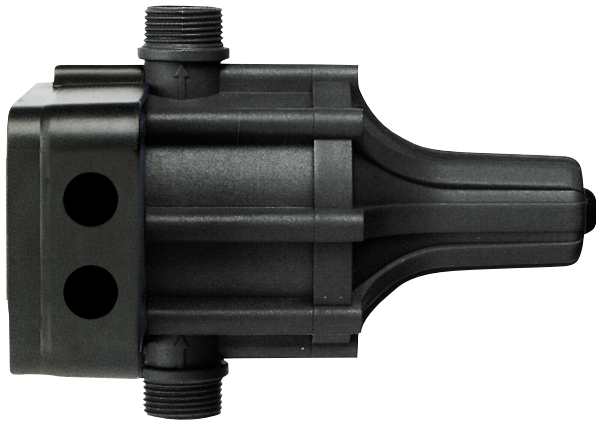


MASCONTROL®

Constant pressure - Constant flow



MASCONTROL®



An intelligent system

Mascontrol is the newest product innovation providing optimum control for electric pumps used in residential and commercial well, water conditioning irrigation and booster systems.

An intelligent mix of hydraulic and electronic engineering, Mascontrol monitors both pressure and flow and automatically controls pump operations.

Mascontrol eliminates the use of large expansion tanks needed with traditional systems. No plenum chambers to recharge, and no irritating variations in pressure and flow at the point of use.

Mascontrol also provides complete run-dry pump protection. No adjustment or maintenance is required. Much more compact than traditional tank systems, Mascontrol is absolutely dependable, durable and simple to install. Over four million units currently in use world-wide.

Mascontrol is the most advanced and economical solution for controlling electric pumps.

Features of operation

- Eliminates pressure tank and switch
- Maintains constant pressure and flow
- Built-in check valve
- Built-in run-dry protection
- Dual voltage 115 V or 230 V
- Absorbs water hammer
- Simple installation saves time and space
- No adjustment or maintenance required
- Can be used with surface or submersible pumps

Features of construction

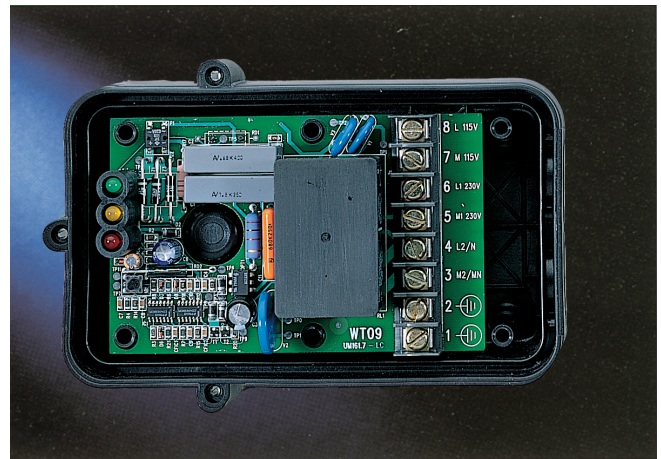
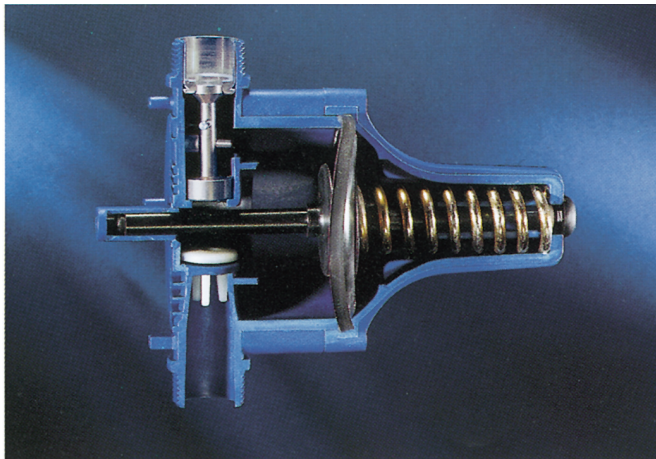
Mascontrol includes a hydraulic section and electronic control box.

The hydraulic section comprises:

- a moulded housing in reinforced plastic.
- a diaphragm and spring responsive to variations in pressure.
- a valve responsive to variations in flow.
- a check valve.

The electronic section comprises:

- a NEMA 12 electronic box molded in self-extinguishing plastic.
- a relay with special contacts and an electrical life of over 300,000 cycles or approximately 10 years (continuous rating).
- a varistor protecting against voltage peaks.
- zero - crossing electrical technology.



Listed by Underwriters
Laboratories Inc. to U.S.
and Canadian safety standards

MADE IN ITALY

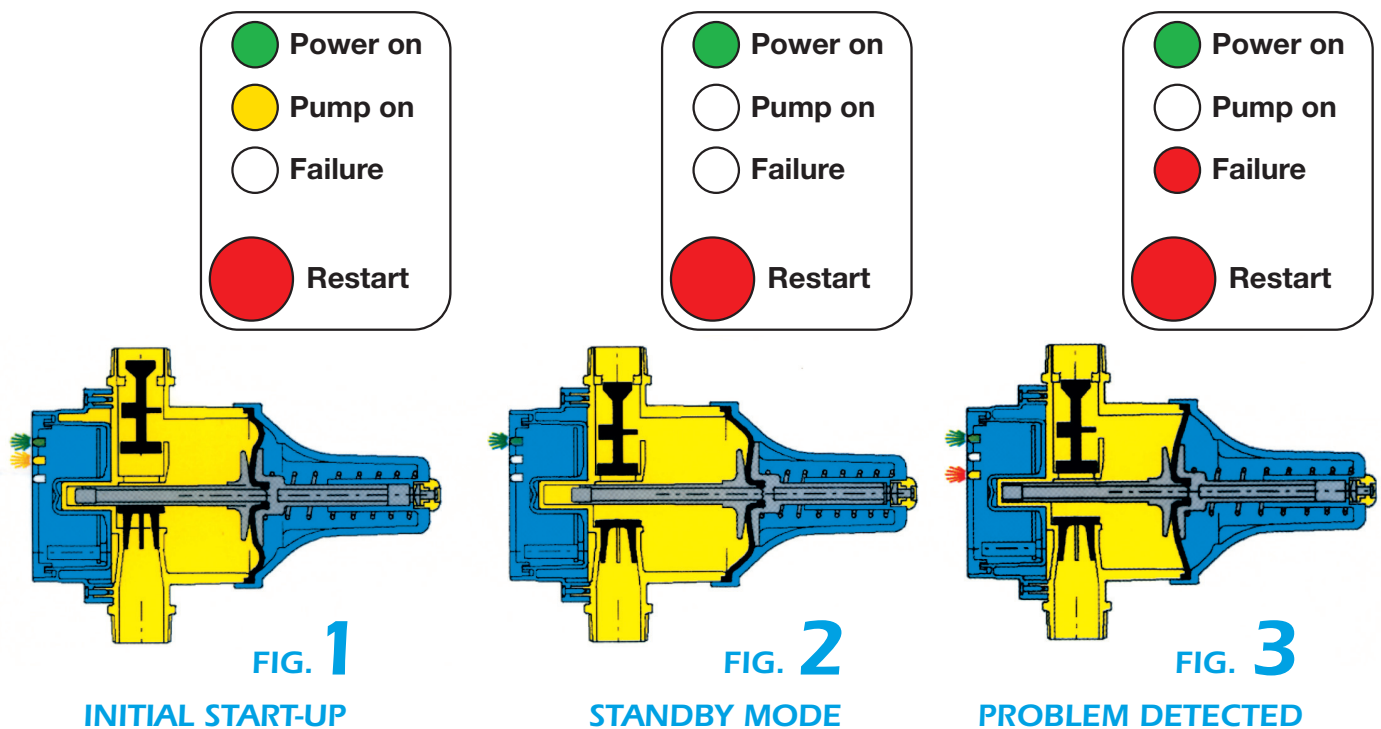


Fully in compliance with current EEC directives.

Materials

Housing	Glass fiber reinforced polyamide PA 6 FV 30%
Diaphragm	EPDM
Spring	Steel C 72 UNI 3545
Flow valve	Stainless steel AISI 304
Check valve	Glass fiber reinforced polyamide PA 6 FV 30%
Control box	Self extinguishing thermoplastic resin 94 - 5 VA
Printed circuit	Vetronite

Operation



The system's easy operating steps are displayed by indicator lights on a small panel on the front of the control box. Two of these will light up when the Mascontrol is connected to the power supply: **Power on** (green) and **Pump on** (yellow), indicating that the circuit powered up and the pump is running (see fig. 1). The pump will continue to operate for a few seconds so that pressure can be established in the system.

At this point, the pump is automatically shut off and switched to the standby mode (green light on), ready to respond to the various monitoring and control signals generated by the system (fig. 2). Whenever a tap or valve is opened, the pump is immediately started by the Mascontrol unit and continues to run as long as the tap remains open (fig. 1). For submersible residential pump systems a 2 or 4.5 gal. total volume tank is recommended to compensate for small water demands. When the tap is closed, the Mascontrol unit shuts off the pump, returns the system to maximum pressure and reverts to the standby mode (fig. 2).

Irregular operating conditions such as a dry or blocked inlet line, etc., are recognized by the **Failure** light (red light on). The pump is shut off immediately.

Once the problem is corrected the user need only press the red **Restart** button to restore normal operation (fig. 3).

If power is lost, the Mascontrol system will reset and restart automatically when power is restored.

Technical Specifications

Dual-voltage	115V / 230 V	Electronic enclosure	NEMA 12
Acceptable power fluctuations	±10%	Maximum operating pressure	145 PSI
Frequency	50/60 Hz	Operating temperature	32-149 °F (0 -65 °C)
Amp rating (full load)	115V-16FLA / 230V-20FLA	Male threaded connections	1" or 1 1/4" NPT
Use contactor for higher amp draws		Electrical conduit connections	1/2"

GRAPH INDICATING PRESSURE LOSSES

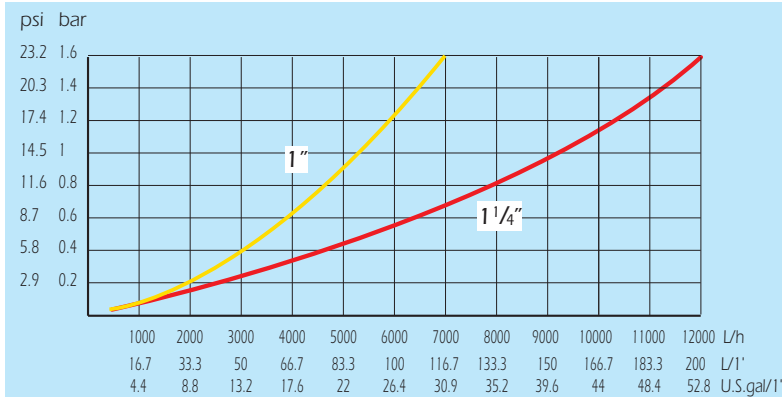
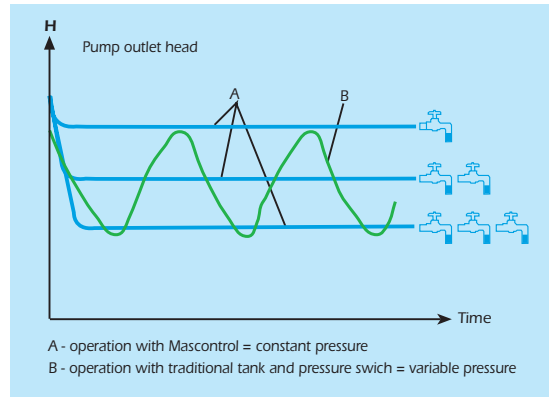
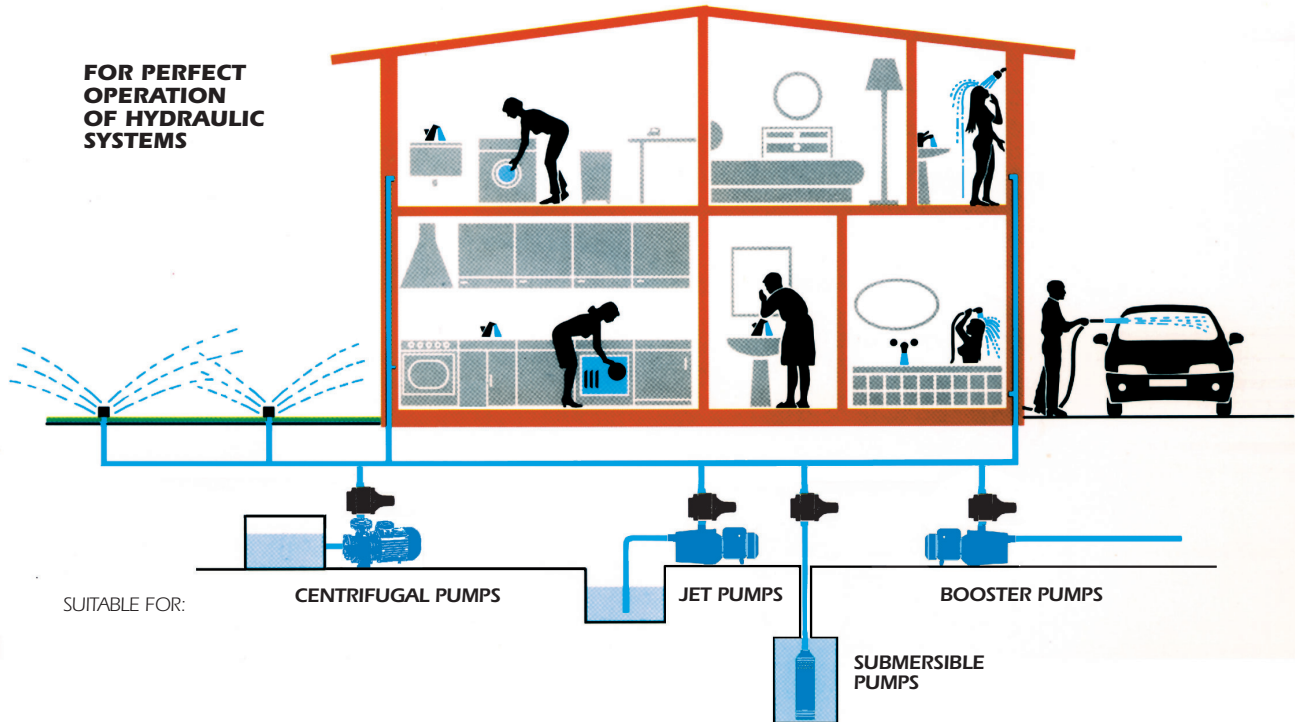


TABLE SHOWING COMPARATIVE PRESSURES



Mascontrol is available in 1" and 1 1/4" models. By utilizing a bypass, the Mascontrol is adaptable to almost any flow and horse power pump. Product warranty is two years from installation date (see footnote below). Replacement parts are the electronic box and hydraulic body - no rebuilds required.

- Mascontrol 1" - for flows up to 15 GPM
- Mascontrol 1 1/4" - for flows up to 25 GPM
- Use bypass application with either model for flows in excess of 25 GPM.



WARRANTY AND DISCLAIMER OF WARRANTY

The following warranty for the product is in lieu of all other conditions or warranties, whether express, implied or statutory, including but not limited to any implied conditions or warranties of merchantability or fitness for a particular purpose and on any other condition or warranty obligation on the part of the manufacturer or its distributors, which are hereby expressly disclaimed. Mascontrol is warranted to be free of defects occurring either in hydraulic or electronic parts for a period of two years from date of installation when installed by a licensed professional in accordance with the product manual and due professional care. The manufacturer reserves the right to inspect and evaluate defective units prior to warranty claim settlement. Improper installation, application or mishandling of unit voids the warranty.

MASCONTROL® . . . the future of pump control

ABOUT MASCONTROL . . .

Mascontrol was developed in Europe as a high tech NO maintenance pump controller to replace the traditional "low tech, high maintenance" pressure tank used in water well applications. It provides constant pressure and flow at the tap eliminating the annoying pressure and flow variance with traditional tank systems. The device is suitable for surface and submersible pumps and can be used in residential and commercial applications including irrigation systems and high flow applications.

Mascontrol is primarily a flow detection device that senses flow down to 0.21 gallons per minute. When a tap is opened, Mascontrol senses the flow and starts the pump. When the tap is closed, Mascontrol operates the pump for an additional 8 seconds to repressurize the system and prevent short cycling the pump. The device has a built in run-dry sensor that prevents pumps from burning up due to low water tables, blockages, loss of prime, etc. It also has a built in check valve. The device requires NO maintenance and the Mascontrol's life expectancy has been tested beyond 300,000 pump cycles or about 8 to 10 years at 30,000 cycles per year. Over 3,000,000 units are in service worldwide. Our failure rate on properly installed units is less than one-half of one percent.

Mascontrol efficiency . . . Most tank systems are sized to refill about every two minutes during constant water usage, i.e. during baths and showers, lawn irrigation, clothes washing and dishwasher usage. Depending on the tank size and water delivery, during most showers that last ten minutes the traditional tank may be refilled at least four to five times, which means the pump was restarted four to five times. Mascontrol starts the pump ONE time and runs the pump until the tap is closed, operating the pump more efficiently by reducing the number of pump starts and eliminating the "amp spikes" or high electricity consumption associated with those unnecessary pump start ups. Although the Mascontrol cycles the pump for small water demands, it significantly reduces the overall daily pump cycles by starting the pump only once for higher demand usage.

We are certain you will enjoy the constant pressure and flow that Mascontrol provides in addition to enjoying the no maintenance benefits and added protection of our built in run-dry sensor and check valve. Should you have questions about our product, please contact your professional installer.

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FEATURES AND BENEFITS

- Eliminates pressure tank and switch.
- Maintains constant pressure and flow.
- Provides built-in run-dry protection.
- Has built-in check valve.
- Dual voltage system – operates either 115V or 230V pumps.
- Absorbs water hammer.
- NO adjustment, NO maintenance required.
- Can be used with surface and submersible pumps.
- Simple installation saves professional's time.
- Can be used for high flow applications by installing on a bypass.
- Controls high horsepower pumps when wired with a contactor.
- Can be used for domestic well, irrigation, and water treatment applications.
- Saves space versus traditional tank systems – mobile home, crawl space, garage etc.
- Excellent for booster pump applications and chlorinator/chemical feed applications.
- Electronic box is separate from hydraulics for service or replacement.
- Mascontrol tested beyond 300,000 cycles (approximately 10 years of use).
- Reported failures for 1999 were less than 1/3 of one percent.
- Automatically resets when power is restored after an outage.
- Built-in short cycle protection.
- Over 3,000,000 units in use worldwide.
- Saves space in distributor's warehouse and on service trucks.
- Reduces pump starts on many well systems.



INSTALLATION GUIDELINES

- Must always be installed in the vertical position, flow arrows up, electronic box level.
- Must always be installed between the pump and first tap.
- Use pressure-reducing valve on high-pressure surface pumps and all submersible pump applications.
- Use only Teflon tape for Mascontrol connections. Pipe dope causes failures!
- Pump's maximum pressure cannot be less than 33.4 psi.
- Maximum column of water (height) above Mascontrol cannot exceed 50 feet.
- Always install a ball valve after the Mascontrol for system service.
- Always confirm electrical characteristics of pump motor before installation, e.g. full load amps and voltage.
- Always confirm line pressure after installation. (Install pressure gauge on service side of system.)
- Follow appropriate wiring diagrams in Owner's Manual or inside the Mascontrol electronic box cover.
- Use liquid-tight non-metallic conduit and connectors/cord grips rated NEMA 12.
- Mascontrol's maximum operating pressure is 145 psi. (MC was tested above 575 psi.)



HOW IT WORKS

The Mascontrol® is a FLOW-BASED system and not a pressure-based system, eliminating the need for a pressure tank and switch. When a tap is opened the pump is started and supplies water to demand. When the tap is closed, the Mascontrol shuts down the pump after 8 seconds to repressurize the system and prevent pump short cycling. Minimum flow required to start the pump is 0.21 gpm. If the system has flows less than 0.21 gpm, Mascontrol will repressurize the system when the system pressure drops below 22 psi.

We do not adjust the motor speed. Pressure and flow at the taps are determined by the pump's capabilities. As demand exceeds the pump's capabilities or curve, pressure and flow will drop. Based on typical domestic usages, a pump controlled by the Mascontrol usually operates in the middle of the pump's curve where electrical consumption is optimal and flow and pressure is consistent. Mascontrol also allows for more efficient pump sizing in many applications.



SETTING SYSTEM PRESSURE

System pressure is determined by the pump. When the pump's pressure exceeds desired system pressure, a pressure regulator is installed ahead of the Mascontrol to set the desired system pressure. We recommend using a standard pressure regulator with ALL submersible pump applications. The maximum pressure generated by the pump remains ahead of the system on the pump side of the regulator. System pressure can easily be adjusted with the regulator.



USING PRESSURE TANKS AND REVERSE OSMOSIS SYSTEMS

Tanks up to 2-gallon drawdown:

Some applications require a small pressure tank to be used in conjunction with the Mascontrol. These applications generally include systems with designed low-flow water usages (less than 0.21 gpm) such as Reverse Osmosis systems or swimming pool evaporation compensators.

These applications involve fractional GPM flows. To supply these minimal flows without starting the pump, we recommend installing a small one-half to two-gallon drawdown tank (WX101 or WX102) after the Mascontrol. DO NOT use a pressure switch. Set the tank precharge at 15 to 30 psi depending on drawdown and delay required.

The small tank will feed the low-flow application and substantially delay pump startup. When normal flow taps are opened the small tank is rapidly depleted by the usage and constant pressure and flow is supplied to demand points.

Tanks over 2-gallon drawdown:

Although larger tanks may be used in conjunction with Mascontrol, we do not recommend using them as the water well homeowner will experience a differential in pressure and flow if the tank capacity is fully utilized. A WX101 or WX102 is sufficient in almost all applications requiring pump start delay. To incorporate a larger pressure tank in a system with the Mascontrol, set the tank precharge approximately 10 psi below the designed system pressure. This allows for some drawdown from the tank before the pump is started. It also means the homeowner will experience a 10 psi variation in pressure before the Mascontrol will detect flow and start the pump.



CICLYNG AND PUMP LIFE

We have tested various types and brands of pumps, domestic and foreign, to determine the number of cycles a pump can endure under the most demanding conditions. While our tests are certainly not conclusive, they provide us with some representative data regarding cycling and pump life.

Our tests are conducted in ambient conditions. A pump is cycled continuously with 8 seconds of run time and 15 seconds of rest time until the pump fails.

Depending on the pump and motor quality, we have found that under the above conditions surface pumps (jets and centrifugals) 2 horsepower and under lasted between 240,000 and 500,000 cycles. Submersible pumps, under the same conditions, reached between 190,000 and 300,000 cycles before failing.

Annual household pump cycles vary depending on the number of occupants, water habits, etc. At 30,000 cycles per year, the surface pumps tested above would have lasted between 8.0 and 16.7 years, the submersibles between 6.3 and 10 years. Certainly under normal operating conditions one could expect the pumps to last longer.

Water quality, inconsistent power supply and lightning damage also affect a pump's life and contribute to premature pump failure.



IRRIGATION APPLICATIONS

Hand Watering with Irrigation Systems

One of the distinct advantages of the Mascontrol versus pump start relays is the ability to use hose bibs for hand watering in conjunction with the irrigation system. Most irrigations systems utilize the Mascontrol on a bypass, and we will focus on this application.

Mascontrol acts as a “pilot” control when used on a bypass. CONSISTENT flow must pass through the bypass on ALL irrigation zones. As flow decreases and pressure increases, it becomes more difficult to move water through the bypass consistently. This becomes readily apparent when larger pumps and mains are needed for bigger irrigation jobs and the customer wants the hand watering feature enabled.

The professional must first determine if adequate cooling will be supplied to the pump when utilizing the hand watering system. A one-inch bypass can supply well over 25 GPM but with moderate to heavy friction losses. If excess pressure is available, this will be of minor concern. BUT, THE SIZE OF THE HOSE OUTLETS AND LINES TO THEM ARE VERY IMPORTANT! THEY SHOULD BE ABLE TO SUPPLY ENOUGH WATER FOR THE APPLICATION AND TO PROVIDE ADEQUATE PUMP COOLING.

How much water is enough for cooling? Follow pump manufacturer’s guidelines, especially for submersible pump applications involving ponds or streams. Pump depth and water temperature may vary significantly in some applications. Pond temperatures vary significantly at different depths depending on season, flow, location and depth of water.

Next, water should CONSISTENTLY flow through the bypass during hand watering. If it does not, Mascontrol will cycle the pump because the unit is reading a periodic stoppage of flow in the bypass. To avoid this situation, begin to close the ball valve between the inlet and outlet of the bypass to throttle more water into the bypass. If this restricts too much flow for the irrigation cycle, install a master valve with a check valve installed immediately after it between the inlet and outlet of the bypass. (See “Bypass Application With Master Valve” illustration.) The master valve operates with the irrigation clock and closes when irrigation is finished. During hand watering, the master valve is closed and all water flows through the bypass eliminating the cycling.

Multi-Zone Systems - Pump Cycling with Bypass

Problem: The pump cycles with one but not all zones. First, be certain a PRESSURE GAUGE is installed on the system after the Mascontrol. The gauge will show exactly what is happening to pressures on each zone.

Cycling on one zone usually occurs when that zone’s GPM requirements are much lower than the others and closing the ball valve is impractical due to flow restriction to the other zones. For instance, assume a 50 GPM pump, and three zones. The first two zones use 38 and 43 GPM respectively, but the last zone only uses 15 GPM.

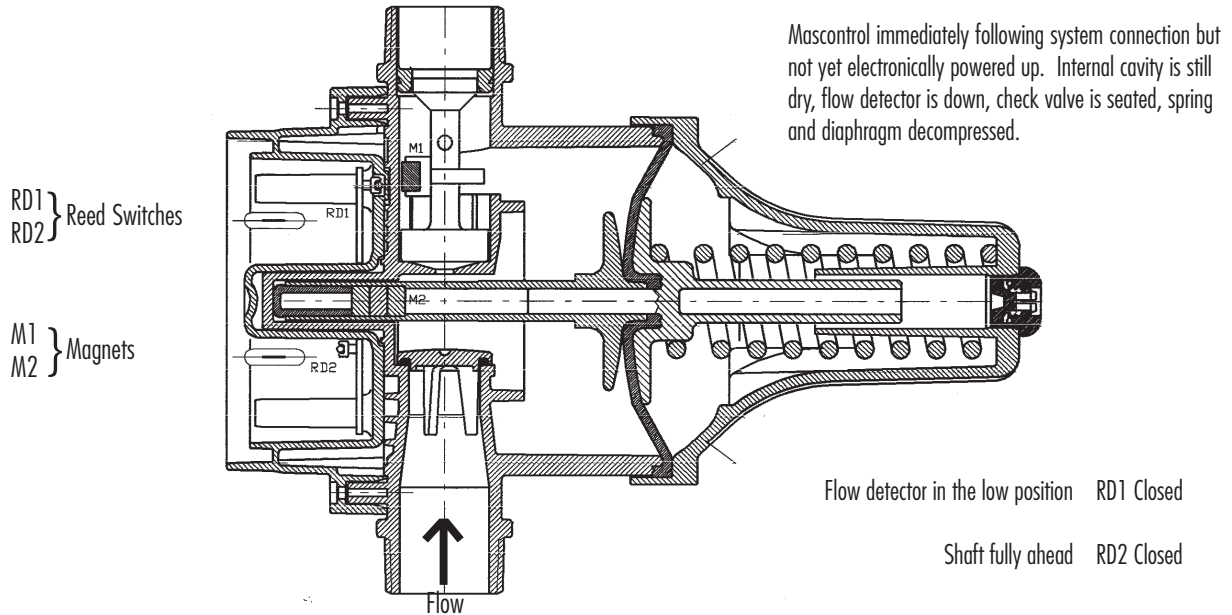
The pressure will increase on this zone and may cause inconsistent flow in the bypass.

Solution: Increase the GPM usage on the last zone by installing more heads and/or discharge enough water back into the well, pond or lake to more closely match demand with pump size.

Important Points to Remember

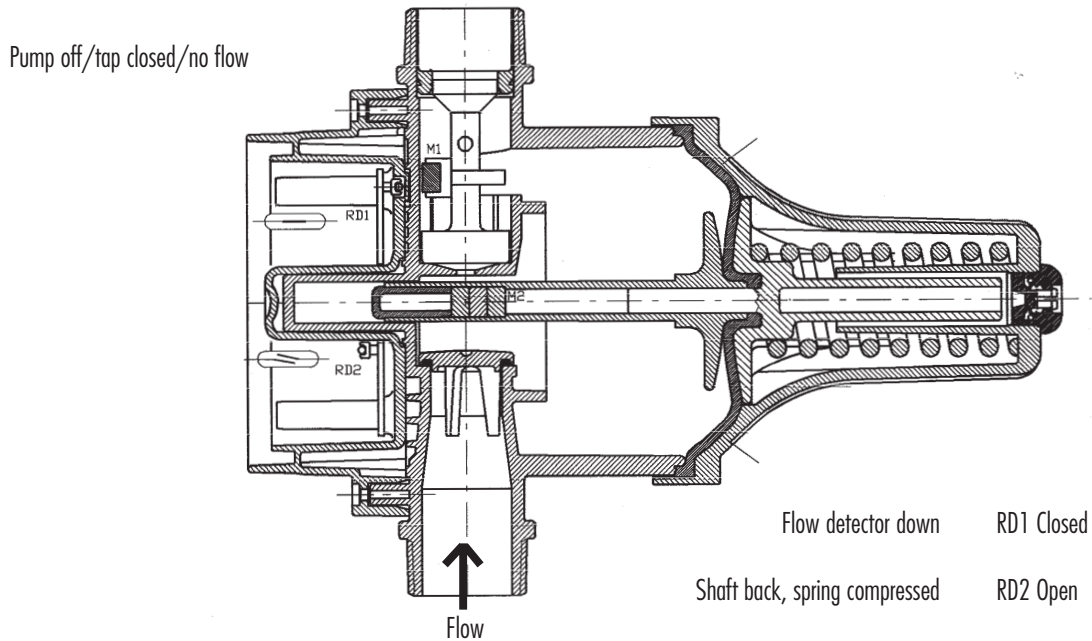
- Pumps should be sized for the flows and pressures required.
- Hand-watering applications should allow for proper pump cooling.
- Generally a bypass is used with: surface pumps above 18 GPM; submersible pumps above 25 GPM due to friction loss.
- Master valves can be used with older irrigation systems when leaks ahead of zone valves are present or the zone valves themselves are faulty.
- Normal residential irrigation equipment is designed to work with pressures between 40 and 60 PSI.
- Most problematic applications involve retail customers asking the professional to accomplish the impossible!
- If unsure of the application, please call your distributor prior to installation if possible.

MASCONTROL® Working Features



When the unit is powered up electrically, the electronic card gives a start signal to the pump which starts working for about 8 seconds (1st timer). The positions of the flow detector and the shaft are modified because of the flow and pressure produced inside the unit which, therefore, automatically resets to reach the condition shown in Illustration 2. If the system requires additional time to pressurize, the unit remains in the static condition (shutdown condition). In this case, the RESET button must be kept depressed until the red LED is off (water is flowing through the Mascontrol).

MASCONTROL® Working Features



The unit stops the pump which starts again automatically when a tap is opened. The pump stops approximately 8 seconds after M1 closes RD1 (2nd timer).

MASCONTROL® Working Features

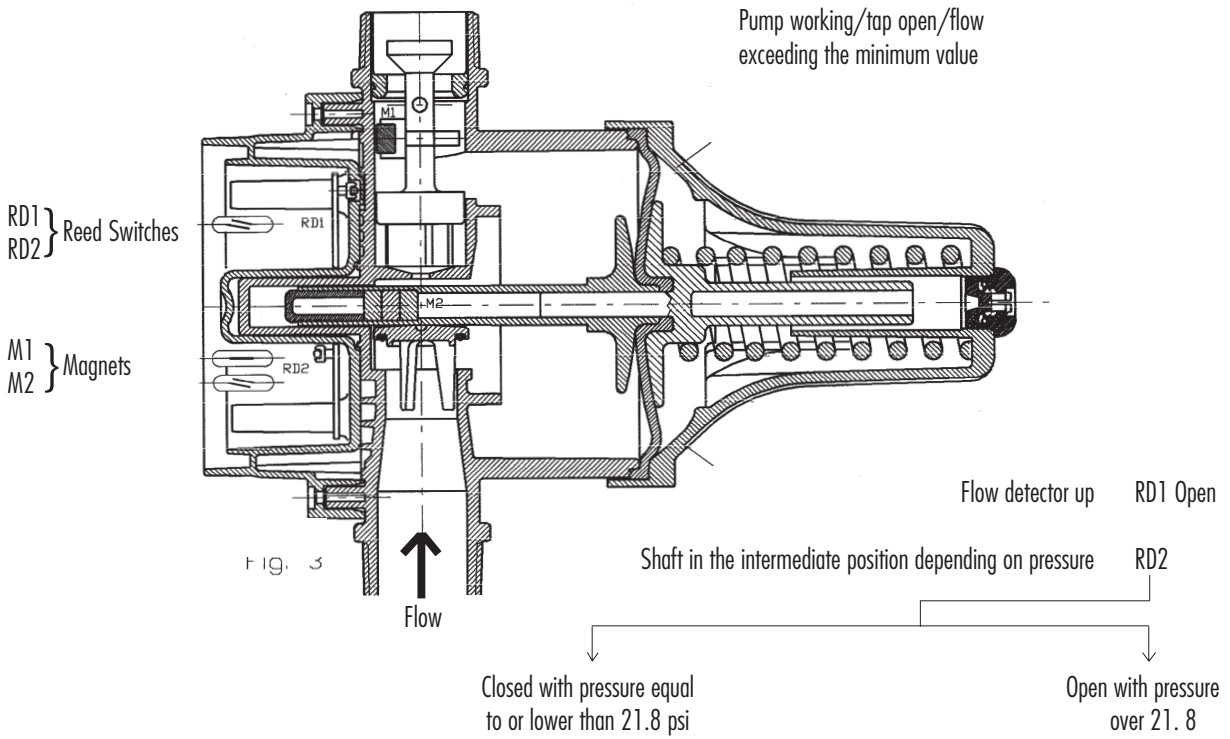


Illustration 4

MASCONTROL® Working Features

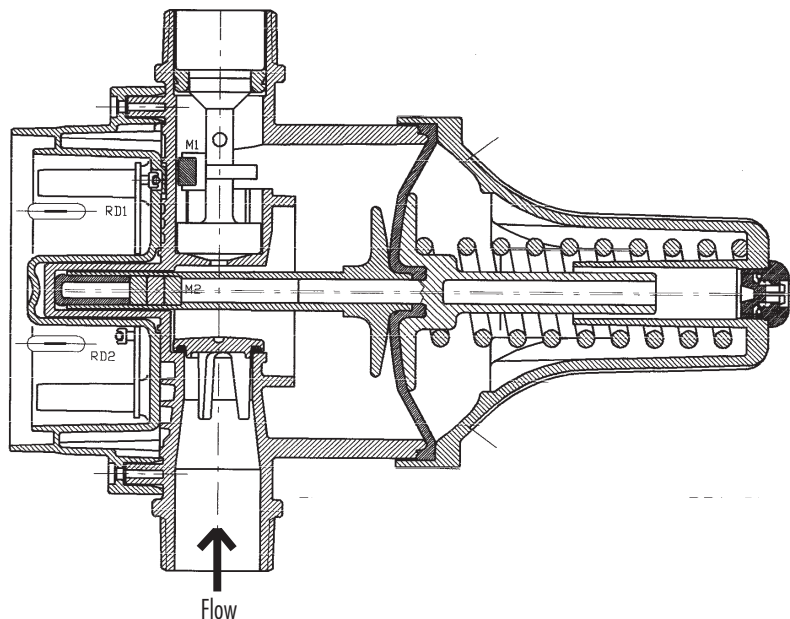
When a tap is opened, the flow inside the unit raises the flow detector. The flow detector opens RD1 through M1 and starts the pump which continues running while flow is present. The minimum flow required to raise the flow detector is .21 gpm. A flow less than that is considered a small leak. In this case, the internal pressure of the Mascontrol "bleeds off" (say from a leaky faucet) until the cut-in pressure of 21.8 psi is reached. At this stage the unit opens RD2 through M2 and repressurizes the system. This type of unit starting can be considered secondary since the start signal to the pump is normally given by the flow from opening a tap. This feature of Mascontrol ensures the system is pressurized at all times.

Pump working/tap open
but NO flow/NO pressure

Shutdown condition

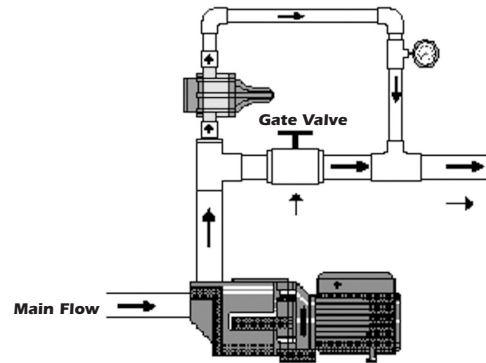
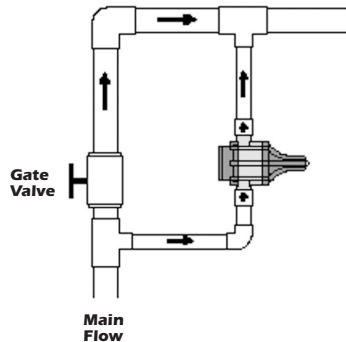
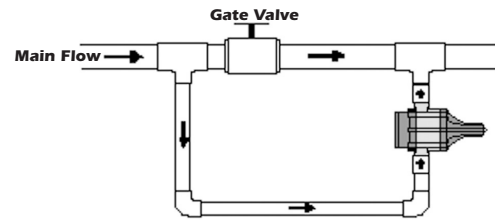
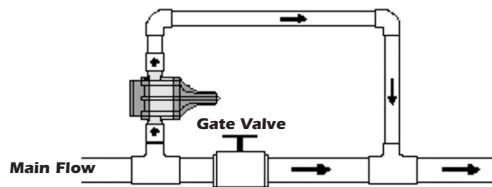
The unit stops the pump (i.e. run-dry condition).
Manual resetting of the system allows the pump
to start again.

The pump stops approximately 8 seconds after
M1 closed RD1 (3rd timer).



BYPASS ILLUSTRATIONS

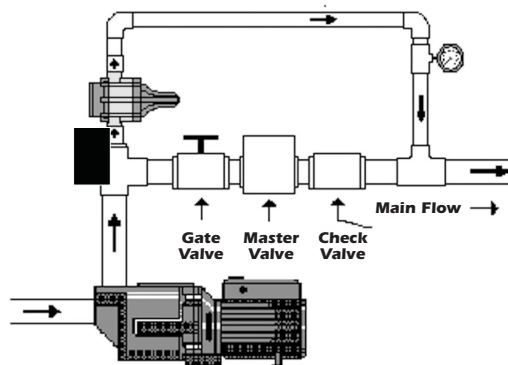
The Mascontrol can be used to control pumps in high flow applications when installed on a 1-inch bypass. Below are illustrations of typical applications. The gate valve serves as an adjustment to “throttle” at least 0.21 gpm into the bypass.



Preferred bypass application for all types of pumps. Very reliable for low flow higher pressure applications, or where flows and pressure will vary with irrigation zones/events.

BYPASS APPLICATIONS WITH MASTER VALVE

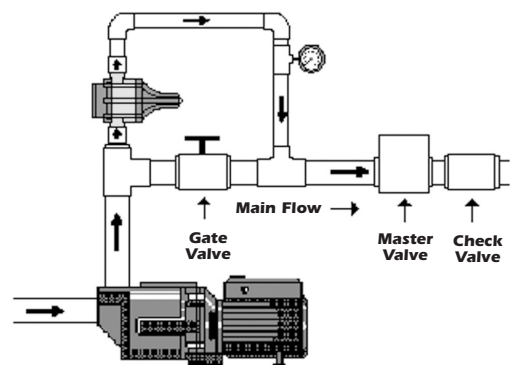
Master Valve used for Hand Watering in High Flow Irrigation Application (Master Valve Controlled by Irrigation Clock)



When using multistage centrifugal pumps, a MASTER VALVE can be used to open the MAIN when irrigating ensuring maximum flow. It closes with the last zone on the irrigation clock and allows for hand watering utilizing the bypass only, ensuring consistent flow through the bypass when hand watering only.

Be certain the flow rate through the bypass alone allows for proper pump cooling. With normal pressures the 1-inch bypass is capable of 25 GPM with 14 PSI friction loss using the bypass only. Lower flow rates will yield less friction loss. See friction loss chart in manual.

Master Valve on Main After Bypass



MASTER VALVE is located on the MAIN after bypass. This application is used for older irrigation systems that have troublesome zone valves or leaking pipes ahead of zone valves. MASTER VALVE operates with the irrigation clock and assures a leak-free system.

Pump Cycle Chart

MASCONTROL vs Pressure Tanks

Family of Four

Fixture	Avg Flow Rate GPM	Gallons per Event	Gallons per Week	Events per Day	Events per Week
Faucets (indoor)	2	2	280	20	140
Toilet Flush	4.5	6	504	12	84
Shower	5	40	1040	4	26
Bathub	6	30	60	1	2
Clothes Washer	4	40	240	1	6
Dishwasher	2.5	10	50	1	5
Lawn Sprinkler/Irrigation	5	414	1242	1	3
Totals			3416		266

M A S C O N T R O L	Cycles per Week										Cycle Difference - Mascontrol More (Less)				
	Tank Size 20gal/5.4 drwdwn	Tank Size 32gal/9.5 drwdwn	Tank Size 44gal/11.9 drwdwn	Tank Size 62gal/16.7 drwdwn	Tank Size 86gal/23.2 drwdwn	Tank Size 119gal/32.1 drwdwn	MASCTRL vs 20 gal.	MASCTRL vs 32 gal.	MASCTRL vs 44 gal.	MASCTRL vs 62 gal.	MASCTRL vs 86 gal.	MASCTRL vs 119 gal.			
	56	84	26	2	2	12	9	4	27	32	39	44	47		
56	84	26	2	2	12	9	4	27	32	39	44	47			
84	26	2	2	12	9	4	27	32	39	44	47				
26	2	12	9	4	27	32	39	44	47						
2	2	12	9	4	27	32	39	44	47						
2	12	9	4	27	32	39	44	47							
12	9	4	27	32	39	44	47								
9	4	27	32	39	44	47									
4	27	32	39	44	47										
27	32	39	44	47											
32	39	44	47												
39	44	47													
44	47														
47															
Totals	193	633	360	287	205	147	106	-440	-167	-94	-12	46	87		
Average Starts per Day	28	90	51	41	29	21	15	-63	-24	-13	-2	7	12		
Average Starts per Year	10064	32985	18749	14968	10666	7678	5549	-22922	-8686	-4904	-602	2386	4515		

Chart data and assumptions:

Most of the chart data is comprised of industry standard averages for flow rates, gallon usages, and gallons consumed daily (gcd) per capita (person). The purpose of this chart is to approximate a family of four's water usage during the average week. We assumed that each person bathes daily and that a faucet is used immediately following toilet use. The irrigation is the Applied Water Required (AWR) for the Charleston, South Carolina area and assumes 3500 sq ft of grass with trees and shrubs (approximately 1/12 of an acre). The gcd per capita can be compared to the American Water Works Association study on Household End Use of Water copyright 1998. We differ from that study in shower gcd, as we assume an eight minute shower. Therefore our percentage of inside water use for other fixtures will be lower than that study because we have allowed more time and gallons for showers. The pressure switch setting on all tanks is 40 - 60 PSI which approximates the homeowner's desired pressure. We used a leading tank manufacturer in our examples because most distributors and well drilling/plumbing professionals are familiar with their sizes and performance.

ANA, Inc. 5.99

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