage shall be placed above and below new firewater main. Contractor to provide thrust blocks at all changes of direction for underground piping.

4.6 Valves

4.6.1 General Valves

Valves shall be provided as shown on the drawings. Each system riser shall be provided with an indicating type valve, as required by NFPA 13, such that all portions of the system can be shut down without interfering with the operation of the remainder of the system. All general valves shall be UL Listed or Factory Mutual Approved.

4.6.2 Underground Valves

At each new tap into the underground firewater main loop, the Contractor shall install a post indicator valve. Valve shall be UL Listed or Factory Mutual approved for the purpose.

4.6.3 Deluge Valves

The systems shall utilize a 90° pattern or straight-through pattern type deluge valve. The Contractor shall install a Tyco DV-5 Deluge Valve with Remote-Resetting Trim, or approved equivalent. The valve shall be externally resettable at the valve by hydraulic means and remotely resettable by resetting manual release toggle switch. The valve shall employ a positive vent on the priming line to ensure that the deluge valve will not prematurely reset. The inlet and outlet connections of valve shall be flanged by flanged. The valve shall be capable of installation in the vertical or horizontal position. The valve shall be UL Listed and Factory Mutual Approved and cross-listed and compatible in operation with Siemens MXL and XLS fire alarm control panels. The valve shall have a working pressure of 250 PSI. The valve trim shall be compatible and shall be installed following the manufacturer's specifications.

4.7 Fire Alarm System Requirements

The Contractor is responsible for installation of new automatic sprinkler systems and manual deluge systems for the fire pump house, engine rooms, and compressor rooms. The Contractor is required to coordinate with the Fire Alarm Contractor for final interface between new suppression systems and the upgraded fire alarm systems.

The sprinkler systems will be monitored by the upgraded fire alarm systems with new components for monitoring waterflow in accordance with NFPA 13. All the sprinkler system zone valves shall be monitored for valve status.

4.8 Painting

4.8.1 Sprinkler Systems

Clean, prime, and paint new system piping as specified herein. Clean surfaces prior to painting. Immediately after cleaning, prime metal surfaces with SSPC Paint 25 or SSPC Paint 25 metal primer applied to a minimum dry film thickness of 1.5 mils. Exercise care to avoid painting nozzles, sprinklers and operating devices. Upon completion of painting, remove materials which were used to protect nozzles, sprinklers and operating devices which have been inadvertently painted and provide new clean operating devices of the proper type.

Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil.

Submit the name, address, telephone number, FAX number, and e-mail address of the contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on a minimum of three similar projects within the past three years. List information by individual.

Do not apply coating when air or substrate conditions are:

- a) Less than 5 degrees F above dew point.
- b) Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

4.9 Pumps/Water Supply

There are three existing pumps serving the CUC facility. There are two electric pumps rated at 150 psi at 1,000 gpm. The third pump, currently utilized as a backup, is a diesel pump rated at 150 psi at 2,500 gpm.

As part of the design process, several iterations of pumping capacity were reviewed to determine adequacy of the water supply. Per NFPA 850 Section 6.2.5, "Where multiple fire pumps are required... the pumps... should be of a sufficient capacity to meet the fire flow requirements... with the largest pump out of service." Therefore, the two electric pumps only should be capable of providing sufficient water for the new fire suppression systems.

Hydraulic calculations have been provided for all new fire suppression systems utilizing all three pumps. In addition, for the hydraulically worst case scenarios for each Engine Room, two additional calculations were performed, one utilizing two electric pumps only and the other utilizing one electric pump and one diesel pump. These calculations showed that the system will operate as intended for the worst case scenarios if one of the electric pumps is out of service. However, the calculations showed that the system will not function as intended if the diesel pump is out of service. As part of a future project, CUC will perform a hydraulic study of current and future hydraulic demand and supplement existing fire water pumping capacity.

From the calculations, the worst case flow demand for the new fire suppression systems is the basement and Engine 101 manual deluge systems operating simultaneously for Engine Room 4. In this scenario, a worst case flow of approximately 3,860 gpm is achieved. The existing water tank contains 545,000 gallons of water. For a typical duration of 90 minutes (which allows for the response of the local fire department and their staging operations) and the worst case flow, a

minimum of 347,400 gallons of water is required on site. This is approximately 64% of the capacity of the existing water tank. It is recommended that CUC install a level alarm on the water tank that will provide a supervisory signal at the Control Building when the level of water in the tank drops below 70%. This will ensure that a sufficient amount of water for the worst case scenario is onsite at all times.

4.10 Area Diking and Spill Protection

Provide area diking to separate the five engines from the Cable Spreading area in Engine Room 5 as indicated on the drawings. The diking is in place to prevent a hydrocarbon fire from directly impinging on the cables in the cable spreading area. The dike shall be a minimum of 18” in height and shall be of non-combustible construction per the requirements of NFPA 30.

4.11 Demolition

Contractor shall provide complete demolition and removal of all existing foam sprinkler systems. This shall include all associated valves, piping, tanks, hangers and other support material. Contractor shall take care to not impede the operation of existing sprinkler systems to remain such as the Engine Room 5 sprinkler systems to remain in the storage areas.

4.12 Systems Migration

The Contractor shall install the new fire suppression systems in such a manner that the existing fire suppression systems are not effected. Contractor shall minimize the time for system migration when both the new and existing systems are not operational. During this time, a fire watch is to be provided with the training and knowledge to use hose reels and fire extinguishers. Contractor to provide a minimum of two weeks notice to CUC officials of the dates and duration of systems migration so that CUC can make proper arrangements such as taking engine out of service for this duration or providing a fire watch.

5.0 BID REQUIREMENTS

This bidder's package is intended to allow contractors to provide CUC with proposals for a complete and working installations of the fire suppression systems. The work includes manual deluge water spray system for each of the eleven total engines located in Engine Rooms 1, 4, and 5; manual deluge water spray systems for the protection of the north and south mechanical annex areas in Engine Room 5; manual deluge water spray systems for the protection of the north and south cable spreading areas in Engine Room 5; a manual deluge water spray system for the protection of the basement mechanical annex/cable spreading area of Engine Room 4; a manual deluge water spray system for the protection of the cable trays in Engine Room 1; automatic closed head sprinkler systems in the two compressor rooms in Engine Room 5; an automatic closed head sprinkler system in the Engine Room 4 compressor room; and a closed head automatic sprinkler system in the Fire Pump Room. All quotations shall include installation of all the listed components, acceptance testing, and a one (1) year warranty on all components installed.

A site visit is mandatory to provide a bid for this project. A site visit will be coordinated with CUC and a date and time will be provided. Adherence to all CUC Personal Protection Equipment and safety regulations is required for entry to the sites.

Each contractor shall provide a competitive cost breakdown and proper qualifications in their proposals. Each contractor's proposal shall include the following items at a minimum:

1. Proposed scope of work and a complete list of materials.
 - a. It should be noted this scope of work shall be provided as a complete cost and any exclusions shall be made apparent to CUC. It is the intent to have a bid which will provide complete and working fire suppression systems in accordance with NFPA requirements.
2. A lump sum cost as well as an itemized bid breakdown as a separate file. The following list shall be a minimum cost breakdown (i.e. each item provided with a separate line item cost.) **Each line item cost shall be broken down into labor and material as well.** Cost not broken down as required will be rejected and not included as part of the bid evaluation:
 - a. All fire suppression work including design associated with shop drawings and submittals,
 - b. All underground work,
 - c. Core drilled holes,
 - d. Completion of as-built documentation to be accepted by CUC,
 - e. Cayman Islands permit cost,
 - f. Training, and
 - g. Restoration services for all areas affected during construction.
3. List of all Sub-contractors including proper licensing documentation.
4. Identification of licensed professional who will sign and seal the drawings.
5. Reference of previous projects similar to this project.

It should be noted that three (3) hard copies and electronic copies of the shop drawings are to be provided to CUC for review. No work is permitted to start until CUC has reviewed the package and all comments have been addressed.

If you have any questions or comments regarding this RFP, or envision a different scope of work from that described in these bid documents, please contact CUC.

Any modification or change which deviates from the original design shall require written approval from CUC. Upon approval of the change, CUC and Contractor shall agree on the cost of this change order and the contractor will be paid cost plus 10%.

5.1 System Commissioning

The fire protection system installations shall be commissioned in accordance with NFPA requirements and per CUC direction. All devices, will be tested in accordance with NFPA 13 and NFPA 15 and the manufacturer's instructions.

The final systems will not be accepted until the complete system installations are in accordance with all applicable codes and are approved by CUC.

Final documentation including manufacturer's manuals and drawings for all new installed system components shall be provided as part of the commissioning and acceptance testing. All documentation must be delivered in electronic format. As-built drawings must be provided in paper form, PDF and .DWG format prior to commencement of acceptance testing.

5.2 System Acceptance

The installing contractor shall inspect and test the installation in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection* and any other applicable codes prior to scheduling an inspection with the Authority Having Jurisdiction. The contractor shall prepare and submit the following to CUC: a set of as-built drawings and hydraulic calculations of the systems, maintenance and instruction bulletins, and the applicable parts of the contractor's material and test certificates covering material and tests certifying that the work has been completed and tested in accordance with plans and specifications.

5.3 System Inspection, Testing and Maintenance

Sprinkler and water spray systems installed in accordance with NFPA 13 and NFPA 15 shall be properly inspected, tested, and maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems* and other applicable codes, to provide at least the same level of performance and protection as designed. The owner shall be responsible for conducting system maintenance and maintaining the system in operating condition.

A. APPENDIX

**A.1. International Fog, Inc. Industrial Containment System 1.5-Inch
RC150A Cut Sheet**

(See Next Page)



RC150A Deluge Nozzle

SPECIFICATION SHEET

Rev 2.0 1-28-2014

- 1.5" Deluge Nozzle
- Made of Stainless Steel and Kevlar Composite
- Flows Water or Foam-Water Solution*
- Mount Vertically or Horizontally
- FM Approved
- Weight: 2 lbs 4 oz
- Length: 5-1/2 inches
- NPT Threading



The International Fog Inc (IFI) Deluge-Tech nozzles use patented IFI fog and rotor technology and are designed to control and suppress fires. IFI Deluge-Tech nozzles are installed on fixed fire protection systems. The nozzles are designed to apply cooling water to exposed vertical, horizontal, curved and irregular shaped surfaces to protect objects from adjacent fires as well as to control or extinguish fire within a protected hazard area. The IFI Deluge-Tech RC150A Nozzle has a rotor that improves water droplet momentum and distribution, making it a more effective suppression nozzle than conventional deluge nozzles with deflector plates. The water is simultaneously directed at a wide angle, providing a protective water curtain, as well as forward which allows for greater reach. The nozzle is used in applications where deluge water spray systems are installed for special hazards protection. The IFI nozzle produces superior protection with a minimum water pressure of 50 psi to a maximum pressure of 175 psi. The nozzle may be oriented in any direction necessary to protect the hazard.

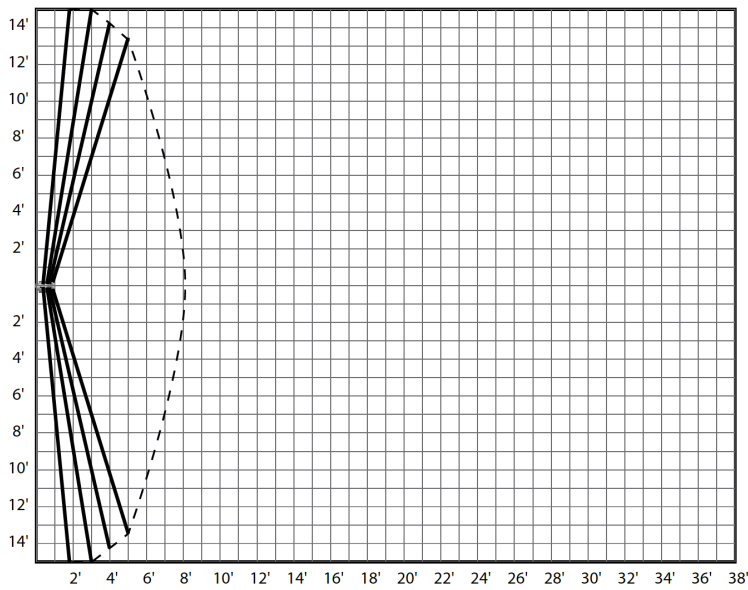


MODEL DESIGNATION	RC150A
Nominal K-Factor	10.2
Strainer	Included in assembly
Installation Positions	Horizontal or Vertical (0 to 180 degrees)
Min and Max Working Pressures	50 to 175 PSI
Nominal Spray Angle	170 Degrees
Spray Coverage	The RC150A provides a wide angle spray reaching 28 ft wide and out to 8 ft at its maximum pressure

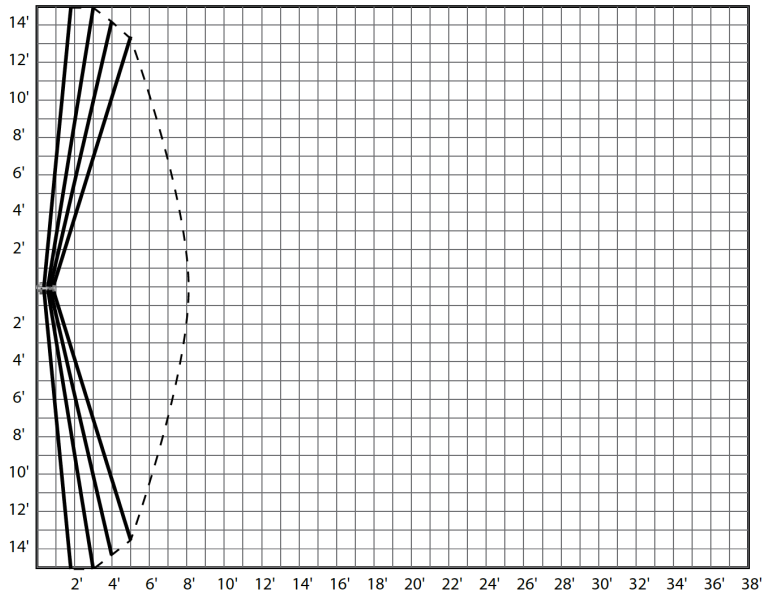
International Fog, Inc
 6 Ferndale Road
 Seven Valleys, PA 17360
www.internationalfog.com
 Voice: 1-312-351-5919
 email: info@internationalfog.com

*The use of Foam has not been FM verified

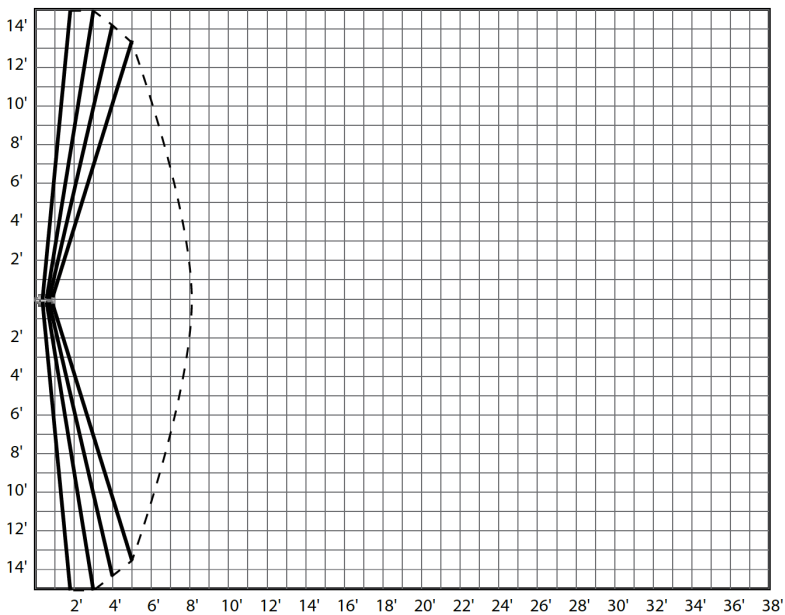




Top and Side View of spray pattern from
RC150A Nozzle at 100 psi
Spray angle of 173 degrees



Top and Side View of spray pattern from
RC150A Nozzle at 125 psi
Spray angle of 166 degrees



Top and Side View of spray pattern from
RC150A Nozzle at 150 psi
Spray angle of 169 degrees

Scale: Each square represents 1 square ft. Dotted line indicates effective width and depth of coverage for the fog pattern.

A.2. International Fog, Inc. Industrial Containment System 1.5-Inch RC150D Cut Sheet

(See Next Page)

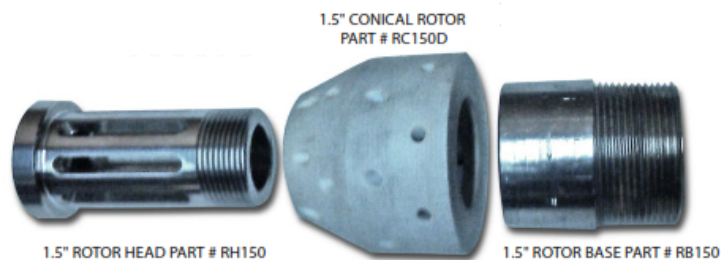


RC150D Deluge Nozzle

SPECIFICATION SHEET

Rev 2.0 1-28-2014

- 1.5" Deluge Nozzle
- Made of Stainless Steel and Kevlar Composite
- Flows Water or Foam-Water Solution*
- Mount Vertically or Horizontally
- FM Approved
- Weight: 2 lbs 4 oz
- Length: 5-1/2 inches
- NPT Threading



The International Fog Inc. (IFI) Deluge-Tech Nozzles use patented IFI fog and rotor technology and are designed to control and suppress fires. IFI Deluge-Tech Nozzles are installed on fixed fire protection systems. The nozzles are designed to apply cooling water to exposed vertical and horizontal, curved and irregular shaped surfaces to protect objects from adjacent fires as well as to control or extinguish fire within a protected hazard area. The Deluge-Tech RC150D Nozzle has a rotor that improves water droplet velocity and distribution, making it a more effective suppression nozzle than conventional deluge nozzles with deflector plates. The water is simultaneously directed at a wide angle, providing a protective water curtain, as well as forward which allows greater reach. The nozzle is used in applications where deluge water spray systems are installed for special hazards protection. The IFI nozzle produces superior protection with a minimum water pressure of 50 psi to a maximum pressure of 175 psi. The nozzle may be oriented in any direction necessary to protect the hazard.

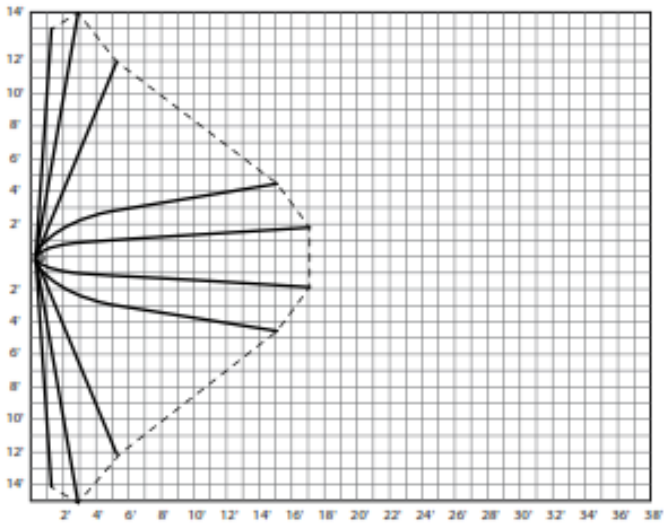


MODEL DESIGNATION	RC150D
Nominal K-Factor	9.0
Strainer	Included in assembly
Installation Positions	Horizontal or Vertical (0 to 180 degrees)
Min and Max Working Pressures	50 to 175 PSI
Nominal Spray Angle	170 Degrees
Spray Coverage	The RC150D provides a wide angle spray reaching 28 ft wide and out to 27 ft at its maximum pressure

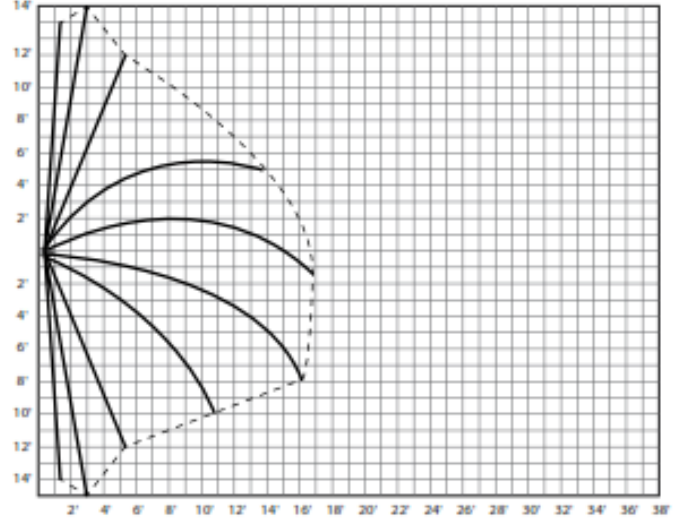
International Fog, Inc
 6 Ferndale Road
 Seven Valleys, PA 17360
www.internationalfog.com
 Voice: 1-312-351-5919
 email: info@internationalfog.com

*Use of Foam has not been FM verified

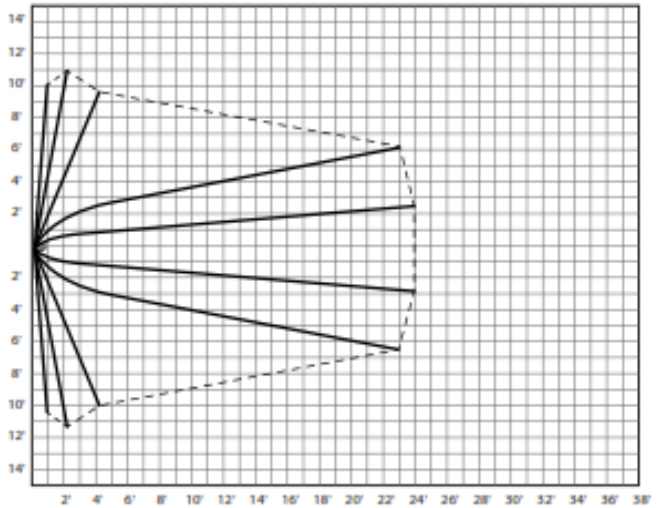




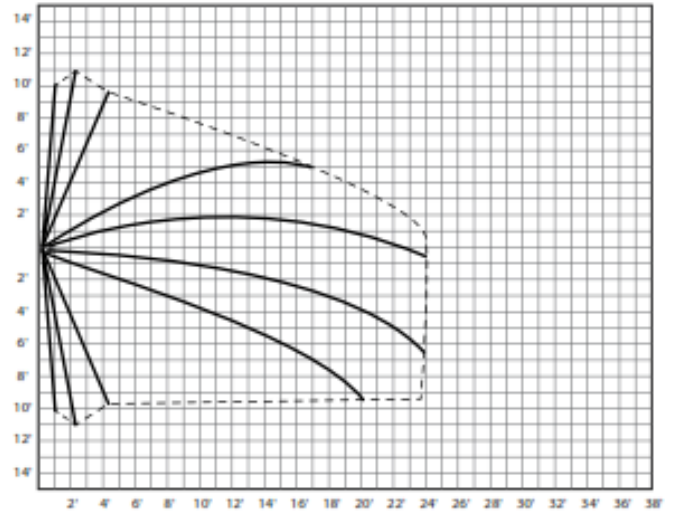
Top View of spray pattern from RC150D Nozzle at 100 psi
Spray angle of 173 degrees



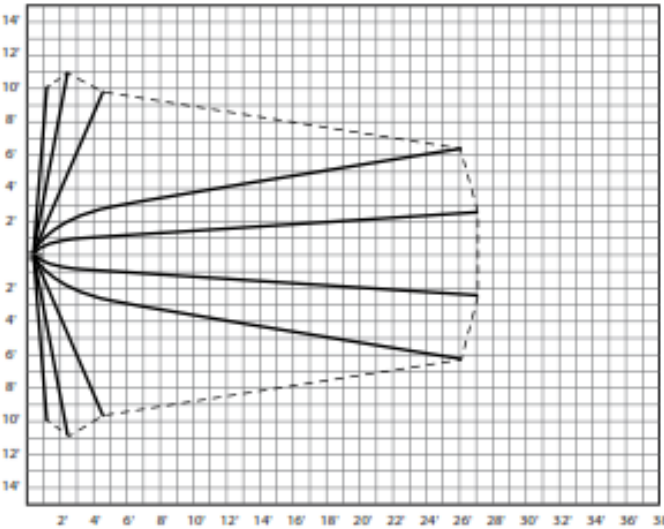
Side View of spray pattern from RC150D Nozzle at 100 psi
Spray angle of 173 degrees



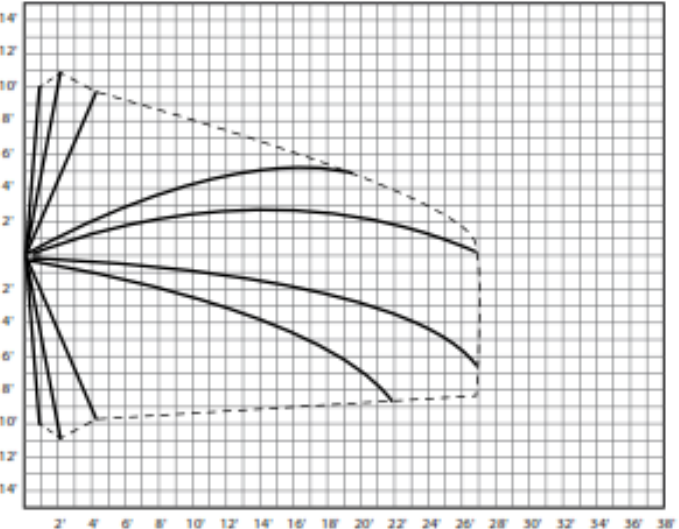
Top View of spray pattern from RC150D Nozzle at 125 psi
Spray angle of 166 degrees



Side View of spray pattern from RC150D Nozzle at 125 psi
Spray angle of 166 degrees



Top View of spray pattern from RC150D Nozzle at 150 psi
Spray angle of 169 degrees



Side View of spray pattern from RC150D Nozzle at 150 psi
Spray angle of 169 degrees

Scale: Each square represents 1 square ft. Dotted line indicates effective width and depth of coverage for the fog pattern.

A.3. Tyco DV-5 Deluge Valve with Remote-Resetting Trim Cut Sheet

DV-5 Deluge Valve with Remote-Resetting Trim 2 to 8 Inch (DN50 to DN200)

General Description

The TYCO DV-5 Deluge Valve with Remote-Resetting Trim is a quick-opening, hydraulically operated, differential-type valve designed for fire protection system service. For use as an automatic water control valve in a deluge fire protection system, this diaphragm-style valve can be opened and closed during a full-flow condition from a remote location.

Key features of the DV-5 Deluge Valve with Remote-Resetting Trim include the following:

- Remote-resetting feature provides the ability to reset the valve from one or more locations.
- Compact, space-saving design reduces valve room footprint and construction costs.
- Electric actuation is compatible with many types of automatic and manual release options.
- Actuation of fire alarms upon system operation is provided.

The automatic resetting feature of this valve provides for easy, remote resetting of a deluge system without having to open a valve hand-hole cover. Simply re-pressurizing the Diaphragm Chamber resets the valve.

Operation of the DV-5 Deluge Valve with Remote-Resetting Trim is provided by an automatic electric detection system or remote manual electric activation. The easily installed trim configuration for the DV-5 Deluge Valve with Remote-Resetting Trim provides for emergency (manual) release of the valve at the valve location.

NOTICE

The DV-5 Deluge Valve with Remote-Resetting Trim described herein must be installed and maintained in compliance with this document as well as with the applicable installation and testing standards (e.g., NFPA 13 and 25), in addition to the standards of any local authorities having jurisdiction. Failure

to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

Technical Data

Approvals

- UL Listed when trimmed as described in Figures 6 - 10
- VdS Approved when trimmed as described in Figures 12 - 16 (Available for European markets only.)

The Trim forms a part of the laboratory listings and is necessary for proper operation of this deluge valve.

Deluge Valve

TYCO DV-5 Deluge Valve

- Figure 5 shows components of the DV-5 Deluge Valve.
- Figure 11 shows the deluge valve with UL trim.
- Figure 17 shows the deluge valve with VdS trim. (Available for European markets only.)

Nominal Sizes

- 2 Inch (DN50)
- 3 Inch (DN80)
- 4 Inch (DN100)
- 6 Inch (DN150)
- 8 Inch (DN200)

Nominal Installation Dimensions

Refer to Figures 1 and 2

Flange Drilling Specifications

Refer to Table B

Valve Maximum Service Pressure

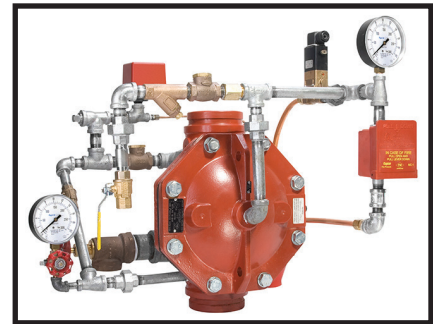
250 psi (17,2 bar)

Pressure Loss

Refer to Graph A

Threaded Ports

- NPT per ANSI Standard B1.20.1
- ISO 7/1



Materials of Construction

NOTICE

The Rilsan* coating for the DV-5 Deluge Valve with Remote-Resetting Trim provides corrosion resistance and is intended to extend the life of the Valve when exposed to internal and external corrosive conditions. Although the Rilsan coating is intended to resist corrosion, it is recommended that the end user or other technical expert familiar with conditions at the proposed installation be consulted with respect to the suitability of this coating for a given corrosive condition.

Deluge systems using a seawater or brackish water supply require special considerations in order to extend the life of the valve and trim. This type of system ideally should be configured with a primary source of clean fresh water and only upon system operation is the secondary water supply (seawater or brackish water) allowed to enter the system.

After system operation, the system should then be thoroughly flushed with clean fresh water. Following this recommendation can increase the service life of the DV-5 Deluge Valve with Remote-Resetting Trim.

Deluge Valve

- Body and Hand-Hole Cover
RILSAN* coated ductile iron per ASTM A 536-77, Grade 65-45-12
- Diaphragm
Nylon fabric reinforced, natural rubber per ASTM D 2000

End Connection		Nominal Valve Size in Pounds (kg.)				
Inlet	Outlet	2 Inch (DN50)	3 Inch (DN80)	4 Inch (DN100)	6 Inch (DN150)	8 Inch (DN200)
Thread	Thread	12 lbs. (5,4 kg.)	N/A	N/A	N/A	N/A
Groove	Groove	10 lbs. (4,5 kg.)	31 lbs. (14,1 kg.)	61 lbs. (27,7 kg.)	99 lbs. (44,9 kg.)	150 lbs. (68,1 kg.)
Flange	Groove	N/A	39 lbs. (17,7 kg.)	74 lbs. (33,6 kg.)	107 lbs. (48,5 kg.)	170 lbs. (77,8 kg.)
Flange	Flange	N/A	47 lbs. (21,3 kg.)	80 lbs. (36,3 kg.)	115 lbs. (52,3 kg.)	190 lbs. (87,5 kg.)

TABLE A
DV-5 DELUGE VALVE WITH REMOTE-RESETTING TRIM
AVAILABLE END CONNECTIONS AND WEIGHTS

- V-Ring
Applies only to 4 Inch/DN100, 6 Inch/DN150 and 8 Inch/DN200
Natural rubber per ASTM D2000
- Diaphragm Cover Fasteners
Galvanized carbon steel

Design Criteria

The following items must be considered and applied accordingly for TYCO DV-5 Deluge Valve with Remote-Resetting Trim installations.

NOTICE

The owner is responsible to design into the system a releasing circuit such that a Solenoid Valve is properly configured to enable remote resetting.

The building owner must be informed of the capabilities and limitations of a remote-resetting system as it pertains to the possibility of an inadvertent manual closing of the DV-5 Deluge Valve during a fire condition. Therefore, personnel responsible for the fire protection system must be fully trained on system components and required actions in the case of an alarm.

The Control Panel, Detectors, and Pull Stations are to be installed in accordance with their laboratory listings and approval.

System piping is to be installed so that it is self-draining. TYCO Model AD-2 Automatic Drain Valves can be used to drain low sections of pipe as necessary. For more information, refer to technical data sheet TFP1632.

Operation

The TYCO Remote-Resetting System includes a differential valve that uses water pressure in the Diaphragm Chamber (Figures 3 and 4) to hold the Diaphragm closed against the water supply pressure.

When the DV-5 Valve with Remote-Resetting Trim is set for service, the Diaphragm Chamber is pressurized through the trim connections from the inlet side of the system's main control/shut-off valve, for example an O.S.&Y. gate valve or butterfly valve.

Opening of the Solenoid Valve in the Remote-Resetting Trim releases water from the Diaphragm Chamber faster than it can be replenished through the Restriction in the Diaphragm Chamber Supply Connection provided in the trim. This release results in a rapid pressure drop in the Diaphragm Chamber, and the force differential applied through the Diaphragm that holds it in the set position is reduced below the valve trip point.

The water supply pressure then forces the Diaphragm open, permitting water to flow into the system piping, as well as through the Alarm Port to actuate system alarms.

Closing of the Solenoid Valve in the Remote-Resetting Trim permits the Diaphragm Chamber to repressurize. This repressurizing results in a pressure increase in the Diaphragm Chamber. The resulting force repressurizes the Diaphragm Chamber, closing the valve and stopping the flow of water into the system piping.

Installation

The DV-5 Deluge Valve with Remote-Resetting Trim is to be installed in accordance with this section. Refer to Figure 11 on Page 15 for UL trim and Figure 17 on Page 21 for VdS trim.

NOTICE

Proper operation of the DV-5 Deluge Valve with Remote-Resetting Trim depends upon trim installed in accordance with the instructions given in this technical data sheet. Failure to follow the appropriate trim diagram may prevent the valve from functioning properly, may void the manufacturer's warranty, and will void listings and approvals.

The DV-5 Deluge Valve and associated trim must be maintained at a minimum temperature of 40°F (4°C).

Heat tracing of the DV-5 Deluge Valve or its associated trim is not permitted. Heat tracing can result in the formation of hardened mineral deposits that are capable of preventing proper operation.

Step 1. Install the deluge valve in a readily visible and accessible location.

Step 2. Before trim installation, clean all nipples, fittings, and devices to ensure they are free of scale and burrs. Use pipe-thread sealant sparingly on male pipe threads only.

Step 3. For UL arrangements, trim the deluge valve in accordance with Figures 6 to 10. (VdS arrangements are fully trimmed.)

Step 4. Exercise care to ensure that check valves, strainers, and globe valves are installed with the flow arrows in the proper direction.

Step 5. Drain tubing to the drip funnel must be installed with smooth bends that will not restrict flow.

Step 6. If necessary, connect the main drain and drip funnel drain, ensuring that a check valve is located at least 12 inches (300 mm) below the drip funnel.

Step 7. Ensure suitable provision exists for disposal of drain water (as in the case of a flow test via the Main Drain Valve). Direct drain water so that it cannot cause accidental damage to property or danger to persons.

Step 8. Connect the Diaphragm Chamber Supply Control Valve to the inlet side of the Main Control/Shut-Off Valve to facilitate setting the valve.

NOTICE

The connection to the Diaphragm Chamber Supply Control Valve should be as short as practical and from the same water supply as the system.

Step 9. Make conduit and electrical connections in accordance with the requirements of the authority having jurisdiction and/or the National Electrical Code (NFPA 70).

Valve Setting Procedure

Perform Steps 1 through 11 when initially setting the DV-5 Deluge Valve with Remote-Resetting Trim for service. Refer to the appropriate trim component functional diagram for your installation: Figure 11 on Page 15 for UL and Figure 17 on Page 21 for VdS.

Step 1. Close the Diaphragm Chamber Supply Control Valve.

Step 2. Close the Main Control/Shut-Off Valve.

Step 3. Open the Main Drain Valve.

Step 4. Depress the plunger of the Automatic Drain Valve to verify that it is open and that the deluge valve is completely drained.

Step 5. Clean the Strainer in the Diaphragm Chamber Supply connection by removing the clean-out plug and strainer basket. Flush the Strainer by momentarily opening the Diaphragm Chamber Supply Control Valve.

Step 6. Reset the actuation system.

Manual Actuation — Push the Manual Control Station operating lever up. However, do not close the hinged cover at this time.

Electric Actuation—Reset the electric detection system (Control Panel) in accordance with the manufacturer's instructions to close the Solenoid Valve.

Step 7. Open the Diaphragm Chamber Supply Control Valve and allow time for full pressure to build up in the Diaphragm Chamber.

Step 8. Operate (open) the Manual Control Station to vent trapped air from the Diaphragm Chamber.

If necessary, first open the hinged cover, and then fully pull down on the operating lever. After aerated water ceases to discharge from the Manual Control Station drain tubing, SLOWLY close the operating lever by pushing it up. Close the hinged cover and insert a new break rod in the small hole through the top of the enclosing box.

Step 9. Inspect drain connections from the Manual Control Station and Solenoid Valve. Before proceeding to the next step, correct any leaks.

Step 10. Verify the ability of the Diaphragm to hold pressure. With the Diaphragm Chamber pressurized, temporarily close the Diaphragm Chamber Supply Control Valve and observe the Diaphragm Chamber Pressure Gauge for a drop in pressure.

- If a drop in pressure occurs, correct any leaks. If necessary, replace the Diaphragm and/or correct any leaks before proceeding to the next step.
- If the Diaphragm Chamber Pressure Gauge does not indicate a drop in pressure, re-open the Diaphragm Chamber Supply Control Valve and proceed to the next step.

Step 11. Slowly open the Main Control/Shut-Off Valve. Close the Main Drain Valve as soon as water discharges from the drain connection.

Observe the Automatic Drain Valve for leaks.

- If there are leaks, determine/correct the cause of the leakage problem.

- If there are no leaks, the DV-5 Deluge Valve with Remote-Resetting Trim is ready to place in service and the Main Control/Shut-Off Valve must then be fully opened.

Step 12. If equipped in trim, open the Alarm Control Valve.

For VdS Trim only, the Alarm Control Valve is recommended to be wire-sealed in the open position with a No. 16 twisted wire, the ends of which are secured by a lead seal. The wire seal should be looped through the hole in the handle and tightly twisted around the pipe nipple at the outlet of the Alarm Control Valve.

NOTICE

After setting a fire protection system, notify the proper authorities and advise those responsible for monitoring proprietary and/or central station alarms.

Valve Size	Nominal Dimensions in Inches and (mm)							
	A	B	C	D	E	F	G	H
2 Inch (DN50)	8.66 (220)	13.19 (355)	10.50 (267)	9.13 (232)	7.13 (181)	15.56 (395)	3.00 (76)	4.09 (103,9)
3 Inch (DN80)	12.79 (325)	13.19 (355)	10.50 (267)	10.44 (265)	7.81 (198)	19.13 (486)	0.88 (22)	3.85 (98,0)
4 Inch (DN100)	15.75 (400)	14.31 (364)	10.50 (267)	11.75 (299)	10.00 (254)	22.13 (562)	0.63 (16)	4.56 (116,0)
6 Inch (DN150)	18.31 (465)	15.31 (389)	10.50 (267)	14.31 (364)	11.38 (289)	23.31 (592)	1.81 (46)	5.86 (149,0)
8 Inch (DN200)	22.44 (570)	16.25 (413)	10.50 (267)	16.00 (406)	12.00 (305)	25.50 (648)	7.38 (187)	5.26 (134,0)

*Minimum clearance

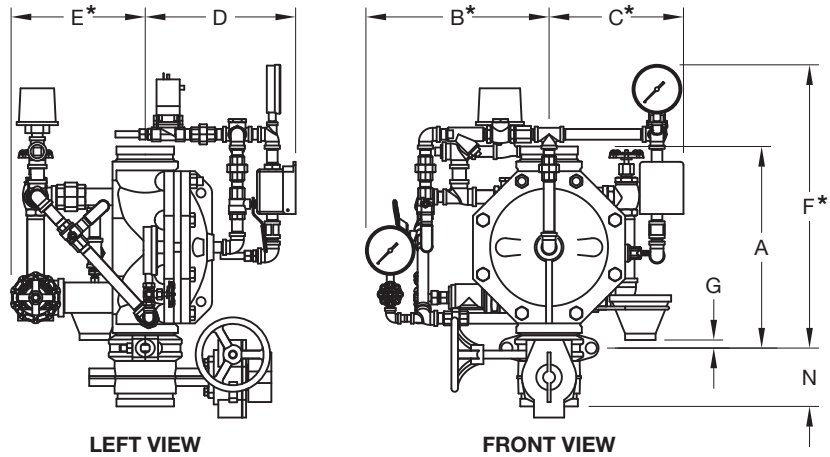


FIGURE 1
DV-5 WITH REMOTE-RESETTING TRIM NOMINAL INSTALLATION DIMENSIONS
UL

Valve Size	Dimensions in Inches and (mm)						
	A	B	C	D	E	F	G
2 Inch (DN50)	8.66 (220)	11.81 (300)	11.61 (295)	7.48 (190)	7.48 (190)	13.78 (350)	7.87 (200)
3 Inch (DN80)	12.79 (325)	12.40 (315)	11.61 (295)	8.66 (220)	8.27 (210)	15.94 (405)	5.12 (130)
4 Inch (DN100)	15.75 (400)	11.42 (290)	11.61 (395)	10.24 (260)	9.25 (235)	17.72 (450)	4.33 (110)
6 Inch (DN150)	18.31 (465)	12.40 (315)	11.61 (395)	12.80 (325)	10.43 (265)	20.47 (520)	1.38 (35)
8 Inch (DN200)	22.44 (570)	13.39 (340)	11.61 (395)	14.37 (365)	11.02 (280)	23.82 (605)	N/A

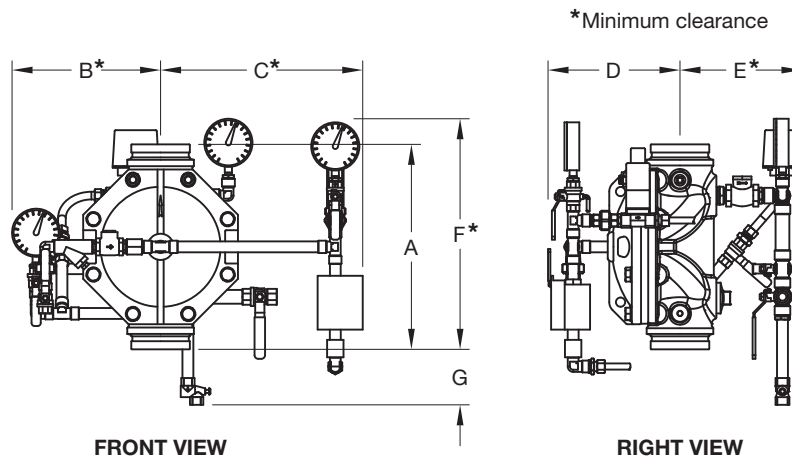
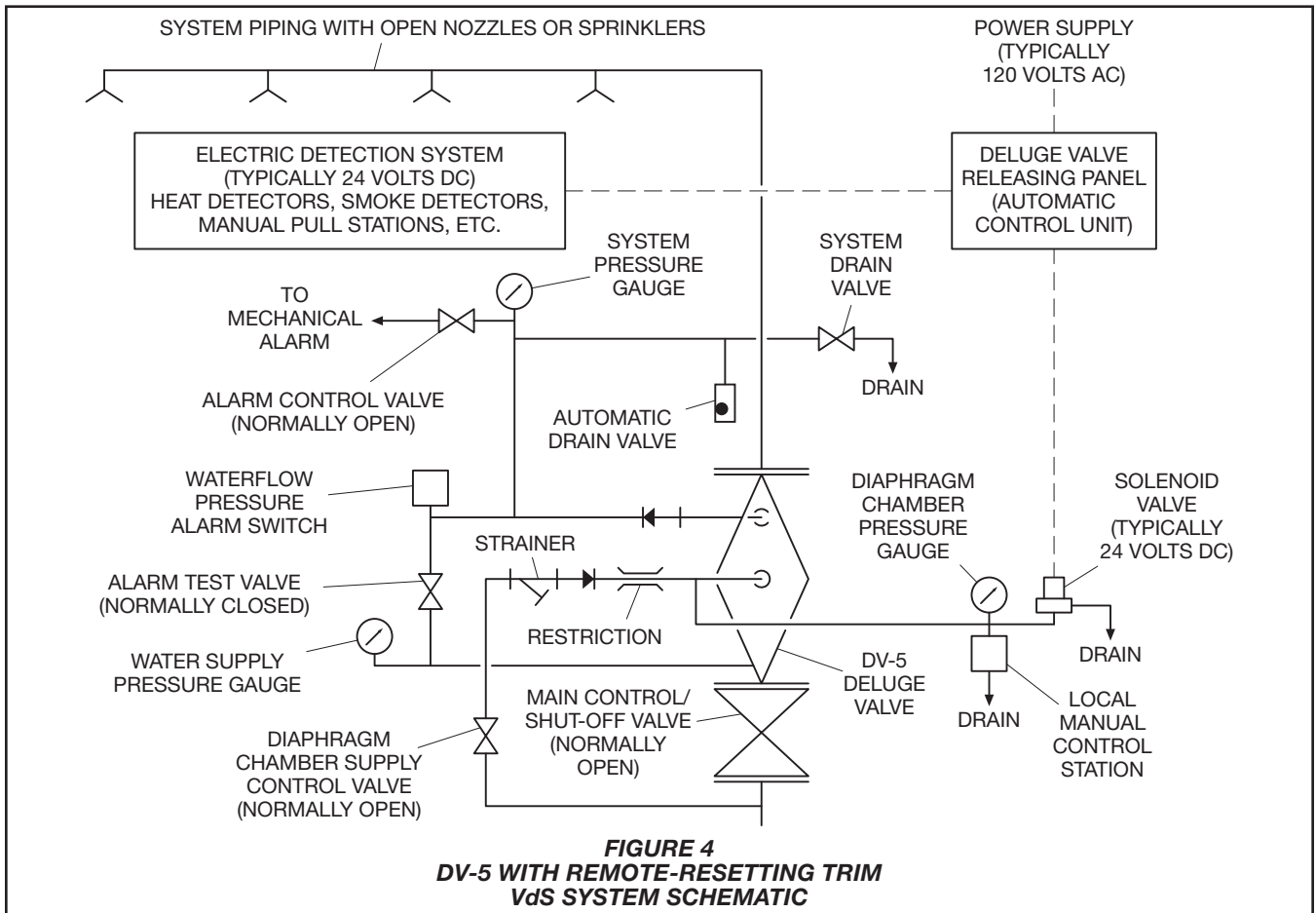
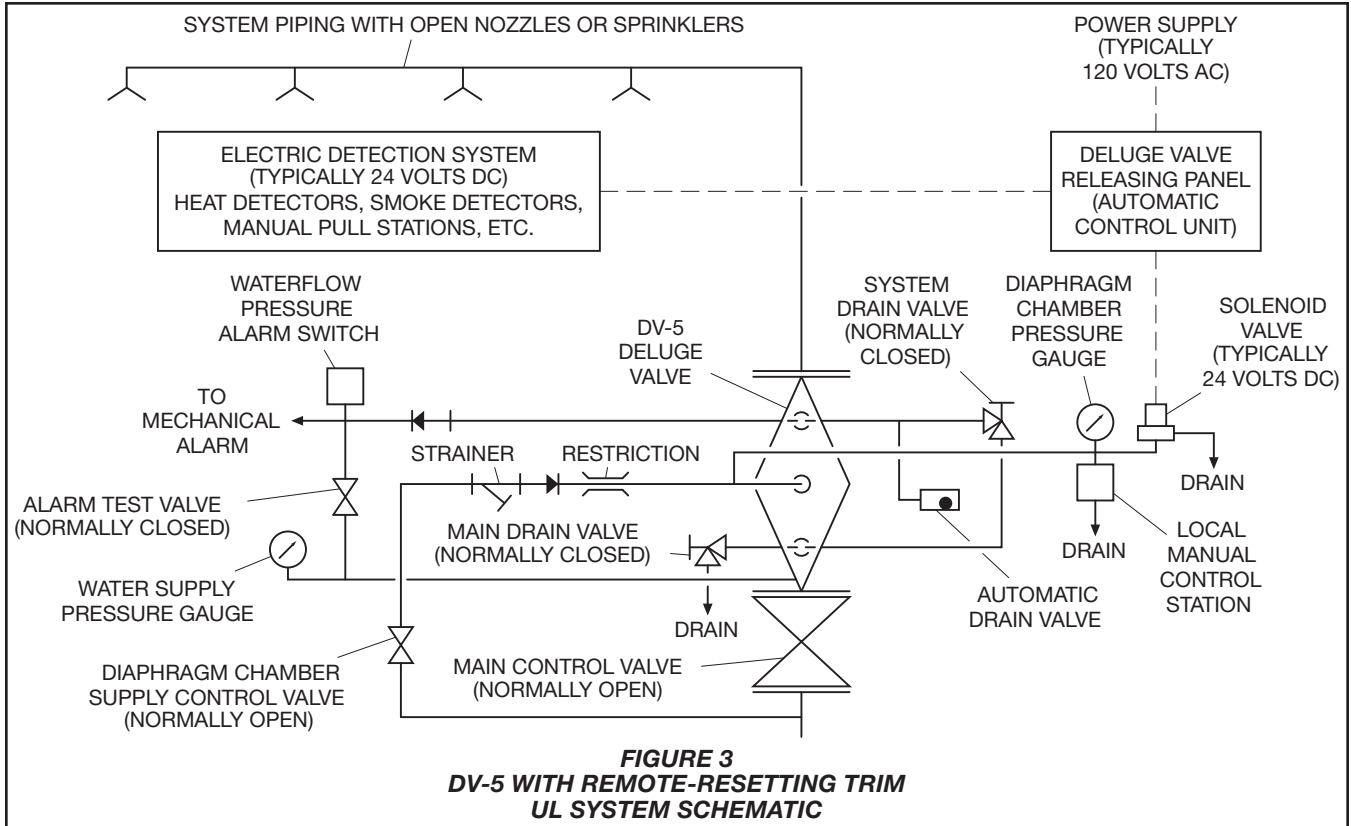


FIGURE 2
DV-5 WITH REMOTE-RESETTING TRIM NOMINAL INSTALLATION DIMENSIONS
VdS
(Available for European Markets Only)



VALVE PARTS			
No.	Description	Qty.	Repair Parts
1	Valve Body	1	NR
2	Diaphragm	1	(a)
3	Diaphragm Cover	1	NR
4	Flat Washer, Metric:		
	2 Inch (DN50) Valve &		
	3 Inch (DN80) Valve,		
	M16	4	CH
	4 Inch (DN100) Valve &		
	6 Inch (DN150) Valve,		
	M16	8	CH
	8 Inch (DN200) Valve,		
	M20	8	CH
5	Hex Bolt, Metric:		
	2 Inch (DN50) Valve &		
	3 Inch (DN80) Valve,		
	M16 x 50 mm.	4	CH
	4 Inch (DN100) Valve,		
	M16 x 50 mm.	6	CH
	6 Inch (DN150) Valve,		
	M16 x 55 mm.	6	CH
	8 Inch (DN200) Valve,		
	M20 x 70 mm.	6	CH
6	Hex Nut, Metric:		
	4 Inch (DN100) Valve &		
	6 Inch (DN150) Valve,		
	M16	2	CH
	8 Inch (DN200) Valve,		
	M20	2	CH

NOTES:

- NR - Not Replaceable
- CH - Common Hardware
- Valve Bodies of 4, 6 and 8 Inch (DN100, DN150 & DN200) valves are equipped with studs and Valve Covers are secured by Hex Nuts and Hex Bolts.
- V-Ring is attached to Diaphragm of 4, 6 and 8 Inch (DN100, DN150 & DN200) valves at factory. If, during internal valve inspection, V-Ring is discovered to be detached from Diaphragm, be advised that V-Ring is a required valve component and that detachment will not affect normal valve operation or performance. Should V-Ring become detached, reinstall between Diaphragm and Diaphragm Cover concentrically as shown.

NOTE: Do not apply adhesives, lubricants, or other substances to Diaphragm, V-Ring, or Valve Body.

REPLACEMENT PARTS		
No.	Description	P/N
(a)	Diaphragm Kit, Includes Item 2:	
	2 Inch (DN50) Valve	92-477-1-107
	3 Inch (DN80) Valve	92-477-1-109
	4 Inch (DN100) Valve	92-477-1-101
	6 Inch (DN150) Valve	92-477-1-103
	8 Inch (DN200) Valve	92-477-1-111

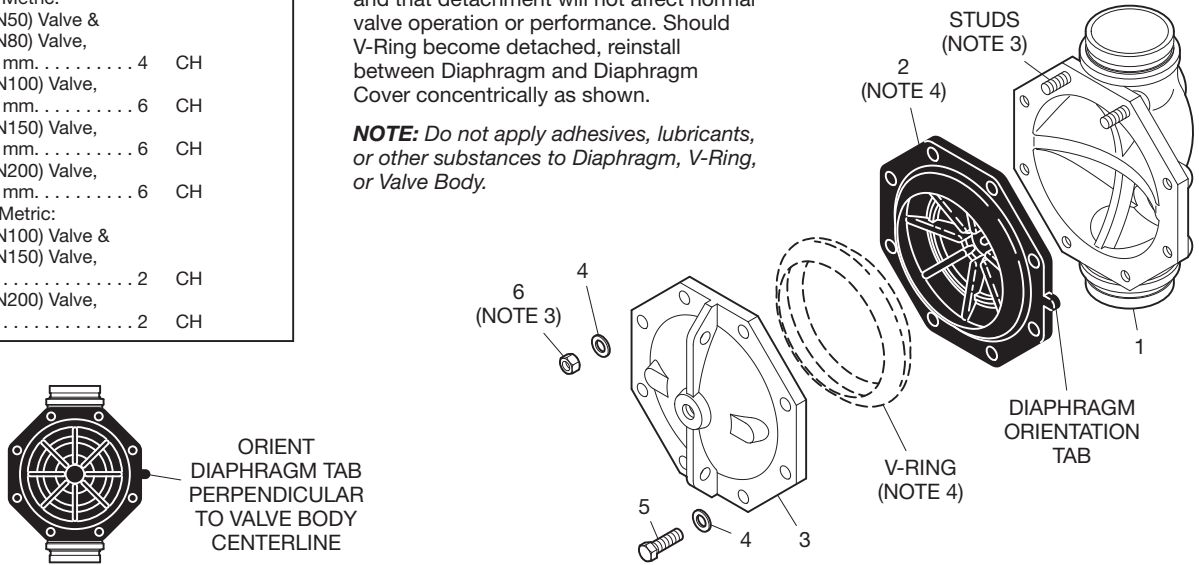
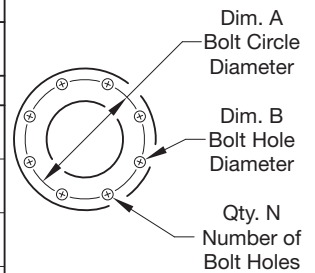


FIGURE 5
DV-5 WITH REMOTE-RESETTING TRIM
VALVE ASSEMBLY

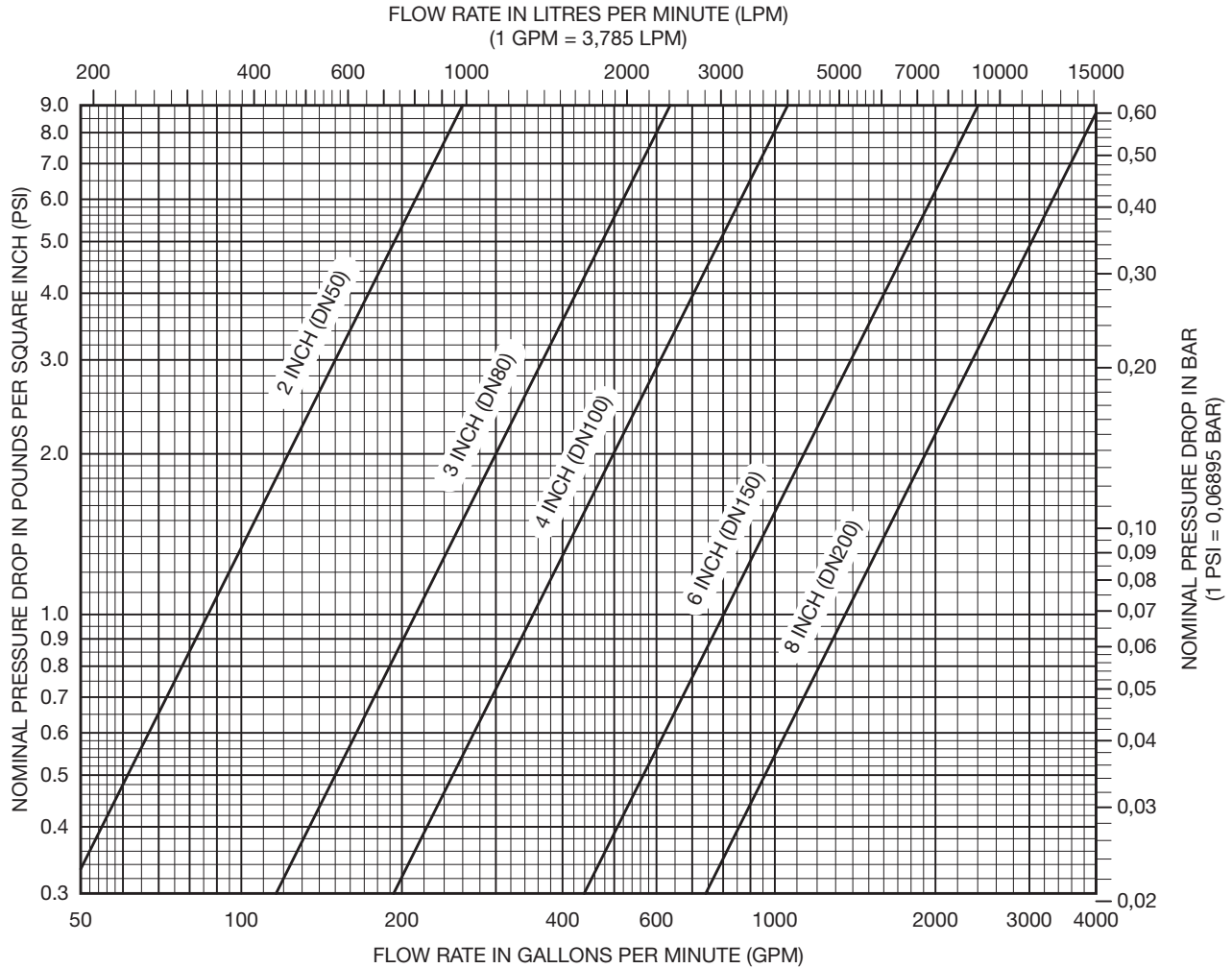
Nominal Valve Size ¹	Flange Drilling Specification														
	Nominal Dimensions in Inches and (mm)														
	ANSI B16.1 (Class 125) ²			ISO 7005-2 (PN10) ³			ISO 7005-2 (PN16) ⁴			JIS B 2210 (10K)			AS 2129 (Table E)		
	A	B	N	A	B	N	A	B	N	A	B	N	A	B	N
3 Inch (DN80)	6.00 (152,4)	0.75 (19,0)	4	USE ISO 7005-2 (PN16)	6.30 (160,0)	0.75 (19,0)	8	N/A			N/A				
4 Inch (DN100)	7.50 (190,5)	0.75 (19,0)	8		7.09 (180,0)	0.75 (19,0)	8	6.89 (175,0)	0.60 (15,0)	8	7.00 (178,0)	0.71 (18,0)	8		
6 Inch (DN150)	9.50 (241,3)	0.88 (22,2)	8		9.45 (240,0)	0.91 (23,0)	8	9.45 (240,0)	0.75 (19,0)	8	9.25 (235,0)	0.87 (22,0)	8		
8 Inch (DN200)	11.75 (298,5)	0.88 (22,2)	8		11.61 (295,0)	0.91 (23,0)	8	11.61 (295,0)	0.91 (23,0)	12	N/A			11.50 (292,0)	0.87 (22,0)



Notes:

- Flange end 1-1/2 & 2 Inch (DN40 & DN50) DV-5 Valves are not offered.
- Same drilling as for B16.5 (Class 150) and B16.42 (Class 250).
- Same drilling as for BS 4504 Section 3.2 (PN10) and DIN 2532 (PN10).
- Same drilling as for BS 4504 Section 3.2 (PN16) and DIN 2532 (PN16).

TABLE B
DV-5 WITH REMOTE-RESETTING TRIM
FLANGE DRILLING SPECIFICATION



Approximate friction loss, based on the Hazen and Williams formula and expressed in equivalent length of pipe with C=120, is as follows:

- 16 feet of 2 inch Schedule 40 pipe for the 2 inch DV-5 Valve calculated on a typical flow rate of 175 gpm.
- 20 feet of 3 inch Schedule 40 pipe for the 3 inch DV-5 Valve calculated on a typical flow rate of 350 gpm.
- 29 feet of 4 inch Schedule 40 pipe for the 4 inch DV-5 Valve calculated on a typical flow rate of 600 gpm.
- 46 feet of 6 inch Schedule 40 pipe for the 6 inch DV-5 Valve calculated on a typical flow rate of 1500 gpm.
- 72 feet of 8 inch Schedule 30 pipe for the 6 inch DV-5 Valve calculated on a typical flow rate of 2500 gpm.

Approximate friction loss, based on the Hazen and Williams formula and expressed in equivalent length of pipe with C=120, is as follows:

- 5 meters of DN50 Schedule 40 pipe for the DN50 DV-5 Valve calculated on a typical flow rate of 662 lpm.
- 6 meters of DN80 Schedule 40 pipe for the DN80 DV-5 Valve calculated on a typical flow rate of 1325 lpm.
- 9 meters of DN100 Schedule 40 pipe for the DN100 DV-5 Valve calculated on a typical flow rate of 2271 lpm.
- 14 meters of DN150 Schedule 40 pipe for the DN150 DV-5 Valve calculated on a typical flow rate of 5678 lpm.
- 22 meters of DN200 Schedule 30 pipe for the DN200 DV-5 Valve calculated on a typical flow rate of 9464 lpm.

GRAPH A
DV-5 WITH REMOTE-RESETTING TRIM
NOMINAL PRESSURE LOSS VERSUS FLOW

NO.	DESCRIPTION	QTY.	P/N
1	300 psi/ 2000 kPa Water Pressure Gauge	2	92-343-1-005
2	1/4" Gauge Test Valve	1	46-005-1-002
3	Model MC-1 Manual Control Station	1	52-289-2-001
4	Model AD-1 Automatic Drain Valve	1	52-793-2-004
5	Priming Supply Restriction, 1/8" Orifice	1	92-020-1-009
6	Item No. Not Used		
7	1/2" Ball Valve	2	46-050-1-004
8	1/2" Swing Check Valve	1	46-049-1-004
9	1/2" Y-Strainer	1	52-353-1-005
10	3/4" Swing Check Valve	1	46-049-1-005
11	3/4" Angle Valve	2	46-048-1-005
12	Drip Funnel Connector	1	92-211-1-005
13	Drip Funnel Bracket	1	92-211-1-003
14	Drip Funnel	1	92-343-1-007
15	3/32" Vent Fitting	1	92-032-1-002
16	1/4" x 18" Tubing	1	CH
17	1/2" Tubing Connector	2	CH

NO.	DESCRIPTION	QTY.	P/N
18	1/2" x 12" Tubing	1	CH
19	1/4" Plug	1	CH
20	3/4" Plug	1	CH
21	1/2" Union	4	CH
22	3/4" Union	2	CH
23	1/4" 90° Elbow	1	CH
24	1/2" 90° Elbow	5	CH
25	3/4" 90° Elbow	1	CH
26	1/2" Tee	3	CH
27	1/2" x 1/4" x 1/2" Tee	3	CH
28	3/4" Tee	2	CH
29	3/4" x 1/2" x 3/4" Tee	2	CH
30	3/4" x 3/4" x 1/2" Tee	1	CH
31	1/4" x Close Nipple	2	CH
32	1/2" x Close Nipple	3	CH
33	1/2" x 1-1/2" Nipple	11	CH
34	1/2" x 2" Nipple	2	CH
35	1/2" x 2-1/2" Nipple	3	CH
36	1/2" x 5" Nipple	1	CH
37	1/2" x 7" Nipple	1	CH
38	1/2" Plug	1	CH

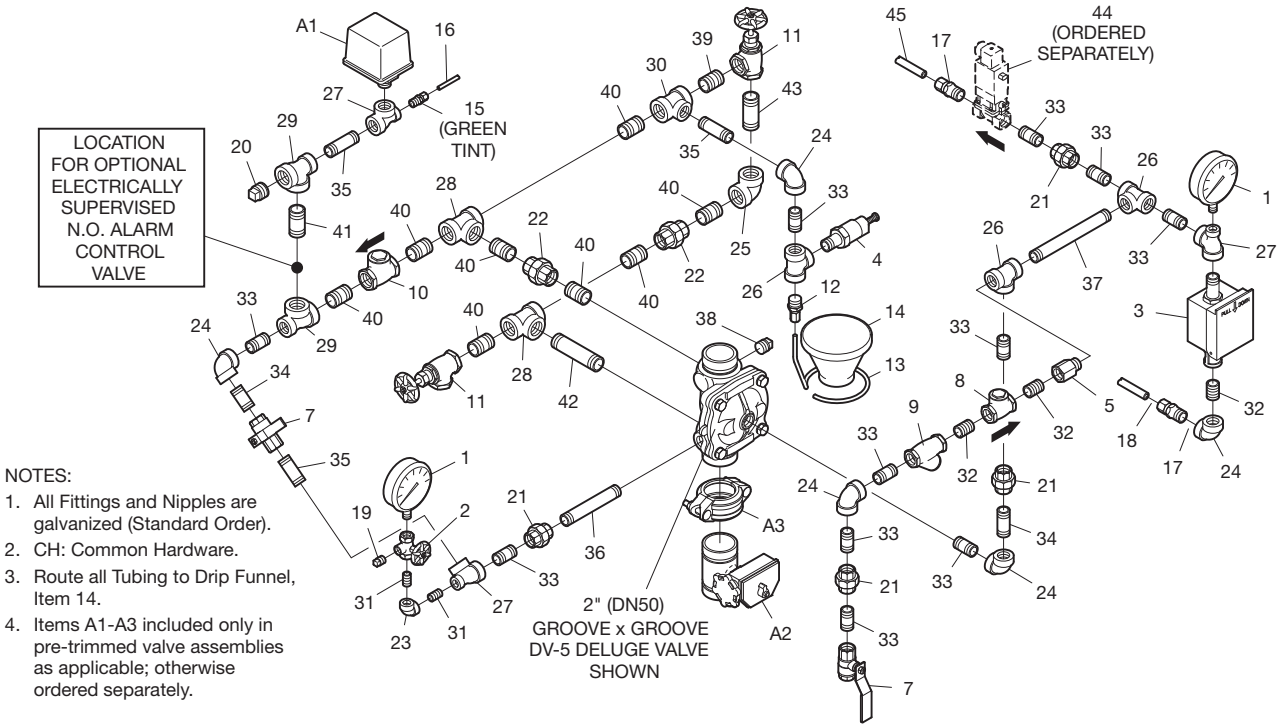
NO.	DESCRIPTION	QTY.	P/N
39	3/4" x Close Nipple	1	CH
40	3/4" x 1-1/2" Nipple	8	CH
41	3/4" x 2" Nipple	1	CH
42	3/4" x 4" Nipple	1	CH
43	3/4" x 2-1/2" Nipple	1	CH
44	24 VDC Impulse Solenoid Valve	1	Ordered Separately
45	1/2" x 24" Tubing	1	CH

COMPONENTS INCLUDED ONLY IN PRE-TRIMMED VALVE ASSEMBLIES:

A1 Waterflow Pressure Alarm Switch, Model PS10-2..... 1 25710

A2 Butterfly Valve, Power Ball 300, 2" (DN50)..... 1 51021A

A3 Figure 577 Coupling, 2" (DN50)..... 1 57720ACP



- NOTES:
1. All Fittings and Nipples are galvanized (Standard Order).
 2. CH: Common Hardware.
 3. Route all Tubing to Drip Funnel, Item 14.
 4. Items A1-A3 included only in pre-trimmed valve assemblies as applicable; otherwise ordered separately.

FIGURE 6
2 INCH (DN50) DV-5 WITH REMOTE-RESETTING TRIM
UL

NO.	DESCRIPTION	QTY.	P/N
1	300 psi/ 2000 kPa Water Pressure Gauge	2	92-343-1-005
2	1/4" Gauge Test Valve	1	46-005-1-002
3	Model MC-1 Manual Control Station	1	52-289-2-001
4	Model AD-1 Automatic Drain Valve	1	52-793-2-004
5	Priming Supply Restriction, 1/8" Orifice	1	92-020-1-009
6	Item No. Not Used		
7	1/2" Ball Valve	2	46-050-1-004
8	1/2" Swing Check Valve	1	46-049-1-004
9	1/2" Y-Strainer	1	52-353-1-005
10	3/4" Swing Check Valve	1	46-049-1-005
11	3/4" Angle Valve	1	46-048-1-005
12	1-1/4" Angle Valve	1	46-048-1-007
13	Drip Funnel Connector	1	92-211-1-005
14	Drip Funnel Bracket	1	92-211-1-003
15	Drip Funnel	1	92-343-1-007
16	3/32" Vent Fitting	1	92-032-1-002
17	1/4" x 18" Tubing	1	CH
18	1/2" Tubing Connector	2	CH

NO.	DESCRIPTION	QTY.	P/N
19	1/2" x 12" Tubing	1	CH
20	1/4" Plug	1	CH
21	3/4" Plug	1	CH
22	1/2" Union	4	CH
23	3/4" Union	2	CH
24	1/4" 90° Elbow	1	CH
25	1/2" 90° Elbow	5	CH
26	3/4" 90° Elbow	1	CH
27	1/2" Tee	3	CH
28	1/2" x 1/4" x 1/2" Tee	3	CH
29	3/4" Tee	1	CH
30	3/4" x 1/2" x 3/4" Tee	2	CH
31	3/4" x 3/4" x 1/2" Tee	1	CH
32	1-1/4" x 3/4" x 1-1/4" Tee	1	CH
33	1/4" x Close Nipple	2	CH
34	1/2" x Close Nipple	3	CH
35	1/2" x 1-1/2" Nipple	12	CH
36	1/2" x 2-1/2" Nipple	2	CH
37	1/2" x 3-1/2" Nipple	1	CH
38	1/2" Plug	1	CH
39	1/2" x 4-1/2" Nipple	1	CH
40	1/2" x 5" Nipple	1	CH

NO.	DESCRIPTION	QTY.	P/N
41	24 VDC Impulse Solenoid Valve	1	Ordered Separately
42	1/2" x 7" Nipple	1	CH
43	3/4" x Close Nipple	3	CH
44	3/4" x 1-1/2" Nipple	5	CH
45	3/4" x 2" Nipple	1	CH
46	3/4" x 4-1/2" Nipple	1	CH
47	1-1/4" x 2" Nipple	1	CH
48	1-1/4" x 4" Nipple	1	CH
49	1/2" x 24" Tubing	1	CH

COMPONENTS INCLUDED ONLY IN PRE-TRIMMED VALVE ASSEMBLIES:

A1 Waterflow Pressure Alarm Switch, Model PS10-2. 1 25710

A2 Model BFV-N Butterfly Valve, 3" (DN80) 1 59300F030N

A3 Figure 577 Coupling, 3" (DN80) 1 57730ACP

LOCATION FOR OPTIONAL ELECTRICALLY SUPERVISED N.O. ALARM CONTROL VALVE

- NOTES:
1. All Fittings and Nipples are galvanized (Standard Order).
 2. CH: Common Hardware.
 3. Route all Tubing to Drip Funnel, Item 15.
 4. Items A1-A3 included only in pre-trimmed valve assemblies as applicable; otherwise ordered separately.

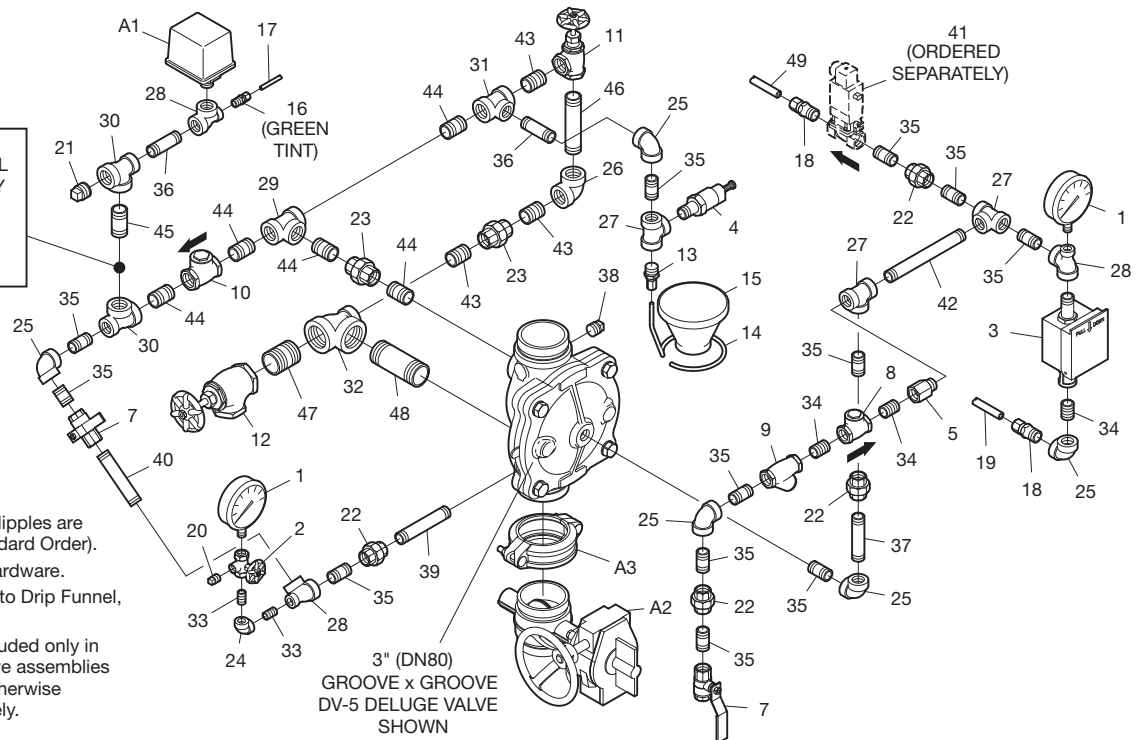


FIGURE 7
3 INCH (DN80) DV-5 WITH REMOTE-RESETTING TRIM UL

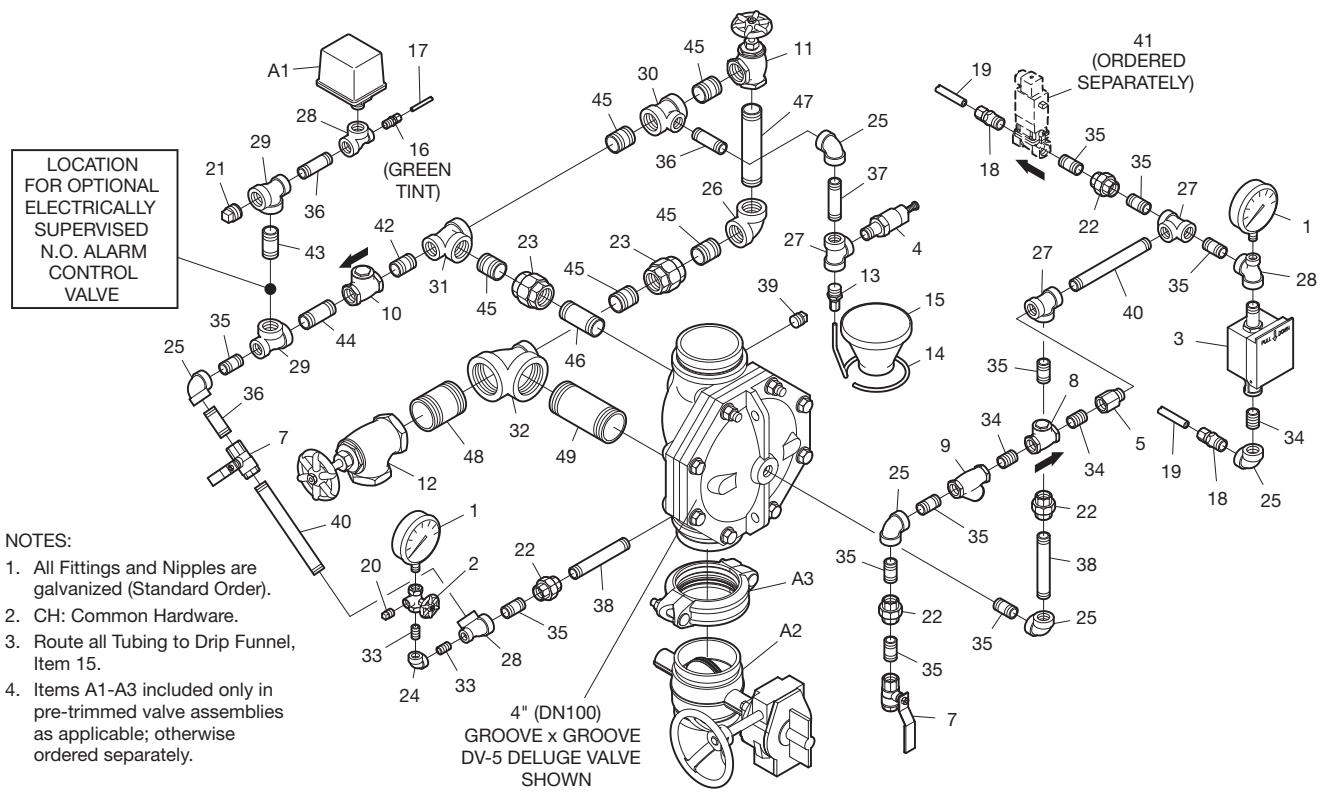
NO.	DESCRIPTION	QTY.	P/N
1	300 psi/ 2000 kPa Water Pressure Gauge	2	92-343-1-005
2	1/4" Gauge Test Valve	1	46-005-1-002
3	Model MC-1 Manual Control Station	1	52-289-2-001
4	Model AD-1 Automatic Drain Valve	1	52-793-2-004
5	Priming Supply Restriction, 1/8" Orifice	1	92-020-1-009
6	Item No. Not Used		
7	1/2" Ball Valve	2	46-050-1-004
8	1/2" Swing Check Valve	1	46-049-1-004
9	1/2" Y-Strainer	1	52-353-1-005
10	3/4" Swing Check Valve	1	46-049-1-005
11	1" Angle Valve	1	46-048-1-006
12	2" Angle Valve	1	46-048-1-009
13	Drip Funnel Connector	1	92-211-1-005
14	Drip Funnel Bracket	1	92-211-1-003
15	Drip Funnel	1	92-343-1-007
16	3/32" Vent Fitting	1	92-032-1-002
17	1/4" x 24" Tubing	1	CH
18	1/2" Tubing Connector	2	CH

NO.	DESCRIPTION	QTY.	P/N
19	1/2" x 24" Tubing	2	CH
20	1/4" Plug	1	CH
21	3/4" Plug	1	CH
22	1/2" Union	4	CH
23	1" Union	2	CH
24	1/4" 90° Elbow	1	CH
25	1/2" 90° Elbow	5	CH
26	1" 90° Elbow	1	CH
27	1/2" Tee	3	CH
28	1/2" x 1/4" x 1/2" Tee	3	CH
29	3/4" x 1/2" x 3/4" Tee	2	CH
30	1" x 1" x 1/2" Tee	1	CH
31	1" x 3/4" x 1" Tee	1	CH
32	2" x 1" x 2" Tee	1	CH
33	1/4" x Close Nipple	2	CH
34	1/2" x Close Nipple	3	CH
35	1/2" x 1-1/2" Nipple	10	CH
36	1/2" x 2-1/2" Nipple	3	CH
37	1/2" x 3" Nipple	1	CH
38	1/2" x 5" Nipple	2	CH
39	1/2" Plug	1	CH
40	1/2" x 7" Nipple	2	CH

NO.	DESCRIPTION	QTY.	P/N
41	24 VDC Impulse Solenoid Valve	1	Ordered Separately
42	3/4" x 1-1/2" Nipple	1	CH
43	3/4" x 2" Nipple	1	CH
44	3/4" x 2-1/2" Nipple	1	CH
45	1" x Close Nipple	5	CH
46	1" x 3" Nipple	1	CH
47	1" x 6" Nipple	1	CH
48	2" x 3" Nipple	1	CH
49	2" x 5" Nipple	1	CH

COMPONENTS INCLUDED ONLY IN PRE-TRIMMED VALVE ASSEMBLIES:

A1	Waterflow Pressure Alarm Switch, Model PS10-2	1	25710
A2	Model BFV-N Butterfly Valve, 4" (DN100)	1	59300F040N
A3	Figure 577 Coupling, 4" (DN100)	1	57740ACP



- NOTES:**
- All Fittings and Nipples are galvanized (Standard Order).
 - CH: Common Hardware.
 - Route all Tubing to Drip Funnel, Item 15.
 - Items A1-A3 included only in pre-trimmed valve assemblies as applicable; otherwise ordered separately.

FIGURE 8
4 INCH (DN100) DV-5 WITH REMOTE-RESETTING TRIM
UL

NO.	DESCRIPTION	QTY.	P/N
1	300 psi/ 2000 kPa Water Pressure Gauge	2	92-343-1-005
2	1/4" Gauge Test Valve	1	46-005-1-002
3	Model MC-1 Manual Control Station	1	52-289-2-001
4	Model AD-1 Automatic Drain Valve	1	52-793-2-004
5	Priming Supply Restriction, 3/16" Orifice	1	92-210-1-011
6	Item No. Not Used		
7	1/2" Ball Valve	2	46-050-1-004
8	1/2" Swing Check Valve	1	46-049-1-004
9	1/2" Y-Strainer	1	52-353-1-005
10	3/4" Swing Check Valve	1	46-049-1-005
11	1" Angle Valve	1	46-048-1-006
12	2" Angle Valve	1	46-048-1-009
13	Drip Funnel Connector	1	92-211-1-005
14	Drip Funnel Bracket	1	92-211-1-003
15	Drip Funnel	1	92-343-1-007
16	3/32" Vent Fitting	1	92-032-1-002
17	1/4" x 24" Tubing	1	CH
18	1/2" Tubing Connector	2	CH

NO.	DESCRIPTION	QTY.	P/N
19	1/2" x 24" Tubing	2	CH
20	1/4" Plug	1	CH
21	3/4" Plug	1	CH
22	1/2" Union	4	CH
23	1" Union	2	CH
24	1/4" 90° Elbow	1	CH
25	1/2" 90° Elbow	5	CH
26	1" 90° Elbow	1	CH
27	1/2" Tee	3	CH
28	1/2" x 1/4" x 1/2" Tee	3	CH
29	3/4" x 1/2" x 3/4" Tee	2	CH
30	1" x 1" x 1/2" Tee	1	CH
31	1" x 3/4" x 1" Tee	1	CH
32	2" x 1" x 2" Tee	1	CH
33	1/4" x Close Nipple	2	CH
34	1/2" x Close Nipple	3	CH
35	1/2" x 1-1/2" Nipple	10	CH
36	1/2" x 2-1/2" Nipple	2	CH
37	1/2" x 5-1/2" Nipple	1	CH
38	1/2" x 3" Nipple	1	CH
39	1/2" x 5" Nipple	2	CH
40	1/2" Plug	1	CH

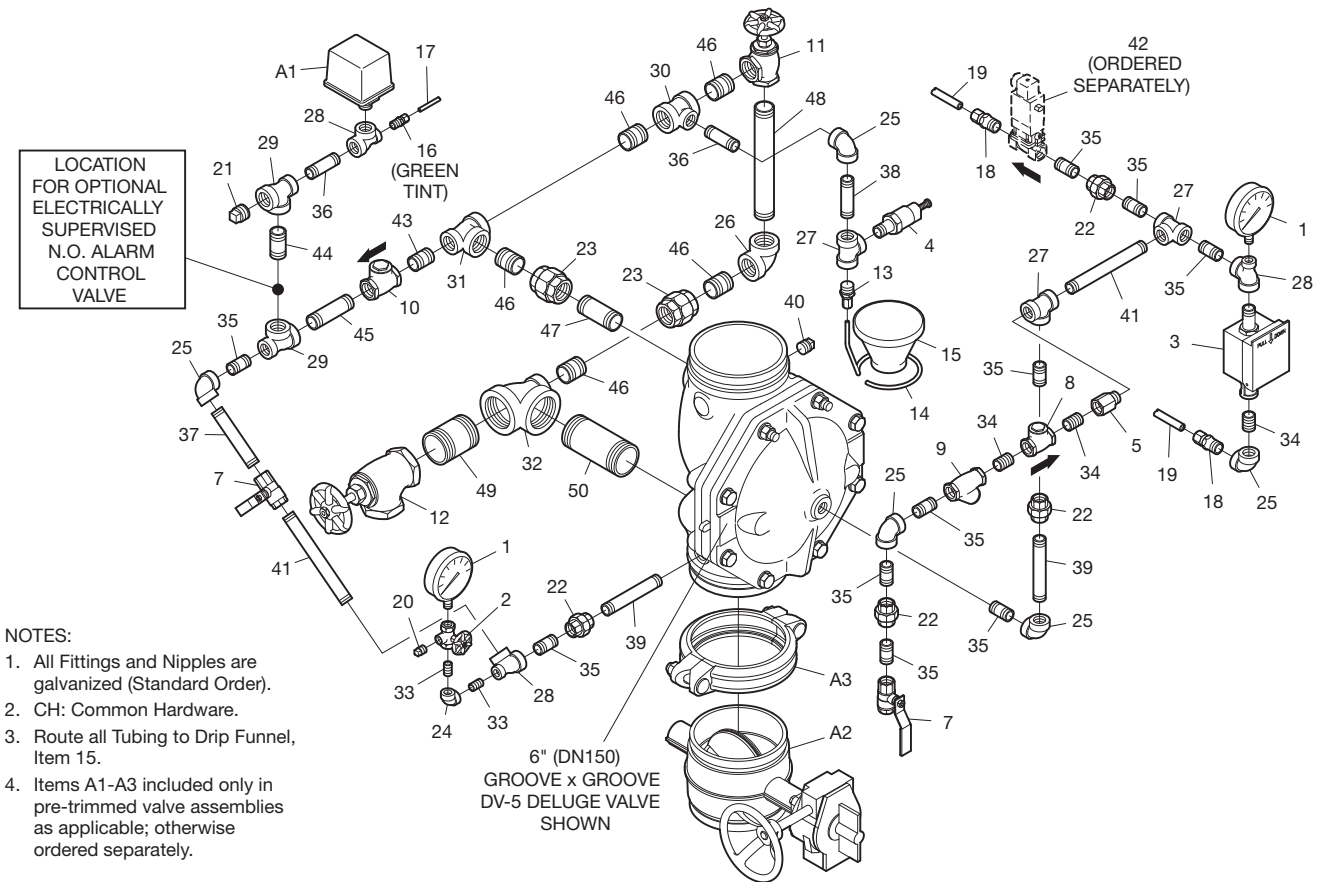
NO.	DESCRIPTION	QTY.	P/N
41	1/2" x 7" Nipple	2	CH
42	24 VDC Impulse Solenoid Valve	1	Ordered Separately
43	3/4" x 1-1/2" Nipple	1	CH
44	3/4" x 2" Nipple	1	CH
45	3/4" x 3-1/2" Nipple	1	CH
46	1" x Close Nipple	5	CH
47	1" x 3" Nipple	1	CH
48	1" x 9" Nipple	1	CH
49	2" x 3" Nipple	1	CH
50	2" x 5" Nipple	1	CH

COMPONENTS INCLUDED ONLY IN PRE-TRIMMED VALVE ASSEMBLIES:

A1 Waterflow Pressure Alarm Switch, Model PS10-2..... 1 25710

A2 Model BFV-N Butterfly Valve, 6" (DN150) 1 59300F060N

A3 Figure 577 Coupling, 6" (DN150)..... 1 57760ACP



- NOTES:**
- All Fittings and Nipples are galvanized (Standard Order).
 - CH: Common Hardware.
 - Route all Tubing to Drip Funnel, Item 15.
 - Items A1-A3 included only in pre-trimmed valve assemblies as applicable; otherwise ordered separately.

FIGURE 9
6 INCH (DN150) DV-5 WITH REMOTE-RESETTING TRIM
UL

NO.	DESCRIPTION	QTY.	P/N
1	300 psi/ 2000 kPa Water Pressure Gauge	2	92-343-1-005
2	1/4" Gauge Test Valve	1	46-005-1-002
3	Model MC-1 Manual Control Station	1	52-289-2-001
4	Model AD-1 Automatic Drain Valve	1	52-793-2-004
5	Priming Supply Restriction, 3/16" Orifice	1	92-210-1-011
6	Item No. Not Used		
7	1/2" Ball Valve	2	46-050-1-004
8	1/2" Swing Check Valve	1	46-049-1-004
9	1/2" Y-Strainer	1	52-353-1-005
10	3/4" Swing Check Valve	1	46-049-1-005
11	1" Angle Valve	1	46-048-1-006
12	2" Angle Valve	1	46-048-1-009
13	Drip Funnel Connector	1	92-211-1-005
14	Drip Funnel Bracket	1	92-211-1-003
15	Drip Funnel	1	92-343-1-007
16	3/32" Vent Fitting	1	92-032-1-002
17	1/4" x 24" Tubing	1	CH
18	1/2" Tubing Connector	2	CH

NO.	DESCRIPTION	QTY.	P/N
19	1/2" x 24" Tubing	2	CH
20	1/4" Plug	1	CH
21	3/4" Plug	1	CH
22	1/2" Union	4	CH
23	1" Union	2	CH
24	1/4" 90° Elbow	1	CH
25	1/2" 90° Elbow	5	CH
26	1" 90° Elbow	1	CH
27	1/2" Tee	3	CH
28	1/2" x 1/4" x 1/2" Tee	3	CH
29	3/4" x 1/2" x 3/4" Tee	2	CH
30	1" x 1" x 1/2" Tee	1	CH
31	1" x 3/4" x 1" Tee	1	CH
32	2" x 1" x 2" Tee	1	CH
33	1/4" x Close Nipple	2	CH
34	1/2" x Close Nipple	3	CH
35	1/2" x 1-1/2" Nipple	10	CH
36	1/2" x 2-1/2" Nipple	2	CH
37	1/2" x 8-1/2" Nipple	1	CH
38	1/2" x 3" Nipple	1	CH
39	1/2" x 5" Nipple	2	CH
40	1/2" Plug	1	CH

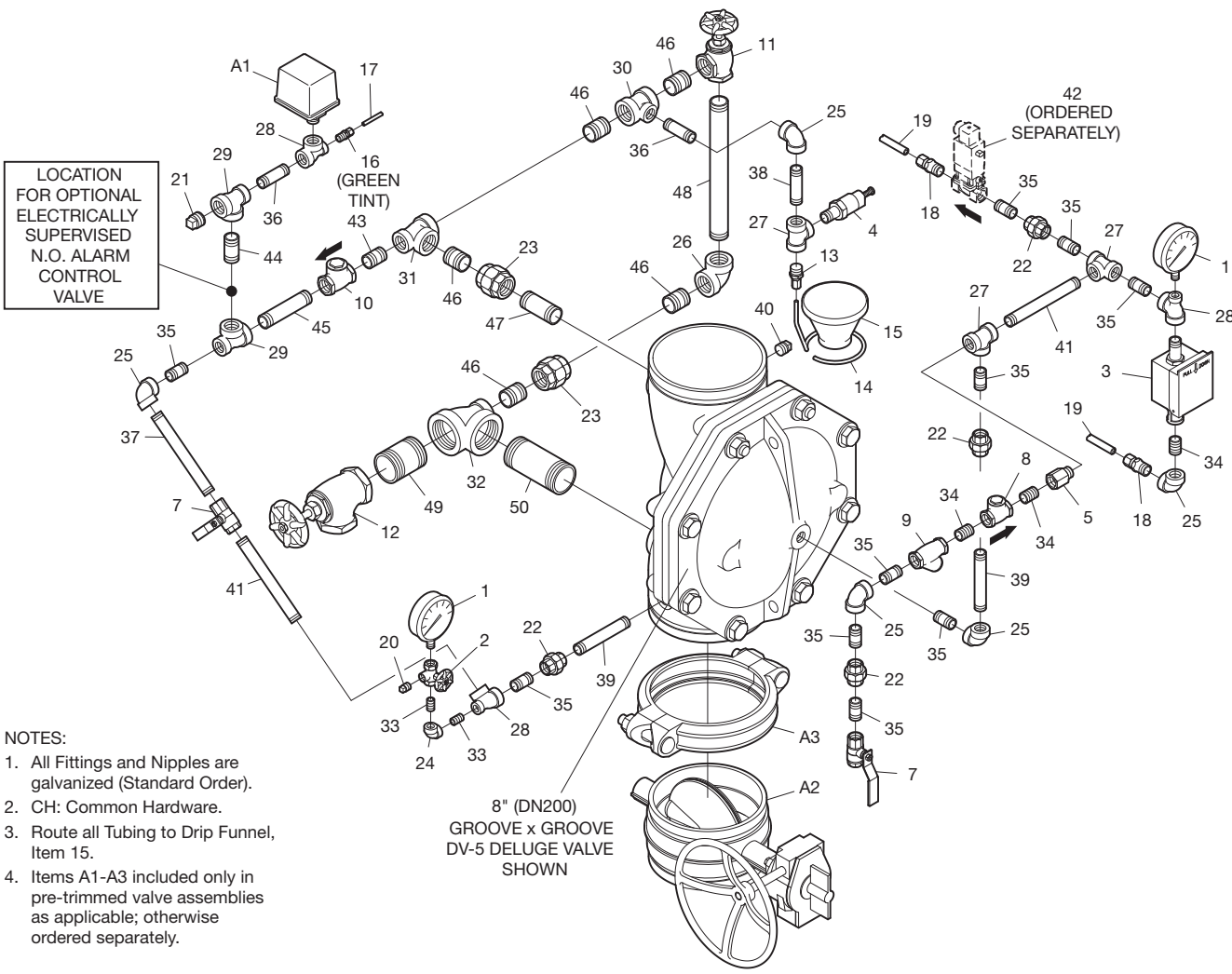
NO.	DESCRIPTION	QTY.	P/N
41	1/2" x 7" Nipple	2	CH
42	24 VDC Impulse Solenoid Valve	1	Ordered Separately
43	3/4" x 1-1/2" Nipple	1	CH
44	3/4" x 2" Nipple	1	CH
45	3/4" x 4-1/2" Nipple	1	CH
46	1" x Close Nipple	5	CH
47	1" x 3" Nipple	1	CH
48	1" x 12" Nipple	1	CH
49	2" x 3" Nipple	1	CH
50	2" x 5" Nipple	1	CH

COMPONENTS INCLUDED ONLY IN PRE-TRIMMED VALVE ASSEMBLIES:

A1 Waterflow Pressure Alarm Switch, Model PS10-2..... 1 25710

A2 Model BFV-N Butterfly Valve, 8" (DN200) 1 59300F080N

A3 Figure 577 Coupling, 8" (DN200)..... 1 57780ACP



- NOTES:
1. All Fittings and Nipples are galvanized (Standard Order).
 2. CH: Common Hardware.
 3. Route all Tubing to Drip Funnel, Item 15.
 4. Items A1-A3 included only in pre-trimmed valve assemblies as applicable; otherwise ordered separately.

FIGURE 10
8 INCH (DN200) DV-5 WITH REMOTE-RESETTING TRIM
UL

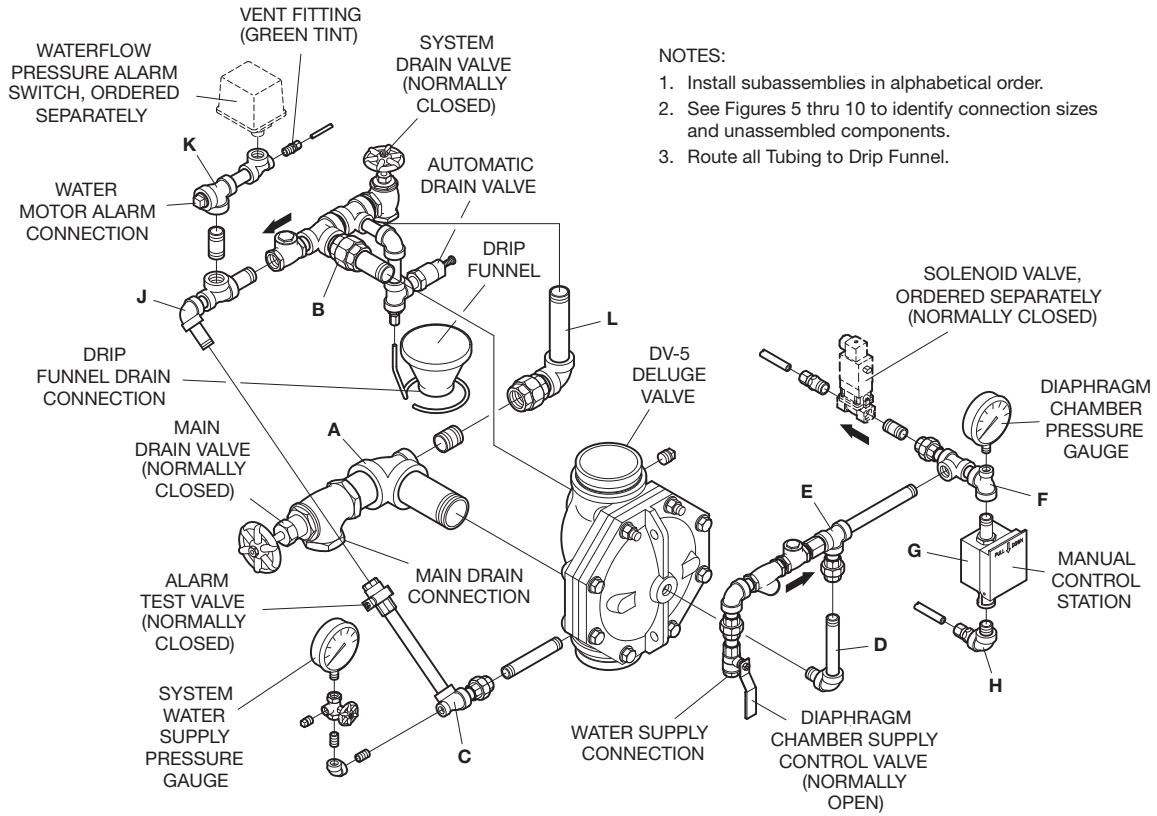


FIGURE 11
DV-5 WITH REMOTE-RESETTING TRIM
UL LISTED
COMPONENT FUNCTIONS AND SEMI-PRESSEMBLED TRIM ARRANGEMENT

NO.	DESCRIPTION	QTY.	P/N
1	Nickel Plated Copper Tube 15 x 1 mm Elbow 90°; 370 mm x 225 mm	1	WS00000096
2	Copper Pipe 10 x 12 mm Length 900 mm	2	WS00000007
3	Pressure Relief Hose 3 x 6 Length 1,2 m; Transparant	2	WS00000004
4	Adapter Tee Brass Male Thread DN20 Female DN20; Type 113; Nickel Plated	2	TTEMEEFN
5	Adapter Tee Brass Female Thread DN20 x DN20 x DN20, Type 111; Nickel Plated	2	TTEEEFN
6	Adapter Tee Brass Male Thread DN15 Female DN15 x DN15; Type 113; Nickel Plated	4	TTDMDDFN
7	Adapter Tee Brass Female Thread DN15 x DN15 x DN15; Type 100 Nickel Plated	1	TTDDDFN
8	Reduce Threaded Fitting, Nickel Plated Brass, Thread Male DN20 x Thread Female DN15 Type 100	2	RTEMDFN
9	Reduce Threaded Fitting, Nickel Plated Brass, Thread Male DN15 x Thread Male DN20 Type 100	1	RTEDMN
10	Adapter Reduce, Brass Male Thread DN15 x Female Thread DN8 Type 100 Nickel Plated	3	RTDMBFN
11	Elbow threaded fitting nickel plated brass thread male dn15 x thread female dn15, type 100	2	ETDMDDFN
12	Elbow Threaded Fitting, Nickel Plated Brass, Thread Male DN15 x DN15, Type 100	1	ETDDMN
13	Elbow Threaded Fitting, Nickel Plated Brass, Thread Female DN15 x DN15, Type 100	1	ETDDFN
14	Adapter Fitting, Nickel Plated Brass Thread Male DN20 x DN20 Type 102	2	ATEEMN
15	Adapter Compr Fitting Brass Male Thread DN15 x Compr Fitt 15 mm, Type 200 Nickel Plated	2	ATDMCON
16	Adapter Fitting, Nickel Plated Brass Thread Male DN15 x DN15 Type 100	4	ATDDMN
17	Pipe Nipple - 3/4" SS316 Male BSPT Length 80 mm	2	AP80E4
18	Pipe Nipple - 1/2" SS316 Male BSPT Length 60 mm	1	AP60D4
19	Pipe Nipple - 1/2" SS316 Male BSPT Length 200 mm	1	AP200D4
20	Pipe Nipple - 3/4" SS316 Male BSPT Length 160 mm	1	AP160D4
21	Pipe Nipple - 3/4" SS316 Male BSPT Length 100 mm	1	AP100E4
22	Pipe Nipple - 1/2" SS316 Male BSPT Length 100 mm	1	AP100D4
23	Pipe Fitting - Union Fig 341 Male/Female BSP Size 1/2" Finish: Stainless Steel	2	A341D4
24	Malleable Fitting - Plug Fig 291 Male BSP Size 1/2" Finish: Galvanized	1	A291D2
25	Malleable Fitting - Plug Fig 290 Male BSP Size 3/4" Finish: Galvanized	1	A290E2
26	Swing Type Check Valve 1/2" Type 99S	1	460491004
27	Straight Tube Connector 12 mm x 1/2" Male Nr 661273	2	81900211
28	Nipple 1/2" M/F Orifice 3 mm Brass	1	700485
29	Ball Valve Size DN15 - 1/2" ISO 7/1 Full Bore PN40 Venthole Threaded M5	2	59304FO
30	DV-5 Deluge Valve; Diaphragm Style; 17,2 bar; Size 2"; Grv x Grv (60 mm) ISO Ports; 3/4" ISO Drain	1	524771910
31	Break Station Model MC-1 for Manual Release ; Galva Fittings	1	522892001
32	Swing Type Check Valve 3/4" Type 99S	1	460491005
33	Elbow WES 3 mm/ M5 (Rart Ref. 610470)	2	406012
34	Solenoid Valve 24 VDC 1/2" ISO Impuls w. Mech. Lock and Man. Emerg. Release	1	2460566
35	1/2" Self-Closing Drain Valve K-Factor Non Operated = 5 K-Factor Operated = 25	1	2162156
36	Strainer Y-Type; Fig 557; 1/2" NPT Connection; 50 Mesh; S304 Screen; Bronze Body	1	20005025
37	Ball Valve Fig. 1610 Full Bore DN20 - 3/4" BSP	2	1610000270
38	Ball Valve Fig. 1610 Full Bore DN15 - 1/2" BSP	2	1610000210
39	Pressure Switch Mod. PS10-1 Single Contact; 1/2" NPT Male	1	0260
40	Water Gauge 1/4" NPT Male 0 - 300 PSI / 0 - 21 bar	3	025500013

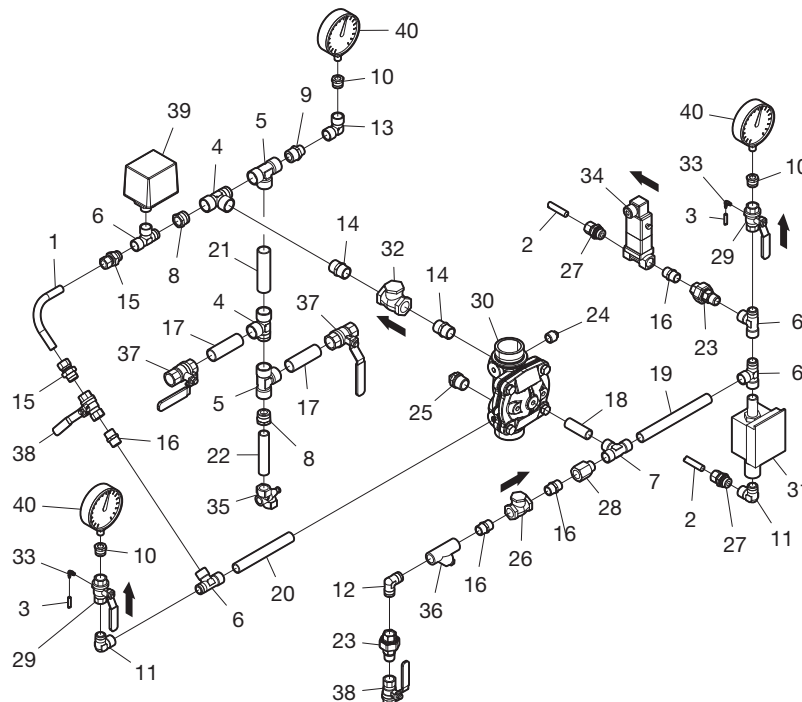


FIGURE 12
2 INCH (DN50) DV-5 WITH REMOTE-RESETTING TRIM
VdS
(Available for European Markets Only)

NO.	DESCRIPTION	QTY.	P/N
1	Nickel Plated Copper Tube 15 x 1 mm Elbow 90°; 370 mm x 225 mm	1	WS00000096
2	Copper Pipe 10 x 12 mm Length 900 mm	2	WS00000007
3	Pressure Relief Hose 3 x 6 Length 1,2 m; Transparant	2	WS00000004
4	Adapter Tee Brass Male Thread DN20 Female DN20; Type 113; Nickel Plated	2	TTEMEEFN
5	Adapter Tee Brass Female Thread DN20 x DN20 x DN20, Type 111; Nickel Plated	2	TTEEEFN
6	Adapter Tee Brass Male Thread DN15 Female DN15 x DN15; Type 113; Nickel Plated	4	TTDMDDFN
7	Adapter Tee Brass Female Thread DN15 x DN15 x DN15; Type 100 Nickel Plated	1	TTDDDFN
8	Reduce Threaded Fitting, Nickel Plated Brass, Thread Male DN20 x Thread Female DN15 Type 100	2	RTEMDFN
9	Reduce Threaded Fitting, Nickel Plated Brass, Thread Male DN15 x Thread Male DN20 Type 100	1	RTEDMN
10	Adapter Reduce, Brass Male Thread DN15 x Female Thread DN8 Type 100 Nickel Plated	3	RTDMBFN
11	Elbow threaded fitting nickel plated brass thread male dn15 x thread female dn15, type 100	2	ETDMDFN
12	Elbow Threaded Fitting, Nickel Plated Brass, Thread Male DN15 x DN15, Type 100	1	ETDDMN
13	Elbow Threaded Fitting, Nickel Plated Brass, Thread Female DN15 x DN15, Type 100	1	ETDDFN
14	Adapter Fitting, Nickel Plated Brass Thread Male DN20 x DN20 Type 102	1	ATEEMN
15	Adapter Compr Fitting Brass Male Thread DN15 x Compr Fitt 15 mm, Type 200 Nickel Plated	2	ATDMCON
16	Adapter Fitting, Nickel Plated Brass Thread Male DN15 x DN15 Type 100	3	ATDDMN
17	Pipe Nipple - 3/4" SS316 Male BSPT Length 80 mm	2	AP80E4
18	Pipe Nipple - 1/2" SS316 Male BSPT Length 80 mm	1	AP80D4
19	Pipe Nipple - 1/2" SS316 Male BSPT Length 60 mm	1	AP60D4
20	Pipe Nipple - 1/2" SS316 Male BSPT Length 200 mm	1	AP200D4
21	Pipe Nipple - 3/4" SS316 Male BSPT Length 160 mm	1	AP160D4
22	Pipe Nipple - 3/4" SS316 Male BSPT Length 100 mm	1	AP100E4
23	Pipe Nipple - 1/2" SS316 Male BSPT Length 100 mm	1	AP100D4
24	Pipe Fitting - Union Fig 341 Male/Female BSP Size 1/2" Finish: Stainless Steel	2	A341D4
25	Malleable Fitting - Plug Fig 291 Male BSP Size 1/2" Finish: Galvanized	1	A291D2
26	Malleable Fitting - Plug Fig 290 Male BSP Size 1-1/4" Finish: Galvanized	1	A290G2
27	Swing Type Check Valve 1/2" Type 99S	1	460491004
28	Straight Tube Connector 12 mm x 1/2" Male Nr 661273	2	81900211
29	Nipple 1/2" M/F Orifice 3 mm Brass	1	700485
30	Ball Valve Size DN15 - 1/2" ISO 7/1 Full Bore PN40 Venthole Threaded M5	2	59304FO
31	DV-5 Deluge Valve; Diaphragm Style; 17,2 bar; Size 3"; Grv x Grv (89 mm) ISO Ports; 1-1/4" ISO Drain	1	524771922
32	Break Station Model MC-1 for Manual Release ; Galva Fittings	1	522892001
33	Swing Type Check Valve 3/4" Type 99S	1	460491005
34	Elbow WES 3 mm/ M5 (Rart Ref. 610470)	2	406012
35	Solenoid Valve 24 VDC 1/2" ISO Impuls w. Mech. Lock and Man. Emerg. Release	1	2460566
36	1/2" Self-Closing Drain Valve K-Factor Non Operated = 5 K-Factor Operated = 25	1	2162156
37	Strainer Y-Type; Fig 557; 1/2" NPT Connection; 50 Mesh; S304 Screen; Bronze Body	1	20005025
38	Ball Valve Fig. 1610 Full Bore DN20 - 3/4" BSP	2	1610000270
39	Ball Valve Fig. 1610 Full Bore DN15 - 1/2" BSP	2	1610000210
40	Pressure Switch Mod. PS10-1 Single Contact; 1/2" NPT Male	1	0260
41	Water Gauge 1/4" NPT Male 0 - 300 PSI / 0 - 21 bar	3	025500013

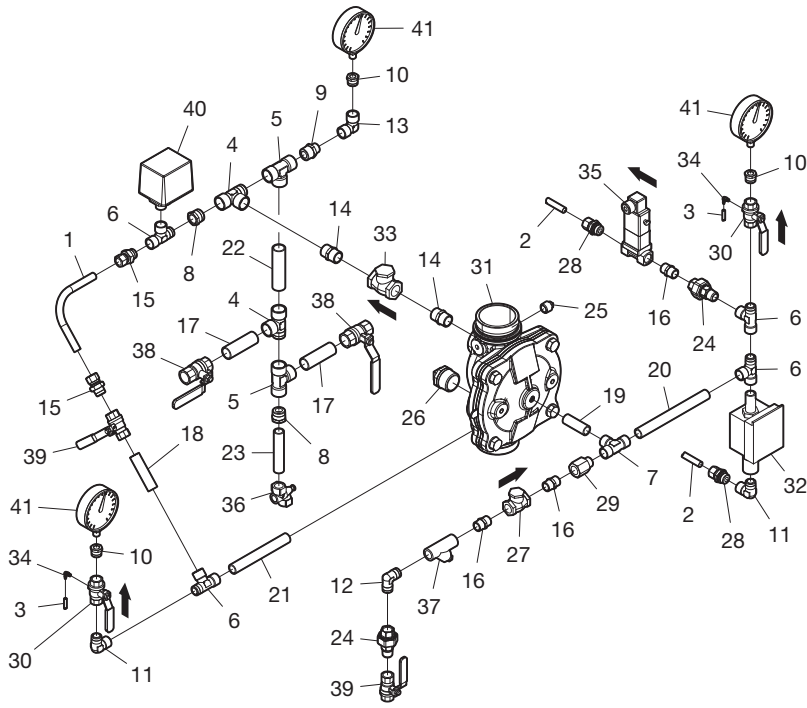


FIGURE 13
3 INCH (DN80) DV-5 WITH REMOTE-RESETTING TRIM
VdS
(Available for European Markets Only)

NO.	DESCRIPTION	QTY.	P/N
1	Nickel Plated Copper Tube 15 x 1 mm Elbow 90°; 370 mm x 225 mm	1	WS00000096
2	Copper Pipe 10 x 12 mm Length 900 mm	2	WS00000007
3	Pressure Relief Hose 3 x 6 Length 1,2 m; Transparant	2	WS00000004
4	Adapter Tee Brass Male Thread DN20 Female DN20; Type 113; Nickel Plated	2	TTEMEEFN
5	Adapter Tee Brass Female Thread DN20 x DN20 x DN20, Type 111; Nickel Plated	2	TTEEEFN
6	Adapter Tee Brass Male Thread DN15 Female DN15 x DN15; Type 113; Nickel Plated	4	TTDMDDFN
7	Adapter Tee Brass Female Thread DN15 x DN15 x DN15; Type 100 Nickel Plated	1	TTDDDFN
8	Reduce Threaded Fitting, Nickel Plated Brass Thread Male DN20 x Male DN25	1	RTFEMN
9	Reduce Threaded Fitting, Nickel Plated Brass, Thread Male DN20 x Thread Female DN15 Type 100	2	RTEMDFN
10	Reduce Threaded Fitting, Nickel Plated Brass, Thread Male DN15 x Thread Male DN20 Type 100	1	RTEDMN
11	Adapter Reduce, Brass Male Thread DN15 x Female Thread DN8 Type 100 Nickel Plated	3	RTDMBFN
12	Elbow threaded fitting nickel plated brass thread male dn15 x thread female dn15, type 100	2	ETDMDFN
13	Elbow Threaded Fitting, Nickel Plated Brass, Thread Male DN15 x DN15, Type 100	1	ETDDMN
14	Elbow Threaded Fitting, Nickel Plated Brass, Thread Female DN15 x DN15, Type 100	1	ETDDFN
15	Adapter Fitting, Nickel Plated Brass Thread Male DN20 x DN20 Type 102	1	ATEEMN
16	Adapter Compr Fitting Brass Male Thread DN15 x Compr Fitt 15 mm, Type 200 Nickel Plated	2	ATDMCON
17	Adapter Fitting, Nickel Plated Brass Thread Male DN15 x DN15 Type 100	3	ATDDMN
18	Pipe Nipple - 1/2" SS316 Male BSPT Length 60 mm	1	AP60D4
19	Pipe Nipple - 1/2" SS316 Male BSPT Length 300 mm	1	AP300D4
20	Pipe Nipple - 1/2" SS316 Male BSPT Length 140 mm	2	AP140D4
21	Pipe Nipple - 1/2" SS316 Male BSPT Length 120 mm	2	AP120D4
22	Pipe Nipple - 3/4" SS316 Male BSPT Length 100 mm	3	AP100E4
23	Pipe Fitting - Union Fig 341 Male/Female BSP Size 1/2" Finish: Stainless Steel	2	A341D4
24	Malleable Fitting - Plug Fig 291 Male BSP Size 2" Finish: Galvanized	1	A291I2
25	Malleable Fitting - Plug Fig 291 Male BSP Size 1/2" Finish: Galvanized	1	A291D2
26	Swing Type Check Valve 1/2" Type 99S	1	460491004
27	Straight Tube Connector 12 mm x 1/2" Male Nr 661273	2	81900211
28	Nipple 1/2" M/F Orifice 3 mm Brass	1	700485
29	Ball Valve Size DN15 - 1/2" ISO 7/1 Full Bore PN40 Venthole Threaded M5	2	59304FO
30	DV-5 Deluge Valve; Diaphragm Style; 17,2 bar; Size 4"; Grv x Grv (114 mm) ISO Ports; 2" ISO Drain	1	524771923
31	Break Station Model MC-1 for Manual Release ; Galva Fittings	1	522892001
32	Swing Type Check Valve 3/4" Type 99S	1	460491005
33	Elbow WES 3 mm/ M5 (Rart Ref. 610470)	2	406012
34	Solenoid Valve 24 VDC 1/2" ISO Impuls w. Mech. Lock and Man. Emerg. Release	1	2460566
35	1/2" Self-Closing Drain Valve K-Factor Non Operated = 5 K-Factor Operated = 25	1	2162156
36	Strainer Y-Type; Fig 557; 1/2" NPT Connection; 50 Mesh; S304 Screen; Bronze Body	1	20005025
37	Ball Valve Fig. 1610 Full Bore DN20 - 3/4" BSP	2	1610000270
38	Ball Valve Fig. 1610 Full Bore DN15 - 1/2" BSP	2	1610000210
39	Pressure Switch Mod. PS10-1 Single Contact; 1/2" NPT Male	1	0260
40	Water Gauge 1/4" NPT Male 0 - 300 PSI / 0 - 21 bar	3	025500013

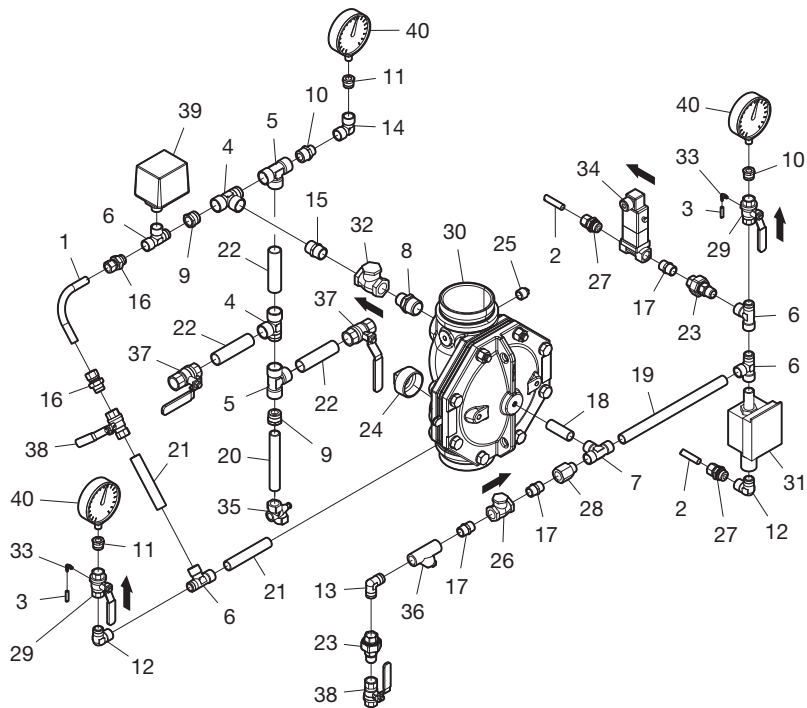


FIGURE 14
4 INCH (DN100) DV-5 WITH REMOTE-RESETTING TRIM
VdS
(Available for European Markets Only)

NO.	DESCRIPTION	QTY.	P/N
1	Nickel Plated Copper Tube 15 x 1 mm Elbow 90°; 370 mm x 225 mm	1	WS00000096
2	Copper Pipe 10 x 12 mm Length 900 mm	2	WS00000007
3	Pressure Relief Hose 3 x 6 Length 1,2 m; Transparant	2	WS00000004
4	Adapter Tee Brass Male Thread DN20 Female DN20; Type 113; Nickel Plated	2	TTEEMEFN
5	Adapter Tee Brass Female Thread DN20 x DN20 x DN20, Type 111; Nickel Plated	2	TTEEEFN
6	Adapter Tee Brass Male Thread DN15 Female DN15 x DN15; Type 113; Nickel Plated	4	TTDMDDFN
7	Adapter Tee Brass Female Thread DN15 x DN15 x DN15; Type 100 Nickel Plated	1	TTDDDFN
8	Reduce Threaded Fitting, Nickel Plated Brass Thread Male DN20 x Male DN25	1	RTFEMN
9	Reduce Threaded Fitting, Nickel Plated Brass, Thread Male DN20 x Thread Female DN15 Type 100	2	RTEMDFN
10	Reduce Threaded Fitting, Nickel Plated Brass, Thread Male DN15 x Thread Male DN20 Type 100	1	RTEDMN
11	Adapter Compr Brass Male Thread DN15 x Female Thread DN8 Type 100 Nickel Plated	3	RTDMBFN
12	Elbow threaded fitting nickel plated brass thread male dn15 x thread female dn15, type 100	2	ETDMDFN
13	Elbow Threaded Fitting, Nickel Plated Brass, Thread Male DN15 x DN15, Type 100	1	ETDDMN
14	Elbow Threaded Fitting, Nickel Plated Brass, Thread Female DN15 x DN15, Type 100	1	ETDDFN
15	Adapter Fitting, Nickel Plated Brass Thread Male DN20 x DN20 Type 102	1	ATEEMN
16	Adapter Compr Fitting Brass Male Thread DN15 x Compr Fitt 15 mm, Type 200 Nickel Plated	2	ATDMCON
17	Adapter Fitting, Nickel Plated Brass Thread Male DN15 x DN15 Type 100	3	ATDDMN
18	Pipe Nipple - 3/4" SS316 Male BSPT Length 80 mm	2	AP80E4
19	Pipe Nipple - 1/2" SS316 Male BSPT Length 60 mm	1	AP60D4
20	Pipe Nipple - 1/2" SS316 Male BSPT Length 300 mm	1	AP300D4
21	Pipe Nipple - 1/2" SS316 Male BSPT Length 140 mm	2	AP140D4
22	Pipe Nipple - 1/2" SS316 Male BSPT Length 120 mm	2	AP120D4
23	Pipe Nipple - 3/4" SS316 Male BSPT Length 100 mm	1	AP100E4
24	Pipe Fitting - Union Fig 341 Male/Female BSP Size 1/2" Finish: Stainless Steel	2	A341D4
25	Malleable Fitting - Plug Fig 291 Male BSP Size 2" Finish: Galvanized	1	A291I2
26	Malleable Fitting - Plug Fig 291 Male BSP Size 1/2" Finish: Galvanized	1	A291D2
27	Swing Type Check Valve 1/2" Type 99S	1	460491004
28	Straight Tube Connector 12 mm x 1/2" Male Nr 661273	2	81900211
29	Nipple 1/2" M/F Orifice 4,76 mm Brass	1	922101011
30	Ball Valve Size DN15 - 1/2" ISO 7/1 Full Bore PN40 Venthole Threaded M5	2	59304FO
31	DV-5 Deluge Valve; Diaphragm Style; 17,2 bar; Size 6"; Grv x Grv (168 mm) ISO Ports; 2" ISO Drain	1	524771925
32	Break Station Model MC-1 for Manual Release ; Galva Fittings	1	522892001
33	Swing Type Check Valve 3/4" Type 99S	1	460491005
34	Elbow WES 3 mm/ M5 (Rart Ref. 610470)	2	406012
35	Solenoid Valve 24 VDC 1/2" ISO Impuls w. Mech. Lock and Man. Emerg. Release	1	2460566
36	1/2" Self-Closing Drain Valve K-Factor Non Operated = 5 K-Factor Operated = 25	1	2162156
37	Strainer Y-Type; Fig 557; 1/2" NPT Connection; 50 Mesh; S304 Screen; Bronze Body	1	20005025
38	Ball Valve Fig. 1610 Full Bore DN20 - 3/4" BSP	2	1610000270
39	Ball Valve Fig. 1610 Full Bore DN15 - 1/2" BSP	2	1610000210
40	Pressure Switch Mod. PS10-1 Single Contact; 1/2" NPT Male	1	0260
41	Water Gauge 1/4" NPT Male 0 - 300 PSI / 0 - 21 bar	3	025500013

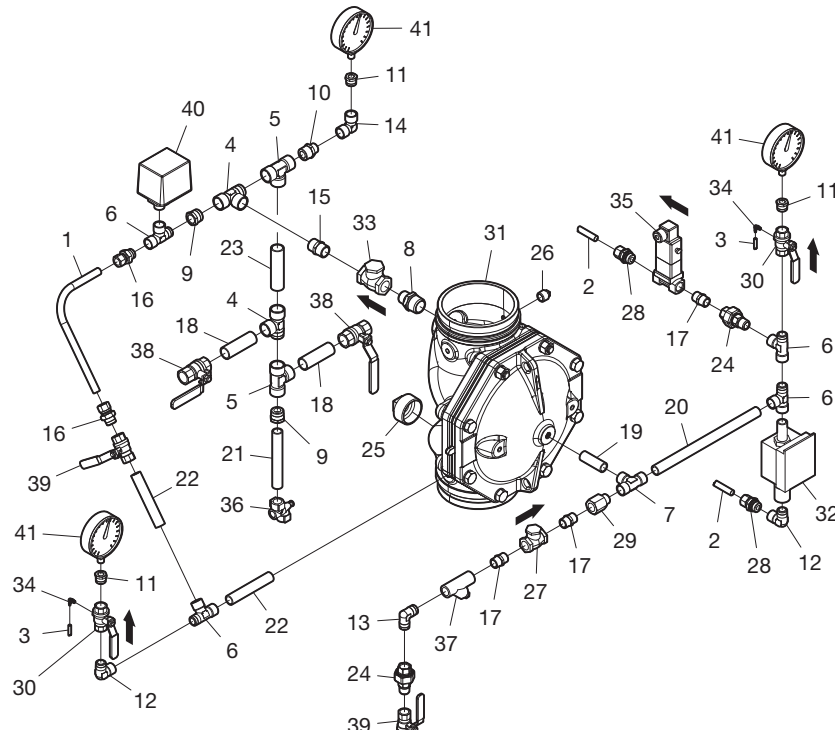


FIGURE 15
6 INCH (DN150) DV-5 WITH REMOTE-RESETTING TRIM
VdS
(Available for European Markets Only)

NO.	DESCRIPTION	QTY.	P/N
1	Nickel Plated Copper Tube 15 x 1 mm Elbow 90°; 370 mm x 225 mm	1	WS00000096
2	Copper Pipe 10 x 12 mm Length 900 mm	2	WS00000007
3	Pressure Relief Hose 3 x 6 Length 1,2 m; Transparant	2	WS00000004
4	Adapter Tee Brass Male Thread DN20 Female DN20; Type 113; Nickel Plated	2	TTEMEEFN
5	Adapter Tee Brass Female Thread DN20 x DN20 x DN20, Type 111; Nickel Plated	2	TTEEEFN
6	Adapter Tee Brass Male Thread DN15 Female DN15 x DN15; Type 113; Nickel Plated	4	TTDMDDFN
7	Adapter Tee Brass Female Thread DN15 x DN15 x DN15; Type 100 Nickel Plated	1	TTDDDFN
8	Reduce Threaded Fitting, Nickel Plated Brass Thread Male DN20 x Male DN25	1	RTFEMN
9	Reduce Threaded Fitting, Nickel Plated Brass, Thread Male DN20 x Thread Female DN15 Type 100	3	RTEMDFN
10	Adapter Reduce, Brass Male Thread DN15 x Female Thread DN8 Type 100 Nickel Plated	3	RTDMBFN
11	Elbow threaded fitting nickel plated brass thread male dn15 x thread female dn15, type 100	2	ETDMDDFN
12	Elbow Threaded Fitting, Nickel Plated Brass, Thread Male DN15 x DN15, Type 100	1	ETDDMN
13	Elbow Threaded Fitting, Nickel Plated Brass, Thread Female DN15 x DN15, Type 100	1	ETDDFN
14	Adapter Fitting, Nickel Plated Brass Thread Male DN20 x DN20 Type 102	1	ATEEMN
15	Adapter Compr Fitting Brass Male Thread DN15 x Compr Fitt 15 mm, Type 200 Nickel Plated	2	ATDMCON
16	Adapter Fitting, Nickel Plated Brass Thread Male DN15 x DN15 Type 100	3	ATDDMN
17	Pipe Nipple - 3/4" SS316 Male BSPT Length 80 mm	2	AP80E4
18	Pipe Nipple - 1/2" SS316 Male BSPT Length 60 mm	1	AP60D4
19	Pipe Nipple - 1/2" SS316 Male BSPT Length 300 mm	1	AP300D4
20	Pipe Nipple - 1/2" SS316 Male BSPT Length 140 mm	2	AP140D4
21	Pipe Nipple - 1/2" SS316 Male BSPT Length 120 mm	2	AP120D4
22	Pipe Nipple - 3/4" SS316 Male BSPT Length 100 mm	2	AP100E4
23	Pipe Fitting - Union Fig 341 Male/Female BSP Size 1/2" Finish: Stainless Steel	2	A341D4
24	Malleable Fitting - Plug Fig 291 Male BSP Size 2" Finish: Galvanized	1	A291I2
25	Malleable Fitting - Plug Fig 291 Male BSP Size 1/2" Finish: Galvanized	1	A291D2
26	Swing Type Check Valve 1/2" Type 99S	1	460491004
27	Straight Tube Connector 12 mm x 1/2" Male Nr 661273	2	81900211
28	Nipple 1/2" M/F Orifice 4.76 mm Brass	1	922101011
29	Ball Valve Size DN15 - 1/2" ISO 7/1 Full Bore PN40 Venthole Threaded M5	2	59304FO
30	DV-5 Deluge Valve; Diaphragm Style; 17.2 bar; Size 8"; Grv x Grv (219 mm) ISO Ports; 2" ISO Drain	1	524771926
31	Break Station Model MC-1 for Manual Release ; Galva Fittings	1	522892001
32	Swing Type Check Valve 3/4" Type 99S	1	460491005
33	Elbow WES 3 mm/ M5 (Rart Ref. 610470)	2	406012
34	Solenoid Valve 24 VDC 1/2" ISO Impuls w. Mech. Lock and Man. Emerg. Release	1	2460566
35	1/2" Self-Closing Drain Valve K-Factor Non Operated = 5 K-Factor Operated = 25	1	2162156
36	Strainer Y-Type; Fig 557; 1/2" NPT Connection; 50 Mesh; S304 Screen; Bronze Body	1	20005025
37	Ball Valve Fig. 1610 Full Bore DN20 - 3/4" BSP	2	1610000270
38	Ball Valve Fig. 1610 Full Bore DN15 - 1/2" BSP	2	1610000210
39	Pressure Switch Mod. PS10-1 Single Contact; 1/2" NPT Male	1	0260
40	Water Gauge 1/4" NPT Male 0 - 300 PSI / 0 - 21 bar	3	025500013

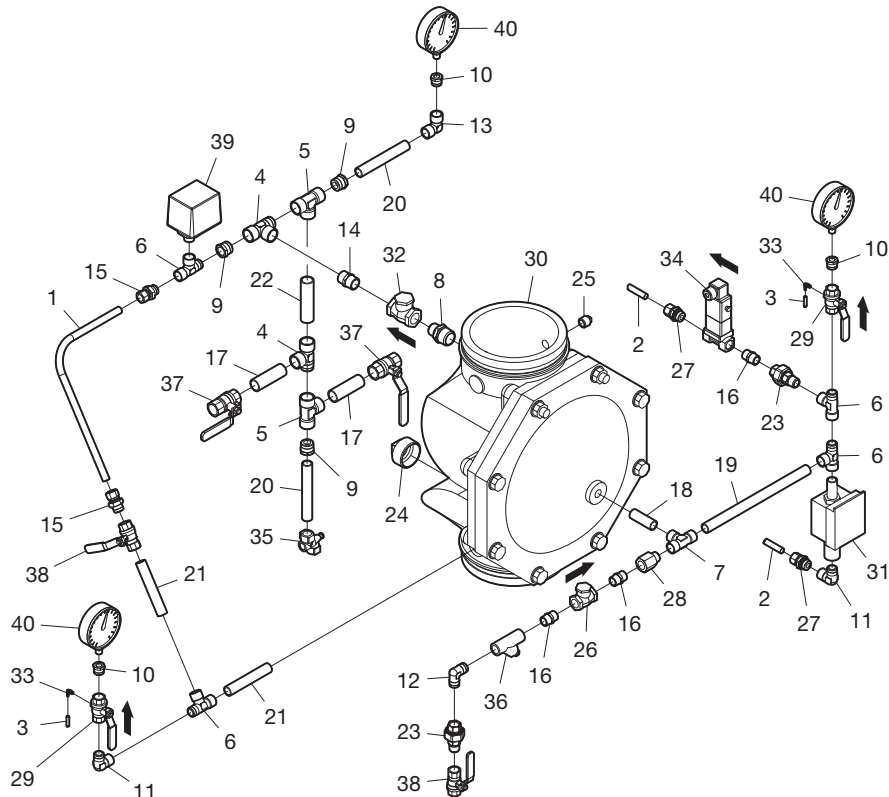
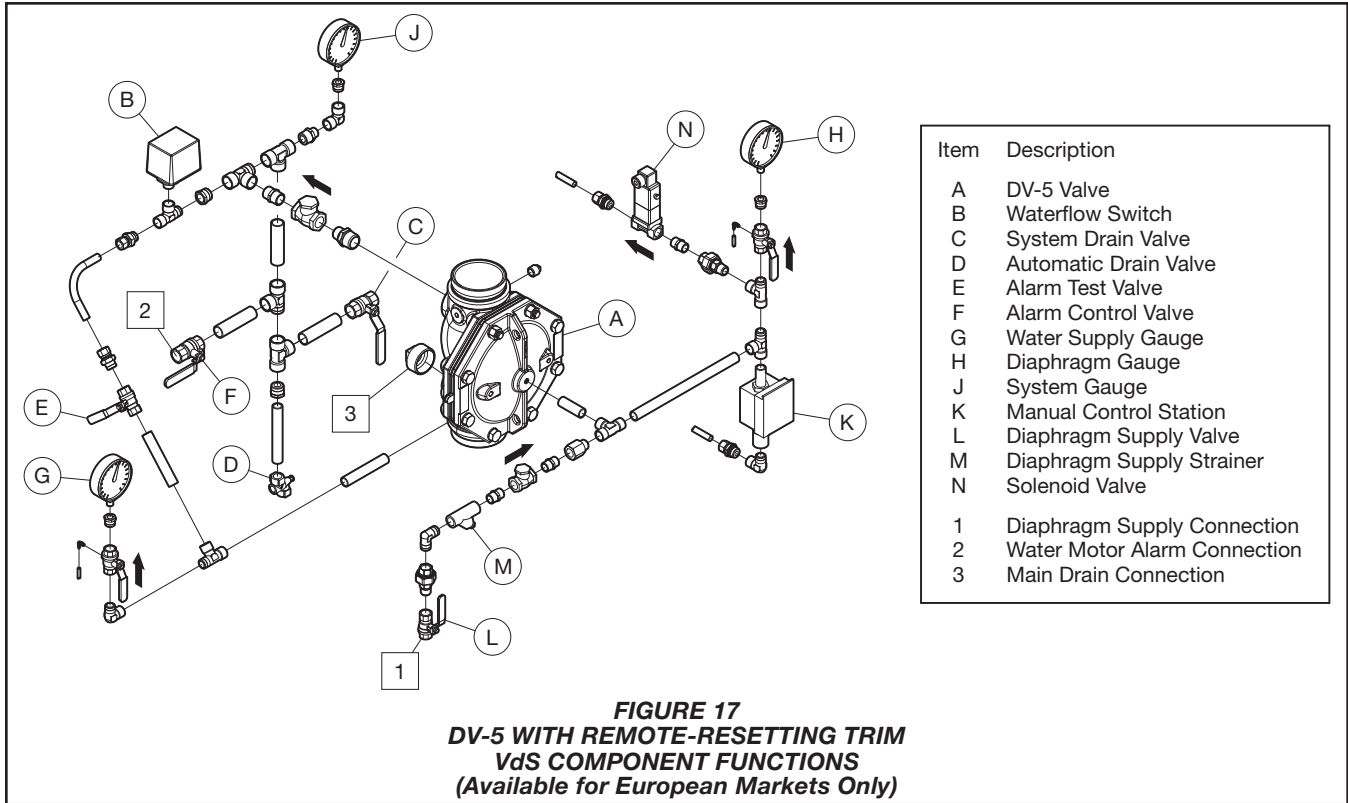


FIGURE 16
8 INCH (DN200) DV-5 WITH REMOTE-RESETTING TRIM
VdS
(Available for European Markets Only)



Care and Maintenance

TYCO DV-5 Deluge Valves with Remote-Resetting Trim must be maintained and serviced in accordance with this section.

Perform the following procedures and inspections as indicated, in addition to any specific requirements of the applicable authorities having jurisdiction (e.g., NFPA). Correct any impairment immediately.

Before closing a fire protection system main control/shut-off valve for maintenance work on the fire protection system that it controls, obtain permission to shut down the affected fire protection system from the proper authorities and notify all personnel who may be affected by this action.

Some procedures in this section result in the operation of the associated alarms. Notify the owner and the fire department, central station, or other signal station to which the alarms are connected before performing the tests.

When the system is using either a seawater or brackish water supply, internal and external inspection of the DV-5 Deluge Valve with Remote-Resetting Trim is essential. Parts showing any signs of corrosion must be replaced to ensure the integrity of the system.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of any authorities having jurisdiction (e.g., NFPA). Contact the installing contractor or product manufacturer with any questions.

Automatic sprinkler systems are recommended to be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Prior to performing inspection and/or maintenance procedures, it is recommended that those individuals responsible for the care and maintenance of the DV-5 Deluge Valve with Remote-Resetting Trim develop a working understanding of the system in general. These instructions, as well as individual instructions for the deluge valve, solenoid valve, manual control station, switches, and pressure maintenance devices, should be reviewed.

Annual Operation Test Procedure

At least once a year, verify proper operation of the DV-5 Deluge Valve with Remote-Resetting Trim (that is, opening of the deluge valve as though a fire condition exists) as follows.

Step 1. To prevent water from flowing beyond the riser, perform the following steps:

- Close the Main Control/Shut-Off Valve.
- Open the Main Drain Valve.
- Open the Main Control/Shut-Off Valve one turn beyond the position at which water just begins to flow from the Main Drain Valve.
- Close the Main Drain Valve.

Step 2. Test the Releasing Panel in accordance with the manufacturer's instructions to energize the Solenoid Valve.

Note: Be prepared to quickly perform Steps 3, 4, and 5 if water must be prevented from flowing beyond the riser.

Step 3. Verify that the deluge valve has tripped as indicated by the flow of water into the system.

Step 4. Close the Main Control/Shut-Off Valve.

Step 5. Close the Diaphragm Chamber Supply Control Valve.

Step 6. Reset the DV-5 Deluge Valve with Remote-Resetting Trim in accordance with the Valve Setting Procedure in this data sheet.

Quarterly Solenoid Valve Test Procedure for Electric Activation

Proper operation of the Solenoid Valve for electric actuation should be verified at least quarterly as follows.

Step 1. Close the Main Control/ Shut-Off Valve.

Step 2. Open the Main Drain Valve.

Step 3. Operate the DV-5 Deluge Valve with Remote-Resetting Trim by operating the electric pull station adjacent to the Control Panel.

Step 4. Verify that the flow of water from the Solenoid Valve drain connection increases to a full flow.

Step 5. Verify that the Diaphragm Chamber pressure has decreased to below 25% of the water supply pressure.

Step 6. Reset the operated pull station and then reset the Control Panel, to close the Solenoid Valve. Check the Solenoid Valve drain for leaks. Correct any leaks before proceeding to the next step.

Step 7. Slowly open the Main Control/ Shut-Off Valve.

Close the Main Drain Valve as soon as water discharges from the drain connection.

Observe the Automatic Drain Valve for leaks.

- If there are leaks, determine/correct the cause of the leakage problem.
- If there are no leaks, the DV-5 Deluge Valve with Remote-Resetting Trim is ready to place in service and the Main Control/Shut-Off Valve must then be fully opened.

Quarterly Waterflow Alarm Test Procedure

Testing system waterflow alarms should be performed quarterly.

To test the waterflow alarm, open the Alarm Test Valve, which allows a flow of water to the Pressure Alarm Switch and/or Water Motor Alarm.

Upon satisfactory completion of the test, close the Alarm Test Valve.

Internal Valve Inspection

Once every five years during the annual operational test procedure and prior to the DV-5 Valve being reset, the interior of the DV-5 Valve must be cleaned and inspected for wear and damage. Damaged or worn parts must be replaced. (Replacement of the diaphragm every ten years is recommended, or more frequently if inspections and/or wear and tear warrant more frequent replacement.)

When reinstalling the Diaphragm Cover, the Diaphragm Cover Fasteners must be uniformly and securely tightened using a cross-draw sequence. Inspect to ensure all of the Diaphragm Cover fasteners are securely tightened.

After tightening, double check to make certain that all of the Diaphragm Cover Fasteners are securely tightened.

NOTES

If the water supply contains chemicals which tend to attack a Nylon fabric reinforced, natural rubber or the five year inspection indicates a build-up of debris within the Deluge Valve that could affect its proper operation, then the frequency of the internal valve inspection procedure must be appropriately increased. If the system has a seawater or brackish water supply, then the frequency of the internal valve inspection procedure must be appropriately increased. (An annual internal valve inspection for a system having a seawater or brackish water supply is recommended.)

With reference to Figure 5, make certain that the Diaphragm is correctly oriented; otherwise, the DV-5 Deluge Valve cannot be properly set.

Under-tightening the Diaphragm Cover Bolts can result in internal and external leakage.

The V-Ring is attached to the Diaphragm at the factory. If, during an internal valve inspection, the V-Ring is discovered to be detached from the Diaphragm, be advised that the V-Ring is a required valve component and that detachment will not affect normal valve operation or performance. Should the V-Ring become detached, reinstall it between the Diaphragm and Diaphragm Cover concentrically as shown in Figure 5.

NOTE: *Do not apply adhesives, lubricants or other substances to the Diaphragm, V-Ring or Valve Body.*

Limited Warranty

For warranty terms and conditions, visit www.tyco-fire.com.

Ordering Procedure

Contact your local distributor for availability. When placing an order, indicate the full product description and Part Number (P/N).

Fully Assembled DV-5 Deluge Valve with Remote-Resetting Trim (Valve Included)

Note that “Galvanized” material is standard. Refer to the Separately Ordered Parts section for parts that are required but ordered separately.

- UL Trim and Valve
- Specify (size), TYCO Fully Assembled DV-5 Deluge Valve with Remote-Resetting Trim, and P/N (Table C)
- VdS Trim and Valve (Available for European Markets Only)
- Specify (size), TYCO Fully Assembled DV-5 Deluge Valve with Remote-Resetting Trim, and P/N (Table D)

Semi-Preassembled DV-5 Deluge Valve with Remote-Resetting Trim (UL Only) (Valve Ordered Separately)

Specify Trim and Valve as follows. Refer to the Separately Ordered Parts section for parts that are required but ordered separately.

- Specify (size) Semi-Preassembled DV-5 Deluge Valve with Remote-Resetting Trim, and P/N (specify). Note that “Galvanized” material is standard.

2 inch (DN50)	
Galvanized	P/N 52-477-2-111
3 inch (DN80)	
Galvanized	P/N 52-477-2-112
4 inch (DN100)	
Galvanized	P/N 52-477-2-114
6 inch (DN150)	
Galvanized	P/N 52-477-2-115
8 inch (DN200)	
Galvanized	P/N 52-477-2-116

- Specify (size) DV-5 Deluge Valve. Refer to technical data sheet TFP1305 for ordering information on this valve, which must be ordered separately for the Semi-Preassembled DV-5 Deluge Valve with Remote-Resetting Trim.

Separately Ordered Parts

The following parts for use with the DV-5 Deluge Valve with Remote-Resetting Trim are required but ordered separately.

Latching Solenoid Valve* (Bürkert)	P/N 2460566
Model PS10-1 Waterflow Pressure Alarm Switch (Potter)	P/N 25700
Model PS10-1 Waterflow Pressure Alarm Switch (European Conformity) (Potter)	P/N 0260
Model PS10-2 Dual-Contact Waterflow Pressure Alarm Switch (Potter)	P/N 25710
600 psi Water Pressure Gauge	P/N 92-343-1-004

(*For additional Solenoid Valve options, refer to Technical Data Sheet TFP2180.)

Vertical Valve Trim (Ordered Separately for the Americas)

The Solenoid Valve and Waterflow Pressure Alarm Switch, provided as standard with only the VdS Trim, are for use in non-hazardous locations; that is, locations where potentially explosive atmospheres are not present. These parts are separately ordered for the UL Trim.

Accessories

Specify (description) for use with the DV-5 Deluge Valve with Remote-Resetting Trim and P/N (specify):

Model AD-2 Automatic Drain (Ball Drip) Valve (TFP1632)	P/N 52-789-1-004
Model WMA-1 Water Motor Alarm Red Finish Gong (TFP921)	P/N 52-630-1-001P
Model WMA-1 Water Motor Alarm Aluminum Finish Gong (TFP921)	P/N 52-630-2-001P
Model WMA-1 Water Motor Alarm European CE Conformance (TFP922)	P/N 52-630-2-021

Replacement Parts

Specify (description) for use with the DV-5 Deluge Valve with Remote-Resetting Trim and P/N (specify). For a complete list of replacement parts, refer to Figures 6 to 10 (UL Trim) and Figures 12 to 16 (VdS Trim).

Model AD-1 Automatic Drain Valve (TFP1630)	P/N 52-793-2-004
Model MC-1 Manual Control Station (TFP1382)	P/N 52-289-2-001
Model PS10-1 Waterflow Pressure Alarm Switch (Potter)	P/N 25700
Model PS10-1 Waterflow Pressure Alarm Switch (European Conformity) (Potter)	P/N 0260
Model PS10-2 Dual-Contact Waterflow Pressure Alarm Switch (Potter)	P/N 25710
Water Pressure Gauge, 300 psi/2000 kPa	P/N 92-343-1-005
“Y” Strainer	P/N 52-353-1-005

