CONTINUE

IRRIGATION PRODUCTS

Irritrol® SYSTEMS

CONTINUE

2001

NEW, EXCITING

CONTINUE

Irritrol® SYSTEMS

. . . AND BEYOND

Quality products. Nothing less. That's our promise to you for 2001.

We know that your reputation (and profit) ride with the products you sell and install. So Irritrol Systems is committing extensive resources to ensure that our products perform to your expectations — all day, every day!

Quality starts with a commitment. It doesn't just happen. At Irritrol Systems, that commitment reaches into every aspect of our product-development cycle. From initial research and engineering to manufacture and testing, we continually refine our existing procedures and initiate new ones. Periodically, we step back from how things traditionally are done and re-evaluate each step of the process. Where fine-tuning is needed, we fine tune. Where surgery is called for, we get out the scalpel.

Our goal is to provide you with the finest, most reliable irrigation products in the industry. To do this, thousands of hours and millions of dollars have gone into producing the more than 200 products included in this catalog. And, as new products are introduced during the year, you can be confident that they, too, will be produced with this same absolute commitment to quality and performance.

No detail is too small; no task is too large in providing you with the products that make businesses successful — yours and ours.

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Total Control
1200

Controllers "At a Glance"

		Slim Dial™	304/306 Series	446/476 Series	Rain Dial® Series	Rain Dial® Plus Series
Applications	Residential	x	x	x	x	x
	Commercial					x
Operation	Hybrid	x		x	x	x
	Solid-state					
	Mechanical		x			
Stations		6	4, 6	6	6, 9, 12	6, 9, 12
Programs		2 independent	1 independent	2 independent	3 independent	3 independent
Start Times		4	5	4 or 8	9	9
Indoor/Outdoor		indoor	indoor/outdoor	indoor/outdoor	indoor/outdoor	indoor/outdoor
Water Budgeting						x
Electronic Circuit Breaker		x		x	x	x

		Total Control® Series	500 Series	Dial Series	MC Plus Series	IBOC Plus Series	IBOC100
Applications	Residential		x				x
	Commercial	x	x	x	x	x	x
Operation	Hybrid	x	x	x		x	
	Solid-state				x		x
	Mechanical						
Stations		6, 9, 12, 15, 18, 24	8, 12	7, 11, 16 18, 24, 36	4, 6, 8, 12, 18 24, 30, 36, 42	4, 8, 12	1
Programs		4 independent	2 independent	2 independent	4 independent	3 independent	1 independent
Start Times		16	4	6	11	24	1
Indoor/Outdoor		indoor/outdoor	indoor/outdoor	outdoor	outdoor	outdoor	outdoor
Water Budgeting		x		x	x	x	
Electronic Circuit Breaker		x	x	x	x	x	
Battery Powered						x	x
Solar Power Option						x	

SLIM DIAL™

6 stations (indoor)

Application

An ideal choice for residential landscapes requiring up to six stations, the Slim Dial hybrid controller combines the convenience of Guided Programming™ with the flexibility of two independent programs. It also offers a 365-day calendar for days of the week or odd/even programming with a total of up to four start times per day.

Features

- Two independent programs offer concurrent operation capability
- Automatic, semi-automatic and manual operation
- Guided Programming™
- Simple nine-position programming dial and large, self-prompting LCD
- 365-day calendar for days of the week or odd/even programming (adjusts for leap year)
- English/Spanish manual and quick-reference cards
- Battery backup keeps accurate time and maintains program during power failure
- Automatic safety backup program
- Master valve/pump start circuit
- Resettable circuit breaker protection
- Attractive, slim-line plastic cabinet
- Wiring skirt/conduit adapter hides wiring for professional installation
- UL and CSA listed

Operating Specifications

- Station run times: 1 minute to 4 hours in 1-minute increments
- Start times: 2 per program for up to 4 total
- Watering schedule: 365-day calendar for days of the week or odd/even programming

Electrical Specifications

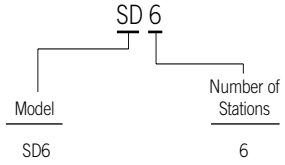
- Transformer input: 120 VAC, 60 Hz
- Transformer output: 24 VAC, .6 amp
- Maximum output per station: 24 VAC, .25 amp
- Maximum output to valves: 24 VAC, .50 amp
- Battery backup: 9-volt alkaline battery (not included)

Dimensions

Height: 6”
Width: 8 ½”
Depth: 2 ½”

SD6

MODELS | HOW TO SPECIFY



304/306 SERIES

CONTROLLERS

4 and 6 stations (outdoor/indoor)

Application

These reliable mechanical controllers, designed primarily for residential applications, provide dependable operation and a host of programming features to meet the specific needs of the homeowner.

Features

- One program
- Six- or seven-day calendar
- Master switch for "On/Off" and automatic settings
- Automatic and manual operation
- Light to indicate circuit operation
- Mechanical circuit breaker
- Master valve/pump start circuit
- Weather-resistant plastic, locking cabinet with an internal transformer (outdoor models)
- Durable plastic cabinet with an external transformer (indoor models)
- Wall mount
- UL listed

Operating Specifications

- Station run times: 5-45 minutes (304 models); 5-30 minutes (306 models)
- Start times: 1-5 per day
- Watering schedule: 6- or 7-day calendar

Electrical Specifications

- Circuit breaker: 1.2 amps minimum holding
- Transformer input: 120 VAC, 60 Hz
- Transformer output: 24 VAC, 1.25 amps
- Maximum output per station: 24 VAC, 1.0 amp
- Maximum output to valves: 24 VAC, 1.0 amp (including master valve)

Dimensions

Outdoor	Indoor
Height: 9 ½"	Height: 7"
Width: 6"	Width: 5"
Depth: 4"	Depth: 3"

304PRi

306PR

MODELS HOW TO SPECIFY

304 PR

Model	Number of Stations	Outdoor/Indoor Mount Option
304PR	4	outdoor
306PR	6	outdoor
304PRi	4	indoor
306PRi	6	indoor

446/476 SERIES

6 stations (outdoor/indoor)

Application

Designed primarily for residential applications, these easy-to-use hybrid controllers provide a variety of flexible, at-a-glance programming options and reliable performance at an economical price.

Features

- Two independent programs
- Simple, at-a-glance programming and program review
- Program stacking
- Automatic, semi-automatic and manual operation
- Self-diagnostic electronic circuit breaker identifies and overrides an electrical malfunction of a valve
- Surge protection on input
- Battery backup keeps accurate time and maintains program during power failure
- Automatic safety backup program
- Master valve/pump start circuit
- Weather-resistant plastic cabinet with an internal transformer (outdoor models)
- Durable plastic cabinet with an external transformer (indoor models)
- Wall mount
- UL and CSA listed

446 Series

- Day interval calendar options of every-day, every-second-day, every-third-day and every-fourth-day
- Interrupt/pause function

476 Series

- Seven-day calendar or interval options of every-day, every-second-day or every-third-day
- Manual advance

Operating Specifications

446 Series

- Station run times: 2-99 minutes
- Start times: 2 per program for up to 4 total
- Watering schedule: Day interval calendar options of every-day, every-second-day, every-third-day and every-fourth-day

476 Series

- Station run times: 2-60 minutes
- Start times: 4 per program for up to 8 total
- Watering schedule: 7-day specific calendar or day interval options of every-day, every-second-day or every-third-day

Electrical Specifications

- Transformer input: 120 VAC, 60 Hz
- Transformer output: 24 VAC, 1.25 amps
- Maximum output per station: 24 VAC, .5 amp
- Maximum output to valves: 24 VAC, 1.0 amp (including master valve)
- Battery backup: 9-volt alkaline battery (not included)

Dimensions

Outdoor	Indoor
Height: 9 ½”	Height: 7”
Width: 6”	Width: 5”
Depth: 4”	Depth: 3”

446PR

476PRi

MODELS HOW TO SPECIFY

446 PR

Model	Outdoor/Indoor Mount Option
446PR	outdoor
476PR	outdoor
446PRi	indoor
476PRi	indoor

RAIN DIAL® SERIES

CONTROLLERS

6, 9 and 12
stations (outdoor/indoor)

Application

This advanced-design hybrid controller provides exceptional scheduling flexibility to accommodate a wide variety of residential applications. Plus, it offers an exclusive modular design and convenient remote programming.

Features

- Three independent programs offer concurrent operation capability
- Seven-day calendar or "Skip Days" interval option from one to 15 days
- Easy-to-read programming dial and large, self-prompting LCD
- Automatic, semi-automatic and timed-manual operation
- Modular design allows easy removal of control module without disturbing valve wiring
- Self-diagnostic electronic circuit breaker overrides an electrical malfunction of a valve
- Electrical surge protection (on both input and output lines) resists damage from lightning storms and power surges
- Battery backup keeps accurate time and maintains program during power failure
- Master valve/pump start circuit
- Weather-resistant plastic, locking cabinet with an internal transformer (outdoor models)
- Durable plastic cabinet with an external transformer (indoor models)
- Wall mount
- UL and CSA listed

Operating Specifications

- Station run times: 1-59 minutes in 1-minute increments or 1-5.9 hours in .1-hour (6 min.) increments
- Start times: 3 per program for up to 9 total
- Watering schedule: 7-day calendar or "Skip Days" interval option from 1-15 days

RD600-EXT
Now with electrical surge protection

5 Year LIGHTNING WARRANTY

See page 78 for more information.

RD900-INT
Now with electrical surge protection

Electrical Specifications

- Transformer input: 120 VAC, 60 Hz
- Transformer output: 24 VAC, 1.25 amps
- Maximum output per station: 24 VAC, .5 amp
- Maximum total output to valves: 24 VAC, 1.0 amp (including master valve)
- Battery backup: 9-volt alkaline (not included)

Dimensions

Outdoor	Indoor
Height: 7 ¾"	Height: 7 ¾"
Width: 10 ¾"	Width: 7"
Depth: 4"	Depth: 3 ¾"

MODELS | HOW TO SPECIFY

RD 600-EXT

Model	Number of Stations	Outdoor/Indoor Mount Option
RD600 -EXT	6	outdoor
RD900 -EXT	9	outdoor
RD1200 -EXT	12	outdoor
RD600 -INT	6	indoor
RD900 -INT	9	indoor
RD1200 -INT	12	indoor

RAIN DIAL® PLUS SERIES

CONTROLLERS

6, 9 and 12
stations (outdoor/indoor)

Application

Irritrol Systems' Rain Dial® Plus controller offers a host of enhanced features, including a 365-day calendar, water budgeting, advanced surge protection and non-volatile memory.

Features

- Three independent programs offer concurrent operation capability
- 365-day calendar with automatic weekday calculation for odd/even day watering options and auto leap year adjustment
- Easy-to-read programming dial and large, self-prompting LCD
- Electrical short circuit station detection and display
- Multiple language capabilities (English, French, German, Italian and Spanish)
- Easy-to-understand icons
- Automatic, semi-automatic and timed-manual operation
- Modular design allows easy removal of control module without disturbing valve wiring
- "Anywhere programming" feature provides convenient remote programming while under battery power
- Self-diagnostic electronic circuit breaker identifies and overrides an electrical malfunction of a valve
- Non-volatile memory holds program during power failure
- Battery backup keeps current time and date during power failure (battery included)
- Electrical surge protection (on both input and output lines) resists damage from lightning storms and power surges
- Start-time stacking when more than three valves are on
- Water budgeting option for each program (0-200%)
- Program erase for each program
- Master valve/pump start circuit
- Weather-resistant plastic, locking cabinet with an internal transformer (outdoor models)
- Durable, plastic cabinet with an external transformer (indoor models)
- Wall mount
- UL, CUL and CE listed

Operating Specifications

- Station run times: 1-59 minutes in 1-minute increments or 1-5.9 hours in .1-hour (6 min.) increments
- Start times: 3 per program for up to 9 daily starts
- Watering schedule: 365-day calendar with automatic weekday calculation for odd/even day watering options

RD12PLUS-EXT
Now with electrical surge protection

5 Year LIGHTNING WARRANTY

See page 78 for more information.

Electrical Specifications

- Transformer input: 120 VAC, 60Hz
- Transformer output: 24 VAC, 1.25 amps
- Maximum output per station: 24 VAC, .5 amp
- Maximum total output: 24 VAC, 1.0 amp (including pump relay/ master valve)
- Battery backup: 9-volt alkaline battery (included)

Dimensions

Outdoor	Indoor
Height: 7 ¾"	Height: 7 ¾"
Width: 10 ¾"	Width: 7"
Depth: 4"	Depth: 3 ¾"

Optional Accessories

- KwikStart™ remote control system kit (KSR-KIT) includes:
  - KS-Remote transmitter (KSR-T)
  - KS-Remote receiver (KSR-R)
  - KS-Remote 3' cable harness (KSR-CA03)
  - KwikStart™ remote adapter kit (KSR-ADP)
- KS-Remote 25' cable harness (KSR-CA25)
- All the items for the remote control system are also available separately

KwikStart™ Remote Control System

*for the new Rain Dial Plus**

- Attaches to Rain Dial Plus controllers to provide convenient remote-controlled operation
- Rain Dial Plus automatic and manual operations remain functional during use of remote control
- Transmitter is preset to operate up to 12 controller stations, but is adjustable from one to 64 stations
- Transmitter power source: 9-volt alkaline battery (supplied)
- Receiver power source: 5 VDC @ 10 mA (supplied from controller)
- Preset station run time: 10 minutes
- Transmitter operating range/line of sight: approximately 160'-300'
- Operating temperature: +14°F to +140°F
- Storage temperature: -22°F to +149°F

*The KwikStart™ remote system is compatible with Rain Dial Plus controllers with manufacturing date codes on or after Oct. 4, 2000 (100400).

KWIKSTART™ REMOTE CONTROL KIT (KSR-KIT)

NEW

MODELS HOW TO SPECIFY

RD 6PLUS-EXT

Model	Number of Stations	Outdoor/Indoor Mount Option
RD6PLUS-EXT	6	outdoor
RD9PLUS-EXT	9	outdoor
RD12PLUS-EXT	12	outdoor
RD6PLUS-INT	6	indoor
RD9PLUS-INT	9	indoor
RD12PLUS-INT	12	indoor

TOTAL CONTROL® SERIES

CONTROLLERS

6, 9, 12, 15, 18 and 24 stations (outdoor/indoor)*

Application

Designed for commercial, light commercial and residential use, this innovative hybrid controller offers maximum programming flexibility to handle a wide variety of sophisticated watering requirements in an easy-to-use format. Plus, its modular design ensures convenient remote programming and hassle-free station additions and upgrades.

Features

- Four independent programs offer concurrent operation capability
- Seven-day calendar, odd/even day or day interval options of one to 30 days
- User-friendly, 10-position programming dial and large, easy-to-read display
- Excluded day option, when used with the odd/even day option, allows selection of specific day(s) not to water
- 365-day clock/calendar for odd/even day programming
- Start-time stacking within each program
- Programmable master valve On/Off per program
- Water budgeting
- Programmable "Rain Off" up to seven days
- Automatic, semi-automatic, manual and timed-manual operation
- Modular design allows easy removal of control module without disturbing valve wiring (6- to 18-station models)
- Full-size terminal boards permit easy upgrades
- Self-diagnostic circuit breaker identifies and overrides an electrical malfunction of a valve
- Heavy-duty electrical surge protection (on both input and output lines) resists damage from lightning storms and power surges
- Non-volatile memory holds program through power failures of any duration
- Battery backup keeps accurate time for up to 90 days during power failures
- Valve test terminal for easy valve identification
- Sensor hookup with sensor by-pass switch
- Weather-resistant plastic, locking cabinet with an internal transformer (outdoor models)

5 Year LIGHTNING WARRANTY

See page 78 for more information.

TC-24EX-B
Now with electrical surge protection

- Durable plastic cabinet with an external transformer (indoor models)
- UL and CSA listed (6-, 9-, 12-, 15- and 18-station models)
- UL and CUL listed (24-station model)

Operating Specifications

- Station run times: 1 minute to 10 hours in 1-minute increments
- Start times: 16 total starts assignable to any program
- Watering schedule: 7-day calendar, odd/even day or interval option of 1-30 days
- Water budgeting: 10-200% per program in 10% increments

Electrical Specifications

- Electronic circuit breaker: 1.25 amps minimum holding
- Maximum output per station: 24 VAC, .5 amp
- Maximum output to valves: 24 VAC, 1.25 amps (including master valve)
- Battery backup: 9-volt alkaline battery (not included)

Outdoor

- Transformer input: 120 VAC, 60 Hz
- Transformer output: 24 VAC, 1.67 amps

Indoor

- Transformer input: 120 VAC, 60 Hz
- Transformer output: 24 VAC, 1.25 amps

Dimensions

Outdoor	Indoor
Height: 8 ½”	Height: 7 ½”
Width: 10 ½”	Width: 9 ½”
Depth: 5”	Depth: 4 ¼”

*15-, 18- and 24-station controllers are available in outdoor models only.

MODELS | HOW TO SPECIFY

TC-6 EX-B

- TC-6 — Number of Stations
- EX-B — Outdoor/Indoor Mount Option

Model	Number of Stations	Outdoor/Indoor Mount Option
TC-6EX-B	6	outdoor
TC-9EX-B	9	outdoor
TC-12EX-B	12	outdoor
TC-15EX-B	15	outdoor
TC-18EX-B	18	outdoor
TC-24EX-B	24	outdoor
TC-6IN-B	6	indoor
TC-9IN-B	9	indoor
TC-12IN-B	12	indoor

500 SERIES CONTROLLERS

8 and 12 stations (outdoor/indoor)

Application

This popular hybrid controller, designed for light commercial and residential use, provides easy, at-a-glance operation, versatile programming and dependable performance to meet the needs of a wide range of applications.

Features

- Two independent programs
- Seven-day calendar or interval options of every-second-day or every-third-day
- Simple, at-a-glance programming
- Program stacking
- Interrupt/pause function
- Automatic and manual operation
- Self-diagnostic electronic circuit breaker identifies and overrides an electrical malfunction of a valve
- Surge protection on input
- Battery backup keeps accurate time and maintains program during power failure
- Automatic safety backup program
- Master valve/pump start circuit
- Weather-resistant plastic, locking cabinet with an internal transformer (outdoor models)
- Durable plastic cabinet with an external transformer (indoor models)
- Wall mount
- UL and CSA listed

Operating Specifications

- Station run times: 2 minutes to 3 hours
- Start times: 2 per program for up to 4 total
- Watering schedule: 7-day specific calendar or day interval options of every-second-day or every-third-day

Electrical Specifications

- Transformer input: 120 VAC, 60 Hz
- Transformer output: 24 VAC, 1.25 amps
- Maximum output per station: 24 VAC, .5 amp
- Maximum output to valves: 24 VAC, 1.0 amp (including master valve)
- Battery backup: 9-volt alkaline battery (not included)

Dimensions

Outdoor	Indoor
Height: 9 ½"	Height: 9 ½"
Width: 7 ½"	Width: 7 ¾"
Depth: 4 ¼"	Depth: 4 ¼"

512PR

MODELS HOW TO SPECIFY

508 PR

Model	Number of Stations	Outdoor/Indoor Mount Option
508PR	8	outdoor
512PR	12	outdoor
508PRi	8	indoor
512PRi	12	indoor

DIAL SERIES

7, 11, 16, 18, 24 and 36 stations (outdoor)

Application

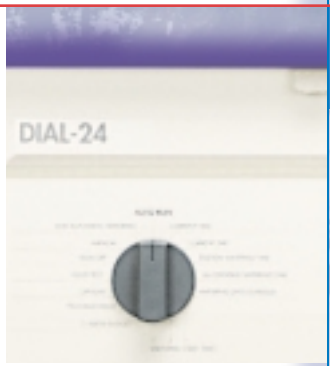
This proven hybrid controller from Irritrol Systems, designed primarily for commercial and light commercial applications, offers the choice of stations and scheduling flexibility required to handle complex applications.

Features

- Two independent programs offer concurrent operation capability
- Six- or 14-day calendar
- Simple-to-use programming dial
- Cycle looping with cycle delay (program B option)
- Start-time stacking within each program
- "All Stations" watering time entry capability
- Water budgeting
- Programmable "Rain Off" up to seven days
- Programmable "Valve Test" function runs each station sequentially from one to nine minutes without affecting program
- LEDs indicate program operation
- Automatic, semi-automatic and manual operation
- Self-diagnostic circuit breaker identifies and overrides an electrical malfunction of a valve
- Non-volatile memory will hold program during power failures of any duration
- Battery backup keeps accurate time for up to 30 days during power failure
- Optimum two-stage primary and secondary surge protection
- Two separate sensor hookups for start/stop
- Weather-resistant steel, locking cabinet with an internal transformer
- UL and CSA listed

Operating Specifications

- Station run times: 1-99 minutes in 1-minute increments; optional .1 minute (6 sec.) to 9.9 minutes or .1 hour (6 min.) to 9.9 hours in program B
- Start times: 3 per program for up to 6 daily starts or cycle looping option for unlimited starts in program B
- Watering schedule: 6- or 14-day calendar
- Water budgeting: 1-255% in 1% increments



Electrical Specifications

- Transformer input: 120 VAC, 60 Hz
- Transformer output: 24 VAC, 1.67 amps
- Maximum output per station: 24 VAC, .80 amp
- Maximum output to valves: 24 VAC, 1.50 amps (including master valve)
- Battery backup: 9-volt alkaline battery (not included)

Dimensions

7- to 16-station Models	18- to 36-station Models
Height: 9 ¾"	Height: 12"
Width: 10 ½"	Width: 14 ¼"
Depth: 4 ½"	Depth: 4 ¾"

Optional Accessories

- Pedestal Mount (P-2B: 7- to 16-station models; P-6B: 18- to 36-station models)

Dial-24B

MODELS HOW TO SPECIFY

Dial-7B

Model — Number of Stations

Model	Number of Stations
Dial-7B	7
Dial-11B	11
Dial-16B	16
Dial-18B	18
Dial-24B	24
Dial-36B	36

MC PLUS SERIES

CONTROLLERS

4, 6, 8, 12, 18, 24, 30, 36 and 42
stations (outdoor)

Application

Designed for commercial, light commercial and residential use, this high-performance solid-state controller from Irritrol Systems offers optimal versatility for handling the demanding watering requirements of almost any application.

Features

- Four independent programs offer concurrent operation capability
- Programmable calendar up to 16 days
- Simple program review
- LEDs indicate station operation
- Cycle looping with cycle delay (program 4 option)
- Start-time stacking within each program
- Programmable delay between stations from one second to four minutes
- "All Stations" watering time entry capability
- Single program option for seasonal pre-programming
- Water budgeting
- Programmable "Rain Off" up to seven days
- Programmable "Valve Test" function runs each station sequentially from one to nine minutes without affecting program
- Alarm signals incomplete programming
- Automatic, semi-automatic, timed-manual and manual operation
- Self-diagnostic circuit breaker identifies and overrides an electrical malfunction of a valve
- Non-volatile memory will hold program during power failures of any duration
- Remote ready
- Battery backup keeps accurate time for up to 30 days during power failures
- Optimum two-stage primary and secondary surge protection

MC-42 PLUS-B

- Two separate sensor hookups for cycle start/stop
- Cables disconnect from terminal strip board for easy installation and maintenance (18- to 42-station models)
- Weather-resistant steel, locking cabinet with an internal transformer
- UL and CSA listed

Operating Specifications

- Station run times: 1 minute to 24 hours in 1-minute increments; 1 second to 24 minutes (program 4 option)
- Start times: 3 per day (programs 1, 2 and 3), 2 start times per day (program 4) for up to 11 daily starts or cycle looping option for unlimited starts in program 4
- Watering schedule: programmable up to 16 days
- Water budgeting: 1-255% in 1% increments

Electrical Specifications

- Transformer input: 120 VAC, 60 Hz
- Transformer output: 24 VAC, 2.08 amps (50 VA)
- Maximum output per station: 24 VAC, 1.24 amps
- Maximum output to valves: 24 VAC, 1.80 amps (including master valve)
- Time-keeping power failure backup: 9-volt alkaline battery (not included)

Dimensions

4- to 12-station Models	18- to 42-station Models
Height: 9 ¾”	Height: 12”
Width: 10 ½”	Width: 14 ¼”
Depth: 4 ¼”	Depth: 4 ¾”

Optional Accessories

- Pedestal Mounts (P-2B: 4- to 12-station models; P-6B: 18- to 42-station models)

MODELS HOW TO SPECIFY

MC-4 Plus-B

Model / Number of Stations

Model	Number of Stations
MC-4 Plus-B	4
MC-6 Plus-B	6
MC-8 Plus-B	8
MC-12 Plus-B	12
MC-18 Plus-B	18
MC-24 Plus-B	24
MC-30 Plus-B	30
MC-36 Plus-B	36
MC-42 Plus B	42

IBOC PLUS SERIES

CONTROLLERS

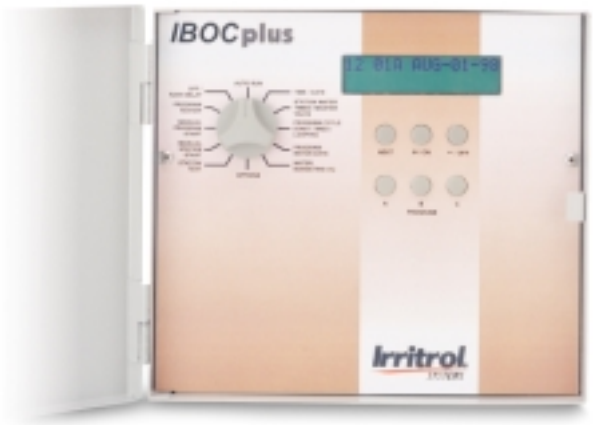
4, 8 and 12
stations (outdoor)

Application

The battery-operated IBOC Plus Series hybrid controller also offers a solar-powered option. Its outstanding scheduling flexibility provides optimum stand-alone performance in a variety of commercial and light commercial applications.

Features

- Three independent programs offer concurrent operation capability
- Odd/even day calendar with day exclusion; seven-day calendar; or one to 62 skip days
- Station water times in one-minute to 23-hour-and-59-minute increments
- Eight start times per program for up to 24 daily start times
- Program cycle looping provides continuous program repeat operation within a selectable watering window
- 6 VDC power or optional solar power
- Solar-powered converter can be mounted up to 1,000 feet from IBOC Plus (SPC-2 option)
- Non-volatile memory retains all program data
- Programmable "Rain Delay" postpones automatic operation for up to 30 days
- Program review and erase
- Large, easy-to-read LCD displays English or Spanish
- One- to 10-minute programmable, test cycle
- Fully programmable manual cycle acts like a fourth temporary program
- Selectable, programmable master valve
- 365-day calendar with automatic leap year adjustment
- Start-time stacking within each program
- Station stacking for up to three stations plus master valve at one time
- Enhanced lightning protection
- Water budgeting from 10-200%
- Electronic circuit breaker detection for open and shorted conditions
- Battery capacity displayed in remaining percentage
- Optional rain sensor input selectable by program



IBOC-4PLUS

Electrical Specifications

- Powered by one 6-volt alkaline battery, or one SPC-2 (solar-powered converter)
- Output: 24 VDC latching
- Master valve output 24 VDC latching
- Rain sensor input selectable per program
- Installed Irritrol Systems, Hardie and Richdel valves must be converted from AC with 24 VDC latching solenoids (E2002)
- Maximum operating pressure: 120 psi

Controllers to Valves

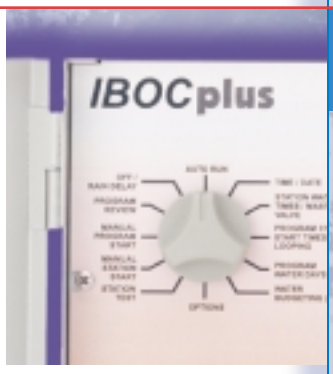
Wire size (Awg)	20	18	16	14	12
Distance (ft.)	400	600	1000	1600	2400

Solar Option

- Simple mounting on top of any IBOC Plus controller model or mounted up to 1,000 feet from the controller
- Maintenance-free gel cell battery: 3-year life
- Solar to load ratio: 6-to-1 (provides full power to IBOC Plus for up to 20 days without sun)
- Output: 25-27 VDC/50mA
- Solar amp/hrs. per day: 600mA, typical
- Load amp/hrs. per day: 100mA, typical
- Operation temperature: -30°C; +60°F
- Storage temperature: -40°C; +80°F

Solar Power Converter Remote Mounting Wire Sizing

Wire Size (Awg)	20	18	16
Distance (ft.)	200	500	1000



Dimensions

IBOC Plus	SPC-1
Height: 9 ¼"	Height: 4 9/16"
Width: 10 ¾"	Width: 10 ⅜"
Depth: 5 ¼"	Depth: 3 ⅜"

Optional Accessories

- Solar converter (SPC-2; includes batteries)
- Pedestal mount (P-2B: all station models)

IBOC-4PLUS/SPC-2

MODELS HOW TO SPECIFY

IBOC-4PLUS

Model / Number of Stations

Model	Number of Stations
IBOC-4PLUS	4
IBOC-8PLUS	8
IBOC-12PLUS	12

NOTE: The SPC-2 option must be purchased separately.

IBOC100

CONTROLLERS

1 station (outdoor)

Application

The new advanced-design IBOC100 is a battery-powered, valve-mounted controller that is easy to install, easy to use and highly reliable. While specifically designed to provide automatic valve operation in areas where a hard-wire connection is impractical, the IBOC100 also is ideal for converting existing electric valves to independent battery operation.

Features

- Hand-programmable
- Modular design allows for easy field programming
- Water-resistant construction provides reliable operation
- Battery-powered unit features low power consumption (one- to two-year life on a single charge)
- Retains program up to two minutes without battery installed
- International icons with English captions provide easy-to-understand programming information
- Run-time programmed in real time for added convenience
- Delay start feature allows unit to be programmed for nighttime automatic irrigation
- Watering interval of 12, 24 and 48 hours or 7 day cycles
- Default program option allows for quick set up—simply plug in battery and set up is complete
- LED lights verify program input and operation
- Fits all Irritrol irrigation valves with internal manual bleed adapter—VA12 (included)
- Low profile design fits in all valve boxes
- One-year warranty
- CUL and CE listed

IBOC100

NEW

Operating Specifications

- Station run times: 6 seconds to 23 hours, 59 minutes programmed in real time
- Delay start: 0 hours, 4 hours, 8 hours or 12 hours
- Default program: 15 minutes of irrigation per day
- Four irrigation cycle options: once per day, twice per day, once per two days and once per seven days
- Pressure limit: 150 psi
- Operating temperature: 32° to 122° F
- Adapters available separately for Irritrol Systems and other valve brands:
  - VA12 for Irritrol valves
  - VA15 for Rain Bird DV valves*
  - VA20 for Nelson valves*
- Battery Pack
  - BAT-10 (included with IBOC100 and available separately)

Electrical Specifications

- Battery: 6 VDC custom battery

Dimensions

- Height: 3”
- Width: 2 ½”
- Depth: 1 ½”
- Weight:
  - IBOC100 5 ¼ oz.
  - Battery assembly 1 ½ oz.

* Rain Bird is a registered trademark of Rain Bird Mfg. Corporation. Nelson is a registered trademark of L.R. Nelson Corporation.

MODELS HOW TO SPECIFY

IBOC 100

Model	Number of Stations
IBOC100	1

PEDESTALS

CONTROLLERS

P-2B

- For MC Plus-B: 4- to 12-station models; Dial-B: 7- to 16-station models; and IBOC Plus: all station models
- Weather-resistant steel

Dimensions

Height: 27 ⅝”
Width: 10 ¾”
Depth: 3 ¼”
Weight: 11 lbs.

P-6B

- For MC Plus-B: 18- to 42-station models; Dial-B: 18- to 36-station models; and IBOC-B: all station models
- Weather-resistant steel

Dimensions

Height: 35”
Width: 14 ¼”
Depth: 4 1/16”
Weight: 21 lbs.

P-2B

P-6B

ACCESSORIES

SPC-2

- Optional solar power converter for IBOC and IBOC Plus Series controllers (includes batteries)

SR-1

- Pump starter relay with weather-resistant case

E2002

- DC latching solenoids for Irritrol Systems, Hardie and Richdel valves used with IBOC and IBOC Plus Series controllers

SPC-2

Valves "At a Glance"

		2700 Series	2400/2600 Series	2500 Series	205 Series	311A Series	200B Series	700 Series (UltraFlow)	100 Series (Century PLUS)	2623DPR Series	300 Series
Applications	Residential	x	x	x	x	x				x	x
	Commercial			x	x	x	x	x	x		
Operation	Manual	x									
	Electric	x	x	x	x	x	x	x	x	x	x
Size	¾"	x				x		x		x	x
	1"	x	x	x	x	x	x	x	x	x	x
	1 ½"						x	x	x		
	2"						x	x	x		
	3"								x		
Configuration	Angle		x				x		x		
	Globe		x	x	x		x	x	x		
	H-body	x				x					
Inlet/Outlet	Threaded	x	x	x	x	x	x	x	x		
	Slip		2400 only	x	x						
Manual Flow Control	Standard	x				x	x	except ¾"	x	x	x
	Optional		x	x	x						
Anti-siphon		x				x					
Pressure Regulating	(OmniReg™)					x	x	x	x	x	x
Internal Bleed		x	x	x	x	x	x	x	x	x	x
External Bleed (Flush)		x	x	x	x	x	x		x	x	x
Anti-contamination									x		
Construction	PVC Body	x	x	x	x	x	x			x	
	Glass-filled Nylon Body							x	x		x

2700 SERIES MANUAL

¾" and 1" plastic models

Application

These long-lasting manual anti-siphon valves, designed primarily for residential use, offer simple operation and trouble-free performance in an operating range of up to 150 psi.

Features

- Convenient manual control handle
- Hand-tight pipe thread connection provides positive seal
- Flow control allows precise flow adjustment and manual shut-off
- Heavy-duty, corrosion- and UV-resistant PVC construction
- Manual H-body with atmospheric vacuum breaker
- Non-rotating Buna-N shut-off seal for long-term performance
- Contamination guard protects valve stem threads
- Easily serviced without removal from system
- Meets listing standards of ASSE, CSA, IAPMO and City of Los Angeles

Operating Specifications

- Flow range: 5-25 GPM
- Pressure range: 10-150 psi

Dimensions

2706PR	2709PR
Height: 4 ⅞"	Height: 5 1/16"
Width: 2 ⅝"	Width: 3 ⅛"
Length: 5 ¾"	Length: 6 ¼"

2706PR

Model	Size	Flow Rate-GPM 5	10	15	20	25
2706PR	¾"	1	3	5		
2709PR	1"	1	1	2	4	6

Pressure Loss-PSI

1) When designing a system, the industry standard for flow rate velocity through pipes and fittings is 5 FPS.
2) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA.
3) See friction loss charts on pages 60 through 65 for details.

MODELS HOW TO SPECIFY

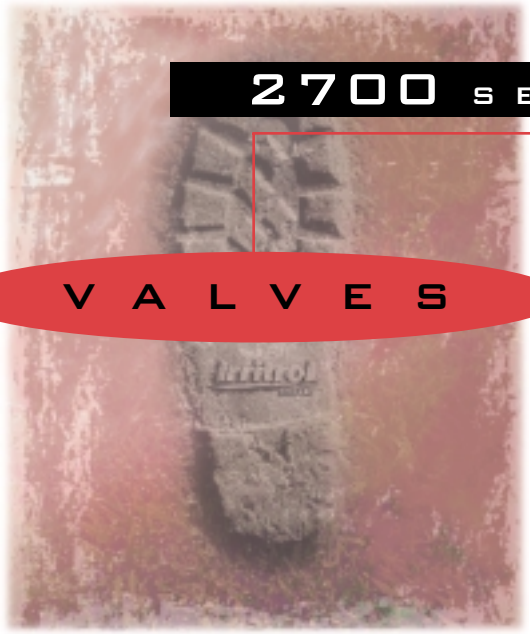
2706 PR

Model	Type	Size
2706PR	anti-siphon	¾"
2709PR	anti-siphon	1"

NOTE: Anti-siphon valve is to be mounted above ground at least 6" above highest sprinkler head (consult local codes).

2700 SERIES ELECTRIC

VALVES



¾" and 1" plastic models

Application

These highly popular next-generation anti-siphon valves, with built-in atmospheric vacuum breakers, offer the ultimate in performance, reliability and ease-of-use for a wide variety of residential applications.

Features

- Rugged, double-beaded SANTOPRENE® diaphragm provides leak-proof seal
- Buna-N valve seat seal
- Manual internal bleed
- Manual external bleed (flush mode)
- Full stainless steel metering system
- Flow control allows precise flow adjustment and manual shut-off
- Gravity-type anti-siphon poppet
- Heavy-duty, corrosion- and UV-resistant PVC, glass-filled polypropylene and stainless steel construction
- Encapsulated injection-molded solenoid
- Captive hex plunger
- Easily serviced without removal from system
- Electric H-body with atmospheric vacuum breaker
- Meets listing standards of ASSE, IAPMO and CSA

APR Models

- Captured hex/Phillips screws
- Removable, ergonomic tamper-resistant flow control handle
- Self-aligning bonnet permits fast and easy servicing
- High-strength ribbed bonnet
- Patent pending floating metering system

DPR Models

- Threaded bonnet system permits fast and easy servicing
- Patented, tamper-resistant flow control mechanism

Operating Specifications

- Flow range: 5-30 GPM
- Pressure range: 10-150 psi

2711APR

Electrical Specifications

- Solenoid: 24 VAC
- Inrush volt-amp: 24 VAC-11.50 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 VAC-5.75 VA
- Holding current: .2 amp

Optional Accessories

- Threaded bonnet wrench (2400-45: DPR models)
- DC latching solenoid (E2002)

  Note: Maximum pressure for a valve that utilizes E2002 latching solenoid is 120 psi.
- Reclaimed water solenoid kit (RW60-Kit); purple solenoid with purple warning tag

Dimensions

2711 Models

Height: 5 ⅝"
Width: 3"
Length: 6 ¼"

2713 Models

Height: 6"
Width: 3"
Length: 6 ⅞"

Flow Rate-GPM

Model	Size	5	10	15	20	30
2711APR/2711DPR	¾"	4.14	4.11	4.72	7.60	
2713APR/2713DPR	1"	2.03	3.10	2.22	3.72	8.01

Pressure Loss-PSI

1) When designing a system, the industry standard for flow rate velocity through pipes and fittings is 5 FPS.
2) Pressure loss data for DPR models are derived from valves independently tested by CIT, Fresno, CA.
3) See friction loss charts on pages 60 through 65 for details.

2713DPR

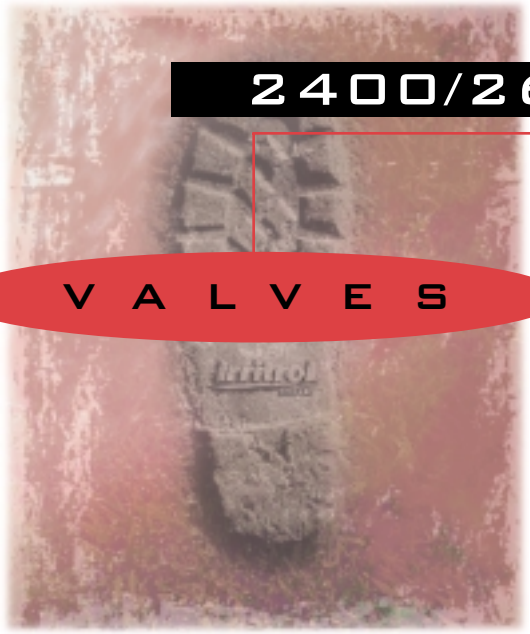
MODELS HOW TO SPECIFY

2711 APR

Model	Size	Threaded Bonnet/ Stainless Steel Screws Options
2711APR	¾"	SS
2713APR	1"	SS
2711DPR	¾"	TB
2713DPR	1"	TB

NOTE: Anti-siphon valve is to be mounted above ground at least 6" above highest sprinkler head (consult local codes).

2400/2600 SERIES



VALVES

1" plastic models

Application

Designed primarily for residential use, these new next-generation durable electric globe and angle valves offer solid construction, reliable performance and convenient operation to accommodate the specific needs of homeowners.

Features

- Rugged, double-beaded SANTOPRENE® diaphragm provides leak-proof seal
- Buna-N valve seat seal
- Manual internal bleed
- Manual external bleed (flush mode)
- Full stainless steel metering system
- Floating bleed tube allows thermal expansion without affecting performance
- Heavy-duty, corrosion- and UV-resistant PVC, glass-filled polypropylene and stainless steel construction
- Encapsulated solenoid
- Captive hex plunger
- Threaded bonnet system permits fast and easy servicing
- Available in female NPT or slip configuration
- Easily serviced without removal from the system

Operating Specifications

- Flow range: 5-30 GPM
- Pressure range: 10-150 psi

Electrical Specifications

- Solenoid: 24 VAC
- Inrush volt-amp: 24 VAC-11.50 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 VAC-5.75 VA
- Holding current: .2 amp

2400T-B

NEW

2400T

MODELS HOW TO SPECIFY

2400 S F

Model/Type	Slip Connection NPT Thread Options	Flow Control
2400S/globe	slip connection	no
2400T/globe	NPT threads	no
2400SF/globe	slip connection	yes
2400TF/globe	NPT threads	yes
2400T-B/globe	male x barb	no
2400TF-B/globe	male x barb	yes
2400T-M/globe	male x male	no
2400TF-M/globe	male x male	yes

Optional Accessories

- Threaded bonnet wrench (2400-45)
- Reclaimed water solenoid kit (RW60-Kit); purple solenoid with purple warning tag
- DC latching solenoid (E2002)

  Note: Maximum pressure for a valve that utilizes E2002 latching solenoid is 120 psi.

Dimensions

2400 Models

Height: 5 ⅛”
Width: 3”
Length: 4”

2600 Model

Height: 5 ⅜”
Width: 3”
Length: 3 ¾”

Flow Rate-GPM

Model	Size	5	10	15	20	30
2400 Series	1"	3.50	4.00	2.97	3.26	6.20
2600 Series	1"	3.34	2.15	1.78	1.90	3.85

Pressure Loss-PSI

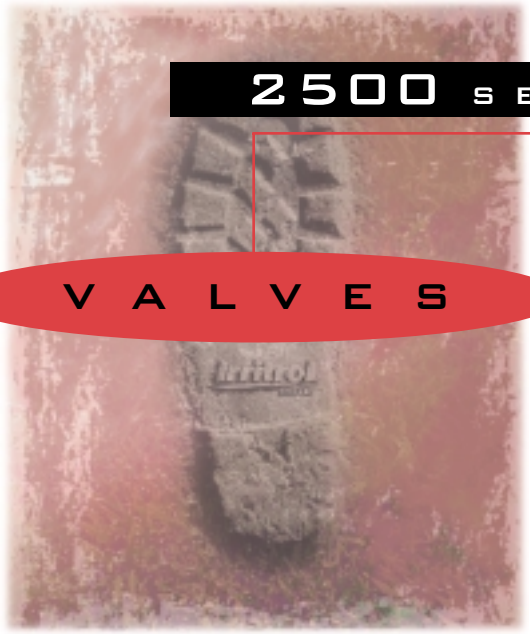
1) When designing a system, the industry standard for flow rate velocity through pipes and fittings is 5 FPS.
2) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA.
3) See friction loss charts on pages 60 through 65 for details.

2600T

MODELS HOW TO SPECIFY

2600 S F

Model/Type	Slip Connection NPT Thread Options	Flow Control
2600T/angle	NPT threads	no
2600TF/angle	NPT threads	yes



2500 SERIES

VALVES

1" plastic models

Application

Designed primarily for light commercial and residential use, the next-generation 2500 Series valves offer a complete package of performance-enhancing features including a full stainless steel metering system and internal manual bleed. Built on the highly popular 205 Series, these rugged, debris-tolerant valves also feature a new self-aligning bonnet, captured screws and a pressure-activated sealing system.

Features

- Rugged, double-beaded SANTOPRENE® diaphragm provides leak-proof seal
- Buna-N valve seat seal
- Manual internal bleed
- Manual external bleed (flush mode)
- Full stainless steel metering system
- Debris-tolerant, floating metering system design suitable for wells and dirty water applications (patent pending metering system)
- High-flow, low-friction-loss design
- Low-flow capability for drip systems
- Captured hex/Phillips screws
- Optional ergonomic flow control allows precise flow adjustment and manual shut-off
- Self-aligning bonnet permits fast and easy servicing
- Heavy-duty, corrosion- and UV-resistant PVC and stainless steel construction
- High-strength ribbed bonnet
- Encapsulated injection-molded solenoid
- Captive hex plunger
- Available in female NPT or slip configuration (no male pipe adapter required)
- Removable, tamper-resistant flow control handle
- Easily serviced without removal from the system

Operating Specifications

- Flow range: 0.25-30 GPM
- Pressure range: 10-150 psi

Electrical Specifications

- Solenoid: 24 VAC
- Inrush volt-amp: 24 VAC-11.50 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 VAC-5.75 VA
- Holding current: .2 amp

Optional Accessories

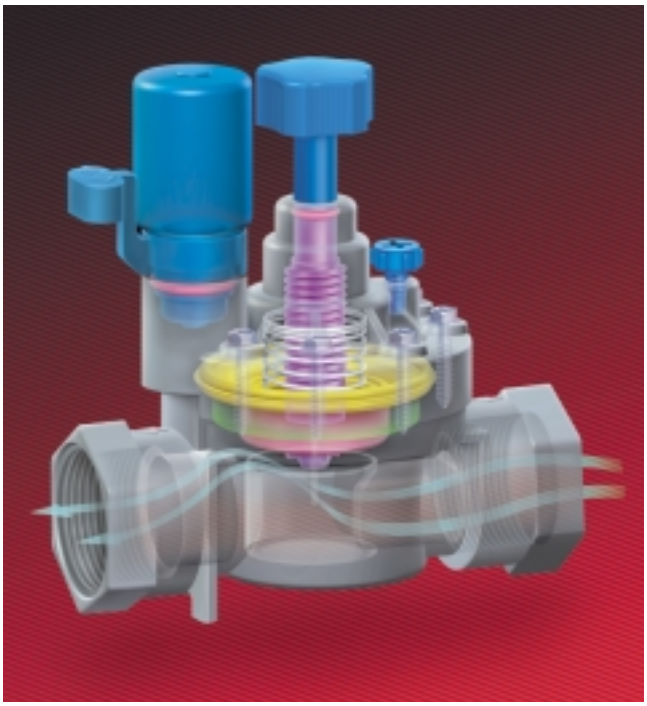
- Reclaimed water solenoid kit (RW60-Kit); purple solenoid with purple warning tag
- DC latching solenoid (E2002)

Note: Maximum pressure for a valve that utilizes E2002 latching solenoid is 120 psi.

Dimensions

Height: 5 ⅛"
Width: 2 ¾"
Length: 5"

2500TF



Flow Rate-GPM

Model	Size	2	5	10	15	20	30	40
2500 Series	1"	3.82	3.00	2.20	1.90	3.10	5.10	11.40

Pressure Loss-PSI

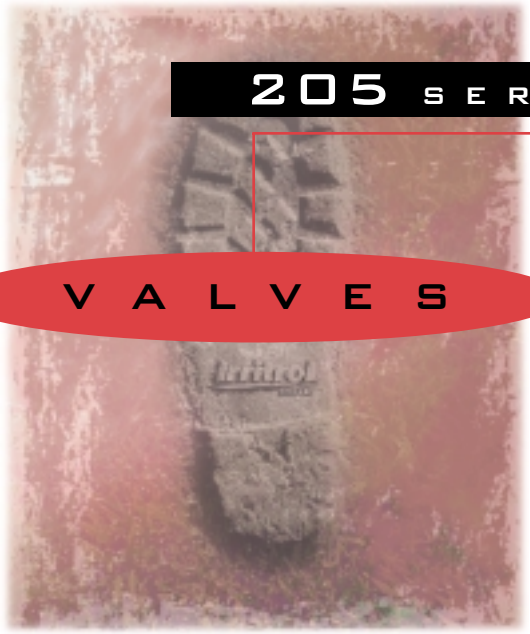
1) When designing a system, the industry standard for flow rate velocity through pipes and fittings is 5 FPS.
2) See friction loss charts on pages 60 through 65 for details.

2500T

MODELS HOW TO SPECIFY

2500 TF

Model	Slip Connection/ Flow Control/ NPT Thread Options
2500S	slip connection
2500SF	slip connection/ flow control
2500T	NPT threads
2500TF	NPT threads/ flow control



205 SERIES

VALVES

Features

- Rugged, nylon-reinforced Buna-N diaphragm provides leak-proof seal
- Buna-N valve seat seal
- Manual external bleed
- Debris-tolerant design
- High-flow, low-friction-loss design
- Optional flow control allows precise flow adjustment and manual shut-off
- Heavy-duty, corrosion- and UV-resistant PVC construction
- Encapsulated solenoid
- Captive hex plunger
- Available in female NPT or slip configuration (no male pipe adapter required)
- Removable, tamper-resistant flow control handle
- Easily serviced without removal from the system

Operating Specifications

- Flow range: 5-30 GPM
- Pressure range: 10-150 psi

Electrical Specifications

- Solenoid: 24 VAC
- Inrush volt-amp: 24 VAC-11.50 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 VAC-5.75 VA
- Holding current: .2 amp

Dimensions

Height: 5 ⅛”
Width: 2 ¾”
Length: 5”

1” plastic models

Application

Irritrol Systems’ popular 205 Series electric globe valves offer debris-tolerant operation and a high-flow, low-friction-loss design for optimum performance in potable and dirty water applications.

Flow Rate-GPM

Model	Size	2	5	10	15	20	30	40	Pressure Loss-PSI
205 Series	1"	3.82	3.00	2.20	1.90	3.10	5.10	11.40	

1) When designing a system, the industry standard for flow rate velocity through pipes and fittings is 5 FPS.
2) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA.
3) See friction loss charts on pages 60 through 65 for details.

205TF

205S

MODELS HOW TO SPECIFY

205 TF

Slip Connection/ Flow Control/ NPT Thread Options

Model	
205S	slip connection
205SF	slip connection/ flow control
205T	NPT threads
205TF	NPT threads/ flow control

311A SERIES

¾" and 1" plastic models

Application

These dependable, premier anti-siphon valves offer proven reliability and operation to meet the needs of residential and light commercial applications.

Features

- Internal and external bleed (flush mode) for manual operation
- Accepts OmniReg™ modular pressure regulator
- Flow control allows precise flow adjustment and manual shut-off
- Upper-body and air-vent cap constructed of glass-filled nylon
- Lower-body constructed of heavy-duty, corrosion- and UV-resistant PVC
- Rugged, double-beaded nylon-reinforced Buna-N diaphragm provides leak-proof seal
- Buna-N valve seat seal
- All stainless steel hardware and springs
- Unique three-way stainless steel bonnet screws with threaded brass inserts
- Encapsulated injection-molded solenoid
- Captive hex plunger
- Polypropylene float
- Removable, tamper-resistant flow control handle
- Externally removable self-cleaning metering system for dirty or effluent water applications
- Meets listing requirements of IAPMO-UPC and City of Los Angeles

Operating Specifications

- Flow range: 1-30 GPM
- Pressure range: 10-150 psi
- Operating temperature: up to 130° F

Electrical Specifications

- Solenoid: 24 VAC
- Inrush volt-amp: 24 VAC-11.50 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 VAC-5.75 VA
- Holding current: .2 amp

311A-.75

Optional Accessories

- OmniReg™ 5-100 psi regulator (OMR-100)
- OmniReg™ 5-30 psi regulator (OMR-30)
- Weatherproof gauge (SPK-100)
- Weatherproof gauge (SPK-30)
- DC latching solenoid (E2002)

  Note: Maximum pressure for a valve that utilizes E2002 latching solenoid is 120 psi.
- Reclaimed water solenoid kit (RW60-Kit); purple solenoid with purple warning tag

Dimensions

Height: 8 ½"
Width: 3 ⅝"
Length: 6"

MODELS

Flow Rate-GPM

Model	Size	1	5	10	15	20	25	30
311A-.75	¾"	5.5	6.0	8.0	9.0	11.0		
311A-1	1"	5.5	6.0	7.5	8.5	10.0	13.0	18.5

Pressure Loss-PSI

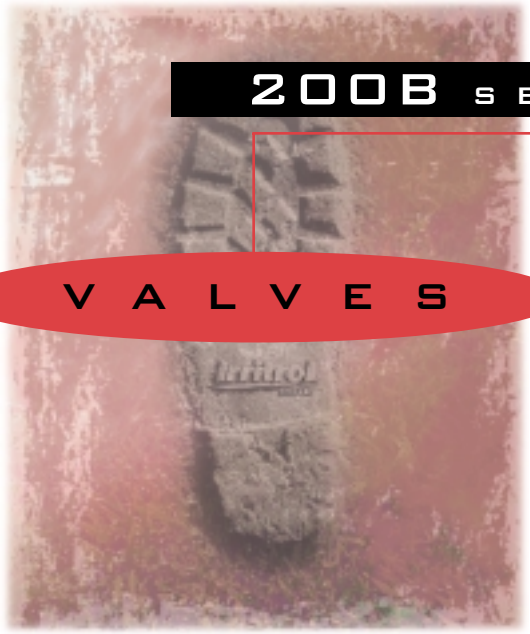
1) When designing a system, the industry standard for flow rate velocity through pipes and fittings is 5 FPS.
2) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA.
3) See friction loss charts on pages 60 through 65 for details.

HOW TO SPECIFY

311A-.75

Model	Size
311A-.75	¾"
311A-1	1"

NOTE: Anti-siphon valve is to be mounted above ground at least 6" above highest sprinkler head (consult local codes).



200B SERIES

VALVES

1", 1½" and 2"
plastic models

Application

These durable, heavy-duty commercial valves offer a selection of key features designed to provide reliable, cost-effective performance under the most challenging conditions.

Features

- Manual internal bleed
- Manual external bleed (flush mode)
- Slow-closing design reduces water hammer
- Optional flow control allows precise flow adjustment and manual shut-off
- Heavy-duty, corrosion- and UV-resistant PVC construction with stainless steel spring and hardware
- Rugged, double-beaded SANTOPRENE® diaphragm provides leak-proof seal
- Buna-N valve seat seal
- High-strength ribbed bonnet and bottom inlet
- Unique threaded inlet plug O-ring seal prevents leaks
- Encapsulated injection-molded solenoid
- Captive hex plunger
- Unique three-way stainless steel bonnet screws accept Phillips, flat-blade and hex-driver tools
- Easily serviced without removal from the system
- Accepts OmniReg™ modular pressure regulator

Pressure Regulation (OmniReg™ modular option)

- Electric or manual operation
- Pressure setting dial
- Self-modulating pressure regulator maintains constant downstream pressure within ±3 psi of pressure setting
- Outlet pressure regulating range from 5-100 psi or 5-30 psi with Schrader valve test port (SPK-100 and SPK-30 gauges optional)
- Retrofits in less than one minute
- Inlet pressure must be 10 psi greater than desired outlet pressure

Operating Specifications

- Flow range: 5-120 GPM
- Pressure range: 20-150 psi

Electrical Specifications

- Solenoid: 24 VAC
- Inrush volt-amp: 24 VAC-11.50 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 VAC-5.75 VA
- Holding current: .2 amp

217B

Optional Accessories

- OmniReg 5-100 psi regulator (OMR-100)
- OmniReg 5-30 psi regulator (OMR-30)
- Weatherproof gauge (SPK-100)
- Weatherproof gauge (SPK-30)
- Reclaimed water solenoid kit (RW60-Kit); purple solenoid with purple warning tag
- DC latching solenoid (E2002)

  Note: Maximum pressure for a valve that utilizes E2002 latching solenoid is 120 psi.

Dimensions

214B/214B-NF

Height: 6 7/8"
Width: 2 7/8"
Length: 4 1/2"

217B/217B-NF

Height: 9 1/16"
Width: 4 3/4"
Length: 6 1/4"

216B/216B-NF

Height: 8"
Width: 4 3/16"
Length: 5 3/8"

Flow Rate-GPM

Model	Size	Globe Angle	5	10	15	20	30	40	50	60	80	100	120
214B	1"	G	3.36	2.60	1.82	2.35	5.40	9.73	- - -	- - -	- - -	- - -	- - -
		A	3.09	2.20	1.48	1.98	4.00	8.12					
216B	1 1/2"	G	- - -	- - -	- - -	3.04	2.66	2.33	2.97	4.14	5.62	- - -	- - -
		A				2.76	2.24	1.99	2.30	3.10	4.42		
217B	2"	G	- - -	- - -	- - -	2.00	1.93	1.73	1.55	1.68	2.99	4.85	6.31
		A				2.00	1.93	1.73	1.55	1.59	2.15	3.27	4.88

Pressure Loss-PSI

1) When designing a system, the industry standard for flow rate velocity through pipes and fittings is 5 FPS.
2) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA.
3) See friction loss charts on pages 60 through 65 for details.
4) In general, we recommend sizing regulating valves toward upper flow ranges for best regulating performance.

216B
(Shown with OmniReg™ modular option.)

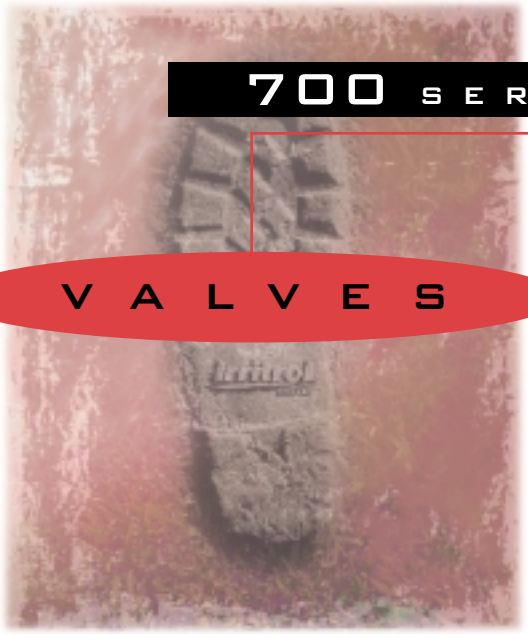
MODELS HOW TO SPECIFY

214B

Model	Size	Flow Control
214B	1"	yes
214B-NF	1"	no
216B	1 1/2"	yes
216B-NF	1 1/2"	no
217B	2"	yes
217B-NF	2"	no

700 SERIES (ULTRAFLOW)

VALVES



¾", 1", 1½" and 2" plastic models

Application

A straight-through flow path for minimum pressure loss and a host of standard and optional operating features make these heavy-duty electric globe valves ideal for a variety of challenging commercial and light commercial applications.

Features

- Manual internal bleed
- Self-flushing, 150-mesh, stainless steel filter screen on 1-, 1½- and 2-inch models
- Unique straight-through flow path provides low pressure loss and superior regulation (OmniReg™)
- Slow-closing design prevents water hammer
- Wide flow range
- Flow control allows precise flow adjustment and manual shut-off (not available on ¾-inch model)
- Compact, low-profile design
- Tough glass-reinforced nylon, stainless steel and brass construction
- Rugged, nylon-reinforced Buna-N diaphragm provides leak-proof seal
- Buna-N valve seat seal
- Encapsulated injection-molded solenoid
- Captive hex plunger
- Unique three-way stainless steel bonnet screws with threaded brass inserts accept Phillips, flat-blade and hex-driver tools
- Accepts OmniReg™ modular pressure regulator

Pressure Regulation (OmniReg™ modular option)

- Electric or manual operation
- Pressure setting dial
- Self-modulating pressure regulator maintains constant downstream pressure within ±3 psi of pressure setting
- Outlet pressure regulating range from 5-100 psi or 5-30 psi with Schrader valve test port (SPK-100 and SPK-30 gauges optional)
- Retrofits in less than one minute
- Inlet pressure must be 10 psi greater than desired outlet pressure

Operating Specifications

- Flow range: 0.10-180 GPM
- Pressure range: 10-150 psi

700B-.75

700-1.5
(Shown with OmniReg™ modular option.)

700-2

Electrical Specifications

- Solenoid: 24 VAC
- Inrush volt-amp: 24 VAC-11.50 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 VAC-5.75 VA
- Holding current: .2 amp

Optional Accessories

- OmniReg 5-100 psi regulator (OMR-100)
- OmniReg 5-30 psi regulator (OMR-30)
- Weatherproof gauge (SPK-100)
- Weatherproof gauge (SPK-30)
- Reclaimed water kit (RW60-Kit); purple solenoid with purple warning tag
- DC latching solenoid (E2002)

Note: Maximum pressure for a valve that utilizes E2002 latching solenoid is 120 psi.

Dimensions

700B-.75
Height: 4 ½"
Width: 1 9/10"
Length: 3 ⅖"

700-1
Height: 4 ½"
Width: 3"
Length: 4 ⅗"

700-1.5
Height: 5 ½"
Width: 4 ⅜"
Length: 6 ¼"

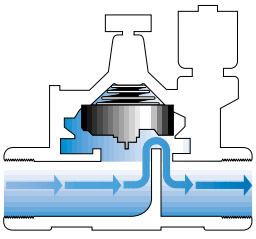
700-2
Height: 7"
Width: 5 ½"
Length: 8"

Flow Rate-GPM

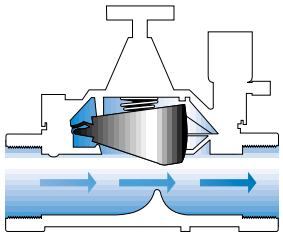
Model	Size	2	5	10	15	20	30	40	50	60	80	100	120	140	160	180
700B-.75	¾"	0.38	0.86	1.22	2.03	3.27	6.75									
700-1	1"	1.59	1.80	2.41	2.23	1.84	3.22	5.58	8.59							
700-1.5	1 ½"				0.19	0.36	0.69	1.13	1.49	2.13	3.85	6.06	8.72	11.89		
700-2	2"						0.64	0.83	0.98	1.17	2.07	3.06	3.96	5.21	6.50	8.23

Pressure Loss-PSI

1) When designing a system, the industry standard for flow rate velocity through pipes and fittings is 5 FPS.
2) Pressure loss data are derived from valves independently tested by CIT, Fresno, CA.
3) See friction loss charts on pages 60 through 65 for details.
4) In general, we recommend sizing regulating valves toward upper flow ranges for best regulating performance.



Conventional flow path



The UltraFlow Series straight-through flow path

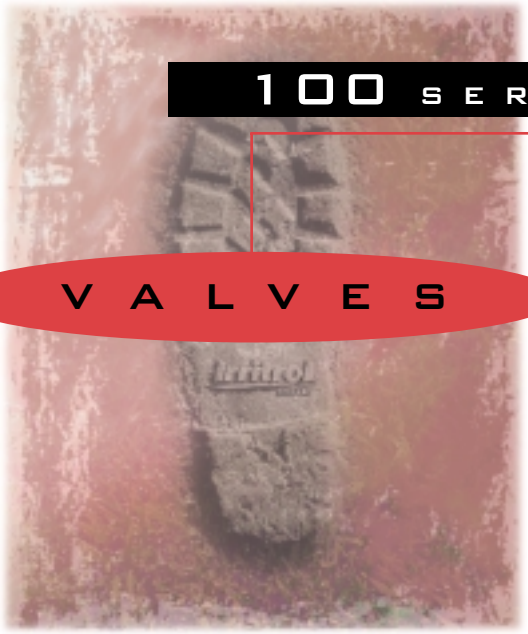
MODELS HOW TO SPECIFY

700B-.75-LS

Model	Size	Solenoid
700B-.75	¾"	yes
700-1	1"	yes
700-1.5	1 ½"	yes
700-2	2"	yes
700B-.75-LS	¾"	no
700-1-LS	1"	no
700-1.5-LS	1 ½"	no
700-2-LS	2"	no

100 SERIES (CENTURY PLUS)

VALVES



1", 1½", 2" and 3"
plastic models

Application

These heavy-duty globe/angle valves, designed primarily for commercial applications, offer superior performance and durability under the most demanding conditions. Tracing its origin back to the highly popular Century Series, the 100 Series (Century PLUS) delivers strong, reliable performance with a host of enhanced features.

Features

- 200 psi rating
- Manual internal bleed
- Manual external bleed (flush mode)
- Flow control allows precise flow adjustment and manual shut-off
- Tough, glass-reinforced nylon, stainless steel and brass construction withstands high temperatures and system surges under pressure
- Rugged, double-beaded, nylon-reinforced Buna-N diaphragm provides leak-proof seal
- Buna-N valve seat seal
- Stainless steel metering (externally removable)
- Encapsulated injection-molded solenoid
- Captive hex plunger
- Positive O-ring seal on inlet plug prevents leaks without damaging seal threads
- Molded-in and anchored studs allow positive bonnet attachment and removal
- Brass flow control stem (2- and 3-inch models)
- Easily serviced without removal from the system
- Accepts OmniReg™ modular pressure regulator

Pressure Regulation Option (OmniReg™ modular option)

- Electric or manual operation
- Pressure setting dial
- Self-modulating pressure regulator maintains constant downstream pressure within ± 3 psi of pressure setting
- Outlet pressure regulating range from 5-100 psi or 5-30 psi with Schrader valve test port (SPK-100 and SPK-30 gauges optional)
- Retrofits in less than one minute
- Inlet pressure must be 10 psi greater than desired outlet pressure
- Not compatible with 102 model.

Anti-contamination (102 models)

- Electric valves with 150-mesh external control water filter and three-way solenoid
- Non-continuous metering system for dirty or effluent water applications
- Small exchange of control water allows minimum filter capacity
- Control water filter allows easy external service
- Selectable normally open or normally closed mode (factory set at normally closed)
- Not compatible with OmniReg™ modular pressure regulator
- Not compatible with E2002 DC latching solenoid

100P3

100P2
(Shown with OmniReg™ modular option.)

100P1

Operating Specifications

- Flow range: 5-300 GPM
- Pressure range: 10-200 psi; 10-100 psi (102 models)

Electrical Specifications

- Solenoid: 24 VAC
- Inrush volt-amp: 24 VAC-11.50 VA
- Inrush current: .4 amp (102 models: .48 amp)
- Holding volt-amp: 24 VAC-5.75 VA
- Holding current: .2 amp (102 models: .24 amp)

Optional Accessories

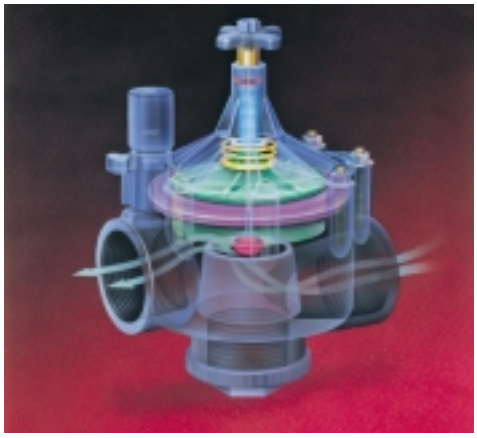
- OmniReg™ 5-100 psi regulator (OMR-100)
- OmniReg™ 5-30 psi regulator (OMR-30)
- Weatherproof gauge (SPK-100)
- Weatherproof gauge (SPK-30)
- Hydraulic conversion kit (HVC-Kit)
- Reclaimed water kit (RW60-Kit); purple solenoid with purple warning tag
- DC latching solenoid (E2002)

Note: Maximum pressure for a valve that utilizes E2002 latching solenoid is 120 psi.

Dimensions

100P1	**102P1**
Height: 6 ¾"	Height: 7 ½"*
Width: 3 ⅝"	Width: 5"
Length: 4 ¾"	Length: 4 ¾"
100P1.5	**102P1.5**
Height: 7 ¼"	Height: 7 ½"*
Width: 3 ⅝"	Width: 5"
Length: 4 ¾"	Length: 4 ¾"
100P2	**102P2**
Height: 9 ½"	Height: 10 ¼"*
Width: 6 ⅛"	Width: 7 ½"
Length: 7 ¾"	Length: 7 ¾"
100P3	**102P3**
Height: 10 ¾"	Height: 11 ½"*
Width: 6 ⅛"	Width: 7 ½"
Length: 8 ¼"	Length: 8 ½"

*Includes flexible tubing measurement.



Flow Rate-GPM

Model	Size	Globe / Angle	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	175	200	225	250	275	300
100P1/102P1	1"	G	4.20	3.20	4.10	7.20	10.90																
		A	4.20	3.10	2.70	4.80	7.90																
100P1.5/102P1.5	1 ½"	G			1.60	2.30	3.60	5.20	7.00	9.20	11.70	14.40	17.50										
		A			1.30	1.60	2.80	4.00	5.50	7.10	9.00	11.00	13.30										
100P2/102P2	2"	G								2.10	2.70	3.30	4.00	4.80	5.60	6.50	7.50	8.60					
		A								1.20	1.60	2.00	2.40	2.80	3.30	3.90	4.40	5.00					
100P3/102P3	3"	G															2.50	3.00	4.10	5.30	6.70	8.30	10.10
		A															1.90	2.40	3.30	4.30	5.50	6.90	8.50

Pressure Loss-PSI

1) When designing a system, the industry standard for flow rate velocity through pipes and fittings is 5 FPS.
2) See friction loss charts on pages 60 through 65 for details.
3) In general, we recommend sizing regulating valves toward upper flow ranges for best regulating performance.
4) 102 valves are not compatible with OmniReg™.

MODELS HOW TO SPECIFY

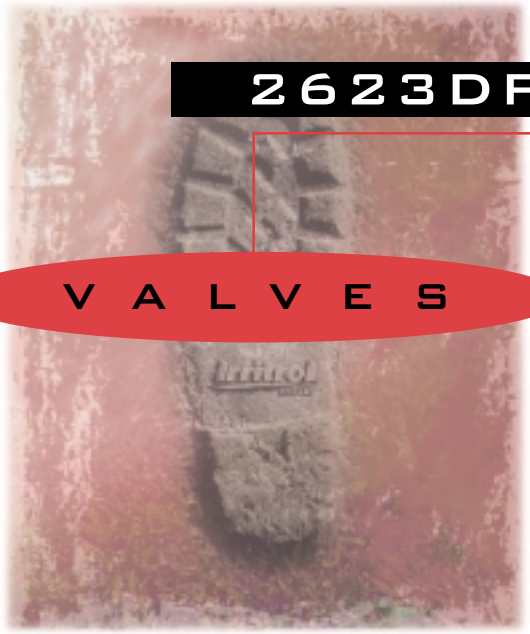
100P1-LS

Model	Size	Solenoid
100P1	1"	yes
100P1.5	1 ½"	yes
100P2	2"	yes
100P3	3"	yes
100P1-LS	1"	no
100P1.5-LS	1 ½"	no
100P2-LS	2"	no
100P3-LS	3"	no

102P1

Anti-contamination Model	Size
102P1	1"
102P1.5	1 ½"
102P2	2"
102P3	3"

2623DPR SERIES VALVE ADAPTERS



VALVES

¾" and 1" valve size

Application

These well-known adapters convert manual anti-siphon valves to electric operation.

Features

- Converts Champion™ brass anti-siphon valves to electric operation
- Manual internal bleed
- Manual external bleed (flush mode)
- Slow-closing design
- Ergonomic flow control allows precise flow adjustment and manual shut-off
- Heavy-duty, corrosion- and UV-resistant PVC and stainless steel construction
- Rugged, double-beaded SANTOPRENE® diaphragm provides leak-proof seal
- Buna-N valve seat seal
- Full stainless steel metering system
- Encapsulated injection-molded solenoid
- Captive hex plunger
- Hex/Phillips screws
- Easy installation
- Compact design
- Accepts OmniReg™ modular pressure regulator*

Operating Specifications

- Pressure range: 10-150 psi

Electrical Specifications

- Solenoid: 24 VAC
- Inrush volt-amp: 24 VAC-11.50 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 VAC-5.75 VA
- Holding current: .2 amp

Optional Accessories

- OmniReg 5-100 psi regulator (OMR-100)*
- OmniReg 5-30 psi regulator (OMR-30)*
- Weatherproof gauge (SPK-100)
- Weatherproof gauge (SPK-30)
- Reclaimed water solenoid kit (RW60-Kit); purple solenoid with purple warning tag
- DC latching solenoid (E2002)

  Note: Maximum pressure for a valve that utilizes E2002 latching solenoid is 120 psi.

Dimensions

Height: 6 ¾"
Width: 2 ⅞"

Note: Champion is a registered trademark of Champion Irrigation Products.

*Compatible with 2623DPR models manufactured after 11/1/98

2623DPR-.75

MODELS HOW TO SPECIFY

2623DPR-.75

Model	Type	Size
2623DPR-.75	Champion brass	¾"
2623DPR-1	Champion brass	1"

300 SERIES VALVE ADAPTERS

¾" and 1" valve size

Application

These commercial-grade adapters convert manual anti-siphon valves to electric operation.

Features

- Converts ¾-inch Champion™ brass anti-siphon valves (300-.75 model) to electric operation
- Converts 1-inch Irritrol manual and 1-inch Champion brass anti-siphon valves (300-1 model) to electric operation
- Manual internal bleed
- Manual external bleed (flush mode)
- Rugged, double-beaded nylon-reinforced Buna-N diaphragm provides leak-proof seal
- Buna-N valve seat seal
- Self-cleaning metering system for dirty water applications (externally removable)
- Flow control allows precise flow adjustment and manual shut-off
- Tough, glass-reinforced nylon, stainless steel and brass construction
- Encapsulated injection-molded solenoid
- Captive hex plunger
- Unique three-way stainless steel bonnet screws with threaded brass inserts
- Accepts OmniReg™ modular pressure regulator

Operating Specifications

- Pressure range: 10-150 psi

Electrical Specifications

- Solenoid: 24 VAC
- Inrush volt-amp: 24 VAC-11.50 VA
- Inrush current: .4 amp
- Holding volt-amp: 24 VAC-5.75 VA
- Holding current: .2 amp

Optional Accessories

- OmniReg 5-100 psi regulator (OMR-100)
- OmniReg 5-30 psi regulator (OMR-30)
- Weatherproof gauge (SPK-100)
- Weatherproof gauge (SPK-30)
- Reclaimed water solenoid kit (RW60-Kit); purple solenoid with purple warning tag
- DC latching solenoid (E2002)

Note: Maximum pressure for a valve that utilizes E2002 latching solenoid is 120 psi.

Dimensions

Height: 7 ¼"
Width: 4"

300-.75

MODELS HOW TO SPECIFY

300-.75

Model	Type	Size
300-.75	Champion brass	¾"
300-1	Champion brass, Irritrol manual	1"

OmniReg™

VALVES

Features

- Clearly marked dial settings permit precise control of downstream pressure
- Desired pressure may be set with water on or off
- One model fits all heavy-duty commercial 100 Series (Century PLUS), 700 Series (UltraFlow), 200B and 311A Series valves*
- Requires only 1 GPM to operate
- Maintains constant downstream pressure, regardless of widely varying inlet pressure
- Delivers an accuracy of ±3 psi
- Low-profile design permits use in applications with limited space
- "Drop in" installation is fast and easy, requiring tightening of only two captured screws
- Schrader valve test port is easily accessible for in-line use
- Manufactured of heavy-duty, corrosion-resistant glass-filled nylon
- Easily serviced internal module
- Stainless steel and brass hardware
- Vandal cap to avoid unauthorized use

Operating Specifications

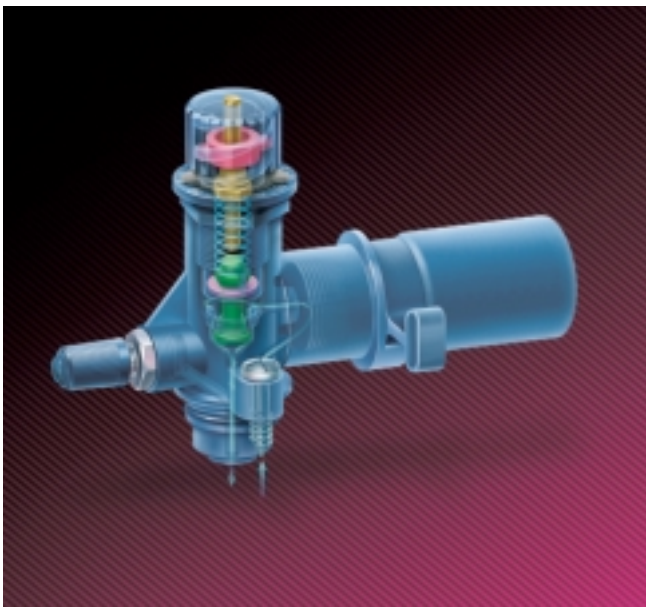
- Flow range: 1 to 300 GPM
- Inlet pressure range: Up to 200 psi
- Pressure regulation:
  5 to 30 psi (Model OMR-30)
  5 to 100 psi (Model OMR-100)
- Inlet pressure to be 10 psi greater than outlet pressure

*Compatible with Century PLUS, 700 UltraFlow (1" and 2") and 311A manufactured after 1/1/96; 700 UltraFlow (¾") manufactured after 5/4/96; and 200B manufactured after 12/1/98.

Application

OmniReg™, a new generation of modular pressure regulating devices, enables the user to quickly and accurately set the exact downstream pressure required for any application. No more guessing. No more estimating.

OMR-100



MODELS HOW TO SPECIFY

OMR-30

Model	Pressure Setting Range
OMR-30	5-30 psi
OMR-100	5-100 psi

OMR-DS*

Model	Function
OMR-DS	Downstream Sensing Kit

* This accessory may be used with either the OMR-30 or OMR-100 models to sense downstream pressure.

ACCESSORIES

Solenoids

R811-24 VACG

- Hardie, Richdel and Irritrol Systems universal encapsulated solenoid (bulk 10 per)
- Captive hex plunger feature
- 24VAC, .40 amp inrush, .20 amp holding

R811-24 VACG

RW60-Kit

- Purple solenoid with purple warning tag
- Hardie, Richdel and Irritrol Systems universal encapsulated solenoid (bulk 10 per)
- Captive hex plunger feature
- 24VAC, .40 amp inrush, .20amp holding

RW60-Kit

E2002

- DC latching solenoid for Hardie, Richdel and Irritrol valves used with IBOC and IBOC Plus Series controllers

R205-Kit

- Prepackaged repair kit for 205 Series non-flow control valves. Includes diaphragm assembly, bonnet assembly, fasteners and spring

R205TF-Kit

- Prepackaged repair kit for 205 Series flow control valves. Includes diaphragm assembly, bonnet assembly, fasteners and spring

SPK-700-XX

- Prepackaged repair kit for UltraFlow Series valves includes diaphragm assembly, support ring, seat seal, O-rings and fasteners (bulk 24 per; repair instructions and parts breakdown included)

SPK-100-XX

- Prepackaged repair kit for Century Series valves includes diaphragm assembly, O-rings, metering rod and fasteners (bulk 24 per; repair instructions and parts breakdown included)

R100PXX

R100P1

- Prepackaged repair kit for Century PLUS Series valves includes diaphragm assembly, O-rings, metering rod and fastening nuts (bulk 24 per; repair instructions and parts breakdown included)

Repair Kits

SPK-HR1

- Prepackaged repair kit includes diaphragm assembly, O-rings, metering rod and fasteners (bulk 24 per)

Tools

2400-45

2400-45

- Threaded nut-ring wrench speeds assembly and service of 2400, 2600, 2711DPR and 2713DPR valves

SPK-30

- 30 psi weatherproof gauge (fits OmniReg™ and all Hardie and Richdel pressure regulators)

SPK-100

- 100 psi weatherproof gauge (fits OmniReg™ and all Hardie and Richdel pressure regulators)

SPK-30, SPK-100

MODELS HOW TO SPECIFY

SPK-700-.75

Model	Size
SPK-700-.75	¾"
SPK-700B-.75	¾"
SPK-700-1	1"
SPK-700-1.5	1½"
SPK-700-2	2"

SPK-100-1

Model	Size
SPK-100-1	1"
SPK-100-1.5	1½"
SPK-100-2	2"
SPK-100-3	3"

R100P1

Model	Size
R100P1	1"
R100P1.5	1½"
R100P2	2"
R100P3	3"

IRRITROL VALVES

It's easy to create just the right valve to meet your specific needs with Irritrol Systems' comprehensive selection of modular options. Use the chart below to match the appropriate Irritrol valve with the desired add-on options. It is as simple as selecting a basic valve model (column A) and desired modular option(s) (column B). Order the listed model numbers and you'll have exactly the right combination of features you need for your application.

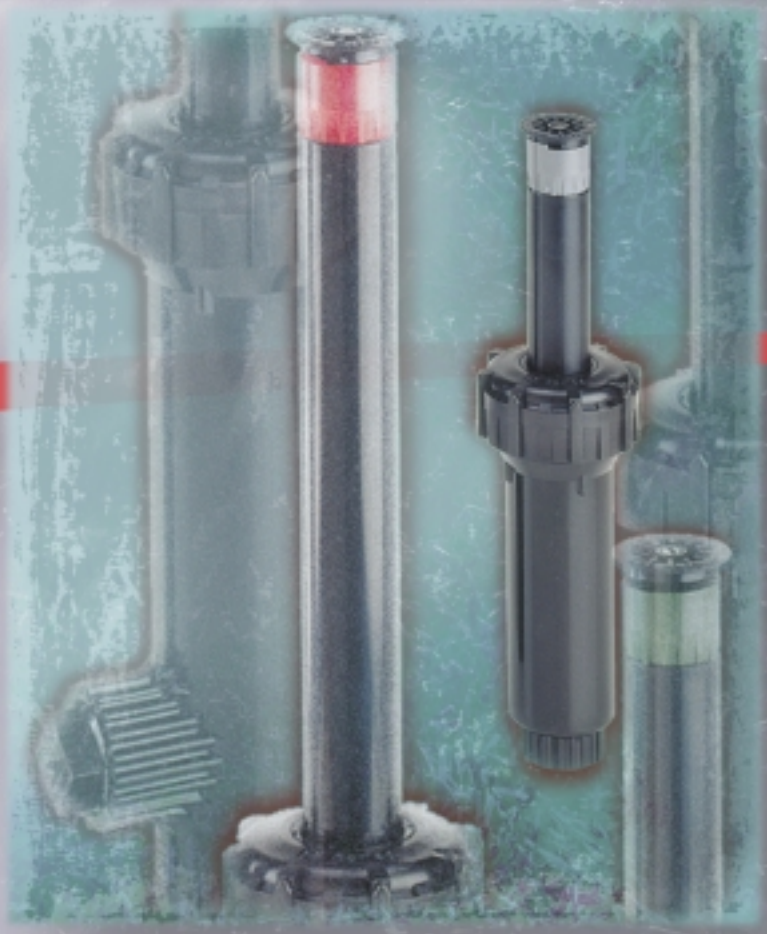
Part numbers appear in bold face.

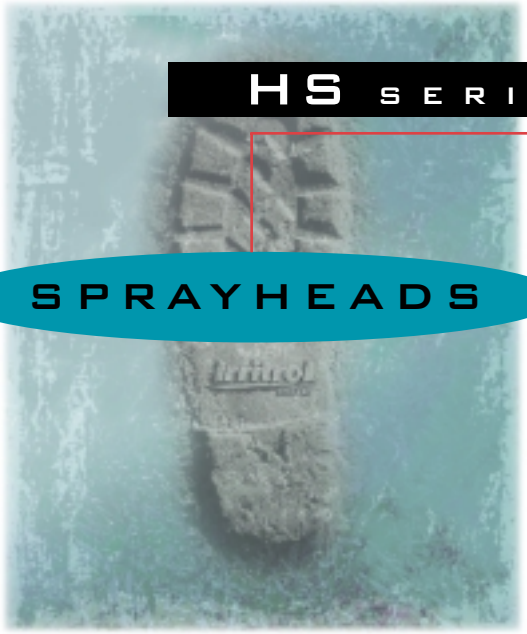
Column A

Basic Valve Models

Column B

Model	Description	24 VAC, 60Hz Solenoid Coil Assembly (captive plunger) **(R811-24VACG)**	24 VAC, 50Hz Solenoid Coil Assembly (captive plunger) **(588403)**	24 VDC Solenoid Assembly **(R576804)**	DC Latching Solenoid (for use with IBOC and IBOC Plus) **(E2002)**	Reclaimed Water Solenoid Kit (purple solenoid with warning tag) **(RW60-Kit)**	OmniReg™ Modular Regulator (0-100 psi) **(OMR-100)**	OmniReg™ Modular Regulator (0-30 psi) **(OMR-30)**	OmniReg™ Modular Regulator Downstream Sensing Kit (fits OMR-100 and OMR-30) **(OMR-DS)**	Hydraulic Valve Conversion Kit (converts Irritrol Century valves to hydraulic valves) **(HVC-Kit)**	Manual Adapter (converts Irritrol 24 VAC electric valves to manual valves) **(R1572)**
214B	1" globe/angle	x	x	x	x	x	x	x	x		x
214B-NF	1" globe/angle, non-flow control	x	x	x	x	x	x	x	x		x
216B	1 ½" globe/angle	x	x	x	x	x	x	x	x		x
216B-NF	1 ½" globe/angle, non-flow control	x	x	x	x	x	x	x	x		x
217B	2" globe/angle	x	x	x	x	x	x	x	x		x
217B-NF	2" globe/angle, non-flow control	x	x	x	x	x	x	x	x		x
100P1	1" globe/angle	x	x	x	x	x	x	x	x	x	x
100P1.5	1 ½" globe/angle	x	x	x	x	x	x	x	x	x	x
100P2	2" globe/angle	x	x	x	x	x	x	x	x	x	x
100P3	3" globe/angle	x	x	x	x	x	x	x	x	x	x
700B-.75	¾" UltraFlow	x	x	x	x	x	x	x	x		x
700-1	1" UltraFlow	x	x	x	x	x	x	x	x		x
700-1.5	1 ½" UltraFlow	x	x	x	x	x	x	x	x		x
700-2	2" UltraFlow	x	x	x	x	x	x	x	x		x
2711APR	¾" electric anti-siphon	x	x	x	x	x					x
2713APR	1" electric anti-siphon	x	x	x	x	x					x
2711DPR	¾" electric anti-siphon	x	x	x	x	x					x
2713DPR	1" electric anti-siphon	x	x	x	x	x					x
2400S/globe	1" globe, slip connection	x	x	x	x	x					x
2400T/globe	1" globe, NPT threads	x	x	x	x	x					x
2600T/globe	1" angle, NPT threads	x	x	x	x	x					x
2500S	1" electric globe, slip connection	x	x	x	x	x					x
2500SF	1" electric globe, slip connection, flow control	x	x	x	x	x					x
2500T	1" electric globe, NPT threads	x	x	x	x	x					x
2500TF	1" electric globe, NPT threads, flow control	x	x	x	x	x					x
2623DPR-.75	¾" electric adapter	x	x	x	x	x	x	x	x		x
2623DPR-1	1" electric adapter	x	x	x	x	x	x	x	x		x
300-.75	¾" electric adapter	x	x	x	x	x	x	x	x		x
300-1	1" electric adapter	x	x	x	x	x	x	x	x		x
311A-.75	¾" electric anti-siphon	x	x	x	x	x	x	x	x		x
311A-1	1" electric anti-siphon	x	x	x	x	x	x	x	x		x





HS SERIES

SPRAYHEADS

3", 4", 6" and 12" models

Application

The new HS Series sprayheads offer a variety of improved features that ensure quality performance and reliability in light commercial and residential applications. With newly redesigned bodies and enhanced pop-up heights, these sprayheads deliver optimum water-efficient coverage.

The introduction of variable arc nozzles to complement the full selection of Canopy™ MPR fixed arc models adds a new dimension of flexibility to the HS Series.

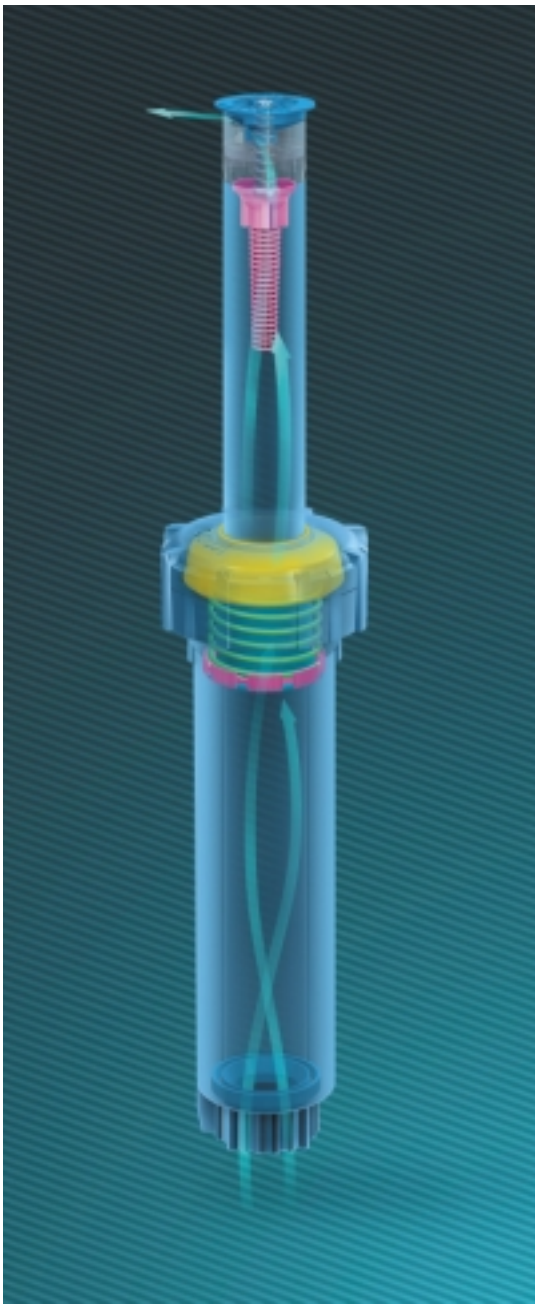
Features

- Newly redesigned bodies
- Matched precipitation rate nozzles provide even coverage
- Ratcheting riser permits easy arc adjustment in the field
- Side and bottom inlets (6- and 12-inch models) reduce installation time
- Pressure-activated seal cleans debris from stem, reduces flow-by during pop up, and prevents leaking between cap and body
- Heavy-duty, stainless steel retract spring ensures positive pop down
- One-piece molded body adds durability

Specifications

- Recommended working pressure: 25-40 psi
- Precipitation rate: 1.34-2.15 inches per hour
- Spacing: 6'-17'
- Flow-by: 0 at 10 psi or greater; .1 GPM otherwise
- Inlet size: ½" female NPT threads
- Exposed diameter: 1⅞"

HS300 HS400 HS600 HS1200



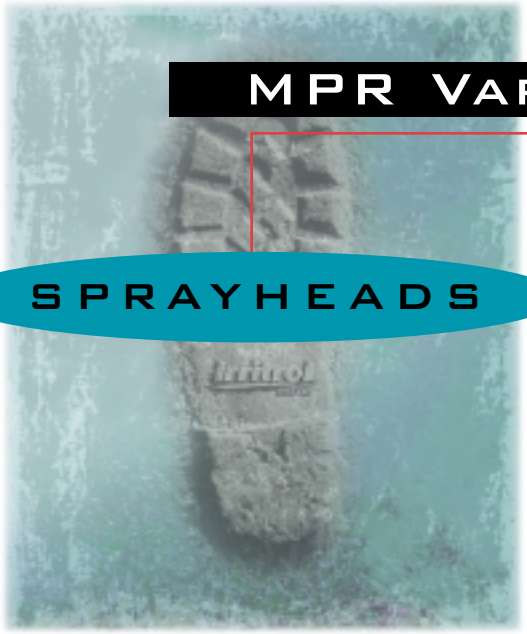
MODELS

HOW TO SPECIFY

HS 300

Model	Pop-up Height
HS300	3”
HS400	4”
HS600	6”
HS1200	12”

MPR Variable Arc Nozzles



SPRAYHEADS

Features

- Adjustable arc patterns from 25° to 360°
- Easy-turn settings
- Superior dirt tolerance
- Exceptional uniform coverage
- Color coded for easy identification
- Radius reduction screw permits up to 25% in-field reduction

HSN-17VAN

HSN-12VAN

HSN-7VAN

HSN-15VAN

HSN-10VAN

The utmost in nozzle flexibility is now available with Irritrol Systems' new matched precipitation rate Variable Arc Nozzles. In addition to conveniently adjustable arc patterns, the nozzles also offer easy-turn settings that can be customized with an included radius adjustment screw.

And there's more. These nozzles offer superior dirt tolerance, as well as reliable performance that delivers exceptional uniformity.

VARIABLE ARC MPR NOZZLES

HSN-7VAN				HSN-10VAN				HSN-12VAN				HSN-15VAN				HSN-17VAN			
Arc	Pressure psi	Radius ft.	Flow GPM	Arc	Pressure psi	Radius ft.	Flow GPM	Arc	Pressure psi	Radius ft.	Flow GPM	Arc	Pressure psi	Radius ft.	Flow GPM	Arc	Pressure psi	Radius ft.	Flow GPM
	20	7	1.36		20	10	1.36		20	12	2.13		20	14	3.08		20	16	3.87
	25	7	1.56		25	10	1.56		25	12	2.24		25	15	3.50		25	17	4.50
360°	30	7	1.95	360°	30	11	1.95	360°	30	13	2.85	360°	30	16	3.71	360°	30	18	4.82
	35	8	2.04		35	11	2.04		35	14	3.05		35	16	4.12		35	18	5.01
	40	9	2.92		40	12	2.92		40	15	3.35		40	17	4.54		40	19	5.51
	20	7	1.02		20	10	1.02		20	12	1.60		20	14	2.31		20	16	2.90
	25	7	1.17		25	10	1.17		25	12	1.68		25	15	2.63		25	17	3.38
270°	30	7	1.46	270°	30	11	1.46	270°	30	13	2.14	270°	30	16	2.79	270°	30	18	3.61
	35	8	1.53		35	11	1.53		35	14	2.29		35	16	3.09		35	18	3.76
	40	9	2.19		40	12	2.19		40	15	2.51		40	17	3.40		40	19	4.13
	20	7	0.91		20	10	0.91		20	12	1.42		20	14	2.06		20	16	2.58
	25	7	1.04		25	10	1.04		25	12	1.50		25	15	2.34		25	17	3.00
240°	30	7	1.30	240°	30	11	1.30	240°	30	13	1.90	240°	30	16	2.48	240°	30	18	3.21
	35	8	1.36		35	11	1.36		35	14	2.03		35	16	2.75		35	18	3.34
	40	9	1.95		40	12	1.95		40	15	2.24		40	17	3.02		40	19	3.67
	20	7	0.68		20	10	0.68		20	12	1.07		20	14	1.54		20	16	1.94
	25	7	0.78		25	10	0.78		25	12	1.12		25	15	1.75		25	17	2.25
180°	30	7	0.97	180°	30	11	0.97	180°	30	13	1.42	180°	30	16	1.86	180°	30	18	2.41
	35	8	1.02		35	11	1.02		35	14	1.52		35	16	2.06		35	18	2.50
	40	9	1.46		40	12	1.46		40	15	1.68		40	17	2.27		40	19	2.75
	20	7	0.45		20	10	0.45		20	12	0.71		20	14	1.03		20	16	1.29
	25	7	0.52		25	10	0.52		25	12	0.75		25	15	1.17		25	17	1.50
120°	30	7	0.65	120°	30	11	0.65	120°	30	13	0.95	120°	30	16	1.24	120°	30	18	1.61
	35	8	0.68		35	11	0.68		35	14	1.02		35	16	1.37		35	18	1.67
	40	9	0.97		40	12	0.97		40	15	1.12		40	17	1.51		40	19	1.84
	20	7	0.34		20	10	0.34		20	12	0.53		20	14	0.77		20	16	0.97
	25	7	0.39		25	10	0.39		25	12	0.56		25	15	0.88		25	17	1.13
90°	30	7	0.49	90°	30	11	0.49	90°	30	13	0.71	90°	30	16	0.93	90°	30	18	1.20
	35	8	0.51		35	11	0.51		35	14	0.76		35	16	1.03		35	18	1.25
	40	9	0.73		40	12	0.73		40	15	0.84		40	17	1.13		40	19	1.38
	20	7	0.17		20	10	0.17		20	12	0.27		20	14	0.39		20	16	0.48
	25	7	0.19		25	10	0.19		25	12	0.28		25	15	0.44		25	17	0.56
45°	30	7	0.24	45°	30	11	0.24	45°	30	13	0.36	45°	30	16	0.46	45°	30	18	0.60
	35	8	0.26		35	11	0.26		35	14	0.38		35	16	0.52		35	18	0.63
	40	9	0.37		40	12	0.37		40	15	0.42		40	17	0.57		40	19	0.69

Data represent test results in zero wind. Adjust for local conditions. Radius may be reduced up to 25% with adjustment screw (this may alter the uniformity of the spray pattern).

MODELS

HOW TO SPECIFY

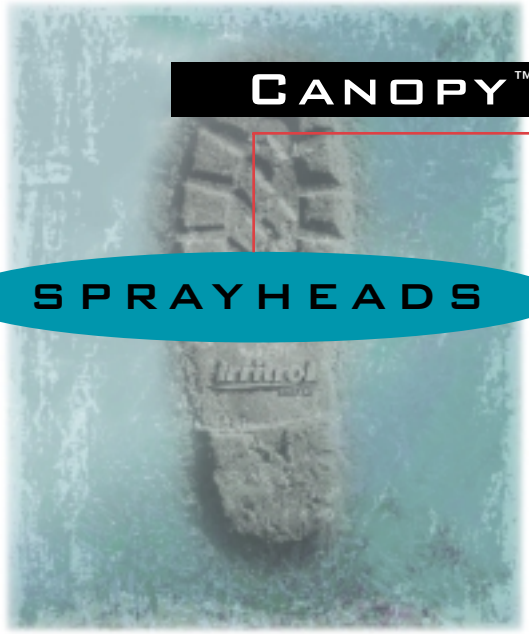
HSN-7 VAN

Model	Series	Pattern
HSN-7VAN*	7	Variable Arc

*See charts for additional models.

Canopy™ MPR Nozzles

SPRAYHEADS

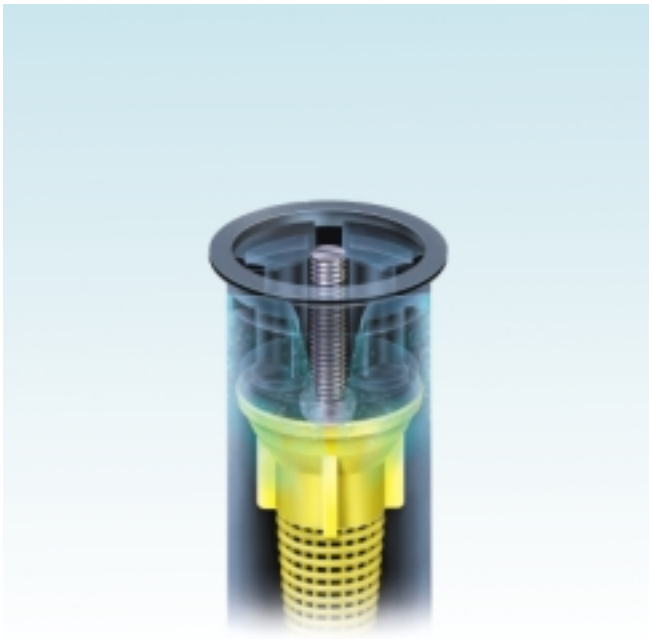


Irritrol Systems' Canopy nozzles deliver uniform, water-efficient distribution that exceeds the performance of any other on the market. Protected by a heavy-duty plastic lid (or canopy), each unit's side-positioned spray outlets remain free of pattern-jeopardizing dirt and other debris.

Thanks to a unique internal flow path and reinforced exterior construction, water is distributed in a series of ultra-efficient quarter-arc segments that results in unmatched water control.

Features

- Uniform, water-efficient distribution with the industry's highest CUs (Coefficient of Uniformity) and lowest SCs (Scheduling Coefficient)
- Large, uniform water droplet size inhibits misting, providing excellent coverage in windy conditions
- Protected nozzle side openings safeguard pattern against interference from the above-ground dirt and other debris
- Even distribution throughout pattern makes coverage ideal for established turf, over-seeding and hydro-seeding applications
- Color-coded nozzles offer immediate radius identification
- Radius reduction screw permits up to 25% in-field reduction



CANOPY™ MPR NOZZLES

7 Series						9 Series						12 Series						15 Series					
Model	Pressure psi	Radius ft.	Flow GPM	Precip.■ in/h	Precip.▲ in/h	Model	Pressure psi	Radius ft.	Flow GPM	Precip.■ in/h	Precip.▲ in/h	Model	Pressure psi	Radius ft.	Flow GPM	Precip.■ in/h	Precip.▲ in/h	Model	Pressure psi	Radius ft.	Flow GPM	Precip.■ in/h	Precip.▲ in/h
HSN7F	20	6	0.61	1.63	1.88	HSN9F	20	8	1.09	1.64	1.89	HSN12F	20	10	1.90	1.83	2.11	HSN15F	20	13	3.05	1.74	2.01
	25	6.5	0.78	1.78	2.05		25	8.5	1.21	1.61	1.86		25	11	2.15	1.71	1.98		25	14	3.37	1.66	1.91
	30	7	0.81	1.59	1.84		30	9	1.33	1.58	1.83		30	12	2.37	1.58	1.83		30	15	3.70	1.58	1.83
	35	7.5	0.88	1.51	1.74		35	9.5	1.45	1.55	1.79		35	13	2.60	1.48	1.71		35	16	4.01	1.51	1.74
	40	8	0.96	1.44	1.67		40	10	1.58	1.52	1.76		40	14	2.80	1.38	1.59		40	17	4.35	1.45	1.67
HSN7TQ	20	6	0.50	1.78	2.06	HSN9TQ	20	8	0.83	1.67	1.92	HSN12TQ	20	10	1.45	1.86	2.15	HSN15TQ	20	13	2.30	1.75	2.02
	25	6.5	0.55	1.67	1.93		25	8.5	0.91	1.62	1.87		25	11	1.61	1.71	1.97		25	14	2.53	1.66	1.91
	30	7	0.61	1.59	1.84		30	9	1.00	1.58	1.83		30	12	1.78	1.58	1.83		30	15	2.78	1.58	1.83
	35	7.5	0.66	1.51	1.74		35	9.5	1.09	1.55	1.79		35	13	1.93	1.47	1.69		35	16	2.98	1.49	1.73
	40	8	0.72	1.44	1.67		40	10	1.18	1.52	1.75		40	14	2.10	1.38	1.59		40	17	3.25	1.44	1.67
HSN7TT	20	6	0.46	1.85	2.13	HSN9TT	20	8	0.72	1.63	1.88	HSN12TT	20	10	1.26	1.82	2.10	HSN15TT	20	13	2.04	1.74	2.01
	25	6.5	0.50	1.71	1.97		25	8.5	0.80	1.60	1.85		25	11	1.42	1.70	1.96		25	14	2.26	1.67	1.92
	30	7	0.54	1.59	1.84		30	9	0.89	1.58	1.83		30	12	1.58	1.58	1.83		30	15	2.47	1.58	1.83
	35	7.5	0.58	1.49	1.72		35	9.5	0.94	1.50	1.74		35	13	1.66	1.42	1.64		35	16	2.68	1.51	1.75
	40	8	0.62	1.40	1.62		40	10	1.00	1.44	1.67		40	14	1.82	1.34	1.55		40	17	2.88	1.44	1.66
HSN7H	20	6	0.33	1.77	2.04	HSN9H	20	8	0.54	1.63	1.88	HSN12H	20	10	0.95	1.83	2.11	HSN15H	20	13	1.53	1.74	2.01
	25	6.5	0.37	1.69	1.95		25	8.5	0.61	1.63	1.88		25	11	1.08	1.72	1.99		25	14	1.68	1.65	1.91
	30	7	0.41	1.61	1.86		30	9	0.67	1.58	1.83		30	12	1.19	1.58	1.83		30	15	1.85	1.58	1.83
	35	7.5	0.45	1.54	1.78		35	9.5	0.79	1.69	1.95		35	13	1.28	1.46	1.68		35	16	1.99	1.50	1.73
	40	8	0.49	1.47	1.70		40	10	0.80	1.54	1.78		40	14	1.36	1.34	1.54		40	17	2.17	1.45	1.67
HSN7T	20	6	0.23	1.85	2.13	HSN9T	20	8	0.36	1.63	1.88	HSN12T	20	10	0.64	1.85	2.14	HSN15T	20	13	1.02	1.74	2.01
	25	6.5	0.25	1.71	1.97		25	8.5	0.40	1.60	1.85		25	11	0.72	1.72	1.99		25	14	1.13	1.67	1.92
	30	7	0.27	1.59	1.84		30	9	0.44	1.58	1.83		30	12	0.79	1.58	1.83		30	15	1.23	1.58	1.83
	35	7.5	0.29	1.49	1.72		35	9.5	0.47	1.50	1.74		35	13	0.86	1.47	1.70		35	16	1.33	1.50	1.73
	40	8	0.31	1.40	1.62		40	10	0.50	1.44	1.67		40	14	0.93	1.37	1.58		40	17	1.45	1.45	1.67
HSN7Q	20	6	0.16	1.71	1.98	HSN9Q	20	8	0.28	1.69	1.95	HSN12Q	20	10	0.48	1.85	2.14	HSN15Q	20	13	0.76	1.73	2.00
	25	6.5	0.18	1.64	1.90		25	8.5	0.30	1.60	1.85		25	11	0.52	1.66	1.91		25	14	0.84	1.65	1.91
	30	7	0.20	1.59	1.84		30	9	0.33	1.58	1.83		30	12	0.59	1.58	1.83		30	15	0.93	1.58	1.83
	35	7.5	0.22	1.51	1.74		35	9.5	0.36	1.54	1.77		35	13	0.64	1.46	1.68		35	16	1.00	1.50	1.74
	40	8	0.24	1.44	1.67		40	10	0.39	1.50	1.73		40	14	0.70	1.38	1.59		40	17	1.08	1.44	1.66

■ Square spacing based on 50% diameter of throw. ▲ Triangle spacing based on 55% diameter of throw.

Specialty Arc Nozzles

9 Series				15 Series			
Model	Pressure psi	W x L ft.	Flow GPM	Model	Pressure psi	W x L ft.	Flow GPM
HSN9EST	20	3 x 8	0.41	HSN15EST	20	3 x 14	0.52
	30	4 x 9	0.45		30	4 x 15	0.61
	40	5 x 10	0.48		40	5 x 17	0.70
HSN9CST	20	3 x 16	0.85	HSN15CST	20	3 x 28	1.10
	30	4 x 18	0.90		30	4 x 30	1.21
	40	5 x 20	0.97		40	5 x 32	1.35
HSN9SST	20	3 x 16	0.85	HSN15SST	20	3 x 28	1.10
	30	4 x 18	0.90		30	4 x 30	1.21
	40	5 x 20	0.97		40	5 x 32	1.35

MODELS HOW TO SPECIFY

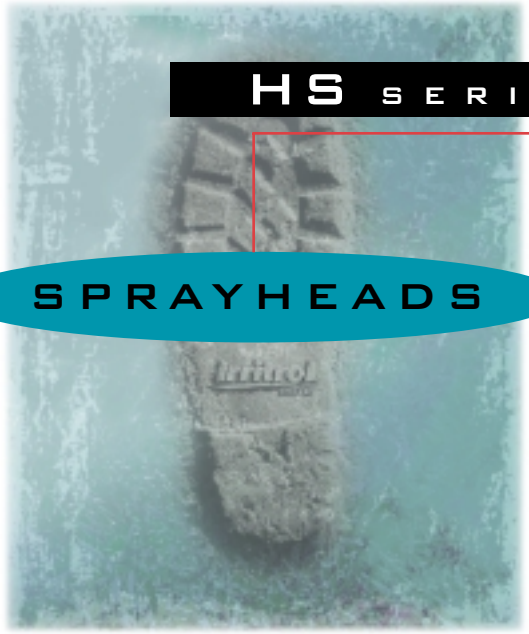
HSN-7 F

Model	Series	Pattern
HSN-7F*	7	Full

*See charts for additional models.

HS SERIES

SPRAYHEADS



Bubbler

533

Application

Engineered to meet the irrigation needs of trees, shrubs and flowers.

Features

- Adjustable flow rate
- Adjustable radius
- Manufactured of heavy-duty ABS

Specifications

- Recommended working pressure: 20-40 psi
- Inlet size: ½" female NPT threads
- Flow rate: 1.36-5.90 GPM
- Radius: 0'-2'

	90° adjustment	180° adjustment	270° adjustment	360° adjustment
PSI	GPM	GPM	GPM	GPM
15	1.36	2.37	2.85	2.97
20	1.56	2.75	3.31	3.45
25	1.77	3.04	3.71	3.86
30	1.93	3.36	4.05	4.32
35	2.01	3.59	4.37	5.51
40	2.25	3.84	4.70	5.90

Note: Adjustments are made by turning cap in counter-clockwise direction.

Shrub Adapter

HS100

Application

Designed for use with sprayhead nozzles in shrub and other low-traffic areas.

Features

- Threads directly onto riser
- UV treated for above-ground mount
- Manufactured of heavy-duty ABS
- Accepts all Irritrol Systems HS Series Canopy™ nozzles

Specifications

- Inlet Size: ½" female NPT threads

MODELS HOW TO SPECIFY

Shrub Adapter

HS100

Model/Nozzle Series

HS100/Irritrol Systems HSN

Bubbler

533

Model

533

Swing Pipe

Super Blue Flex™ Pipe

Application

Ideal for installing sprayheads in difficult and hard-to-reach areas.

Features

- Highly flexible
- Easily unwinds from center of coil
- Durable, low-density poly-ethylene
- Shrink-wrapped coils

Specifications

- Maximum working pressure: 80 psi at 100° F
- Inside diameter: .49”
- Outside diameter: .68”
- Wall thickness: .095”
- Nominal size: .50”
- Coil size: 100’

Fittings

- FFP-C barbed coupler
- FFP-T barbed tee
- FFP-50EM ½” male x barb elbow
- FFP-75EM ¾” male x barb elbow

MODELS | HOW TO SPECIFY

Swing Pipe

EHD1295-010-D

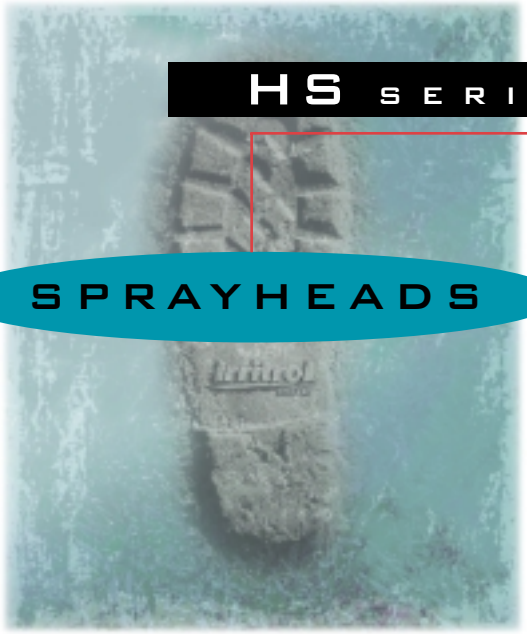
Model

EHD1295-010-D
EHF1295-010-D**

**Shipped from Florida

HS SERIES

SPRAYHEADS



HS Check Valve

HS00-CV

Application

For use in protection against low-head drainage. Also reduces water waste and erosion.

Features

- HS check valve extends system life by reducing negative effects of water hammer
- Fits pop-up heights: 6” and 12”
- Requires use of bottom inlet only

Specifications

- Maintains up to 8’ in elevation change

Non-potable Water Cover

HS00-NP

Application

Purple-colored plastic cover snaps over spray cap to identify non-potable water system. For use with effluent/non-potable water only.

MODELS | HOW TO SPECIFY

Non-potable Water Cover

HS00-NP

Model

Fits all new HS Pop-up models

Check Valve

HS00-CV

Model

Fits 6" and 12" HS Pop-up models


DESIGN
Steps
DD

Details on Disk

Complete installation drawings, specifications and flow curves (in standard and metric) are only a click away with Irritrol Systems' new Details on Disk program.

This unique software package will save hours of design time by placing volumes of critical data at your fingertips. Simply copy the drawings directly onto your CAD program or other Windows software. Text also can be transferred to any DOS- or Windows-based software.

The complete Details on Disk program is fully exportable into DXF and DWG formats so you can use them with existing CAD programs, including AutoCAD, CADkey and RainCAD. Also, you can export all details and flow curves into WFM (Windows Metafile) format for use with most Windows applications.

Details on Disk is available for a nominal charge.

For additional information on Details on Disk, complete and mail the business reply card located in the back of this catalog or contact your local Irritrol Systems representative.

Formulas

		(U.S.)		*(METRIC)*
Precipitation Rates				
Equilateral Triangular Spacing	P.R.= (in/hr)	$\frac{\text{(GPM of 360) x 96.25}}{\text{(Head Spacing)}^2 \text{ x .866}}$	*P.R.= (mm/hr)*	$\frac{m^3/hr \text{ of } 360 \times 1000}{m^2 \times .866}$
Square/Rectangular Spacing	P.R.= (in/hr)	$\frac{\text{(GPM of 360) x 96.25}}{\text{Head Spacing x Row Spacing}}$	*P.R.= (mm/hr)*	$\frac{m^3/hr \text{ of } 360 \times 1000}{\text{Head Spacing x Row Spacing}}$
Square/Rectangular Spacing for Specific Arc	P.R.= (in/hr)	$\frac{\text{34650 x GPM (for any arc)}}{\text{Degrees of Arc x Head Spacing x Row Spacing}}$	*P.R.= (mm/hr)*	$\frac{m^3/hr \text{ (for any arc) } \times 1000}{\text{Degrees of Arc x Head Spacing x Row Spacing}}$
Horsepower	H.P. =	$\frac{\text{GPM x Ft of Head}}{\text{3,960 x Pump Efficiency (expressed as a decimal)}}$		
Station Run Time	S.R.T. = (min/wk)	$\frac{\text{Total Weekly Req'd (inch/wk) x 60 (min/hr)}}{\text{Precipitation Rate (in/hr)}}$	*S.R.T. = (min/wk)*	$\frac{\text{Total Weekly Req'd (mm/wk) x 60 (min/hr)}}{\text{Precipitation Rate (mm/hr)}}$
Pipe Velocity	V= (ft/sec)	$\frac{\text{0.4085 x Flow (GPM)}}{\text{(Inside Pipe Diameter in Inches)}^2}$	*V= (m/sec)*	$\frac{1273.24 \text{ x Flow (l/sec)}}{\text{(Inside Pipe Diameter in Millimeters)}^2}$
Scheduling Coefficient	S.C. =	$\frac{\text{Average Precipitation Rate (in/hr)}}{\text{Lowest Precipitation Rate (in/hr)}}$	*S.C. =*	$\frac{\text{Average Precipitation Rate (mm/hr)}}{\text{Lowest Precipation Rate (mm/hr)}}$
Slope	S =	$\frac{\text{Rise (Measure of Length)}}{\text{Run (Measure of Length)}}$		

Conversion Factors

To Convert	From	To	Multiply By
Area	acres	feet^2	43560
	acres	meters^2	4046.8˘
	meters^2	feet^2	10.764
	feet^2	inches^2	144
	inches^2	centimeters^2	6.452
	hectares	meters^2	10,000
	hectares	acres	2.471
Power	kilowatts	horsepower	1.3410
Flow	feet^3/minutes	meters^3/second	0.0004719
	feet^3/second	meters^3/second	.02832
	yards^3/minute	meters^3/second	.01274
	gallons/minute	meters^3/hour	.22716
	gallons/minute	liters/minute	3.7854
	gallons/minutes	liters/second	.06309
	meters^3/hour	liters/minute	16.645
	meters^3/hour	liters/second	.2774
	liters/minute	liters/second	60
Length	feet	inches	12
	inches	centimeters	2.540
	feet	meters	.30481
	kilometers	miles	.6214
	miles	feet	5280
	miles	meters	1609.34
	millimeters	inch	.03937
Pressure	PSI	kilopascals	6.89476
	PSI	bars	.068948
	bars	kilopascals	100
	PSI	feet of head	2.31
Velocity	feet/second	meters/second	.3048
Volume	feet^3	gallons	7.481
	feet^3	liters	28.32
	meters^3	feet^3	35.31
	meters^3	yard^3	1.3087
	yards^3	feet^3	27
	yards^3	gallons	202
	acres/feet	feet^3	43,560
	gallons	meters^3	.003785
	gallons	liters	3.785
	imperial gallons	gallons	1.833

PVC Class 200 IPS Plastic Pipe

Sizes: ¾" thru 6"
Flow: 1 thru 600 GPM

(1120, 1220) SDR 21 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

SIZE	¾"		1"		1¼"		1½"		2"		2½"		3"		4"		6"	
OD	1.050		1.315		1.660		1.900		2.375		2.875		3.500		4.500		6.625	
ID	.930		1.189		1.502		1.720		2.149		2.601		3.166		4.072		5.993	
WALL THK.	.060		0.063		0.079		0.090		0.113		0.117		0.167		0.214		0.316	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	0.47	0.06	0.28	0.02	0.18	0.01	0.13	0.00										
2	0.94	0.22	0.57	0.07	0.36	0.02	0.27	0.01	0.17	0.00								
3	1.42	0.46	0.86	0.14	0.54	0.04	0.41	0.02	0.26	0.01	0.18	0.00						
4	1.89	0.79	1.15	0.24	0.72	0.08	0.55	0.04	0.35	0.01	0.24	0.01						
5	2.36	1.20	1.44	0.36	0.90	0.12	0.68	0.06	0.44	0.02	0.30	0.01						
6	2.83	1.68	1.73	0.51	1.08	0.16	0.82	0.08	0.53	0.03	0.36	0.01	0.24	0.00				
7	3.30	2.23	2.02	0.67	1.26	0.22	0.96	0.11	0.61	0.04	0.42	0.01	0.28	0.01				
8	3.77	2.85	2.30	0.86	1.44	0.28	1.10	0.14	0.70	0.05	0.48	0.02	0.32	0.01				
9	4.25	3.55	2.59	1.07	1.62	0.34	1.24	0.18	0.79	0.06	0.54	0.02	0.36	0.01				
10	4.72	4.31	2.88	1.30	1.80	0.42	1.37	0.22	0.88	0.07	0.60	0.03	0.40	0.01				
11	5.19	5.15	3.17	1.56	1.98	0.50	1.51	0.26	0.97	0.09	0.66	0.03	0.44	0.01				
12	5.66	6.05	3.46	1.83	2.17	0.59	1.65	0.30	1.06	0.10	0.72	0.04	0.48	0.02	0.29	0.00		
14	6.60	8.05	4.04	2.43	2.53	0.78	1.93	0.40	1.23	0.14	0.84	0.05	0.56	0.02	0.34	0.01		
16	7.55	10.30	4.61	3.11	2.89	1.00	2.20	0.52	1.41	0.17	0.96	0.07	0.65	0.03	0.39	0.01		
18	8.49	12.81	5.19	3.87	3.25	1.24	2.48	0.64	1.59	0.22	1.08	0.09	0.73	0.03	0.44	0.01		
20	9.43	15.58	5.77	4.71	3.61	1.51	2.75	0.78	1.76	0.26	1.20	0.10	0.81	0.04	0.49	0.01		
22	10.38	18.58	6.34	5.62	3.97	1.80	3.03	0.93	1.94	0.32	1.32	0.12	0.89	0.05	0.54	0.01		
24	11.32	21.83	6.92	6.60	4.34	2.12	3.30	1.09	2.12	0.37	1.44	0.15	0.97	0.06	0.59	0.02		
26	12.27	25.32	7.50	7.65	4.70	2.46	3.58	1.27	2.29	0.43	1.56	0.17	1.05	0.07	0.63	0.02		
28	13.21	29.04	8.08	8.78	5.06	2.82	3.86	1.46	2.47	0.49	1.68	0.19	1.13	0.07	0.68	0.02		
30	14.15	33.00	8.65	9.98	5.42	3.20	4.13	1.66	2.65	0.56	1.80	0.22	1.22	0.09	0.73	0.02	0.34	0.00
35	16.51	43.91	10.10	13.27	6.32	4.26	4.82	2.20	3.09	0.75	2.11	0.29	1.42	0.11	0.86	0.03	0.39	0.01
40	18.87	56.23	11.54	17.00	7.23	5.45	5.51	2.82	3.53	0.95	2.41	0.38	1.62	0.14	0.98	0.04	0.45	0.01
45			12.98	21.14	8.13	6.78	6.20	3.51	3.97	1.19	2.71	0.47	1.83	0.18	1.10	0.05	0.51	0.01
50			14.42	25.70	9.04	8.24	6.89	4.26	4.41	1.44	3.01	0.57	2.03	0.22	1.23	0.06	0.56	0.01
55			15.87	30.66	9.94	9.83	7.58	5.09	4.85	1.72	3.31	0.68	2.23	0.26	1.35	0.08	0.62	0.01
60			17.31	36.02	10.85	11.55	8.27	5.97	5.30	2.02	3.61	0.80	2.44	0.31	1.47	0.09	0.68	0.01
65			18.75	41.77	11.75	13.40	8.96	6.93	5.74	2.35	3.92	0.93	2.64	0.36	1.59	0.10	0.73	0.02
70					12.65	15.37	9.65	7.95	6.18	2.69	4.22	1.06	2.84	0.41	1.72	0.12	0.79	0.02
75					13.56	17.47	10.34	9.03	6.62	3.06	4.52	1.21	3.05	0.46	1.84	0.14	0.85	0.02
80					14.46	19.68	11.03	10.18	7.06	3.44	4.82	1.36	3.25	0.52	1.96	0.15	0.90	0.02
85					15.37	22.02	11.72	11.39	7.50	3.85	5.12	1.52	3.45	0.59	2.09	0.17	0.96	0.03
90					16.27	24.48	12.41	12.66	7.95	4.28	5.42	1.69	3.66	0.65	2.21	0.19	1.02	0.03
95					17.18	27.06	13.10	13.99	8.39	4.74	5.72	1.87	3.86	0.72	2.33	0.21	1.07	0.03
100					18.08	29.76	13.79	15.39	8.83	5.21	6.03	2.06	4.07	0.79	2.46	0.23	1.13	0.04
110					19.89	35.50	15.17	18.36	9.71	6.21	6.63	2.45	4.47	0.94	2.70	0.28	1.24	0.04
120							16.54	21.57	10.60	7.30	7.23	2.88	4.88	1.11	2.95	0.33	1.36	0.05
130							17.92	25.02	11.48	8.47	7.84	3.34	5.29	1.29	3.19	0.38	1.47	0.06
140							19.30	28.70	12.36	9.71	8.44	3.84	5.69	1.47	3.44	0.43	1.59	0.07
150									13.25	11.04	9.04	4.36	6.10	1.68	3.69	0.49	1.70	0.08
160									14.13	12.44	9.64	4.91	6.51	1.89	3.93	0.55	1.81	0.08
170									15.01	13.91	10.25	5.50	6.91	2.11	4.18	0.62	1.93	0.09
180									15.90	15.47	10.85	6.11	7.32	2.35	4.42	0.69	2.04	0.11
190									16.78	17.10	11.45	6.75	7.73	2.60	4.67	0.76	2.15	0.12
200									17.66	18.80	12.06	7.43	8.14	2.85	4.92	0.84	2.27	0.13
225									19.87	23.38	13.56	9.24	9.15	3.55	5.53	1.04	2.55	0.16
250											15.07	11.23	10.17	4.31	6.15	1.27	2.83	0.19
275											16.58	13.39	11.19	5.15	6.76	1.51	3.12	0.23
300											18.09	15.74	12.21	6.05	7.38	1.78	3.40	0.27
325											19.60	18.25	13.22	7.01	7.99	2.06	3.69	0.31
350													14.24	8.05	8.61	2.36	3.97	0.36
375													15.26	9.14	9.22	2.69	4.25	0.41
400													16.28	10.30	9.84	3.03	4.54	0.46
425													17.29	11.53	10.45	3.39	4.82	0.52
450													18.31	12.81	11.07	3.77	5.11	0.57
475													19.33	14.16	11.68	4.16	5.39	0.63
500															12.30	4.58	5.67	0.70
550															13.53	5.46	6.24	0.83
600															14.76	6.42	6.81	0.98

Note: areas of chart indicate velocities over 5 feet per second (FPS). Use with caution.

Velocity of flow values are computed from the general equation $V = .408 \frac{Q}{d^2}$

Friction pressure loss values are computed from the equation $hf = 0.2083 \left(\frac{100}{C}\right)^{1.852} \frac{Q^{1.852}}{d^{4.866}}$ x .433 for psi loss per 100' of pipe

PVC Class 315 IPS Plastic Pipe

Sizes: ½" thru 6"
Flow: 1 thru 600 GPM

(1120, 1220) SDR 13.5 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

SIZE	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		4"		6"	
OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		4.500		6.625	
ID	0.716		0.894		1.121		1.414		1.618		2.023		2.449		2.982		3.834		5.643	
WALL THK.	0.062		0.078		0.097		0.123		0.141		0.176		0.213		0.259		0.333		0.491	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	0.79	0.22	0.51	0.07	0.32	0.02	0.20	0.01	0.15	0.00										
2	1.59	0.78	1.02	0.27	0.64	0.09	0.40	0.03	0.31	0.01	0.19	0.00								
3	2.38	1.65	1.53	0.56	0.97	0.19	0.61	0.06	0.46	0.03	0.29	0.01	0.20	0.00						
4	3.18	2.82	2.04	0.96	1.29	0.32	0.81	0.10	0.62	0.05	0.39	0.02	0.27	0.01						
5	3.97	4.26	2.55	1.45	1.62	0.48	1.02	0.16	0.77	0.08	0.49	0.03	0.34	0.01	0.22	0.00				
6	4.77	5.97	3.06	2.03	1.94	0.67	1.22	0.22	0.93	0.11	0.59	0.04	0.40	0.02	0.27	0.01				
7	5.57	7.95	3.57	2.70	2.27	0.90	1.42	0.29	1.09	0.15	0.69	0.05	0.47	0.02	0.32	0.01				
8	6.36	10.18	4.08	3.45	2.59	1.15	1.63	0.37	1.24	0.19	0.79	0.06	0.54	0.03	0.36	0.01				
9	7.16	12.66	4.59	4.30	2.92	1.43	1.83	0.46	1.40	0.24	0.89	0.08	0.61	0.03	0.41	0.01				
10	7.95	15.38	5.10	5.22	3.24	1.74	2.04	0.56	1.55	0.29	0.99	0.10	0.68	0.04	0.45	0.01	0.27	0.00		
11	8.75	18.35	5.61	6.23	3.57	2.07	2.24	0.67	1.71	0.35	1.09	0.12	0.74	0.05	0.50	0.02	0.30	0.01		
12	9.55	21.56	6.12	7.32	3.89	2.43	2.44	0.79	1.87	0.41	1.19	0.14	0.81	0.05	0.55	0.02	0.33	0.01		
14	11.14	28.69	7.14	9.74	4.54	3.24	2.85	1.05	2.18	0.54	1.39	0.18	0.95	0.07	0.64	0.03	0.38	0.01		
16	12.73	36.74	8.16	12.47	5.19	4.15	3.26	1.34	2.49	0.70	1.59	0.23	1.08	0.09	0.73	0.04	0.44	0.01		
18	14.32	45.69	9.18	15.51	5.84	5.16	3.67	1.67	2.80	0.87	1.79	0.29	1.22	0.12	0.82	0.04	0.49	0.01		
20	15.91	55.54	10.20	18.86	6.49	6.27	4.08	2.03	3.11	1.05	1.99	0.35	1.36	0.14	0.91	0.05	0.55	0.02		
22	17.50	66.26	11.23	22.50	7.14	7.48	4.48	2.42	3.42	1.25	2.19	0.42	1.49	0.17	1.00	0.06	0.61	0.02		
24	19.10	77.84	12.25	26.43	7.79	8.79	4.89	2.84	3.74	1.47	2.39	0.50	1.63	0.20	1.10	0.08	0.66	0.02		
26			13.27	30.65	8.44	10.19	5.30	3.29	4.05	1.71	2.59	0.58	1.76	0.23	1.19	0.09	0.72	0.03		
28			14.29	35.16	9.09	11.69	5.71	3.78	4.36	1.96	2.79	0.66	1.90	0.26	1.28	0.10	0.77	0.03	0.35	0.00
30			15.31	39.95	9.74	13.29	6.12	4.29	4.67	2.23	2.99	0.75	2.04	0.30	1.37	0.11	0.83	0.03	0.38	0.01
35			17.86	53.15	11.36	17.68	7.14	5.71	5.45	2.96	3.48	1.00	2.38	0.39	1.60	0.15	0.97	0.04	0.44	0.01
40					12.98	22.64	8.16	7.31	6.23	3.80	3.98	1.28	2.72	0.51	1.83	0.19	1.11	0.06	0.51	0.01
45					14.61	28.15	9.18	9.10	7.01	4.72	4.48	1.59	3.06	0.63	2.06	0.24	1.24	0.07	0.57	0.01
50					16.23	34.22	10.20	11.06	7.79	5.74	4.98	1.94	3.40	0.76	2.29	0.29	1.38	0.09	0.64	0.01
55					17.85	40.83	11.22	13.19	8.57	6.85	5.48	2.31	3.74	0.91	2.52	0.35	1.52	0.10	0.70	0.02
60					19.48	47.97	12.24	15.50	9.35	8.04	5.98	2.71	4.08	1.07	2.75	0.41	1.66	0.12	0.76	0.02
65							13.26	17.97	10.13	9.33	6.48	3.15	4.42	1.24	2.98	0.48	1.80	0.14	0.83	0.02
70							14.28	20.62	10.90	10.70	6.97	3.61	4.76	14.2	3.21	0.55	1.94	0.16	0.89	0.02
75							15.30	23.43	11.68	12.16	7.47	4.10	5.10	1.62	3.44	0.62	2.08	0.18	0.96	0.03
80							16.32	26.40	12.46	13.71	7.97	4.62	5.44	1.82	3.67	0.70	2.22	0.21	1.02	0.03
85							17.34	29.54	13.24	15.33	8.47	5.17	5.78	2.04	3.89	0.78	2.35	0.23	1.08	0.04
90							18.36	32.84	14.02	17.05	8.97	5.75	6.12	2.27	4.12	0.87	2.49	0.26	1.15	0.04
95							19.38	36.30	14.80	18.84	9.47	6.35	6.46	2.51	4.35	0.96	2.63	0.28	1.21	0.04
100									15.58	20.72	9.96	6.99	6.80	2.76	4.58	1.06	2.77	0.31	1.28	0.05
110									17.14	24.72	10.96	8.34	7.48	3.29	5.04	1.26	3.05	0.37	1.40	0.06
120									18.70	29.04	11.96	9.79	8.16	3.87	5.50	1.48	3.33	0.44	1.53	0.07
130											12.96	11.36	8.84	4.48	5.96	1.72	3.60	0.51	1.66	0.08
140											13.95	13.03	9.52	5.14	6.42	1.97	3.88	0.58	1.79	0.09
150											14.95	14.81	10.20	5.84	6.88	2.24	4.16	0.66	1.92	0.10
160											15.95	16.69	10.88	6.59	7.34	2.53	4.44	0.74	2.04	0.11
170											16.94	18.67	11.56	7.37	7.79	2.83	4.71	0.83	2.17	0.13
180											17.94	20.75	12.24	8.19	8.25	3.14	4.99	0.93	2.30	0.14
190											18.94	22.94	12.92	9.05	8.71	3.47	5.27	1.02	2.43	0.16
200											19.93	25.23	13.60	9.95	9.17	3.82	5.55	1.12	2.56	0.17
225													15.30	12.38	10.32	4.75	6.24	1.40	2.88	0.21
250													17.00	15.05	11.47	5.77	6.93	1.70	3.20	0.26
275													18.70	17.95	12.61	6.89	7.63	2.03	3.52	0.31
300															13.76	8.09	8.32	2.38	3.84	0.36
325															14.91	9.39	9.02	2.76	4.16	0.42
350															16.05	10.77	9.71	3.17	4.48	0.48
375															17.20	12.23	10.40	3.60	4.80	0.55
400															18.35	13.79	11.10	4.06	5.12	0.62
425															19.49	15.42	11.79	4.54	5.44	0.69
450																	12.49	5.05	5.76	0.77
475																	13.18	5.58	6.08	0.85
500																	13.87	6.14	6.40	0.94
550																	15.26	7.32	7.04	1.12
600																	16.65	8.60	7.68	1.31

Note: areas of chart indicate velocities over 5 feet per second (FPS). Use with caution.

Velocity of flow values are computed from the general equation $V = .408\frac{Q}{d^2}$

Friction pressure loss values are computed from the equation $hf = 0.2083 \left(\frac{100}{C}\right)^{1.852} \frac{Q^{1.852}}{d^{4.866}}$ x .433 for psi loss per 100' of pipe

PVC SCHEDULE 40 IPS PLASTIC PIPE

Sizes: ½" thru 6"
Flow: 1 thru 600 GPM

(1120, 1220) C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

SIZE	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		4"		6"	
OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		4.500		6.625	
ID	0.622		0.824		1.049		1.380		1.610		2.067		2.469		3.068		4.026		6.065	
WALL THK.	0.109		0.113		0.133		0.140		0.145		0.154		0.203		0.216		0.237		0.280	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.05	0.43	0.60	0.11	0.37	0.03	0.21	0.01	0.15	0.00										
2	2.11	1.55	1.20	0.39	0.74	0.12	0.42	0.03	0.31	0.02	0.19	0.00								
3	3.16	3.28	1.80	0.84	1.11	0.26	0.64	0.07	0.47	0.03	0.28	0.01	0.20	0.00						
4	4.22	5.60	2.40	1.42	1.48	0.44	0.85	0.12	0.62	0.05	0.38	0.02	0.26	0.01						
5	5.27	8.46	3.00	2.15	1.85	0.66	1.07	0.18	0.78	0.08	0.47	0.02	0.33	0.01	0.21	0.00				
6	6.33	11.86	3.60	3.02	2.22	0.93	1.28	0.25	0.94	0.12	0.57	0.03	0.40	0.01	0.26	0.01				
7	7.38	15.77	4.20	4.01	2.59	1.24	1.49	0.33	1.10	0.15	0.66	0.05	0.46	0.02	0.30	0.01				
8	8.44	20.20	4.80	5.14	2.96	1.59	1.71	0.42	1.25	0.20	0.76	0.06	0.53	0.02	0.34	0.01				
9	9.49	25.12	5.40	6.39	3.33	1.97	1.92	0.52	1.41	0.25	0.85	0.07	0.60	0.03	0.39	0.01				
10	10.55	30.54	6.00	7.77	3.70	2.40	2.14	0.63	1.57	0.30	0.95	0.09	0.66	0.04	0.43	0.01				
11	11.60	36.43	6.60	9.27	4.07	2.86	2.35	0.75	1.73	0.36	1.05	0.11	0.73	0.04	0.47	0.02				
12	12.65	42.80	7.21	10.89	4.44	3.36	2.57	0.89	1.88	0.42	1.14	0.12	0.80	0.05	0.52	0.02	0.30	0.00		
14	14.76	56.94	8.41	14.48	5.19	4.47	2.99	1.18	2.20	0.56	1.33	0.17	0.93	0.07	0.60	0.02	0.35	0.01		
16	16.87	72.92	9.61	18.55	5.93	5.73	3.42	1.51	2.51	0.71	1.52	0.21	1.07	0.09	0.69	0.03	0.40	0.01		
18	18.98	90.69	10.81	23.07	6.67	7.13	3.85	1.88	2.83	0.89	1.71	0.26	1.20	0.11	0.78	0.04	0.45	0.01		
20	21.09	110.23	12.01	28.04	7.41	8.66	4.28	2.28	3.14	1.08	1.90	0.32	1.33	0.13	0.86	0.05	0.50	0.01		
22			13.21	33.45	8.15	10.33	4.71	2.72	3.46	1.29	2.10	0.38	1.47	0.16	0.95	0.06	0.55	0.01		
24			14.42	39.30	8.89	12.14	5.14	3.20	3.77	1.51	2.29	0.45	1.60	0.19	1.04	0.07	0.60	0.02		
26			15.62	45.58	9.64	14.08	5.57	3.17	4.09	1.75	2.48	0.52	1.74	0.22	1.12	0.08	0.65	0.02		
28			16.82	52.28	10.38	16.15	5.99	4.25	4.40	2.01	2.67	0.60	1.87	0.25	1.21	0.09	0.70	0.02		
30			18.02	59.41	11.12	18.35	6.42	4.83	4.72	2.28	2.86	0.68	2.00	0.29	1.30	0.10	0.75	0.03		
35					12.97	24.42	7.49	6.43	5.50	3.04	3.34	0.90	2.34	0.38	1.51	0.13	0.88	0.04	0.38	0.00
40					14.83	31.27	8.56	8.23	6.29	3.89	3.81	1.15	2.67	0.49	1.73	0.17	1.00	0.04	0.44	0.01
45					16.68	38.89	9.64	10.24	7.08	4.84	4.29	1.43	3.01	0.60	1.95	0.21	1.13	0.06	0.49	0.01
50					18.53	47.27	10.71	12.45	7.87	5.88	4.77	1.74	3.34	0.73	2.16	0.26	1.25	0.07	0.55	0.01
55							11.78	14.85	8.65	7.01	5.25	2.08	3.68	0.88	2.38	0.30	1.38	0.08	0.61	0.01
60							12.85	17.45	9.44	8.24	5.72	2.44	4.01	1.03	2.60	0.36	1.51	0.10	0.66	0.01
65							13.92	20.23	10.23	9.56	6.20	2.83	4.35	1.19	2.81	0.41	1.63	0.11	0.72	0.02
70							14.99	23.21	11.01	10.96	6.68	3.25	4.68	1.37	3.03	0.48	1.76	0.13	0.77	0.02
75							16.06	26.37	11.80	12.46	7.16	3.69	5.01	1.56	3.25	0.54	1.88	0.14	0.83	0.02
80							17.13	29.72	12.59	14.04	7.63	4.16	5.35	1.75	3.46	0.61	2.01	0.16	0.88	0.02
85							18.21	33.26	13.37	15.71	8.11	4.66	5.68	1.96	3.68	0.68	2.13	0.18	0.94	0.02
90							19.28	36.97	14.16	17.46	8.59	5.18	6.02	2.18	3.90	0.76	2.26	0.20	0.99	0.03
95									14.95	19.30	9.07	5.72	6.35	2.41	4.11	0.84	2.39	0.22	1.05	0.03
100									15.74	21.22	9.54	6.29	6.69	2.65	4.33	0.92	2.51	0.25	1.10	0.03
110									17.31	25.32	10.50	7.51	7.36	3.16	4.76	1.10	2.76	0.29	1.22	0.04
120									18.88	29.75	11.45	8.82	8.03	3.72	5.20	1.29	3.02	0.34	1.33	0.05
130											12.41	10.23	8.70	4.31	5.63	1.50	3.27	0.40	1.44	0.05
140											13.36	11.74	9.37	4.94	6.06	1.72	3.52	0.46	1.55	0.06
150											14.32	13.33	10.03	5.62	6.50	1.95	3.77	0.52	1.66	0.07
160											15.27	15.03	10.70	6.33	6.93	2.20	4.02	0.59	1.77	0.08
170											16.23	16.81	11.37	7.08	7.36	2.46	4.27	0.66	1.88	0.09
180											17.18	18.69	12.04	7.87	7.80	2.74	4.53	0.73	1.99	0.10
190											18.14	20.66	12.71	8.70	8.23	3.02	4.78	0.81	2.10	0.11
200											19.09	22.72	13.38	9.57	8.66	3.33	5.03	0.89	2.21	0.12
225													15.05	11.90	9.75	4.14	5.66	1.10	2.49	0.15
250													16.73	14.47	10.83	5.03	6.29	1.34	2.77	0.18
275													18.40	17.26	11.92	6.00	6.92	1.60	3.05	0.22
300															13.00	7.05	7.55	1.88	3.32	0.26
325															14.08	8.17	8.18	2.18	3.60	0.30
350															15.17	9.38	8.81	2.50	3.88	0.34
375															16.25	10.65	9.43	2.84	4.15	0.39
400															17.33	12.01	10.06	3.20	4.43	0.44
425															18.42	13.43	10.69	3.58	4.71	0.49
450															19.50	14.93	11.32	3.98	4.99	0.54
475																	11.95	4.40	5.26	0.60
500																	12.58	4.84	5.54	0.66
550																	13.84	5.77	6.10	0.79
600																	15.10	6.78	6.65	0.92

Note: ▭ areas of chart indicate velocities over 5 feet per second (FPS). Use with caution.

Velocity of flow values are computed from the general equation $V = .408\frac{Q}{d^2}$

Friction pressure loss values are computed from the equation $hf = 0.2083\left(\frac{100}{C}\right)^{1.852}\frac{Q^{1.852}}{d^{4.866}}$ x .433 for psi loss per 100' of pipe

PVC SCHEDULE 80 IPS PLASTIC PIPE

Sizes: ½" thru 6"
Flow: 1 thru 600 GPM

(1120, 1220) C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

SIZE	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		4"		6"	
OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		4.500		6.625	
ID	0.546		0.742		0.957		1.278		1.500		1.939		2.323		2.900		3.826		5.761	
WALL THK.	0.147		0.154		0.179		0.191		0.200		0.218		0.276		0.300		0.337		0.432	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.36	0.81	0.74	0.18	0.44	0.05	0.24	0.01	0.18	0.01	0.10	0.00								
2	2.73	2.92	1.48	0.66	0.89	0.19	0.49	0.05	0.36	0.02	0.21	0.01	0.15	0.00						
3	4.10	6.19	2.22	1.39	1.33	0.40	0.74	0.10	0.54	0.05	0.32	0.01	0.22	0.01						
4	5.47	10.54	2.96	2.37	1.78	0.69	0.99	0.17	0.72	0.08	0.43	0.02	0.30	0.01						
5	6.84	15.93	3.70	3.58	2.22	1.04	1.24	0.25	0.90	0.12	0.54	0.03	0.37	0.01	0.24	0.00				
6	8.21	22.33	4.44	5.02	2.67	1.46	1.49	0.36	1.08	0.16	0.65	0.05	0.45	0.02	0.29	0.01				
7	9.58	29.71	5.18	6.68	3.11	1.94	1.74	0.47	1.26	0.22	0.75	0.06	0.52	0.03	0.33	0.01				
8	10.94	38.05	5.92	8.56	3.56	2.48	1.99	0.61	1.45	0.28	0.86	0.08	0.60	0.03	0.38	0.01				
9	12.31	47.33	6.66	10.64	4.00	3.09	2.24	0.76	1.63	0.35	0.97	0.10	0.68	0.04	0.43	0.01				
10	13.68	57.52	7.41	12.93	4.45	3.75	2.49	0.92	1.81	0.42	1.08	0.12	0.75	0.05	0.48	0.02	0.27	0.00		
11	15.05	68.63	8.15	15.43	4.90	4.47	2.74	1.10	1.99	0.50	1.19	0.14	0.83	0.06	0.53	0.02	0.30	0.01		
12	16.42	80.63	8.89	18.13	5.34	5.26	2.99	1.29	2.17	0.59	1.30	0.17	0.90	0.07	0.58	0.02	0.33	0.01		
14			10.37	24.12	6.23	6.99	3.49	1.71	2.53	0.79	1.51	0.23	1.05	0.09	0.67	0.03	0.39	0.01		
16			11.85	30.88	7.12	8.95	3.99	2.19	2.90	0.01	1.73	0.29	1.20	1.12	0.77	0.04	0.44	0.01		
18			13.33	38.41	8.01	11.14	4.49	2.73	3.26	1.26	1.95	0.36	1.36	0.15	0.87	0.05	0.50	0.01		
20			14.82	46.69	8.90	13.54	4.99	3.31	3.62	1.52	2.17	0.44	1.51	0.18	0.97	0.06	0.55	0.02		
22			16.30	55.70	9.80	16.15	5.49	3.95	3.98	1.81	2.38	0.52	1.66	0.22	1.06	0.07	0.61	0.02		
24			17.78	65.44	10.69	18.97	5.99	4.64	4.35	2.13	2.60	0.61	1.81	0.25	1.16	0.09	0.66	0.02		
26			19.26	75.90	11.58	22.01	6.49	5.39	4.71	2.47	2.82	0.71	1.96	0.29	1.26	0.10	0.72	0.03		
28					12.47	25.24	6.99	6.18	5.07	2.83	3.03	0.81	2.11	0.34	1.35	0.11	0.78	0.03		
30					13.36	28.69	7.49	7.02	5.43	3.22	3.25	0.92	2.26	0.38	1.45	0.13	0.83	0.03	0.36	0.00
35					15.59	38.16	8.74	9.34	6.34	4.29	3.79	1.23	2.64	0.51	1.69	0.17	0.97	0.05	0.43	0.01
40					17.81	48.87	9.99	11.96	7.25	5.49	4.34	1.57	3.02	0.65	1.94	0.22	1.11	0.06	0.49	0.01
45							11.24	14.88	8.16	6.83	4.88	1.96	3.40	0.81	2.18	0.28	1.25	0.07	0.55	0.01
50							12.49	18.09	9.06	8.30	5.42	2.38	3.78	0.99	2.42	0.34	1.39	0.09	0.61	0.01
55							13.73	21.58	9.97	9.90	5.96	2.84	4.15	1.18	2.66	0.40	1.53	0.10	0.67	0.01
60							14.98	25.35	10.87	11.63	6.51	3.33	4.53	1.38	2.91	0.47	1.67	0.12	0.73	0.02
65							16.23	29.40	11.78	13.49	7.05	3.87	4.91	1.61	3.15	0.55	1.81	0.14	0.79	0.02
70							17.48	33.72	12.69	15.47	7.59	4.44	5.29	1.84	3.39	0.63	1.95	0.16	0.86	0.02
75							18.73	38.32	13.59	17.58	8.13	5.04	5.67	2.09	3.63	0.71	2.09	0.18	0.92	0.03
80							19.98	43.19	14.50	19.81	8.68	5.68	6.04	2.36	3.88	0.80	2.22	0.21	0.98	0.03
85									15.41	22.16	9.22	6.36	6.42	2.63	4.12	0.90	2.36	0.23	1.04	0.03
90									16.32	24.64	9.76	7.07	6.80	2.93	4.36	1.00	2.50	0.26	1.10	0.04
95									17.22	27.23	10.30	7.81	7.18	3.24	4.60	1.10	2.64	0.29	1.16	0.04
100									18.13	29.95	10.85	8.59	7.56	3.57	4.85	1.21	2.78	0.31	1.22	0.04
110									19.94	35.73	11.93	10.25	8.31	4.25	5.33	1.45	3.06	0.38	1.35	0.05
120											13.02	12.04	9.07	5.00	5.82	1.70	3.34	0.44	1.47	0.06
130											14.10	13.96	9.82	5.60	6.30	1.97	3.62	0.51	1.59	0.07
140											15.19	16.02	10.58	6.65	6.79	2.27	3.90	0.59	1.72	0.08
150											16.27	18.20	11.34	7.56	7.27	2.57	4.18	0.67	1.84	0.09
160											17.36	20.51	12.09	8.51	7.76	2.89	4.45	0.75	1.96	0.10
170											18.44	22.95	12.85	9.53	8.24	3.24	4.73	0.84	2.08	0.11
180											19.53	25.51	13.60	10.59	8.73	3.60	5.01	0.93	2.21	0.13
190													14.36	11.71	9.21	3.98	5.29	1.03	2.33	0.14
200													15.12	12.87	9.70	4.37	5.57	1.14	2.45	0.16
225													17.01	16.01	10.91	5.44	6.27	1.41	2.76	0.19
250													18.90	19.46	12.12	6.61	6.96	1.72	3.07	0.23
275															13.34	7.89	7.66	2.05	3.38	0.28
300															14.55	9.27	8.36	2.41	3.68	0.33
325															15.76	10.75	9.05	2.79	3.99	0.38
350															16.97	12.33	9.75	3.20	4.30	0.44
375															18.19	14.01	10.45	3.64	4.60	0.50
400															19.40	15.79	11.14	4.10	4.91	0.56
425																	11.84	4.59	5.22	0.63
450																	12.54	5.10	5.53	0.70
475																	13.23	5.64	5.83	0.77
500																	13.93	6.20	6.14	0.85
550																	15.32	7.40	6.76	1.01
600																	16.72	8.69	7.37	1.19

Note: ▭ areas of chart indicate velocities over 5 feet per second (FPS). Use with caution.

Velocity of flow values are computed from the general equation $V = .408\frac{Q}{d^2}$

Friction pressure loss values are computed from the equation $hf = 0.2083\left(\frac{100}{C}\right)^{1.852}\frac{Q^{1.852}}{d^{4.866}}$ x .433 for psi loss per 100' of pipe

POLYETHYLENE (PE) SDR-PRESSURE RATED TUBE

Sizes: ½" thru 6"
Flow: 1 thru 600 GPM

(2306, 3206, 3306) SDR 7, 9, 11.5, 15 C=150
PSI LOSS PER 100 FEET OF TUBE (PSI/100 FT)

SIZE	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		4"		6"	
ID	0.622		0.824		1.049		1.380		1.610		2.067		2.469		3.068		4.026		6.065	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.05	0.49	0.60	0.12	0.37	0.04	0.21	0.01	0.15	0.00	0.09	0.00								
2	2.10	1.76	1.20	0.45	0.74	0.14	0.42	0.04	0.31	0.02	0.19	0.01								
3	3.16	3.73	1.80	0.95	1.11	0.29	0.64	0.08	0.47	0.04	0.28	0.01	0.20	0.00						
4	4.21	6.35	2.40	1.62	1.48	0.50	0.85	0.13	0.62	0.06	0.38	0.02	0.26	0.01						
5	5.27	9.60	3.00	2.44	1.85	0.76	1.07	0.20	0.78	0.09	0.47	0.03	0.33	0.01	0.21	0.00				
6	6.32	13.46	3.60	3.43	2.22	1.06	1.28	0.28	0.94	0.13	0.57	0.04	0.40	0.02	0.26	0.01				
7	7.38	17.91	4.20	4.56	2.59	1.41	1.49	0.37	1.10	0.18	0.66	0.05	0.46	0.02	0.30	0.01				
8	8.43	22.93	4.80	5.84	2.96	1.80	1.71	0.47	1.25	0.22	0.76	0.07	0.53	0.03	0.34	0.01				
9	9.49	28.52	5.40	7.26	3.33	2.24	1.92	0.59	1.41	0.28	0.85	0.08	0.60	0.03	0.39	0.01				
10	10.54	34.67	6.00	8.82	3.70	2.73	2.14	0.72	1.57	0.34	0.95	0.10	0.66	0.04	0.43	0.01				
11	11.60	41.36	6.00	10.53	4.07	3.25	2.35	0.86	1.73	0.40	1.05	0.12	0.73	0.05	0.47	0.02	0.27	0.00		
12	12.66	48.60	7.21	12.37	4.44	3.82	2.57	1.01	1.88	0.48	1.14	0.14	0.80	0.06	0.52	0.02	0.30	0.01		
14	14.76	64.65	8.41	16.46	5.19	5.08	2.99	1.34	2.20	0.63	1.33	0.19	0.93	0.08	0.60	0.03	0.35	0.01		
16	16.87	82.79	9.61	21.07	5.93	6.51	3.42	1.71	2.51	0.81	1.52	0.24	1.07	0.10	0.69	0.04	0.40	0.01		
18	18.98	02.97	10.81	26.21	6.67	8.10	3.85	2.13	2.83	1.01	1.71	0.30	1.20	0.13	0.78	0.04	0.45	0.01		
20			12.01	31.86	7.41	9.84	4.28	2.59	3.14	1.22	1.90	0.36	1.33	0.15	0.86	0.05	0.50	0.01		
22			13.21	38.01	8.15	11.74	4.71	3.09	3.46	1.46	2.10	0.43	1.47	0.18	0.95	0.06	0.55	0.02		
24			14.42	44.65	8.89	13.79	5.14	3.63	3.77	1.72	2.29	0.51	1.60	0.21	1.04	0.07	0.60	0.02		
26			15.62	41.79	9.64	16.00	5.57	4.21	4.09	1.99	2.48	0.59	1.74	0.25	1.12	0.09	0.65	0.02		
28			16.82	59.41	10.38	18.35	5.99	4.83	4.40	2.28	2.67	0.68	1.87	0.29	1.21	0.10	0.70	0.03		
30			18.02	67.50	11.12	20.85	6.42	5.49	4.72	2.59	2.86	0.77	2.00	0.32	1.30	0.11	0.75	0.03	0.33	0.01
35					12.97	27.74	7.49	7.31	5.50	3.45	3.34	1.02	2.34	0.43	1.51	0.15	0.88	0.04	0.38	0.01
40					14.83	35.53	8.56	9.36	6.29	4.42	3.81	1.31	2.67	0.55	1.73	0.19	1.00	0.05	0.44	0.01
45					16.68	44.19	9.64	11.64	7.08	5.50	4.29	1.63	3.01	0.69	1.95	0.24	1.13	0.06	0.49	0.01
50					18.53	53.71	10.71	14.14	7.87	6.68	4.77	1.98	3.34	0.83	2.16	0.29	1.25	0.08	0.55	0.01
55							11.78	16.87	8.65	7.97	5.25	2.36	3.68	1.00	2.38	0.35	1.38	0.09	0.61	0.01
60							12.85	19.82	9.44	9.36	5.72	2.78	4.01	1.17	2.60	0.41	1.51	0.11	0.66	0.01
65							13.92	22.99	10.23	10.86	6.20	3.22	4.35	1.36	2.81	0.47	1.63	0.13	0.72	0.02
70							14.99	26.37	11.01	12.46	6.68	3.69	4.68	1.56	3.03	0.54	1.76	0.14	0.77	0.02
75							16.06	29.97	11.80	14.16	7.16	4.20	5.01	1.77	3.25	0.61	1.88	0.16	0.83	0.02
80							17.13	33.77	12.59	15.95	7.63	4.73	5.35	1.99	3.46	0.69	2.01	0.18	0.88	0.03
85							18.21	37.79	13.37	17.85	8.11	5.29	5.68	2.23	3.68	0.77	2.13	0.21	0.94	0.03
90							19.28	42.01	14.16	19.84	8.59	5.88	6.02	2.48	3.90	0.86	2.26	0.23	0.99	0.03
95									14.95	21.93	9.07	6.50	6.35	2.74	4.11	0.95	2.39	0.25	1.05	0.03
100									15.74	24.12	9.54	7.15	6.69	3.01	4.33	1.05	2.51	0.28	1.10	0.04
110									17.31	28.77	10.50	8.53	7.36	3.59	4.76	1.25	2.76	0.33	1.22	0.05
120									18.88	33.80	11.45	10.02	8.03	4.22	5.20	1.47	3.02	0.39	1.33	0.05
130											12.41	11.62	8.70	4.90	5.63	1.70	3.27	0.45	1.44	0.06
140											13.36	13.33	9.37	5.62	6.06	1.95	3.52	0.52	1.55	0.07
150											14.32	15.15	10.03	6.38	6.50	2.22	3.77	0.59	1.66	0.08
160											15.27	17.08	10.70	7.19	6.93	2.50	4.02	0.67	1.77	0.09
170											16.23	19.11	11.37	8.05	7.36	2.80	4.27	0.75	1.88	0.10
180											17.18	21.24	12.04	8.95	7.08	3.11	4.53	0.83	1.99	0.11
190											18.14	23.48	12.71	9.89	8.23	3.44	4.78	0.92	2.10	0.12
200											19.09	25.81	13.38	10.87	8.66	3.78	5.03	1.01	2.21	0.14
225													15.05	13.52	9.75	4.70	5.66	1.25	2.49	0.17
250													16.73	16.44	10.83	5.71	6.29	1.52	2.77	0.21
275													18.40	19.61	11.92	6.82	6.92	1.82	3.05	0.25
300															13.00	8.01	7.55	2.13	3.32	0.29
325															14.08	9.29	8.18	2.48	3.60	0.34
350															15.17	10.65	8.81	2.84	3.88	0.39
375															16.25	12.10	9.43	3.23	4.15	0.44
400															17.33	13.64	10.06	3.64	4.43	0.50
425															18.42	15.26	10.69	4.07	4.71	0.55
450															19.50	16.97	11.32	4.52	4.99	0.62
475																	11.95	5.00	5.26	0.68
500																	12.58	5.50	5.54	0.75
550																	13.84	6.56	6.10	0.89
600																			15.10	7.70	6.65	1.05

Note: ▭ areas of chart indicate velocities over 5 feet per second (FPS). Use with caution.

Velocity of flow values are computed from the general equation $V = .408\frac{Q}{d^2}$

Friction pressure loss values are computed from the equation $hf = 0.2083\left(\frac{100}{C}\right)^{1.852}\frac{Q^{1.852}}{d^{4.866}}$ x .433 for psi loss per 100' of pipe

TYPE K COPPER WATER TUBE C=140

Sizes: ½" thru 3"
Flow: 1 thru 600 GPM

PSI LOSS PER 100 FEET OF TUBE (PSI/100 FT)

SIZE	½"		⅝"		¾"		1"		1¼"		1½"		2"		2½"		3"	
OD	0.625		0.750		0.875		1.125		1.375		1.625		2.125		2.625		3.125	
ID	0.527		0.652		0.745		0.995		1.245		1.481		1.959		2.435		2.907	
WALL THK.	0.049		0.049		0.065		0.065		0.065		0.072		0.083		0.095		0.109	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.46	1.09	0.95	0.39	0.73	0.20	0.41	0.05	0.26	0.02	0.18	0.01	0.10	0.00				
2	2.93	3.94	1.91	1.40	1.47	0.73	0.82	0.18	0.52	0.06	0.37	0.03	0.21	0.01				
3	4.40	8.35	2.87	2.97	2.20	1.55	1.23	0.38	0.78	0.13	0.55	0.05	0.31	0.01	0.20	0.00		
4	5.87	14.23	3.83	5.05	2.94	2.64	1.64	0.65	1.05	0.22	0.74	0.09	0.42	0.02	0.27	0.01	0.19	0.00
5	7.34	21.51	4.79	7.64	3.67	3.99	2.06	0.98	1.31	0.33	0.93	0.14	0.53	0.04	0.34	0.01	0.24	0.01
6	8.81	30.15	5.75	10.70	4.41	5.60	2.47	1.37	1.57	0.46	1.11	0.20	0.63	0.05	0.41	0.02	0.28	0.01
7	10.28	40.11	6.71	14.24	5.14	7.44	2.88	1.82	1.84	0.61	1.30	0.26	0.74	0.07	0.48	0.02	0.33	0.01
8	11.75	51.37	7.67	18.24	5.88	9.53	3.29	2.33	2.10	0.78	1.48	0.34	0.85	0.09	0.55	0.03	0.38	0.01
9	13.22	63.89	8.63	22.68	6.61	11.86	3.70	2.90	2.36	0.97	1.67	0.42	0.95	0.11	0.61	0.04	0.43	0.02
10	14.69	77.66	9.59	27.57	7.35	14.41	4.12	3.53	2.63	1.18	1.86	0.51	1.06	0.13	0.68	0.05	0.48	0.02
11	16.15	92.65	10.55	32.89	8.08	17.19	4.53	4.21	2.89	1.41	2.04	0.61	1.16	0.16	0.75	0.05	0.53	0.02
12	17.62	108.85	11.51	38.64	8.82	20.20	4.94	4.94	3.15	1.66	2.23	0.71	1.27	0.18	0.82	0.06	0.57	0.03
14			13.43	51.41	10.29	26.87	5.76	6.57	3.68	2.21	2.60	0.95	1.48	0.24	0.95	0.08	0.67	0.04
16			15.35	65.83	11.76	34.41	6.59	8.42	4.21	2.83	2.97	1.22	1.70	0.31	1.10	0.11	0.77	0.05
18			17.27	81.88	13.23	42.80	7.41	10.47	4.73	3.52	3.34	1.51	1.91	0.39	1.23	0.13	0.86	0.06
20			19.19	99.53	14.70	52.02	8.24	12.73	5.26	4.28	3.72	1.84	1.12	0.47	1.37	0.16	0.96	0.07
22					16.17	62.06	9.06	15.18	5.79	5.10	4.09	2.19	2.33	0.56	1.51	0.20	1.06	0.08
24					17.64	72.92	9.89	17.84	6.31	5.99	4.46	2.58	2.55	0.66	1.65	0.23	1.15	0.10
26					19.11	84.57	10.71	10.69	6.84	6.95	4.83	2.99	2.76	0.77	1.78	0.27	1.25	0.11
28							11.53	23.73	7.37	7.98	5.20	3.43	2.97	0.88	1.92	0.30	1.35	0.13
30							12.36	26.97	7.89	9.06	5.58	3.89	3.18	1.00	2.06	0.35	1.44	0.15
35							14.42	35.88	9.21	12.06	6.51	5.18	3.72	1.33	2.40	0.46	1.68	0.19
40							16.48	45.95	10.52	15.44	7.44	6.63	4.25	1.70	2.75	0.59	1.93	0.25
45							18.54	57.15	11.84	19.20	8.37	8.25	4.78	2.12	3.00	0.73	2.17	0.31
50									13.16	23.34	9.30	10.03	5.31	2.57	3.44	0.89	2.41	0.38
55									14.47	27.85	10.23	11.97	5.84	3.07	3.78	1.06	2.65	0.45
60									15.79	32.71	11.16	14.06	6.37	3.60	4.12	1.25	2.89	0.53
65									17.10	37.94	12.09	16.31	6.91	4.18	4.47	1.45	3.13	0.61
70									18.42	43.52	13.02	18.70	7.44	4.80	4.81	1.66	3.37	0.70
75									19.74	49.46	13.95	21.25	7.97	5.45	5.16	1.89	3.62	0.80
80											14.88	23.95	8.50	6.14	5.50	2.13	3.86	0.90
85											15.81	26.80	9.03	6.87	5.84	2.38	4.10	1.01
90											16.74	29.79	9.56	7.64	6.19	2.65	4.34	1.12
95											17.67	32.93	10.09	8.44	6.53	2.93	4.58	1.24
100											18.60	36.21	10.63	9.28	6.88	3.22	4.82	1.36
110													11.69	11.08	7.56	3.84	5.31	1.62
120													12.75	13.01	8.25	4.52	5.79	1.91
130													13.82	15.09	8.94	5.24	6.27	2.21
140													14.88	17.31	9.63	6.01	6.75	2.54
150													15.94	19.67	10.32	6.83	7.24	2.88
160													17.01	22.17	11.00	7.69	7.72	3.25
170													18.07	24.81	11.69	8.61	8.20	3.64
180													19.13	27.58	12.38	9.57	8.69	4.04
190															13.07	10.58	9.17	4.47
200															13.76	11.63	9.65	4.91
225															15.48	14.47	10.86	6.11
250															17.20	17.58	12.07	7.43
275															18.92	20.98	13.27	8.86
300																	14.48	10.41
325																	15.69	12.07
350																	16.89	13.85
375																	18.10	15.73
400																	19.31	17.73
425																		
450																		
475																		
500																		
550																		
600																		

Note: areas of chart indicate velocities over 5 feet per second (FPS). Use with caution.

Velocity of flow values are computed from the general equation $V = .408\frac{Q}{d^2}$

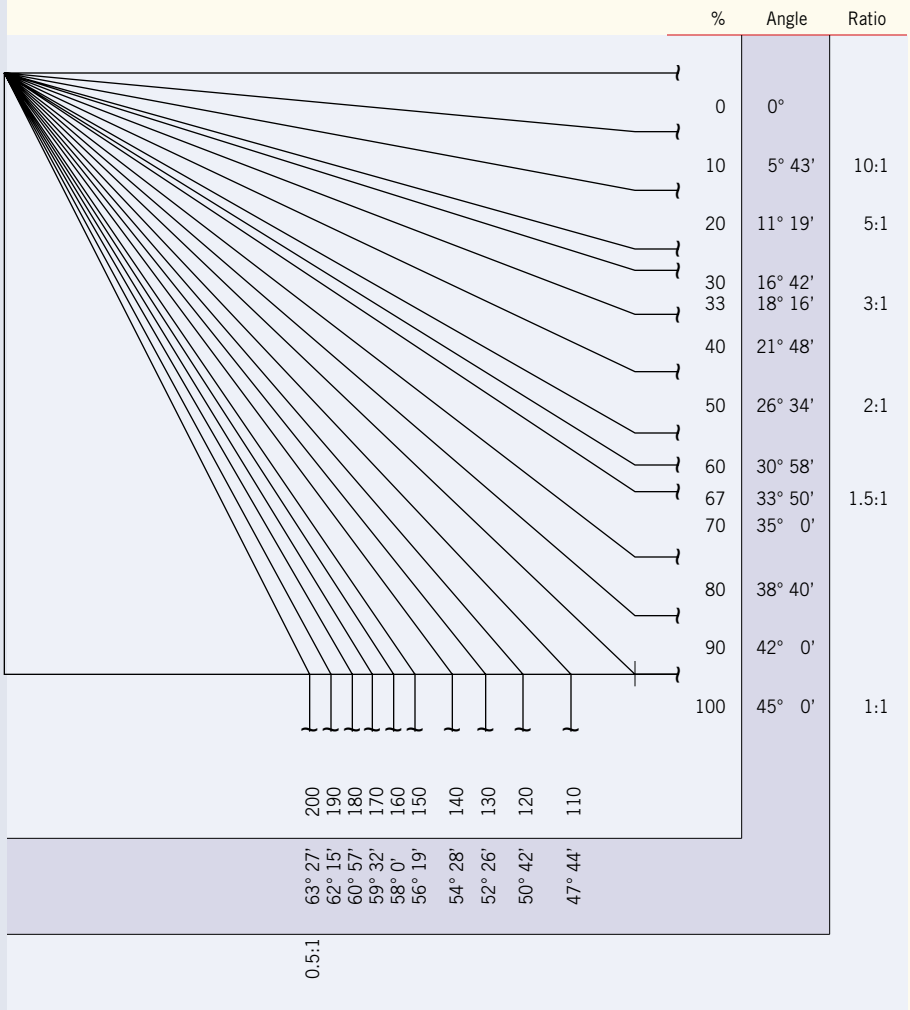
Friction pressure loss values are computed from the equation $hf = 0.2083\left(\frac{100}{C}\right)^{1.852}\frac{Q^{1.852}}{d^{4.866}}$ x .433 for psi loss per 100' of pipe

Pressure Loss - psi

FLOW GPM	NOMINAL SIZE						
	5/8"	3/4"	1"	1-1/2"	2"	3"	4"
1	0.2	0.1					
2	0.3	0.2					
3	0.4	0.3					
4	0.6	0.5	0.1				
5	0.9	0.6	0.2				
6	1.3	0.7	0.3				
7	1.8	0.8	0.4				
8	2.3	1.0	0.5				
9	3.0	1.3	0.6				
10	3.7	1.6	0.7				
11	4.4	1.9	0.8				
12	5.1	2.2	0.9				
13	6.1	2.6	1.0				
14	7.2	3.1	1.1				
15	8.3	3.6	1.2				
16	9.4	4.1	1.4	0.4			
17	10.7	4.6	1.6	0.5			
18	12.0	5.2	1.8	0.6			
19	13.4	5.8	2.0	0.7			
20	15.0	6.5	2.2	0.8			
22		7.9	2.8	1.0			
24		9.5	3.4	1.2			
26		11.2	4.0	1.4			
28		13.0	4.6	1.6			
30		15.0	5.3	1.8	0.7		
32			6.0	2.1	0.8		
34			6.9	2.4	0.9		
36			7.8	2.7	1.0		
38			8.7	3.0	1.2		
40			9.6	3.3	1.3		
42			10.6	3.6	1.4		
44			11.7	3.9	1.5		
46			12.8	4.2	1.6		
48			13.9	4.5	1.7		
50			15.0	4.9	1.9	0.7	
52				5.3	2.1		
54				5.7	2.2		
56				6.2	2.3		
58				6.7	2.5		
60				7.2	2.7	1.0	
65				8.3	3.2	1.1	
70				9.8	3.7	1.3	
75				11.3	4.3	1.5	
80				12.8	4.9	1.6	0.7
90				16.1	6.2	2.0	0.8
100				20.0	7.8	2.5	0.9
110					9.5	2.9	1.0
120					11.3	3.4	1.2
130					13.0	3.9	1.4
140					15.1	4.5	1.6
150					17.3	5.1	1.8
160					20.0	5.8	2.1
170						6.5	2.4
180						7.2	2.7
190						8.0	3.0
200						9.0	3.2
220						11.0	3.9
240						13.0	4.7
260						15.0	5.5
280						17.3	6.3
300						20.0	7.2
350							10.0
400							13.0
450							16.2
500							20.0

Slope and Maximum Precipitation Rate Reference Charts

Percent, Angle and Ratio



Maximum Precipitation Rates

Soil Texture	Maximum Precipitation Rates: Inches Per Hour							
	0 to 5% slope		5 to 8% slope		8 to 12% slope		12% + slope	
	Cover	Bare	Cover	Bare	Cover	Bare	Cover	Bare
Coarse sandy soils	2.00	2.00	2.00	1.50	1.50	1.0	1.0	0.50
Coarse sandy soils over compact subsoils	1.75	1.50	1.25	1.00	1.00	0.75	0.75	0.40
Uniform light sandy loams	1.75	1.00	1.25	0.80	1.00	0.60	0.75	0.40
Light sandy loams over compact subsoils	1.25	0.75	1.00	0.50	0.75	0.40	0.50	0.30
Uniform silt loams	1.00	0.50	0.80	0.40	0.60	0.30	0.40	0.20
Silt loams over compact subsoil	0.60	0.30	0.50	0.25	0.40	0.15	0.30	0.10
Heavy clay or clay loam	0.20	0.15	0.15	0.10	0.12	0.08	0.10	0.06

The maximum PR values listed are as suggested by the United States Department of Agriculture.
The values are average and may vary with respect to actual soil condition and condition of ground cover.

Wire Sizing

Method of Wire Sizing for Electrical Components of an Automatic Irrigation System

Data Needed

- Maximum current draw of the electrical unit (valve or controller) in amperes (I)
- Distance in feet (one way) to the electrical unit (F)
- The allowable voltage drop in the wire without affecting functions of the electrical unit (Vd)

Steps

1. Calculate the maximum allowable wire resistance per 1000 feet with the following formula:

$$R = \frac{*500 \times Vd}{F \times 1}$$

where R = allowable wire resistance per 1000 feet.

2. Select the wire size from Chart #2 which has a resistance less than that calculated in the above formula.

Example: A valve with a minimum operating voltage of 20 volts and inrush current of .30 amps is to be located 2680 ft. from a controller. The controller minimum output voltage is 24VAC.

The allowable voltage drop (Vd) = 24 - 20 = 4 volts
The distance to valve (F) = 2680 ft.
The current draw (I) = .3 amps

$$R = \frac{500 \times 4}{2680 \times .3} = 2.49 \text{ ohm/1000 ft.}$$

From Chart #2 we find that #14 AWG wire has slightly too much resistance. Therefore, choose #12 AWG copper wire.

The accompanying charts are useful for quick and easy selection of wire sizes for valves with standard and optional solenoids. Chart #3 is set up to provide maximum wire runs given a standard 24VAC valve with a minimum operating voltage of 20 volts and a controller output of 24VAC. Chart #4 is a multiplier factor for determining maximum wire runs for other controller output voltages and optional solenoids.

Example: Determine maximum wire run to a valve with model 24VAC-D solenoid and controller output voltage of 26 volts and #14 control and ground wire.

From Chart #3 we find a length of 2590 ft. with #14 ground and control wire. From Chart #4 the multiplier factor at 26VAC controller output with a model 24VAC-D solenoid is 4.33. Therefore, the maximum wire distance to the valve is: 4.33 x 2590 feet = 11,215 feet.

* This assumes control wire and ground wire are the same size.

Minimum Operating Voltages at Various Static Pressures
(standard 24VAC solenoid)

Chart 1 Minimum Solenoid Operating Voltage Under Various Line Pressure

Line Pressure	Voltage (Internal Bleed Configurations)	Voltage (External Bleed Configurations)
200 PSI (13,8 Bar)	21.1	
175 PSI (12,1 Bar)	20.2	
150 PSI (10,3 Bar)	19.1	20.0
125 PSI (8,6 Bar)	18.2	19.1
100 PSI (6,9 Bar)	17.1	18.2
75 PSI (5,2 Bar)	16.1	17.3
50 PSI (3,4 Bar)	16.0	16.4

Chart 2 Copper Wire Resistance of Various Sizes

Sizes AWG	Resistance at 20°C Ohms per 1000 ft.
4	.250
6	.40
8	.64
10	1.02
12	1.62
14	2.57
16	4.10
18	6.51

Chart 3 Maximum One-way Distance (ft.) Between Controller and Valve (standard 24 VAC solenoid)†

Valve Wire Sizing

Ground Wire	Control Wire						
	18	16	14	12	10	8	6
18	1020	1260	1470	1640	1770	1860	1930
16	1260	1630	2000	2330	2610	2810	2960
14	1470	2000	2590	3180	3710	4150	4480
12	1640	2330	3180	4120	5050	5900	6590
10	1770	2610	3710	5050	6540	8030	9380
8	1860	2810	4150	5900	8030	10400	12770
6	1930	2960	4480	6590	9380	12770	16540

†Solenoid Model: 24 VAC Pressure: 150 PSI Voltage Drop: 4 V Min. Op. Voltage: 20 V Amperage (peak): 0.3A

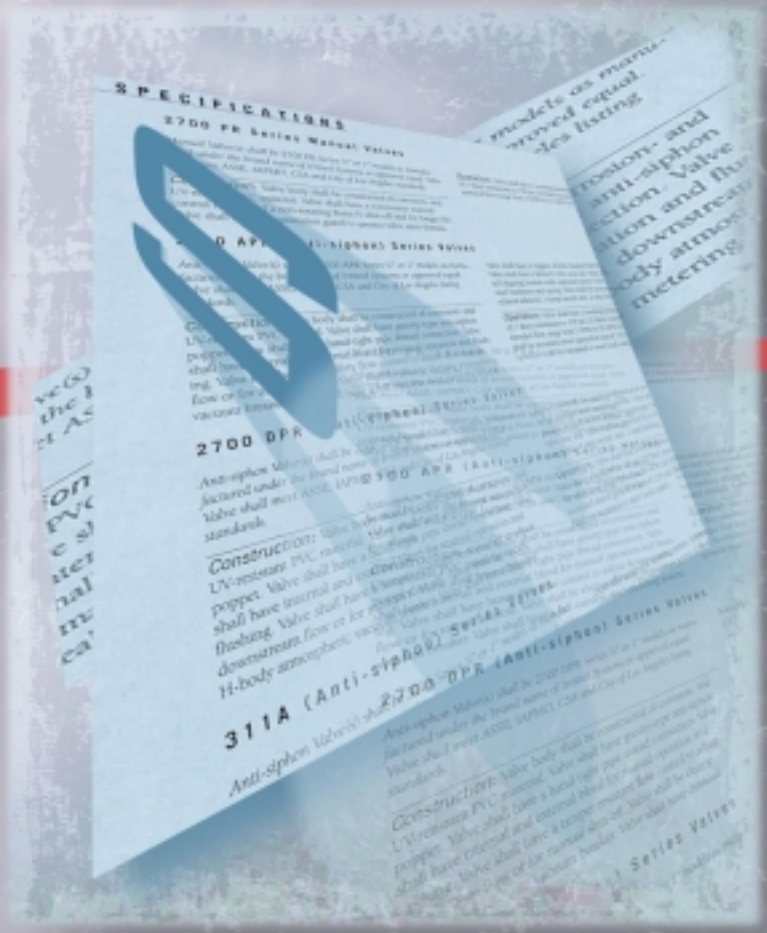
Multiplier Factor for Various Controller Output Voltages and Optional Low Voltage Solenoids

Chart 4

Controller Output Voltage	24-Volt Solenoids		
	24VAC	24VAC-D	24VDC
28	2.0	5.77	5.45
27	1.75	5.05	4.77
26	1.5	4.33	4.09
25	1.25	3.61	3.41
24	1.0	2.88	2.73
23	.75	2.16	2.05
22	.50	1.44	1.36

Chart 5

Controller Output Voltage	12-Volt Solenoids		
	12VAC	12VAC-D	12VDC
16	.58	2.50	1.96
15	.50	2.08	1.63
14	.41	1.67	1.30
13	.33	1.25	.98
12	.25	.83	.65
11	.17	.42	.33


SPECIFICATIONS
2700 DPK
311A (Anti-siphon) Series Valves

CONTROLLERS

Slim Dial™ Controllers

Automatic Controller(s) shall be Slim Dial model with 6 stations as manufactured under the brand name of Irritrol Systems to be installed or wired in accordance with manufacturer's published instructions.

Operation: Controller shall be electronically controlled, have 2 independent watering programs with 2 start times per program for a total of 4 start times per day. Watering times shall be available from 1 minute to 4 hours in 1-minute increments per station. Controller shall have a 365-day calendar for days of the week or odd/even programming. Controller shall have automatic, semi-automatic or true manual modes. Controller shall have a battery backup and master valve/pump circuit. Programming shall be accomplished via a 9-position programming dial and selection buttons with user feedback provided by a LCD.

Construction: Controller shall be enclosed in a durable, slim-line plastic case for indoor installation.

Electric: Transformer input shall be 120 VAC, 60Hz (220/240 VAC, 50Hz). Transformer output shall be 24 VAC, .6 amp. Includes an electronic circuit breaker. Maximum output per station shall be 24 VAC, .25 amp. Maximum output to valves shall be 24 VAC, .5 amp. Battery backup shall be provided by one 9-volt alkaline battery.

446 Series Controllers

Automatic Controller(s) shall be model 446 Series with 6 stations in the indoor (PRi) or outdoor (PR) model as manufactured under the brand name of Irritrol Systems to be installed or wired in accordance with manufacturer's published instructions.

Operation: Controller shall be electronically controlled, have 2 watering programs, day calendar options of every-day, every-second-day, every-third-day and every-fourth-day. Controller shall have watering times from 2 to 99 minutes and 2 start times per program for a total of 4 start times per day. Controller shall have manual or semi-automatic operation, and a true interrupt "Pause" system function. Controller shall provide a "Rain Off" function, battery backup and master valve/pump circuit. Programming shall be accomplished via slide switches and selection buttons. Program review shall be accomplished via easy, at-a-glance program settings. Controller shall have self-diagnostic electronic circuit breaker with valve "fuse" detection that identifies and overrides an electrical malfunction of a valve. Controller shall have a "Program Stack" memory function, and an automatic safety backup program.

Construction: Outdoor controllers shall be enclosed in a UL-listed, weather-resistant case.

Electric: Transformer input shall be 120 VAC, 60Hz (220/240 VAC, 50Hz). Transformer output shall be 24 VAC, 1.25 amps. Includes an electronic circuit breaker. Maximum output per station shall be 24 VAC, .5 amp. Maximum output to valves shall be 24 VAC, 1.0 amp (including master valve). Controller shall have surge protection on input.

476 Series Controllers

Automatic Controller(s) shall be model 476 Series with 6 stations in the indoor (PRi) or outdoor (PR) model as manufactured under the brand name of Irritrol Systems to be installed or wired in accordance with manufacturer's published instructions.

Operation: Controller shall be electronically controlled, have 2 watering programs, a 7-day specific calendar with day interval options of every-day, every-second-day or every-third-day. Controller shall have watering times from 2 to 60 minutes and 4 start times per program for a total of 8 start times per day. Controller shall have a true manual station "On" and manual cycle start with "Advance" to step through stations for system testing. Controller shall provide a "Rain Off" function, battery backup and master valve/pump circuit. Programming shall be accomplished via slide switches and selection buttons. Program review shall be accomplished via easy, at-a-glance program settings. Controller shall have self-diagnostic electronic circuit breaker with valve "fuse" detection that identifies and overrides an electrical malfunction of a valve. Controller shall have a "Program Stack" memory function and an automatic safety backup program.

Construction: Outdoor controllers shall be enclosed in a UL-listed, weather-resistant case.

Electric: Transformer input shall be 120 VAC, 60Hz (220/240 VAC, 50Hz). Transformer output shall be 24 VAC, 1.25 amps. Includes an electronic circuit breaker. Maximum output per station shall be 24 VAC, .5 amp. Maximum output to valves shall be 24 VAC, 1.0 amp (including master valve). Controller shall have surge protection on input.

500 Series Controllers

Automatic Controller(s) shall be model 500 Series with stations (8 or 12) in the indoor (PRi) or outdoor (PR) model as manufactured under the brand name of Irritrol Systems to be installed or wired in accordance with manufacturer's published instructions.

Operation: Controller shall be electronically-controlled and have 2 watering programs with 2 start times per program for a total of 4 start times per day, and watering times from 2 minutes to 3 hours. Controller shall also have a 7-day specific calendar with day interval options of every-second- or third-day. Controller shall provide manual operation and include a "Rain Off" function, battery backup and master valve/ pump circuit. Programming shall be accomplished via slide switches and selection buttons. Program review shall be accomplished via easy, at-a-glance program settings. Controller shall have self-diagnostic electronic circuit breaker. Controller shall have a true interrupt "Pause" system function, a "Program Stack" memory function and an automatic safety backup program.

Construction: Outdoor controllers shall be enclosed in a UL-listed, weather-resistant case.

Electric: Transformer input shall be 120 VAC, 60Hz (220/240 VAC, 50Hz). Transformer output shall be 24 VAC, 1.25 amps. Includes an electronic circuit breaker. Maximum output per station shall be 24 VAC, .5 amp. Maximum output to valves shall be 24 VAC, 1.0 amp (including master valve). Controller shall have surge protection on input.

CONTROLLERS

Rain Dial® Series Controllers

Automatic Controller(s) shall be Rain Dial RD Series with stations (6, 9 or 12) in the indoor (INT) or outdoor (EXT) model as manufactured under the brand name of Irritrol Systems to be installed or wired in accordance with manufacturer's published instructions.

Operation: Controller shall have a 7-day calendar or "Skip Days" watering schedule to allow intervals from 1 to 15 days with 3 independent programs that can run concurrently. Programs shall have 3 start times, per program, for up to 9 daily start times. Watering times shall be from 1 to 59 minutes in 1-minute increments or 1 to 5.9 hours in .1-hour increments. Battery backup shall be provided to keep programs and current time. Controller shall have manual operation that starts a program cycle and runs a single station for an adjustable period of time. Controller shall have self-diagnostic electronic circuit breaker with valve-short detection that identifies and overrides an electrical malfunction. All programming shall be accomplished by use of a simple program dial and selection buttons with a large LCD for ease of programming. Controller shall have modular design/enclosed electronics.

Construction: Outdoor models shall be enclosed in a weather-resistant, locking case with built-in 24-volt transformer. Indoor models shall be enclosed in a one-piece case with 24-volt plug-in transformer. A pump start master valve circuit shall be standard.

Electric: Transformer input shall be 120 VAC, 60Hz (220/240 VAC, 50Hz). Maximum output per station shall be 24 VAC, 0.5 amp. Maximum total output to valves shall be 24 VAC, 1.0 amp (including master valve). Controller shall have a self-diagnostic electronic circuit breaker with valve "short" detection that identifies and overrides an electrical malfunction of a valve. Controller shall have an electrical surge protection system to resist damage from power surges and electrical storms.

Rain Dial® Plus Series Controllers

Automatic Controller shall be Rain Dial RD Plus Series with stations (6, 9, or 12) in indoor (INT) or outdoor (EXT) model as manufactured under the brand name of Irritrol Systems to be installed or wired in accordance with manufacturer's published instructions and applicable local codes.

Operation: Controller shall have automatic, semi-automatic and manual operation. Controller shall have 365-day calendar including: "weekday", "skip days", or "odd/even day" watering schedule. The controller shall have 3 independent programs that run concurrently. Programs shall have 3 start times per program, for up to 9 daily start times. Watering times shall be from 1 to 59 minutes in 1-minute increments or 1 to 5.9 hours in .1 hour increments. The controller shall have non-volatile memory capability to maintain programs during power failure. Battery back up shall be provided to current time and date. Battery will be included with controller. Controller shall have the capability of remote/battery programming. Controller shall have manual operation that starts either a program cycle or runs a single station for an adjustable period of time. Controller shall have water budgeting feature allowing for watering time to be adjusted from 0% to 200%. Controller shall have self-diagnostic electronic circuit breaker with valve-short and valve-open circuit detection that identifies and overrides an electrical malfunction. Controller shall be compatible with an optional remote control system under the same brand name. Controller shall have two terminals for wire connection to a rain or soil moisture sensor system and shall have a sensor bypass switch. All programming shall be accomplished by use of a simple program dial and selection buttons with a large LCD for ease of programming. Controller shall have modular design/enclosed electronics. Controller shall have multi-language display capabilities (English, Spanish, French, German and Italian). Controller shall be UL, CUL and CE listed.

Construction: Outdoor models shall be enclosed in a weather-resistant, locking case with built-in 24-volt transformer. Indoor models shall be enclosed in a one-piece case with 24-volt plug-in transformer. A pump start master valve circuit shall be standard.

Electric: Transformer input shall be 120 VAC, 60Hz (220/240 VAC, 50Hz). Maximum output per station shall be 24 VAC, 0.5 amp. Maximum total output to valves shall be 24 VAC, 1.0 amp (including master valve). Controller shall have a self-diagnostic electronic circuit breaker with valve "short" detection that identifies and overrides an electrical malfunction of a valve. Controller shall have an electrical surge protection system to resist damage from power surges and electrical storms. Controller shall have a metallic shield to resist electromagnetic interference.

CONTROLLERS

Total Control® Series Controllers

Automatic Controller(s) shall be model Total Control TC Series with stations (6, 9, or 12) in the indoor (IN-B) or outdoor (EX-B) model or stations (15, 18 or 24) in the outdoor (EX-B) model as manufactured under the brand name of Irritrol Systems to be installed or wired in accordance with manufacturer's published instructions.

Operation: Controller shall be electronically controlled and have 4 independent watering programs that can run concurrently with each station's watering time independently variable from 1 minute to 10 hours in 1-minute increments. Controller shall also have programmable watering calendar options of 7-day specific, odd/even or day interval options of 1 to 30 days. Clock shall have 365-day calendar for true unattended odd/even day programming with automatic leap year compensation. Controller shall have 16 total start times assignable to any program(s). Controller shall have a water budgeting feature that changes all stations within a program by a percentage from 10 to 200% in 10% increments without permanently altering the program. Controller shall have a "Valve Test" terminal. Controller shall have a programmable "Rain Off" up to 7 days. Programs shall be held in non-volatile memory throughout power failures of any duration. Controller shall have real-time battery (alkaline) backup capable of keeping accurate time during power failures up to 90 continuous days. Controller shall have a self-diagnostic electronic circuit breaker with valve-short detection that identifies and overrides an electrical malfunction. Programming shall be available in automatic, semi-automatic, single station timed manual and true manual operation. All programming shall be accomplished by use of a simple programming dial and selection buttons with a large LCD for ease of programming. Controller shall have start time stacking within each program, a pump start, programmable master valve and sensor hook up. Controller shall have modular design/enclosed electronics.

Construction: Outdoor controllers shall be enclosed in a weather-resistant plastic case with lock and key. Indoor models shall be enclosed in a plastic cabinet with a 24-volt plug-in transformer.

Electric: TC-6EX-B, TC-9EX-B, TC-12EX-B, TC-15EX-B, TC-18EX-B, and TC-24EX-B transformer input shall be 120 VAC, 60Hz (220/240 VAC, 50Hz). Transformer output shall be 24 VAC, 1.67 amps. TC-6IN-B, TC-9IN-B and TC-12IN-B transformer input shall be 120 VAC, 60Hz (220/240 VAC, 50Hz). Transformer output shall be 24 VAC, 1.25 amps. Electronic circuit breaker shall be 1.25 amps minimum holding. Maximum output per station shall be 24 VAC, .5 amp. Maximum operating output to all valves shall be 24 VAC, 1.25 amp (including master valve). Controller shall have heavy-duty, two-stage primary and secondary surge protection to resist damage from power surges and electrical storms.

Dial Series Controllers

Automatic Controller(s) shall be Dial-B Series with stations (7, 11, 16, 18, 24 or 36) as manufactured under the brand name of Irritrol Systems to be installed or wired in accordance with manufacturer's published instructions.

Operation: Controller shall be electronically-controlled and have 2 independent watering programs that can run concurrently with each station's watering time independently variable from 1 to 99 minutes. Controller shall have a programmable 6- or 14-day watering calendar with 3 start times per day, per program. Controller shall have 16-position function dial and LEDs shall indicate which program is operating. A programmable "Valve Test" shall turn each station on for 1 to 9 minutes sequentially for system test purposes without affecting program. A programmable "Rain Off" shall be available for up to 7 days. Non-volatile memory shall hold program during power failures of any duration. Real time battery backup shall keep accurate time during power failures for up to 30 continuous days. Controller shall have a self-diagnostic electronic circuit breaker with valve-short detection that identifies and overrides an electrical malfunction. Controller shall be provided with the following program B options: watering time of .1 minutes (6 seconds) to 9.9 minutes or .1 hours (6 minutes) to 9.9 hours and cycle looping with cycle delay for continuous operation. Controllers shall have a Water Budgeting feature that changes all stations within a program from 1 to 255% in 1% increments (with 100% as normal). Controller shall have start time stacking within each program.

Construction: Controller shall be enclosed in a UL-listed, rust-resistant, locking steel cabinet. Controller shall have 2 separate sensor hookups for shutdown and cycle initiation. Optional pedestal mounts shall be available (P-2B: 7- to 16-station models; P-6B: 18- to 36-station models).

Electric: Transformer input shall be 120 VAC, 60Hz (220/240 VAC, 50Hz). Transformer output shall be 24 VAC, 1.67 amps. Maximum output per station shall be 24 VAC, .80 amp. Maximum operating output to valves shall be 24 VAC, 1.50 amps (including master valve). Controller shall have optimum 2-stage primary and secondary surge protection.

CONTROLLERS

MC Plus Series Controllers

Automatic Controller(s) shall be MC Plus-B Series with stations (4, 6, 8, 12, 18, 24, 30, 36 or 42) as manufactured under the brand name of Irritrol Systems to be installed or wired in accordance with manufacturer's published instructions.

Operation: Controller shall be electronically controlled and have 4 independent watering programs that can run concurrently with each station's watering time independently variable from 1 minute to 24 hours in 1-minute increments. Controller shall have a single entry option for watering time to enter the same watering time for each station. Controller shall also have a programmable watering calendar with up to 16 days. Programs 1, 2 and 3 shall have 3 daily start times with program 4 having 2 daily start times. Program 4 shall have cycle looping with cycle delay from 1 second to 24 minutes and optional seconds watering time from 1 second to 24 minutes. Controller shall have 2 separate sensor hook-ups for shutdown and cycle initiation, an alarm to signal incomplete programming and a water budgeting feature that changes all stations within a program from 1 to 255% in increments of 1% (with 100% as normal). All programming shall be accomplished by use of keyboard pads with LEDs to indicate which station is operating. Programmable delay between stations shall range from 1 second to 4 minutes. Controller shall have programmable "Valve Test" capable of turning each station on from 1 to 9 minutes sequentially. Controller shall have a programmable "Rain Off" up to 7 days. Programs shall be held in non-volatile memory throughout power failures of any duration. Controller shall have real-time battery backup capable of keeping accurate time during power failures up to 30 days. Controller shall have self-diagnostic electronic circuit breaker with valve short detection that identifies and overrides an electrical malfunction. Programming shall be available in automatic, semi-automatic, single station timed manual and true manual operation with a single program option for seasonal pre-programming. Controller shall have start time stacking within each program and simple program review scrolling.

Construction: Controller shall be enclosed in a UL listed, rust-resistant, locking steel cabinet. Quick disconnect cables to terminal strip shall be standard on 18- to 42-station models. Optional pedestal mounts shall be available (P-2B: 4- to 12-station models; P-6B: 18- to 42-station models).

Electric: Transformer input shall be 120 VAC, 60Hz (220/240 VAC, 50Hz). Transformer output shall be 24 VAC, 2.08 amps. Maximum output per station shall be 24 VAC, 1.24 amps. Maximum operating output to valves shall be 24 VAC, 1.80 amps (including master valve). Controller shall have optimum 2-stage primary and secondary surge protection.

IBOC Plus Series Controllers

Automatic Controller(s) shall be IBOC Plus Series with stations (4, 8, or 12) as manufactured under the brand name of Irritrol Systems to be installed or wired in accordance with manufacturer's published instructions. Valves installed must be converted from standard AC solenoid to 24-volt DC latching solenoid (E2002) for Irritrol Systems valves.

Operation: Controller shall be powered by one 6-volt lantern battery or 24-volt solar powered with optional SPC-2. Battery life shall be a minimum of 1 year. Battery life shall be displayed as a percentage of total life. Controller shall have 3 independent programs with 8 start times per program. Controller shall be able to operate up to 12 standard latching solenoid valves (1 solenoid per station) and 1 master valve/pump start latching relay. Station times shall be 1 minute to 23 hours 59 minutes, in 1-minute increments, displayed as hours and minutes. Controller shall have a 365-day calendar with weekday, interval (1-62), and odd/even scheduling with automatic leap-year adjustment. Controller shall have the capability to exclude specific days from the watering schedule when using odd/even day option. Controller shall have water budgeting (10-200%), start-time stacking within program, program looping and station stacking. Controller shall have programmable (1-10 minutes) test cycle. Operation will be automatic, semi-automatic and manual operation modes. Manual cycle shall be programmable from 1 to 99 minutes. Controller shall have non-volatile memory to retain program data and programmable rain off (1-30 days). Controller shall have programmable rain sensor hook up and programmable master valve hook up. Electronic circuit breaker shall automatically detect short- and open-circuit conditions on station output. Controller shall have user selectable instruction displayed in either English or Spanish. Maximum operating pressure shall be 120 psi (8,2 bar).

Controller to Valves

Wire size (Awg)	20	18	16	14	12
Distance (Ft)	400	600	1000	1600	2400

Metric					
Wire size (mm^2)	,5	,8	1,5	2,5	3,5
Distance (m)	120	180	300	480	720

Construction: Controller shall be enclosed in rust-resistant, locking steel cabinet with sufficient space for standard 6-volt lantern battery and quick wire disconnect terminal board.

Electric: Input shall be 6/24 VDC. Output and master valve circuit shall be a bi-directional pulse to drive a 24-volt latching solenoid. Maximum of one 24 VDC latching solenoid per station.

Solar Power Converter (Optional)

Solar Power Converter(s) shall be model SPC-2 as manufactured for Irritrol Systems.

Operation: Converter shall be able to easily convert all style IBOC and IBOC Plus controllers to solar power.

Construction: Converter shall include vandal-resistant Duravolt™ solar electric module. Converter shall have fully self-contained design to eliminate the need for lantern battery. Solar to load ratio shall be 6-to-1 to provide full power to IBOC Plus for up to 20 days without sunlight. Solar amp/hours per day shall be 600mah, typical. Load amp/hours per day shall be 100mah, typical. Converter shall be able to be remote mounted up to 1,000 feet (150m) away from IBOC Plus.

Solar Power Converter Remote Operation Wire Sizing Chart

Wire size (Awg)	20	18	16
Distance (Ft)	200	500	1000

Metric			
Wire size (mm^2)	,5	,8	1,5
Distance (m)	60	90	150

Converter shall have two-piece design that uses allen bolts and gaskets to ensure easy, water-resistant and vandal-resistant installation. Design shall be maintenance free and include maintenance-free gel cell battery with a 3-year life expectancy.

Controllers/Valves

IBOC100 Battery-powered Controller

Automatic Controllers shall be IBOC100 individual battery-powered controllers as manufactured under the brand name of Irritrol Systems to be installed in accordance with manufacturer's published instructions. Valve must be converted from standard AC solenoid to VA12 valve solenoid adapter for Irritrol Systems valves.

Operation: Controller shall be powered by special 6 VDC battery, BAT10, as manufactured by Irritrol Systems and shipped with every IBOC series controller. Battery life is one to two irrigation seasons depending on the amount of controller operation. Each controller operates one valve. Controller is manually programmed. Depressing the Run Time button starts an irrigation sequence. This is acknowledged by a flash from the On light. Depressing the Run Time button a second time stops the irrigation sequence and is acknowledged by a flash from the Off light. The controller now has a start time and a run time set. Run time operation is from 6 seconds to 23 hours and 59 minutes.

The Interval button has four settings. Depressing the Interval button once sets a watering interval of every 12 hours and is acknowledged by the Interval light flashing once. Depressing the Interval button a second time sets a watering interval of every 24 hours and is acknowledged by the Interval light flashing twice. Depressing the Interval button a third time sets the watering interval for every 48 hours and is acknowledged by the Interval light flashing three times. Depressing the Interval button a fourth time sets the watering interval for every 7 days and is acknowledged by the Interval light flashing four times. The start time can be delayed 0, 4, 8 or 12 hours by depressing the Delay Start button. Depressing the Delay Start button once delays the start 0 hours and is acknowledged by one series of flashes from the Interval light, then the On light and finally the Off light. Depressing the Delay Start button a second, third or fourth time results in a 4, 8 or 12 hour delay of the start time and is acknowledged by 2, 3 or 4 flashs of the Interval light, then the On light and finally the Off light. The IBOC Series controller has a default program of 15 minutes of run time. Connecting an active battery to a controller is acknowledged by a series of flashes from first the Interval light, then the On light and finally from the Off light. Connecting an active battery sets a start time and a 15 minute run time that will start 24 hours later. The watering interval can be modified with the Interval button function at this time. Once a watering sequence has occurred, the start can always be modified by using the Delay Start function. The program is retained in an EEPROM that maintains the program for two minutes without battery power allowing the removal of a battery and replacement of an active battery. The controller can be installed on the valve adapter in a vertical or horizontal position.

Construction: The controller and the custom battery are water resistant by encapsulating both units in unique resins used in the marine industry. The controller has a low profile allowing it to fit in almost any valve box. The unique technology includes a patented low power latching solenoid that is encapsulated with Marine Industry resins inside the controller. The controller measures 3" L x 2 ½" W x 1 ½" H (76mm x 63mm x 38mm). The controller operates to 150psi (10 Bars). Operational temperature range is 35°F to 140°F (1°C to 60°C). The controller weighs 5 ¼ oz (150 grams) and the battery weighs 1 ½ oz (40 grams).

2700 PR Series Manual Valves

Manual Valve(s) shall be 2700 PR Series ¾" or 1" models as manufactured under the brand name of Irritrol Systems or approved equal. Valve shall meet ASSE, IAPMO, CSA and City of Los Angeles standards.

Construction: Valve body shall be constructed of corrosion- and UV-resistant PVC material. Valve shall have a convenient manual control handle and a non-rotating Buna-N shut-off seal for longer life. Valve shall have contamination guard to protect valve stem threads.

Operation: Valve shall have a working pressure range from 10 psi (0,7 Bars) minimum to 150 psi (10 Bars) maximum and a recommended flow range from 5 GPM to 25 GPM (20 to 100 l/m).

2700 APR (Anti-siphon) Series Valves

Anti-siphon Valve(s) shall be 2700 APR Series ¾" or 1" models as manufactured under the brand name of Irritrol Systems or approved equal. Valve shall meet ASSE, IAPMO, CSA and City of Los Angeles listing standards.

Construction: Valve body shall be constructed of corrosion- and UV-resistant PVC material. Valve shall have gravity-type anti-siphon poppet. Valve shall have a hand-tight pipe thread connection. Valve shall have internal and external bleed for manual operation and flushing. Valve shall have heavy duty flow control to adjust downstream flow or for manual shutoff. Valve shall be electric H-body atmospheric vacuum breaker. Valve shall have a full stainless steel metering system. Valve shall have a rugged, double-beaded SANTOPRENE® diaphragm. Valve shall have a Buna-N valve seat seal. Valve shall have a positive self aligning bonnet with captured screws. Valve shall have all stainless steel hardware and spring. Valve shall be powered by a 24 VAC encapsulated solenoid, .4 amp inrush and .2 amp holding.

Operation: Valve shall have a working pressure range from 10 psi (0,7 Bars) minimum to 150 psi (10 Bars) maximum and a recommended flow range from 5 GPM to 30 GPM (20 to 114 l/m). Valves shall be mounted above ground at least 6" (16 cm) above highest sprinkler head (or mounted to meet local codes).

VALVES

2700 DPR (Anti-siphon) Series Valves

Anti-siphon Valve(s) shall be 2700 DPR Series ¾" or 1" models as manufactured under the brand name of Irritrol Systems or approved equal. Valve shall meet ASSE, IAPMO, CSA and City of Los Angeles listing standards.

Construction: Valve body shall be constructed of corrosion- and UV-resistant PVC material. Valve shall have gravity-type anti-siphon poppet. Valve shall have a hand-tight pipe thread connection. Valve shall have internal and external bleed for manual operation and flushing. Valve shall have a tamper-resistant flow control to adjust downstream flow or for manual shut-off. Valve shall be electric H-body atmospheric vacuum breaker. Valve shall have threaded bonnet assembly for quick installation and servicing. Valve shall have a full stainless steel metering system. Valve shall have a rugged, double-beaded SANTOPRENE® diaphragm.Valve shall have a Buna-N valve seat seal. Valve shall be powered by a 24 VAC encapsulated solenoid, .4 amp inrush and .2 amp holding.

Operation: Valve shall have a working pressure range from 10 psi (0,7 Bars) minimum to 150 psi (10 Bars) maximum and a recommended flow range from 5 to 30 GPM (20 to 114 ℓ/M). Valves shall be mounted above ground at least 6" (16 cm) above highest sprinkler head (or mounted to meet local codes).

311A (Anti-siphon) Series Valves

Anti-siphon Valve(s) shall be 311A Series ¾" or 1" models as manufactured under the brand name of Irritrol Systems or approved equal. Valve shall meet IAPMO-UPC listing standards.

Construction: Valve body shall be constructed of PVC material with stainless steel hardware and spring. Valve shall have a gravity-type anti-siphon poppet with a polypropylene float. Valve shall have internal and external bleed for manual operation and flushing. Valve shall have flow control for precise flow adjustment and manual shut-off. Valve shall be electric H-body atmospheric vacuum breaker. Valve shall have a double-beaded nylon-reinforced Buna-N diaphragm.Valve shall have a Buna-N valve seat seal. Valve shall have a self-cleaning and externally removable metering system. Metering system shall be fully stainless steel. Electric adapter portion of the valve shall be constructed of glass-filled nylon with molded brass inserts in the body for attachment of the bonnet with stainless steel three-way screws. Valve shall be powered by a 24 VAC encapsulated solenoid, .4 amp inrush and .2 amp holding.

Operation: Valve shall have a working pressure range from 10 psi (0,7 Bars) minimum to 150 psi (10,3 Bars) maximum and a recommended flow range from 1 to 30 GPM (3,8 to 378 ℓ/M). Valves shall be mounted above ground at least 6" (16 cm) above highest sprinkler head (or mounted to meet local codes).

2400/2600 Series Valves

Valve(s) shall be 2400 1" electric globe or 2600 1" electric angle models as manufactured under the brand name of Irritrol Systems or approved equal.

Construction: Valve body shall be constructed of corrosion- and UV-resistant PVC material. Valve shall be available in NPT or welded slip configuration. Valve shall also be available with female threaded inlet and outlet. Valve shall have manual internal and external bleed for manual operation and flushing. Valve shall have a floating bleed tube that allows thermal expansion without affecting performance. Valve shall have a threaded bonnet assembly to speed installation and service. Valve shall have a full stainless steel metering system.Valve shall have a rugged, double-beaded SANTOPRENE® diaphragm and a tamper-resistant flow control mechanism.Valve shall have a Buna-N valve seat seal. Valve shall be serviceable without need to be removed from system. Valve shall be powered by a 24 VAC encapsulated solenoid, .4 amp inrush and .2 amp holding.

Operation: Valve shall have a working pressure range from 10 psi (0,7 Bars) minimum to 150 psi (10 Bars) maximum and a recommended flow range from 5 to 30 GPM (20 to 114 ℓ/M).

2500 Series Valves

Valve(s) shall be 2500 Series 1" electric globe models as manufactured under the brand name of Irritrol Systems or approved equal.

Construction: Valve body shall be constructed of corrosion- and UV-resistant PVC material. Valve shall be available in NPT or welded slip configuration. Design of valve shall be high flow, low friction loss and shall include optional flow control for precise flow adjustment and manual shut off. Valve shall have debris-tolerant, floating metering system design to accommodate dirty water conditions. Valve shall have internal and external bleed for manual operation and flushing. Valve shall have a removable tamper-resistant flow control handle. Valve shall have a full stainless steel metering system. Valve shall have a rugged, double-beaded SANTOPRENE® diaphragm.Valve shall have a Buna-N valve seat seal. Valve shall have a positive self aligning bonnet with captured screws. Valve shall have a high-strength, ribbed bonnet. Valve shall be serviceable without needing to be removed from system. Valve shall be powered by a 24 VAC encapsulated solenoid, .4 amp inrush and .2 amp holding.

Operation: Valve shall have a working pressure range from 10 psi (0,7 Bars) minimum to 150 psi (10 Bars) maximum and a recommended flow range from 0.25 to 30 GPM (20 to 114 ℓ/M).

VALVES

205 Series Valves

Valve(s) shall be 205 Series 1" electric globe models as manufactured under the brand name of Irritrol Systems or approved equal.

Construction: Valve body shall be constructed of corrosion- and UV-resistant PVC material. Valve shall be available in NPT or welded slip configuration. Design of valve shall be high flow, low friction loss and shall include optional flow control for precise flow adjustment and manual shut-off. Valve shall have debris tolerant design to accommodate dirty water conditions. Valve shall have a manual external bleed and removable tamper-resistant flow control handle. Valve shall have a nylon-reinforced Buna-N diaphragm. Valve shall have a Buna-N valve seat seal. Valve shall be serviceable without needing to be removed from system. Valve shall be powered by a 24 VAC encapsulated solenoid, .4 amp inrush and .2 amp holding.

Operation: Valve shall have a working pressure range from 10 psi (0,7 Bars) minimum to 150 psi (10 Bars) maximum and a recommended flow range from 5 to 30 GPM (20 to 114 ¹⁄ₘ).

200B Series Valves

Valve(s) shall be 200B Series 1", 1 ½" or 2" electric globe/angle models as manufactured under the brand name of Irritrol Systems or approved equal.

Construction: Valve body shall be constructed of corrosion- and UV-resistant PVC material with all stainless steel hardware and spring. Valve shall have internal and external bleed for manual operation and flushing. Valve shall have a high-strength, ribbed bonnet and bottom inlet. Valve shall have a heavy-duty double-beaded diaphragm.Valve shall have a Buna-N valve seat seal. Valve shall be easily serviced without needing to be removed from the system. Valve shall be powered by a 24 VAC solenoid with a captive plunger, .4 amp inrush, and .2 amp holding.

Operation: Valve shall have a working pressure range from 20 psi (1,4 Bars) minimum to 150 psi (10 Bars) maximum. Valve shall have a recommended flow range from 5 to 120 GPM (20 to 450 ¹⁄ₘ) depending on valve size.

Pressure Regulation (OmniReg™ Modular Option): Outlet pressure regulating range shall be from 5 to 100 psi (0,3 to 6,9 Bars) or 5 to 30 psi (0,3 to 2,1 Bars) dependent on the regulator option. Valve shall have self-modulating type pressure regulator that maintains constant downstream pressure and be accurate to within ±3 psi (0,2 Bars) of pressure setting. Inlet pressure shall be 10 psi (0,7 Bars) greater than desired outlet pressure. Valve shall have an internal bleed for manual operation in pressure regulation mode. Valve shall be able to be installed in any position.

100 Series (Century PLUS) Valves

Valve(s) shall be 100 Series (Century PLUS) 1", 1 ½", 2" or 3" electric globe/angle models as manufactured under the brand name of Irritrol Systems or approved equal.

Construction: Valve body shall be of glass-reinforced nylon for superior high temperature and high-pressure strength and shall not be affected by rust or electrolysis. Plug shall be provided for globe or angle configuration sealed with a positive O-ring. Valve shall have slow-closing design to prevent water hammer. Valve shall have electric or manual operation. Manual operation shall have an internal and external bleed. Internal bleed shall have a solenoid bleed lever. External bleed shall be present for flushing. Valve shall have a flow control for downstream flow adjustment and/or manual closing. Valve shall have a nylon-reinforced double-beaded Buna-N diaphragm.Valve shall have a Buna-N valve seat seal. Valve shall have a self-cleaning externally removable metering system. Valve shall be serviceable without needing to be removed from the system. Body shall have molded brass studs anchored for positive bonnet attachment. 2" and 3" models shall have a brass control stem. Valve shall be powered by a 24 VAC captive plunger solenoid, .4 amp inrush and .2 amp holding.

Operation: Valve shall have a working pressure range from 10 psi (0,7 Bars) minimum to 200 psi (14 Bars) maximum and a recommended flow range from 5 to 300 GPM (20 to 1150 ¹⁄ₘ) depending on valve size.

Anti-contamination (102 models): Valve shall be electric globe/angle with external control-water filter and three-way solenoids. Valve shall have non-continuous metering system for dirty or effluent water applications. Valve shall have a small exchange of control water to allow for minimum filter capacity. Valve shall have externally-serviceable, 150-mesh control-water filter. Valve shall have selectable normally open or normally closed operation (factory set at normally closed). Working pressure range shall be 10 to 100 psi (0,7 to 6,9 Bars). Not compatible with E2002 DC latching solenoid.

Pressure Regulation (OmniReg™ Modular Option): Outlet pressure regulating range shall be from 5 to 100 psi (0,3 to 6,9 Bars) or 5 to 30 psi (0,3 to 2,1 Bars) dependent on the regulator option. Valve shall have self-modulating type pressure regulator that maintains constant downstream pressure and be accurate to within ±3 psi (0,2 Bars) of pressure setting. Inlet pressure shall be 10 psi (0,7 Bars) greater than desired outlet pressure. Valve shall have an internal bleed for manual operation in pressure regulation mode. Valve shall be able to be installed in any position. Not compatible with E2002 DC latching solenoid.

VALVES/SPRAYHEADS

700 Series (UltraFlow) Valves

Valve(s) shall be 700 Series (UltraFlow) ¾", 1", 1 ½" or 2" electric globe models as manufactured under the brand name of Irritrol Systems or approved equal.

Construction: Valve body and bonnet shall be constructed of glass-reinforced nylon, with stainless steel hardware and spring. Valve shall have a slow-closing design to prevent water hammer. Valve shall have manual operation with internal bleed. Valve shall have a self-flushing, 150-mesh stainless steel control-water filter. Valve shall have a straight-through flow path that results in low pressure loss. A solid brass flow control stem shall be standard. Except ¾" model, valve shall have a nylon-reinforced double-beaded Buna-N diaphragm.Valve shall have a Buna-N valve seat seal. Body shall have molded brass inserts for positive bonnet attachment.

Operation: Valve shall have a working pressure range from 10 to 150 psi (0,7 to 10 Bars) and include screen and flow control. Valve shall have a flow range of 0.10 to 180 GPM (0,39 to 681 l/m) depending on valve size.

Pressure Regulation (OmniReg™ Modular Option): Outlet pressure regulating range shall be from 5 to 100 psi (0,3 to 6,9 Bars) or 5 to 30 psi (0,3 to 2,1 Bars) dependent on the regulator option. Valve shall have self-modulating type pressure regulator that maintains constant downstream pressure and be accurate to within ±3 psi (0,2 Bars) of pressure setting. Inlet pressure shall be 10 psi (0,7 Bars) greater than desired outlet pressure. Valve shall have an internal bleed for manual operation in pressure regulation mode. Valve shall be able to be installed in any position.

HS Series Sprayheads

Sprayheads shall be HS Series fixed spray models as manufactured under the brand name of Irritrol Systems or approved equal.

Construction: The sprinkler shall be a fixed-spray type capable of covering a___foot (___meter) radius at___psi (___Bars). The sprinkler shall offer a series of interchangeable fixed arc Canopy spray nozzles in 7', 9', 12', and 15' (2,13m, 2,74m, 3,66m and 4,57m) radii. Each family of nozzles shall be available in ¼-, ⅓-, ½-, ⅔-, ¾- and full-arc configurations. All nozzles shall be shipped and installed with a filter screen device. A gray screen shall be provided for the 7'-, 9'-, and 12'- (2,13m, 2,74m, 3,66m) radii nozzles. A black screen shall be provided with the 15'- (4,57m) radius nozzles. All screens shall be captive to the nozzle when properly installed in the sprinkler head. The sprinkler shall offer a series of interchangeable variable arc nozzles (VANs) in 7', 10', 12', 15' and 17' radii. Each nozzle shall be able to accommodate arcs from 25° to 360°. A gray screen shall be provided for all VAN nozzles.

Performance: Depending on Canopy nozzle selected and pressure, the sprinkler shall discharge from 0.16 GPM (0,61 l/m) to 4.35 GPM (16,47 l/m). Depending on VAN nozzle selected and pressure, the sprinkler shall discharge from 0.17 GPM (0,64 l/m)to 5.51 GPM (20,85 l/m).

All nozzles shall be balanced with regard to their precipitation rate, whether spaced in a triangular or square spacing plan. All nozzles shall have a radius adjustment screw capable of reducing radius by up to 25% from the fully open position. Each nozzle family shall be color coded on the base of the nozzle unit.

The body shall offer a pop-up height from the properly installed grade to the middle of the nozzle orifice (3", 4", 6", or 12") (5,08cm, 10,16cm, 15,24cm, 30,48cm). The sprinkler shall have a racheting riser allowing the installer to orient the spray to the proper area without turning the body once installed. The sprinkler shall have a ½" (1,27cm) NPT inlet.

An optional check valve shall be made available. It shall be universal to each sprinkler size and retrofitable to any previously installed sprinklers.

533 Bubbler

Bubblers shall be Model 533 as manufactured under the brand name of Irritrol Systems or approved equal.

Performance: The bubbler shall have an adjustable flow rate between 0 and 5.9 GPM (0 and 22,33 l/m). Depending on pressure and flow adjustment, the bubbler shall deliver between 0 and 2' (0 and 0,61 meters) radius. The bubbler shall have a ½" (1,27cm) NPT for attachment to a standard riser.

TRADE WARRANTY

Irritrol Systems and its affiliate, Irritrol Warranty Company, pursuant to an agreement between them, jointly warrant to Irritrol Systems trade customers that Irritrol Systems products will be free from original manufacturing defects in materials and workmanship.

"ONE"

For the first year from the date of original sale, we offer "Hassle-free" over-the-counter exchange of products found to have original manufacturing defects.

"FIVE"

For years two through five from the date of original sale, we will repair or replace — without charge — all parts which are found to have original manufacturing defects, provided the product is returned at customer's expense.

This warranty does not apply to loss or damage to the product due to improper installation, abuse, alteration, mishandling, accident, or if the product has been serviced by other than Irritrol Systems or its authorized service centers. This warranty is not a consumer warranty and does not extend to anyone other than those trade customers who purchase Irritrol Systems products. Neither Irritrol Systems nor Irritrol Warranty Company is liable for failure of products not manufactured by Irritrol Systems even though such products may be sold or used in conjunction with Irritrol Systems products. Neither Irritrol Systems nor Irritrol Warranty Company is liable for indirect, incidental or consequential damages, including but not limited to vegetation loss during periods of malfunction or resulting non-use. Neither Irritrol Systems nor Irritrol Warranty Company is liable for any loss or damage and property damage resulting from installer's negligence.

"LIGHTNING"

5 Year LIGHTNING WARRANTY

Rain Dial controllers (manufactured on or after 11/1/00), Rain Dial Plus controllers (manufactured on or after 10/4/00) and Total Control controllers (manufactured on or after 10/27/00), when properly installed and "earth" grounded as described in their instruction manuals, shall be warranted to our trade customers for repair or replacement (at Irritrol Systems' option) if damaged by lightning or electrical surges during their 5-year trade warranty period.

This warranty is the only warranty made by Irritrol Systems or Irritrol Warranty Company. It replaces all other express warranties and all implied warranties are disclaimed including the implied warranties of merchantability and fitness for a particular purpose.

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At Irritrol Systems, we're serious about providing the tools our customers need to succeed. We will continue to expand our Web site to provide you, the customer, with the best possible service. If you have suggestions or ideas on how we can make this site even more useful, contact our Web master at contactirritrol@toro.com.

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