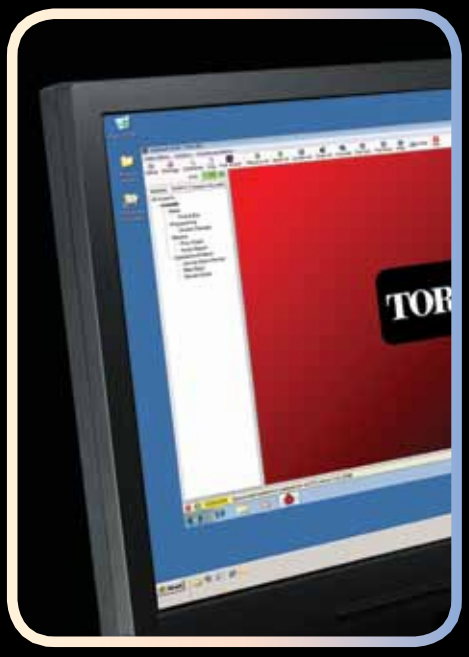
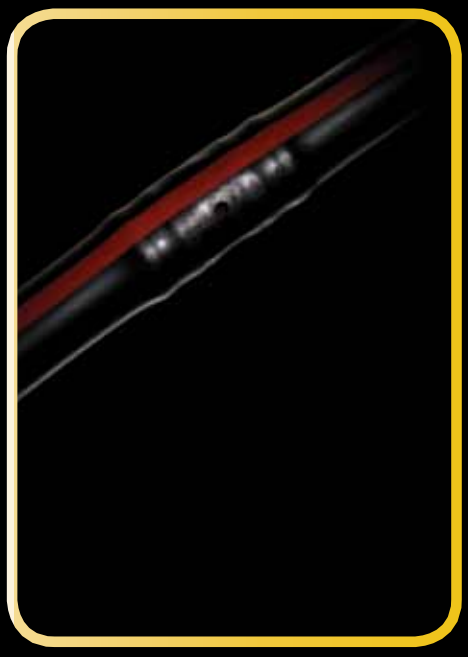
TORO Count on it.

Residential/Commercial Irrigation Specification Catalog

2011-2012





Our Commitment to Responsible Environmental Practices

Consistent with the principles on which we were founded, The Toro Company is committed to helping customers improve their outdoor environments with innovative turf maintenance equipment and precision irrigation systems. At the same time, we employ strategies and practices to protect, support and enhance the human and natural resources.

Important to our future. Product Innovation

Our commitment to designing and delivering innovative new products has not wavered. It's the lifeblood of our company. By working closely with customers to anticipate the future, we're in constant pursuit of new technologies to help protect the environment, conserve water, increase productivity and control costs.

Toro Precision™ Series Spray Nozzles

Water Management

With proven and proprietary water-saving irrigation technologies, we continue to advance our position as a leader in water management.

- Hold over 200 patents for pioneering irrigation products.
- Recognized as a "2008 New Product of the Year" by the Irrigation Association, Toro's Precision™ Series Spray Nozzles represent the most significant breakthrough in nozzle technology in over 60 years. These nozzles reduce overall water use by up to 30 percent*.
- Precision irrigation is a priority. Products such as Toro's Intelli-Sense™ controllers with weather-based ET technology could provide Leadership in Energy and Environmental Design (LEED) credits for water efficient landscaping, while Turf Guard® wireless soil moisture and salinity sensors help customers maintain healthy turf with less water and energy.
- A leading manufacturer of water-conserving drip irrigation products for landscapes, agriculture, nurseries and greenhouses. Drip irrigation helps maintain healthy crops and landscapes while using less water and fertilizer.

Turf Guard® Web-Based Soil Monitoring System

Operational Efficiency

Our focus remains constant on eliminating waste and increasing efficiencies in our operations. We continue to identify improvements that deliver greater efficiency and manufacturing flexibility. These ongoing efforts have yielded both environmental and operational benefits.

Philanthropy

The Toro Giving Program has built a legacy of environmental, educational and community support that is deeply rooted in our culture.

- Annual financial support to environmental organizations.
- The company hosts employee activities to renovate parks and restore lakes, rivers and landscapes to their natural beauty.
- Support environmental research projects on the precision application of water and chemicals.
- Educate individuals of all ages on environmental issues.
- Fund turf management research programs at leading academic institutions to improve product efficiency and productivity.

* Projections of water savings are based on Precision Series Spray Nozzles and conventional spray nozzles using the same watering schedule.

Customer Care You Can Count On

Toro Technical Support

Our technical support team is truly extraordinary at what they do. Between them they have over 100 years of irrigation experience that you can depend on. For an excellent support experience, call 1-877-345-TORO (8676) or email irrigation.support@toro.com.

Toro Controller Repair

Did you know that with Toro's Board Exchange Program you can get the replacement controller boards you need immediately? Through your distributor, controller repair provides controller boards ready for immediate board exchange to assure that controller downtime is minimal and your landscape and reputation stays protected. For immediate assistance call 1-877-345-TORO (8676), Monday – Friday, 6:00 AM – 3:30 PM PST.

Toro Training

Toro offers its customers training and education on new product technology, water management best practices, and provides world-class business skills training for professional contractors to help them increase productivity and improve their bottom line. For online product training, visit www.torocontractor.com/education. To learn more about other educational opportunities in your area and nationwide, call 1-877-345-TORO (8676).

Toro NSN®

Toro's National Support Network (NSN) is a team of A+ certified technicians and licensed irrigators dedicated to the daily operations and maintenance of computerized central control systems. Every new Toro computerized central irrigation control system includes Toro NSN support, as well as convenient classroom, web and computer-based training. For assistance call 1-888-676-TORO (8676) or visit www.toronsn.com.

Toro Online Information

We offer a complete listing of all irrigation products at (www.toro.com/professional irrigation) along with links to Distributor locator, CAD Details, and product literature. Specialty sites for our contractor partners (www.torocontractor.com) and water management highlights (www.torowatersmart.com) are full of great information at your fingertips.

ANATOMY OF A SMART IRRIGATION SYSTEM

All the parts of an irrigation system… controller, valves, sprinklers… work together to ensure your customers' plants get proper watering. Replacing just one portion of their system with efficient products helps save water. Over time, replacing all components of their system (or installing a new system) with efficient irrigation products ensures optimum savings.

RainSensor™ Series with patented Water Conservation Modes
Page #: 104

Intelli-Sense™ Professional ET-Adjusting Smart Controller
Page #: 93

TPV Valve Series with patented DBS Technology™
Page #: 66

P-220 Valve with Pressure Regulation
Page #: 72

TFS Series Flow Sensor
Page #: 103

TPV Drip Zone Kit
Page #: 140


T5 Rotor with
patent pending
Air Foil Distribution
Technology
Page #: 40
Irrigation SHOW 2008
New Product
Contest Winner
Precision™ Series
Spray Nozzles with patented
H²O Chip Technology
Page #: 18
570Z Sprays with patented
X-Flow® Valve-In-Stem
Shutoff
Page #: 14
Precision™ Series
Rotating Nozzles with
Planetary Gear Drive
Page #: 22
DL2000® Subsurface
Dripline with patented
ROOTGUARD®
Technology
Page #: 124

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Landscape Drip Pages 122-141

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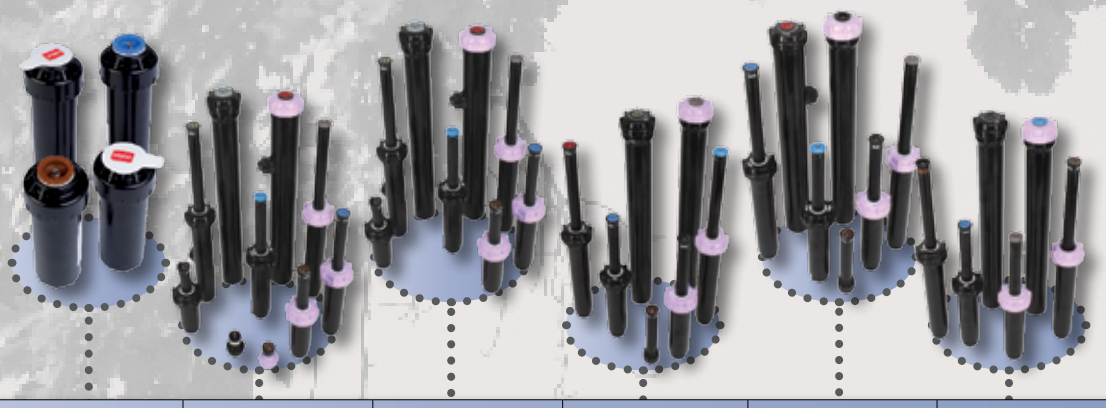
Fixed Sprays Overview

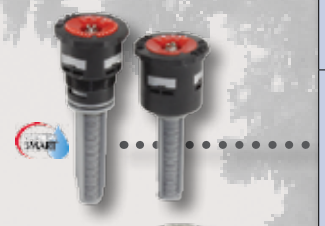


Model	LPS Series	570Z	570ZLP	570ZXF	570ZPR	570ZPRX
Page Number	10-11	12-13	12-13	14-15	16-17	16-17
Radius	2'-18' (0,6m-5,5m)	2'-26' (0,6m-7,9m)	2'-26' (0,6m-7,9m)	2'-26' (0,6m-7,9m)	2'-17' (0,6-5,2m)	2'-17' (0,6-5,2m)
Flow Range	0.05-4.50 GPM 0,19-17,0 LPM	0.05-4.50 GPM (0,19-17,0 LPM)	0.05-4.50 GPM (0,19-17,0 LPM)	0.05-4.50 GPM 0,19-17,0 LPM	0.05-3.45 GPM 0,19-13,0 LPM	0.05-3.45 GPM 0,19-13,0 LPM
Operating Pressure Range (inlet)	20-50 PSI (1,4-3,5 Bar)	20-75 PSI (1,4-5,2 Bar)	15-75 PSI (1,0-5,2 Bar)	20-75 PSI (1,4-5,2 Bar)	20-75 PSI (1,4-5,2 Bar)	20-75 PSI (1,4-5,2 Bar)
Turf	X	X	X	X	X	X
Shrubs/Ground Cover	X	X	X	X	X	X
Slopes	X	X	X	X	X	X
High Pressure Systems		X		X	X	X
Low Pressure Systems	X		X			
Medians				X	X	X
High Traffic Areas				X	X	X
High Wind					X	X
Pop-up Height To Nozzle	2" (50 mm) 4" (100 mm)	2" (50 mm) 3" (75 mm) 4" (100 mm) 6" (150 mm) 12" (300 mm)	2" (50 mm) 3" (75 mm) 4" (100 mm) 6" (150 mm) 12" (300 mm)	4" (100 mm) 6" (150 mm) 12" (300 mm)	4" (100 mm) 6" (150 mm) 12" (300 mm)	4" (100 mm) 6" (150 mm) 12" (300 mm)
Side Inlet Option		6" (150 mm) 12" (300 mm)	6" (150 mm) 12" (300 mm)	6" (150 mm) 12" (300 mm)	6" (150 mm) 12" (300 mm)	6" (150 mm) 12" (300 mm)
Check Valve Option	X	X	X	X	X	X
Effluent Water Option		X	X	X	X	X
Shrub Model		X	X	X	X	X
Zero Flush		X	X	X	X	X
X-Flow® Water Shut-off				X		X
Built-in Pressure Regulator					X	X
Serviceable Seal		X	X	X	X	X
Warranty	Two years	Two years	Two years	Two years	Five years	Five years

WaterSmart® Feature

Nozzles Overview

Note: All 570 nozzles work in all Toro® sprays.
Precision Series also offer additional models to fit Irritrol®, Rain Bird®, and Hunter® sprays.



Model	Radius	Arcs	Flow Range	Recommended Operating Pressure
Precision™ Series Spray Nozzles Page 18-21	5'-15' (1,5-4,6m) 4'x9' (1,2-2,7m) 4'x15' (1,2-4,6m) 4'x18' (1,2-5,5m) 4'x30' (1,2-9,1m)	60°, 90°, 120°, 150°, 180°, 210°, 240°, 270°, 360° and Specialty	.038-2.4 GPM (0,14-9,08 LPM)	30 PSI (2,0 Bar)
Precision™ Series Rotating Nozzle Page 22-23	14'-26' (4,3m-7,9m)	45° to 270°, Full-circle	.38-3.78 GPM (1,43-14,3 LPM)	40-50 PSI (2,8-3,5 Bar)
MPR Plus Page 24-25	2'-18' (0,61m-5,5m)	1/4, 1/3, 1/2, 2/3, 3/4, Full and Specialty	0.05-4.58 GPM (1,9-17,3 LPM)	30 PSI (2,0 Bar)
TVAN Page 26	7'-18' (2,13m-5,5m)	0°-360°	0.7-5.60 GPM (2,65-21,2 LPM)	30 PSI (2,0 Bar)
Stream Sprays Page 27	13'-22' (4,0m-6,7m)	1/4, 1/2, Full	0.6-2.70 GPM (2,3-10,2 LPM)	30 PSI (2,0 Bar)
Stream Bubblers Page 27	1.5'-18' (0,46m-5,5m)	1/4", 1/2", Full, 2X180, 4x180	0.49-2.02 GPM (1,85-7,64 LPM)	20-30 PSI (1,4-2,0 Bar)
Flood Bubbler PC Page 28	Circle	Flood	0.25-2.0 GPM (0,94-7,6 LPM)	20-30 PSI (1,4-2,0 Bar)
500 Series Bubblers Page 28	6'-17' (2,13m-5,5m)	2/60, 4/60, 6/60, 2/180	1.08-3.70 GPM (4,1-14,0 LPM)	20-30 PSI (1,4-2,0 Bar)

WaterSmart® Feature

LPS Series Sprays

- 2" (50mm) and 4" (100mm) Pop-up
- Radius: 2'-18' (0,6-5,5m)
- Operating Pressure Range: 20-50 psi (1,4-3,5 Bar)

The Toro® LPS Series meets the demand without sacrificing quality. These fixed sprays feature a durable, compact body with a pressure activated seal that minimizes flow-by during start-up and keeps debris away during retraction.

Features & Benefits

Pressure Activated Seal
Minimizes flow-by during pop-up and keeps debris away from stem during retraction.

Stainless Steel Retraction Spring
This heavy-duty spring ensures positive pop-down.

Easy Grip Top
Unique grip-and-turn adjustment from the top of the nozzle – wet or dry.

Removable Components
Nozzle, screen and internal components are easily removed for flushing and servicing.

Compatible With All 570Z Nozzles
Available with pre-installed Toro Variable Arc Nozzles (TVAN) in five radii or can accept any 570Z nozzle offering.

Water Management Highlight

Easy Arc Adjustment Means Accurate Watering

TVAN Series nozzles are designed to deliver effective watering coverage with maximum irrigation efficiency. Whether a standard size, odd angle or irregularly shaped area, the TVAN Series is able to meet the watering requirements with just one nozzle. There is no need to worry about dry spots on lawns or wasting water on sidewalks, driveways and other hardscapes.

Specifications

Dimensions

- Body diameter: 1¼" (32mm)
- Cap diameter: 1 ⅝" (41,3mm)
- Inlet: ½" (12mm) female-threaded

Operating Specifications and Features

- Radius: 2' – 18' (0,6-5,5m)
- Operating pressure range: 20-50 psi (1,4-3,5 Bar)
- Recommended pressure for spray nozzles: 30 psi (2,1 Bar)
- Recommended pressure for rotating nozzles: 40-50 psi (2,8-3,5 Bar)
- Flow by: 0 at 10 psi (0 at 0,7 Bar) or greater
- Infinitely adjustable from 0° to 360°
- Top color-coded nozzles

Options Available

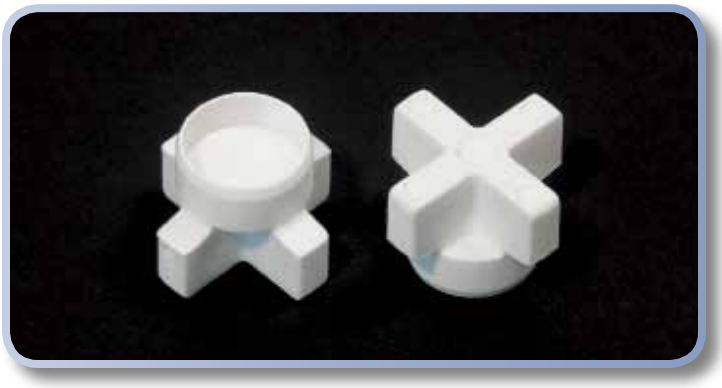
- LPSCV - Check Valve: Maintains up to 7' (2,1m) elevation change

Warranty

- Two years

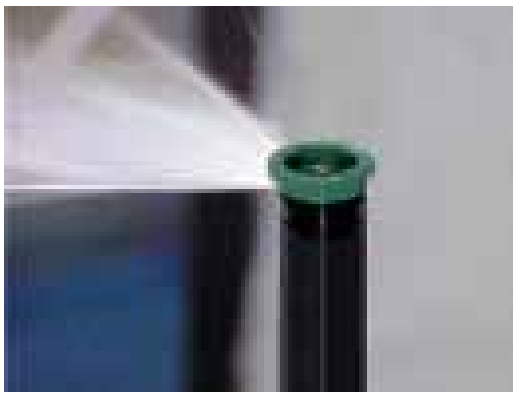
Optional Check valve

The LPS sprinkler series has an optional check valve rated to hold back 7' (2,1m) of elevation change. This helps to eliminate low head drainage and keeps the lines charged to lessen water hammer potential.



LPS Series Model List	
Model	**Description**
LPS200	2" (50mm) Pop-up w/o nozzle
LPS208	2" (50mm) Pop-up w/TVAN8 installed
LPS210	2" (50mm) Pop-up w/TVAN10 installed
LPS212	2" (50mm) Pop-up w/TVAN12 installed
LPS215	2" (50mm) Pop-up w/TVAN15 installed
LPS217	2" (50mm) Pop-up w/TVAN17 installed
LPS400	4" (100mm) Pop-up w/o nozzle
LPS408	4" (100mm) Pop-up w/TVAN8 installed
LPS410	4" (100mm) Pop-up w/TVAN10 installed
LPS412	4" (100mm) Pop-up w/TVAN12 installed
LPS415	4" (100mm) Pop-up w/TVAN15 installed
LPS417	4" (100mm) Pop-up w/TVAN17 installed

Color-coded on top for easy radius identification when installed



Specifying Information—LPS Series

LPS X XX CV

Description	Body	Nozzle	Options
LPS	X	XX	CV
LPS—LPS Fixed Spray	2—2" Body (50mm) 4—4" Body (100mm)	00—Body Only 08—8' (2,4m) 10—10' (3,0m) 12—12' (3,7m) 15—15' (4,6m) 17—17' (5,2m)	CV—Check Valve

Example: A 4" (100mm) Fixed-spray Sprinkler with a 10' (3,0m) nozzle, would be specified as: LPS410

570Z & 570ZLP Series Sprays

- **Shrub, 2" (50mm), 3" (75mm), 4" (100mm), 6" (150mm) and 12" (300mm) Pop-up**
- **Radius: 2'-26' (0,6m-7,9m)**
- **Operating Pressure Range (570Z): 20-75 psi (1,4-5,2 Bar)**
- **Operating Pressure Range (570LP): 15-75 psi (1,0-5,2 Bar)**

Versatile. Flexible. Reliable. The Toro® 570Z sprinkler embodies all that is required for residential and service contractors wanting to stock just one sprinkler family.

Effluent Options Available

Check Valve Options Available

Features & Benefits

Zero Flush Wiper Seal
Prevents flushing on pop-up, allowing more sprinklers on the same line.

One-Piece Check Valve
Easily installed at the factory or in the field. Maintains up to 10' (3m) elevation change.

Low Pressure or Enhanced Retraction Spring
Choose the spring which best meets your site specific needs. New to the family is the low pressure 570ZLP which allows for pop-up and retraction at lower pressures.

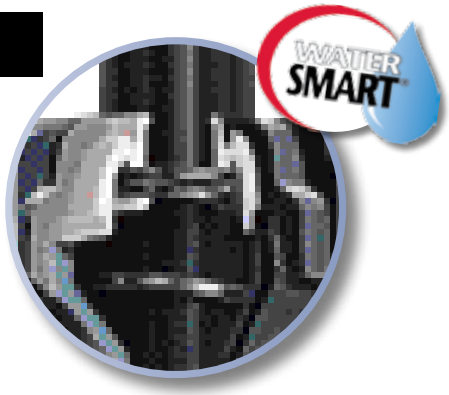
Ratcheting Riser
For easy and reliable arc adjustment on pop-up models.

Small 2" (50mm) Diameter Cap
Less visible, reducing damage from exposure or vandals.

Water Management Highlight

No Flushing on Pop-Up!

With a pressure-activated wiper seal that flushes only upon retraction, flow-by is eliminated on pop-up reducing water waste and allowing more heads per valve. This zero-flush seal is what makes the 570Z Series a spray head for those serious about effective water management.



Enhanced zero flush seal

Specifications

Dimensions

- Body diameter:
  - 1 ⅜" (35mm) on 2P, 3P, 4P, 6P and 6P SI models
  - 1 ⅝" (40mm) on 12P
  - 1 ¾" (45mm) on 12P SI
- Cap diameter: 2" (50mm)
- Inlet: ½" (12mm) female-threaded
- Side inlet: 4 ¾" (120mm) from top of sprinkler to center of side inlet

Operating Specifications

- Radius: 2'-26' (0,6m-7,9m)
- Operating pressure range (570Z): 20-75 psi (1,4-5,2 Bar)
- Operating pressure range (570ZLP): 15-75 psi (1,0-5,2 Bar)
- Recommended pressure for spray nozzles: 30 psi (2,1 Bar)
- Recommended pressure for rotating nozzles: 40-50 psi (2,8-3,5 Bar)
- Flow rate: 0.05 – 4.5 GPM (0,2-17,0 LPM)

Additional Features

- Stainless steel retraction spring
- Low pressure sealing on LP models at 15 psi (1,0 Bar) for low pressure pumps and well systems
- All bodies shipped with flush plug in place

Options Available

- Check Valve (570CV): maintains up to 10' elevation change (not for side-inlet models)
- 570SEAL: Serviceable seal for all 570Z models
- Effluent water indicators:
  - Effluent Shrub Adapter (102-1231)
  - Effluent Snap-on Cap Cover (89-9752)
  - Effluent Molded Cap with seal (102-1211)
- 570-6X: 6" (150mm) Riser Extender
- 570-SR-6: 6" (150mm) Stationary Riser ½" (12mm) male-threaded inlet
- 570-SR-18: 18" (450mm) Stationary Riser ½" (12mm) male-threaded inlet
- Riser Pull-up Tool (89-6395)
- Adjustment Key (89-7350)

Warranty

- Two years

570LP Series Model List	
Model	**Description**
570Z-2LP	570Z, 2" (50mm), Low Pressure
570Z-3LP	570Z, 3" (75mm), Low Pressure
570Z-4LP	570Z, 4" (100mm), Low Pressure
570Z-6LP	570Z, 6" (150mm), Low Pressure
570Z-6LPSI	570Z, 6" (150mm), Low Pressure, Side Inlet
570Z-12LP	570Z, 12" (300mm), Low Pressure
570Z-12LPSI	570Z, 12" (300mm), Low Pressure, Side Inlet

Note: all w/o Nozzle

570Z Series Model List	
Model	**Description**
570Z-2P	2" (50mm) Sprinkler
570Z-3P	3" (75mm) Sprinkler
570Z-4P	4" (100mm) Sprinkler
570Z-4PCOM	4" (100mm) Sprinkler, w/Check Valve
570Z-6P	6" (150mm) Sprinkler
570Z-6PSI	6" (150mm) Sprinkler, Side inlet Body
570Z-6PCOM	6" (150mm) Sprinkler, w/Check Valve
570Z-12P	12" (300mm) Sprinkler
570Z-12PSI	12" (300mm) Sprinkler, Side inlet Body
570Z-12PCOM	12" (300mm) Sprinkler, w/Check Valve
570S	Shrub Adapter

Note: all w/o Nozzle

Specifying Information—570ZLP Series

570X-XXLP-XX-COM-E

Model	Pop-up Height	Optional	Optional	Optional
570X	**XXXL**	**SI**	**COM**	**E**
Z—Lawn Pop-up & High Pop	2LP—2" (50mm) 3LP—3" (75mm) 4LP—4" (100mm) 6LP—6" (150mm) 12LP—12" (300mm)	SI—Side Inlet*	COM—Check- O- Matic™**	E—Effluent

Example: A 570ZLP Series Sprinkler (low pressure) with a pop-up height of 6" (150mm) and a check valve, you would specify: **570Z-6LP COM**

Specifying Information—570Z Series

570X-XXP-XX-COM-E

Model	Pop-up Height	Optional	Optional	Optional
570X	**XXP**	**SI**	**COM**	**E**
S—Shrub Z—Lawn Pop-up & High Pop	2—2" (50mm) 3—3" (75mm) 4—4" (100mm) 6—6" (150mm) 12—12" (300mm)	SI—Side Inlet*	COM—Check- O- Matic™**	E—Effluent

Example: A 570Z Series Sprinkler with a pop-up height of 6" (150mm) and a check valve, you would specify: **570Z-6P COM**

*Available for 6" (150mm) and 12" (300mm) models.
**Available with non-side inlet models except 2" (50mm) and 3" (75mm).

570ZXF Series Sprays

- **Shrub, 4" (100mm), 6" (150mm) and 12" (300mm) Pop-up**
- **Radius: 2'-26' (0,6m-7,9m)**
- **Operating Pressure Range: 20-75 psi (1,4-5,2 Bar)**

Convenient and versatile. The Toro® 570ZXF sprinkler has all the versatility and features of the 570Z with the added value of Toro's patented X-Flow® technology.

Effluent Options Available

Check Valve Options Available

Water Management Highlight

X-Flow Technology Shuts Off Water Waste

A missing or damaged spray head nozzle can let up to 40 gallons of water escape per minute. The patented X-Flow technology is a shut-off device built right into the sprinkler. When accidents or vandalism occur the 570ZXF is there to reduce liability and minimize water waste.

Features & Benefits

Patented X-flow® Water Shut-off Device
Built into the riser and restricts water loss by 99% if the nozzle is removed or damaged, eliminating potential erosion or safety concerns. Allows for "dry" nozzle and filter-replacement or maintenance, while the system is running.

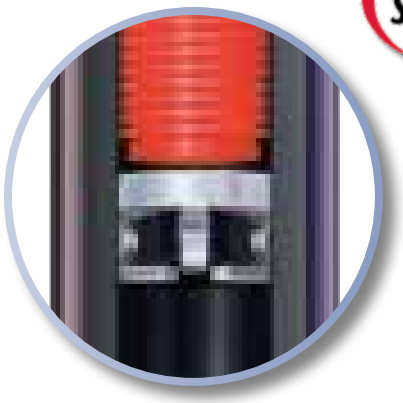
Zero Flush Wiper Seal
Prevents flushing on pop-up, allowing more sprinklers on the same line.

Enhanced Retraction Spring and Wiper Seal
Robust retraction spring and enhanced seal material ensures positive pop-up and retraction on all 570Z models.

One-Piece Check Valve
Easily installed at the factory or in the field. Maintains up to 10' (3m) elevation change.

Ratcheting Riser
For easy and reliable arc adjustment on pop-up models.

Small 2" (50mm) Diameter Cap
Less visible, reducing damage from exposure or vandals.



Patented X-Flow® Shut-off Device

Specifications

Dimensions

- Body diameter:
  – 1 ⅜" (35mm) on 4P, 6P and 6P SI models
  – 1 ⅝" (41mm) on 12P
  – 1 ¾" (44,5mm) on 12P SI
- Cap diameter: 2" (50mm)
- Inlet: ½" female-threaded
- Side inlet: 4¾" (120,7mm) from top of sprinkler to center of side inlet

Operating Specifications

- Radius: 2'-26' (0,6m-7,4m)
- Operating pressure range: 20-75 psi (1,4-5,2 Bar)
- Recommended pressure for spray nozzles: 30 psi (2,1 Bar)
- Recommended pressure for rotating nozzles: 40-50 psi (2,8-3,5 Bar)
- Flow rate: 0.05 – 4.5 GPM (0,2-17,0 LPM)

Additional Features

- Stainless steel retraction spring
- All bodies shipped with flush plug in place

Options Available

- Check Valve (570CV): maintains up to 10' (3m) elevation change (on non-side-inlet models)
- 570SEAL: Serviceable seal for all 570Z models
- Effluent water indicators:
  – Effluent Snap-on Cap Cover (89-9752)
  – Effluent Molded Cap with seal (102-1211)
- Riser Pull-up Tool (89-6395)
- Adjustment Key (89-7350)

Warranty

- Two years

Without X-Flow

With X-Flow

570ZXF allows for dry nozzle installations and change outs

570ZXF Series Model List

Model	Description
570S-XF	Shrub Sprinkler, w/Shut-off
570Z-4P XF	4" (100mm) Sprinkler, w/Shut-off
570Z-4P XF COM	4" (100mm) Sprinkler, w/Check Valve and Shut-off
570Z-6P XF	6" (150mm) Sprinkler, w/Shut-off
570Z-6P XF SI	6" (150mm) Sprinkler, Side-inlet Body, w/ Shut-off
570Z-6P XF COM	6" (150mm) Sprinkler, w/Check Valve and Shut-off
570Z-12P XF	12" (300mm) Sprinkler, w/Shut-off
570Z-12P XF SI	12" (300mm) Sprinkler, Side-inlet Body, w/Shut-off
570Z-12P XF COM	12" (300mm) Sprinkler, w/Check Valve and Shut-off

Note: all w/o Nozzle

Specifying Information—570ZXF Series

570Z-XXP-SI-XF-COM-E

Model	Pop-up Height	Optional	Optional	Optional
570X	**XXP**	**SI**	**COM**	**E**
S—Shrub Z—Lawn Pop-up & High-pop	4—4" (100mm) 6—6" (150mm) 12—12" (300mm)	SI—Side Inlet*	COM—Check O-Matic**	E—Effluent

Example: A 570Z XF Series Sprinkler with a pop-up height of 6" (150mm) and a check valve would be specified as: **570Z-6P XF COM**

*Available for 6" (150mm) and 12" (300mm) models.
**Available with non-side inlet models.

570ZPR & 570ZPRX Series Sprays

- **Shrub, 4" (100mm), 6" (150mm) and 12" (300mm) Pop-up**
- **Radius: 2'-17' (0,6-5,2m)**
- **Operating Pressure Range: 20-75 psi (1,4-5,2 Bar)**

Built-in pressure regulation.
The Toro® 570ZPR and 570ZPRX feature a patented in-riser pressure regulator, bringing another superior feature to the 570Z series.

The 570Z PRX sprinkler also includes the X-Flow® technology combined in a single riser providing unmatched water management.

Effluent Options Available

Check Valve Options Available

Water Management Highlight

570ZPRX: For Those Serious About Water Management
By combining the patented X-Flow and pressure-regulation technologies into one riser, the 570PRX stabilizes the performance of the system at 30 psi (2,1 Bar) from the first head to the last ensuring optimum nozzle performance.

Features & Benefits

Patented In-riser Pressure Regulator
Maintains constant 30 psi (2,1 Bar) psi outlet pressure, which minimizes misting and fogging caused by pressures above 30 psi (2,1 Bar).

Zero Flush Wiper Seal
Prevents flushing on pop-up, allowing more sprinklers on the same line.

Enhanced Retraction Spring and Wiper Seal
Robust retraction spring and enhanced seal material ensures positive pop-up and retraction on all 570Z models.

Ratcheting Riser
For easy and reliable arc adjustment on pop-up models.

Small 2" (50mm) Diameter Cap
Less visible, reducing damage from exposure or vandals.

AND FOR 570ZPRX MODELS:

Patented X-flow® Water Shut-off Device
- Built into the riser and restricts water loss by 99% if the nozzle is removed or damaged, eliminating potential erosion or safety concerns.
- Allows for "dry" nozzle and filter-replacement or maintenance, while the system is running.

Without Pressure Regulation

With Pressure Regulation

Specifications

Dimensions

- Body diameter:
  - 1 ⅜" (35mm) on 4P, 6P and 6P SI models
  - 1 ⅝" (40mm) on 12P
  - 1 ¾" (45mm) on 12P SI
- Cap diameter: 2" (50mm)
- Inlet: ½" (12mm) female-threaded
- Side inlet: 4 ¾"(120mm) from top of sprinkler to center of side inlet

Operating Specifications

- Radius: 2'-17' (0,6-5,2m)
- Operating pressure range: 20-75 psi (1,4-5,2 Bar)
- Recommended pressure for spray models: 30 psi (2,1 Bar)
- Note: Precision™ Series Rotating Nozzle radius is 17' (5,2m) with 570ZPR and 570ZPRX due to constant 30 psi (2,1 Bar) outlet pressures. For longer distances, use 570Z COM or 570ZXF COM
- Flow rate: 0.05 – 3.45 GPM (0,2-13,0 LPM)

Additional Features

- Stainless steel retraction spring
- All bodies shipped with flush plug in place

Options Available

- Check Valve (570CV): maintains up to 10' (3,0) elevation change (on non-side-inlet models)
- 570SEAL:Serviceable seal for all 570Z models
- Effluent water indicators:
  - Effluent Snap-on Cap Cover (89-9752)
  - Effluent Molded Cap with seal (102-1211)
- 5706X: 6" (150mm) Riser Extender (35-2636)
- Riser Pull-up Tool (89-6395)
- Adjustment Key (89-7350)

Warranty

- Five years

570ZPR Series Model List

Model	Description
All Models Include Patented In-Riser Pressure Regulator	
570Z-4P PR	4" (100mm) Sprinkler
570Z-4P PR COM	4" (100mm) Sprinkler, w/Check Valve
570Z-4P PR COM E	4" (100mm) Sprinkler, w/Check Valve, and Effluent
570Z-6P PR	6" (150mm) Sprinkler
570Z-6P PR COM	6" (150mm) Sprinkler, w/Check Valve
570Z-6P PR COM E	6" (150mm) Sprinkler, w/Check Valve and Effluent
570Z-12P PR	12" (300mm) Sprinkler
570Z-12P PR COM	12" (300mm) Sprinkler, w/Check Valve
570Z-12P PR COM E	12" (300mm) Sprinkler, w/Check Valve and Effluent
570S-PR	Shrub
570S-PRE	Shrub and Effluent

Note: all w/o Nozzle

570ZPRX Series Model List

Model	Description
All Models Include Pressure Regulation and X-Flow® Shut-off	
570S-PRX	Shrub Sprinkler
570Z-4P PRX	4" (100mm) Sprinkler
570Z-6P PRX	6" (150mm) Sprinkler
570Z-6P SI PRX	6" (150mm) Sprinkler, Side-inlet Body
570Z-12P PRX	12" (300mm) Sprinkler
570Z-12P SI PRX	12" (300mm) Sprinkler, Side-inlet Body
With Check Valve added	
570Z-4P PRX COM	4" (100mm) Sprinkler
570Z-6P PRX COM	6" (150mm) Sprinkler
570Z-12P PRX COM	12" (300mm) Sprinkler
With Effluent Molded Cap added	
570Z-4P PRX E	4" (100mm) Sprinkler
570Z-4P PRX COM E	4" (100mm) Sprinkler, w/Check Valve
570Z-6P PRX E	6" (150mm) Sprinkler
570Z-6P PRX COM E	6" (150mm) Sprinkler, w/Check Valve
570Z-12P PRX E	12" (300mm) Sprinkler
570Z-12P PRX COM E	12" (300mm) Sprinkler, w/Check Valve

Note: all w/o Nozzle

Specifying Information—570ZPR & 570ZPRX Series

570X-XXP-SI-PRX-COM-E

Model	Pop-up Height	Optional	X-flow	Optional	Optional
570X	**XXP**	**SI**	**PRX**	**COM**	**E**
S—Shrub Z—Lawn Pop-up & High-pop	4—4" (100mm) 6—6" (150mm) 12—12" (300mm)	SI—Side Inlet*	PR—Pressure Regulation Only PRX—Pressure Regulation With X-flow™	COM—Check Valve**	E—Effluent

Example: A 570Z PR Series Sprinkler with a pop-up height of 6" (150mm) with a side-inlet option, would be specified as: **570Z-6P SI PR**

Example: A 570Z PRX Series Sprinkler with a pop-up height of 6" (150mm) with a side-inlet option, would be specified as: **570Z-6P SI PRX**

*Available for 6" (150mm) and 12" (300mm) models.
**Available with non-side inlet models.
PRX models not recommended for use with PCD nozzles.

Precision™ Series Spray Nozzles

- Radius: 5'-15' (1,5-4,6m)
- Operating Pressure Range: 20-75 psi (1,4-5,2 Bar)
- Arc Options: 60°, 90°, 120°, 150°, 180°, 210°, 240°, 270°, 360°
- Side & Corner Specialty Patterns
- Fit Toro® or Irritrol®, Rain Bird® and Hunter® Spray Bodies

Toro's new Precision Series Spray Nozzles are the most complete and efficient spray nozzle line available to help irrigation professionals manage water use, eliminate runoff and reduce customer water bills.

Male- or Female-threaded Nozzles

5' (1,5m)

8' (2,4m)

10' (3,0m)

12' (3,7m)

15' (4,6m)

Specialty Arcs

Features & Benefits

Patented H²0 Chip Technology

Using patented H²0 chip technology – and no moving parts – each Precision Series Spray nozzles creates one or more high frequency oscillating streams to achieve the desired arc and radius with 1/3 less water usage.

Maximize Irrigation Efficiency

Precision Spray nozzles deliver an industry first 1"/hr (25mm/hr) precipitation rate, which better matches soil infiltration rate. This lower precipitation rate, along with high distribution uniformity make this nozzles family the most efficient nozzle from 5'-15' (1,5-4,6m).

Design and Retrofit Effectiveness

The lower flow rate of Precision Series spray nozzles maximizes design efficiency and saves on overall material costs by using fewer valves and less controller stations. In addition, existing systems with low pressure can be fixed with a simple retrofit of the existing high-flow nozzle.

Third-Party Performance Validation

Precision Series Spray nozzles have been tested and validated in the field and at the Center for Irrigation Technology (CIT).

Water Management Highlight

High Irrigation Efficiency with 1"/hr. (25mm/hr.) Matched Precipitation Rate

Precision™ Series Spray Nozzles tested higher than competitive water conserving nozzles in multiple independent third party studies for irrigation efficiency. The 1"/hr. (25mm/hr.) precipitation rate ensures irrigation runtimes can be achieved even with tight watering windows.

Specifications

Operating Specifications

- Radius: 5'-15' (1,5-4,6m)
- Operating pressure range: 20-75 psi (1,4-5,2 Bar)
- Recommended Pressure: 30 psi (2,1 Bar)
- Flow Rate: 0.04-2.4 GPM (0,1-9,4 LPM)
- Nozzle trajectory:
  - 5': 5°
  - 8': 10°
  - 10': 15°
  - 12': 20°
  - 15': 27°
  - Corner and Side Strips: 20°

Additional Features

- Specialty Arcs available (60°, 120°, 150°, 210°, 240°)
- Radius reduction 25% maximum
- Color coded for radius on top of the nozzle
- Precipitation rate ≤ 1"/hour (≤ 25mm/hour)
- Maintains precipitation rate as radius is reduced up to max of 25%
- Matched precipitation rate within radius families
- Matched precipitation rates between radius families
- Screen attached to nozzle for easy insertion into the spray body
- Works on all spray bodies

Warranty

- Two years

Precision Series Nozzle Model List

5' "O" Nozzle (Red)

Male	Female	Descrip.
O-T-5-60	O-5-60	60° Arc
O-T-5-Q	O-5-Q	90° Arc
O-T-5-T	O-5-T	120° Arc
O-T-5-150	O-5-150	150° Arc
O-T-5-H	O-5-H	180° Arc
O-T-5-210	O-5-210	210° Arc
O-T-5-TT	O-5-TT	240° Arc
O-T-5-TQ	O-5-TQ	270° Arc
O-T-5-F	O-5-F	360° Arc

8' "O" Nozzle (Green)

Male	Female	Descrip.
O-T-8-60	O-8-60	60° Arc
O-T-8-Q	O-8-Q	90° Arc
O-T-8-T	O-8-T	120° Arc
O-T-8-150	O-8-150	150° Arc
O-T-8-H	O-8-H	180° Arc
O-T-8-210	O-8-210	210° Arc
O-T-8-TT	O-8-TT	240° Arc
O-T-8-TQ	O-8-TQ	270° Arc
O-T-8-F	O-8-F	360° Arc

10' "O" Nozzle (Blue)

Male	Female	Descrip.
O-T-10-60	O-10-60	60° Arc
O-T-10-Q	O-10-Q	90° Arc
O-T-10-T	O-10-T	120° Arc
O-T-10-150	O-10-150	150° Arc
O-T-10-H	O-10-H	180° Arc
O-T-10-210	O-10-210	210° Arc
O-T-10-TT	O-10-TT	240° Arc
O-T-10-TQ	O-10-TQ	270° Arc
O-T-10-F	O-10-F	360° Arc

12' "O" Nozzle (Brown)

Male	Female	Descrip.
O-T-12-60	O-12-60	60° Arc
O-T-12-Q	O-12-Q	90° Arc
O-T-12-T	O-12-T	120° Arc
O-T-12-150	O-12-150	150° Arc
O-T-12-H	O-12-H	180° Arc
O-T-12-210	O-12-210	210° Arc
O-T-12-TT	O-12-TT	240° Arc
O-T-12-TQ	O-12-TQ	270° Arc
O-T-12-F	O-12-F	360° Arc

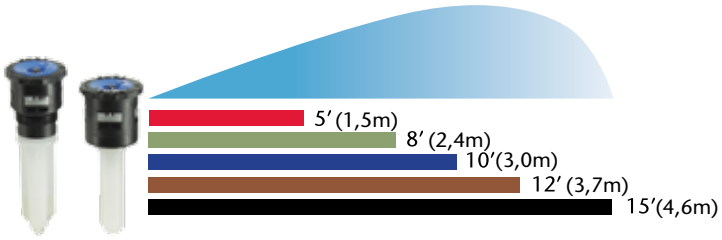
15' "O" Nozzle (Black)

Male	Female	Descrip.
O-T-15-60	O-15-60	60° Arc
O-T-15-Q	O-15-Q	90° Arc
O-T-15-T	O-15-T	120° Arc
O-T-15-150	O-15-150	150° Arc
O-T-15-H	O-15-H	180° Arc
O-T-15-210	O-15-210	210° Arc
O-T-15-TT	O-15-TT	240° Arc
O-T-15-TQ	O-15-TQ	270° Arc
O-T-15-F	O-15-F	360° Arc

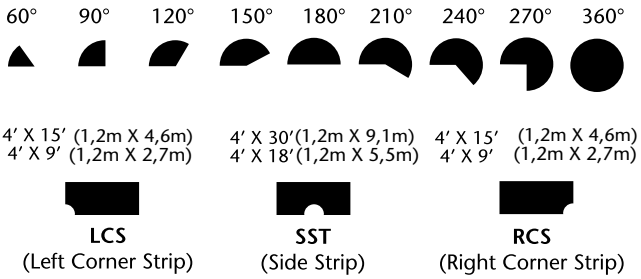
Special Patterns (Grey)

Male	Female	
O-T-4X9-RCS	O-4X9-RCS	Right Corner
O-T-4X9-LCS	O-4X9-LCS	Left Corner
O-T-4X18-SST	O-4X18-SST	Side Strip
O-T-4X15-RCS	O-4X15-RCS	Right Corner
O-T-4X15-LCS	O-4X15-LCS	Left Corner
O-T-4X30-SST	O-4X30-SST	Side Strip

5 Radii Available In Male or Female Threads



9 Arcs Plus Side and Corner Strips Available



Specifying Information

O-X-XXXX-XXX

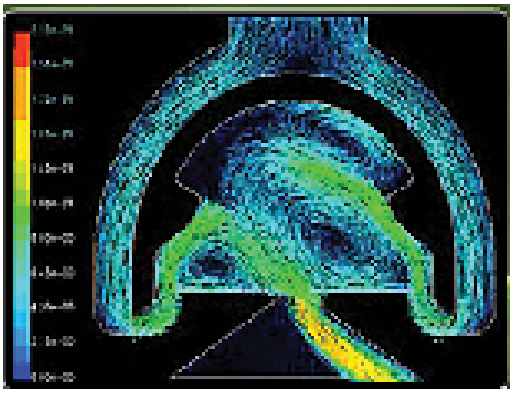
Nozzle	Thread	Radius	Arc	Body
O	X	XXXX	XXX	
O—1" Per Hour	T—Toro Male Threaded Nozzle Blank—Female Threaded Nozzle	5—5' (1,5m) 8—8' (2,4m) 10—10' (3,0m) 12— 12' (3,7m) 15—15' (4,6m) (4X15—4'X15'* (1,2mX4,6m) 4X30—4'X30'* (1,2mX9,1m) 4X9—4'X9' (1,2mX2,7m) 4X18—4'X18' (1,2mX5,5m)	60—60° Q—90° T—120° 150—150° H—180° 210—210° TT—240° TQ—270° F-360—Full-circle LCS—Left Corner RCS—Right Corner SST—Side Strip*	Call out body as required

Example: A female threaded Precision Series Spray with a spray radius of 12' (3,7m) and a 90° arc would be specified as: O-12-Q
Example 2: A male threaded Precision Series Spray with a spray radius of 10' (3,0m) and a 180° arc would be specified as: O-T-10-H

The Patented H²O Chip

No Moving or Sonic Welded Parts

Assures no variation at the end of the water arc for better edge definition and consistent, reliable performance.



Water expands and collapses inside the H²0 Chip created high-frequency oscillating streams which allow for distance of throw using 1/3 less flow.

Matched Precipitation Rate even after 25% Radius Reduction

The stainless steel radius reduction screw can reduce the radius down 25% without affecting precipitation rate…an industry first for spray nozzles!

Pre-Attached Filter Screen for Installation Convenience

Filter Screen is pre-attached to the nozzle to ensure timely installations and retrofits. There are three different sizes of mesh filters to prevent debris from clogging the head.

Uniform Droplet Size

The H²O Chip generates a larger, more uniform droplet size resulting in consistency across the irrigated arc, increased wind resistance and less unintentional watering of hardscape features and run-off.

Performance Data Precision™ Series Spray Nozzles—US

Arc	PSI	GPM	Radius	Precip.Rate ■ (in./hr.)	Precip. Rate ▲ (in./hr.)
5-60° ▲	20	0.04	4.7	0.99	1.15
	30	0.04	5.0	0.99	1.15
	40	0.04	5.0	0.99	1.15
	50	0.05	5.3	0.99	1.14
5Q	20	0.06	4.6	1.02	1.18
	30	0.06	5.0	0.99	1.14
	40	0.07	5.0	1.00	1.16
	50	0.07	5.0	1.02	1.17
5T	20	0.07	4.4	1.01	1.17
	30	0.09	5.0	1.04	1.20
	40	0.09	5.2	0.99	1.15
	50	0.10	5.4	0.98	1.13
5-150°	20	0.07	4.0	1.02	1.18
	30	0.11	5.0	1.03	1.19
	40	0.12	5.2	1.04	1.20
	50	0.13	5.4	1.04	1.20
5H	20	0.10	4.4	0.99	1.15
	30	0.13	5.0	1.00	1.16
	40	0.14	5.1	1.00	1.15
	50	0.14	5.2	0.99	1.14
5-210°	20	0.10	4.4	0.99	1.15
	30	0.15	5.2	1.07	1.23
	40	0.16	5.3	1.10	1.27
	50	0.17	5.5	1.08	1.25
5TT	20	0.14	4.3	1.09	1.26
	30	0.17	5.0	0.98	1.13
	40	0.19	5.0	1.07	1.23
	50	0.19	5.0	1.09	1.25
5TQ	20	0.15	4.3	1.02	1.17
	30	0.20	5.0	1.00	1.16
	40	0.21	5.0	1.05	1.21
	50	0.22	5.0	1.10	1.27
5F ●	20	0.17	4.0	1.02	1.18
	30	0.26	5.0	1.00	1.16
	40	0.26	5.0	1.00	1.16
	50	0.26	5.0	1.00	1.16

Arc	PSI	GPM	Radius	Precip.Rate ■ (in./hr.)	Precip. Rate ▲ (in./hr.)
8-60° ▲	20	0.10	7.6	1.0	1.2
	30	0.11	8.0	1.0	1.1
	40	0.12	8.1	1.1	1.2
	50	0.13	8.3	1.1	1.3
8Q	20	0.14	7.0	1.1	1.3
	30	0.17	8.0	1.0	1.1
	40	0.18	8.2	1.0	1.2
	50	0.18	8.4	1.0	1.1
8T	20	0.20	7.6	1.0	1.2
	30	0.22	8.0	1.0	1.1
	40	0.23	8.2	1.0	1.1
	50	0.24	8.3	1.0	1.1
8-150°	20	0.25	7.5	1.0	1.2
	30	0.27	8.0	1.0	1.1
	40	0.28	8.1	1.0	1.1
	50	0.29	8.2	1.0	1.2
8H	20	0.26	7.0	1.0	1.2
	30	0.33	8.0	1.0	1.1
	40	0.34	8.0	1.0	1.2
	50	0.34	8.0	1.0	1.2
8-210°	20	0.33	7.6	1.1	1.3
	30	0.36	8.0	1.1	1.3
	40	0.37	8.1	1.1	1.3
	50	0.38	8.2	1.1	1.3
8TT	20	0.34	7.0	1.0	1.2
	30	0.44	8.0	1.0	1.1
	40	0.46	8.0	1.0	1.2
	50	0.46	8.0	1.0	1.2
8TQ	20	0.41	7.2	1.0	1.1
	30	0.49	8.0	1.1	1.1
	40	0.54	8.0	1.1	1.2
	50	0.55	8.0	1.1	1.2
8F ●	20	0.55	7.0	1.1	1.2
	30	0.66	8.0	1.0	1.1
	40	0.68	8.0	1.0	1.2
	50	0.71	8.0	1.1	1.2

Arc	PSI	GPM	Radius	Precip.Rate ■ (in./hr.)	Precip. Rate ▲ (in./hr.)
10-60° ▲	20	0.16	9.5	1.0	1.2
	30	0.17	10.0	1.0	1.1
	40	0.18	10.0	1.0	1.2
	50	0.19	10.0	1.1	1.3
10Q	20	0.26	9.5	1.0	1.1
	30	0.23	10.0	1.0	1.2
	40	0.28	10.2	1.0	1.2
	50	0.28	10.3	1.0	1.2
10T	20	0.31	9.5	1.0	1.1
	30	0.34	10.0	1.0	1.1
	40	0.36	10.0	1.0	1.2
	50	0.37	10.0	1.1	1.2
10-150°	20	0.41	9.8	1.0	1.1
	30	0.43	10.0	1.0	1.1
	40	0.44	10.2	1.0	1.1
	50	0.46	10.4	1.0	1.1
10H	20	0.48	9.7	1.0	1.1
	30	0.51	10.0	1.0	1.1
	40	0.55	10.3	1.0	1.2
	50	0.56	10.4	1.0	1.2
10-210°	20	0.56	9.8	1.1	1.3
	30	0.58	10.0	1.1	1.3
	40	0.60	10.4	1.1	1.2
	50	0.62	10.5	1.1	1.3
10TT	20	0.63	9.6	1.0	1.1
	30	0.69	10.0	1.0	1.2
	40	0.73	10.3	1.0	1.1
	50	0.74	10.4	1.0	1.1
10TQ	20	0.71	9.5	1.0	1.1
	30	0.79	10.0	1.0	1.1
	40	0.84	10.3	1.0	1.1
	50	0.86	10.4	1.0	1.1
10F ●	20	0.95	9.6	1.0	1.1
	30	1.03	10.0	1.0	1.1
	40	1.08	10.3	1.0	1.1
	50	1.12	10.4	1.0	1.2

Arc	PSI	GPM	Radius	Precip.Rate ■ (in./hr.)	Precip. Rate ▲ (in./hr.)
12-60° ▲	20	0.24	11.5	1.0	1.2
	30	0.25	12.0	1.0	1.2
	40	0.26	12.1	1.0	1.2
	50	0.28	12.2	1.1	1.3
12Q	20	0.34	12.0	1.0	1.2
	30	0.37	12.1	1.0	1.1
	40	0.39	11.4	1.0	1.2
	50	0.39	12.0	1.0	1.1
12T	20	0.46	11.5	1.0	1.2
	30	0.49	12.0	1.0	1.1
	40	0.51	12.2	1.0	1.1
	50	0.52	12.3	1.0	1.1
12-150°	20	0.60	11.6	1.0	1.2
	30	0.62	12.0	1.0	1.2
	40	0.63	12.2	1.0	1.1
	50	0.64	12.3	1.0	1.1
12H	20	0.70	11.5	1.0	1.2
	30	0.74	12.0	1.0	1.1
	40	0.79	12.3	1.0	1.2
	50	0.80	12.4	1.0	1.2
12-210°	20	0.76	11.6	1.1	1.3
	30	0.82	12.0	1.1	1.3
	40	0.84	12.3	1.1	1.2
	50	0.85	12.4	1.1	1.2
12TT	20	0.90	11.4	1.0	1.2
	30	0.99	12.0	1.0	1.1
	40	1.04	12.3	1.0	1.1
	50	1.05	12.4	1.0	1.1
12TQ	20	1.05	11.4	1.0	1.2
	30	1.15	12.0	1.0	1.2
	40	1.19	12.2	1.0	1.2
	50	1.22	12.3	1.0	1.2
12F ●	20	1.35	11.5	1.0	1.1
	30	1.48	12.0	1.0	1.1
	40	1.59	12.4	1.0	1.1
	50	1.60	12.5	1.0	1.1

Arc	PSI	GPM	Radius	Precip.Rate ■ (in./hr.)	Precip. Rate ▲ (in./hr.)
15-60° ▲	20	0.35	14.0	1.0	1.2
	30	0.39	15.0	1.0	1.2
	40	0.40	15.1	1.0	1.2
	50	0.42	15.3	1.0	1.2
15Q	20	0.53	14.2	1.0	1.2
	30	0.58	15.0	1.0	1.1
	40	0.60	15.1	1.0	1.2
	50	0.61	15.3	1.0	1.2
15T	20	0.72	14.3	1.0	1.2
	30	0.77	15.0	1.0	1.1
	40	0.81	15.3	1.0	1.2
	50	0.82	15.4	1.0	1.2
15-150°	20	0.92	14.7	1.0	1.2
	30	0.96	15.0	1.0	1.2
	40	1.00	15.2	1.0	1.2
	50	1.10	15.3	1.1	1.3
15H	20	1.10	14.5	1.0	1.2
	30	1.16	15.0	1.0	1.1
	40	1.25	15.4	1.0	1.2
	50	1.28	15.5	1.0	1.2
15-210°	20	1.15	14.5	1.1	1.2
	30	1.20	15.0	1.0	1.2
	40	1.30	15.5	1.0	1.2
	50	1.40	15.6	1.1	1.3
15TT	20	1.45	14.5	1.0	1.2
	30	1.54	15.0	1.0	1.1
	40	1.58	15.2	1.0	1.1
	50	1.61	15.3	1.0	1.1
15TQ	20	1.72	14.5	1.0	1.2
	30	1.78	15.0	1.0	1.1
	40	1.82	15.0	1.0	1.2
	50	1.90	15.3	1.0	1.2
15F ●	20	2.20	14.5	1.0	1.2
	30	2.31	15.0	1.0	1.1
	40	2.35	15.2	1.0	1.1
	50	2.40	15.3	1.0	1.1

Arc	PSI	GPM	Radius	Precip.Rate ■ (in./hr.)	Precip. Rate ▲ (in./hr.)
4X30 SST	20	0.62	4x28	1.0	1.1
	30	0.66	4x30	1.1	1.2
	40	0.67	4x30	1.1	1.2
	50	0.68	4x30	1.1	1.3
4X15 LCS	20	0.32	4x15	1.0	1.2
	30	0.33	4x15	1.1	1.2
	40	0.34	4x15	1.1	1.3
	50	0.34	4x15	1.1	1.3
4X15 RCS	20	0.32	4x15	1.0	1.2
	30	0.33	4x15	1.1	1.2
	40	0.34	4x15	1.1	1.3
	50	0.34	4x15	1.1	1.3
4X18 SST	20	0.36	4X18	1.0	1.1
	30	0.37	4X18	1.0	1.1
	40	0.38	4X18	1.0	1.2
	50	0.38	4X18	1.0	1.2
4X9 LCS	20	0.18	4X9	1.0	1.1
	30	0.19	4X9	1.0	1.2
	40	0.20	4X9	1.1	1.2
	50	0.20	4X9	1.1	1.1
4X9 RCS	20	0.18	4X9	1.0	1.2
	30	0.19	4X9	1.0	1.2
	40	0.20	4X9	1.1	1.2
	50	0.20	4X9	1.1	1.2

Precision™ Series Rotating Nozzles

- **Radius: 14'-26' (4,3-8,0m)**
- **Operating Pressure Range: 20-75 psi (1,4-5,2 Bar)**
- **45°-360° Arc Settings**
- **Fit Toro® or Irritrol®, Rain Bird® and Hunter® Spray Bodies**

Based off the design of the world's leading gear-driven rotor for golf applications, the Precision Series Rotating Nozzle is powered by a proven gear drive and delivers wind resistant, multi-stream, multi-trajectory patterns.

Female-threaded PRN-A

Male-threaded PRN-TA

Female-threaded PRN-F

Male-threaded PRN-TF

PRN Adjustment Tool

Water Management Highlight

Precision Series Rotating Nozzles supply matched precipitation with any arc and any radius from 14 to 26 feet (4,3m-8,0m). Water is applied slowly and evenly to reduce runoff and wasted water.

Features & Benefits

Gear-Driven
Utilizes a proven planetary gear drive, variable stator and turbine to rotate the nozzle.

Fewer Models
Only two male-threaded nozzles and two female-threaded nozzles are required to cover radius range from 14-26 feet (4,3m-8,0m) and arc range from 45-360°.

Matched Precipitation Rate of 0.55"/hr. (14 mm/hr.)
These nozzles deliver water more slowly and evenly than standard spray nozzles. The precipitation rate of 0.55"/hr. (14 mm/hr.) helps prevent excess run times often set to stay within watering windows.

Consistent Speed of Rotation
The gear drive mechanism delivers a consistent speed of rotation regardless of system pressure and prevents product stalling at low pressure.

Step-Up™ Technology

Step-Up™ Technology is designed to deliver high uniformity with matched precipitation for in-close watering all the way out to the furthest radius point. The unique "steps" create 15 streams, each designed to cover an area of the pattern.

Specifications

Operating Specifications

- Radius: 14'-26' (4,3-7,9m)
- Operating pressure range: 20-75 psi (1,4-5,2 Bar)
- Recommended Pressure: 40-50 psi (2,8-3,5 Bar)
- Flow Rate: 0.17-3.68 GPM (1,4-14 LPM)

Additional Features

- 15 unique streams with different trajectories
- Maximum height of 20° trajectory to fight through wind
- Threads onto nearly all sprayheads and shrub adapters (male or female)
- Pre-attached screen for easy installation
- Radius reduction up to 25% by turning set screw 90°
- Color coded to identify adjustable or full circle
- Precipitation rate = 0.55"/hr. (14 mm/hr.) on square spacing plans
- Maintains precipitation rate as radius is reduced
- Matched precipitation from 14-26 feet (4,3-7,9m)
- Matched precipitation from 20-75 psi (1,4-5,2 Bar)
- Adjustable by hand or with included tool
- Consistent speed of rotation not affected by pressure

Warranty

- Five years

Precision Series Rotating Nozzle Model List	
Male Threaded	Description
• PRN-TA	Toro Threaded, 14-26 feet (4,3-7,9m), Adjustable from 45°-270°
• PRN-TF	Toro Threaded, 14-26 feet (4,3-7,9m), Full-Circle
Female Threaded	Description
• PRN-A	Threaded, 14-26 feet (4,3-7,9m), Adjustable from 45°-270°
• PRN-F	Threaded, 14-26 feet (4,3-7,9m), Full-Circle

PRN Visual Arc Adjustment

The unique adjustment method allows for pre-setting of arc by hand or tool before the nozzle is installed. Visual indicators allow the user to quickly adjust the arc pattern to the desired arc from 45-270°. The adjustment band can be adjusted by hand or with the pre-included tool.

Performance Data—Precision™ Series Rotating Nozzles—US

Arc	PSI	GPM	Radius	Precip.Rate ■ (in./hr.)	Precip. Rate ▲ (in./hr.)
45°	20	0.17	14.0	0.67	0.77
	30	0.19	15.0	0.65	0.75
	40	0.25	17.0	0.67	0.77
	50	0.31	18.5	0.70	0.81
	60	0.35	19.5	0.71	0.82
	75	0.43	22.0	0.68	0.79
90°	20	0.43	16.0	0.65	0.75
	30	0.49	17.5	0.62	0.71
	40	0.62	20.5	0.57	0.66
	50	0.75	22.5	0.57	0.66
	60	0.82	23.5	0.57	0.66
	75	0.92	25.0	0.57	0.65
120°	20	0.48	16.4	0.69	0.79
	30	0.57	17.5	0.72	0.83
	40	0.78	20.2	0.55	0.64
	50	0.97	22.5	0.55	0.64
	60	1.07	23.5	0.56	0.65
	75	1.18	25.0	0.55	0.63
180°	20	0.83	15.0	0.71	0.82
	30	0.94	17.0	0.63	0.72
	40	1.22	20.5	0.56	0.65
	50	1.46	22.5	0.56	0.64
	60	1.61	24.0	0.54	0.62
	75	1.81	26.0	0.52	0.60
240°	20	1.12	15.0	0.72	0.83
	30	1.27	17.0	0.63	0.73
	40	1.56	20.0	0.56	0.65
	50	1.80	21.5	0.56	0.65
	60	1.95	22.5	0.56	0.64
	75	2.20	24.0	0.55	0.64
270°	20	1.08	14.0	0.71	0.81
	30	1.23	16.0	0.62	0.71
	40	1.62	19.0	0.57	0.66
	50	2.00	21.5	0.55	0.64
	60	2.26	23.0	0.55	0.63
	75	2.60	25.0	0.53	0.61
360°	20	1.81	15.0	0.77	0.89
	30	2.00	17.2	0.65	0.75
	40	2.56	20.9	0.56	0.65
	50	3.09	22.9	0.57	0.65
	60	3.34	23.8	0.57	0.66
	75	3.68	25.6	0.54	0.62

Nozzle data subject to change.

Specifying Information—Precision Series Rotating Nozzle

PRN-XX		
Model	**Thread**	**Model**
PRN	**X**	**X**
PRN—Precision Rotating Nozzle	T—Male Thread Blank—Female Thread	A—Adjustable arc F— Full-circle
Example: A male threaded Precision Series Rotating nozzle with a 24' (7,31m) radius and a 180° arc would be specified as: **PRN-TA** A female threaded Precision Series Rotating nozzle with a 20' (6,1)radius and 360° arc would be specified as: **PRN-F**		

MPR Plus Spray Nozzles

- **Radius: 2′-18′ (0,6-8,0m)**
- **Operating Pressure Range: 20-75 psi (1,4-5,2 Bar)**
- **Matched Precipitation**
- **Side & Corner Specialty Patterns**
- **Arc Options: 90°, 120°, 180°, 240°, 270°, 360°**
- **Fit Toro® Spray Bodies**

MPR Nozzles make design and installation easier than ever. Just pick your spacing and choose your arc - the nozzle does everything else.

MPR Plus Spray Nozzle Series Model List			
Model	Description	Model	Description
5′ (1,5m) MPR Plus Nozzle Red		**8′ (2,4m) MPR Plus Nozzle Green**	
5Q	90° Arc	8Q	90° Arc
5T	120° Arc	8T	120° Arc
5H	180° Arc	8H	180° Arc
5TT	240° Arc	8TT	240° Arc
5TQ	270° Arc	8TQ	270° Arc
5F	360° Arc	8F	360° Arc
10′ (3,0m) MPR Plus Nozzle Blue		**12′ (3,7) MPR Plus Nozzle Brown**	
10Q	90° Arc	12Q	90° Arc
10T	120° Arc	12T	120° Arc
10H	180° Arc	12H	180° Arc
10TT	240° Arc	12TT	240° Arc
10TQ	270° Arc	12TQ	270° Arc
10F	360° Arc	12F	360° Arc
15′ (4,6) MPR Plus Nozzle Black		**Special Patterns Orange**	
15Q	90° Arc	4SST	Side Strip 4′x30′ (1,2-6,1m)
15T	120° Arc		
15H	180° Arc	4EST	End Strip 4′x15′ (1,2-4,3m)
15TT	240° Arc		
15TQ	270° Arc	4CST	Center Strip 4′x30′ (1,2-6,1m)
15F	360° Arc		
		9SST	Side Strip 9′x18′ (2,7-5,2m)
		4SSST	Side Strip 4′x18′ (1,2-5,2m)
		2SST	Side Strip 2′ x 6′ (0,6-1,8m)

(Note: All above also available in Pressure Compensating (PC) Models

Features & Benefits

Matched Precipitation Rates
Ensure all nozzles (every arc within a family) apply water at approximately the same rate.

Low Flow Rates
Allow for more sprinklers to be placed on the same zone.

Pre-installed Pressure Compensation Device (PCD)
Eliminate fogging, conserve water and provide precise flow rates (also available without PC Devices).

Complete Selection Of Arcs
Arcs for all radius options – full, 3/4, 2/3, 1/2, 1/3 and 1/4.

Specifications

Operating Specifications

- Operating pressure range: 20-75 psi (1,4-5,2 Bar)
- Recommended pressure: 30 psi (2,1 Bar)
- Flow Rate: 0.05 – 4.58 GPM (0,2-17,3 LPM)
- Nozzle trajectory:
  - 5′: 5° - 8′: 10° - 10′: 17° - 12′: 24° - 15′: 28°
  - Corner and Side Strips: 17°

Additional Features

- Standard and special spray patterns
- Customized screens for each nozzle
- Patterns for small areas: full set of arcs for 10′, 8′ and 5′ (3,0m, 2,4m, and 1,5m) radius nozzles
- 4′ x 18′ (1,2-5,2m) side strip ideal for medians
- 2′ x 6′ (0,6-1,8m) for small planter beds and other narrow areas
- Fine-mesh snap-in filter screens for lower flow nozzles
- Five levels of trajectory
- Convenient nozzle packaging – nozzles and screens packed separately
- Adjustment screw allows up to 25% reduction in radius and complete shutoff

Warranty

- Two years

Specifying Information—MPR Plus

XX-XXX-PC		
Radius	**Arc**	**Optional**
XX	XXX	PC
5—5′ (1,5m) 8—8′ (2,4m) 10—10′ (3,0m) 12—12′ (3,7m) 15—15′ (4,6m)	Q—90° T—120° H—180° TT—240° Q—270° F—360° EST—End Strip CST—Center Strip SST—Side Strip	PC—Pressure Compensation
Example: A 570 MPR Plus Nozzle with a spray of 10′ (3,0m), 180° arc and pressure compensation, would be specified as: **10-H-PC**		

Note: To specify a MPR Plus nozzle with a 570Z sprinkler body, attach the body specification before the above nozzle specification.
Note: Do not use PCDs with 570Z PR & 570Z PRX models

Performance Data-MPR Plus Spray Nozzles—US

5' Series with 5° Trajectory—Red

Arc	Desc.	psi	GPM	Radius	Prec. Rate ▲	Prec. Rate ■
90°	5-Q	20	0.05	4	1.40	1.21
		30	0.09	5	1.61	1.40
		40	0.12	6	1.78	1.54
		50	0.15	6	1.86	1.62
	5-Q-PC	30-40	0.09	5	1.61	1.40
		40-75	0.10	5	1.79	1.55
120°	5-T	20	0.07	4	1.47	1.27
		30	0.12	5	1.61	1.40
		40	0.16	6	1.78	1.54
		50	0.20	6	1.86	1.62
	5-T-PC	30-40	0.12	5	1.61	1.40
		40-75	0.13	5	1.79	1.55
180°	5-H	20	0.10	4	1.40	1.21
		30	0.19	5	1.70	1.47
		40	0.23	6	1.70	1.47
		50	0.27	6	1.68	1.45
	5-H-PC	30-40	0.18	5	1.61	1.40
		40-75	0.20	5	1.79	1.55
240°	5-TT	20	0.15	4	1.57	1.36
		30	0.25	5	1.68	1.45
		40	0.30	6	1.66	1.44
		50	0.35	6	1.63	1.41
	5-TT-PC	30-40	0.23	5	1.54	1.34
		40-75	0.27	5	1.81	1.57
270°	5-TQ	20	0.20	4	1.86	1.61
		30	0.29	5	1.73	1.50
		40	0.34	6	1.68	1.45
		50	0.40	6	1.66	1.44
	5-TQ-PC	30-40	0.26	5	1.55	1.34
		40-75	0.29	5	1.73	1.50
360°	5-F	20	0.25	4	1.75	1.51
		30	0.38	5	1.70	1.47
		40	0.45	6	1.66	1.44
		50	0.53	6	1.65	1.43
	5-F-PC	30-40	0.35	5	1.57	1.36
		40-75	0.39	5	1.75	1.51

8' Series with 10° Trajectory —Green

Arc	Desc.	psi	GPM	Radius	Prec. Rate ▲	Prec. Rate ■
90°	8-Q	20	0.17	7	1.55	1.34
		30	0.24	8	1.68	1.45
		40	0.26	9	1.61	1.39
		50	0.29	9	1.60	1.39
	8-Q-PC	30-40	0.22	8	1.54	1.33
		40-75	0.25	8	1.75	1.51
120°	8-T	20	0.23	7	1.58	1.36
		30	0.30	8	1.57	1.36
		40	0.36	9	1.67	1.45
		50	0.40	9	1.66	1.44
	8-T-PC	30-40	0.29	8	1.52	1.32
		40-75	0.35	8	1.84	1.59
180°	8-H	20	0.37	8	1.47	1.27
		30	0.50	8	1.75	1.51
		40	0.58	9	1.80	1.56
		50	0.65	9	1.80	1.56
	8-H-PC	30-40	0.44	8	1.54	1.33
		40-75	0.50	8	1.75	1.51
240°	8-TT	20	0.56	7	1.92	1.66
		30	0.70	8	1.84	1.59
		40	0.80	9	1.86	1.61
		50	0.88	9	1.82	1.58
	8-TT-PC	30-40	0.59	8	1.55	1.34
		40-75	0.70	8	1.84	1.59
270°	8-TQ	20	0.63	7	1.92	1.66
		30	0.76	8	1.77	1.53
		40	0.86	9	1.78	1.54
		50	0.93	9	1.71	1.48
	8-TQ-PC	30-40	0.64	8	1.49	1.29
		40-75	0.70	8	1.63	1.41
360°	8-F	20	0.74	7	1.69	1.46
		30	1.00	8	1.75	1.51
		40	1.16	9	1.80	1.56
		50	1.30	9	1.80	1.56
	8-F-PC	30-40	0.85	8	1.49	1.29
		40-75	1.00	8	1.75	1.51

10' Series with 17° Trajectory—Blue

Arc	Desc.	psi	GPM	Radius	Prec. Rate ▲	Prec. Rate ■
90°	10-Q	20	0.30	9	1.66	1.44
		30	0.40	10	1.79	1.55
		40	0.50	11	1.85	1.60
		50	0.60	12	1.86	1.62
	10-Q-PC	30-40	0.33	10	1.48	1.28
		40-75	0.37	10	1.66	1.43
120°	10-T	20	0.42	9	1.74	1.51
		30	0.52	10	1.75	1.51
		40	0.65	11	1.80	1.56
		50	0.75	12	1.75	1.51
	10-T-PC	30-40	0.44	10	1.48	1.28
		40-75	0.50	10	1.68	1.45
180°	10-H	20	0.60	9	1.66	1.44
		30	0.71	10	1.59	1.38
		40	0.85	11	1.57	1.36
		50	0.99	12	1.65	1.43
	10-H-PC	30-40	0.66	10	1.48	1.28
		40-75	0.75	10	1.68	1.45
240°	10-TT	20	0.71	9	1.47	1.27
		30	0.97	10	1.63	1.41
		40	1.10	11	1.67	1.45
		50	1.19	11	1.65	1.43
	10-TT-PC	30-40	0.89	10	1.49	1.29
		40-75	1.00	10	1.68	1.45
270°	10-TQ	20	0.82	9	1.51	1.31
		30	1.04	10	1.55	1.34
		40	1.20	11	1.62	1.41
		50	1.35	11	1.66	1.44
	10-TQ-PC	30-40	0.99	10	1.48	1.28
		40-75	1.09	10	1.63	1.41
360°	10-F	20	1.11	9	1.72	1.49
		30	1.49	10	1.67	1.44
		40	1.61	11	1.63	1.42
		50	1.85	11	1.71	1.48
	10-F-PC	30-40	1.33	10	1.49	1.29
		40-75	1.51	10	1.69	1.46

12' Series with 24° Trajectory —Brown

Arc	Desc.	psi	GPM	Radius	Prec. Rate ▲	Prec. Rate ■
90°	12-Q	20	0.40	11	1.48	1.28
		30	0.50	12	1.55	1.35
		40	0.60	13	1.64	1.42
		50	0.63	13	1.67	1.44
	12-Q-PC	30-40	0.48	12	1.49	1.29
		40-75	0.53	12	1.65	1.43
120°	12-T	20	0.57	11	1.58	1.37
		30	0.72	12	1.68	1.45
		40	0.87	13	1.87	1.62
		50	0.97	13	1.93	1.67
	12-T-PC	30-40	0.64	12	1.49	1.29
		40-75	0.70	12	1.63	1.41
180°	12-H	20	0.95	11	1.76	1.52
		30	1.09	12	1.69	1.47
		40	1.30	13	1.72	1.49
		50	1.55	14	1.77	1.53
	12-H-PC	30-40	0.96	12	1.49	1.29
		40-75	1.05	12	1.63	1.41
240°	12-TT	20	1.12	11	1.55	1.35
		30	1.45	12	1.69	1.46
		40	1.63	13	1.75	1.52
		50	1.80	13	1.79	1.55
	12-TT-PC	30-40	1.28	12	1.49	1.29
		40-75	1.40	12	1.63	1.41
270°	12-TQ	20	1.05	11	1.42	1.23
		30	1.55	12	1.61	1.39
		40	1.65	13	1.58	1.36
		50	1.80	13	1.59	1.38
	12-TQ-PC	30-40	1.44	12	1.49	1.29
		40-75	1.60	12	1.66	1.44
360°	12-F	20	1.67	11	1.54	1.34
		30	2.19	12	1.70	1.47
		40	2.35	13	1.68	1.46
		50	2.70	13	1.79	1.55
	12-F-PC	30-40	1.92	12	1.49	1.29
		40-75	2.10	12	1.63	1.41

15' Series with 28° Trajectory—Black

Arc	Desc.	psi	GPM	Radius	Prec. Rate ▲	Prec. Rate ■
90°	15-Q	20	0.68	14	1.55	1.34
		30	0.85	15	1.69	1.46
		40	1.04	16	1.82	1.57
		50	1.23	16	2.15	1.86
	15-Q-PC	30-40	0.75	15	1.49	1.29
		40-75	0.81	15	1.61	1.40
120°	15-T	20	0.95	14	1.75	1.52
		30	1.10	15	1.64	1.42
		40	1.30	16	1.82	1.57
		50	1.45	16	2.03	1.75
	15-T-PC	30-40	1.00	15	1.49	1.29
		40-75	1.10	15	1.64	1.42
180°	15-H	20	1.37	13	1.79	1.55
		30	1.65	15	1.66	1.44
		40	2.02	16	1.77	1.53
		50	2.14	16	1.87	1.62
	15-H-PC	30-40	1.50	15	1.49	1.29
		40-75	1.65	15	1.64	1.42
240°	15-TT	20	1.78	14	1.59	1.38
		30	2.20	15	1.64	1.42
		40	2.66	16	1.74	1.51
		50	2.84	16	1.86	1.61
	15-TT-PC	30-40	2.00	15	1.49	1.29
		40-75	2.20	15	1.64	1.42
270°	15-TQ	20	2.10	13	1.85	1.61
		30	2.60	15	1.72	1.49
		40	3.00	16	1.86	1.61
		50	3.40	16	1.98	1.72
	15-TQ-PC	30-40	2.30	15	1.53	1.32
		40-75	2.50	15	1.66	1.44
360°	15-F	20	2.85	13	1.89	1.63
		30	3.60	15	1.79	1.55
		40	4.20	16	1.84	1.59
		50	4.58	16	2.00	1.73
	15-F-PC	30-40	3.00	15	1.49	1.29
		40-75	3.30	15	1.64	1.42

Special Patterns—Orange

Pattern	Desc.	psi	GPM	Special Patterns Width		Length	Prec. Rate*
	4-EST	20	0.38	3'	x	12'	2.03
		30	0.45	4'	x	15'	1.44
		40	0.53	5'	x	18'	1.13
		50	0.60	6'	x	20'	0.96
	4-EST-PC	30-40	0.43	4'	x	15'	1.38
		40-75	0.50	4'	x	15'	1.61
	4-CST	20	0.75	3'	x	24'	2.01
		30	0.90	4'	x	30'	1.44
		40	1.04	4'	x	30'	1.67
		50	1.16	4'	x	31'	1.80
	4-CST-PC	30-40	0.86	4'	x	30'	1.38
		40-75	1.00	4'	x	30'	1.61
	9-SST	20	1.00	9'	x	18'	1.19
		30	1.20	9'	x	18'	1.43
		40	1.38	9'	x	20'	1.48
		50	1.55	10'	x	22'	1.36
	9-SST-PC	30-40	1.10	9'	x	18'	1.31
		40-75	1.20	9'	x	18'	1.43
	4-SST	20	0.65	4'	x	24'	1.30
		30	0.90	4'	x	30'	1.44
		40	1.04	4'	x	32'	1.56
		50	1.16	5'	x	33'	1.35
	4-SST-PC	30-40	0.88	4'	x	30'	1.41
		40-75	1.00	4'	x	30'	1.61
	2-SST	20	0.08	2'	x	5'	1.54
		30	0.09	2'	x	6'	1.44
		40	0.10	2'	x	7'	1.38
		50	0.12	3'	x	7'	1.10
	2-SST-PC	30-40	0.09	2'	x	6'	1.44
		40-75	0.10	2'	x	6'	1.61
	4S-SST	20	0.46	4'	x	17'	1.30
		30	0.55	4'	x	18'	1.47
		40	0.63	4'	x	19'	1.60
		50	0.71	5'	x	19'	1.44
	4S-SST-PC	30-40	0.50	4'	x	18'	1.34
		40-75	0.59	4'	x	18'	1.58

Radius shown in feet. Data based on 360°.
Shaded row indicates optimal operating pressure.
▲ Precipitation rates are for triangular spacing, shown in inches per hour, calculated at 50% of diameter.
■ Precipitation rates are for square spacing, shown in inches per hour, calculated at 50% of diameter.
*Specialty arc nozzles are calculated using 2 overlapping nozzles and the total area formula.
All performance specifications are based on the stated working pressure available at the base of the sprinkler.

TVAN Variable Arc Nozzles

- **Radius: 8′-17′ (2,4-5,2m)**
- **Operating Pressure Range: 20-50 psi (1,4-3,5 Bar)**
- **Arc Options: 0°-360° (infinitely adjustable)**

Quick, easy and infinitely adjustable!
Toro® Variable Arc Nozzles (TVAN) are designed to deliver excellent irrigation efficiency with maximum product versatility.

Easy Grip Top

The easy grip top makes arc adjustment from 0°-360° a snap

Features & Benefits

Matched Precipitation Rates
Within a given radius family (MPR) ensures all nozzles apply water at approximately the same rate.

Unique Grip And Turn Adjustment
Requires no tools and makes arc setting fast and simple. Adjust from the top of the nozzle – wet or dry.

Infinitely Adjustable From 0° - 360°
The TVAN provides a variety of arc settings to precisely match any terrain and reduces inventory by meeting the needs of any size or shape landscape.

Five Color-coded Nozzles
Allow for quick and easy identification even when retracted.

TVAN Variable Arc Nozzles Model List

Model	Description
TVAN8	8′ (2,4m) Variable Arc Pattern
TVAN10	10′ (3,0m) Variable Arc Pattern
TVAN12	12′ (3,7m) Variable Arc Pattern
TVAN15	15′ (4,6m) Variable Arc Pattern
TVAN17	17′ (5,2m) Variable Arc Pattern

Specifying Information—TVAN

TVANXX

Model	Radius
TVAN	**XX**
TVAN—Toro Variable Arc Nozzle	8—8′ (2,4m) Variable Arc Pattern 10—10′ (3,0m) Variable Arc Pattern 12—12′ (3,7m) Variable Arc Pattern 15—15′ (4,6m) Variable Arc Pattern 17—17′ (5,2m) Variable Arc Pattern

Example: A TVAN8 nozzle, would be specified as:TVAN8

Specifications

Operating Specifications
- Radius: 8′ to 17′ (2,4-5,2m)
- Operating pressure range: 20-50 psi (1,4-3,5 Bar)
- Recommended pressure: 30 psi (2,1 Bar)

Additional Features
- Stainless steel adjustment screw allows up to 25% radius reduction
- Nozzle arc adjustment opens from a fixed left stop position indicated by an arrow on the top
- Compatibility with any female threaded riser made, means one nozzle family can meet all your needs

Warranty
- Two years

TVAN Variable Arc Nozzle Performance Data—US

Pattern	PSI	8 Series-Green				10 Series-Blue				12 Series-Brown				15′ Series-Black				17′ Series-Gray			
		GPM	Rad	Precip. Rate ▲	Precip. Rate ■	GPM	Rad	Precip. Rate ▲	Precip. Rate ■	GPM	Rad	Precip. Rate ▲	Precip. Rate ■	GPM	Rad	Precip. Rate ▲	Precip. Rate ■	GPM	Rad	Precip. Rate ▲	Precip. Rate ■
90°	20	0.58	7	5.26	4.56	0.59	9	3.24	2.81	0.76	10	3.38	2.93	1.06	15	2.09	1.81	1.25	16	2.17	1.88
	30	0.71	8	4.93	4.27	0.72	10	3.20	2.77	0.93	12	2.87	2.49	1.29	15	2.55	2.21	1.46	17	2.25	1.95
	40	0.82	9	4.50	3.90	0.84	10	3.73	3.24	1.07	12	3.30	2.86	1.49	16	2.59	2.24	1.68	18	2.31	2.00
	50	0.92	9	5.05	4.38	0.94	10	4.18	3.62	1.21	13	3.18	2.76	1.66	16	2.88	2.50	1.87	18	2.57	2.22
180°	20	0.81	7	3.67	3.18	0.94	9	2.58	2.24	1.35	10	3.00	2.60	1.71	14	1.94	1.68	1.95	15	1.93	1.67
	30	0.99	8	3.44	2.98	1.15	10	2.56	2.21	1.65	12	2.55	2.21	2.08	15	2.05	1.78	2.38	17	1.83	1.59
	40	1.15	8	3.99	3.46	1.33	10	2.96	2.56	1.91	12	2.95	2.55	2.40	15	2.37	2.05	2.74	17	2.11	1.83
	50	1.28	9	3.51	3.04	1.49	10	3.31	2.87	2.13	13	2.80	2.43	2.68	15	2.65	2.29	3.06	18	2.10	1.82
270°	20	1.08	7	3.27	2.83	1.37	9	2.51	2.17	1.90	11	2.33	2.02	2.41	14	1.82	1.58	2.69	14	2.03	1.76
	30	1.33	8	3.08	2.67	1.67	10	2.47	2.14	2.32	12	2.39	2.07	2.94	15	1.94	1.68	3.28	17	1.68	1.46
	40	1.53	8	3.54	3.07	1.92	10	2.85	2.47	2.68	12	2.76	2.39	3.38	15	2.23	1.93	3.76	17	1.93	1.67
	50	1.70	9	3.11	2.69	2.15	10	3.19	2.76	2.99	12	3.08	2.67	3.77	16	2.18	1.89	4.19	18	1.92	1.66
360°	20	1.25	7	2.84	2.46	1.73	9	2.37	2.06	2.27	10	2.52	2.19	2.69	13	1.77	1.53	3.05	17	1.17	1.02
	30	1.52	8	2.64	2.29	2.11	10	2.35	2.03	2.77	12	2.14	1.85	3.26	15	1.61	1.40	3.73	17	1.43	1.24
	40	1.75	9	2.40	2.08	2.42	10	2.69	2.33	3.12	12	2.41	2.09	3.79	15	1.87	1.62	4.26	18	1.46	1.27
	50	1.96	9	2.69	2.33	2.69	10	2.99	2.59	3.47	12	2.68	2.32	4.33	16	1.88	1.63	4.71	18	1.62	1.40

Shaded data indicates optimal operating pressure.
Radius shown in feet. Data based on 360°.

Stream Spray Nozzles

Specifications

Operating Specifications and Features

- Recommended operating pressure range: 20-75 psi (1,4-5,2 Bar)
- Flow Rate: 0.60 – 2.70 GPM (2,3-10,2 LPM)
- Radius adjusts up to 50%
- 10° or 35° Angle
- Non-Rotating

Warranty

Two years

Performance Data
10° Stream Spray—US

Pattern	Desc.	psi	GPM	Radius	Prec. Rate* ▲	Prec. Rate* ■
90°	10-SSQ	20	0.60	14	1.36	1.18
		30	0.80	16	1.39	1.20
		40	0.92	17	1.42	1.23
		50	1.03	18	1.41	1.22
	10-SSQ-PC	40-50	0.70	13	1.84	1.60
		60-70	0.70	15	1.38	1.20
180°	10-SSH	20	1.00	14	1.13	.98
		30	1.20	16	1.04	.90
		40	1.38	17	1.06	.92
		50	1.55	18	1.06	.92
	10-SSH-PC	40-50	1.40	13	1.84	1.60
		60-70	1.40	15	1.38	1.20
360°	10-SSF	20	1.80	14	1.02	.88
		30	2.10	16	.91	.79
		40	2.42	17	.93	.81
		50	2.70	18	.93	.80
	10-SSF-PC	40-50	1.80	13	1.18	1.03
		60-70	2.00	15	.99	.86

Performance Data
35° Stream Spray—US

Pattern	Desc.	psi	GPM	Radius	Prec. Rate* ▲	Prec. Rate* ■
90°	35-SSQ	20	0.60	18	.82	.71
		30	0.80	20	.89	.77
		40	0.92	21	.93	.80
		50	1.03	22	.95	.82
	35-SSQ-PC	40-50	0.70	17	1.08	.93
		60-70	0.70	18	.96	.83
180°	35-SSH	20	1.00	18	.69	.59
		30	1.20	20	.67	.58
		40	1.38	21	.70	.60
		50	1.55	22	.71	.62
	35-SSH-PC	40-50	1.40	17	1.08	.93
		60-70	1.40	18	.96	.83
360°	35-SSF	20	1.80	18	.62	.54
		30	2.10	20	.58	.51
		40	2.42	21	.61	.53
		50	2.70	22	.62	.54
	35-SSF-PC	40-50	1.80	17	.69	.60
		60-70	2.00	18	.69	.59

Note: Stream sprays are not recommended for turf applications. Radius shown in feet. Data based on 360°.

Stream Spray Nozzles Model List	
Non-Pressure Compensating	
Model	**Description**
10-SSQ	90° Arc
10-SSH	180° Arc
10-SSF	360° Arc
35-SSQ	90° Arc
35-SSH	180° Arc
35-SSF	360° Arc
Pressure Compensating	
10-SSQ-PC	90° Arc
10-SSH-PC	180° Arc
10-SSF-PC	360° Arc
35-SSQ-PC	90° Arc
35-SSH-PC	180° Arc
35-SSF-PC	360° Arc

Stream Bubbler Nozzles

Specifications

Operating Specifications and Features

- Recommended operating pressure range: 10-75 psi (0,7-5,2 Bar)
- Flow Rate: 0.49 – 2.02 GPM (1,9-9,0 LPM)
- Fits all Toro spray bodies, shrub adapters, risers and riser extenders

Warranty

Two years

Stream Bubbler Nozzle Performance Data

Pattern		Description	10 psi GPM	10 psi Rad	20 psi GPM	20 psi Rad	30 psi GPM	30 psi Rad	40 psi GPM	40 psi Rad	50 psi GPM	50 psi Rad	60 psi GPM	60 psi Rad
2/60°		SB-90	0.49	7	0.70	11	0.86	13	1.00	15	1.12	16	1.23	18
2/60°		SB-90-PC2					0.21	1.5	0.22	1.5	0.23	1.5	0.24	1.5
4/60°		SB-180	0.84	5	1.18	9	1.43	12	1.66	14	1.86	16	2.02	17
4/60°		SB-180-PC2					0.46	2.5	0.49	2.5	0.50	2.5	0.51	2.5
6/60°		SB-360	1.18	3	1.63	6	2.00	8	2.29	9	2.55	10	2.82	11
6/60°		SB-360-PC2					0.74	1.5	0.75	1.5	0.76	1.5	0.77	1.5
2/180°		SB-2-180	0.49	7	0.70	11	0.86	13	1.00	15	1.12	16	1.23	18
2/180°		SB-2-180-PC2					0.21	1.5	0.22	1.5	0.23	1.5	0.24	1.5
2/60x2/60°		SB-4-180	0.84	5	1.18	9	1.43	12	1.66	14	1.86	16	2.02	17
2/60x2/60°		SB-4-180-PC2					0.46	2.5	0.49	2.5	0.50	2.5	0.51	2.5

Radius shown in feet. Data based on 360°.

Stream Bubbler Nozzles Model List	
Model	**Description**
Pressure Compensating	
• SB-90-PC2	90° Arc, 2' Radius
• SB-180-PC2	180° Arc, 2' Radius
• SB-360-PC2	360° Arc, 2' Radius
• SB-2-180-PC2	180° Arc, 2 Stream, 2' Radius
• SB-4-180-PC2	180° Arc, 4 Stream, 2' Radius,

Pressure-compensating Flood Bubblers

Specifications

Operating Specifications and Features

- Recommended operating pressure range: 20-75 psi (1,4-5,2 Bar)
  Maximum pressure: 75 psi (5,2 Bar)
- Flow Rate: Adjustable: 0 – 2.0 GPM (0-7,6 LPM);
  Fixed Flow: 0.25, 0.50 and 1.0 GPM (0,9; 1,9; 3,8 LPM)
- Adjustment screw allows up to 25% reduction in radius
- Compatible with shrub adapter, 570Z Series sprinklers, risers and riser extenders

Warranty

Two years

Flood Bubbler Performance Data

Pattern	Model No.	GPM @ 40 psi	GPM @ 50 psi	GPM @ 60 psi
Flood ●	FB25PC	0.25	0.25	0.25
	FB50PC	0.45	0.50	0.50
	FB100PC	0.95	1.00	1.00
	FB200ADJPC	1.90	2.00	2.00

Pressure-compensating Flood Bubblers Model List

Model	Description
FB-25-PC	.25 GPM (0,9 LPM)
FB-50-PC	.50 GPM (1,9 LPM)
FB-100-PC	1.00 GPM (3,8 LPM)
FB-200-ADJ-PC2.00	Adjustable GPM (LPM)

500 Series Bubblers

Specifications

Operating Specifications and Features

- Recommended operating pressure range:
  – Flood: 15-75 psi (1,0-5,2 Bar)
  – Stream: 10-75 psi (0,7-5,2 Bar)
  Maximum pressure: 75 psi (5,2 Bar)
- Flow Rate:
  – Flood: 1.7 – 2.7 GPM (6,4-10,2 LPM)
  – Stream: 1.08 – 3.70 GPM (4,1-14,0 LPM)
- Inlet: ½" (12mm) female thread
- Attaches directly to risers
- Radius adjusts up to 50%

Warranty

Two years

Adjustable Flood Bubbler Nozzle Performance Data—US

Pattern	Model No.	psi	GPM
Universal Flood ●	514-20	15	1.70
		20	2.00
		25	2.20
		30	2.40
		35	2.50
		40	2.70

500 Series Adjustable Stream Bubbler Nozzle Performance Data —US

Pattern		Model No.	10 psi		20 psi		30 psi		40 psi	
			GPM	Rad	GPM	Rad	GPM	Rad	GPM	Rad
2/60°		511-30	1.08	10	1.52	14	1.87	16	2.10	17
4/60°		512-30	1.50	7	2.11	10	2.58	11	2.98	13
6/60°		514-30	1.89	6	2.61	8	3.20	10	3.70	11
2/180°		516-30	1.08	10	1.52	14	1.87	16	2.10	17

Radius shown in feet. Data based on 360°.

500 Series Bubblers Model List

Model	Description
511-30	90° Arc, Stream Bubbler
512-30	180° Arc, Stream Bubbler
514-30	360° Arc, Stream Bubbler
516-30	180° Arc, 2-stream Bubbler
514-20	Universal Flood Bubbler

Effluent Water Indicators

102-0562

- Lavender molded cover for use on 570Z Series pop-up models

102-1211 570Z

- Lavender molded cap for use on 570Z Series pop-up models
- Includes wiper seal

102-1231

- Lavender molded 570Z Series shrub adapter
- Installs onto a ½" (12mm) NPT riser

Serviceable Parts

570SEAL

- Serviceable seal for all 570Z models
- Reccommended for upgrades

Check Valve

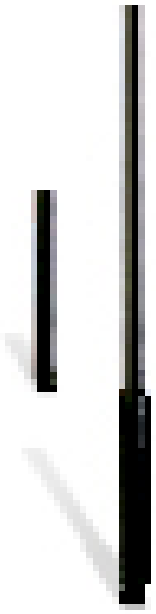
570CV

- Check valve for all the 570Z models
- Install in field to prevent low head drainage

Risers and Extenders

570-6X

- 570Z Extender
- Male-inlet threads install onto any 570Z pop-up sprinkler or shrub adapter to provide a 6" (15cm) extension
- Maximum pressure: 75 psi (5,2 Bar)



570-SR-6 and 570SR-18

- 570Z stationary riser
- ½" (12mm) male-threaded inlet for installation on pipe fittings
- Maximum pressure: 75 psi (5,2 Bar)
- Height: 6" (15cm), 18" (4 5cm)

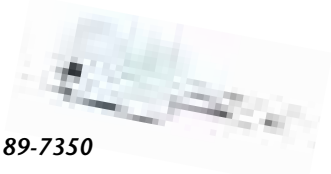
Tools

89-6395

- Riser pull-up and screen removal tool for all 570Z Series models

102-1777

- X-tool for 570Z XF/PRX Series models for easy nozzle removal and assembly



89-7350

- Adjustment tool for all 570Z Series models

PRNTOOL

- PRN Adjustment Tool for Precision™ Series Rotating Nozzles
- Adjusts arc and radius.

Super Funny Pipe®

- **20′ (6m), 50′ (16m), 100′ (30,5m) Coils**
- **Up to 120 psi (8,3 Bar)**

Toro® Super Funny Pipe is practical and saves time. Whether you are installing a new system or replacing an old sprinkler, Super Funny Pipe makes the job easier.

Features & Benefits

Flexible, Thick-walled Polyethylene Pipe

Super Funny Pipe is a high-strength poly tubing that solves tough sprinkler installation and replacement problems. It acts as an extension cord between the water line and the sprinkler.

Easy Installation For Problem Areas

One of the most useful and time-saving sprinkler installation aids whether you are installing a new system or replacing an old sprinkler. Also comes pre-assembled as the Super Funny Pipe Swing Joints in 8″ (20,3cm) and 12″ (30,5cm) lengths or just get the individual fittings as needed.

Specifications

Dimensions

- Wall thickness: .10″ ± .01 (2,5mm ± 0,25)
- Inside diameter: .49″ ± 0.005 (12,4mm ± 0,13)
- Outside diameter: .70″ (17.8mm)

Operating Specifications and Features

- Maximum pressure: 120 psi (8,3 Bar)
- Cushions sprinklers from external impact
- Connects to sprinklers and Toro fittings

Warranty

Two years

Super Funny Pipe Friction Loss Data

	GPM Flow						
GPM	1	2	3	4	5	6	7
PSI Loss	0.01	0.02	0.06	0.09	0.15	0.21	0.27

This chart indicates the amount of pressure loss (psi) per foot of Super Funny Pipe at stated flow rates (GPM).

Super Funny Pipe Model List	
Model	**Description**
850-23	20′ (6,1m)Length, 3⁄8″ (9,5mm) Polyethylene Pipe
850-24	50′ (15,2m) Coil, 3⁄8″ (9,5mm) Polyethylene Pipe
850-25	100′ (30,4m) Coil, 3⁄8″ (9,5mm) Polyethylene Pipe

Super Funny Pipe® Swing Joints

Super Funny Pipe Swing Joints Model List	
Model	**Description**
SPFA-585	8" x 1/2" (200 x 12mm)
SPFA-5875	8" x 3/4" (200 x 18mm)
SPFA-5125	12" x 1/2" (300 x 12mm)
SPFA-51275	12" x 3/4" (300 x 18mm)

Top pair:
12" and 8" Long X 1/2"
(30,5cm and 20,3cm X 12mm)

Bottom pair:
12" and 8" Long X 3/4"
(30,5cm and 20,3cm X 19mm)

Specifications

Warranty

Two years

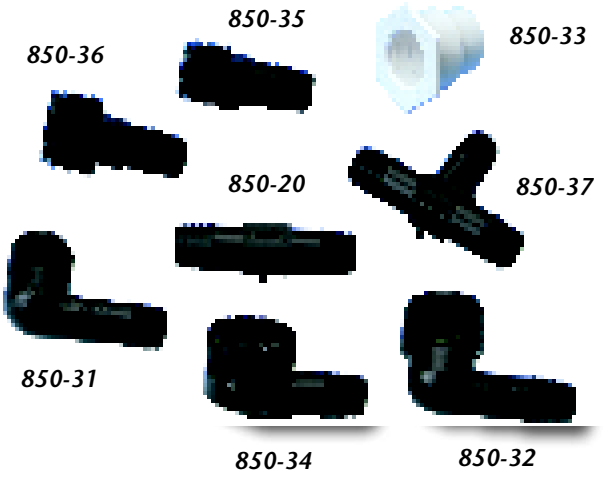
Super Funny Pipe® Fittings

Super Funny Pipe Fittings Friction Loss Data

Model No.	Description	GPM Flow						
		1	2	3	4	5	6	7
850-36	¾" Male Adapter	0.04	0.10	0.23	0.43	0.80	1.37	1.86
850-35	½" Male Adapter	0.03	0.06	0.18	0.31	0.60	1.00	1.41
850-31	½" Male Elbow	0.05	0.15	0.36	0.62	1.13	1.62	2.37
850-34	½" Female Elbow	0.05	0.15	0.36	0.62	1.13	1.62	2.37
850-32	¾" Male Elbow	0.06	0.18	0.41	0.80	1.42	2.20	3.05

This chart indicates the amount of pressure loss (psi) per foot of Super Funny Pipe at stated flow rates (GPM).

Super Funny Pipe Fittings Model List	
Model	**Description**
850-20	Coupling
850-31	Male Elbow, 1/2" (12mm)
850-32	Male Elbow, 3/4" (19mm)
850-33	Female Adapter, 1/2" – 3/4" (12-19mm)
850-34	Female Elbow, 1/2" (12mm)
850-35	Male Adapter, 1/2" (12mm)
850-36	Male Coupling, 3/4" (19mm)
850-37	Tee, Barbed Inserts
850-60	Saddle Tee, 3/4" (19mm)
850-61	Saddle Tee, 1" (25mm)

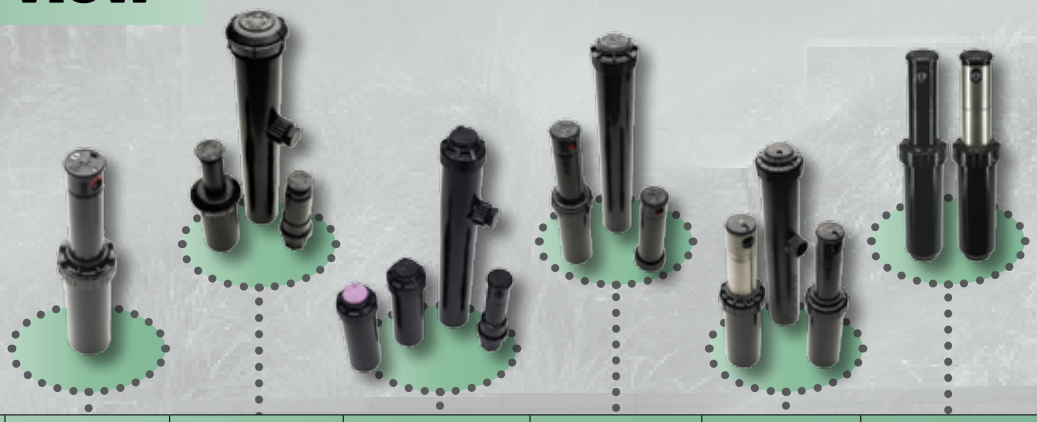


Specifications

Warranty

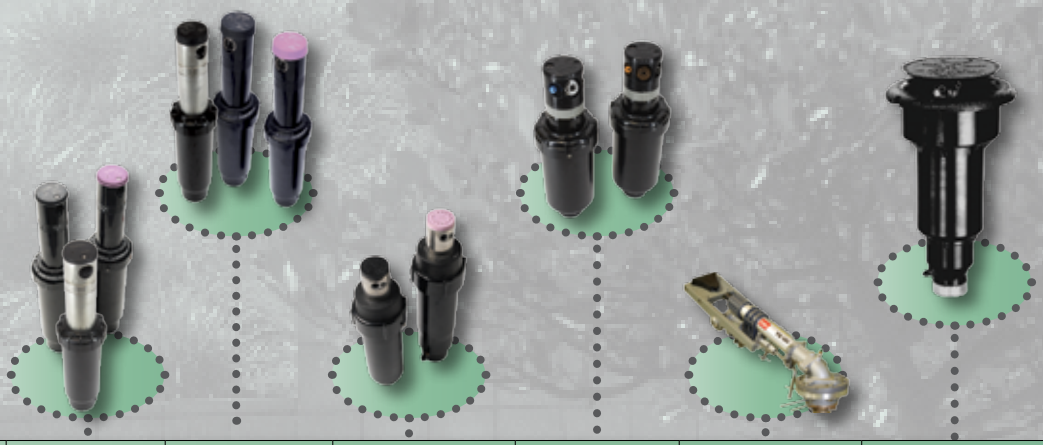
Two years

Rotors Overview



Model	Mini-8	300, 340 Multi-Stream	T5	Super 800	TR50XT	T7
Page Number	34-35	36-39	40-41	42-43	44-45	46-47
Inlet size	1/2" (13mm)	3/4" (20mm)	3/4" (20mm)	3/4" (20mm)	3/4" (20mm)	1" (25mm)
Radius	20'-35' (6,1-10,7m)	15'-33' (4,6-10,1m)	25'-50' (7,6-15,2m)	28'-50' (8,5-15,2m)	28'-48' (8,5-14,6m)	46'-83' (14,0 - 25,0m)
Flow Range	0.8-3.40 GPM (3,0-12,9 LPM)	0.57-7.54 GPM (2,0-28,0 LPM)	0.76-9.63 GPM (2,8-36,5 LPM)	0.5-10.0 GPM (1,9-37,9 LPM)	1.0-9.8 GPM (3,8-37,0 LPM)	6.7 - 30.6 GPM (25,4-116 LPM)
Operating Pressure Range	30-50 PSI (2,0-3,5 Bar)	35-50 PSI (2,4-3,5 Bar)	25-70 PSI (1,7-4,8 Bar)	30-70 PSI (2,0-4,8 Bar)	30-70 PSI (2,0-4,8 Bar)	40-100 psi (2,8 - 7,0 Bar)
Artificial Turf						
Shrubs/Ground Cover		X	X	X	X	
Slopes		X	X	X	X	
Low Pressure	X		X	X	X	
High Traffic/Vandal Prone Areas					X	
Rubber Cover for Sports Fields			X	X	X	X
High Wind			X	X	X	
Normally Open Hydraulic System						
Full Circle	X	X	X	X	X	X
Part-circle Adjustable	X		X	X	X	X
Part-circle Fixed		X				
Part/Full Circle In One	X	X	X	X	X	X
Stainless Steel Riser					X	X
Check Valve	Optional	Optional	Optional	Optional	Standard	Standard
Effluent Water Option		X	X	X	X	X
Shrub Model		X	X	X	X	
High Pop Model		X	X	X	X	
Smart-Arc Memory				X	X	X
Below Grade					X	X
Trajectory Adjustment					5°-25°	
X-Flow Water Shut-off					X	
Standard Pop-up Height	4" (100mm)	2 ¾"-3 ¾" (70-95mm)	5" (127mm)	4 ½" (114mm)	5" (127mm)	5" (127mm)
Warranty	Two years	Two years	Five years	Five years	Five years	Five years

WaterSmart® Feature



Model	TR70P	TR70XTP	640	TS90	TG101	690
Page Number	48-49	50-51	53-55	56-57	58-59	60
Inlet size	1" (25mm)	1" (25mm)	1" (25mm)	1" (25mm)	2" (50mm)	1½" (37mm)
Radius	43'-71' (13-21m)	30'-68' (9-21m)	47'-67' (14-20m)	53' - 95' (16-29m)	91'-178' (27-54m)	87'-108' (26,5-33m)
Flow Range	7.5-29.6 GPM (28-112 LPM)	6.7-27.0 GPM (25-102 LPM)	6.0-25.0 GPM (23-95 LPM)	14.0-61.5 GPM (53-233 LPM)	42-248 GPM (158-938 LPM)	51.0-82.2 GPM (193-311 LPM)
Operating Pressure Range	40-100 PSI (2,8-7,0 Bar)	40-100 PSI (2,8-7,0 Bar)	40-90 PSI (2,8-6,2 Bar)	40-100 PSI (2,8-7,0 Bar)	50-95 PSI (3,5-6,5 Bar)	80-100 PSI (5,5-7,0 Bar)
Artificial turf				X	X	X
Shrubs/Ground Cover						
Slopes						
Low Pressure						
High Traffic/Vandal Prone Areas	X	X	X			
Rubber Cover for Sports Fields	X	X	X	X		
High Wind		X		X		X
Normally Open Hydraulic System			X			X
Full Circle	X	X	X			1 and 2 Speed
Part-circle Adjustable	X	X				
Part-circle Fixed			X			90˚ and 180˚
Part/Full Circle In One	X	X		X	X	
Stainless Steel Riser	X	X	X			
Check Valve	Standard	Standard	Standard	Standard		X
Effluent Water Option	X	X	X	X		X
Shrub Model						
High Pop Model						
Smart-Arc Memory	X	X		X		
Below Grade	X	X	X	X		
Trajectory Adjustment		5°-25°		7°-30°		
X-Flow Water Shut-off		X				
Standard Pop-up Height	5" (127mm)	5" (127mm)	2 ⅜" (60mm)	4" (100mm)		2¼" (57mm)
Warranty	Five years	Five years	Five years	Five years	Two years	Three years

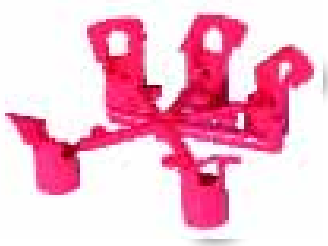
WaterSmart® Feature

Mini 8 Series

- **Inlet Size: ½" (13mm)**
- **Radius: 20'-35' (6,1-10,7m)**
- **Operating Pressure Range: 30-50 psi (2,0-3,4 Bar)**

When spray heads won't do the job and a full size rotor is just too much, you need the Mini 8 from Toro®. Designed to fill in that hard to cover area between 20' (6,1m) and 35'(10,7m), the Mini 8 provides great value and water efficiency for your landscapes.

Check Valve Options Available



Nozzle Tree—
Five interchangeable nozzles – comes pre-installed with a 1.5 nozzle

Features & Benefits

Top Arc Indication
Ensures easy adjustments from 40° to 360° with visual feedback of arc change by reading the scale.

Stainless Steel Radius Adjustment Screw
Allows up to 25% reduction.

Pressure Activated Seal
The seal and robust trip mechanism offer enhanced reliability.

Ratcheting Riser
Easily shift the riser and fixed left stop to the desired position.

Five Interchangeable Nozzles
To cover varying flow and radius requirements (comes pre-installed with a 1.5 nozzle).

Part And Full Circle In One
Offers convenience and reduces inventory requirements.

Water Management Highlight

Not Too Big and Not Too Small - the Mini 8 is Just Right

With the smaller nozzle set you get lower flows on smaller spaces providing more efficient application and water savings. And compared to sprays, it saves on the number of heads which in turn reduces the number of valves and stations required. No matter how you look at it, the Mini 8 brings together money savings with better water management.

Arc Scale
Use a slotted screwdriver to turn. Read arc change on the arc scale as the screwdriver is turned. The arrow points to the arc degrees.

Optional Check Valve

Prevents low head drainage and puddling at the sprinkler.

Specifications

Dimensions

- Body height: 6" (150mm)
- Pop-up to nozzle height: 3 ¾" (95mm)
- Exposed diameter: 1 ¾" (45mm)
- Cap diameter: 2 ¼" (57mm)
- Inlet: ½" (13mm) female-threaded

Operating Specifications

- Radius: 20'–35' (6,1–10,7m)
- Operating pressure range: 30-60 psi (2,0-4,1 Bar)
- Flow Rate: 0.80 – 3.40 GPM (3,0-12,9 LPM)
- Trajectory: 25°

Options Available

- MINI8-CV - Check Valve – maintains up to 8' elevation change (Bag of 25)
- 102-2024 – Adjustment Tool

Warranty

- Two years

Mini 8 Performance Data—US

Nozzle	psi	GPM	Radius	Prec. Rate ▲	Prec. Rate ■
.75	30	0.8	20	0.21	0.18
	40	0.9	21	0.22	0.19
	50	1.0	22	0.23	0.20
1.0	30	1.0	26	0.15	0.13
	40	1.1	27	0.17	0.15
	50	1.3	28	0.18	0.16
1.5*	30	1.3	29	0.12	0.15
	40	1.5	30	0.19	0.16
	50	1.7	31	0.20	0.17
2.0	30	1.7	30	0.21	0.18
	40	2.0	31	0.23	0.20
	50	2.3	31	0.27	0.23
3.0	30	2.6	34	0.25	0.22
	40	3.0	35	0.27	0.24
	50	3.4	35	0.31	0.27

Radius shown in feet. Data based on 360°.

▲ Precipitation rates are for triangular spacing, shown in inches per hour, calculated at 50% of diameter.
■ Precipitation rates are for square spacing, shown in inches per hour, calculated at 50% of diameter.
All performance specifications are based on the stated working pressure available at the base of the sprinkler.
** Pre-installed nozzle.*

Mini 8 Model List	
Model	**Description**
MINI8-4P	Mini 8 Rotor, 4" (100mm) Lawn Pop-up

Specifying Information

MINI8-4P-XX-XX				
Description	**Body**	**Nozzle**		**Optional**
MINI8	**4P**	**XX**		**XX**
MINI8—Mini 8 Rotor	4P—Lawn Pop-up	75—.75 10—1.0 15—1.5	20—2.0 30—3.0	CV—Check Valve
Example: A Mini 8 Series sprinkler with a 3.0 nozzle, would be specified as: **MINI8-4P-30**				

Note: MINI8-CV available in bags of 25.

300 Series Multi-Stream Rotor®

- **Inlet Size: ¾" (20mm) for Lawn and High-pop; ½"-¾" (13-20mm) for Shrub model**
- **Radius: 15'-30' (4,6-9,2m)**
- **Operating Pressure Range: 35-50 psi (2,4-3,5 Bar)**

The 300 Series Multi-Stream Rotor from Toro® combines a highly distinctive way to irrigate with the reliability you've come to expect. Uniquely designed, Multi-Stream Rotors feature multiple rotating streams, a slower precipitation rate and excellent wind resistance.

Effluent Options Available

Check Valve Options Available

Features & Benefits

Unique Multiple Rotating Streams
Provide slow, effective watering, plus you can zone your arcs together, saving time and water.

Matched Precipitation Rate Arc Discs
Ensures uniform delivery of water across each square foot of an irrigated area, resulting in high-precision water application.

Choice Of Six Nozzles And Nine Interchangeable Arc Discs
For maximum versatility covering varying landscape needs (4 separate nozzles for high-pops).

Selection Of Pop-up Heights
3" (76,2mm) Lawn Pop-up, shrub and high-pop – to satisfy varying installation requirements.

Water Management Highlight

A Winning Combination of Watering Efficiency and Visual Appeal

The exclusive "fingers of water" application takes a flow of water and divides it into smaller streams at different trajectories for a stronger performance all across the landscape. Shorter radii get the coverage needed with enough water still in the main stream to reach longer distances. This also creates a heavier watering stream at the tail end of the spray allowing for greater wind resistance.

Specifications

Dimensions

- Body Diameter: 2 ⅜" (60mm)
- Cap Diameter: 3"(75mm)
- Height:
  – Lawn Pop-up: 6 ⅛" (155mm)
  – High-Pop: 16" (405mm)
- Shrub Base Diameter: 1 ¾" (45mm)

Operating Specifications

- Radius: 15'-30' (4,6-9,2m)
- Flow Rate:
  – Lawn Pop-up and High-pop: 0.57-7.51 GPM (2,1-28,4 LPM)
  – Shrub (COM): 2.07-6.36 GPM (7,8-24,0 LPM)
- Operating Pressure Range: 35-50 psi (2,4-3,5 Bar)
- Trajectory: 3 angles to cover short, medium & large radius
- Pop-up to nozzle:
  – Lawn Pop-up: 2 ¾" (70mm)
  – High-Pop: 11 ¾" (298mm)
- Inlet (Female-threaded):
  – Lawn Pop-up and High-pop: ¾" (20mm)
  – Shrub: ½" to ¾" (13-20mm)
- Large basket filter screen

Options Available

- Recycled Water Indicators:
  – 89-7853 — Omni Nozzle Cover (Use with Part No. 300-15)
  – 89-7854 — High-pop Omni Nozzle Cover (Use w/Part No. 300-25)
  – 89-7889 — Rotor Plug
- Check Valve - maintains up to 8' elevation change (shrub com only)
- 35-1344 — Locking cap for Lawn Pop-up models (standard on high-pop models)

Warranty

- Two years

300 Series arc discs come in 9 different selections

300 Series:
Shrub w/COM (360° Arc Disc)
(Model Nos. 300-10-00COM)—US

Nozzle	psi	300 Series GPM	Radius
01	50	2.07	14
01	75	2.95	16
02	50	2.48	23
02	75	3.69	25
03	50	4.55	27
03	75	6.24	29
63	50	2.66	28
63	75	3.82	30
93	50	3.64	29
93	75	5.29	31
Omni (Min)	50	2.67	16
Omni (Min)	75	3.95	18
Omni (Max)	50	5.08	30
Omni (Max)	75	6.36	33

300 Series Lawn Pop-up
Apex @ 50 psi—US

Nozzle	27°
	Max. Ht. of Spray
01	4' 10"
02	5' 1"
03	5' 11"
63	7' 0"
93	6' 3"

300 Series: 300-15 and 300-25 Omni™ Adjustable-radius Nozzle Performance Chart

psi	Radius	Precipitation Rate* ▲	Precipitation Rate* ■	90°	112°	135°	157.7°	180°	202.5°	225°	270°	360°
				GPM								
35	15	1.69	1.46	0.85	1.06	1.28	1.49	1.70	1.91	2.13	2.55	3.41
35	18	1.37	1.19	1.00	1.24	1.50	1.75	2.00	2.25	2.50	3.00	4.00
35	21	1.15	1.00	1.15	1.42	1.72	2.01	2.29	2.58	2.86	3.44	4.58
35	24	0.99	0.86	1.29	1.60	1.94	2.26	2.58	2.91	3.23	3.88	5.17
35	26	0.95	0.82	1.44	1.79	2.16	2.52	2.88	3.24	3.60	4.32	5.76
50	18	1.60	1.38	1.16	1.44	1.74	2.04	2.33	2.62	2.91	3.49	4.65
50	21	1.35	1.17	1.34	1.66	2.01	2.35	2.68	3.02	3.35	4.02	5.36
50	24	1.17	1.02	1.52	1.88	2.28	2.66	3.04	3.42	3.80	4.56	6.08
50	27	1.04	0.90	1.70	2.10	2.55	2.97	3.40	3.82	4.24	5.09	6.79
50	30	0.93	0.80	1.88	2.33	2.82	3.29	3.75	4.23	4.69	5.63	7.51

300 Series: Fixed-radius Nozzle Performance Chart

Nozzle	psi	Radius	Precip. Rate* ▲	Precip. Rate* ■	90°	112°	135°	157.7°	180°	202.5°	225°	270°	360°
					GPM								
01	35	16	0.99	0.86	0.57	0.71	0.86	1.00	1.14	1.28	1.43	1.71	2.28
	50	18	0.99	0.86	0.72	0.90	1.08	1.26	1.44	1.62	1.80	2.16	2.88
02	35	21	0.73	0.63	0.72	0.90	1.08	1.26	1.44	1.62	1.80	2.16	2.88
	50	24	0.66	0.57	0.85	1.06	1.28	1.49	1.71	1.92	2.13	2.56	3.41
03	35	28	0.77	0.67	1.36	1.69	2.04	2.38	2.72	3.05	3.39	4.07	5.43
	50	30	0.80	0.69	1.61	2.01	2.42	2.82	3.23	3.63	4.03	4.84	6.45
63§	35	28	0.39	0.33	0.68	0.85	1.02	1.19	1.36	1.53	1.70	2.04	2.72
	50	30	0.40	0.35	0.81	1.00	1.21	1.41	1.62	1.82	2.02	2.42	3.23
93§	35	28	0.58	0.50	1.02	1.27	1.53	1.78	2.04	2.29	2.54	3.05	4.07
	50	30	0.60	0.52	1.21	1.51	1.82	2.12	2.42	2.72	3.03	3.63	4.84

**▲ Precipitation rates are for triangular spacing, shown in inches per hour, calculated at 50% of diameter.*
■ Precipitation rates are for square spacing, shown in inches per hour, calculated at 50% of diameter.
All performance specifications are based on the stated working pressure available at the base of the sprinkler.
Radius shown in feet. Data based on 360°.
§ Low gallonage.

300 Series Multi-Stream Rotor Model List

Model	Description
300-00-00	Lawn Pop-up w/o Nozzle
300-10-00	Shrub w/o Nozzle
300-10-00-COM	Shrub w/o Nozzle with Check Valve
300-12-00	12" (300mm) Pop-up w/o Nozzle

Specifying Information— 300 Series Multi-Stream Rotor

3XX-XX-XX-COM-E

Arc	Body	Nozzle	Optional	
3XX	XX	XX	COM	E
04—90° 05—112° 06—135° 07—157.5° 08—180° 09—202.5° 10—225° 12—270° 16—360°	00—Lawn Pop-up 10—Shrub 12—High- pop		COM—Check-O-Matic *(COM available on shrub model only)*	E—Effluent

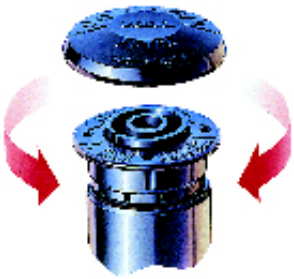
Example: A 300 Series Shrub Sprinkler with a 90° arc and an adjustable nozzle, would be specified as: **304-10-15**

* Available on Lawn Pop-up and Shrub only
** Must be used on High-pop body

340 Series Multi-Stream Rotor®

- **Inlet Size: ¾" (20mm) for Lawn and High-pop; ½"-¾" (13-20mm) for Shrub model**
- **Radius: 15'-33' (4,6-10,1m)**
- **Operating Pressure Range: 35-50 psi (2,4-3,5 Bar)**

Providing the same water saving distribution feature as the 300 Series, the Toro® 340 Series Multi-Stream Rotor provides a higher 4" (100mm) pop-up and a slower rotation speed that increases radius up to 33' (10,1m).



The Omni Nozzle adjusts from 15' to 33' (4,6-10,1m)

Effluent Options Available

Check Valve Options Available

Features & Benefits

Unique Multiple Rotating Streams
Provides slow, effective watering, plus you can zone your sprinklers with different arcs together, saving time and water. Multiple rotating streams create a striking visual appeal.

Matched Precipitation Rate Arc Discs
Ensures uniform delivery of water across each square foot of an irrigated area, resulting in high-precision water application.

Choice Of Six Nozzles And Nine Interchangeable Arc Discs
For maximum versatility covering varying landscape needs (4 separate nozzles for high-pops).

Selection Of Body Sizes
4"(100mm) Lawn Pop-up, shrub and high-pop – to satisfy varying installation requirements.

Water Management Highlight

Slower Rotation for Even Watering

Because of the slower rotation speed, the 340 Series Multi-Stream Rotor will get water all the way out to the end of the radii, up to 33' (10,1m), before it has moved past the intended area. Combined with the additional pop-up height, you'll also get an extra 2-3 (,6-,9m) feet of radius.

Specifications

Dimensions

- Body Diameter: 2 ⅜" (60mm)
- Cap Diameter: 3" (75mm)
- Height:
  - Lawn Pop-up: 6 ⅛" (155mm)
  - High-Pop: 16" (405mm)
- Shrub Base Diameter: 1 ¾" (45mm)

Operating Specifications

- Radius: 15'-33' (4,6-10,1m)
- Flow Rate:
  - Lawn Pop-up and High-pop: 0.57-7.54 GPM (2-28 LPM)
  - Shrub (COM): 2.07-6.36 GPM (7,8-24,0 LPM)
- Operating Pressure Range: 35-50 psi (2,4-3,5 Bar)
- Trajectory: 3 angles to cover short, medium & large radius
- Pop-up to nozzle:
  - Lawn Pop-up: 3 ¾" (95mm)
  - High-Pop: 11 ¾" (298mm)
- Inlet (Female-threaded):
  - Lawn Pop-up and High-pop: ¾" (20mm)
  - Shrub: ½" to ¾" (13-20mm)
- Large basket filter screen
- Standard Check Valve on Lawn Pop-up – maintains up to 8' elevation change

Options Available

- 340-09 — Replacement Plastic Arc Tree
- Effluent Water Indicators:
  - 89-7853 — Omni Nozzle Cover (Use with Part No. 300-15)
  - 89-7854 — High-pop Omni Nozzle Cover (Use w/Part No. 300-25)
  - 89-7889 - Rotor Plug
- Check Valve for shrub COM— maintains up to 8' (2,4m) elevation change
- 35-1344 — Locking cap for Lawn Pop-up models (standard on high-pop models)

Warranty

- Two years

340 Series Lawn Pop-up Apex @ 50 psi—US

Nozzle	27°
	Max. Ht. of Spray
01	4' 10"
02	5' 1"
03	5' 11"

340 Series: Shrub w/COM (360° Arc Disc) (Model Nos. 340-10-15COM)—US

Nozzle	psi	340 Series GPM	Radius
01	50	2.07	14
01	75	2.95	16
02	50	2.48	23
02	75	3.69	25
03	50	4.55	27
03	75	6.24	29
63	50	2.66	28
63	75	3.82	30
93	50	3.64	29
93	75	5.29	31
Omni (Min)	50	2.67	16
Omni (Min)	75	3.95	18
Omni (Max)	50	5.55	30
Omni (Max)	75	6.36	33

340 Series: 300-15 Omni™ Adjustable-radius Nozzle Performance Chart —US

psi	Radius	Precipitation Rate* ▲	Precipitation Rate* ■	90°	112.5°	135°	157.7°	180°	202.5°	225°	270°	360°
				GPM								
35	15	1.53	1.33	0.78	0.97	1.16	1.36	1.55	1.74	1.94	2.33	3.10
35	18	1.32	1.14	0.96	1.20	1.44	1.68	1.93	2.17	2.41	2.89	3.85
35	22	1.06	0.92	1.16	1.44	1.73	2.02	2.31	2.60	2.89	3.47	4.62
35	26	0.88	0.76	1.34	2.01	1.67	2.34	2.68	3.01	3.34	4.01	5.35
35	28	0.86	0.75	1.52	1.90	2.28	2.66	3.04	3.42	3.80	4.56	6.08
50	18	1.28	1.11	0.94	1.17	1.40	1.64	1.87	2.10	2.34	2.81	3.74
50	22	1.08	0.93	1.17	1.47	1.76	2.05	2.35	2.64	2.93	3.52	4.69
50	26	0.93	0.80	1.41	1.76	2.12	2.47	2.82	3.17	3.53	4.23	5.64
50	29	0.87	0.75	1.65	2.06	2.47	2.88	3.30	3.71	4.12	4.94	6.59
50	33	0.77	0.67	1.89	2.36	2.83	3.30	3.77	4.24	4.71	5.66	7.54

340 Series: Fixed-radius Nozzle Performance Chart —US

Nozzle	psi	Radius	Precip. Rate* ▲	Precip. Rate* ■	90°	112°	135°	157.7°	180°	202.5°	225°	270°	360°
					GPM								
01	35	16	0.99	0.86	0.57	0.71	0.86	1.00	1.14	1.28	1.43	1.71	2.28
	50	18	0.99	0.86	0.72	0.90	1.08	1.26	1.44	1.62	1.80	2.16	2.88
02	35	21	0.73	0.63	0.72	0.90	1.08	1.26	1.44	1.62	1.80	2.16	2.88
	50	24	0.66	0.57	0.85	1.06	1.28	1.49	1.71	1.92	2.13	2.56	3.41
03	35	28	0.77	0.67	1.36	1.69	2.04	2.38	2.72	3.05	3.39	4.07	5.43
	50	30	0.80	0.69	1.61	2.01	2.42	2.82	3.23	3.63	4.03	4.84	6.45
63§	35	28	0.39	0.33	0.68	0.85	1.02	1.19	1.36	1.53	1.70	2.04	2.72
	50	30	0.40	0.35	0.81	1.00	1.21	1.41	1.62	1.82	2.02	2.42	3.23
93§	35	28	0.58	0.50	1.02	1.27	1.53	1.78	2.04	2.29	2.54	3.05	4.07
	50	30	0.60	0.52	1.21	1.51	1.82	2.12	2.42	2.72	3.03	3.63	4.84

*▲ Precipitation rates are for triangular spacing, shown in inches per hour, calculated at 50% of diameter.
■ Precipitation rates are for square spacing, shown in inches per hour, calculated at 50% of diameter.
All performance specifications are based on the stated working pressure available at the base of the sprinkler.
Radius shown in feet. Data based on 360°.
§ Low gallonage.*

340 Series Multi-Stream Rotor Model List	
Model	**Description**
• 340-00-00	Lawn Pop-up w/Plastic Arc Disc Tree
• 340-10-00	Shrub w/Plastic Arc Disc Tree
• 340-10-00-COM	Shrub w/Check Valve and Plastic Arc Disc Tree
• 340-12-00	12" (300mm) Pop-up w/Plastic Arc Disc Tree

Specifying Information— 340 Series Multi-Stream Rotor

34XX-XX-XX-COM-E

Arc	Body	Nozzle	Optional	Optional
34XX	**XX**	**XX**	**COM**	**E**
04—90° 05—112.5° 06—135° 07—157.5° 08—180° 09—202.5° 10—225° 12—270° 16—360°	00—Lawn Pop- up 10—Shrub 12—High-pop	01—Small Radius, 12 Ports 02—Medium Radius, 12 Ports 03—Large Radius, 12 Ports 15—Adjustable (Omni) Shrub and Lawn Pop-up 21—Small Radius, 12 Ports, High-pop* 22—Medium Radius, 12 Ports, High-pop* 23—Large Radius, 12 Ports, High-pop* 25—Adjustable (Omni) Nozzle High-pop* 63—Large Radius, 6 Ports, Low GPM*** 93—Large Radius, 9 Ports, Low GPM***	COM—Check-O-Matic** *(COM not available on high pop models)*	E—Effluent

Example: A 180° 340 Series Lawn Pop-up with a 180° arc and an adjustable Omni nozzle, would be specified as: **3408-00-15**

** Must be used on High-pop body*
*** COM is standard on lawn pop-up models and optional on shrub models*
**** Available on Lawn Pop-up and Shrub only*

T5 Series

- **Inlet Size: ¾" (20mm)**
- **Radius: 25'-50' (7,6-15,2m)**
- **Operating Pressure Range: 25-70 psi (1,7-4,8 Bar)**

The new Toro® T5 Series Rotor has the features to satisfy all your basic irrigation needs while surprising you with a few extras.

Effluent Options Available

Check Valve Options Available

Features & Benefits

5" (127mm) Pop-Up
Easily replaces many competitive 4' (100mm) units in the same footprint but delivers an extra inch of pop-up.

Standard Rubber Cover
The top of the sprinkler is covered with a heavy duty rubber cover to minimize impact injuries and reduce liability.

Nozzle Tree
The T5 comes with a full nozzle tree of 8 standard nozzles (25°) and 4 low angle nozzles (10°).

Optional Check Valve
Available with a hold back strength of 7' (2,1m) of elevation change.

Top Adjust Arc Set
The T5 can be set between a minimum arc set of 40° and a full circle set of 360°. Arc changes are made from the top of the sprinkler while popped up or down by using a small slotted screwdriver.

NOTE: See Page 61 For T5 Service Kits

102-7715—T5 Tool Kit
102-7712—T5 Nozzle Tree Kit
102-7714—T5 Check Valve Kit

Extensive testing for T5 nozzle efficiency was performed using SPACE calculations

Stream straighteners align the water flow behind the nozzle.

Nozzles
Geometry on the face of the nozzle creates breakup.

Specifications

Dimensions

	Lawn Pop	*Shrub*	*HP*
Body Diameter:	2 ¼" (57mm)	2 ¼" (57mm)	2 ¼" (57mm)
Cap Diameter:	2 ⅝" (67mm)	N/A	2 ⅝" (67mm)
Height:	7 ½" (190mm)	7 ¾" (196mm)	16 ⅞" (200mm)

Operating Specifications

- Radius: 25'-50' (7,6-15,2m)
- Flow Rate: .76 – 9.63 GPM (2,8-36,5 LPM)
- Operating Pressure Range: 25-70 PSI (1,7-4,8 Bar)
- Trajectory: 25° standard, 10° low angle
- Pop-up to nozzle: 5" (127mm)
- Inlet: ¾" (20mm)
- Factory installed with a #3.0 nozzle

Options Available

- Check valve

Warranty

- Five years

T-5 Nozzle Performance Data—US

Nozzle	PSI	Radius	GPM	Precipitation Rate (in/hr)▲	(in/hr)■
1.5	25	33	1.15	0.23	0.20
	35	34	1.38	0.27	0.23
	45	35	1.59	0.29	0.25
	55	35	1.74	0.32	0.27
	65	36	1.88	0.32	0.28
2.0	25	35	1.45	0.26	0.23
	35	36	1.80	0.31	0.27
	45	37	2.12	0.34	0.30
	55	37	2.30	0.37	0.32
	65	37	2.58	0.42	0.36
2.5	25	35	1.75	0.32	0.28
	35	36	2.20	0.38	0.33
	45	37	2.55	0.41	0.36
	55	37	2.80	0.45	0.39
	65	37	3.05	0.50	0.43
3.0*	25	36	2.20	0.38	0.33
	35	38	2.60	0.40	0.35
	45	40	3.05	0.42	0.37
	55	40	3.52	0.49	0.42
	65	40	3.80	0.53	0.46
4.0	25	37	2.95	0.48	0.41
	35	40	3.55	0.49	0.43
	45	42	4.10	0.52	0.45
	55	42	4.45	0.56	0.49
	65	43	4.85	0.58	0.50
5.0	25	39	3.75	0.55	0.47
	35	41	4.50	0.60	0.52
	45	43	5.10	0.61	0.53
	55	45	5.75	0.63	0.55
	65	45	6.10	0.67	0.58
6.0	25	39	4.20	0.61	0.53
	35	43	5.20	0.63	0.54
	45	46	6.05	0.64	0.55
	55	47	6.65	0.67	0.58
	65	48	7.25	0.70	0.61
8.0	25	36	5.75	0.99	0.85
	35	43	7.10	0.85	0.74
	45	47	8.05	0.81	0.70
	55	48	8.95	0.86	0.75
	65	50	9.70	0.86	0.75

** Pre-installed nozzle*

Nozzle	PSI	Radius	GPM	Precipitation Rate (in/hr)▲	(in/hr) ■
1.0LA	25	25	0.74	0.26	0.23
	35	28	0.94	0.27	0.23
	45	28	1.02	0.29	0.25
	55	29	1.14	0.30	0.26
	65	29	1.25	0.33	0.29
1.5LA	25	27	1.10	0.34	0.29
	35	30	1.35	0.33	0.29
	45	31	1.52	0.35	0.30
	55	31	1.75	0.40	0.35
	65	31	1.90	0.44	0.38
2.0LA	25	29	1.40	0.37	0.32
	35	31	1.72	0.40	0.34
	45	32	2.05	0.45	0.39
	55	33	2.25	0.46	0.40
	65	33	2.45	0.50	0.43
3.0LA	25	29	2.20	0.58	0.50
	35	33	2.60	0.53	0.46
	45	34	3.05	0.59	0.51
	55	36	3.40	0.58	0.51
	65	36	3.70	0.63	0.55

T5 Series Model List	
Model	**Description**
• T5P	5" (127mm) Lawn Pop-up w/o check valve
• T5PCK	5" (127mm) Lawn Pop-up w/ check valve
• T5PE	5" (127mm) Lawn Pop-up w/o check valve-effluent
• T5PCKE	5" (127mm) Lawn Pop-up w/ check valve-effluent
• T5S	Shrub
• T5HP	High-Pop

Specifying Information—T5 Sprinkler

T5X-XXXX-CK-X

Description	Body	Nozzle			Optional	Optional
T5	**P**	**XXXX**			**CK**	**E**
T5	P—Lawn Pop-up S—Shrub HP—High Pop	15—1.5 GPM 20—2.0 GPM 25—2.5 GPM 30—3.0 GPM	40—4.0 GPM 50—5.0 GPM 60—6.0 GPM 80—8.0 GPM	Low Angle Nozzle 10LA—1.0 GPM 15LA—1.5 GPM 20LA—2.0 GPM 30LA—3.0 GPM	CK— Check-O-Matic*	E—Effluent

Example: A T5 Lawn Pop-up sprinkler with a 2.5 nozzle, would be specified as: **T5P-25**

Super 800 Series

- **Inlet Size: ¾" (20mm)**
- **Radius: 28'-50' (8,5-15,2m)**
- **Operating Pressure Range: 30-70 psi (2,0-4,8 Bar)**

For everyday outstanding performance in a rotor, the Toro® Super 800 Series provides for all your watering needs.

Standard rubber cover with arc indicator scale on top

Effluent Options Available

Check Valve Options Available

Features & Benefits

Five Inch Pop-Up Height
Clears tall grasses and allows for less frequent mowing.

Arc Indicator On Top
Top Arc indicator for easy adjustments from 40° to 360° - read the arc change off the scale as you make adjustments.

Smart Arc™ Memory
Returns sprinkler to previously set arc if vandalized without damage.

Continuous Unidirectional Rotation
Provides uniform coverage when set at full circle.

Part And Full Circle In One Sprinkler
Installation convenience and reduced inventory requirements.

Water Management Highlight

Check valve

The optional check valve eliminates low head drainage and keeps the laterals fully charged with water.

Specifications

Dimensions

- Body Diameter:
  - Lawn Pop-up: 2 ⅜" (60mm)
  - High-pop: 2 ¼" (57mm)
- Cap Diameter:
  - Lawn Pop-up: 2 ⅝" (67mm)
  - High-pop: 3" (76mm)
- Height:
  - Lawn Pop-up: 7 ⅝" (194mm)
  - High-Pop: 17" (431mm)
  - Shrub: 7 ¾" (197mm)

Operating Specifications

- Radius: 28'-50' (8,5-15,2m)
- Flow Rate: 0.5-10 GPM (1,9-37,8 LPM)
- Operating Pressure Range: 30-70 psi (2,0-4,8 Bar)
- Trajectory: 28°
- Pop-up to nozzle: 4 ½" (114mm) on Lawn Pop-up
- Lawn model comes factory installed with a #2.5 nozzle set at 90 degrees arc
- Inlet: 3/4" (20mm) NPT female-threaded

Additional Features

- Pressure activated seal and robust trip mechanism
- Standard rubber cover
- Selection of body styles: Lawn Pop-up, Shrub and High-pop
- Nozzle tree with 9 standard and 4 low-angle nozzles
- Stainless steel radius adjustment screw allows up to 25% radius reduction

Options Available

- 102-2024 – Adjustment Tool
- CK – Check Valve – maintains up to 6' (1,8m) elevation change
- Effluent water indicator

Warranty

- Five years

Super 800 Series Model List

Model	Description
• S800	5" (127mm) Lawn Pop-up w/o Check Valve
• S800CK	5" (127mm) Lawn Pop-up w/Check Valve
• S800E	5" (127mm) Lawn Pop-up w/o Check Val and Effluent Cover
• S800CKE	5" (127mm) Lawn Pop-up w/Check Valve and Effluent Cover
• S800S	Shrub
• S800SE	Shrub w/Effluent Rubber Cover
• S800HP	12" (300mm) High Pop with check valve
• S800HPE	12" (300mm) High Pop w/Check Valve and Effluent Rubber Cover

Super 800 Standard Nozzle Performance Data

Nozzle	psi	GPM	Radius	Precipitation Rate (in/hr) ▲	(in/hr) ■
.50	30	0.5	28	0.07	0.06
	40	0.6	29	0.08	0.07
	50	0.7	29	0.09	0.08
	60	0.8	30	0.10	0.09
.75	30	0.7	29	0.09	0.08
	40	0.8	30	0.10	0.09
	50	0.9	31	0.10	0.09
	60	1.0	32	0.11	0.09
1.0	30	1.3	32	0.14	0.12
	40	1.5	33	0.15	0.13
	50	1.6	34	0.15	0.13
	60	1.8	35	0.16	0.14
2.0	30	2.4	37	0.19	0.17
	40	2.5	40	0.17	0.15
	50	3.0	42	0.19	0.16
	60	3.3	43	0.20	0.17
2.5*	30	2.5	38	0.19	0.17
	40	2.8	39	0.20	0.18
	50	3.2	40	0.22	0.19
	60	3.5	41	0.23	0.20
3.0	30	3.6	38	0.28	0.24
	40	4.2	39	0.31	0.27
	50	4.6	41	0.30	0.26
	60	5.0	42	0.32	0.27
4.0	30	4.4	43	0.26	0.23
	40	5.1	44	0.29	0.25
	50	5.6	46	0.29	0.25
	60	5.9	49	0.27	0.24
6.0	40	5.9	45	0.32	0.28
	50	6.0	46	0.32	0.27
	60	6.3	48	0.30	0.26
	70	6.7	49	0.31	0.27
8.0	40	8.0	42	0.50	0.44
	50	8.5	45	0.47	0.40
	60	9.5	49	0.44	0.48
	70	10.0	50	0.44	0.49

Radius shown in feet. Data based on 360°.
**Pre-installed nozzle.*

Super 800 Low-angle Nozzle Performance Data

Nozzle	psi	GPM	Radius	Precipitation Rate (in/hr) ▲	(in/hr) ■
1.0	30	1.1	22	0.28	0.24
	40	1.3	24	0.33	0.28
	50	1.5	26	0.30	0.26
	60	1.7	28	0.28	0.25
3.0	30	2.3	29	0.40	0.34
	40	2.8	32	0.34	0.29
	50	3.1	35	0.32	0.28
	60	3.4	37	0.31	0.27
4.0	30	3.8	31	0.39	0.34
	40	4.5	34	0.37	0.32
	50	5.1	37	0.36	0.31
	60	5.6	38	0.36	0.31
6.0	30	4.9	38	0.50	0.43
	40	5.8	40	0.51	0.44
	50	6.5	42	0.50	0.44
	70	7.2	44	0.49	0.43

Radius shown in feet. Data based on 360°.

Specifying Information—Super 800

S800 XXX-XX-CK-E

Description	Body	Nozzle	Optional	Optional
S800	XXX	XX	COM	E
S800—Super 800 Rotor	S—Shrub P—5" (127mm) Lawn Pop-up 12H—12" (300mm) High-pop	50—0.50 30—3.0 75—0.75 40—4.0 10—1.0 60—6.0 20—2.0 80—8.0 25—2.5	CK—Check Valve	Effluent

Example: A Super 800 Series Sprinkler with a 5" pop-up height and a 2.5 nozzle, would be specified as: **S800P25**

TR50XT Series

- **Inlet Size: ¾" (20mm)**
- **Radius: 28'-48' (8,5-14,6m)**
- **Operating Pressure Range: 30-70 psi (2,0-4,8 Bar)**

The Toro® TR50XT Series Rotor is the ultimate sprinkler upgrade! No ¾" (20mm) rotor can match the feature set of TruArc™ adjustments, Smart Arc™ memory return in addition to Toro's patented X-Flow® and Trujectory™ technologies.

Effluent Options Available

Check Valve Options Available

SST Riser Options Available

High

Low

Features & Benefits

X-Flow® Water Shutoff Device
Allows one or more sprinklers to be shut-off while all the others on the same line are still running.

Exclusive Trujectory™ Adjustment
Allows fine-tuning of nozzle spray trajectory - make adjustments from 5° to 25° to compensate for wind, low-hanging branches or throwing water from the top of slopes.

TruArc™ For Easy Arc Set
Eliminates "palming" of a sprinkler to check the final arc setting—visual arc set from arrow on cap to arrow on riser.

Smart Arc™ Memory
Safely returns sprinkler to previously set arc if vandalized, and slip clutch assures no damage to gears.

Standard Reversible Check Valve
Prevents low-head drainage, keeping laterals charged with water (maintains up to 8' (2.4m) elevation change).

Below Grade Installation
Allows for maximum safety helping to eliminate the potential for tripping accidents or damage caused by mowers.

Water Management Highlight

TruJectory™: Accurate Arc Adjustment without Switching the Nozzle Set

With Toro's TruJectory technology you can adjust anywhere between 5 and 25 degrees without having to change out the nozzle. The easy-to-use design combines the fine-tuning capability that you really want with what your installation requires. Overthrows onto hardscapes are eliminated and the integrity of the stream remains intact since there is no need for a diffuser screw.

Specifications

Dimensions

- Body Diameter:
  - Lawn Pop-up: 2 ⅜" (59mm)
  - High-pop: 2 ½" (64mm)
- Cap Diameter: 3" (75mm)
- Height:
  - Lawn Pop-up: 8" (200mm)
  - High-Pop: 15 ⅞" (403mm)

Operating Specifications

- Radius: 28-48' (8,5-14,6m)
- Flow Rate: 1.0– 9.80 GPM (3,8-37,1 LPM)
- Operating Pressure Range: 30-70 psi (2,1-4,8 Bar)
- Trajectory: Adjustable from 5°-25°
- Pop-up to nozzle: 4¾" (120mm)
- Inlet: ¾" (20mm) female-threaded
  - ½" to ¾" (13-20mm) female-threaded on shrub
- ½" (13mm) below grade installation (except shrub model)

Additional Features

- Cluster, water-lubricated, gear-drive design
- Standard rubber cover
- Large filter screen to prevent clogging
- Factory installed with a #3.0 nozzle
- Left arc indicator on cap (arrow) and on body (hash mark), and right trip indicator on black adjusting band
- Dry mode pull-up slot for convenience
- Arc adjustment from 30°-360°
- Continuous, unidirectional rotation provides uniform water coverage when set at full circle
- Color-coded nozzle tree with 8 interchangeable nozzles
- Stainless steel radius adjustment screw allows up to 25% radius reduction

Warranty

- Five years

TR50XT Performance Data

Nozzle Size	PSI	Flow	25°			15°			5°		
			Radius	Precip. Rate* ▲	Precip. Rate* ■	Radius	Precip. Rate* ▲	Precip. Rate* ■	Radius	Precip. Rate* ▲	Precip. Rate* ■
1.0 Yellow	30	1.0	33	0.10	0.09	31	0.12	0.10	28	0.14	0.12
	40	1.1	34	0.11	0.09	31	0.13	0.11	29	0.15	0.13
	50	1.3	35	0.12	0.10	32	0.14	0.12	30	0.16	0.14
	60	1.4	36	0.12	0.10	32	0.15	0.13	31	0.16	0.14
	70	1.5	37	0.12	0.11	33	0.15	0.13	31	0.17	0.15
1.5 Orange	30	1.1	34	0.11	0.09	32	0.12	0.10	30	0.14	0.12
	40	1.4	35	0.13	0.11	32	0.15	0.13	31	0.16	0.14
	50	1.6	36	0.14	0.12	33	0.16	0.14	32	0.17	0.15
	60	1.7	37	0.14	0.12	33	0.17	0.15	32	0.18	0.16
	70	1.9	38	0.15	0.13	34	0.18	0.16	33	0.19	0.17
2.0 Red	30	1.6	36	0.14	0.12	34	0.15	0.13	32	0.17	0.15
	40	1.9	37	0.15	0.13	34	0.18	0.16	33	0.19	0.17
	50	2.2	38	0.17	0.15	35	0.20	0.17	34	0.21	0.18
	60	2.4	39	0.18	0.15	36	0.21	0.18	35	0.22	0.19
	70	2.6	40	0.18	0.16	37	0.21	0.18	36	0.22	0.19
3.0* Black	30	2.3	37	0.19	0.16	35	0.21	0.18	33	0.23	0.20
	40	2.7	38	0.21	0.18	36	0.23	0.20	34	0.26	0.22
	50	3.1	39	0.23	0.20	37	0.25	0.22	35	0.28	0.24
	60	3.4	40	0.24	0.20	38	0.26	0.23	36	0.29	0.25
	70	3.6	42	0.23	0.20	39	0.26	0.23	38	0.28	0.24
4.5 Blue	30	3.4	38	0.26	0.23	35	0.31	0.27	33	0.35	0.30
	40	4.0	39	0.29	0.25	36	0.34	0.30	34	0.38	0.33
	50	4.6	40	0.32	0.28	38	0.35	0.31	36	0.39	0.34
	60	5.1	41	0.34	0.29	39	0.37	0.32	37	0.41	0.36
	70	5.6	43	0.34	0.29	40	0.39	0.34	39	0.41	0.35
6.0 Green	30	4.4	39	0.32	0.28	36	0.38	0.33	33	0.45	0.39
	40	5.1	40	0.35	0.31	37	0.41	0.36	34	0.49	0.42
	50	5.8	41	0.38	0.33	39	0.42	0.37	36	0.50	0.43
	60	6.5	42	0.41	0.35	40	0.45	0.39	38	0.50	0.43
	70	7.1	44	0.41	0.35	42	0.45	0.39	40	0.49	0.43
7.5 Brown	30	5.2	40	0.36	0.31	36	0.45	0.39	33	0.53	0.46
	40	6.2	41	0.41	0.35	38	0.48	0.41	35	0.56	0.49
	50	7.1	43	0.43	0.37	40	0.49	0.43	37	0.58	0.50
	60	7.8	44	0.45	0.39	41	0.52	0.45	39	0.57	0.49
	70	8.5	45	0.47	0.40	43	0.51	0.44	41	0.56	0.49
9.0 Gray	30	6.1	40	0.42	0.37	36	0.52	0.45	33	0.62	0.54
	40	7.1	42	0.45	0.39	39	0.52	0.45	36	0.61	0.53
	50	8.0	45	0.44	0.38	41	0.53	0.46	38	0.62	0.53
	60	8.9	46	0.47	0.40	42	0.56	0.49	40	0.62	0.54
	70	9.8	48	0.47	0.41	44	0.56	0.49	42	0.62	0.53

Shaded areas represent optimum operating pressure for that nozzle size.

**Pre-installed nozzle.*
Data based on 360°.

TR50XTP Series Model List	
Model	**Description**
• TR50XTP	5" (127mm) Lawn pop-up
• TR50XTPE	5" (127mm) Lawn pop-up, Effluent
• TR50XTS	Shrub
• TR50XTSE	Shrub, Effluent
• TR50XTHP	12" (300mm) High-pop
• TR50XTHPE	12" (300mm) High-pop, Effluent
• TR50XTPSS	5" (127mm) Lawn pop-up w/ Stainless Steel Riser
• TR50XTPSSE	5" (127mm) Lawn pop-up w/ Stainless Steel Riser, Effluent

Specifying Information—TR50XT

TR50XT XX-XX-E

Description	Body	Nozzle	Optional
TR50XT	XX	XX	E
TR50XT—TR50XT Series Rotor	P—Lawn Pop-up S—Shrub HP—High-pop PSS—Stainless Steel Riser	10—1.0 45—4.5 15—1.5 60—6.0 20—2.0 75—7.5 30—3.0 90—9.0	E—Effluent

Example: A TR50XT Series sprinkler with High-pop and a 6.0 nozzle, would be specified as: **TR50XT-HP-60**

T7 Series

- **Inlet Size: 1" (25mm) NPT or BSP**
- **Radius: 46-83' (14,0-25,0m)**
- **Operating Pressure Range: 40-100 psi (2,8 - 7,0 Bar)**

The Toro® T7 Rotor is built rugged to withstand the harsh conditions and vandalism present in municipal/government, sports fields and commercial rotor applications.

Effluent Options Available

SST Riser Options Available

Features & Benefits

Top Arc Indication
Arc setting indicator on top of the rotor allows for easy wet or dry adjustments from 45°-360°.

High Efficiency Nozzles
Single port design ensures water is evenly distributed across the pattern without putting too much water near the head, which prevents seed from washing away.

Vandal and Abuse Resistance
Smart Arc™ memory safely returns sprinkler to previously set arc if vandalized.

Design Solutions and Safety
Standard check valve to prevent low head drainage. Small exposed diameter reduces possibility of injury on play areas.

Durability
Heavy duty retract spring and water-lubricated gear drive. Wiper seal reduces stick-ups and wiper seal leaks.

Standard rubber cover with arc indicator from 45°-360° simplifies installation and service

Specifications

Dimensions

- Pop-up height to nozzle: 5" (127mm)
- Body height: 8.8" (223.5mm)
- Rubber cover diameter: 2.2" (55.9mm)
- Body diameter: 2.7" (68.6mm)

Operating Specifications

- Precipitation rate: .30 -.55 (7.6 - 14.0mm) inches per hour
- Radius: 46'-83' (14,0 - 25,0m)
- Flow rate: 6.7-30.6 GPM (25,4-116 LPM)
- Operating pressure range: 40-100 psi (2,8-7,0 Bar)
- Inlet size: 1" (25mm) threaded NPT or 1" (25mm) BSP
- Nozzle trajectory: 25°
- Arc adjustment: 45°-360° (unidirectional at 360°)

Additional Features

- Standard check valve
- Threaded cap-retained riser assembly
- Variable reversing stator
- Seven nozzle sizes from 7-27 GPM (26,5-102 LPM)
- Slip clutch
- Nozzle support/breakup screw
- Riser pull-up feature on top of nozzle base
- Adjustment/pull up tool supplied
- Locking cap screw

Options Available

- Stainless steel riser
- Effluent indicator

Warranty

- Five years

Nozzle	Pressure PSI	Flow GPM	Radius ft.	Precip. In/hr ■	Precip. In/hr ▲
7	40	6.7	46	0.35	0.30
	50	7.4	48	0.36	0.32
	60	8.1	49	0.38	0.33
	70	8.8	51	0.38	0.33
	80	9.6	52	0.39	0.34
	90	10.2	53	0.40	0.35
	100	10.7	54	0.41	0.35
9	40	7.4	47	0.37	0.32
	50	8.4	51	0.36	0.31
	60	8.6	52	0.35	0.31
	70	9.6	53	0.39	0.34
	80	10.3	54	0.39	0.34
	90	10.9	55	0.40	0.35
	100	11.5	56	0.41	0.35
12*	40	9.4	50	0.42	0.36
	50	10.5	56	0.37	0.32
	60	11.4	57	0.38	0.33
	70	12.4	58	0.38	0.33
	80	13.4	61	0.40	0.35
	90	14.2	62	0.41	0.36
	100	15.1	63	0.42	0.37
16	40	13.1	52	0.54	0.47
	50	14.7	59	0.47	0.41
	60	15.7	61	0.47	0.41
	70	17.0	63	0.48	0.41
	80	18.2	65	0.48	0.41
	90	19.4	66	0.50	0.43
	100	20.5	68	0.49	0.43
20	40	16.0	52	0.66	0.57
	50	18.5	59	0.59	0.51
	60	19.7	61	0.59	0.51
	70	21.0	65	0.55	0.48
	80	22.5	68	0.54	0.47
	90	24.0	69	0.56	0.48
	100	25.3	71	0.56	0.48
24	40	15.7	53	0.63	0.55
	50	17.9	59	0.58	0.50
	60	19.8	62	0.58	0.50
	70	21.6	65	0.57	0.49
	80	23.2	68	0.56	0.48
	90	25.0	69	0.58	0.50
	100	26.4	71	0.58	0.50
27	40	18.6	56	0.66	0.57
	50	21.3	64	0.58	0.50
	60	23.7	70	0.54	0.46
	70	25.5	75	0.50	0.44
	80	27.1	77	0.51	0.44
	90	28.9	82	0.48	0.41
	100	30.5	83	0.49	0.43

T7 Rotor Model List	
Model	**Description**
• T7P-02	1" (25mm) Rotor
• T7P-02E	1" (25mm) Rotor, Effluent Indicator
• T7PSS-02	1" (25mm) Stainless Steel Rotor
• T7PSS-02E	1" (25mm) Stainless Steel Rotor, Effluent Indicator

Specifying Information—T7 Sprinkler

T7PXX-02X			
Descrip.	**Optional**	**Thread**	**Optional**
T7P	SS	**02**	E
T7P—Sports Rotor	SS—Stainless Steel Riser	NPT Thread	E—Effluent
Example: A T7P sprinkler with a stainless steel riser, would be specified as: **T7PSS-02**			

TR70P Series

- **Inlet Size: 1" (25mm) NPT or BSP**
- **Radius: 43'-71' (13,1-21,6m)**
- **Operating Pressure Range: 40-100 psi (2,8-7,0 Bar)**

Heavy-duty and commercial grade. The Toro® TR70 Series includes innovative features – TruArc™ adjustment for easy arc set, Smart Arc™ memory for return to previous pattern, and standard 5" (127mm) pop-up.

Effluent Options Available

SST Riser Options Available

Features & Benefits

TruArc™ For Easy Arc Set
Eliminates "palming" of a sprinkler to check the final arc setting-visual arc set from arrow on cap to arrow on riser.

Unique, Over-Molded Wiper Seal
For greater debris resistance.

Smart Arc™ Memory
Safely returns sprinkler to previously set arc if vandalized.

Standard Reversible Check Valve
Prevents low-head drainage, keeping laterals charged with water (maintains up to 10' (3m) elevation change).

Below Grade Installation
Allows for maximum safety helping to eliminate the potential for tripping accidents and damage caused by mowers.

Safe rubber cover and below grade installation

Water Management Highlight

Smart Arc™ Technology: It Just Makes Sense

A rotor that's designed for park and sports field installations must be ready to withstand some trouble. Whether from vandals or just accidental movement during play, watering arcs can get disturbed. With the exclusive SmartArc memory feature, the sprinkler will automatically return to the previous arc setting when tampering occurs. The durable slip clutch design prevents damage to the gears, and when joined with SmartArc, you've got a rotor with an unbeatable combination.

Specifications

Dimensions

- Body Diameter: 2 ⅜" (60mm)
- Cap Diameter: 3" (76mm)
- Height: 9 ¼" (235mm)

Operating Specifications

- Radius: 43'-71' (13-21m)
- Flow Rate: 7.5-29.6 GPM (28-112 LPM)
- Operating Pressure Range: 40-100 psi (2,8-7,0 Bar)
- Trajectory: 25°
- Pop-up to nozzle: 4 ¾" (120,6 mm)
- Inlet: 1" (25mm) female-threaded
- ½" (13mm) below grade

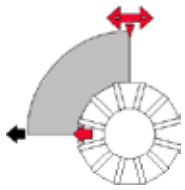
Additional Features

- Standard check valve maintains up to 10' (3,0m) elevation change
- Cluster, water-lubricated, gear-drive design
- Arc adjustment from 30° to 360°
- Standard, reversible check valve prevents low-head drainage keeping laterals charged with water
- Black adjustment band for visual verification of arc setting
- Unique, over-molded wiper seal for greater debris resistance and below grade installation
- Standard rubber cover
- Stainless steel radius adjustment screw allows up to 25% radius reduction
- Large filter screen to prevent clogging
- Color-coded nozzle tree with 7 nozzles

Warranty

- Five years

Align the fixed left stop by positioning the arrow on the cap with the reverse point on the left.



Adjust the right arc by positioning the down arrow on the black band with the desired reverse point on the right.

Nozzle Size	psi	GPM	Radius	Precip. Rate ▲	Precip. Rate ■
7 Orange	40	6.6	43	0.40	0.34
	50	7.3	44	0.42	0.36
	60	8.1	46	0.43	0.37
	70	8.8	48	0.42	0.37
	80	9.4	49	0.44	0.38
	90	9.9	51	0.42	0.37
	100	10.4	52	0.43	0.37
9 Red	40	7.4	46	0.39	0.34
	50	8.1	48	0.39	0.34
	60	8.7	51	0.37	0.32
	70	9.4	53	0.37	0.32
	80	10	54	0.38	0.33
	90	10.7	55	0.39	0.34
	100	11.4	56	0.40	0.35
12* Black	40	9.9	48	0.48	0.41
	50	10.7	50	0.48	0.41
	60	11.6	52	0.48	0.41
	70	12.4	54	0.47	0.41
	80	13.3	56	0.47	0.41
	90	14.2	58	0.47	0.41
	100	15.1	60	0.47	0.40
16 Blue	40	13.2	50	0.59	0.51
	50	14.4	52	0.59	0.51
	60	15.7	54	0.60	0.52
	70	16.9	56	0.60	0.52
	80	18	58	0.59	0.52
	90	19.1	60	0.59	0.51
	100	20.2	62	0.58	0.51
20 Green	40	16.1	51	0.69	0.60
	50	17.5	54	0.67	0.58
	60	18.8	57	0.64	0.56
	70	20.2	59	0.64	0.56
	80	21.4	61	0.64	0.55
	90	22.6	62	0.65	0.57
	100	23.8	64	0.65	0.56
24 Brown	40	17.8	52	0.73	0.63
	50	19.1	55	0.70	0.61
	60	20.4	58	0.67	0.58
	70	21.7	60	0.67	0.58
	80	23	62	0.67	0.58
	90	24.4	63	0.68	0.59
	100	25.7	65	0.68	0.59
27 Gray	40	18.7	50	0.83	0.72
	50	20.5	57	0.70	0.61
	60	22.3	62	0.64	0.56
	70	24.1	64	0.65	0.57
	80	25.3	66	0.65	0.56
	90	26.6	69	0.62	0.54
	100	27.8	71	0.61	0.53

**Pre-installed nozzle.*

TR70P Series Model List	
Model	**Description**
• TR70P-02	5" (127mm) Lawn pop-up
• TR70P-02E	5" (127mm) Lawn pop-up, Effluent
• TR70PSS-02	5" (127mm) Lawn pop-up w/Stainless Steel Riser
• TR70PSSE-02	5" (127mm) Lawn pop-up w/Stainless Steel Riser, Effluent

Specifying Information—TR70P

TR70 XXX-XX-E

Description	Body	Nozzle	
TR70	XX	XX	E
TR70—TR70 Series Rotor	P—Lawn Pop-up PSS—stainless Steel	7—7.0 20—20.0 9—9.0 24—24.0 12—12.0 27—27.0 16—16.0	E—Effluent

Example: A TR70 Series lawn pop-up sprinkler with a 12.0 nozzle, would be specified as: **TR70P-12**

TR70XTP Series

- **Inlet Size: 1" (25mm) NPT or BSP**
- **Radius: 30'-68' (9,1-20,7m)**
- **Operating Pressure Range: 40-100 psi (2,8-7,0 Bar)**

In addition to being technologically impressive, the advanced Toro® TR70XTP Series rotors are a sprinkler built for superior performance. With the same features and broad coverage of TR70P, the XT version adds the patented X-Flow® and TruJectory™ technologies found in Toro's TR50XT Series.

Effluent Options Available

SST Riser Options Available

Features & Benefits

X-Flow® Water Shutoff Device
Allows one or more sprinklers to be shut-off while all the others on the same line are still running.

Exclusive Trujectory™ Adjustment
Allows fine-tuning of nozzle spray trajectory - make adjustments from 5° to 25° to compensate for wind, low-hanging branches or throwing water from the top of slopes.

Continuous Uni-Directional Rotation
Provides uniform coverage when set at full circle.

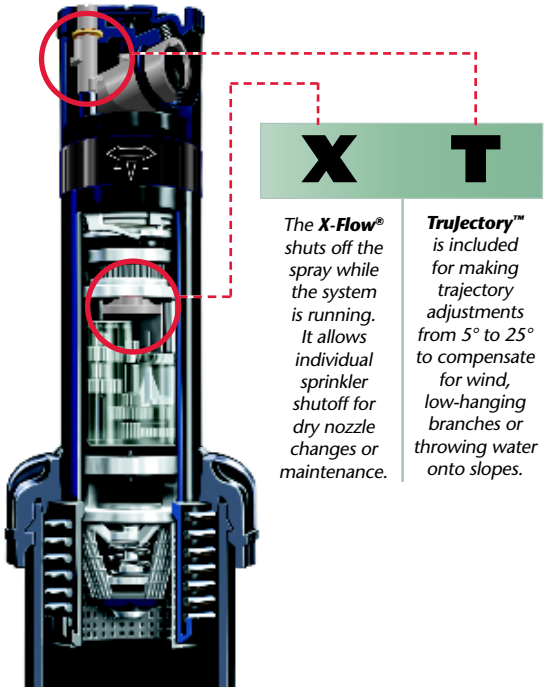
Smart Arc™ Memory
Safely returns sprinkler to previously set arc if vandalized, and slip clutch assures no damage to gears.

Below Grade Installation
Allows for maximum safety helping to eliminate the potential for tripping accidents or damage caused by mowers.

Water Management Highlight

TruJectory Offers Precise Water Throw and Radius Flexibility

The TR70XTP utilizes Toro's exclusive TruJectory technology for a built-in adjustment tool that doesn't require changing out the nozzle set. Obstacles such as wind and hardscapes are no longer a concern.



*The **X-Flow**® shuts off the spray while the system is running. It allows individual sprinkler shutoff for dry nozzle changes or maintenance.*

***TruJectory**™ is included for making trajectory adjustments from 5° to 25° to compensate for wind, low-hanging branches or throwing water onto slopes.*

Specifications

Dimensions

- Body Diameter: 2 ⅜" (60mm)
- Cap Diameter: 3" (76mm)
- Height: 9 ¼" (235mm)

Operating Specifications and Features

- Radius: 30' – 68' (9,1-20,7m)
- Flow Rate: 6.7 – 27.0 GPM (25-102 LPM)
- Operating Pressure Range: 40-100 psi (2,8- 7,0 Bar)
- Trajectory: Adjustable from 5° to 25°
- Pop-up to nozzle: 4 ¾" (121mm)
- Inlet: 1" (25mm) female-threaded
- ½" (13mm) below-grade installation
- Check valve maintains up to 10' (3,0m) elevation change
- Full 5" (127mm) pop-up to clear tall turf

Warranty

- Five years

TR70XTP Performance Data —US

Nozzle Size	psi	Flow	25° Radius	25° Precip. Rate* ▲	25° Precip. Rate* ■	15° Radius	15° Precip. Rate* ▲	15° Precip. Rate* ■	5° Radius	5° Precip. Rate* ▲	5° Precip. Rate* ■
7 Orange	40	6.6	38	0.51	0.44	35	0.60	0.52	30	0.82	0.71
	50	7.3	40	0.51	0.44	37	0.59	0.51	33	0.75	0.65
	60	8.1	43	0.49	0.42	40	0.56	0.49	36	0.69	0.60
	70	8.8	45	0.48	0.42	42	0.55	0.48	39	0.64	0.56
	80	9.4	46	0.49	0.43	43	0.57	0.49	40	0.65	0.57
	90	9.9	48	0.48	0.41	45	0.54	0.47	41	0.65	0.57
	100	10.4	49	0.48	0.42	46	0.55	0.47	42	0.66	0.57
9 Red	40	7.4	39	0.54	0.47	36	0.63	0.55	32	0.80	0.70
	50	8.1	41	0.54	0.46	38	0.62	0.54	35	0.73	0.64
	60	8.7	44	0.50	0.43	41	0.58	0.50	38	0.67	0.58
	70	9.4	46	0.49	0.43	43	0.57	0.49	40	0.65	0.57
	80	10	48	0.48	0.42	44	0.57	0.50	41	0.66	0.57
	90	10.7	49	0.50	0.43	46	0.56	0.49	43	0.64	0.56
	100	11.4	51	0.49	0.42	47	0.57	0.50	44	0.65	0.57
12* Black	40	9.7	40	0.67	0.58	36	0.83	0.72	32	1.05	0.91
	50	10.5	43	0.63	0.55	40	0.73	0.63	35	0.95	0.83
	60	11.2	47	0.56	0.49	44	0.64	0.56	38	0.86	0.75
	70	12	50	0.53	0.46	46	0.63	0.55	42	0.76	0.65
	80	12.9	52	0.53	0.46	49	0.60	0.52	45	0.71	0.61
	90	13.8	55	0.51	0.44	51	0.59	0.51	47	0.69	0.60
	100	14.7	57	0.50	0.44	53	0.58	0.50	49	0.68	0.59
16 Blue	40	11.9	40	0.83	0.72	36	1.02	0.88	33	1.21	1.05
	50	13.3	44	0.76	0.66	40	0.92	0.80	36	1.14	0.99
	60	14.7	48	0.71	0.61	45	0.81	0.70	39	1.07	0.93
	70	16.1	52	0.66	0.57	47	0.81	0.70	43	0.97	0.84
	80	17.2	54	0.66	0.57	50	0.76	0.66	46	0.90	0.78
	90	18.3	57	0.63	0.54	52	0.75	0.65	49	0.85	0.73
	100	19.4	59	0.62	0.54	54	0.74	0.64	50	0.86	0.75
20 Green	40	14.2	40	0.99	0.85	36	1.22	1.05	32	1.54	1.33
	50	15.8	45	0.87	0.75	40	1.10	0.95	35	1.43	1.24
	60	17.4	49	0.81	0.70	45	0.96	0.83	37	1.41	1.22
	70	19	54	0.72	0.63	48	0.92	0.79	44	1.09	0.94
	80	20.2	56	0.72	0.62	51	0.86	0.75	47	1.02	0.88
	90	21.3	59	0.68	0.59	53	0.84	0.73	50	0.95	0.82
	100	22.5	61	0.67	0.58	56	0.80	0.69	51	0.96	0.83
24 Brown	40	14.9	41	0.99	0.85	37	1.21	1.05	32	1.62	1.40
	50	17.1	46	0.90	0.78	41	1.13	0.98	35	1.55	1.34
	60	18.3	50	0.81	0.70	46	0.96	0.83	38	1.41	1.22
	70	19.5	56	0.69	0.60	52	0.80	0.69	45	1.07	0.93
	80	20.8	58	0.69	0.60	54	0.79	0.69	48	1.00	0.87
	90	22	60	0.68	0.59	56	0.78	0.68	51	0.94	0.81
	100	23.2	62	0.67	0.58	57	0.79	0.69	52	0.95	0.83
27 Gray	40	16.6	41	1.10	0.95	38	1.28	1.11	32	1.80	1.56
	50	18.9	47	0.95	0.82	42	1.19	1.03	38	1.45	1.26
	60	20.4	51	0.87	0.75	50	0.91	0.79	48	0.98	0.85
	70	21.9	55	0.80	0.70	54	0.83	0.72	53	0.87	0.75
	80	23.3	60	0.72	0.62	58	0.77	0.67	55	0.86	0.74
	90	24.8	64	0.67	0.58	61	0.74	0.64	58	0.82	0.71
	100	26.3	68	0.63	0.55	63	0.74	0.64	59	0.84	0.73

Data based on 360°.
**Factory installed nozzle.*

TR70XT Series Model List	
Model	**Description**
• TR70XTP-02	5" (127mm) Lawn pop-up
• TR70XTP-02E	5" (127mm) Lawn pop-up, Effluent
• TR70XTPSS-02	5" (127mm) Lawn pop-up w/Stainless Steel Riser
• TR70XTPSS-02E	5" (127mm) Lawn pop-up w/Stainless Steel Riser, Effluent

Specifying Information—TR70XT

TR70XT XX-XX-E

Description	Body	Nozzle	Optional
TR70XT	XX	XX	E
TR70XT—TR70XT Series Rotor	P—Pop-up PSS—Stainless Steel	7—7.0 20—20.0 9—9.0 24—24.0 12—12.0 27—27.0 16—16.0	E—Effluent

Example: A TR70XT Series sprinkler Lawn Pop-up and a 12.0 nozzle, would be specified as: **TR70XTP-12**

Sports Field Solutions

Challenges of Sports Turf Maintenance:

As a sports field manager, you face unique challenges and goals in landscape maintenance:

Appearance – Making sure your turf looks its best on game day, especially if it will be on national TV.

Playability – Ensuring peak team performance and maximizing player safety, while also minimizing potential liability.

Turf Health – Maintaining your turf in high-usage, short-recovery-window environments.

Water Use – Keeping the field in good condition while keeping your water costs down.

If your fields are surfaced with artificial grass, your irrigation needs are balanced with the goal of no infield disruption of the playing surface:

Wash Down – Ensuring sufficient coverage to clean the entire field.

Cool Down – Minimizing playing surface temperatures, especially in summer.

Toro offers a complete line of professional products from control systems to sprinklers and in-field monitoring systems that work together to provide optimal water-management solutions for all your sports field needs. We want to help you make your turf the best it can be – that's why Toro is committed to developing advanced and improved products that water more accurately, more efficiently, more dependably, and more affordably. Our efforts don't stop at irrigation, though… from mowers to grooming equipment to aerators, Toro provides a complete sports field maintenance solution. And, through continued industry efforts like sponsorship of the Sports Turf Managers Association, we look forward to answering your needs as a sports field manager with innovative solutions for years to come.

Sports Field And Artificial Turf Sprinklers:

T7 Series
Radius: 46'-83'
(14,0-25,0m)

640 Series
Radius: 47'-67'
(14,0-20,0m)

TS90 Series
Radius: 53'-95'
(16,2-29,0m)

690 Series
Radius: 87'-108'
(26,5-33,0m)

TG101 Series
Radius: 91'-178'
(27-54m)

Sports Field Management Solutions:

Sentinel® Central Control
(Page #: 110-111)

- PC-based Water Management System
- Weather-based Runtime Adjustment
- Advanced Reporting including Water Use & ET
- Flow Monitoring with Automatic E-mail Alert
- Sophisticated Scheduler / Optimizer Program
- Radio, Ethernet, Internet, & Cellular Communications

Turf Guard® Soil Monitoring System
(Page #: 118-119)

- Turf Guard® Soil Monitoring System
- Wireless Soil Monitoring
- Soil Moisture, Temperature, & Salinity
- Web-based Reporting & Analysis
- Monitor up to 500 Sensors per System
- Ideal for Managing Playability of Sports Fields

For more information and sports field designs using Toro Products visit www.toro.com

640 Series

- **Inlet Size: 1" (25mm) NPT or BSP**
- **Radius: 47'-67' (14,0-20,0m)**
- **Operating Pressure Range: 40-90 psi (2,8-6,2 Bar)**

Considered the most durable, heavy-duty commercial sprinkler available, the Toro® 640 Series is the proven veteran for athletic fields, parks, campuses and commercial sites.

Effluent Options Available

Check Valve Options Available

Features & Benefits

35 Years of Reliability
Once the 640 Series sprinkler goes in the ground, it stays there. With a stainless steel-encased nozzle assembly and gear drive design.

Normally Open Valve-In-Head Body
Allows individual head control - the only commercial grade Toro rotor available with this feature.

Stainless Steel, Engineering Plastic and Brass Construction
Provide dependable performance in the most demanding environments.

Standard Check Valve
Prevents low-head drainage and keeps laterals charged with water.

The 640 installs below grade for increased player safety.

Dimensions

- Body diameter: 2 ½" (65mm)
- Cap diameter: 3 ¼" (83mm)
- Body height: Check-O-Matic – 9"(230mm); Valve-In-head – 10 ½"(267mm)
- Exposed surface diameter when buried ½" below grade: 1¾" (65mm)

Operating Specifications

- Radius: 47' – 67' (14-20m)
- Flow Rate: 6.0 – 25.0 GPM (23-95 LPM)
- Operating Pressure Range: 40-90 psi (2,8-6,2 Bar)
- Trajectory: 27°
- Pop-up to nozzle: 2 3/8" (60mm)
- Inlet: 1" female-threaded (25mm)
- Below-grade installation: up to ½" (13mm)
- Check-O-Matic maintains up to 15' (4,6m) elevation change
- Selection of five nozzles and 12 arcs
- Adjustment screw allows up to 25% radius reduction

Additional Features

- Standard rubber cover
- Vandal-resistant cap with locking set screw
- Small exposed surface diameter
- Gear-drive design
- Basket filter screen
- Stainless steel retraction spring

Options Available

- 995-100 - Valve-In-Head Snap Ring Pliers
- 995-08 - Valve Removal Tool
- 995-35 - Valve Insertion Tool
- 995-37 - Seal Installation Tool
- 995-42 - Canister Removal Tool
- 996-51 - Cap Removal Tool

Warranty

- Five years

640-XXX

To specify a 640 Series Nozzle and Stator with recycled marker, append the model number with one of the following nozzle sets:

40E	41E	42E
43E	44E	

For Example: 640-41E

640-0XXX

To specify a 640 Series Drive Assembly, append the model number with one of the following arcs:

045°	127°	192°
060°	148°	238°
090°	173°	270°
108°	180°	360°

For Example: 640-0108

640 Series Sprinklers—US

Nozzle Apex @ 50 psi	
27 ° Nozzle	Max. Ht. of Spray
40	11' 6"
41	13' 10"
42	13' 5"

Nozzle Apex @ 60 psi	
43	18' 8"

Nozzle Apex @ 75 psi	
44	19' 8"

640-XX

To specify a 640 Series Nozzle and Stator, append the model number with one of the following nozzle sets:

40	41	42
43	44	

For Example: 640-41

640 Series Model List

Model	Description
• 640-0XXX	Drive Assembly
• 640-10	Body Package, Valve-In-Head
• 640-20	Body Package, Check-O-Matic
• 640-XX	Nozzle and Stator
• 640-XXX	Nozzle and Stator, Effluent
Standard Arcs w/Check-O-Matic	
• 641-02-40	90° Arc, #40 Nozzle
• 641-02-41	90° Arc, #41 Nozzle
• 641-02-42	90° Arc, #42 Nozzle
• 641-02-43	90° Arc, #43 Nozzle
• 641-02-44	90° Arc, #44 Nozzle
• 642-02-40	180° Arc, #40 Nozzle
• 642-02-41	180° Arc, #41 Nozzle
• 642-02-42	180° Arc, #42 Nozzle
• 642-02-43	180° Arc, #43 Nozzle
• 642-02-44	180° Arc, #44 Nozzle
• 644-02-40	360° Arc, #40 Nozzle
• 644-02-41	360° Arc, #41 Nozzle
• 644-02-42	360° Arc, #42 Nozzle
• 644-02-43	360° Arc, #43 Nozzle
• 644-02-44	360° Arc, #44 Nozzle

Specifying Information—640

64X 0X-4X-XXX-E

Arc	Valve Type	Nozzle	Special Arc		Optional
X	0X	X	XXX		E
0—Special Arc 1—90° 2—180° 3—270° 4—360°	1—Normally Open Valve-In-Head 2—Check-O-Matic	0 1 2 3 4	045° 060° 108° 127°	148° 173° 192° 238°	E—Effluent Model

Example: A 640 Series Sprinkler with a 90° arc, 40 nozzle and a check valve, would be specified as: **641-02-40**

Most 640 sprinklers are available in component parts only. Consult Res/Com Finished Goods Price List for a complete list of sprinklers available as finished goods.

Nozzle	psi	GPM	Radius	360°		270°		238°		192°		180°		173°	
				▲	■	▲	■	▲	■	▲	■	▲	■	▲	■
40	40	6.0	47	0.30	0.26	0.40	0.35	0.46	0.39	0.57	0.49	0.60	0.52	0.63	0.54
	50	6.7	50	0.30	0.26	0.40	0.34	0.45	0.39	0.56	0.49	0.60	0.52	0.62	0.54
	60	7.3	52	0.30	0.26	0.40	0.35	0.45	0.39	0.56	0.49	0.60	0.52	0.62	0.54
	70	8.0	53	0.32	0.27	0.42	0.36	0.48	0.41	0.60	0.52	0.63	0.55	0.66	0.57
	80	8.6	54	0.33	0.28	0.44	0.38	0.50	0.43	0.62	0.53	0.66	0.57	0.68	0.59
	90	9.2	55	0.34	0.29	0.45	0.39	0.51	0.44	0.64	0.55	0.68	0.59	0.70	0.61
41	40	9.5	48	0.46	0.40	0.61	0.53	0.69	0.60	0.86	0.75	0.92	0.79	0.95	0.83
	50	10.2	53	0.40	0.35	0.54	0.47	0.61	0.58	0.76	0.60	0.81	0.70	0.84	0.73
	60	11.0	54	0.42	0.36	0.56	0.48	0.63	0.55	0.79	0.68	0.84	0.73	0.87	0.76
	70	11.9	55	0.44	0.38	0.58	0.50	0.66	0.57	0.82	0.71	0.87	0.76	0.91	0.79
	80	12.7	56	0.45	0.39	0.60	0.52	0.68	0.59	0.85	0.73	0.90	0.78	0.94	0.81
	90	13.4	57	0.46	0.40	0.61	0.53	0.69	0.60	0.86	0.74	0.92	0.79	0.95	0.83
42	40	12.0	52	0.49	0.43	0.66	0.57	0.75	0.65	0.93	0.80	0.99	0.85	1.03	0.89
	50	12.9	55	0.47	0.41	0.63	0.55	0.72	0.62	0.89	0.77	0.95	0.82	0.99	0.85
	60	14.0	56	0.50	0.43	0.66	0.57	0.75	0.65	0.93	0.81	0.99	0.86	1.03	0.89
	70	14.7	57	0.50	0.44	0.67	0.58	0.76	0.66	0.95	0.82	1.01	0.87	1.05	0.91
	80	15.8	58	0.52	0.45	0.69	0.60	0.79	0.68	0.98	0.85	1.04	0.90	1.09	0.94
	90	16.8	58	0.56	0.48	0.74	0.64	0.84	0.73	1.04	0.90	1.11	0.96	1.16	1.00
43	40	13.2	56	0.47	0.41	0.62	0.54	0.71	0.61	0.88	0.76	0.94	0.81	0.97	0.84
	50	14.5	59	0.46	0.40	0.62	0.53	0.70	0.61	0.87	0.75	0.93	0.80	0.96	0.83
	60	15.7	59	0.50	0.43	0.67	0.58	0.76	0.66	0.94	0.82	1.00	0.87	1.04	0.83
	70	17.0	61	0.51	0.44	0.68	0.59	0.77	0.67	0.96	0.83	1.02	0.88	1.06	0.92
	80	18.3	63	0.51	0.44	0.68	0.59	0.77	0.67	0.96	0.83	1.03	0.89	1.07	0.92
	90	19.4	64	0.53	0.46	0.70	0.61	0.80	0.69	0.99	0.86	1.05	0.91	1.10	0.95
44	40	16.7	55	0.61	0.53	0.82	0.71	0.93	0.80	1.15	1.00	1.23	1.06	1.28	1.11
	50	18.6	60	0.57	0.50	0.76	0.66	0.87	0.75	1.08	0.94	1.15	1.00	1.20	1.03
	60	19.9	61	0.59	0.52	0.79	0.68	0.90	0.78	1.12	0.97	1.19	1.03	1.24	1.07
	70	21.9	63	0.61	0.53	0.82	0.71	0.93	0.80	1.15	1.00	1.23	1.06	1.28	1.11
	80	23.4	65	0.62	0.53	0.82	0.71	0.93	0.81	1.16	1.00	1.23	1.07	1.28	1.11
	90	25.0	67	0.62	0.54	0.82	0.71	0.94	0.81	1.16	1.01	1.24	1.07	1.29	1.12

Nozzle	psi	GPM	Radius	148°		127°		108°		90°		60°		45°	
				▲	■	▲	■	▲	■	▲	■	▲	■	▲	■
40	40	6.0	47	0.73	0.64	0.85	0.74	1.01	0.87	1.21	1.05	1.81	1.57	2.42	2.09
	50	6.7	50	0.72	0.63	0.84	0.73	0.99	0.86	1.19	1.03	1.79	1.55	2.38	2.06
	60	7.3	52	0.73	0.63	0.85	0.74	1.00	0.75	1.20	1.04	1.80	1.56	2.40	2.08
	70	8.0	53	0.77	0.67	0.90	0.78	1.05	0.91	1.27	1.10	1.90	1.65	2.53	2.19
	80	8.6	54	0.80	0.69	0.93	0.80	1.09	0.95	1.31	1.14	1.97	1.70	2.62	2.27
	90	9.2	55	0.82	0.71	0.96	0.83	1.13	0.98	1.35	1.17	2.03	1.76	2.71	2.34
41	40	9.5	48	1.11	0.96	1.30	1.12	1.53	1.32	1.83	1.59	2.75	2.38	3.67	3.18
	50	10.2	53	0.98	0.85	1.14	0.99	1.34	1.16	1.62	1.40	2.42	2.10	3.23	2.80
	60	11.0	54	1.02	0.88	1.19	1.03	1.40	1.21	1.68	1.45	2.52	2.18	3.36	2.91
	70	11.9	55	1.06	0.92	1.24	1.07	1.46	1.26	1.75	1.52	2.62	2.27	3.50	3.03
	80	12.7	56	1.09	0.95	1.27	1.10	1.50	1.30	1.80	1.56	2.70	2.34	3.60	3.12
	90	13.4	57	1.11	0.97	1.30	1.12	1.53	1.32	1.83	1.59	2.75	2.38	3.67	3.18
42	40	12.0	52	1.20	1.04	1.40	1.21	1.64	1.42	1.97	1.71	2.96	2.56	3.95	3.42
	50	12.9	55	1.15	1.00	1.34	1.16	1.58	1.37	1.90	1.64	2.85	2.46	3.79	3.29
	60	14.0	56	1.21	1.05	1.40	1.22	1.65	1.43	1.99	1.72	2.98	2.58	3.97	3.44
	70	14.7	57	1.22	1.06	1.42	1.23	1.68	1.445	2.01	1.74	3.02	2.61	4.03	3.49
	80	15.8	58	1.27	1.10	1.48	1.28	1.74	1.51	2.09	1.81	3.13	2.71	4.18	3.62
	90	16.8	58	1.35	1.17	1.57	1.36	1.85	1.60	2.22	1.92	3.33	2.89	4.44	3.85
43	40	13.2	56	1.14	0.98	1.32	1.15	1.56	1.35	1.87	1.62	2.81	2.43	3.74	3.24
	50	14.5	59	1.13	0.97	1.31	1.14	1.54	1.34	1.85	1.60	2.78	2.41	3.71	3.21
	60	15.7	59	1.22	1.06	1.42	1.23	1.67	1.45	2.01	1.74	3.01	2.61	4.01	3.47
	70	17.0	61	1.23	1.07	1.44	1.25	1.69	1.47	2.03	1.76	3.05	2.64	4.06	3.52
	80	18.3	63	1.25	1.08	1.45	1.25	1.71	1.48	2.05	1.78	3.08	2.66	4.10	3.55
	90	19.4	64	1.28	1.11	1.49	1.29	1.75	1.52	2.11	1.82	3.16	2.74	4.21	3.65
44	40	16.7	55	1.49	1.29	1.74	1.50	2.04	1.77	2.46	2.13	3.68	3.19	4.91	4.25
	50	18.6	60	1.40	1.21	1.63	1.41	1.91	1.66	2.30	1.99	3.45	2.99	4.60	3.98
	60	19.9	61	1.45	1.25	1.68	1.46	1.98	1.71	2.38	2.06	3.57	3.09	4.76	4.12
	70	21.9	63	1.49	1.29	1.74	1.53	2.04	1.84	2.45	2.76	3.68	3.68	4.91	4.25
	80	23.4	65	1.50	1.30	1.74	1.51	2.05	1.78	2.46	2.13	3.70	3.20	4.93	4.27
	90	25.0	67	1.50	1.30	1.75	1.52	2.06	1.79	2.48	2.15	3.72	3.22	4.95	4.29

** ▲Precipitation rates are for triangular spacing, shown in inches per hour, calculated at 50% of diameter.*
** ▲Precipitation rates are for square spacing, shown in inches per hour, calculated at 50% of diameter.*
All performance specifications are based on the stated working pressure available at the base of the sprinkler.
Radius shown in feet. Data based on 360°.
Note: For the 640, differing arcs cannot be valved together.

TS90 Series

- **Inlet Size: 1" (25mm) NPT or BSP**
- **Radius: 53'-95' (16,2-29,0m)**
- **Operating Pressure Range: 40-100 psi (2,8-7,0 Bar)**

For big open spaces, the Toro TS90 provides unparalleled features and performance into a single fully adjustable rotor.

Effluent Options Available

Features & Benefits

Trujectory Adjustment from 7° to 30°
Fine tunes nozzle spray height, helps provide true head-to-head coverage, and compensates for windy conditions.

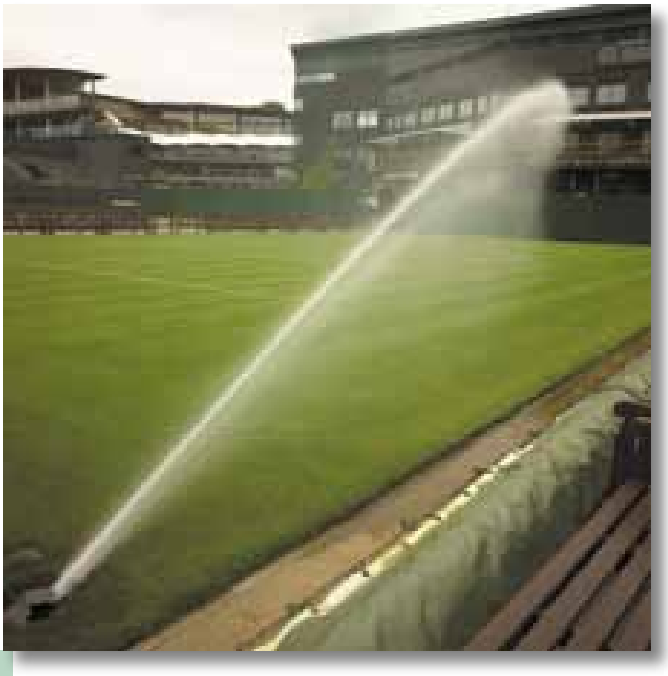
Part- And Full-Circle In One Sprinkler
No need to inventory multiple models or service parts

Back Nozzle Capable
Perfect for perimeter of sports fields. Provides the flexibility for fine-tuning any watering requirement.

Ratcheting Riser
Allows you to adjust the riser position in the body with no disassembly. Simply pull up the riser and ratchet it to the precise position you want to water.

Three Nozzle Configuration
Provides better distribution uniformity, nozzle flexibility and system efficiency.

Constant-Velocity Drive
Provides reliable rotation speed – from sprinkler to sprinkler.



Specifications

Dimensions

- Body Height: 10" (254mm)
- Overall Height: 12.5" (317mm)
- Retracted Height: 8.5" (216mm)
- Pop-Up Height: 4" (100mm)
- Exposed Cap Diameter: 2.2" (56mm)

Operating Specifications

- Radius: 53'-95' (16,2-29,0m) at 25° trajectory
- Flow Rate: 14.0-61.5 GPM (53-233 LPM)
- Precipitation Rate: .56-.60"/hr (14,2-15,2mm/hr)
- Arc: Full- & Part-circle in one
  - Full-circle: 360° unidirectional clockwise rotation
  - Part-circle: 40°-330°
- Rotation Speed: 3 minutes ± 30 seconds
- Inlet: 1" (25mm) female-threaded (NPT or BSP)
- Operating pressure range: 40-100 psi (2,8-7,0 Bar)

Additional Features

- Full set of color-coded nozzles that thread directly into the front.
- Rubber cover and below grade installation
- Check Valve standard – maintains up to 10' (3m) elevation
- Nozzle options: 9 main, 3 intermediate, 1 inner

Options Available

Effluent Indicator available: part number 118-0063
Main Nozzle Tool: 5/8" (16mm) hex socket or Toro Part 995-99 Intermediate and Trajectory tool: 5/16" (8mm) hex socket or Toro Part 995-105

Warranty

5 years

TS90TP Nozzle Performance Data—US

Nozzle Set		Stator	50 PSI		60 PSI		70 PSI		80 PSI		90 PSI		100 PSI	
Number	Main/Intermediate		Radius (Ft.)	Flow (GPM)	Radius (Ft.)	Flow (GPM)	Radius (Ft.)	Flow (GPM)	Radius (Ft.)	Flow (GPM)	Radius (Ft.)	Flow (GPM)	Radius (Ft.)	Flow (GPM)
1	Yellow/Blue	102-1939 Yellow	53	14.0	54	15.2	55	16.4	55	17.4	54	18.5	56	19.4
2	Blue/Red		55	18.8	59	20.5	61	22.1	59	23.6	59	25.0	62	26.3
3	Brown/Orange		-	-	57	22.7	60	24.5	61	26.1	63	27.6	68	29.1
4	Orange/Orange		-	-	-	-	74	32.7	80	35.1	81	37.0	82	38.9
5	Green/Blue	102-1940 White	-	-	-	-	-	-	79	37.7	82	39.9	84	41.8
6	Gray/Blue		-	-	-	-	-	-	82	39.6	86	41.9	87	44.1
7	Black/Orange		-	-	-	-	-	-	80	43.6	87	46.2	84	48.6
8	Red/Blue		-	-	-	-	-	-	86	48.5	88	51.4	88	54.1
9	Beige/Blue	102-1941 White	-	-	-	-	-	-	85	55.1	91	58.3	95	61.6

TS90 Series Model List	
Model	**Description**
• TS90TP-02-14 • TS90TP-02-58	#3 nozzle pre-installed #6 nozzle pre-installed

Specifying Information—TS90TP

TS90TP XX-X-X				
Arc	**Threads**	**Nozzle**		**Optional**
TS90TP	XX	X		E
TS90TP— TS90TP 1" (25mm) Rotor with TruJectory	02—NPT	1 2 3 4 5	6 7 8 9	E—Effluent Model
Example: A TS90 Series sprinkler with TruJectory, NPT threads, and with an 82' (25m) radius would be specified as: **TS90TP-02-58**				

TG101 Series

- **Inlet Size: 2" (50mm) NPT or BSP**
- **Radius: 91'-178' (27-54m)**
- **Operating Pressure Range: 40-95 psi (2,8-6,5 Bar)**

The Toro® TG101-NPT large-radius, gun-style sprinkler is ideal for applications that require long distance throw, such as irrigation solely from the perimeter of sports fields, or for cleaning and cooling artificial turf.

Features & Benefits

Innovative Drive System
Adjusts automatically, ensuring steady rotation and uniform coverage at varying pressures.

Excellent Uniformity
Using a single nozzle design (spreader nozzles not required).

Dispersed Jet Upon Start-up
Reduces run-off and over-watering.

Self-adjusting Jet Breaker Device
To vary distribution at lower pressures or to increase close-in watering.

No Maintenance
The TG101 is maintenance-free.

Energy Savings
The great versatility of the gun is further increased with the dynamic intermittent jet-breaker. It allows energy savings and reduction of system operating costs by running an irrigation system at lower pressures.

Distribution
The unique drive system allows a better stream diffusion. This greatly reduces furrows and run-off.

Adjustable Brake Force
The self-adjusting system adapts its brake force to the existing system pressure. This is essential for uniform water application.

TG101-NPT Performance Data — 24° Trajectory—US

Pressure PSI	Nozzle 0.47"		Nozzle 0.55"		Nozzle 0.63"		Nozzle 0.71"		Nozzle 0.79"		Nozzle 0.87"		Nozzle 0.94"	
	Flow GPM	Radius Feet	Flow GPM	Radius Feet	Flow GPM	Radius Feet	Flow GPM	Radius Feet	Flow GPM	Radius Feet	Flow GPM	Radius Feet	Flow GPM	Radius Feet
30			46.7	85.3	61.2	91.5	77.5	97.4	95.5	103.3	115.8	108.6	137.8	113.8
35			52.4	92.8	68.2	99.7	86.7	106.3	107.0	112.5	129.4	118.4	154.1	124.0
40	42.3	91.5	57.2	99.4	74.8	107.0	95.1	113.8	112.3	120.4	141.8	127.0	168.6	132.9
50	45.8	96.8	62.1	105.3	81.0	113.2	102.6	120.7	126.3	127.6	153.2	134.5	182.3	141.1
60	48.9	102.0	66.5	110.9	86.7	119.1	109.6	127.0	135.1	134.5	163.8	141.4	195.0	148.3
65	51.5	106.6	70.4	115.8	92.0	124.7	116.2	132.9	143.5	140.4	171.4	148.0	206.5	155.2
70	54.6	110.9	74.0	120.7	96.8	120.6	122.4	138.1	151.9	146.3	183.1	186.7	217.9	161.4
80	57.2	115.2	77.9	125.0	101.7	134.5	128.5	143.4	158.5	151.6	191.9	159.8	228.5	167.3
90	59.9	119.1	81.0	129.3	106.1	139.1	134.3	148.0	168.5	156.8	200.3	165.0	238.6	172.9
95	62.1	122.7	84.5	133.2	110.5	143.0	139.5	152.6	172.6	161.7	208.7	170.3	248.3	178.5

Note: Products may not be available in all regions.
Please consult your Toro regional manager for availability.

Specifications

Operating Specifications

- Radius: 91-178 feet (27-54m)
- Flow Rate: 42-248 GPM (190-1127 LPM)
- Operating Pressure Range: 40-95 PSI (2,5-6,5 Bar)
- Trajectory: 24°
- Two standard nozzle options: 0.63" and .87" (16-20mm) (additional range of nozzles available for specialty applications)

Additional Features

- Powerful and efficient stream diffusion
- Standard 2" (51mm) NPT thread connection
- High-quality, durable construction
- Full or part-circle operation in one unit
- Adjustable rotation speed

Warranty

- Two years

TG101 Model List	
Model	**Description**
• TG101-NPT	Large Radius Gun-Style Sprinkler

No maintenance
The TG101 gun is maintenance-free. The modern design avoids the use of ball bearings, which can seize at contact with moisture, cause failure.

Specifying Information—TR70XT

TG101-X-XX	
Description	**Nozzle**
TG101	**XX**
TG101—TG101 Sprinkler	16—16.0 24—24.0 20—20.0 26—26.0 22—22.0 28—28.0
Example: A TG101 sprinkler, part circle with a 16.0 nozzle, would be specified as: **TG101-P-16**	

690 Series

- **Inlet Size: 1½" (37mm) NPT or BSP**
- **Radius: 87'-108' (26,5-33,0m)**
- **Operating Pressure Range: 80-150 PSI (5,5-10,3 Bar)**

For nearly 40 years the 690 series has set the standard for durability and reliability in commercial applications. Extremely rugged, the 690 Series is constructed of brass, stainless steel and engineering plastics for unmatched performance in the most demanding environments.

Features & Benefits

Artificial Playing Surfaces
Radius and flow capabilities are perfect for cooling and rinsing artificial playing surfaces such as football fields.

Electric Valve In Head Models
Provide individual head control that ensures run times can match differing soil, turf and terrain watering requirements, pressure regulation to ensure all nozzles perform at the same pressure and manual ON-OFF-auto control at the head.

Fixed Arc Drives
Nine fixed arc drive assemblies ensure positive retention of the coverage area with no arc drift

Balanced Application Rate
Used in single or double row applications these sprinklers operate at a slower speed over the non-overlap area and a faster speed over the overlapped areas to provide a balanced application rate.

Dimensions
- Body diameter: 10" (254mm)
- Body height: 16" (405mm)
- Weight: 5.6 lbs. (2,54 kg)

Operating Specifications
- Radius: 87' – 108' (26,5-33,0m)
- Flow Rate: 51.0 – 82.2 GPM (193-311 LPM)
- Operating Pressure Range: 80-150 psi (5,5-10,3 Bar)
- Pop-up height to nozzle: ¾" (20mm)
- Inlet: 1 ½" NPT (38mm)
- Check-O-Matic: Maintains 37' (11,2m) of elevation
- Electric Valve-in-head Solenoid: 24V ac, 50/60 Hz
  - Inrush: 60 Hz, 0.30 amps
  - Holding: 60 Hz, 0.20 amps
- All internal components serviceable from the top

Warranty
- Three years

690 Series Performance Chart

Base Pressure	Nozzle Set 90		Nozzle Set 91		Nozzle Set 92	
psi	Radius	GPM	Radius	GPM	Radius	GPM
80	87	51.0	96	61.2	100	74.0
100	90	57.1	100	73.5	108	82.2

Radius shown in feet.
Sprinkler radius of throw per ASAE standard S398.1.

690 Series Model List	
Model	**Description**
• 690	90° Part-circle sprinkler
• 691	180° Part-circle sprinkler
• 694	Full-circle sprinkler
• 696	2-speed (60°-120°) sprinkler
• 698	2-speed (180°-180°) sprinkler

Specifying Information—690

69X-0X-XXX

Arc		*Valve-In-Head Type*	*Nozzle*	*Pressure Regulation**
69X		**0X**	**XX**	**X**
1—90° 2—180° 4—Full-circle 6—Full-circle, 2-speed (60°–120°) 8—Full-circle, 2-speed (180°–180°)	A—150° B—165° C—195° D—210°	1—Normally Open Hydraulic 2—Check-O-Matic 6—Electric	90 91 92	8—80 psi 1—100 psi

Example: When specifying a 690 Series Sprinkler with a 180° arc, electric valve-in-head, #91 nozzle, and pressure regulation at 80 psi (5,5 Bars), you would specify: **692-06-918**

*Electric models only.

Rotor Accessories

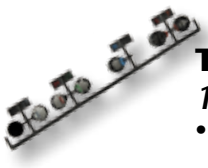
Effluent Water Indicators

300 & 340 Series
89-7853
- Lavender cover for 300 and 340 Series Omni nozzle
- Use with part no. 300-15 (Omni Nozzle)

89-7854
- Lavender cover for 300 and 340 Series Omni nozzle high-pop models
- Use with part no. 300-25 (Omni Nozzle)

89-7889
- Lavender plug for 300 and 340 Series with fixed-radius nozzles

Super 800
102-3787
- Nozzle tree



TR70/T7
102-2633
- Nozzle tree

Installation/Adjustment Tools

Mini 8 & S800 Series
102-2024
- Adjustment tool for Mini 8 and Super 800 Series models

T5 Rotor Tool Kit
102-7715
- 20 tools per bag

T5 Nozzle Tree Kit
102-7712
- 20 nozzle trees per bag

T5 Rotor Check Valve Kit
102-7714
- 20 valve seals per bag

T7 Rotor Tool Kit
102-6527
- 20 tools per bag

640 Series
995-07
- VIH pliers for 640 Series models

995-08
- Valve removal tool for 640 Series models
- Designed for quick removal of valve assembly from body

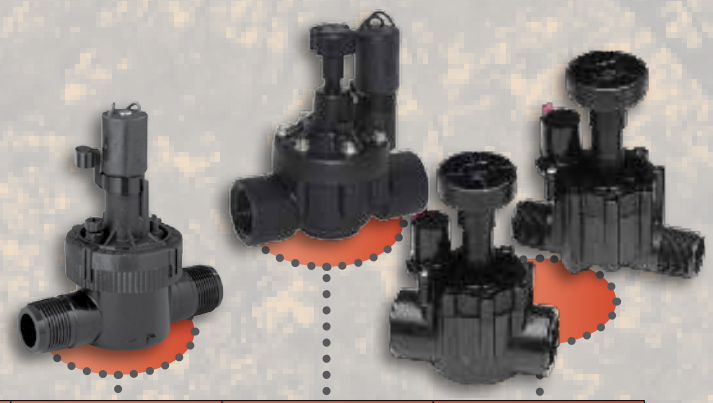
995-42
- Canister removal tool for 640 Series models

996-51
- Cap removal tool for 640 Series models

995-37
- Seal installation tool for 640 Series models

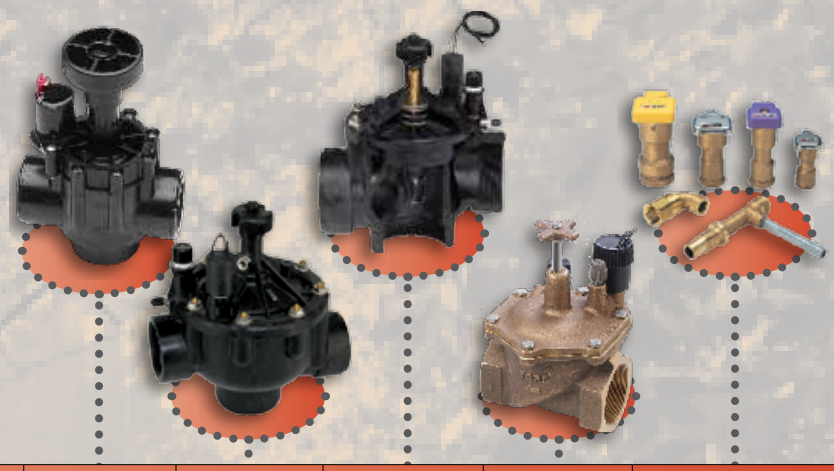
995-35
- Valve insertion tool for 640 Series models
- Designed for accurate one-step insertion of valve assembly and snap ring

Valves Overview



Model		EZ-Flo® Plus	TPV Series	250/260 Series 254/264 Series
Page Number		64-65	66-67	68-69
Flow range		.025-30 GPM (1-114 LPM)	0.1- 40 GPM (1-151 LPM)	0.25-30 GPM (1-114 LPM)
Operating Pressure		10-150 PSI Max (0,7-10 Bar)	10-175 PSI Max (0,7-12 Bar)	10-150 PSI Max (0,7-10 Bar)
Conditions	Electrically-Activated Systems	X	X	X
	Hydraulically-Activated Systems			250/260 only
	Pin-Type Systems			250/260 only
	Effluent Water	X	X	X
Sizes	3/4" (20mm)	X		254/264 only
	1" (25mm)	X	X	X
	1 ¼" (31mm)			
	1 ½" (37mm)			
	2" (50mm)			
	2 ½" (67mm)			
	3" (75mm)			
Configurations	Angle	X		
	Anti-Siphon	X		
	Inline/Globe	X	X	X
Inlet/Outlet	Threaded (Female)	X	X	250/260 only
	Slip	X	X	
	Male X Male	X	X	254/264 only
	Male X Barb	X	X	254/264 only
Features	Manual Flow Control	X	X	X
	Pressure Regulation			
	Internal Bleed	X	X	
	External Bleed (Flush)	X	X	X
	Optional DC Latching Solenoid	X	X	
Body Construction	ABS			X
	PVC	X	X	
	Glass-filled Nylon			X
	Glass-filled Polypropylene	X		
	Brass			
Warranty		Three years	Five years	Two years

WaterSmart® Feature



Model		252 Series	P-220 Series	P-220 Scrubber	220 Brass Series	Quick Coupler Series
Page Number		70-71	72-73	74-75	76-77	78
Flow range		5.0-90.0 GPM (19-340 LPM)	5.0-300 GPM (19-1136 LPM)	80-300 GPM (302-1136 LPM)	5.0-350 GPM (19-1325 LPM)	
Operating Pressure		10-150 PSI Max (0,7-10 Bar)	10-220 PSI Max (0,7-15,2 Bar)	10-220 PSI Max (0,7-15,2 Bar)	10-220 Psi Max (0,7-15,2 Bar)	
Conditions	Electrically-Activated Systems	X	X	X	X	
	Hydraulically-Activated Systems	X				
	Pin-Type Systems					
	Effluent Water	X	X	X	X	X
Sizes	3/4" (20mm)					X
	1" (25mm)	X	X		X	X
	1 ¼" (32mm)				X	
	1 ½" (38mm)	X	X		X	
	2" (50mm)	X	X	X	X	
	2 ½" (64mm)				X	
	3" (75mm)		X	X	X	
Configurations	Angle	X	X	X	X	
	Anti-Siphon					
	Inline/Globe	X	X	X	X	
Inlet/Outlet	Threaded (Female)	X	X	X	X	
	Slip					
	Male X Male					
	Male X Barb					
Features	Manual Flow Control	X	X	X	X	
	Pressure Regulation		X	X	X	
	Internal Bleed		X	X		
	External Bleed (Flush)	X	X	X	X	
	Optional DC Latching Solenoid		X	X	X	
Body Construction	ABS	X				
	PVC					
	Glass-filled Nylon	X	X	X		
	Glass-filled Polypropylene					
	Brass				X	X
Warranty		Two years	Five years	Five years	Five years	Two years

WaterSmart® Feature

EZ-Flo® Plus Jar-Top Series

- 3/4" (20mm), 1" (25mm)
- Electric

The name says it all – EZ. Easy to install and easy to service, these Toro® valves are easy to choose. Perfect for residential applications, EZ-Flo Plus valves are available in a broad range of configurations providing the flexibility you need.

Effluent Options Available

DC Latching Solenoid Option

Features & Benefits

Jar-Top Design
Requires no screws and provides fast and easy servicing.

PVC, Glass-Filled Nylon and Stainless Steel Construction
Provides longer life span and leak protection in nearly any environment.

Double-beaded, Chloramine and Ozone-Resistant Santoprene® Diaphragm
Ensures a consistent, leak-proof seal all the way up to 150 psi (10,3 Bar).

In-Line or Anti-Siphon Models
Ample selection for new and retrofit installations.

Optional Flow Control
Adjusts the flow of each zone on a system.

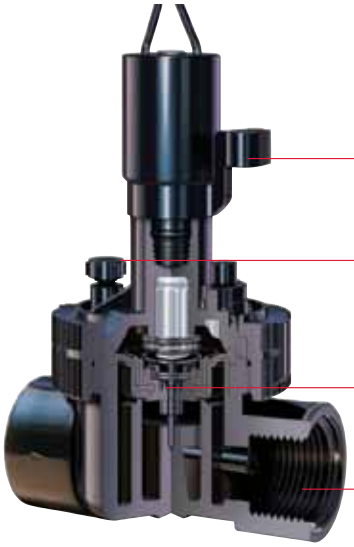
Water Management Highlight

Jar-Top for Ease of Use

No screws mean less time flushing out the system on start-up. Cleaning the diaphragm area is uncomplicated as it requires no tools. EZ-Flo Plus valves are simple to service – it's that easy.

EZ-Flo® Plus with DC Latching Solenoid

EZ-Flo valves can be ordered with pre-installed DC Latching solenoids providing cost and labor savings. Perfect for use with Toro controllers, especially DDCWP and TDC.



Specifications

Dimensions

- Female Globe: 5 ⅛" H x 3" W x 4" L (130 x 75 x 101mm)
- Male Globe: 5 ⅛" H x 3" W x 5 ½" L (130 x 75 x 140mm)
- Anti-Siphon: 6" H x 3" W x 6 ⅞" L (152 x 75 x 175mm)

Operating Specifications and Additional Features

- Flow Range:
  – ¾"(20mm): 0.25 – 20 GPM (0,9-76 LPM)
  – 1"(25mm): 0.25 – 30 GPM (0,9-113 LPM)
- Operating Pressure: 10-150 psi (0,68-10,32 Bar)
- Encapsulated solenoid (102-7053) with captured hex plunger, spring and O-ring (24 VAC):
  - Inrush current, 0.4 amps
  - Holding current, 0.2 amps
- Available with or without flow control

Options Available

- DCLS-P — Potted DC Latching Solenoid
- EFF-KIT-60Hz— Effluent Solenoid Assembly and Tag

Warranty

- Three years

Friction Loss Data—US

Size	Model	GPM Flow					
		0.25	5	10	15	20	30
1"	Inline	2.0	3.5	4.0	3.0	3.3	6.2
1"	Anti-siphon	2.0	2.1	3.1	2.3	3.8	8.1
¾"	Anti-siphon	2.0	4.2	4.2	4.8	7.6	—

EZ-Flo Plus Series Model List

AC Solenoids

Model	Description
• EZF-29-03	3/4" (20mm) Electric, NPT, Anti-siphon
• EZF-29-04	1" (25mm) Electric, NPT, Anti-siphon
• EZF-20-04	1" (25mm) Electric, Slip
• EZF-26-04	1" (25mm) Electric, Female NPT
• EZF-21-04	1" (25mm) Electric, Male x Male NPT
• EZF-25-04	1" (25mm) Electric, Male x Barb NPT
• EZF-00-04	1" (25mm) Electric, Slip without flow control
• EZF-06-04	1" (25mm) Electric, Female NPT without flow control
• EZF-01-04	1" (25mm) Electric, Male x Male NPT without flow control
• EZF-05-04	1" (25mm) Electric, Male x Barb NPT without flow control

DC Solenoids

Model	Description
• EZF-20-94	1" (25mm) Electric, Slip, with DC Latching Solenoid
• EZF-26-94	1" (25mm) Electric, Female, NPT, with DC Latching Solenoid
• EZF-21-94	1" (25mm) Electric, Male x Male NPT with DC Latching Solenoid
• EZF-25-94	1" (25mm) Electric, Male x Barb NPT with DC Latching Solenoid

Specifying Information—EZ-Flo® Plus

	EZF X-X-XX		
Model	**Flow Control**	**Body Style**	**Size**
EZF	**X**	**X**	**0X**
EZF—EZ-Flo Plus Valve	0—Without 2—With	0—1" Slip x Slip 1—1" Male x Male NPT 5—Male NPT x Barb 6—1" Female NPT 9—Anti-siphon	03—¾"(20mm) 04—1" (25mm) 94—1" (25mm) with DCLS-P (flow control models only)
Example: A 1" (25mm) EZ-Flo Plus Valve with slip configuration and flow control would be specified as: **EZF-20-04**			

TPV Series

- 1" (25mm)
- 0.1—40 GPM (0,38-151 LPM)
- Electric

The search for a full-featured yet economically priced, residential and commercial valve is over thanks to Toro's newest 1" (25mm) valve offering–the TPV Series. These full-featured, rugged, debris-resistant valves feature flow ranges from 0.1 to 40 GPM (0,38-151 LPM), making them ideal for everything from drip to high-flow residential and light-commercial applications.

Effluent Options Available

DC Latching Solenoid Option

Features & Benefits

Tough Double-Beaded, Chloramine and Ozone-Resistant Santoprene® Diaphragm
Ensures a consistent, leak-proof seal all the way up to 175 psi (12,0 Bar).

Patented DBS (Debris Bypass System) Technology™
Metering system ensures proper functionality, even in tough environments.

Multiple Body Styles
Choose from various styles to meet any installation requirement.

Wide Range of Flows and Pressure
One valve for all site specific needs.

Robust Solenoid Design
Ensures reliable opening and closing.

Water Management Highlight

DBS Technology™ (Debris Bypass System)

DBS is a patented vibrating metering pin and diaphragm assembly that allows for small particles to pass through the valve without clogging.

Specifications

Dimensions

- 5 ⅛" H x 2 ¾" W x 5" L (130 x 70 x 127mm)

Operating Specifications

- Flow Range: 0.1 to 40 GPM (0,38-151 LPM)
- Operating Pressure: Electric – 10 to 175 psi (0,7-12,0 Bar)
- Burst pressure safety rating: 1000 psi (68,9 Bar)
- Solenoid: 24 VAC (50/60 Hz) Standard (102-7053)
  - Inrush: 0.4 amps
  - Holding: 0.2 amps

Additional Features

- Rugged, Double-Beaded Santoprene diaphragm
- Patented DBS™ (Debris Bypass System) technology
- Operates in low-flow and landscape drip applications when a filter is installed upstream (see page 145)
- Built with either AC or DC Latching Solenoids
- Manual Operation without the use of a controller—Internal and External Bleed
- Captured hex/Phillips screws
- Optional flow control allows precise zone adjustment and manual shutoff
- Encapsulated injection-molded solenoid with a captured plunger
- Removable flow control handle to ensure vandal-resistance
- Slip models feature patented Glue Stop™
- Self-aligning bonnet permits fast and easy servicing
- Large directional flow arrows

Options Available

- EFF-Kit-60Hz - Recycled Water Solenoid Assembly and Watering Tag
- DCLS-P - Potted DC Latching Solenoid Assembly

Warranty

- Five years

Glue Stop™
TPV Slip-by-Slip models include this patented feature which ensures that the installer cannot block the downstream port of the valve during installation with primer and cement.

TPV Series Model List

AC Solenoids

Model	Description
• TPV100	1" (25mm) Female NPT, In-Line, w/o FlowControl
• TPVF100	1" (25mm) Female NPT, In-Line, w/Flow Control
• TPV100MM	1" (25mm) Male Thread x Male Thread, In-Line, w/o Flow Control
• TPVF100MM	1" (25mm) Male Thread x Male Thread, In-Line, w/Flow Control
• TPV100S	1" (25mm) Slip x Slip, In-Line, w/o Flow Control
• TPVF100S	1" (25mm) Slip x Slip, In-Line, w/Flow Control
• TPV100MB	1" (25mm) Male Thread x Barb, In-Line, w/o Flow Control
• TPVF100MB	1" (25mm) Male Thread x Barb, In-Line, w/Flow Control

DC Solenoids

Model	Description
• TPVF100DC	1" (25mm) Female NPT, In-Line, w/ Flow Control, DCLS-P
• TPVF100MMDC	1" (25mm) Male Thread x Male Thread, In-Line, w/ Flow Control, DCLS-P
• TPVF100SDC	1" (25mm) Slip x Slip, In-Line, w/Flow Control, DCLS-P
• TPVF100MBDC	1" (25mm) Male Thread x Barb, In-Line, w/Flow Control, DCLS-P

TPV Friction Loss data—US

GPM Flow	.10	.25	5	10	15	20	30	40
PSI Loss	2.0	2.0	3.5	3.9	3.0	3.3	7.0	13

Specifying Information—TPV

TPVX100XXXX

Model	Flow Control	Size	Body Style	Optional
TPV	X	**100**	X X	XX
TPV—TPV Valve	F—With Flow Control	100— 1" (25mm)	MM—Male X Male S—Slip MB—Male X Barb	DC—DCLS-P Latching Solenoid

Example: A 1" (25mm) TPV Valve with slip configuration and flow control would be specified as: **TPVF100S**

250/260 & 254/264 Series

- 3/4" (20mm) and 1" (25mm)
- Electric/Hydraulic

Heavy duty. Hardworking. The Toro® 250/260 and 254/264 Series Valves are made to withstand whatever a large residential or light commercial application can dish out.

Effluent Options Available

Features & Benefits

Heavy-Duty Toro Solenoid
Provides dependable operation and long life.

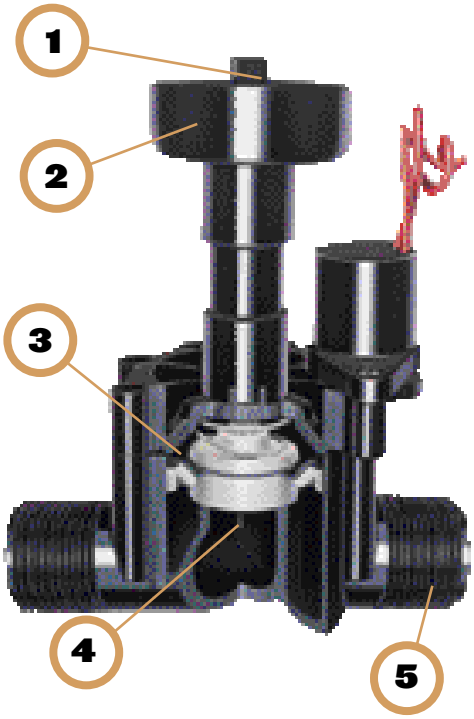
Optional Flow Control
Adjust the flow of each zone.

Various Inlet and Outlet Choices
Ample selection for new and retrofit installations.

Single-Piece Robust Rubber Diaphragm
For reliable, leak-free closing.

Tough, Glass-Filled Zytel Cap And Body
Durable materials which provide years of reliable operation.

254 Male x Male Valve



1. *Manual bleed screw*
2. *Optional flow control*
3. *Single-piece rubber diaphragm*
4. *Stainless-steel metering pin*
5. *Tough, glass-filled cap and body*

Water Management Highlight

Effluent Flow Control Handle

Ideal for systems using reclaimed water, this flow control handle is easily viewable from the top of the valve.

Specifications

Dimensions

- 3/4" (20mm): 3" H x 4" W (75 x 101mm)
- 1" (25mm) 250 & 254 (with flow control): 6" H x 4 ½" W (152 x 114mm)
- 1" (25mm) 260 & 264 (w/o flow control): 4 ½" H x 4 ½" W (114 x 114mm)

Operating Specifications

- Recommended flow range:
  - 3/4" (20mm): 0.25 to 15.0 GPM
  - 1" (25mm): 5.0 to 30.0 GPM
- Operating Pressure
  - 3/4" (20mm): 10 to 150 psi (0,7-10,3 Bar)
  - 1" (25mm): 20 to 150 psi (1,4-10,3 Bar)
- Solenoid: 24 VAC
  - 3/4" (20mm): Inrush: 0.25 amps, 6.00 VA; Holding: 0.19 amps, 4.56 VA
  - 1" (25mm): Inrush: 0.30 amps, 7.20 VA; Holding: 0.20 amps, 4.80 VA
- Burst Pressure safety rating: 750 psi (51,7 Bar)

Additional Features

- Manual flow control adjustable to zero flow
- Self-cleaning, stainless steel metering pin
- External manual bleed
- 18" (5,5m) lead wires (electric)
- Single-piece rubber diaphragm
- Recycled water flow-control knob available
- Available with or without flow control
- Low in-rush solenoid

Options Available

- 89-7855 - Effluent Water Indicator Valve Flow Control Knob

Warranty

- Two years

250/260 Series Model List

Model	Description
Female Thread	
• 250-06-04	1" (25mm) Female NPT, In-line, w/ Flow Control
• 260-06-04	1" (25mm) Female NPT, In-line, w/o Flow Control
• 250-00-04	1" (25mm) Female NPT, In-line, Pin-type Hydraulic, w/Flow Control
• 250-01-04	1" (25mm) Female NPT, In-line, Normally Open Hydraulic, w/Flow Control
Male Thread	
• 264-06-03	3/4" (20mm) Male Thread x Male Thread, In-Line, w/o Flow Control
• 254-06-04	1" (25mm) Male Thread x Male Thread, In-Line, w/ Flow Control
• 264-06-04	1" (25mm) Male Thread x Male Thread, In-Line, w/o Flow Control
• 254-16-04	1" (25mm) Male Thread x Insert, In-Line, w/ Flow Control
• 264-16-04	1" (25mm) Male Thread x Insert, In-Line, w/o Flow Control

254/264 Series Friction Loss Data—US

Size	Model	GPM Flow											
		.5	1	2	5	10	15	20	25	30	35	40	45
¾"	Electric	<1.0	<1.0	<1.0	1.5	3.0	6.5						
1"	Electric				2.0	2.0	2.3	3.1	4.0	5.4	7.0	8.7	10.5

Note: For optimum sprinkler performance when designing a system, calculate total friction loss to ensure sufficient downstream pressure. Flow rates are recommended not to exceed 5 psi loss. Values are listed in psi.

250/260 Series Friction Loss Data—US

Size	Model	GPM Flow						
		0.5	10	15	20	25	30	40
1"	Hydraulic	<1.0	1.0	2.0	3.0	4.0	6.0	9.5
1"	Electric		4.4	4.5	5.0	5.0	7.0	9.5

Specifying Information—250/260

2X0-0X-04

Flow Control	Activation Type	Size
2X0	**0X**	**04**
5—w/Flow Control 6—w/o Flow Control	0—Pin-type Hydraulic 1—Normally Open Hydraulic 6—Electric	04—1" (25mm)
Example: A 1" (25mm) 250 Series Valve with flow control and electric activation would be specified as: **250-06-04**		

Note: DC Latching Solenoid not available.

Specifying Information—254/264

2X4-X6-0X

Flow Control	Body Style	Size
2X4	**X6**	**0X**
5—w/Flow Control 6—w/o Flow Control	0—Male Thread x Male Thread 1—Male Thread x Barb	3—¾" (20mm) 4—1" (25mm)
Example: A 1" (25mm) electric 264 Series Valve without flow control with a barb would be specified as: **264-16-04**		

Note: DC Latching Solenoid not available.

252 Series

- 1″ (25mm), 1½″ (37mm), 2″ (50mm)
- Electric/Hydraulic
- Globe, Angle

Toro® 252 Series valves are built tough and ready to withstand the harshest conditions in any commercial application. With several configurations to choose from, 252 Series valves are available in electric or hydraulic, 1″ (25mm), 1.5″ (38mm) and 2″ (50mm)globe/angle models with flow control.

Effluent Options Available

Features & Benefits

Heavy-Duty Toro Solenoid
Provides dependable operation and long life.

High-Grade Construction
Made of durable materials to resist wear.

Globe and Angle Configurations
Easy to use in any application.

Fabric-Reinforced Rubber Diaphragm
Provides long-term tear and stretch tolerance.

Water Flow Control Handle
Adjusts the flow of each zone on a system.

Robust ABS Material
Ensures the valve will resist heavy pressure and high flows without damage.

Water Management Highlight

External Bleed

The external bleed allows perfect manual operation of the valve without electrically charging the solenoid. System flushing can also be accomplished using the external bleed with debris and other material being flushed out of the port.

Specifications

Dimensions

- 1" (25mm): 6 ¾" H x 4 ½" W (171 x 114mm)
- 1½" (38mm): 7 ¾" H x 6" W (197 x 152mm)
- 2" (50mm): 9 ½" H x 7" W (241 x 178mm)

Operating Specifications

- Recommended Flow Range:
  – 1" (25mm): 5.0 to 20 GPM (19-76 LPM)
  – 1½" (38mm): 25 to 70 GPM (114-303 LPM)
  – 2" (50mm): 60 to 90 GPM (227-568 LPM)
- Operating Pressure: 20 to 150 psi (1,3-10,3 Bar)
- Solenoid: 24 VAC, 50/60 Hz
  –Inrush: 0.30 amps, 7.20 VA
  –Holding: 0.20 amps, 4.80 VA
- Burst pressure safety rating: 750 psi (51,7 Bar)

Additional Features

- Globe and globe/angle built into one valve
- Manual flow control
- External manual bleed
- 24" (60cm) lead wires 1 ½"(38mm) and 2"(50mm) electric or 18" (45cm) lead wires 1"(25mm) electric
- Self-cleaning, stainless steel metering pin (electric)
- Tough, glass-filled bonnet
- Single-piece diaphragm

Options Available

- 89-7855 – Effluent Water Indicator Valve Flow Control Knob

Warranty

- Two years

Globe and Angle In One Valve

The all-in-one globe and angle configuration allows flexibility in design and installation. Angle installations allow for less friction loss across the piping system while globe configurations are standard in many irrigation systems.

252 Series Model List	
Female NPT In-line/Angle w/Flow Control	
Model	**Description**
• 252-06-04	1" (25mm)
• 252-26-06	1½" (38mm)
• 252-26-08	2" (50mm)
• 252-21-06	1 ½" (38mm) Normally Open
• 252-21-08	2" (50mm) Normally Open

252 Series Friction Loss Data—US

Size	Type	Config.	GPM Flow												
			5	10	20	25	30	40	50	60	70	80	100	120	150
1½"	Hydraulic	Globe Angle				1.0 1.0	1.0 1.0	2.0 1.5	3.0 1.5	4.0 3.0	5.5 4.0	6.5 5.0			
2"	Hydraulic	Globe Angle								1.5 1.0	2.0 1.0	2.0 1.5	3.5 2.0	5.0 3.0	8.0 5.0
1"	Electric	Globe Angle	3.0 2.0	4.0 3.5	5.0 4.5	6.0 4.5	7.0 5.0	9.5 7.5							
1½"	Electric	Globe Angle				1.5 1.5	1.0 1.0	2.0 1.5	3.0 2.0	4.0 3.0	5.0 3.0	7.0 5.0			
2"	Electric	Globe Angle								2.0 1.0	2.0 1.0	2.5 2.0	3.5 3.0	5.5 4.0	8.0 5.0

Note: For optimum performance when designing a system, be sure to calculate total friction loss to ensure sufficient downstream pressure. For optimum regulation performance, size regulating valves toward the higher flow ranges. Flow rates are recommended not to exceed 5 psi (0,3 bar) loss.

= Debris-resistant models

Specifying Information—252

252-XX-0X		
Model	**Activation Type**	**Size**
252	**XX**	**0X**
252—252 Series Valve	06—1" Electric 21—Normally Open Hydraulic 26—1½" or 2" Electric	4—1" (25mm) 6—1½" (40mm) 8—2" (50mm)
Example: A 1½" (40mm) electric 252 Series Valve, would be specified as: **252-26-06**		

Note: DC Latching Solenoid not available.

P-220 Series

- 1" (25mm), 1½" (37mm), 2" (50mm), 3" (75mm)
- Electric
- Pressure-regulating
- Globe, Angle

For proven reliability in the field, the Toro® P-220 Series valves deliver. Constructed of heavy-duty, glass-filled nylon material, these valves are ready to consistently withstand pressures up to 220 PSI (15 Bar).

Effluent Options Available

Pressure Regulation

DC Latching Solenoid Option

Features & Benefits

Durable Glass-Filled Nylon
Ensures the P-220 can operate at pressures up to 220 psi (15 Bar).

Precise Pressure Control Option
Compact EZReg® dial-design technology (factory or field installed - no need to remove solenoid).

Internal And External Manual Bleed
Keeps valve box dry and easy to use.

Schrader Valve Pre-Installed
Simple verification of downstream pressure.

Nearly Three Times the Lightning Protection of Competitive Product
With a lightning rating exceeding 20,000 volts.

Optional Spike-Guard™ Solenoid
Reduces wire size requirements, allows twice as many valves to run simultaneously on a transformer, and lowers power costs.

Filter Screen On 2" (50mm) & 3" Models (75 mm)
Allows for upstream filtration of water to ensure no clogging occurs inside the valve.

Water Management Highlight

Pressure Regulator

The EZReg® module can regulate with flows of only 5 GPM (0,3 Bar) with a 1" (25mm) valve and it only requires 10 psi (0,7 Bar) differential to operate. The pressure regulator can be easily and quickly installed—even under pressure, with no danger of water geysers.

Specifications

Dimensions

- 1" (25mm): 6 ¾" H x 3 ⅝" W (171 x 92mm)
- 1 ½" (38mm): 7 ¼" H x 3 ⅝" W (184 x 92mm)
- 2" (50mm): 9 ½" H x 6 ⅛" W (241 x 156mm)
- 3" (75mm): 10 ¾" H x 6 ⅛" W (273 x 156mm)

Operating Specifications

- Flow Range:
  – 1" (25mm): 5 to 35 GPM (19-114 LPM)
  – 1 ½" (38mm): 30 to 110 GPM (114-265LPM)
  – 2" (50mm): 80 to 180 GPM (300-530 LPM)
  – 3" (75mm): 150 to 300 GPM (568-852 LPM)
- Operating Pressure:
  – Electric – 10 to 220 psi (0,7-15 Bar)
- Pressure regulating:
  – Outlet (EZR-30): 5 to 30 psi ± 3 (0,3-2,0 Bar)
  – Outlet (EZR-100): 5 to 100 psi ± 3 (0,3-7,0 Bar)
- Inlet: 10 to 220 psi (0,7-15,0 Bar)
- Minimum pressure differential (between inlet and outlet) for pressure regulation: 10 psi (0,7 Bar)
- Burst pressure safety rating: 750 psi (51,7 Bar)
- Body styles:
  – Globe/Angle – 1", 1 ½", 2", 3" (25, 40, 50, 75mm) female threads
- Spike Guard™ Solenoid: 24 VAC (50/60 Hz) Standard
  – Inrush: 60 Hz: 0.12 amps
  – Holding: 60 Hz: 0.1 amps
- 102-7053 Solenoid: 24 VAC (50/60 Hz)
  – Inrush: 60 Hz: 0.4 amps
  – Holding: 60 Hz: 0.2 amps

Additional features

- Tough glass-filled nylon and stainless steel construction
- Internal and External bleed
- Pressure regulates in electric or pressure-regulating models
- No external tubing for either pressure-regulating model
- Standard, built-in Schrader-type valve for downstream pressure verification
- Flow control independent of solenoid
- Self-aligning bonnet to ensure correct installation
- Self-cleaning, stainless steel metering rod
- Low-flow capability down to 5 GPM (18,9 LPM) with EZReg
- Low-power requirement for longer wire runs

Options Available

- EZR-30 - EZReg, 5–30 psi (0,3-2,1 Bar) Regulator Module
- EZR-100 - EZReg, 5–100 psi (0,3-7,0 Bar) Regulator Module
- EFF-KIT-60Hz - Effluent Water (Lavender) Solenoid Assembly (24 VAC, 60 Hz) and Warning Tag
- 102-7053 - 24 VAC Solenoid Assembly, 60 Hz, 18" (457mm) Leads, Captive Plunger
- DCLS-P - Potted DC Latching Solenoid Assembly

Warranty

- Five years

P-220 Series Model List

Model	Description	With Pre-Installed Latching Solenoids
• P220-26-04 • P220-26-06 • P220-26-08 • P220-26-00	1"(25mm) In-line, Angle 1½"(38mm) In-line, Angle 2"(50mm) In-line, Angle 3"(75mm) In-line, Angle	• P220-26-94 • P220-26-96 • P220-26-98 • P220-26-90
Pressure-Regulated With EZ Reg®		**With Pre-Installed Latching Solenoids**
Model	**Description**	
• P220-27-04 • P220-27-06 • P220-27-08 • P220-27-00	1"(25mm) In-line, Angle 1½"(38mm) In-line, Angle 2"(50mm) In-line, Angle 3"(75mm) In-line, Angle	• P220-27-94 • P220-27-96 • P220-27-98 • P220-27-90

P-220 Series Friction Loss Data—US

Size	Config.	GPM Flow																					
		5	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	180	200	225	250	275	300
1"	Globe Angle	4.00 4.00	4.20 4.20	3.20 3.10	4.10 2.70	7.20 4.80																	
1½"	Globe Angle				1.60 1.30	2.30 1.60	3.60 2.80	5.20 4.00	7.00 5.50	9.20 7.10	11.20 8.90	13.60 10.90	16.40 13.50										
2"	Globe Angle									2.10 1.20	2.70 1.60	3.30 2.00	4.00 2.40	4.80 2.80	5.60 3.30	6.50 3.90	7.50 4.40	8.70 5.20					
3"	Globe Angle																2.50 1.90	3.00 2.40	4.10 3.30	5.30 4.30	6.70 5.50	8.30 6.90	10.10 8.50

Note: For optimum performance when designing a system, be sure to calculate total friction loss to ensure sufficient downstream pressure. For optimum regulation performance, size regulating valves toward the higher flow ranges. Flow rates are recommended not to exceed 5 psi loss.

Specifying Information—P220

P220-2X-X-X

Model	Activation Type	Solenoid	Size
P220	**2X**	**X**	**X**
P220—P-220 Series Plastic Valve	26—NPT, Electric 27—NPT, Pressure-regulated EZR-100 (Standard)	0—Standard Solenoid 9—DC Latching Solenoid	4—1" (25mm) 6—1½"(38mm) 8—2" (50mm) 0—3" (75mm)

Example: A 1" (25mm) P-220 Series plastic electric, pressure-regulating valve would be specified as: **P220-27-04**

P-220 Scrubber Series

- 2" (50mm), 3" (75mm)
- Electric
- Pressure-regulating
- Globe, Angle

A true dirty water irrigation valve, able to handle chlorine and other chemicals found in reclaimed and other non-potable water systems.

Effluent Options Available

Pressure Regulation

DC Latching Solenoid Option

Features & Benefits

Durable Glass-Filled Nylon
Ensures the P-220 can operate at pressures up to 220 psi (15 Bar).

Active Cleansing Technology (ACT™)
Industry's first active scrubber valve cleans continuously whereas competitive valves only clean on opening and closing.

Fabric-reinforced EPDM Diaphragm and EPDM Seat
Designed to work in virtually all water applications.

Rugged Internal Plastic And Stainless Steel Parts
Scrubber fan, nut and metering system are designed with marine and aerospace plastics and metals which make them resistant to water treated with chlorines and ozones.

Precise Pressure Regulation Option
Compact EZReg® dial-design technology ensures precise downstream pressure for optimizing sprinkler head performance.

Completely Serviceable and Retrofitable
Diaphragm assembly may be replaced or retrofitted to previous models.

ACT™ System

Patent-pending Active Cleansing Technology – in which the turbine is constantly rotating to clean the metering/filtration area. This ensures that dirt, algae, chlorines, chloramines and water treated with ozone will not impede valve performance.

Specifications

Dimensions

- 2" (50mm): 9 ½" H x 6 ⅛" W (241 x 156mm)
- 3" (75mm): 10 ¾" H x 6 ⅛" W (273 x 156mm)

Operating Specifications

- Flow Range:
  – 2" (50mm) 80 to 180 GPM (302 to 681 LPM)
  – 3" (75mm) 150 to 300 GPM (568 to 1136 LPM)
- Operating Pressure
  – Electric – 20 to 220 psi (1,4 to 15,2 Bar)
- Pressure regulating:
  – Outlet (EZR-30): 5 to 30 psi ± 3 (0,3 to 2,1 Bar)
  – Outlet (EZR-100): 5 to 100 psi ± 3 (0,3 to 7,0 Bar)
- Inlet: 10 to 220 psi (0,7 to 15,2 Bar)
- Minimum pressure differential (between inlet and outlet) for pressure regulation: 10 psi (0,7 Bar)
- Body styles:
  – Globe/Angle – 2"(50mm), 3"(75mm) female threads
- 102-7053 Solenoid: 24 VAC (50/60 Hz) Standard
  – Inrush: 60 Hz: 0.4 amps
  – Holding: 60 Hz: 0.2 amps

Additional features

- Tough glass-filled nylon and stainless steel construction
- Internal and External bleed
- Pressure regulates in electric or pressure-regulating models
- No external tubing for either pressure-regulating model
- Standard, built-in Schrader-type valve for downstream pressure verification
- Flow control independent of solenoid
- Self-aligning bonnet to ensure correct installation
- Self-cleaning, stainless steel metering rod
- Low-flow capability down to 5 GPM (18,9 LPM) with EZReg
- 316 nuclear-grade stainless-steel stem for maximum corrosion resistance

Options Available

- EZR-30 - EZReg, 5-30 psi (0,3-2,1 Bar) Regulator Module
- EZR-100 - EZReg, 5-100 psi (0,3-7,0 Bar) Regulator Module
- EFF-KIT-60 Hz - Effluent Water (Lavender) Solenoid Assembly (24 VAC, 60 Hz) and Warning Tag
- 102-7053 - 24 VAC Solenoid Assembly, 60 Hz, 18" (45,7cm) Leads, Captive Plunger

Warranty

- Five years

P-220 Scrubber Series Model List	
Model	**Description**
• P220S-26-08	P-220, 2" (50mm) with ACT™ System
• P220S-26-00	P-220, 3" (75mm) with ACT™ System
• P220S-27-08	P-220, 2" (50mm) with EZReg® and ACT™ System
• P220S-27-00	P-220, 3" (75mm) with EZReg® and ACT™ System
• P220S-KIT-08	2" (50mm) Scrubber diaphragm assembly kit
• P220S-KIT-00	3" (75mm) Scrubber diaphragm assembly kit

P-220S Series Friction Loss Data—US

Size	Config.	GPM Flow													
		80	90	100	110	120	130	140	150	180	200	225	250	275	300
2"	Globe	3.87	4.29	4.41	6.50	7.78	9.30	9.94	12.15						
	Angle	2.79	3.58	5.69	5.62	6.4	7.35	8.95	9.94						
3"	Globe								2.65	3.40	5.10	5.98	6.70	7.73	11.05
	Angle								2.10	2.65	4.65	4.30	5.54	6.98	9.95

Note: For optimum performance when designing a system, be sure to calculate total friction loss to ensure sufficient downstream pressure. For optimum regulation performance, size regulating valves toward the higher flow ranges. Flow rates are recommended not to exceed 5 psi loss.

Specifying Information—P220S

P220S-2X-X-X			
Model	**Activation Type**	**Solenoid**	**Size**
P220S	**2X**	**X**	**X**
P220S—P-220S Scrubber Series Plastic Valve	6—NPT, Electric 7—NPT, Pressure-regulated EZR-100 (Standard)	0—Standard Solenoid 9—DC Latching Solenoid	8—2" (50mm) 0—3" (75mm)
Example: A 2" (50mm) P-220S Series plastic electric, pressure-regulating valve would be specified as: **P220S-27-08**			

220 Brass Series

- 1" (25mm), 1¼" (31mm), 1½" (37mm), 2" (50mm), 2½" (67mm),3" (75mm)
- Electric
- Pressure-regulating
- Globe, Angle

Built for superior performance under pressure, these Toro® heavy-duty brass and stainless steel valves are rugged and reliable. The debris-resistant design is tested and proven under the harshest conditions.

Effluent Options Available

Pressure Regulation

DC Latching Solenoid Option

Notes: All come with Effluent Sticker and Label. Compatible with DC Latching Solenoid.

Features & Benefits

Nearly Three Times the Lightning Protection of Competitive Product
With a lightning rating exceeding 20,000 volts.

Precise Pressure Control Option
Compact EZReg® dial-design technology (factory or field installed - no need to remove solenoid).

Dirty Water Resistance
120-mesh, stainless steel filter screen is constantly flushed by the flow, enabling the use of very dirty water without clogging and valve closure failure.

External Downstream Manual Bleed
Keeps valve box dry and allows for manually setting pressure regulation.

Spike-Guard™ Solenoid
Reduces wire size requirements, allows twice as many valves to run simultaneously on a transformer and lowers power costs.

Water Management Highlight

Dirty Water Resistance

The 120-mesh, stainless steel filter screen is positioned on the supply side of the water stream. It is constantly flushed by the flow, enabling the use of very dirty water without clogging. Stainless steel construction of both the filter screen and the valve solenoid seat ensure long component life in all types of water and pressures.

Specifications

Dimensions

- 1"(25mm): 5 ¼" H x 5" W (133 x 127mm)
- 1 ¼" (31mm): 6 ½" H x 6" W (165 x 152mm)
- 1 ½"(37mm): 6 ½" H x 6" W (165 x 152mm)
- 2" (50mm): 7 ½" H x 7" W (191 x 178mm)
- 2 ½" (67mm): 8 ¾" H x 8 ½" W (223 x 216mm)
- 3" (75mm): 8 ¾" H x 8 ½" W (223 x 216mm)

Operating Specifications

- Flow Range:
  - 1"(25mm): 5 to 40 GPM (19 to 151 LPM)
  - 1 ¼" (31mm): 20 to 100 GPM (75 to 378 LPM)
  - 1 ½"(37mm): 20 to 130 GPM (75 to 492 LPM)
  - 2" (50mm): 30 to 180 GPM (114 to 681 (LPM)
  - 2 ½" (67mm): 60 to 250 GPM (227 to 946 LPM)
  - 3" (75mm): 80 to 350 GPM (303 to 1324 LPM)
- Operating Pressure:
  - Electric – 10 to 220 psi 1,4 to 15,2 Bar)
  - Pressure regulating:
  - Outlet (EZR-30): 5 to 30 psi ± 3 (0,3 to 2,1 Bar)
  - Outlet (EZR-100): 5 to 100 psi ± 3 (0,3 to 7,0 Bar)
- Inlet: 10 to 220 psi (1,4 to 15,2 Bar)
- Minimum pressure differential (between inlet and outlet) for pressure regulation: 10 psi (1,4 Bar)
- Burst pressure safety rating: 750 psi (51,7 Bar)
- Body styles:
  - Globe valve – 1" (25mm), 1 ¼"(32mm), 1 ½"(37mm), 2"(50mm) female threads
  - Angle valve – 2 ½"(67mm), 3"(75mm) female threads
- Spike Guard™ Solenoid: 24 VAC (50/60 Hz) Standard
  - Inrush: 60 Hz: 0.12 amps
  - Holding: 60 Hz: 0.1 amps

Additional features

- Diaphragm stem guide
- 316 nuclear-grade stainless-steel stem for maximum corrosion resistance
- Pressure regulator can be installed as a service kit without draining the main line
- Pressure regulates in electric and manual modes, serviceable under pressure
- Forward-flow design for more precise regulation
- Standard, built-in Schrader-type valve for downstream pressure verification
- Anti-vandal dust cap on pressure-regulating models
- No external tubing for either electric or pressure regulating models
- Manual flow control: adjustable to zero flow
- Tough, double-beaded, fabric-reinforced rubber diaphragm

Options Available

- EZR-30 - EZReg, 5-30 psi (0,3-2,1 Bar) Regulator Module
- EZR-100 - EZReg, 5-100 psi (0,3-7,0 Bar) Regulator Module
- EFF-KIT-60 Hz - Effluent Water (Lavender) Solenoid Assembly (24 VAC, 60 Hz) and Warning Tag
- 102-7053 - 24 VAC Solenoid Assembly, 60 Hz, 18" (45,7cm) Leads, Captive Plunger
- DCLS-P - Potted DC Latching Solenoid Assembly

Warranty

- Five years

220 Brass Series Friction Loss Data—US

Model	Type	GPM Flow																		
		5	10	15	20	30	40	50	60	70	80	100	120	150	170	180	200	250	300	350
1"	Electric	2.0	2.5	1.5	2.5	5.5	8.9													
1¼"	Electric				4.4	4.7	5.1	5.5	5.8	7.2										
1½"	Electric				3.9	4.2	4.6	4.9	5.2	5.5	7.2									
2"	Electric					1.0	2.0	2.0	2.5	3.0	3.5	6.0	7.5	10.0						
2½"	Electric								2.0	2.2	2.3	2.4	2.5	3.0	4.0	4.5	5.5			
3"	Electric										2.2	2.4	2.5	3.0	4.0	4.5	5.5	6.5	7.0	7.5

Notes: For optimum performance when designing a system, calculate total friction loss to ensure sufficient downstream pressure.
For optimum regulation performance, size regulating valves toward the higher flow ranges.
Flow rates are recommended not to exceed 5 psi loss.

Specifying Information—220 Brass

220-2X-X-X			
Model	**Activation Type**	**Solenoid**	**Size**
220	**2X**	**X**	**X**
220—220 Series Brass Valve	6—NPT, Electric 7—NPT, Pressure regulated (5–100)	0—Spike Guard Solenoid 6—Less Solenoid 9 - DC Latching Solenoid	4—1" (25mm) 8—2" (50mm) 5—1¼"(32mm) 9—2½"(65mm) 6—1½"(40mm) 0—3" (75mm)
Example: A 1" (25mm) NPT pressure-regulated, 220 Series Brass Valve with Spike Guard solenoid, would be specified as: **220-27-04**			

Note: 1", 1½" and 2" —globe configuration.
2½" and 3"—angle configuration.

220 Brass Series Model List	
Model	**Description**
• 220-26-04	1" (25mm) In-line
• 220-26-05	1 ¼" (31mm) In-line
• 220-26-06	1 ½" (37mm) In-line
• 220-26-08	2" (50mm) In-line
• 220-26-09	2 ½" (67mm) Angle
• 220-26-00	3" (75mm) Angle
Pressure Regulated With EZREG®	
• 220-27-04	1" (25mm) In-line
• 220-27-05	1 ¼" (31mm) In-line
• 220-27-06	1 ½" (37mm) In-line
• 220-27-08	2" (50mm) In-line
• 220-27-09	2 ½" (67mm) Angle
• 220-27-00	3" (75mm) Angle
With Latching Solenoid	
• 220-26-94	1" (25mm) In-line
• 220-26-95	1 ¼" (31mm) In-line
• 220-26-96	1 ½" (37mm) In-line
• 220-26-98	2" (50mm) In-line
• 220-26-99	2 ½" (67mm) Angle
• 220-26-90	3" (75mm) Angle
Electric Valves Less Solenoid	
• 220-26-64	1" (25mm) In-line
• 220-26-66	1 ½" (37mm) In-line
• 220-26-68	2" (50mm) In-line
• 220-26-60	3" (75mm) Angle

Quick Coupler Series

- 3/4" (20mm) and 1" (25mm)
- Standard, Vinyl, Effluent

Toro® Quick Coupler valves are designed for durable everyday use in projects requiring quick remote water access to the mainline water supply.

Effluent Options Available

Features & Benefits

Stainless Steel And Brass Construction
Quick Couplers are also available with metal or vinyl covers in locking or non-locking options.

Multiple Models To Choose From
There are a variety of one-piece and two-piece models in ¾" (20mm) and 1" (25mm) sizes, including ACME thread key connections.

Eliminate Tangled Hoses
The 360-degree hose swivel provides movement without hose tangling.

¾" (20mm) Quick Coupling Valves and Accessories Model List

Model	Description
• 075-SLSC	One-piece, ¾" (20mm) Single Lug, Quick Coupler w/Standard Metal Cover
• 075-SLK	¾" (20mm) Single Lug Key, with 1/2" (12mm) Top Pipe Thread Outlet
• 075-75MHS	¾" (20mm) NPT x ¾" (20mm) MHT Hose Swivel

1" Quick Coupling Valves and Accessories Model List

Model	Description
• 100-SLSC	One-piece, 1"(25mm) Single Lug, Quick Coupler w/Metal Cover
• 100-SLVC	One-piece, 1" Single Lug, Quick Coupler w/Vinyl Cover
• 100-SLVLC	One-piece, 1" (25mm) Single Lug, Quick Coupler w/Vinyl Locking Cover
• 100-2SLVC	Two-piece, 1" (25mm) Single Lug, Quick Coupler w/Vinyl Cover
• 100-ATLVC	One-piece, 1" (25mm) Quick Coupler w/Acme Thread and Lavender Locking Vinyl Cover
• 100-2SLLVC	Two-piece, 1" (25mm) Single Lug Quick Coupler w/Lavender Vinyl Locking Cover
• 100-AK	1" (25mm) Acme Thread, 1" (25mm) Top Pipe Thread Outlet
• 100-SLK	Single Lug Key, 1" (25mm) Top Pipe Thread Outlet w/Internal ¾" (20mm) NPT Threads
• 075-MHS	¾" (20mm) NPT x 1" (25mm) MHT Hose Swivel
• 100-MHS	1" (25mm) NPT x 1" (25mm) MHT Hose Swivel
• LK	Key for Locking Cap

Quick Coupler Series Friction Loss Data—US

Model Number	GPM Flow											
	10	15	20	25	30	35	40	50	60	70	85	100
075-SLSC	1.5	3.1	5.3	8.5								
100-2SLLC			1.1	2.2	3.6	5.7	8.0					

Note: For optimum sprinkler performance when designing a system, be sure to calculate total friction loss to ensure sufficient downstream pressure. Values listed in psi. Flow rates are recommended not to exceed 5 psi loss.

Specifying Information—Quick Couplers

XXX-XX-XX		
Size	**Nozzle**	**Optional**
XXX	XX	XX
075—¾" (20mm) 100—1" (25mm)	SL—One-piece, Single Lug 2SL—Two-piece, Single Lug AT—ACME Thread	SC—Standard Cover VC—Vinyl Cover LVC—Effluent Vinyl Cover VLC—Vinyl Locking Cover
Example: A 1" (25mm) one-piece, single lug Quick Coupler Valve with a vinyl locking cover, would be specified as: **100-SLVLC**		

Valve Accessories

Solenoids

DCLS-P

- Potted DC latching solenoid for Toro valves used with EZ-Flo Plus, TPV, P-220 or 220 Series brass valves

102-7053

- Solenoid assembly for EZ-Flo Plus, TPV, P-220 or 220 Series brass valves
- Captive hex plunger features
- 24 VAC
- 60 Hz, 18" (0,5m) leads

SGS

- Spike Guard Solenoid compatible with EZ-Flo Plus, TPV, P-220 or 220 Series brass valves
- Inrush 0.2A
- Holding: 0.1A
- 20,000 volts lightning rating

LWS

- Low Wattage Solenoid compatible with EZ-Flo Plus, TPV, P-220 or 220 Series brass valves
- Inrush 0.2A
- Holding: 0.1A

Effluent Water Indicators

89-7855

- Effluent flow-control knob for 254/264, 250/260 and 252 Series valves

EFF-Kit-60Hz

- Effluent solenoid with warning tag for EZ-Flo Plus, TPV , P-220 or 220 Series brass valves
- Captive hex plunger features
- 24 VAC, 0.40 amp inrush, 0.20-amp-holding

RWSG-Kit

- Effluent sticker and tag for P-220 valves with Spike Guard solenoids

1088501

- Effluent tag for use with Toro or competitive valves

EZReg™ Pressure-regulation Options

EZR-30 and EZR-100

- Pressure-regulator module for use with P-220 and 220 Series valves
- Precise pressure control with dial design
- EZR-30: 5–30 psi (0,3–2,0 Bar)
- EZR-100: 5–100 psi (0,3–7,0 Bar)

Valve Wire Sizing Chart

Maximum One-way Distance (in ft.) Between Controller and Valve Using Spike-Guard™ Solenoid*

Ground Wire	Control Wire						
	18	16	14	12	10	8	6
18	2040	2520	2940	3280	3540	3720	3860
16	2520	3260	4000	4660	5220	5620	5920
14	2940	4000	5180	6360	7420	8300	8960
12	3280	4660	6360	8240	10100	11800	13180
10	3540	5220	7420	10100	13180	16060	18770
8	3720	5260	8300	11800	16060	20800	25540
6	3860	5960	8960	13180	18700	25540	33080

** Solenoid Model: 24 V ac Pressure: 150 psi*
Voltage Drop: 4 V Minimum Operating Voltage: 20 V Amperage (peak) 0.12 A

Controller Overview

Model	DDC™WP	XTRA Smart™	TMC-212	TMC-424E
Page Number	82-83	84-85	86-87	88-89
Number of Stations	2, 4, 6, 8	2 to 10	2 to 12	4 to 24
Modular		X	X	X
ET-Adjust		X		w/TriComm™
Flow-Sensing				X
TMR-1-Compatible			X	X
Two-wire Decoder				
RainSensor - Compatible	X	X	X	X
Number of Programs	3	3	3	4
Simultaneous Program Operation				X
Number of Start Times	3 Per Program	4 Per Program	4 Per Program	16
Maximum Station Runtime	4 Hours	4 Hours	4 Hours	8 Hours
Days of the Week Programming	X	X	X	X
Odd/Even Programming	X	X	X	X
Interval Programming	X	X	X	X
ET-Optimized Programming				
Valves Per Station	1	2	2	2
Battery-Powered	X			
Armchair™ Programming	X			X
Optional High-Surge Protection				X
Enclosure	Waterproof Indoor/ Outdoor	Indoor	Indoor/Outdoor	Indoor/Outdoor
Warranty	Two years	Two years	Three years	Five years

WaterSmart® Feature

Model	TIS-612	TIS-PRO	Custom Command	TDC Series
Page Number	92	93	94-95	96-98
Number of Stations	6, 9, 12	12, 24, 36, 48	9, 12, 15, 18, 24, 36, 48	100-200
Modular				X
ET-Adjust	X	X		w/TriComm™
Flow-Sensing		X		
TMR-1-Compatible		X	X	X
Two-wire Decoder				X
RainSensor - Compatible	X	X	X	X
Number of Programs	3	4	4	10
Simultaneous Program Operation	X	X	X	X
Number of Start Times	2 Per Program	2 Per Program	16	60
Maximum Station Runtime	24 Hours	24 Hours	10 Hours	24 Hours
Days of the Week Programming	X	X	X	X
Odd/Even Programming	X	X	X	X
Interval Programming	X	X	X	X
ET-Optimized Programming	X	X		
Valves Per Station	2	2	2	2
Armchair™ Programming			X	
Optional High-Surge Protection				X
Enclosure	Indoor/Outdoor	Outdoor	Outdoor	Outdoor
Pedestal Option		X	X	X
Warranty	Five years	Five years	Five years	Five years

WaterSmart® Feature

DDC™WP Series

- 2-, 4-, 6- and 8-Stations
- Battery-powered
- Indoor and Outdoor

Looking for a rugged waterproof controller ideal for remote or isolated installations? Toro's DDCWP Series controller provides all that and more. Using the new potted DC latching solenoid, the DDCWP is battery-operated using two 9V batteries.

Wired Rain Sensor Compatible

Features & Benefits

Fully Waterproof and Submersible
Submersible up to 6.5' (2m) per IP-68 standards, allowing contractors to mount up to an 8-station controller in a valve box.

Operates DC Latching Solenoids
Controller is compatible with most manufacturers' DC Latching solenoids.

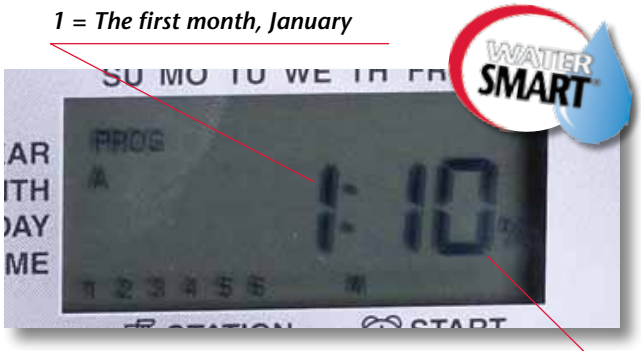
Exclusive "Digital Dial" Technology
Simple programming functions.

Unique Power Feature
Verifies sufficient voltage level for turning stations off before turning any stations on.

Monthly Watering Schedule
Monthly preset option – ideal for automatic runtime adjustments.

Water Management Highlight

1 = The first month, January



10 = 100%. 140% would be designated as 14.

Monthly % Adjust

DDCWP adjusts annual irrigation run time during initial controller set up. Options include from 0-200% and January to December scheduling. With easy adjusting for seasonal watering, water savings is enhanced for all-around intelligent programming.

Specifications

Dimensions

- 5 ¾" W x 5" H x 1 15⁄16" D (145 x 126 x 4,9mm)
- Weight: 23.3 oz. (672 grams) without 9V battery

Operating Specifications and Additional Features

- Operating temperature: 0° - 60° C
- Operates using two x 9V alkaline batteries (not supplied)
- Operates one latching solenoid per station and one latching solenoid-equipped master valve
- Controller is compatible with all Toro valves accepting latching solenoids (model DCLS-P or equivalent) and competitive valve models/latching solenoids
- Accepts Toro TRS Wired RainSensor™, Wired Rain/Freeze and other normally-closed sensors
- Low-battery indicator visible on LCD screen
- Three independent programs and three start times per program
- Three scheduling choices by program:
  –Seven-day calendar
  –1 to 7-day interval
  –Odd/even with 365-day calendar and 31st day exclusion
- Station run times from one minute to four hours in one-minute increments
- Seasonal adjust by month from 0-200% in 10% increments
- Manual operation by station or program
- Self-diagnostic circuit breaker skips shorted stations
- Up to five-year program retention with on-board coin battery saves time of day and all programming features

Warranty

- Two years

EZ-Flo® Plus and P-220 valves shown with the DCLS-P Latching solenoid which provide cost and labor savings.

Battery Cap

Easy installation of two 9V batteries with the simple screw on/off lid. The battery cap provides a dependable leak-proof seal allowing submersion up to 6.5' (2m) per IP-68.

DDCWP Series Model List	
Model	**Description**
• DDCWP-2-9V	2-station
• DDCWP-4-9V	4-station
• DDCWP-6-9V	6-station
• DDCWP-8-9V	8-station

Wire Run Lengths for DDCWP

With battery voltage at 9 VDC, maximum recommended wire runs for an 8-station DDCWP are:

Multi-strand Wire	Distance Feet (meters)
18 AWG (1,0mm²)	197 (60m)
16 AWG (1,5mm²)	305 (93m)
14 AWG (2,5mm²)	493 (150m)
12 AWG (4,0mm²)	820 (250m)

Specifying Information—DDCWP

DDCWP-X-9V		
Description	**Stations**	**Voltage**
DDCWP	XX	XX
DDCWP—Digital Dial Waterproof Controller	2—2 Stations 6—6 Stations 4—4 Stations 8—8 Stations	9V—9 Volt
Example: An 8 station DDCWP controller would be specified as: **DDCWP-8-9V**		

XTRA Smart™

- 2- to 10- Stations
- Indoor
- Wireless, ET-Based Irrigation
- Software Based Programming

The XTRA Smart system includes a computer programmable option for simple set-up and programming based on your site-specific conditions! After programming on your laptop or PC, simply transfer data to the EC-XTRA™ controller using the Smart Pod™ flash drive module. Once information is downloaded to the controller, wirelessly communicate to the XTRA SMART weather sensor and your irrigation run times will adjust along with the weather ensuring the proper amount of water is applied, no more, no less.

Rain Sensor Compatible

Features & Benefits

Software Based Programming Setup
Automatically generate watering schedules in just a few minutes. Enter zone information along with your zip code and watering days to create a base schedule.

Transfer Smart Programming Information to Controller
Save set-up time as the Smart Pod transfers your computer-based programming into the controller.

Weather-Based Schedule Changes
The XTRA SMART weather sensor wirelessly delivers critical weather information to the Smart Pod, which changes controller runtimes automatically.

Scheduling Flexibility
Three independent programs and four start times per program so manual programs can be entered in addition to the computer generated schedule.

Non-Volatile Memory
Requires no batteries and holds programming information for up to five years.

XTRA Smart Software to program Smart Pod

EC-XTRA Controller with Smart Pod plugged

Wirelessly gather daily ET from up to1000 ft. (305m) line of sight

Specifications

Dimensions

- Indoor: 6½" H x 7½" W x 2" D (165 x 190 x 51mm)
- Weight: 3 lbs. 4 oz. (1,5 kg)

Electrical Specifications

- Electrical input power:
  - 120 VAC
  - 18 VA maximum
  - UL, CUL Listed
- Station output power:
  - 24 VAC
  - 0.50 amps per station maximum
  - 0.50 amps pump/master valve
  - 0.70 amps total load

Operating Specifications

- Three programs, four start times per program
- Station run times from one minute to four hours
- Three Scheduling choices
  - Seven-day calendar
  - 1- to 7-day interval with day exclusion
  - Odd/even days with day exclusion
- Programmable well recovery/station delay from 1 to 60 seconds or 1 to 60 minutes
- Pump start delay from 1 to 60 seconds
- Master valve on/off by program
- Automatic split cycle when season adjust is greater than 100%
- Program stacking
- Rain delay from one to seven days
- Hot-swappable station modules
- Compatible with normally open or normally closed rain sensors
- Operation of two solenoids per station (up to 0.50 amps per station max)

Additional Features

- Free XTRA Smart software online
- Automatic updates

Optional Accessories

- TRS – Wired Rainsensor
- 53853-Wired Rain/Freeze Sensor
- TWRS/TWRFS – Wireless RainSensor or Wireless Rain/Freeze Sensor

Warranty

- Two years

Water Management Highlight

Daily weather information transmits to the controller and run times adjust accordingly to ensure the proper amount of water is applied.

Advanced Features

Auto-split on Season Adjust > 100%

The ECXTRA is designed to help minimize the potential for runoff. When Season Adjust is set > 100%, the ECXTRA will automatically split station runtimes in half and run two cycles of the program to minimize the effects of extended runtimes and allow for absorption.

XTRA Smart Model List	
Model	**Description**
• 53855	XTRA Smart Bundle Pack—Controller, Smart Pod and weather station
Station Modules - *Base model includes 8 stations (4 modules)*	
Model	**Description**
• 53741	2-station Expansion Module

TMC-212 Series

- 2- to 12-Stations
- Indoor and Outdoor
- Modular

Designed for flexibility, the Toro® TMC-212 is the ideal controller choice for residential applications. With station count modularity from 2 -12 stations and indoor or outdoor models, it's also one of the only controllers needed in a contractor's inventory.

Rain Sensor Compatible

TMR-1 Compatible

Two-station Modules

Two-station modules provide station count flexibility and cost-effectiveness.

TSM-02 Standard

Features & Benefits

Station Count Modularity
For flexibility and reduced inventory— modular from 2 to 12 stations in 2-station increments.

Automatic Short Detection
For circuit protection and faster troubleshooting.

Non-Volatile Memory
Requires no batteries and holds programming for up to five years.

Scheduling Flexibility
Three independent programs and four start times per program.

Pump Start Compatibility
Pump Delay and Well Recovery/Station Delay with Pump-enabled Option.

Water Management Highlight

Auto-split on Season Adjust > 100%

The TMC-212 is designed to help minimize the potential for runoff. When Season Adjust is set > 100%, the TMC-212 will automatically split station run-times in half and run two cycles of the program to minimize the effects of extended runtimes and allow for absorption.

Specifications

Dimensions

- Indoor: 8" W x 8 ½" H x 2" D (203 x 216 x 51mm)
- Outdoor: 13" W x 9 ½" H x 3 ½" D (330 x 241 x 89mm)
- Weight:
  - Indoor – 3 lbs. 4 oz. (1,5 kg)
  - Outdoor – 5 lbs. 6 oz. (2,4 kg)

Electrical Specifications

- Electrical input power:
  - 120 VAC
  - 18 VA maximum (indoor models)
  - 20 VA maximum (outdoor models)
  - UL, CUL Listed
- Station output power:
  - 24 VAC
  - 0.50 amps per station maximum
  - 0.50 amps pump/master valve
  - 0.70 amps total load
- Surge Protection:
  - 6.0 KV common mode; 600 V normal mode

Operating Specifications

- Three programs, four start times per program
- Station run times from one minute to four hours
- Three Scheduling choices
  - Seven-day calendar
  - 1- to 7-day interval with day exclusion
  - Odd/even days with day exclusion
- Programmable well recovery/station delay from 1 to 60 seconds or 1 to 60 minutes
- Pump start delay from 1 to 60 seconds
- Master valve on/off by program
- Automatic split cycle when season adjust is greater than 100%
- Program stacking
- Rain delay from one to seven days
- Hot-swappable station modules
- Compatible with normally open or normally closed rain sensors
- Operation of two solenoids per station (up to 0.50 amps per station max)
- Indoor and key-lock outdoor models

Optional Accessories

- TRS – Wired RainSensor
- 53853 – Wired Rain/Freeze Sensor
- TWRS/TWRFS – Wireless RainSensor or Wireless Rain/Freeze Sensor
- TMR-1 – Maintenance Remote

Warranty

- Three years

Advanced Features

Pump Start Delay provides settable time delay between activation of MV/PS and first valve to allow for main pressurization. Well Recovery/Station Delay provides settable time delay between stations to allow for slow-closing valves or well refill with selectable MV/PS Energized during delay.

TMC-212 Series Model List	
Model	**Description**
• TMC-212-ID • TMC-212-OD	4-station, Indoor 4-station, Outdoor
Station Modules - *Base model includes 4 stations (2 modules)*	
Model	**Description**
• TSM-02	2-station Expansion Module

Specifying Information—TMC-212

TMC-212-XX	
Model	**Cabinet Type**
TMC-212	XX
TMC-212—Toro Controller	ID—Indoor OD—Outdoor

Specifying Information—TSM Module

TSM-XX	
Model	**Module Description**
TSM	XX
TSM—Toro Station Module	02—2-station Expansion Module
Example: A 6-station indoor TMC-212 Controller, would be specified as: **TMC-212-ID and TSM-02**	

Note: Base model includes four stations (two modules)

TMC-424E Series

- 4- to 24-Stations
- Indoor and Outdoor
- Modular
- Flow-Sensing

The TMC-424E Series takes modularity to a whole new level. Toro's advanced modular technology combines sophisticated features with simple operation to provide a customizable controller.

Rain Sensor Compatible

Flow Sensor Compatible

TriComm™ Compatible

TMR-1 Compatible

Features & Benefits

Station Count Modularity
Station count modularity from 4 to 24 stations using 4- or 8-station modules for flexibility.

Two Levels of Surge Protection
Standard or High Surge modules provide options to meet regional lightning protection needs.

Flow-Sensing
Monitor and react to system leaks or breaks.

Up to 4 Master Valve or Pump Start Connections
Options for connection of up to four Master Valve or Pump Start Relays utilizing TSM-4F or TSM-8F modules.

Run Times In Minutes or Seconds
Ability to set run times for less than a minute provides efficient watering for planter box, misting cycle, nursery, or syringe cycle needs.

Armchair Programming
Removable Timing Mechanism can be powered by 9V battery allowing for easy and comfortable programming.

Water Management Highlight

Flow-Sensing for Greater Water Savings

With flow-sensing capability that monitors up to three independent flow sensors, the controller consistently monitors for problems and takes action as needed to isolate breaks or system issues.

Specifications

Dimensions

- 10¾" W x 10¼" H x 4 5/8" D (273 x 260 x 117mm)
- Weight: Indoor–7.5 lbs. (3,4 kg); Outdoor–7.1 lbs. (3,2 kg)

Electrical Specifications

- Input power:
  - 120 VAC
  - 30 VA (internal and external plug-in type transformer)
  - UL, CUL-listed
- Station output power:
  - 24 VAC
  - 0.50 amps per station maximum
  - 0.50 amps pump/master valve
  - 1.20 amps total load
- Surge Protection:
  - Standard – 6.0 KV common mode; 600 V normal mode
  - High Surge – 6.0 KV common mode; 6.0 KV normal mode

Specifications and Features

- Four programs with 16 total start times
- Three Scheduling choices
  - Seven-day calendar
  - 1- to 31-day interval with day exclusion
  - Odd/even days with day exclusion
- Station run times in minutes or seconds
- Programmable well recovery/station delay from 1 to 60 seconds or 1 to 60 minutes
- Pump start/master valve settable by program and station
- Operate up to three programs simultaneously
- Rain delay from one to 14 days and water budgeting from 0-200% in 10% increments
- Hot-swappable station modules
- Review feature quickly recaps all program information
- Short detection for faster troubleshooting
- Valve Test mode for quick system checks
- Multi-language capability (English, Spanish, French, Italian, German and Portuguese)
- Program erase
- 12/24-hour real-time clock
- Non-volatile memory

Optional Accessories

- Tri-Comm™ – Web-based remote management
- TRS – Wired RainSensor
- 53853 – Wired Rain/Freeze Sensor
- TWRS/TWRFS – Wireless RainSensor or Wireless Rain/Freeze Sensor
- TMR-1 – Maintenance Remote
- TFS-Flow Sensor

Warranty

- Five years

Up to 4 Master Valve/PS Connections

One on controller terminal block and 3 flow-sensing modules. Any station can be assigned to any MV. Options for a single station to activate both a controller and flow module MV/PS connection (e.g., MV and Booster Pump activation).

TMC-424E Series Model List	
Model	**Description**
• TMC-424E-ID* • TMC-424E-OD*	Modular, Indoor Modular, Outdoor
Base models include TSM-4 (4-station Module)	
Station Modules - *Base model includes 4 stations*	
Model	**Description**
• TSM-4 • TSM-4H • TSM-4F • TSM-8 • TSM-8H • TSM-8F	4-station Expansion Module 4-station Expansion Module, High-Surge 4-station Expansion Module, Flow-Sensing 8-station Expansion Module 8-station Expansion Module, High-Surge 8-station Expansion Module, Flow-Sensing

Specifying Information—TMC-424

TMC-424E-XX-XX-XX-XX		
Model	**Type**	**Module Description**
TMC-424E	XX	XX-XX-XX
TMC-424E—Toro Controller	ID—Indoor OD—Outdoor	4—4-station, Standard-Surge 4H—4-station, High-Surge 4F—4-station, High-Surge and Flow-Sensing 8—8-station, Standard-Surge 8H—8-station, High-Surge 8F—8-station, High-Surge and Flow-Sensing
Example: A 16-station TMC-424E controller in an indoor cabinet with one flow monitor would be specified as: **TMC-424E-ID-8F-8**		

** Note: Base model comes with one TSM-4 (4-station) included.*

TIS Family *(Intelli-Sense™)*

- **TIS-612**
- **TIS-PRO**
- **ET-Based Irrigation**

Now you're talking seriously smart irrigation!
Using ET-based technology, Toro® Intelli-Sense Series controllers ensure landscapes receive the right amount of water – no more, no less.

ET Adjust

Rain Sensor Compatible

Flow Sensor Compatible

TMR-1 Compatible

Features & Benefits

Daily, ET-Driven, Self-Adjusting Runtimes
Complies with most municipal and smart controller rebate programs.

Patented WeatherTRAK® Scheduling Engine
Determines optimum schedule for your landscaping, taking into account:
- Sprinkler type, precipitation rate and efficiency
- Plant type and root depth
- Slope and sprinkler location on slope
- Soil type
- Micro-climate
- Usable rainfall

ET Everywhere™ Data Service
Real-time sophisticated modeling system that provides weather data accurate to the square kilometer.

No Need for Unsightly Weather Stations
Accurate, real-time, ET-based irrigation without the need for unsightly weather stations or time-consuming and inconvenient sensor maintenance.

Irrigation Association (IA) SWAT™ Certified
Performance scores were 100% Adequacy and 0% Watering Excess.

Intelli-Sense™ Antennas
In some installations, an external Antenna will be required for proper ET Everywhere™ signal reception. In these locations, an antenna will need to be purchased and installed for TIS-612 Controllers. TIS-PRO controllers come with pre-installed pancake antennas. An optional antenna amplifier is also available. Contact WeatherTRAK Customer Support for help in identifying antenna needs.

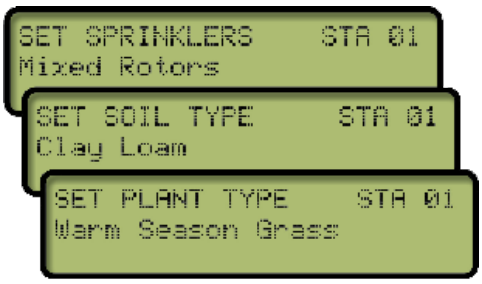
Specifying Information—TIS Antenna

TIS-ANT-XX	
Description	**Model**
TIS	**ANTXX**
TIS – Toro Intelli-Sense	ANT – Bowtie Antenna – For plastic wall mount TIS-612 controllers. ANT02 – Pancake Antenna for Metal Cabinet Mounting.
ANT-AMP-KIT – Optional Antenna Amplification Kit (powered).*	

* Antenna Amplifier Kit is available only from WeatherTRAK Customer Support.

ET Everywhere™

Intelli-Sense uses WeatherTRAK® scheduling software to automatically calculate the optimum irrigation schedule—based on a series of self-prompting questions answered upon installation*.

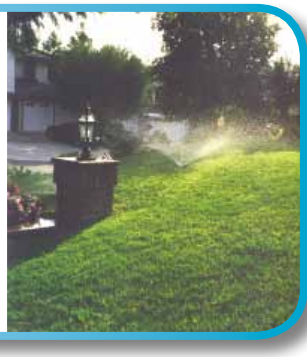


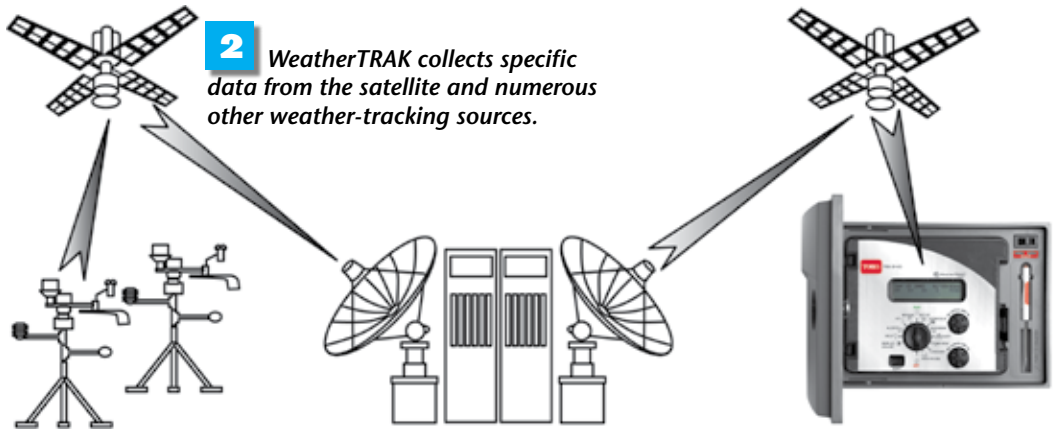
* Variables include:

- Sprinkler type
- Precipitation rate
- Efficiency rate
- Soil type
- Plant type
- Root depth
- Micro climate
- Slope factor

Every day, site-specific information is gathered from weather stations, transmitted through satellites and delivered via ET Everywhere™ to the Intelli-Sense controller.

Based on the daily updates, irrigation schedules are updated automatically to ensure precise water amounts are delivered —every time.





1 *Across the US each day, a vast network of weather stations transmit weather data to the NOAA satellite*

2 *WeatherTRAK collects specific data from the satellite and numerous other weather-tracking sources.*

3 *This information is then analyzed and converted to location-specific evapotranspiration (ET) data (accurate to one square kilometer) and transmitted to the WeatherTRAK wireless network.*

4 *Current ET data is then broadcast to Intelli-Sense controllers (with ET Everywhere service enabled) and adjusts irrigation schedules accordingly.*

Specifying Information—ET Everywhere™ Data Service

ETE-XXX-XY		
Model	**Stations**	**Service**
ETE	XX	XX
ETE—ET Everywhere	612—6, 9 or 12 stations PRO—12, 24, 36, 48 stations	1Y—One Year 2Y—Two Years 3Y—Three Years 5Y—Five Years
Contact WeatherTRAK Customer Service at 1-800-362-8774 for purchase and activation of ET Everywhere Data Service.		

TIS-612 Series

- 6-, 9-,12-stations
- ET-Based
- Indoor and Outdoor

Rain Sensor Compatible

Flow Sensor Compatible

Specifications

Dimensions

- Indoor models: 7½" H x 6½" W x 3¼" D (190 x 165 x 83mm)
- Outdoor models: 7½" H x 9½" W x 5¾" D (190 x 241 x 146mm)
- Weight:
  - Indoor models: 4 lbs. 8 oz. (2,0 kg)
  - Outdoor models: 5 lbs. 6 oz. (2,4 kg)

Electrical Specifications

- Input power: 120 VAC, (60 Hz)
- Station output power:
  - 24 VAC (60 Hz)
  - 0.50 amps per station maximum
  - 0.375 amps pump/master valve
  - 1.0 amps total load (TIS-612)
- UL/CSA-listed transformer

Specifications and Features

- Three independent programs with one start time per program, with optional second start time per program for high ET days
- Selectable water window
- Scheduling with 365-day calendar:
  - Optimized by WeatherTRAK® with day exclusion
  - Odd/Even
  - Interval (1-31 days)
  - Days of Week (1-7 days)
- Three runtime programming options: 1) Automated by WeatherTRAK; 2) User-set runtimes; 3) User-set runtimes with ET-adjustment
- Independent station adjust from -50% to +25% in 5% increments
- Program stacking or simultaneous operation of two programs
- Cycle-and-soak programming allows up to 20 cycles per start time
- 365-day calendar includes optional automatic adjustment for daylight savings
- Review mode shows schedule and programming for each valve
- Selectable maximum ET value
- Last downloaded ET values include time and date stamp
- Selectable crop coefficients (Kc values) for custom plant types
- Automatic short detection for faster troubleshooting
- Non-volatile memory maintains programming during a power outage for up to 10 years

Optional Accessories

- TIS-ANT - Intelli-Sense Antenna
- TRS – Wired RainSensor
- 53853 – Wired Rain/Freeze Sensor
- TWRS/TWRFS – Wireless RainSensor or Wireless Rain/Freeze Sensor

Warranty

- Five years

TIS-612/240 Series Model List

Model	Description
• TIS-06-ID	6-station, Indoor Mount
• TIS-06-OD	6-station, Outdoor Mount
• TIS-09-ID	9-station, Indoor Mount
• TIS-09-OD	9-station, Outdoor Mount
• TIS-12-ID	12-station, Indoor Mount
• TIS-12-OD	12-station, Outdoor Mount

Specifying Information—TIS-612

TIS-XX-XX

Model	Type	Cabinet/Accessories
TIS	XX	XX
TIS—Toro Intelli-Sense	06—6-station Controller 09—9-station Controller 12—12-station Controller	ID—Indoor OD—Outdoor

Example: A 12-station, Intelli-Sense (TIS-612) Controller in an outdoor cabinet would be specified as: **TIS-12-OD**

TIS-PRO Series

- 12-, 24-, 36-, 48-Stations
- Flow-Sensing
- ET-Based
- Outdoor Metal Cabinet

TMR-1 Compatible

Flow Sensor Compatible

Pedestal Option

The TIS-PRO units may be ordered with either a powder coat gray or stainless steel pedestal. To order please contact Toro EICON at 303-290-1881

TIS-PRO Series Model List	
Model	**Description**
TIS-12P-MW	12-station, Metal Wall Mount Cabinet
TIS-24P-MW	24-station, Metal Wall Mount Cabinet
TIS-36P-MW	36-station, Metal Wall Mount Cabinet
TIS-48P-MW	48-station, Metal Wall Mount Cabinet

Specifications

Dimensions

- 10 ¾" W x 15 ¾" H x 5 ¾" D (273 x 400 x 146mm)
- Weight: 21 lbs. 8 Oz (9,8 kg)

Electrical Specifications

- Input power:
  - 120 VAC, 50/60 Hz, 0.5A (24 W max.)
- Output (per station):
  - 24 VAC, 50/60 Hz, 0.5A (12 VA max.)
- Master Valve/Pump Start Relay Output:
  - 24 VAC, 0.5A
- Output (total):
  - 24 VAC, 50/60 Hz, 1.5A (36 VA max.)
- UL, CUL-listed

Operating Specifications

- Four independent programs with two start times and one 24-hour water window
- Scheduling with 365-day calendar:
  - Optimized by WeatherTRAK® with day exclusion
  - Odd/Even
  - Interval (1-31 days)
  - Days of Week (1-7 days)
  - Days of Week by Month (1-7 days)
- Three runtime programming options: 1) Automated by WeatherTRAK; 2) User-set runtimes; 3) User-set runtimes with ET-adjustment
- Independent station adjust from -50% to +25% in 5% increments
- Watering Day Frequency / Allowable Depletion Adjust
- Sequential stacking of programs or overlap up to four programs simultaneously
- Manual operation of individual valve stations or all stations from 1-99 minutes in 1-minute increments
- Compatible with normally closed rain, rain/freeze or wind sensors
- Compatible with normally open or normally closed master valves
- Non-volatile memory maintains program in case of power outage for up to 10 years.
- Dedicated rain sensor, flow sensor, and master valve terminals
- Review mode provides schedule and program for each individual station
- Built-in alerts for flow programmimg, hardware and communications
- Compatible with Toro Flow Sensors – TFS series
- Flow-monitoring capability for high flow, leak detection and no-flow conditions with ability to exclude station(s)

Optional Accessories

- TIS-PED – Pedestal Mount
- TMR-1 – Toro Maintenance Remote
- TFS – Toro Flow Sensor
- TRS – Wired RainSensor
- 53853 – Wired Rain/Freeze Sensor
- TWRS/TWRFS – Wireless RainSensor or Wireless Rain/Freeze Sensor

Warranty

- Five years

Specifying Information—TIS-PRO

TIS-XXP-XXX			
Model	**Type**	**Type**	**Cabinet**
TIS	**XX**	**P**	**XXX**
TIS—Toro Intelli-Sense	12—12-Station 24—24 Station 36—36-Station 48—48-station	P - Professional	MW—Metal WallMount PED—Pedestal Mount
Example: A 36-station Intelli-Sense Professional Controller in a Metal Wall Mount Cabinet would be specified as: **TIS-36P-MW**			

Custom Command™ Series

- 9-, 12-, 15-, 18-, 24-, 36-, 48-Stations
- Wall- or Pedestal-Mount

With the highest surge protection in its price range, the Toro® Custom Command offers durability and performance in one rugged commercial-grade controller.

TMR-1 Compatible

Rain Sensor Compatible

Features & Benefits

Versatile Runtimes
Runtimes from one minute to ten hours in one-minute increments meet the needs of standard or drip applications.

Independent Programs
Four fully independent programs and 16 start times that can run concurrently with start time overlap protection within each program.

High Surge Protection
Highest surge protection in its price range for lightning-prone areas.

Metal or Plastic Enclosures
Available in wall-mount metal cabinet with optional metal pedestal, or wall-mount plastic cabinet.

Hand-Held Remote Compatible
Compatible with the Toro TMR-1 Maintenance Remote for ease of use, troubleshooting, and field maintenance operation.

Water Management Highlight

Wired RainSensor or Wireless Rain/Freeze sensors will stop irrigation when it rains or when temperature drops below a user-defined point.

Specifications

Dimensions

- Plastic: 11½" W x 5⅞" H x 8⅝" D (292 x 149 x 219mm)
- Metal (12-, 15-, 18- and 24-stations):
  10 ¾" W x 9 ¾" H x 5 ¾" D (273 x 247 x 146mm)
- Metal (36- and 48-stations):
  10 ¾" W x 15 ¾" H x 5 ¾" D (273 x 400 x 146mm)
- Pedestal (CC-PED):
  10 ¾" W x 27 ⅞" H x 3 ⅜" D (273 x 708 x 86mm)
- Weight
  - Plastic: 8 lbs (3,6 kg)
  - Metal (12-, 15-, 18-, and 24-station): 14 lbs (6,4 kg)
  - Metal (36- and 48-station): 18 lbs (8,2 kg)

Electrical Specifications

- Input Power
  - 120 VAC ± 10%, (60 Hz)
  - 0.50 amps (24 W) maximum
- Station output power
  - 24 VAC (60 Hz)
  - 0.50 amps (12 VA) per station maximum
  - 0.50 amps (12 VA) pump/master valve
  - 1.25 amps (30 VA) total load
- UL, CUL Listed

Operating Specifications

- Three selectable watering schedules:
  - Seven-day calendar
  - Odd/even days with day exclusion
  - 31-day interval
- 365-day calendar with automatic compensation for leap year
- Rain delay from one to seven days
- Program stacking for simultaneous operation of one to four programs (four program stacking only in 36- and 48-station models)
- Individual station manual start and manual start by program
- Independent program erase for each program
- Master valve/pump start operation selectable by program
- Available in 9-, 12-, 15-, 18-, 24-, 36- and 48-station models
- Non-volatile memory retains programmed information in event of power failure
- Time and date retention for up to 90 days using 9-volt battery
- Self-diagnostic circuit breaker that identifies and overrides faulty stations

Optional Accessories

- TRS - Wired RainSensor
- 53853 – Wired Rain/Freeze Sensor
- TWRS/TWRFS - Wireless RainSensor or Rain/Freeze Sensor
- TMR-1 - Maintenance Remote

Warranty

- Five years

Multiple Enclosure Options

Metal or plastic cabinets and optional metal pedestals meet a variety of installation needs.

High-Surge Protection

With the highest surge protection in its competitive price range, a self-diagnostic circuit breaker and a five-year warranty, this controller withstands the test of time.

Custom Command Series Model List			
Wall-Mount Metal Cabinet		**Wall-Mount Plastic Cabinet**	
Model	**Description**	**Model**	**Description**
• CC-M12 • CC-M15 • CC-M18 • CC-M24 • CC-M36 • CC-M48	12-station 15-station 18-station 24-station 36-station 48-station	• CC-P9 • CC-P12 • CC-P15 • CC-P18 • CC-P24	9-station 12-station 15-station 18-station 24-station
Metal Pedestal Mount			
Model	**Description**		
• CC-PED • TIS-PED	Compatible with CC-M12 to CC-M24 models only Compatible with CC-M36 and CC-M48 models only		

Specifying Information—Custom Command

CC-X-XX-PED

Model	Cabinet	Description	Optional
CC	X	XX	PED
CC—Custom Command	M—Metal P—Plastic	9—9-stations 12—12-stations 15—15-stations 18—18-stations 24—24-stations 36—36-stations 48—48-stations	PED—Optional Pedestal Mount

Example: A 12-station Custom Command Controller with an internal transformer and metal cabinet would be specified as: **CC-M12**

TDC Series 2-Wire System

- 50—200 Stations
- 1-, 2- or 4-Station Decoders

For an energy efficient, highly cost-effective way to irrigate large commercial installations, you'll want the TDC Series from Toro®. Using a two-wire path to communicate to buried decoders, the TDC system eliminates high costs associated with traditional valve wiring, trenching and trouble-shooting.

Rain Sensor Compatible

TMR-1 Compatible

Coming Soon:

TriComm™ Compatibility!
(For remote site management)

Features & Benefits

New ISP Decoders
Industry leading surge protections up to 20 KV means less grounding in the field than competitive products.

Advanced Diagnostics
The TDC provides true two-way communication with each decoder in the field, thus providing communication verification to decoders in the field, as well as shorted or open solenoid conditions, making troubleshooting a breeze.

Low-Power Operating Costs
The TDC Decoders operate DC Latching Solenoids which utilize no power when valves are in operation.

Water Budget
Water budget by controller, by program and by station (Season Adjust) 0 to 250% in 1% increments.

Simple, Intuitive Programming
Installation and future servicing are quick and simple thanks to the large LCD display and the industry's most intuitive interface.

Key-locking, Front-Entry, Metal Cabinet

TDC offers a key-locking cabinet in both the outdoor and indoor model controllers. Constructed from heavy-duty powder-coated metal, this is a wall-mount cabinet that provides superior weather and vandalism resistance.

Stainless Steel Pedestal Option

With Toro's EICON Special Build division, TDC units may be ordered with a stainless steel pedestal. To order please specify CDEC-PED-100 or CDEC-PED-200.

Specifications

Dimensions

- Cabinet: 14" W x 13" H x 6" D (356 x 330 x 152mm)

Electrical Specifications

- Input Power: 120 VAC or 220/240 VAC (50/60 Hz)
- Station Output Power: Up to 38 VAC maximum; 3 amps maximum output
- Wiring-two wire path: Jacketed, twisted pair 14 AWG to 15,000 ft.
- Wiring-two wire path: Jacketed, twisted pair 16 AWG to 8.450 ft.
- Wiring-decoder to solenoid: Standard pair 14 AWG to 400 ft.

Operating Specifications

- 20 KV surge protection with proper grounding of 10 Ohms or less at the controller
- 10 independent irrigation programs
- Six start times per program
- Day of the week programming, odd/even, interval (1-31 days)
- 0-255% adjust by controller, by program, by station
- Day Exclusion (remove a day from standard program)
- Programmable master valve and pump start, by station
- Manual start of each station or entire program
- Non-volatile memory retains programming
- Self-diagnostics circuit breaker skips shorted/open stations
- Two-way confirmation of decoder activation
- Activate up to 20 solenoids at up to 2.8 miles away
- Programmable rain delay up to 31 days
- Water window calculator
- 10-digit alpha-numeric zone identification
- Remote-Ready and RainSensor-compatible
- Upgradeable to Sentinel® Central Control
- Utilizes DC latching solenoids for valve control

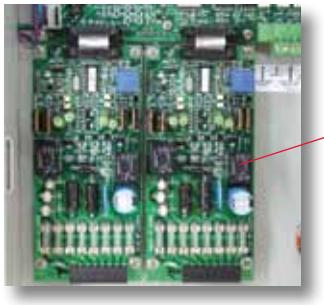
Optional Accessories

- DEG-SG-LINE Decoder, Line Surge Protector
- TRS Wired RainSensor
- 53853 Wired Rain/Freeze Sensor
- TWRS/TWRFS Wireless RainSensor or Wireless Rain/Freeze Sensor
- TMR-1-KIT Toro Maintenance Remote

Warranty

- Five years

Modular Design



Upgrade Module

The base model of the TDC offers 50 stations with capability to easily add another module allowing up to 200-station control. This is ideal for phased projects. Independently fused wire paths (4 per 100 stations = 8 for 200 stations) provide protection to the controller in the event of a short in field wiring.

TDC Series Model List

Metal Pedestal Mount

Model	Description
• CDEC-SA-50	50-station, w/remote connection
• CDEC-SA-100	100-station, w/remote connection
• CDEC-SA-200	200-station, w/remote connection
• CDEC-PED-100	100-station, Two-wire controller on stainless steel pedestal*
• CDEC-PED-200	200-station, Two-wire controller on stainless steel pedestal*
	** Order through EICON Special Build*

Two-Wire Station Decoders

Model	Description
• CDEC-ISP-1	1-station w/ integrated surge protection (Operates up to two solenoids)
• CDEC-ISP-2	2-station w/ integrated surge protection (Operates up to four solenoids)
• CDEC-ISP-4	4-station w/ integrated surge protection (Operates up to eight solenoids)

Specifying Information—CDEC

Model	Description
CDEC-ISP-1	Single Station Decoder w/ integrated surge protection
CDEC-ISP-2	Two Station Decoder w/ integrated surge protection
CDEC-ISP-4	Four Station Decoder w/ integrated surge protection

Specifying Information—DEC

Model	Description
DEC-SG-LINE	Decoder, line surge protector*

*One per 1500 Feet

Specifying Information

CDEC-XXX-XXX

Model	Cabinet	Description
CDEC	XXX	XX
CDEC—2-wire Controller w/remote hook up	SA—Wall Mount Metal Cabinet PED—Stainless Steel Pedestal*	50—50 Stations 100—100 Stations 200—200 stations
Example: A TDC Controller with 200 stations would be specified as: **CDEC-SA-200**		

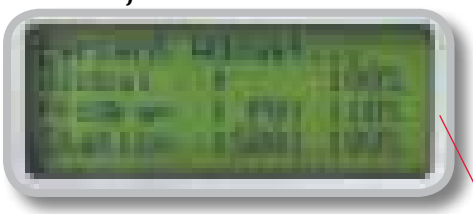
**Order through EICON*

TDC Series 2-Wire System

Simple and Straight-Forward Controller Interface

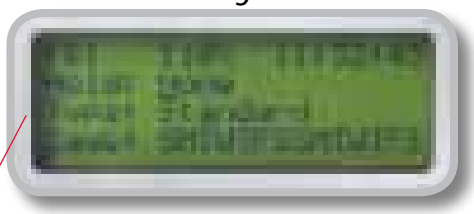
Thanks to the simple nature of the user interface, the TDC controller is the most straight-forward decoder controller on the market. The LCD display is large and backlit. Up, down, left and right arrows make it simple to maneuver through the display. And every time data is entered it is saved. A Toro exclusive, the TDC dial allows users to scroll through selections faster and easier– about half the time of competitive units.

Percent Adjust



Users can choose to adjust from 0 to 255% of scheduled run time in 1% increments. Change all the programs and stations to the same percent or adjust individual programs or stations up or down.

Scheduled Watering Screen



At the Schedule Watering Screen, choices include a 14-day calendar rolling schedule, odd/even day watering, interval watering up to 31 days or a varying weekday/ weekend schedule.

Station Setting Screen

The Station Setting Screen walks users through assigning codes. Each decoder has a 5-digit address that gets assigned to an individual station. A 10-digit alpha-numeric name may also be assigned.

Grow In Program

The Grow In program is ideal for systems laying down new plantings. The program ensures new turf is watered as needed and the TDC makes it simple to adjust as sod and plants grow.

Home Screen

The Home Screen will always display current time and date and list the next scheduled start time. Stations that are in current run time will also be displayed, clearly identifying how much watering time remains. Alarms will show up for troubled zones and diagnostic runs are simple.

Run Times

Station run times can be customized choosing a range of stations from the menu – instead of having to program individually. Selections can also be for how many simultaneous stations should be run at one time.

TDC+ Controllers

- Up to 204 Stations
- Software programmable
- Two-wire Decoders
- Flow Sensor Remote Ready

The installation benefits of Two-Wire combined with the feature benefits of a Sentinel Controller!
EICON Special Build's latest control system is easy to install and expand.

Specifications

Dimensions

- Small wall-mount:
  14" W x 13" H X 6" D (355 x 330 x 152mm)
- Stainless steel wall-mount:
  17 1/8" W x 30 ¾" H x 8 5/8" D (435 x 781 x 219mm)
- Stainless steel pedestal-mount:
  17 1/8" W x 34 ½" H x 8 5/8" D (435 x 876 x 219mm)
- Plastic Pedestal-mount:
  17" W x 40" H x 16" D (432 x 1016 x 406mm)
- Weight:
  - Small Metal Wall-mount: 21 lbs (9,5 kg)
  - Stainless steel wall-mount: 47 lbs (21,3 kg)
  - Stainless steel pedestal-mount: 64 lbs (29,0 kg)
  - Plastic Pedestal: 60 lbs (27,2 kg)

Electrical Specifications

- Input power: 120 VAC or 220/240 VAC (50/60 Hz)
- Station output power: Up to 38 VAC maximum; 3 amps maxi. output
- Wiring two-wire path: Jacketed, twisted pair 14 AWG to 15,000 ft (4572 m)
- Wiring two-wire path: Jacketed, twisted pair 16 AWG to 8,450 ft (2575 m)
- Wiring decoder to solenoid: Jacketed, twisted pair 14 AWG to 400 ft (122 m)

Features & Benefits

Software Based Setup And Programming

- Each Satellite is shipped with multi-lingual Sentinel WMS Software and serial cable for direct connection to any computer
- Instant viewable two-way communication for uploads and downloads of setup, configuration settings and programs
- Easy 5 digit decoder addressing for up to 204 zones per controller
- Interactive reports detailing alarms, water usage, and flow graphs
- Program backup and storage

Lower Installation Costs

- Two-Wire installations proven to save money on materials and labor at 30 zones or above

System Performance

- Operate 16 simultaneous valves up to 2.7 miles (4,3km) in any direction from the controller when used with Toro® Decoders
- Flow Sensing and automatic station shut-down, plus logging of daily, monthly and yearly water use
- UHF radio Hand Held Remote compatible (SHHR) for extended coverage distance from the controller
- Rain Sensor and Switch Sensor connection

Sentinel Hand Held Remote Model List	
Model	**Description**
• ESB-TDC+	Enhanced Two-Wire Controller

TDC Series Model List	
Two-Wire Station Decoders	
Model	**Description**
• CDEC-ISP-1	1-station w/ integrated surge protection (Operates up to two solenoids)
• CDEC-ISP-2	2-station w/ integrated surge protection (Operates up to four solenoids)
• CDEC-ISP-4	4-station w/ integrated surge protection (Operates up to eight solenoids)

Specifying Information

ESB-TDC+-XXX-XXX

Configuration		Station Count	Enclosure Type	
ESB	**TDC+**	XXX	XXX	
ESB204-U2/— EICON Special Build	TDC+— Enhanced Two-wire Controller	100— 100 Station Capability 200—200 Station Capability	WS5 - Small Painted Cabinet WS2 - SS Wall Mount	WS4 - Medium SS Cabinet PS1 - SS Pedestal

TMR-1 *(Maintenance Remote)*

- 1.5 Mile (2,41km) Range
- Large LCD

This is irrigation maintenance at its easiest!
The Toro® TMR-1 is a maintenance remote system that allows a single operator to perform irrigation checks and fully operate the system from up to 1.5 miles (2,4 km) away.

Features & Benefits

Operates on Unlicensed MURS Frequencies
Up to 1.5 mile line-of-sight range without the hassles of FCC licensing.

Toro Exclusive All Stations Cycle (ASC) Function
Provides one-start system operation for walk-throughs, maximizing productivity – 2-minute runtimes per station.

Quick-Connect System (For Toro Controllers)
Allows receiver to easily be moved from one controller to another; circular connector can be bracket-mounted or mounted using 1/2" conduit.

Multi-Controller/Multi-Site Capability
Programmable address allowing selection of up to 999 different remote receivers at controllers.

Specifications

Dimensions
- Receiver size: 12" x 3" (305 x 76mm) with antenna
- Transmitter size: 12" x 3" (305 x 76mm) with antenna

Electrical Specifications
- Receiver input voltage: 22-26 VAC input
- Transmitter DC Operating voltage: 4-6V DC (AA Batteries included)
- Transmitter operates on 4 AA NiMH rechargeable batteries or 4 AA standard alkaline batteries
- Battery charger: Dual rate 12-hour charger
- Receiver operates off of the 24 VAC power from the controller
- FCC, UL-listed

Controller Compatibility
- Toro: TMC-212, TMC-424E, Custom Command, TIS-PRO, TDC

Operating Specifications
- Frequency: MURS designated channels – U.S. USE ONLY (151.82, 151.88, 151.94, 154.57, 154.6 MHz)
- Automatic detection and avoidance of busy channels
- Operating temperature range: -10° to 60° C
- Up to 1.5 miles (2,4 km) line-of-sight range and typically 1/2 mile (0,8 km) in obstructed areas
- Intuitive, easy-to-use keypad
- Large, easy-to-read LCD display
- Remotely controls up to 500 stations
- Battery life indicator
- Circular connector comes standard with 5' (1,5m) cable
- Simple, intuitive command set
- Default run time is 10 minutes
- Display shows countdown of time left to run
- Ergonomic design and removable belt clip

Optional Accessories
- TMR-1-CHG Wall Charger

Warranty
- Two years

Specifying Information—TMR-1

TMR-1-XXX	
Model	**Description**
TMR-1	**XXX**
TMR-1—Toro Maintenance Remote	KIT—Complete Kit: Transmitter, Receiver, Circular Connector/Cable Assembly, Batteries, Carrying Case TX—Hand-held Transmitter, Batteries RX—Receiver, Circular Connector Assembly CC—Circular Connector
Example: A complete TMR-1 Maintenance Remote Kit would be specified as: **TMR-1-KIT**	

EICON Remote

- 5-Mile (8,04km) Range
- Universal Wiring

For powerful, long-range, multi-site control, EICON maintenance remotes have been the irrigation industry standard since 1969.

Features & Benefits

Up to 5-Mile (8km) Line-of-sight Range
Plus powerful UHF FM signal is the best available tool for communicating with receivers behind walls or in other hard-to-reach locations.

Universal Wiring
Receivers connect to any controller with 24 VAC outputs.

Two-way Voice Communication
Hand-held transmitter is capable of two-way voice communication as well as date transmission.

All Maintenance Remotes are ordered through and available from the EICON Division of Toro:

EICON
7304 South Alton Way, #M,
Englewood Colorado, 80112
303-290-1881

Specifications

Dimensions

- MRC Receiver: 6.25" D x 8" W x 2.5" H (159 x 203 x 64mm)
- Omnitrol Receiver: 1.75" D x 3.25" W x 5.25" H (45 x 83 x 133mm)

Specifications and Features

- Hand-held radios feature rechargeable batteries
- Low battery indicators
- Hand-held transceivers are locally serviceable at radio service centers
- All components comply with FCC rules and regulations
- Receivers available in 12, 24, 36 or 48 station configurations
- Omnitrol receivers may be upgraded to as many as 96 stations
- MRC units are compatible with any controller that controls solenoids, relays etc., utilizing 24 VAC
- Any of the outputs in the host controller maybe turned on or off in any order
- A run time can be entered from the hand-held transceiver (from 1 to 20 minutes) for multiple valve syringe or sequential operations
- Ability to individually address and control up to 1000 controllers with a single hand held transceiver
- Receiver address codes may be changed by the operator
- An indicator light illuminates and begins blinking when the receiver unit is properly installed
- External antenna connectors are standard. For special applications where reception may become a problem such as deep underground or extreme ranges, special application antennas are available

Optional Accessories

- TRX-5U UHF Hand Held Transceiver with DTMF Keypad – includes charger
- P-30 30" (76cm), 12-station wiring harness for wiring to individual station outputs
- P-48 48" (122cm), 12-station wiring harness for wiring to individual station outputs
- E-36: 36" (91cm) pigtail extension

Warranty

- Two years

Specifying Information—EICON Special Build

ESB -XXX-XX-XXX

Description	Model	Type	Options
ESB	XXX	XX	XXX
ESB—EICON SpecialBuild	MRC—Maintenance Remote Complete Kit MRX—Maintenance Remote Receiver OTL —Omnitrol Maintenance Remote Complete Kit OTX —Omnitrol Maintenance Remote Receiver RLM—Permanent mount receiver card	12—12 stations Universal 24—24 stations Universal 36—36 stations Universal 48—48 stations Universal	IR—Irritrol® MC-E Remote Connector RB—Rain Bird® (ESP-MC) Remote Connector*

*Only available in RLM Version

EZ-Remote®

- **Up to 300' Range (91,44m)**
- **Uses Single 9V Battery**

Simple and straight-forward, the Toro® EZ Remote is a tool for the homeowner or maintenance crew that desires effortless, handheld controller operation.

Specifications

Specifications and Features

- Compatible with: TMC-212, TMC-424E and Custom Command
- 160' to 300' (49 to 91m) range (range varies based on site and atmospheric conditions)
- Low-battery indicator

Warranty

- One-year

EZ-Remote Series Model List	
Model	**Description**
• EZR-KIT	Remote Transmitter/Receiver
• EZR-T	Remote Transmitter Kit
• EZR-R	Remote Receiver Kit
• EZR-CA03	Remote 40" (102cm) Cable Harness Kit
• EZR-CA25	Remote 25' (63cm) Cable Harness Kit

Specifying Information—EZ-Remote

EZR-XXXX			
Model	**Description**		
EZR	XXXX		
EZR—EZ-Remote	KIT—EZ-Remote Complete Kit*	T—EZ-Remote Transmitter only	R—EZ-Remote Receiver only
Example: A complete EZ-Remote kit would be specified as: **EZR-KIT**			

** Includes receiver, transmitter and 40" harness kit.*

Electric-Hydraulic Converters

Toro® Electric-Hydraulic Converters (EHC) provide the ability to bring together electrical outputs from sophisticated electric controllers and the pressure-based signals in hydraulic irrigation systems.

Electric-Hydraulic Converters Model List	
Model	**Description**
• EHC-01-01	1-Station, Normally Open
• EHC-01-04	4-Station, Normally Open
• EHC-08-04	4-Station, Normally Closed
• EHC-01-12	12-Station, Normally Open
• EHC-08-12	12-Station, Normally Closed
• EHC-01-16	16-Station, Normally Open
• EHC-08-16	16-Station, Normally Closed

Specifications

Dimensions

- 4-Station: 8 ¾" W x 4 ½" H x 2 ½" D (222 x 114 x 64mm)
- 12-Station: 8 ¾" W x 12 ½" H x 2 ½" D (222 x 318 x 64mm)
- 16-Station: 8 ¾" W x 16 ½" H x 2 ½" D (222 x 419 x 64mm)

Electrical Specifications

- Input power:
  - 24 VAC (60 Hz)
  - Holding - .225A @ 24 VAC
  - Inrush - .400A @ 24 VAC

Specifications and Features

- Pressure: 40-150 psi (2,8-10,3 Bar)
- Wiring: 18 AWG x 4' (1,2m) wire leads
  - Maximum distance from converter to valve:
    3/16"(4,7mm) – 500' (152m)
    1/4" (6,4mm) – 1000' (304m)
- Normally open: Valve elevation should not exceed 25' (7,6m) above or 70' (21,3m) below controller elevation
- Normally closed: Valve elevation should not exceed 0' (0m) above or 70' (21,3m) below controller elevation
- Direct manual control activates any sprinkler from the converter
- Optional plastic pedestal (89-8342)

Warranty

- Two years

Specifying Information—ECH Converter

EHC-XX-XX						
Model	**Configuration**		**Stations**			
EHC	XX		XX			
EHC—Electric-Hydraulic Converter	01—Normally Open	08—Normally Closed	01—1-Station	04—4-Station	12—12-Station	16—16-Station
Example: An Electric-hydraulic Converter with 16 stations and normally closed actuation would be specified as: **EHC-08-16**						

TFS *(Flow Sensors)*

- ½" , ¾" ,1" , 1½" , 2" , 3", 4" Plastic Tee Sizes (12mm, 20mm, 25mm, 37mm, 50mm, 75mm, 100mm)
- 1.2 GPM to 500 GPM (4,5-1892 LPM)

Features & Benefits

Effective Flow Monitoring Even In Flows Less Than 5 GPM (19 LPM)

Effective in ranges from 1.2 GPM to 500 GPM (4,5-1892 LPM). Teamed with the Toro TMC-424, ½", ¾" and 1" (12mm, 20mm, 25mm) sensors provide a cost-effective flow monitoring and alarm system.

Compatible With Competitive Controllers

In addition to the TORO compatible controllers – TMC-424E, TIS-PRO, Sentinel® and SitePro® – these flow sensors work with any controller or control system compatible with frequency output flow sensors (pulses per second proportional to flow velocity).

TFS Series Model List

Model	Description	Suggested Operating Range:
• TFS-050	1/2" (13mm) Flow Sensor	1.2-12 GPM (4,5-45 LPM)
• TFS-075	3/4" (20mm) Flow Sensor	2.7-28 GPM (10,2-65 LPM)
• TFS-100	1" (25mm) Flow Sensor	5-50 GPM (18,9-189 LPM)
• TFS-150	1½" (37mm) Flow Sensor	5-100 GPM (18,9-379 LPM)
• TFS-200	2" (50mm) Flow Sensor	10-200 GPM (38-757 LPM)
• TFS-300	3" (75mm) Flow Sensor	20-300 GPM (76-1135 LPM)
• TFS-400	4" (100mm) Flow Sensor	40-500 GPM (151-1892 LPM)

Specifications

Specifications and Features

- Simple impeller-based design
- Potted electronics designed for valve box or underground applications
- Sensor pre-installed in tee
- Removable sensor design for easy replacement without removal of tee
- Socket end tee
- Output: 2-wire, unscaled pulse – pulse width 5msec +/- 25%
- Frequency: 3.2 to 200 Hz
- Pressure Rating:
  - 1/2", 3/4" and 1"(13, 20 and 25mm): up to 150 psi (10,3 Bar)
  - 1 ½", 2", 3" and 4"(37, 50, 75, and 100mm): up to 100 psi (6,8 Bar)
- Temperature Rating: Up to 140º F (60º C)
- Flow Range (Velocity):
  - 1/2", 3/4" and 1"(13, 20 and 25mm): 2'-20' (0,6-6,0m) per second
  - 1 ½", 2", 3" and 4"(37, 50, 75, and 100mm): 0.5'-30' (0,1-9,1m) per second
- Accuracy:
  - 1/2", 3/4" and 1"(13, 20 and 25mm): +/- 3 to 5%
  - 1 ½", 2", 3" and 4"(37, 50, 75, and 100mm): +/- 1%
- Linearity/repeatability:
  - 1/2", 3/4" and 1"(13, 20 and 25mm): ± 1.5%
  - 1 ½", 2", 3" and 4"(37, 50, 75, and 100mm): ± 0.3%
- Tee:
  - 1/2", 3/4" and 1"(13, 20 and 25mm): Schedule 40 PVC
  - 1 ½", 2", 3" and 4"(37, 50, 75, and 100mm): Schedule 80 PVC
- Sensor Housing: Potted, PPS
- Impeller:
  - 1/2", 3/4" and 1"(13, 20 and 25mm): 300SST
  - 1 ½", 2", 3" and 4"(37, 50, 75, and 100mm): Glass-filled nylon
- Shaft: Tungsten Carbide
- Bearing: UHMWPE
- Wires: 18AWG direct burial shielded cable

Warranty

- Two years

Specifying Information—TFS

TFS-XXX

Model	Configuration	
TFS	XXX	
TFS—Flow Sensor	050—1/2" (13mm) Plastic Tee 075—3/4" (20mm) Plastic Tee 100—1" (25mm) Plastic Tee 150—1 1/2" (37mm) Plastic Tee	200—2" (50mm) Plastic Tee 300—3" (75mm) Plastic Tee 400—4" (100mm) Plastic Tee

Wireless RainSensor™

- **Rain or Rain/Freeze Sensor**
- **500’ (152,4m) Range**

No wires. No hassle. Just reliable rain sensing that provides optimum water savings. Toro® innovative wireless technology provides easy to use, advanced features for prompt reaction when it starts to rain.

Specifications

Dimensions

- Transmitter: 1 ¾” W x 3 ½” H x 1 ¾” D (44 x 89 x 44mm)
- Receiver: 2” W x 4” H x 1 ¾” D (51 x 102 x 44mm)
- Weight: 0.78 lbs. (0,4 kg) product and carton

Electrical Specifications

- Transmitter Power: Two replaceable lithium cells (CR2032-3V)
- Receiver Power Source: 22-28 VAC/VDC, 100mA (from existing timer or optional tranformer)
- Relay contacts output: Normally-opened or normally-closed; 3A @ 24VAC
- FCC, IC, AVA, UL, CUL, CE and C-tick approved

Specifications and Features

- Operating temperature: -20° F to 120° F (-28°C– 49°C)
- Housing material: Weather and UV resistant engineered polymer
- Transmitting range: up to 500’ (152m) (line-of-sight) with adjustable antenna
- Sensor: maintenance free hygroscopic disks; adjustable rain sensitivity: 1/8” to 3/4” (3,2-20mm)
- Low battery indicator
- Signal strength indicator/scale
- Rain delay feature that works intelligently with the rain sensor (unlike most controller-based rain delays)
- Fail-safe modes in the event of loss of communications or failed sensor
- Real-time outside temperature displayed on the LCD (TWRFS only)
- Five year easy to replace, standard coin batteries
- Versatile mounting options – one-piece Quick-Clip™ gutter bracket or ½”(13mm) conduit adapter
- Can control multiple receivers/controllers with one sensor transmitter

Warranty

- Five years

Features & Benefits

Smart Bypass™

Allows for system override at any time and resets automatically.

Rain/Freeze Combination

Features digital programmable accuracy – a first in the industry – The Freeze shutoff can be set from 35°F (1,7°C) to 45°F (7,2°C) in 2° (0,5°C) increments.

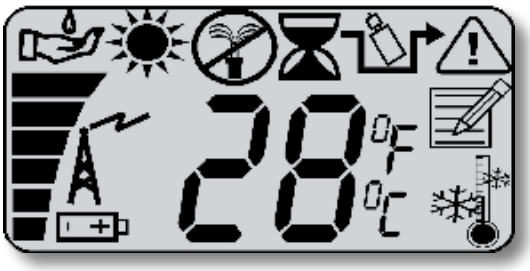
Water Management Highlight

Water Conservation Modes

Selectable water conservation modes delay resumption of irrigation by intelligently extending beyond mechanical reset time and can save you up to 30%* more water.

* Savings vary based on sensor setting, watering schedule and other conditions.

First LCD In A Wireless Rainsensor



Provides informative system feedback including outside temperature, and transmitter signal strength and battery life.

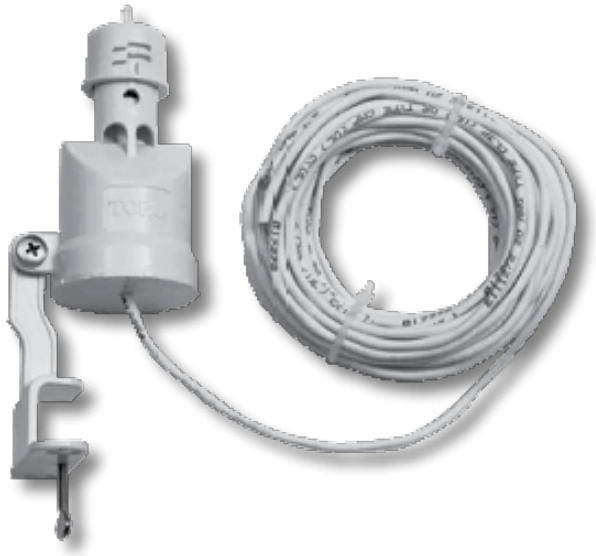
Specifying Information

Model	Description
TWRS	Toro Wireless RainSensor
TWRFS	Toro Wireless Rain/Freeze Sensor

Wired RainSensor™

- **Wired Rain and Rain/Freeze Sensor**
- **Normally-Open or Normally-Closed**

When it rains sometimes all you need is a simple sensor that ensures the job gets done. With multiple set-points for adjustable rain sensitivity and maintenance-free sensing disks, Toro's TRS provides the reliability required.



Features & Benefits

Compatible With All Toro And Other Manufacturers' Controllers

Universal Normally Open and Normally Closed operation for compatibility with all controllers that are designed to accept a sensor device.

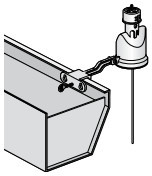
Maintenance Free Hygroscopic Discs

Industry standard sensing discs with adjustable rain shut-off indexes at 1/8" (3,2mm), 1/4" (6,4mm), 1/2" (12mm) and 3/4" (17mm) of rain.

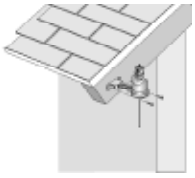
25 Feet Of UV-Resistant Cable

Includes 25 feet (7.6m) of white outdoor-rated, UV-resistant cable.

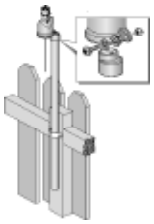
Three Mounting Options:



Quick Clip gutter bracket



Wall mount



Conduit adapter

Specifications

Dimensions

- Transmitter: 1¾" W x 3½" H x 1¾" D (44 x 89 x 44mm)
- Weight: 0.80 lbs (0,4 kg) product and carton

Specifications and Features

- Relay contacts output, normally open or normally closed: 3A, 24 VAC
- Operating temperature: -20° F to 120° F (-28°C– 49°C)
- Low profile design and UV-resistant housing for sensor
- No special tools required for installation

Warranty

- Two years

Wired Rain/Freeze Sensor

New Wired Rain/Freeze Sensor automatically suspends irrigation when the temperature drops below 37° F (2,8°C) saving piping networks and irrigation components.

Specifying Information

Model	Description
TRS 53853	Toro Wired RainSensor Toro Wired Rain/Freeze Sensor

Central Control Overview

Model	TriComm™ Systems	Sentinel® Central Control
Page Number	108-109	110-111
Maximum Number Of Satellites	Unlimited	999 (total)
Maximum Stations Per Satellite	24—TMC-424E 200—TDC	204
Number Of Programs	4—TMC-424E 10—TDC	16 per Satellite
Ability To Make Program Changes In Field	X	X
Programming By Time	X	X
Programming By Water Volume		X
Automatic ET-Based Runtime Adjustment	X	X
Programmable Valve Sequence	X	X
Flow Optimization		X
Alarms & Reports	X	X
Station Operation Recording	X	X
Water Use Recording	X	X
Historical Water Use Comparison		Daily, Weekly, Yearly
Importing Maps		X
Software Only Option		X
Software + Computer Option		X
Windows® Compatible	X	X
Toro NSN® Support Inlcuded	X	Two years

Sentinel Communications Options
Narrowband Radio (450-470 MHz)
Ethernet/Internet
Cell Enabled Data Modem
Landline Telephone
Spread Spectrum Radio (900 MHz)
Fiber Optics

WaterSmart® Feature

Model	Small Metal Wall Mount (24 VAC Terminals)	Stainless Steel Wall Mount (24 VAC Terminals)	Stainless Steel Pedestal (24 VAC Terminals)	Plastic Pedestal (24 VAC Terminals)	Two-Wire Satellite (Multiple Enclosures)
Number Of Stations	12, 24, 36, 48, 96 with MapTo or WOB	12, 24, 36, 48, 96 with MapTo or WOB	12, 24, 36, 48, 96 with MapTo or WOB	12, 24, 36, 48, 60, 72, 84, 96	204
Modular		X	X	X	X
MapTo Option	X	X	X	X	X
ET-Adjust	X	X	X	X	X
Flow Sensing Compatible	X	X	X	X	X
Remote (SHHR) Compatible	X	X	X	X	X
RainSensor Compatible	X	X	X	X	X
Number Of Programs	16	16	16	16	16
Simultaneous Program Operation	Up to 2 Amps	Up to 2 Amps	Up to 2 Amps	Up to 2 Amps	16
Number Of Start Times	8 per Program	8 per Program	8 per Program	8 per Program	8 per Program
Max Station Runtime	4 Hours 15 Minutes	4 Hours 15 Minutes	4 Hours 15 Minutes	4 Hours 15 Minutes	4 Hours 15 Minutes
Days Of The Week Programming	X	X	X	X	X
Odd/Even Programming	X	X	X	X	X
Interval Programming	X	X	X	X	X
Flow Monitoring	X	X	X	X	X
Water Use Logging	X	X	X	X	X
Valves Per Station	2	2	2	2	2
Multiple Levels Of High Surge Protection	Level 1, Level 3 & Level 4	Level 1, Level 3 & Level 4	Level 1, Level 3 & Level 4	Level 1, Level 3 & Level 4	ISP Decoders + Line Surge Protectors
Warranty	Five years	Five years	Five years	Five years	Five years

WaterSmart® Feature

TriComm™ System

- Remote Site Management
- Internet-based Software
- Auto ET-Adjust
- Theoretical Water Use Reports

The Toro TriComm™ System is a Remote Site Management Tool for Irrigation Systems, using an Internet-based control interface over a GPRS cellular network.

TriComm Modem Kit

Features & Benefits

Internet-based Software
Access the TriComm System from any Web-connected computer or WAP-enabled PDA or mobile phone.

Automatic ET-Adjustment
System connection to a weather station provides the ability for automatic runtime adjustment by daily ET.

E-mail or Text message Alerts
Customizable e-mail or text message alerts for real-time notification of controller alarms.

Two-Way Communications
All communications occur through state-of-the-art cellular network with real-time indication of controller connectivity. Controller Status shows currently operating programs and stations with irrigation time remaining.

Water Use Reports
Comprehensive reporting provides theoretical water consumption reports based on controller learned flow per station versus daily runtime.

Toro NSN® Support
TriComm comes with a minimum of one-year of NSN Support – unlimited toll-free support with 24/7/365 emergency paging.

TMC-424E Compatible

Coming Soon:
TDC Compatibility!

Water Management Highlight

Auto ET Adjust

TriComm Modem connection to a Davis Instruments Vantage Pro2™ Weather Station provides user account with on-line ET Data that can be used for daily adjustment of runtimes.

Specifications

Dimensions

- 3.54" W x 2.48" H x 0.79 D (90mm X 63mm X 29mm)
- Weight: .35 lbs. (150 g)

Electrical Specifications

- Transformer input power: 100-240 VAC, 0.8A, 50/60 Hz
- Modem Input Power: 12 VDC, 1.08A

Controller Compatibility

TMC-424E Modular Controller

Specifications and Features

- Hardware Includes:
  - GPRS Modem
  - Plug-in Transformer
  - Antenna
  - Communication cable
- Operating temperature -22°F-149°F (-30°C to 65°C)
- Web-based software
- Internet Access through Web-enabled PC or WAP-enabled Phones or Mobile Devices.
- Customizable Alerts through text message or e-mail.
- Individual User Permissioning
- Multiple User Levels
- Password-secured Login
- Controller grouping into "Areas" for shared Season Adjust
- Manual ET Entry & Runtime Adjustment
- Visual connectivity status of each account controller
- Download/Upload communications status bar
- Access to all programming features of TMC-424E
- Manual Station or Manual Program Operation
- Status report of Currently Operating Programs/Stations
- Communications Status and Cellular Signal Strength Display
- Alert & Communications Reports
- Multi-language capability (English, Spanish, French, German, Italian, Portuguese)
- 1 Year NSN Toll-free Phone support
- Automatic ET Adjustment of Runtimes
- Water Consumption Reporting
- Interactive Maps

Warranty

- Two years

Customizable Alerts

The TriComm System can send real-time e-mail or text-message Alerts to users for alarm conditions (flow, fuse, etc), or standard operations (Station ON, etc).

Status Reports

Controller Status shows currently operating programs and stations with time remaining, as well as any controller alarms.

TriComm Series Model List	
Model	**Description**
TCOMM-ACTKIT-N	First Modem to an Account. Includes: Account Activation, Modem Kit, SIM Card, 1 year TriComm Web service, 1 year cellular data plan, 1 year NSN phone support for account
TCOMM-MODEM-N	Additional Modems. Includes: Modem Kit, SIM Card, 1 year TriComm Web service for controller, 1 year cellular data plan
TCOMM-WEATHER-N	Weather Station Modem Kit: Weather Station Modem, Modem Connection Cable for Davis Instruments Weather Console, SIM Card, 1 year TriComm Web service for weather station, 1 year cellular data plan.

Specifying Information

TCOMM-XXXXXX-N		
Description	**Model**	**NSN**
TCOMM	**XXXXXX**	**N**
TCOMM—Toro TriComm	ACTKIT – Activation Kit (First Modem in Account) MODEM – Modem Kit (Additional Account Modems) WEATHER – Weather Station Modem and Connection Cable.	N – 1 Year NSN Support

TCOMM-RENEW-X		
Description	**Model**	**Type**
TCOMM	**RENEW**	**X**
TCOMM—Toro TriComm	RENEW – One year Subscription & Communications Renewal	A – Account Renewal (includes NSN Subscription & one modem). M – Renewal for additional modem in account (controller or weatherstation)

Sentinel® Central Control

- Central Control Software
- PC-based
- ET-based Watering

Sentinel Central Control from Toro® is a powerful system that literally "stands guard" over large irrigation sites. With the ability to control up to 999 field satellites from one location, users have a water management tool that provides reliability, accuracy and water savings.

Turf Guard® Option

ET Adjust

Features & Benefits

Simple To Use
Microsoft® Windows-based software – daily operations and scheduling are made quick and easy.

Features For Water Management
ET-based watering, flow sensing and optimization, water usage report with historical comparison.

Multiple Communication Options
Communication options like radio, telephone, fiber optics cellular, and Ethernet can be mixed and matched to meet system requirements.

Distributed Programming
Stores irrigation programs in the computer while allowing irrigation control at the satellite level, ensuring the loss of a component does not result in the loss of irrigation across the system.

Toro NSN® Support
All centrals come with a minimum of two years of NSN support – unlimited 24-hour toll-free support with 24/7/365 emergency paging

Three Choices Of Central Packages
1) Software only; 2) Software and radio communication interface; 3) Central computer, software and radio communication interface.

Water Management Highlight

Water savings – ET-based
(multiple weather station options)

Effective ET-based system management can lead to water savings of 25% to 30% per year. As an additional source of savings, pipeline breaks, malfunctioning valves, and missing heads are automatically detected and shut down, preventing excessive water loss.

Specifications

Specifications and Features

- Control up to 999 field satellites
- Group controllers into “systems” for system-wide adjustments:
  - Rain Days
  - Percent Adjust
  - ET-Adjustment from shared weather source
- Field changes to controller programs can be uploaded to computer
- Support for the System Administration
  - Set system, program and satellite descriptions
  - Map valve positions on site maps
  - Mark special dates on on-screen calendar
- Alarm reporting of any system component failure, including communicatios, over/under-flow conditions, electrical problems or power failure
- Extensive reporting features:
  - Run time reports
  - Water usage
  - Alarms
  - Logging of system changes
- Water use, rain and ET accumulation
- Flow optimizing to maintain optimum flow and shorten water window
- Ability to redefine valve sequence without physically changing wire terminations in field satellite
- Information overview by group and satellite
- System status indications for individual field satellite
- On-line help screens
- Map-based feedback on system status
- Standard telephone modem or internet connection allows for remote access to central software via pcAnywhere™

Warranty

- Two year extendable by continuous NSN subscription

Distributed Intelligence

Each Sentinel® controller is a fully intelligent unit with program data stored at both the field satellite and within the central computer. In the event a computer or master controller goes off line, there will be no loss of irrigation. True two-way communication allows programming changes to occur at the on-site field controller and uploaded to the central computer. Protection from unauthorized changes is ensured as the controller program can be easily compared to the program saved in the central computer.

Sentinel Central Model List

Central Software/Computer Models	
Model	**Description**
• SGIS-1-T	Software Only w/2 years of NSN Support
• SGIS-0-1	Software, Peripheral Hardware w/2 years of NSN Support
• SGIS-1-0	Software, Computer Equip, Peripheral Hardware w/2 years of NSN Support
NSN Support Extension Models	
Model	**Description**
• SSE-T-1	1-year Extension for SGIS-0-1 of SGIS-1-T
• SSE-T-3	3-year Extension for SGIS-0-1 of SGIS-1-T
• SSE-C-1	1-year Extension for SGIS-1-0 (w/computer warranty)
• SSE-C-3	3-year Extension for SGIS-1-0 (w/computer warranty)

Specifying Information—Sentinel Central

SGIS-X-X	
Description	**Optional**
SGIS	-X-X
SGIS—Sentinel Central Control Irrigation System	1-T—Software Only w/2 Years of NSN Telephone Support for Software 0-1—Software, Peripheral Hardware w/2 Years of NSN Telephone Support 1-0—Software, Computer Equipment, Peripheral Hardware w/2 Years of NSN Telephone Support (with computer warranty)

Sentinel® Controllers

- Modular
- Remote Ready
- ET-based Run Times
- Flow Sensor Ready
- Two Wire Decoders

Toro® Sentinel field satellites are commercial grade, modular units that do the irrigation control work in the field. Designed to operate in both stand-alone and central mode.

Cabinet choices

Powder-coated, wall-mount enclosure

16-gauge stainless steel, front-entry, wall-mount enclosure with backplate and junction box

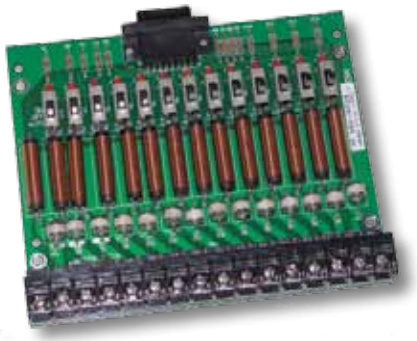
Double-sided, plastic, top-entry pedestal-mount enclosure with dual backplates and junction box

16-gauge stainless steel, top-entry, pedestal-mount enclosure with backplate and junction box

Remote Ready

Flow Sensor Compatible

Modular



Modular in 12-station increments, up to 48-stations.

Features & Benefits

Flow Sensing
Reads, displays and reacts to under and over flow situations and track water usage. No additional circuit boards are required.

High-Surge Options
Options for three levels of surge protection.

Weather Based Irrigation
Sentinel waters according to ET values by using one or a number of onsite weather stations.

Manual Station Outputs
Flip the toggle switch to manually operate stations.

MapTo Capability
Provides the ability to program and communicate to another field controller within radio reception – providing control of 96-stations from one Sentinel Satellite.

True Two-Way Communication
Allows for changes in the field to be uploaded to the central computer and audible confirmation of hand held radio to satellite commands.

Water Management Highlight

Remote and Flow Sensor Ready

Every Sentinel® Controller comes hand held compatible and flow sensor ready right out of the box.

Specifications

Dimensions

- Small wall-mount:
  10 ¼" W x 15 ¼" H X 5 ¼" D (260 x 387 x 133mm)
- Stainless steel wall-mount:
  17 1/8" W x 30 ¾" H x 8 5/8" D (435 x 781 x 219mm)
- Stainless steel pedestal-mount:
  17 1/8" W x 34 ½" H x 8 5/8" D (435 x 876 x 219mm)
- Plastic Pedestal-mount:
  17" W x 40" H x 16" D (432 x 1016 x 406mm)
- Weight:
  - Small Metal Wall-mount: 21 lbs (9,5 kg)
  - Stainless steel wall-mount: 47 lbs (21,3 kg)
  - Stainless steel pedestal-mount: 64 lbs (29,0 kg)
  - Plastic Pedestal: 60 lbs (27,2 kg)

Electrical Specifications

- Input power:
  - 120 VAC, 60 Hz
- Station output power:
  - 24 VAC
  - 1.0 amps per station maximum
  - 2.0 amps total load
- Surge protection: Level 4, 24 V output boards, 20 KV @ 10 KVA
- UL Listed

Specifications and Features

- 16 programs
- Eight start times per program
- 6-week scheduling calendar
- Station runtimes from one minute to 4 hours and 15 minutes
- Global adjustment from 0-255%

Specifications and Features (cont.)

- Flow sensor ready
- Handheld remote ready
- Two sensor inputs included for rain sensors or other switch sensors
- Ability to connect to a laptop to download large station count programs
- Upgrade to a central computer system without additional field satellite hardware or costs
- Program single or multiple stations to operate sequentially or start a program or multiple programs with just a few keystrokes
- Ability to read open- or closed-contact switches in any station count configuration
- Current monitor will disable a station if excessive amp draw is detected
- Non-volatile memory will retain all programming and real-time data for 10 years
- Multi-language display: English, Spanish, French, and Italian
- Operating temperature: 14° to 140°F (-10° to 60°C)
- Options from Level 1 to Level 4 surge protection offer multiple choices to meet regional lighting protection needs: Level 4 surge rated to 20 KV @ 10 KVA

Optional Accessories

- TRS – Wired RainSensor
- TWRS/TWRFS – Wireless RainSensor or Wireless Rain/Freeze Sensor
- TFS – Flow Sensors
- SHHR - Hand Held Remote

Warranty

- Five years

Sentinel Satellite Model List

Model	Description
• SSAK • SSAMN	Sentinel Satellite Assembly with Keypad Sentinel MapTo Assembly

Specifying Information—Sentinel

SSAXX-XX-XXX-6-N-S-X

Configuration	Station Count	Cabinet Type	Output	Comm.	Sensor Capable	Surge Options
SSAXX	XX	XXX	**6**	**N**	**S**	X
SSAK—Sentinel Satellite Assy. with Keypad SSAMN— Sentinel MapTo	12—12-station 24—24-station 36—36-station 48—48-station	WS3—Powder-coated Wall Mount (Small) PS1— Stainless Steel Pedestal Mount (Large) WS2—Stainless Steel Wall Mount (Large) PP1— Plastic Pedestal Mount (Large)	6—Electric 4 V ac	N—Narrow-band	S—Sensor	1—Standard Surge Large-capacity Terminal Block w/LEDs 3—Surge on Small Wall Mount 4—Large-capacity Terminal Block w/LEDs Switches Chokes & Add'l Surge

Example: A 24-station Sentinel Satellite in a metal wall-mount cabinet with electric output, narrow-band communication and surge, would be specified as: **SSAK24WS36NS3**

Example: A 24-station Sentinel MapTo in a wall-mount cabinet with electric output, narrow-band communication and surge, would be specified as: **SSAMN24WS36NS3**

Sentinel® Two-Wire Controllers

- Up to 204 Stations
- Flow Sensor Ready
- 1-, 2- or 4-station Decoders
- Remote Ready

Easy to install and expand – a highly cost-effective field controller for large central control installations. Using a two-wire path to communicate to decoders, the Sentinel Two-Wire controller eliminates high costs associated with traditional valve wiring.

Stainless Steel Pedestal

Plastic Pedestal

Stainless Steel Wall Mount

Small Metal Wall Mount

Remote Ready

Flow Sensor Compatible

Sentinel 2-Wire Controller Model List	
Model	**Description**
• SSAKTW	Two-Wire Sentinel Satellite
Two-Wire Station Decoders	
Model	**Description**
• CDEC-ISP-1	1-station w/ integrated surge protection (Operates up to two solenoids)
• CDEC-ISP-2	2-station w/ integrated surge protection (Operates up to four solenoids)
• CDEC-ISP-4	4-station w/ integrated surge protection (Operates up to eight solenoids)

Specifications

Dimensions

- Small wall-mount:
  14" W x 13" H X 6" D (355 x 330 x 152mm)
- Stainless steel wall-mount:
  17 1/8" W x 30 ¾" H x 8 5/8" D (435 x 781 x 219mm)
- Stainless steel pedestal-mount:
  17 1/8" W x 34 ½" H x 8 5/8" D (435 x 876 x 219mm)
- Plastic Pedestal-mount:
  17" W x 40" H x 16" D (432 x 106 x 406mm)
- Weight:
  - Small Metal Wall-mount: 21 lbs (9,5 kg)
  - Stainless steel wall-mount: 47 lbs (21,3 kg)
  - Stainless steel pedestal-mount: 64 lbs (29,0 kg)
  - Plastic Pedestal: 60 lbs (27,2 kg)

Electrical Specifications

- Input power: 120 VAC or 220/240 VAC (50/60 Hz)
- Station output power: Up to 38 VAC maximum; 3 amps maximum output
- Wiring two-wire path: Jacketed, twisted pair 14 AWG to 15,000 ft (4572 m)
- Wiring two-wire path: Jacketed, twisted pair 16 AWG to 8,450 ft (2575 m)
- Wiring decoder to solenoid: Jacketed, twisted pair 14 AWG to 400 ft (122 m)

Specifications and Features

- 100 Station base model expandable to 200 stations
- Operates Valves with DC-Latching Solenoids
- 16 programs, eight start times per program
- 6-week or 365-day scheduling calendar
- Station runtimes from one minute to 4 hours and 15 minutes
- Global adjustment from 0-255%
- Handheld remote ready
- Two sensor inputs included for rain sensors or other switch sensors
- Multi-language display: English, Spanish, French and Italian
- Operating Temperature: 14° to 140° F (-10°C to 60°C)

Optional Accessories

- TRS – Wired RainSensor
- TWRS/TWRFS – Wireless RainSensor or Wireless Rain/Freeze Sensor
- TFS – Flow Sensors
- SHHR - Hand Held Remote

Warranty

- Five years

Specifying Information

ESB-SSAKTW-XXX-XXX-XXX

Configuration		Station Count	Communications		Enclosure
ESB	**SSAKTW**	**XXX**	**XXX**		**XXX**
ESB204-U2/—EICON Special Build	SSAKTW—Sentinel Satellite Assembly, Two-Wire	100—100 station capability 200—200 station capability	EN—Ethernet PM—Phone modem SS—Spread spectrum	WEN—Wireless ethernet CDM—Cellular modem FIB—Fiber optic	WS5—Small Painted Cabinet WS4—Medium SS Cabinet WS2—SS Wall Mount PS1—SS Pedestal

Sentinel® Wireless Output Boards

Sentinel Wireless Output Boards utilize spread spectrum radio communication between the control module and the output boards, allowing virtually unlimited installation flexibility while eliminating surge damage to the control module. Solar powered output boards provide the perfect solution for medians and islands. Retrofits and remote flow sensing are a snap since hardscape crossing issues are eliminated.

- **12-stations**

Specifications

Specifications & Features

- Wireless Output Controllers are expandable in 12-station increments from 12 to 96-stations
- Ability to mount outputs remote from Sentinel® Control Module - No cabling between output boards and control module
- Improved sensing includes real-time current draw per station
- Manual Station Activation Switches
- High Surge Protection

Options

- Flow Monitoring Only units available (no stations) for water supply flow monitoring
- Multiple Enclosure Options
- Standard or Solar-powered
- AC or DC-Latching

Warranty

- Two years

Sentinel® Custom Control Series

Sentinel Custom Control satellites are built to fit your needs and to eliminate controller overkill on small sites. These satellites ship without manual interface keypad or display, minimizing expense without sacrificing capabilities. All the features expected of a Sentinel controller, but cost-effective for your small site needs.

- **9-, 12- or 18-station**

Remote Ready

Flow Sensor Compatible

Specifications

Specifications & Features

- All the capabilities of a Sentinel Controller, including 16 programs and eight start times per program.
- 9, 12, and 18 station models• 6-week scheduling calendar.
- Station runtimes from one minute to four hours and 15 minutes.
- Global adjustment from 0-255%.
- Percent adjust by program from 0-255%.
- Two sensor inputs included for rain sensors or other switch sensors.
- Flow Monitoring Only units available (no stations) for water supply flow monitoring.

Options

- Multiple Enclosure Options
- Standard or Solar-powered
- AC or DC-Latching

Warranty

- Two years

Hand Held Remote

The Sentinel remote allows users to conduct irrigation checks, and fully operate the system without opening a field satellite enclosure or needing a second person.This remote also serves as a two-way voice radio, allowing easy communication with other crew members.

Specifications

Dimensions

- Transmitter size (with antenna):
  2 3/8" W x 1 3/4" D x 11" H (60 x 44 x 279mm)

Specifications and Features

- Simple command set
- Accesses controller and satellite features from the field
- Direct access to controllers (central control software not required)
- Two-way voice communication capability
- System On and Off command activation
- Five-watt radio
- 120 selectable and programmable channels
- Range: 2 to 3 miles (3,2 to 4,8 km)

Warranty

- Two year

Specifying Information

Model No.	Description
SHHR	Sentinel Hand Held Radio

Retro Link

The Sentinel Retro-Link assembly unit allows an existing Irritrol® MC-E or Rain Bird® ESP-MC controller to be upgraded to a Sentinel field satellite. Retro-Link is 100% compatible with the Sentinel central control software.

Specifications

Dimensions

- 5 ½" W x 5 ½" L x 1 ½" H (140 x 140 x 279mm)

Specifications and Features

- Flow sensor, ET gauge or rain sensor capabilities
- Non-volatile memory in case of a power outage
- 100% compatibility with the Sentinel central control software
- Optional hand-held control with a Sentinel hand-held unit
- Provides the convenience of remote manual control
- Multiple hand-helds can be used on one-site

Accessories

- SHHR - Sentinel Hand Held Remote

Warranty

- Two year

Sentinel Retro Link Model List	
Model	**Description**
• RLS-IR • RLS-RB	Sentinel Retro-Link Assembly (Irritrol) Sentinel Retro-Link Assembly (Rain Bird ESP-MC)

Specifying Information

Model	Description			
ESB - RLS - U - 2 - XX				
ESB—Eicon Special Build	RLS—Sentinel Retro-Link	U—UHF	2—2-way	IR—Irritrol RB—Rain Bird

For information, ordering, or quotes, contact:
***EICON Division** • The Toro Company*
7304 S. Alton Way, Suite M
Centennial, Colorado 80112
PHONE: (303) 290-1881 FAX: (303) 290-9546

Sentinel® Weather Sources

Maximize efficiency on your Sentinel system by using ET-Based watering. ET-Based watering automatically schedules irrigation based on individual landscape needs and local weather conditions. The result is higher property values, lower water bills and a healthier environment. Unlike competitive systems, Sentinel works in conjunction with multiple weather sources including on-site weather stations and the new wireless, web-based Precision™ ET.

Features & Benefits

Precision-ET

Precision-ET is a web-based ET source that users subscribe to through the Toro National Support Network . Virtual Weather Stations are assigned based on Latitude and Longitude coordinates. Each "location" will require a yearly fee, however, unlimited controllers may be assigned to any latitude and longitude.

On-Site Weather Stations*

Choose from a number of manufacturer's weather stations to meet your customer's needs. Choose wired or wireless versions to best suit the installation method needed.

***CIMIS (CA Only)**
Freely access a network of over 120 automated weather stations in the State of California managed by the California Department of Water Resources (DWR).

Specifications

Recommendation On-Site Weather Station

- Davis Vantage Pro 2 Plus™
  - Cabled (6162C)
- Less Expensive
- 100' (30,5m) feet of cable provided
- 1000' (305m) possible
  - Wireless (6162)
- No cable necessary
- Repeaters can be used
  - Wireless Repeaters (7654)
- AC powered
- Solar
- Used with 6162 Davis Station
- WeatherLink® Software (6510 SER)

Supported Weather Sources:

- Precision-ET (Virtual)
- CIMIS (Free CA only)
- Davis Instruments®
  - Vantage Pro 2 Plus™
  - Grow Weather™
- Campbell Scientfic®
  - ET 106
  - Turf Weather
- Irrisoft™
  - Weather Reach™

Turf Guard® Soil Monitoring System

- Soil Moisture
- Salinity
- Temperature
- Web-based Interface

The Toro® Turf Guard Wireless Soil Monitoring system helps you improve your turf, soil and water efficiency. The system is a revolutionary technology that lets you know what's going on beneath the surface of your turf, so you can make timely, more-informed adjustments.

Features & Benefits

Monitor Moisture Levels And Adjust Irrigation

Reduce water usage and improve playability without risking turf quality. Promote root growth by avoiding over watering. Detect dry areas before it impacts the turf's health.

Track Salt Build-up And Schedule Flushing

Take the guesswork out of monitoring and managing salinity levels. Get positive confirmation that your flushing reduced soil salts. Know when and how much water to flush with.

Monitor Daily Soil Temperatures

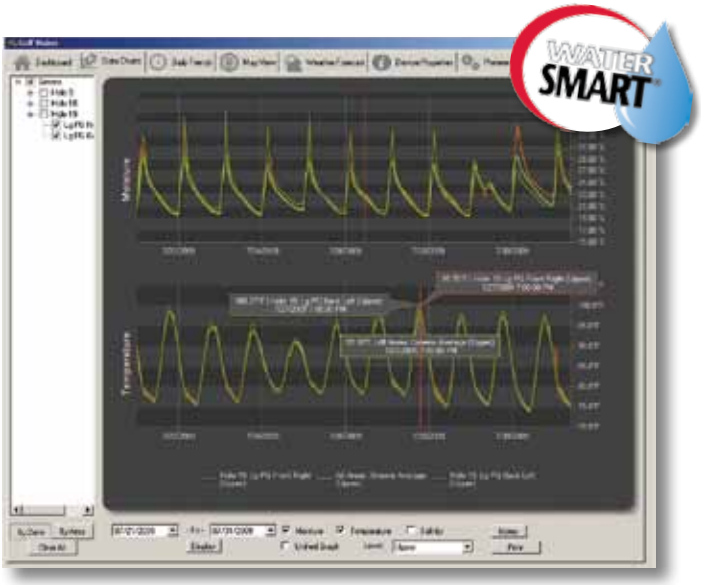
Predict peak soil temperatures early in the day to start remediation activities before an emergency. Schedule fungicide applications and pesticides for optimal effectiveness. Understand evaporation rates and syringing needs.

Wireless Network

No wires between the repeaters and the sensors, or the sensor and the probes means that sensors can be installed anywhere on your turf without disrupting play. Install sensors in other areas without having to trench or pull wires.

Water Management Highlight

No need to guess at how much water to apply for flushing an area, let Turf Guard tell you when enough water has been applied to push the salts out of the root zone. Don't wonder if you need to irrigate an area tonight, let Turf Guard tell you if the area is in an acceptable moisture level range.



Specifications

Dimensions

- Body: 2" x 3 5/8" x 6 1/8" (50 x 92 x 156mm)
- Spikes: 1 3/4" x 3/16" (44 x 5mm)
- Installation Hole Diameter: 4.25" (108mm)

Electrical Specifications

- Input Power:
  - Repeater: <.02A @ 6 VDC
  - Base Station: <.1A @ 120 VAC, 50/60 Hz

Temperature Specifications

- Operating: 32°F to 140°F (0°C - 60°C)
- Storage: -22°F to 180°F (-30°C - 82°C)

Sensing

- 0.1°F (-17°C) Temperature resolution
- 0.1 % Volumetric soil moisture content resolution
- 0.1 dS/m Soil conductivity resolution (Salinity)

Communication

- Repeater Range: 5,000' (1524m) line-of-sight
- Buried Sensor Range: 500' (152m) line-of-sight
- 900 MHz ISM Band FHSS Communication
- Additional licensing not required

Operating Specifications and Additional Features

- Immediately ready for operation after installation
- Advanced MESH routing technology overcomes obstacles
- Repeater can plug into standard 120V outlet
- Durable sensor housing is resistant to aeration damage
- Supports up to 500 sensors per system
- Expected sensor battery life of 3 years, field replaceable
- Sensor reading sent every 5 minutes
- Measures two distinct depths in the soil profile
- Automatic network configuration and failure recovery
- Graphical system overview displays sensor data at a -glance
- Plots trends and compares historical and current readings
- Move quickly from system-wide averages to individual sensor readings

Warranty

- Comes with 1 year of NSN support (extended suport plans available)

How it works:

- Multiple sensors buried in a site at critical root zone levels.
- Above-ground relays installed on or in existing irrigation controller enclosures.
- Wireless MESH networking links all sensors to central computer
- Moisture, Temperature and Salinity readings displayed in your office

Sensor

- Measures soil moisture, temperature, and salinity.
- Two distinct depths in the soil profile—Critical root zone level and a second 4.5 (11,5cm) inches lower
- Independent measurements from each depth.

Repeater

- Can run off of a standard 120V outlet
- Multiple sensors can be run through just one repeater, no configuration required.

Base Station

Connects to Internet in the office.

Web-based Interface

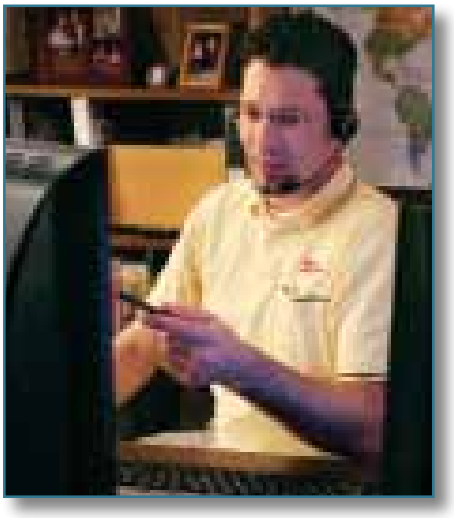
View current sensor readings and historical data remotely from any Web-connected computer or Web-enabled Mobile Phone or PDA.

Specifying Information—Turf Guard

Model	Description
TG-S2-R	Turf Guard Sensor With Replaceable Battery
TG-R-INT	Repeater-Internal Mount
TG-R-EXT	Repeater-External Mount
TG-B	Base Station
TG-PS	Power Supply

NSN® National Support Network

Isn't it nice to know someone's got you covered? Available day or night, you can count on the Toro® National Support Network (NSN) team for total operational confidence.



Specifications

Support for the Sentinel® Central Control

- Every Sentinel central package comes standard with 2-years NSN support
- Unlimited 24-hour toll-free support with 24/7/365 emergency paging
- Technical assistance by email with next business day response
- Remote PC assistance where connectivity is available
- Support of Microsoft® opertating system software when purchased from NSN
- NSN lab for field issue duplication and diagnostics
- Technical bulletins
- Remote data storage for duration of subscription period
- Extended warranty on central hardware components with continuous subscription
- User training both hardware and software
- For more information on products, services or training, contact:

Toro NSN
P.O. Box 3339,
Abilene, TX 79604
Phone: 888-676-8676
Website: toronsn.com

Features & Benefits

24-Hour, Seven-Day, 365 Support

Worldwide, Toro NSN is always available to answer your questions, troubleshoot your system and solve your problems. And if needed, our 24-hour central computer and component replacement service ensures minimal disruption to the operation of your irrigation system (U.S.).

Industry-Best Training – Classroom And Internet- Based

Classroom instruction is available at regional locations and at the NSN Training Center—where classes feature hands-on computer training and the operation of Toro hardware. NSN's new internet-based Training In Ten™ features critical instruction that can be learned in ten minutes or less and quickly applied right on-the-job!

The Confidence Of Working With The Best In The Business

Toro NSN is a Microsoft® Certified Partner. Our support technicians are licensed irrigators. NSN has a diagnostic lab on-site for each irrigation platform, all field hardware, plus ancillary products. The lab is used to duplicate field issues and investigate causes and solutions as part of Toro's commitment to continuous improvement. NSN is dedicated to irrigation—we know your business and expectations.

New System Support, Flexible Options To Renew

Every new Sentinel offering includes Toro NSN support. To protect your Toro investment long-term, choose a renewal option that gives you exactly what you need for continued reliable, cost-effective support and extended warranty, including equipment upgrades to keep your technology current and powerful.

Note: NSN Features vary based on the Sentinel product offering purchased. Contact Toro Sales for details.

TORO NSN.

Specifying Information—NSN/Sentinel Support Extensions

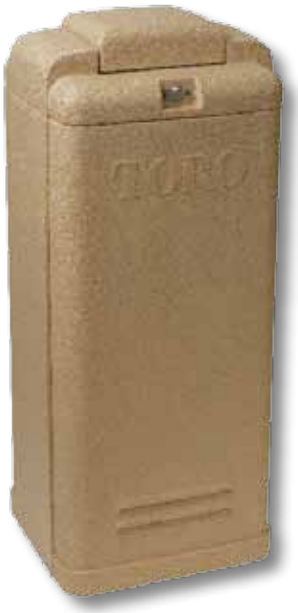
SSE-X-X	
Description	**Optional**
SSE	**-X-X**
SSE—Toro NSN Support for Sentinel Subscription Extensions*	T-1— 1-year Extension for SGIS-0-1 or SGIS-1-T T-3— 3-year Extension for SGIS-0-1 or SGIS-1-T C-1— 1-year Extension for SGIS-1-0 (w/computer warranty) C-3— 3-year Extension for SGIS-1-0 (w/computer warranty)

*1- and 3-year NSN extensions can be purchased up-front in conjunction with SGIS packages to provide the end-user with an additional one or three years of NSN support. For example, a customer can order the SGIS-1-0 and the SSE-C-3 which would equal five years of NSN support. These extensions are for original purchases only; existing plan renewals are still purchased through Toro NSN.

EICON Special Build

*No matter what your central control system **requires,*** from controller enclosures to communications type, Toro's Sentinel® can meet the demand. With EICON Special Build (ESB), if a standard Sentinel controller is unable to do the job, the ESB team can custom-produce exactly what your system needs.

Solar-powered Controller
Retrofit or areas like highway mediums where standard 120 VAC can't be run to.



Sandstone Plastic Pedestal
For desert / arid locations where a turf-green just does not fit into the landscape.

Features & Benefits

Communication Options
Not only has Sentinel been at the forefront of narrowband radio technology as an irrigation control and data transmission method, but we also have extensive experience in systems utilizing Ethernet, Internet, Spread Spectrum Radio, Cellular Phone, Landline Phone, Fiber Optics, Radio Repeaters, or a combination of the above. So, if narrowband radios don't work, tell us what will.

Enclosures To Meet Your Needs
Every installation is not the same and one enclosure does not work in every situation. If you prefer sandstone-colored plastic, because your landscape is in a semi-arid environment where green plastic just does not work, or if you need painted metal enclosures, or enclosures with 9 or 96 stations, let us know.

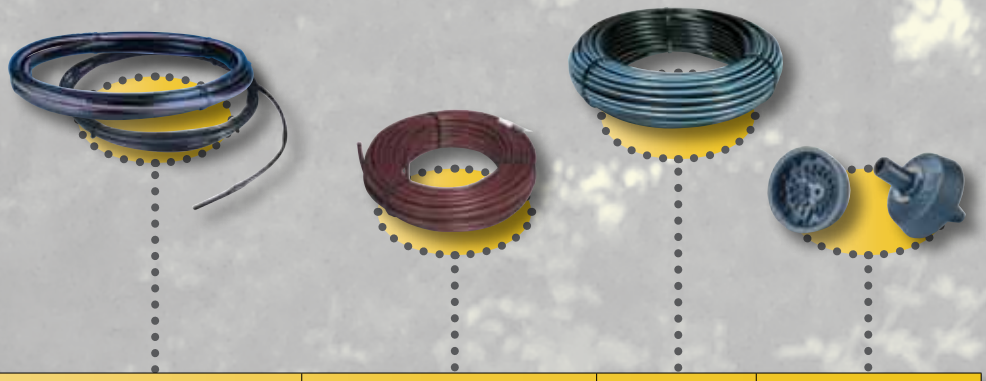
Retro-Link Options
Many existing controllers, like the Irritrol® MC-E or a Rain Bird® ESP-MC can be upgraded with a Sentinel Retro-Link to turn them into a Sentinel Satellite without needing to replace the controller.

Tell Us What You Need
Whether it is solar-powered controllers, a non-standard voltage supply, or other issues you need solved, tell us what you need. We'll tell you if it's possible.

For information, ordering, or quotes, contact:

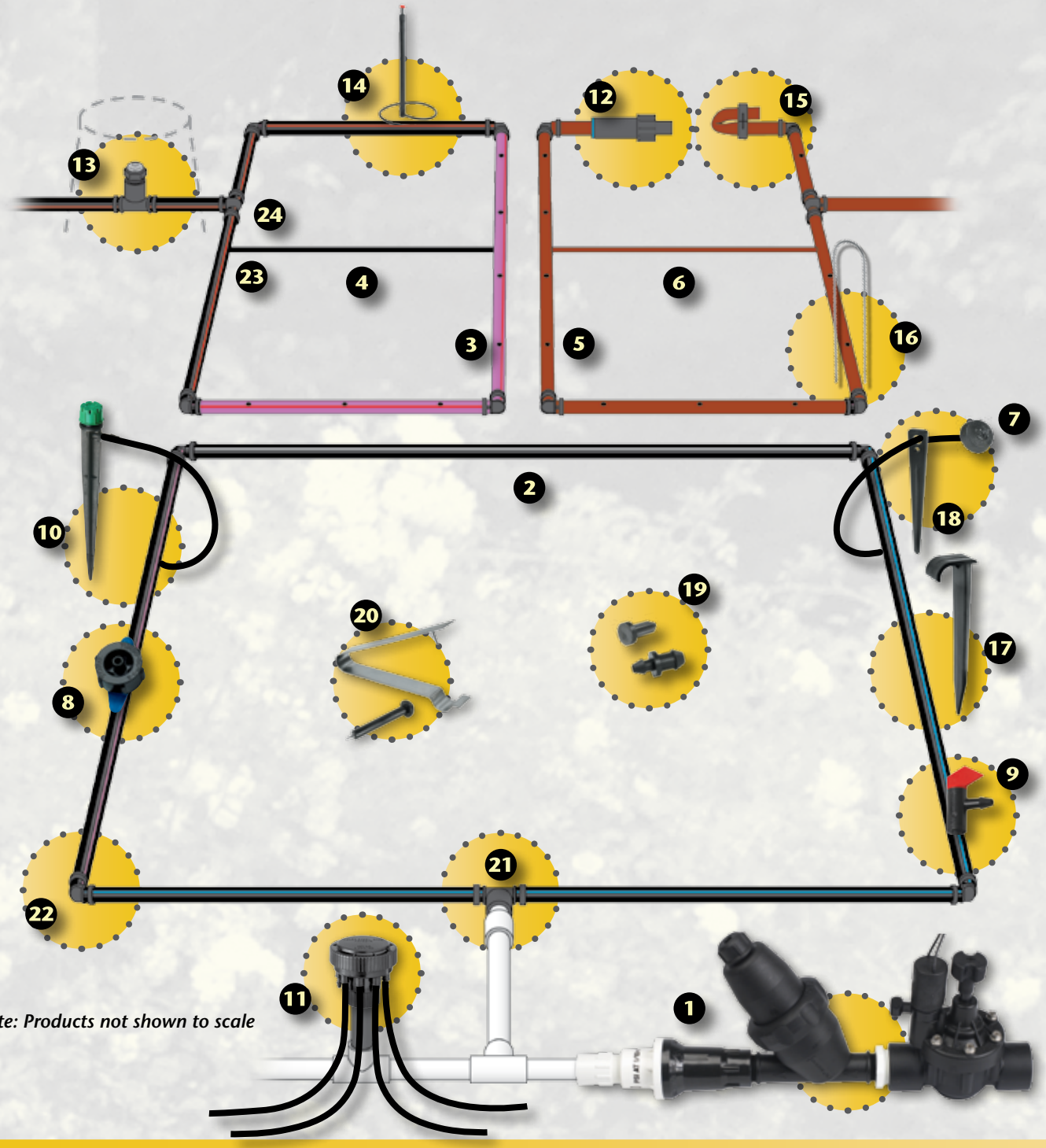
EICON Division
The Toro Company
7304 S. Alton Way, Suite M
Centennial, Colorado 80112
PHONE: (303) 290-1881 FAX: (303) 290-9546

Landscape Drip Overview



	DL2000® & Microline w/ROOTGUARD®	Drip In® Dripline* & Soakerline™*	Blue Stripe® Hose	On-line Emitters
Page Number	124-125 and 128	126-127	130-131	132-138
Sizes	.710"(18mm) OD DL2000 1/4" (6mm) Microline	.710"(18mm) OD Drip In 1/4" (6mm) Soakerline	1/4" to 1" (6-25mm)	
Emitter Spacing	12"; 18" (30cm; 46cm) DL2000 6"; 12" (15cm; 30cm) Microline	12"; 18" (30cm; 46cm) Drip In 6"; 12" (15cm; 30cm) Soakerline		
Flow Range	0.5-1.0 GPH (1,9-3,8 LPH)	0.5-1.0 GPH (1,9-3,8 LPH)		0.5-4.0 GPH (1,9-15,1 LPH)
Operating Pressure	15-60 PSI (1,0-4,1 Bar)	15-60 PSI (1,0-4,1 Bar)		8-60 PSI (0,5-4,1 Bar)
Pressure Compensating	DL2000	Drip In PC		NGE® Turbo-SC® Plus
Non-Pressure Compensating	Microline	Soakerline		E-2® Classic Take-apart
Turf/Subsurface	X			
Shrubs/Ground Cover	X	X	X	X
Sloped Areas			X	X
High Pressure Systems				
Low Pressure Systems	X	X	X	X
High Traffic Areas	X		X	
Nursery		X		
Median Strips/ Parking Islands	X		X	
High Wind Conditions	X	X		X
Subsurface Irrigation	X			

* Custom emitter spacing available. Requires minimum order of 80K feet.



Note: Products not shown to scale

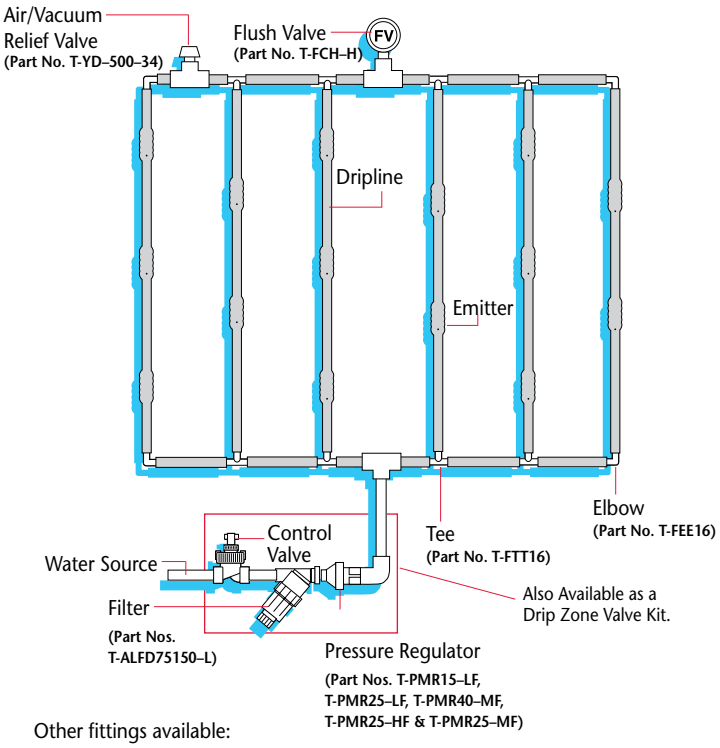
1. Drip Zone Kit (p. 140)
2. Blue Stripe Hose (p. 130)
3. DL2000 Subsurface Dripline (p. 124)
4. DL2000 Micro-Line (p. 128)
5. PC Brown Drip-In Dripline (p.126)
6. 1/4" Soakerline Dripline (p. 128)
7. NGE Emitter (p. 132)
8. Turbo-SC Emitter (p. 134)
9. E2 Emitter (p. 146)
10. Varistake Emitter (p. 140)
11. Multi-Outlet Manifold (p. 137)
12. Flush Valve (p. 129)
13. Vacuum Relief Valve (p. 129)
14. Operation Indicator (p. 129)
15. End Clamp (p. 129)
16. Steel Staple (p. 129)
17. Plastic Locator Stake (p. 129)
18. 1/4" Locater Stake (p. 129)
19. Goof Plugs & Bug Caps (p. 129)
20. Hole Punchers (p. 129)
21. FPT to Loc-Eze Adapter (p. 129)
22. Loc-Eze Elbow (p. 129)
23. 1/4" Barbed Coupling (p. 129)
24. Loc-Eze Tee (p. 129)

DL2000® Series PC Dripline

- 12" (31cm) and 18" (46cm) Emitter Spacing
- 0.5 (1,9 LPH) or 1.0 GPH 3.8 LPH
- 5/8"(15,75mm)—0.710" x 0.620" (18,03 x 15,75mm)
- US Gov. Approved ROOTGUARD® Protection

Toro® DL2000 Dripline is the most technologically advanced subsurface irrigation system available. Through its non-toxic ROOTGUARD® technology, only DL2000 delivers optimal water application directly to the root zone while safely inhibiting root intrusion.

Effluent Options Available



Other fittings available:
- Coupling (Part No. T-FCC16)
- Adapter (Part No. T-FAM16)
- Compression Adapter (Part No. T-CA-710)

Features & Benefits

U.S. Government-approved ROOTGUARD Protection
The pre-emergent, TREFLAN®, is impregnated into the emitter during the molding process and creates a "force field" effect around the emitter outlet, diverting root growth and assuring long term reliability.

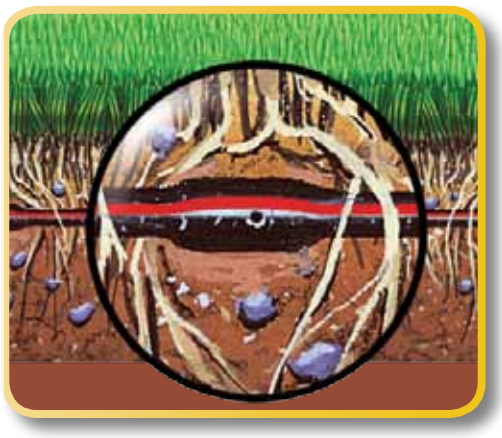
At Grade Or Buried Options
Can be installed at grade or buried 4" – 8" (10,2-20,4cm)underground, delivering irrigation directly to the plant's root zone.

Pressure Compensating PC Self-cleaning Emitters
Provide precise, trouble-free water application. TREFLAN® impregnated emitters are inseparably welded to the inside wall of durable polyethylene dripline tubing during manufacturing.

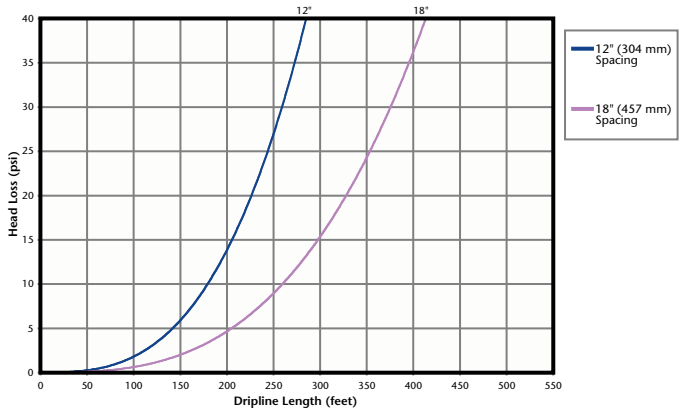
Environmentally Friendly
Irrigation takes place at or below grade so there is minimal water loss due to mist, evaporation, run-off or wind. Fertigation needs are reduced because water is applied only at the root zone.

Safety and Liability
When DL2000 is installed below ground, the landscape surface is free from irrigation equipment that may disrupt activities or cause injury. Sub-surface performance also avoids slippery walkways and roadways as well as wet walls, fences and windows.

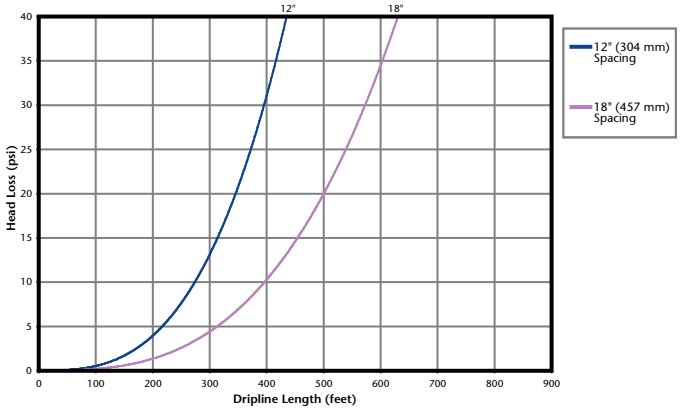
Distinctive red stripe on tubing signifies DL2000 with ROOTGUARD



Head Loss vs. Dripline Length and Emitter Spacing DL2000 5⁄8″, 1.06 GPH (4 LPH) Emitter @ 0% Slope



Head Loss vs. Dripline Length and Emitter Spacing DL2000 5⁄8″, 0.53 GPH (2 LPH) Emitter @ 0% Slope



NOTE: For information about the effects of temperature on polyethylene drip hose/tubing, please see bottom of pg. 164.

Warranty

Against Root Intrusion: Seven years
Hose: Five years pro-rated

5/8″ (16mm) OD			Inlet Pressure VS Maximum Length of Run In Feet			
Part No.	Flow Rate (GPH)	Emitter Spacing	15 psi	25 psi	30 psi	40 psi
RGP-212	.53	12″	250′	360′	400′	460′
RGP-218	.53	18″	350′	515′	565′	650′
RGP-412	1.0	12″	160′	240′	260′	300′
RGP-418	1.0	18″	240′	340′	375′	430′

DL2000 Performance Table—US	
Flow Rate	.53/1.06 GPH
Coefficient of Variation (Cv)	≤ 5%
Flow Exponent (x)	0.05
Inside Diameter	0.620″
Outside Diameter	0.710″
Wall	0.045″
Operating pressure (P)	15–60 psi
Minimum filtration requirement	120 Mesh
Hazen-Williams C factor	140
Barb loss factor (Kd)	.98

DL2000 Model List

5/8″ (16mm) DL 2000 PC DRIPLINE with ROOTGUARD

Model	Description
• RGP-212-01	0.5 GPH (1,9 LPH), 12″ (31cm) emitter spacing, 100 ft. (31m) coil
• RGP-412-01	1.0 GPH (3,8 LPH), 12″ (31cm) emitter spacing, 100 ft. (31m) coil
• RGP-218-01	0.5 GPH (1,9 LPH), 18″ (46cm) emitter spacing, 100 ft. (31m) coil
• RGP-418-01	1.0 GPH (3,8 LPH), 18″ (46cm) emitter spacing, 100 ft. (31m) coil
• RGP-212-05	0.5 GPH (1,9 LPH), 12″ (31cm) emitter spacing, 500 ft. coil (152m)
• RGP-412-05	1.0 GPH (3,8 LPH), 12″ (31cm) emitter spacing, 500 ft. coil (152m)
• RGP-218-05	0.5 GPH (1,9 LPH), 18″ (46cm) emitter spacing, 500 ft. coil (152m)
• RGP-418-05	1.0 GPH (3,8 LPH), 18″ (46cm) emitter spacing, 500 ft. coil (152m)
• RGP-212-10	0.5 GPH (1,9 LPH), 12″ (31cm) emitter spacing, 1000 ft. coil (304m)
• RGP-412-10	1.0 GPH (3,8 LPH), 12″ (31cm) emitter spacing, 1000 ft. coil (304m)
• RGP-218-10	0.5 GPH (1,9 LPH), 18″ (46cm) emitter spacing, 1000 ft. coil (304m)
• RGP-418-10	1.0 GPH (3,8 LPH), 18″ (46cm) emitter spacing, 1000 ft. coil (304m)

5/8″ DL2000 PC PURPLE DRIPLINE with ROOTGUARD

Model	Description
• RGP-212-05-E	0.5 GPH (1,9 LPH), 12″ (31cm) emitter spacing, 500 ft. coil (152m)
• RGP-412-05-E	1.0 GPH (3,8 LPH), 12″ (31cm) emitter spacing, 500 ft. coil (152m)
• RGP-218-05-E	0.5 GPH (1,9 LPH), 18″ (46cm) emitter spacing, 500 ft. coil (152m)
• RGP-418-05-E	1.0 GPH (3,8 LPH), 18″ (46cm) emitter spacing, 500 ft. coil (152m)

Specifying Information—DL2000

RGP X-XX-XX-E

Emitter Flow	Emitter Spacing	Coil Length	Optional
X	XX	XX	E
2—.50 GPH (1,9 LPH) 4—1.0 GPH (3,8 LPH)	12—12″ (30,5 cm) 18—18″ (45,7 cm)	01—100′ (30,5 m) 05—500′ (152,4 m) 10—1000′ (305 m)	E—Purple Tubing for Non-potable Water

Example: A 500′ (152,4m) coil of Pressure-compensating Dripline with ROOTGUARD, 12″ (30,5cm) emitter spacing and 0.5 GPH (2.0 LPH), would be specified as: **RGP-212-05**

Note: Specify/use Loc-Eze Fittings or .710 Compression Fittings

For precipitation rate information, please refer to pg. 164

Drip In® PC Brown Dripline

- 12" (31cm) and 18" (46cm) Emitter Spacing
- 0.5 (1,9 LPH) or 1.0 GPH (3.8 LPH)
- Pressure Compensating
- 100' (30,5m), 250' 76,2m) & 500' (152m)Coils

With higher water costs in our future, it makes more sense than ever to use inline tubing in suitable landscape applications. Drip In PC is both an effective and economical choice for at-grade installations.

Effluent Options Available

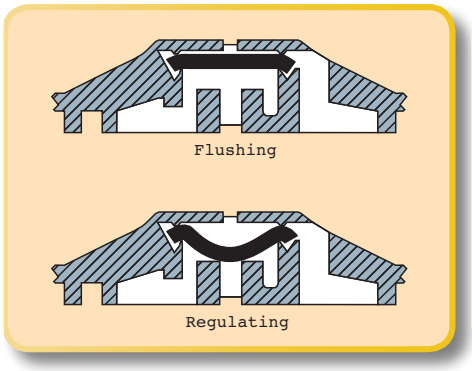
Features & Benefits

Built-in Emitters
Deliver precise water application directly to the root zone.

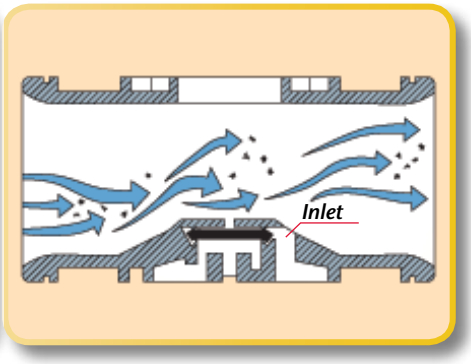
Fully Pressure-compensating from 15 – 60 PSI (1,03-4,13 Bar)
The pressure compensating design makes it ideal for slopes, high wind areas and areas with limited water supply or low pressure.

High Uniformity
Proven, dependable pressure compensating Drip In emitters deliver uniform, precise emitter discharge rates with exceptionally low variability.

Keeps Water Off Hardscapes
Preventing unsightly water stains.

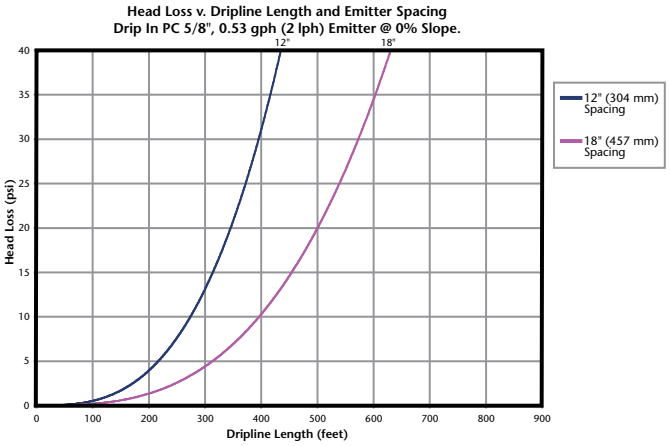


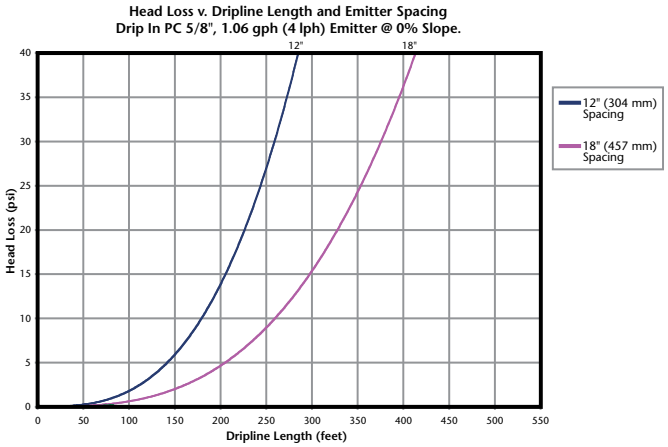
UNIQUE, CONTINUOUS FLUSHING
Flushing occurs at low pressure at start up, during the irrigation cycle if the emitter begins to clog and there is a reduction in flow, and as pressure drops during shut-down.



HIGHLY CLOG RESISTANT
Unique, raised internal filtration design deflects debris upward and away from the emitter's inlet. Because the inlet is also raised, sediment won't collect at the inlet while the system is off.

DUAL OPPOSED OUTLETS
In above ground installations, dual opposing ports in every emitter assure that at least one outlet provides air relief, which prevents back-siphonage of contamination into the emitter.





Length of Run Chart

5/8" (0.620" ID / 0.710" OD)				Inlet pressure vs. Max length of run in Feet			
Part Number	Tubing Size	Flow Rate	Emitter Spacing	15 psi	25 psi	30 psi	40 psi
T-PCB1853-12	.620" ID	.53 gph	12"	250'	360'	400'	460'
T-PCB1853-18	.620" ID	.53 gph	18"	350'	515'	565'	650'
T-PCB1810-12	.620" ID	1.0 gph	12"	160'	240'	260'	300'
T-PCB1810-18	.620" ID	1.0 gph	18"	240'	340'	375'	430'

Dripin PC Brown Performance Table—US	
Flow Rate	.53/1.06 GPH
Coefficient of Variation (Cv)	≤ 5%
Flow Exponent (x)	0.05
Inside Diameter	0.620"
Outside Diameter	0.710"
Wall	0.045"
Operating Pressure (P)	15–60 psi
Minimum Filtration Requirement	120 Mesh
Hazen-Williams C Factor	140
Barb Loss Factor (Kd)	.98

NOTE: For information about the effects of temperature on polyethylene drip hose/tubing, please see bottom of pg. 164.

DripIn PC Model List

5/8" (16mm) Brown PC Dripline

0.620" ID x 0.710" OD x 0.045" Wall
(15,7mm ID x 18,0mm OD x 1,1mm Wall)

Model	Description
• T-PCB1853-12-100	0.53 GPH (2,0 LPH), 12" (31cm) emitter spacing, 100' (31m) coil
• T-PCB1810-12-100	1.0 GPH (3,8 LPH), 12" (31cm) emitter spacing, 100' (31m) coil
• T-PCB1853-18-100	0.53 GPH (2,0 LPH), 18" (46cm) emitter spacing, 100' (31m) coil
• T-PCB1810-18-100	1.0 GPH (3,8 LPH), 18" (46cm) emitter spacing, 100' (31m) coil
• T-PCB1853-12-250	0.53 GPH (2,0 LPH), 12" (31cm) emitter spacing, 250' (76m) coil
• T-PCB1810-12-250	1.0 GPH (3,8 LPH), 12" (31cm) emitter spacing, 250' (76m) coil
• T-PCB1853-18-250	0.53 GPH (2,0 LPH), 18" (46cm) emitter spacing, 250' (76m) coil
• T-PCB1810-18-250	1.0 GPH (3,8 LPH), 18" (46cm) emitter spacing, 250' (76m) coil
• T-PCB1853-12-500	0.53 GPH (2,0 LPH), 12" (31cm) emitter spacing, 500' (152m) coil
• T-PCB1810-12-500	1.0 GPH (3,8 LPH), 12" (31cm) emitter spacing, 500' (152m) coil
• T-PCB1853-18-500	0.53 GPH (2,0 LPH), 18" emitter spacing, 500' (152m) coil
• T-PCB1810-18-500	1.0 GPH (3,8 LPH), 18" emitter spacing, 500' (152m) coil

5/8" (18mm) Purple PC Dripline (Effluent)

• T-PCE1810-12-500	1.0 GPH (3,8 LPH), 12" (31cm) emitter spacing, 500' (152m) coil

Specifying Information—DripIn PC

T-PCX-X-18-XX-XX-XXX

Tubing Type	Skin	Tubing Size	Emitter Flow (@ 30 psi)	Emitter Spacing	Coil Length
T-PC	X	18	XX	XX	XXX
T-PC–Drip In Tubing	B–Brown Drip In Tubing E–Purple Drip In Tubing (Effluent)	18–5/8" (.720 OD X 0.620" ID) (18mm OD X 16mm ID)	53–0.53 GPH (2,0 LPH) 10–1.00 GPH (4,0 LPH)	12–12" (30,5cm) 18–18" (45,7cm)	100–100' (30,5m) 250–250' (75,2m) 500–500' (152,4m)

Example: A coil of 5/8" (16mm ID) pressure compensating .53 GPH (2,0 LPH)emitters spaced at 12" ((45,7cm) on a 500' (152,3m) coil would be specified as: **T-PCB1853-12-500**

For precipitation rate information, please refer to pg. 168

DL2000® Series Microline with ROOTGUARD®

- 1/4" (6,4mm)Tubing
- 0.5 GPH (1,9 LPH)
- 6" (16cm) and 12" (31cm) Emitter Spacing

DL2000 Microline Performance Table—US	
Inside Diameter	0.170"
Outside Diameter	0.250"
Wall	0.040"
Operating Pressure	15–60 psi
Minimum Filtration Requirement	140 Mesh
Nominal Flow Rate (Q)	0.53 GPH

NOTE: For information about the effects of temperature on polyethylene drip hose/tubing, please see bottom of pg. 164.

Features & Benefits

ROOTGUARD® Protection
Uses the non-toxic Treflan® creating a force-field effect guarding against root intrusion into the emitters.

¼" (6,4mm) Tubing With Built-in Emitters
Allows for ease of installation even to the smallest of areas.

Length of Run Chart

Part Number	Tubing Size	Flow Rate	Emitter Spacing	Inlet Pressure	Maximum Length of Run
T-MCRG-206	1/4" (6,4mm)	.53 GPH (2,0 LPH)	6" (15,2mm)	15 psi (1,03 bar)	19' (5,8m)
T-MCRG-212	1/4" (6,4mm)	.53 GPH (2,0 LPH)	12" (30,5mm)	15 psi (1,03 bar)	33' (10m)

Specifying Information—Microline

Part Number	Description
T-MCRG-206	DL2000 100' (30,5m) Roll, ¼" (6,4mm) Non-pressure-compensating Microline Dripline w/ROOTGUARD, 6" (15,2mm) Emitter Spacing, 0.50 GPH (1,9 LPH)
T-MCRG-212	DL2000 100' (30,5m) Roll, ¼" (6,4mm) Non-pressure-compensating Microline Dripline w/ROOTGUARD, 12" (30,5mm) Emitter Spacing, 0.50 GPH (1,9 LPH)

Soakerline™ 1/4" (6,4mm) Classic Dripline

- 100' (30,5m) Coils
- 0.53 GPH (2.0 LPH)
- 6" (15cm) and 12" (31cm) Emitter Spacing

NOTE: For information about the effects of temperature on polyethylene drip hose/tubing, please see bottom of pg. 164.

Features & Benefits

Flexible And Sturdy Design
Soakerline ¼" (6,4mm)dripline has a flexible and sturdy design making it ideal for young trees, shrubs, planter boxes and small landscape applications.

Built-in Emitters
Allow for ease of installation.

Brown Color
To blend into landscape areas.

Soakerline Performance Table-US	
Inside Diameter	0.170"
Outside Diameter	0.250"
Wall	0.040"
Operating Pressure	15–60 psi
Minimum Filtration Requirement	140 Mesh
Nominal Flow Rate (Q)	0.53 GPH

Length of Run Chart

Part Number	Tubing Size	Flow Rate	Emitter Spacing	Inlet Pressure	Max Length of Run
T-SDB252-6-100	1/4" (6,4mm)	.53 GPH (2,0 LPH)	6" (15,2mm)	15 psi (1,03 bar)	19' (5,8m)
T-SDB252-12-100	1/4" (6,4mm)	.53 GPH (2,0 LPH)	12" (30,5mm)	15 psi (1,03 bar)	33' (10m)

For precipitation rate information, please refer to pg. 164

Loc-Eze® Fittings and Accessories

Specifying Information— ⅝" (12mm) Loc-Eze® Fittings

Part Number	Description
T-FTT16	Loc-Eze Tee
T-FEE16	Loc-Eze Elbow
T-FCC16	Loc-Eze Coupling
T-FAM16	Loc-Eze x 1/2" (12mm) MPT Male Adapter
T-FTV16	Loc-Eze x 1/2" (12mm) Slip Adapter Tee
T-FTF16	Loc-Eze x 1/2" (12mm) FPT Tee
T-FJA16	Loc-Eze x 3/4" (20mm) MHT without Cap
T-FJJ16	Loc-Eze x 3/4" (20mm) MHT with Cap
T-FAS16-1	Loc Eze x 3/4" (20mm) FHT Swivel with Washer
T-FTS16	Loc Eze x 3/4" (20mm) FHT Swivel with Screen
T-FTS16-1	Loc-Eze x 3/4" (20mm) FHT Swivel Tee with Washer
T-FAS16	Loc-Eze x 3/4" (20mm) FHT Swivel Tee with Screen

Note: ⅝" (16mm) EHW1645 is an equivalent hose size to DL2000 Dripline.

T-FTT16 T-FEE16 T-FCC16 T-FAM16 T-FTV16 T-FTF16 T-FJA16 T-FJJ16 T-FAS16-1 T-FTS16 T-FTS16-1 T-FAS16

T-YD-500-34 T-FCH-H-FIPT T-FPG02 T-FCH-H-FHT T-FJQ16 T-BC-025 T-DL-MP9 T-IPS1500 T-SS6-50 T-FMP16

Specifying Information Accessories

Part Number	Description
T-YD-500-34	Air Vent—½" (12mm) MIPT Air Release & Vacuum Relief Valve
T-FCH-H-FIPT	Flush Valve—¾" (20mm) FPT (Pipe Thread), 0.8 GPM, 2 psi Sealing Pressure
T-FCH-H-FHT	Flush Valve—¾" (20mm) FHT (Hose Thread), 0.8 GPM, 2 psi Sealing Pressure
T-DL-MP9	DL2000 Pop-up Operation Indicator
T-FJQ16	5/8" (16mm) Figure-eight End Clamp
T-SS6-50	3/4" (20mm) Steel Soil Staple to Hold Tubing in Place
T-IPS1500	5/8" (16mm) Plastic Locator Stake to Hold Tubing in Place
T-FPG02	Double-sided Goof Plug
T-BC-025	Bug Cap for 1/4" (6,4mm) Tubing
T-FMP16	Stainless Steel Insertion Tool for 1/4" (6,4mm) Barbed Fittings and Emitters

Specifying Information— Microline ¼" (4mm)Fittings

Part Number	Description
T-FTT0400	Tee (Barb x Barb)
T-FEE0400	Elbow (Barb x Barb)
T-FCC0400	Coupling (Barb x Barb)
T-FCV-BB	Microflow Valve (Barb x Barb)
T-FMP08	Hose Punch for 1/4" (4mm) barbed fittings and emitter
T-IPS0104	1/4" (4mm) plastic locator stake to hold tubing in place

T-FCC0400 T-FTT0400 T-FEE0400 T-FCV-BB T-FMP08 T-IPS0104

T-CA-710 T-CEFCH-H

Specifying Information— 0.710 (18mm)OD Compression Fittings

Part No.	Description
T-CA-710	OD Compression Adapter 1/2" (12mm) Spigot
T-CEFCH-H	OD Compression Adapter with Flush Valve, 0.8 GPM (3,03 LPM), 2 psi (9,76k/m²) Sealing

Blue Stripe® Polyethylene Hose

- 5/8" (16mm), 3/4" (20mm), 1" (25mm) ID
- 7 Year Warranty

Central to any point-source drip installation, is the water delivery system. It needs to be reliable, trouble-free and cost effective. Providing the solution for over 30 years, Toro® Blue Stripe® hose leads the industry as the highest requested hose on the market.

Effluent Options Available

NOTE: For information about the effects of temperature on polyethylene drip hose/tubing, please see bottom of pg. 164.

Features & Benefits

Manufactured From Premium Grade Linear Low Density Polyethylene
For the most dependable long-lasting operation.

Minimum 2% Carbon Black Added
To provide optimum protection against ultraviolet (UV) deterioration.

Available With Blue, White Or Lavender Stripe
For easy on-site identification of drip zones or applications during installation and operation.

Wide Range Of Choices
Available in a wide range of diameters, wall thicknesses, coil lengths and working pressures.

Lock-eze Fittings Recommended
5/8" (16mm) Loc-Eze Fittings are designed to work with 5/8" (16mm) hose.

Blue Stripe® Micro-Distribution Hose

ID Controlled Hose

Part Number		Hose Size	Nominal Hose Size			Coil Length	Coil Ship Weight	Pressure Rating
		ID Inch	ID Inch	OD Inch	Wall Inch	Ft.	Lbs.	psi
Blue Stripe Round Hose - Coil Stretch Wrapped								
	T-EHW0437-100	1/4" (6,4mm)	0.170 (4,31mm)	0.250 (6,4mm)	0.040 (1,02mm)	1,000 (305m)	9.64 (4,37k)	161 (,078bar)
Blue Stripe Round Hose - Coil Banded								
	T-EHD0437-010	1/4" (6,4mm)	0.170 (4,31mm)	0.250 (6,4mm)	0.040 (1,02mm)	100 (30,5m)	1.1 (,5k)	161 (,078bar)

Blue Stripe® Polyethylene Hose

ID Controlled Hose

Part Number		Hose Size	Nominal Hose Size			Coil Length	Coil Ship Weight	Pressure Rating
		ID Inch	ID Inch	OD Inch	Wall Inch	Ft.	Min. Lbs.	psi
Blue Stripe® Round Hose – Coil Stretch Wrapped								
	T-EHW1645-010	5/8" (16mm)	0.615 (15,49mm)	0.705 (17,91mm)	0.045 (1,143mm)	100 (30,5m)	4.0 (1,81k)	61 (,029bar)
	T-EHW1645-050	5/8" (16mm)	0.615 (15,49mm)	0.705 (17,91mm)	0.045 (1,143mm)	500 (152,4m)	19.8 (8,98k)	61 (,029bar)
Blue Stripe® Round Hose - Coil Banded								
	T-EHD1554-050A (palletized)	-	0.570 (14,48mm)	0.680 (17,27mm)	0.055 (1,397mm)	500 (152,4m)	21.5 (9,75k)	77 (,037bar)
P,X	T-EHD1645-050A (palletized)	5/8" (16mm)	0.615 (15,49mm)	0.705 (17,91mm)	0.045 (1,143mm)	500 (152,4m)	18.9 (8,57k)	61 (,029bar)
P,X	T-EHD2057-050A (palletized)	3/4" (20mm)	0.805 (20,45mm)	0.920 (23,34mm)	0.057 (1,448mm)	500 (152,4m)	31.2 (14,15k)	59 (,028bar)
	T-EHD2667-066A (palletized)	1" (25mm)	1.060 (26,92mm)	1.195 (30,35mm)	0.067 (1,702mm)	660 (201m)	63.3 (28,7k)	53 (,025bar)

Note: For the two designated part numbers above, replace "D" with "P" in the part number to specify Purple Hose for reclaimed water. For the same two designated part numbers above, replace "D" with "X" in the part number to specify White Stripe Hose.

Blue Stripe® Polyethylene Hose Model List	
Micro-Distribution Hose - Coil Stretch Wrapped	
Model	**Description**
• T-EHW0437-100	LLDPE; 1/4"; ID: 0.170''; OD: 0.250''; Wall: 0.040''; 1,000' coil (LLDPE; 6mm; ID: 0,4mm; OD: 0,6mm; Wall: 0,1mm; 304m coil)
Micro-Distribution Hose - Coil Banded	
Model	**Description**
• T-EHD0437-010	LLDPE, 1/4", ID-0.170'', OD-0.250'', Wall-0.040'', 100' coil (LLDPE; 6mm; ID: 0,4mm; OD: 0,6mm; Wall: 0,1mm; 31m coil)
Inside Diameter (ID) controlled - Coil Stretch Wrapped	
Model	**Description**
• T-EHW1645-010 • T-EHW1645-050	5/8"; ID: 0.615"; OD: 0.705"; Wall: 0.045"; 100' coil (16mm, ID: 1,6mm; OD: 1,8mm; Wall: 0,1mm; 31m coil) 5/8"; ID: 0.615"; OD: 0.705"; Wall: 0.045"; 500' coil (16mm, ID: 1,6mm; OD: 1,8mm; Wall: 0,1mm; 152m coil)
Inside Diameter (ID) Controlled - Coil Banded	
Model	**Description**
• T-EHD1554-050A • T-EHD1645-050A • T-EHD2057-050A • T-EHD2667-066A	ID: 0.570''; OD: 0.680''; Wall: 0.055''; 500' coil (palletized) (ID: 14,5mm; OD: 17,3mm; Wall: 1,4mm; 152m coil palletized) 5/8 "; ID: 0.615''; OD: 0.705''; Wall: 0.045''; 500' coil (palletized) (16mm; ID: 15,6mm; OD: 17,9mm; Wall: 0,1mm; 152m coil palletized) 3/4"; ID: 0.805'', OD: 0.920''; Wall: 0.057''; 500' coil (palletized) (20mm; ID: 20,4mm, OD: 23,4mm; Wall: 1,5mm; 152m coil palletized) 1"; ID: 1.060''; OD: 1.195''; Wall: 0.067''; 660' coil (25mm; ID: 26,9mm; OD: 30,4mm; Wall: 1,7mm; 201m coil)
Lavender Stripe Round Hose	
Inside Diameter (ID) Controlled - Coil Banded	
Model	**Description**
• T-EHP1645-050A • T-EHP2057-050A	5/8", ID-0.615'', OD-0.705'', Wall-0.045'', 500' coil (palletized) (16mm; ID: 15,6mm; OD: 17,9mm; Wall: 0,1mm; 152m coil palletized) 3/4", ID-0.805'', OD-0.920'', Wall-0.057'', 500' coil (palletized) (20mm; ID: 20,4mm, OD: 23,4mm; Wall: 1,5mm; 152m coil palletized)
White Stripe™ Round Hose	
Inside Diameter (ID) Controlled - Coil Banded	
Model	**Description**
• T-EHX1645-050A • T-EHX2057-050A	5/8", ID-0.615'', OD-0.705'', Wall-0.045'', 500' coil (palletized) (16mm; ID: 15,6mm; OD: 17,9mm; Wall: 0,1mm; 152m coil palletized) 3/4", ID-0.805'', OD-0.920'', Wall-0.057'', 500' coil (palletized) (20mm; ID: 20,4mm, OD: 23,4mm; Wall: 1,5mm; 152m coil palletized)

Specifying Information—Blue Stripe Polyethylene Hose

T-EH-X-XX-XX-XXX-X					
Model	**Stripe Color / Packaging**	**Tubing Size (ID)**	**Wall Thickness**	**Coil Length**	**Optional**
T-EH	X	XX	XX	XXX	X
T-EH - Blue Stripe Hose	D - Blue Stripe / Coil Banded W - Blue Stripe / Stretch Wrapped P - Lavender Stripe / Coil Banded X - White Stripe / Coil Banded	04 - 4mm (.16") 15 - 15mm (.59") 16 - 16mm (.63") 20 - 20mm (.79") 26 - 26mm (1.02")	37 - .037" (0,94mm) 45 - .045" (1,14mm) 54 - .054" (1,37mm) 57 - .057" (1,44mm) 67 - .067" (1,70mm)	010 - 100' (30,5m) 050 - 500' (153m) 066 - 660' (201m) 100 - 1000' (305m)	A- Palletized

NGE® New Generation Emitters

- **0.5 (1,9 LPH), 1.0 (3,8 LPH) and 2.0 GPH (7,6 LPH)**
- **8-60 psi (0,6-4,14 Bar)**
- **Pressure-Compensating**

Designed for demanding drip irrigation installations, the Toro® New Generation Emitter (NGE) has what it takes to keep your system flowing.

NGE with Black, 1.0 GPH (3,8 LPH) color-coded dust cap

NGE with Red, 2.0 GPH (7,6 LPH) color-coded dust cap

NGE with Blue, 0.5 GPH (1,9 LPH) color-coded dust cap

Male adapter option for use with ¼" (6,4mm) exit tubing

Features & Benefits

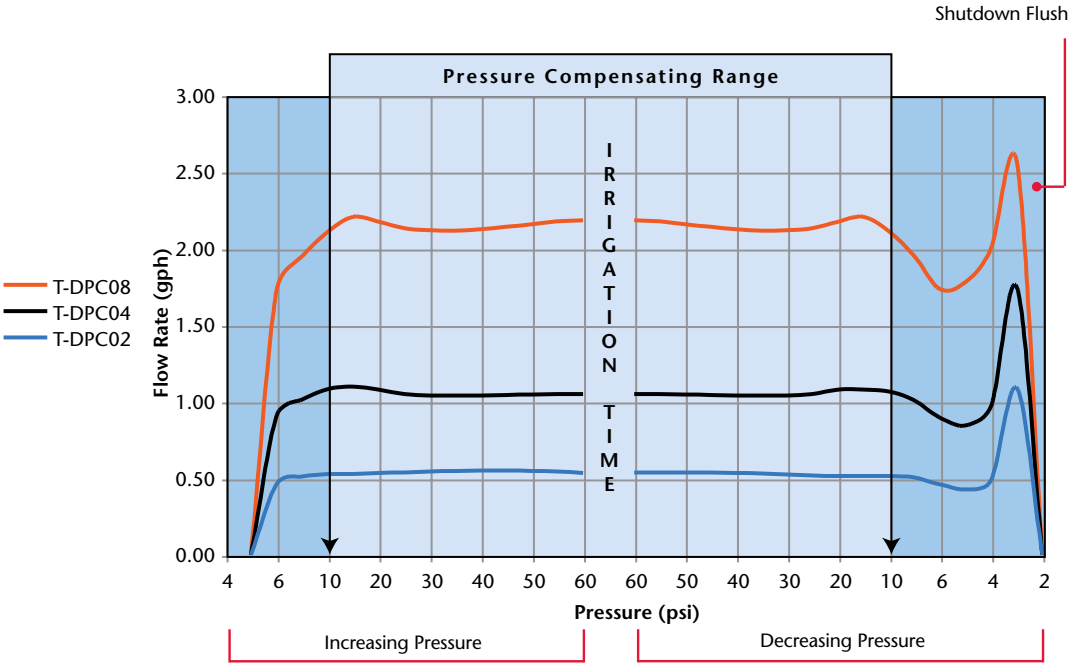
Uniform Flow Rates
Make the NGE ideal for use in difficult topographical conditions.

Unique Emitter Design And Pressure Compensating Diaphragm
Allows the emitter to self-flush during operation and shut-down to facilitate cleaning. This ensures the emitter is free of debris at start-up and during the emitter operation.

Stops the emitter from draining below 2-3 psi (0,14-0,20 Bar) preventing complete drainage of the system. This reduces the time required to refill the system at start-up improving the overall operation.

Allows the emitter to close inhibiting back siphoning and preventing the emitter from being contaminated with debris

Coefficient Of Variation (CV) Of 3% Or Less
As tested by Toro and independent labs, the NGE is one of the best performing pressure-compensating emitters available.



NGE Flow Rates—US

Pressure	DPC02	DPC04	DPC08
psi	GPH	GPH	GPH
6	0.46	0.91	1.73
8	0.51	1.01	1.95
10	0.53	1.08	2.11
15	0.53	1.10	2.21
20	0.53	1.08	2.17
25	0.54	1.05	2.13
30*	**0.54**	**1.04**	**2.12**
35	0.55	1.04	2.12
40	0.55	1.04	2.12
45	0.55	1.04	2.14
50	0.55	1.05	2.16
55	0.54	1.05	2.18
60	0.54	1.05	2.18

** Recommended operating pressure*

Specifications

Specifications

- Recommended operating pressure: 8-60 psi (0,5-4,1 Bar)
- Flow Rates:
  - T-DPC02 – 0.5 GPH (1,9 LPH)
  - T-DPC04 – 1.0 GPH (3,8 LPH)
  - T-DPC08 – 2.0 GPH (7,6 LPH)
- Color-coded snap-on dust cap (0.5 Blue; 1.0 Black; 2.0 Red) deters dust and insects from entering the emitter
- Barbed inlet allows emitters to be installed directly onto hose or used with ¼" (6mm) tubing

Warranty

- Two years

NGE Performance Table—US

		T-DPC02	T-DPC04	T-DPC08
Nominal Flow Rate (Q)	GPH	0.5 GPH	1.0 GPH	2.0 GPH
Recom. Pressure Range (P)	psi	8–60 psi		
Emitter Exponent (x)		0.000	0.000	0.002
Coefficient of Variation (Cv)		3%		
Min. Filtration Requirement		140 Mesh (105 Micron)		
Optional Outlet		-MA (Male Adapter)	-DC (Snap-on Dust Cap)	
Color (Cap)		Blue	Black	Red

Specifying Information—NGE Emitter

Part Number	Description
	NGE SF (Self-flushing) Pressure-compensating Turbulent Flow Emitter with Male Adapter
T-DPC02-MA	0.5 GPH (2 LPH) NGE Self-flushing Pressure-compensating Emitter w/Male Adapter (black)
T-DPC04-MA	1.0 GPH (4 LPH) NGE Self-flushing Pressure-compensating Emitter w/Male Adapter (black)
T-DPC08-MA	2.0 GPH (8 LPH) NGE Self-flushing Pressure-compensating Emitter w/Male Adapter (black)
	NGE SF (Self-flushing) Pressure-compensating Turbulent Flow Emitter with Dust Cap
T-DPC02-DC-BLUE	0.5 GPH (2 LPH) NGE Self-flushing Pressure-compensating Emitter w/Dust Cap (blue)
T-DPC04-DC	1.0 GPH (4 LPH) NGE Self-flushing Pressure-compensating Emitter w/Dust Cap (black)
T-DPC08-DC-RED	2.0 GPH (8 LPH) NGE Self-flushing Pressure-compensating Emitter w/Dust Cap (red)

For precipitation rate information, please refer to pg. 164

Turbo-SC® Plus
Pressure-compensating Emitter

- 0.5 (1,9 LPH), 1.0 (3,8 LPH) and 2.0 GPH (7,6 LPH)
- Self-Flushing
- Pressure-Compensating

From the company that has pioneered so many drip irrigation innovations, the Toro® Turbo SC Plus has an industry track record for proven performance and affordability. Known as the DPJ emitter, Turbo SC Plus offers the two features liked by so many users. Pressure-compensation for system uniformity and "take-apart" for simple on site inspection.

Features & Benefits

Take-apart Feature
Permits fast, easy on-site inspection and cleaning.

Large Self-flushing, Turbulent Flow Path
For higher resistance to plugging where water conditions may be a problem.

Male Adapter With Bug Shield
Deters the entry of insects, but also can be used with ¼" (6,4mm) exit tubing for precision water placement.

Color-coded Base For Easy On-site Identification
Blue – 0.5 GPH (1,9 LPH); Black – 1.0 GPH (3,8 LPH); Red – 2.0 GPH (7,6 LPH).

Red
2.0 GPH
(8,0 LPH)

Black
1.0 GPH
(4,0 LPH)

Blue
0.5 GPH
(2,0 LPH)

Specifications

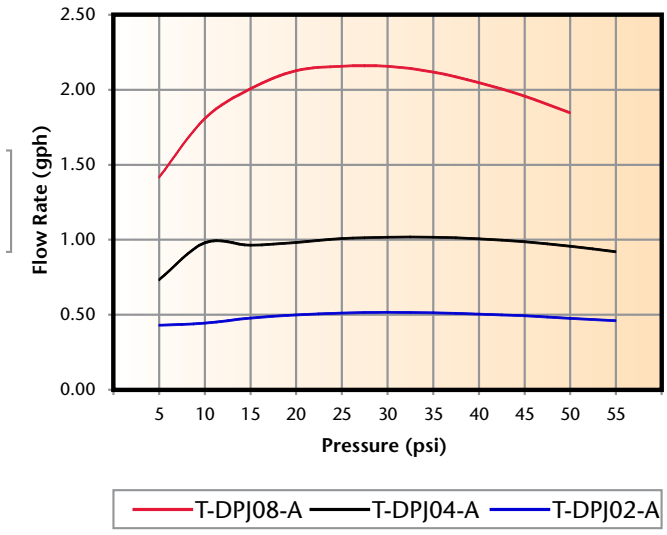
Specifications

- Proven PC (pressure-compensating) emitter design
- Barbed inlet allows emitters to be installed directly onto hose or used with ¼" (6mm) tubing
- High quality diaphragm for improved pressure compensation and uniformity over a wide range of pressure

Warranty

- One year

Pressure vs. Flow



Flow Rate

PSI	T-DPJ02-A	T-DPJ04-A	T-DPJ08-A
5	0.42	0.73	1.41
10	0.44	0.97	1.80
15	0.47	0.96	2.00
20	0.49	0.97	2.12
25	0.50	1.00	2.15
***30**	**0.51**	**1.01**	**2.15**
35	0.51	1.01	2.11
40	0.50	1.00	2.04
45	0.49	0.98	1.95
50	0.47	0.95	1.84
55	0.45	0.91	

** Recommended operating pressure*
Values listed in gallons per hour.

Turbo-SC Performance Table—US

		T-DPJ02-A	T-DPJ04-A	T-DPJ08-A
Nominal Flow Rate (Q)	**GPH**	0.5 GPH	1.0 GPH	2.0 GPH
Recom. Pressure Range (P)	**psi**	10–50 psi		
Emitter Exponent (x)		0.02	-0.04	0.01
Min. Filtration Requirement		140 Mesh (105 Micron)		
Color (Base)		Blue	Black	Red

Specifying Information—Turbo-SC Plus

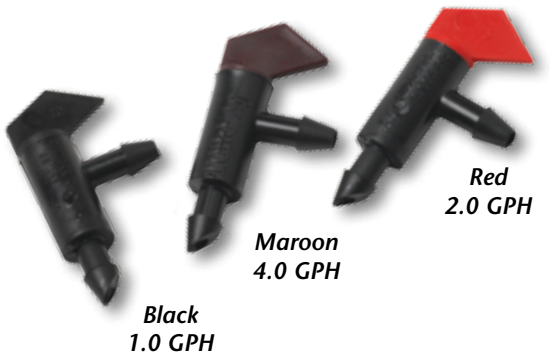
Part Number	Description
T-DPJ02-A-BLUE	0.5 GPH (2 LPH) Pressure-compensating Emitter w/Male Adapter (Blue)
T-DPJ04-A	1.0 GPH (4 LPH) Pressure-compensating Emitter w/Male Adapter (Black)
T-DPJ08-A-RED	2.0 GPH (8 LPH) Pressure-compensating Emitter w/Male Adapter (Red)

For precipitation rate information, please refer to pg. 164

E-2® Classic Take Apart Emitter

- 1.0 (4,0 LPH), 2.0 (8,0 LPH) and 4.0 GPH (16,0 LPH)
- Barbed Inlet
- Non-Pressure-Compensating
- Color-coded

First introduced in 1972, the E-2 is considered the take-apart emitter by which all others are measured. While there have been a few improvements over the years, the E-2 emitter still provides accurate watering at an economical price.



Features & Benefits

Fast Single Barb Installation
Install directly onto hose.

Large Open Flow Path
For resistance to plugging.

Take-apart Feature
Allows fast simple field inspection.

Specifications

Specifications

- Flow Rates:
  - T-DBK04-100 – 1.0 GPH (3,8 LPH)
  - T-DBK08-RED-100 – 2.0 GPH (7,6 LPH)
  - T-DBK16-MB-100 – 4.0 GPH (16,0 LPH)
- Proven Classic hydraulic design
- Economic emitter for trouble-free applications
- Barbed inlet allows emitters to be installed directly onto hose or used with ¼" (6,4mm) leader tubing (T-EHD0437)
- Exit barb may be used with 1/4" (6mm) exit tubing for precision water placement

Warranty

- One year

		T-DBK04	T-DBK08	T-DBK16
Nominal Flow Rate (Q)	GPH @ 15 psi	1.06 GPH	2.11 GPH	4.23 GPH
Flow Coefficient (K)	U.S. Units	0.22	0.41	0.85
Operating Pressure Range (P)	psi	0–50 psi		
	Bar	0–3,5 Bar		
Flow Exponent (X)		0.60	0.57	0.56
Coefficient of Variation (Cv)		≤ 5%	≤ 6%	≤ 6.5%
Minimum Filtration Requirement		140 Mesh (105 Micron)		

E-2 Emitter Flow Rate—US

psi	T-DBK04	T-DBK08	T-DBK16
5	0.58	1.03	2.09
10	0.88	1.53	3.08
15	1.12	1.93	3.87
20	1.33	2.27	4.55
25	1.52	2.58	5.15
30	1.70	2.87	5.71
35	1.87	3.13	6.23
40	2.03	3.38	6.71
45	2.17	3.62	7.17
50	2.32	3.84	7.61

** Recommended operating pressure*
Values listed in gallons per hour.

Specifying Information
E-2 Classic Emitter

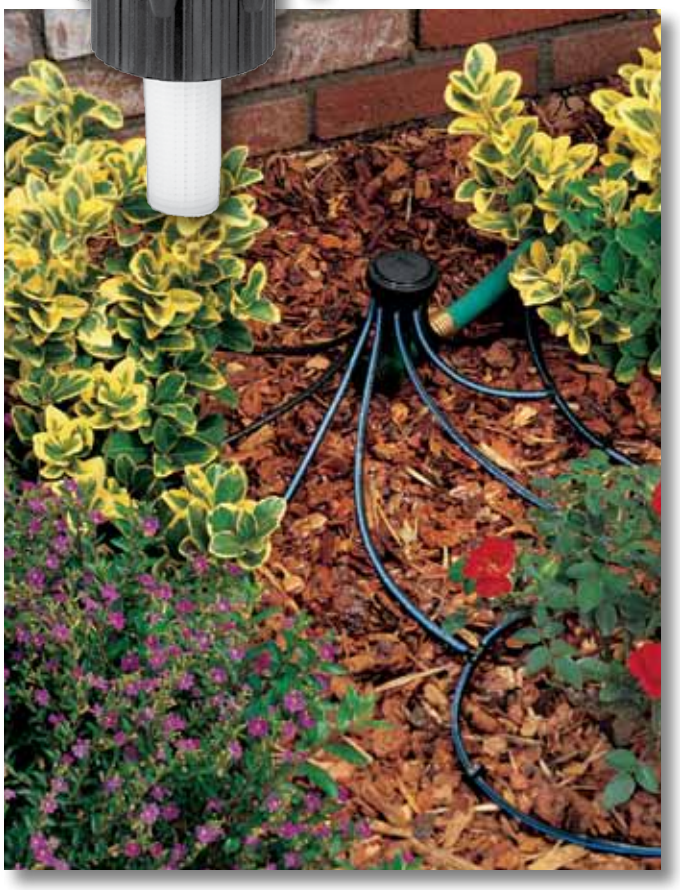
Model No.	Description
T-DBK04-100	1.06 GPH (4,0 LPH) E-2 Emitter (Black)
T-DBK08-RED-100	2.11 GPH (7,9 LPH) E-2 Emitter (Red)
T-DBK16-MB-100	4.23 GPH (16,0 LPH) E-2 Emitter (Maroon)

For precipitation rate information, please refer to pg. 168

Pressure Regulating Multi-Outlet Drip Manifold

- 9 Barbed Outlets
- Pressure-Regulating

The T-PR25-9 can be installed on any 1/2" (12mm) riser or fitting and easily converts traditional spray systems to drip, micro spray, or micro stream bubblers.



Features & Benefits

- Built-in 25 psi (1,7 Bar) pressure regulator delivers consistent, reliable, low-volume irrigation
- Barbed outlets (9) accept ¼" (6,4mm) micro-tube & emitters, micro-bubblers or micro-sprays – ideal for mixed planting areas.
- Small shut-off caps provided with unit seal unused outlets.
- When system is off, cover unthreads for access to screen without disturbing ¼" (6,4mm) micro-tube connected to outlets.

Specifications

Specifications

- ½" (13mm) FPT Inlet
- Operating Pressure: 20 – 100 psi (1,4-6,9 bar)
- Manifold Outlet Pressure: 21 – 28 psi (1,5-1,9 bar)
- Manifold Flow Range: 1 – 210 GPH (0.06-13.2 lpm)
- Individual Outlet Flow Range: 1 -20 GPH (0.06-1.3 lpm)
- Barbed outlets accept ¼" (6mm) tubing: ID: .170 - .188

Warranty

- One year

Specifying Information— Pressure Regulating Drip Manifold

Model No.	Description
T-PR25-9	Pressure Regulating 9-outlet Drip Manifold

Varis® and Varistake® Adjustable Emitters

- 0—14 GPH (53,0 LPH)
- Adjustable
- Maximum working pressure: 45 psi (3,1 Bar)

Varis and Varistake Adjustable Emmiters Model List		
Diameter of throw (maximum opening at 30 clicks):		
PSI (Bar)	***At 1"(2,5cm) Height***	***At 2.5"(6,3cm) Height***
20 (1,4) 30 (2,1) 40 (2,8)	6" (15,2cm) 13.5" (34,3cm) 21" (53,3cm)	8" (20,3cm) 15.5" (39,4cm) 27" (68,6cm)
Varis and Varistake Flows:		
PSI	***Flow Range***	
10 (0,6) 20 (1,4) 30 (2,1) 40 (2,8)	0-7 GPH (0-26,5 LPH) 0-10 GPH (0-37,9 LPH) 0-11 GPH (0-41,6 LPH) 0-14 GPH (0-53,0 LPH)	

Features & Benefits

Available As Stake Assembly or As Barbed Emitter
Varistake connects to ¼" (6,4mm) micro-tube (T-EHD0437) for precise placement at plant. Varis emitter installs directly onto drip lateral.

Adjustable Flow Rate
Adjustable from 0 to 14 GPH (53 LPH) – makes this emitter ideal for potted and container plants.

Easy To Maintain
Green top unthreads completely to permit easy inspection and cleaning.

Specifying Information— Varis and Varistake Emitters

Model No.	Description
T-DAK05	Varis Adjustable Emitter with 1/4" (4mm) Barbed Inlet
T-DAK15	Varistake Adjustable Emitter with 4-3/4" (12cm) Stake and 1/4" (4mm) Barbed Inlet

For precipitation rate information, please refer to pg. 164

Pressure Regulators

Specifying Information—PC Regulators

Model Number	Description
T-PMR15-LF	3/4"(20mm), 15 psi (73,2 kg/m²), 1/10-8 GPM (0,38-30,3 LPH)Low Flow Pressure Regulator
T-PMR25-LF	3/4" (20mm), 25 psi (122,0 kg/m²), 1/10-8 GPM (0,38-30,3 LPH)Low Flow Pressure Regulator
T-PMR40-MF	3/4" (20mm), 40 psi (195,0 kg/m²), 2-20 GPM (7,6-75,7 LPH) Medium Flow Pressure Regulator
T-PR25-HF	1-1/4" (31,8mm) x 1" (25mm), 25 psi (122,0 LPH), 10 – 32 GPM (38,0-121,0 LPH), High Flow Pressure Regulator
T-PMR25-MF	3/4" (20mm), 25 psi (122,0 kg/m²), 2 – 20 GPM (7,6-75,7 LPH), Medium Flow Pressure Regulator

Plastic Y-Filters

- ¾" (20mm), 1" (25mm), 1½" (40mm)
- 150 Mesh

Filtration for your drip system doesn't have to be difficult. Since low volume systems require filtration for effective and efficient watering, Toro® F-Series filters are designed to perform.

Specifications

Specifications

- Recommended pressure range: 5 – 142 psi (0,3-9,8 Bar)
- Flow Rate: 5 – 80 GPM (19-303 LPM)
- ¾" and 1" (20mm & 25mm) screen filters are available in small- and large-size bodies
- Body and cap constructed of nylon
- Locking ring constructed of glass reinforced nylon
- O-ring constructed of Buna-N

Warranty

- One year

Features & Benefits

½" (12mm) Male Thread Outlet
With cap for quick flush cleaning.

Easy Element Access
For trouble free maintenance.

Constructed Of Highest Quality Plastics
For durability and corrosion resistance.

Plastic Y-Filters (Disc) Specifying Information

Model	Size	Maximum Flow	Element	Mesh	Body	Head Loss Curve
T-ALFD75150-L	3/4" (20mm)	25 GPM (94,6 LPH)	Disc	150	Large	B
T-ALFD10150-L	1" (25mm)	35 GPM (132,5 LPH)	Disc	150	Large	C
T-ALFD15150-L	1-1/2" (37mm)	80 GPM (302,8 LPH)	Disc	150	Large	D

Plastic Y-Filters (SS Screen) Specifying Information

Model	Size	Maximum Flow	Element	Mesh	Body	Head Loss Curve
T-ALFS75150-S	3/4" (20mm)	18 GPM (68,1 LPH)	Screen	150	Small	A
T-ALFS75150-L	3/4" (20mm)	25 GPM (94,6 LPH)	Screen	150	Large	B
T-ALFS10150-S	1" (25mm)	25 GPM (94,6 LPH)	Screen	150	Small	B
T-ALFS10150-L	1" (25mm)	35 GPM (132,5 LPH)	Screen	150	Large	C
T-ALFS15150-L	1-1/2" (37mm)	80 GPM (302,8 LPH)	Screen	150	Large	D

Replacement SS Screen/Disc Filter Elements Specifying Information

Model	Size	Element	Mesh	Body
T-AMP-0004-4F	3/4" (20mm), 1" (25mm) and 1-1/2" (37mm)	Disc	150	Large Body Size Filters
T-AMP0004-15	1/4" (6,4mm) and 1" (25mm)	Screen	150	Small Body Size Filters
T-AMP000-2F	3/4" (20mm), 1" (25mm) and 1-1/2" (37mm)	Screen	150	Large Body Size Filters

When installing the disc filters, the flow direction is opposite to the screen filter.

Drip Zone Valve Kits

- **3/4" (20mm) with AVB or 1" (25mm) inline**
- **Residential and Commercial**
- **Low Volume**

Pre-packaged and ready for installation – Toro® Drip Zone Valve Kits provide everything you need for drip zone automation. No need to specify or purchase separate parts.

Low Flow TPV Series Drip Zone Kits

Features & Benefits

Everything You Need Is In The Kit

- Toro Y-Filter – protects against contamination.
- Control Valve – controls the flow of water
- Pressure Regulator – reduces system pressure to levels suitable for drip irrigation

Specially Designed For Low-volume Drip Applications

- These kits are a simple, one-stop package available in ¾" (20mm) and 1" (25mm) sizes
- Less valve kits also available

Reliable Valve Options

- TPV Series, 1" (25mm) Inline
- EZ-Flo® Plus, ¾" (20mm) AVB and 1" (25mm) Inline
- 700 UltraFlow® Valve, 1" (25mm) Inline

Specifications	Toro EZ-Flo Plus AVB*		Toro TPV		700 UltraFlow In-line	
Part Number	DZK-EZF-075-LF	DZK-EZF-075-MF	DZK-TPV-1-LF	DZK-TPV-1-MF	DZK-700-1-LF	DZK-700-1-MF
Description	Drip Zone Valve Kit, ¾" (20mm) EZ-Flo Plus, AVB, Low-flow	Drip Zone Valve Kit, ¾" (20mm) EZ-Flo Plus, AVB, Medium-flow	Drip Zone Valve Kit, 1" (25mm), Low-flow	Drip Zone Valve Kit, 1" (25mm), Medium-flow	Drip Zone Valve Kit, 1" (25mm) 700 UltraFlow, In-line, Low-flow	Drip Zone Valve Kit, 1" (25mm) 700 UltraFlow, In-line, Medium-flow
Connection Size	¾" (20mm)	¾" (20mm)	1" (25mm)	1" (25mm)	1" (25mm)	1" (25mm)
Control Valve Solenoid	24VAC, Inrush: 0.4 amps, 11.5 VA, Holding 0.20 amps, 5.75 VA					
Minimum Flow Rate	0.25 GPM (0,9 LPM)	2 GPM (7,6 LPM)	0.10 GPM (0,4 LPM)	2 GPM (7,6 LPM)	0.10 GPM (0,4 LPM)	2 GPM (7,6 LPM)
Maximum Flow Rate	8 GPM (30 LPM)	20 GPM (76 LPM)	8 GPM (30 LPM)	20 GPM (76 LPM)	8 GPM (30 LPM)	20 GPM (76 LPM)
Maximum Pressure	150 psi (10 Bar)	150 psi (10 Bar)	150 psi (10 Bar)	150 psi (10 Bar)	150 psi (10 Bar)	150 psi (10 Bar)
Y-Filter Degree of Filtration	150 mesh/100 Microns	150 mesh/100 Microns	150 mesh/100 Microns	150 mesh/100 Microns	150 mesh/100 Microns	150 mesh/100 Microns
Regulator-Preset Pressure	25 psi (1,7 Bar)	25 psi (1,7 Bar)	25 psi (1,7 Bar)	25 psi (1,7 Bar)	25 psi (1,7 Bar)	25 psi (1,7 Bar)
Thread Connection-Upstream	Female NPT	Female NPT	Female NPT	Female NPT	Female NPT	Female NPT
Thread Connection-Downstream	Female NPT	Female NPT	Male NPT	Female NPT	Male NPT	Female NPT
Minimum Number of Emitters: **0.5 GPH (1,9 LPM)** **1 GPH (3,8 LPM)** **2 GPH (7,6 LPM)**	 30 15 8	 240 120 60	 12 6 3	 240 120 60	 12 6 3	 240 120 60
Maximum Number of Emitters: **0.5 GPH (1,9 LPM)** **1 GPH (3,8 LPM)** **2 GPH (7,6 LPM)**	 960 490 240	 2400 1200 600	 960 490 240	 2400 1200 600	 960 490 240	 2400 1200 600

Note: Consult your local plumbing code for backflow prevention requirements.
** AVB = Atmospheric Vacuum Breaker (Anti-siphon Valve)*

Toro Drip Zone Valve Kits Model List

Model	Description
• DZK-EZF-075-LF	Drip Zone Kit: 3/4" (20mm) EZ-Flo Plus Valve, AVB, Filter, Low-flow Regulator & Fittings
• DZK-EZF-075-MF	Drip Zone Kit: 3/4" (20mm) EZ-Flo Plus Valve, AVB, Filter, Medium-flow Regulator & Fittings
• DZK-EZF-1-LF	Drip Zone Kit: 1" EZ-Flo Plus, Filter, Low-flow Regulator & Fittings
• DZK-EZF-1-MF	Drip Zone Kit: 1" EZ-Flo Plus, Filter, Medium Flow Regulator & Fittings
• DZK-TPV-1-LF	Drip Zone Kit: 1" (25mm) TPV, Filter, Low-flow Regulator & Fittings
• DZK-TPV-1-MF	Drip Zone Kit: 1" (25mm) TPV, Filter, Medium-flow Regulator & Fittings
• DZK-700-1-LF	Drip Zone Kit: 1" (25mm) 700 UltraFlow Inline Valve, Filter, Low-flow Regulator &Fittings
• DZK-700-1-MF	Drip Zone Kit: 1" (25mm) 700 UltraFlow Inline Valve, Filter, Medium-flow Regulator & Fittings
• DZK-X-075-LF	Drip Zone Kit less valve with Filter, Low-flow Regulator & Fittings
• DZK-X-075-MF	Drip Zone Kit less valve with Filter, Medium-flow Regulator & Fittings

Flow vs. Friction Loss

Part Number	GPM (Flow)	0.25	5	8	15	20
DZK-EZF-075-LF	Friction Loss (psi)	3	5	5	n/a	n/a
	Min. Inlet Press. (psi)	30	32	32	34	39
DZK-EZF-075-MF	Friction Loss (psi)	3	5	5	7	13
	Min. Inlet Press. (psi)	30	32	32	34	39
DZK-TPV-1-LF	Friction Loss (psi)	2	3.5	3.7	3	3.3
	Min. Inlet Press. (psi)	30	32	32	34	39
DZK-TPV-1-MF	Friction Loss (psi)	2	3.5	3.7	3	3.3
	Min. Inlet Press. (psi)	30	32	32	32	35
DZK-700-1-LF	Friction Loss (psi)	3	3	3	n/a	n/a
	Min. Inlet Press. (psi)	30	30	30	32	34
DZK-700-1-MF	Friction Loss (psi)	3	3	3	4.5	7
	Min. Inlet Press. (psi)	30	30	30	32	34

Specifying Information—Drip Zone Valve Kits

DZK-XXXXXX-XX

Kit	Valve Type	Flow Rate
DZK	XXXXXX	XX
DZK—Drip Zone Kit	EZF-075—¾" (20mm) EZ-Flo Plus AVB EZF-1—1" (25mm) EZ-Flo Plus AVB TPV-1—1" (25mm) TPV 700-1—1" (25mm) In-line X-075—3/4", No Valve	LF—Low Flow MF—Medium Flow
Example: A Drip Zone Kit with a 700 Series UltraFlow, 1" (25mm) commercial valve would be specified as: DZK-700-1-LF		

Resources and Metric Performace Data

Toro Technical Support
1-877-345-8676

Toro NSN®
1-888-676-8676/www.toronsn.com

Toro Controller Repair
1-877-345-8676

Order Services
1-800-654-1882

www.toro.com

www.torocontractor.com

www.torowatersmart.com

Formulas and Conversion Factors

Precipitation Rates

	U.S.	Metric
Equilateral Triangular Spacing		
P.R. = (in/hr)	$\frac{(\text{GPM of 360}) \times 96.25}{(\text{Head Spacing})^2 \times .866}$	P.R. = (mm/hr) $\frac{m^3/hr \text{ of } 360 \times 1000}{m^2 \times .866}$
Square/Rectangular Spacing		
P.R. = (in/hr)	$\frac{(\text{GPM of 360}) \times 96.25}{\text{Head Spacing} \times \text{Row Spacing}}$	P.R. = (mm/hr) $\frac{m^3/hr \text{ of } 360 \times 1000}{\text{Head Spacing} \times \text{Row Spacing}}$
Square/Rectangular Spacing for Specific Arc		
P.R. = (in/hr)	$\frac{34650 \times \text{GPM (for any arc)}}{\text{Degrees of Arc} \times \text{Head Spacing} \times \text{Row Spacing}}$	P.R. = (mm/hr) $\frac{m^3/hr \text{ (for any arc)} \times 1000}{\text{Degrees of Arc} \times \text{Head Spacing} \times \text{Row Spacing}}$

Horsepower

H.P. = $\frac{\text{GPM} \times \text{Ft of Head}}{3{,}960 \times \text{Pump Efficiency (expressed as a decimal)}}$

Station Run Time

S.R.T. = (min/wk) $\frac{\text{Total Weekly Req'd (inch/wk)} \times 60 \text{ (min/hr)}}{\text{Precipitation Rate (in/hr)}}$

S.R.T. = (min/wk) $\frac{\text{Total Weekly Req'd (mm/wk)} \times 60 \text{ (min/hr)}}{\text{Precipitation Rate (mm/hr)}}$

Pipe Velocity

V= (ft/sec) $\frac{0.4085 \times \text{Flow (GPM)}}{(\text{Inside Pipe Diameter in Inches})^2}$

V= (m/sec) $\frac{1273.24 \times \text{Flow (l/sec)}}{(\text{Inside Pipe Diameter in Millimeters})^2}$

Slope

S = $\frac{\text{Rise (Measure of Length)}}{\text{Run (Measure of Length)}}$

To Convert	From	To	Multiply By
Area	acres	feet^2	43560
	acres	meters^2	4046.8
	meters^2	feet^2	10.764
	feet^2	inches^2	144
	inches^2	centimeters^2	6.452
	hectares	meters^2	10,000
	hectares	acres	2.471
Power	kilowatts	horsepower	1.3410
Flow	feet^3/minutes	meters^3/second	0.0004719
	feet^3/second	meters^3/second	.02832
	yards^3/minute	meters^3/second	.01274
	gallons/minute	meters^3/hour	.22716
	gallons/minute	liters/minute	3.7854
	gallons/minutes	liters/second	.06309
	meters^3/hour	liters/minute	16.645
	meters^3/hour	liters/second	.2774
	liters/minute	liters/second	60
Length	feet	inches	12
	inches	centimeters	2.540
	feet	meters	.30481
	kilometers	miles	.6214
	miles	feet	5280
	miles	meters	1609.34
	millimeters	inch	.03937

To Convert	From	To	Multiply By
Pressure	psi	kilopascals	6.89476
	psi	bars	.068948
	bars	kilopascals	100
	psi	feet of head	2.31
Velocity	feet/second	meters/second	.3048
Volume	feet^3	gallons	7.481
	feet^3	liters	28.32
	meters^3	feet^3	35.31
	meters^3	yard^3	1.3087
	yards^3	feet^3	27
	yards^3	gallons	202
	acres/feet	feet^3	43,560
	gallons	meters^3	.003785
	gallons	liters	3.785
	imperial gallons	gallons	1.833

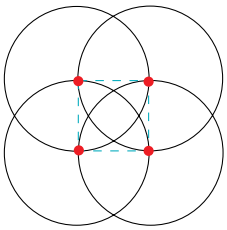
Sprinkler Spacing

- The Toro Company does not recommend designing for 0 mph wind conditions. Design in consideration of the worst wind conditions.

Precipitation Rate Formulas

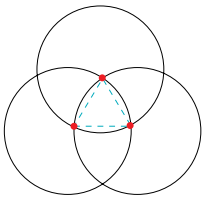
- Square-spaced sprinklers in pattern:

$$\frac{\text{GPM of full circle} \times 96.3}{(\text{Spacing})^2}$$



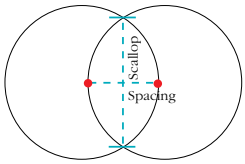
- Triangular-spaced sprinklers in pattern:

$$\frac{\text{GPM of full circle} \times 96.3}{(\text{Spacing})^2\ (0.866)}$$



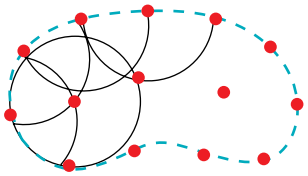
- Single row:

$$\frac{\text{GPM of full circle} \times 96.3}{(\text{Spacing})\ (\text{Scallop})}$$



- Area and flow:

$$\frac{\text{Total GPM of zone} \times 96.3}{\text{Total irrigated square feet of zone}}$$



Winterization Specifications

In freezing climates, sprinklers and valves should be properly winterized to prevent freeze-related damage. For detailed information, refer to Toro Form No. 364-0072.

FRICTION LOSS FORMULAS

Hazen-Williams Equation:

$$H_f = (0.2083)\ (100 / C)^{1.852}\ (Q^{1.852} / D^{4.866})$$

(The result is multiplied by .433 to give psi loss for 100 feet of pipe)

The velocity values were derived using the following:

$$V = (0.408 \times Q_{gpm}) / d^2$$

(The average inside diameter of OD controlled pipe was based upon subtracting two times the minimum wall thickness plus one-half of the wall thickness tolerance from the outside diameter.)

- Pressure ratings for plastic pipes are based on 23° C or 73.4° F
- Head loss decreases (increases) approximately 1% for every 3 degrees F above (below) the reference temperature (73.4° F)

Friction Loss Characteristics

Losses in psi per 100 feet of hose (psi/100 ft.) for hose sizes: .509" (13mm) ID through .627" (16mm) ID

Part No.		EHD1335		EHD1348		EHD1350		EHD1443		EHD1554		EHD1635		EHD1642		EHD1645	
Nom. ID		0.509"		0.510"		0.520"		0.550"		0.572"		0.616"		0.627"		0.616"	
Min. ID		0.506"		0.510"		0.516"		0.547"		0.569"		0.613"		0.624"		0.613"	
Min. Wall		0.035"		0.048"		0.050"		0.043"		0.054"		0.035"		0.042"		0.045"	
Flow		Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss
GPM	GPH	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI
0.5	30	0.80	0.37	0.79	0.35	0.77	0.34	0.68	0.25	0.63	0.21	0.54	0.14	0.52	0.13	0.54	0.14
1.0	60	1.60	1.33	1.57	1.28	1.53	1.21	1.37	0.91	1.26	0.75	1.09	0.52	1.05	0.48	1.09	0.52
1.5	90	2.39	2.82	2.36	2.71	2.30	2.56	2.05	1.93	1.89	1.59	1.63	1.11	1.57	1.02	1.63	1.11
2.0	120	3.19	4.80	3.14	4.62	3.07	4.37	2.73	3.29	2.52	2.71	2.17	1.89	2.10	1.73	2.17	1.89
2.5	150	3.99	7.26	3.93	6.99	3.84	6.60	3.41	4.97	3.15	4.10	2.72	2.85	2.62	2.62	2.72	2.85
3.0	180	4.79	10.18	4.71	9.80	4.60	9.26	4.10	6.97	3.79	5.75	3.26	4.00	3.15	3.67	3.26	4.00
3.5	210	5.58	13.55	5.50	13.04	5.37	12.31	4.78	9.27	4.42	7.65	3.80	5.32	3.67	4.88	3.80	5.32
4.0	240	6.38	17.35	6.28	16.69	6.14	15.77	5.46	11.87	5.05	9.79	4.35	6.81	4.20	6.25	4.35	6.81
4.5	270	7.18	21.57	7.07	20.76	6.90	19.61	6.14	14.76	5.68	12.18	4.89	8.48	4.72	7.77	4.89	8.48
5.0	300	7.98	26.22	7.85	25.24	7.67	23.84	6.83	17.94	6.31	14.81	5.44	10.30	5.25	9.45	5.44	10.30
6.0	360	9.57	36.75	9.42	35.37	9.21	33.41	8.19	25.15	7.57	20.75	6.52	14.44	6.29	13.24	6.52	14.44
7.0	420	11.17	48.90	10.99	47.06	10.74	44.45	9.56	33.46	8.83	27.61	7.61	19.21	7.34	17.62	7.61	19.21
8.0	480			12.56	60.26	12.27	56.92	10.92	42.85	10.09	35.36	8.70	24.60	8.39	22.56	8.70	24.60
9.0	540			14.13	74.95	13.81	70.80	12.29	53.29	11.36	43.98	9.78	30.60	9.44	28.06	9.78	30.60
10.0	600							13.65	64.77	12.62	53.45	10.87	37.19	10.49	34.11	10.87	37.19
11.0	660									13.88	63.77	11.96	44.37	11.54	40.69	11.96	44.37
ID120	720									15.14	74.93			12.59	47.81	13.05	52.13

Losses in psi per 100 feet of hose (psi/100 ft.) for hose sizes: .726" (18mm) ID through 1.360" (35mm) ID

Part No.		EHD1845		EHD1847		EHD1850		EHD2052		EHD2057		EHD2662		EHD2667		EHD3580	
Nom. ID		0.710"		0.729"		0.729"		0.807"		0.807"		1.060"		1.060"		1.365"	
Min. ID		0.707"		0.726"		0.726"		0.804"		0.804"		1.056"		1.056"		1.360"	
Min. Wall		0.045"		0.047"		0.050"		0.052"		0.057"		0.062"		0.067"		0.084"	
Flow		Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss
GPM	GPH	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI
1	60	0.82	0.26	0.78	0.23	0.78	0.23	0.63	0.14	0.63	0.14	0.37	0.04	0.37	0.04	0.22	0.01
2	120	1.63	0.94	1.55	0.83	1.55	0.83	1.26	0.50	1.26	0.50	0.73	0.13	0.73	0.13	0.44	0.04
3	180	2.45	2.00	2.33	1.75	2.33	1.75	1.90	1.07	1.90	1.07	1.10	0.28	1.10	0.28	0.66	0.08
4	240	3.27	3.40	3.10	2.99	3.10	2.99	2.53	1.82	2.53	1.82	1.47	0.48	1.47	0.48	0.88	0.14
5	300	4.09	5.14	3.88	4.52	3.88	4.52	3.16	2.75	3.16	2.75	1.83	0.73	1.83	0.73	1.10	0.21
6	360	4.90	7.21	4.65	6.34	4.65	6.34	3.79	3.85	3.79	3.85	2.20	1.02	2.20	1.02	1.33	0.30
7	420	5.72	9.59	5.43	8.43	5.43	8.43	4.42	5.13	4.42	5.13	2.56	1.36	2.56	1.36	1.55	0.40
8	480	6.54	12.28	6.20	10.79	6.20	10.79	5.06	6.57	5.06	6.57	2.93	1.74	2.93	1.74	1.77	0.51
9	540	7.36	15.27	6.98	13.42	6.98	13.42	5.69	8.17	5.69	8.17	3.30	2.16	3.30	2.16	1.99	0.63
10	600	8.17	18.57	7.75	16.32	7.75	16.32	6.32	9.93	6.32	9.93	3.66	2.63	3.66	2.63	2.21	0.77
11	660	8.99	22.15	8.53	19.47	8.53	19.47	6.95	11.84	6.95	11.84	4.03	3.14	4.03	3.14	2.43	0.92
12	720	9.81	26.02	9.30	22.87	9.30	22.87	7.58	13.91	7.58	13.91	4.40	3.69	4.40	3.69	2.65	1.08
13	780	10.62	30.18	10.08	26.52	10.08	26.52	8.22	16.14	8.22	16.14	4.76	4.28	4.76	4.28	2.87	1.25
14	858	11.69	36.04	11.09	31.68	11.09	31.68	9.04	19.27	9.04	19.27	5.24	5.11	5.24	5.11	3.16	1.49
15	920	12.54	41.01	11.89	36.04	11.98	36.04	9.69	21.93	9.69	21.93	5.62	5.81	5.62	5.81	3.39	1.70
16	982	13.38	46.27	12.69	40.66	12.69	40.66	10.35	24.74	10.35	24.74	6.00	6.56	6.00	6.56	3.62	1.91
17	1,044	14.23	51.82	13.49	45.54	13.49	45.54	11.00	27.71	11.00	27.71	6.38	7.34	6.38	7.34	3.84	2.14
18	1,080			13.95	48.46	13.95	48.46	11.38	29.48	11.38	29.48	6.59	7.81	6.59	7.81	3.98	2.28
19	1,140			14.73	53.56	14.73	53.56	12.01	32.59	12.01	32.59	6.96	8.64	6.96	8.64	4.20	2.52
20	1,200							12.64	35.83	12.64	35.83	7.33	9.50	7.33	9.50	4.42	2.77
22	1,320							13.90	42.75	13.90	42.75	8.06	11.33	8.06	11.33	4.86	3.31
24	1,440							15.17	50.23	15.17	50.23	8.79	13.31	8.79	13.31	5.30	3.88
26	1,560							16.43	58.25	16.43	58.25	9.52	15.44	9.52	15.44	5.74	4.50
28	1,680							17.69	66.82	17.69	66.82	10.26	17.71	10.26	17.71	6.18	5.17
30	1,800							18.96	75.93	18.96	75.93	10.99	20.13	10.99	20.13	6.63	5.87
32	1,920									20.22	85.57	11.72	22.68	11.72	22.68	7.07	6.62
34	2,040											12.45	25.38	12.45	25.38	7.51	7.40
36	2,160											13.19	28.21	13.19	28.21	7.95	8.23
38	2,280											13.92	31.18	13.92	31.18	8.39	9.10
40	2,400											14.65	34.29	14.65	34.29	8.83	10.00
45	2,700											16.48	42.65	16.48	42.65	9.94	12.44
50	3,000											18.32	51.84	18.32	51.84	11.04	15.12
55	3,300											20.15	61.84	20.15	61.84	12.15	18.04
60	3,600											21.98	72.66	21.98	72.66	13.25	21.19
65	3,900													23.81	84.27	14.36	24.58
70	4,200															15.46	28.19
75	4,500															16.56	32.04
80	4,800															17.67	36.11
85	5,100															18.77	40.40
90	5,400															19.88	44.91
95	5,700															20.98	49.64

Shaded area represents velocities over 5 fps.
Use with caution.

Friction losses are calculated using Hazen-Williams equation (C = 140) and minimum inside diameter. See pg 148 for friction loss formulas.

Friction Loss Characteristics

Losses in psi per 100 feet of hose (psi/100 ft.) for hose sizes: .596" (16mm) ID through .870" (22mm) ID

Part No.		EHO1650		EHO2055		EHO2060		HDO2255	
Nom. ID		0.600"		0.830"		0.820"		0.870"	
Min. ID		0.596"		0.821"		0.811"		0.870"	
Nom. Wall		0.050"		0.055"		0.060"		0.055"	
Flow		Velocity	Loss	Velocity	Loss	Velocity	Loss	Velocity	Loss
GPM	GPH	FPS	PSI	FPS	PSI	FPS	PSI	FPS	PSI
0.5	30	0.58	0.17	0.30	0.03	0.31	0.04	0.27	0.03
1.0	60	1.15	0.60	0.61	0.13	0.62	0.13	0.54	0.10
1.5	90	1.73	1.27	0.91	0.27	0.93	0.28	0.81	0.20
2.0	120	2.30	2.16	1.21	0.46	1.24	0.48	1.08	0.34
2.5	150	2.88	3.27	1.52	0.69	1.55	0.73	1.35	0.52
3.0	180	3.45	4.59	1.82	0.96	1.86	1.02	1.62	0.73
3.5	210	4.03	6.10	2.12	1.28	2.17	1.36	1.89	0.97
4.0	240	4.60	7.82	2.42	1.64	2.48	1.74	2.16	1.24
4.5	270	5.18	9.72	2.73	2.04	2.79	2.17	2.43	1.54
5.0	300	5.75	11.81	3.03	2.48	3.11	2.64	2.70	1.87
6.0	360	6.90	16.56	3.64	3.48	3.73	3.69	3.24	2.62
7.0	420	8.05	22.03	4.24	4.63	4.35	4.92	3.78	3.49
8.0	480	9.20	28.21	4.85	5.93	4.97	6.29	4.32	4.47
9.0	540	10.35	35.09	5.45	7.38	5.59	7.83	4.86	5.56
10.0	600	11.50	42.65	6.06	8.96	6.21	9.52	5.40	6.76
11.0	660	12.65	50.89	6.67	10.70	6.83	11.35	5.94	8.06
12.0	720	13.80	59.78	7.27	12.57	7.45	13.34	6.48	9.47
13.0	780			7.88	14.57	8.07	15.47	7.02	10.99
14.0	840			8.48	16.72	8.70	17.75	7.56	12.61
15.0	900			9.09	19.00	9.32	20.16	8.10	14.32
16.0	960			9.70	21.41	9.94	22.72	8.64	16.14
17.0	1,020			10.30	23.95	10.56	25.42	9.17	18.06
18.0	1,080			10.91	26.63	11.18	28.26	9.71	20.08
19.0	1,140			11.51	29.43	11.80	31.24	10.25	22.19
20.0	1,200			12.12	32.36	12.42	34.35	10.79	24.40
22.0	1,320			13.33	38.61	13.66	40.98	11.87	29.11
24.0	1,440			14.55	45.36	14.91	48.15	12.95	34.20
26.0	1,560			15.76	52.61	16.15	55.84	14.03	39.67
28.0	1,680			16.97	60.35			15.11	45.51
30.0	1,800							16.19	51.71
32.0	1,920							17.27	58.27

Shaded area represents velocities over 5 fps.

Use with caution.

Friction losses are calculated using Hazen-Williams equation (C = 140) and minimum inside diameter. See pg 148 for friction loss formulas.

POLYETHYLENE (PE) PLASTIC PIPE ID CONTROLLED

Size: ½" thru 4" Flow: 1 thru 500GPM

PE 3408 ASTM D-2239 C=140 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

Size	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		4"	
Avg ID	0.622		0.824		1.049		1.380		1.610		2.067		2.469		3.068		4.026	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.05	0.49	0.60	0.12	0.37	0.04	0.21	0.01	0.16	0.00								
2	2.11	1.76	1.20	0.45	0.74	0.14	0.43	0.04	0.31	0.02	0.19	0.01						
3	3.16	3.73	1.80	0.95	1.11	0.29	0.64	0.08	0.47	0.04	0.29	0.01						
4	4.22	6.35	2.40	1.62	1.48	0.50	0.86	0.13	0.63	0.06	0.38	0.02	0.27	0.01				
5	5.27	9.60	3.00	2.44	1.85	0.76	1.07	0.20	0.79	0.09	0.48	0.03	0.33	0.01				
6	6.33	13.46	3.61	3.43	2.22	1.06	1.29	0.28	0.94	0.13	0.57	0.04	0.40	0.02	0.26	0.01		
7	7.38	17.91	4.21	4.56	2.60	1.41	1.50	0.37	1.10	0.18	0.67	0.05	0.47	0.02	0.30	0.01		
8	8.44	22.93	4.81	5.84	2.97	1.80	1.71	0.47	1.26	0.22	0.76	0.07	0.54	0.03	0.35	0.01		
9	9.49	28.52	5.41	7.26	3.34	2.24	1.93	0.59	1.42	0.28	0.86	0.08	0.60	0.03	0.39	0.01		
10	10.55	34.67	6.01	8.82	3.71	2.73	2.14	0.72	1.57	0.34	0.95	0.10	0.67	0.04	0.43	0.01		
12			7.21	12.37	4.45	3.82	2.57	1.01	1.89	0.48	1.15	0.14	0.80	0.06	0.52	0.02		
14			8.41	16.45	5.19	5.08	3.00	1.34	2.20	0.63	1.34	0.19	0.94	0.08	0.61	0.03		
16			9.61	21.07	5.93	6.51	3.43	1.71	2.52	0.81	1.53	0.24	1.07	0.10	0.69	0.04	0.40	0.01
18			10.82	26.21	6.67	8.10	3.86	2.13	2.83	1.01	1.72	0.30	1.20	0.13	0.78	0.04	0.45	0.01
20			12.02	31.85	7.42	9.84	4.28	2.59	3.15	1.22	1.91	0.36	1.34	0.15	0.87	0.05	0.50	0.01
22					8.16	11.74	4.71	3.09	3.46	1.46	2.10	0.43	1.47	0.18	0.95	0.06	0.55	0.02
24					8.90	13.79	5.14	3.63	3.78	1.72	2.29	0.51	1.61	0.21	1.04	0.07	0.60	0.02
26					9.64	16.00	5.57	4.21	4.09	1.99	2.48	0.59	1.74	0.25	1.13	0.09	0.65	0.02
28					10.38	18.35	6.00	4.83	4.41	2.28	2.67	0.68	1.87	0.28	1.21	0.10	0.70	0.03
30					11.12	20.85	6.43	5.49	4.72	2.59	2.86	0.77	2.01	0.32	1.30	0.11	0.76	0.03
32					11.86	23.50	6.86	6.19	5.04	2.92	3.06	0.87	2.14	0.36	1.39	0.13	0.81	0.03
34					12.61	26.29	7.28	6.92	5.35	3.27	3.25	0.97	2.28	0.41	1.47	0.14	0.86	0.04
36							7.71	7.69	5.67	3.63	3.44	1.08	2.41	0.45	1.56	0.16	0.91	0.04
38							8.14	8.50	5.98	4.02	3.63	1.19	2.54	0.50	1.65	0.17	0.96	0.05
40							8.57	9.35	6.30	4.42	3.82	1.31	2.68	0.55	1.73	0.19	1.01	0.05
42							9.00	10.24	6.61	4.83	4.01	1.43	2.81	0.60	1.82	0.21	1.06	0.06
44							9.43	11.16	6.93	5.27	4.20	1.56	2.94	0.66	1.91	0.23	1.11	0.06
46							9.86	12.12	7.24	5.72	4.39	1.70	3.08	0.71	1.99	0.25	1.16	0.07
48							10.28	13.11	7.56	6.19	4.58	1.84	3.21	0.77	2.08	0.27	1.21	0.07
50							10.71	14.14	7.87	6.68	4.77	1.98	3.35	0.83	2.17	0.29	1.26	0.08
55							11.78	16.87	8.66	7.97	5.25	2.36	3.68	0.99	2.38	0.35	1.38	0.09
60							12.85	19.82	9.44	9.36	5.73	2.77	4.02	1.17	2.60	0.41	1.51	0.11
65									10.23	10.86	6.21	3.22	4.35	1.36	2.82	0.47	1.64	0.13
70									11.02	12.45	6.68	3.69	4.69	1.55	3.03	0.54	1.76	0.14
75									11.81	14.15	7.16	4.19	5.02	1.77	3.25	0.61	1.89	0.16
80									12.59	15.95	7.64	4.73	5.35	1.99	3.47	0.69	2.01	0.18
85									13.38	17.84	8.12	5.29	5.69	2.23	3.68	0.77	2.14	0.21
90											8.59	5.88	6.02	2.48	3.90	0.86	2.27	0.23
95											9.07	6.50	6.36	2.74	4.12	0.95	2.39	0.25
100											9.55	7.15	6.69	3.01	4.33	1.05	2.52	0.28
110											10.50	8.53	7.36	3.59	4.77	1.25	2.77	0.33
120											11.46	10.02	8.03	4.22	5.20	1.47	3.02	0.39
130											12.41	11.62	8.70	4.89	5.63	1.70	3.27	0.45
140											13.37	13.33	9.37	5.61	6.07	1.95	3.52	0.52
150													10.04	6.38	6.50	2.22	3.78	0.59
160													10.71	7.19	6.94	2.50	4.03	0.67
170													11.38	8.04	7.37	2.79	4.28	0.74
180													12.05	8.94	7.80	3.11	4.53	0.83
190													12.72	9.88	8.24	3.43	4.78	0.92
200													13.39	10.87	8.67	3.78	5.03	1.01
220															9.54	4.50	5.54	1.20
240															10.40	5.29	6.04	1.41
260															11.27	6.14	6.54	1.64
280															12.14	7.04	7.05	1.88
300															13.00	8.00	7.55	2.13
320															13.87	9.02	8.05	2.40
340																	8.56	2.69
360																	9.06	2.99
380																	9.57	3.30
400																	10.07	3.63
420																	10.57	3.98
440																	11.08	4.33
460																	11.58	4.71
480																	12.08	5.09
500																	12.59	5.49

Shaded area represents velocities over 5 fps.

Use with caution.

See pg 148 for friction loss formulas

PVC CLASS 200 IPS PLASTIC PIPE

Size: ½" thru 6" Flow: 1 thru 500GPM

ASTM D-2241 (1120, 1220) SDR 21 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		4"		6"	
Avg.ID	0.696		0.910		1.169		1.482		1.700		2.129		2.581		3.146		4.046		5.955	
Pipe OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		4.500		6.625	
Avg Wall	0.072		0.070		0.073		0.089		0.100		0.123		0.147		0.177		0.227		0.335	
MinWall	0.062		0.060		0.063		0.079		0.090		0.113		0.137		0.167		0.214		0.316	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	0.84	0.25	0.49	0.07	0.30	0.02	0.19	0.01	0.14	0.00										
2	1.68	0.90	0.99	0.24	0.60	0.07	0.37	0.02	0.28	0.01	0.18	0.00								
3	2.53	1.90	1.48	0.52	0.90	0.15	0.56	0.05	0.42	0.02	0.27	0.01								
4	3.37	3.24	1.97	0.88	1.19	0.26	0.74	0.08	0.56	0.04	0.36	0.01	0.24	0.01						
5	4.21	4.89	2.46	1.33	1.49	0.39	0.93	0.12	0.71	0.06	0.45	0.02	0.31	0.01						
6	5.05	6.86	2.96	1.86	1.79	0.55	1.11	0.17	0.85	0.09	0.54	0.03	0.37	0.01	0.25	0.00				
7	5.90	9.12	3.45	2.47	2.09	0.73	1.30	0.23	0.99	0.12	0.63	0.04	0.43	0.02	0.29	0.01				
8	6.74	11.68	3.94	3.17	2.39	0.94	1.49	0.30	1.13	0.15	0.72	0.05	0.49	0.02	0.33	0.01				
9	7.58	14.53	4.43	3.94	2.69	1.17	1.67	0.37	1.27	0.19	0.81	0.06	0.55	0.02	0.37	0.01				
10	8.42	17.66	4.93	4.79	2.99	1.42	1.86	0.45	1.41	0.23	0.90	0.08	0.61	0.03	0.41	0.01				
12	10.11	24.75	5.91	6.71	3.58	1.98	2.23	0.63	1.69	0.32	1.08	0.11	0.73	0.04	0.49	0.02				
14	11.79	32.93	6.90	8.93	4.18	2.64	2.60	0.83	1.98	0.43	1.26	0.14	0.86	0.06	0.58	0.02				
16	13.48	42.16	7.88	11.44	4.78	3.38	2.97	1.07	2.26	0.55	1.44	0.18	0.98	0.07	0.66	0.03	0.40	0.01		
18	15.16	52.44	8.87	14.23	5.37	4.21	3.34	1.33	2.54	0.68	1.62	0.23	1.10	0.09	0.74	0.03	0.45	0.01		
20			9.85	17.29	5.97	5.11	3.72	1.61	2.82	0.83	1.80	0.28	1.22	0.11	0.82	0.04	0.50	0.01		
22			10.84	20.63	6.57	6.10	4.09	1.92	3.11	0.99	1.98	0.33	1.35	0.13	0.91	0.05	0.55	0.01		
24			11.82	24.24	7.17	7.17	4.46	2.26	3.39	1.16	2.16	0.39	1.47	0.15	0.99	0.06	0.60	0.02		
26			12.81	28.11	7.76	8.31	4.83	2.62	3.67	1.34	2.34	0.45	1.59	0.18	1.07	0.07	0.65	0.02		
28			13.80	32.25	8.36	9.53	5.20	3.01	3.95	1.54	2.52	0.52	1.71	0.20	1.15	0.08	0.70	0.02		
30			14.78	36.64	8.96	10.83	5.57	3.41	4.24	1.75	2.70	0.59	1.84	0.23	1.24	0.09	0.75	0.03		
32					9.55	12.21	5.94	3.85	4.52	1.97	2.88	0.66	1.96	0.26	1.32	0.10	0.80	0.03	0.37	0.00
34					10.15	13.66	6.32	4.31	4.80	2.21	3.06	0.74	2.08	0.29	1.40	0.11	0.85	0.03	0.39	0.00
36					10.75	15.18	6.69	4.79	5.08	2.45	3.24	0.82	2.20	0.32	1.48	0.12	0.90	0.04	0.41	0.01
38					11.35	16.78	7.06	5.29	5.36	2.71	3.42	0.91	2.33	0.36	1.57	0.14	0.95	0.04	0.44	0.01
40					11.94	18.45	7.43	5.82	5.65	2.98	3.60	1.00	2.45	0.39	1.65	0.15	1.00	0.04	0.46	0.01
42					12.54	20.20	7.80	6.37	5.93	3.27	3.78	1.09	2.57	0.43	1.73	0.16	1.05	0.05	0.48	0.01
44					13.14	22.02	8.17	6.94	6.21	3.56	3.96	1.19	2.69	0.47	1.81	0.18	1.10	0.05	0.51	0.01
46					13.73	23.91	8.55	7.54	6.49	3.86	4.14	1.29	2.82	0.51	1.90	0.19	1.15	0.06	0.53	0.01
48					14.33	25.87	8.92	8.15	6.78	4.18	4.32	1.40	2.94	0.55	1.98	0.21	1.20	0.06	0.55	0.01
50					14.93	27.90	9.29	8.79	7.06	4.51	4.50	1.51	3.06	0.59	2.06	0.23	1.25	0.07	0.58	0.01
55							10.22	10.49	7.76	5.38	4.95	1.80	3.37	0.71	2.27	0.27	1.37	0.08	0.63	0.01
60							11.15	12.33	8.47	6.32	5.40	2.11	3.67	0.83	2.47	0.32	1.50	0.09	0.69	0.01
65							12.07	14.30	9.18	7.33	5.85	2.45	3.98	0.96	2.68	0.37	1.62	0.11	0.75	0.02
70							13.00	16.40	9.88	8.41	6.30	2.81	4.29	1.10	2.89	0.42	1.74	0.12	0.81	0.02
75							13.93	18.63	10.59	9.56	6.75	3.20	4.59	1.25	3.09	0.48	1.87	0.14	0.86	0.02
80							14.86	21.00	11.29	10.77	7.20	3.60	4.90	1.41	3.30	0.54	1.99	0.16	0.92	0.02
85									12.00	12.05	7.65	4.03	5.21	1.58	3.50	0.60	2.12	0.18	0.98	0.03
90									12.71	13.40	8.10	4.48	5.51	1.76	3.71	0.67	2.24	0.20	1.04	0.03
95									13.41	14.81	8.55	4.95	5.82	1.94	3.92	0.74	2.37	0.22	1.09	0.03
100									14.12	16.28	9.00	5.45	6.12	2.13	4.12	0.81	2.49	0.24	1.15	0.04
110											9.90	6.50	6.74	2.55	4.53	0.97	2.74	0.29	1.27	0.04
120											10.80	7.63	7.35	2.99	4.95	1.14	2.99	0.34	1.38	0.05
130											11.70	8.85	7.96	3.47	5.36	1.32	3.24	0.39	1.50	0.06
140											12.60	10.16	8.57	3.98	5.77	1.52	3.49	0.45	1.61	0.07
150											13.50	11.54	9.19	4.52	6.18	1.73	3.74	0.51	1.73	0.08
160											14.40	13.01	9.80	5.10	6.60	1.95	3.99	0.57	1.84	0.09
170													10.41	5.70	7.01	2.18	4.24	0.64	1.96	0.10
180													11.02	6.34	7.42	2.42	4.49	0.71	2.07	0.11
190													11.64	7.01	7.83	2.67	4.74	0.79	2.19	0.12
200													12.25	7.71	8.24	2.94	4.98	0.86	2.30	0.13
220													13.47	9.19	9.07	3.51	5.48	1.03	2.53	0.16
240													14.70	10.80	9.89	4.12	5.98	1.21	2.76	0.18
260															10.72	4.78	6.48	1.41	2.99	0.21
280															11.54	5.48	6.98	1.61	3.22	0.25
300															12.37	6.23	7.48	1.83	3.45	0.28
320															13.19	7.02	7.98	2.06	3.68	0.31
340															14.02	7.86	8.47	2.31	3.91	0.35
360															14.84	8.73	8.97	2.57	4.14	0.39
380																	9.47	2.84	4.37	0.43
400																	9.97	3.12	4.60	0.48
420																	10.47	3.42	4.83	0.52
440																	10.97	3.72	5.06	0.57
460																	11.46	4.04	5.29	0.62
480																	11.96	4.37	5.52	0.67
500																	12.46	4.72	5.75	0.72

Shaded area represents velocities over 5 fps. Use with caution.

See pg 148 for friction loss formulas

PVC Class 200 IPS Plastic Pipe

Size: 6" thru 18" Flow: 20 thru 4700GPM

ANSI/ASAE S376.2 ASTM 2241 SDR21 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

Size	6"		8"		10"		12"		14"		16"		18"	
Avg.ID	5.955		7.755		9.666		11.464		12.588		14.384		15.246	
Pipe OD	6.625		8.625		10.750		12.750		14.000		16.000		18.000	
Avg Wall	0.335		0.435		0.542		0.643		0.706		0.808		1.377	
Min Wall	0.316		0.410		0.511		0.606		0.666		0.762		0.857	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
20	0.23	0.00	0.14	0.00	0.09	0.00	0.06	0.00	0.05	0.00	0.04	0.00	0.04	0.00
40	0.46	0.01	0.27	0.00	0.17	0.00	0.12	0.00	0.10	0.00	0.08	0.00	0.07	0.00
60	0.69	0.01	0.41	0.00	0.26	0.00	0.19	0.00	0.15	0.00	0.12	0.00	0.11	0.00
80	0.92	0.02	0.54	0.01	0.35	0.00	0.25	0.00	0.21	0.00	0.16	0.00	0.14	0.00
100	1.15	0.04	0.68	0.01	0.44	0.00	0.31	0.00	0.26	0.00	0.20	0.00	0.18	0.00
150	1.73	0.08	1.02	0.02	0.66	0.01	0.47	0.00	0.39	0.00	0.30	0.00	0.26	0.00
200	2.30	0.13	1.36	0.04	0.87	0.01	0.62	0.01	0.51	0.00	0.39	0.00	0.35	0.00
250	2.88	0.20	1.70	0.06	1.09	0.02	0.78	0.01	0.64	0.01	0.49	0.00	0.44	0.00
300	3.45	0.28	2.04	0.08	1.31	0.03	0.93	0.01	0.77	0.01	0.59	0.00	0.53	0.00
350	4.03	0.37	2.37	0.10	1.53	0.04	1.09	0.02	0.90	0.01	0.69	0.01	0.61	0.00
400	4.60	0.48	2.71	0.13	1.75	0.05	1.24	0.02	1.03	0.01	0.79	0.01	0.70	0.00
450	5.18	0.59	3.05	0.16	1.97	0.06	1.40	0.02	1.16	0.02	0.89	0.01	0.79	0.01
500	5.75	0.72	3.39	0.20	2.18	0.07	1.55	0.03	1.29	0.02	0.99	0.01	0.88	0.01
550	6.33	0.86	3.73	0.24	2.40	0.08	1.71	0.04	1.42	0.02	1.08	0.01	0.97	0.01
600	6.90	1.01	4.07	0.28	2.62	0.10	1.86	0.04	1.54	0.03	1.18	0.01	1.05	0.01
650	7.48	1.17	4.41	0.32	2.84	0.11	2.02	0.05	1.67	0.03	1.28	0.02	1.14	0.01
700	8.05	1.34	4.75	0.37	3.06	0.13	2.17	0.06	1.80	0.04	1.38	0.02	1.23	0.01
750	8.63	1.52	5.09	0.42	3.28	0.14	2.33	0.06	1.93	0.04	1.48	0.02	1.32	0.02
800	9.20	1.72	5.43	0.48	3.49	0.16	2.48	0.07	2.06	0.04	1.58	0.02	1.40	0.02
850	9.78	1.92	5.77	0.53	3.71	0.18	2.64	0.08	2.19	0.05	1.68	0.03	1.49	0.02
900			6.11	0.59	3.93	0.20	2.79	0.09	2.32	0.06	1.77	0.03	1.58	0.02
950			6.44	0.65	4.15	0.22	2.95	0.10	2.45	0.06	1.87	0.03	1.67	0.02
1000			6.78	0.72	4.37	0.25	3.10	0.11	2.57	0.07	1.97	0.04	1.76	0.03
1050			7.12	0.79	4.59	0.27	3.26	0.12	2.70	0.07	2.07	0.04	1.84	0.03
1100			7.46	0.86	4.80	0.29	3.41	0.13	2.83	0.08	2.17	0.04	1.93	0.03
1150					5.02	0.32	3.57	0.14	2.96	0.09	2.27	0.05	2.02	0.03
1200					5.24	0.34	3.73	0.15	3.09	0.10	2.37	0.05	2.11	0.04
1250					5.46	0.37	3.88	0.16	3.22	0.10	2.46	0.05	2.19	0.04
1300					5.68	0.40	4.04	0.17	3.35	0.11	2.56	0.06	2.28	0.04
1350					5.90	0.43	4.19	0.19	3.48	0.12	2.66	0.06	2.37	0.05
1400					6.11	0.46	4.35	0.20	3.60	0.13	2.76	0.07	2.46	0.05
1450					6.33	0.49	4.50	0.21	3.73	0.14	2.86	0.07	2.55	0.05
1500					6.55	0.52	4.66	0.23	3.86	0.14	2.96	0.08	2.63	0.06
1600					6.99	0.59	4.97	0.26	4.12	0.16	3.16	0.08	2.81	0.06
1700					7.42	0.66	5.28	0.29	4.38	0.18	3.35	0.09	2.98	0.07
1800							5.59	0.32	4.63	0.20	3.55	0.11	3.16	0.08
1900							5.90	0.35	4.89	0.22	3.75	0.12	3.34	0.09
2000							6.21	0.39	5.15	0.25	3.94	0.13	3.51	0.10
2100							6.52	0.42	5.41	0.27	4.14	0.14	3.69	0.11
2200							6.83	0.46	5.66	0.29	4.34	0.15	3.86	0.12
2300							7.14	0.50	5.92	0.32	4.54	0.17	4.04	0.13
2400							7.45	0.54	6.18	0.34	4.73	0.18	4.21	0.14
2500							7.76	0.59	6.44	0.37	4.93	0.19	4.39	0.15
2600							8.07	0.63	6.69	0.40	5.13	0.21	4.56	0.16
2700							8.38	0.67	6.95	0.43	5.32	0.22	4.74	0.17
2800							8.69	0.72	7.21	0.46	5.52	0.24	4.91	0.18
2900							9.00	0.77	7.47	0.49	5.72	0.26	5.09	0.19
3000							9.31	0.82	7.72	0.52	5.92	0.27	5.27	0.20
3100							9.62	0.87	7.98	0.55	6.11	0.29	5.44	0.22
3200							9.93	0.92	8.24	0.59	6.31	0.31	5.62	0.23
3300									8.50	0.62	6.51	0.32	5.79	0.24
3400									8.75	0.66	6.70	0.34	5.97	0.26
3500									9.01	0.69	6.90	0.36	6.14	0.27
3600									9.27	0.73	7.10	0.38	6.32	0.29
3700									9.53	0.77	7.30	0.40	6.49	0.30
3800			Shaded area represents velocities over 5 fps. Use with caution.								7.49	0.42	6.67	0.32
3900											7.69	0.44	6.85	0.33
4000											7.89	0.46	7.02	0.35
4100											8.09	0.48	7.20	0.37
4200											8.28	0.51	7.37	0.38
4300													7.55	0.40
4400													7.72	0.42
4500													7.90	0.43
4600													8.07	0.45
4700													8.25	0.47

See pg 148 for friction loss formulas

PVC CLASS 315 IPS PLASTIC PIPE

Size: ½" thru 6" Flow: 1 thru 500GPM

ASTM D-2239 (1120, 1220) SDR 13.5 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

Size	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		4"		6"	
Avg.ID	0.696		0.874		1.101		1.394		1.598		1.983		2.423		2.948		3.794		5.583	
Pipe OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		4.500		6.625	
Avg Wall	0.072		0.088		0.107		0.133		0.151		0.196		0.226		0.274		0.353		0.521	
Min Wall	0.062		0.078		0.097		0.123		0.141		0.176		0.213		0.259		0.333		0.491	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	0.84	0.25	0.53	0.08	0.34	0.03	0.21	0.01	0.16	0.00										
2	1.68	0.90	1.07	0.30	0.67	0.10	0.42	0.03	0.32	0.02	0.21	0.01								
3	2.53	1.90	1.60	0.63	1.01	0.20	0.63	0.06	0.48	0.03	0.31	0.01								
4	3.37	3.24	2.14	1.07	1.35	0.35	0.84	0.11	0.64	0.06	0.42	0.02	0.28	0.01						
5	4.21	4.89	2.67	1.61	1.68	0.53	1.05	0.17	0.80	0.09	0.52	0.03	0.35	0.01						
6	5.05	6.86	3.20	2.26	2.02	0.74	1.26	0.23	0.96	0.12	0.62	0.04	0.42	0.02	0.28	0.01				
7	5.90	9.12	3.74	3.01	2.36	0.98	1.47	0.31	1.12	0.16	0.73	0.06	0.49	0.02	0.33	0.01				
8	6.74	11.68	4.27	3.86	2.69	1.25	1.68	0.40	1.28	0.20	0.83	0.07	0.56	0.03	0.38	0.01				
9	7.58	14.53	4.81	4.80	3.03	1.56	1.89	0.49	1.44	0.25	0.93	0.09	0.63	0.03	0.42	0.01				
10	8.42	17.66	5.34	5.83	3.37	1.90	2.10	0.60	1.60	0.31	1.04	0.11	0.69	0.04	0.47	0.02				
12	10.11	24.75	6.41	8.17	4.04	2.66	2.52	0.84	1.92	0.43	1.25	0.15	0.83	0.06	0.56	0.02				
14	11.79	32.93	7.48	10.87	4.71	3.53	2.94	1.12	2.24	0.58	1.45	0.20	0.97	0.08	0.66	0.03				
16	13.48	42.16	8.55	13.92	5.39	4.53	3.36	1.44	2.56	0.74	1.66	0.26	1.11	0.10	0.75	0.04	0.45	0.01		
18	15.16	52.44	9.61	17.32	6.06	5.63	3.78	1.79	2.88	0.92	1.87	0.32	1.25	0.12	0.85	0.05	0.51	0.01		
20			10.68	21.05	6.73	6.84	4.20	2.17	3.20	1.12	2.08	0.39	1.39	0.15	0.94	0.06	0.57	0.02		
22			11.75	25.11	7.40	8.16	4.62	2.59	3.52	1.33	2.28	0.47	1.53	0.18	1.03	0.07	0.62	0.02		
24			12.82	29.50	8.08	9.59	5.04	3.04	3.83	1.57	2.49	0.55	1.67	0.21	1.13	0.08	0.68	0.02		
26			13.89	34.21	8.75	11.12	5.46	3.53	4.15	1.82	2.70	0.64	1.81	0.24	1.22	0.09	0.74	0.03		
28			14.96	39.25	9.42	12.76	5.88	4.05	4.47	2.08	2.91	0.73	1.95	0.27	1.31	0.11	0.79	0.03		
30			16.02	44.60	10.10	14.50	6.30	4.60	4.79	2.37	3.11	0.83	2.08	0.31	1.41	0.12	0.85	0.04		
32					10.77	16.34	6.72	5.18	5.11	2.67	3.32	0.93	2.22	0.35	1.50	0.14	0.91	0.04	0.42	0.01
34					11.44	18.28	7.14	5.80	5.43	2.98	3.53	1.04	2.36	0.39	1.60	0.15	0.96	0.04	0.45	0.01
36					12.12	20.32	7.56	6.45	5.75	3.32	3.74	1.16	2.50	0.44	1.69	0.17	1.02	0.05	0.47	0.01
38					12.79	22.46	7.98	7.13	6.07	3.67	3.94	1.28	2.64	0.48	1.78	0.19	1.08	0.05	0.50	0.01
40					13.46	24.70	8.40	7.84	6.39	4.03	4.15	1.41	2.78	0.53	1.88	0.20	1.13	0.06	0.52	0.01
42					14.14	27.04	8.82	8.58	6.71	4.41	4.36	1.54	2.92	0.58	1.97	0.22	1.19	0.07	0.55	0.01
44					14.81	29.47	9.24	9.35	7.03	4.81	4.57	1.68	3.06	0.63	2.07	0.24	1.25	0.07	0.58	0.01
46					15.48	32.00	9.66	10.15	7.35	5.22	4.77	1.83	3.20	0.69	2.16	0.27	1.30	0.08	0.60	0.01
48					16.16	34.62	10.08	10.98	7.67	5.65	4.98	1.98	3.34	0.75	2.25	0.29	1.36	0.08	0.63	0.01
50					16.83	37.34	10.50	11.85	7.99	6.09	5.19	2.13	3.47	0.80	2.35	0.31	1.42	0.09	0.65	0.01
55							11.55	14.13	8.79	7.27	5.71	2.54	3.82	0.96	2.58	0.37	1.56	0.11	0.72	0.02
60							12.60	16.60	9.59	8.54	6.23	2.99	4.17	1.13	2.82	0.43	1.70	0.13	0.79	0.02
65							13.65	19.26	10.39	9.91	6.74	3.47	4.52	1.31	3.05	0.50	1.84	0.15	0.85	0.02
70							14.70	22.09	11.18	11.37	7.26	3.98	4.86	1.50	3.29	0.58	1.98	0.17	0.92	0.03
75							15.75	25.10	11.98	12.91	7.78	4.52	5.21	1.70	3.52	0.66	2.13	0.19	0.98	0.03
80							16.80	28.29	12.78	14.55	8.30	5.09	5.56	1.92	3.76	0.74	2.27	0.22	1.05	0.03
85									13.58	16.28	8.82	5.70	5.91	2.15	3.99	0.83	2.41	0.24	1.11	0.04
90									14.38	18.10	9.34	6.33	6.25	2.39	4.23	0.92	2.55	0.27	1.18	0.04
95									15.18	20.01	9.86	7.00	6.60	2.64	4.46	1.02	2.69	0.30	1.24	0.05
100									15.98	22.00	10.38	7.70	6.95	2.90	4.69	1.12	2.83	0.33	1.31	0.05
110											11.41	9.18	7.64	3.46	5.16	1.33	3.12	0.39	1.44	0.06
120											12.45	10.79	8.34	4.07	5.63	1.57	3.40	0.46	1.57	0.07
130											13.49	12.51	9.03	4.72	6.10	1.82	3.68	0.53	1.70	0.08
140											14.53	14.35	9.73	5.41	6.57	2.08	3.97	0.61	1.83	0.09
150											15.56	16.31	10.42	6.15	7.04	2.37	4.25	0.69	1.96	0.11
160											16.60	18.38	11.12	6.93	7.51	2.67	4.54	0.78	2.09	0.12
170													11.81	7.76	7.98	2.99	4.82	0.87	2.23	0.13
180													12.51	8.62	8.45	3.32	5.10	0.97	2.36	0.15
190													13.20	9.53	8.92	3.67	5.39	1.08	2.49	0.16
200													13.90	10.48	9.39	4.03	5.67	1.18	2.62	0.18
220													15.29	12.50	10.33	4.81	6.24	1.41	2.88	0.22
240													16.68	14.69	11.27	5.66	6.80	1.66	3.14	0.25
260															12.21	6.56	7.37	1.92	3.40	0.29
280															13.15	7.52	7.94	2.20	3.67	0.34
300															14.08	8.55	8.50	2.50	3.93	0.38
320															15.02	9.64	9.07	2.82	4.19	0.43
340															15.96	10.78	9.64	3.16	4.45	0.48
360															16.90	11.98	10.20	3.51	4.71	0.54
380																	10.77	3.88	4.97	0.59
400																	11.34	4.27	5.24	0.65
420																	11.90	4.67	5.50	0.71
440																	12.47	5.09	5.76	0.78
460																	13.04	5.53	6.02	0.84
480																	13.61	5.98	6.28	0.91
500																	14.17	6.45	6.54	0.98

Shaded area represents velocities over 5 fps.
Use with caution.

See pg 148 for friction loss formulas

SCHEDULE 40 PVC IPS PLASTIC PIPE

Size: ½" thru 6" Flow: 1 thru 500GPM

ASTM D-1785 (1120, 1220) C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		4"		6"	
Avg ID	0.602		0.804		1.029		1.360		1.590		2.047		2.445		3.042		3.998		6.031	
Pipe OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		4.500		6.625	
Avg Wall	0.119		0.123		0.143		0.150		0.155		0.164		0.215		0.229		0.251		0.297	
Min Wall	0.109		0.113		0.133		0.140		0.145		0.154		0.203		0.216		0.237		0.280	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.13	0.50	0.63	0.12	0.39	0.04	0.22	0.01	0.16	0.00										
2	2.25	1.82	1.26	0.44	0.77	0.13	0.44	0.03	0.32	0.02	0.19	0.00								
3	3.38	3.85	1.89	0.94	1.16	0.28	0.66	0.07	0.48	0.03	0.29	0.01								
4	4.50	6.55	2.52	1.60	1.54	0.48	0.88	0.12	0.65	0.06	0.39	0.02	0.27	0.01						
5	5.63	9.91	3.16	2.42	1.93	0.73	1.10	0.19	0.81	0.09	0.49	0.03	0.34	0.01						
6	6.75	13.89	3.79	3.40	2.31	1.02	1.32	0.26	0.97	0.12	0.58	0.04	0.41	0.02	0.26	0.01				
7	7.88	18.48	4.42	4.52	2.70	1.36	1.54	0.35	1.13	0.16	0.68	0.05	0.48	0.02	0.31	0.01				
8	9.01	23.66	5.05	5.79	3.08	1.74	1.76	0.45	1.29	0.21	0.78	0.06	0.55	0.03	0.35	0.01				
9	10.13	29.43	5.68	7.20	3.47	2.17	1.99	0.56	1.45	0.26	0.88	0.08	0.61	0.03	0.40	0.01				
10	11.26	35.77	6.31	8.75	3.85	2.63	2.21	0.68	1.61	0.32	0.97	0.09	0.68	0.04	0.44	0.01				
12	13.51	50.14	7.57	12.27	4.62	3.69	2.65	0.95	1.94	0.44	1.17	0.13	0.82	0.05	0.53	0.02				
14	15.76	66.71	8.84	16.32	5.39	4.91	3.09	1.26	2.26	0.59	1.36	0.17	0.96	0.07	0.62	0.03				
16	18.01	85.42	10.10	20.90	6.17	6.29	3.53	1.62	2.58	0.76	1.56	0.22	1.09	0.09	0.71	0.03	0.41	0.01		
18	20.26	106.3	11.36	25.99	6.94	7.82	3.97	2.01	2.90	0.94	1.75	0.28	1.23	0.12	0.79	0.04	0.46	0 .01		
20			12.62	31.59	7.71	9.51	4.41	2.45	3.23	1.14	1.95	0.33	1.36	0.14	0.88	0.05	0.51	0.01		
22			13.89	37.69	8.48	11.35	4.85	2.92	3.55	1.37	2.14	0.40	1.50	0.17	0.97	0.06	0.56	0.02		
24			15.15	44.28	9.25	13.33	5.29	3.43	3.87	1.60	2.34	0.47	1.64	0.20	1.06	0.07	0.61	0.02		
26			16.41	51.36	10.02	15.46	5.74	3.98	4.20	1.86	2.53	0.54	1.77	0.23	1.15	0.08	0.66	0.02		
28			17.67	58.91	10.79	17.73	6.18	4.56	4.52	2.13	2.73	0.62	1.91	0.26	1.23	0.09	0.71	0.02		
30			18.94	66.94	11.56	20.15	6.62	5.19	4.84	2.42	2.92	0.71	2.05	0.30	1.32	0.10	0.77	0.03		
32					12.33	22.71	7.06	5.85	5.16	2.73	3.12	0.80	2.18	0.34	1.41	0.12	0.82	0.03	0.36	0.00
34					13.10	25.41	7.50	6.54	5.49	3.06	3.31	0.89	2.32	0.38	1.50	0.13	0.87	0.03	0.38	0.00
36					13.87	28.24	7.94	7.27	5.81	3.40	3.51	0.99	2.46	0.42	1.59	0.14	0.92	0.04	0.40	0.01
38					14.64	31.22	8.38	8.04	6.13	3.76	3.70	1.10	2.59	0.46	1.68	0.16	0.97	0.04	0.43	0.01
40					15.41	34.33	8.82	8.84	6.46	4.13	3.89	1.21	2.73	0.51	1.76	0.18	1.02	0.05	0.45	0.01
42					16.18	37.58	9.26	9.67	6.78	4.52	4.09	1.32	2.87	0.56	1.85	0.19	1.07	0.05	0.47	0.01
44					16.95	40.96	9.71	10.54	7.10	4.93	4.28	1.44	3.00	0.61	1.94	0.21	1.12	0.06	0.49	0.01
46					17.73	44.47	10.15	11.45	7.42	5.35	4.48	1.57	3.14	0.66	2.03	0.23	1.17	0.06	0.52	0.01
48					18.50	48.12	10.59	12.39	7.75	5.79	4.67	1.69	3.28	0.71	2.12	0.25	1.23	0.07	0.54	0.01
50					19.27	51.90	11.03	13.36	8.07	6.25	4.87	1.83	3.41	0.77	2.20	0.27	1.28	0.07	0.56	0.01
55							12.13	15.94	8.88	7.45	5.36	2.18	3.75	0.92	2.42	0.32	1.40	0.08	0.62	0.01
60							13.24	18.72	9.68	8.75	5.84	2.56	4.09	1.08	2.65	0.37	1.53	0.10	0.67	0.01
65							14.34	21.72	10.49	10.15	6.33	2.97	4.44	1.25	2.87	0.43	1.66	0.11	0.73	0.02
70							15.44	24.91	11.30	11.65	6.82	3.41	4.78	1.43	3.09	0.50	1.79	0.13	0.79	0.02
75							16.54	28.31	12.10	13.23	7.30	3.87	5.12	1.63	3.31	0.56	1.91	0.15	0.84	0.02
80							17.65	31.90	12.91	14.91	7.79	4.36	5.46	1.84	3.53	0.63	2.04	0.17	0.90	0.02
85									13.72	16.69	8.28	4.88	5.80	2.06	3.75	0.71	2.17	0.19	0.95	0.03
90									14.52	18.55	8.76	5.43	6.14	2.29	3.97	0.79	2.30	0.21	1.01	0.03
95									15.33	20.50	9.25	6.00	6.48	2.53	4.19	0.87	2.42	0.23	1.07	0.03
100									16.14	22.55	9.74	6.59	6.82	2.78	4.41	0.96	2.55	0.25	1.12	0.03
110											10.71	7.87	7.51	3.31	4.85	1.14	2.81	0.30	1.23	0.04
120											11.68	9.24	8.19	3.89	5.29	1.34	3.06	0.36	1.35	0.05
130											12.66	10.72	8.87	4.52	5.73	1.56	3.32	0.41	1.46	0.06
140											13.63	12.30	9.55	5.18	6.17	1.79	3.57	0.47	1.57	0.06
150											14.61	13.97	10.24	5.89	6.61	2.03	3.83	0.54	1.68	0.07
160											15.58	15.75	10.92	6.63	7.05	2.29	4.08	0.61	1.79	0.08
170													11.60	7.42	7.50	2.56	4.34	0.68	1.91	0.09
180													12.28	8.25	7.94	2.85	4.59	0.75	2.02	0.10
190													12.97	9.12	8.38	3.15	4.85	0.83	2.13	0.11
200													13.65	10.03	8.82	3.46	5.11	0.92	2.24	0.12
220													15.01	11.96	9.70	4.13	5.62	1.09	2.47	0.15
240													16.38	14.06	10.58	4.85	6.13	1.28	2.69	0.17
260															11.46	5.63	6.64	1.49	2.92	0.20
280															12.35	6.46	7.15	1.71	3.14	0.23
300															13.23	7.34	7.66	1.94	3.37	0.26
320															14.11	8.27	8.17	2.19	3.59	0.30
340															14.99	9.25	8.68	2.45	3.81	0.33
360															15.87	10.29	9.19	2.72	4.04	0.37
380																	9.70	3.01	4.26	0.41
400																	10.21	3.31	4.49	0.45
420																	10.72	3.62	4.71	0.49
440																	11.23	3.95	4.94	0.53
460																	11.74	4.28	5.16	0.58
480																	12.25	4.64	5.38	0.63
500																	12.76	5.00	5.61	0.68

Shaded area represents velocities over 5 fps.
Use with caution.

See pg 148 for friction loss formulas

PVC SCHEDULE 40 IPS PLASTIC PIPE

Size: 4" thru 12" Flow: 10 thru 3000GPM

ASTM D1785 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	4"		6"		8"		10"		12"	
Avg.ID	3.998		6.031		7.942		9.976		11.889	
Pipe OD	4.500		6.625		8.625		10.750		12.750	
Avg Wall	0.251		0.297		0.342		0.387		0.431	
Min Wall	0.237		0.280		0.322		0.365		0.406	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
10	0.26	0.00	0.11	0.00	0.06	0.00	0.04	0.00	0.03	0.00
20	0.51	0.01	0.22	0.00	0.13	0.00	0.08	0.00	0.06	0.00
30	0.77	0.03	0.34	0.00	0.19	0.00	0.12	0.00	0.09	0.00
40	1.02	0.05	0.45	0.01	0.26	0.00	0.16	0.00	0.12	0.00
50	1.28	0.07	0.56	0.01	0.32	0.00	0.20	0.00	0.14	0.00
60	1.53	0.10	0.67	0.01	0.39	0.00	0.25	0.00	0.17	0.00
70	1.79	0.13	0.79	0.02	0.45	0.00	0.29	0.00	0.20	0.00
80	2.04	0.17	0.90	0.02	0.52	0.01	0.33	0.00	0.23	0.00
90	2.30	0.21	1.01	0.03	0.58	0.01	0.37	0.00	0.26	0.00
100	2.55	0.25	1.12	0.03	0.65	0.01	0.41	0.00	0.29	0.00
120	3.06	0.36	1.35	0.05	0.78	0.01	0.49	0.00	0.35	0.00
140	3.57	0.47	1.57	0.06	0.91	0.02	0.57	0.01	0.40	0.00
160	4.08	0.61	1.79	0.08	1.03	0.02	0.66	0.01	0.46	0.00
180	4.59	0.75	2.02	0.10	1.16	0.03	0.74	0.01	0.52	0.00
200	5.11	0.92	2.24	0.12	1.29	0.03	0.82	0.01	0.58	0.00
225	5.74	1.14	2.52	0.15	1.46	0.04	0.92	0.01	0.65	0.01
250	6.38	1.39	2.80	0.19	1.62	0.05	1.02	0.02	0.72	0.01
275	7.02	1.65	3.08	0.22	1.78	0.06	1.13	0.02	0.79	0.01
300	7.66	1.94	3.37	0.26	1.94	0.07	1.23	0.02	0.87	0.01
325	8.30	2.25	3.65	0.30	2.10	0.08	1.33	0.03	0.94	0.01
350	8.93	2.58	3.93	0.35	2.26	0.09	1.43	0.03	1.01	0.01
375			4.21	0.40	2.43	0.10	1.54	0.03	1.08	0.01
400			4.49	0.45	2.59	0.12	1.64	0.04	1.15	0.02
425			4.77	0.50	2.75	0.13	1.74	0.04	1.23	0.02
450			5.05	0.56	2.91	0.15	1.84	0.05	1.30	0.02
475			5.33	0.62	3.07	0.16	1.95	0.05	1.37	0.02
500			5.61	0.68	3.23	0.18	2.05	0.06	1.44	0.02
550			6.17	0.81	3.56	0.21	2.25	0.07	1.59	0.03
600			6.73	0.95	3.88	0.25	2.46	0.08	1.73	0.03
650			7.29	1.10	4.20	0.29	2.66	0.09	1.88	0.04
700			7.85	1.26	4.53	0.33	2.87	0.11	2.02	0.05
750					4.85	0.38	3.07	0.12	2.16	0.05
800					5.17	0.42	3.28	0.14	2.31	0.06
850					5.50	0.47	3.48	0.16	2.45	0.07
900					5.82	0.53	3.69	0.17	2.60	0.07
950					6.15	0.58	3.89	0.19	2.74	0.08
1000					6.47	0.64	4.10	0.21	2.89	0.09
1050					6.79	0.70	4.30	0.23	3.03	0.10
1150					7.44	0.83	4.71	0.27	3.32	0.12
1200					7.76	0.90	4.92	0.30	3.46	0.13
1250							5.12	0.32	3.61	0.14
1300							5.33	0.34	3.75	0.15
1350							5.53	0.37	3.90	0.16
1400							5.74	0.39	4.04	0.17
1500							6.15	0.45	4.33	0.19
1550							6.35	0.47	4.47	0.20
1600							6.56	0.50	4.62	0.21
1650							6.76	0.53	4.76	0.23
1700							6.97	0.56	4.91	0.24
1750							7.17	0.59	5.05	0.25
1800									5.20	0.27
1850									5.34	0.28
1900									5.48	0.29
1950									5.63	0.31
2000									5.77	0.32
2100		Shaded area represents velocities over 5 fps. Use with caution.							6.06	0.35
2200									6.35	0.39
2300									6.64	0.42
2400									6.93	0.45
2500									7.22	0.49
2600										
2700										
2800										
2900										
3000										

See pg 148 for friction loss formulas

SCHEDULE 80 PVC IPS PLASTIC PIPE

Size: ½" thru 6" Flow: 1 thru 500GPM

ASTM D-1785 (1120, 1220) C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

Size	½"		¾"		1"		1¼"		1½"		2"		2½"		3"		4"		6"	
Avg ID	0.526		0.722		0.935		1.254		1.476		1.913		2.289		2.864		3.786		5.709	
Pipe OD	0.840		1.050		1.315		1.660		1.900		2.375		2.875		3.500		4.500		6.625	
Avg Wall	0.157		0.164		0.190		0.203		0.212		0.231		0.293		0.318		0.357		0.458	
Min Wall	0.147		0.154		0.179		0.191		0.200		0.218		0.276		0.300		0.337		0.432	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.47	0.97	0.78	0.21	0.47	0.06	0.26	0.01	0.19	0.01										
2	2.95	3.50	1.57	0.75	0.93	0.21	0.52	0.05	0.37	0.02	0.22	0.01								
3	4.42	7.42	2.35	1.59	1.40	0.45	0.78	0.11	0.56	0.05	0.33	0.01								
4	5.90	12.64	3.13	2.71	1.87	0.77	1.04	0.18	0.75	0.08	0.45	0.02	0.31	0.01						
5	7.37	19.11	3.91	4.09	2.33	1.16	1.30	0.28	0.94	0.13	0.56	0.04	0.39	0.01						
6	8.85	26.78	4.70	5.74	2.80	1.63	1.56	0.39	1.12	0.18	0.67	0.05	0.47	0.02	0.30	0.01				
7	10.32	35.63	5.48	7.63	3.27	2.17	1.82	0.52	1.31	0.24	0.78	0.07	0.55	0.03	0.35	0.01				
8	11.80	45.63	6.26	9.77	3.73	2.78	2.08	0.67	1.50	0.30	0.89	0.09	0.62	0.04	0.40	0.01				
9	13.27	56.75	7.04	12.15	4.20	3.45	2.34	0.83	1.69	0.37	1.00	0.11	0.70	0.04	0.45	0.01				
10	14.75	68.98	7.83	14.77	4.67	4.20	2.59	1.01	1.87	0.46	1.11	0.13	0.78	0.05	0.50	0.02				
12			9.39	20.70	5.60	5.88	3.11	1.41	2.25	0.64	1.34	0.18	0.93	0.08	0.60	0.03				
14			10.96	27.55	6.53	7.83	3.63	1.88	2.62	0.85	1.56	0.24	1.09	0.10	0.70	0.03				
16			12.52	35.27	7.47	10.03	4.15	2.40	3.00	1.09	1.78	0.31	1.25	0.13	0.80	0.04	0.46	0.01		
18			14.09	43.87	8.40	12.47	4.67	2.99	3.37	1.35	2.01	0.38	1.40	0.16	0.90	0.05	0.51	0.01		
20			15.65	53.32	9.33	15.16	5.19	3.63	3.75	1.64	2.23	0.47	1.56	0.19	0.99	0.07	0.57	0.02		
22					10.27	18.08	5.71	4.33	4.12	1.96	2.45	0.56	1.71	0.23	1.09	0.08	0.63	0.02		
24					11.20	21.24	6.23	5.09	4.49	2.30	2.68	0.65	1.87	0.27	1.19	0.09	0.68	0.02		
26					12.13	24.64	6.75	5.91	4.87	2.67	2.90	0.76	2.02	0.32	1.29	0.11	0.74	0.03		
28					13.07	28.26	7.26	6.77	5.24	3.06	3.12	0.87	2.18	0.36	1.39	0.12	0.80	0.03		
30					14.00	32.12	7.78	7.70	5.62	3.48	3.34	0.99	2.34	0.41	1.49	0.14	0.85	0.04		
32					14.93	36.19	8.30	8.68	5.99	3.92	3.57	1.11	2.49	0.46	1.59	0.16	0.91	0.04	0.40	0.01
34					15.87	40.49	8.82	9.71	6.37	4.39	3.79	1.24	2.65	0.52	1.69	0.17	0.97	0.04	0.43	0.01
36							9.34	10.79	6.74	4.88	4.01	1.38	2.80	0.58	1.79	0.19	1.02	0.05	0.45	0.01
38							9.86	11.93	7.12	5.40	4.24	1.53	2.96	0.64	1.89	0.21	1.08	0.06	0.48	0.01
40							10.38	13.11	7.49	5.93	4.46	1.68	3.11	0.70	1.99	0.24	1.14	0.06	0.50	0.01
42							10.90	14.35	7.87	6.49	4.68	1.84	3.27	0.77	2.09	0.26	1.20	0.07	0.53	0.01
44							11.42	15.65	8.24	7.08	4.91	2.00	3.43	0.84	2.19	0.28	1.25	0.07	0.55	0.01
46							11.94	16.99	8.61	7.69	5.13	2.18	3.58	0.91	2.29	0.31	1.31	0.08	0.58	0.01
48							12.45	18.38	8.99	8.32	5.35	2.35	3.74	0.98	2.39	0.33	1.37	0.08	0.60	0.01
50							12.97	19.83	9.36	8.97	5.57	2.54	3.89	1.06	2.49	0.36	1.42	0.09	0.63	0.01
55							14.27	23.65	10.30	10.70	6.13	3.03	4.28	1.27	2.74	0.43	1.57	0.11	0.69	0.01
60							15.57	27.79	11.24	12.57	6.69	3.56	4.67	1.49	2.98	0.50	1.71	0.13	0.75	0.02
65									12.17	14.58	7.25	4.13	5.06	1.72	3.23	0.58	1.85	0.15	0.81	0.02
70									13.11	16.73	7.80	4.74	5.45	1.98	3.48	0.66	1.99	0.17	0.88	0.02
75									14.05	19.01	8.36	5.38	5.84	2.25	3.73	0.76	2.13	0.19	0.94	0.03
80									14.98	21.42	8.92	6.06	6.23	2.53	3.98	0.85	2.28	0.22	1.00	0.03
85									15.92	23.96	9.48	6.78	6.62	2.83	4.23	0.95	2.42	0.24	1.06	0.03
90											10.03	7.54	7.01	3.15	4.48	1.06	2.56	0.27	1.13	0.04
95											10.59	8.34	7.40	3.48	4.73	1.17	2.70	0.30	1.19	0.04
100											11.15	9.17	7.79	3.83	4.97	1.29	2.85	0.33	1.25	0.04
110											12.26	10.94	8.57	4.57	5.47	1.53	3.13	0.39	1.38	0.05
120											13.38	12.85	9.34	5.37	5.97	1.80	3.42	0.46	1.50	0.06
130											14.49	14.90	10.12	6.22	6.47	2.09	3.70	0.54	1.63	0.07
140											15.61	17.09	10.90	7.14	6.96	2.40	3.98	0.62	1.75	0.08
150													11.68	8.11	7.46	2.73	4.27	0.70	1.88	0.10
160													12.46	9.14	7.96	3.07	4.55	0.79	2.00	0.11
170													13.24	10.23	8.46	3.44	4.84	0.88	2.13	0.12
180													14.02	11.37	8.95	3.82	5.12	0.98	2.25	0.13
190													14.80	12.57	9.45	4.22	5.41	1.09	2.38	0.15
200													15.57	13.82	9.95	4.64	5.69	1.19	2.50	0.16
220															10.94	5.54	6.26	1.42	2.75	0.19
240															11.94	6.51	6.83	1.67	3.00	0.23
260															12.93	7.55	7.40	1.94	3.25	0.26
280															13.93	8.66	7.97	2.23	3.51	0.30
300															14.92	9.84	8.54	2.53	3.76	0.34
320															15.92	11.09	9.11	2.85	4.01	0.39
340																	9.68	3.19	4.26	0.43
360																	10.25	3.55	4.51	0.48
380																	10.82	3.92	4.76	0.53
400																	11.39	4.31	5.01	0.58
420																	11.95	4.72	5.26	0.64
440																	12.52	5.14	5.51	0.70
460																	13.09	5.59	5.76	0.76
480																	13.66	6.04	6.01	0.82
500																	14.23	6.52	6.26	0.88

Shaded area represents velocities over 5 fps.

Use with caution.

See pg 148 for friction loss formulas

PVC SCHEDULE 80 IPS PLASTIC PIPE

Size: 4" thru 12" Flow: 10 thru 3000GPM

ASTM D1785 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	4"		6"		8"		10"		12"	
Avg.ID	3.786		5.709		7.565		9.493		11.294	
Pipe OD	4.500		6.625		8.625		10.750		12.750	
Avg Wall	0.357		0.458		0.530		0.629		0.728	
Min Wall	0.337		0.432		0.500		0.593		0.687	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
10	0.28	0.00	0.13	0.00	0.07	0.00	0.05	0.00	0.03	0.00
20	0.57	0.02	0.25	0.00	0.14	0.00	0.09	0.00	0.06	0.00
30	0.85	0.04	0.38	0.00	0.21	0.00	0.14	0.00	0.10	0.00
40	1.14	0.06	0.50	0.01	0.29	0.00	0.18	0.00	0.13	0.00
50	1.42	0.09	0.63	0.01	0.36	0.00	0.23	0.00	0.16	0.00
60	1.71	0.13	0.75	0.02	0.43	0.00	0.27	0.00	0.19	0.00
70	1.99	0.17	0.88	0.02	0.50	0.01	0.32	0.00	0.22	0.00
80	2.28	0.22	1.00	0.03	0.57	0.01	0.36	0.00	0.26	0.00
90	2.56	0.27	1.13	0.04	0.64	0.01	0.41	0.00	0.29	0.00
100	2.85	0.33	1.25	0.04	0.71	0.01	0.45	0.00	0.32	0.00
120	3.42	0.46	1.50	0.06	0.86	0.02	0.54	0.01	0.38	0.00
140	3.98	0.62	1.75	0.08	1.00	0.02	0.63	0.01	0.45	0.00
160	4.55	0.79	2.00	0.11	1.14	0.03	0.72	0.01	0.51	0.00
180	5.12	0.98	2.25	0.13	1.28	0.03	0.81	0.01	0.58	0.00
200	5.69	1.19	2.50	0.16	1.43	0.04	0.91	0.01	0.64	0.01
225	6.40	1.49	2.82	0.20	1.60	0.05	1.02	0.02	0.72	0.01
250	7.12	1.81	3.13	0.24	1.78	0.06	1.13	0.02	0.80	0.01
275	7.83	2.15	3.44	0.29	1.96	0.07	1.25	0.02	0.88	0.01
300	8.54	2.53	3.76	0.34	2.14	0.09	1.36	0.03	0.96	0.01
325	9.25	2.94	4.07	0.40	2.32	0.10	1.47	0.03	1.04	0.01
350	9.96	3.37	4.38	0.46	2.50	0.12	1.58	0.04	1.12	0.02
375			4.69	0.52	2.67	0.13	1.70	0.04	1.20	0.02
400			5.01	0.58	2.85	0.15	1.81	0.05	1.28	0.02
425			5.32	0.65	3.03	0.17	1.92	0.06	1.36	0.02
450			5.63	0.73	3.21	0.18	2.04	0.06	1.44	0.03
475			5.95	0.80	3.39	0.20	2.15	0.07	1.52	0.03
500			6.26	0.88	3.56	0.22	2.26	0.07	1.60	0.03
550			6.88	1.05	3.92	0.27	2.49	0.09	1.76	0.04
600			7.51	1.24	4.28	0.31	2.72	0.10	1.92	0.04
650			8.14	1.44	4.63	0.36	2.94	0.12	2.08	0.05
700			8.76	1.65	4.99	0.42	3.17	0.14	2.24	0.06
750					5.35	0.48	3.40	0.16	2.40	0.07
800					5.70	0.54	3.62	0.18	2.56	0.08
850					6.06	0.60	3.85	0.20	2.72	0.09
900					6.42	0.67	4.07	0.22	2.88	0.09
950					6.77	0.74	4.30	0.24	3.04	0.10
1000					7.13	0.81	4.53	0.27	3.20	0.12
1050					7.49	0.89	4.75	0.29	3.36	0.13
1150					8.20	1.05	5.21	0.35	3.68	0.15
1200					8.56	1.14	5.43	0.38	3.84	0.16
1250							5.66	0.41	4.00	0.17
1300							5.89	0.44	4.16	0.19
1350							6.11	0.47	4.32	0.20
1400							6.34	0.50	4.48	0.22
1500							6.79	0.57	4.80	0.24
1550							7.02	0.60	4.96	0.26
1600							7.24	0.64	5.12	0.28
1650							7.47	0.68	5.28	0.29
1700							7.70	0.72	5.44	0.31
1750							7.92	0.76	5.60	0.33
1800		Shaded area represents velocities over 5 fps. Use with caution.							5.76	0.34
1850									5.92	0.36
1900									6.08	0.38
1950									6.24	0.40
2000									6.40	0.42
2100									6.72	0.46
2200									7.04	0.50
2300									7.36	0.54
2400									7.68	0.58
2500									8.00	0.63
2600										
2700										
2800										
2900										
3000										

See pg 148 for friction loss formulas

TYPE 'K' COPPER TUBING

Size: ½" thru 3" Flow: 1 thru 600 GPM

ASTM B 88 C=140 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	½"		5/8"		¾"		1"		1¼"		1½"		2"		2½"		3"	
Avg ID	0.527		0.652		0.745		0.995		1.245		1.481		1.959		2.435		2.907	
Pipe OD	0.625		0.750		0.875		1.125		1.375		1.625		2.125		2.625		3.125	
Avg Wall	0.049		0.049		0.065		0.065		0.065		0.072		0.083		0.095		0.109	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.47	1.09	0.96	0.39	0.74	0.20	0.41	0.05	0.26	0.02								
2	2.94	3.94	1.92	1.40	1.47	0.73	0.82	0.18	0.53	0.06								
3	4.41	8.35	2.88	2.97	2.21	1.55	1.24	0.38	0.79	0.13								
4	5.88	14.23	3.84	5.05	2.94	2.64	1.65	0.65	1.05	0.22								
5	7.35	21.51	4.80	7.64	3.68	3.99	2.06	0.98	1.32	0.33								
6	8.81	30.15	5.76	10.70	4.41	5.59	2.47	1.37	1.58	0.46	1.12	0.20						
7	10.28	40.12	6.72	14.24	5.15	7.44	2.88	1.82	1.84	0.61	1.30	0.26						
8	11.75	51.37	7.68	18.24	5.88	9.53	3.30	2.33	2.11	0.78	1.49	0.34						
9	13.22	63.90	8.64	22.68	6.62	11.85	3.71	2.90	2.37	0.97	1.67	0.42						
10	14.69	77.66	9.60	27.57	7.35	14.41	4.12	3.52	2.63	1.18	1.86	0.51						
12			11.52	38.64	8.82	20.20	4.95	4.94	3.16	1.66	2.23	0.71	1.28	0.18				
14			13.44	51.41	10.29	26.87	5.77	6.57	3.69	2.21	2.60	0.95	1.49	0.24				
16			15.36	65.83	11.76	34.41	6.59	8.42	4.21	2.83	2.98	1.22	1.70	0.31				
18			17.28	81.88	13.23	42.80	7.42	10.47	4.74	3.52	3.35	1.51	1.91	0.39				
20					14.70	52.02	8.24	12.72	5.26	4.28	3.72	1.84	2.13	0.47				
22					16.17	62.06	9.07	15.18	5.79	5.10	4.09	2.19	2.34	0.56	1.51	0.19	1.06	0.08
24					17.64	72.91	9.89	17.84	6.32	5.99	4.46	2.58	2.55	0.66	1.65	0.23	1.16	0.10
26							10.71	20.69	6.84	6.95	4.84	2.99	2.76	0.77	1.79	0.27	1.26	0.11
28							11.54	23.73	7.37	7.97	5.21	3.43	2.98	0.88	1.93	0.30	1.35	0.13
30							12.36	26.96	7.90	9.06	5.58	3.89	3.19	1.00	2.06	0.35	1.45	0.15
32							13.19	30.39	8.42	10.21	5.95	4.39	3.40	1.12	2.20	0.39	1.54	0.16
34							14.01	34.00	8.95	11.42	6.32	4.91	3.61	1.26	2.34	0.44	1.64	0.18
36							14.84	37.79	9.48	12.70	6.70	5.46	3.83	1.40	2.48	0.49	1.74	0.20
38							15.66	41.77	10.00	14.04	7.07	6.03	4.04	1.55	2.61	0.54	1.83	0.23
40							16.48	45.94	10.53	15.43	7.44	6.63	4.25	1.70	2.75	0.59	1.93	0.25
42							17.31	50.28	11.06	16.89	7.81	7.26	4.47	1.86	2.89	0.65	2.03	0.27
44									11.58	18.41	8.18	7.91	4.68	2.03	3.03	0.70	2.12	0.30
46									12.11	19.99	8.56	8.59	4.89	2.20	3.17	0.76	2.22	0.32
48									12.63	21.63	8.93	9.30	5.10	2.38	3.30	0.83	2.32	0.35
50									13.16	23.33	9.30	10.03	5.32	2.57	3.44	0.89	2.41	0.38
55									14.48	27.84	10.23	11.96	5.85	3.07	3.78	1.06	2.66	0.45
60									15.79	32.70	11.16	14.05	6.38	3.60	4.13	1.25	2.90	0.53
65									17.11	37.93	12.09	16.30	6.91	4.18	4.47	1.45	3.14	0.61
70									18.43	43.51	13.02	18.70	7.44	4.79	4.82	1.66	3.38	0.70
75											13.95	21.24	7.97	5.45	5.16	1.89	3.62	0.80
80											14.88	23.94	8.51	6.14	5.50	2.13	3.86	0.90
85											15.81	26.79	9.04	6.87	5.85	2.38	4.10	1.01
90											16.74	29.78	9.57	7.63	6.19	2.65	4.35	1.12
95											17.67	32.91	10.10	8.44	6.54	2.93	4.59	1.24
100											18.60	36.19	10.63	9.28	6.88	3.22	4.83	1.36
110			Shaded area represents velocities over 7 fps. Use with caution, where water hammer is a concern.										11.69	11.07	7.57	3.84	5.31	1.62
120													12.76	13.01	8.26	4.51	5.79	1.91
130													13.82	15.08	8.95	5.23	6.28	2.21
140													14.88	17.30	9.63	6.00	6.76	2.54
150													15.95	19.66	10.32	6.82	7.24	2.88
160													17.01	22.16	11.01	7.69	7.72	3.25
170													18.07	24.79	11.70	8.60	8.21	3.63
180															12.39	9.56	8.69	4.04
190															13.07	10.57	9.17	4.46
200															13.76	11.62	9.66	4.91
220															15.14	13.87	10.62	5.86
240															16.51	16.29	11.59	6.88
260															17.89	18.90	12.55	7.98
280															19.27	21.68	13.52	9.15
300																	14.48	10.40
320																	15.45	11.72
340																	16.42	13.11
360																	17.38	14.58
380																	18.35	16.11
400																		
420																		
440																		
460																		
480																		
500																		

See pg 148 for friction loss formulas

TYPE 'L' COPPER TUBING

Size: ½" thru 3" Flow: 1 thru 500GPM
C=140 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	½"		5/8"		¾"		1"		1"		1½"		2"		2½"		3"	
Avg.ID	0.545		0.666		0.785		1.025		1.265		1.505		1.985		2.465		2.945	
Pipe OD	0.625		0.750		0.875		1.125		1.375		1.625		2.125		2.625		3.125	
Avg Wall	0.040		0.042		0.045		0.050		0.055		0.060		0.070		0.080		0.090	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.37	0.93	0.92	0.35	0.66	0.16	0.39	0.04	0.25	0.02								
2	2.75	3.35	1.84	1.26	1.32	0.57	0.78	0.15	0.51	0.06								
3	4.12	7.09	2.76	2.67	1.99	1.20	1.17	0.33	0.76	0.12								
4	5.49	12.09	3.68	4.56	2.65	2.05	1.55	0.56	1.02	0.20								
5	6.87	18.27	4.60	6.89	3.31	3.09	1.94	0.85	1.27	0.30								
6	8.24	25.61	5.52	9.65	3.97	4.34	2.33	1.18	1.53	0.43	1.08	0.18						
7	9.62	34.07	6.44	12.84	4.63	5.77	2.72	1.58	1.78	0.57	1.26	0.24						
8	10.99	43.63	7.36	16.45	5.30	7.39	3.11	2.02	2.04	0.72	1.44	0.31						
9	12.36	54.26	8.28	20.45	5.96	9.19	3.50	2.51	2.29	0.90	1.62	0.39						
10	13.74	65.95	9.20	24.86	6.62	11.17	3.88	3.05	2.55	1.10	1.80	0.47						
12			11.04	34.85	7.95	15.66	4.66	4.28	3.06	1.54	2.16	0.66	1.24	0.17				
14			12.88	46.36	9.27	20.83	5.44	5.69	3.57	2.04	2.52	0.88	1.45	0.23				
16			14.72	59.37	10.59	26.68	6.21	7.28	4.08	2.62	2.88	1.12	1.66	0.29				
18			16.56	73.84	11.92	33.18	6.99	9.06	4.59	3.25	3.24	1.40	1.86	0.36				
20					13.24	40.33	7.77	11.01	5.10	3.96	3.60	1.70	2.07	0.44				
22					14.57	48.11	8.54	13.14	5.61	4.72	3.96	2.03	2.28	0.53	1.48	0.18	1.03	0.08
24					15.89	56.53	9.32	15.44	6.12	5.55	4.32	2.38	2.49	0.62	1.61	0.22	1.13	0.09
26							10.10	17.90	6.63	6.43	4.68	2.76	2.69	0.72	1.75	0.25	1.22	0.11
28							10.87	20.54	7.14	7.38	5.04	3.17	2.90	0.82	1.88	0.29	1.32	0.12
30							11.65	23.33	7.65	8.38	5.40	3.60	3.11	0.94	2.01	0.33	1.41	0.14
32							12.43	26.30	8.16	9.45	5.76	4.06	3.31	1.05	2.15	0.37	1.51	0.15
34							13.20	29.42	8.67	10.57	6.12	4.54	3.52	1.18	2.28	0.41	1.60	0.17
36							13.98	32.71	9.18	11.75	6.48	5.05	3.73	1.31	2.42	0.46	1.69	0.19
38							14.76	36.15	9.69	12.99	6.84	5.58	3.93	1.45	2.55	0.51	1.79	0.21
40							15.53	39.75	10.20	14.28	7.21	6.13	4.14	1.59	2.69	0.56	1.88	0.23
42							16.31	43.51	10.71	15.63	7.57	6.71	4.35	1.75	2.82	0.61	1.98	0.26
44									11.22	17.04	7.93	7.32	4.56	1.90	2.95	0.66	2.07	0.28
46									11.73	18.50	8.29	7.94	4.76	2.07	3.09	0.72	2.16	0.30
48									12.24	20.02	8.65	8.60	4.97	2.24	3.22	0.78	2.26	0.33
50									12.75	21.59	9.01	9.27	5.18	2.41	3.36	0.84	2.35	0.35
55									14.02	25.76	9.91	11.06	5.70	2.88	3.69	1.00	2.59	0.42
60									15.30	30.26	10.81	13.00	6.21	3.38	4.03	1.18	2.82	0.50
65									16.57	35.10	11.71	15.07	6.73	3.92	4.36	1.37	3.06	0.57
70									17.85	40.26	12.61	17.29	7.25	4.50	4.70	1.57	3.29	0.66
75											13.51	19.65	7.77	5.11	5.04	1.78	3.53	0.75
80											14.41	22.14	8.28	5.76	5.37	2.01	3.76	0.84
85											15.31	24.77	8.80	6.44	5.71	2.25	4.00	0.94
90											16.21	27.54	9.32	7.16	6.04	2.50	4.23	1.05
95											17.11	30.44	9.84	7.91	6.38	2.76	4.47	1.16
100											18.01	33.47	10.35	8.70	6.71	3.03	4.70	1.28
110													11.39	10.38	7.39	3.62	5.17	1.52
120													12.43	12.20	8.06	4.25	5.65	1.79
130													13.46	14.15	8.73	4.93	6.12	2.07
140													14.50	16.23	9.40	5.66	6.59	2.38
150													15.53	18.44	10.07	6.43	7.06	2.70
160			Shaded area represents velocities over 7 fps. Use with caution, where water hammer is a concern.										16.57	20.78	10.74	7.24	7.53	3.05
170													17.60	23.25	11.41	8.11	8.00	3.41
180															12.09	9.01	8.47	3.79
190															12.76	9.96	8.94	4.19
200															13.43	10.95	9.41	4.61
220															14.77	13.07	10.35	5.50
240															16.12	15.35	11.29	6.46
260															17.46	17.80	12.23	7.49
280															18.80	20.42	13.17	8.59
300																	14.11	9.76
320																	15.05	11.00
340																	15.99	12.31
360																	16.94	13.69
380																	17.88	15.13
400																		
420																		
440																		
460																		
480																		
500																		

See pg 148 for friction loss formulas

TYPE 'M' COPPER TUBING

Size: ½" thru 3" Flow: 1 thru 500GPM

C=140 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	½"		5/8"		¾"		1"		1¼"		1½"		2"		2½"		3"	
Avg.ID	0.569		0.690		0.811		1.055		1.291		1.527		2.009		2.495		2.981	
Pipe OD	0.625		0.750		0.875		1.125		1.375		1.625		2.125		2.625		3.125	
Avg Wall	0.028		0.030		0.032		0.035		0.042		0.049		0.058		0.065		0.072	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
1	1.26	0.75	0.86	0.29	0.62	0.13	0.37	0.04	0.24	0.01								
2	2.52	2.71	1.71	1.06	1.24	0.48	0.73	0.13	0.49	0.05								
3	3.78	5.75	2.57	2.25	1.86	1.03	1.10	0.29	0.73	0.11								
4	5.04	9.80	3.43	3.83	2.48	1.75	1.47	0.49	0.98	0.18								
5	6.30	14.81	4.28	5.80	3.10	2.64	1.83	0.73	1.22	0.27								
6	7.56	20.76	5.14	8.13	3.72	3.70	2.20	1.03	1.47	0.39	1.05	0.17						
7	8.82	27.62	6.00	10.81	4.34	4.92	2.57	1.37	1.71	0.51	1.22	0.23						
8	10.08	35.37	6.86	13.84	4.96	6.31	2.93	1.75	1.96	0.66	1.40	0.29						
9	11.34	44.00	7.71	17.22	5.58	7.84	3.30	2.18	2.20	0.82	1.57	0.36						
10	12.60	53.48	8.57	20.93	6.20	9.53	3.67	2.65	2.45	0.99	1.75	0.44						
12			10.28	29.33	7.44	13.36	4.40	3.72	2.94	1.39	2.10	0.61	1.21	0.16				
14			12.00	39.02	8.68	17.78	5.13	4.94	3.43	1.85	2.45	0.82	1.42	0.22				
16			13.71	49.97	9.93	22.77	5.87	6.33	3.92	2.37	2.80	1.05	1.62	0.28				
18			15.43	62.15	11.17	28.32	6.60	7.87	4.41	2.95	3.15	1.30	1.82	0.34				
20			17.14	75.55	12.41	34.42	7.33	9.57	4.90	3.58	3.50	1.58	2.02	0.42				
22					13.65	41.06	8.06	11.42	5.39	4.28	3.85	1.89	2.22	0.50	1.44	0.17	1.01	0.07
24					14.89	48.24	8.80	13.41	5.88	5.02	4.20	2.22	2.43	0.58	1.57	0.20	1.10	0.09
26							9.53	15.56	6.36	5.83	4.55	2.57	2.63	0.68	1.70	0.24	1.19	0.10
28							10.26	17.85	6.85	6.68	4.90	2.95	2.83	0.78	1.84	0.27	1.29	0.11
30							11.00	20.28	7.34	7.59	5.25	3.35	3.03	0.88	1.97	0.31	1.38	0.13
32							11.73	22.85	7.83	8.56	5.60	3.78	3.23	0.99	2.10	0.35	1.47	0.15
34							12.46	25.57	8.32	9.57	5.95	4.23	3.44	1.11	2.23	0.39	1.56	0.16
36							13.20	28.42	8.81	10.64	6.30	4.70	3.64	1.24	2.36	0.43	1.65	0.18
38							13.93	31.42	9.30	11.76	6.65	5.20	3.84	1.37	2.49	0.48	1.74	0.20
40							14.66	34.55	9.79	12.94	7.00	5.71	4.04	1.50	2.62	0.52	1.84	0.22
42							15.40	37.81	10.28	14.16	7.35	6.26	4.25	1.65	2.75	0.57	1.93	0.24
44									10.77	15.43	7.70	6.82	4.45	1.79	2.88	0.63	2.02	0.26
46									11.26	16.76	8.05	7.40	4.65	1.95	3.01	0.68	2.11	0.29
48									11.75	18.13	8.40	8.01	4.85	2.11	3.15	0.73	2.20	0.31
50									12.24	19.56	8.75	8.64	5.05	2.27	3.28	0.79	2.30	0.33
55									13.46	23.33	9.62	10.31	5.56	2.71	3.60	0.95	2.53	0.40
60									14.69	27.41	10.50	12.11	6.07	3.19	3.93	1.11	2.75	0.47
65									15.91	31.79	11.37	14.04	6.57	3.70	4.26	1.29	2.98	0.54
70									17.14	36.47	12.25	16.11	7.08	4.24	4.59	1.48	3.21	0.62
75											13.12	18.31	7.58	4.82	4.92	1.68	3.44	0.71
80											14.00	20.63	8.09	5.43	5.24	1.89	3.67	0.80
85											14.87	23.08	8.59	6.07	5.57	2.12	3.90	0.89
90											15.75	25.66	9.10	6.75	5.90	2.35	4.13	0.99
95											16.62	28.36	9.60	7.46	6.23	2.60	4.36	1.09
100											17.50	31.19	10.11	8.21	6.55	2.86	4.59	1.20
110													11.12	9.79	7.21	3.41	5.05	1.44
120													12.13	11.51	7.87	4.01	5.51	1.69
130													13.14	13.34	8.52	4.65	5.97	1.96
140													14.15	15.31	9.18	5.33	6.43	2.24
150													15.16	17.39	9.83	6.06	6.89	2.55
160													16.17	19.60	10.49	6.83	7.35	2.87
170													17.18	21.93	11.14	7.64	7.81	3.21
180															11.80	8.50	8.26	3.57
190															12.45	9.39	8.72	3.95
200															13.11	10.33	9.18	4.34
220															14.42	12.32	10.10	5.18
240															15.73	14.47	11.02	6.09
260															17.04	16.79	11.94	7.06
280															18.35	19.25	12.86	8.10
300																	13.77	9.20
320																	14.69	10.37
340																	15.61	11.60
360																	16.53	12.90
380																	17.45	14.26
400																		
420																		
440																		
460																		
480																		
500																		

Shaded area represents velocities over 7 fps.
Use with caution, where water hammer is a concern.

See pg 148 for friction loss formulas

HDPE DR 7 265 PSI (IPS SIZE, OD CONTROLLED

Size: 3" thru 18" Flow: 50 thru 4000GPM

ANSI/ASAE S376.3 PE3408, ASTM D2239 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	3"		4"		6"		8"		10"		12"		14"		16"		18"	
Avg.ID	2.440		3.136		4.589		6.013		7.494		8.890		9.760		11.156		12.550	
Pipe OD	3.500		4.500		6.625		8.625		10.750		12.750		14.000		16.000		18.000	
Avg Wall	0.530		0.682		1.018		1.306		1.628		1.930		2.120		2.422		2.725	
Min Wall	0.500		0.643		0.946		1.232		1.536		1.821		2.000		2.286		2.571	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
50	3.43	0.78	2.07	0.23	0.97	0.04	0.56	0.01	0.36	0.00	0.26	0.00	0.21	0.00	0.16	0.00	0.13	0.00
60	4.11	1.09	2.49	0.32	1.16	0.05	0.68	0.01	0.44	0.00	0.31	0.00	0.26	0.00	0.20	0.00	0.16	0.00
70	4.80	1.45	2.90	0.43	1.36	0.07	0.79	0.02	0.51	0.01	0.36	0.00	0.30	0.00	0.23	0.00	0.18	0.00
80	5.48	1.86	3.32	0.55	1.55	0.09	0.90	0.02	0.58	0.01	0.41	0.00	0.34	0.00	0.26	0.00	0.21	0.00
90	6.17	2.31	3.73	0.68	1.74	0.11	1.02	0.03	0.65	0.01	0.46	0.00	0.39	0.00	0.30	0.00	0.23	0.00
100	6.85	2.81	4.15	0.83	1.94	0.13	1.13	0.03	0.73	0.01	0.52	0.01	0.43	0.00	0.33	0.00	0.26	0.00
120	8.22	3.93	4.98	1.16	2.32	0.18	1.35	0.05	0.87	0.02	0.62	0.01	0.51	0.00	0.39	0.00	0.31	0.00
140	9.59	5.23	5.81	1.54	2.71	0.24	1.58	0.06	1.02	0.02	0.72	0.01	0.60	0.01	0.46	0.00	0.36	0.00
160	10.96	6.70	6.64	1.98	3.10	0.31	1.81	0.08	1.16	0.03	0.83	0.01	0.69	0.01	0.52	0.00	0.41	0.00
180			7.47	2.46	3.49	0.39	2.03	0.10	1.31	0.04	0.93	0.02	0.77	0.01	0.59	0.01	0.47	0.00
200			8.30	2.99	3.87	0.47	2.26	0.13	1.45	0.04	1.03	0.02	0.86	0.01	0.66	0.01	0.52	0.00
220			9.13	3.56	4.26	0.56	2.48	0.15	1.60	0.05	1.14	0.02	0.94	0.01	0.72	0.01	0.57	0.00
240			9.96	4.19	4.65	0.66	2.71	0.18	1.74	0.06	1.24	0.03	1.03	0.02	0.79	0.01	0.62	0.00
260			10.79	4.86	5.04	0.76	2.93	0.20	1.89	0.07	1.34	0.03	1.11	0.02	0.85	0.01	0.67	0.01
280			11.62	5.57	5.42	0.87	3.16	0.23	2.03	0.08	1.45	0.03	1.20	0.02	0.92	0.01	0.73	0.01
300					5.81	0.99	3.39	0.27	2.18	0.09	1.55	0.04	1.28	0.03	0.98	0.01	0.78	0.01
320					6.20	1.12	3.61	0.30	2.32	0.10	1.65	0.04	1.37	0.03	1.05	0.01	0.83	0.01
340					6.59	1.25	3.84	0.34	2.47	0.12	1.76	0.05	1.46	0.03	1.11	0.02	0.88	0.01
360					6.97	1.39	4.06	0.37	2.62	0.13	1.86	0.06	1.54	0.04	1.18	0.02	0.93	0.01
380					7.36	1.54	4.29	0.41	2.76	0.14	1.96	0.06	1.63	0.04	1.25	0.02	0.98	0.01
400					7.75	1.69	4.51	0.45	2.91	0.16	2.06	0.07	1.71	0.04	1.31	0.02	1.04	0.01
450					8.72	2.10	5.08	0.56	3.27	0.19	2.32	0.08	1.93	0.05	1.48	0.03	1.17	0.02
500					9.69	2.56	5.64	0.69	3.63	0.24	2.58	0.10	2.14	0.06	1.64	0.03	1.30	0.02
550					10.66	3.05	6.21	0.82	4.00	0.28	2.84	0.12	2.36	0.08	1.80	0.04	1.42	0.02
600					11.62	3.58	6.77	0.96	4.36	0.33	3.10	0.14	2.57	0.09	1.97	0.05	1.55	0.03
650							7.33	1.12	4.72	0.38	3.36	0.17	2.78	0.11	2.13	0.06	1.68	0.03
700							7.90	1.28	5.09	0.44	3.61	0.19	3.00	0.12	2.29	0.06	1.81	0.04
750							8.46	1.45	5.45	0.50	3.87	0.22	3.21	0.14	2.46	0.07	1.94	0.04
800							9.03	1.64	5.81	0.56	4.13	0.24	3.43	0.16	2.62	0.08	2.07	0.05
850							9.59	1.83	6.18	0.63	4.39	0.27	3.64	0.17	2.79	0.09	2.20	0.05
900							10.16	2.04	6.54	0.70	4.65	0.30	3.85	0.19	2.95	0.10	2.33	0.06
950							10.72	2.25	6.90	0.77	4.90	0.34	4.07	0.21	3.11	0.11	2.46	0.06
1000							11.28	2.48	7.26	0.85	5.16	0.37	4.28	0.23	3.28	0.12	2.59	0.07
1050							11.85	2.71	7.63	0.93	5.42	0.40	4.50	0.26	3.44	0.13	2.72	0.08
1100									7.99	1.01	5.68	0.44	4.71	0.28	3.61	0.15	2.85	0.08
1150									8.35	1.10	5.94	0.48	4.93	0.30	3.77	0.16	2.98	0.09
1200									8.72	1.19	6.19	0.52	5.14	0.33	3.93	0.17	3.11	0.10
1250									9.08	1.28	6.45	0.56	5.35	0.35	4.10	0.19	3.24	0.10
1300									9.44	1.38	6.71	0.60	5.57	0..38	4.26	0.20	3.37	0.11
1350									9.81	1.48	6.97	0.64	5.78	0.41	4.43	0.21	3.50	0.12
1400									10.17	1.58	7.23	0.69	6.00	0.44	4.59	0.23	3.63	0.13
1450									10.53	1.69	7.49	0.74	6.21	0.47	4.75	0.24	3.76	0.14
1500									10.90	1.80	7.74	0.78	6.42	0.50	4.92	0.26	3.89	0.15
1550									11.26	1.91	8.00	0.83	6.64	0.53	5.08	0.28	4.02	0.16
1600									11.62	2.03	8.26	0.88	6.85	0.56	5.25	0.29	4.14	0.16
1650											8.52	0.93	7.07	0.59	5.41	0.31	4.27	0.17
1700											8.78	0.99	7.28	0.63	5.57	0.33	4.40	0.18
1750											9.03	1.04	7.50	0.66	5.74	0.35	4.53	0.19
1800											9.29	1.10	7.71	0.70	5.90	0.36	4.66	0.21
1900											9.81	1.21	8.14	0.77	6.23	0.40	4.92	0.23
2000			Shaded area represents velocities over 5 fps. Use with caution.								10.32	1.33	8.57	0.85	6.56	0.44	5.18	0.25
2100											10.84	1.46	8.99	0.93	6.88	0.48	5.44	0.27
2200											11.36	1.59	9.42	1.01	7.21	0.53	5.70	0.30
2300											11.87	1.73	9.85	1.10	7.54	0.57	5.96	0.32
2400													10.28	1.19	7.87	0.62	6.22	0.35
2500													10.71	1.28	8.20	0.67	6.48	0.38
2600													11.14	1.38	8.52	0.72	6.74	0.41
2700													11.56	1.48	8.85	0.77	6.99	0.43
2800													11.99	1.58	9.18	0.82	7.25	0.46
2900															9.51	0.88	7.51	0.50
3000															9.83	0.94	7.77	0.53
3300															10.82	1.12	8.55	0.63
3600															11.80	1.31	9.33	0.74
3900																	10.10	0.86
4000																	10.36	0.90

See pg 148 for friction loss formulas

HDPE DR 9 200 PSI (IPS SIZE, OD CONTROLLED

Size: 3" thru 18" Flow: 50 thru 4000GPM

ANSI/ASAE S376.3 PE3408, ASTM D2239 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	3"		4"		6"		8"		10"		12"		14"		16"		18"	
Avg.ID	2.674		3.440		5.065		6.593		8.218		9.746		10.700		12.230		13.760	
Pipe OD	3.500		4.500		6.625		8.625		10.750		12.750		14.000		16.000		18.000	
Avg Wall	0.413		0.530		0.780		1.016		1.266		1.502		1.650		1.885		2.120	
Min Wall	0.389		0.500		0.736		0.958		1.194		1.417		1.556		1.778		2.000	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
50	2.85	0.50	1.72	0.15	0.80	0.02												
60	3.42	0.70	2.07	0.20	0.95	0.03												
70	3.99	0.93	2.41	0.27	1.11	0.04												
80	4.56	1.19	2.76	0.35	1.27	0.05												
90	5.14	1.48	3.10	0.43	1.43	0.07												
100	5.71	1.80	3.45	0.53	1.59	0.08	0.94	0.02										
120	6.85	2.52	4.14	0.74	1.91	0.11	1.13	0.03										
140	7.99	3.35	4.83	0.98	2.23	0.15	1.31	0.04										
160	9.13	4.29	5.52	1.26	2.54	0.19	1.50	0.05	0.97	0.02								
180			6.21	1.57	2.86	0.24	1.69	0.07	1.09	0.02								
200			6.90	1.90	3.18	0.29	1.88	0.08	1.21	0.03								
220			7.59	2.27	3.50	0.35	2.06	0.10	1.33	0.03								
240			8.27	2.67	3.82	0.41	2.25	0.11	1.45	0.04	1.03	0.02						
260			8.96	3.10	4.13	0.47	2.44	0.13	1.57	0.04	1.12	0.02						
280			9.65	3.55	4.45	0.54	2.63	0.15	1.69	0.05	1.20	0.02						
300					4.77	0.61	2.82	0.17	1.81	0.06	1.29	0.03	1.07	0.02				
320					5.09	0.69	3.00	0.19	1.93	0.07	1.37	0.03	1.14	0.02				
340					5.41	0.77	3.19	0.21	2.05	0.07	1.46	0.03	1.21	0.02				
360					5.73	0.86	3.38	0.24	2.17	0.08	1.55	0.04	1.28	0.02				
380					6.04	0.95	3.57	0.26	2.30	0.09	1.63	0.04	1.35	0.02				
400					6.36	1.05	3.75	0.29	2.42	0.10	1.72	0.04	1.43	0.03				
450					7.16	1.30	4.22	0.36	2.72	0.12	1.93	0.05	1.60	0.03	1.23	0.02		
500					7.95	1.58	4.69	0.44	3.02	0.15	2.15	0.07	1.78	0.04	1.36	0.02		
550					8.75	1.89	5.16	0.52	3.32	0.18	2.36	0.08	1.96	0.05	1.50	0.03		
600					9.54	2.22	5.63	0.61	3.62	0.21	2.58	0.09	2.14	0.06	1.64	0.03	1.29	0.02
650							6.10	0.71	3.93	0.24	2.79	0.11	2.32	0.07	1.77	0.04	1.40	0.02
700							6.57	0.82	4.23	0.28	3.01	0.12	2.49	0.08	1.91	0.04	1.51	0.02
750							7.04	0.93	4.53	0.32	3.22	0.14	2.67	0.09	2.05	0.05	1.62	0.03
800							7.51	1.05	4.83	0.36	3.44	0.16	2.85	0.10	2.18	0.05	1.72	0.03
850							7.98	1.17	5.14	0.40	3.65	0.17	3.03	0.11	2.32	0.06	1.83	0.03
900							8.45	1.30	5.44	0.45	3.87	0.19	3.21	0.12	2.45	0.06	1.94	0.04
950							8.92	1.44	5.74	0.49	4.08	0.21	3.39	0.14	2.59	0.07	2.05	0.04
1000							9.39	1.58	6.04	0.54	4.30	0.24	3.56	0.15	2.73	0.08	2.15	0.04
1050							9.86	1.73	6.34	0.59	4.51	0.26	3.74	0.16	2.86	0.09	2.26	0.05
1100									6.65	0.65	4.72	0.28	3.92	0.18	3.00	0.09	2.37	0.05
1150									6.95	0.70	4.94	0.31	4.10	0.19	3.14	0.10	2.48	0.06
1200									7.25	0.76	5.15	0.33	4.28	0.21	3.27	0.11	2.59	0.06
1250									7.55	0.82	5.37	0.36	4.45	0.23	3.41	0.12	2.69	0.07
1300									7.85	0.88	5.58	0.38	4.63	0.24	3.55	0.13	2.80	0.07
1350									8.16	0.94	5.80	0.41	4.81	0.26	3.68	0.14	2.91	0.08
1400									8.46	1.01	6.01	0.44	4.99	0.28	3.82	0.15	3.02	0.08
1450									8.76	1.08	6.23	0.47	5.17	0.30	3.96	0.16	3.12	0.09
1500									9.06	1.15	6.44	0.50	5.35	0.32	4.09	0.17	3.23	0.09
1550									9.36	1.22	6.66	0.53	5.52	0.34	4.23	0.18	3.34	0.10
1600									9.67	1.29	6.87	0.56	5.70	0.36	4.36	0.19	3.45	0.11
1650									9.97	1.37	7.09	0.60	5.88	0.38	4.50	0.20	3.56	0.11
1700											7.30	0.63	6.06	0.40	4.64	0.21	3.66	0.12
1750											7.52	0.67	6.24	0.42	4.77	0.22	3.77	0.12
1800											7.73	0.70	6.41	0.45	4.91	0.23	3.88	0.13
1900											8.16	0.78	6.77	0.49	5.18	0.26	4.09	0.14
2000			Shaded area represents velocities over 5 fps. Use with caution.								8.59	0.85	7.13	0.54	5.46	0.28	4.31	0.16
2100											9.02	0.93	7.48	0.59	5.73	0.31	4.53	0.17
2200											9.45	1.02	7.84	0.65	6.00	0.34	4.74	0.19
2300											9.88	1.10	8.20	0.70	6.27	0.37	4.96	0.21
2400													8.55	0.76	6.55	0.40	5.17	0.22
2500													8.91	0.82	6.82	0.43	5.39	0.24
2600													9.27	0.88	7.09	0.46	5.60	0.26
2700													9.62	0.94	7.36	0.49	5.82	0.28
2800													9.98	1.01	7.64	0.53	6.03	0.30
2900															7.91	0.56	6.25	0.32
3000															8.18	0.60	6.46	0.34
3300															9.00	0.71	7.11	0.40
3600															9.82	0.84	7.76	0.47
3900																	8.40	0.55
4000																	8.62	0.57

See pg 148 for friction loss formulas

HDPE DR 11 160 PSI (IPS SIZE, OD CONTROLLED

Size: 3" thru 18" Flow: 50 thru 4000GPM

ANSI/ASAE S376.3 PE3408, ASTM D2239 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	3"		4"		6"		8"		10"		12"		14"		16"		18"	
Avg.ID	2.826		3.632		5.349		6.963		8.678		10.292		11.300		12.914		14.532	
Pipe OD	3.500		4.500		6.625		8.625		10.750		12.750		14.000		16.000		18.000	
Avg Wall	0.337		0.434		0.638		0.831		1.036		1.229		1.350		1.543		1.734	
Min Wall	0.318		0.409		0.602		0.784		0.977		1.159		1.273		1.455		1.636	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
50	2.55	0.38	1.55	0.11	0.71	0.02												
60	3.07	0.53	1.86	0.16	0.86	0.02												
70	3.58	0.71	2.17	0.21	1.00	0.03												
80	4.09	0.91	2.47	0.27	1.14	0.04												
90	4.60	1.13	2.78	0.33	1.28	0.05												
100	5.11	1.37	3.09	0.40	1.43	0.06	0.84	0.02										
120	6.13	1.92	3.71	0.57	1.71	0.09	1.01	0.02										
140	7.15	2.56	4.33	0.76	2.00	0.11	1.18	0.03										
160	8.17	3.28	4.95	0.97	2.28	0.15	1.35	0.04										
180	9.20	4.08	5.57	1.20	2.57	0.18	1.51	0.05										
200	10.22	4.96	6.19	1.46	2.85	0.22	1.68	0.06	1.08	0.02	0.77	0.01						
220	11.24	5.91	6.80	1.74	3.14	0.27	1.85	0.07	1.19	0.03	0.85	0.01						
240	12.26	6.95	7.42	2.05	3.42	0.31	2.02	0.09	1.30	0.03	0.92	0.01						
260			8.04	2.38	3.71	0.36	2.19	0.10	1.41	0.03	1.00	0.01						
280			8.66	2.73	3.99	0.41	2.36	0.11	1.52	0.04	1.08	0.02						
300			9.28	3.10	4.28	0.47	2.52	0.13	1.63	0.04	1.16	0.02						
320			9.90	3.49	4.56	0.53	2.69	0.15	1.73	0.05	1.23	0.02						
340			10.52	3.91	4.85	0.59	2.86	0.16	1.84	0.06	1.31	0.02	1.09	0.02				
360			11.13	4.34	5.13	0.66	3.03	0.18	1.95	0.06	1.39	0.03	1.15	0.02				
380					5.42	0.73	3.20	0.20	2.06	0.07	1.46	0.03	1.21	0.02				
400					5.70	0.80	3.37	0.22	2.17	0.08	1.54	0.03	1.28	0.02				
450					6.42	1.00	3.79	0.28	2.44	0.09	1.73	0.04	1.44	0.03				
500					7.13	1.21	4.21	0.34	2.71	0.12	1.93	0.05	1.60	0.03	1.22	0.02		
550					7.84	1.45	4.63	0.40	2.98	0.14	2.12	0.06	1.76	0.04	1.35	0.02		
600					8.56	1.70	5.05	0.47	3.25	0.16	2.31	0.07	1.92	0.04	1.47	0.02		
650					9.27	1.97	5.47	0.55	3.52	0.19	2.50	0.08	2.08	0.05	1.59	0.03		
700					9.98	2.26	5.89	0.63	3.79	0.21	2.70	0.09	2.24	0.06	1.71	0.03	1.35	0.02
750					10.69	2.57	6.31	0.71	4.06	0.24	2.89	0.11	2.40	0.07	1.83	0.04	1.45	0.02
800							6.73	0.80	4.33	0.27	3.08	0.12	2.56	0.08	1.96	0.04	1.55	0.02
850							7.15	0.90	4.61	0.31	3.27	0.13	2.72	0.09	2.08	0.04	1.64	0.03
900							7.57	1.00	4.88	0.34	3.47	0.15	2.88	0.09	2.20	0.05	1.74	0.03
950							7.99	1.10	5.15	0.38	3.66	0.16	3.04	0.10	2.32	0.05	1.84	0.03
1000							8.42	1.21	5.42	0.42	3.85	0.18	3.20	0.12	2.45	0.06	1.93	0.03
1050							8.84	1.33	5.69	0.45	4.04	0.20	3.36	0.13	2.57	0.07	2.03	0.04
1100							9.26	1.45	5.96	0.50	4.24	0.22	3.51	0.14	2.69	0.07	2.13	0.04
1150							9.68	1.57	6.23	0.54	4.43	0.23	3.67	0.15	2.81	0.08	2.22	0.04
1200							10.10	1.70	6.50	0.58	4.62	0.25	3.83	0.16	2.94	0.08	2.32	0.05
1250							10.52	1.83	6.77	0.63	4.81	0.27	3.99	0.17	3.06	0.09	2.42	0.05
1300									7.04	0.68	5.01	0.29	4.15	0.19	3.18	0.10	2.51	0.05
1350									7.31	0.72	5.20	0.32	4.31	0.20	3.30	0.10	2.61	0.06
1400									7.58	0.78	5.39	0.34	4.47	0.21	3.43	0.11	2.70	0.06
1450									7.86	0.83	5.59	0.36	4.63	0.23	3.55	0.12	2.80	0.07
1500									8.13	0.88	5.78	0.38	4.79	0.24	3.67	0.13	2.90	0.07
1550									8.40	0.94	5.97	0.41	4.95	0.26	3.79	0.14	2.99	0.08
1600									8.67	0.99	6.16	0.43	5.11	0.27	3.91	0.14	3.09	0.08
1650									8.94	1.05	6.36	0.46	5.27	0.29	4.04	0.15	3.19	0.09
1700									9.21	1.11	6.55	0.48	5.43	0.31	4.16	0.16	3.28	0.09
1750									9.48	1.17	6.74	0.51	5.59	0.32	4.28	0.17	3.38	0.10
1800									9.75	1.23	6.93	0.54	5.75	0.34	4.40	0.18	3.48	0.10
1900									10.29	1.36	7.32	0.59	6.07	0.38	4.65	0.20	3.67	0.11
2000											7.70	0.65	6.39	0.42	4.89	0.22	3.86	0.12
2100											8.09	0.72	6.71	0.45	5.14	0.24	4.06	0.13
2200											8.47	0.78	7.03	0.50	5.38	0.26	4.25	0.15
2300											8.86	0.85	7.35	0.54	5.63	0.28	4.44	0.16
2400													7.67	0.58	5.87	0.30	4.64	0.17
2500													7.99	0.63	6.12	0.33	4.83	0.18
2600													8.31	0.68	6.36	0.35	5.02	0.20
2700													8.63	0.72	6.61	0.38	5.22	0.21
2800													8.95	0.77	6.85	0.40	5.41	0.23
2900															7.09	0.43	5.60	0.24
3000															7.34	0.46	5.80	0.26
3300															8.07	0.55	6.38	0.31
3600															8.81	0.64	6.96	0.36
3900																	7.53	0.42
4000																	7.73	0.44

Shaded area represents velocities over 5 fps.
Use with caution.

See pg 148 for friction loss formulas

HDPE DR 13.5 128 PSI (IPS SIZE, OD CONTROLLED

Size: 3" thru 18" Flow: 1 thru 4000GPM

ANSI/ASAE S376.2 PE3408, ASTM D2239 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	3"		4"		6"		8"		10"		12"		14"		16"		18"	
Avg.ID	2.950		3.794		5.583		7.269		9.062		10.748		11.802		13.488		15.174	
Pipe OD	3.500		4.500		6.625		8.625		10.750		12.750		14.000		16.000		18.000	
Avg Wall	0.275		0.353		0.521		0.678		0.844		1.001		1.099		1.256		1.413	
Min Wall	0.259		0.333		0.491		0.639		0.796		0.944		1.037		1.185		1.333	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
50	2.34	0.31	1.42	0.09	0.65	0.01												
60	2.81	0.43	1.70	0.13	0.79	0.02												
70	3.28	0.58	1.98	0.17	0.92	0.03												
80	3.75	0.74	2.27	0.22	1.05	0.03												
90	4.22	0.92	2.55	0.27	1.18	0.04												
100	4.69	1.11	2.83	0.33	1.31	0.05	0.77	0.01										
120	5.63	1.56	3.40	0.46	1.57	0.07	0.93	0.02										
140	6.56	2.08	3.97	0.61	1.83	0.09	1.08	0.03										
160	7.50	2.66	4.54	0.78	2.09	0.12	1.24	0.03										
180	8.44	3.31	5.10	0.97	2.36	0.15	1.39	0.04										
200			5.67	1.18	2.62	0.18	1.54	0.05	0.99	0.02	0.71	0.01						
220			6.24	1.41	2.88	0.22	1.70	0.06	1.09	0.02	0.78	0.01						
240			6.80	1.66	3.14	0.25	1.85	0.07	1.19	0.02	0.85	0.01						
260			7.37	1.92	3.40	0.29	2.01	0.08	1.29	0.03	0.92	0.01						
280			7.94	2.20	3.67	0.34	2.16	0.09	1.39	0.03	0.99	0.01						
300					3.93	0.38	2.32	0.11	1.49	0.04	1.06	0.02						
320					4.19	0.43	2.47	0.12	1.59	0.04	1.13	0.02						
340					4.45	0.48	2.63	0.13	1.69	0.05	1.20	0.02	1.00	0.01				
360					4.71	0.54	2.78	0.15	1.79	0.05	1.27	0.02	1.05	0.01				
380					4.97	0.59	2.93	0.16	1.89	0.06	1.34	0.02	1.11	0.02				
400					5.24	0.65	3.09	0.18	1.99	0.06	1.41	0.03	1.17	0.02				
450					5.89	0.81	3.47	0.22	2.24	0.08	1.59	0.03	1.32	0.02				
500					6.54	0.98	3.86	0.27	2.48	0.09	1.77	0.04	1.46	0.03	1.12	0.01		
550					7.20	1.17	4.25	0.33	2.73	0.11	1.94	0.05	1.61	0.03	1.23	0.02		
600					7.85	1.38	4.63	0.38	2.98	0.13	2.12	0.06	1.76	0.04	1.35	0.02		
650					8.51	1.60	5.02	0.44	3.23	0.15	2.30	0.07	1.90	0.04	1.46	0.02		
700							5.41	0.51	3.48	0.17	2.47	0.08	2.05	0.05	1.57	0.03	1.24	0.01
750							5.79	0.58	3.73	0.20	2.65	0.09	2.20	0.05	1.68	0.03	1.33	0.02
800							6.18	0.65	3.97	0.22	2.83	0..10	2.34	0.06	1.79	0.03	1.42	0.02
850							6.56	0.73	4.22	0.25	3.00	0.11	2.49	0.07	1.91	0.04	1.51	0.02
900							6.95	0.81	4.47	0.28	3.18	0.12	2.64	0.08	2.02	0.04	1.59	0.02
950							7.34	0.90	4.72	0.31	3.36	0.13	2.78	0.08	2.13	0.04	1.68	0.02
1000							7.72	0.98	4.97	0.34	3.53	0.15	2.93	0.09	2.24	0.05	1.77	0.03
1050							8.11	1.08	5.22	0.37	3.71	0.16	3.08	0.10	2.35	0.05	1.86	0.03
1100									5.47	0.40	3.89	0.18	3.22	0.11	2.47	0.06	1.95	0.03
1150									5.71	0.44	4.06	0.19	3.37	0.12	2.58	0.06	2.04	0.04
1200									5.96	0.47	4.24	0.21	3.52	0.13	2.69	0.07	2.13	0.04
1250									6.21	0.51	4.41	0.22	3.66	0.14	2.80	0.07	2.21	0.04
1300									6.46	0.55	4.59	0.24	3.81	0.15	2.92	0.08	2.30	0.04
1350									6.71	0.59	4.77	0.26	3.95	0.16	3.03	0.08	2.39	0.05
1400									6.96	0.63	4.94	0.27	4.10	0.17	3.14	0.09	2.48	0.05
1450									7.20	0.67	5.12	0.29	4.25	0.19	3.25	0.10	2.57	0.05
1500									7.45	0.71	5.30	0.31	4.39	0.20	3.36	0.10	2.66	0.06
1550									7.70	0.76	5.47	0.33	4.54	0.21	3.48	0.11	2.75	0.06
1600									7.95	0.80	5.65	0.35	4.69	0.22	3.59	0.12	2.84	0.07
1650									8.20	0.85	5.83	0.37	4.83	0.24	3.70	0.12	2.92	0.07
1700											6.00	0.39	4.98	0.25	3.81	0.13	3.01	0.07
1750											6.18	0.41	5.13	0.26	3.92	0.14	3.10	0.08
1800											6.36	0.44	5.27	0.28	4.04	0.14	3.19	0.08
1900											6.71	0.48	5.57	0.31	4.26	0.16	3.37	0.09
2000											7.06	0.53	5.86	0.34	4.49	0.18	3.54	0.10
2100											7.42	0.58	6.15	0.37	4.71	0.19	3.72	0.11
2200											7.77	0.63	6.44	0.40	4.93	0.21	3.90	0.12
2300											8.12	0.69	6.74	0.44	5.16	0.23	4.08	0.13
2400													7.03	0.47	5.38	0.25	4.25	0.14
2500													7.32	0.51	5.61	0.27	4.43	0.15
2600													7.62	0.55	5.83	0.29	4.61	0.16
2700													7.91	0.59	6.06	0.31	4.78	0.17
2800													8.20	0.63	6.28	0.33	4.96	0.18
2900															6.50	0.35	5.14	0.20
3000															6.73	0.37	5.32	0.21
3300															7.40	0.44	5.85	0.25
3600															8.07	0.52	6.38	0.29
3900																	6.91	0.34
4000																	7.09	0.36

Shaded area represents velocities over 5 fps. Use with caution.

See pg 148 for friction loss formulas

C900 DR 18 CLASS 150 (C.I.O.D.)

Size: 4" thru 12" Flow: 25 thru 8500GPM

AWWA C900 ASTM D1784 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	4"		6"		8"		10"		12"	
Avg.ID	4.234		6.088		7.984		9.792		11.646	
Pipe OD	4.800		6.900		9.050		11.100		13.200	
Avg Wall	0.283		0.406		0.533		0.654		0.777	
Min Wall	0.267		0.383		0.503		0.617		0.733	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
25	0.57	0.01	0.28	0.00	0.16	0.00	0.11	0.00	0.08	0.00
50	1.14	0.05	0.55	0.01	0.32	0.00	0.21	0.00	0.15	0.00
75	1.71	0.11	0.83	0.02	0.48	0.01	0.32	0.00	0.23	0.00
100	2.28	0.19	1.10	0.03	0.64	0.01	0.43	0.00	0.30	0.00
125	2.84	0.29	1.38	0.05	0.80	0.01	0.53	0.00	0.38	0.00
150	3.41	0.41	1.65	0.07	0.96	0.02	0.64	0.01	0.45	0.00
175	3.98	0.54	1.93	0.09	1.12	0.02	0.74	0.01	0.53	0.00
200	4.55	0.69	2.20	0.12	1.28	0.03	0.85	0.01	0.60	0.01
225	5.12	0.86	2.48	0.15	1.44	0.04	0.96	0.01	0.68	0.01
250	5.69	1.05	2.75	0.18	1.60	0.05	1.06	0.02	0.75	0.01
275	6.26	1.25	3.03	0.21	1.76	0.06	1.17	0.02	0.83	0.01
300	6.83	1.47	3.30	0.25	1.92	0.07	1.28	0.02	0.90	0.01
325	7.40	1.70	3.58	0.29	2.08	0.08	1.38	0.03	0.98	0.01
350	7.97	1.95	3.85	0.33	2.24	0.09	1.49	0.03	1.05	0.01
375	8.53	2.22	4.13	0.38	2.40	0.10	1.60	0.04	1.13	0.02
400	9.10	2.50	4.40	0.43	2.56	0.11	1.70	0.04	1.20	0.02
450			4.95	0.53	2.88	0.14	1.91	0.05	1.35	0.02
500			5.50	0.65	3.20	0.17	2.13	0.06	1.50	0.03
550			6.05	0.77	3.52	0.21	2.34	0.08	1.65	0.03
600			6.60	0.91	3.84	0.24	2.55	0.09	1.80	0.04
700			7.71	1.20	4.48	0.32	2.98	0.12	2.11	0.05
800			8.81	1.54	5.12	0.41	3.40	0.15	2.41	0.07
900			9.91	1.92	5.76	0.51	3.83	0.19	2.71	0.08
1000					6.40	0.62	4.26	0.23	3.01	0.10
1100					7.04	0.74	4.68	0.28	3.31	0.12
1200					7.68	0.87	5.11	0.32	3.61	0.14
1300					8.32	1.01	5.53	0.38	3.91	0.16
1400					8.96	1.16	5.96	0.43	4.21	0.19
1500					9.60	1.32	6.38	0.49	4.51	0.21
1600					10.24	1.49	6.81	0.55	4.81	0.24
1700							7.23	0.62	5.11	0.27
1800							7.66	0.69	5.41	0.29
1900							8.08	0.76	5.72	0.33
2000							8.51	0.83	6.02	0.36
2100							8.94	0.91	6.32	0.39
2200							9.36	0.99	6.62	0.43
2300									6.92	0.46
2400									7.22	0.50
2500									7.52	0.54
2600									7.82	0.58
2700									8.12	0.63
2800										
2900										
3000										
3100										
3200										
3300										
3400										
3500										
3600										
3800			Shaded area represents velocities over 5 fps. Use with caution.							
3900										
4000										
4200										
4400										
4600										
4800										
5000										
5500										
6000										
6500										
7000										
7500										
8000										
8500										

See pg 148 for friction loss formulas

C900 DR 25 CLASS 100 (C.I.O.D.)

Size: 4" thru 12" Flow: 25 thru 8500GPM

AWWA C900 ASTM D1784 C=150 PSI LOSS PER 100 FEET OF PIPE (PSI/100 FT)

size	4"		6"		8"		10"		12"	
Avg.ID	4.392		6.314		8.282		10.158		12.080	
Pipe OD	4.800		6.900		9.050		11.100		13.200	
Avg Wall	0.204		0.293		0.384		0.471		0.560	
Min Wall	0.192		0.276		0.362		0.444		0.528	
Flow GPM	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss	Velocity FPS	PSI Loss
25	0.53	0.01	0.26	0.00	0.15	0.00	0.10	0.00	0.07	0.00
50	1.06	0.04	0.51	0.01	0.30	0.00	0.20	0.00	0.14	0.00
75	1.59	0.09	0.77	0.02	0.45	0.00	0.30	0.00	0.21	0.00
100	2.12	0.16	1.02	0.03	0.59	0.01	0.40	0.00	0.28	0.00
125	2.64	0.24	1.28	0.04	0.74	0.01	0.49	0.00	0.35	0.00
150	3.17	0.34	1.54	0.06	0.89	0.02	0.59	0.01	0.42	0.00
175	3.70	0.45	1.79	0.08	1.04	0.02	0.69	0.01	0.49	0.00
200	4.23	0.58	2.05	0.10	1.19	0.03	0.79	0.01	0.56	0.00
225	4.76	0.72	2.30	0.12	1.34	0.03	0.89	0.01	0.63	0.01
250	5.29	0.88	2.56	0.15	1.49	0.04	0.99	0.01	0.70	0.01
275	5.82	1.05	2.81	0.18	1.64	0.05	1.09	0.02	0.77	0.01
300	6.35	1.23	3.07	0.21	1.78	0.06	1.19	0.02	0.84	0.01
325	6.87	1.43	3.33	0.24	1.93	0.07	1.29	0.02	0.91	0.01
350	7.40	1.63	3.58	0.28	2.08	0.07	1.38	0.03	0.98	0.01
375			3.84	0.32	2.23	0.08	1.48	0.03	1.05	0.01
400			4.09	0.36	2.38	0.10	1.58	0.04	1.12	0.02
450			4.61	0.45	2.68	0.12	1.78	0.04	1.26	0.02
500			5.12	0.54	2.97	0.14	1.98	0.05	1.40	0.02
550			5.63	0.65	3.27	0.17	2.17	0.06	1.54	0.03
600			6.14	0.76	3.57	0.20	2.37	0.08	1.68	0.03
700			7.16	1.01	4.16	0.27	2.77	0.10	1.96	0.04
800			8.19	1.29	4.76	0.35	3.16	0.13	2.24	0.05
900			9.21	1.61	5.35	0.43	3.56	0.16	2.52	0.07
1000			10.23	1.95	5.95	0.52	3.95	0.19	2.80	0.08
1100					6.54	0.62	4.35	0.23	3.08	0.10
1200					7.14	0.73	4.74	0.27	3.36	0.12
1300					7.73	0.85	5.14	0.31	3.63	0.14
1400					8.33	0.97	5.54	0.36	3.91	0.16
1500					8.92	1.11	5.93	0.41	4.19	0.18
1600					9.52	1.25	6.33	0.46	4.47	0.20
1700							6.72	0.52	4.75	0.22
1800							7.12	0.57	5.03	0.25
1900							7.51	0.63	5.31	0.27
2000							7.91	0.70	5.59	0.30
2100							8.30	0.76	5.87	0.33
2200							8.70	0.83	6.15	0.36
2300									6.43	0.39
2400									6.71	0.42
2500									6.99	0.45
2600									7.27	0.49
2700									7.55	0.52
2800									7.83	0.56
2900									8.11	0.60
3000									8.39	0.64
3100									8.67	0.68
3200		Shaded area represents velocities over 5 fps. Use with caution.								
3300										
3400										
3500										
3600										
3800										
3900										
4000										
4200										
4400										
4600										
4800										
5000										
5500										
6000										
6500										
7000										
7500										
8000										
8500										

See pg 148 for friction loss formulas

Drip Equations

Number of Emitters per Plant

$$\text{Emitters per tree} = \frac{\text{canopy area (sq. ft.)} \times 0.75}{\text{wetted area per emitter (sq. ft.)}}$$

	Wetted Area	
Soil Type	Diameter (ft.)	Area (sq. ft.)
Sand	2 – 3	3 – 7
Sandy Loam	3 – 4.5	7 – 16
Loam	3 – 5	7 – 20
Clay-Loam	4 – 6	13 – 28
Clay	5 – 7	20 – 38

Flow per zone

$$\text{Flow per zone (gpm)} = \frac{\text{Total number of drippers} \times \text{dripper flow rate (gph)}}{60 \text{ (minutes)}}$$

Precipitation Rate for Evenly Spaced Laterals and Emitters

Precipitation Rate for Drip Laterals (inches/hour)							
Emitter Flow	Emitter Spacing	Spacing Between Drip Laterals					
		6 in.	12 in.	18 in.	24 in.	30 in.	36 in.
0.53 gph	12 in.	1.62	0.81	0.54	0.40	0.32	0.27
0.53 gph	18 in.	1.08	0.54	0.36	0.27	0.22	0.18
0.53 gph	24 in.	0.81	0.40	0.27	0.20	0.16	0.13
1.02 gph	12 in.	3.11	1.56	1.04	0.78	0.62	0.52
1.02 gph	18 in.	2.07	1.04	0.69	0.52	0.41	0.35
1.02 gph	24 in.	1.56	0.78	0.52	0.39	0.31	0.26

Precipitation Rate Formula:

$$\text{Precipitation Rate (in./hr.)} = \frac{231.1 \times \text{Emitter Flow (gph)}}{\text{Lateral Spacing (in.)} \times \text{Emitter Spacing (in.)}}$$

Note: This formula applies to evenly spaced drip irrigation laterals and emitters

Precipitation Rate for a Single Lateral

Precipitation Rate (in/hr) of a Single Row of Dripline In a Contained Landscape						
Emitter Flow	Emitter Spacing	Width of Contained Landscape				
		1 ft.	2 ft.	3 ft.	4 ft.	5 ft.
0.53 gph	12 in.	0.81	0.40	0.27	0.20	0.16
0.53 gph	18 in.	0.54	0.27	0.18	0.13	0.11
0.53 gph	24 in.	0.40	0.20	0.13	0.10	0.08
1.02 gph	12 in.	1.56	0.78	0.52	0.39	0.31
1.02 gph	18 in.	1.04	0.52	0.35	0.26	0.21
1.02 gph	24 in.	0.78	0.39	0.26	0.19	0.16

Precipitation Rate Formula:

$$\text{Precipitation Rate (in./hr.)} = \frac{231.1 \times \text{Emitter Flow (gph)}}{\text{Width of Contained Area (in.)} \times \text{Emitter Spacing (in.)}}$$

Thermal Effects on Drop Hose and Dripline

For recurring, ambient temperatures above 73°F (23°C), multiply PSI rating of selected tubing by the appropriate FACTOR from the table below. Result will be the temp-corrected maximum PSI rating for the tubing selected. For temperatures not shown, but between 73°F & 140°F (23°C & 60°C), interpolate to obtain the temp-corrected maximum PSI. Use this information to select the appropriate pressure regulator to assure tubing life expectancy and warranty coverage.

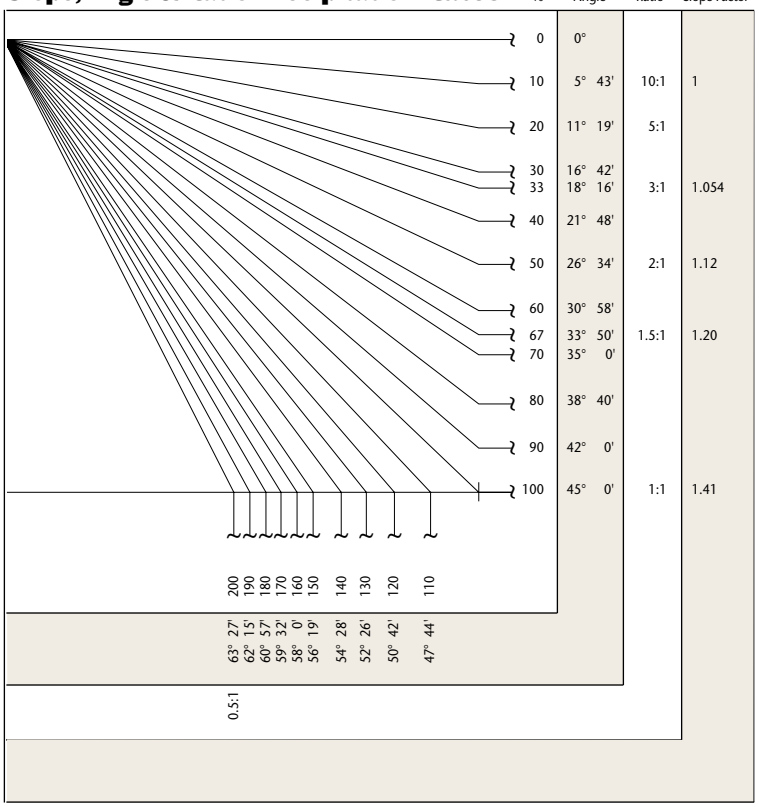
°F	°C	FACTOR
73°	23°	1.00
80°	27°	0.92
90°	32°	0.81
100°	38°	0.70
110°	43°	0.60
120°	49°	0.45
130°	54°	0.32
140°	60°	0.18

Pressure Loss Through Water Meters
Precipitation Rate Reference Charts

Pressure Loss—psi

FLOW GPM	NOMINAL SIZE						
	⅝"	¾"	1"	1½"	2"	3"	4"
1	0.2	0.1					
2	0.3	0.2					
3	0.4	0.3					
4	0.6	0.5	0.1				
5	0.9	0.6	0.2				
6	1.3	0.7	0.3				
7	1.8	0.8	0.4				
8	2.3	1.0	0.5				
9	3.0	1.3	0.6				
10	3.7	1.6	0.7				
11	4.4	1.9	0.8				
12	5.1	2.2	0.9				
13	6.1	2.6	1.0				
14	7.2	3.1	1.1				
15	8.3	3.6	1.2				
16	9.4	4.1	1.4	0.4			
17	10.7	4.6	1.6	0.5			
18	12.0	5.2	1.8	0.6			
19	13.4	5.8	2.0	0.7			
20	15.0	6.5	2.2	0.8			
22		7.9	2.8	1.0			
24		9.5	3.4	1.2			
26		11.2	4.0	1.4			
28		13.0	4.6	1.6			
30		15.0	5.3	1.8	0.7		
32			6.0	2.1	0.8		
34			6.9	2.4	0.9		
36			7.8	2.7	1.0		
38			8.7	3.0	1.2		
40			9.6	3.3	1.3		
42			10.6	3.6	1.4		
44			11.7	3.9	1.5		
46			12.8	4.2	1.6		
48			13.9	4.5	1.7		
50			15.0	4.9	1.9	0.7	
52				5.3	2.1		
54				5.7	2.2		
56				6.2	2.3		
58				6.7	2.5		
60				7.2	2.7	1.0	
65				8.3	3.2	1.1	
70				9.8	3.7	1.3	
75				11.3	4.3	1.5	
80				12.8	4.9	1.6	0.7
90				16.1	6.2	2.0	0.8
100				20.0	7.8	2.5	0.9
110					9.5	2.9	1.0
120					11.3	3.4	1.2
130					13.0	3.9	1.4
140					15.1	4.5	1.6
150					17.3	5.1	1.8
160					20.0	5.8	2.1
170						6.5	2.4
180						7.2	2.7
190						8.0	3.0
200						9.0	3.2
220						11.0	3.9
240						13.0	4.7
260						15.0	5.5
280						17.3	6.3
300						20.0	7.2
350							10.0
400							13.0
450							16.2
500							20.0

Slope, Angle & Ratio Precipitation Rates



Maximum Precipitation Rates

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

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

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

Data Needed

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

Steps

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

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

where R = allowable wire resistance per 1000 feet.

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

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

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

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

From Chart #2 we find that #14 AWG wire has slightly too much resistance. Therefore, choose #12 AWG copper wire. The accompanying charts are useful for quick and easy selection of wire sizes for valves with standard and optional solenoids. Chart #3 is set up to provide maximum wire runs given a standard 24 V ac valve with a minimum operating voltage of 20 volts and a controller output of 24 V ac Chart #4 is a multiplier factor for determining maximum wire runs for other controller output voltages and optional solenoids.

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

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

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

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

Chart 1
Minimum Solenoid Operating Voltage Under Various Line Pressure

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

Chart 2
Copper Wire Resistance of Various Sizes

Sizes AWG	Resistance at 20°C Ohms per 1000 ft.
4	.25
6	.40
8	.64
10	1.02
12	1.62
14	2.57
16	4.10
18	6.51

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

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

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

Multiplier Factor for Various Controller Output Voltages and Optional Low-voltage Solenoids

Chart 4

Controller Output Voltage	24-Volt Solenoids		
	24 V ac	24 V ac-D	24 VDC
28	2.00	5.77	5.45
27	1.75	5.05	4.77
26	1.50	4.33	4.09
25	1.25	3.61	3.41
24	1.00	2.88	2.73
23	.75	2.16	2.05
22	.50	1.44	1.36

Chart 5

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

Sprays Metric Data

MPR Plus Spray Nozzles—Metric

5′ Series with 0° Trajectory—Red

Pattern	Desc.	Pressure			Flow LPM	Radius m
		Bar	kPa	Kg/cm²		
1/4	5-Q	1,5	150	1,53	0,22	1,3
		2,0	200	2,04	0,33	1,5
		2,5	250	2,55	0,41	1,6
		3,0	300	3,06	0,49	1,7
		3,5	350	3,57	0,58	1,8
	5-Q-PC	2,07-2,76	207-276	2,11-2,82	0,34	1,5
		2,76-5,18	276-518	2,82-5,28	0,38	1,5
1/3	5-T	1,5	150	1,53	0,30	1,3
		2,0	200	2,04	0,44	1,5
		2,5	250	2,55	0,55	1,6
		3,0	300	3,06	0,66	1,7
		3,5	350	3,57	0,77	1,8
	5-T-PC	2,07-2,76	207-276	2,11-2,82	0,45	1,5
		2,76-5,18	276-518	2,82-5,28	0,49	1,5
1/2	5-H	1,5	150	1,53	0,44	1,3
		2,0	200	2,04	0,69	1,5
		2,5	250	2,55	0,81	1,6
		3,0	300	3,06	0,92	1,7
		3,5	350	3,57	1,03	1,8
	5-H-PC	2,07-2,76	207-276	2,11-2,82	0,68	1,5
		2,76-5,18	276-518	2,82-5,28	0,76	1,5
2/3	5-TT	1,5	150	1,53	0,63	1,3
		2,0	200	2,04	0,91	1,5
		2,5	250	2,55	1,06	1,6
		3,0	300	3,06	1,20	1,7
		3,5	350	3,57	1,34	1,8
	5-TT-PC	2,07-2,76	207-276	2,11-2,82	0,87	1,5
		2,76-5,18	276-518	2,82-5,28	1,02	1,5
3/4	5-TQ	1,5	150	1,53	0,82	1,3
		2,0	200	2,04	1,06	1,5
		2,5	250	2,55	1,22	1,6
		3,0	300	3,06	1,37	1,7
		3,5	350	3,57	1,53	1,8
	5-TQ-PC	2,07-2,76	207-276	2,11-2,82	0,98	1,5
		2,76-5,18	276-518	2,82-5,28	1,10	1,5
Full	5-F	1,5	150	1,53	1,03	1,3
		2,0	200	2,04	1,39	1,5
		2,5	250	2,55	1,60	1,6
		3,0	300	3,06	1,81	1,7
		3,5	350	3,57	2,03	1,8
	5-F-PC	2,07-2,76	207-276	2,11-2,82	1,33	1,5
		2,76-5,18	276-518	2,82-5,28	1,48	1,5

8′ Series with 5° Trajectory —Green

Pattern	Desc.	Pressure			Flow LPM	Radius m
		Bar	kPa	Kg/cm²		
1/4	8-Q	1,5	150	1,53	0,69	2,2
		2,0	200	2,04	0,88	2,4
		2,5	250	2,55	0,96	2,5
		3,0	300	3,06	1,02	2,6
		3,5	350	3,57	1,11	2,8
	8-Q-PC	2,07-2,76	207-276	2,11-2,82	0,83	2,4
		2,76-5,18	276-518	2,82-5,28	0,95	2,4
1/3	8-T	1,5	150	1,53	0,92	2,2
		2,0	200	2,04	1,11	2,4
		2,5	250	2,55	1,28	2,5
		3,0	300	3,06	1,42	2,6
		3,5	350	3,57	1,53	2,8
	8-T-PC	2,07-2,76	207-276	2,11-2,82	1,10	2,4
		2,76-5,18	276-518	2,82-5,28	1,33	2,4
1/2	8-H	1,5	150	1,53	1,49	2,3
		2,0	200	2,04	1,84	2,4
		2,5	250	2,55	2,08	2,5
		3,0	300	3,06	2,29	2,6
		3,5	350	3,57	2,48	2,8
	8-H-PC	2,07-2,76	207-276	2,11-2,82	1,67	2,4
		2,76-5,18	276-518	2,82-5,28	1,89	2,4
2/3	8-TT	1,5	150	1,53	2,21	2,2
		2,0	200	2,04	2,60	2,4
		2,5	250	2,55	2,89	2,5
		3,0	300	3,06	3,13	2,6
		3,5	350	3,57	3,35	2,8
	8-TT-PC	2,07-2,76	207-276	2,11-2,82	2,23	2,4
		2,76-5,18	276-518	2,82-5,28	2,65	2,4
3/4	8-TQ	1,5	150	1,53	2,47	2,2
		2,0	200	2,04	2,83	2,4
		2,5	250	2,55	3,11	2,5
		3,0	300	3,06	3,35	2,6
		3,5	350	3,57	3,54	2,8
	8-TQ-PC	2,07-2,76	207-276	2,11-2,82	2,42	2,4
		2,76-5,18	276-518	2,82-5,28	2,65	2,4
Full	8-F	1,5	150	1,53	2,97	2,2
		2,0	200	2,04	3,69	2,4
		2,5	250	2,55	4,16	2,5
		3,0	300	3,06	4,58	2,6
		3,5	350	3,57	4,96	2,8
	8-F-PC	2,07-2,76	207-276	2,11-2,82	3,22	2,4
		2,76-5,18	276-518	2,82-5,28	3,79	2,4

10′ Series with 12° Trajectory—Blu

Pattern	Desc.	Pressure			Flow LPM	Radius m
		Bar	kPa	Kg/cm²		
1/4	10-Q	1,5	150	1,53	1,20	2,8
		2,0	200	2,04	1,48	3,0
		2,5	250	2,55	1,75	3,2
		3,0	300	3,06	2,03	3,5
		3,5	350	3,57	2,30	3,7
	10-Q-PC	2,07-2,76	207-276	2,11-2,82	1,25	3,0
		2,76-5,18	276-518	2,82-5,28	1,40	3,0
1/3	10-T	1,5	150	1,53	1,66	2,8
		2,0	200	2,04	1,93	3,0
		2,5	250	2,55	2,28	3,2
		3,0	300	3,06	2,59	3,5
		3,5	350	3,57	2,87	3,7
	10-T-PC	2,07-2,76	207-276	2,11-2,82	1,67	3,0
		2,76-5,18	276-518	2,82-5,28	1,89	3,0
1/2	10-H	1,5	150	1,53	2,34	2,8
		2,0	200	2,04	2,65	3,0
		2,5	250	2,55	3,02	3,2
		3,0	300	3,06	3,40	3,4
		3,5	350	3,57	3,79	3,5
	10-H-PC	2,07-2,76	207-276	2,11-2,82	2,50	3,0
		2,76-5,18	276-518	2,82-5,28	2,84	3,0
2/3	10-TT	1,5	150	1,53	2,86	2,8
		2,0	200	2,04	3,57	3,0
		2,5	250	2,55	3,98	3,1
		3,0	300	3,06	4,28	3,3
		3,5	350	3,57	4,53	3,4
	10-TT-PC	2,07-2,76	207-276	2,11-2,82	3,40	3,0
		2,76-5,18	276-518	2,82-5,28	3,79	3,0
3/4	10-TQ	1,5	150	1,53	3,25	2,8
		2,0	200	2,04	3,85	3,0
		2,5	250	2,55	4,32	3,1
		3,0	300	3,06	4,74	3,3
		3,5	350	3,57	5,15	3,4
	10-TQ-PC	2,07-2,76	207-276	2,11-2,82	3,75	3,0
		2,76-5,18	276-518	2,82-5,28	4,13	3,0
Full	10-F	1,5	150	1,53	4,45	2,7
		2,0	200	2,04	5,50	3,0
		2,5	250	2,55	5,92	3,1
		3,0	300	3,06	6,41	3,3
		3,5	350	3,57	7,07	3,4
	10-FQ-PC	2,07-2,76	207-276	2,11-2,82	5,04	3,0
		2,76-5,18	276-518	2,82-5,28	5,72	3,0

12′ Series with 23° Trajectory —Brown

Pattern	Desc.	Pressure			Flow LPM	Radius m
		Bar	kPa	Kg/cm²		
1/4	12-Q	1,5	150	1,53	1,58	3,4
		2,0	200	2,04	1,85	3,6
		2,5	250	2,55	2,13	3,8
		3,0	300	3,06	2,31	4,0
		3,5	350	3,57	2,39	4,0
	12-Q-PC	2,07-2,76	207-276	2,11-2,82	1,82	3,7
		2,76-5,18	276-518	2,82-5,28	2,01	3,7
1/3	12-T	1,5	150	1,53	2,26	3,4
		2,0	200	2,04	2,67	3,6
		2,5	250	2,55	3,08	3,8
		3,0	300	3,06	3,43	3,9
		3,5	350	3,57	3,70	4,0
	12-T-PC	2,07-2,76	207-276	2,11-2,82	2,42	3,7
		2,76-5,18	276-518	2,82-5,28	2,65	3,7
1/2	12-H	1,5	150	1,53	3,69	3,4
		2,0	200	2,04	4,07	3,6
		2,5	250	2,55	4,62	3,8
		3,0	300	3,06	5,25	4,1
		3,5	350	3,57	5,94	4,3
	12-H-PC	2,07-2,76	207-276	2,11-2,82	3,63	3,7
		2,76-5,18	276-518	2,82-5,28	4,00	3,7
2/3	12-TT	1,5	150	1,53	4,46	3,4
		2,0	200	2,04	5,36	3,6
		2,5	250	2,55	5,91	3,8
		3,0	300	3,06	6,40	3,9
		3,5	350	3,57	6,86	4,0
	12-TT-PC	2,07-2,76	207-276	2,11-2,82	4,85	3,7
		2,76-5,18	276-518	2,82-5,28	5,30	3,7
3/4	12-TQ	1,5	150	1,53	4,31	3,3
		2,0	200	2,04	5,68	3,6
		2,5	250	2,55	6,10	3,8
		3,0	300	3,06	6,44	3,9
		3,5	350	3,57	6,86	4,0
	12-TQ-PC	2,07-2,76	207-276	2,11-2,82	5,45	3,7
		2,76-5,18	276-518	2,82-5,28	6,06	3,7
Full	12-F	1,5	150	1,53	6,67	3,4
		2,0	200	2,04	8,09	3,6
		2,5	250	2,55	8,67	3,8
		3,0	300	3,06	9,36	3,9
		3,5	350	3,57	10,32	4,0
	12-F-PC	2,07-2,76	207-276	2,11-2,82	7,27	3,7
		2,76-5,18	276-518	2,82-5,28	7,95	3,7

15′ Series with 27° Trajectory—Black

Pattern	Desc.	Pressure			Flow LPM	Radius m
		Bar	kPa	Kg/cm²		
1/4	15-Q	1,5	150	1,53	2,69	4,3
		2,0	200	2,04	3,15	4,5
		2,5	250	2,55	3,67	4,8
		3,0	300	3,06	4,19	4,9
		3,5	350	3,57	4,71	4,9
	15-Q-PC	2,07-2,76	207-276	2,11-2,82	2,84	4,6
		2,76-5,18	276-518	2,82-5,28	3,07	4,6
1/3	15-T	1,5	150	1,53	3,70	4,2
		2,0	200	2,04	4,11	4,5
		2,5	250	2,55	4,64	4,7
		3,0	300	3,06	5,12	4,7
		3,5	350	3,57	5,53	4,7
	15-T-PC	2,07-2,76	207-276	2,11-2,82	3,79	4,6
		2,76-5,18	276-518	2,82-5,28	4,16	4,6
1/2	15-H	1,5	150	1,53	5,37	4,1
		2,0	200	2,04	6,14	4,5
		2,5	250	2,55	7,12	4,8
		3,0	300	3,06	7,81	4,9
		3,5	350	3,57	8,13	4,9
	15-H-PC	2,07-2,76	207-276	2,11-2,82	5,68	4,6
		2,76-5,18	276-518	2,82-5,28	6,25	4,6
2/3	15-TT	1,5	150	1,53	7,02	4,3
		2,0	200	2,04	8,17	4,5
		2,5	250	2,55	9,42	4,8
		3,0	300	3,06	10,31	4,9
		3,5	350	3,57	10,80	4,9
	15-TT-PC	2,07-2,76	207-276	2,11-2,82	7,57	4,6
		2,76-5,18	276-518	2,82-5,28	8,33	4,6
3/4	15-TQ	1,5	150	1,53	8,28	4,1
		2,0	200	2,04	9,65	4,5
		2,5	250	2,55	10,79	4,7
		3,0	300	3,06	11,89	4,8
		3,5	350	3,57	12,98	4,9
	15-TQ-PC	2,07-2,76	207-276	2,11-2,82	8,71	4,6
		2,76-5,18	276-518	2,82-5,28	9,47	4,6
Full	15-F	1,5	150	1,53	11,29	4,1
		2,0	200	2,04	13,34	4,5
		2,5	250	2,55	15,05	4,8
		3,0	300	3,06	16,40	4,9
		3,5	350	3,57	17,45	4,9
	15-F-PC	2,07-2,76	207-276	2,11-2,82	11,36	4,6
		2,76-5,18	276-518	2,82-5,28	12,49	4,6

Special Patterns—Orange

Nozzle Pattern	Pressure			Flow LPM	Special Patterns W x L (m)
	Bar	kPa	Kg/cm²		
4-EST	1,5	150	1,53	1,48	1,0 x 3,8
	2,0	200	2,04	1,68	1,2 x 4,5
	2,5	250	2,55	1,89	1,4 x 5,1
	3,0	300	3,06	2,10	1,6 x 5,7
	3,5	350	3,57	2,29	1,9 x 6,1
4-EST-PC	2,07-2,76	207-276	2,11-2,82	1,63	1,2 x 4,4
	2,76-5,18	276-518	2,82-5,28	1,89	1,2 x 4,4
4-CST	1,5	150	1,53	2,94	1,0 x 7,6
	2,0	200	2,04	3,35	1,2 x 9,0
	2,5	250	2,55	3,74	1,2 x 9,1
	3,0	300	3,06	4,10	1,2 x 9,3
	3,5	350	3,57	4,43	1,2 x 9,5
4-CST-PC	2,07-2,76	207-276	2,11-2,82	3,26	1,2 x 9,1
	2,76-5,18	276-518	2,82-5,28	3,79	1,2 x 9,1
9-SST	1,5	150	1,53	3,92	2,7 x 5,5
	2,0	200	2,04	4,47	2,7 x 5,5
	2,5	250	2,55	4,97	2,7 x 5,9
	3,0	300	3,06	5,45	2,8 x 6,3
	3,5	350	3,57	5,92	3,1 x 6,8
9-SST-PC	2,07-2,76	207-276	2,11-2,82	4,16	2,7 x 5,5
	2,76-5,18	276-518	2,82-5,28	4,54	2,7 x 5,5
4-SST	1,5	150	1,53	2,63	1,2 x 7,6
	2,0	200	2,04	3,31	1,2 x 9,0
	2,5	250	2,55	3,74	1,2 x 9,5
	3,0	300	3,06	4,10	1,3 x 9,9
	3,5	350	3,57	4,43	1,5 x 10,1
4-SST-PC	2,07-2,76	207-276	2,11-2,82	3,33	1,2 x 9,1
	2,76-5,18	276-518	2,82-5,28	3,79	1,2 x 9,1
2-SST	1,5	150	1,53	0,31	0,6 x 1,6
	2,0	200	2,04	0,34	0,6 x 1,8
	2,5	250	2,55	0,36	0,6 x 2,0
	3,0	300	3,06	0,41	0,7 x 2,1
	3,5	350	3,57	0,46	0,9 x 2,1
2-SST-PC	2,07-2,76	207-276	2,11-2,82	0,34	0,6 x 1,8
	2,76-5,18	276-518	2,82-5,28	0,38	0,6 x 1,8
4S-SST	1,5	150	1,53	1,80	1,2 x 5,2
	2,0	200	2,04	2,05	1,2 x 5,5
	2,5	250	2,55	2,27	1,2 x 5,7
	3,0	300	3,06	2,49	1,3 x 5,8
	3,5	350	3,57	2,71	1,5 x 5,8
4S-SST-PC	2,07-2,76	207-276	2,11-2,82	1,89	1,2 x 5,5
	2,76-5,18	276-518	2,82-5,28	2,23	1,2 x 5,5

Radius shown in meters. ▭ *= nozzles with PCDs. All performance specifications are based on the stated working pressure available at the base of the sprinkler.*

TVAN Variable Arc Nozzles Performance Data — Metric

		8 Series-Green				10 Series-Blue				12 Series-Brown				15′ Series-Black				17′ Series-Gray			
				Precip. Rate				Precip. Rate				Precip. Rate				Precip. Rate				Precip. Rate	
Pattern	Bar	LPM	Rad. (m)	▲	■	LPM	Rad (m)	▲	■	LPM	Rad (m)	▲	■	LPM	Rad (m)	▲	■	LPM	Rad (m)	▲	■
90°	1,50	1,30	2,20	74,44	64,46	1,80	2,80	63,63	55,10	3,00	3,40	71,92	62,28	3,90	4,60	51,08	44,23	4,60	4,90	53,10	45,98
	2,00	1,40	2,40	67,36	58,33	1,90	3,00	58,51	50,67	3,10	3,60	66,29	57,41	4,20	4,60	55,01	47,64	5,10	5,20	52,27	45,27
	2,50	1,60	2,60	65,59	56,80	2,30	3,00	70,82	61,33	3,80	3,80	72,93	63,16	4,90	4,80	58,94	51,04	5,80	5,40	55,12	47,74
	3,00	1,80	2,70	68,43	59,26	2,60	3,00	73,90	64,00	4,50	4,10	74,19	64,25	5,60	4,90	64,64	55,98	6,50	5,50	59,55	51,57
	3,50	1,90	2,70	72,23	62,55	2,80	3,00	86,22	74,67	4,80	4,30	71,94	62,30	6,10	4,90	70,41	60,97	7,00	5,50	64,13	55,54
180°	1,50	2,10	2,20	60,12	52,07	3,20	2,50	70,95	61,44	5,20	3,40	62,33	53,98	6,50	4,10	53,58	46,40	7,40	4,40	52,97	45,87
	2,00	2,40	2,40	57,74	50,00	3,60	2,70	64,63	55,97	5,70	3,60	60,94	52,78	7,10	4,50	48,58	42,07	8,00	5,10	42,62	36,91
	2,50	2,60	2,40	62,55	54,17	3,90	2,90	64,26	55,65	6,40	4,00	55,43	48,00	8,00	4,60	52,39	45,37	10,70	5,30	52,78	45,71
	3,00	2,80	2,50	62,08	53,76	4,30	3,00	66,20	57,33	7,10	4,30	53,21	46,08	8,80	4,60	57,63	49,91	10,70	5,30	52,78	45,71
	3,50	2,90	2,80	51,26	44,39	4,70	3,00	72,36	62,67	7,70	4,30	57,71	49,97	9,40	4,60	61,56	53,31	11,60	5,50	53,14	46,02
270°	1,50	3,20	2,20	61,08	52,88	4,50	2,50	66,51	57,59	7,40	3,20	66,76	57,80	8,60	3,80	55,02	47,63	9,90	4,20	51,85	44,89
	2,00	3,50	2,40	56,13	48,60	4,90	2,70	62,09	53,76	8,10	3,90	49,20	42,59	9,90	4,50	45,16	39,10	10,80	5,10	38,36	33,21
	2,50	3,80	2,40	60,95	52,76	5,60	2,90	61,51	53,26	9,40	4,20	49,23	42,62	10,90	4,60	47,59	41,20	12,70	5,20	43,39	37,56
	3,00	4,20	2,50	62,08	53,75	6,20	3,00	63,64	55,10	10,40	4,30	51,96	44,99	11,90	4,70	49,77	43,09	14,20	5,30	46,70	40,43
	3,50	4,60	2,80	54,20	46,93	6,70	3,00	68,77	59,54	10,90	4,30	54,46	47,15	12,90	4,90	49,63	42,97	15,40	5,50	47,03	40,72
360°	1,50	4,20	2,20	60,12	52,07	6,20	2,50	68,73	59,52	8,60	3,00	66,21	57,33	9,90	3,80	47,50	41,14	11,00	5,20	28,19	24,41
	2,00	4,80	2,40	57,74	50,00	6,90	2,70	65,58	56,79	10,00	3,80	47,98	41,55	11,80	4,50	40,37	34,96	12,80	5,50	29,32	25,39
	2,50	5,50	2,60	56,37	48,82	7,90	2,90	65,09	56,36	11,10	3,60	59,34	51,39	12,90	4,60	42,24	36,58	14,20	5,50	32,52	28,17
	3,00	6,10	2,70	57,98	50,21	8,80	3,00	67,75	58,67	12,10	3,50	68,44	59,27	14,00	4,70	43,91	38,03	15,60	5,50	35,73	30,94
	3,50	6,70	2,70	63,68	55,14	9,50	3,00	73,14	63,33	12,90	3,70	65,29	56,54	15,00	4,90	43,29	37,48	17,00	5,50	38,94	33,72

▲ Precipitation rates are for triangular spacing, shown in millimeters (Metric) or inches (English) per hour, calculated at 50% of diameter.
■ Precipitation rates are for square spacing, shown in millimeters (Metric) or inches (English) per hour, calculated at 50% of diameter.
All performance specifications are based on the stated working pressure available at the base of the sprinkler.

Shaded data indicates optimal operating pressure. Data based on 360°.

Performance Data— Precision™ Series Rotating Nozzles

Arc	Bar	LPM	Radius	Precip.Rate ■ (mm./hr	Precip Rate ▲ (mm./ hr.)	Rotation Speed (seconds)
45°	1.7	0.68	4.3	9.0	10.37	14.0
	2.4	0.95	4.9	9.6	11.03	13.5
	3.1	1.55	5.8	11.1	12.83	13.5
	3.8	1.74	6.1	11.2	12.99	13.0
	4.5	1.21	6.1	7.8	9.03	12.5
	5.2	1.32	6.7	7.1	8.17	12.0
90°	1.7	1.70	4.9	17.2	19.85	12.5
	2.4	2.04	5.8	14.6	16.89	12.3
	3.1	2.54	6.7	13.5	15.63	12.0
	3.8	2.84	7.0	13.9	16.01	11.8
	4.5	3.14	7.6	13.0	15.00	11.6
	5.2	3.37	7.9	12.9	14.87	11.4
120°	1.7	1.93	4.9	19.5	22.50	12.4
	2.4	2.88	6.1	18.6	21.46	12.0
	3.1	3.48	7.0	17.0	19.64	11.5
	3.8	3.79	7.3	17.0	19.61	11.3
	4.5	4.20	7.6	17.4	20.06	11.0
	5.2	4.47	7.6	18.5	21.32	10.6
180°	1.7	2.88	4.6	16.5	19.07	11.7
	2.4	3.94	5.8	14.1	16.27	11.4
	3.1	4.96	6.7	13.2	15.28	11.0
	3.8	5.53	7.0	13.5	15.58	10.5
	4.5	6.25	7.6	12.9	14.91	10.2
	5.2	6.70	7.9	12.8	14.78	10.0
240°	1.7	4.24	4.6	48.7	56.21	11.5
	2.4	5.49	5.8	39.3	45.36	11.2
	3.1	6.36	6.4	37.3	43.02	11.0
	3.8	7.15	6.7	38.2	44.10	10.5
	4.5	7.87	7.0	38.5	44.40	10.0
	5.2	8.52	7.3	38.2	44.11	9.5
270°	1.7	4.09	4.3	17.9	20.69	11.2
	2.4	5.19	5.5	13.7	15.88	11.0
	3.1	6.93	6.4	13.5	15.58	10.5
	3.8	8.06	6.7	14.3	16.52	10.0
	4.5	8.93	7.3	13.3	15.38	10.0
	5.2	9.88	7.6	13.6	15.68	9.5
360°	1.7	6.85	4.6	19.7	22.71	12.5
	2.4	8.90	5.8	15.9	18.38	12.3
	3.1	11.96	6.7	16.0	18.43	12.0
	3.8	13.55	7.0	16.5	19.11	11.0
	4.5	14.61	7.3	16.4	18.92	9.8
	5.2	15.82	7.6	16.4	18.88	9.5

Performance Data
10° Stream Spray—Metric

Pattern	Desc.	Pressure			LPM	Radius meters
		Bar	kPa	Kg/cm²		
90°	10-SSQ	1,5	150	1,53	2,40	4,4
		2,0	200	2,04	2,95	4,8
		2,5	250	2,55	3,31	5,1
		3,0	300	3,06	3,63	5,3
		3,5	350	3,57	3,93	5,5
	10-SSQ-PC	2,8-3,5	280-350	2,86-3,57	2,65	4,0
		4,1-4,8	410-480	4,18-4,90	2,65	4,6
180°	10-SSH	1,5	150	1,53	3,92	4,4
		2,0	200	2,04	4,47	4,8
		2,5	250	2,55	4,97	5,1
		3,0	300	3,06	5,45	5,3
		3,5	350	3,57	5,92	5,5
	10-SSH-PC	2,8-3,5	280-350	2,86-3,57	5,30	4,0
		4,1-4,8	410-480	4,18-4,90	5,30	4,6
360°	10-SSF	1,5	150	1,53	7,01	4,4
		2,0	200	2,04	7,84	4,8
		2,5	250	2,55	8,71	5,1
		3,0	300	3,06	9,53	5,3
		3,5	350	3,57	10,30	5,5
	10-SSF-PC	2,8-3,5	280-350	2,86-3,57	6,81	4,0
		4,1-4,8	410-480	4,18-4,90	7,57	4,6

Performance Data
35° Stream Spray—Metric

Pattern	Desc.	Pressure			LPM	Radius meters
		Bar	kPa	Kg/cm²		
90°	35-SSQ	1,5	150	1,53	2,40	5,6
		2,0	200	2,04	2,95	6,0
		2,5	250	2,55	3,31	6,3
		3,0	300	3,06	3,63	6,5
		3,5	350	3,57	3,93	6,7
	35-SSQ-PC	2,8-3,5	280-350	2,86-3,57	2,65	5,2
		4,1-4,8	410-480	4,18-4,90	2,65	5,5
180°	35-SSH	1,5	150	1,53	3,92	5,6
		2,0	200	2,04	4,47	6,0
		2,5	250	2,55	4,97	6,3
		3,0	300	3,06	5,45	6,5
		3,5	350	3,57	5,92	6,7
	35-SSH-PC	2,8-3,5	280-350	2,86-3,57	5,30	5,2
		4,1-4,8	410-480	4,18-4,90	5,30	5,5
360°	35-SSF	1,5	150	1,53	7,01	5,6
		2,0	200	2,04	7,84	6,0
		2,5	250	2,55	8,71	6,3
		3,0	300	3,06	9,53	6,5
		3,5	350	3,57	10,30	6,7
	35-SSF-PC	2,8-3,5	280-350	2,86-3,57	6,81	5,2
		4,1-4,8	410-480	4,18-4,90	7,57	5,5

Note: Stream sprays not recommended for turf applications.

500 Series Adjustable Stream Bubbler Nozzle Performance Data

Pattern		Model No.	1 Bar 100 kPa 1,02 Kg/cm²		1,5 Bar 150 kPa 1,53 Kg/cm²		2 Bar 200 kPa 2,04 Kg/cm²		2,5 Bar 250 kPa 2,55 Kg/cm²		3 Bar 300 kPa 3,06 Kg/cm²	
			LPM	Rad	LPM	Rad	LPM	Rad	LPM	Rad	LPM	Rad
2/60°		511-30	3,6	4,84	4,4	5,99	4,8	6,95	5,1	7,62	5,3	8,25
4/60°		512-30	2,5	6,72	3,1	8,30	3,3	9,59	3,7	10,71	4,2	11,81
6/60°		514-30	2,1	8,38	2,5	10,27	3,0	11,89	3,2	13,30	3,5	14,67
2/180°		516-30	3,6	4,84	4,4	5,99	4,8	6,95	5,1	7,62	5,3	8,25

Radius shown in meters. Data based on 360°.

Flood Bubbler Performance Data

Pattern	Model No.	2,5 Bar LPM	3 Bar LPM	3,5 Bar LPM	4 Bar LPM
Flood ●	FB-25-PC	0,95	0,95	0,95	0,95
	FB-50-PC	1,63	1,77	1,89	1,89
	FB-100-PC	3,53	3,66	3,79	3,79
	FB-200-ADJ-PC	7,05	7,32	7,57	7,57

Adjustable Flood Bubbler Nozzle Performance Data—Metric

Pattern	Model No.	Bar	kPa	Kg/cm²	LPM
360° Flood ●	514-20	1,00	100	1,02	6,32
		1,25	125	1,28	7,14
		1,50	150	1,53	7,84
		1,75	175	1,79	8,38
		2,00	200	2,04	8,93
		2,25	225	2,30	9,28
		2,50	250	3,55	9,65
		2,75	275	3,81	10,20

Stream Bubbler Nozzle Performance Data

Pattern		Description	1 Bar		2 Bar		2,5 Bar		3 Bar		3,5 Bar		4 Bar	
			LPM	Rad	LPM	Rad	LPM	Rad	LPM	Rad	LPM	Rad	LPM	Rad
2/60°		SB-90	2,7	2,21	3,9	3,19	4,3	3,59	4,7	3,94	4,9	4,27	5,4	4,57
2/60°		SB-90-PC2					0,5	0,82	0,5	0,85	0,5	0,87	0,5	0,90
4/60°		SB-180	2,1	3,76	3,6	5,32	4,0	5,96	4,5	6,55	4,9	7,09	5,1	7,53
4/60°		SB-180-PC2					0,8	1.81	0,8	1,87	0,8	1,90	0,8	1,92
6/60°		SB-360	1,3	5,23	2,4	7,43	2,6	8,26	2,8	9,01	3,1	9,73	3,7	11,77
6/60°		SB-360-PC2					0,5	2,82	0,5	2,85	0,5	2,88	0,5	2,91
2/180°		SB-2-180	2,7	2,21	3,9	3,19	4,3	3,59	4,7	3,94	4,9	4,27	5,4	4,57
2/180°		SB-2-180-PC2					0,5	0,82	0,5	0,85	0,5	0,87	0,5	0,90
2/60x2/60°		SB-4-180	2,1	3,76	3,6	5,32	4,0	5,96	4,5	6,55	4,9	7,09	5,1	7,53
2/60x2/60°		SB-4-180-PC2					0,8	1,81	0,8	1,87	0,8	1,90	0,8	1,92

Radius shown in feet. Data based on 360°.

Super Funny Pipe Fittings Friction Loss Data

Model No.	Description	LPM Flow				
		5	10	15	20	25
850-36	20mm Male Adapter	1,35	4,13	9,55	21,7	37,7
850-35	13mm Male Adapter	0,89	3,08	6,89	16,1	28,2
850-31	13mm Male Elbow	1,87	6,43	13,8	28,7	46,9
850-34	13mm Female Elbow	1,87	6,43	13,8	28,7	46,9
850-32	20mm Male Elbow	2,23	7,42	17,8	7,10	61,4

This chart indicates the amount of pressure loss (kPa) per foot of Super Funny Pipe at stated flow rates (LPM).

Super Funny Pipe Friction Loss Data—LPM Flow

LPM	5	10	15	20	25
BAR Loss	0,30	1,02	2,00	3,77	5,58

This chart indicates the amount of pressure loss (kPa) per foot of Super Funny Pipe at stated flow rates (LPM).

Sprays Metric Data

Performance Data Precision™ Series Spray Nozzles—Metric

Arc	Bar	LPM	Radius	Precip.Rate ■ (mm./hr.)	Precip. Rate △ (mm./hr.)
5-60° ▲	1.38	0.14	1.43	25.25	29.15
	2.07	0.16	1.52	25.24	29.15
	2.76	0.16	1.52	25.24	29.15
	3.45	0.18	1.62	25.08	28.96
5Q	1.38	0.21	1.40	25.89	29.90
	2.07	0.24	1.52	25.05	28.92
	2.76	0.25	1.52	25.44	29.37
	3.45	0.25	1.52	25.83	29.83
5T	1.38	0.26	1.34	25.77	29.76
	2.07	0.34	1.52	26.42	30.50
	2.76	0.35	1.58	25.24	29.14
	3.45	0.37	1.65	24.91	28.77
5-150°	1.38	0.26	1.22	26.00	30.03
	2.07	0.42	1.52	26.15	30.20
	2.76	0.45	1.58	26.38	30.46
	3.45	0.49	1.65	26.50	30.60
5H	1.38	0.38	1.34	25.27	29.18
	2.07	0.49	1.52	25.44	29.37
	2.76	0.51	1.55	25.39	29.32
	3.45	0.53	1.58	25.15	29.04
5-210°	1.38	0.38	1.34	25.27	29.18
	2.07	0.57	1.58	27.14	31.34
	2.76	0.61	1.62	27.86	32.18
	3.45	0.64	1.68	27.49	31.75
5TT	1.38	0.53	1.31	27.78	32.08
	2.07	0.64	1.52	24.95	28.81
	2.76	0.70	1.52	27.15	31.35
	3.45	0.71	1.52	27.59	31.86
5TQ	1.38	0.57	1.31	25.80	29.79
	2.07	0.76	1.52	25.44	29.37
	2.76	0.79	1.52	26.71	30.84
	3.45	0.83	1.52	27.98	32.31
5F	1.38	0.64	1.22	25.99	30.01
	2.07	0.98	1.52	25.44	29.37
	2.76	0.98	1.52	25.44	29.37
	3.45	0.98	1.52	25.44	29.37

Arc	Bar	LPM	Radius	Precip.Rate ■ (mm./hr.)	Precip. Rate ▲ (mm./hr.)
8-60° ▲	1.38	0.38	2.32	25.41	29.34
	2.07	0.42	2.44	25.22	29.13
	2.76	0.45	2.47	26.84	31.00
	3.45	0.49	2.53	27.69	31.98
8Q	1.38	0.53	2.13	27.95	32.28
	2.07	0.62	2.44	25.22	29.13
	2.76	0.68	2.50	26.19	30.24
	3.45	0.68	2.56	24.96	28.82
8T	1.38	0.76	2.32	25.41	29.34
	2.07	0.83	2.44	25.22	29.13
	2.76	0.87	2.50	25.10	28.98
	3.45	0.89	2.53	25.03	28.91
8-150°	1.38	0.95	2.29	26.09	30.13
	2.07	1.02	2.44	24.77	28.60
	2.76	1.06	2.47	25.05	28.93
	3.45	1.10	2.50	25.32	29.24
8H	1.38	0.98	2.13	25.96	29.97
	2.07	1.25	2.44	25.22	29.13
	2.76	1.28	2.44	25.84	29.83
	3.45	1.29	2.44	25.99	30.01
8-210°	1.38	1.25	2.32	27.95	32.27
	2.07	1.36	2.44	27.52	31.78
	2.76	1.40	2.47	27.59	31.86
	3.45	1.44	2.50	27.65	31.92
8TT	1.38	1.29	2.13	25.46	29.40
	2.07	1.67	2.44	25.22	29.13
	2.76	1.73	2.44	26.20	30.25
	3.45	1.74	2.44	26.31	30.39
8TQ	1.38	1.55	2.19	25.15	29.04
	2.07	1.85	2.44	24.35	28.11
	2.76	2.04	2.44	26.83	30.98
	3.45	2.08	2.44	27.33	31.55
8F	1.38	2.08	2.13	27.46	31.70
	2.07	2.50	2.44	25.22	29.13
	2.76	2.57	2.44	25.99	30.01
	3.45	2.69	2.44	27.14	31.33

Arc	Bar	LPM	Radius	Precip.Rate ■ (mm./hr.)	Precip. Rate ▲ (mm./hr.)
10-60° ▲	1.38	0.61	2.90	26.02	30.04
	2.07	0.64	3.05	24.95	28.81
	2.76	0.68	3.05	26.42	30.50
	3.45	0.72	3.05	27.88	32.20
10Q	1.38	0.87	2.90	24.93	28.79
	2.07	0.98	3.05	25.44	29.37
	2.76	1.06	3.11	26.33	30.41
	3.45	1.06	3.14	25.82	29.82
10T	1.38	1.17	2.90	25.21	29.11
	2.07	1.29	3.05	24.95	28.81
	2.76	1.36	3.05	26.42	30.50
	3.45	1.40	3.05	27.15	31.35
10-150°	1.38	1.55	2.99	25.06	28.94
	2.07	1.63	3.05	25.24	29.15
	2.76	1.67	3.11	24.83	28.67
	3.45	1.74	3.17	24.97	28.83
10H	1.38	1.82	2.96	24.96	28.82
	2.07	1.93	3.05	24.95	28.81
	2.76	2.08	3.14	25.36	29.29
	3.45	2.12	3.17	25.33	29.25
10-210°	1.38	2.12	2.99	28.53	32.94
	2.07	2.20	3.05	28.37	32.76
	2.76	2.27	3.17	27.14	31.34
	3.45	2.35	3.20	27.51	31.77
10TT	1.38	2.38	2.93	25.08	28.96
	2.07	2.61	3.05	25.32	29.23
	2.76	2.76	3.14	25.25	29.15
	3.45	2.80	3.17	25.10	28.99
10TQ	1.38	2.69	2.90	25.02	28.89
	2.07	2.99	3.05	25.12	29.01
	2.76	3.18	3.14	25.18	29.07
	3.45	3.26	3.17	25.28	29.20
10F	1.38	3.60	2.93	25.21	29.12
	2.07	3.90	3.05	25.19	29.09
	2.76	4.09	3.14	24.90	28.75
	3.45	4.24	3.17	25.33	29.25

Arc	Bar	LPM	Radius	Precip.Rate ■ (mm./hr.)	Precip. Rate ▲ (mm./hr.)
12-60° ▲	1.38	0.91	3.51	26.63	30.75
	2.07	0.95	3.66	25.48	29.42
	2.76	0.98	3.69	26.06	30.10
	3.45	1.06	3.72	27.61	31.88
12Q	1.38	1.29	3.47	25.60	29.56
	2.07	1.40	3.66	25.14	29.03
	2.76	1.48	3.69	26.06	30.10
	3.45	1.48	3.75	25.22	29.12
12T	1.38	1.74	3.51	25.52	29.47
	2.07	1.85	3.66	24.97	28.83
	2.76	1.93	3.72	25.14	29.03
	3.45	1.97	3.75	25.22	29.12
12-150°	1.38	2.27	3.54	26.50	30.60
	2.07	2.35	3.66	25.59	29.55
	2.76	2.38	3.72	25.16	29.05
	3.45	2.42	3.75	25.14	29.03
12H	1.38	2.65	3.51	25.89	29.90
	2.07	2.80	3.66	25.14	29.03
	2.76	2.99	3.75	25.55	29.50
	3.45	3.03	3.78	25.45	29.39
12-210°	1.38	2.88	3.54	27.63	31.91
	2.07	3.10	3.66	27.86	32.17
	2.76	3.18	3.75	27.16	31.36
	3.45	3.22	3.78	27.04	31.23
12TT	1.38	3.41	3.47	25.41	29.34
	2.07	3.75	3.66	25.22	29.13
	2.76	3.94	3.75	25.22	29.12
	3.45	3.97	3.78	25.06	28.93
12TQ	1.38	3.97	3.47	25.69	29.67
	2.07	4.35	3.66	25.39	29.32
	2.76	4.50	3.72	25.42	29.36
	3.45	4.62	3.75	25.64	29.61
12F	1.38	5.11	3.51	24.97	28.83
	2.07	5.60	3.66	25.14	29.03
	2.76	6.02	3.78	25.29	29.21
	3.45	6.06	3.81	25.05	28.92

Arc	Bar	LPM	Radius	Precip.Rate ■ (mm./hr.)	Precip. Rate ▲ (mm./hr.)
15-60° ▲	1.38	1.32	4.27	26.21	30.26
	2.07	1.48	4.57	25.44	29.37
	2.76	1.51	4.60	25.75	29.73
	3.45	1.59	4.66	26.33	30.41
15Q	1.38	2.01	4.33	25.72	29.70
	2.07	2.20	4.57	25.22	29.12
	2.76	2.27	4.60	25.75	29.73
	3.45	2.31	4.66	25.50	29.44
15T	1.38	2.73	4.36	25.84	29.83
	2.07	2.91	4.57	25.11	29.00
	2.76	3.07	4.66	25.39	29.32
	3.45	3.10	4.69	25.37	29.30
15-150°	1.38	3.48	4.48	25.31	29.22
	2.07	3.63	4.57	25.36	29.28
	2.76	3.79	4.63	25.73	29.71
	3.45	4.16	4.66	27.93	32.25
15H	1.38	4.16	4.42	25.59	29.55
	2.07	4.39	4.57	25.22	29.12
	2.76	4.73	4.69	25.78	29.77
	3.45	4.85	4.72	26.06	30.10
15-210°	1.38	4.35	4.42	26.76	30.90
	2.07	4.54	4.57	26.09	30.13
	2.76	4.92	4.72	26.09	30.57
	3.45	5.30	4.75	28.14	32.50
15TT	1.38	5.49	4.42	25.30	29.22
	2.07	5.83	4.57	25.11	29.00
	2.76	5.98	4.63	25.09	28.97
	3.45	6.09	4.66	25.23	29.14
15TQ	1.38	6.51	4.42	26.01	30.04
	2.07	6.74	4.57	25.16	29.05
	2.76	6.89	4.57	25.72	29.70
	3.45	7.19	4.66	25.81	29.80
15F	1.38	8.33	4.42	25.59	29.55
	2.07	8.74	4.57	25.11	29.00
	2.76	8.90	4.63	24.88	28.73
	3.45	9.08	4.66	25.08	28.96

Arc	Bar	LPM	Radius	Precip.Rate ■ (mm./hr.)	Precip. Rate ▲ (mm./hr.)
4X30 SST	1.38	2.35	1.2 x 8.4	25.28	30.04
	2.07	2.50	1. 2 x 9	26.91	28.81
	2.76	2.54	1. 2 x 9	27.31	30.50
	3.45	2.57	1. 2 x 9	27.72	32.20
4X15 LCS	1.38	1.21	1.2 x 4.5	26.09	28.79
	2.07	1.25	1.2 x 4.5	26.91	29.37
	2.76	1.29	1.2 x 4.5	27.72	30.41
	3.45	1.29	1.2 x 4.5	27.72	29.82
4X15 RCS	1.38	1.21	1.2 x 4.5	26.09	29.11
	2.07	1.25	1.2 x 4.5	26.91	28.81
	2.76	1.29	1.2 x 4.5	27.72	30.50
	3.45	1.29	1.2 x 4.5	27.72	31.35
4X18 SST	1.38	1.36	1.2 x 5.4	24.46	28.96
	2.07	1.40	1.2 x 5.4	25.14	29.23
	2.76	1.44	1.2 x 5.4	25.82	29.15
	3.45	1.44	1.2 x 5.4	25.82	28.99
4X9 LCS	1.38	0.68	1.2 x 2.7	24.46	28.89
	2.07	0.72	1.2 x 2.7	25.82	29.01
	2.76	0.76	1.2 x 2.7	27.18	29.07
	3.45	0.76	1.2 x 2.7	27.18	29.20
4X9 RCS	1.38	0.68	1.2 x 2.7	24.46	29.12
	2.07	0.72	1.2 x 2.7	25.82	29.09
	2.76	0.76	1.2 x 2.7	27.18	28.75
	3.45	0.76	1.2 x 2.7	27.18	29.25

300/340 Series: Shrub w/COM (360° Arc Disc) (Model Nos. 300-10-00COM & 340-10-15COM)—Metric

Nozzle	Bar	LPM	Radius
01	3,5	7,9	4,3
01	5,0	10,8	4,8
02	3,5	9,5	7,0
02	5,0	13,5	7,6
03	3,5	17,4	8,2
03	5,0	23,0	8,8
63	3,5	10,2	8,6
63	5,0	14,0	9,1
93	3,5	14,0	8,9
93	5,0	19,4	9,4
Omni (Min)	3,5	10,2	4,9
Omni (Min)	5,0	14,5	5,4
Omni (Max)	3,5	21,1	9,2
Omni (Max)	5,0	23,8	10

300 Series: 300-15 and 300-25 Omni™ Adjustable-radius Nozzle Performance Chart

Pressure			Radius meters	90°	112°	135°	157,7°	180°	202,5°	225°	270°	360°
Bar	kPa	Kg/cm²		Flow LPM (at designated arcs)								
2,5	250	2,55	4,5	3,2	4,0	4,9	5,7	6,5	7,3	8,1	9,7	12,9
			5,0	3,5	4,4	5,3	6,2	7,1	8,0	8,8	10,6	14,1
			6,0	4,2	5,2	6,2	7,3	8,3	9,3	10,4	12,5	16,6
			7,0	4,8	5,9	7,2	8,4	9,6	10,7	11,9	14,3	19,1
			8,0	5,6	6,9	8,3	9,7	11,1	12,5	13,9	16,7	22,2
3,5	350	3,57	6,0	4,8	6,0	7,2	8,4	9,6	10,8	12,0	14,4	19,2
			7,0	5,6	6,9	8,3	9,7	11,1	12,5	13,9	16,7	22,2
			8,0	6,3	7,8	9,4	11,0	12,6	14,2	15,7	18,9	25,2
			9,0	7,0	8,8	10,6	12,3	14,1	15,8	17,6	21,1	28,2
			10,0	7,8	9,7	11,7	13,6	15,6	17,5	19,5	23,4	31,2

All performance specifications are based on the stated working pressure available at the base of the sprinkler.

300/340 Series: Fixed-radius Nozzle Performance Chart

Nozzle	Pressure			Radius 300 Series	Radius 340 Series	90°	112°	135°	157,7°	180°	202,5°	225°	270°	360°
	Bar	kPa	Kg/cm²			Flow LPM (at designated arcs)								
01	2,5	250	2,55	4,9	4,9	2,20	2,76	3,31	3,86	4,41	4,96	5,51	6,61	8,81
	3,5	350	3,57	5,5	5,5	2,75	3,44	4,13	4,82	5,51	6,20	6,88	8,26	11,0
02	2,5	250	2,55	6,5	4,9	2,77	3,45	4,15	4,84	5,53	6,23	6,92	8,30	11,1
	3,5	350	3,57	7,4	5,5	3,25	4,07	4,88	5,69	6,50	7,32	8,13	9,76	13,0
03	2,5	250	2,55	8,6	4,9	5,22	6,52	7,83	9,13	10,4	11,7	13,1	15,7	20,9
	3,5	350	3,57	9,2	5,5	6,15	7,69	9,23	10,8	12,3	13,8	15,4	18,5	24,6
63§	2,5	250	2,55	8,6	4,9	2,61	3,27	3,92	4,58	5,23	5,88	6,54	7,84	10,5
	3,5	350	3,57	9,2	5,5	3,08	3,85	4,62	5,39	6,16	6,93	7,70	9,24	12,3
93§	2,5	250	2,55	8,6	4,9	3,91	4,89	5,67	6,85	7,82	8,80	9,78	11,7	15,7
	3,5	350	3,57	9,2	5,5	4,62	5,77	6,93	8,08	9,23	10,4	11,5	13,9	18,5

All performance specifications are based on the stated working pressure available at the base of the sprinkler.
§ Low flow

340 Series: 300-15 Omni™ Adjustable-radius Nozzle Performance Chart

Pressure			Radius meters	90°	112,5°	135°	157,7°	180°	202,5°	225°	270°	360°
Bar	kPa	Kg/cm²		Flow LPM (at designated arcs)								
2,5	250	2,55	4,5	2,87	3,57	4,30	5,02	5,74	6,45	7,17	8,61	11,5
			5,0	3,25	4,05	4,88	5,70	6,51	7,32	8,14	9,76	13,0
			6,0	3,96	4,93	5,94	6,93	7,92	8,91	9,90	11,9	15,7
			7,0	4,57	5,68	6,85	7,99	9,13	10,3	11,4	13,7	18,3
			8,0	5,16	6,42	7,74	9,03	10,3	11,6	12,9	15,5	20,6
			8,5	5,70	7,09	8,55	9,97	11,4	12,8	14,2	17,1	22,8
3,5	350	3,57	5,5	3,55	4,41	5,32	6,21	7,10	8,00	8,87	10,6	14,2
			6,0	3,91	4,87	8,87	6,85	7,83	8,81	9,78	11,7	15,7
			7,0	4,65	5,79	6,97	8,14	9,30	10,5	11,6	14,0	18,6
			8,0	5,40	6,71	8,09	9,44	10,8	11,1	13,5	16,2	21,6
			9,0	6,38	7,94	9,57	11,2	12,8	14,4	16,0	19,2	25,5
			10,0	7,11	8,85	10,7	12,4	14,2	16,0	17,8	21,3	28,4

All performance specifications are based on the stated working pressure available at the base of the sprinkler.
§ Low flow.

TS90TP Nozzle Performance Data—Metric

Nozzle Set		Stator	3,4 bar		4,1 bar		4,8 bar		5,5 bar		6,2 bar		6,9 bar	
Number	Main/Intermediate		Radius (m)	Flow (LPM)	Radius (m)	Flow (LPM)	Radius (m)	Flow (LPM)	Radius (m)	Flow (LPM)	Radius (m)	Flow (LPM)	Radius (m)	Flow (LPM)
1	Yellow/Blue	102-1939 Yellow	16,2	53	16,5	58	16,8	62	16,8	66	16,5	70	17,1	74
2	Blue/Red		16,8	71	18,0	78	18,6	84	18,0	89	18,0	95	18,9	100
3	Brown/Orange		-	-	17,4	86	18,3	93	18,6	99	19,2	105	20,7	110
4	Orange/Orange		-	-	-	-	22,6	124	24,4	133	24,7	140	25,0	147
5	Green/Blue	102-1940 White	-	-	-	-	-	-	24,1	143	25,0	151	25,6	158
6	Gray/Blue		-	-	-	-	-	-	25,0	150	26,2	159	26,5	167
7	Black/Orange		-	-	-	-	-	-	24,4	165	26,5	175	25,6	184
8	Red/Blue		-	-	-	-	-	-	26,2	184	26,8	195	26,8	205
9	Beige/Blue	102-1941 White	-	-	-	-	-	-	25,9	208	27,7	221	29,0	233

Super 800 Performance Data

Nozzle	Bar	LPM	Radius
.50	2,0	1,1	8,5
	3,0	1,5	8,8
	3,5	1,9	8,8
	4,0	2,3	9,1
.75	2,0	1,9	8,8
	3,0	2,3	9,1
	3,5	2,7	9,4
	4,0	3,0	9,8
1.0	2,0	4,9	9,8
	3,0	5,7	10,1
	3,5	6,5	10,4
	4,0	7,2	10,7
2.0	2,0	7,6	10,1
	3,0	9,1	10,4
	3,5	10,3	10,7
	4,0	11,4	11,0
2.5	2,0	7,6	10,1
	3,0	9,1	10,4
	3,5	10,3	10,7
	4,0	11,4	11,0
3.0	2,0	12,2	10,7
	3,0	14,1	11,0
	3,5	16,3	11,3
	4,0	18,2	11,6
4.0	2,0	15,2	11,0
	3,0	18,6	11,3
	3,5	21,3	11,6
	4,0	23,6	11,9
6.0	2,0	20,5	11,3
	3,0	24,3	11,9
	3,5	27,7	12,5
	4,0	30,8	13,1
8.0	2,0	25,8	11,6
	3,0	31,2	12,2
	3,5	36,1	12,8
	4,0	40,3	13,4

Radius shown in meters. Data based on 360°.

Super 800 Low-angle Nozzle Performance Data

Nozzle	Bar	LPM	Radius
1.0	2,0	4,2	8,5
	3,0	4,9	8,8
	3,5	5,7	9,1
	4,0	6,5	9,4
3.0	2,0	8,7	9,1
	3,0	10,6	10,1
	3,5	11,8	10,7
	4,0	12,9	11,3
4.0	2,0	14,4	9,4
	3,0	17,1	10,4
	3,5	19,4	11,3
	4,0	21,3	11,9
6.0	2,0	18,6	9,8
	3,0	22,0	10,7
	3,5	24,7	11,9
	4,0	27,4	9,4

Radius shown in meters. Data based on 360°.

T5 Performance Data—Metric

Nozzle	Pressure Bar	Radius m.	Flow m³/hr	Flow l/m	Precip. ■ (mm/hr)	Precip.▲ (mm/hr)
1.5	1,7	10,10	0,25	4,2	5	6
	2,0	10,20	0,28	4,8	5	6
	2,5	10,40	0,31	5,4	6	7
	3,0	10,60	0,34	6,0	6	7
	3,5	10,70	0,37	6,0	7	8
	4,0	10,60	0,40	6,6	7	8
	4,5	10,40	0,42	7,2	8	9
2.0	1,7	10,70	0,34	5,4	6	7
	2,0	10,80	0,36	6,0	6	7
	2,5	11,00	0,41	6,6	7	8
	3,0	11,20	0,45	7,8	7	8
	3,5	11,30	0,49	8,4	8	9
	4,0	11,10	0,42	9,0	8	10
	4,5	10,70	0,55	9,0	10	11
2.5	1,7	10,70	0,41	6,6	7	8
	2,0	10,90	0,44	7,2	7	8
	2,5	11,30	0,50	8,4	8	9
	3,0	11,30	0,56	9,6	9	10
	3,5	11,30	0,60	10,2	9	11
	4,0	11,30	0,64	10,8	10	12
	4,5	11,30	0,68	11,4	11	12
3.0	1,7	11,00	0,51	8,4	8	10
	2,0	11,20	0,55	9,0	9	10
	2,5	11,20	0,62	10,2	9	11
	3,0	12,10	0,69	11,4	9	11
	3,5	12,20	0,74	12,6	10	12
	4,0	12,20	0,80	13,2	11	12
	4,5	12,20	0,84	13,8	11	13
4.0	1,7	11,30	0,66	10,8	10	12
	2,0	11,60	0,71	12,0	11	12
	2,5	12,30	0,81	13,2	11	13
	3,0	12,70	0,89	15,0	11	13
	3,5	12,80	0,97	16,2	12	14
	4,0	12,80	1,04	17,4	13	15
	4,5	12,80	1,10	18,0	13	15
5.0	1,7	11,90	0,84	13,8	12	14
	2,0	12,10	0,91	15,	12	14
	2,5	12,70	1,03	17,4	13	15
	3,0	13,50	1,13	18,6	12	14
	3,5	13,70	1,23	20,4	13	15
	4,0	13,70	1,32	22,2	14	16
	4,5	13,70	1,40	23,4	15	17
6.0	1,7	11,90	0,97	16,2	14	16
	2,0	12,40	1,05	17,4	14	16
	2,5	13,20	1,21	20,4	14	16
	3,0	13,90	1,34	22,2	14	16
	3,5	14,20	1,45	24,0	14	17
	4,0	14,90	1,55	25,8	15	17
	4,5	14,60	1,64	28,2	15	18
8.0	1,7	11,00	1,34	22,2	22	26
	2,0	11,80	1,45	24,0	21	24
	2,5	13,30	1,63	27,0	19	21
	3,0	14,10	1,79	30,0	18	21
	3,5	14,90	1,93	32,4	18	20
	4,0	15,20	2,06	34,2	18	21
	4,5	15,20	2,19	36,6	19	22

T-5 Low Angle Nozzle Performance Data-Bar

Nozzle	Pressure Bar	Radius m.	Flow m³/hr	Flow l/m	Precip. ■ (mm/hr)	Precip.▲ (mm/hr)
1.0 LA	1,7	7,60	0,17	3,0	6	7
	2,0	8,00	0,18	3,0	6	6
	2,5	8,60	0,20	3,6	5	6
	3,0	8,80	0,22	3,6	6	7
	3,5	8,80	0,24	4,2	6	7
	4,0	8,80	0,26	4,2	7	8
	4,5	8,80	0,27	4,8	7	8
1.5 LA	1,7	8,20	0,26	4,2	8	9
	2,0	8,60	0,28	4,8	8	9
	2,5	9,20	0,32	5,4	8	9
	3,0	9,40	0,35	6,0	8	9
	3,5	9,40	0,38	6,6	9	10
	4,0	9,40	0,41	6,6	9	11
	4,5	9,40	0,44	7,2	10	11
2.0 LA	1,7	8,80	0,33	5,4	9	10
	2,0	9,10	0,36	6,0	9	10
	2,5	9,50	0,41	6,6	9	10
	3,0	9,70	0,45	7,8	10	11
	3,5	9,90	0,49	8,4	10	11
	4,0	10,10	0,52	9,0	10	12
	4,5	10,10	0,56	9,0	11	13
3.0 LA	1,7	8,80	0,51	8,4	13	15
	2,0	9,30	0,55	9,0	13	15
	2,5	10,10	0,62	10,2	12	14
	3,0	10,60	0,68	11,4	12	14
	3,5	10,80	0,74	12,6	3	15
	4,0	11,00	0,80	13,2	13	15
	4,5	11,00	0,84	13,8	14	16

1. Precipitation rates based on half-circle operation
2. ■ square spacing based on 50% diameter of throw
3. ▲ triangular spacing based on 50% diameter of throw

TR50XT Performance Data

Nozzle Size	Bar	Flow	5°			15°			25°		
			Radius	Precip. Rate*		Radius	Precip. Rate*		Radius	Precip. Rate*	
				■	■		■	■		■	■
1.0 Yellow	2,0	3,8	6,1	7,0	6,1	7,9	4,2	3,6	9,1	3,1	2,7
	2,5	4,1	6,3	7,1	6,2	8,0	4,4	3,8	9,1	3,4	2,9
	3,0	4,5	6,5	7,3	6,3	8,1	4,7	4,0	9,2	3,6	3,2
	3,5	4,9	6,8	7,4	6,4	8,3	5,0	4,3	9,3	3,9	3,4
	4,0	5,3	7,3	6,8	5,9	8,5	5,1	4,4	9,3	4,2	3,7
	4,5	5,6	7,5	7,0	6,0	8,5	5,3	4,6	9,3	4,5	3,9
	5,0	6,0	7,5	7,3	6,3	8,6	5,6	4,9	9,3	4,7	4,1
1.5 Orange	2,0	4,7	8,5	4,5	3,9	9,1	3,9	3,4	10,4	3,0	2,6
	2,5	5,1	8,6	4,7	4,1	9,3	4,0	3,5	10,6	3,2	2,7
	3,0	5,5	8,7	5,0	4,4	9,5	4,3	3,7	10,7	3,3	2,9
	3,5	6,0	8,9	5,3	4,6	9,6	4,5	3,9	10,8	3,5	3,1
	4,0	6,5	9,2	5,3	4,6	9,7	4,7	4,1	10,8	3,8	3,3
	4,5	6,9	9,4	5,4	4,7	9,8	5,0	4,3	10,7	4,1	3,6
	5,0	7,3	9,5	5,6	4,8	9,8	5,3	4,6	10,7	4,4	3,8
2 Red	2,0	6,3	9,4	4,9	4,2	9,8	4,6	4,0	11,0	3,6	3,1
	2,5	6,8	9,4	5,3	4,6	10,1	4,6	4,0	11,3	3,7	3,2
	3,0	7,5	9,5	5,7	5,0	10,5	4,7	4,1	11,5	3,9	3,4
	3,5	8,2	9,6	6,1	5,3	10,7	5,0	4,3	11,6	4,2	3,7
	4,0	8,9	9,8	6,3	5,5	10,9	5,1	4,5	11,7	4,5	3,9
	4,5	9,5	10,0	6,6	5,7	11,0	5,4	4,7	11,7	4,8	4,1
	5,0	10,0	10,1	6,8	5,9	11,0	5,7	4,9	11,8	5,0	4,3
3 Black	2,0	8,9	9,4	6,9	5,9	10,4	5,7	4,9	11,6	4,6	4,0
	2,5	9,6	9,4	7,4	6,4	10,5	6,0	5,2	11,9	4,7	4,1
	3,0	10,5	9,7	7,7	6,7	10,7	6,3	5,5	12,2	4,9	4,2
	3,5	11,4	10,1	7,7	6,7	11,0	6,5	5,6	12,5	5,0	4,4
	4,0	12,3	10,4	7,8	6,8	11,3	6,6	5,7	12,6	5,3	4,6
	4,5	13,0	10,6	8,0	7,0	11,6	6,7	5,8	13,0	5,4	4,6
	5,0	13,8	10.7	8,3	7,2	11,8	6,9	5,9	13,3	5,4	4,7
4.5 Blue	2,0	13,6	9,4	10,5	9,1	10,4	8,8	7,6	11,9	6,7	5,8
	2,5	14,7	9,6	11,0	9,5	10,5	9,3	8,1	12,1	7,0	6,0
	3,0	16,1	10,0	11,2	9,7	10,7	9,7	8,4	12,3	7,4	6,4
	3,5	17,7	10,4	11,4	9,8	11,2	9,8	8,5	12,5	7,8	6,8
	4,0	19,0	10,5	12,0	10,4	11,5	10,0	8,6	12,7	8,1	7,0
	4,5	20,3	10,8	12,1	10,5	11,7	10,2	8,8	12,8	8,6	7,4
	5,0	21,4	11,0	12,2	10,6	11,9	10,4	9,0	12,8	9,0	7,8
6 Green	2,0	16,7	9,4	12,9	11,2	10,7	10,1	8,8	12,5	7,4	6,4
	2,5	18,0	9,5	13,7	11,9	11,0	10,4	9,0	12,6	7,9	6,8
	3,0	19,8	9,9	13,9	12,0	11,5	10,3	9,0	12,8	8,3	7,2
	3,5	21,6	10,6	13,4	11,6	12,2	10,1	8,7	13,1	8,7	7,5
	4,0	23,3	11,1	13,0	11,3	12,2	10,8	9,4	13,1	9,4	8,1
	4,5	24,8	11,4	13,3	11,5	12,4	11,3	9,8	13,3	9,6	8,4
	5,0	26,1	11,5	13,7	11,8	12,5	11,5	10,0	13,6	9,8	8,5
7.5 Brown	2,0	18,6	10,4	12,0	10,4	10,7	11,3	9,8	12,5	8,2	7,1
	2,5	20,1	10,6	12,3	10,6	10,9	11,8	10,2	12,5	8,9	7,7
	3,0	21,9	10,8	13,0	11,2	11,0	12,5	10,8	12,5	9,6	8,3
	3,5	23,8	10,8	14,1	12,2	11,1	13,3	11,5	12,7	10,3	8,9
	4,0	25,7	10,9	14,9	12,9	11,4	13,8	11,9	12,8	10,9	9,4
	4,5	27,4	11,1	15,5	13,5	11,5	14,3	12,4	13,0	11,3	9,8
	5,0	28,9	11,2	16,0	13,9	11,6	14,8	12,8	13,1	11,6	10,0
9 Gray	2,0	23,1	10,4	14,8	12,9	10,4	14,8	12,9	12,8	9,7	8,4
	2,5	25,2	10,6	15,7	13,6	10,5	15,9	13,8	12,8	10,6	9,2
	3,0	27,8	10,7	16,9	14,6	10,8	16,6	14,3	13,0	11,4	9,8
	3,5	30,5	10,7	18,5	16,1	11,3	16,5	14,3	13,4	11,7	10,1
	4,0	32,9	10,7	20,0	17,3	11,6	16,8	14,5	13,5	12,4	10,8
	4,5	35,4	10,9	20,6	17,8	12,0	17,1	14,8	13,9	12,7	11,0
	5,0	17,5	11,2	20,8	18,0	12,2	17,4	15,0	14,2	12,9	11,1

* ■ *Precipitation rates are for triangular spacing, shown in millimeters per hour, calculated at 50% of diameter.*

■ *Precipitation rates are for square spacing, shown in millimeters per hour, calculated at 50% of diameter.*

All performance specifications are based on the stated working pressure available at the base of the sprinkler.

Radius can be reduced 25% with breakup screw.

Performance rating is based on a zero wind condition.

Radius shown in meters. Data based on 360°.

TR70P Performance Data—Metric

Nozzle Size	Bar	LPM	Radius	Precip. Rate	
				▲	■
7 Orange	3,5	28,6	13,2	11,4	9,9
	4,0	30,5	13,6	11,4	9,9
	4,5	32,4	13,7	11,9	10,3
	5,0	34,3	13,6	12,8	11,1
	5,5	36,3	13,4	13,9	12,1
	6,0	37,2	13,4	14,5	12,5
	6,5	39,8	13,7	14,7	12,8
	7,0	42,5	14,0	14,9	12,9
9 Red	3,5	31,9	14,1	11,2	9,7
	4,0	33,0	14,5	10,8	9,4
	4,5	34,5	14,8	10,9	9,4
	5,0	36,1	15,1	11,0	9,5
	5,5	37,8	15,5	10,8	9,4
	6,0	38,1	15,8	10,6	9,2
	6,5	40,6	16,0	11,0	9,5
	7,0	44,4	16,2	11,7	10,1
12 Black	3,5	40,0	16,2	10,6	9,1
	4,0	43,1	16,6	10,8	9,3
	4,5	45,9	16,9	11,1	9,6
	5,0	48,3	17,1	11,4	9,9
	5,5	51,0	17,4	11,7	10,1
	6,0	53,5	17,6	12,0	10,4
	6,5	55,9	17,9	12,0	10,4
	7,0	58,6	18,3	12,1	10,4
16 Blue	3,5	58,2	16,9	14,2	12,3
	4,0	60,9	17,7	13,4	11,6
	4,5	63,9	18,3	13,2	11,4
	5,0	66,9	18,6	13,4	11,6
	5,5	69,9	18,6	14,0	12,1
	6,0	73,2	19,7	13,1	11,4
	6,5	76,3	20,2	12,9	11,2
	7,0	79,3	20,5	13,1	11,3
20 Green	3,5	70,8	16,9	17,2	14,9
	4,0	74,3	17,7	16,3	14,2
	4,5	77,5	18,3	16,0	13,9
	5,0	80,8	18,7	15,9	13,8
	5,5	84,6	19,2	15,9	13,8
	6,0	85,8	19,8	15,1	13,1
	6,5	90,0	20,4	15,0	13,0
	7,0	95,7	20,8	15,3	13,3
24 Brown	3,5	71,1	17,5	16,1	14,0
	4,0	74,1	18,3	15,2	13,2
	4,5	78,3	18,9	15,1	13,1
	5,0	82,9	19,4	15,2	13,2
	5,5	87,3	20,1	15,0	13,0
	6,0	91,1	20,3	15,3	13,2
	6,5	95,0	20,8	15,2	13,1
	7,0	98,6	21,4	14,9	12,9
27 Gray	3,5	80,6	18,1	17,0	14,7
	4,0	87,7	19,2	16,5	14,3
	4,5	93,5	20,0	16,2	14,0
	5,0	98,0	20,5	16,1	14,0
	5,5	101,3	20,7	16,3	14,1
	6,0	105,1	20,9	16,8	14,4
	6,5	109,0	21,3	16,6	14,4
	7,0	112,8	21,7	16,5	14,3

* ▲ *Precipitation rates are for triangular spacing, shown in millimeters per hour, calculated at 50% of diameter.*

■ *Precipitation rates are for square spacing, shown in millimeters per hour, calculated at 50% of diameter.*

All performance specifications are based on the stated working pressure available at the base of the sprinkler.

Radius shown in meters. Data based on 360°.

Rotors Metric Data

TR70XT Performance Data—Metric

Nozzle Size	Pressure			LPM	Radius		
	Bar	kPa	Kg/cm²		5°	15°	25°
7 Orange	3,0	300	3,06	25,9	10,5	12,2	13,6
	3,5	350	3,57	27,1	11,3	12,8	14,0
	4,0	400	4,08	29,0	11,5	13,0	14,3
	4,5	450	4,59	30,7	11,9	13,3	14,5
	5,0	500	5,10	32,5	12,3	13,5	14,7
	5,5	550	5,61	34,4	12,5	13,7	14,9
	6,0	600	6,12	35,5	12,7	13,3	15,1
	6,5	650	6,63	37,7	12,9	13,6	15,4
	7,0	700	7,14	40,4	13,2	14,4	15,6
9 Red	3,0	300	3,06	28,1	10,5	12,2	13,9
	3,5	350	3,57	30,5	11,3	12,8	14,3
	4,0	400	4,08	32,4	11,5	13,0	14,6
	4,5	450	4,59	34,1	11,6	13,3	14,8
	5,0	500	5,10	35,6	11,7	13,5	15,0
	5,5	550	5,61	36,7	12,2	13,7	15,2
	6,0	600	6,12	39,9	12,6	14,1	15,5
	6,5	650	6,63	42,4	12,9	14,3	15,5
	7,0	700	7,14	44,2	13,2	14,4	15,6
12* Black	3,0	300	3,06	39,0	10,5	12,3	14,0
	3,5	350	3,57	43,4	11,3	13,1	14,7
	4,0	400	4,08	46,2	11,5	13,3	15,1
	4,5	450	4,59	48,9	11,7	13,6	15,4
	5,0	500	5,10	51,5	12,0	13,8	15,6
	5,5	550	5,61	53,7	12,2	14,0	15,8
	6,0	600	6,12	56,4	12,6	14,4	16,1
	6,5	650	6,63	58,8	12,9	14,6	16,2
	7,0	700	7,14	60,8	13,2	14,7	16,5
16 Blue	3,0	300	3,06	50,4	10,8	12,7	14,7
	3,5	350	3,57	55,3	11,7	13,8	15,9
	4,0	400	4,08	59,4	12,6	14,7	16,6
	4,5	450	4,59	63,3	13,1	15,3	17,2
	5,0	500	5,10	66,7	13,6	15,7	17,7
	5,5	550	5,61	69,2	14,3	16,1	17,7
	6,0	600	6,12	72,7	14,5	16,4	17,9
	6,5	650	6,63	75,6	14,9	16,6	18,1
	7,0	700	7,14	77,9	15,3	16,8	18,3
20 Green	3,0	300	3,06	55,9	10,8	13,0	15,0
	3,5	350	3,57	61,8	11,7	14,1	16,3
	4,0	400	4,08	66,5	12,6	15,0	17,4
	4,5	450	4,59	70,5	13,8	16,0	18,2
	5,0	500	5,10	74,4	14,7	16,8	18,7
	5,5	550	5,61	78,2	14,9	17,1	19,2
	6,0	600	6,12	81,5	15,4	17,1	19,4
	6,5	650	6,63	84,5	15,5	17,3	19,6
	7,0	700	7,14	87,1	15,6	18,2	19,9
24 Brown	3,0	300	3,06	57,9	11,3	13,2	15,2
	3,5	350	3,57	62,4	12,6	14,7	16,8
	4,0	400	4,08	66,0	13,7	15,6	17,5
	4,5	450	4,59	69,4	14,5	16,3	18,2
	5,0	500	5,10	72,8	15,0	16,8	18,7
	5,5	550	5,61	76,7	15,2	17,1	18,9
	6,0	600	6,12	80,3	16,1	17,9	19,5
	6,5	650	6,63	83,7	16,7	18,5	20,1
	7,0	700	7,14	86,7	17,1	19,0	20,5
27 Gray	3,0	300	3,06	66,2	10,8	13,1	15,5
	3,5	350	3,57	72,4	11,7	14,4	17,2
	4,0	400	4,08	77,7	12,8	15,5	18,0
	4,5	450	4,59	82,7	14,1	16,5	18,8
	5,0	500	5,10	87,3	15,2	17,3	19,4
	5,5	550	5,61	91,4	15,8	18,0	19,8
	6,0	600	6,12	95,3	16,5	18,6	20,7
	6,5	650	6,63	99,1	17,0	19,2	21,3
	7,0	700	7,14	102,9	17,4	19,6	21,7

All performance specifications are based on the stated working pressure available at the base of the sprinkler.
Radius shown in meters. Data based on 360°.
#12 nozzle comes pre-installed from factory.

T7 Sports Rotor Nozzle Performance Data

Nozzle	Pressure	Flow (lpm)	Radius (m)	Precip, mm/hr ■	Precip, mm/hr ▲
7,0	2,8	25,4	14,0	8,9	7,7
	3,4	28,0	14,5	9,3	8,0
	4,1	30,5	14,8	9,7	8,4
	4,8	33,4	15,5	9,6	8,3
	5,5	36,3	15,8	10,0	8,7
	6,2	38,6	16,2	10,3	8,9
	6,9	40,7	16,5	10,4	9,0
9,0	2,8	28,1	14,3	9,5	8,2
	3,4	31,9	15,5	9,1	7,9
	4,1	32,6	15,8	9,0	7,8
	4,8	36,3	16,0	9,8	8,5
	5,5	39,0	16,5	10,0	8,6
	6,2	41,3	16,8	10,2	8,8
	6,9	43,5	17,1	10,4	9,0
12,0	2,8	35,6	15,2	10,6	9,2
	3,4	39,7	17,1	9,5	8,2
	4,1	43,3	17,7	9,6	8,3
	4,8	47,1	18,3	9,8	8,4
	5,5	50,7	18,6	10,2	8,8
	6,2	53,8	18,9	10,4	9,0
	6,9	57,1	19,2	10,7	9,3
16,0	2,8	49,7	15,8	13,7	11,9
	3,4	55,6	18,0	11,9	10,3
	4,1	59,5	18,6	11,9	10,3
	4,8	64,2	19,2	12,1	10,5
	5,5	69,0	19,8	12,2	10,5
	6,2	73,5	20,1	12,6	10,9
	6,9	77,6	20,7	12,5	10,8
20,0	2,8	60,6	15,8	16,7	14,5
	3,4	69,9	18,0	15,0	13,0
	4,1	74,4	18,6	14,9	12,9
	4,8	79,3	19,8	14,0	12,1
	5,5	85,1	20,7	13,7	11,9
	6,2	90,8	21,0	14,2	12,3
	6,9	95,8	21,6	14,2	12,3
24,0	2,8	59,5	16,0	16,1	13,9
	3,4	67,7	17,8	14,7	12,8
	4,1	74,9	18,7	14,8	12,8
	4,8	81,8	19,8	14,4	12,5
	5,5	87,9	20,7	14,2	12,3
	6,2	94,4	21,0	14,8	12,8
	6,9	100,1	21,6	14,8	12,8
27,0	2,8	70,5	17,1	16,8	14,5
	3,4	80,7	19,5	14,7	12,7
	4,1	89,6	21,3	13,6	11,8
	4,8	96,6	22,9	12,8	11,1
	5,5	102,7	23,5	12,9	11,2
	6,2	109,5	25,0	12,1	10,5
	6,9	115,3	25,3	12,5	10,8

690 Series Performance Chart

Base Pressure	Nozzle Set 90		Nozzle Set 91		Nozzle Set 92	
Bar	Radius	LPM	Radius	LPM	Radius	LPM
.038	26,5	193	29,2	232	30,5	280
.047	27,4	216	30,5	279	33,0	311

Radius shown in meters.
Sprinkler radius of throw per ASAE standard S398.1.

TG101-NPT Performance Data — 24° Trajectory—Metric

Pressure bar	Nozzle 12mm			Nozzle 14mm			Nozzle 16mm			Nozzle 18mm			Nozzle 20mm			Nozzle 22mm			Nozzle 24mm		
	Flow m³/h	Flow l/s	Radius m	Flow m³/h	Flow l/s	Radius m	Flow m³/h	Flow l/s	Radius m	Flow m³/h	Flow l/s	Radius m	Flow m³/h	Flow l/s	Radius m	Flow m³/h	Flow l/s	Radius m	Flow m³/h	Flow l/s	Radius m
2,0				10,6	2,96	26,0	13,9	3,86	27,9	17,6	4,89	29,7	29,7	6,04	31,5	26,3	7,30	33,1	31,3	8,69	34,7
2,5				11,9	3,31	28,3	15,5	4,32	30,4	19,7	5,47	32,4	24,3	6,75	34,3	29,4	8,17	36,1	35,0	9,72	37,8
3,0	9,6	2,66	27,9	13,0	3,62	30,3	17,0	4,73	32,6	21,6	5,99	34,7	25,6	7,39	36,7	32,2	8,95	38,7	38,3	10,65	40,5
3,5	10,4	2,87	29,5	14,1	3,91	32,1	18,4	5,11	34,5	23,3	6,47	36,8	28,7	7,99	38,9	34,8	9,66	41,0	41,4	11,50	43,0
4,0	11,1	3,07	31,1	15,1	4,18	33,8	19,7	5,46	36,3	24.9	6,91	38,7	30,7	8,54	41,0	37,2	10,33	43,1	44,3	12,29	45,2
4,5	11,7	3,26	32,5	16,0	4,44	35,3	20,9	5,80	38,0	26,4	7,33	40.5	32,6	9,05	42,8	39,4	10,96	45,1	46,9	13,04	47,3
5,0	12,4	3,44	33,8	16,8	4,68	36,8	22,0	6,11	39,5	27,8	7,73	42,1	34,4	9,54	44,6	41,6	11,55	46,9	49,5	13,74	49,2
5,5	13,0	3,60	35,1	17,7	4,91	38,1	23,1	6,41	41,0	29,2	8,11	43,7	36,0	10,01	46,2	43,6	12,11	48,7	51,9	14,42	51,0
6,0	13,6	3,76	36,3	18,4	5,12	39,4	24,1	6,69	42,4	30,5	8,47	45,1	37,6	10,46	47,8	45,5	12,65	50,3	54,2	15,06	52,7
6,5	14,1	3,92	37,4	19,2	5,33	40,6	25,1	6,96	43,6	31,7	8,81	46,5	39,2	10,88	49,3	47,4	13,17	51,9	56,4	15,67	54,4

Note: Products may not be available in all regions. Please consult your Toro regional manager for availability.

640 Series Performance Data

Nozzle	Base Pressure			LPM	Radius	Precip. Rate*	
	Bar	kPa	kg/cm²			■	■
40	3,0	300	3,06	23,6	14,6	7,7	6,6
	3,5	350	3,57	25,5	15,3	7,5	6,5
	4,0	400	4,08	27,2	15,7	7,6	6,6
	4,5	450	4,59	29,0	16,0	7,8	6,8
	5,0	500	5,10	30,9	16,2	8,1	7,1
	5,5	550	5,61	32,5	16,5	8,3	7,2
	6,0	600	6,12	34,1	16,7	8,5	7,3
41	3,0	300	3,06	36,9	15,2	11,0	9,6
	3,5	350	3,57	38,8	16,2	10,2	9,6
	4,0	400	4,08	41,0	16,4	10,5	9,1
	4,5	450	4,59	43,4	16,6	10,9	9,4
	5,0	500	5,10	45,8	16,8	11,2	9,7
	5,5	550	5,61	48,0	17,1	11,4	9,8
	6,0	600	6,12	49,9	17,3	11,5	10,0
42	3,0	300	3,06	46,6	16,2	12,3	10,6
	3,5	350	3,57	49,1	16,8	12,0	10,4
	4,0	400	4,08	52,2	17,0	12,5	10,8
	4,5	450	4,59	54,4	17,2	12,7	11,0
	5,0	500	5,10	56,7	17,5	12,8	11,1
	5,5	550	5,61	59,7	17,7	13,2	11,4
	6,0	600	6,12	62,5	17,7	13,8	11,9
43	3,0	300	3,06	51,7	17,4	11,8	10,2
	3,5	350	3,57	55,2	18,0	11,8	10,2
	4,0	400	4,08	58,5	18,0	12,5	10,8
	4,5	450	4,59	62,0	18,3	12,8	11,1
	5,0	500	5,10	65,6	18,7	13,0	11,2
	5,5	550	5,61	69,1	19,2	13,0	11,2
	6,0	600	6,12	72,2	19,4	13,3	11,5
44	3,0	300	3,06	65,7	17,3	15,2	13,1
	3,5	350	3,57	70,8	18,3	14,6	12,7
	4,0	400	4,08	74,3	18,5	15,0	13,0
	4,5	450	4,59	79,3	18,9	15,4	13,3
	5,0	500	5,10	84,3	19,4	15,5	13,4
	5,5	550	5,61	88,4	19,8	15,6	13,5
	6,0	600	6,12	92,8	20,2	15,7	13,6

Mini 8 Performance Data—Metric

Nozzle	bar	LPM	Radius	Prec. Rate	
				▲	■
.75	2,0	3,0	6,1	5,6	4,8
	2,5	3,3	6,3	5,8	5,0
	3,0	3,8	6,5	6,2	5,4
	3,5	4,6	6,7	7,1	6,1
1.0	2,0	4,2	7,9	4,7	4,0
	2,5	4,6	8,1	4,8	4,2
	3,0	5,2	8,3	5,2	4,5
	3,5	5,7	8,6	5,3	4,6
1.5	2,0	4,5	8,8	4,0	3,5
	2,5	5,0	9,0	4,3	3,7
	3,0	5,6	9,3	4,5	3,9
	3,5	6,1	9,5	4,7	4,0
2.0	2,0	5,3	9,1	4,4	3,8
	2,5	6,0	9,3	4,8	4,2
	3,0	6,8	9,4	5,3	4,6
	3,5	7,7	9,4	6,0	5,2
3.0	2,0	8,7	10,3	5,7	4,9
	2,5	9,4	10,6	5,8	5,0
	3,0	10,4	10,7	6,3	5,4
	3,5	11,5	10,7	6,9	6,0

Radius shown in meters.

Valves Metric Data

EZ-Flo® Friction Loss Data—Metric

Size	Model	LPM Flow					
		1	19	38	57	76	114
25mm (1")	Inline	0,14	0,24	0,28	0,31	0,32	0,43
25mm (1")	Anti-siphon	0,14	0,14	0,31	0,16	0,26	0,56
20mm (¾")	Anti-siphon	0,14	0,29	0,29	0,33	0,52	—

252 Series Friction Loss Data—Metric

Size	Type	Config.	LPM Flow													
			25	50	75	100	125	150	175	200	250	300	400	500	600	700
40mm (1½")	Hydraulic	Globe Angle				0,07 0,07	0,09 0,08	0,14 0,10	0,18 0,10	0,23 0,13	0,34 0,25	0,44 0,34	0,78 0,56	1,06 0,93		
50mm (2")	Hydraulic	Globe Angle									0,14 0,07	0,17 0,13	0,27 0,23	0,43 0,30	0,61 0,37	0,79 0,52
25mm (1")	Electric	Globe Angle	0,2 0,2	0,30 0,26	0,34 0,31	0,42 0,32	0,53 0,40	0,65 0,51								
40mm (1½")	Electric	Globe Angle				0,10 0,09	0,11 0,08	0,14 0,10	0,18 0,12	0,23 0,16	0,32 0,21	0,47 0,33	0,84 0,52	1,20 0,70		
50mm (2")	Electric	Globe Angle									0,14 0,07	0,17 0,13	0,28 0,23	0,45 0,30	0,61 0,37	0,79 0,52

250/260 Series Friction Loss Data—Metric

Size	Model	LPM Flow						
		20	40	60	80	100	125	150
1" (25mm)	Hydraulic	<0,1	0,1	0,1	0,2	0,3	0,5	0,6
1" (25mm)	Electric		0,3	0,3	0,3	0,4	0,5	0,6

TPV Friction Loss Data—Metric

LPM Flow	,38	,94	18,9	37,8	56,8	75,7	113,6	151,4	189,3
Bar Loss	,14	,14	,24	,27	,21	,23	,48	,90	1,34

254/264 Series Friction Loss Data—Metric

Size	Model	LPM Flow							
		2	25	50	75	100	125	150	175
20mm (¾")	Electric	<1,0	0,1	0,4	0,7				
25mm (1")	Electric		0,1	0,2	0,2	0,3	0,4	0,6	0,8

Quick Coupler Series Friction Loss Data—Metric

Model Number	LPM Flow										
	35	50	75	100	125	150	175	225	275	325	375
075-SLSC	0,1	0,2	0,4	0,6							
100-2SLLC			0,1	0,2	0,3	0,5					

P-220S Series Friction Loss Data—Metric

Size	Config.	GPM Flow													
		80	90	100	110	120	130	140	150	180	200	225	250	275	300
2"	Globe Angle	3.87 2.79	4.29 3.58	4.41 5.69	6.50 5.62	7.78 6.4	9.30 7.35	9.94 8.95	12.15 9.94						
3"	Globe Angle								2.65 2.10	3.40 2.65	5.10 4.65	5.98 4.30	6.70 5.54	7.73 6.98	11.05 9.95

220 Brass Series Friction Loss Data—Metric

Model	Type	LPM Flow																			
		25	50	75	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1000	1200	1400
25mm (1")	Electric	0,15	0,13	0,17	0,31	0,41	0,48														
32mm (1¼")	Electric			0,38	0,42	0,47	0,51	0,56	0,61	0,88	1,03										
40mm (1½")	Electric			0,32	0,33	0,36	0,37	0,42	0,47	0,55	0,64	0,79	1,02								
50mm (2")	Electric					0,09	0,14	0,15	0,19	0,24	0,35	0,44	0,51	0,59	0,75	1,00					
65mm (2½")	Electric								0,15	0,16	0,16	0,17	0,17	0,19	0,24	0,33	0,40	0,46			
75mm (3")	Electric									0,16	0,16	0,17	0,17	0,19	0,24	0,33	0,40	0,43	0,46	0,49	0,53

P-220 Series Friction Loss Data—Metric*

Size	Configuration	LPM Flow																					
		40	60	80	100	120	140	160	180	200	250	300	350	400	450	500	550	600	700	800	900	1000	1100
25mm (1")	Globe Angle	0,29 0,29	0,25 0,35	0,25 0,21	0,26 0,20	0,32 0,21	0,43 0,29	0,55 0,38	0,69 0,49	0,82 0,61													
40mm (1½")	Globe Angle					0,12 0,09	0,14 0,10	0,18 0,13	0,23 0,17	0,28 0,22	0,43 0,34	0,62 0,48	0,85 0,65	1,11 0,85									
50mm (2")	Globe Angle											0,14 0,08	0,20 0,12	0,25 0,15	0,32 0,19	0,40 0,24	0,48 0,29	0,54 0,32					
75mm (3")	Globe Angle																	0,18 0,14	0,24 0,19	0,32 0,26	0,41 0,34	0,52 0,43	0,65 0,54

Note: For optimum performance when designing a system, be sure to calculate total friction loss to ensure sufficient downstream pressure.
For optimum regulation performance, size regulating valves toward the higher flow ranges.
Flow rates are recommended not to exceed 0,3 bar loss.
Values shown in bar.
For kPa values, multiply tabular values by 100. For Kg/cm² values, multiply tabular values by 1,02.

** Data taken with EZReg pressure regulation device installed. Data remains the same with or without pressure regulation.*

Landscape Drip Metric Data

DL2000 Performance Table—Metric	
Flow Rate	2.0/4.0 LPH
Coefficient of Variation (Cv)	≤ 5%
Flow Exponent (x)	0.05
Inside Diameter	15,75 mm
Outside Diameter	18,03 mm
Wall	1,143 mm
Operating pressure (P)	1,03–4,13 Bar
Minimum filtration requirement	125 Micron
Hazen-Williams C factor	140
Barb loss factor (Kd)	.98

5/8" (16mm) OD			Inlet Pressure VS Maximum Length of Run In Meters			
Part No.	Flow Rate (LPH)	Emitter Spacing	1,03 bar	1,72 bari	2,07 bar	2,76 bar
RGP-212	2,0 LPH	30,5 cm	76m	110m	122m	140m
RGP-218	2,0 LPH	45,7 cm	107m	157m	172m	198m
RGP-412	4,0 LPH	30,5 cm	49m	73m	79m	91m
RGP-418	4,0 LPH	45,7 cm	73m	104m	114m	131m

Soakerline Performance Table-Metric	
Inside Diameter	4,32 mm
Outside Diameter	6,35 mm
Wall	1,02 mm
Operating Pressure	1,03–4,13 Bar
Minimum Filtration Requirement	105 Micron
Nominal Flow Rate (Q)	2 LPH

Soakerline Length of Run Chart

Part Number	Tubing Size	Flow Rate	Emitter Spacing	Inlet Pressure	Max Length of Run
T-SDX252-6-100	1/4" (6,4mm)	.53 GPH (2,0 LPH)	6" (15,2mm)	15 psi (1,03 bar)	19' (5,8m)
T-SDX252-12-100	1/4" (6,4mm)	.53 GPH (2,0 LPH)	12" (30,5mm)	15 psi (1,03 bar)	33' (10m)

Turbo-SC Performance Table—Metric

		T-DPJ02-A	T-DPJ04-A	T-DPJ08-A
Nominal Flow Rate (Q)	**LPH**	2,0 LPH	4,0 LPH	8,0 LPH
Recom. Pressure Range (P)	**Bar**	0,7–3,5 Bar		
Emitter Exponent (x)		0.02	-0.04	0.01
Min. Filtration Requirement		140 Mesh (105 Micron)		
Color (Base)		Blue	Black	Red

Turbo-SC Flow Rate—Metric

Bar	T-DPJ02-A		T-DPJ08-A
0,5	1,60	2,94	6,01
1,0	1,74	3,49	7,42
1,5	1,95	3,69	8,40
***2,0**	**1,90**	**3,77**	**8,02**
2,5	1,94	3,32	8,11
3,0	1,82	3,69	7,29
3,5	1,78	3,61	6,97
4,0	1,74	3,49	

** Recommended operating pressure*
Values listed in liters per hour.

E-2 Emitter Performance Table—Metric

		T-DBK04	T-DBK08	T-DBK16
Nominal Flow Rate (Q)	**LPH @ 1 Bar**	4 LPH	8 LPH	16 LPH
Flow Coefficient (K)	**Metric Units**	4,15	7,17	14,38
Operating Pressure Range (P)	**Bar**	0–3,5 Bar		
Flow Exponent (X)		0.60	0.57	0.56
Coefficient of Variation (Cv)		≤ 5%	≤ 6%	≤ 6.5%
Minimum Filtration Requirement		140 Mesh (105 Micron)		

E-2 Emitter Flow Rate—Metric

Bar	T-DBK04	T-DBK08	T-DBK16
0,50	2,73	4,82	9,74
*1,00	4,15	7,17	14,38
1,50	5,31	9,04	18,05
2,00	6,31	10,65	21,21
2,50	7,22	12,10	24,04
3,00	8,07	13,43	26,63
3,50	8,85	14,66	29,04

** Recommended operating pressure*
Values listed in gallons per hour.

DL2000 Microline Performance Table—Metric	
Inside Diameter	4,32 mm
Outside Diameter	6,35 mm
Wall	1,02 mm
Operating Pressure	1,03–4,13 Bar
Minimum Filtration Requirement	105 Micron
Nominal Flow Rate (Q)	2 LPH

DL2000 Microline Length of Run Chart

Part Number	Tubing Size	Flow Rate	Emitter Spacing	Inlet Pressure	Maximum Length of Run
T-MCRG-206	1/4"	.53 GPH (2,0 LPH)	6" (15,2mm)	15 psi (1,03 bar)	19' (5,8m)
T-MCRG-212	1/4" (6,4mm)	.53 GPH (2,0 LPH)	12" (30,5mm)	15 psi (1,03 bar)	33' (10m)

Landscape Drip Metric Data

NGE Performance Table—Metric

		T-DPC02	T-DPC04	T-DPC08
Nominal Flow Rate (Q)	**LPH**	2,0 LPH	4,0 LPH	8,0 LPH
Recom. Pressure Range (P)	**Bar**	0,6–4,1 Bar		
Emitter Exponent (x)		0.000	0.000	0.002
Coefficient of Variation (Cv)		3%		
Min. Filtration Requirement		140 Mesh (105 Micron)		
Optional Outlet		-MA (Male Adapter) -DC (Snap-on Dust Cap)		
Color (Cap)		Blue	Black	Red

NGE Flow Rates—Metric

Pressure	T-DPC02	T-DPC04	T-DPC08
Bar	**LPH**	**LPH**	**LPH**
0,41	1,76	3,44	6,56
0,55	1,93	3,84	7,37
0,69	2,00	4,10	7,98
1,03	2,00	4,16	8,35
1,38	2,02	4,08	8,23
1,72	2,04	3,97	8,07
2,07	**2,06**	**3,94**	**8,02**
2,41	2,08	3,94	8,01
2,76	2,09	3,94	8,04
3,10	2,08	3,95	8,11
3,45	2,07	3,96	8,17
3,79	2,06	3,97	8,24
4,14	2,03	3,97	8,27

** Recommended operating pressure*

Drip Zone Kits Flow vs. Friction Loss—Metric

Part Number	LPM	1	19	30	57	76
DZK-EZF-075-LF	Friction Loss (bar)	0,21	0,34	0,34	n/a	n/a
	Minimum Inlet Pressure (bar)	2,01	2,21	2,21	2,34	2,69
DZK-2711-075-MF	Friction Loss (bar)	0,21	0,34	0,34	0,48	0,90
	Minimum Inlet Pressure (bar)	2,01	2,21	2,21	2,34	2,69
DZK-TPV-1-LF	Friction Loss (bar)	0,21	0,34	0,34	n/a	n/a
	Minimum Inlet Pressure (bar)	2,01	2,21	2,21	2,21	2,41
DZK-TPV-1-MF	Friction Loss (bar)	0,21	0,34	0,34	n/a	n/a
	Minimum Inlet Pressure (bar)	2,01	2,21	2,21	2,21	2,41
DZK-700-1-LF	Friction Loss (bar)	0,21	0,34	0,34	n/a	n/a
	Minimum Inlet Pressure (bar)	2,01	2,21	2,21	2,21	2,41
DZK-700-1-MF	Friction Loss (bar)	0,21	0,34	0,34	n/a	n/a
	Minimum Inlet Pressure (bar)	2,01	2,21	2,21	2,21	2,41
DZK-700-1-MF	Min. Inlet Pressure (bar)	0,21	0,34	0,34	0,34	0,55
	Minimum Inlet Pressure (bar)	2,01	2,21	2,21	2,21	2,41

Dripin PC Brown Performance Table—Metric

Flow Rate	2.0/4.0 LPH
Coefficient of Variation (Cv)	≤ 5%
Flow Exponent (x)	0.05
Inside Diameter	15,75 mm
Outside Diameter	18,03 mm
Wall	1,143 mm
Operating Pressure (P)	1,03–4,13 Bar
Minimum Filtration Requirement	125 Micron
Hazen-Williams C Factor	140
Barb Loss Factor (Kd)	.98

Dripin PC Brown Length of Run—Metric

15.75mm ID / 18mm OD)				Inlet pressure vs. Max length of run in Meters			
Part Number	Tubing Size	Flow Rate	Emitter Spacing	1.03 bar	1.72 bar	2.07 bar	2.76 bar
T-PCS1853-12	15.75 mm ID	2.0 lph	30.5 cm	76 m	110 m	122 m	140 m
T-PCS1853-18	15.75 mm ID	2.0 lph	45.7 cm	107 m	157 m	172 m	198 m
T-PCS1853-24	15.75 mm ID	2.0 lph	61.0 cm	137 m	198 m	219 m	251 m
T-PCS1810-12	15.75 mm ID	4.0 lph	30.5 cm	49 m	73 m	79 m	91 m
T-PCS1810-18	15.75 mm ID	4.0 lph	45.7 cm	73 m	104 m	114 m	131 m
T-PCS1810-24	15.75 mm ID	4.0 lph	61.0 cm	91 m	130 m	145 m	165 m

Toro Limited Warranty for Irrigation Products

The Toro Company and its affiliate, Toro Warranty Company, pursuant to an agreement between them, jointly warrants to the owner, each new piece of irrigation product (featured in the current catalog at date of installation) against defects in material and workmanship for a period described herein, provided they are used for irrigation purposes under manufacturer's recommended specifications.

During the warranty period, we will repair or replace, at our option, any part found to be defective. Your remedy is limited solely to the replacement or repair of defective parts. This warranty does not apply (i) to Acts of God (e.g., lightning, flooding, etc.) unless specifically listed under the Extended Lightning Protection Warranty provided herein; or (ii) to products not manufactured by Toro when used in conjunction with Toro products; or (iii) where equipment is used or installation is performed in any manner contrary to Toro's specifications and instructions, or where equipment is altered or modified.

Return the defective part to your irrigation contractor or installer, or your local distributor who may be listed in your telephone directory Yellow Pages under "Irrigation Supplies" or "Sprinkler Systems," or contact The Toro Warranty Company, 5825 Jasmine Street Riverside, California 92504, phone (877) 345-8676 for the location of your nearest Toro distributor, or outside the U.S., call (951)-688-9221.

Neither Toro nor Toro Warranty Company is liable for indirect, incidental or consequential damages in connection with the use of equipment, including but not limited to: vegetation loss, the cost of substitute equipment or services required during periods of malfunction or resulting non-use, property damage or personal injury resulting from installer's actions, whether negligent or otherwise. Some states do not allow the exclusion of incidental or consequential damages, so this exclusion may not apply to you.

All implied warranties, including those of merchantability and fitness for use, are limited to the duration of this express warranty.

Some states do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you.

This warranty gives you specific legal rights and you may have other rights, which vary from state to state.

Standard Warranty

Toro Irrigation Division products are covered by this warranty for a period of two years from the date of installation, except as otherwise noted.

Extended Three-year Warranty

The following products are covered by this warranty for three years from date of installation: TMC-212 Series, DDC™WP controller, and EZ-Flo® Plus Series valves.

Extended Five-year Warranty

The following products are covered by this warranty for five years from date of installation: 570Z PR and 570Z PRX Series fixed sprays; Precision Rotating Nozzle, Super 800 Series, TR50XT Series, 2001® Series, T5 Series, TR70P and TR70XTP Series, T7 Series, TS90 and 640 Series rotors; TPV Series, P-220 Series and 220 Brass Series valves; TMC-424E Series, Intelli-Sense™ (TIS-612/TIS-240/TIS-PRO), TDC controller and Custom Command Series controllers; and TWRS Wireless RainSensor™ Series (receiver and transmitter).

Sentinel® Series Product Warranty

All Sentinel centrals, with the exception of centrals covered by the Toro National Support Network (NSN®), and Sentinel hand held remotes are covered by this warranty for a period of two years from date of installation.

All Sentinel Series satellites are covered by this warranty for a period of five years from date of installation.

Lightning Protection Warranty

In addition to the extended five-year warranty, the Toro TMC-424E installed with High Surge Modules and Custom Command Series controllers are specifically warranted against lightning-related damage for a period of five years from date of installation when properly installed and grounded in accordance with the installation instructions.

Landscape Drip Warranty

Warranty period from date of delivery:

DL2000® Series Dripline
- Emitters 2 years
- Hose 5 years (prorated)
- Rootguard 7 years

Drip In® Series Dripline
- Emitters 2 years
- Hose 5 years (prorated)

Blue Stripe® Hose
- All 7 years (prorated)

Fittings
- All 1 year

Emission Devices
- All (except NGE) 1 year
- NGE Emitter 2 years

Filters and Components
- All 1 year

Other Accessories
- All 1 year

Grounding

The Toro Warranty for Irrigation Controllers is void if controller is not properly grounded per instruction manual. A good ground source is a mandatory component of overall surge protection for Toro Irrigation Control Systems. Grounding electrode(s) should be placed at each automatic controller or controller group locations. The resistance to the grounding electrode should not exceed 10 Ohms when measured with a Megger Earth Resistance Testing instrument or equivalent. It is the responsibility of the installer to connect all electronic irrigation equipment for which he is responsible to earth ground in accordance with Article 250 of the National Electrical Code (NEC.) Even with optimum grounding, neither Toro nor Toro Warranty Company are liable for product failures due to acts of God (i.e., lightning, flooding, etc.) and these failures are not covered by warranty.

We reserve the right to improve our products and make changes in the specifications and designs without notice and without incurring obligation.

Products depicted in this brochure are for demonstration purposes only. Actual products offered for sale may vary in design and features.

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