



2017 Golf Products Catalog



With a singular focus on irrigation since 1933, thousands of courses around the world rely on Rain Bird. Learn more at rainbird.com/golf.

Installing peace of mind. That's intelligent.



Choose an irrigation partner you can trust. Rain Bird irrigation systems protect you from the unpredictable. Flo-Manager® dynamic flow control ensures demand initiated via central, remote and mobile interfaces is managed within your system's hydraulic capacity. Exclusive Smart Pump™ intelligence shuts down excess flow when pipe breaks happen, while industry-leading surge protection minimizes disruption from lightning strikes. Backed by a 5-year warranty on rotors and swing joints, with Rain Bird you're protected.



Rain Bird® 751 Full/Part Circle Rotor with Integrated Control and Memory Arc®

RAIN BIRD®

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Cover Photo: The Club at Admirals Cove



= Exclusive Rain Bird Feature

An irrigation leader for over 80 years, Rain Bird has developed hundreds of breakthrough products and features not available from any other irrigation manufacturer. The combined result of these many innovations is the world's most water-efficient, dynamically adaptable golf irrigation system. Look for this symbol throughout the catalog and discover the Rain Bird difference.

Central Control Systems

Rain Bird® Central Control Systems are designed with ease of use in mind. These systems effectively integrate advanced technologies and optional software to arrive at solutions that manage water use responsibly to save money and reduce utility costs, while continually enhancing course appearance and improving playability.



The Right Level of Control — Right Now.

All too often, superintendents or greens committees purchase a central control system that exceeds the irrigation requirements for their golf course. Before deciding which central control system to purchase, think about the level of control you believe is necessary to maintain course appearance and playability, while reducing water, labor and energy costs. Keep in mind, all Rain Bird Central Control Systems are backward compatible so upgrading your system as the irrigation needs of your course change is easy and affordable.



Cirrus™

As our most advanced central control product, Cirrus serves as the intelligent control for many of golf's most sophisticated irrigation systems. By combining computer-aided design with GPS geo-referenced images and state-of-the-art ET-based scheduling, it delivers all the most innovative features that highly-demanding courses expect.



Nimbus II™

Combining advanced features with simple operation, Nimbus II is a good choice for courses that want to save time and effort while maintaining premier playing conditions. ET-based scheduling and advanced flow management ensure users get the most from every drop of water.

Stratus II™ and StratusLT™

The Stratus platform is an excellent choice for simple time- or ET-based scheduling. With Stratus, you can start with the basics any course needs to efficiently maintain lush conditions on any course, or upgrade to advanced features if you want more sophisticated irrigation management.



Refer to the chart on the following page to compare the features and irrigation management tools provided with each of these systems.

		Cirrus™	Nimbus™ II	Stratus™ II	StratusLT™
Features	Real-time decision making	✓	✓	✓	✓
	Radio communication option	✓	✓	✓	✓
	Works with Rain Bird Integrated Control™ System (ICS)	✓	✓	✓	✓
	Works with all Rain Bird satellites	✓	✓	✓	✓
	Works with Rain Bird decoders	✓	✓	✓	✓
	Works with Rain Bird MI Series™ Mobile Controller	✓	✓	✓	✓
	Works with The FREEDOM System™	✓	✓	✓	✓
	Maximum number of interfaces - Hybrid (same or mix)	12	8	2	1
	Number of ICS™ wire groups (paths) standard	4	4	1	1
	Maximum number of ICS™ stations	36,000*	24,000‡	6,000‡	750
	Number of 2-wire satellite wire groups (paths) standard	4	4	2	1
	Maximum number of 2-wire satellite wire groups	48**	32**	8**	1
	Maximum number of 2-wire satellite stations	32,256**	21,504**	5,376**†	672
	Maximum number of wireless satellite stations	32,256**	21,504**	5,376**†	672
	Number of decoders/solenoids standard	500/1,000	500/1,000	500/1,000	200/400 ◊
	Maximum number of decoders/solenoids	6,000/12,000 Δ	4,000/8,000 Δ	700/1,400 Δ	300/600 with LDI
Programming	Number of simultaneously active decoder solenoids per interface	40/LDI	40/LDI	40/LDI	15/SDI
	Maximum number of weather stations	5	5	1	1 (WS-PRO LT only)
	Maximum number of pump stations	6	6	6	2
	Standard/QuickIRR™/SimpleIRR™	✓	✓	✓	✓
	Number of courses	3	3	2	1
	Number of holes	54	54	27	18
	Number of Flo-Zones™	999	999	999	999
	Programs	Unlimited	Unlimited	500	250
Software Features	Schedules	50 per program	50 per program	25 per program	25 per program
	Irrigation programs - active simultaneous	50	50	20	10
	Temporary Program adjust	✓	✓	✓	✓
	Temporary Schedule adjust	✓	✓	✓	✓
	Temporary Station adjust	✓	✓	✓	✓
	Flo-Manager® - Dynamic Power and Hydraulic Optimization	✓	✓	✓	✓
	Flo-Guard™	✓	✓	✓	✓
	ET Management (Fully Automatic)	✓	✓	✓	✓
Software Features	ET-Based Scheduling - Irrigation by Volume	✓	✓	✓	✓
	Minimum ET Operation	✓	✓	✓	✓
	ET Spreadsheet™ Analysis	✓	✓	✓	✓
	Rain Bird® MI Series Mobile Controller	✓	✓	✓	✓
	Advanced IC™ diagnostics with pinpoint accuracy	✓	✓	✓	✓
	Wireless satellite radio diagnostics	✓	✓	✓	✓
	Comprehensive decoder diagnostics	✓	✓	✓	✓
	Real-Time Operation Log	✓	✓	✓	✓
	Report Generation	✓	✓	✓	—
	Water budgeting 0-300%	✓	✓	✓	✓
	Rain Bucket™ - accumulated rainfall allowance	✓	✓	✓	✓
	Rain Sensor	✓	✓	✓	✓
	Rain Watch™ - respond and use rain events immediately	✓	✓	✓	✓
	QuickStart™ - system setup and run irrigations in minutes	✓	✓	✓	✓
	Help Screens	✓	✓	✓	✓
	Course Monitor™	✓	✓	✓	✓
	Hole View	✓	✓	✓	✓
	DryRun™ - projected flow and runtimes	✓	✓	✓	✓
	Course View™ - map based graphical view of course	✓	✓	✓	✓
	Import GPS, CAD, and/or Aerial photos	✓	✓	✓	✓
	Virtual Monitoring and Control - area	✓	✓	✓	✓
	Virtual Monitoring and Control - individual stations	✓	✓	✓	—
	Smart Weather™ - monitoring and alarms	✓	✓	✓	—
	Precipitation Data	✓	✓	✓	✓
	Rotor Data	✓	✓	✓	✓
	Cycle + Soak™	✓	✓	✓	✓
	Smart Weather™	✓	✓	✓	✓
	Multiple Weather Stations	✓	✓	✓	—
	Hybrid - System expansion with additional interfaces (same or mix)	✓	✓	✓	—
	Station Layers - Map/Operations	✓	✓	✓	—
	Rain Bird Messenger - email alerts	✓	✓	✓	✓
	Smart Pump™	✓	Keycode Module Option	Keycode Module Option	Keycode Module Option
	Additional Wire Groups (path) - expand from standard	✓	✓	Keycode Module Option	—

*With additional ICS(s) ** Possible with Hybrid Module and additional MIM™(s) †Possible with Hybrid Module and additional Wire Groups Module(s) ‡ Possible with Hybrid Module and additional ICI(s)
 Δ Possible with Hybrid Module and additional LDI(s) ◊ Possible using a LDI instead of Standard SDI.

Cirrus™

Specifications

Map-Based Control	Up to 3 Courses (54 Holes)
Programs	Unlimited
Schedules	Up to 50 per Program
Interfaces	Up to 12
Satellite Stations	Up to 32,256
IC™ Stations	Up to 36,000
Pump Stations	Up to 6
Weather Stations	Up to 5



STANDARD FEATURES

- **Hybrid Communication (Up to 12 interfaces)** – Use any combination of field hardware to control irrigation specific to your course requirements.
- **RainWatch™** – Active rainfall monitoring and automatic user-defined irrigation responses dynamically deliver exact application rates and reduce water use—all during an irrigation cycle.
- **SmartPump™** – 24/7 pump station monitoring allows you to automatically modify irrigation demand based on your actual pump data, increasing your pump station efficiency and protecting your entire hydraulic system.
- **Flo-Manager®** – With real-time flow management, Flo-Manager delivers maximum watering flexibility, reducing wear on your pump station and minimizing your water window.
- **Temporary Station, Schedule and Program Adjust** – Fine-tuned adjustments can be made on individual stations, programs and schedules to resolve temporary irrigation needs.
- **Quick IRR™ and Simple IRR™** – Intuitive programming makes building irrigation programs simple and quick.
- **Smart Weather™** – Automatically adjust your system based on real-time weather events and daily evapotranspiration (ET) measurements for precision irrigation and less waste.

Nimbus™ II



Specifications

Map-Based Control	Up to 3 Courses (54 Holes)
Programs	Unlimited
Schedules	Up to 50 per Program
Interfaces	Up to 8
Satellite Stations	Up to 21,504
IC™ Stations	Up to 24,000
Pump Stations	Up to 6
Weather Stations	Up to 5

STANDARD FEATURES

- **Hybrid Communication (Up to 8 interfaces)** – Use any combination of field hardware to control irrigation specific to your course requirements.
- **RainWatch™** – Active rainfall monitoring and automatic user-defined irrigation responses dynamically deliver exact application rates and reduce water use—all during an irrigation cycle.
- **Flo-Manager®** – With real-time flow management, Flo-Manager delivers maximum watering flexibility, reducing wear on your pump station and minimizing your water window.
- **Temporary Station, Schedule and Program Adjust** – Fine-tuned adjustments can be made on individual stations, programs and schedules to resolve temporary irrigation needs.
- **Quick IRR™ and Simple IRR™** – Intuitive programming makes building irrigation programs simple and quick.
- **Smart Weather™** – Automatically adjust your system based on real-time weather events and daily evapotranspiration (ET) measurements for precision irrigation and less waste.

Upgrade Option



SmartPump™ – 24/7 pump station monitoring allows you to automatically modify irrigation demand based on your actual pump data, increasing your pump station efficiency and protecting your entire hydraulic system.

Stratus™ II and StratusLT™



STANDARD FEATURES

- **Hybrid Communication (Up to 2 interfaces with Stratus II)** – Combine two different field interfaces for added flexibility when controlling irrigation specific to your course requirements.
- **RainWatch™** – Active rainfall monitoring and automatic user-defined irrigation responses dynamically deliver exact application rates and reduce water use—all during an irrigation cycle.
- **Flo-Manager®** – With real-time flow management, Flo-Manager delivers maximum watering flexibility, reducing wear on your pump station and minimizing your water window.
- **Temporary Station, Schedule and Program Adjust** – Fine-tuned adjustments can be made on individual stations, programs and schedules to resolve temporary irrigation needs.
- **Quick IRR™ and Simple IRR™** – Intuitive programming makes building irrigation programs simple and quick.
- **Smart Weather™** – (Stratus II only) Automatically adjust your system based on real-time weather events and daily evapotranspiration (ET) measurements for precision irrigation and less waste.

Specifications	Stratus II	StratusLT
Map-Based Control	Up to 2 Courses (27 Holes)	Up to 18 Holes
Programs	500	250
Schedules	Up to 25 per Program	Up to 25 per Program
Interfaces	Up to 2	–
Satellite Stations	Up to 5,376	Up to 672
IC™ Stations	Up to 6,000	Up to 750
Pump Stations	Up to 6	Up to 2
Weather Stations	1	1 (WS-PRO LT only)

Upgrade Options



SmartPump™ – 24/7 pump station monitoring allows you to automatically modify irrigation demand based on your actual pump data, increasing your pump station efficiency and protecting your entire hydraulic system.

Additional Wire Groups – (Stratus II only)

Advanced Control Technologies

Rain Bird® Advanced Control Technologies are designed with ease of use in mind. From soil sensing to pump management with our powerful central control, we offer a full range of solutions that integrate advanced technologies and optional software. With their help, you can manage water responsibly, save money and reduce utility costs, while continually enhancing course appearance and improving playability.



The Rain Bird® Integrated Sensor System™ (ISS) gives you absolute control over your turf

Every golf course is its own complex ecosystem. To provide a consistent, playable environment, you need an accurate understanding of turf health. The Rain Bird® Integrated Sensor System™ offers a snapshot of soil conditions to help you to understand what is happening below ground. It is also the only system in the industry to deliver easy-to-install absolute soil sensing and full integration with the central control system. As a result, you'll save more time, water and money with Rain Bird.

ISDL-2400 Wireless Data Logger:

The data logger receives soil data from the sensors and sends it through the wireless network to the central control.



ISR-2400 Wireless Repeater:

Strategically place multiple repeaters around your course to create a wireless mesh network.



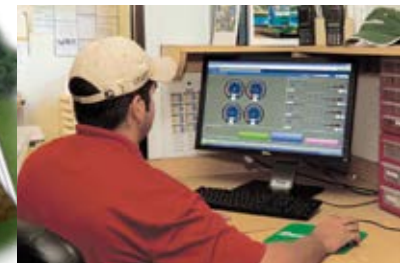
TSM-3 Soil Sensor:

Rain Bird® ISS offers an easy-to-install absolute sensor that provides accurate soil readings without calibration.



ISG-2400 Gateway:

Located at the computer, the gateway is the link between data loggers and repeaters in the field and the Soil Manager™ software.



ISS Soil Manager:

From the convenience of your computer, receive accurate, real-time information on soil conditions, as well as manually or automatically adjust run times based on soil moisture, with Rain Bird's state-of-the-art Soil Manager software.

Integrated Sensor System™ (ISS)

FEATURES AND BENEFITS

- **Dynamic integration. Fully automatic.**
When paired with a Rain Bird Central Control System, the Integrated Sensor System can automatically adjust sprinkler run times to reach or maintain moisture levels, minimizing water consumption, resulting in healthier turf and better playing conditions.
- **Intelligent monitoring.** As a standalone system, the ISS analyzes soil moisture and calculates water budget recommendations for any golf course.
- **Maximum accuracy. Zero calibration.**
The ISS uses research-grade soil sensors backed by years of field experience. The ISS takes highly accurate real-time readings of soil moisture, salinity and temperature immediately following installation and without calibration — for easy installation and immediate accuracy.
- **Adjustable soil sensing rate.** With the Rain Bird ISS, the frequency of soil sensing measurements can be adjusted to match course needs.
- **Dependable results.** Sensor readings are automatically stored by the data logger on Secure Digital High Capacity (SDHC) storage cards. Data is not lost due to power outages or wireless communication issues.
- **Dependable communication.** The ISS uses a proven wireless mesh network which ensures the necessary range of transmission and a secured traffic from the data logger to the Soil Manager™ software.
- **Simple installation.** Network devices (data loggers and repeaters) are battery-powered and easy to install. There is no AC power source to worry about.
- **Improves turf health, course consistency and playability.** The ISS can help deliver more consistent turf quality, anticipate plant stress, weed germination, pest infestations and other factors. You can use less water to flush salts from the soil profile.

SPECIFICATIONS

- **System capacity:** 200 sensors, 20 ISDL-2400 data loggers, 40 ISR-2400 repeaters per ISG-2400 gateway.
 - Frequency of sensor readings can be adjusted between 2 and 120 minutes.
- Electrical Input:**
- **ISDL-2400 and ISR-2400 repeater:**
Four (4) D-cell alkaline batteries
 - **Minimum battery life:** 12 months at 20°C (68°F) assuming 100 sensor readings per day (every 15 minutes)
 - **ISG-2400 gateway:** Powered via PC USB port
 - Each gateway and repeater communicate directly with up to eight (8) network devices (data loggers and repeaters) to enable wireless mesh capability and ensure optimum radio communication.

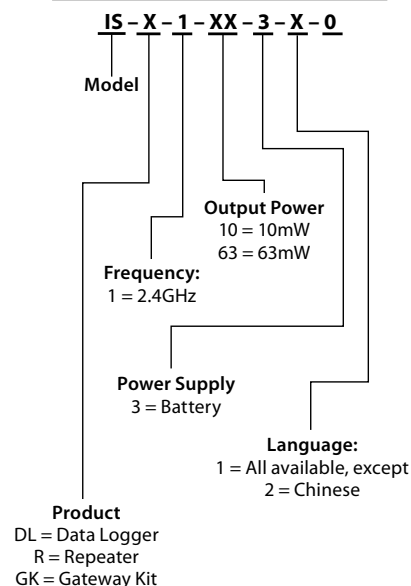
Grounding Requirements:

- ISDL-2400 data logger and ISR-2400 repeaters are battery-powered devices and do not have grounding requirements.



● Integrated Sensor System

HOW TO SPECIFY



Note: Check country of use output power regulations before ordering.

Wireless Network:

- **General**
 - 2.4 GHz ISM DSSS (Digital Sequencing Spread Spectrum) unlicensed frequency
 - Power output 10mW and 63mW per country of use regulations
 - Protocol: DigiMesh™ proprietary mesh network
 - Communication Range: Unobstructed line of sight 800 yards min.
- **Data Logger**
 - **Capacity:** 18 Rain Bird specified TSM-3 Soil Sensors that use SDI-12 protocol. Nine (9) sensors per channel on two (2) channels.
 - **Electrical input:** 4.1-6.5V using four (4) D-cell alkaline batteries
 - **Data storage:** Sensor data stored on 4GB or higher capacity SDHC card (card included)
 - **Upgrades:** Firmware can be upgraded using SD card
 - **Display:** Backlit with 10-position menu and four (4) soft keys for automatic and manual operation including system settings, (language, date, time, units), automatic and manual sensor operation, sensor setup and special features
 - **Languages:**
 - English • French • Spanish
 - German • Chinese • Portuguese
 - Swedish • Italian
 - External antenna tuned for 2.4 GHz communication
 - **Operating temperature:** -10°C to 54°C (14°F to 130°F)
 - **Storage temperature:** -40°C to 66°C (-40°F to 150°F)
- **Repeater**
 - **Electrical input:** 4.1-6.5V using four (4) D-cell alkaline batteries
 - **Languages:** Same as Data Logger
 - **Display:** Backlit with four (4) soft keys
 - Firmware upgrade using SDHC card (card not included)
 - **Operating temperature:** 14°F to 140°F (-10°C to 60°C)
 - **Battery operating temperature:** -4°F to 130°F (-20°C to 54°C)
 - **Storage temperature:** -40°F to 150°F (-40°C to 66°C)
- **Gateway**
 - USB to serial to USB

Sensors:

- **TSM-3 Soil Sensors**
 - Sensor connects to a Rain Bird ISDL-2400 Wireless Data Logger and provide soil moisture, salinity and temperature readings
 - Sensor takes accurate readings immediately following installation and without calibration
 - Sensor measures and reports:
 - Soil temperature
 - Absolute water fraction by volume (WFV) in % with loam calibration
 - 0.1 to 15 dS/m in-soil electro conductivity
 - 1% stable WFV readings over the following conditions:
 - » -22°F to 131°F (-30°C to 55°C) (non-frozen soil)
 - » 0.1 to 4 dS/m EC
 - Robust, long life materials and construction
 - Industry standard SDI-12 interface
 - Sensor connects to a data logger through an 18-gauge three-wire cable that is at most 500 feet (152 meters) long. Sensor itself shall have a 25 ft (7,6 meters) long 18-gauge three-wire cable. Additional cable, not provided, is required to reach 500 feet.
 - Low power operation:
 - 9 to 20 VDC
 - <1 mA typical standby mode
 - 30 mA moisture read mode

Software:

- **Hardware requirements, same as Rain Bird central**
 - Microsoft Windows® 7 or higher
 - PC with 2.2GHz or higher processor
 - Minimum of 2GB RAM memory
 - 3 GB of available hard disk space
 - Power Profile of computer configured to not sleep
 - DirectX 9.0 c-compatible display driver (Windows® XP Mode under - Windows® 7 and later not supported)
- **Languages**
 - English • French • Spanish
 - German • Chinese • Portuguese
 - Swedish • Italian

Soil Manager™:

- **Monitoring**
 - Dashboard view
 - Sensor graph view with annotation capability
 - Sensor table view with annotation and export to Excel capabilities
 - Communication, power and sensor alerts
 - Diagnostics including network device battery level and signal strength status (RSSI)
 - User-defined email alerts for out-of-range soil moisture, salinity and temperature values, communication and power status
 - Water budget recommendations available when one sensor is linked to a particular irrigation program
- **Monitoring with dynamic central integration enabled**
 - Same as monitoring version
 - Full integration with any Rain Bird irrigation central control software version 7 or higher
 - Sprinkler runtime adjustment based on soil moisture measurements and water budget predictions

MI Series Mobile Controllers

Remote access to your central control is now as convenient as the Internet, with mobile control. This software runs on your central control computer to provide remote irrigation control via a web-enabled device or smart phone.

Rain Bird® MI series mobile controllers are designed to work on a smartphone or tablet with Internet connectivity and offer far more remote options than anything else available.

Once connected to the Internet, up to nine (9) remote users can simultaneously control sprinklers and programs, review system activity or directly change settings on both sprinklers and irrigation programs. All activity is logged at the central control for convenient review.

MI series mobile controllers now also include MI FREEDOM user interfaces. MI FREEDOM provides two smartphone interfaces for users to implement traditional The FREEDOM System™ commands: 1) Handheld radio keypad for users with years of handheld radio keypad experience. 2) Soft keyboard interface for use of The FREEDOM System commands on a standard smartphone virtual keyboard.

SYSTEM REQUIREMENTS

- Designed for Windows® 7 or higher.
- Requires an Internet connection to the central control computer.
- Requires a smart phone or tablet.

Feature Comparison

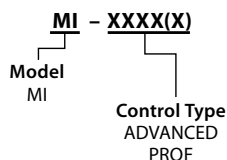
Link Name	Advanced	Professional
Satellites (Areas)/Stations	X	X
Programs/Schedules	X	X
Diagnostics		X
Accessories		X
Alarm Log		X
Cancel All	X	X

Accessories

Link Name	Advanced	Professional
Water Budget		X
Demand Flow	X	X
Smart Pump™		X
Smart Weather™		X
Activity Log	X	X
Online Users	X	X

● MI Series Mobile Controller (Software License only)*

HOW TO SPECIFY



*Phone not included.

The FREEDOM System™

The FREEDOM handheld provides reliable, two-way communication with your Rain Bird system. Use it to choose from command-based or schedule-based operations, making irrigation adjustments a snap. Either way, The FREEDOM System puts you in control of your irrigation management system wherever you are.

System Features and Benefits

- **Two-way Communication with Rain Bird Centrals.** Audio response at radio indicates command received by central.
- **Station- and Program-based Commands.** Provides the flexibility to turn ON or OFF any station or an entire area with the click of a few buttons.
- **FREEDOM-based Commands Recorded at Central.** Irrigation activity logged at the central whether stations turned ON with FREEDOM System or with central.
- **Optional Flo-Manager® Bypass.** Permits FREEDOM user to bypass Flo-Manager.
- **Optional Operating Window.** Allows user to define FREEDOM usage hours, which helps superintendents to control irrigation activity.
- **Two-Way Voice Communication**
- **Telephone Operation.** All FREEDOM commands can be activated using a telephone connection.

Radio Features and Benefits

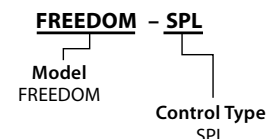
Weather-resistant and reliable. The TK 3180 handheld radio is built to survive the drops, hard-knocks and weather environments of its users. The TK 3180 meets or exceeds the demanding MIL-STD "driven rain" standard, which guarantees water-resistant performance even in wet weather.

- **LCD Display.** The backlit, high-resolution dot matrix 12-character display furnishes the user with a simple easy-to-read interface.
- **High-Quality Audio Output.** Equipped with an extra-large 1.58-inch speaker that delivers a half-watt of audio power for robust clarity.
- **Extra-Long Battery Life.** 1100 mAh batteries deliver more than nine (9) hours of operating time on a single charge (5-5-90 duty).
- **Wide/Narrow Channel Bandwidth.** Each channel can be programmed for wide or narrow bandwidth operation.
- **Radio Warranty.** One-year warranty.
- **MIL-STD 810 C/D/E/F Environmental Tests.** Meets or exceeds the stringent IP/54/55 dust and water intrusion standards and a full range of tough MIL-STD 810 C, D, E and F environmental standards in categories such as vibration, shock, dust, humidity, rain, temperature, solar radiation and atmospheric pressure.



● The FREEDOM System™

HOW TO SPECIFY



SPECIFICATIONS

Frequency: 450 – 470 MHz
(Narrowband)

Note: Site survey and license required

Power:
100 V/110 V: 60 Hz
230 V: 50/60 Hz

Pump Manager 2

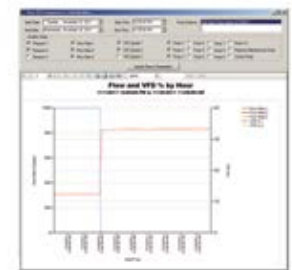
Rain Bird® Pump Manager 2 is engineered for the golf course professional looking to simplify pump control, monitoring and data reporting. This powerful software application gives you full control of your pump station from your computer or central control.

FEATURES AND BENEFITS

- Pump Manager 2 provides a direct link to the pump station touchscreen so you can view and modify pump operations from your computer or tablet as though you were standing right in front of it.
- Since all pump operation data is contained on your computer, Pump Manager 2 and its built-in reporting capabilities can keep you apprised of operations, flow, water use and other key information.
- Pump Manager 2 includes common reports for future review or regulatory reporting.
- For customized reporting, data can be exported in a file compatible with common spreadsheet applications such as Microsoft® Excel®.
- Pump Manager 2 is standard with ten different language options.
- Pump Manager 2 can be used with any computer or fully integrated with Rain Bird's many central control systems.
- Best of all, Pump Manager 2 is fully integrated with Rain Bird's exclusive central control feature, Smart Pump™.



Pump Manager 2 monitor



Pump Manager 2 customized reports



Pump Manager 2's touchscreen interface

Smart Pump™

FEATURES AND BENEFITS

Rain Bird's Smart Pump™ is a powerful central control software tool that improves pump station performance more than any comparable product on the market. It integrates your irrigation system from Reservoir to Rotor, constantly comparing actual flow to expected flow. By making smart, real-time decisions based on this information, it optimizes your system — saving water, conserving electricity and reducing wear and tear on your valuable pumping system.

ACTUAL FLOW MEASUREMENT

Unlike other irrigation central control software, Smart Pump bases its decisions on actual flow, not estimated flow. By using accurate information — in real time — Smart Pump automatically balances supply with system demand. That means greater efficiency and an end to wasted water and electricity.

24-HOUR PUMP SUPERVISION

With Smart Pump, you can relax knowing your system will instantly respond to actual field conditions with the right decisions. For instance, if a pipe breaks, Smart Pump will stop water flow to the pipe to prevent turf damage. Or if the pump station fails, Smart Pump will make immediate water demand adjustments to keep the system from shutting down permanently. It's like having your own irrigation supervisor at every sprinkler, 24/7.

INTEGRATION MEETS INTELLIGENCE

Smart Pump seamlessly integrates your entire irrigation system. It automatically starts waiting sprinklers or pauses active sprinklers to reduce flow or increase demand, keeping your irrigation system running at peak efficiency at all times.



● Smart Pump™

HOW TO SPECIFY

SMARTPUMPM

Model
Smart Pump

Weather Stations

Rain Bird offers two Weather Station options to help meet your course's unique irrigation management needs. Both WS-PRO2 and the WS-PRO LT provide evapotranspiration (ET) management and reporting capabilities; while only the WS-PRO2 offers optional intelligent alarm and irrigation control responses through Rain Bird's powerful Smart Weather™ software.

FEATURES AND BENEFITS

Superior ET Model. Rain Bird's Central Control Systems use weather sensor input to determine ET rates based upon a field-proven proprietary equation for ET.

Automatic ET Download/Selective Usage. Automatically download weather data daily and calculate ET to determine irrigation times for the entire system or by specific areas, holes or stations.

ET Override. Allows you to easily set certain programs to ignore ET values when determining run times.

Rain Bucket. Allows rainfall from one day to be carried over to the following day(s) for more accurate ET calculations.

Multiple Station Capacity. Connect up to five (5) weather stations to one central control system for more precise ET values based upon different weather conditions and micro climates around the golf course.

Max Rainfall. User-defined maximum rainfall can be set to limit the amount of acceptable rainfall for specific soil types or other areas that are subject to high run-off.

Weather Data Reports. Generate reports to show current or past weather conditions by the hour, day, week, month or year.

Unlimited Data Storage. Store unlimited weather data at the central control.

Multiple Languages. Choose from 10 different languages (English, French, German, Italian, Japanese, Korean, Portuguese, Spanish, Swedish or Chinese).

English or Metric Measurement Units. Easily select between English or Metric units of measure.

The WS-PRO2 Weather Station along with Rain Bird's Smart Weather Software supports alarms when thresholds are exceeded in:

- Rain
- High or Low Ambient Temperatures
- High Winds
- Rainfall Intensity

When any of these alarms exceed user-defined thresholds in a programmed time period, the system will initiate an alarm condition. The alarms will automatically reset when temperature, rain or wind conditions are again within acceptable ranges for irrigation.

Automatic Shut Off/Turn On. Rain Bird Central Control Systems automatically shut OFF irrigation operation for the entire system or in specific areas of the course (tee box, fairway, green, etc.) when alarm conditions are detected at the weather station. They also automatically turn ON irrigation when weather conditions return to the acceptable range for irrigation.

Automatic Pause/Resume. Rain Bird Central Control Systems automatically suspend irrigation to the entire system or specific areas (tee box, fairway, greens, etc.) when alarm conditions are detected. They also automatically resume irrigation when weather conditions return to the acceptable range for irrigation.

Automatic Notification. The WS-PRO2 Weather Station, using Rain Bird® Messenger™, can automatically notify you wherever you are, at the central control or via text messaging or e-mail when alarm conditions exist.



● WS-PRO2 Weather Station

HOW TO SPECIFY

WS - XXXX-XX - XX - X

Connection
SH = Short Haul
PH = Phone Modem†
WL = Wireless*

Model
PRO2 =
Professional
Series

PRO LT =
Professional
Light Series

Power
Blank = User
Supplied
S = Solar
Powered

*Only available on WS-PRO LT
† Only available on WS-PRO2



● WS-PRO LT

Weather Stations

	WS-PRO LT	WS-PRO2
Specifications		
Compatible Modules	<ul style="list-style-type: none"> Automatic ET Multiple Weather Station 	<ul style="list-style-type: none"> Automatic ET Multiple Weather Station Smart Weather™ Alarms Smart Messenger Module
Communication Options	<ul style="list-style-type: none"> Wireless (900 MHz SS Radio or 2.4 GHz Radio) Short Haul 	<ul style="list-style-type: none"> Telephone Short Haul
Transmission Range	<ul style="list-style-type: none"> Wireless 900 MHz <ul style="list-style-type: none"> ½ mile (805 m) Wireless 2.4 GHz <ul style="list-style-type: none"> ¼ mile (402 m) Short Haul – 20,000 ft (6.096 m) 	<ul style="list-style-type: none"> Telephone – no limit Short Haul – 20,000 ft (6.096 m)
Power Supply Required	• 16 to 22 VDC	• 9.5 to 16 VDC
Optional Power Supplies	• Solar Panel	• Solar Panel
Temperature Range	• -40° to 122° F (-40° to 50° C)	• -13° to 122° F (-25° to 50° C)
Air Temperature Sensor Operating Range	• -40° to 122° F (-40° to 50° C)	• -13° to 122° F (-25° to 50° C)
Accuracy	• ± 0.9° F (±0.5° C)	• ± 2.7° F (±1.5° C)
Relative Humidity Sensor Operating Range	• 0 – 100%	• 0 – 100%
Accuracy	• ±5% – 90% to 100% RH	• ±6% – 90% to 100% RH
	• ±3% – 10% to 95% RH	• ±3% – 0% to 90% RH
Rain Gauge Sensor Resolution	• 0.04" (1 mm)	• 0.01" (0.25 mm)
Solar Radiation Sensor Accuracy	• ±2.5%	• ±3%
Wind Direction Sensor Range	• 360° mechanical, 352° electrical	• 360° mechanical, 356° electrical
Accuracy	—	• ±4°
Wind Speed Sensor Starting Threshold	• 0.78 ms ⁻¹ (1.75 mph)	• 0.4 ms ⁻¹ (0.9 mph)

	Automatic ET Module	Alarms Module
Smart Weather Features		
Compatible Weather Stations	WS-PRO LT, WS-PRO2	WS-PRO2
Generate Alarms <i>(rain, ambient temperature, wind, rain intensity and soil temperature)</i>	—	X
Reset Alarms	—	X
Automatic Shut Off/Turn On	—	X
Automatic Pause/Resume	—	X
Automatic Notification*	—	X
Superior ET Model	X	X
Automatic ET Download	X	X
ET Override	X	X
Cost Savings	X	X
Rain Bucket	X	X
Multiple Station Capacity**	X	X
Max Rain Fall	X	X
Reliable Sensor Input	X	X
Weather Data Reports	X	X
Unlimited Data Storage	X	X
Multiple Languages	X	X
English or Metric Units of Measure	X	X
Cirrus™ Central Control	X	X
Nimbus™ II Central Control	Optional	Optional
Stratus™ II Central Control	Optional	Optional
Stratus LT™	Optional	

* Requires Smart Messenger Module.

** Requires Multiple Weather Station Module.

Rain Watch™

Patented Rain Bird® Rain Watch™ technology maximizes water efficiency, while minimizing system wear and tear, through intelligent, real-time decision-making based accurate rainfall measurement.

FEATURES AND BENEFITS

- The industry's first active rainfall monitoring and response system.
- The only system designed to automatically react to rainfall and adjust sprinkler application rates to take full advantage of natural rain, thereby eliminating over-watering.
- Saves water and electricity, while keeping the course drier and more playable, by pausing, adjusting or canceling irrigation in the event of rainfall.
- Results in reduced wear and tear on irrigation system components.
- An integral part of Rain Bird® Central Control Software versions 4.0 and higher.

HOW RAIN WATCH MANAGES RAINFALL

- Stationed throughout the course, up to four (4) high-resolution Rain Watch rain cans collect environmental data.
- A rotor can be set to react to any of the rain cans.
- The central control system continuously polls each rain can.

Rainfall data received by the system is used to make intelligent decisions based on user-defined responses:

System Response: For course-wide reactions

Program Response: For program-specific responses

No-Action Response: For monitoring only

Intelligent responses include:



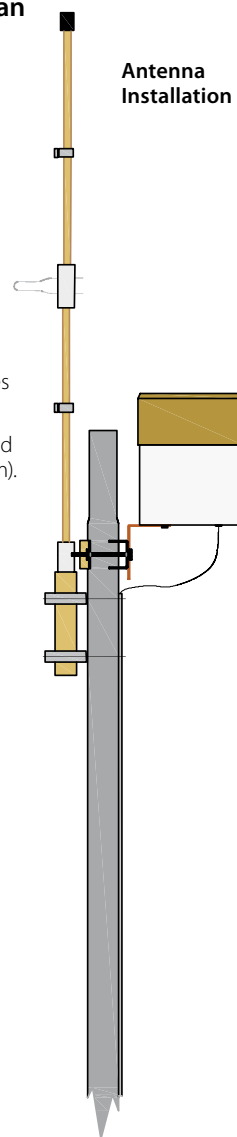
- Pause
- Resume
- Adjust runtimes and resume
- Cancel



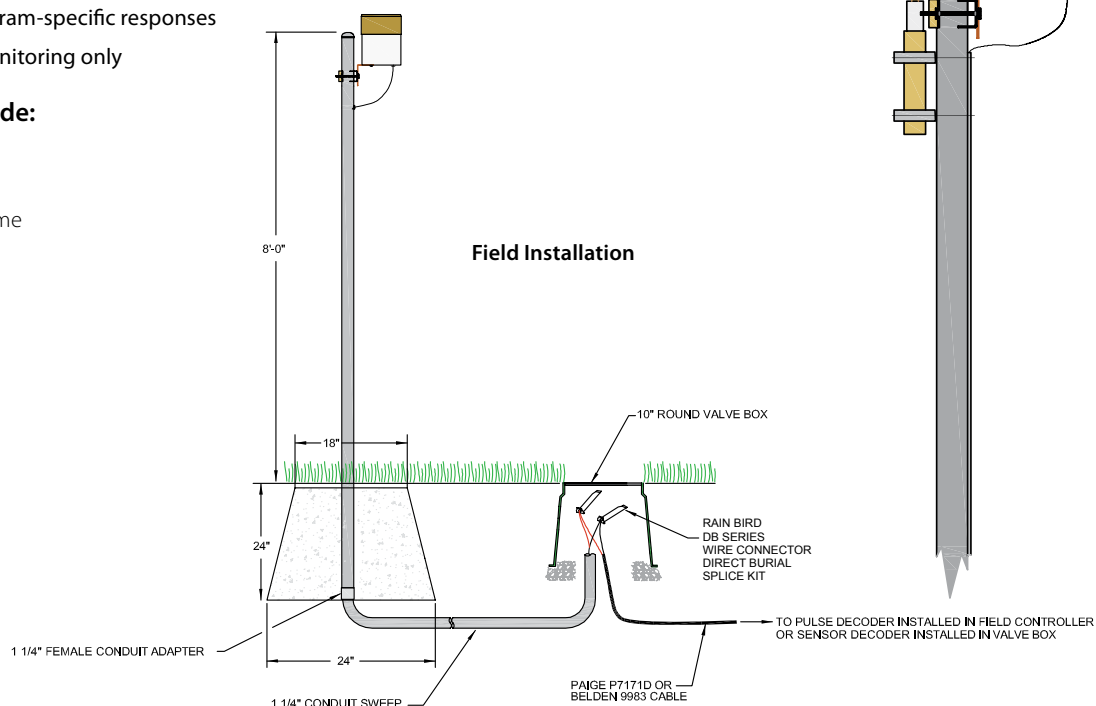
● Rain Can

AN EXAMPLE OF RAIN WATCH IN ACTION

- Your daily irrigation schedule calls for 0.20 inches (0.51 cm) of precipitation.
- A storm begins and once accumulated rainfall reaches your desired 0.04-inch (0.10 cm) threshold, Rain Watch suspends irrigation.
- The storm passes after putting down 0.11 inches (0.28 cm) of rain.
- Rain Bird software automatically adjusts remaining runtimes for active stations, as well as those stations yet to run.
- Natural precipitation is seamlessly integrated into scheduled irrigation, resulting in a water savings of 0.11 inches (0.28 cm).



Antenna Installation



Field Control Systems

Rain Bird® Field Control Systems are engineered to deliver the trusted performance that golf course professionals need to optimize course appearance and playability. From best-in-class satellite-based systems to reliable field decoders to the dynamic IC System,™ Rain Bird offers a full range of solutions. Choose Rain Bird field control for easy irrigation scheduling, adjustment and maintenance.



Integrated Control System™ (IC System) Rotors and Valves

Now, Integrated Control Technology is built into the rotor and valve for easy, streamlined control. The Rain Bird® IC System™ connects central control directly to the rotor or valve. No field controllers, separate decoders, secondary wiring or unnecessary splices mean fewer areas that can breakdown, wear out or malfunction.

FEATURES AND BENEFITS

Simple to Install – Requires up to 90% less wire than traditional satellite control systems and 50% fewer splices than a traditional decoder system.

Cost Savings – Fewer splices and less wire require less time and effort to install the system.

System Database Management – The Integrated Control Module (ICM) offers tear off bar codes for easy scanning to simplify the creation of the central control system database for quick operation. As soon as the wire path is connected to the computer, you can turn on the sprinklers and valves.

Reliable Control – The IC System is a simple yet sophisticated controller/rotor/valve system built around a new generation of Rain Bird's proven solenoid and satellite technology. Simplicity results in reliability.

Easier to Design – The IC System is easier to design—only simple calculations are required. It eliminates an array of troublesome considerations—there are no satellite controllers to design around or conceal.

Easier Maintenance – The IC System is capable of intelligent, two-way communication with each and every ICM on the golf course. Almost all troubleshooting can be managed through intuitive diagnostics built into the central control software. The learning curve for maintenance is minimal.

Course technicians can easily accomplish most maintenance tasks. The ICM is easily removed and can be replaced if necessary.

Dependable – The IC System is designed to always turn off if problems occur. When the wire path is damaged or cut, or if central control communication is lost, the ICM is designed to turn off automatically.

True "Below 30 Volt Control System" – As the IC System wire path output is 28.5 Volt, the IC System is a "true less than 30 Volt" control system. A lower than 30 Volt system is considered a low voltage system and is typically not subjected to code requirements regarding deep burial of the wire path.

Below Ground Control – Since the ICM is built right into the rotor or valve, the entire control system is below ground. Unlike field controller systems, the below-ground system offers protection against damage from vandalism, flooding and insects.

Golf Course Aesthetics – Since the IC System control is designed to be entirely below ground, the golf course vistas are clear of irrigation components as envisioned by the golf course designer.

The IC System allows the full benefits of Rain Bird central control systems including: ET-based scheduling, customized course graphics, multiple mapping options, and the ability to "see" the placement and operation of individual rotors.

Central Control "Smart Features" – With the IC System, you have the ability to utilize all of Rain Bird's central control "Smart Features" including: Minimum ET,™ Smart Weather,™ Smart Pump,™ and superior monitoring of system operation.



● PESB ICM Valve

● 751 IC Rotor

FIELD CONTROL SYSTEMS

HOW TO SPECIFY

ICM Rotors*					Valves**	
A -	XXX -	IC -	XX -	XX	XXX -	XXX(X)
Thread Type	Model	Body	Nozzle	Pressure Regulator	Size	Model
ACME Only	700 751 900 950		See nozzle charts for each rotor	70 (4.8) 80 (5.5)	150 200 300	PESIC PESIC-R EFIC-CP BPESIC

* For exact combinations of Rotors (Nozzles and Pressure Regulator) see pages 31-40 for correct model.

** For exact combinations of Valves (Size), see pages 45-47 for correct model.

SPECIFICATIONS

System Capacity*: 750 ICMs per Output Wire Path, 1500 ICMs per Output Driver Board, 3000 ICMs per IC Interface (ICI), up to 36,000 ICMs with Cirrus™

** Specific System Capacity is dependent on the Central Control System*

ICI Electrical Specifications:

115 VAC Nominal 98-132 VAC

220-240 VAC Nominal 208-255 VAC

100 VAC Nominal 91-110 VAC @ 60 HZ +/- 2 HZ

Electrical Output: 28.5 VAC, 1.25 AMP Per Wire Path

Active Stations: No electrical limit — only limited by hydraulics of pipe network and size of pump station

ICM Current Requirements: Varies based on wire path length — Nominal Current Draw is 0.33 mA on 5000 feet (1500 meters) of wire

Grounding Requirements: ICSD to be grounded at less than 50 ohms every 500 feet (150 meters) or 15 ICMs whichever is less. The central control is to be grounded with less than 10 ohms of resistance

Compliance: CE, FCC, UL

Environment:

Working Range: 32° F to 122° F (0° C to 50° C)

Storage Temperature: -40° F to 150° F
(-40° C to 65° C)

Operating and Storage Humidity: 100%

Dimensions:

ICM: 2.23" x 1.70" (57 mm x 43 mm)

ICSD: 2.00" x 1.41" (51 mm x 43 mm)

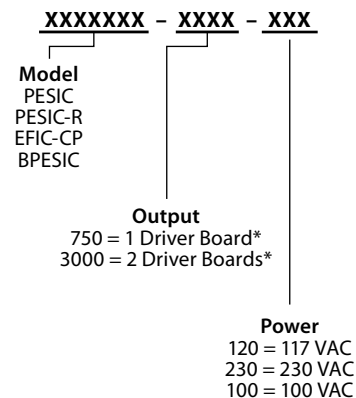
Compatibility: Rain Bird 700/751 Series Rotors, Rain Bird EAGLE™ 700 and 900 Series Rotors** and Rain Bird PEB, PESB, PESB-R, PGA, EFB, BPE and BPES electric valves.

*** Note EAGLE Rotors sold before 6/2009 will have a random orientation of the ICM relative to the Selector Housing*

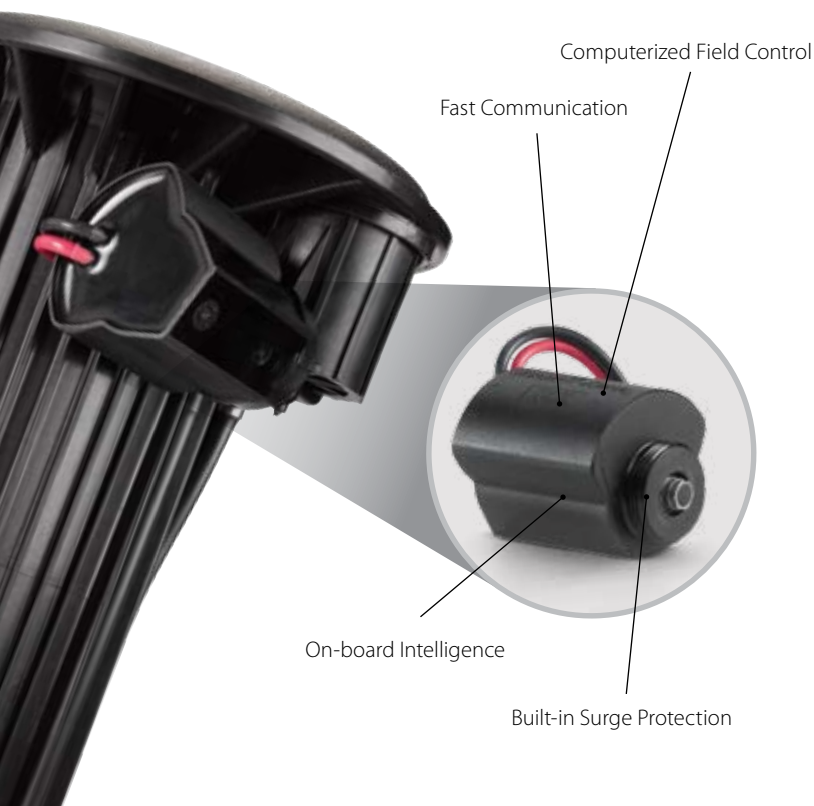
Maximum Wire Paths: Two (2) Outputs per IC Driver Board and Up to four (4) total per ICI and Multiple Branches Per Wire Path

ICI

HOW TO SPECIFY



** Each driver board has 2 wire paths.
See page 6 for the number of wire paths enabled per Central Control system.*



Intelligence Built Into Every ICM



PAR+ES Controller

The easy-to-program, central control-ready Rain Bird® PAR+ES Controller features 72-Station capability, unlimited programs with central control, standard premium surge protection, extensive diagnostics and a best-in-class pedestal enclosure.

FEATURES AND BENEFITS

Communication — Standalone, two-wire and LINK.

Central Control Ready — Works with any Rain Bird Central Control System. End-user can access controller via cellular phone (MI Series Mobile Controller*) or UHF radio (FREEDOM System™).

- Dynamic Flo-Manager®
- Smart Pump™
- Smart Sensor™
- Smart Weather™

Pedestal Colors — Available in gray.

Easy Programming — Large, raised control buttons with clear, descriptive icons and a high-contrast Liquid Crystal Display (LCD) panel make programming easy — even for the novice. Lights indicate active schedules and central control status, while unique Copy/Paste function speeds programming process. An angled keypad aids visibility as well as water drainage, and makes the PAR+ES controller extremely easy to use.

Greater Water Precision — The PAR+ES controller allows you to program six (6) automatic and two (2) manual schedules. It allows you to turn on a maximum of 16 solenoids at 60 Hz and 12 solenoids at 50 Hz, and features four (4) control modes — giving you ample programming and operating control.

Modular Configuration Allows Easy Expansion — The PAR+ES is available in 16, 32, and 56-station base configurations and can be easily upgraded in 8-station increments. By simply plugging in an eight-station Output Station Module (OSM) you can expand your PAR+ES controller capabilities to accommodate 24, 40, 48, 64 or 72 stations.

Multi Manual with Station and Program Stacking — Perfect for syringing or putting down fertilizer, multi manual allows to manually launch up to 16 stations at one time. Split second delayed start prevents water hammer and high inrush current.

Multiple Schedule Operation — No schedule limit when operated with Rain Bird Central Control Systems. Six (6) automatic (with 12 start times each) and two (2) manual schedules available for standalone operation.

Universal Performance Simplifies Installation and Operation — The intuitive PAR+ES Controller reduces installation and training hassles with its many universal features. For quick electrical hookups, the system automatically senses and adjusts for either a 50 or 60 Hz current; while one (1) transformer accommodates 100 V/120 V, 220 V or 230 V/240 V with the flip of a switch. The PAR+ES Controller also displays system activities and accepts user input in eight (8) different languages. The icon-driven controls and multilingual display eliminate confusion and translation problems.



Mix and Match — Mix and match with any other Rain Bird Controller and with any Rain Bird Central Control System.



Easy to Use — Large buttons with clear, descriptive icons make programming easy.



Enclosed Electronics — Provides the best protection against the elements.

16-Solenoid Simultaneous Operation — Heavy-duty transformer permits simultaneous operation of up to 16 solenoids (12 at 50 Hz).

Irrigation Control — Variable or weekday programming, for weekday cycle or for irrigation every other day, every three (3) days or up to every nine (9) days.

Water Budget — Increase or decrease run times on a schedule in 10% increments from 0 to 200%.

Simplified Installation — One (1) transformer accommodates various power inputs.

Front Panel Lighting — LEDs and backlit Liquid Crystal Display (LCD) make programming easy even in poor lighting.

Large Capacity Terminal Strip — Accepts up to two (2) 14-gauge wires per station.

Standard Station Lights — OSM lights provide easy identification of active stations.

Standard Station Switches — Turn stations on or off quickly for easy operation and troubleshooting.

Premium Surge Protection — Premium surge protection included in all models.

Sensor Response — Sensor activation cancels irrigation at controller.

Master Valve Activation — Activate master valve output with station activation.

Available PAR+ES Retro Kit — Extends the useful life of older control systems by converting to PAR+ES water-saving technology (see page 25).

The flexible PAR+ES can be ordered in the following configurations:

- PAR+ES standalone controller in a plastic pedestal.
- PAR+ES satellite with two-wire module in a plastic pedestal.
- PAR+ES satellite with LINK (wireless) module in a plastic pedestal.

All configurations are offered with a weather proof and impact-resistant plastic pedestal.

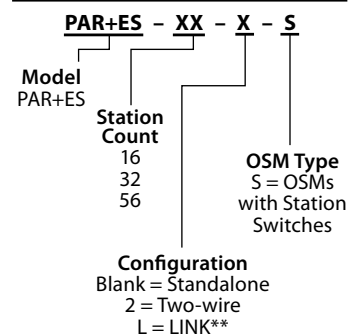
Buy only the control you need today and increase your operating capabilities or change your communication method at any time.

*Software required



● PAR+ES

HOW TO SPECIFY



Note: Expandable up to 72-Station count by adding OSMs.

**LINK Radios must be ordered separately from controller.

SPECIFICATIONS

Station Capacity: 72 stations, up to 16 solenoids operating simultaneously (60 Hz)

Electrical Input: (50/60 Hz)

117 VAC Nominal 98 to 132 VAC

220 VAC Nominal 208 to 232 VAC

240 VAC Nominal 225 to 255 VAC

Electrical Output: 26.5 VAC, 5.25 AMP

Station Load Capacity: Up to four (4) 24 VAC, seven (7) VA solenoids per station

Plastic Pedestal Dimensions:

Width: 17" (43.2 cm)

Height: 34 ¾" (88 cm)

Depth: 21" (53.4 cm)

Programs: As many programs as possible with Rain Bird Central Control Systems or six (6) automatic (12 start times each) and two (2) manual in standalone mode

Water Budget: 0 to 200% in 10% increments

Station Runtimes: One (1) to 120 minutes, in one (1) minute increments

Languages: English, French, German, Italian, Japanese, Portuguese, Spanish and Dutch

Grounding Requirements: Less than 10 ohms

Compliance: UL & C-UL Listed, CE approved, C-Tick Compliant and FCC



PAR+ES Retro Kit

The PAR+ES Retro Kit is the perfect controller upgrade for low budget upgrade to extend the life of your irrigation system.

FEATURES

Installation — Installs in any Rain Bird small plastic or stainless steel pedestal as well as several other competitors' pedestal — with additional hardware required.

Versatile Configurations — Available as standalone, hardwired¹ or wireless². Hardwired and wireless configurations have real-time two-way communication with central control. In wireless mode, up to four controllers can share a single radio.

Expandable — 16-station configuration up to 48-station using plug-in 8-station output station modules with switches and station LED.

Easy Programming — Large, raised control buttons with clear, descriptive icons and a high-contrast Liquid Crystal Display (LCD) panel make programming easy. Lights indicate active schedules and central control status, while unique Copy/Paste function speeds programming process.

Central Control Ready — Works with any Rain Bird Central Control System. Compatible with Flo-Manager®, Smart Weather™, RainWatch™ and Smart Pump™ modules. Factory-configured to receive commands via cellular phone (MI Series Mobile Controller*) or UHF radio (The FREEDOM System™).

Multiple Schedule Operation — No schedule limit when operated with Rain Bird Central Control Systems. Six (6) automatic (with 12 start times each) and two (2) manual schedules available for standalone operation.

Multi Manual with Station and Program Stacking — Perfect for syringing or putting down fertilizer, multi manual allows to manually launch as many stations as necessary. Split-second delayed start prevents water hammer and high inrush current.

SPECIFICATIONS

Water Budget: 0 to 200% in 10% increments

Station Runtimes: One (1) to 120 minutes, in one (1) minute increments

Configurations: Standalone, hardwired and wireless

Programs: No limit with Rain Bird Central Control Systems. Six (6) automatic (12 start times each) and two (2) manual programs

Schedule: Variable day watering (up to nine (9) days), custom day-of-the-week by program

Electrical Input:
117 VAC ±10% (60 Hz)
220 VAC (50 Hz)

Electrical Output: 26.5 VAC, 3 AMP

Station Load Capacity: Up to four (4) 24 VAC, seven (7) VA solenoids per station

Languages: English, French, German, Italian, Japanese, Portuguese, Spanish and Dutch

¹Requires interface module not included. ²Requires additional transformer. *Additional software required

PAR+ES Sat Decoder

The PAR+ES Sat Decoder combines the features and benefits of a controller system with those of a decoder system. The resulting advantages for the user include:

- Easy Installation
- Reduced Installation Costs
- Easy Expansion

The idea is simple:

1. Install the controller.
2. Install a single two-wire path to control all the sprinklers.
3. Install decoder between wire path and each sprinkler head.
 - Uses up to 90 percent fewer wires than conventional hardwire systems
 - Built-in diagnostic tools
 - Compatible with all Rain Bird Golf Decoders (FD-101, FD-102, FD-202, FD-401 and FD-601)
 - Simply attach new decoder to the wire path
 - Operates as a standalone controller or add a Rain Bird® Central Control System for greater control
 - Operates up to 72 decoder addresses
4. Program controller with decoder address.

SPECIFICATIONS

Station Capacity: 72 decoder addresses, up to 16 solenoids operating simultaneously (60 Hz)

Configurations: Standalone, two-wire and LINK

Electrical Input: (50/60 Hz)
115 VAC Nominal 98 – 132 VAC
220 VAC Nominal 208 – 232 VAC
240 VAC Nominal 225 – 255 VAC

Electrical Output: 26.5 VAC, 5.25 AMP

Station Load Capacity: Up to two (2) 24 VAC, seven (7) VA solenoids per station depending on decoder type

Plastic Pedestal Dimensions:
Width: 17" (43.2 cm)

Height: 34¾" (88 cm)

Depth: 21" (53.4 cm)

Programs: As many programs as possible with Rain Bird Central Control Systems or six (6) automatic (12 start times each) and two (2) manual in standalone mode

Water Budget: 0 – 200% in 10% increments

Station Runtimes: One (1) – 120 minutes, in one (1) minute increments

Languages: English, French, German, Italian, Japanese, Portuguese, Spanish and Dutch

Grounding Requirements: Less than 10 ohms

Compliance: UL & C-UL Listed, CE approved, G-Tick Compliant and FCC

Maximum Wire Length Between Controller and Decoder:

#12 AWG:

Star Design: 3.8 miles (6.1 km)

Loop Design: 15.2 miles (24.4 km)

#14 AWG

Star Design: 2.4 miles (3.8 km)

Loop Design: 9.6 miles (15.2 km)

Maximum Wire Length Between Decoder and Rotor: 456 ft (#14 AWG)

Maximum Wire Paths: Four (4), plus multiple branches per wire path

● PAR+ES Decoder Controller

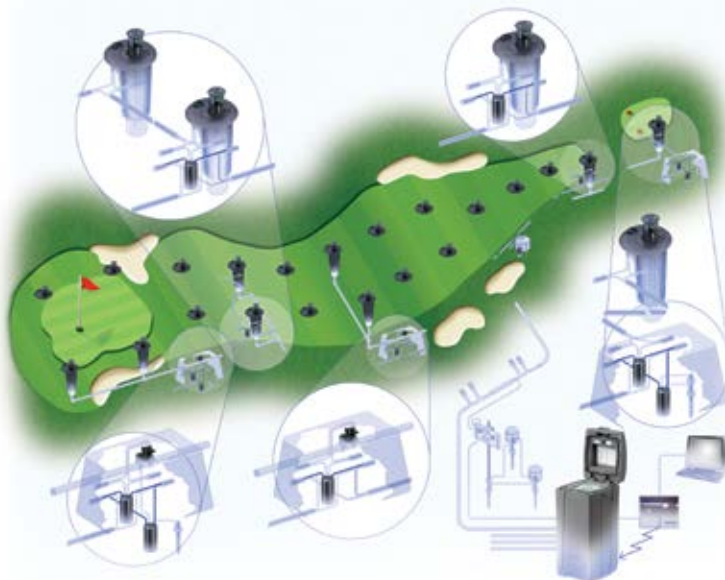
HOW TO SPECIFY

PAR+ES – DEC – X – 72

Model
PAR+ES

Configuration
Blank = Standalone
2 = Two-wire
L = LINK*

*LINK Radios must be ordered separately from controller.



Decoder Controller

ESC-1 Controller

Get the power of advanced water management in one, easy-to-use package with the full-featured ESC-1 Controller. This golf-quality, value-priced controller features four programs, a real-time calendar, RASTER™ troubleshooting technology and the best customer satisfaction program in the industry.

FEATURES

Station Capacity — 16, 24 or 40 stations.

Central Control Ready — Works with any Rain Bird® Central Control System. Factory-configured to receive commands via cellular phone (MI Series Mobile Controller®) or UHF radio (The FREEDOM System™).

- ✓ • Dynamic Flo-Manager®
- ✓ • Smart Pump™
- ✓ • Smart Sensor™
- ✓ • Smart Weather™

✓ **Mix and Match** — Mix and match with any other Rain Bird Controller and with any Rain Bird Central Control System.

Pedestal — Best-in-class weather-proof plastic pedestal.

Easy to Use — Large buttons with clear, descriptive icons make programming easy.

Large Capacity Terminal Strip — Accepts up to two (2) 14-gauge wires per station.

Standard Surge Protection — Heavy-duty surge protection included in all models.

RASTER (rapid station test routine) — Allows to detect short and open circuits between controller and station.

Cycle + Soak™ — Helps to avoid water puddles and run off.

Irrigation Control — Two (2) master valve terminals, one programmable by station.

Easy Programming — ODD day watering. EVEN day watering. Variable day cycle from one (1) to 99 days per program. Custom day-of-the-week by program.

Battery Programmable Controller — Allows for programming prior to installation.

Multiple Schedule Operation — As many programs as permitted by Rain Bird Central Control Systems or four (4) independent programs with eight (8) start times each in standalone mode.

The flexible ESC-1 can be ordered in the following configurations:

- ESC-1 standalone controller in a plastic pedestal.
- ESC-1 satellite with hardwired module in a plastic pedestal.

SPECIFICATIONS

Configurations: Standalone, two-wire

Electrical Input:
117 VAC ±10% (60 Hz)

Electrical Output: 26.5 VAC, 3 AMP

Station Load Capacity: Up to two (2) 24 VAC, seven (7) VA solenoids per station

Power Supply Overload: Backup fuse 3 AMP SLO-BLO

Battery Backup: 9 VDC, NiCad rechargeable

Water Budget: 0 to 300% in 1% increments

Rain Delay: Enables system to stay off for up to 99 days with auto-restart

Station Runtimes: 0 to 2 hours, in 1-minute increments; 2 to 12 hours in 10-minute increments

Compliance: UL & C-UL Listed, CE approved, G-Tick Compliant and FCC

Plastic Pedestal Dimensions:

Width: 17" (43.2 cm)

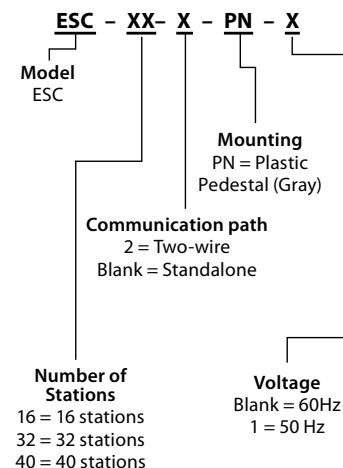
Height: 34 ¾" (88 cm)

Depth: 21" (53.4 cm)



● ESC-1

HOW TO SPECIFY



FD-101, FD-102, FD-202, FD-401 and FD-601 Decoders

A technology long-since proven on golf courses around the world, Rain Bird decoders provide best-in-class field control on centrally controlled irrigation systems. Installed underground and featuring simple, low-cost wiring, decoders are an aesthetically pleasing, full-featured, economical option for reliable in-field control.

FEATURES AND BENEFITS

- Improve aesthetics and reduce costs with buried in-field controls.
- Easy system expansion — simply splice into the communication line and add additional decoders.
- Installation requires up to 80 percent less wire than conventional controller systems.
- Electronic components are completely encapsulated to protect against the elements.
- Simple, two-wire system can be spliced and stored during installation.
- Underground decoders reduce the chance of damage from animals or vandals.
- Pre-coded addressing eliminates confusion associated with switch-based addressing.
- With the addition of Rain Bird's Decoder Programming Unit (DPU), decoder addresses can be reassigned if necessary.

Simple, Reliable Control

If you're looking for an alternative to a traditional in-field controller, Rain Bird decoders may be the right solution for you. These self-contained switching stations for your central control system are simple, yet very reliable. They work with your central control system just like conventional controllers but are buried underground away from the elements.

A Cost-Effective Alternative

A simple wiring configuration and absence of protective enclosures keeps installation and maintenance costs low. Rain Bird decoders are a "true lower than 30 volt" system that utilize a two-wire path of 14-gauge wire connecting the central control system, decoders and valves or valve-in-head sprinklers.

Sensor Capability

If you need information from analog, pulse or switch sensors to manage your irrigation, connect the sensor to the SD-210 sensor decoder and view the data at the central. Using Smart Sensor™, sensor data can even be used to control the irrigation.

Protect Against the Elements

With all electronic components fully sealed within a water-tight enclosure and buried underground, damage from floods, frost, rodents or vandals is virtually eliminated. Rain Bird decoders are an especially good choice for flood plains.

An Out-of-Sight Solution

Buried decoder systems leave nothing exposed to the elements. With no evidence of in-field control, this aesthetically pleasing alternative works perfectly in situations where controller enclosures are unwanted or impractical.

Excellent for Renovations

Thanks to advanced central control technology and simple wiring requirements, decoders are a smart choice for many golf course renovations. With Rain Bird's Cirrus™, Nimbus™ II and Stratus™ II Central Control Systems, it is now possible to use Rain Bird's hybrid feature to operate controllers, decoders and IC concurrently. This makes it easy to expand irrigation coverage using a minimal amount of wire and decoders.

In-Field Control Options

The addition of decoders doesn't mean the elimination of in-field control. Decoders can be turned on and off in the field with The FREEDOM System™ or MI series mobile controllers*. The MI series mobile controller allows precise control of the decoder system anywhere Internet access is available. Another alternative is The FREEDOM System™. This handheld radio remote allows you to signal changes to the central control system from anywhere on the course.

The Right Amount of Control

Select different decoders to operate one, two, four or six solenoids. Five different decoders let you choose the amount of control you need.



● Decoders

HOW TO SPECIFY

FD - XXX

Model Decoder Type

- 101 Single Address (1 solenoid)
- 102 Single Address (up to 2 solenoids)
- 202 Dual Address (up to 4 solenoids)
- 401 Four Addresses (up to 4 solenoids)
- 601 Six Addresses (up to 6 solenoids)

*Additional software required

Maximum Critical Path Lengths for Two-Wire Paths

Nominal Wire Size	ohms/1000' ohms/Km	Loop (Nominal Wire Size)		Star	
		Km	Miles	Km	Miles
2.5 mm ²	15.00 ohms/Km	12.0	7.5	3.0	1.8
14 AWG	2.58 ohms/1000'	15.2	9.6	3.8	2.4
12 AWG	1.62 ohms/1000'	24.4	15.2	6.1	3.8
10 AWG	1.02 ohms/1000'	39.2	24.4	9.8	6.1

Characteristic Table for Various Decoder Models

Decoder Model	Number of Addresses Per Decoder	Maximum Number of Solenoids Per Address	Maximum Addresses Operating at Once	Current Draw (mA at Rest per Decoder)
FD-101	1	1	1	0.5 mA
FD-102	1	2	1	0.5 mA
FD-202	2	2	2	1.0 mA
FD-401 ¹	4	1	4	1.0 mA
FD-601 ¹	6	1	4	1.0 mA

Design Criteria

Condition	Cirrus	Nimbus II	Stratus II	Stratus LT
Maximum resistance in critical path	33 ohms	33 ohms	33 ohms	33 ohms
Maximum number of addresses per wire path ²	250	250	250	200
Maximum number of addresses per LDI	500	500	500	300
Maximum number of addresses per SDI	200	200	200	200
Maximum number of active solenoids per wire path	20	20	20	15
Recommended Interface unit	LDI	LDI	LDI	SDI
Maximum number of active solenoids per recommended interface ³	40	40	40	15
Active solenoid current draw (mA)				
Golf Black Solenoid	20 mA	20 mA	20 mA	20 mA
Golf Green Coil	20 mA	20 mA	20 mA	20 mA
"B" (white wires)	25 mA	25 mA	25 mA	25 mA
"DV" (black wires)	15 mA	15 mA	15 mA	15 mA
Hybrid system max number of interfaces per system (LDI, SDI)	12	8	2	1

Basic Data

The Basic Data For A Decoder System Is As Follows:

500 maximum ⁴	Decoder addresses per LDI interface unit
200 maximum	Decoder addresses per SDI interface unit
40 maximum	Active solenoids per LDI (with 20 mA current draw each)
15 maximum	Active solenoids per SDI (with 20 mA current draw each)
20 maximum	Active solenoids per two-wire path on LDI (with 20 mA current draw each)
15 maximum	Active solenoids per two-wire path on SDI (with 20 mA draw current each)
9 Volts	Maximum allowable voltage drop per two-wire path
15 mA (total) ⁵	For LDI or SDI Lights
0.5 mA each	For each inactive FD-101 or FD-102 decoder
1.0 mA each	For each inactive FD-401, FD-202 or FD-601 decoder
15 mA each	For each active DV solenoid coil with black wires
20 mA each	For each active Golf (green) solenoid coil
25 mA each	For each active B solenoid coil with white wires
LSP-1 Installation	No more than 8 decoders between two LSP-1 surge arrestors or no more than 500 ft., whichever is less. LSP-1 ground grid resistance of 50 ohms or less is recommended.

Maximum Wire Lengths for Secondary Path Wire Runs

Wire Size	Meters	Feet
1.5 mm ²	100	328
2.0 mm ²	133	436
2.5 mm ²	166	545
16.0 AWG	88	289
14.0 AWG	139	456
12.0 AWG	220	720

¹Has LSP-1 surge protection built-in.

²A wire path is the leg coming off the LDI, SDI or LTB.

³The number of decoders on a large system with long wire runs may reduce the number of active decoders that you will be able to operate at one time before the interface maximum current draw is exceeded and the interface shuts down (disconnects from the field wiring).

⁴Although the LDI can handle a maximum of 500 decoder addresses total. With any number over 380, the number of active decoders you will be able to operate simultaneously may be reduced.

⁵Although the LDI and SDI can supply 1,000 mA and 500 mA respectively, allow 50 mA of safety factor (design 950 mA with a LDI and 450 mA with a SDI)

Controller Power Wire Sizing Worksheet

	PAR+ES	PAR+ES Link with Radio	PAR+ES SAT Decoder**	PAR+ES SAT Decoder Link with Radio**
Input (VAC)	117	117	117	117
Output (VAC)	26.5	26.5	26.5	26.5
Simultaneous Rain Bird Solenoids at 60 Hz (50Hz)				
Per Controller*	16 (12)	16 (12)	16 (12)	16 (12)
Per Station	4	4	2	2
AMP Draw at Rest***	0.15	0.17	0.235	0.250
1	0.22	0.24	0.250	0.265
2	0.30	0.32	0.258	0.273
3	0.37	0.40	0.264	0.281
4	0.45	0.47	0.272	0.289
5	0.52	0.54	0.280	0.297
6	0.60	0.62	0.288	0.305
7	0.67	0.70	0.296	0.313
8	0.75	0.77	0.304	0.321
9	0.82	0.84	0.312	0.329
10	0.90	0.92	0.320	0.337
11	0.97	0.99	0.328	0.345
12	1.05	1.07	0.336	0.353
13	1.12	1.14	0.344	0.361
14	1.20	1.22	0.352	0.369
15	1.27	1.29	0.360	0.377
16	1.35	1.37	0.368	0.385

Feature Comparison

	PAR+ES	PAR+ES Sat Decoder	ESC-1
# Stations	16 – 72 (Increments of 8)	Up to 72 decoder addresses	16, 24, 40
Communication Options	Standalone, Hardwire and Radio	Standalone, Hardwire and Radio	—
Central Control	All Rain Bird Centrals	All Rain Bird Centrals	—
Max Output at 60 Hz	5 Amp, 16 solenoids	5 Amp, 16 solenoids	3 Amp, 7 solenoids
# Programs	6 automatic, 2 manual	6 automatic, 2 manual	4 automatic
Program Start Times	12 per program	12 per program	8 per program
Programming Cycle	Weekday, Variable (up to 9)	Weekday, Variable (up to 9)	Even Day, Odd Day, Weekday, Variable (up to 31)
Water Adjust	0-200%, 10%	0-200%, 10%	0 - 300%, 1%
Surge Protection	Premium	Premium	Heavy-Duty
Max Station Run Times	2 Hours	2 Hours	12 Hours
Sensors	Yes	Yes	Yes
Master Valve	Yes	Yes	1 automatic and second set by station

*Includes Master Valve.

**Considering 72 decoders installed.

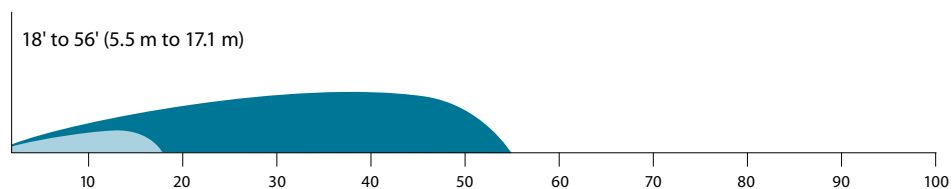
*** Total AMP Draw in chart is based on 117 VAC input. For 220/240 VAC input controllers, use 50% of amp draw shown in chart.

Gear-Driven Rotors

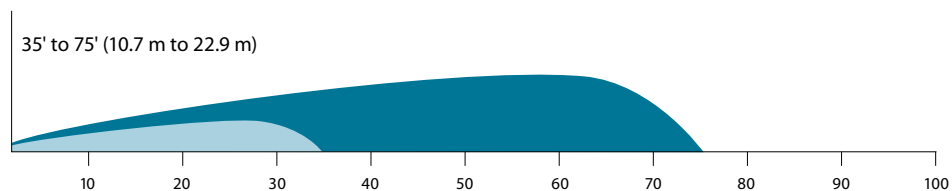
Rain Bird® Gear-Driven Rotors are engineered to efficiently manage water, while promoting a lush, highly profitable course, through minimal maintenance requirements, worry-free performance and maximum water distribution uniformity. Trusted by golf course professionals everywhere, particularly those in drought-prone areas, these innovative rotors deliver optimal playing surfaces, high durability and reduced water costs.



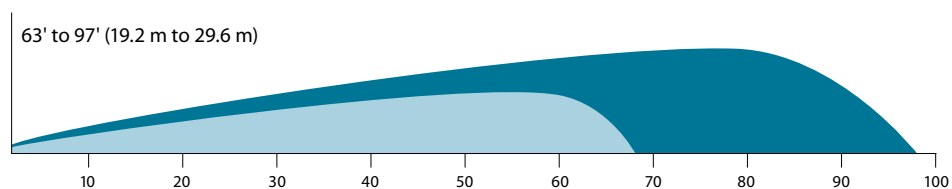
351B Series
Short Throw (pg 40)



700/751 Series (pg 32–35)



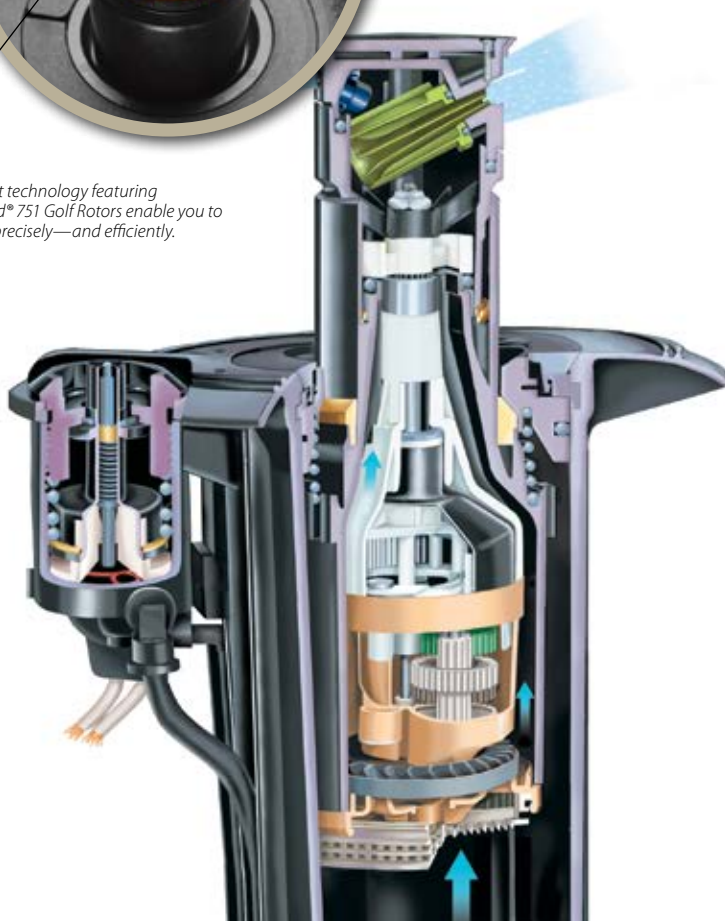
900/950 Series (pg 38–39)





Get more from every rotor with Rapid-Adjust Technology featuring MemoryArc®. Available on Rain Bird® 751 Golf Rotors, this innovative feature allows you to easily adjust watering on greens, fairways or roughs for unmatched versatility and more precise watering.

Thanks to rapid-adjust technology featuring MemoryArc®, Rain Bird® 751 Golf Rotors enable you to water your turf more precisely—and efficiently.



FEATURES AND BENEFITS

Turn-of-a-Screw Flexibility: Rain Bird 751 golf rotors offer easy, top-adjustable rotation settings that retain the memory of their part-circle arc setting when shifting between full- and part-circle operation. This unique feature is designed to offer quick, dry arc adjustments not just during grow-in, but for the life of the rotor.

Proven Rain Bird Performance: The Rain Bird 700/751 series features the high efficiency nozzles you've come to expect from the industry leader and delivers the best performance yet from Rain Bird golf rotors. With large droplets that cut through harsh winds and consistent pressure regulation, Rain Bird rotors deliver the even distribution you need to guarantee a healthy playing surface.

Industry-Leading Durability: Rain Bird 700/751 series golf rotors deliver improved durability. Trust their rugged construction for year after year of reliable, hassle-free performance.

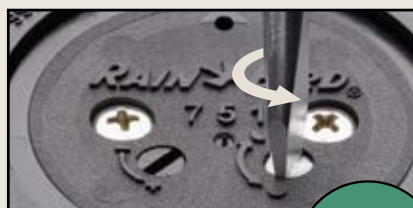
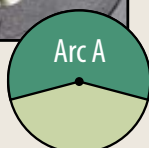
Backward Compatibility: Rain Bird 700/751 series golf rotors offer backward compatibility with every 700 series EAGLE™ Rotor manufactured since 1992. Saving precious time and money is as simple as dropping new Rain Bird 700/751 Series internal assemblies into your existing rotor cases.

Low Cost of Ownership: Rain Bird golf rotors offer a low cost of ownership through a powerful combination of versatility, performance and durability. Install 700 and 751 golf rotors to optimize water consumption, simplify operation and minimize replacement, maintenance and inventory costs.

Rapid-Adjust Technology featuring Memory Arc®



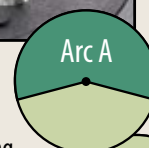
Set primary rotor arc.



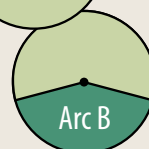
Turn the Full/Part Adjustment Screw for full-circle operation.



Turn to part circle again for either Arc A or Arc B setting.



or



No need to adjust arc when going between full- and part-circle settings.

Versatility with a twist. Easily shift between three arc settings to selectively water fairways, roughs—or both.

Rain Bird® 700/751 Series

SPECIFICATIONS

Radius:

Rain Bird® 700 Series: 56' to 79' (17.1 m to 24.1 m)

Rain Bird® 751 Series: 35' to 75' (10.7 m to 22.9 m)

Flow Rate:

700 Series: 16.3 to 43.9 gpm (1.03 to 2.76 l/s)
(3.70 to 9.95 m³/h)

751 Series: 7.0 to 37.7 gpm (0.44 to 2.38 l/s)
(1.59 to 8.56 m³/h)

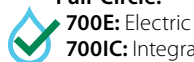
Arc:

700 Series: Full-circle 360°

751 Series: Full-circle 360°; Adjustable 30° to 345°

Models:

Full-Circle:



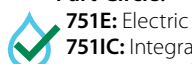
700E: Electric

700IC: Integrated Control

700S/H: Combined use Stopamatic (SAM)
or Hydraulic (N.O.)*

700B: Seal-A-Matic™ device

Part-Circle:



751E: Electric

751IC: Integrated Control

751S/H: Combined use Stopamatic (SAM)
or Hydraulic (N.O.)*

751B: Seal-A-Matic™ device

Maximum Inlet Pressure:

Models 700/751E and IC: 150 psi (10.3 bars)

Models 700/751S/H and B: 100 psi (6.9 bars)

Pressure Regulation Range: 60 to 100 psi
(4.1 to 6.9 bars)

Factory Pressure Settings: 700E/IC and 751E/IC
available in 70 and 80 psi (4.8 and 5.5 bars)

Inlet Threads:

Models E, IC, S/H: 1.25" (3.2 cm) ACME
Female Threaded

Models B: 1" (2.5 cm) ACME Female Threaded

Dimensions:

Body Height:

Models E, IC, S/H: 12.0" (30.5 cm)

Models B: 9.6" (24.5 cm)

Pop-Up Height to Mid-Nozzle:

Models E, IC, S/H, B: 2.6" (6.6 cm)

Top Diameter:

Models E, IC, S/H: 6.25" (15.9 cm)

Models B: 4.25" (10.8 cm)

Rotation Time:

700 Series: 360° in ≤ 180 seconds;

150 seconds nominally

751 Series: 180° in ≤ 90 seconds;

75 seconds nominally

Holdback:

Block: 10' (3.1 m) of elevation

SAM/Hydraulic: 15' (4.6 m) of elevation

Nozzle Trajectory:

Standard: 25°

Wind Tolerant: 12°

Low-Angle: 17°

Maximum Stream Height:

Standard: 17' (5.2 m)

Wind Tolerant: 10' (3.1 m)

Solenoid: 24 VAC solenoid power requirement:

0.41 amp inrush current (9.8 VA);

60 cycle: 0.25 amp holding current (6.0 VA);

50 cycle: 0.32 amp holding current (7.7 VA)

Surge Resistance: Up to 25kV standard on
electric models

Top-Serviceable Rock Screen™ and Replaceable Valve

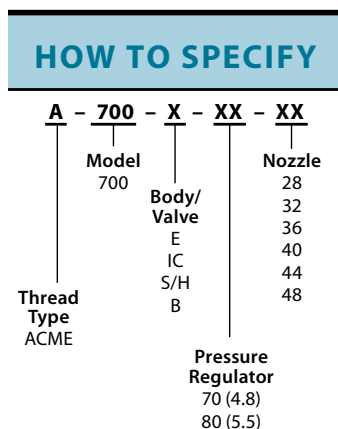
Seat: On models 700E,

IC, S/H and 751E, IC, S/H

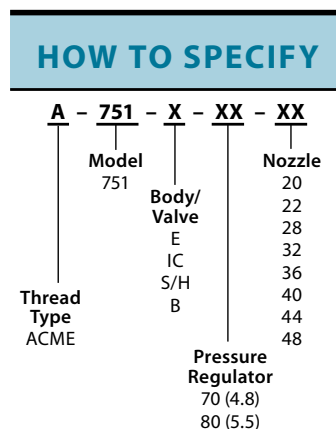
* N.O. — Normally open



● 700 Series



● 751 Series



Dual Spreader™ Nozzles Performance Data: 700 Series

U.S. Data

Base Pressure (psi)	50		60		70		80		90		100	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
#28 - White	57	18.0	59	19.7	59	21.3	61	22.8	61	24.1	61	25.5
#32 - Blue	61	21.9	63	22.8	65	24.5	65	27.4	67	29	67	29.6
#36 - Yellow	65	23.2	65	25.5	65	27.5	67	29.5	65	31.2	67	32.9
#40 - Orange	65	25.5	67	27.8	71	29.8	71	31.9	73	33.9	73	35.6
#44 - Green	—	—	71	30.7	69	33.0	71	35.2	75	37.5	75	39.5
#48 - Black	—	—	—	—	73	37.0	77	39.4	79	41.8	77	43.8

Metric Data

Base Pressure (bars)	3.4			4.1			4.8			5.5			6.2			6.9		
	Radius (m)	Flow (l/s)	Flow (m3/h)	Radius (m)	Flow (l/s)	Flow (m3/h)	Radius (m)	Flow (l/s)	Flow (m3/h)	Radius (m)	Flow (l/s)	Flow (m3/h)	Radius (m)	Flow (l/s)	Flow (m3/h)	Radius (m)	Flow (l/s)	Flow (m3/h)
#28 - White	17.4	1.14	4.09	18.0	1.24	4.47	18.0	1.34	4.84	18.6	1.44	5.18	18.6	1.52	5.47	18.6	1.61	5.79
#32 - Blue	18.6	1.38	4.97	19.2	1.44	5.18	19.8	1.55	5.56	19.8	1.73	6.22	20.4	1.83	6.59	20.4	1.87	6.72
#36 - Yellow	19.8	1.46	5.27	19.8	1.61	5.79	19.8	1.73	6.25	20.4	1.86	6.70	19.8	1.97	7.09	20.4	2.08	7.47
#40 - Orange	19.8	1.61	5.79	20.4	1.75	6.31	21.6	1.88	6.77	21.6	2.01	7.25	22.3	2.14	7.70	22.3	2.25	8.09
#44 - Green	—	—	—	21.6	1.94	6.97	21.0	2.08	7.49	21.6	2.22	7.99	22.9	2.37	8.52	22.9	2.49	8.97
#48 - Black	—	—	—	—	—	—	22.3	2.33	8.40	23.5	2.49	8.95	24.1	2.64	9.49	23.5	2.76	9.95

Dual Spreader™ Nozzles Performance Data: 751 Series

U.S. Data

Base Pressure (psi)	50		60		70		80		90		100	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
#20 - Gray	37	7.0	39	7.8	39	8.4	41	8.9	—	—	—	—
#22 - Red	40	8.3	45	9.5	45	10.2	43	10.8	—	—	—	—
#28 - White	55	15.2	57	16.8	59	18.1	59	19.3	59	20.5	57	21.5
#32 - Blue	59	17.1	61	18.6	61	20	61	21.4	63	22.5	63	23.9
#36 - Yellow	61	19.1	63	20.8	65	22.6	67	24	69	25.5	69	26.5
#40 - Orange	63	21.7	67	23.8	69	25.6	71	27.5	71	28.9	71	30.7
#44 - Green	—	—	65	26.3	69	28.3	71	30.4	71	32.1	73	34.1
#48 - Black	—	—	—	—	69	31.4	73	33.7	75	35.7	73	37.7

Metric Data

Base Pressure (bars)	3.4			4.1			4.8			5.5			6.2			6.9		
	Radius (m)	Flow (l/s)	Flow (m3/h)	Radius (m)	Flow (l/s)	Flow (m3/h)	Radius (m)	Flow (l/s)	Flow (m3/h)	Radius (m)	Flow (l/s)	Flow (m3/h)	Radius (m)	Flow (l/s)	Flow (m3/h)	Radius (m)	Flow (l/s)	Flow (m3/h)
#20 - Gray	11.3	0.40	1.6	11.8	0.49	1.77	11.9	0.53	1.91	12.5	0.56	2.02	—	—	—	—	—	—
#22 - Red	12.2	0.52	1.89	13.7	0.60	2.16	13.7	0.64	2.32	13.1	0.68	2.45	—	—	—	—	—	—
#28 - White	16.8	0.96	3.45	17.4	1.06	3.82	18.0	1.14	4.11	18.0	1.22	4.38	18.0	1.29	4.66	17.4	1.36	4.88
#32 - Blue	18.0	1.08	3.88	18.6	1.17	4.22	18.6	1.26	4.54	18.6	1.35	4.86	19.2	1.42	5.11	19.2	1.51	5.43
#36 - Yellow	18.6	1.21	4.34	19.2	1.31	4.72	19.8	1.43	5.13	20.4	1.51	5.45	21.0	1.61	5.79	21.0	1.67	6.02
#40 - Orange	19.2	1.37	4.93	20.4	1.50	5.41	21.0	1.62	5.81	21.0	1.73	6.25	21.6	1.82	6.56	21.6	1.94	6.97
#44 - Green	—	—	—	19.8	1.66	5.97	21.0	1.79	6.43	21.6	1.92	6.90	21.6	2.03	7.29	22.3	2.15	7.74
#48 - Black	—	—	—	—	—	—	21.0	1.98	7.13	22.3	2.13	7.65	22.9	2.25	8.11	22.3	2.38	8.56

All data is generated from tests conducted in accordance with ASAE Standard S398.1 for at least 30 minutes in zero-wind conditions. Rain Bird recommends the use of SPACE for Windows® equivalent program or derived performance data to optimize nozzle selection.

Wind Tolerant Nozzles Performance Data: 700 Series

U.S. Data

Base Pressure (psi)	50		60		70		80		90		100	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
#16WTN - Gray	—	—	56	16.3	56	17.5	60	18.5	62	20.2	63	21.1
#18WTN - Red	—	—	58	19.0	61	20.9	65	22.3	65	23.2	65	24.2
#22WTN - Black	—	—	—	—	65	27.6	65	34.8	67	38.8	71	40.5

Metric Data

Base Pressure (bars)	3.4			4.1			4.8			5.5			6.2			6.9		
	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)
#16WTN - Gray	—	—	—	17.1	1.03	3.70	17.1	1.10	3.97	18.3	1.17	4.20	18.9	1.27	4.59	19.2	1.33	4.79
#18WTN - Red	—	—	—	17.7	1.20	4.32	18.6	1.32	4.75	19.8	1.41	5.06	19.8	1.46	5.27	19.8	1.53	5.50
#22WTN - Black	—	—	—	—	—	—	19.8	1.74	6.27	19.8	2.20	7.90	20.4	2.45	8.81	21.6	2.56	9.20

Wind Tolerant Nozzles Performance Data: 751 Series

U.S. Data

Base Pressure (psi)	50		60		70		80		90		100	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
#16WTN - Gray	—	—	60	15.7	62	16.7	62	17.8	64	18.8	66	20.4
#18WTN - Red	—	—	63	18.8	63	20.0	65	21.4	67	22.7	67	24.0
#22WTN - Black	—	—	—	—	65	27.6	65	35.8	67	37.6	71	41.1

Metric Data

Base Pressure (bars)	3.4			4.1			4.8			5.5			6.2			6.9		
	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)
#16WTN - Gray	—	—	—	18.3	0.99	3.57	18.9	1.05	3.79	18.9	1.12	4.04	19.5	1.19	4.27	20.1	1.29	4.63
#18WTN - Red	—	—	—	19.2	1.19	4.27	19.2	1.26	4.54	19.8	1.35	4.86	20.4	1.43	5.16	20.4	1.51	5.45
#22WTN - Black	—	—	—	—	—	—	19.8	1.74	6.27	19.8	2.26	8.13	20.4	2.37	8.54	21.6	2.59	9.33

Low-Angle Nozzles Performance Data: 700 Series

U.S. Data

Base Pressure (psi)	50		60		70		80		90		100	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
#32LA - Gray	57	19.5	59	21.6	61	23.5	63	25.5	65	27.4	67	29.1
#36LA - Red	—	—	61	24.2	63	26.3	65	28.4	67	30.9	67	33.1
#44LA - Brown	—	—	—	—	67	34.5	69	36.4	71	38.9	71	41.7

Metric Data

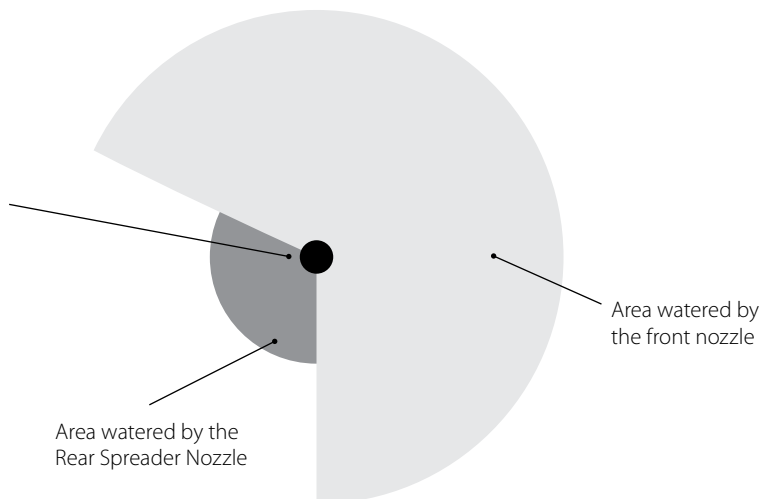
Base Pressure (bars)	3.5			4.0			4.5			5.0			5.5			6.0			6.5			6.9		
	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)
#32LA Gray	17.4	1.23	4.43	17.9	1.34	4.81	18.3	1.43	5.13	18.7	1.51	5.45	19.2	1.61	5.78	19.6	1.69	6.09	20.1	1.77	6.39	20.4	1.84	6.61
#36LA Red	—	—	—	18.4	1.49	5.38	18.9	1.60	5.75	19.4	1.69	6.09	19.8	1.79	6.44	20.2	1.90	6.85	20.4	2.01	7.23	20.4	2.09	7.52
#44LA Brown	—	—	—	—	—	—	19.8	2.09	7.53	20.6	2.21	7.94	21.0	2.29	8.26	21.5	2.41	8.67	21.6	2.53	9.11	21.6	2.63	9.47

Rear Spreader Nozzle

Typical Installation:

Watering area behind the Rain Bird 751

Rain Bird 751 with
Rear Spreader Nozzle



751 Series Performance Data With Rear Spreader Nozzles

U.S. Data — Base Pressure (psi)

Spreader Nozzle Color	60			70			80			60			70			80		
	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)
MAIN NOZZLE #28 – WHITE										MAIN NOZZLE #32 – BLUE								
Orange	20.00	55.00	25.00	21.40	55.00	23.00	22.80	55.00	23.00	22.10	61.00	29.00	23.40	61.00	29.00	25.20	61.00	29.00
Green	22.90	51.00	47.00	24.00	53.00	45.00	25.60	51.00	47.00	24.60	57.00	47.00	26.60	59.00	45.00	28.40	59.00	45.00
Blue	22.63	50.98	44.98	24.39	50.98	44.98	25.27	52.99	44.98	24.57	58.99	42.98	26.55	58.99	44.98	28.27	60.99	44.98
Black	21.13	52.99	36.98	23.12	52.99	38.98	24.39	50.98	38.98	23.20	58.99	36.98	24.79	56.99	36.98	26.64	58.99	38.98
Red	21.90	53.00	49.00	23.60	55.00	49.00	25.10	55.00	47.00	24.10	55.00	49.00	25.00	57.00	47.00	26.50	57.00	47.00
Blue w/Diffuser	20.90	57.00	33.00	21.50	55.00	33.00	22.90	55.00	33.00	23.20	61.00	31.00	24.90	61.00	31.00	26.30	61.00	31.00
Black w/Diffuser	19.20	54.99	30.97	29.28	56.99	30.97	21.84	54.99	30.97	20.96	56.99	32.97	22.63	56.99	32.97	24.08	56.99	32.97
MAIN NOZZLE #36 – YELLOW										MAIN NOZZLE #40 – ORANGE								
Orange	23.40	61.00	29.00	25.40	63.00	29.00	27.10	63.00	27.00	27.70	69.00	29.00	29.60	69.00	29.00	31.60	71.00	29.00
Green	26.90	61.00	43.00	29.10	61.00	45.00	30.50	63.00	45.00	30.20	63.00	47.00	32.40	65.00	49.00	34.50	69.00	51.00
Blue	25.93	58.99	40.98	28.00	60.99	38.98	29.76	60.99	38.98	29.68	62.99	40.98	32.10	64.99	40.98	34.25	66.99	40.98
Black	26.42	60.99	36.98	27.78	60.99	34.97	29.54	60.99	36.98	28.97	60.99	36.98	31.22	62.99	36.98	34.20	62.99	36.98
Red	26.10	61.00	45.00	28.20	61.00	43.00	30.20	61.00	43.00	30.40	63.00	47.00	32.80	67.00	45.00	34.70	67.00	45.00
Blue w/Diffuser	24.60	63.00	35.00	26.30	63.00	31.00	27.90	65.00	33.00	28.00	63.00	31.00	30.30	67.00	31.00	32.10	69.00	31.00
Black w/Diffuser	24.48	64.99	34.97	25.67	64.99	34.97	27.12	64.99	34.97	27.21	62.99	30.97	29.46	64.99	30.97	31.30	66.99	30.97
MAIN NOZZLE #44 – GREEN										MAIN NOZZLE #48 – BLACK								
Spreader Nozzle Color	60			70			80			60			70			80		
	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)
Orange	29.30	65.00	27.00	31.70	69.00	27.00	33.70	71.00	27.00	33.70	71.00	27.00	33.70	71.00	27.00	33.70	71.00	27.00
Green	32.80	65.00	47.00	35.40	67.00	43.00	37.80	69.00	43.00	37.80	69.00	43.00	37.80	69.00	43.00	37.80	69.00	43.00
Blue	32.27	64.99	38.98	35.00	66.99	38.98	37.16	69.00	38.98	37.16	69.00	38.98	37.16	69.00	38.98	37.16	69.00	38.98
Black	31.79	64.99	34.97	34.25	66.99	34.97	36.50	71.00	32.97	36.50	71.00	32.97	36.50	71.00	32.97	36.50	71.00	32.97
Red	32.30	65.00	45.00	34.90	67.00	45.00	37.10	67.00	33.00	37.10	67.00	33.00	37.10	67.00	33.00	37.10	67.00	33.00
Blue w/Diffuser	30.90	67.00	33.00	33.20	73.00	31.00	35.50	73.00	33.00	35.50	73.00	33.00	35.50	73.00	33.00	35.50	73.00	33.00
Black w/Diffuser	29.06	64.99	32.97	31.22	69.00	28.97	33.37	71.00	30.97	33.37	71.00	30.97	33.37	71.00	30.97	33.37	71.00	30.97
MAIN NOZZLE #48 – BLACK										MAIN NOZZLE #48 – BLACK								
Spreader Nozzle Color	70			80			90			70			80			90		
	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)	Flow (gpm)	Main Nozzle Range (ft)	Rear Spreader Range (ft)
Orange	35.00	73.00	29.00	37.60	75.00	29.00	39.70	79.00	29.00	35.00	73.00	29.00	37.60	75.00	29.00	39.70	79.00	29.00
Green	38.30	71.00	45.00	40.70	77.00	45.00	42.80	77.00	47.00	38.30	73.00	45.00	40.70	77.00	45.00	42.80	77.00	47.00
Blue	37.47	71.00	40.98	39.49	75.00	38.98	42.27	75.00	38.98	37.47	71.00	40.98	39.49	75.00	38.98	42.27	75.00	38.98
Black	37.47	75.00	36.98	40.11	77.00	34.97	42.14	78.97	36.98	37.47	75.00	36.98	40.11	77.00	34.97	42.14	78.97	36.98
Red	37.80	73.00	47.00	40.40	73.00	47.00	42.80	77.00	47.00	37.80	73.00	47.00	40.40	73.00	47.00	42.80	77.00	47.00
Blue w/Diffuser	36.00	77.00	31.00	38.30	77.00	31.00	40.60	77.00	31.00	36.00	77.00	31.00	38.30	77.00	31.00	40.60	77.00	31.00
Black w/Diffuser	35.22	73.00	30.97	37.25	73.00	30.97	39.14	77.00	30.97	35.22	73.00	30.97	37.25	73.00	30.97	39.14	77.00	30.97

751 Series Performance Data With Rear Spreader Nozzles

Metric Data — Base Pressure (bars)

Spreader Nozzle Color	4.1			4.8			5.5			4.1			4.8			5.5		
	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Tail Nozzle Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)
	MAIN NOZZLE #28 – WHITE									MAIN NOZZLE #32 – BLUE								
Orange	4.54	16.76	7.62	4.86	16.76	7.01	5.18	16.76	7.01	5.02	18.59	8.84	5.31	18.59	8.84	5.72	18.59	8.84
Green	5.20	15.54	14.33	5.45	16.15	13.72	5.81	15.54	14.33	5.59	17.37	14.33	6.04	17.98	13.72	6.45	17.98	13.72
Blue	5.14	15.54	13.71	5.54	15.54	13.71	5.74	16.15	13.71	5.58	17.98	13.10	6.03	17.98	13.71	6.42	18.59	13.71
Black	4.80	16.15	11.27	5.25	16.15	11.88	5.54	15.54	11.88	5.27	17.98	11.27	5.63	17.37	11.27	6.05	17.98	11.88
Red	4.97	16.15	14.94	5.36	16.76	14.94	5.70	16.76	14.33	5.47	16.76	14.94	5.68	17.37	14.33	6.02	17.37	14.33
Blue w/Diffuser	4.75	17.37	10.06	4.88	16.76	10.06	5.20	16.76	10.06	5.27	18.59	9.45	5.66	18.59	9.45	5.97	18.59	9.45
Black w/Diffuser	4.36	16.76	9.44	6.65	17.37	9.44	4.96	16.76	9.44	4.76	17.37	10.05	5.14	17.37	10.05	5.47	17.37	10.05
	MAIN NOZZLE #36 – YELLOW									MAIN NOZZLE #40 – ORANGE								
Orange	5.31	18.59	8.84	5.77	19.2	8.84	6.16	19.2	8.23	6.29	21.03	8.84	6.72	21.03	8.84	7.18	21.64	8.84
Green	6.11	18.59	13.11	6.61	18.59	13.72	6.93	19.2	13.72	6.86	19.2	14.33	7.36	19.81	14.94	7.84	21.03	15.54
Blue	5.89	17.98	12.49	6.36	18.59	11.88	6.76	18.59	11.88	6.74	19.20	12.49	7.29	19.81	12.49	7.78	20.42	12.49
Black	6.00	18.59	11.27	6.31	18.59	10.66	6.71	18.59	11.27	6.58	18.59	11.27	7.09	19.20	11.27	7.77	19.20	11.27
Red	5.93	18.59	13.72	6.40	18.59	13.11	6.86	18.59	13.11	6.90	19.20	14.33	7.45	20.42	13.72	7.88	20.42	13.72
Blue w/Diffuser	5.59	19.20	10.67	5.97	19.20	9.45	6.34	19.81	10.06	6.36	19.20	9.45	6.88	20.42	9.45	7.29	21.03	9.45
Black w/Diffuser	5.56	19.81	10.66	5.83	19.81	10.66	6.16	19.81	10.66	6.18	19.20	9.44	6.69	19.81	9.44	7.11	20.42	9.44
MAIN NOZZLE #44 – GREEN																		
Spreader Nozzle Color	4.1			4.8			5.5			4.1			4.8			5.5		
	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Tail Nozzle Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)
Orange	6.65	19.81	8.23	7.20	21.03	8.23	7.65	21.64	8.23	7.65	21.64		7.65	21.64	8.23	7.65	21.64	8.23
Green	7.45	19.81	14.33	8.04	20.42	13.11	8.59	21.03	13.11	8.59	21.03		8.59	21.03	13.11	8.59	21.03	13.11
Blue	7.33	19.81	11.88	7.95	20.42	11.88	8.44	21.03	11.88	8.44	21.03		8.44	21.03	11.88	8.44	21.03	11.88
Black	7.22	19.81	10.66	7.78	20.42	10.66	8.29	21.64	10.66	8.29	21.64		8.29	21.64	10.66	8.29	21.64	10.66
Red	7.34	19.81	13.72	7.93	20.42	13.72	8.43	20.42	13.72	8.43	20.42		8.43	20.42	13.72	8.43	20.42	13.72
Blue w/Diffuser	7.02	20.42	10.06	7.54	22.25	9.45	8.06	22.25	9.45	8.06	22.25		8.06	22.25	9.45	8.06	22.25	9.45
Black w/Diffuser	6.60	19.81	10.05	7.09	21.03	8.83	7.58	21.64	9.44	7.58	21.64		7.58	21.64	9.44	7.58	21.64	9.44
MAIN NOZZLE #48 – BLACK																		
Spreader Nozzle Color	4.8			5.5			6.2			4.8			5.5			6.2		
	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Tail Nozzle Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)	Flow (m³/h)	Main Nozzle Range (m)	Rear Spreader Range (m)
Orange	7.95	22.25	8.84	8.54	22.86	8.84	9.02	24.08	8.84	9.02	24.08		9.02	24.08	8.84	9.02	24.08	8.84
Green	8.70	21.64	13.72	9.24	23.47	13.72	9.72	23.47	14.33	9.72	23.47		9.72	23.47	14.33	9.72	23.47	14.33
Blue	8.51	21.64	12.49	8.97	22.86	11.88	9.60	22.86	11.88	9.60	22.86		9.60	22.86	11.88	9.60	22.86	11.88
Black	8.51	22.86	11.27	9.11	23.47	10.66	9.57	24.07	11.27	9.57	24.07		9.57	24.07	11.27	9.57	24.07	11.27
Red	8.59	22.25	14.33	9.18	22.25	14.33	9.72	23.47	14.33	9.72	23.47		9.72	23.47	14.33	9.72	23.47	14.33
Blue w/Diffuser	8.18	23.47	9.45	8.70	23.47	9.45	9.22	23.47	9.45	9.22	23.47		9.22	23.47	9.45	9.22	23.47	9.45
Black w/Diffuser	8.00	22.25	9.44	8.46	22.25	9.44	8.89	23.47	9.44	8.89	23.47		8.89	23.47	9.44	8.89	23.47	9.44

All data is generated from tests conducted in accordance with ASAE Standard S398.1 for at least 30 minutes in zero-wind conditions. Rain Bird recommends the use of SPACE for Windows® equivalent program or derived performance data to optimize nozzle selection.

EAGLE™ 900 Series

SPECIFICATIONS

Radius: 63' to 97' (19.2 m to 29.6 m)


Flow Rate: 21.4 to 57.1 gpm
(1.35 to 3.60 l/s) (4.85 to 12.97 m³/h)

Arc: Full-circle, 360°

Models:

Full-Circle:

EAGLE 900E: Electric

 **EAGLE 900 IC:** Integrated Control

EAGLE 900S/H: Combined use Stopmatic (SAM) or Hydraulic (N.O.)*

Maximum Inlet Pressure:

Models 900E/IC: 150 psi (10.3 bars)

Models 900S/H: 100 psi (6.9 bars)

Pressure Regulation Range:

60 to 100 psi (4.1 to 6.9 bars)

Factory Pressure Settings:

900E/IC and 950E/IC available in 70 and 80 psi
(4.8 and 5.5 bars)

Dimensions:

Body Height: 13.4" (34.0 cm)

Pop-Up Height to Mid-Nozzle: 2.25" (5.7 cm)

Top Diameter: 7" (17.8 cm)

Nozzle Trajectory: 25°

Inlet Threads: 1.5" (3.8 cm) (15/21) ACME
Female Threaded

Holdback: SAM/Hydraulic 15' (4.6 m) elevation

Rotation Time: 360° in ≤ 240 seconds;
210 seconds nominally

Maximum Stream Height: 20' (6.1 m)

Solenoid: 24 VAC solenoid power requirement:

0.41 amp inrush current (9.8 VA);

60 cycle: 0.25 amp holding current (6.0 VA);

50 cycle: 0.32 amp holding current (7.7 VA).

Surge Resistance: Up to 25kV standard on electric models

Top-Serviceable Rock Screen™ and Replaceable

Valve Seat: All 900 and 950 models

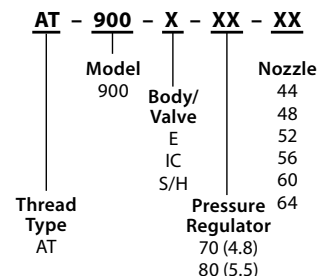
All data is generated from tests conducted in accordance with ASAE Standard S398.1 for at least 30 minutes in zero-wind conditions. Rain Bird recommends the use of SPACE for Windows® equivalent program or derived performance data to optimize nozzle selection.

* N.O. — Normally open



● EAGLE™ 900 Series

HOW TO SPECIFY



EAGLE 900 Series Performance Data

High Performance Nozzles U.S. Data

Base Pressure (psi)	#44 Blue		#48 Yellow		#52 Orange		#56 Green		#60 Black		#64 Red	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
60	63	21.4	73	28.9	75	31.9	—	—	—	—	—	—
70	67	23.5	73	31.9	79	34.6	83	40.7	87	43.2	91	47.2
80	71	24.7	75	34.1	81	37.1	85	43.5	91	46.4	93	51.0
90	71	26.5	77	35.0	81	39.5	87	46.4	91	49.5	95	54.0
100	73	27.9	77	36.2	83	41.8	89	49.1	91	52.2	97	57.1

High Performance Nozzles Metric Data

Base Pressure (bars)	#44 Blue			#48 Yellow			#52 Orange			#56 Green			#60 Black			#64 Red		
	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)
4.1	19.2	1.35	4.85	22.3	1.82	6.56	22.9	2.01	7.25	—	—	—	—	—	—	—	—	—
4.5	19.8	1.42	5.11	22.3	1.89	6.81	23.5	2.10	7.57	25.0	2.48	8.94	26.2	2.63	9.47	27.4	2.88	10.35
5.0	20.7	1.50	5.40	22.4	2.00	7.22	24.2	2.22	8.00	25.5	2.61	9.40	26.8	2.78	10.00	27.9	3.04	10.94
5.5	21.6	1.55	5.59	22.8	2.14	7.72	24.7	2.34	8.41	25.9	2.74	9.87	27.7	2.92	10.52	28.3	3.21	11.56
6.0	21.6	1.64	5.90	23.3	2.19	7.88	24.7	2.45	8.81	26.3	2.87	10.34	27.7	3.20	11.86	28.8	3.35	12.06
6.5	21.9	1.71	6.16	23.5	2.24	8.06	24.9	2.55	9.19	26.8	3.00	10.80	27.7	3.20	11.86	29.2	3.49	12.57
6.9	22.3	1.76	6.35	23.5	2.28	8.22	25.3	2.64	9.49	27.1	3.10	11.15	27.7	3.29	11.86	29.6	3.60	12.97

EAGLE™ 950 Series

SPECIFICATIONS

Radius: 70' to 92' (21.3 m to 28.0 m)


Flow Rate: 19.5 to 59.4 gpm
(1.23 to 3.75 l/s) (4.43 to 13.49 m³)


Arc: 40° to 345°

Models:

Part-Circle:

EAGLE 950E: Electric

 **EAGLE 950 IC:** Integrated Control

 **EAGLE 950S/H:** Combined use Stopamatic (SAM) or Hydraulic (N.O.)*

Maximum Inlet Pressure:

Models 950E/IC: 150 psi (10.3 bars)

Models 950S/H: 100 psi (6.9 bars)

Pressure Regulation Range:

60 to 100 psi (4.1 to 6.9 bars)

Factory Pressure Settings:

900E/IC and 950E/IC available in 70 and 80 psi
(4.8 and 5.5 bars)

Dimensions:

Body Height: 13.4" (34.0 cm)

Pop-Up Height to Mid-Nozzle: 2.25" (5.7 cm)

Top Diameter: 7" (17.8 cm)

Nozzle Trajectory: 25°

Inlet Threads: 1.5" (3.8 cm) (15/21) ACME

Female Threaded

Holdback: SAM/Hydraulic 15' (4.6 m) elevation

Rotation Time: 180° in ≤ 120 seconds;
105 seconds nominally

Maximum Stream Height: 20' (6.1 m)

Solenoid: 24 VAC solenoid power requirement:
0.41 amp inrush current (9.8 VA); **60 cycle:** 0.25 amp
holding current (6.0 VA); **50 cycle:** 0.32 amp holding
current (7.7 VA).

Surge Resistance: Up to 25kV standard on
electric models

Top-Serviceable Rock Screen™ and Replaceable

Valve Seat: All 900 and 950 models

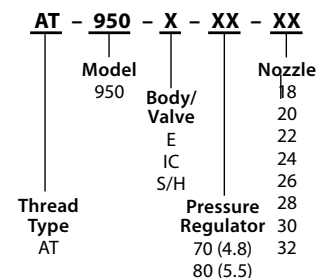
*All data is generated from tests conducted in accordance with ASAE
Standard S398.1 for at least 30 minutes in zero-wind conditions. Rain
Bird recommends the use of SPACE for Windows® equivalent program
or derived performance data to optimize nozzle selection.*

* N.O. — Normally open



● EAGLE™ 950 Series

HOW TO SPECIFY



EAGLE 950 Series Performance Data

Nozzles U.S. Data

Base Pressure (psi)	#18 White-C		#20 Gray-C		#22 Blue-C		#24 Yellow-C		#26 Orange		#28 Green		#30 Black		#32 Brown	
	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
60	70	19.5	72	23.0	74	26.5	76	30.8	78	36.0	—	—	—	—	—	—
70	72	21.3	74	25.1	76	28.8	80	33.5	82	38.7	84	42.9	84	47.3	84	50.4
80	74	22.9	76	27.0	80	30.9	84	36.0	84	41.5	86	47.3	86	50.4	85	53.1
90	75	24.4	78	28.7	82	32.9	88	38.4	86	43.4	89	48.5	90	52.9	88	55.6
100	76	25.8	80	30.5	84	34.6	90	40.5	88	46.7	91	52.2	92	55.8	92	59.4

Nozzles Metric Data

Base Pressure (bars)	#18 White-C			#20 Gray-C			#22 Blue-C			#24 Yellow-C			#26 Orange			#28 Green			#30 Black			#32 Brown		
	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)	Radius (m)	Flow (l/s)	Flow (m³/h)
4.1	21.3	1.23	4.43	21.9	1.45	5.22	22.6	1.67	6.02	23.2	1.94	7.00	23.8	2.27	8.18	—	—	—	—	—	—	—	—	—
4.5	21.7	1.29	4.64	22.3	1.52	5.48	22.9	1.75	6.29	23.8	2.03	7.32	24.4	2.36	8.50	25.2	2.62	9.44	25.2	2.90	—	25.3	3.10	11.17
5.0	22.1	1.37	4.93	22.7	1.61	5.81	23.5	1.85	6.66	24.7	2.15	7.75	25.1	2.49	8.95	25.8	2.78	10.00	25.8	3.03	10.92	25.7	3.22	11.60
5.5	22.5	1.44	5.19	23.2	1.70	6.12	24.4	1.95	7.01	25.6	2.27	8.16	25.6	2.61	9.41	26.2	2.98	10.72	26.2	3.18	11.43	25.9	3.35	12.05
6.0	22.8	1.51	5.44	23.6	1.78	6.40	24.8	2.04	7.34	26.5	2.38	8.56	26.0	2.70	9.73	26.9	3.04	10.93	27.1	3.29	11.85	26.6	3.46	12.46
6.5	23.0	1.58	5.68	24.0	1.86	6.69	25.3	2.12	7.64	27.1	2.48	8.93	26.5	2.83	10.18	27.4	3.16	11.37	27.7	3.42	12.30	27.3	3.61	13.00
6.9	23.2	1.63	5.86	24.4	1.92	6.93	25.6	2.18	7.86	27.4	2.56	9.20	26.8	2.95	10.61	27.7	3.29	11.86	28.0	3.52	12.67	28.0	3.75	13.49

EAGLE™ 351B Series

SPECIFICATIONS

Radius: 18' to 56' (5.5 m to 17.1 m)

Arc: 360° in full-circle mode, adjustable from 50° to 330° in part-circle mode

Flow Rate: 1.8 to 15.5 gpm (0.11 to 0.98 l/s)

Models:

EAGLE™ 351B: Seal-A-Matic™ device

Maximum Inlet Pressure: 100 psi (6.9 bar)

Recommended Operating Pressure: 60 psi (4.1 bar), 70 psi (4.8 bar), 80 psi (5.5 bar)

Flow:

Full-Circle Mode: 360° ≤ 180 seconds;
120 seconds nominally

Part-Circle Mode: 180° ≤ 90 seconds;
60 seconds nominally

Inlet Threads: 1" (2.5 cm) ACME

Holdback: 10' (3.1 m) of elevation

Nozzle Trajectory:

Low Flow and High Flow Nozzles: 17°

Long Throw Nozzles: 25°

Maximum Stream Height: 13' (4.0 m)

Dimensions:

Body Height: 9.6" (24.5 cm)

Top Diameter: 4.25" (10.8 cm)

Pop-Up Height to Mid-Nozzle: 3.25" (8.3 cm)



● EAGLE™ 351B Series

HOW TO SPECIFY

AT - 351 - B - XX(X)			
Thread Type AT	Model 351	Body/ Valve B	Nozzle**
			18S 22S
			26S 30S
			36S
Low Flow			18M† 26M†
			30M† 36M†
High Flow			40 44
			48 54
Long Throw			

EAGLE 351B Series Performance Data

U.S. Data

	Nozzle	60 psi		70 psi		80 psi		90 psi	
		Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)	Radius (ft)	Flow (gpm)
LOW FLOW	18S White	18	1.8	20	1.9	20	2.0	22	2.2
	22S Dark Gray	22	2.2	22	2.4	24	2.5	26	2.7
	26S Dark Orange	24	2.6	24	2.8	26	3.1	26	3.2
	30S Light Green	30	3.0	30	3.1	32	3.2	32	3.4
	36S Brown	34	3.6	34	3.8	34	4.2	36	4.4
HIGH FLOW	18M Ivory	20	4.0	22	4.2	22	4.4	24	4.7
	26M Medium Orange	24	5.6	24	6.0	26	6.5	26	6.9
	30M Green	30	5.7	30	6.2	32	6.6	32	7.1
	36M Light Brown	34	7.1	34	7.8	34	8.4	36	8.9
LONG THROW	40 Orange	37	2.1	40	2.3	42	2.4	42	2.5
	44 Red	44	3.5	46	3.6	46	4.1	46	4.3
	48 Blue	48	5.8	48	6.4	48	6.8	48	7.0
	54 Beige	50*	12.4*	54*	13.5*	56*	14.6*	56*	15.5*

Metric Data

	Nozzle	4.1 bar			4.8 bar			5.5 bar			6.2 bar		
		Radius (m)	Flow (lps)	Flow (m³/h)	Radius (m)	Flow (lps)	Flow (m³/h)	Radius (m)	Flow (lps)	Flow (m³/h)	Radius (m)	Flow (lps)	Flow (m³/h)
LOW FLOW	18S White	5.5	0.11	0.41	6.1	0.12	0.43	6.1	0.13	0.45	6.7	0.14	0.50
	22S Dark Gray	6.7	0.14	0.50	6.7	0.15	0.55	7.3	0.16	0.57	7.9	0.17	0.61
	26S Dark Orange	7.3	0.16	0.60	7.3	0.18	0.64	7.9	0.20	0.70	7.9	0.20	0.73
	30S Light Green	9.1	0.19	0.68	9.1	0.20	0.70	9.8	0.20	0.73	9.8	0.21	0.77
	36S Brown	10.4	0.23	0.82	10.4	0.24	0.86	10.4	0.26	0.95	11.0	0.28	1.00
HIGH FLOW	18M Ivory	6.1	0.25	0.91	6.1	0.26	0.95	6.7	0.28	1.00	7.3	0.30	1.07
	26M Medium Orange	7.3	0.35	1.27	7.3	0.38	1.36	7.9	0.41	1.48	7.9	0.44	1.57
	30M Green	9.1	0.36	1.30	9.1	0.39	1.41	9.8	0.42	1.50	9.8	0.45	1.61
	36M Light Brown	10.4	0.45	1.61	10.4	0.49	1.77	10.4	0.53	1.91	11.0	0.56	2.02
LONG THROW	40 Orange	11.3	0.13	0.48	12.2	0.15	0.52	12.8	0.15	0.55	12.8	0.16	0.57
	44 Red	13.4	0.22	0.80	14.0	0.23	0.82	14.0	0.26	0.93	14.0	0.27	0.98
	48 Blue	14.6	0.37	1.32	14.6	0.40	1.45	14.6	0.43	1.55	14.6	0.44	1.60
	54 Beige	15.2*	0.78*	2.82*	16.5*	0.85*	3.07*	17.1*	0.92*	3.32*	17.1*	0.98*	3.52*

*For best results, recommended for use in triangular spacing only. †Matched precipitation nozzles.

Data reflects no pressure regulation. For a block rotor, it is the pressure at the inlet to the rotor casing after the pressure had been regulated through a valve. All data is generated from tests conducted in accordance with ASAE Standard S398.1 for at least 30 minutes, in zero-wind conditions. Rain Bird recommends the use of SPACE for Windows® equivalent programming or derived performance data to optimize nozzle selection.

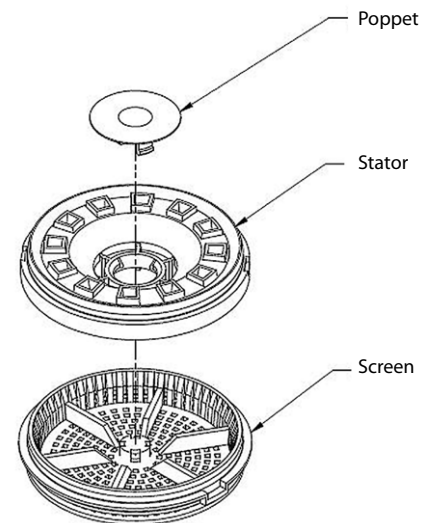
**Nozzle Shipping: (Standard Nozzle Installed/Included Smaller and Larger Nozzles): 22S/18S, 26S 30S/26S, 36S 30M/18M, 26M, 36M 36S/40, 44 48/44, 54

Golf Rotor Stator Configuration

Nozzle	Pressure Settings psi (bars)				All SAM/Hyd and Block
	60 (4.1)	70 (4.8)	80 (5.5)	100 (6.9)	
700					
White #28	SPC	SPC	SPC	SPC	SPC
Blue #32	SPO	SPO	SPO	SPO	SPO
Yellow #36	SPO	SPO	SPO	SPO	SPO
Orange #40	SNP	SNP	SNP	SNP	SNP
Green #44	SNP	SNP	SNP	SNP	SNP
Black #48	N/R	SNP	SPR	SPR	SNP
751					
Gray #20	S4	S4	S4	S4	S4
Red #22	S8	S8	S8	S8	S8
White #28	SPC	SPC	SPC	SPC	SPC
Blue #32	SPO	SPO	SPO	SPO	SPO
Yellow #36	SPO	SPO	SPO	SPO	SPO
Orange #40	SNP	SNP	SNP	SNP	SNP
Green #44	SNP	SNP	SNP	SNP	SNP
Black #48	SNP	SPR	SPR	SPR	SNP
900					
Blue #44	SPC	SPC	SPC	SPC	SPC
Yellow #48	SPC	SPC	SPC	SPC	SPC
Orange #52	SPC	SPO	SPO	SPO	SPO
Green #56	N/R	SNP	SNP	SNP	SNP
Black #60	N/R	SNP	SPR	SPR	SPR
Brown #64	N/R	SPR	SPR	SPR	SPR
950					
White #18C	SPC	SPC	SPC	SPC	SPC
Gray #20C	SPC	SPC	SPC	SPC	SPC
Blue #22C	SPC	SPC	SPC	SPC	SPC
Yellow #24C	SPC	SPC	SPO	SPO	SPO
Orange #26	SPO	SPO	SPO	SPO	SPO
Green #28	N/R	SNP	SPR	SPR	SPR
Black #30	N/R	SNP	SPR	SPR	SPR
Brown #32	N/R	SNP	SPR	SPR	SPR

SPC = Stator Poppet Closed
 SPO = Stator Poppet Open
 SNP = Stator No Poppet
 SPR = Spacer

S0 = Screen Only
 S4 = Stator with 4 holes
 S8 = Stator with 8 holes
 N/R = Not a recommended pressure and nozzle combination



Swing Joints

Looking to enhance the performance of your golf course irrigation system? Rain Bird® Swing Joints are the perfect solution. Featuring superior flow characteristics and excellent structural integrity, these swing joints are designed to deliver the performance you expect from Rain Bird while saving you money. They are available in a wide range of configurations. Rain Bird Swing Joints are the perfect complement to our golf series rotors.

SPECIFICATIONS

Diameters: 1" (2.5 cm), 1.25" (3.2 cm) and 1.5" (3.8 cm)

Lay Arm Lengths: 8" (20.3 cm), 12" (30.5 cm) and 18" (45.7 cm)

Inlet Type: NPT, BSP, ACME, spigot and socket

Outlet Thread Type: NPT, BSP or ACME

Enlarging NPT, BSP or ACME Outlets:

Available on 1" (2.5 cm) and 1.25" (3.2 cm) swing joints for connections to many rotors with 1 1/4" (3.2 cm) and 1 1/2" (3.8 cm) inlet sizes respectively (no additional adapters required)

Inlet Configurations: Standard side or top-mount connections

Outlet Configuration: Single-top or triple-top

Pressure Rating: 315 psi (21.7 bar) at 73°F (22.8°C)

Reducing ACME Inlet: Available on 1 1/4" (3.2 cm) diameter swing joints for connection to a 1 1/2" ACME service tee

Multiple Inlet/Outlet Configurations: Available with standard and triple top configurations for added rotor positioning flexibility. Also available are models for top mount or side mount to lateral lines.

- **Superior Flow Characteristics.** An innovative swept elbow design* reduces pressure loss by up to 50 percent over other swing joints.
- **Excellent Structural Integrity.** Reduces the costs associated with fatigue-related failures.
- **Double O-ring Protection.** Provides a better seal to ensure that joints are kept clean and can be repositioned easily.
- **Modified ACME Outlet.** Improves safety by losing seal engagement before losing thread engagement during rotor removal.
- **Color-coding and Distinct Size Markings.** Reduce costs by eliminating errors and improving installation efficiency with quick size identification at the job site.
- **Oversized Threaded Inlets.** Make hand-tightening and blind installations (underwater) easier. This also reduces the risk of potential damage caused by over-tightening with a wrench.
- **Extended Warranty.** When used with Rain Bird golf rotors, extends rotor and swing joint warranty to five years.

*Patent pending

ALSO AVAILABLE

NPT and BSP ACME Adapters

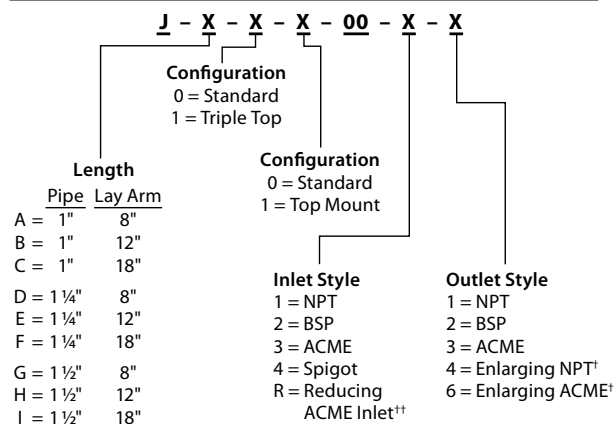
If you currently have NPT or BSP swing joints, you can now enjoy the benefits of ACME-threaded rotors by utilizing a Rain Bird NPT-ACME or BSP-ACME side of the adapter. Just screw the adapter into the inlet on the ACME case, and then screw the rotor with the adapter onto the NPT or BSP swing joint until it is snug. Available for 1", 1 1/4", and 1 1/2" swing joints, the adapter adds only about 1 3/8" to the installed height of the rotor, and is rated at the same operating pressures as Rain Bird® Swing Joints.



● NPT or BSP to ACME Adapter

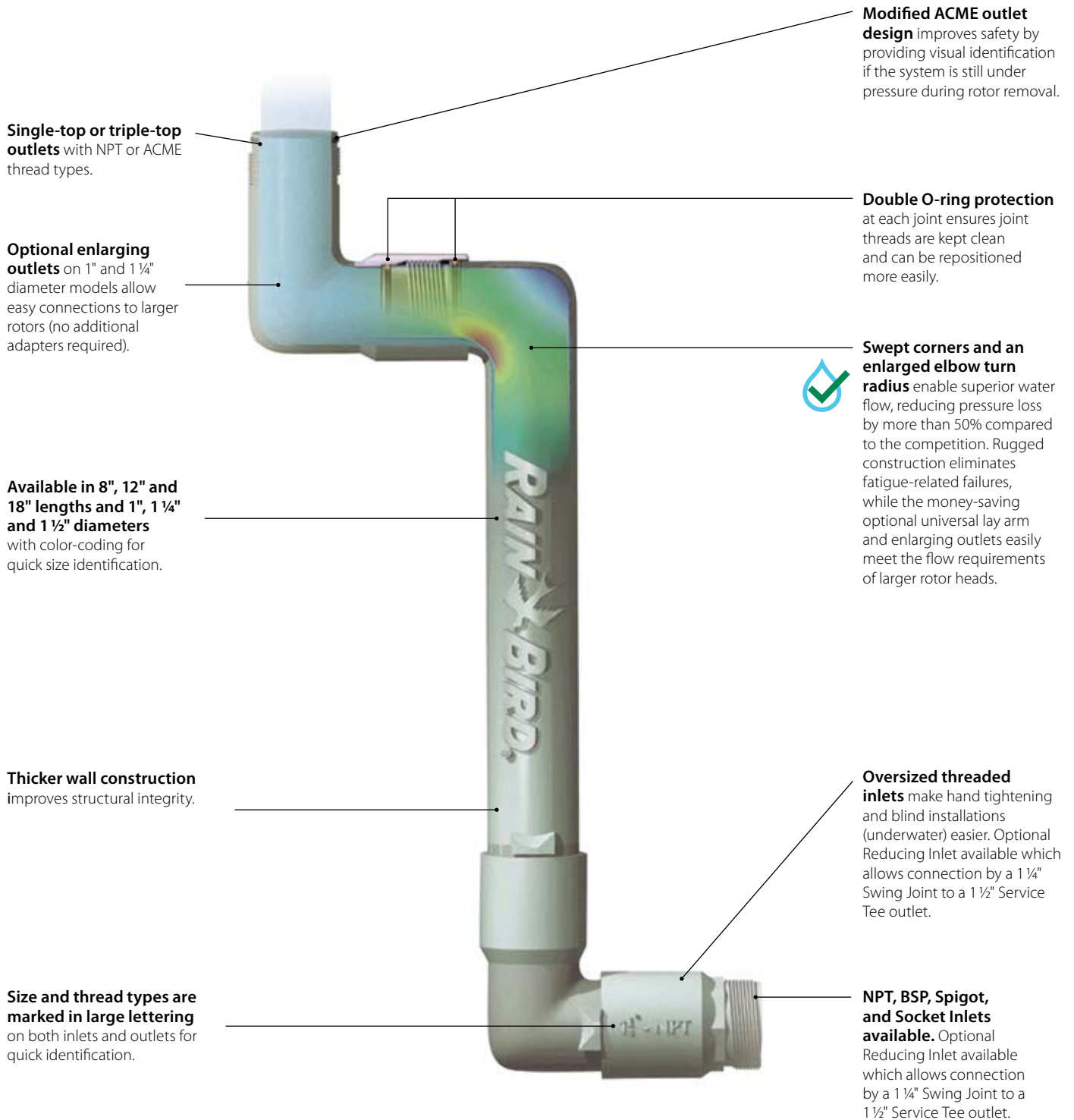
● Swing Joints

HOW TO SPECIFY



†Enlarging outlet available only on 1" and 1 1/4" diameter models

††Reducing inlet available on 1 1/4" diameter models



Valves

Rain Bird® Valves are ruggedly reliable and expertly engineered to provide an elevated standard of product integrity that is unmatched in the industry. Constructed of industrial-strength glass-filled nylon or classic brass, Rain Bird Valves are designed to withstand the harshest environments, and the lasting, trouble-free performance continues to earn the trust of golf course professionals worldwide.



100-PESB/PESB-R, 150-PESB/PESB-R and 200-PESB/PESB-R

SPECIFICATIONS

Models:

- 100-PESB:** 1" (2.5 cm) (26/34)
- 100-PESB-R:** 1" (2.5 cm) (26/34)
- 150-PESB:** 1 ½" (3.8 cm) (40/49)
- 150-PESB-R:** 1 ½" (3.8 cm) (40/49)
- 200-PESB:** 2" (5.1 cm) (50/60)
- 200-PESB-R:** 2" (5.1 cm) (50/60)
- 100-PESB-R-WK:** 1" (2.5 cm) (26/34) Conversion Kit
- 150-PESB-R-WK:** 1 ½" (3.8 cm) (40/49) Conversion Kit
- 200-PESB-R-WK:** 2" (5.1 cm) (50/60) Conversion Kit

Valve and PRS-D module must be ordered separately.
See page 48 for more information on the PRS-D option.

For non-U.S. applications it is necessary to specify NPT
or BSP thread type.

Flow: 0.25 to 200 gpm (0.06 to 45.5 m³/h);
(1.2 to 757 l/m)

Flow with PRS-D: 5 to 200 gpm (1.1 to 45.4 m³/h);
(19.2 to 757 l/m)

Pressure: 20 to 200 psi (1.38 to 13.8 bar)

Pressure with PRS-D: Up to 100 psi (6.90 bar)
The PRS-D option adds 2" (5.1 cm) to valve height.

Electrical Specifications:

- Power:** 24 VAC 50/60 Hz (cycles/sec) solenoid
- Inrush Current:** 0.41 A (9.84 VA) at 60 Hz
- Holding Current:** 0.14 A (3.43 VA) at 60 Hz
- Coil Resistance:** 30 to 39 ohms

Dimensions:

100-PESB/PESB-R (1"):
Height: 6 ½" (16.5 cm)
Length: 4" (10.2 cm)
Width: 4" (10.2 cm)

150-PESB /PESB-R (1 ½"):
Height: 8" (20.3 cm)
Length: 6" (15.2 cm)
Width: 6" (15.2 cm)

200-PESB /PESB-R (2"):
Height: 8" (20.3 cm)
Length: 6" (15.2 cm)
Width: 6" (15.2 cm)

Temperature: 150°F (66°C) maximum



● PESB



● PESB-R

HOW TO SPECIFY

XXX	-	XXXX-X	-	XXX-X
Size		Model		Optional Feature
100		PESB		PRS-D
150		PESB-R		ICM
200				

Also available in IC configuration.
Please see page 21 on how to specify.

PESB/PESB-R Series Valves

U.S. Data — Pressure Loss* (psi)				Metric Data — Pressure Loss* (bar)				
Flow (gpm)	100-PESB/PESB-R 1"	150-PESB/PESB-R 1½"	200-PESB/PESB-R 2"	Flow (m³/h)	Flow (l/m)	100-PESB/PESB-R 2.5 cm	150-PESB/PESB-R 3.8 cm	200-PESB/PESB-R 5.1 cm
0.25	0.8/1.6	—	—	0.06	1	0.06/0.11	—	—
0.5	1.0/3.0	—	—	0.3	5	0.09/0.13	—	—
1	1.3/1.8	—	—	0.6	10	0.10/0.15	—	—
5	1.7/2.9	—	—	1.2	20	0.12/0.20	—	—
10	1.8/2.9	—	—	3	50	0.15/0.19	—	—
20	2.9/2.6	3.9/3.5	—	6	100	0.32/0.32	0.26/0.22	—
30	5.6/5.8	3.6/3.1	—	9	150	0.68/0.69	0.24/0.16	—
40	10.0/10.2	3.5/2.3	—	12	200	—	0.26/0.16	0.33/0.25
50	15.6/16.0	3.6/2.1	4.8/3.7	15	250	—	0.33/0.24	0.32/0.24
75	—	5.4/4.3	4.5/3.3	18	300	—	0.42/0.33	0.32/0.25
100	—	9.6/7.5	5.2/4.7	21	350	—	0.57/0.45	0.34/0.30
125	—	14.6/11.9	8.2/8.6	24	400	—	0.74/0.59	0.41/0.38
150	—	21.2/17.0	11.8/12.6	27	450	—	0.92/0.75	0.51/0.53
175	—	—	15.5/14.8	30	500	—	1.14/0.91	0.64/0.67
200	—	—	19.5/18.9	33	550	—	1.38/1.10	0.77/0.82
				36	600	—	—	0.90/0.92
				39	650	—	—	1.04/1.00
				42	700	—	—	1.18/1.13
				45	757	—	—	1.34/1.30

- Rain Bird recommends flow rates in the supply line not to exceed 7 ½ ft/sec (2.29 m/s) in order to reduce the effects of water hammer.
- For flows below 5 gpm (1.14 m³/h, 19.2 l/m), Rain Bird recommends use of upstream filtration to prevent debris from collecting below the diaphragm.
- For flows below 10 gpm (2.27 m³/h, 37.8 l/m), Rain Bird recommends that the flow control stem be turned down two full turns from the fully open position.
- PRS-D recommended for use in shaded area only.

*Loss values are with flow control fully open using the tan solenoid retainer.

100-EFB-CP-R, 150-EFB-CP-R and 200-EFB-CP-R

SPECIFICATIONS

Models:

- 100-EFB-CP-R: 1" (2.5 cm)
- 150-EFB-CP-R: 1½" (3.8 cm)
- 200-EFB-CP-R: 2" (5.1 cm) (Brass)

Valve and PRS-D module must be ordered separately.
See page 50 for more information on the PRS-D option.

For non-U.S. applications it is necessary to specify NPT or BSP thread type.

Flow with or without PRS-D: 5 to 200 gpm
(19.2 to 757 l/m)

Pressure: 15 to 200 psi (1.0 to 13.8 bar)

Pressure with PRS-D: 15 to 100 psi (1.0 to 7.0 bar)

Pressure Requirements using PRS-D: 15 psi (1.0 bar)
inlet pressure above desired outlet pressure

Note: The PRS-D option adds 2" (5.1 cm) to valve height.

Electrical Specifications:

Power: 24 VAC

50/60 Hz (cycles/sec) solenoid

Inrush current: 0.41 A (9.84 VA) at 60 Hz

Holding current: 0.14 A (3.43 VA) at 60 Hz

Coil resistance: 30 to 39 ohms

Dimensions:

100-EFB-CP-R (1"):

Height: 6" (15.2 cm)

Length: 4½" (11.4 cm)

Width: 3¼" (8.3 cm)

150-EFB-CP-R (1½"):

Height: 6½" (16.5 cm)

Length: 5½" (14.0 cm)

Width: 4½" (11.4 cm)

200-EFB-CP-R (2"):

Height: 7" (17.8 cm)

Length: 6¾" (17.1 cm)

Width: 5¾" (14.6 cm)

Temperature: 150°F (66°C) maximum



● 100-EFB-CP-R

HOW TO SPECIFY

XXX	- EFB-CP-R -	XXX-X
Size		Optional Feature
100		PRS-D
150	Model	ICM
200	EFB-CP-R	

Also available in IC configuration.
Please see page 21 on how to specify.

NEW RELCAIMED STANDARD:

Features chlorine-resistant EPDM diaphragm for applications using reclaimed water.

EFB-CP-R Series Valves

U.S. Data — Pressure Loss* (psi)

Flow (gpm)	100-EFB-CP-R 1"	150-EFB-CP-R 1½"	200-EFB-CP-R 2"
5	0.2	—	—
10	0.7	—	—
15	1.2	—	—
20	2.1	2.3	0.5
30	5.0	2.9	0.6
40	8.2	2.0	0.8
50	13.0	3.3	1.1
60	—	4.6	1.8
80	—	7.5	2.4
100	—	11.8	3.8
120	—	16.6	5.9
140	—	—	7.8
160	—	—	10.0
180	—	—	12.5
200	—	—	15.8

Metric Data — Pressure Loss* (bar)

Flow (m³/h)	Flow (l/m)	100-EFB-CP-R 2.5cm	150-EFB-CP-R 3.8cm	200-EFB-CP-R 5.1cm
1	19	0.01	—	—
3	50	0.07	—	—
6	100	0.27	0.19	0.04
9	150	0.56	0.14	0.05
12	200	—	0.25	0.09
15	250	—	0.38	0.14
18	300	—	0.51	0.16
21	350	—	0.70	0.23
24	400	—	0.91	0.30
27	450	—	1.13	0.40
30	500	—	—	0.49
33	550	—	—	0.58
36	600	—	—	0.68
39	650	—	—	0.79
42	700	—	—	0.92
45	757	—	—	1.09

1. Rain Bird recommends flow rates in the supply line not to exceed 7½ ft/sec (2.29 m/s) in order to reduce the effects of water hammer.

2. For flows below 5 gpm (1.14 m³/h, 19.2 l/m), Rain Bird recommends use of upstream filtration to prevent debris from collecting below the diaphragm.

3. For flows below 10 gpm (2.27 m³/h, 37.8 l/m), Rain Bird recommends that the flow control stem be turned down two full turns from the fully open position.

4. PRS-D recommended for use in shaded area only.

*Loss values are with flow control fully open using the tan solenoid retainer.

300-BPES Brass Valves

SPECIFICATIONS

Models:

300-BPES: 3" (7.6 cm) (80/90)

*Valve and PRS-D module must be ordered separately.
9 for more information on the PRS-D option.*

*For non-U.S. applications it is necessary to specify NPT
or BSP thread type.*

Flow with or without PRS-D: 60 to 300 gpm
(13.6 to 68.1 m³/h); (227 to 1136 l/m)

Pressure: 20 to 200 psi (1.4 to 13.8 bar)

Pressure with PRS-D: Up to 100 psi (6.9 bar)

Pressure Requirements using PRS-D: 15 psi (1.0 bar)
inlet pressure above desired outlet pressure

Note: The PRS-D option adds 2" (5.1 cm) to valve height.

Dimensions:

300-BPES (3"):

Height: 13 5/8" (34.6 cm)

Length: 8" (20.32 cm)

Width: 7" (17.78 cm)

Temperature: 110°F (43° C) maximum

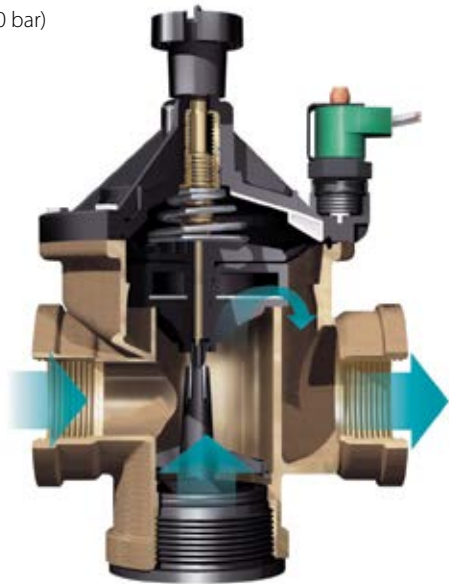
Electrical Specifications:

Power: 24 VAC 50/60 Hz
(cycles/sec) solenoid

Inrush current: 0.41 A (9.84 VA)
at 60 Hz

Holding current: 0.28 A
(6.72 VA) at 60 Hz

Coil resistance: 28 ohms, nominal



● 300-BPES

HOW TO SPECIFY

XXX	-	BPES	-	XXX-X
Size 300		Model BPES		Optional Feature PRS-D ICM

*Also available in IC configuration.
Please see page 21 on how to specify.*

VALVES

RECOMMENDATIONS

Rain Bird recommends flow rates in the supply line not to exceed 7 1/2 ft/sec (2.29 m/s) in order to reduce the effects of water hammer.

BPES 3" (7.6 cm) Valves

U.S. Data — Pressure Loss* (psi)			Metric Data — Pressure Loss* (bar)			
Flow (gpm)	Globe	Angle	Flow (m ³ /h)	Flow (l/m)	Globe 2.5 cm	Angle 3.8 cm
60	6.6	6.8	13.6	227	0.46	0.47
80	5.1	5.9	24	400	0.19	0.21
100	3.2	3.5	36	600	0.14	0.14
120	1.8	1.8	48	800	0.21	0.19
140	1.8	2.1	60	1000	0.29	0.26
160	2.0	2.1	68	1136	0.34	0.31
180	2.2	2.0				
200	2.7	2.5				
250	4.0	3.4				
300	4.9	4.5				

*Loss values are with flow control fully open using the tan solenoid retainer.

Quick Coupling Valves

SPECIFICATIONS

Models:

- 3RC:** ¾" (1.9 cm) (20/27) Rubber cover, one-piece body
- 33DRC:** ¾" (1.9 cm) (20/27) Double track key lug, rubber cover, two-piece body
- 33DLRC:** ¾" (1.9 cm) (20/27) Double track key lug, locking rubber cover, two-piece body
- 33DNP:** ¾" (1.9 cm) (20/27) Non-potable, purple locking rubber cover, two-piece body
- 44RC:** 1" (2.5 cm) (26/34) Rubber cover, two-piece body
- 44LRC:** 1" (2.5 cm) (26/34) Locking rubber cover, two-piece body
- 44NP:** 1" (2.5 cm) (26/34) Non-potable, purple locking rubber cover, two-piece body
- 5RC:** 1" (2.5 cm) (26/34)* Rubber cover, one-piece body
- 5LRC:** 1" (2.5 cm) (26/34)* Locking rubber cover, one-piece body
- 5NP:** 1" (2.5 cm) (26/34) Non-potable, purple locking rubber cover, one-piece body
- 7:** 1 ½" (3.8 cm) (40/49)* Metal cover, one-piece body

Flow:

Models 3RC, 33DRC, 33DLRC, 33DNP, 44RC, 44LRC, 44NP, 5RC, 5LRC, 5NP, 7: 10 to 125 gpm
(2.27 to 28.39 m³/h; 37.8 to 473 l/m)

Models 33DNP, 44NP, 5NP: 10 to 70 gpm
(2.27 to 15.89 m³/h; 37.8 to 265 l/m)

Pressure: 5 to 125 psi (0.4 to 8.6 bar)

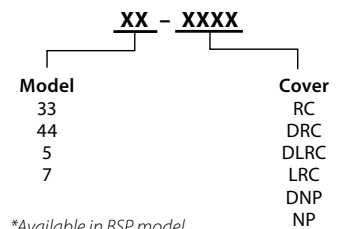
Height:

- 3RC:** 4.3" (10.8 cm)
- 33DRC:** 4.4" (11.1 cm)
- 33DLRC:** 4.6" (11.8 cm)
- 33DNP:** 4.4" (11.1 cm)
- 44RC:** 6.0" (15.2 cm)
- 44LRC:** 6.0" (15.2 cm)
- 44NP:** 6.0" (15.2 cm)
- 5RC:** 5.5" (14.0 cm)
- 5LRC:** 5.5" (14.0 cm)
- 5NP:** 5.5" (14.0 cm)
- 7:** 5.8" (14.6 cm)



● Quick Coupling Valves

HOW TO SPECIFY



*Available in BSP model.



● Quick Coupling Valve Keys

55K-1

Quick Coupling Valve Keys

Top Pipe Threads

Valve	Key	Male	Female
3RC	33DK	¾"	19 mm
33DRC	33DK	¾"	19 mm
33NP	33DK	¾"	19 mm
44NP	44K	1"	25 mm
44RC	44K	1"	25 mm
5RC	55K-1	1"	25 mm
5NP	55K-1	1"	25 mm
7	7K	1 ½"	38 mm

Quick Coupling Valves

U.S. Data — Pressure Loss* (psi)

Flow (gpm)	3RC 0.75"	33DRC, 33DLRC, 33DNP 0.75"	44RC, 44LRC, 44NP 1"	5RC, 5LRC, 5NP 1"	7 1.50"
10	1.8	2.0	—	—	—
15	4.7	4.3	2.2	—	—
20	7.2	7.6	4.4	—	—
30	—	—	11.5	4.1	—
40	—	—	—	7.3	—
50	—	—	—	11.0	1.7
60	—	—	—	15.7	2.5
70	—	—	—	21.5	3.6
80	—	—	—	—	4.9
90	—	—	—	—	8.4
100	—	—	—	—	14.0

Metric Data — Pressure Loss* (bar)

Flow (m³/h)	Flow (l/m)	3RC 1.9 cm	33DRC, 33DLRC, 33DNP 1.9 cm	44RC, 44LRC, 44NP 2.5 cm	5RC, 5LRC, 5NP 2.5 cm	7 3.8 cm
2.3	38	0.12	0.12	—	—	—
4	67	0.41	0.42	0.23	—	—
5	83	0.57	0.62	0.40	—	—
6	100	—	—	0.62	—	—
7	117	—	—	0.83	0.30	—
8	133	—	—	—	0.40	—
9	150	—	—	—	0.50	—
10	167	—	—	—	0.61	—
12	200	—	—	—	0.85	0.13
14	233	—	—	—	1.15	0.18
16	267	—	—	—	1.50	0.25
22	367	—	—	—	—	0.54
28	473	—	—	—	—	0.97

Pressure Regulating Module

The PRS-Dial is an excellent means of regulating outlet pressure at the valve regardless of incoming pressure fluctuations. The visible scale makes adjustment quick and easy. The regulator fits all Rain Bird® PGA, PEB, PESB, PESB-R, GB, EFB-CP and BPES series valves.

Regulates and maintains constant outlet pressure between 15 and 100 psi (1.04 to 6.9 bar) within ± 3 psi (± 0.21 bar).

Adjustment knob with detents permits fine-tune setting in 1/3 psi (0.02 bar) increments. Dial cartridge makes installation and adjustment quick, easy and accurate.

FEATURES

- Improved spike reduction capabilities reduce water hammer.
- Ergonomic design with snap-tight cover to prevent vandalism.
- Waterproof dial cartridge eliminates fogging and binding.
- Dial cartridge retrofits into all existing PRS-B units.
- Schrader valve connects pressure hose gauge, ordered separately.
- Easy field installation — PRS-Dial threads underneath the solenoid and adapter.
- Corrosion-resistant glass-filled nylon for rugged performance.

OPERATING RANGE

Pressure: Up to 100 psi (6.9 bar)¹

Regulation: 15 to 100 psi (1.04 to 6.9 bar)

Accuracy: ± 3 psi (± 0.21 bar)

Flow: Refer to chart

Valve Flow Ranges²

U.S. Data		Metric Data		
Model	gpm	Model	m ³ /h	l/m
100-PGA	5–40	100-PGA	1.14–9.08	19.2–15.1
150-PGA	30–100	150-PGA	6.81–22.70	113–378
200-PGA	40–150	200-PGA	9.08–34.05	151–568
100-PEB	5–50	100-PEB	1.14–11.35	19.2–189
150-PEB	20–150	150-PEB	4.54–34.05	76–568
200-PEB	75–200	200-PEB	17.03–45.40	284–757
100-PESB/PESB-R	5–50	100-PESB/PESB-R	1.14–11.35	19.2–189
150-PESB/PESB-R	20–150	150-PESB/PESB-R	4.54–34.05	76–568
200-PESB/PESB-R	75–200	200-PESB/PESB-R	17.03–45.40	284–757
100-GB	5–50	100-GB	1.14–11.35	19.2–189
125-GB	20–80	125-GB	4.54–18.16	76–302
150-GB	20–120	150-GB	4.54–31.78	76–529
200-GB	20–200	200-GB	4.54–45.40	76–757
100-EFB-CP-R	5–50	100-EFB-CP-R	1.14–11.35	19.2–189
125-EFB-CP-R	20–80	125-EFB-CP-R	4.54–18.16	76–302
150-EFB-CP-R	20–120	150-EFB-CP-R	4.54–31.78	76–529
200-EFB-CP-R	20–200	200-EFB-CP-R	4.54–45.40	76–757
300-BPES	60–300	300-BPES	13.62–68.10	227–1136



MODELS

- PRS-D

APPLICATION INFORMATION

- Proper operation requires inlet pressure to be a minimum of 15 psi (1.04 bar) higher than desired outlet pressure.
- For areas with very high pressure or uneven terrain, install sprinklers with PRS pressure regulating stems and/or SAM check valves.
- When inlet pressure exceeds 100 psi (6.9 bar), a pressure regulating master valve or inline pressure regulator is required.
- Rain Bird does not recommend using the pressure regulating module for applications outside the recommended flow ranges.
- To reduce the effects of water hammer, Rain Bird recommends flow rates in the supply line not to exceed 7 1/2 ft/sec (2.29 m/s).
- For flows below 10 gpm (2.27 m³/h, 37.8 l/m), Rain Bird recommends the flow control stem be turned down two full turns from the fully open position.
- The PRS-D option adds an additional 2" (5.1 cm) to valve height.

● PRS-Dial

¹ While the PRS-Dial unit can withstand pressures up to 200 psi (13.8 bar), accurate pressure regulation can be maintained only up to 100 psi (6.9 bar).

² The PRS-Dial regulates only up to 100 psi (6.9 bar).

DBRY Wire Connectors

CONNECTIONS MADE EASY

Install Faster

When your installation crew is making countless wire connections on a jobsite, why slow them down with unnecessary work steps? Use Rain Bird® DBRY wire connectors to get the job done faster.

Reduce Inventory

This is the only wire connector you'll need! It is ideal for use on two-wire decoder control systems.

- Use for standard controllers, valve boxes and soil moisture sensors.
- Wire combinations ranging from 22ga to 6ga.
- Use on connections from 24 VAC to 600 VAC.
- UL 486D certified for direct burial.

Avoid Call Backs

Locating and repairing a corroded wire splice costs your business time and money. Avoid unnecessary service call backs. Use Rain Bird DBRY wire connectors for reliable connections.

- The strain relief ensures wires are secure and won't pull apart.
- Waterproof silicone sealant protects against corrosion.
- U.V.-material ensures product performance does not degrade even after long periods of exposure to sunlight.

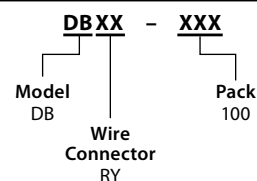
FEATURES AND BENEFITS

- Direct-bury silicone-filled tube with strain relief
- UL 486D listed and 600V rated waterproof and corrosion-proof
- Patent pending snap-fit lid provides strain relief
- UV- and impact-resistant
- Excellent for above-ground or direct-bury applications
- Pre-filled with silicone that never hardens
- Includes Red/Yellow Nut Connector
- Wire Range: Red/Yellow #6 – #22
- Perfect for Two-Wire Decoder Systems, Field Controller or Integrated Control Systems (ICS)



● DBRY Series

HOW TO SPECIFY



Service Tools

Rain Bird offers a full line of quality tools for the service and maintenance of Rain Bird Golf Rotors. Constructed of heavy-duty metal alloys and durable plastic, these tools are lightweight and easy to use.

D02203

Snap-Ring Pliers 900/950/1100/1150



D02236

Snap-Ring Pliers 700/750/500/550



B41700

Valve Insertion Tool 900/950/1100/1150



B41710

Valve Insertion Tool 700/750/500/550



B41720

EAGLE™ Selector Service Tool/Key



D02237

Installation Socket for
Top-Serviceable Rock Screen



D05205

Universal Hose Adapter



D02215

7" Selector Valve Key



D02221

18" Selector Valve Key



Y05100

351B Rotor Tool



232693S

351B Hold-up Tool



Pumps and Filtration

Rain Bird applies its industry leading irrigation expertise to the design and manufacture of pump stations and filters to provide solutions to meet customer requirements. By doing so, Rain Bird is the only irrigation manufacturer able to provide totally integrated irrigation solutions, Reservoir to Rotor. Rain Bird's solutions reliably and dependably deliver a more playable course, while lowering operational costs.



Unequaled Quality and Performance

Remote Pump Station Access

Rain Bird's user interface is a network ready design that allows for remote access via PC, laptop, tablet, smart phone, or any web-enabled mobile device. These devices are simple to navigate, properly formats to the screen of the device being used and allows for complete control and monitoring of your golf Pump Station. This remote accessibility provides Rain Bird customers the confidence to control their pumping systems when they are away from the course.

Electrical Design

Rain Bird® pump stations are built to UL508A standards and use the industry's best surge suppression reducing the risk of electronic component damage that could lead to inconvenient and costly downtime. This design includes full heavy-duty circuit breaker integration providing the ultimate protection with the best serviceability.

Backup Pressure Regulation

Every station comes with an engineered design and properly sized pressure relief valve to provide automatic pressure regulation in the event of an overpressure situation.

VFD Per Motor (VPM) Option

Rain Bird offers the industry's most comprehensive package upon request, including a VFD for each main motor on a multi-pump station. This option offers superior motor protection along with no mechanical switching components. It also provides a level of efficient backup pressure regulation that a pressure relief valve or butterfly valve cannot deliver.

Durable Polyester Powder-Coating

Rain Bird's in-house steel-grit blasting system assures all exterior surfaces of the pump station are prepared to specification standards and allows for the best coating adhesion. The polyester powder-coat Rain Bird applies is far more durable than competitive solvent-based multi-layer coatings. In fact, Rain Bird's powder-coating process scores a 10 out of 10 on an ASTM corrosion test provided by Sherwin Williams. Other industry pump stations scored four (4) out of 10 on the very same test. In addition the powder-coating process is considered very environmentally friendly.

Engineered Pump Station Skid Design

Using 3D modeling, the channel steel skid frame is engineered for strength and rigidity. This engineered design reduces vibration and eliminates the need for raised, extra-thick steel plates under the pump heads, which can be a trip hazard. The deck is the industry's strongest and longest lasting with continuously welded smooth steel plate. In addition, Rain Bird follows industry standards and manufacturer's recommendations for station components such as the proper specifications for flow meters.

Advanced Controls

With the industry's leading touch screens, Rain Bird continues to innovate by offering the largest screen as a standard. Beyond being network ready, this interface offers up to 20 years of historical memory capability and USB backup. With features such as filtration integration, water feature control, lake level control, pump lockouts, auto set point adjustment per pump, motor starts protection, and many more, Rain Bird has driven pump station innovation in the Golf Industry for the last decade.

Real-Time System Integration

Rain Bird pump stations have Pump Manager 2 and Smart Pump™ technology at the central control, so you can configure your system to automatically monitor and self-adjust to changing conditions. This seamless integration by Rain Bird improves your system's overall performance by reducing watering windows and minimizing energy use.

Pump and Motor Options

Rain Bird offers custom designed cast iron discharge heads for golf irrigation pump stations. With superior flow characteristics and 12 times the required tensile strength for golf pump stations, they are the obvious choice for the application. Rain Bird utilizes G.E. motors with industry-leading warranties, efficiencies and durability.

Air Relief

Rain Bird provides air relief on each pump. Individual air relief valves allow for the maximum amount of air to be removed from the pump columns and not enter into the irrigation system.

User Controls

Rain Bird pump stations have set the bar with simple, large-icon touchscreen controls in nine (9) different languages. Each pump has a lighted, three position Manual–Off–Auto switch for intuitive, safe backup control of the station.



Pump Station Platforms Quick Reference Guide

LP SERIES

HES1

- One horizontal end suction pump
- 5 to 10 HP motor with VFD
- Up to 100 psi (6.9 bar)
- Up to 200 gpm (12.6 lps, 45.4 m³/h)
- Aluminum Enclosure
- Monochrome touch-panel display



VM1

- One vertical multistage pump
- 1 to 2 HP motor with VFD
- Up to 50 psi (3.5 bar)
- Up to 60 gpm (355.8 lps, 13.6 m³/h)
- Aluminum Enclosure
- Monochrome touch-panel display



D SERIES

HES1

- One horizontal end suction pump
- 5 to 20 HP motor with VFD
- Up to 130 psi (9.0 bar)
- Up to 350 gpm (22.1 lps, 79.5 m³/h)
- Powder-coated steel enclosure
- Monochrome touch-panel display



VM1

- One vertical multistage pump
- 3 to 15 HP motor with VFD
- Up to 115 psi (7.9 bar)
- Up to 200 gpm (12.6 lps, 45.4 m³/h)
- Powder-coated steel enclosure
- Monochrome touch-panel display



M SERIES

HES1

- One horizontal end suction pump
- 20 to 50 HP motor with VFD
- Up to 120 psi (8.3 bar)
- Up to 600 gpm (37.9 lps, 136 m³/h)
- Aluminum Enclosure
- Monochrome touch-panel display



VM1

- One vertical multistage pump
- 15 to 60 HP motor with VFD
- Up to 155 psi (10.7 bar)
- Up to 500 gpm (31.5 lps, 114 m³/h)
- Aluminum Enclosure
- Monochrome touch-panel display



COMPACT DECK

VT1

- 25 to 75 HP motors with VFD
- Up to 140 psi (9.7 bar)
- Up to 500 gpm (31.5 lps, 114 m³/h)
- Color touch-panel display



VT2

- 25 to 75 HP motors with VFD
- Up to 140 psi (9.7 bar)
- Up to 1600 gpm (101 lps, 363 m³/h)
- Color touch-panel display



LARGE DECK

VT2

- Large Deck to accommodate optional integrated filtration
- 25 to 75 HP motors with VFD
- Up to 140 psi (9.7 bar)
- Up to 1600 gpm (101 lps, 363 m³/h)
- Color touch-panel display



VT3

- Large Deck to accommodate optional integrated filtration
- 40 to 75 HP motors with VFD
- Up to 140 psi (9.7 bar)
- Up to 2400 gpm (151 lps, 545 m³/h)
- Color touch-panel display



PUMP STATION PLATFORMS

HES2

- Two horizontal end suction pumps
- 20 to 60 HP motors with VFD
- Up to 124 psi (8.6 bar)
- Up to 1200 gpm (76 lps, 273 m³/h)
- Aluminum Enclosure
- Monochrome touch-panel display



VM2

- Two vertical multistage pumps
- 25 to 60 HP motor with VFD
- Up to 150 psi (10.3 bar)
- Up to 1000 gpm (63.1 lps, 227 m³/h)
- Aluminum Enclosure
- Monochrome touch-panel display



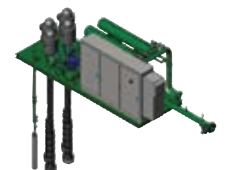
HES3

- Three horizontal end suction pumps
- 20 to 60 HP motors with VFD
- Up to 124 psi (8.6 bar)
- Up to 1800 gpm (114 lps, 409 m³/h)
- Aluminum Enclosure
- Monochrome touch-panel display



VT4-LARGE

- Large Deck to accommodate optional integrated filtration
- 40 to 75 HP motors with VFD
- Up to 140 psi (9.7 bar)
- Up to 3000 gpm (189 lps, 681 m³/h)
- Color touch-panel display



PANEL ONLY

- Controls 1-6 pumps, up to 100 HP each
- VFD or VPM
- Flow meter and pressure transducer included.



“I+ Series” Hydraulic Suction Scanning Filter

Self-cleaning line powered hydraulic water filters for turf, landscape, agriculture, greenhouse, golf course and nursery applications.

FEATURES

- Flow rate: 15 – 7,350 gpm
- Max temperature: 210° F
- Single electric ball valve for flushing operations standard
- 316 L stainless steel sintered screens standard
- Screen opening: 5µ – 4000µ
- Working pressure: 35 – 150 psi
- Material: Stainless Steel, Powder Coated Carbon Steel, Duplex Steel, or Fiberglass Reinforced Plastic
- Available as filter only, or as a complete assembly with bypass manifold and valves



“I+ Series” Suction Scanning Filter Performance Data

Powder-Coated Carbon Steel Model Number	Stainless Steel Model Number	Line Size (in)	Standard Flow Rate (gpm)				Sintered Screen Area (ft²)	Sintered Screen Area (in²)	Flush Volume (gallons)	Flush Line Size (in)	Minimum Inlet Pressure During Rinse Cycle (psi)
			MICRON 300	200	120	100					
			MESH 50	80	125	140					
HS-I-02-A	HS-I-02-A-S	2	200	200	200	200	2.65	382	15 to 50	1.5	35
HS-I-03-A	HS-I-03-A-S	3	300	300	300	300	2.65	382	15 to 50	1.5	35
HS-I-04-A	HS-I-04-A-S	4	500	500	500	500	2.65	382	15 to 50	1.5	35
HS-I-04-B	HS-I-04-B-S	4	500	500	500	500	5.25	756	15 to 50	1.5	35
HS-I-04-C	HS-I-04-C-S	4	500	500	500	500	7.00	1008	15 to 50	1.5	35
HS-I-04-D	HS-I-04-D-S	4	500	500	500	500	9.25	1332	35 to 110	2.0	35
HS-I-06-A	HS-I-06-A-S	6	650	630	555	530	2.65	382	15 to 50	1.5	35
HS-I-06-B	HS-I-06-B-S	6	1000	1000	1000	1000	5.25	756	15 to 50	1.5	35
HS-I-06-C	HS-I-06-C-S	6	1000	1000	1000	1000	7.00	1008	15 to 50	1.5	35
HS-I-06-D	HS-I-06-D-S	6	1000	1000	1000	1000	9.25	1332	35 to 110	2.0	35
HS-I-08-B	HS-I-08-B-S	8	1400	1260	1100	1050	5.25	756	15 to 50	1.5	35
HS-I-08-C	HS-I-08-C-S	8	1700	1680	1470	1400	7.00	1008	15 to 50	1.5	35
HS-I-08-D	HS-I-08-D-S	8	2000	2000	1943	1850	9.25	1332	35 to 110	2.0	35
HS-I-10-C	HS-I-10-C-S	10	1900	1680	1470	1400	7.00	1008	15 to 50	1.5	35
HS-I-10-D	HS-I-10-D-S	10	2000	2000	1943	1850	9.25	1332	35 to 110	2.0	35
HS-I-10-E	HS-I-10-E-S	10	2700	2700	2573	2450	12.25	1764	35 to 110	2.0	35
HS-I-12-D	HS-I-12-D-S	12	2000	2000	1943	1850	9.25	1332	35 to 110	2.0	35
HS-I-12-E	HS-I-12-E-S	12	3100	2940	2573	2450	12.25	1764	35 to 110	2.0	35
HS-I-12-F	HS-I-12-F-S	12	3800	3660	3200	3050	15.25	2196	35 to 110	2.0	35
HS-I-14-E	HS-I-14-E-S	14	3100	2940	2573	2450	12.25	1764	35 to 110	2.0	35
HS-I-14-F	HS-I-14-F-S	14	3800	3660	3200	3050	15.25	2196	35 to 110	2.0	35
HS-I-14-G	HS-I-14-G-S	14	4500	4320	3780	3600	18.00	2592	35 to 110	2.0	35
HS-I-16-E	HS-I-16-E-S	16	3100	2940	2573	2450	12.25	1764	35 to 110	2.0	35
HS-I-16-F	HS-I-16-F-S	16	3800	3660	3200	3050	15.25	2196	35 to 110	2.0	35
HS-I-16-G	HS-I-16-G-S	16	4500	4320	3780	3600	18.00	2592	35 to 110	2.0	35
HS-I-16-H	HS-I-16-H-S	16	6125	5880	5145	4900	24.50	3528	35 to 110	2.0	35
HS-I-18-F	HS-I-18-F-S	18	3800	3660	3200	3050	15.25	2196	35 to 110	2.0	35
HS-I-18-G	HS-I-18-G-S	18	4500	4320	3780	3600	18.00	2592	35 to 110	2.0	35
HS-I-18-H	HS-I-18-H-S	18	6125	5880	5145	4900	24.50	3528	35 to 110	2.0	35
HS-I-20-G	HS-I-20-G-S	20	4500	4320	3780	3600	18.00	2592	35 to 110	2.0	35
HS-I-20-H	HS-I-20-H-S	20	7350	5880	5145	4900	24.50	3528	35 to 110	2.0	35
HS-I-24-H	HS-I-24-H-S	24	7350	5880	5145	4900	24.50	3528	35 to 110	2.0	35
HS-I-30-H	HS-I-30-H-S	30	7350	5880	5145	4900	24.50	3528	35 to 110	2.0	35

All models have a rinse duration of 10 to 30 seconds.

The above calculated flow rates are based on good quality water. For fair, poor or bad water contact Rain Bird. Drawings of standard filter models are available at www.rainbird.com
Standard Rain Bird controllers: Auto-EC2-110V AC and Auto-EC2-9V DC (I+Series filters integrated with a Rain Bird Pump station are controlled by pump station PLC).

“E+ Series” and “E0+ Series” Electric Suction Scanning Filter

Rain Bird’s E+ and E0+ Series automatic self-cleaning water filters utilize an electric motor to assist in cleaning during the backwash cycle in turf, landscape, agriculture, greenhouse, golf course, nursery applications and emerging green and blue industries like Aquaculture. Rain Bird electric filters can operate at system pressures as low as 15 psi.

FILTER CHARACTERISTICS:

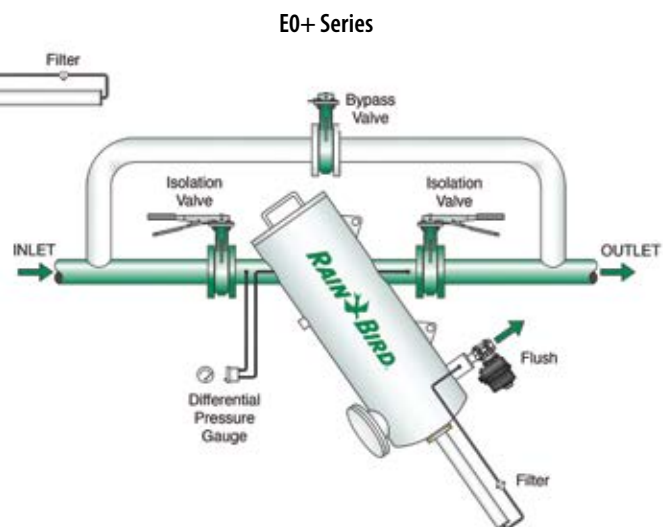
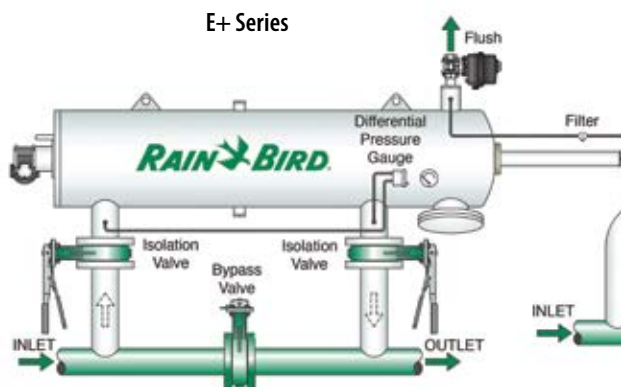
- E+ Series filters are parallel flanged
- E0+ filters are straight flanged
- Flow Rate: 15 – 7,350 gpm
- Max Temperature: 210° F
- Single electric ball valve for flushing operations standard
- 316 L stainless steel sintered screens standard
- Screen opening: 5μ – 4000μ
- Working pressure: 15 – 150 psi
- Materials of Construction: Stainless Steel, Carbon Steel, Duplex Stainless or Fiberglass Reinforce Plastic
- Available as a filter unit only, or as a filter assembly including bypass plumbing and valves



Stainless steel



Powder-coated carbon steel



“E+” and “E0+ Series” Suction Scanning Filter Performance Data

E+ Series Models		EO+ Series Models		Line Size (in.)	Standard Flow Rate (gpm)				Sintered Screen Area (ft3)	Sintered Screen Area (in²)	Flush Volume (gal)	Flush Line Size (in.)	
Powder Coated Carbon Steel	Stainless Steel	Powder Coated Carbon Steel	Stainless Steel		MICRON MESH	300 50	200 75	120 125					100 140
HS-E-02-A	HS-E-02-A-S	HS-E0-02-A	HS-E0-02-A-S	2		200	200	200	200	2.65	382	15 to 50	1.5
HS-E-03-A	HS-E-03-A-S	HS-E0-03-A	HS-E0-03-A-S	3		300	300	300	300	2.65	382	15 to 50	1.5
HS-E-04-A	HS-E-04-A-S	HS-E0-04-A	HS-E0-04-A-S	4		500	500	500	500	2.65	382	15 to 50	1.5
HS-E-04-B	HS-E-04-B-S	HS-E0-04-B	HS-E0-04-B-S	4		500	500	500	500	5.25	756	15 to 50	1.5
HS-E-04-C	HS-E-04-C-S	HS-E0-04-C	HS-E0-04-C-S	4		500	500	500	500	7.00	1008	15 to 50	1.5
HS-E-04-D	HS-E-04-D-S	HS-E0-04-D	HS-E0-04-D-S	4		500	500	500	500	9.25	1332	35 to 110	2.0
HS-E-06-A	HS-E-06-A-S	HS-E0-06-A	HS-E0-06-A-S	6		650	630	555	530	2.65	382	15 to 50	1.5
HS-E-06-B	HS-E-06-B-S	HS-E0-06-B	HS-E0-06-B-S	6		1000	1000	1000	1000	5.25	756	15 to 50	1.5
HS-E-06-C	HS-E-06-C-S	HS-E0-06-C	HS-E0-06-C-S	6		1000	1000	1000	1000	7.00	1008	15 to 50	1.5
HS-E-06-D	HS-E-06-D-S	HS-E0-06-D	HS-E0-06-D-S	6		1000	1000	1000	1000	9.25	1332	35 to 110	2.0
HS-E-08-B	HS-E-08-B-S	HS-E0-08-B	HS-E0-08-B-S	8		1400	1260	1100	1050	5.25	756	15 to 50	1.5
HS-E-08-C	HS-E-08-C-S	HS-E0-08-C	HS-E0-08-C-S	8		1700	1680	1470	1400	7.00	1008	15 to 50	1.5
HS-E-08-D	HS-E-08-D-S	HS-E0-08-D	HS-E0-08-D-S	8		2000	2000	1943	1850	9.25	1332	35 to 110	2.0
HS-E-10-C	HS-E-10-C-S	HS-E0-10-C	HS-E0-10-C-S	10		1900	1680	1470	1400	7.00	1008	15 to 50	1.5
HS-E-10-D	HS-E-10-D-S	HS-E0-10-D	HS-E0-10-D-S	10		2000	2000	1943	1850	9.25	1332	35 to 110	2.0
HS-E-10-E	HS-E-10-E-S	HS-E0-10-E	HS-E0-10-E-S	10		2700	2700	2573	2450	12.25	1764	35 to 110	2.0
HS-E-12-D	HS-E-12-D-S	HS-E0-12-D	HS-E0-12-D-S	12		2000	2000	1943	1850	9.25	1332	35 to 110	2.0
HS-E-12-E	HS-E-12-E-S	HS-E0-12-E	HS-E0-12-E-S	12		3100	2940	2573	2450	12.25	1764	35 to 110	2.0
HS-E-12-F	HS-E-12-F-S	HS-E0-12-F	HS-E0-12-F-S	12		3800	3660	3200	3050	15.25	2196	35 to 110	2.0
HS-E-14-E	HS-E-14-E-S	HS-E0-14-E	HS-E0-14-E-S	14		3100	2940	2573	2450	12.25	1764	35 to 110	2.0
HS-E-14-F	HS-E-14-F-S	HS-E0-14-F	HS-E0-14-F-S	14		3800	3660	3200	3050	15.25	2196	35 to 110	2.0
HS-E-14-G	HS-E-14-G-S	HS-E0-14-G	HS-E0-14-G-S	14		4500	4320	3780	3600	18.00	2592	35 to 110	2.0
HS-E-16-E	HS-E-16-E-S	HS-E0-16-E	HS-E0-16-E-S	16		3100	2940	2573	2450	12.25	1764	35 to 110	2.0
HS-E-16-F	HS-E-16-F-S	HS-E0-16-F	HS-E0-16-F-S	16		3800	3660	3200	3050	15.25	2196	35 to 110	2.0
HS-E-16-G	HS-E-16-G-S	HS-E0-16-G	HS-E0-16-G-S	16		4500	4320	3780	3600	18.00	2592	35 to 110	2.0
HS-E-16-H	HS-E-16-H-S	HS-E0-16-H	HS-E0-16-H-S	16		6125	5880	5145	4900	24.50	3528	35 to 110	2.0
HS-E-18-F	HS-E-18-F-S	HS-E0-18-F	HS-E0-18-F-S	18		3800	3660	3200	3050	15.25	2196	35 to 110	2.0
HS-E-18-G	HS-E-18-G-S	HS-E0-18-G	HS-E0-18-G-S	18		4500	4320	3780	3600	18.00	2592	35 to 110	2.0
HS-E-18-H	HS-E-18-H-S	HS-E0-18-H	HS-E0-18-H-S	18		6125	5880	5145	4900	24.50	3528	35 to 110	2.0
HS-E-20-G	HS-E-20-G-S	HS-E0-20-G	HS-E0-20-G-S	20		4500	4320	3780	3600	18.00	2592	35 to 110	2.0
HS-E-20-H	HS-E-20-H-S	HS-E0-20-H	HS-E0-20-H-S	20		7350	5880	5145	4900	24.50	3528	35 to 110	2.0
HS-E-24-H	HS-E-24-H-S	HS-E0-24-H	HS-E0-24-H-S	24		7350	5880	5145	4900	24.50	3528	35 to 110	2.0
HS-E-30-H	HS-E-30-H-S	HS-E0-30-H	HS-E0-30-H-S	30		7350	5880	5145	4900	24.50	3528	35 to 110	2.0

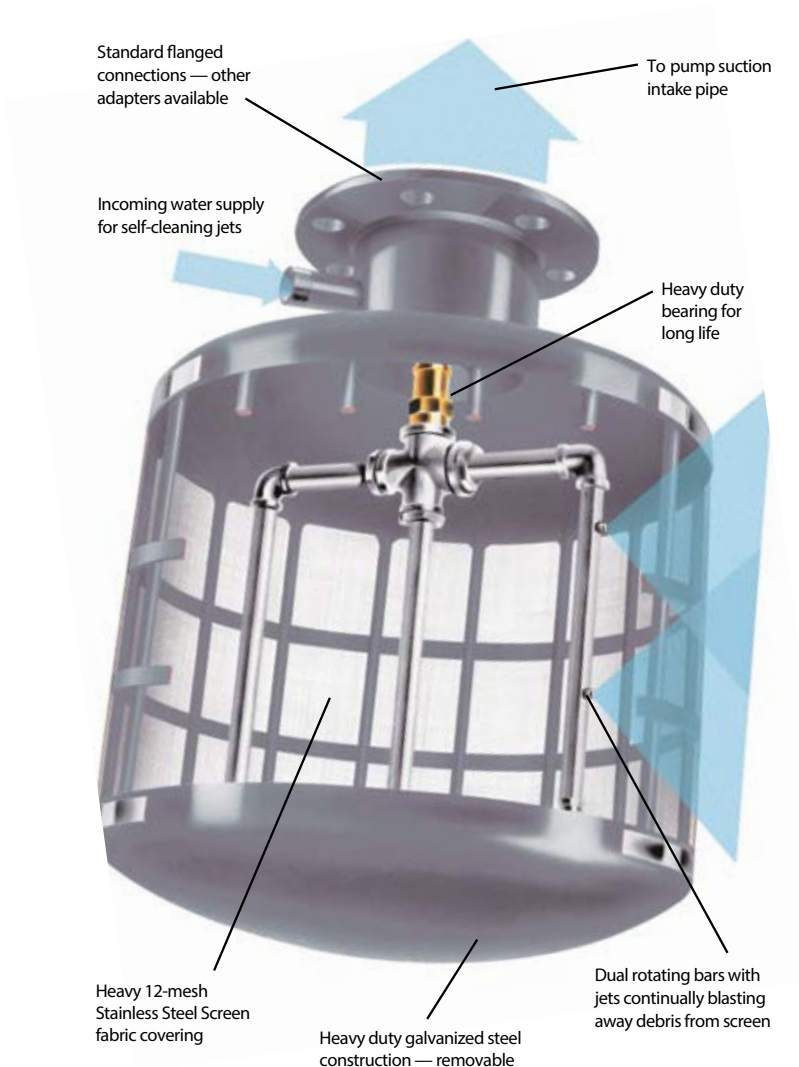
The above calculated flow rates are based on good quality water. For fair, poor or bad water contact Rain Bird. Drawings of standard filter models are available at www.rainbird.com
Standard Rain Bird controllers: Auto-EC-2-E 110/220V (Series filters integrated with a Rain Bird Pump station are controlled by pump station PLC).

Self-Cleaning Pump Suction Screen

Keep Debris Out of Your Pumping and Irrigation System

FEATURES

- Galvanized, self-cleaning pump suction screen removes large trash and debris from water sources, saving time and money in energy, pumping efficiency and maintenance costs
- Heavy 12 or 24 mesh stainless steel screen increases your pump efficiency for many years to come
- All water must pass through the pump suction screen attached to the end of the pump suction line before entering the pump intake pipe. A small, side-stream from the pump discharge plumbing drives two spray bars that continually rotate, jetting water at the screen and blasting debris away



Self-Cleaning Pump Suction Screen Performance Data

12 Mesh Filter										
Model Number	Flow US gpm	Flow m ³ /h	Screen Length (in)	Total Length (in)	Screen Diameter (in)	Flange Size (in)	Return Inlet Pipe Size (in)	Operating Pressure (min - max psi)	Weight Lbs.	Cleaning Spray (gpm)
PSS200	325	73.8	11	25	16	4	1.5	35-100	38	20
PSS400	550	124.9	15	28.8	16	6	1.5	40-100	57	20
PSS600	750	170.3	16	32.5	24	8	1.5	40-100	101	20
PSS800	950	215.7	18	34.5	24	10	1.5	45-100	108	20
PSS1000	1350	306.5	23	39.5	24	10	1.5	50-100	116	24
PSS1400	1650	374.6	26	42.5	24	12	1.5	55-100	128	24
PSS1700	1950	442.7	28	44.5	26	12	1.5	55-100	148	24
PSS2000	2350	533.5	32	48.5	26	14	1.5	60-100	160	24
PSS2400	2600	590.2	35	52.5	30	16	1.5	65-100	233	28
PSS3000	3000	681.0	40	57.5	30	16	1.5	40-65	236	44
PSS3500	3500	794.5	40	59.5	36	18	1.5	40-65	283	44
PSS4000	4000	908.0	40	63.5	42	18	1.5	40-65	358	44
PSS400024-G	2765	627.7	40	63.5	42	18	1.5	40-65	358	44

Additional Filtration Products

Rain Bird offers an extensive line of filtration products to fit any course need. For more information about these products, contact Rain Bird Filter Department at filters@rainbird.com or 1-877-646-9532.

"C+ Series"

- Automatic hydraulic suction scanning screen filters



"G Series" Hydraulic Suction Scanning Screen Filter

- Economy and value with lower backwash volumes.



HDF 1x2 Disc Filters

- Automatic self-cleaning 2" filter for low flow ranges



HDF 2 Disc Filters

- Automatic self-cleaning disc filtration equipment with 2" valves and high density polyethylene manifold



Centrifugal Sand Separators

- Remove contaminants to minimize required maintenance and increase efficiency

Landscape Solutions

Properly maintained clubhouse grounds and landscapes enhance the environment upon which the game is played, and create positive impressions that encourage repeat rounds or an increase in memberships. Rain Bird offers a number of landscape irrigation solutions — from sprays and nozzles to low-volume drip and root watering systems — that manage water responsibly, while promoting the growth of healthy, stress-free plants and grass areas. For a complete listing of landscape products, please consult the Rain Bird Landscape Irrigation Products–2017 Catalog.



RD1800™ Series Spray Heads

4", 6", 12" (10.2 cm; 15.2 cm; 30.5 cm)

- Designed for use with all Rain Bird plastic spray head nozzles – Rotary Nozzles, U-Series, MPR, VAN, HE-VAN and SQ Series
- Parts resistant to corrosion in treated recycled water containing chlorine and other chemicals
- Strong stainless steel spring provides reliable stem retraction and withstands corrosion
- Exclusive co-molded, pressure-activated Triple-Blade Wiper Seal ensures a positive seal without excess "flow-by", which enables more heads to be installed on the same valve.
- Debris pockets in the base of the spray body prevent recirculation of harmful debris during operation.
- Reinforced ratchet mechanism allows easy nozzle pattern alignment without tools, withstands chemicals and prevents pattern misalignment over time.
- Pre-installed 1800 Pop-Top™ flush plug blocks debris from entering after flushing and allows for easy nozzle installation.
- UV-resistant plastic and stainless steel parts, assure long product life.
- All sprinkler components are removable from the top without special tools, for quick and easy flushing and maintenance.
- Side inlets featured on non Seal-A-Matic™ (SAM) models only.
- Five-year trade warranty.

Spacing: 2.5 to 24 feet (0.8 to 7.3 m)

Pressure: SAM Models: 15 to 100 psi (1.0 to 6.9 bar)
All Other Models: 15 to 70 psi
(1.0 to 4.8 bar)

SPECIFICATIONS

Flow-by: SAM Models: 0 at 15 psi (1.0 bar) or greater; 0.5 gpm (0.1 m³/h; 0.03 l/s) otherwise

All Other Models: 0 at 10 psi (0.7 bar) or greater; 0.5 gpm (0.1 m³/h; 0.03 l/s) otherwise

- ½" (15/21) NPT female threaded inlet

• Models and Height:

- **RD-04:** 6" (15 cm) body height; 4" pop-up height (10.2 cm)
- **RD-06:** 9 3/8" (24 cm) body height; 6" pop-up height (15.2 cm)
- **RD-12:** 16" (40 cm) body height; 12" pop-up height (30.5 cm)
- **Exposed surface diameter:** 2 ¼" (5.7 cm)

RD1800 SAM PRS Series

4", 6", 12" (10.2 cm, 15.2 cm, 30.5 cm)

- Incorporates all RD1800 series SAM and PRS features
- Built-in Seal-A-Matic™ (SAM) check valve. Eliminates the need for under-the-head check valves. No parts to be installed at the site
- Stronger retract spring to accommodate elevation changes up to 14' (4.2 m). One of the strongest springs in the industry
- Prevents drainage from spray heads at lower elevations. Stops water waste. Ends landscape damage due to flooding and erosion
- Ideal for use in areas with changing elevations
- Retains water in lateral pipes which reduces wear on system components by minimizing water hammer during start-up
- Adjusts to fluctuating pressure, optimizing flow and promoting a more consistent spray pattern.
- Ends misting and fogging caused by high pressure. Stops water waste. Ensures necessary watering occurs in high pressure or wind conditions.
- "SAM-PRS" stamped on the cap for easy identification and maintenance

4" Models	6" Models	12" Models
RD-04-NP	RD-06-NP-NSI	RD-12-S-P30
RD-04-S-P30	RD-06-S-P30	RD-12-S-P30-F
RD-04-S-P30-F	RD-06-S-P30-F	RD-12-S-P30-F-N
RD-04-S-P30-F-N	RD-06-S-P30-F-N	RD-12-S-P30-NP
RD-04-S-P30-NP	RD-06-S-P30-NP	RD-12-S-P45-F
RD-04-S-P45-F	RD-06-S-P45-F	RD-12-S-P45-F-N
RD-04-S-P45-F-N	RD-06-S-P45-F-N	RD-12-S-P45-NP
RD-04-S-P45-NP	RD-06-S-P45-NP	



● RD1800 Series

HOW TO SPECIFY

RD-XX - X

Model
RD-04
RD-06
RD-12

Optional Feature
S: SAM

P30: 30 psi (2.1 bar) PRS

P45: 45 psi (3.1 bar) PRS

F: Flow Shield™

NP: Non-Potable Water indication

Exclusive Flow-Shield™ Technology

Exclusive Flow-Shield™ Technology provides up to 90% reduction in water loss when a nozzle is removed, preventing potentially costly and unacceptable run-off.



Low-Flow Service Indication Stream

Exclusive Flow-Shield Technology delivers a low-flow service indication stream when a nozzle is removed. As a result, system performance is maintained, water is saved and you don't have to wait until you have brown grass or dead plants to notice something's wrong.

Patented Pressure Regulator

The RD1800's patented pressure regulator increases nozzle efficiency by up to 50% in high pressure applications.



Triple-Blade Wiper Seal

The RD1800™ series features an exclusive Triple-Blade Wiper Seal. The top seal flushes during pop-up and wipes the stem clean during retraction, preventing external debris from entering. During operation, the primary seal combines with the stem's surface to eliminate flow-by. The exclusive third blade provides another line of defense, in case the primary seal is damaged.



Reinforced Ratchet Mechanism

The RD1800's ratchet mechanism was designed to improve ease of use and consistency, hold its setting over time, withstand years of chlorine exposure and provide greater debris resistance.

Seal-A-Matic™ (SAM) Check Valve

Exclusive to Rain Bird, the SAM check valve holds back up to 14 feet of head and helps eliminate low head drainage, erosion, run-off and water hammer at start-up.

Reclaimed Water Resistance

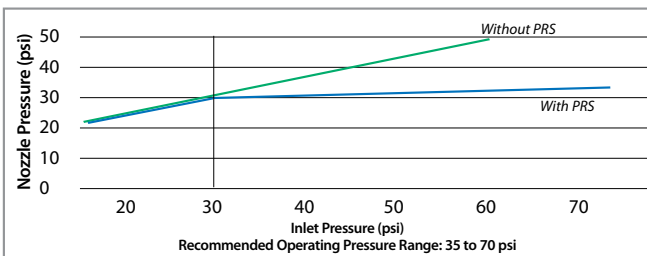
The RD1800 Series is designed with reclaimed water resistant materials such as EPDM and Polyester. These materials resist degradation caused by chlorine in reclaimed water, ensuring a longer life.

Unique Debris Pockets

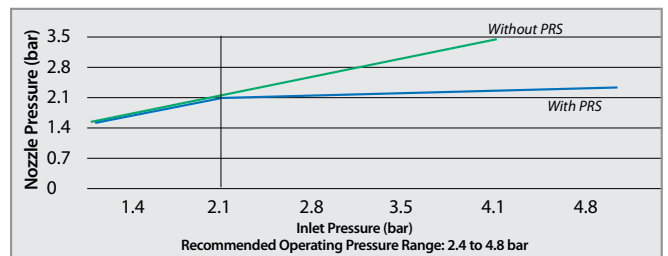
With each system start-up, the RD1800's unique debris pockets hold grit in place—removing it from circulation and preventing long-term damage.



RD1800-PRS Performance



RD1800-PRS Performance



R-VAN18

Adjustable Arc Rotary Nozzle

FEATURES

- Adjust arc and radius without tools.
- Low precipitation rate reduces run-off and erosion.
- Maintains efficient performance at high operating pressures without misting or fogging.
- Compatible with all models of Rain Bird spray bodies in addition to a wide variety of risers and adapters.
- Matched precipitation rates across radius and arcs simplify the design process.
- Installing with Rain Bird 5000 series rotor matched precipitation rate (MPR) nozzles allows for mixed-zone irrigation designs from 13' to 35' (4.0 m to 10.7 m).
- Meets the requirements of the ASABE/ICC 802-2014 standard with a DU(LQ) of >0.70.¹
- Three-year trade warranty.

OPERATING RANGE

Pressure range: 30-55 psi (2.1 to 3.8 bar)

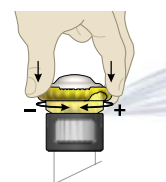
Spacing: 13' to 18' (4.0 m to 5.5 m)

Recommended Operating Pressure: 45 psi (3.1 bar)

¹ Distribution Uniformity (DULQ): DU in irrigation is a measure of how uniformly water is applied to the area being watered. DULQ is calculated by taking the volume in the lowest quarter of catch can measurements and dividing it by the average volume of all catch can measurements.

Installation on Rain Bird 1800-P45 spray bodies recommended. Installation on Rain Bird spray bodies with SAM check valve recommended in sandy environments.

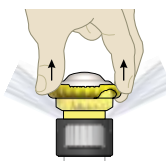
R-VAN18



Arc Adjustment



Radius Adjustment

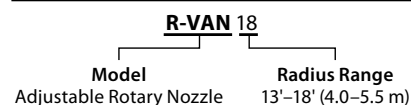


Flush Debris



● R-VAN18

HOW TO SPECIFY



U.S. Data						Metric Data				
Arc	Pressure (psi)	Radius (ft)	Flow (gpm)	Precip (in/hr)	Precip (in/hr)	Pressure (bar)	Radius (m)	Flow (l/m)	Precip (mm/h)	Precip (mm/h)
270°	30	16	1.26	0.65	0.75	2.1	4.9	4.77	17	19
	35	16	1.35	0.64	0.74	2.4	4.9	5.11	16	19
	40	17	1.42	0.63	0.73	2.8	5.2	5.38	16	18
	45	17	1.51	0.64	0.73	3.1	5.2	5.72	16	18
	50	18	1.57	0.60	0.69	3.4	5.5	5.94	15	18
	55	18	1.62	0.60	0.69	3.8	5.5	6.13	15	18
180°	30	16	0.85	0.65	0.75	2.1	4.9	3.22	17	19
	35	16	0.91	0.64	0.74	2.4	4.9	3.44	16	19
	40	17	0.98	0.63	0.73	2.8	5.2	3.71	16	18
	45	17	1.01	0.64	0.73	3.1	5.2	3.82	16	18
	50	18	1.07	0.60	0.69	3.4	5.5	4.05	15	18
	55	18	1.09	0.60	0.69	3.8	5.5	4.13	15	18
90°	30	16	0.42	0.65	0.75	2.1	4.9	1.59	17	19
	35	16	0.47	0.64	0.74	2.4	4.9	1.78	16	19
	40	17	0.50	0.63	0.73	2.8	5.2	1.89	16	18
	45	17	0.50	0.64	0.73	3.1	5.2	1.89	16	18
	50	18	0.54	0.60	0.69	3.4	5.5	2.04	15	18
	55	18	0.58	0.60	0.69	3.8	5.5	2.20	15	18

Note: All R-VAN Nozzles tested on 4" (10.2 cm) pop-ups. Performance data taken in zero-wind conditions. Radius reduction over 25% of the normal throw of the nozzle is not recommended.

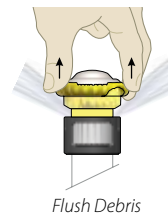
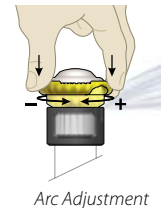
■ ▲ Square and triangular spacing based on 50% diameter of throw

R-VAN1724

Adjustable Arc Rotary Nozzle

FEATURES

- Adjust arc and radius without tools.
- Low precipitation rate reduces run-off and erosion.
- Maintains efficient performance at high operating pressures without misting or fogging.
- Compatible with all models of Rain Bird spray bodies in addition to a wide variety of risers and adapters.
- Matched precipitation rates across radius and arcs simplify the design process.
- Installing with Rain Bird 5000 series rotor matched precipitation rate (MPR) nozzles allows for MPR irrigation designs from 13' to 35' (4.0 m to 10.7 m).
- Meets the requirements of the ASABE/ICC 802-2014 standard with a DU(LQ) of >0.70.¹
- Three-year trade warranty.



● R-VAN1724

OPERATING RANGE

Pressure range: 20-55 psi (1.4 to 3.8 bar)

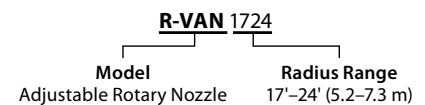
Spacing: 17' to 24' (5.2 m to 7.3 m)

Recommended Operating Pressure: 45 psi (3.1 bar)

¹ Distribution Uniformity (DULQ): DU in irrigation is a measure of how uniformly water is applied to the area being watered. DULQ is calculated by taking the volume in the lowest quarter of catch can measurements and dividing it by the average volume of all catch can measurements.

Installation on Rain Bird 1800-P45 spray bodies recommended. Installation on Rain Bird spray bodies with SAM check valve recommended in sandy environments.

HOW TO SPECIFY



R-VAN1724

U.S. Data						Metric Data				
Arc	Pressure (psi)	Radius (ft)	Flow (gpm)	Precip (in/hr)	Precip (mm/hr)	Pressure (bar)	Radius (m)	Flow (l/m)	Precip (mm/h)	Precip (mm/h)
270°	30	21	2.26	0.70	0.81	2.1	6.4	8.56	18	21
	35	22	2.39	0.66	0.76	2.4	6.7	9.05	17	19
	40	23	2.55	0.63	0.73	2.8	7.0	9.65	16	18
	45	23	2.73	0.64	0.73	3.1	7.0	10.33	16	18
	50	24	2.76	0.61	0.70	3.4	7.3	10.45	15	18
	55	24	2.80	0.61	0.70	3.8	7.3	10.60	15	18
180°	30	21	1.41	0.70	0.81	2.1	6.4	5.34	18	21
	35	22	1.55	0.66	0.76	2.4	6.7	5.87	17	19
	40	23	1.69	0.63	0.73	2.8	7.0	6.40	16	18
	45	23	1.83	0.64	0.73	3.1	7.0	6.93	16	18
	50	24	1.91	0.61	0.70	3.4	7.3	7.23	15	18
	55	24	1.98	0.61	0.70	3.8	7.3	7.50	15	18
90°	30	21	0.73	0.70	0.81	2.1	6.4	2.76	18	21
	35	22	0.78	0.66	0.76	2.4	6.7	2.95	17	19
	40	23	0.85	0.63	0.73	2.8	7.0	3.22	16	18
	45	23	0.91	0.64	0.73	3.1	7.0	3.44	16	18
	50	24	0.98	0.61	0.70	3.4	7.3	3.71	15	18
	55	24	1.05	0.61	0.70	3.8	7.3	3.97	15	18

Note: All R-VAN Nozzles tested on 4" (10.2 cm) pop-ups. Performance data taken in zero-wind conditions. Radius reduction over 25% of the normal throw of the nozzle is not recommended.

■ ▲ Square and triangular spacing based on 50% diameter of throw

Full-Circle Rotary Nozzles

Low precipitation rate of 0.60 in/hr (15.2 mm/hr)
from 13' to 24' feet.

FEATURES

- Greater distribution uniformity keeps your landscape green without overwatering.
- Thick wind-resistant streams and large water droplets resist prevailing winds and maximize water landing in the target zone.
- Low 0.6"/hr precipitation reduces or eliminates run-off on slopes and hard clay soils with 35% less run time than the leading competitor.
- Matched precipitation rates enable large and small turf areas to be zoned together by mixing R-Series rotary nozzles, R-VAN and 5000 series rotors with the MPR nozzle set.
- Meets the requirements of the ASABE/ICC 802-2014 standard with a DU(LQ) of >0.70.¹
- Three-year trade warranty.

OPERATING RANGE

Pressure range: 20-55 psi (1.4 to 3.8 bar)²

Spacing: 13' to 24' (4.0 m to 7.3 m)

Recommended Operating Pressure: 45 psi (3.1 bar)³

¹ Distribution Uniformity (DULQ): DU in irrigation is a measure of how uniformly water is applied to the area being watered. DULQ is calculated by taking the volume in the lowest quarter of catch can measurements and dividing it by the average volume of all catch can measurements.

² These ranges are based on proper pressure at nozzle.

³ Rain Bird recommends using 1800 P45 spray bodies to maintain optimum nozzle performance in higher pressure situations.

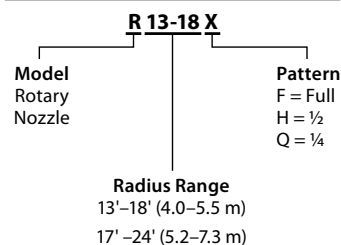
MODELS

- There are three different patterns available, in two radius ranges:
 - 13' to 18' (4.0 m to 5.5 m)
 - 17' to 24' (5.2 m to 7.3 m)



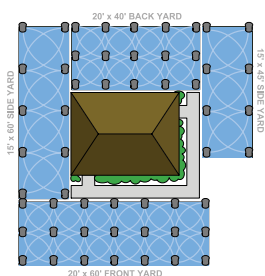
● Rotary Nozzle

HOW TO SPECIFY



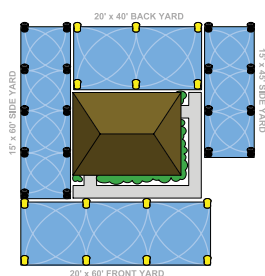
Note: Installation on Rain Bird® 1800®-SAM spray bodies recommended in sandy environments.

With Conventional Spray Nozzles



- Total 58 gpm
- 6 zones required

With Rotary Nozzles



- Total 26 gpm
- 3 zones required



R13-18 Series (Black)

Arc	U.S. Data			Metric Data	
	Pressure (psi)	Radius (ft)	Flow (gpm)	Precip (in/hr)	Precip (mm/h)
R13-18F	30	16	1.60	0.61	0.70
	35	16	1.73	0.61	0.70
	40	17	1.85	0.61	0.70
	45	18	1.96	0.61	0.70
	50	18	2.07	0.61	0.70
	55	18	2.17	0.61	0.70
	Pressure (bar)	Radius (m)	Flow (l/m)	Precip (mm/h)	Precip (mm/h)
	2.1	4.8	6.06	15	18
	2.4	5.0	6.54	15	18
	2.8	5.2	6.99	15	18
	3.1	5.4	7.42	15	18
	3.4	5.5	7.82	15	18
	3.8	5.6	8.20	15	18

R17-24 Series (YELLOW)

R17-24F	30	21	3.00	0.65	0.75
	35	22	3.24	0.65	0.75
	40	23	3.46	0.65	0.75
	45	23	3.67	0.65	0.75
	50	24	3.87	0.65	0.75
	55	24	4.06	0.65	0.75
	Pressure (bar)	Radius (m)	Flow (l/m)	Precip (mm/h)	Precip (mm/h)
	2.1	6.4	11.36	16	19
	2.4	6.7	12.26	16	19
	2.8	6.9	13.10	16	19
	3.1	7.1	13.89	16	19
	3.4	7.3	14.65	16	19
	3.8	7.4	15.37	16	19

R-VAN and R-Series nozzles can be installed on the same zone as the 5000 series MPR rotors.

- Matched precipitation rate (MPR) from 13' to 35'
- Superior coverage — >0.70 DU(LQ)
- Thick, wind-resistant streams



HE-VAN Series Nozzles

High-Efficiency Variable Arc Spray Nozzles

FEATURES

- HE-VAN's even coverage allows you to shorten run times by up to 35%, saving you water and money, while still maintaining a healthy lawn. HE-VAN has more than a 40 percent even-coverage improvement over existing variable arc nozzles.
- HE-VAN nozzles have a unique stream pattern, designed for superior coverage and wind resistance. Low-trajectory spray and large water droplets prevent misting and airborne evaporation so the right amount of water is delivered to the right place. Gentle close-in watering eliminates dry-spots around the spray head.
- HE-VAN nozzles throw to the exact specified radius, delivering the cleanest edge of any VAN on the market today.
- Reduced zone run times, compared to competitive nozzles, help stay within tight watering windows, conserve water and save money.
- With full adjustability from 0° to 360°, you'll be able to efficiently water landscapes of all shapes, while saving time and stocking fewer nozzles.
- Matched precipitation rates allow you to install Rain Bird® HE-VAN, MPR and U-Series nozzles on the same zone.
- Fits on all Rain Bird® 1800® series spray heads, UNI-Spray™ series spray heads and Rain Bird shrub adapters.
- Meets the requirements of the ASABE/ICC 802-2014 standard with a DU(LQ) of >0.70.¹
- Three year trade warranty.

OPERATING RANGE*

Spacing: 6 to 15 feet (1.8 to 4.6 m)²

Pressure: 15 to 30 psi (1.0 to 2.1 bar)

Optimum Pressure: 30 psi (2.1 bar)³

MODELS

HE-VAN-08: 6 to 8 feet (1.8 to 2.4 m)

HE-VAN-10: 8 to 10 feet (2.4 to 3.0 m)

HE-VAN-12: 9 to 12 feet (2.7 to 3.7 m)

HE-VAN-15: 12 to 15 feet (3.7 to 4.6 m)

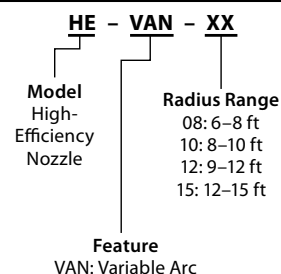
¹ Distribution Uniformity (DULQ): DU in irrigation is a measure of how uniformly water is applied to the area being watered. DULQ is calculated by taking the volume in the lowest quarter of catch can measurements and dividing it by the average volume of all catch can measurements.

² These ranges are based on proper pressure at nozzle





³ Rain Bird recommends using 1800 PRS Spray Bodies to maintain optimum nozzle performance in higher pressure situations







HOW TO SPECIFY



8 Series HE-VAN — 24° Trajectory

U.S. Data						Metric Data					
Nozzle	Pressure (psi)	Radius (ft)	Flow (gpm)	Precip (in/hr)	Precip (in/hr)	Pressure (Bar)	Radius (m)	Flow (m ³ /h)	Flow (l/m)	Precip (mm/h)	Precip (mm/h)
	15	5	0.83	3.19	3.68	1.03	1.52	0.19	3.14	82	95
	20	6	0.96	2.56	2.95	1.38	1.83	0.22	3.62	66	76
	25	7	1.07	2.10	2.42	1.72	2.13	0.25	4.05	54	62
	30	8	1.17	1.76	2.03	2.07	2.44	0.27	4.43	45	52
	15	5	0.62	3.19	3.68	1.03	1.52	0.14	2.35	82	95
	20	6	0.72	2.56	2.95	1.38	1.83	0.16	2.72	66	76
	25	7	0.80	2.10	2.42	1.72	2.13	0.18	3.04	54	62
	30	8	0.88	1.76	2.03	2.07	2.44	0.20	3.33	45	52
	15	5	0.41	3.19	3.68	1.03	1.52	0.10	1.57	82	95
	20	6	0.48	2.56	2.95	1.38	1.83	0.11	1.81	66	76
	25	7	0.53	2.10	2.42	1.72	2.13	0.12	2.02	54	62
	30	8	0.59	1.76	2.03	2.07	2.44	0.13	2.22	45	52
	15	5	0.21	3.19	3.68	1.03	1.52	0.05	0.78	82	95
	20	6	0.24	2.56	2.95	1.38	1.83	0.05	0.91	66	76
	25	7	0.27	2.10	2.42	1.72	2.13	0.06	1.01	54	62
	30	8	0.29	1.76	2.03	2.07	2.44	0.07	1.11	45	52





10 Series HE-VAN — 27° Trajectory

U.S. Data						Metric Data					
Nozzle	Pressure (psi)	Radius (ft)	Flow (gpm)	Precip (in/hr)	Precip (in/hr)	Pressure (Bar)	Radius (m)	Flow (m ³ /h)	Flow (l/m)	Precip (mm/h)	Precip (mm/h)
	15	7	1.26	2.48	2.86	1.03	2.13	0.29	4.78	64	74
	20	8	1.46	2.19	2.53	1.38	2.44	0.34	5.52	56	65
	25	9	1.63	1.94	2.24	1.72	2.74	0.37	6.17	50	57
	30	10	1.78	1.72	1.98	2.07	3.05	0.41	6.76	44	51
	15	7	0.95	2.48	2.86	1.03	2.13	0.22	3.59	64	74
	20	8	1.09	2.19	2.53	1.38	2.44	0.25	4.14	56	65
	25	9	1.22	1.94	2.24	1.72	2.74	0.28	4.63	50	57
	30	10	1.34	1.72	1.98	2.07	3.05	0.31	5.07	44	51
	15	7	0.63	2.48	2.86	1.03	2.13	0.15	2.39	64	74
	20	8	0.73	2.19	2.53	1.38	2.44	0.17	2.76	56	65
	25	9	0.81	1.94	2.24	1.72	2.74	0.19	3.09	50	57
	30	10	0.89	1.72	1.98	2.07	3.05	0.21	3.38	44	51
	15	7	0.32	2.48	2.86	1.03	2.13	0.07	1.20	64	74
	20	8	0.36	2.19	2.53	1.38	2.44	0.08	1.38	56	65
	25	9	0.41	1.94	2.24	1.72	2.74	0.09	1.54	50	57
	30	10	0.45	1.72	1.98	2.07	3.05	0.10	1.69	44	51





NOTE: Turning the radius reduction screw may be required to achieve catalog radius and flow when the arc is set at less than maximum.

■ Square spacing based on 50% diameter of throw. ▲ Triangular spacing based on 50% diameter of throw. Performance data taken in zero wind conditions.

12 Series HE-VAN — 23° Trajectory

U.S. Data						Metric Data					
Nozzle	Pressure (psi)	Radius (ft)	Flow (gpm)	Precip (in/hr)	Precip (in/hr)	Pressure (Bar)	Radius (m)	Flow (m³/h)	Flow (l/m)	Precip (mm/h)	Precip (mm/h)
	15	9	1.67	1.99	2.30	1.0	2.7	0.38	6.33	50.5	58.3
	20	10	1.93	1.86	2.15	1.4	3.0	0.44	7.31	47.3	54.6
	25	11	2.16	1.72	1.99	1.7	3.4	0.49	8.18	43.7	50.4
	30	12	2.37	1.58	1.83	2.1	3.7	0.54	8.96	40.2	46.4
	15	9	1.25	1.99	2.30	1.0	2.7	0.28	4.75	50.5	58.3
	20	10	1.45	1.86	2.15	1.4	3.0	0.33	5.48	47.3	54.6
	25	11	1.62	1.72	1.99	1.7	3.4	0.37	6.16	43.7	50.4
	30	12	1.77	1.58	1.83	2.1	3.7	0.40	6.72	40.2	46.4
	15	9	0.84	1.99	2.30	1.0	2.7	0.19	3.17	50.5	58.3
	20	10	0.97	1.86	2.15	1.4	3.0	0.22	3.66	47.3	54.6
	25	11	1.08	1.72	1.99	1.7	3.4	0.25	4.09	43.7	50.4
	30	12	1.18	1.58	1.83	2.1	3.7	0.27	4.48	40.2	46.4
	15	9	0.42	1.99	2.30	1.0	2.7	0.09	1.58	50.5	58.3
	20	10	0.48	1.86	2.15	1.4	3.0	0.11	1.83	47.3	54.6
	25	11	0.54	1.72	1.99	1.7	3.4	0.12	2.04	43.7	50.4
	30	12	0.59	1.58	1.83	2.1	3.7	0.13	2.24	40.2	46.4

15 Series HE-VAN — 25° Trajectory

U.S. Data						Metric Data					
Nozzle	Pressure (psi)	Radius (ft)	Flow (gpm)	Precip (in/hr)	Precip (in/hr)	Pressure (Bar)	Radius (m)	Flow (m³/h)	Flow (l/m)	Precip (mm/h)	Precip (mm/h)
	15	11	2.62	2.08	2.40	1.0	3.4	0.59	9.91	52.9	61.1
	20	12	3.02	2.02	2.33	1.4	3.7	0.69	11.44	51.3	59.3
	25	14	3.38	1.66	1.92	1.7	4.3	0.77	12.79	42.2	48.7
	30	15	3.70	1.58	1.83	2.1	4.6	0.84	14.01	40.2	46.5
	15	11	1.96	2.08	2.40	1.0	3.4	0.45	7.43	52.9	61.1
	20	12	2.27	2.02	2.33	1.4	3.7	0.51	8.58	51.3	59.3
	25	14	2.53	1.66	1.92	1.7	4.3	0.58	9.59	42.2	48.7
	30	15	2.78	1.58	1.83	2.1	4.6	0.63	10.51	40.2	46.5
	15	11	1.31	2.08	2.40	1.0	3.4	0.30	4.95	52.9	61.1
	20	12	1.51	2.02	2.33	1.4	3.7	0.34	5.72	51.3	59.3
	25	14	1.69	1.66	1.92	1.7	4.3	0.38	6.39	42.2	48.7
	30	15	1.85	1.58	1.83	2.1	4.6	0.42	7.00	40.2	46.5
	15	11	0.65	2.08	2.40	1.0	3.4	0.15	2.48	52.9	61.1
	20	12	0.76	2.02	2.33	1.4	3.7	0.17	2.86	51.3	59.3
	25	14	0.84	1.66	1.92	1.7	4.3	0.19	3.20	42.2	48.7
	30	15	0.93	1.58	1.83	2.1	4.6	0.21	3.50	40.2	46.5

NOTE: Turning the radius reduction screw may be required to achieve catalog radius and flow when the arc is set at less than maximum.

■ Square spacing based on 50% diameter of throw. ▲ Triangular spacing based on 50% diameter of throw. Performance data taken in zero wind conditions.

RWS (Root Watering System)

Root watering system promotes deep root growth, healthy tree development and accelerated growth.

FEATURES AND BENEFITS

- Subsurface aeration and irrigation prevents tree and shrub transplant shock.
- Highest efficiency solution for tree irrigation — up to 95% emission uniformity with minimal wind, evaporation, or edge control losses.
- Aesthetically designed subsurface bubbler contributes to a landscape's natural appearance.
- Locking grate at grade deters vandals, protects the emission device and reduces risk of injury.
- Helps prevent shallow root growth and costly damage to hardscape.
- Self-contained and factory-assembled units for assured reliability.
- Variety of models available to accommodate design flexibility.

For the RWS Model:

- 4" (10 cm) retaining cap and vandal-resistant locking grate tops a 36" (91 cm) semi-rigid mesh tube.
- Factory installed swing assemblies (excluding RWS) with a 1401 (0.25 gpm; 0.95 l/m), 1402 (0.5 gpm; 1.9 l/m), or 1404 (1.00 gpm; 3.8 l/m) bubbler on a fixed riser makes connecting to lateral lines easy.
- Optional check valve included to keep the lines from draining.
- Optional sand sock is ideal for use in fine soils.

For the RWS-Mini:

- 4" (10.2 cm) retaining cap and vandal resistant locking grate tops a 18" (46 cm) semi-rigid mesh tube.
- Factory-installed ½" (1 cm) spiral barb elbow with a 1401 or 1402 bubbler makes connecting to lateral lines easy.
- Optional check valve included to keep the lines from draining.
- Optional sand sock is ideal for use in fine soils.

For the RWS-Supplemental:

- 2" (5.1 cm) snap-on cap and base cap enclose a 10" (25 cm) semi-rigid mesh tube.
- Factory installed ½" (1 cm) spiral barb elbow with 1401 bubbler makes connecting to lateral lines easy.
- Optional check valve included to keep the lines from draining.
- Optional sand sock for use in fine soils.
- Perfect for shrubs.



RWS integrated collar and locking grate retainer.



RWS-Sock

Designed to fit over the outside of the unit. Ideal for use in sandy soil, it will deter fine soil from infiltrating the RWS canister.



HOW TO SPECIFY

RWS - X - X - X - XXXX				
Model RWS				Bubbler Model
				Optional C = Check Valve
				1401 1402 1404
				Bubbler B = Bubbler pre-installed
				Other Size M = Mini S = Supplemental

DIMENSIONS

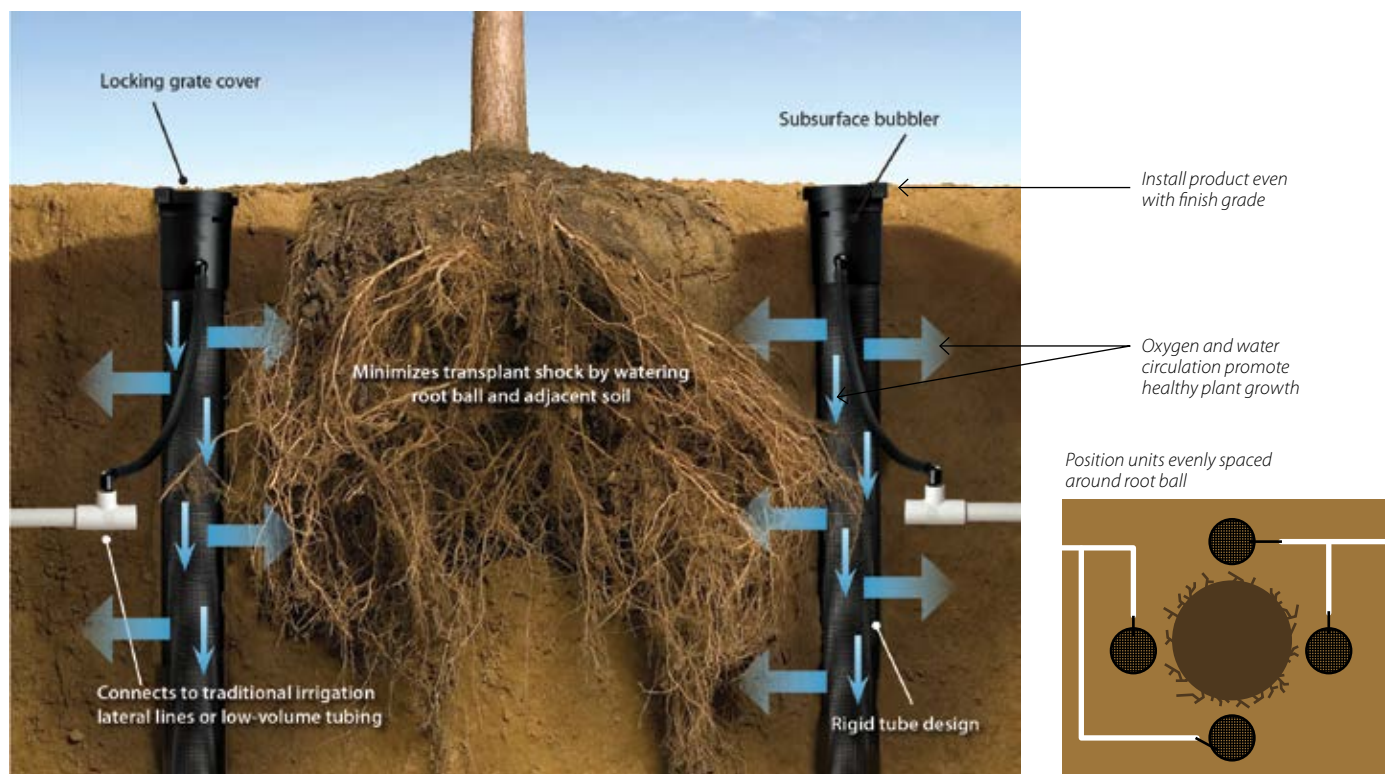
Root Watering: 4" (10 cm) diameter x 36" (91 cm) length

Root Watering-Mini: 4" (10 cm) diameter x 18" (46 cm) length

Root Watering-Supplemental: 2" (5 cm) diameter x 10" (25 cm) length

RWS Models/Specifications

Model	Bubbler	Check Valve	Swing Assembly with ½" (1.3 cm) (15/21) M NPT Inlet	Spiral Barb Elbow with ½" (1.3 cm) (15/21) M NPT inlet
Root Watering — 36" (91 cm) length with 4" (10 cm) vandal-resistant locking grate				
RWS	Ideal for ¼" drip tubing or customer-provided hardware	—	—	—
RWS-B-C-1401	0.25 gpm (0.95 l/m)	Yes	Yes	—
RWS-B-1401	0.25 gpm (0.95 l/m)	—	Yes	—
RWS-B-X-1401	0.25 gpm (0.95 l/m)	—	Yes (18" with no elbow)	—
RWS-B-C-1402	0.50 gpm (1.90 l/m)	Yes	Yes	—
RWS-B-1402	0.50 gpm (1.90 l/m)	—	Yes	—
RWS-B-C-1404	1.00 gpm (3.80 l/m)	Yes	Yes	—
Root Watering-Mini — 18" (46 cm) length with 4" (10 cm) vandal-resistant locking grate				
RWS-M	Ideal for ¼" drip tubing or customer-provided hardware	—	—	—
RWS-M-B-C-1041	0.25 gpm (0.95 lpm)	Yes	—	Yes
RWS-M-B-1401	0.25 gpm (0.95 lpm)	—	—	Yes
RWS-M-B-C-1402	0.50 gpm (1.90 lpm)	Yes	—	Yes
RWS-M-B-1402	0.50 gpm (1.90 lpm)	—	—	Yes
Root Watering-Supplemental — 10" (25 cm) length with 2" (5 cm) snap-on cap and base				
RWS-S-B-C-1401	0.25 gpm (0.95 lpm)	Yes	—	Yes
RWS-S-B-1401	0.25 gpm (0.95 lpm)	—	—	Yes
Root Watering-Accessories				
RWS-SOCK (Root Watering Sock) (6 per bag)				
RWS-GRATE-P (Root Watering Series Purple Grate for RWS and RWS Mini)e for RWS and RWS-M)				



XFS Copper-Colored Sub-Surface Dripline with Copper Shield™ Technology

Sub-surface drip irrigation (SDI) ideal for small, narrow and tight planting areas near clubhouses, parking lot mediums, walkways and cart paths, bunker facings and under turf grass. Also perfect for installation on greens and driving ranges.

Rain Bird® XFS Copper-Colored Sub-Surface dripline with Copper Shield™ Technology is the latest innovation in the Rain Bird Landscape Drip family. Rain Bird's patent-pending Copper Shield Technology protects the emitter from root intrusion, creating a long-lasting, low maintenance sub-surface drip irrigation system for use under turf grass or shrub and groundcover areas.

A proprietary tubing material makes XF Series Dripline the most flexible tubing in the industry, making it the easiest dripline to design with and install.

Accepts Rain Bird Easy Fit Compression Fittings, XF Dripline Barbed Insert Fittings and other 17 mm barbed insert fittings.

FEATURES

Simple

- Rain Bird's low-profile emitter design reduces in-line pressure loss, allowing longer lateral runs, simplifying design and reducing installation time.
- Variety of emitter flow rates, emitter spacing and coil lengths provide maximum design flexibility for either sub-surface turf, or on-surface shrub and groundcover applications.

Reliable

- XFS sub-surface dripline emitters are protected from root intrusion by Rain Bird's patent-pending Copper Shield Technology resulting in a system that does not require maintenance or replacement of chemicals to prevent root intrusion.
- The pressure-compensating emitter design provides a consistent flow over the entire lateral length ensuring higher uniformity for increased reliability in the pressure range of 8.5 to 60 psi.

Made with Recycled Content

- All Rain Bird XF Dripline (XFD, XFS, XFCV) qualify for LEED credit 4.2 by containing at least 20% Polyethylene post-consumer recycled material by cost. These come in an assortment of coil sizes, flow rates and emitter spacing.

Durable

- Dual-layered tubing (copper over black) provides unmatched resistance to chemicals, algae growth and UV damage.
- Grit Tolerant: Rain Bird's proprietary emitter design resists clogging by use of an extra-wide flow path combined with a self-flushing action.

OPERATING RANGE

Pressure: 8.5 to 60 psi (0.58 to 4.14 bar)

Flow rates: 0.4 gph, 0.6 gph, and 0.9 gph
(1.6 l/h, 2.3 l/hr, and 3.5 l/hr)

Temperature:

Water: Up to 100°F (37.8° C)

Ambient: Up to 125°F (51.7° C)

Required Filtration: 120 mesh

SPECIFICATIONS

Dimensions:

OD: 0.634" (16mm)

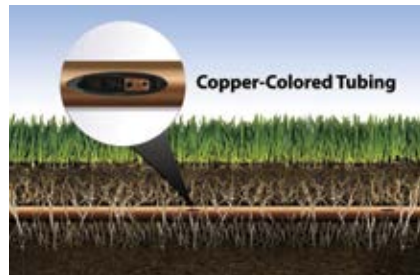
ID: 0.536" (13.6mm)

Thickness: 0.049" (1.2mm)

Spacing: 12" and 18"
(30.5 cm and 45.7 cm)

Coils: 100' and 500' (30.5 m and 152.4 m)

Coil Color: Copper

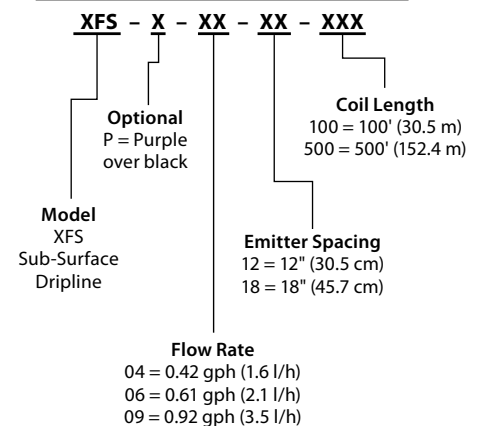


XFS Sub-Surface Dripline with Copper Shield™ Technology



● XFS Sub-Surface Dripline

HOW TO SPECIFY



XFS Dripline offers increased flexibility for easy installation

XFCV Dripline with Heavy-Duty Check Valve

Dripline for Elevated Applications

With a heavy-duty 3.5 psi check valve for on-surface applications, the XFCV is the most effective dripline in the industry and is ideal for areas where no other dripline will work.

When used in applications where elevation changes exist, the patent-pending check valve keeps the dripline charged, holding 8 feet of hold back.

Offers better uniformity and helps to prevent over-watering at the low-point in the zone, avoiding puddling and water draining from the dripline

Accepts Rain Bird® Easy Fit Compression Fittings, XF Dripline Barbed Insert Fittings and other 17 mm barbed insert fittings.

FEATURES

Simple

- Patent-pending 3.5 psi check valve technology keeps the dripline charged with water at all times, increasing uniformity of watering, and conserves water by eliminating the need to recharge the line at the beginning of each watering cycle.
- A proprietary tubing material makes XF Series Dripline the most flexible tubing in the industry, making it the easiest dripline to design with and install.
- Low-profile emitter design reduces in-line pressure loss, allowing longer lateral runs, simplifying design and reducing installation time.
- Variety of emitter flow rates, emitter spacing and coil lengths provide design flexibility for on-surface areas with or without elevation changes.

Reliable

- The pressure-compensating emitter design provides a consistent flow over the entire lateral length ensuring higher uniformity for increased reliability in the pressure range of 20 to 60 psi.

Made with Recycled Content

- All Rain Bird XF Dripline (XFD, XFS, XFCV) qualify for LEED credit 4.2 by containing at least 20% Polyethylene post-consumer recycled material by cost. These come in an assortment of coil sizes, flow rates and emitter spacing.

Durable

- Dual-layered tubing (brown over black) provides unmatched resistance to chemicals, algae growth and UV damage.
- Rain Bird's proprietary emitter design resists clogging by use of an extra wide flow path combined with a self-flushing action.

OPERATING RANGE

Opening Pressure: 14.5 psi (0.58 to 1.0 bar)

Pressure: 20 psi to 60 psi (1.38 to 4.14 bar)

Flow rates: 0.6 gph and 0.9 gph (2.3 l/hr and 3.5 l/hr)

Temperature:

Water: Up to 100°F (37.8° C)

Ambient: Up to 125°F (51.7° C)

Required Filtration: 120 mesh

SPECIFICATIONS

Dimensions:

OD: 0.634" (16mm)

ID: 0.536" (13.6mm)

Thickness: 0.049" (1.2mm)

Spacing: 12" and 18" (30.5 cm and 45.7 cm)

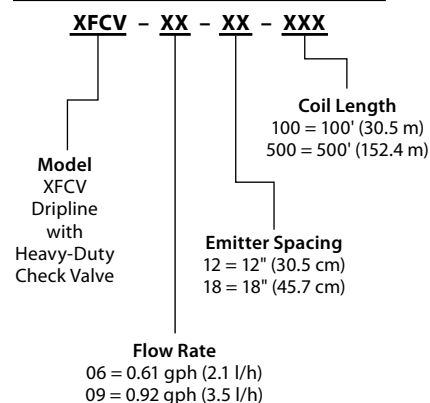
Coils: 100' and 500' (30.5 m and 152.4 m)

- Coil Color: Brown
- Use with XF Dripline Insert Fittings, Rain Bird Easy Fit Compression Fittings and 17 mm insert fittings



● XFCV Dripline

HOW TO SPECIFY



QF Dripline Header

A Quick and Flexible Solution to Dripline Headers

Patent-pending pre-fabricated header for dripline installations. A quick and flexible replacement for a site-built header.

Using a proprietary blend of polyethylene similar to Rain Bird's XF Series Dripline, the QF Dripline header allows installers to simply roll out the header and attach the dripline at guaranteed 12" or 18" spacing.

FEATURES

- QF Dripline Header elbow rotate 360° and incorporate a protective ring — preventing damage and ensuring a proper seal.
- The protective ring also provides leverage to make attaching the dripline easier.
- The rotating elbow manages trenching misalignment. Move left or right to accommodate the dripline — no need to re-trench.
- Elbows utilize the same design as Rain Bird's popular XFF Fittings, requiring 50% less insertion force, and are compatible with the XFF Fittings tool.

SPECIFICATIONS

QF Dripline Header ¾"

Dimensions:

OD: 0.940" (23.9 mm)

ID: 0.820" (20.8 mm)

Thickness: 0.060" (1.5 mm)

QF Dripline Header 1"

Dimensions:

OD: 1.200" (30.5 mm)

ID: 1.060" (26.9 mm)

Thickness: 0.070" (1.8 mm)

MODELS

XQF7512100: XQF ¾" Dripline Header (12" spacing, 100' coil)

XQF7518100: XQF ¾" Dripline Header (18" spacing, 100' coil)

XQF1012100: XQF 1" Dripline Header (12" spacing, 100' coil)

XQF1018100: XQF 1" Dripline Header (18" spacing, 100' coil)

XQF101210P: XQF 1" Dripline Header (12" spacing, 100' coil) Purple

XQF101810P: XQF 1" Dripline Header (18" spacing, 100' coil) Purple

Compatible Twist Lock Fittings



800 Series
For QF Dripline Header ¾"

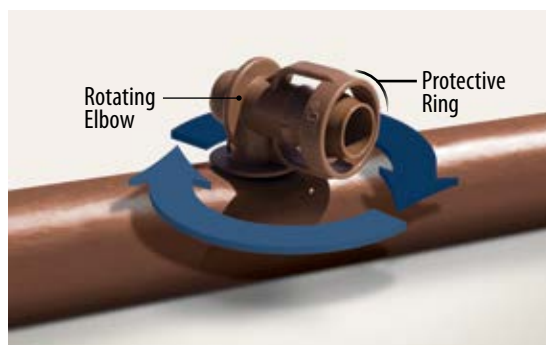
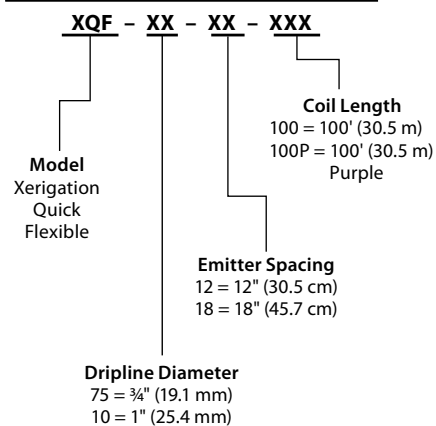


1000 Series
For QF Dripline Header 1"



● QF Dripline Header

HOW TO SPECIFY



XF Series Blank Tubing

FEATURES

- Greater flexibility is easier to install and saves time
- Brown color matches landscape and blends with mulch.
Matches XF Series Dripline inline emitter tubing
- Compatible with XF Series Dripline (0.536" ID x 0.634" OD)
- Accepts Rain Bird® Easy Fit Compression Fittings, XF Dripline Insert Fittings, and 17 mm insert fittings
- Not compatible with 16 mm fittings

SPECIFICATIONS

OD: 0.634" (16.1 mm)

ID: 0.536" (13.6 mm)

Wall Thickness: 0.049" (1.2 mm)

MODELS

XFD100: 100 ft. coil (30 m)

XFD250: 250 ft. coil (76 m)

XFD500: 500 ft. coil (152 m)



● XFD100

Friction Loss Characteristics

U.S. Data			Metric Data		
Flow (gpm)	Velocity (fps)	Loss (psi)	Flow l/m	Velocity m/s	Loss bar
0.50	0.70	0.27	1.89	0.21	0.06
1.00	1.40	0.97	3.79	0.43	0.22
1.50	2.10	2.06	5.68	0.64	0.46
2.00	2.80	3.50	7.57	0.85	0.79
2.50	3.50	5.29	9.46	1.07	1.20
3.00	4.20	7.42	11.36	1.28	1.68
3.50	4.90	9.87	13.25	1.49	2.23
4.00	5.60	12.64	15.14	1.71	2.86
4.50	6.30	15.72	17.03	1.92	3.56
5.00	7.00	19.11	18.93	2.13	4.32
5.50	7.70	22.80	20.82	2.35	5.16
6.00	8.40	26.78	22.71	2.56	6.06

psi loss per 100 feet of pipe (psi/100ft)

bar loss per 100 meters of pipe (bar/100m)

Note: Use of tubing at flows shown in dark shaded area of table is not recommended, as velocities exceed 5 ft/sec (1.5 m/s)

XF Series Dripline Insert Fittings

FEATURES

- Complete line of 17mm insert fittings to simplify installation of XF Series Dripline.
- High quality barbs grab tubing for a secure fit.
- Unique barb design to reduce insertion force and still retain a secure fit.
- Non-obtrusive colored fittings to compliment natural earth tones.

OPERATING RANGE

Opening Pressure: 0 to 50 psi (0 to 3.5 bar) clamps will be required.

MODELS

XFF-COUP: 17 mm Barb x Barb Coupling

XFF-ELBOW: 17 mm Barb x Barb Elbow

XFF-MA-050: 17 mm Barb x ½" MPT Male Adapter

XFF-TEE: 17 mm Barb x Barb x Barb Tee

XFF-TMA-050: 17 mm Barb x ½" MPT x 17 mm Barb Tee Male Adapter

XFF-MA-075: 17 mm Barb x ¾" MPT Male Adapter

XFD-CROSS: Barb Cross 17 mm x 17 mm x 17 mm x 17 mm

XFD-TFA-075: Barb Tee Female Adapter 17 mm x ¾" FPT x 17 mm

LD16STK: 7/8" Barbed Tubing Plastic Stake

FITINS-TOOL: XF Fitting Insertion Tool. Compatible with XFF-COUP, XFF-ELBOW, XFF-TEE and QF Dripline Header



XT-700 Distribution Tubing

Durable, thick-walled distribution tubing stands up to harsh conditions and performs well in all climates.

FEATURES

- Thick-walled, flexible tubing resists kinks and damage caused by routine landscape maintenance activities
- Extruded from UV-resistant polyethylene resin materials

OPERATING RANGE

- Pressure: 0 to 60 psi (0 to 4.1 bar)

SPECIFICATIONS

OD: 0.700" (18 mm)

ID: 0.580" (15 mm)

Wall Thickness: 0.06" (1.5 mm)

MODELS

- **XT-700-100:** 100-foot coil (30 m)
- **XT-700-500:** 500-foot coil (152 m)

Note: For both water conservation and appearance, it is recommended that a 2" to 3" (5 to 8 cm) mulch cover be placed on top of the tubing



● XT-700-100

Friction Loss Characteristics

U.S. Data			Metric Data			
Flow (gpm)	Velocity (fps)	Loss (psi)	Flow (m ³ /h)	Flow l/m	Velocity m/s	Loss bar
0.50	0.61	0.19	0.11	1.89	0.19	0.01
1.00	1.21	0.69	0.23	3.79	0.37	0.05
1.50	1.82	1.45	0.34	5.68	0.56	0.10
2.00	2.43	2.47	0.45	7.57	0.74	0.17
2.50	3.03	3.74	0.57	9.46	0.92	0.26
3.00	3.64	5.24	0.68	11.36	1.11	0.36
3.50	4.24	6.97	0.79	13.25	1.29	0.48
4.00	4.85	8.93	0.91	15.14	1.48	0.62
4.50	5.46	11.10	1.02	17.03	1.67	0.77
5.00	6.06	13.50	1.14	18.93	1.85	0.93
5.50	6.67	16.10	1.25	20.82	2.03	1.11
6.00	7.28	18.92	1.36	22.71	2.22	1.31

psi loss per 100 feet of pipe (psi/100ft)

bar loss per 100 meters of pipe (bar/100m)

Note: Use of tubing at flows shown in dark shaded area of table is not recommended, as velocities exceed 5 ft/sec (1.5 m/s)

Xeri-Bug™ Emitters

Point-source low-flow emitters for watering the root zones of plants, trees and container plants.

FEATURES

- The only emitters with self-piercing barbs, making them the easiest to install using the Xeriman™ tool.
- Widest selection of pressure-compensating emitters, with three flow rates and three inlet options.
- Most compact and unobtrusive emitters.
- Flow rates of 0.5, 1.0 and 2.0 gph (1.89, 3.79 and 7.57 l/h)
 - Pressure-compensating design delivers uniform flow throughout a wide pressure range (15 to 50 psi; 1.0 to 3.5 bar).
- Available with 3 different inlets (1.0 and 2.0 models):
 - Self-piercing barb for quick, one-step insertion into ½" or ¾" drip tubing
 - 10-32 threaded inlet that easily threads into a PolyFlex Riser, 1032 Thread adapter or 1800 Xeri-Bubbler Adapter
 - ½" FPT inlet that easily threads onto a ½" PVC riser (1.0 and 2.0 gph models)
- Outlet barb securely retains ¼" Distribution Tubing (XQ)
- Design makes installation and maintenance easy
 - Self-flushing action minimizes clogging
 - Robust design made from highly inert materials that are resistant to chemicals
 - Durable plastic construction is UV-resistant
- Color-coded to identify flow rate

OPERATING RANGE

Flow: 0.5 to 2.0 gph (1.89 to 7.57 l/h)

Pressure: 15 to 50 psi (1.0 to 3.5 bar)

Required filtration: 150 to 200 mesh (75 to 100 micron)

MODELS

BARB INLET x BARB OUTLET

XB-05PC: Blue, 0.5 gph (1.89 l/h)

XB-10PC: Black, 1.0 gph (3.79 l/h)

XB-20PC: Red, 2.0 gph (7.57 l/h)

10-32 THREAD INLET x BARB OUTLET

XB-05PC-1032: Blue, 0.5 gph (1.89 l/h)

XB-10PC-1032: Black, 1.0 gph (3.79 l/h)

XB-20PC-1032: Red, 2.0 gph (7.57 l/h)

½" FPT INLET x BARB OUTLET

XBT-10: Black, 1.0 gph (3.79 l/h)

XBT-20: Black, 2.0 gph (7.57 l/h)

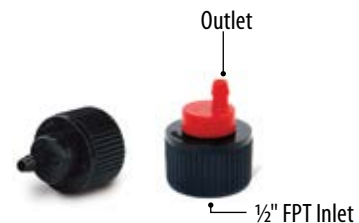


● XB-05PC | XB-10PC | XB-20PC



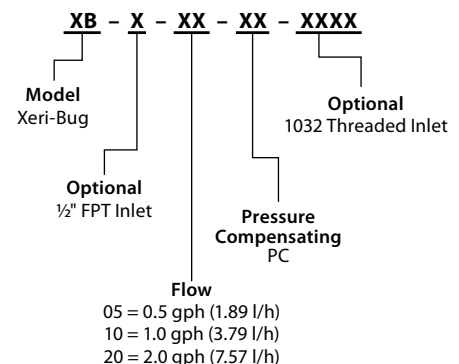
● XB-05PC-1032 | XB-10PC-1032 | XB-20PC-1032

1032-threaded models are specifically designed to be used with PolyFlex Risers, 1032 thread adapters (1032-A), or 1800 Xeri-Bubbler Adapter (XBA-1800)



● XBT-10 | XBT-20

HOW TO SPECIFY



Large-Capacity Filters

Large Capacity and Low Maintenance with a Solid Build

- High flow rate disc filtration units are ideal for use with ponds and other water features
- Provides extra large filtration capacity for residential, commercial, and municipal applications
- Durable filters can be easily removed for cleaning, significantly reducing cleaning time

FEATURES

- Disc filters can decompress for easy cleaning
- Available with 120 mesh Stainless Steel Screen Filters or 120 mesh disc filters
- Auxiliary connection with a threaded cap can be drilled to allow draining or depressurization
- Larger filters for higher flow and lower maintenance

OPERATING RANGE

1" Model:

Maximum Flow: Up to 26 gpm (6 m³/hr)

Filtering Surface (disc): 28 in² (180cm²)

1.5" Models:

Maximum Flow: Up to 88 gpm (20 m³/hr)

Filtering Surface (disc): 83 in² (535 cm²)

Filtering Surface (screen): 76 in² (490 cm²)

2" Models:

Maximum Flow: Up to 110 gpm (25 m³/hr)

Filtering Surface (disc): 81 in² (525 cm²)

Filtering Surface (screen): 75 in² (485 cm²)

Maximum Pressure: 116 psi (8 bar)

Maximum Temperature: Up to 140° F (60° C)

MODELS

LCRBY100D: 1" large-capacity disc filter

LCRBY150S: 1.5" large-capacity screen filter

LCRBY150D: 1.5 large-capacity disc filter

LCRBY200S: 2" large-capacity screen filter

LCRBY200D: 2" large-capacity disc filter

SPARE PARTS

- **SMFC120MS:** ¾" – 1" SCR N CART LG CAP 120M
- **SMFC120MD:** ¾" – 1" DISC CART LG CAP 120M
- **LGFC120MS:** 1 ½" – 2" SCR N CRT LG CAP 120M
- **LGFC120MD:** 1 ½" – 2" DISC CRT LG CAP 120M



● LCRBY200D

SPECIFICATIONS

Inlet / Outlet Size:

1" Models: 1" NPT

1.5" Models: 1.5" NPT

2" Models: 2" NPT

FILTRATION

- Screen Filter*: 120 Mesh (130 Micron)
- Plastic Filter Discs: 120 Mesh (130 Micron)



Screen Filter:

The 120 mesh screen filters are easy to clean and provide reliable filtration.

Plastic Filter Discs:

These filters are made up of over a hundred grooved discs that allow water to pass while trapping debris. Less maintenance required due to large surface area.



Disc and Screen Filters

* Screen not available in 1" model

Pressure Loss Characteristics — Disc Filter

U.S. Data				Metric Data			
Flow (gpm)	1" Filter (psi)	1.5" Filter (psi)	2" Filter (psi)	Flow (l/m)	2.5 cm Filter (bar)	3.8 cm Filter (bar)	5.1 cm Filter (bar)
5	0.60	0.08	0.10	18.93	0.04	0.01	0.01
11	1.16	0.18	0.10	41.67	0.08	0.01	0.01
22	2.61	0.40	0.10	83.33	0.18	0.03	0.01
33	4.35	0.73	0.24	125.00	0.30	0.05	0.02
44	—	1.05	0.40	166.67	—	0.07	0.03
55	—	1.50	0.60	208.33	—	0.10	0.04
66	—	2.18	0.82	250.00	—	0.15	0.06
77	—	3.10	1.10	291.67	—	0.21	0.08
88	—	3.95	1.60	333.33	—	0.27	0.11
99	—	—	2.03	375.00	—	—	0.14
110	—	—	2.47	416.67	—	—	0.17



2" Disc Filter

Pressure Loss Characteristics — Screen Filter

U.S. Data				Metric Data			
Flow (gpm)	1" Filter (psi)	1.5" Filter (psi)	2" Filter (psi)	Flow (l/m)	2.5 cm Filter (bar)	3.8 cm Filter (bar)	5.1 cm Filter (bar)
5	0.80	0.00	0.00	18.93	0.06	0.00	0.00
11	1.74	0.00	0.00	41.67	0.12	0.00	0.00
22	2.90	0.50	0.20	83.33	0.20	0.03	0.01
33	4.06	0.95	0.25	125.00	0.28	0.07	0.02
44	—	1.45	0.44	166.67	—	0.10	0.03
55	1.89	0.60	0.60	208.33	—	0.13	0.04
66	—	2.32	0.87	250.00	—	0.16	0.06
77	—	2.76	1.16	291.67	—	0.19	0.08
88	—	3.19	1.45	333.33	—	0.22	0.10
99	—	—	1.89	375.00	—	—	0.13
110	—	—	2.32	416.67	—	—	0.16

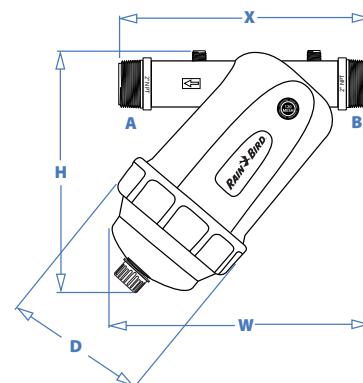


1.5" Screen Filter

Filter Housing Dimensions

Model	A, B	H	W	X	D
1" (2.5 cm)	1" NPT	6.81"	7.48"	6.22"	3.27"
1.5" (2.5 cm)	1.5" NPT	9.53"	10.25"	9.92"	5.67"
2" (5.1 cm)	2" NPT	9.76"	10.63"	10.51"	5.67"

Letters correspond to diagram on right.



VB Series Valve Boxes

Commercial Grade Boxes That Are Loaded With a Rich Set of Industry-Leading Features

FEATURES

- **Strength and Stability** – Multiple sizes and shapes are designed with corrugated sides and wide flange bases for maximum durability, compression strength, and stability
- **Smart Lid Design** – Designed with no holes to keep out pests, beveled edges to minimize damage potential from turf equipment, and for easy hand and shovel access
- **Flexible Installations** – Interlocking stacking capabilities, extension models and pipe hole knockouts support deeper and flexible installations
- **Environmentally Friendly** – Earth-friendly, LEED-compliant material made of 100% recycled materials (black boxes and black lids only)

Bolt Hole Knock-Out
keeps hazardous insects and pests out when bolt is not used

Corrugated Sides
maintain structural integrity under heavy load

Finger or Shovel Access Slot for easy removal of lid

Beveled Lid Edges
prevent damage from lawn equipment

Interlocking Feature
locks two boxes together when fitted bottom-to-bottom for deep installations

Knock-Out Retainers
hold removed knock-outs in place during backfill

Knock-Outs
built into all four sides

Wide Flange
stabilizes box eliminating need for brick and provides enhanced side load strength

							
7 Inch Round Valve Box	10 Inch Round Valve Box	Standard Valve Box	Standard Extension	Jumbo Valve Box	Jumbo Extension	Super Jumbo Valve Box	Maxi Jumbo Valve Box

Size

Bottom Diameter: 9.9 inches (25.1 cm) Height: 9.0 inches (22.9 cm)	Bottom Diameter: 13.75 inches (34.9 cm) Height: 10.0 inches (25.4 cm)	Length: 21.8 inches (55.4 cm) Width: 16.6 inches (42.2 cm) Height: 12.0 inches (30.5 cm)	Length: 20.0 inches (50.8 cm) Width: 14.75 inches (37.5 cm) Height: 6.75 inches (17.1 cm)	Length: 26.3 inches (66.8 cm) Width: 19.8 inches (50.3 cm) Height: 12.1 inches (30.7 cm)	Length: 24.4 inches (62.0 cm) Width: 17.9 inches (45.5 cm) Height: 6.75 inches (17.1 cm)	Length: 33.1 inches (84.1 cm) Width: 23.8 inches (60.5 cm) Height: 15.0 inches (38.1 cm)	Length: 40.3 inches (102.4 cm) Width: 27.1 inches (68.8 cm) Height: 18.0 inches (45.7 cm)
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Additional Features

Easily removable knock-outs simplify pipe placement and reduce installation time Four equally spaced knock-outs accommodate up to 2.0" (5.0 cm) diameter pipe	Easily removable knock-outs simplify pipe placement and reduce installation time Four equally spaced knock-outs accommodate up to 2.0" (5.0 cm) diameter pipe	Two large center knock-outs accommodate up to 3.5" (8.9 cm) diameter pipe and 11 knock-outs accommodate up to 2" (5.0 cm) diameter pipe	Extension models support deeper and more flexible installations	Easily removable knock-outs simplify pipe placement and reduce installation time Two large center knock-outs accommodate up to 3.5" (8.9 cm) diameter pipe. (Extensions do not have knock-outs)	Extension models support deeper and more flexible installations	Easily removable knock-outs simplify pipe placement and reduce installation time Thirteen large knock-outs accommodate up to 3.5" (8.9 cm) diameter pipe	Easily removable knock-outs simplify pipe placement and reduce installation time. Six large knock-outs on the ends accommodate up to 5.0" (12.7 cm) diameter pipe and 12 knock-outs on the sides accommodate up to 3.0" (7.6 cm) diameter pipe
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Models

VB7RND: 7" Round Body & Green Lid VB7RNDDB: 7" Round Body Only VB7RNDGL: Green Lid VB7RNDPL: Purple Lid VB7RNDDBKL: Black Lid	VB10RND: 10" Round Body & Green Lid VB10RNDDB: 10" Round Body Only VB10RNDGL: Green Lid VB10RNDPL: Purple Lid VB10RNDDBKL: Black Lid VB10RNDH: 10" Round Body & Locking Green Lid	VBSTD: Standard Body & Green Lid VBSTDB: Standard Body Only VBSTDGL: Green Lid VBSTDPL: Purple Lid VBSTDDBKL: Black Lid VBSTDH: Standard Body & Locking Green Lid	VBSTD6EXTB: Standard Extension Body Only	VBJMB: Jumbo Body & Green Lid VBJMBB: Jumbo Body Only VBJMBGL: Green Lid VBJMBPL: Purple Lid VBJMBDBKL: Black Lid VBJMBH: Jumbo Body & Locking Green Lid	VBJMB6EXTB: Jumbo Extension Body Only	VBSPRH: Super Jumbo Body & 2 Lock Green Lid VBSPRPH: Super Jumbo Body & 2 Lock Purple Lid	VBMAXH: Maxi-Jumbo Body & 2 Lock Green Lid VBMAXPH: Maxi-Jumbo Body & 2 Lock Purple Lid
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LOCKING SYSTEMS

VB-LOCK-H: Hex head $\frac{3}{8}$ " x $2\frac{1}{4}$ " (1.0 x 5.7 cm) bolt, washer, and clip

VB-LOCK-P: Penta head $\frac{3}{8}$ " x $2\frac{1}{4}$ " (1.0 x 5.7 cm) bolt, washer, and clip

Technical Information

This section includes conversion factors, equivalents and formulas as they apply to golf course irrigation. The information is arranged by category to simplify and speed the process when making accurate calculations.



Areas

6,452 sq cm	1 sq in
144 sq in	1 sq ft
9 sq ft	1 sq yd
43,560 sq ft	1 acre
1 acre	43,560 sq ft
1 acre	4,840 sq yd
1 acre	160 sq rods
1 sq rod	272.25 sq ft
1 sq rod	30.25 sq yd
640 acres	1 sq mi
640 acres	1 section
Area of a Circle	$r^2 \times 3.1416$
Area of a Square	One Side Squared
Area of a Triangle	$\frac{1}{2}$ Base x Altitude
Area of a Rectangle	Length x Width
Area of a Parallelogram	Base x Altitude

Lineal Measurements

1 centimeter	0.3937 inches
1 cubit	18 inches
1 meter	39.37 inches
1 rod	16.5 feet
1 rod	5.5 yards
1 chain	4 rods
1 chain	66 feet
320 rods	1 mile
5280 feet	1 mile
Circumference of Circle	Diameter x 3.1416

Volume

1728 cu in	1 cu ft
231 cu in	1 gallon
27 cu ft	1 cu yd
1 cu ft	7.48052 gal (U.S.)
1 cu yd	202 gallons (U.S.)
16 drams	1 ounce
32 ounces	1 quart
4 quarts	1 gallon
1 gallon	3.785 liters
1 gallon	0.00379 cu m
1 gallon	0.833 imperial gallons
27,154 gallons	1 acre inch
325,851 gallons	1 acre foot
1,000,000 gallons	3.0689 acre ft
1 acre foot	43,560 cu ft
Volume of a Cube	Area of Base x Height
Volume of a Pyramid	$\frac{1}{2}$ Area of Base x Height
Volume of a Sphere	Diameter ³ x 0.5236

Mass/Weight

1 kg	2.204 lbs
1 lb	454 g = 7000 grains
1 slug	14.5 kg
1 stone	14 lb

Weights

1 U.S. Gallon (Water)	8.3357 lbs
1 Cu Foot (Water)	62.3554 lbs
1 Imperial Gallon	10.0 lbs
1 Liter	2.2 lbs
Earth, in Place Undisturbed	100 lbs/cu ft
Earth, Dry and Loose	82-90 lbs/cu ft
Earth, Moist	75-100 lbs/cu ft
Sand, Dry	90-106 lbs/cu ft
Shale or Red Rock	162 lbs/cu ft
Limestone	160-163 lbs/cu ft
Base Gravel	12.0 lbs/sq ft/inch Thick in Place
Asphalt	12.5 lbs/sq ft/inch Thick in Place
Sack Cement	94 lbs
Concrete (Plain)	140 lbs/cu ft
Concrete (Reinforced)	150 lbs/cu ft

Pressures

1 atmosphere	29.921 inches of hg @ 32° f
1 atmosphere	33.94 ft of water @ 62° f
1 atmosphere	14.6963 lbs/sq in
1 lb/sq inch	2.31 feet of head
1 foot of water	0.433 lbs/sq in
1 kg/sq cm	14.22 lbs/sq in
1 foot of water	62.3554 lbs/sq ft
1 bar	14.5 lbs/sq in

Flows

1 gallon/min (U.S.)	0.002228 cu ft/sec
1 gallon/min (U.S.)	0.13368 cu ft/min
1 gallon/min (U.S.)	8.0208 cu ft/hr
1 gallon/min (U.S.)	0.06309 liters/sec
1 gallon/min (U.S.)	3.78533 liters/min
1 gallon/min (U.S.)	0.0044192 acre ft/24 hrs
1 gallon/min (U.S.)	0.22712 cu m/hr
1 cu ft/sec	448.83 gpm
1 liter/sec	15.85 gpm
1 cu m/min	264 gpm
1 acre in/hr	452.57 gpm
1 acre ft/day	226.3 gpm
1,000,000 gallons/day	694.4 gpm
1 cu ft/sec	0.992 acre in/hr

Power

1 horsepower	33,000 ft lbs/min
1 horsepower	746 watts
1 horsepower	0.746 kilowatts

Temperature

F	$^{\circ}\text{C} \times 9/5 + 32$
C	$(^{\circ}\text{F} - 32) \times 5/9$

Design Formulas

Precipitation Rate (in/hr)	Run-Time	Velocity
$\text{Square} = \frac{96.3 \times \text{GPM} \times 360}{S \times S \times \text{Sprinkler Arc}}$	$\text{Run-Time} = \frac{\text{Desired Application} \times 60}{\text{Precipitation Rate}}$	$V = \frac{0.480 \times Q}{(ID)^2}$ <p>Where: <i>V</i> = Velocity in feet per second <i>Q</i> = Gallons per minute <i>ID</i> = Inside diameter of pipe</p>
$\text{Triangular} = \frac{96.3 \times \text{GPM} \times 360}{S \times S \times 0.866 \times \text{Sprinkler Arc}}$		
$\text{Single Row} = \frac{96.3 \times \text{GPM}}{S \times 0.8 \text{ Diameter}} \quad S = \text{Spacing}$		

Power Formulas

Horse Power	Electrical Power	Pump Laws (Affinity Laws)
<p>1 hp = 550 foot pounds per second = 746 watts or 0.746 kW = 1 second foot of water falling 8.8'</p> <p>Water HP = $\frac{\text{GPM} \times \text{TDH}}{3960}$</p> <p>Where: <i>GPM</i> = Gallons per minute <i>TDH</i> = Total dynamic head</p> <p>Brake HP = $\frac{\text{GPM} \times \text{TDH}}{3960 \times E}$</p> <p>Where: <i>GPM</i> = Gallons per minute <i>TDH</i> = Total dynamic head <i>E</i> = Pump efficiency</p> <p>1 kilowatt (kW) = 1000 watts = 1,341 HP = 735.5 foot pounds per second</p>	<p>3ϕ kVA = $\frac{1.732 \times \text{FLA} \times \text{Voltage}}{1000}$</p> <p>1$\phi$ kVA = $\frac{\text{FLA} \times \text{Voltage}}{1000}$</p> <p>Ohm's Law: <i>V</i> = <i>IR</i></p> <p>Where: <i>V</i> = Voltage in Volts <i>I</i> = Current in Amperes <i>R</i> = Resistance in ohms</p> <p>Amp Calculation Amps = Watts / Volts</p>	<p>$\text{RPM}_2 / \text{RPM}_1 = \text{Flow}_2 / \text{Flow}_1$ $(\text{RPM}_2 / \text{RPM}_1)^2 = \text{Pressure}_2 / \text{Pressure}_1$ $(\text{RPM}_2 / \text{RPM}_1)^3 = \text{Power}_2 / \text{Power}_1$</p> <p>Example: An irrigation pump operating at 1800 RPM and producing 600 gpm at 120 psi is switched to 3600 RPM:</p> <p>$\text{RPM}_2 / \text{RPM}_1 = \text{Flow}_2 / \text{Flow}_1$ = 3600 RPM / 1800 RPM = Flow₂ / 600 gpm = 1200 gpm</p> <p>$(\text{RPM}_2 / \text{RPM}_1)^2 = \text{Pressure}_2 / \text{Pressure}_1$ = (3600 RPM / 1800 RPM)² = Pressure₂ / 120 psi = 480 psi</p> <p>$(\text{RPM}_2 / \text{RPM}_1)^3 = \text{Power}_2 / \text{Power}_1$ = (3600 RPM / 1800 RPM)³ = Power₂ / 60 HP = 480 HP</p>

Electric Formulas for Calculating Amperes, Horsepower, Kilowatts and kVA

Alternating Current

To Find:	Single Phase	Two Phase - Four phase wire	Three Phase
Amperes when "HP" is Known	$\frac{\text{HP} \times 746}{E \times \% \text{EFF} \times \text{PF}}$	$\frac{\text{HP} \times 746}{E \times \% \text{EFF} \times \text{PF} \times 2}$	$\frac{\text{HP} \times 746}{E \times \% \text{EFF} \times \text{PF} \times 1.73}$
Amperes when "kW" is Known	$\frac{\text{kW} \times 1000}{E \times \text{PF}}$	$\frac{\text{kW} \times 1000}{E \times \text{PF} \times 2}$	$\frac{\text{kW} \times 1000}{E \times \text{PF} \times 1.73}$
Amperes when "kVA" is Known	$\frac{\text{kVA} \times 1000}{E}$	$\frac{\text{kVA} \times 1000}{E \times 2}$	$\frac{\text{kVA} \times 1000}{E \times 1.73}$
Kilowatts	$\frac{E \times I \times \text{PF}}{1000}$	$\frac{E \times I \times \text{PF} \times 2}{1000}$	$\frac{E \times I \times \text{PF} \times 1.73}{1000}$
Kilovolt - Amperes "kVA"	$\frac{E \times I}{1000}$	$\frac{E \times I \times 2}{1000}$	$\frac{E \times I \times 1.73}{1000}$
Horsepower	$\frac{E \times I \times \% \text{EFF} \times \text{PF}}{746}$	$\frac{E \times I \times \% \text{EFF} \times \text{PF} \times 2}{746}$	$\frac{E \times I \times \% \text{EFF} \times \text{PF} \times 1.73}{746}$

Where:
 Power Factor (PF) = $\frac{\text{Power Used (Watts) or kW}}{\text{Apparent Power kVA}}$

Percent Efficiency (%EFF) = $\frac{\text{Output (Watts)}}{\text{Input (Watts)}}$

E = Volts
I = Amperes
W = Watts

Conductor Properties For Insulated Annealed Copper Direct Current Resistance — Ohms Per 1000 Feet

Copper Awg	Temperature (°F/°C)				Cross Sectional Area (Circular Mils)
	167/75	149/65	77/25	68/20	
18 Solid	7.77	7.519	6.515	6.390	1,620
18 Stranded	7.95	7.693	6.666	6.538	1,620
16 Solid	4.89	4.732	4.100	4.021	2,580
16 Stranded	4.99	4.829	4.184	4.104	2,580
14 Solid	3.07	2.971	2.574	2.525	4,110
14 Stranded	3.14	3.039	2.633	2.582	4,110
12 Solid	1.93	1.868	1.618	1.587	6,530
12 Stranded	1.98	1.916	1.660	1.628	6,530
10 Solid	1.21	1.171	1.015	0.995	10,380
10 Stranded	1.24	1.200	1.040	1.020	10,380
8 Solid	0.764	0.739	0.641	0.628	16,510
8 Stranded	0.778	0.753	0.652	0.640	16,510
6 Stranded	0.491	0.475	0.412	0.404	26,240
4 Stranded	0.308	0.298	0.258	0.253	41,740
2 Stranded	0.194	0.188	0.163	0.160	66,360
1/0 Stranded	0.122	0.118	0.102	0.100	105,600
2/0 Stranded	0.097	0.094	0.081	0.080	133,100

Source: 2008 Edition of National Electric Code (NFPA 70), Chapter 9, Table 8.

System designer must use resistance values which correlate to temperatures and applications for each specific project.

Full Load Amperage (FLA)

Motor HP	Single Phase A-C		Three Phase A-C Induction Type Squirrel Cage & Wound Rotor		
	115 VOLTS	230 VOLTS**	230 VOLTS**	460 VOLTS	575 VOLTS
½	9.8	4.9	2.2	1.1	0.9
¾	13.8	6.9	3.2	1.6	1.3
1	16	8	4.2	2.1	1.7
1 ½	20	10	6.0	3.0	2.4
2	24	12	6.8	3.4	2.7
3	34	17	9.6	4.8	3.9
5	56	28	15.2	7.6	6.1
7 ½	80	40	22	11	9
10	100	50	28	14	11
15			42	21	17
20			54	27	22
25			68	34	27
30			80	40	32
40			104	52	41
50			130	65	52
60			154	77	62
75			192	96	77
100			240	120	96
125			296	148	118
150			350	175	140
200			456	228	182
250			558	279	223

**For 208V applications, increase the 230V FLA by 10%

To calculate the FLA of a pump motor operating on a VFD, multiply the nominal FLA by 1.24

To estimate FLA station, multiply the largest load by 1.25 and then add this to remaining component FLAs.

Example: a 460V 2 x 50HP pump station with a SHP PIM pump would have an FLA of 173.4 Amps.

Horsepower To Kilowatts

Horsepower	Kilowatt
1	0.746
3	2.2
5	3.7
10	7.5
15	11.2
20	14.9
25	18.7
30	22.4
40	29.8
50	37.3
60	44.8
75	56.0

$$173.4 \text{ Amps} = 1.24 \times 1.25 \times 65A + 65A + 7.6A$$

PE 4710 IPS HDPE DR 13.5 (161 psi) Pipe

Velocity in Feet Per Second — Friction Loss in psi Per 100 Feet (C = 150)

Nominal Size (ID) Flow (gpm)	2" (2.002)		3" (2.950)		4" (3.793)		6" (5.585)		8" (7.271)		10" (9.062)		12" (10.748)		14" (11.801)		16" (13.487)		18" (15.173)	
	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss
2	0.20	0.01	0.09	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.41	0.02	0.19	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.61	0.04	0.28	0.01	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.81	0.07	0.38	0.01	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	1.02	0.10	0.47	0.02	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	1.22	0.14	0.56	0.02	0.34	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	1.43	0.19	0.66	0.03	0.40	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	1.63	0.25	0.75	0.04	0.45	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	1.83	0.31	0.84	0.05	0.51	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	2.04	0.37	0.94	0.06	0.57	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	2.24	0.44	1.03	0.07	0.62	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	2.44	0.52	1.13	0.08	0.68	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	2.65	0.61	1.22	0.09	0.74	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	2.85	0.70	1.31	0.11	0.79	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	3.05	0.79	1.41	0.12	0.85	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	3.56	1.05	1.64	0.16	0.99	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	4.07	1.35	1.88	0.20	1.13	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
45	4.58	1.67	2.11	0.25	1.28	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	5.09	2.04	2.34	0.31	1.42	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	5.60	2.43	2.58	0.37	1.56	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	6.11	2.85	2.81	0.43	1.70	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
65	6.62	3.31	3.05	0.50	1.84	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70	7.13	3.80	3.28	0.58	1.99	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	7.63	4.31	3.52	0.65	2.13	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	8.14	4.86	3.75	0.74	2.27	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
85	8.65	5.44	3.99	0.82	2.41	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	9.16	6.04	4.22	0.92	2.55	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100			4.69	1.11	2.84	0.33	1.31	0.05	0.77	0.01	0.50	0.00	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110			5.16	1.33	3.12	0.39	1.44	0.06	0.85	0.02	0.55	0.01	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120			5.63	1.56	3.40	0.46	1.57	0.07	0.93	0.02	0.60	0.01	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130			6.09	1.81	3.69	0.53	1.70	0.08	1.00	0.02	0.65	0.01	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
140			6.56	2.08	3.97	0.61	1.83	0.09	1.08	0.03	0.70	0.01	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150			7.03	2.36	4.25	0.69	1.96	0.11	1.16	0.03	0.75	0.01	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160			7.50	2.66	4.54	0.78	2.09	0.12	1.23	0.03	0.79	0.01	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00
170			7.97	2.98	4.82	0.88	2.22	0.13	1.31	0.04	0.84	0.01	0.60	0.01	0.00	0.00	0.00	0.00	0.00	0.00
180			8.44	3.31	5.10	0.97	2.35	0.15	1.39	0.04	0.89	0.01	0.64	0.01	0.00	0.00	0.00	0.00	0.00	0.00
190			8.91	3.66	5.39	1.08	2.49	0.16	1.47	0.05	0.94	0.02	0.67	0.01	0.00	0.00	0.00	0.00	0.00	0.00
200			9.38	4.02	5.67	1.18	2.62	0.18	1.54	0.05	0.99	0.02	0.71	0.01	0.00	0.00	0.00	0.00	0.00	0.00
225			10.55	5.00	6.38	1.47	2.94	0.22	1.74	0.06	1.12	0.02	0.79	0.01	0.00	0.00	0.00	0.00	0.00	0.00
250			11.72	6.08	7.09	1.79	3.27	0.27	1.93	0.08	1.24	0.03	0.88	0.01	0.00	0.00	0.00	0.00	0.00	0.00
275			12.89	7.25	7.80	2.13	3.60	0.32	2.12	0.09	1.37	0.03	0.97	0.01	0.00	0.00	0.00	0.00	0.00	0.00
300			14.06	8.52	8.51	2.51	3.92	0.38	2.32	0.11	1.49	0.04	1.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00
325			15.24	9.88	9.22	2.91	4.25	0.44	2.51	0.12	1.61	0.04	1.15	0.02	0.00	0.00	0.00	0.00	0.00	0.00
350			16.41	11.34	9.93	3.34	4.58	0.51	2.70	0.14	1.74	0.05	1.24	0.02	0.00	0.00	0.00	0.00	0.00	0.00
375				12.88	10.63	3.79	4.91	0.58	2.89	0.16	1.86	0.05	1.32	0.02	0.00	0.00	0.00	0.00	0.00	0.00
400				14.52	11.34	4.27	5.23	0.65	3.09	0.18	1.99	0.06	1.41	0.03	0.00	0.00	0.00	0.00	0.00	0.00
425				16.24	12.05	4.78	5.56	0.73	3.28	0.20	2.11	0.07	1.50	0.03	0.00	0.00	0.00	0.00	0.00	0.00
450				18.06	12.76	5.31	5.89	0.81	3.47	0.22	2.24	0.08	1.59	0.03	0.00	0.00	0.00	0.00	0.00	0.00
475				19.96	13.47	5.87	6.21	0.89	3.67	0.25	2.36	0.08	1.68	0.04	0.00	0.00	0.00	0.00	0.00	0.00
500					14.18	6.46	6.54	0.98	3.86	0.27	2.48	0.09	1.77	0.04	0.00	0.00	0.00	0.00	0.00	0.00
550					15.60	7.71	7.19	1.17	4.24	0.32	2.73	0.11	1.94	0.05	0.00	0.00	0.00	0.00	0.00	0.00
600					17.02	9.05	7.85	1.38	4.63	0.38	2.98	0.13	2.12	0.06	0.00	0.00	0.00	0.00	0.00	0.00
650					18.43	10.50	8.50	1.60	5.02	0.44	3.23	0.15	2.30	0.07	0.00	0.00	0.00	0.00	0.00	0.00
700					19.85	12.05	9.16	1.83	5.40	0.51	3.48	0.17	2.47	0.08	0.00	0.00	0.00	0.00	0.	

SDR 21 (Class 200) PVC Pipe

Velocity in Feet Per Second — Friction Loss in psi Per 100 Feet (C = 150)

Nominal Size (ID) Flow (gpm)	1" (1.189)		1¼" (1.502)		1½" (1.720)		2" (2.149)		2½" (2.601)		3" (3.166)		4" (4.072)		6" (5.993)		8" (7.805)		10" (9.728)		12" (11.538)	
	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss	Vel	Loss
2	0.58	0.07	0.36	0.02	0.28	0.01	0.18	0.00	0.12	0.00	0.08	0.00	0.05	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.01	0.00
4	1.15	0.24	0.72	0.08	0.55	0.04	0.35	0.01	0.24	0.01	0.16	0.00	0.10	0.00	0.05	0.00	0.03	0.00	0.02	0.00	0.01	0.00
6	1.73	0.51	1.09	0.16	0.83	0.08	0.53	0.03	0.36	0.01	0.24	0.00	0.15	0.00	0.07	0.00	0.04	0.00	0.03	0.00	0.02	0.00
8	2.31	0.86	1.45	0.28	1.10	0.14	0.71	0.05	0.48	0.02	0.33	0.01	0.20	0.00	0.09	0.00	0.05	0.00	0.03	0.00	0.02	0.00
10	2.89	1.30	1.81	0.42	1.38	0.22	0.88	0.07	0.60	0.03	0.41	0.01	0.25	0.00	0.11	0.00	0.07	0.00	0.04	0.00	0.03	0.00
12	3.46	1.83	2.17	0.59	1.65	0.30	1.06	0.10	0.72	0.04	0.49	0.02	0.30	0.00	0.14	0.00	0.08	0.00	0.05	0.00	0.04	0.00
14	4.04	2.43	2.53	0.78	1.93	0.40	1.24	0.14	0.84	0.05	0.57	0.02	0.34	0.01	0.16	0.00	0.09	0.00	0.06	0.00	0.04	0.00
16	4.62	3.11	2.89	1.00	2.21	0.52	1.41	0.17	0.96	0.07	0.65	0.03	0.39	0.01	0.18	0.00	0.11	0.00	0.07	0.00	0.05	0.00
18	5.19	3.87	3.26	1.24	2.48	0.64	1.59	0.22	1.09	0.09	0.73	0.03	0.44	0.01	0.20	0.00	0.12	0.00	0.08	0.00	0.06	0.00
20	5.77	4.71	3.62	1.51	2.76	0.78	1.77	0.26	1.21	0.10	0.81	0.04	0.49	0.01	0.23	0.00	0.13	0.00	0.09	0.00	0.06	0.00
22	6.35	5.62	3.98	1.80	3.03	0.93	1.94	0.32	1.33	0.12	0.90	0.05	0.54	0.01	0.25	0.00	0.15	0.00	0.09	0.00	0.07	0.00
24	6.93	6.60	4.34	2.12	3.31	1.09	2.12	0.37	1.45	0.15	0.98	0.06	0.59	0.02	0.27	0.00	0.16	0.00	0.10	0.00	0.07	0.00
26	7.50	7.65	4.70	2.45	3.59	1.27	2.30	0.43	1.57	0.17	1.06	0.07	0.64	0.02	0.30	0.00	0.17	0.00	0.11	0.00	0.08	0.00
28	8.08	8.78	5.06	2.82	3.86	1.46	2.47	0.49	1.69	0.19	1.14	0.07	0.69	0.02	0.32	0.00	0.19	0.00	0.12	0.00	0.09	0.00
30	8.66	9.97	5.43	3.20	4.14	1.65	2.65	0.56	1.81	0.22	1.22	0.08	0.74	0.02	0.34	0.00	0.20	0.00	0.13	0.00	0.09	0.00
35	10.10	13.27	6.33	4.26	4.83	2.20	3.09	0.74	2.11	0.29	1.42	0.11	0.86	0.03	0.40	0.01	0.23	0.00	0.15	0.00	0.11	0.00
40	11.54	16.99	7.23	5.45	5.52	2.82	3.53	0.95	2.41	0.38	1.63	0.14	0.98	0.04	0.45	0.01	0.27	0.00	0.17	0.00	0.12	0.00
45			8.14	6.78	6.21	3.51	3.98	1.19	2.71	0.47	1.83	0.18	1.11	0.05	0.51	0.01	0.30	0.00	0.19	0.00	0.14	0.00
50			9.04	8.24	6.90	4.26	4.42	1.44	3.02	0.57	2.04	0.22	1.23	0.06	0.57	0.01	0.33	0.00	0.22	0.00	0.15	0.00
55			9.95	9.83	7.59	5.08	4.86	1.72	3.32	0.68	2.24	0.26	1.35	0.08	0.62	0.01	0.37	0.00	0.24	0.00	0.17	0.00
60			10.85	11.55	8.27	5.97	5.30	2.02	3.62	0.80	2.44	0.31	1.48	0.09	0.68	0.01	0.40	0.00	0.26	0.00	0.18	0.00
65			11.76	13.39	8.96	6.93	5.74	2.34	3.92	0.93	2.65	0.36	1.60	0.10	0.74	0.02	0.44	0.00	0.28	0.00	0.20	0.00
70					9.65	7.95	6.18	2.69	4.22	1.06	2.85	0.41	1.72	0.12	0.80	0.02	0.47	0.01	0.30	0.00	0.21	0.00
75					10.34	9.03	6.63	3.05	4.52	1.21	3.05	0.46	1.85	0.14	0.85	0.02	0.50	0.01	0.32	0.00	0.23	0.00
80					11.03	10.17	7.07	3.44	4.82	1.36	3.26	0.52	1.97	0.15	0.91	0.02	0.54	0.01	0.34	0.00	0.25	0.00
85					11.72	11.38	7.51	3.85	5.13	1.52	3.46	0.58	2.09	0.17	0.97	0.03	0.57	0.01	0.37	0.00	0.26	0.00
90							7.95	4.28	5.43	1.69	3.66	0.65	2.21	0.19	1.02	0.03	0.60	0.01	0.39	0.00	0.28	0.00
100							8.83	5.20	6.03	2.06	4.07	0.79	2.46	0.23	1.14	0.04	0.67	0.01	0.43	0.00	0.31	0.00
110							9.72	6.21	6.63	2.45	4.48	0.94	2.71	0.28	1.25	0.04	0.74	0.01	0.47	0.00	0.34	0.00
120							10.60	7.30	7.24	2.88	4.88	1.11	2.95	0.33	1.36	0.05	0.80	0.01	0.52	0.00	0.37	0.00
130									7.84	3.34	5.29	1.28	3.20	0.38	1.48	0.06	0.87	0.02	0.56	0.01	0.40	0.00
140									8.44	3.83	5.70	1.47	3.44	0.43	1.59	0.07	0.94	0.02	0.60	0.01	0.43	0.00
150									9.05	4.36	6.11	1.67	3.69	0.49	1.70	0.08	1.00	0.02	0.65	0.01	0.46	0.00
160									9.65	4.91	6.51	1.89	3.94	0.55	1.82	0.08	1.07	0.02	0.69	0.01	0.49	0.00
170									10.25	5.49	6.92	2.11	4.18	0.62	1.93	0.09	1.14	0.03	0.73	0.01	0.52	0.00
180									7.33	2.35	4.43	0.69	2.04	0.11	1.21	0.03	0.78	0.01	0.55	0.00		
190									7.73	2.59	4.68	0.76	2.16	0.12	1.27	0.03	0.82	0.01	0.58	0.00		
200									8.14	2.85	4.92	0.84	2.27	0.13	1.34	0.04	0.86	0.01	0.61	0.01		
225									9.16	3.55	5.54	1.04	2.56	0.16	1.51	0.04	0.97	0.02	0.69	0.01		
250									10.18	4.31	6.15	1.27	2.84	0.19	1.67	0.05	1.08	0.02	0.77	0.01		
275											6.77	1.51	3.12	0.23	1.84	0.06	1.19	0.02	0.84	0.01		
300											7.38	1.78	3.41	0.27	2.01	0.07	1.29	0.03	0.92	0.01		
325											8.00	2.06	3.69	0.31	2.18	0.09	1.40	0.03	1.00	0.01		
350											8.61	2.36	3.98	0.36	2.34	0.10	1.51	0.03	1.07	0.01		
375											9.23	2.68	4.26	0.41	2.51	0.11	1.62	0.04	1.15	0.02		
400											9.84	3.03	4.54	0.46	2.68	0.13	1.72	0.04	1.23	0.02		
425											10.46	3.38	4.83	0.52	2.85	0.14	1.83	0.05	1.30	0.02		
450													5.11	0.57	3.01	0.16	1.94	0.05	1.38	0.02		
475													5.40	0.63	3.18	0.18	2.05	0.06	1.46	0.03		
500													5.68	0.70	3.35	0.19	2.16	0.07	1.53	0.03		
550													6.25	0.83	3.68	0.23	2.37	0.08	1.69	0.03		
600													6.82	0.98	4.02	0.27	2.59	0.09	1.84	0.04		
650													7.38	1.13	4.35	0.31	2.80	0.11	1.99	0.05		
700													7.95	1.30	4.69	0.36	3.02	0.12	2.15	0.05		
750													8.52	1.48	5.02	0.41	3.23	0.14	2.30	0.06		
800													9.09	1.67	5.36	0.46	3.45	0.16	2.45	0.07		
8																						

Pressure Conversion

psi	Feet	Meter	Bar	kPa
1	2.3090	0.7038	0.0689	6.8948
80	185	56	5.5	552
85	196	60	5.9	586
90	208	63	6.2	621
95	219	67	6.6	655
100	231	70	6.9	689
105	242	74	7.2	724
110	254	77	7.6	758
115	266	81	7.9	793
120	277	84	8.3	827
125	289	88	8.6	862
130	300	91	9.0	896
135	312	95	9.3	931
140	323	99	9.7	965
150	346	106	10.3	1034
160	369	113	11.0	1103
170	393	120	11.7	1172
180	416	127	12.4	1241
190	439	134	13.1	1310
200	462	141	13.8	1379

Flow Rate Conversion

gpm	ft ³ /s	m ³ /h	l/s	acre-ft/day
1	0.0022	0.2271	0.0002	0.004419
100	0.22	22.7	6.3	0.442
250	0.56	56.8	15.8	1.105
500	1.11	113.6	31.5	2.210
750	1.67	170.3	47.3	3.314
1000	2.23	227.1	63.1	4.419
1500	3.34	340.7	94.6	6.629
2000	4.46	454.2	126.2	8.838
2500	5.57	567.8	157.7	11.048
3000	6.68	681.4	189.3	13.258
3500	7.80	794.9	220.8	15.467
4000	8.91	908.5	252.4	17.677
4500	10.03	1022.1	283.9	19.886
5000	11.14	1135.6	315.5	22.096
6000	13.37	1362.7	378.5	26.515
7000	15.60	1589.9	441.6	30.934
8000	17.82	1817.0	504.7	35.353
9000	20.05	2044.1	567.8	39.773
10000	22.28	2271.2	630.9	44.192

Lake Intake Box Screen Sizing

Flow Rate In (gpm)	Box Screen Size
0 - 500	18" square
501 - 1000	24" square
1001 - 1800	30" square
1801 - 2800	36" square
2801 - 4000	42" square
4001 - 5000	48" square
5001 - 7000	54" square
7001 - 8500	60" square
8501 - 10000	66" square

Based on screen velocities of less than 0.5 feet per second

Wet Well Intake Pipe Sizing

Flow Rate In gpm	50'	Length of Pipe in Feet 100'	200'	300'	Nominal IPS Pipe Diameter
0 - 500	12"	12"	12"	14"	
501 - 1000	18"	18"	18"	18"	
1001 - 1500	24"	24"	24"	24"	
1501 - 2000	26"	26"	26"	26"	
2001 - 2500	28"	28"	28"	28"	
2501 - 3000	30"	30"	30"	30"	
3001 - 3500	32"	32"	32"	32"	
3501 - 4000	34"	34"	34"	34"	
4001 - 5000	36"	36"	36"	36"	

The nominal IPS pipe diameters listed in this chart assume a total equivalent pipe length as listed for friction loss calculations. A recommended internal pipe water velocity of up to 1.5 feet per second and/or a draw down of 1 inch or less is used to develop this conservative intake sizing table. Consult a Rain Bird engineer for values ranging outside of this chart.

Wet Well Open Area Sizing

Size	Shape	Number Of Pumps
36" Dia	Round	1 - Vertical Turbine
48" Dia	Round	1 or 2 - Vertical Turbines
60" Dia	Round	1 or 2 - Vertical Turbines
72" Dia	Round	1 to 3 - Vertical Turbines
84" Dia	Round	1 to 5 - Vertical Turbines
96" Dia	Round	1 to 6 - Vertical Turbines
6' x 8'	Rectangular	1 to 7 - Vertical Turbines

Micron to Mesh Conversion

Micron	U.S. Mesh	Inches
2000	10	0.0787
1680	12	0.0661
1410	14	0.0555
1190	16	0.0469
1000	18	0.0394
841	20	0.0331
707	25	0.028
595	30	0.0232
500	35	0.0197
420	40	0.0165
354	45	0.0138
297	50	0.0117
250	60	0.0098
210	70	0.0083
177	80	0.007
149	100	0.0059
125	120	0.0049
105	140	0.0041
88	170	0.0035
74	200	0.0029
63	230	0.0024
53	270	0.0021
44	325	0.0017
37	400	0.0015

Integrated Control System™ Wire Path Design

Recommended to load balance wire path.

- Do not utilize the full system capacity of 750 ICMs on one wire path. Instead, leave room to expand the system and add sensing capability in the future.

The wire distance is the “trunk length” of the wire path.

- The trunk length is the “longest single run of wire” needed for accommodating the installed ICMs.

Branches can be added to the trunk wire.

- Branches do not increase the maximum number of ICMs on the wire path.

Wire Distance in Feet (ft.)

No. of units	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000
50	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
100	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
150	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
200	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG
250	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG
300	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG
350	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG
400	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG
450	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG
500	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG
550	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG
600	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	10 AWG
650	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	—	—
700	14 AWG	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	—	—	—
750	14 AWG	14 AWG	14 AWG	14 AWG	12 AWG	12 AWG	12 AWG	12 AWG	10 AWG	10 AWG	10 AWG	10 AWG	—	—	—

Wire Distance in Meters (m)

No. of units	1,000	1,250	1,500	1,750	2,000	2,250	2,500	2,750	3,000	3,250	3,500	3,750	4,000	4,250	4,500
50	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²
100	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²
150	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²
200	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²
250	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²
300	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	4.0 mm ²
350	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²
400	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²
450	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²
500	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²
550	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	6.0 mm ²
600	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	6.0 mm ²	6.0 mm ²
650	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	6.0 mm ²	6.0 mm ²	6.0 mm ²	6.0 mm ²
700	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	6.0 mm ²	6.0 mm ²	6.0 mm ²	6.0 mm ²	—
750	2.5 mm ²	2.5 mm ²	2.5 mm ²	2.5 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	4.0 mm ²	6.0 mm ²	6.0 mm ²	6.0 mm ²	6.0 mm ²	—	—

Water Velocity Table

Internal Pipe Diameter																								
gpm	2"	4"	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"
10	1.0	0.3	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20	2.0	0.5	0.2	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30	3.1	0.8	0.3	0.2	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40	4.1	1.0	0.5	0.3	0.2	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50	5.1	1.3	0.6	0.3	0.2	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
60	6.1	1.5	0.7	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—
70	7.2	1.8	0.8	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—
80	8.2	2.0	0.9	0.5	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—	—
90	9.2	2.3	1.0	0.6	0.4	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—	—
100	10.2	2.6	1.1	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—	—	—	—
150	15.3	3.8	1.7	1.0	0.6	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	—	—	—	—	—	—	—
200	20.4	5.1	2.3	1.3	0.8	0.6	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	—	—	—	—
250	25.5	6.4	2.8	1.6	1.0	0.7	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	—	—
300	30.7	7.7	3.4	1.9	1.2	0.9	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
350	35.8	8.9	4.0	2.2	1.4	1.0	0.7	0.6	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
400	40.9	10.2	4.5	2.6	1.6	1.1	0.8	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
450	46.0	11.5	5.1	2.9	1.8	1.3	0.9	0.7	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
500	51.1	12.8	5.7	3.2	2.0	1.4	1.0	0.8	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
600	61.3	15.3	6.8	3.8	2.5	1.7	1.3	1.0	0.8	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
700	71.5	17.9	7.9	4.5	2.9	2.0	1.5	1.1	0.9	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
800	81.7	20.4	9.1	5.1	3.3	2.3	1.7	1.3	1.0	0.8	0.7	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
900	92.0	23.0	10.2	5.7	3.7	2.6	1.9	1.4	1.1	0.9	0.8	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
1000	102.2	25.5	11.4	6.4	4.1	2.8	2.1	1.6	1.3	1.0	0.8	0.7	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2
1250	127.7	31.9	14.2	8.0	5.1	3.5	2.6	2.0	1.6	1.3	1.1	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2
1500	153.3	38.3	17.0	9.6	6.1	4.3	3.1	2.4	1.9	1.5	1.3	1.1	0.9	0.8	0.7	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3
1750	178.8	44.7	19.9	11.2	7.2	5.0	3.6	2.8	2.2	1.8	1.5	1.2	1.1	0.9	0.8	0.7	0.6	0.6	0.5	0.4	0.4	0.4	0.3	0.3
2000	204.4	51.1	22.7	12.8	8.2	5.7	4.2	3.2	2.5	2.0	1.7	1.4	1.2	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4
2500	255.4	63.9	28.4	16.0	10.2	7.1	5.2	4.0	3.2	2.6	2.1	1.8	1.5	1.3	1.1	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.4
3000	306.5	76.6	34.1	19.2	12.3	8.5	6.3	4.8	3.8	3.1	2.5	2.1	1.8	1.6	1.4	1.2	1.1	0.9	0.8	0.8	0.7	0.6	0.6	0.5
3500	357.6	89.4	39.7	22.4	14.3	9.9	7.3	5.6	4.4	3.6	3.0	2.5	2.1	1.8	1.6	1.4	1.2	1.1	1.0	0.9	0.8	0.7	0.7	0.6
4000	408.7	102.2	45.4	25.5	16.3	11.4	8.3	6.4	5.0	4.1	3.4	2.8	2.4	2.1	1.8	1.6	1.4	1.3	1.1	1.0	0.9	0.8	0.8	0.7
4500	459.8	114.9	51.1	28.7	18.4	12.8	9.4	7.2	5.7	4.6	3.8	3.2	2.7	2.3	2.0	1.8	1.6	1.4	1.3	1.1	1.0	0.9	0.9	0.8
5000	510.9	127.7	56.8	31.9	20.4	14.2	10.4	8.0	6.3	5.1	4.2	3.5	3.0	2.6	2.3	2.0	1.8	1.6	1.4	1.3	1.2	1.1	1.0	0.9
5500	562.0	140.5	62.4	35.1	22.5	15.6	11.5	8.8	6.9	5.6	4.6	3.9	3.3	2.9	2.5	2.2	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0
6000	613.1	153.3	68.1	38.3	24.5	17.0	12.5	9.6	7.6	6.1	5.1	4.3	3.6	3.1	2.7	2.4	2.1	1.9	1.7	1.5	1.4	1.3	1.2	1.1

Main line pipe diameter under standard practice is sized to achieve < 5 feet-per-second water velocity.

Wet-well intake pipe diameter under standard practice is sized to achieve < 1.5 feet-per-second water velocity.

Velocities listed are based on the actual internal diameter to the pipe. Verify internal diameter based on class or type of pipe being used.

Rain Bird will repair or replace at no charge any Rain Bird professional product that fails in normal use within the warranty period stated below. You must return it to the dealer or distributor where you bought it. Product failures due to acts of God including without limitation, lightning and flooding, are not covered by this warranty. This commitment to repair or replace is our sole and total warranty.

Implied Warranties of Merchantability and Fitness, if Applicable, are Limited to One Year from the Date of Sale. We will not, under any circumstances be liable for incidental or consequential damages, no matter how they occur.

I. Landscape Irrigation Products

1800° Series Pop-Up Spray Heads, U-Series Nozzles, Brass MPR Nozzles, A-8S and PA-8S-PRS Shrub Adapters, and 1300 and 1400 Bubblers, 5000 Series Rotors, 5500 Series Rotors, 7005/8005 Rotors, Falcon® 6504 Series Rotors, PEB and PESB Plastic Valves – **5 Years**

All other Landscape Irrigation products – **3 years**

II. Golf Products

Golf Rotors: EAGLE™ Series and EAGLE IC™ Series, Rain Bird® Series and Rain Bird IC™ Golf rotors – **3 years**. Additionally, EAGLE Series and EAGLE IC Series, Rain Bird Series and Rain Bird IC Golf Rotor sold and installed in conjunction with a Rain Bird swing joint – **5 years**. Proof of concurrent installation is required.

Swing Joints – **5 years**

Brass Remote Control Valves and Brass Quick Coupling and Keys – **3 years**

Filtration system controllers – **3 years**

LINK™ Radios – **3 years**

TSM-3 SDI12 Soil Sensor (ISS) – **3 years**

All other golf products – **1 year**

III. Agricultural Products

LF Series Sprinklers – **5 years**

Other Impact Sprinklers – **2 years**

All other AG products – **1 year**

IV. Pump Stations

Rain Bird guarantees that its pump station will be free of manufacturer defects for three years from the date of start-up but not beyond forty months from the date of purchase by the original customer with a copy of the seller's invoice required for coverage under this Policy. Start-up or service by anyone other than a Rain Bird authorized representative, when required, will void these terms and conditions.

Provided that all installation, start-up, operation responsibilities, and recommended maintenance procedures have been properly executed and performed by authorized Rain Bird representatives, when required, Rain Bird will replace or repair, at Rain Bird's option, any Rain Bird part found to be defective under normal recommended use during the effective period of this Policy, such evaluation to be solely determined by Rain Bird. Rain Bird's only obligation and customer's exclusive remedy under this Policy is limited to repair or replacement, at Rain Bird's option, of the parts or the products the defects of which are reported to Rain Bird within the applicable Policy period, which prove to be defective and such evaluation will be solely determined by Rain Bird.

In no case will Rain Bird cover labor costs associated with repair or replacement of parts beyond one year from date of start-up. Repairs performed and parts used at Rain Bird's expense must be authorized by Rain Bird, in writing, prior to repairs being performed. Product repairs or replacement under this Policy will not extend this Policy. Coverage for repaired or replaced product shall end when this Policy terminates. Rain Bird's sole obligation and customer's exclusive remedy under this Policy shall be limited to such repair or replacement.

Upon request, Rain Bird may provide advice on trouble-shooting a defect during the effective period of this Customer Satisfaction Policy. Repair service must be performed by a Rain Bird authorized representative regardless of whether the labor is covered by Rain Bird or is at the owner's expense during the effective period of this Policy. However, no service, replacement or repair under this Customer Satisfaction Policy will be rendered while the customer is in default of any payments due to Rain Bird.

Rain Bird will not accept responsibility for costs associated with the removal, replacement or repair of equipment in difficult-to-access locations and such evaluation will be solely determined by

Rain Bird. Difficult-to-access locations include (but are not limited to) locations where any of the following are required:

- | | |
|-------------------------------|--|
| 1) Cranes larger than 15 tons | 5) Dredging |
| 2) Divers | 6) Roof removal or other such construction/deconstruction requirements |
| 3) Barges | 7) Any other unusual means or requirements |
| 4) Helicopters | |

Such extraordinary cost associated with difficult-to-access locations shall be the sole responsibility of the customer, regardless of the reason requiring removal, repair or replacement of the equipment.

The terms and conditions of this Customer Satisfaction Policy do not cover damage, loss or injury caused by or resulting from the following:

- | | |
|---|---|
| 1) Misapplication, abuse, or failure to conduct routine maintenance (to include winterization / winter lay-up procedures). | 9) Non-WYE configured power supplies such as open delta, phase converters or other forms of unbalanced three phase power supplies. |
| 2) Pumping of liquids other than fresh water as defined by the U.S. Environmental Protection Agency, unless the pump station quoted by Rain Bird specifically lists these other liquids and their concentrations. | 10) Improper electrical grounding or exposure to incoming power lacking circuit breaker or fused protection. |
| 3) Use of pesticides (to include insecticides, fungicides and herbicides), free chlorine or other strong biocides. | 11) Using the control panel as a service disconnect. |
| 4) Exposure to electrolysis, erosion, or abrasion. | 12) Lightning, earthquake, flood, windstorm or other Acts of Nature. |
| 5) Use or presence of destructive gases or chemicals unless these materials and their concentrations are specified in the Rain Bird quotation. | 13) Failure of pump packing seal (unless the failure occurs on initial start-up). |
| 6) Electrical supply voltages above or below those specified for correct pump station operation. | 14) Any damage or loss to plants, equipment or groundwater or injury to people caused by the failure of or improper use of an injection system or improper concentration of chemicals or plant nutrients introduced into the pump station by an injection system. |
| 7) Electrical phase loss or reversal. | 15) Any failure of nutrient or chemical storage or spill containment equipment or facilities associated with the pump station location. |
| 8) Use of a power source other than that specified in the original quotation. | |

The foregoing terms and conditions constitute Rain Bird's entire pump station customer satisfaction policy. This policy is exclusive and in lieu of any other warranties whatsoever, whether express, implied, or statutory including the implied warranties of merchantability and fitness for a particular purpose, which are all hereby expressly disclaimed. The sole remedy under this policy shall be limited to the repair or replacement of the pump station or its components pursuant to the terms and conditions contained herein. In the case of any components or injection systems manufactured by others (as noted on the pump station quotation), there is no warranty provided by Rain Bird and these items are covered solely by and to the extent of the warranty if any, offered by those other manufacturers.

Rain Bird shall not be liable to the customer or any other person or entity for any liability, loss, delay or damage caused or alleged to be caused, directly or indirectly, by any use, defect, failure or malfunction of the pump station or by any injection system whether a claim for such liability, loss, delay or damages is based upon warranty, contract, tort or otherwise. Rain Bird shall not be liable for incidental, consequential, collateral or indirect damages or delay or loss of profit or loss of use or any damages related to the customer's business operations, nor for those caused by acts of nature. In no case and under no circumstances shall Rain Bird's liability exceed the Rain Bird Corporation's net sale price of the pump station.

Laws concerning customer warranties and disclaimers vary from state to state, jurisdiction to jurisdiction, province to province or country to country and therefore some of the foregoing limitations may not apply to you. The exclusions and limitations set out above are not intended to, and should not be construed so as to contravene mandatory provisions of applicable law. If any part or term of this policy is held to be illegal, unenforceable or in conflict with applicable law by a court of competent jurisdiction, the validity of the remaining portions of this policy shall not be affected, and all rights and obligations shall be construed and enforced as if this policy did not contain the particular part or term held to be invalid.

V. All other products – 1 year

[illegible]

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