

Series VSPD-Duplex Booster System

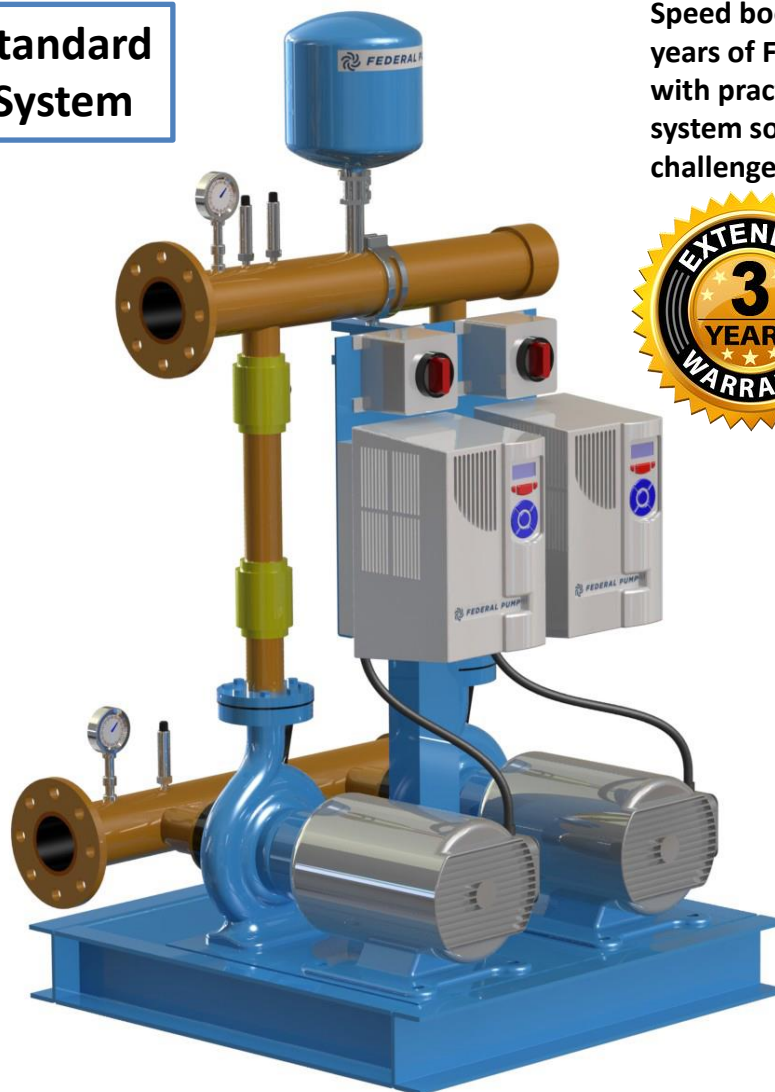
July 2014 New Product Release

Meets SDWA and NSF standards for potable water use!

Standard System

- Mechanical equipment
- Roof tank fill systems
- Booster systems
- Irrigation systems
- Chemical feed systems
- Marine vessels
- Apartment/Condo Use
- Cooling tower
- High Rise
- Hospital
- Universities
- Hotel/Casino Water-TI
- Water fountain display

Capacities to 800GPM
Pressure Boost to 100PSI*
Sizes 2.5" to 6" Manifolds
HP to 40 each pump
Available in single and three phase power



Federal Pump Series VSPS Duplex Variable Speed booster systems combine over 87 years of Federal Pump product reliability with practical energy efficient designed system solutions where water pressure challenges exist.



- Low Installed Costs
- Built-In-Reliability
- Quiet Operation
- Certified and Tested
- Backed by Federal Pump 87 year tradition
- Supported by USA Distribution Network
- Automatic Operation 24/7
- Controlled by pressure transducers. Designed with copper manifolds.

Available in simplex, duplex and triplex arrangements, Series VSP variable speed pressure regulated systems provides automatic operation and ease in maintenance.

*Higher pressure available-Consult local sales office

Series VSPT-Triplex Booster System

July 2014 New Product Release

Meets SDWA and NSF standards for potable water use!

- Mechanical equipment
- Roof tank fill systems
- Booster systems
- Irrigation systems
- Chemical feed systems
- Marine vessels
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Standard System



Federal Pump Series VSPT Triplex Variable Speed booster systems combine over 87 years of Federal Pump product reliability with practical energy efficient designed system solutions where water pressure challenges exist.



- Low Installed Costs
- Built-In-Reliability
- Quiet Operation
- Certified and Tested
- Backed by Federal Pump 87 year tradition
- Supported by USA Distribution Network
- Automatic Operation 24/7
- Controlled by pressure transducers. Designed with copper manifolds.

Capacities to 1200 GPM
Pressure Boost to 100PSI*
Sizes 2.5" to 6" Manifolds
HP to 40 each pump
Available in single and three phase power

Available in simplex, duplex and triplex arrangements, Series VSP variable speed pressure regulated systems provides automatic operation and ease in maintenance.

*Higher pressure available-Consult local sales office

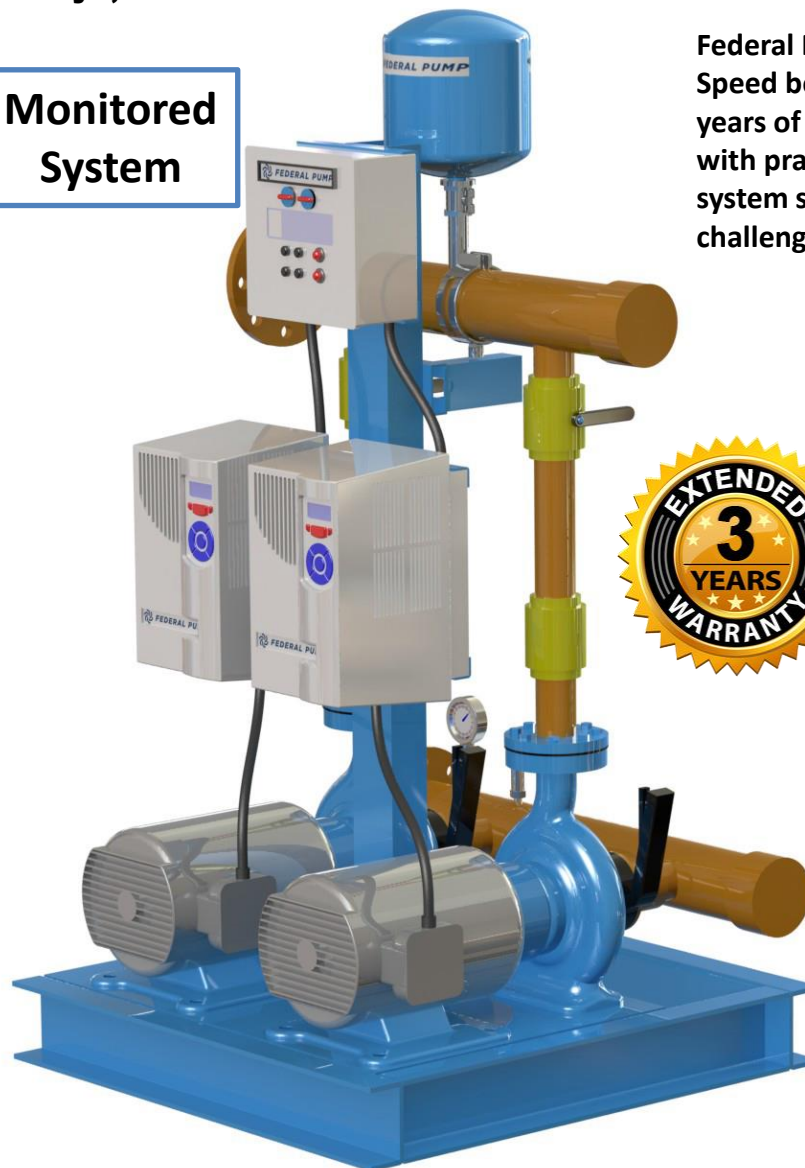
Series VSPDM-Duplex Booster System

July 2014 New Product Release

Meets SDWA and NSF standards for potable water use!

- Mechanical equipment
- Roof tank fill systems
- Booster systems
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- Water fountain display

Monitored System



Federal Pump Series VSPS Duplex Variable Speed booster systems combine over 87 years of Federal Pump product reliability with practical energy efficient designed system solutions where water pressure challenges exist.

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- Quiet Operation
- Certified and Tested
- Backed by Federal Pump 87 year tradition
- Supported by USA Distribution Network
- Automatic Operation 24/7
- Controlled by pressure transducers. Designed with copper manifolds.

Capacities to 800GPM
Pressure Boost to 100PSI*
Sizes 2.5" to 6" Manifolds
HP to 40 each pump
Available in single and three phase power

Available in simplex, duplex and triplex arrangements, Series VSP variable speed pressure regulated systems provides automatic operation and ease in maintenance.

*Higher pressure available-Consult local sales office

Series VSPTM-Triplex Booster System

July 2014 New Product Release

Meets SDWA and NSF standards for potable water use!

- Mechanical equipment
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Monitored System



Federal Pump Series VSPS Duplex Variable Speed booster systems combine over 87 years of Federal Pump product reliability with practical energy efficient designed system solutions where water pressure challenges exist.



- Low Installed Costs
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- Quiet Operation
- Certified and Tested
- Backed by Federal Pump 87 year tradition
- Supported by USA Distribution Network
- Automatic Operation 24/7
- Controlled by pressure transducers. Designed with copper manifolds.

Capacities to 800GPM
Pressure Boost to 100PSI*
Sizes 2.5" to 6" Manifolds
HP to 40 each pump
Available in single and three phase power

Available in simplex, duplex and triplex arrangements, Series VSP variable speed pressure regulated systems provides automatic operation and ease in maintenance.

*Higher pressure available-Consult local sales office

Series VSPD-Duplex Booster System

July 2014 New Product Release

Optional: System mounted controller provides system (versus pump only) display, houses circuit breaker disconnect switches and provides digital read-out of system flow and pressure and alarm conditions. Includes system mounted flow and pressure transducers.

Unique multiplexing variable speed drive controls interact for properly balanced system. Each drive includes adjustable system set points, digital display of pump operation and failure modes, provides automatic alternation between lead and lag pumps

End suction "back pull-out" designed pumps allow for motors and pump liquid end to be maintained without any disruption to piping connections. Pumps provided with cast iron casing, bronze Impellers, mechanical seals and directly connected to energy efficient motors allowing ease in operation and maintenance.

Fabricated steel baseplate supports entire system including all pumps, electrical drives, piping and system mounted accessories.

Interconnecting power wiring from motors to controls along with wiring for sensors designed and installed for each system

System mounted 10 Gallon ASME rated cushion tank provides cushion effect for pressure sensing system transducer to signal on or terminate pump operation.

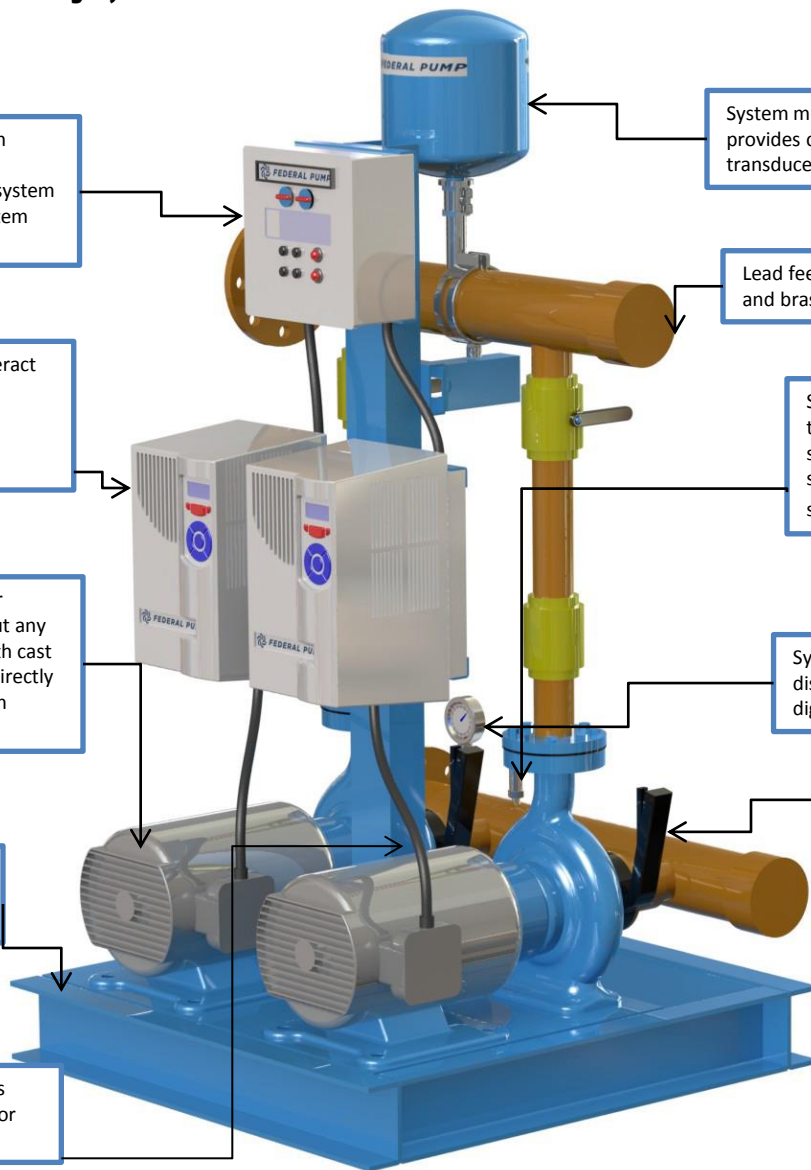
Lead free-Copper manifolds with lead-free soldered connections and brass valves, are sized for efficient system operation.

System provided with individual pump/pressure transducers that provide 4-20 maDC signal; monitoring system pressure and operating pumps at the appropriate speed to meet system set point requirements. Low suction pressure cut-off is standard feature.

System mounted pressure gauges provide suction and discharge pressure readings as a back-up to control drive digital read-out.

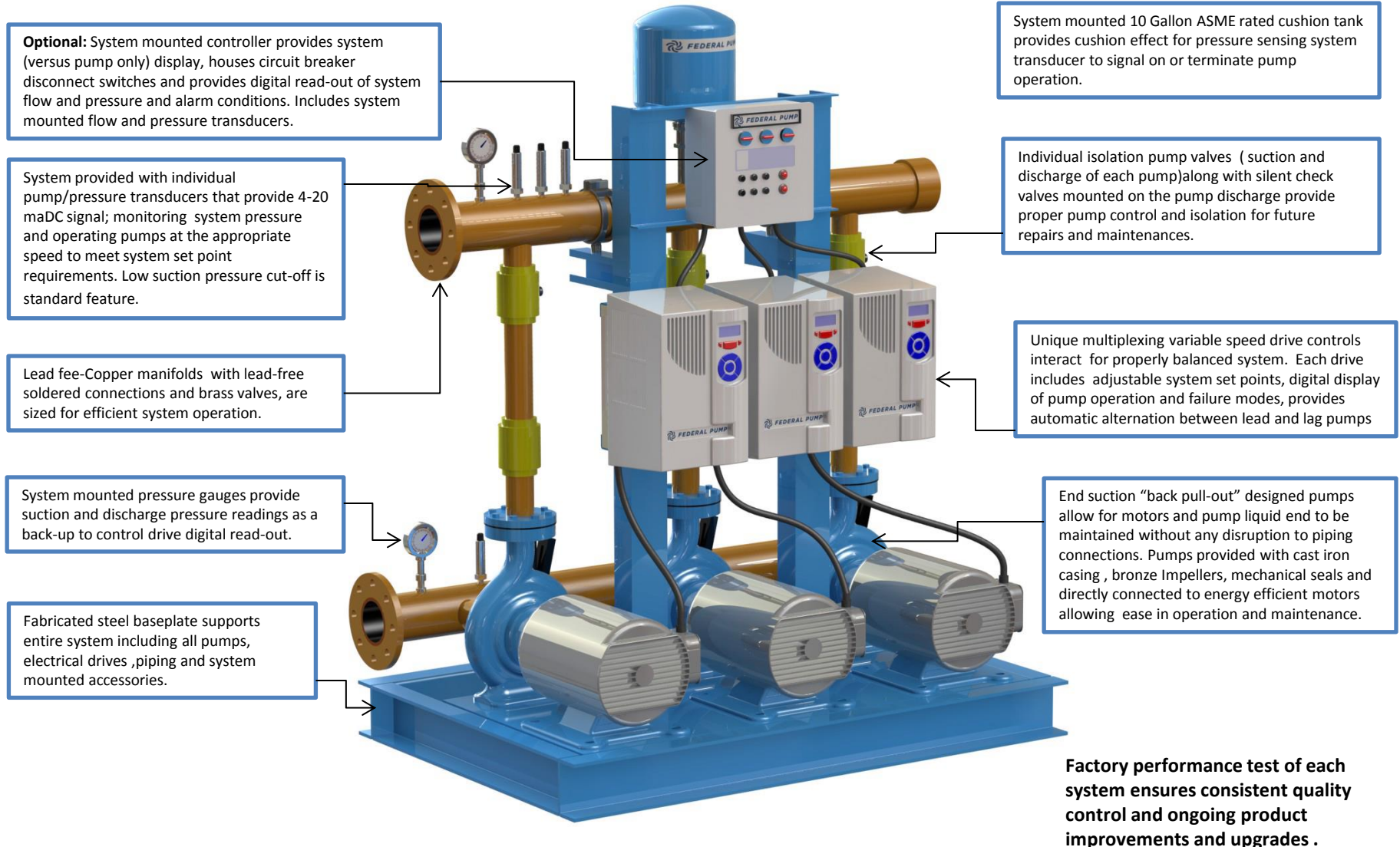
Individual isolation pump valves (suction and discharge of each pump) along with silent check valves mounted on the pump discharge provide proper pump control and isolation for future repairs and maintenances.

Factory performance test of each system ensures consistent quality control and ongoing product improvements and upgrades.



Note: System shown with Optional Monitor panel. Standard system provided with VFD and Breakers

Series VSPT-Triplex Booster System July 2014 New Product Release



Note: System shown with Optional Monitor panel. Standard system provided with VFD and Breakers

Suggested Specifications

General Product Overview

Furnish and install where shown in the plans a Federal Pump Series VSPD Duplex Variable Speed prefabricated system designed to deliver the scheduled flow and pressure differential as shown in the plans. System will require individual drive power connections and a single suction and single discharge piping connection. All other wiring and piping internal to the prefabricated system will be provided by the pump manufacturer. Complete system shall be a product manufactured in the City of New York by a licensed and registered USA pump manufacturer. Pump system shall be warranted for a period of 3 years from the date of shipment

System Materials:

System shall include Cast iron/bronze fitted close coupled pumps with back pull out design each rated GPM and PSI as shown in the plans. Motor HP, RPM and voltage shall be supplied to meet system design conditions and rated as shown in the plans. Pumps shall be provided with mechanical seals. Pumps shall be rated 125% of system design pressure. Interconnecting piping shall be supplied in lead free copper construction with all isolation valves and check valves provided in brass construction. All potable water pump system materials will meet SDWA requirement for minimum to zero lead as amended 1.1.2014. Pumps, valves piping and controls shall be fabricated and tested for 100% performance range testing and hydrostatic tested to 125% of design pressure. System shall include suction and discharge mounted pressure gauges for visual indication of system conditions and suction manifold mounted temperature casing relief valve. All material will meet SDWA 1.01.2014 amended compatibility and designed in accordance with NSF-61 requirements.

System Controls:

Booster system will be provided with individual pump variable frequency drives sequenced through multiplexing design and provided with individual pressure transducers. The pressure transducers will be installed in the system manifolds and monitor system pressure set point. Each variable frequency drive will be provided with a power disconnect switch that will control the power to the drive. The pressure transducer will provide a 4-20mA DC proportional signal to each drive to increase or decrease the speed of the pump and ensure system design conditions are maintained. Each variable frequency drive will include HOA selector switch, programmable pump process set point, operator keypad with intuitive pump language, multiplex controller where the drives interact with one another in meeting system requirements, digital readout of RRM, Amps, Hertz, pressure, delay timers (sleep protection) for pump off operation, auto restart after power loss, duplex alternation based upon run times and system set point requirements, low suction pressure cutout and alarm light. Provide 10 Gallon ASME rated cushion tank mounted on discharge manifold.

Sequence of Operation:

The system discharge pressure transducers will monitor the discharge pressure of the system to ensure system pressure requirements are maintained. In the event of a drop in system pressure below the set point the pressure transducer will signal the variable speed drive to initiate lead pump operation and increase motor speed thereby increasing pressure output from the pump. The pump will continue increasing speed until such time that system pressure conditions are met. The pump will increase or decrease speed as required by system demand. When system demand is satisfied, the variable speed controller will, after a time delay, terminate pump operation. If system demand is not met and pressure falls below the set point, the lag pump will start and run in parallel with the lead pump to meet system conditions. The controller will include system set point adjustments that allow the pressure settings and time delay settings to be adjusted as may be required by the system. The controller will include digital display of those set points. Upon meeting system conditions the lag pump will terminate operation followed by the lead pump, after a timed delay. The system will select the lead pump for the next cycle based upon the least run time of each of the pumps. Provide system factory performance test from 0-100% system flow requirements.

Low Suction Cut-Off:

In the event of low suction condition, the suction pressure transducer will sense the decline in pressure below the acceptable low suction pressure point and terminate operation of the pump and display a red light alarm light condition. The digital display board will also communicate the alarm condition and failure reason.

Visual and Audible System Monitor Panel (Optional)

Provide a visual indication control panel mounted and wired on the system package. The visual indication control panel will house the pump circuit breakers and include HMI readout of system alarm conditions and operating conditions including: Pump/drive failure alarm, low suction pressure cutoff and alarm, system flow in GPM, system pressure in PSI. All alarms will be connected to a common alarm horn for audible alarm signal. System will be provided in NEMA 12 enclosure (or as required in the plans) with HMI alarm indicator panel mounted on the front cover. Control panel will include interconnection between system sensors, variable speed drives and electric motors. Alarms will include dry contacts for remote indication.

Start-Up

Upon completion of installation by the contractor, the pump manufacturer's representative will review the installation to ensure proper connections, witness the performance of the VSPV System from 0 to 100% system pressure and monitor and test low suction pressure cut-off and document completion of the commissioned system. The representative will train the onsite personnel in operating the system. Cushion tank to be charged to system required conditions at start-up.

(Optional): If the system is provided with a charged cushion tank, the pump manufacturer's representative will ensure the tank is charged to the appropriate pre-charge condition to ensure proper operation of the system.

Operation manuals

A complete set of system operation manuals will be provided at completion of system start-up.

Maintenance Agreement: The pump manufacturer's representative will provide an 18 month maintenance agreement where the representative will review the installation every 6 months to ensure proper operation of the system and suggest any necessary adjustments due to actual system performance over the period. A separate agreement will be submitted to the customer and included in the base price of the equipment purchase.

Warranty: The pump manufacturer will provide a three year limited warranty for material and workmanship and take unit responsibility of the system components.

Suggested Specifications

General Product Overview

Furnish and install where shown in the plans a Federal Pump Series VSPT Triplex Variable Speed prefabricated system designed to deliver the scheduled flow and pressure differential as shown in the plans. System will require individual drive power connections and a single suction and single discharge piping connection. All other wiring and piping internal to the prefabricated system will be provided by the pump manufacturer. Complete system shall be a product manufactured in the City of New York by a licensed and registered USA pump manufacturer. Pump system shall be warranted for a period of 3 years from the date of shipment

System Materials:

System shall include Cast iron/bronze fitted close coupled pumps with back pull out design each rated GPM and PSI as shown in the plans. Motor HP, RPM and voltage shall be supplied to meet system design conditions and rated as shown in the plans. Pumps shall be provided with mechanical seals. Pumps shall be rated 125% of system design pressure. Interconnecting piping shall be supplied in lead free copper construction with all isolation valves and check valves provided in brass construction. All potable water pump system materials will meet SDWA requirement for minimum to zero lead as amended 1.1.2014. Pumps, valves piping and controls shall be fabricated and tested for 100% performance range testing and hydrostatic tested to 125% of design pressure. System shall include suction and discharge mounted pressure gauges for visual indication of system conditions and suction manifold mounted temperature casing relief valve. All material will meet SDWA 1.01.2014 amended compatibility and designed in accordance with NSF-61 requirements.

System Controls:

Booster system will be provided with individual pump variable frequency drives sequenced through multiplexing design and provided with individual pressure transducers. The pressure transducers will be installed in the system manifolds and monitor system pressure set point. Each variable frequency drive will be provided with a power disconnect switch that will control the power to the drive. The pressure transducer will provide a 4-20mA DC proportional signal to each drive to increase or decrease the speed of the pump and ensure system design conditions are maintained. Each variable frequency drive will include HOA selector switch, programmable pump process set point, operator keypad with intuitive pump language, multiplex controller where the drives interact with one another in meeting system requirements, digital readout of RRM, Amps, Hertz, pressure, delay timers (sleep protection) for pump off operation, auto restart after power loss, duplex alternation based upon run times and system set point requirements, low suction pressure cutout and alarm light. Provide 10 Gallon ASME rated cushion tank mounted on discharge manifold.

Sequence of Operation:

The system discharge pressure transducers will monitor the discharge pressure of the system to ensure system pressure requirements are maintained. In the event of a drop in system pressure below the set point the pressure transducer will signal the variable speed drive to initiate lead pump operation and increase motor speed thereby increasing pressure output from the pump. The pump will continue increasing speed until such time that system pressure conditions are met. The pump will increase or decrease speed as required by system demand. When system demand is satisfied, the variable speed controller will, after a time delay, terminate pump operation. If system demand is not met and pressure falls below the set point, the lag pump will start and run in parallel with the lead pump to meet system conditions. The controller will include system set point adjustments that allow the pressure settings and time delay settings to be adjusted as may be required by the system. The controller will include digital display of those set points. Upon meeting system conditions the lag pump will terminate operation followed by the lead pump, after a timed delay. The system will select the lead pump for the next cycle based upon the least run time of each of the pumps. Provide system factory performance test from 0-100% system flow requirements. Third pump in sequence (Lag 2) will act as stand-by pump and alternate with lead and Lag Pump 1 based upon cycle time.

Low Suction Cut-Off:

In the event of low suction condition, the suction pressure transducer will sense the decline in pressure below the acceptable low suction pressure point and terminate operation of the pump and display a red light alarm light condition. The digital display board will also communicate the alarm condition and failure reason.

Visual and Audible System Monitor Panel (Optional)

Provide a visual indication control panel mounted and wired on the system package. The visual indication control panel will house the pump circuit breakers and include HMI readout of system alarm conditions and operating conditions including: Pump/drive failure alarm, low suction pressure cutoff and alarm, system flow in GPM, system pressure in PSI. All alarms will be connected to a common alarm horn for audible alarm signal. System will be provided in NEMA 12 enclosure (or as required in the plans) with HMI alarm indicator panel mounted on the front cover. Control panel will include interconnection between system sensors, variable speed drives and electric motors. Alarms will include dry contacts for remote indication.

Start-Up

Upon completion of installation by the contractor, the pump manufacturer's representative will review the installation to ensure proper connections, witness the performance of the VSPV System from 0 to 100% system pressure and monitor and test low suction pressure cut-off and document completion of the commissioned system. The representative will train the onsite personnel in operating the system. Cushion tank to be charged to system required conditions at start-up.

(Optional): If the system is provided with a charged cushion tank, the pump manufacturer's representative will ensure the tank is charged to the appropriate pre-charge condition to ensure proper operation of the system.

Operation manuals

A complete set of system operation manuals will be provided at completion of system start-up.

Maintenance Agreement: The pump manufacturer's representative will provide an 18 month maintenance agreement where the representative will review the installation every 6 months to ensure proper operation of the system and suggest any necessary adjustments due to actual system performance over the period. A separate agreement will be submitted to the customer and included in the base price of the equipment purchase.

Warranty: The pump manufacturer will provide a three year limited warranty for material and workmanship and take unit responsibility of the system components.

Calculate System Flow Rate

FEDERAL PUMP BOOSTER SYSTEM PRODUCT OFFERING

Selection and Sizing Booster Systems: Calculating System Flow Rate Requirements

Total system design conditions can be determined by using the fixture flow unit values and conversion Tables shown below

Determine System Flow Rate (1)

Fixture Type	Public	Semi-Public	Private
Water Closet			
Flush Valve	10	8	6
Flush tank	5	4	3
Urinal			
Flush Valve, pedestal	10	8	0
Flush Valve, stall or wall	5	4	3
Flush tank	3	2	0
Bath Tub	4	3	2
Shower	4	3	2
Lavatory (sink)	2	1	1
Bathroom Group			
(Water closet plus			
lavatory plus Tub/Shower)			
With flush valve	0	0	8
With flush tank	0	0	6
Sink:			
Kitchen	4	3	2
General	3	2	0
Service	3	2	2
Lavatory	0	2	0
Bar	3	2	0
Dishwasher			
General	6	4	2
Pot and Pans	3	3	0
Garbage Disposal, sink	3	3	2
Washing machine	0	6	4
Laundry Tub	0	3	3
Drinking fountain	2	1	1
Ice Cube machine	1	1	1
Steam tables	1	1	0
Hose Connections, 3/4"	0	4	4
Fire Sprinkler	10	10	0

PUBLIC

Hospitals, hotels, factories, retail schools, etc.

SEMI-PUBLIC

Office buildings, clubs, motels

PRIVATE:

Apartment buildings, homes etc.

Note (1)

Fixture Flow Tables do not include air-conditioning, swimming pool, boiler make-up or other mechanical equipment requirements.

Actual GPM requirements for these demand factors should be added.

Fixture Flow Unit Conversion

FFU	GPM	FFU	GPM
100	40	2000	210
200	70	2500	240
300	80	3000	270
400	90	3500	320
500	100	4000	350
750	115	5000	410
1000	120	6000	450
1250	150	7000	520
1500	170	8000	590
1750	190	9000	620

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Calculate System Pressure Requirements

FEDERAL PUMP BOOSTER SYSTEM PRODUCT OFFERING

Selection and Sizing Booster Systems: Calculating System Head (pressure) Requirements

Determine Pump Discharge Head (2)

Total Dynamic Head expressed in Feet

Vertical distance from pump to highest fixture (feet)

plus

Friction loss through piping System (feet)

plus

Pressure required at highest Fixture (feet)

plus

System loss through the SP system (PRV System) (feet)

10'

less

Minimum suction pressure (feet)

System total dynamic head

Note: PSI X 2.31 = Feet of Head. Feet of head X 0.433 = PSI

Note: Variable speed booster systems do not include PRV (pressure regulating valves) and meet system requirements by varying the speed of each pump.

Notes:

(1) Federal Pump selection criteria for system flow conditions are based upon Hunter' s Curve criteria for selecting design flow. This criteria is quite conservative and used only as a guideline in selecting system flow conditions.

(2) Discharge head calculations are based upon simple water supply systems that do not include backflow preventers or other filtration devices that may affect final suction pressure. Suction pressure reading should be taken when water is flowing to determine dynamic and not static suction pressure conditions.

Pressurized Cushion Tank: Variable Speed Systems

Pressurized or cushion tanks, popular with constant speed pressure reducing valve controlled systems, provide a limited service where pumps, running at shut-off conditions revert flow to pressurized tanks and use that pressurized water in low flow requirements, typically off peak hours, preventing or delaying pump operation resulting in saved energy.

Unlike pressure regulated systems, variable speed pump systems do not operate at extended periods against a closed pressure regulating valve and are not capable of diverting water under higher pressure than system requirements at the point of installation; as the pressure transducers slow pump operation at the set point.

Federal Pump does not recommend larger cushion storage tanks in variable speed operations and does supply smaller 6-10 gallon pre-charged tanks to be used more as a pressure sensing buffer as compared to actual water storage vessels where useable water (water under pressure that is greater than system pressure) is negligible.

In addition, most variable speed booster systems capture pressure variations in the discharge manifolds, where flow rates are reasonably predictable, and not subject to significant variations that may require a pressure vessel or cushion tank to minimize system variations that may affect pressure sensing

The principle of variable speed is to slow down the pumps as the system approaches set point and does not allow the pumps to operate at shut off. In addition, variable speed systems that are subject to high variations in suction pressure, do not capture and store that pressure, as the case may be with pressure regulating valve controlled systems, but simply slow the pumps down as suction pressure increases.

Calculations that allow the designer to size a larger cushion tank are included in the attached selection for pressure regulating valves based upon Boyle's law but are not applicable in variable speed systems.

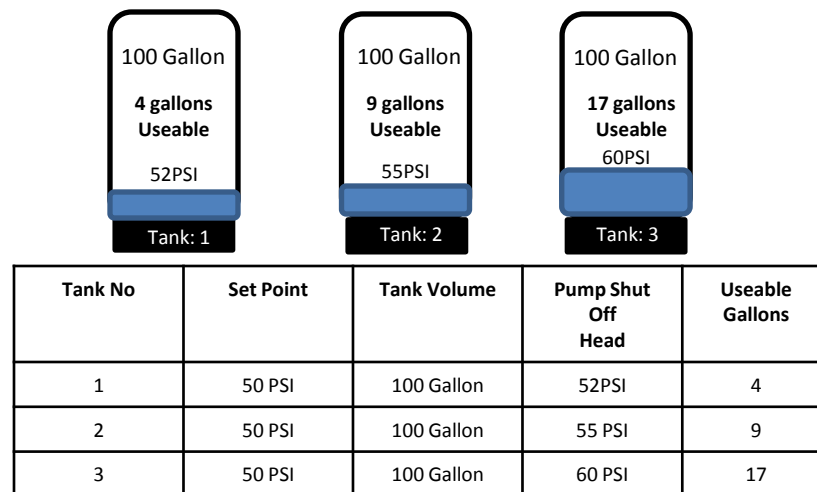
Sizing Cushion Tanks in Booster Systems

Question: How much water is stored in a cushion tank that can meet system requirements at low demand periods and keep the system off until set point demand is reached?

Answer: For variable speed system: 0 gallons

Answer: For PRV controlled system: It depends upon the pump selection comparing shut-off head to design point and suction pressure variations as these are the only two variables that store pressure above the system set point. Figure 1 below (system set point 50 psi) explores the possibilities:

Figure No: 1



Boyles Law: $P1V1=P2V2$ (50 PSI X 100Gallons) = (52PSI X V2) V2= 96 ➡ 4 Gallons Stored

For variable speed systems there is no increase in pressure above the system set point as the system is designed to slow down and not build pressure in these cushion vessels above the set point. In PRV systems Tank No: 1 and 2 scenarios are more typical with end suction pumps; one of the more popular pumps used in booster systems with the expectations of "useable stored water" at very small amounts as compared to size of the vessels provided.

40 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-4020-2	40	20	46	1.25CC-1.5-2	1.5	2.5
VSP-4030-2	40	30	70	1.25CC-1.5-2	1.5	2.5
VSP-4040-2	40	40	92	1.25CC-1.5-2	1.5	2.5
VSP-4050-2	40	50	116	1CG-3-2	3	2.5
VSP-4060-2	40	60	139	1 CG-5-2	5	2.5
VSP-4070-2	40	70	162	1 CG-5-2	5	2.5
VSP-4080-2	40	80	185	1 CG-5-2	5	2.5
VSP-4090-2	40	90	208	1.5CK-7.5-2	7.5	2.5
VSP-40100-2	40	100	231	1.5CK-10-2	10	2.5

60 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-6020-2	60	20	46	1.5CC-1.5-2	1.5	2.5
VSP-6030-2	60	30	70	1.5CG-2-2	2	2.5
VSP-6040-2	60	40	92	1.5CG-3-2	3	2.5
VSP-6050-2	60	50	116	1.5CG-5-2	5	2.5
VSP-6060-2	60	60	139	1.5CG-5-2	5	2.5
VSP-6070-2	60	70	162	1.5CK-5-2	5	2.5
VSP-6080-2	60	80	185	1.5CK-7.5-2	7.5	2.5
VSP-6090-2	60	90	208	1.5CK-7.5-2	7.5	2.5
VSP-60100-2	60	100	231	1.5CK-10-2	10	2.5

Series VSP Booster System Pump Selection Tables-3450 RPM

80 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-8020-2	80	20	46	1.5CC-1.5-2	1.5	2.5
VSP-8030-2	80	30	70	1.5CC-3-2	3	2.5
VSP-8040-2	80	40	92	1.5CG-5-2	5	2.5
VSP-8050-2	80	50	116	1.5CG-5-2	5	2.5
VSP-8060-2	80	60	139	1.5CG-7.5-2	7.5	2.5
VSP-8070-2	80	70	162	1.5CG-7.5-2	7.5	2.5
VSP-8080-2	80	80	185	1.5CK-7.5-2	7.5	2.5
VSP-8090-2	80	90	208	1.5CK-10-2	10	2.5
VSP-80100-2	80	100	231	1.5CK-15-2	15	2.5

100 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-10020-2	100	20	46	1.5CC-1.5-2	1.5	3
VSP-10030-2	100	30	70	1.5CC-3-2	3	3
VSP-10040-2	100	40	92	1.5CG-5-2	5	3
VSP-10050-2	100	50	116	1.5CG-5-2	5	3
VSP-10060-2	100	60	139	1.5CG-7.5-2	7.5	3
VSP-10070-2	100	70	162	1.5CG-10-2	10	3
VSP-10080-2	100	80	185	1.5CK-10-2	10	3
VSP-10090-2	100	90	208	1.5CK-15-2	15	3
VSP-100100-2	100	100	231	1.5CK-15-2	15	3

120 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-12020-2	40	20	46	1.5CC-2-2	2	3
VSP-12030-2	40	30	70	1.5CC-3-2	3	3
VSP-12040-2	40	40	92	1.5CG-5-2	5	3
VSP-12050-2	40	50	116	1.5CG-7.5-2	7.5	3
VSP-12060-2	40	60	139	1.5CG-7.5-2	7.5	3
VSP-12070-2	40	70	162	1.5CG-10-2	10	3
VSP-12080-2	40	80	185	1.5CK-15-2	15	3
VSP-12090-2	40	90	208	1.5CK-15-2	15	3
VSP-120100-2	40	100	231	1.5CK-15-2	15	3

140 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-14020-2	60	20	46	2 CG-3-2	3	4
VSP-14030-2	60	30	70	2 CG-5-2	5	4
VSP-14040-2	60	40	92	2 CG-7.5-2	7.5	4
VSP-14050-2	60	50	116	2 CG-7.5-2	7.5	4
VSP-14060-2	60	60	139	2 CG-10-2	10	4
VSP-14070-2	60	70	162	1.5CG-10-2	10	4
VSP-14080-2	60	80	185	2 CG-15-2	15	4
VSP-14090-2	60	90	208	1.5CK-15-2	15	4
VSP-140100-2	60	100	231	1.5 CK-20-2	20	4

Series VSP Booster System Pump Selection Tables: 3450 RPM

160 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-16020-2	80	20	46	2 CG-3-2	3	4
VSP-16030-2	80	30	70	2 CG-5-2	5	4
VSP-16040-2	80	40	92	2 CG-7.5-2	7.5	4
VSP-16050-2	80	50	116	2 CG-10-2	10	4
VSP-16060-2	80	60	139	2 CG-10-2	10	4
VSP-16070-2	80	70	162	2 CG-15-2	15	4
VSP-16080-2	80	80	185	2 CG-15-2	15	4
VSP-16090-2	80	90	208	2 CK-20-2	20	4
VSP-160100-2	80	100	231	2 CK-20-2	20	4

180 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-18020-2	100	20	46	2 CG-5-2	5	4
VSP-18030-2	100	30	70	2 CG-5-2	5	4
VSP-18040-2	100	40	92	2 CG-7.5-2	7.5	4
VSP-18050-2	100	50	116	2 CG-10-2	10	4
VSP-18060-2	100	60	139	2 CG-10-2	10	4
VSP-18070-2	100	70	162	2 CG-15-2	15	4
VSP-18080-2	100	80	185	2 CG-15-2	15	4
VSP-18090-2	100	90	208	2 CK-20-2	20	4
VSP-180100-2	100	100	231	2 CK-20-2	20	4

200 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-20020-2	200	20	46	2.5CG-5-2	5	4
VSP-20030-2	200	30	70	2.5 CG-7.5-2	7.5	4
VSP-20040-2	200	40	92	2 CG-7.5-2	7.5	4
VSP-20050-2	200	50	116	2 CG-10-2	10	4
VSP-20060-2	200	60	139	2 CG-15-2	15	4
VSP-20070-2	200	70	162	2 CG-15-2	15	4
VSP-20080-2	200	80	185	2 CG-15-2	15	4
VSP-20090-2	200	90	208	2 CK-20-2	20	4
VSP-200100-2	200	100	231	2 CK-25-2	25	4

250 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-25020-2	250	20	46	2.5CG-5-2	5	5
VSP-25030-2	250	30	70	2.5 CG-7.5-2	7.5	5
VSP-25040-2	250	40	92	2.5CG-10-2	10	5
VSP-25050-2	250	50	116	2.5 CG-15-2	15	5
VSP-25060-2	250	60	139	2.5CG-15-2	15	5
VSP-25070-2	250	70	162	2 CG-15-2	15	5
VSP-25080-2	250	80	185	2.5 CG-20-2	20	5
VSP-25090-2	250	90	208	2 CK-25-2	25	5
VSP-250100-2	250	100	231	2 CK-25-2	25	5

Series VSP Booster System Pump Selection Tables: 3450 RPM

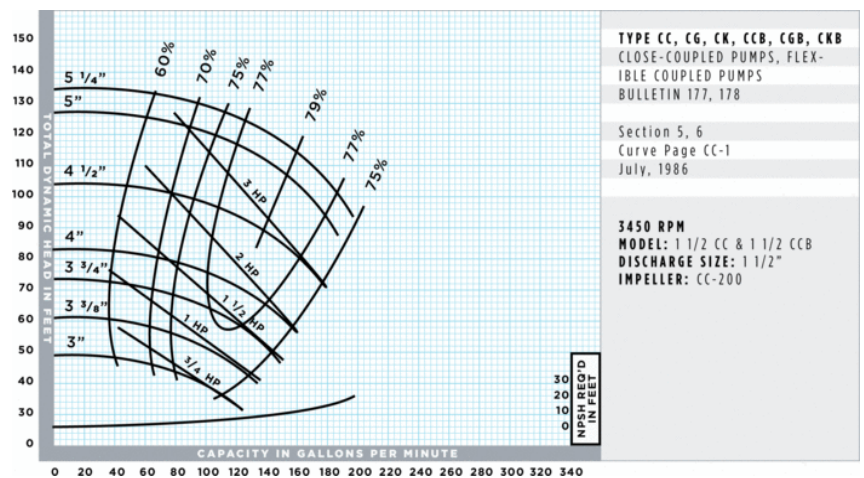
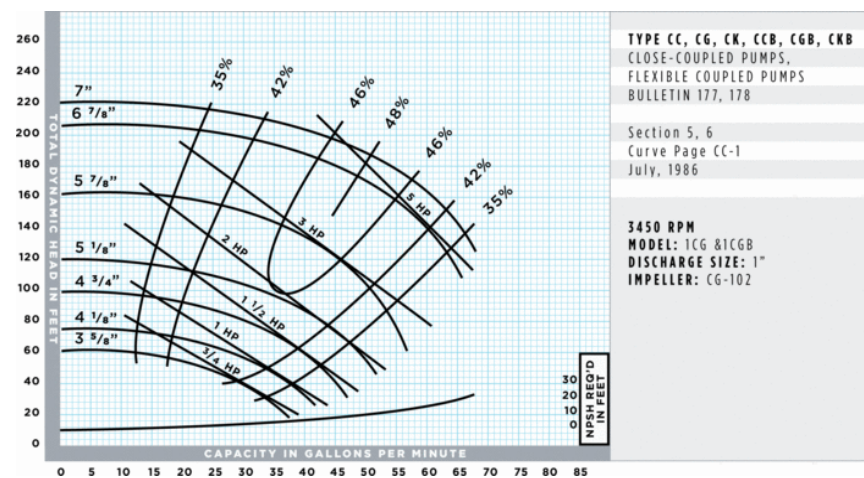
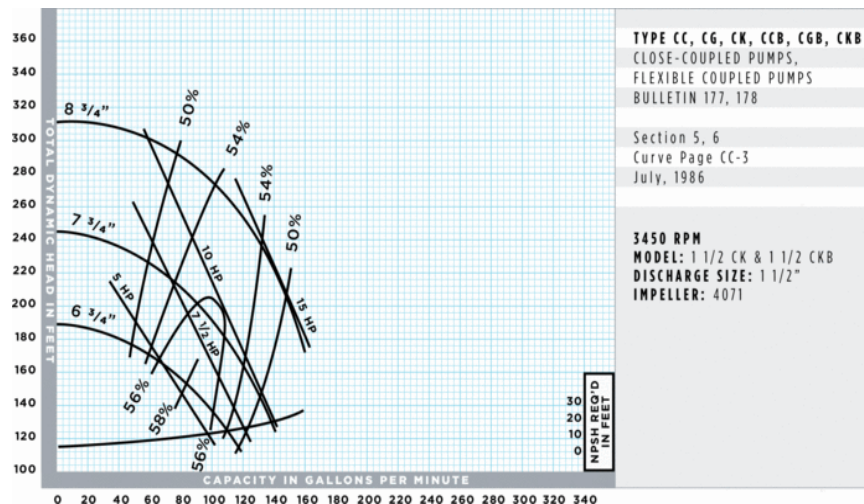
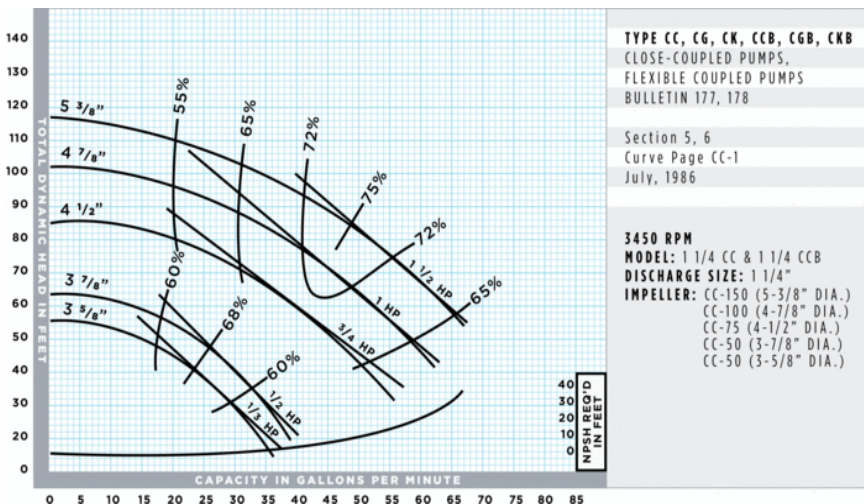
300 GPM per Pump

System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-30020-2	300	20	46	2.5CG-7.5-2	7.5	5
VSP-30030-2	300	30	70	2.5 CG-7.5-2	7.5	5
VSP-30040-2	300	40	92	2.5CG-15-2	15	5
VSP-30050-2	300	50	116	2.5 CG-15-2	15	5
VSP-30060-2	300	60	139	2.5CG-20-2	20	5
VSP-30070-2	300	70	162	2.5 CG-20-2	20	5
VSP-30080-2	300	80	185	2.5 CK-25-2	25	5
VSP-30090-2	300	90	208	2.5 CK-30-2	30	5
VSP-300100-2	300	100	231	2.5 CK-30-2	30	5

400 GPM per Pump

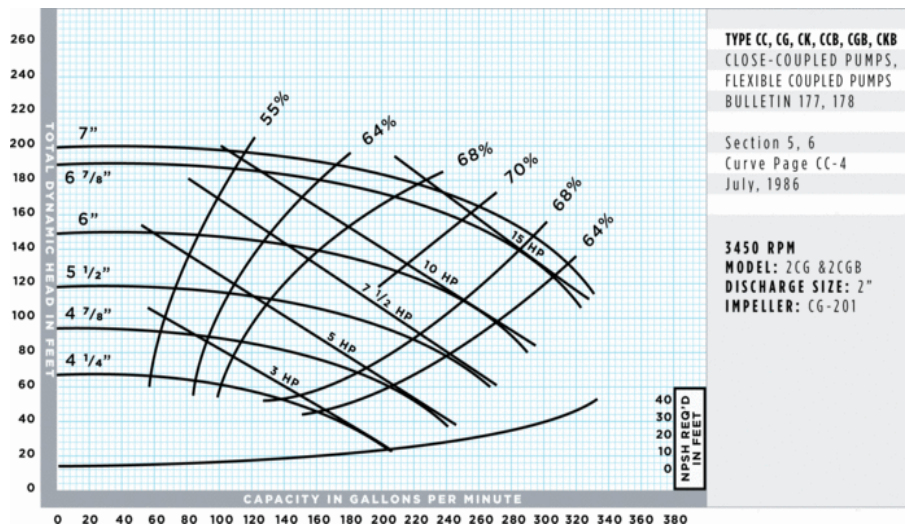
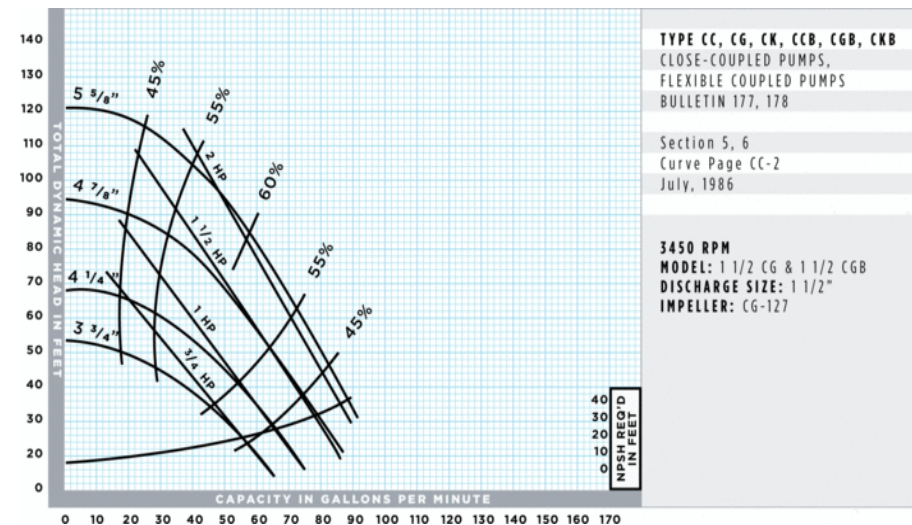
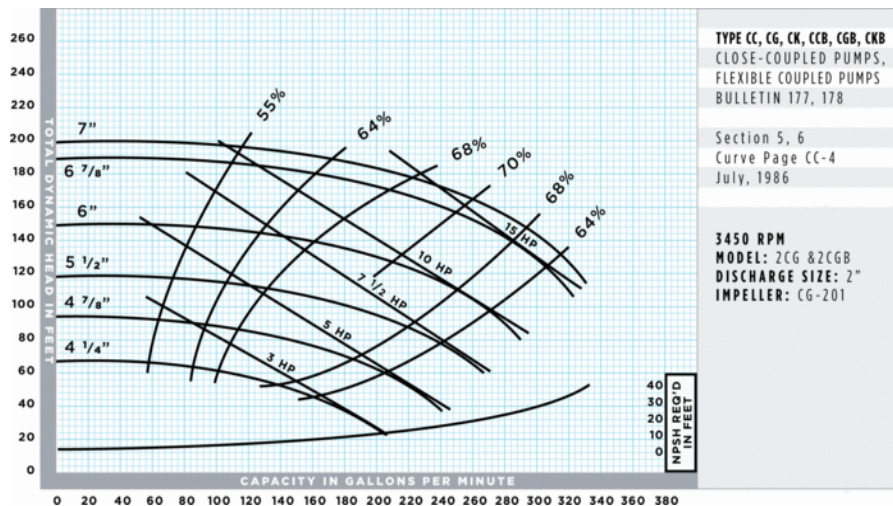
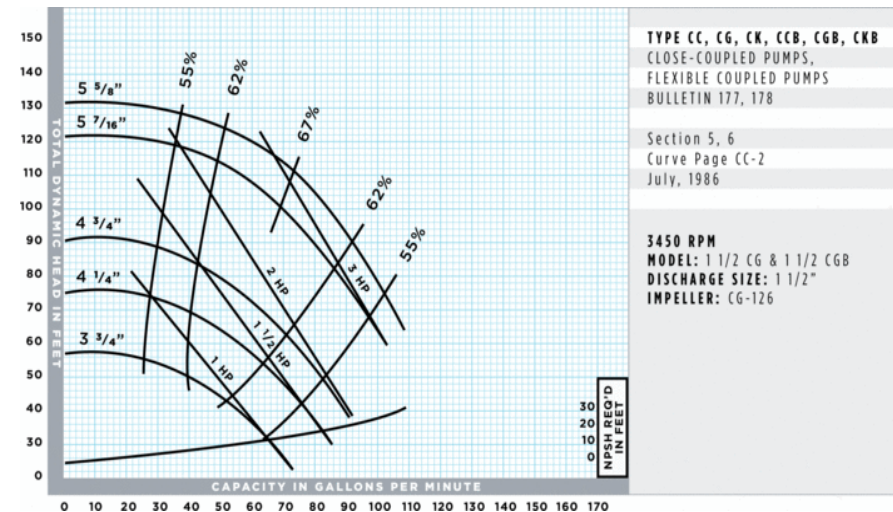
System No	GPM Each pump	PSI	TDH	Pump Model	3450 RPM HP	Header Size
VSP-40020-2	400	20	46	3 CG-7.5-2	7.5	6
VSP-40030-2	400	30	70	3 CG-10-2	10	6
VSP-40040-2	400	40	92	3 CG-15-2	15	6
VSP-40050-2	400	50	116	3 GC-20-2	20	6
VSP-40060-2	400	60	139	3 CG-20-2	20	6
VSP-40070-2	400	70	162	3 CG-25-2	25	6
VSP40080-2	400	80	185	3 CG-30-2	30	6
VSP-40090-2	400	90	208	2.5 CK-40-2	40	6
VSP-400100-2	400	100	231	2.5 CK-40-2	40	6

Performance Curves: VSP Booster System 3450 RPM



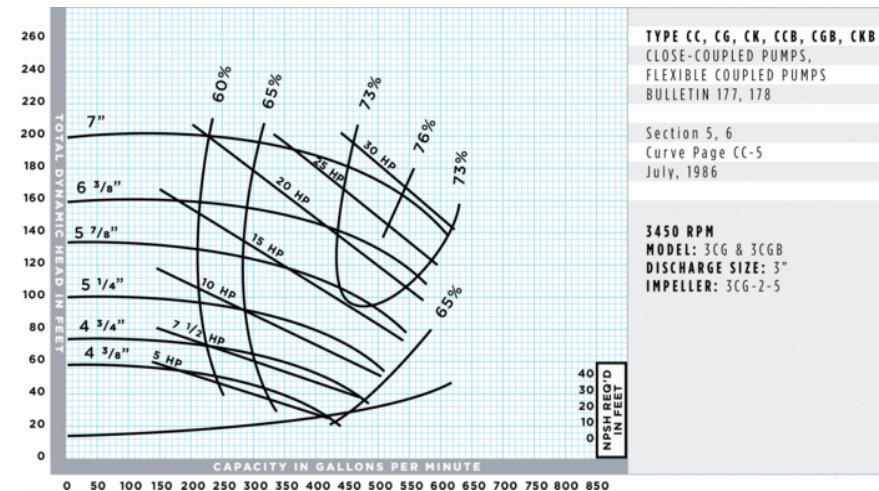
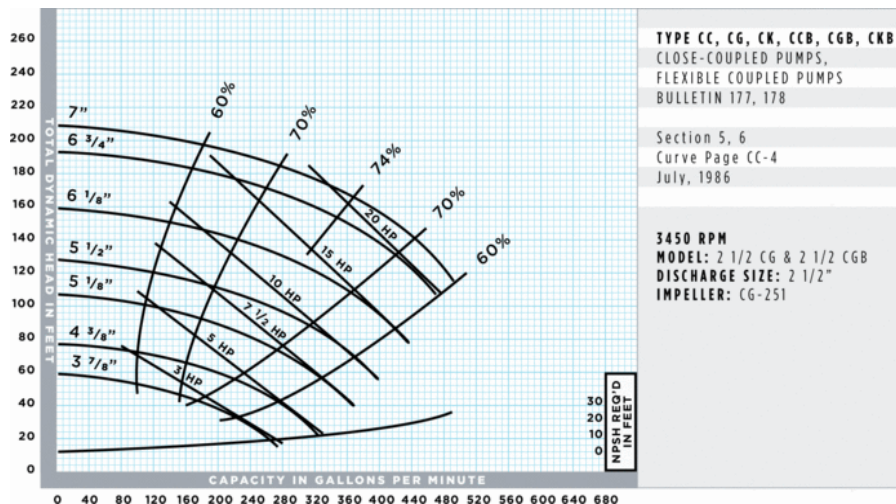
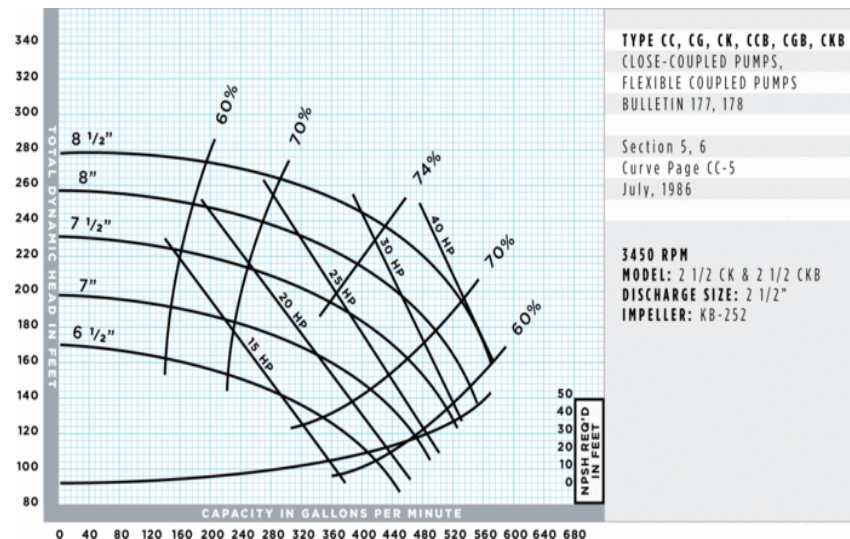
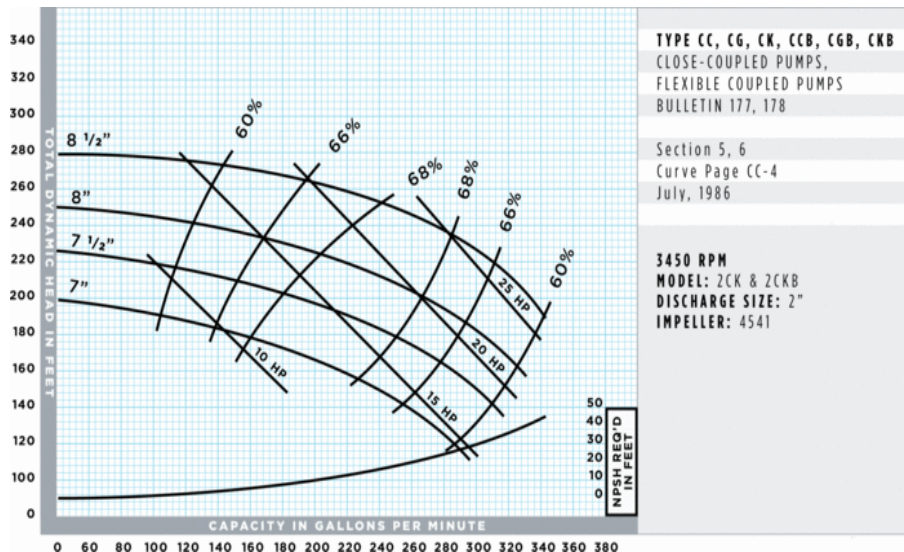
Performance Curves: VSPD Booster System

3450 RPM



Performance Curves: VSP Booster System

3450 RPM



Duplex System Dimensions

Standard System

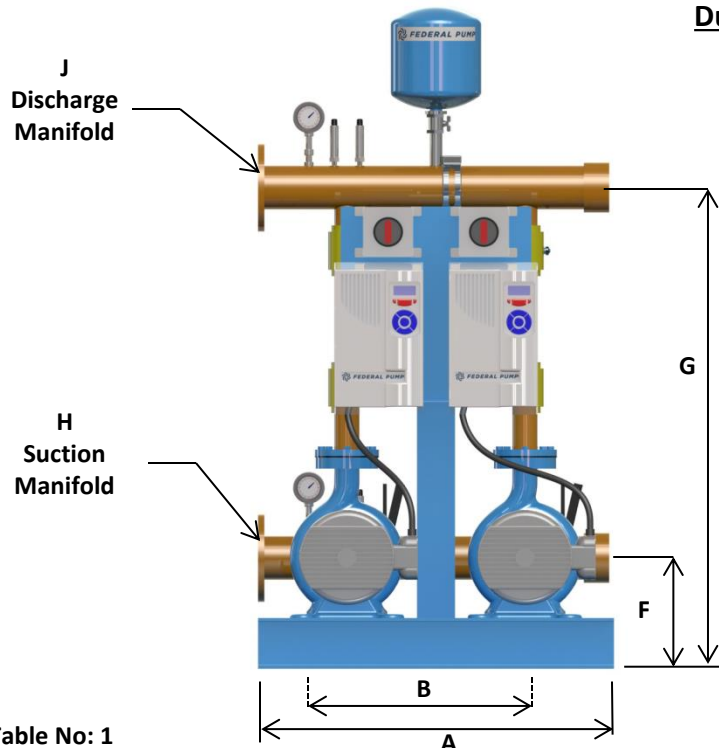


Table No: 1

Motor Frame	3450 RPM-HP	1750 RPM-HP	F
143 JM	1.5	1	7.5
145 JM	2 thru 3	1.5 thru 2	7.5
182 JM	5	3	8.5
184 JM	7.5	5	8.5
213 JM	10	7.5	9.25
215 JM	15	10	9.25
254 JM	20	15	10.25
256 JM	25	20	10.25
284 JM	30	25	11

Table No: 2

Dimension	Standard Duplex
A	41
B	25
C	29
D	27
E	54
G	Refer to Note: 4
K	0.875

(4) Holes
K Dimension

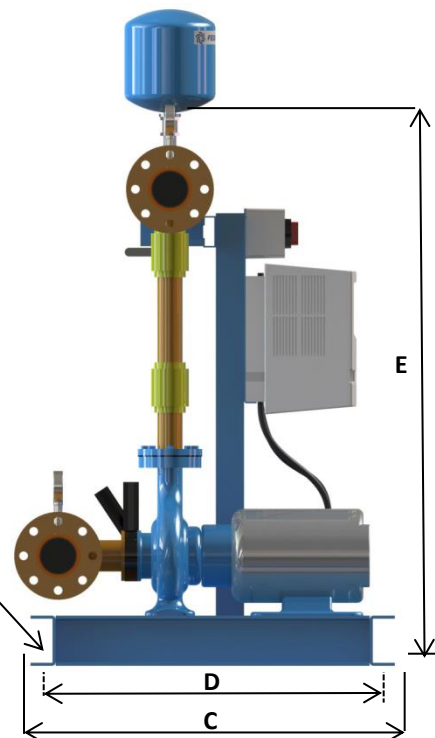
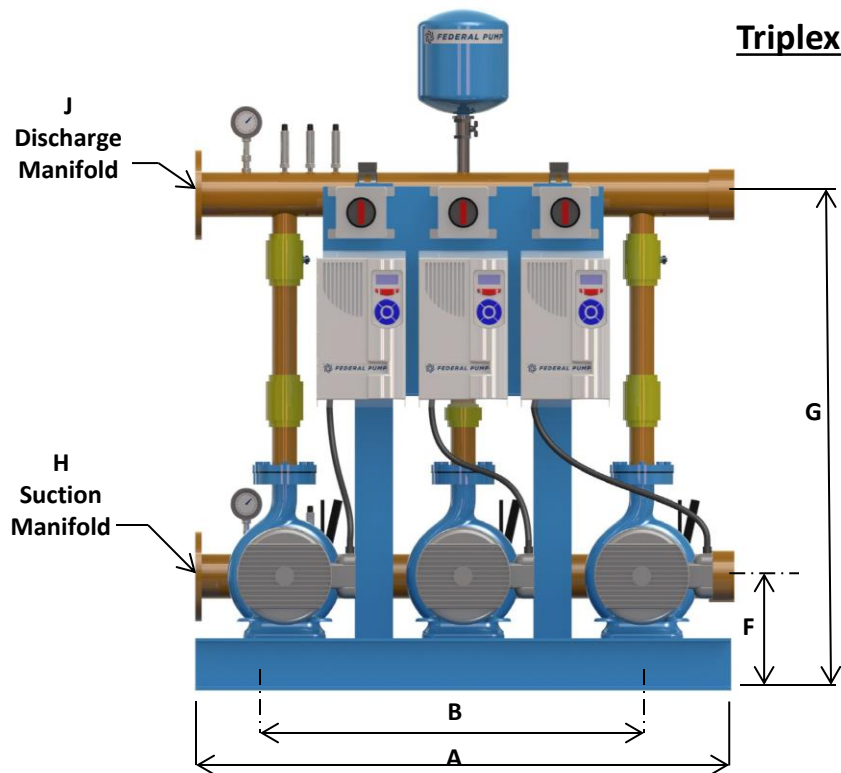


Table No: 3

Total Pump GPM	H	J	Type
160 and Less	2.5	2.5	Flanged
161 thru 240	3	3	Flanged
241 thru 420	4	4	Flanged
421 thru 660	5	5	Flanged
661 thru 900	6	6	Flanged

Notes:

1. Do not use dimensions for construction purposes unless certified.
2. All dimensions are in inches unless otherwise noted.
3. For simple and triple systems, refer to other catalog sections.
4. The "G" dimension varies with pump size. Refer to factory.
5. Standard system manifold locations are as shown.
6. Other manifold options are available. Refer to factory.



(4) Holes
K Dimension



Table No: 1

Motor Frame	3450 RPM-HP	1750 RPM-HP	F
143 JM	1.5	1	7.5
145 JM	2 thru 3	1.5 thru 2	7.5
182 JM/184JM	5 to 7.5	3 to 5	8.5
213 JM/215JM	10/15	7.5/10	9.25
254 JM	20	15	10.25
256 JM	25	20	10.25
284 JM	30	25	11
286JM	40	30	12

Table No: 2

Dimension	Standard Triplex
A	66
B	50
C	29
D	27
E	54
G	Refer to Note: 4
K	0.875

Table No: 3

Total Pump GPM	H	J	Type
160 and Less	2.5	2.5	Flanged
161 thru 240	3	3	Flanged
241 thru 420	4	4	Flanged
421 thru 660	5	5	Flanged
661 thru 900	6	6	Flanged
901 thru 1200	6	6	Flanged

Duplex System Dimensions

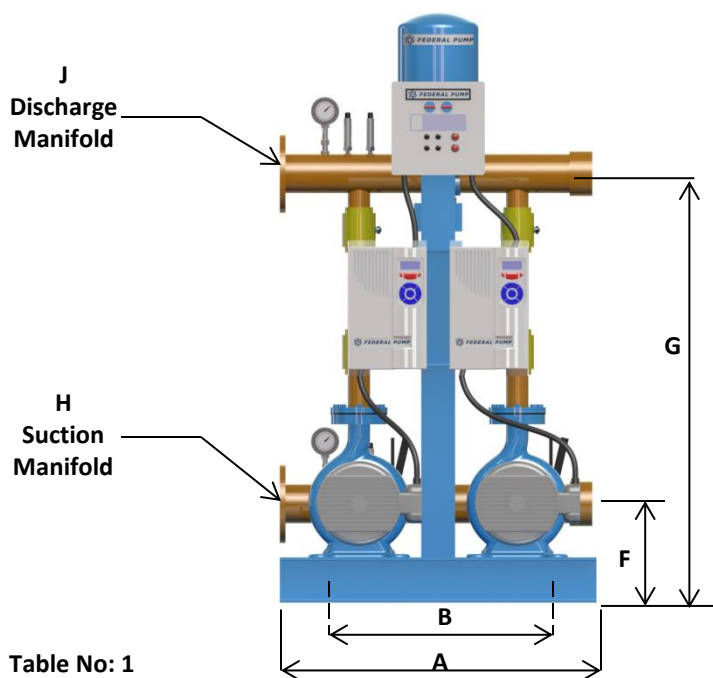


Table No: 1

Motor Frame	3450 RPM-HP	1750 RPM-HP	F
143 JM	1.5	1	7.5
145 JM	2 thru 3	1.5 thru 2	7.5
182 JM	5	3	8.5
184 JM	7.5	5	8.5
213 JM	10	7.5	9.25
215 JM	15	10	9.25
254 JM	20	15	10.25
256 JM	25	20	10.25
284 JM	30	25	11

(4) Holes
K Dimension

Table No: 2

Dimension	Standard Duplex
A	41
B	25
C	29
D	27
E	54
G	Refer to Note: 4
K	0.875

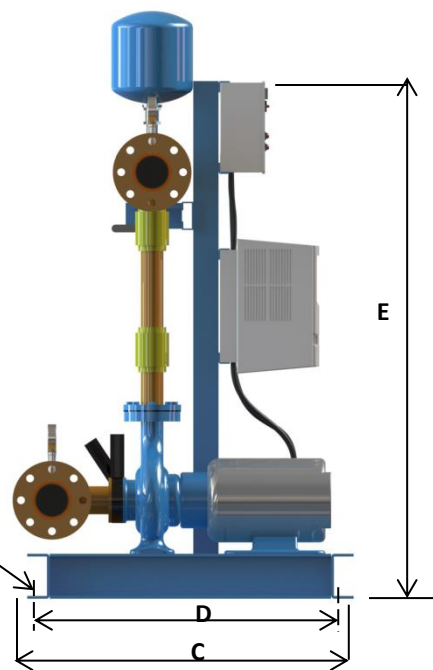


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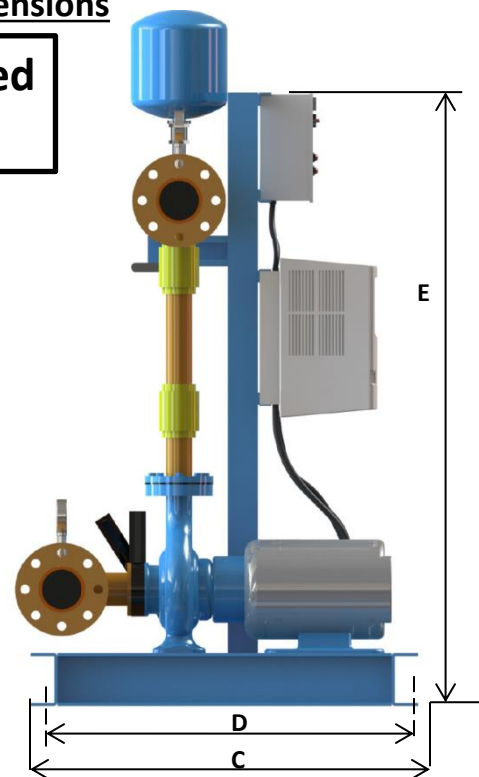
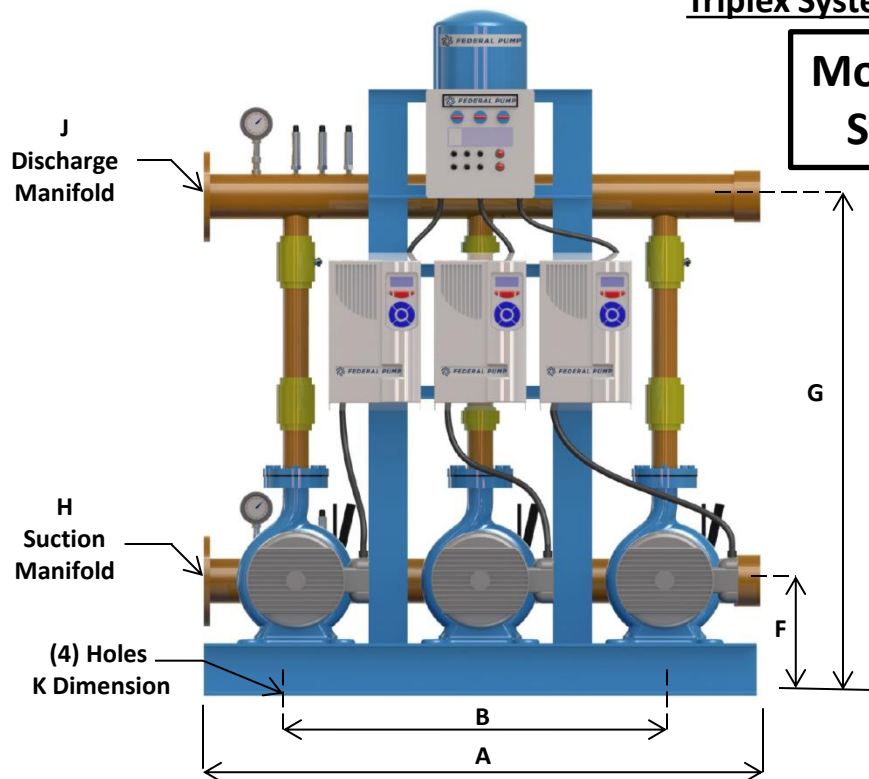
Total Pump GPM	H	J	Type
160 and Less	2.5	2.5	Flanged
161 thru 240	3	3	Flanged
241 thru 420	4	4	Flanged
421 thru 660	5	5	Flanged
661 thru 900	6	6	Flanged

Notes:

1. Do not use dimensions for construction purposes unless certified
2. All dimensions are in inches unless otherwise noted.
3. For simplex and triplex system dimensions, refer to other catalog sections
4. The "G" dimension varies with pump size. Refer to factory.
5. Standard system manifolds locations are as shown.
6. Other manifold connection options are available. Refer to factory.

- Notes:**
1. Do not use dimensions for construction purposes unless certified
 2. All dimensions are in inches unless otherwise noted.
 3. For simplex and triplex system dimensions, refer to other catalog sections
 4. The "G" dimension varies with pump size. Refer to factory.
 5. Standard system manifolds locations are as shown.
 6. Other manifold connection options are available. Refer to factory.

Triplex System Dimensions



Notes:

1. Do not use dimensions for construction purposes unless certified
2. All dimensions are in inches unless otherwise noted.
3. For simplex and triplex system dimensions, refer to other catalog sections
4. The "G" dimension varies with pump size. Refer to factory.
5. Standard system manifolds locations are as shown.
6. Other manifold connection options are available. Refer to factory.

Table No: 1

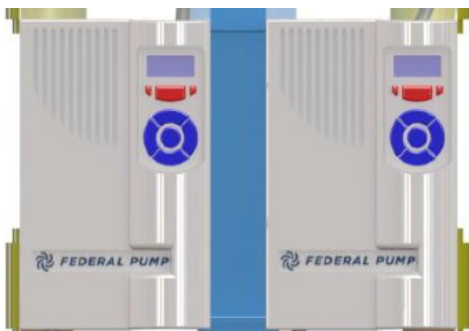
Motor Frame	3450 RPM-HP	1750 RPM-HP	F
143 JM	1.5	1	7.5
145 JM	2 thru 3	1.5 thru 2	7.5
182 JM/184JM	5 to 7.5	3 to 5	8.5
213 JM/215JM	10/15	7.5/10	9.25
254 JM	20	15	10.25
256 JM	25	20	10.25
284 JM	30	25	11
286JM	40	30	12

Table No: 2

Dimension	Standard Triplex
A	66
B	50
C	29
D	27
E	54
G	Refer to Note: 4
K	0.875

Table No: 3

Total Pump GPM	H	J	Type
160 and Less	2.5	2.5	Flanged
161 thru 240	3	3	Flanged
241 thru 420	4	4	Flanged
421 thru 660	5	5	Flanged
661 thru 900	6	6	Flanged
901 thru 1200	6	6	Flanged



Multiplexing Variable Speed Booster System Control

Pump Genius process control software is designed to reduce system operation and maintenance costs while increasing process accuracy and protection. The software provides multiple pump control and protection, as well as system monitoring and protection. Pump Genius can be applied to any system that requires constant flow or pressure.

Performance Features (includes)

- 1-75 HP @ 230V / 2-600HP @ 480V
- Overload capacity: nominal 110% for 60sec.
- Starting torque: 100% at 3 Hz
- Motor preheat function
- Adjustable accel/decel: 0.1 to 6000 sec.
- Controlled speed range: 40:1
- Critical frequency rejection: 3 selectable, adjustable bands
- Torque-limiting: 30-180%
- Energy Saving control
- Torque boost: full range, auto
- Power loss ride-thru: 2 sec
- Auto restart after power loss or resettable fault, selectable, programmable
- Feedback signal loss detection
- Serial communications loss detection
- "Up / Down" floating point control capability (PI)
- Stationary motor auto-tuning
- Pump Sleep function
- Run-permissive input
- Pressure differential via two inputs

Pump Control Features (Includes)

- Operator Keypad with intuitive pump language
- Hand-Off-Auto
- Programmable Pump Process Set Point
- Pump Start Level & Start Time
- Sleep Protection
- Simplex, Duplex, Triplex, and Multiplex Control
- Automatic System Restart
- No Flow Detection
- Pump Control Features Low and High Feedback set points
- Pre-Charge Low Level Control
- Thrust Bearing Control
- Automatic System Stabilization
- Motor Condensation Pre-Heat Function Protective Features
- Current-limited stall prevention
- Heat sink over-temperature, speed fold-back
- Bi-directional start into rotating motor
- Current-limiting DC bus fuse
- Optically-isolated controls
- Short circuit protection:
- Phase-phase and phase-neutral
- Ground fault protection
- Short circuit withstand rating: 100K RMS
- Electronic motor overload: UL
- Current limit
- Fault display: last 10 faults
- Fault circuit: OC, OV, OT
- Over torque and under torque protection
- Pump Protective Features
- Dry Well
- Air in System
- Blocked Impeller
- Pump over Cycling
- No Flow Protection
- Loss of Prime
- Transducer Loss
- Over Torque
- Anti-Cavitation



Monitor Panel



Monitor Panel provided with associated flow and pressure transducers to monitor system performance. In the interest of continuous product development and technological advancements, product overview and associated options may change over time. Ensure this attachment is submitted to the appropriate approval agencies and added to the order fulfillment process to provide the correct features as submitted !

Federal Pump Monitor panel is designed to work in harmony with the “Pump Genius” providing increased system monitoring. The Monitor Panel includes:

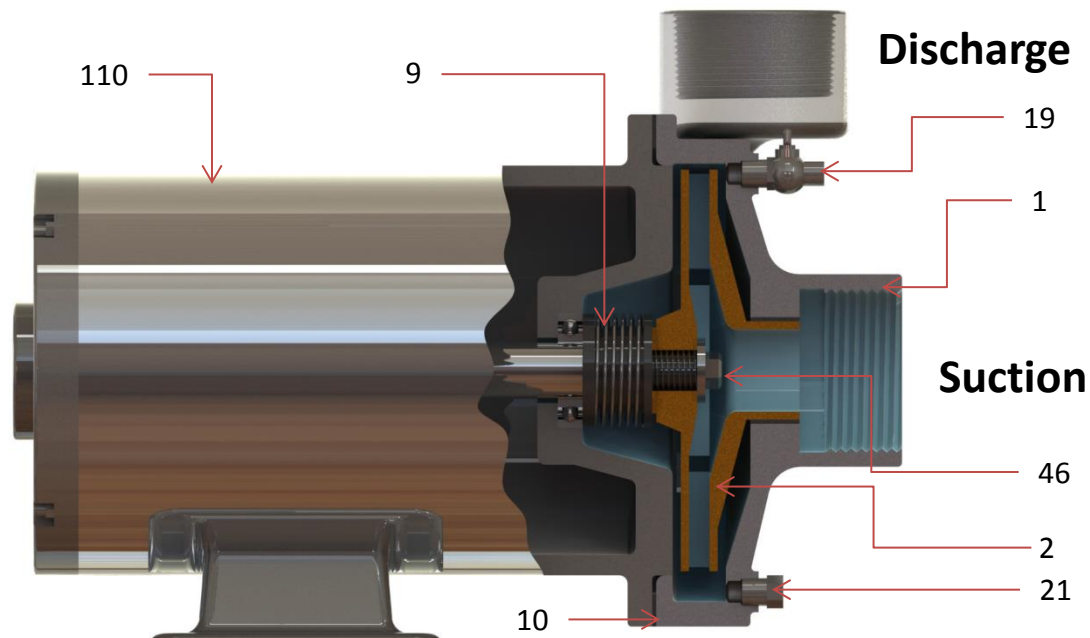
- ☐ Individual Pump Circuit Breaker with through the door handle mechanisms
- ☐ Single feed power distribution block
- ☐ Control Circuit Transformer with 115V fused secondary
- ☐ Program Logic Control (PLC)
- ☐ 3.5” HMI Color Screen with programming capabilities
- ☐ System Flow in GPM
- ☐ System Pressure in PSI
- ☐ Low Suction Pressure Alarm with cut-out
- ☐ Low system pressure alarm
- ☐ High System Pressure Alarm
- ☐ VFD Failure/Status
- ☐ Dry Contacts for all alarm for remote indication
- ☐ Common audible alarm with silence push button
- ☐ Terminal Blocks

- ☐ All alarms provided with time delay adjustable via HMI to minimize false alarms.

- ☐ UL508 Certification

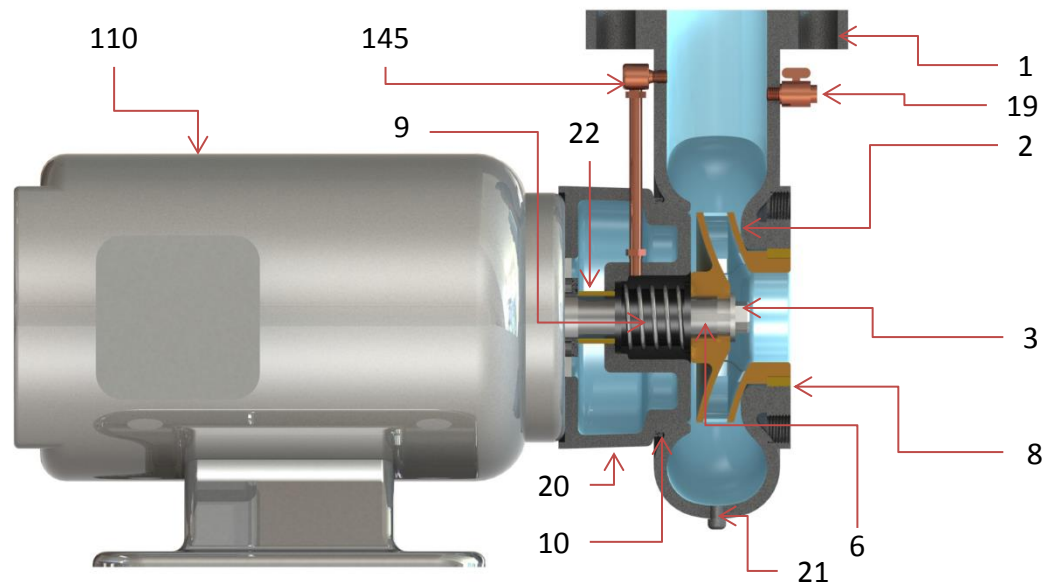
- ☐ Monitor Panel mounted and wired to system variable speed drives with drive back up indication of individual pump performance and digital readout of ‘Pump Genius’ features.

Type: CC Series



Part No.	Part Name	No. Required	Cl/Bronze Fitted
1	Pump casing	1	Cast Iron
2	Impeller	1	Bronze
9	Mechanical seal	1	Ni-resist/Viton
10	Casing gasket	1	Veg. Fiber
12	Radial bearing	1	Steel-Ball Bearing
19	Vent cock	1	Brass
21	Plug	1	Steel
22	Cap screw	4	Steel
46	Impeller set screw	1	Stainless Steel
110	Motor	1	ODP/TEFC

Type: CG/CK Series



Number	Name	Required	CI/Bronze Fitted
1	Pump casing	1	Cast iron
2	Impeller	1	Bronze
3	Impeller lock screw	1	Stainless Steel
6	Impeller key	1	Stainless Steel
8	Case Wear ring	1	Bronze
9	Mechanical Seal	1	Ni-resist/Viton
10	Casing gasket	1	Veg. Fiber
19	Vent cock	1	Brass
20	Bracket	1	Cast iron
21	Case Drain Plug	1	Steel
22	Shaft Sleeve	1	Bronze
23	Flinger	1	Rubber
110	Motor	1	ODP/TEFC
145	Seal by-pass assembly	1	Copper