



## Preferred Specifications

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# CM / CMU Series Two Stage Series/ Parallel Centrifugal Fire Pumps

## A. Pump

The pump shall be of two-piece construction and shall comply with all applicable requirements of the latest standards for automotive fire apparatus of the National Fire Protection Association, NFPA No. 1901 and shall have a rated capacity of 750 – 1250 GPM (CM) or 1250 - 2250 GPM (CMU). The Pump shall be free from objectionable pulsation and vibration under all normal operating conditions.

### 1. Pump Body

The pump body shall be close-grained, gray iron or have the option of being made of bronze and can be vertically split in two sections for easy removal of the impeller assembly. All passageways are carefully matched to assure the very best hydraulic flow characteristics.

### 2. Discharge Manifold

The discharge manifold shall be cast as an integral part of the pump body assembly and shall provide at least four full 3-1/2-inch openings for ultimate flexibility in providing various discharge outlets for maximum efficiency, and shall be located as follows:

- One outlet on the right side of the pump body
- One outlet on the left side of the pump body
- One outlet on the front of the pump body
- One outlet directly on top of the pump discharge manifold

### 3. Impeller

The impellers shall be bronze and be balanced both mechanically and hydraulically for vibration-free operation.

#### a. Flame Plating (Standard on CMU, Optional on CM)

The impellers shall have flame plated hubs to assure maximum pump life and efficiency despite the presence of abrasive particles, such as fine sand, in the water being pumped.

### 4. Wear Rings

The wear rings shall be bronze and shall be easily replaceable to restore original pump efficiency and eliminate the need for replacing the entire pump casing due to wear.

### 5. Impeller Shaft

The impeller shaft shall be heat-treated stainless steel that is ground at all critical areas and polished under packing. It shall allow separation of the transmission from the pump without disassembling either component.

### 6. Anti-Friction Bearings

The impeller shaft shall be supported at each end by oil or grease lubricated anti-friction ball bearings for rigid and precise support. Bearings shall be protected from water and sediment by suitable seal housings, flinger rings, and oil seals. No sleeve type bearings shall be used.

### 7. Seal Housings

The seal housings on packed pumps shall be equipped with braided flexible graphite rings held in place by a split bronze gland which is fully removable and adjustable. There shall be an option with self-adjusting, spring-loaded, maintenance-free, mechanical shaft seals.

### 8. Transfer Valve

The transfer valve shall come with ball-type bronze valve, in removable bronze housings with large waterways for smooth flow. The transfer valve shall come standard with manual operation and shall have an option of electric operation. The transfer valve shall provide smooth transfer to either PRESSURE or VOLUME without sticking.

## 9. Pump Transmission

- a. The transmission case shall be made of an aluminum case (C22 or PA) for all pump ratings. If equipped with a K Transmission for pumps rated up to 1250 GPM (CM models) the case shall be aluminum. Pumps rated over 1250 GPM (CMU models), the case shall be made of gray iron. The pump transmission shall be rigidly attached to the pump body assembly and be of latest design incorporating a high strength, involute tooth form chain drive or gear drive capable of operating at high speeds to provide smooth, quiet transfer of power. The shift engagement shall be accomplished by a free-sliding collar to maintain ROAD or PUMP position.

### 1. Pump Shift (C22 Only)

The pump shift shall be pneumatically operated and shall use a standard automotive air valve to control a double-action, air-shift cylinder. The in-cab control valve shall include a detent lock to prevent accidental shifting.

## 10. Priming Systems

- a. The Venturis air primer system shall be mounted on the pump transmission or apparatus frame and uses the on-board air supply to create a vacuum to prime the fire pump. The basic system shall consist of a Venturis Air Primer, priming valve and auto or manual prime control panel.
- b. VPO oil-free rotary vane priming pump shall be rigidly attached to the pump transmission or apparatus frame and activated by a vacuum-activated priming (VAP) valve with a single push-button switch. Valve actuation may be accomplished while the main pump is in operation, if necessary to assure a complete prime.

### 1. Lubrication Option

A lubrication option shall allow the use of Prime Safe lubricant. A priming tank is required when the lubrication option is selected.

## 11. Pressure Control System

The relief valve system shall be positive and quick acting and shall have a control valve to provide instantaneous hydraulic lock-out which does not require the operator to cancel out or disturb the pressure rating. Relief valve control (pilot valve) shall be protected from malfunction due to sand or other sediment in the water by a strainer which can be removed, cleaned, and replaced from the operator's panel while the pump is operating. Relief valve indicator lights shall be provided and mounted on the panel adjacent to the pilot valve assembly. The indicator lights are to be "amber" marked OPEN to indicate the relief valve is bypassing and "green" marked CLOSED to indicate the relief valve is closed.

### a. Discharge Relief Valve

The discharge relief valve system shall incorporate two separate units, a panel mounted pilot valve which controls the operation of the relief valve proper, and the relief valve which is normally mounted on the pump. The relief valve shall be mounted on the pump or in the piping between the intake and discharge sides of the pump. It shall modulate flow between discharge and intake by ranging between the fully open and fully closed position in response to hydraulic signals from the pilot valve. The relief valve shall be available in three sizes. A two-inch diameter relief valve shall be used on pumps with rated capacities of 750 GPM (2850 L/min.) or less. For pumps with rated capacities through 1250 GPM (4750 L/min.), a three-inch diameter relief valve shall be used. For pumps with rated capacities of 1250 GPM through 2250 GPM (4750 through 8550 L/min.), a four-inch relief valve shall be used.

### b. Intake Relief Valve

1. Piloted intake relief valve shall be a pilot-operated intake relief valve and shall be provided by the pump manufacturer. The pilot valve shall be mounted in a position specified by the purchaser, and allow adjustment from 50 P.S.I.G. to 250 P.S.I.G. A pilot-operated intake relief valve will allow full opening of the relief valve with a very small rise in intake pressure above set pressure.
2. Non-piloted intake relief valve shall be mounted on the pump intake. The valve shall have a 2-1/2 in. Victaulic on the outside diameter and a 2 in. NPT (F) tap on the inside diameter. The control to adjust relief valve dumping pressure shall be integral to the valve.

## 12. Manifold Drain Valve Assembly

The manifold drain valve assembly shall consist of a stainless-steel plunger in a bronze body with multiple ports. The valve shall be designed so that the pump discharge pressure prevents it from opening accidentally. The drain valve control shall be panel mounted, cable or rod operated and identified PUMP DRAIN.

## 13. Tank to Pump Valve

The tank to pump valve shall be a ¼ turn, open-close, full-flow, 3-1/2-inch diameter ball valve that is attached directly to the pump. The valve shall be operated by a remote-control handle or by an optional rotary 12- or 24-volt electric rotary actuator or rotary manual actuator.

## 14. Discharge Valves

The discharge valve shall be bronze-fitted, ball-type, with a self-adjusting seal for wear. All discharge valves shall be capable of being locked or unlocked at the valve from the control panel at any position between OPEN or CLOSED and shall operate freely up to maximum pump discharge pressure. Valve seal shall be between the pump and the valve stem mechanism to minimize air leaks and facilitate draining. One valve shall be furnished for each 250 GPM of rated capacity. Means shall be provided for attaching (1) a pressure gauge which will indicate the pressure in the line immediately outboard of the valve, and (2) a drain of at least 3/4-inch NPT for simultaneously draining the valve and line outboard the valve. They shall be available in the following sizes:

- 2-1/2" ¼ turn open-close
- 3-1/2" ¼ turn open-close
- remote locking handle
- Rack and sector push-pull with locking handle
- Rotary Electric Actuator
- Manual Rotary Actuator

## 15. Monarch Intake Valve

The Waterous Monarch Intake Valve shall include an extra short intake fitting, an intake butterfly valve and an intake nipple with integral relief valve mounting pad, all designed to fit behind the pump panel. The Waterous Monarch shall feature a Jamesbury Wafer Sphere high performance butterfly valve. The Monarch valve shall also feature a provision for a pre-valve relief valve and your choice of a manual worm gear, pneumatic or electric actuator.

## 16. Auto Tank Fill

The Auto Tank Fill System shall maintain tank water level between 50 and 80% of capacity: The system shall be calibrated for any shape or size tank, shall allow operator interaction while Auto Tank Fill System is in operation, operator shall have the ability to open or close the electric-actuated ball valve using the Electric Valve Position Control. The Auto Tank Fill System shall be equipped with the following items unless specified otherwise:

- Pressure Transducer
- Tank Level Display
- Electric Valve Position Control
- Auto Tank Fill Selector Switch (Green LED indicates Auto Tank Fill Mode)
- Electric-Actuated Ball Valve (Furnished (1) valve)
- Cables

## 17. Overheat Protection Manager (OPM)

The Waterous Overheat Protection Manager (OPM) shall act as a safety device by releasing hot water from the discharge area of the pump to the ground. The OPM shall consist of a valve that opens when the water in the pump reaches 140° F (60° C) and a warning light on the pump panel that is triggered by a thermal switch when the water in the pump reaches 180° F (82° C).

## 18. Zinc Pump Intake Strainers and Magnesium Anodes

The pump intake strainers shall be removable, die cast zinc screens that are designed to provide cathodic protection for the pump, thus reducing corrosion in the pump. Magnesium anodes are normally mounted on the pump intake piping, but they may also be installed in the discharge piping if no intake mounting locations were available. Physical mounting of the anode may be via an NPT tap or bolt-on flange.