



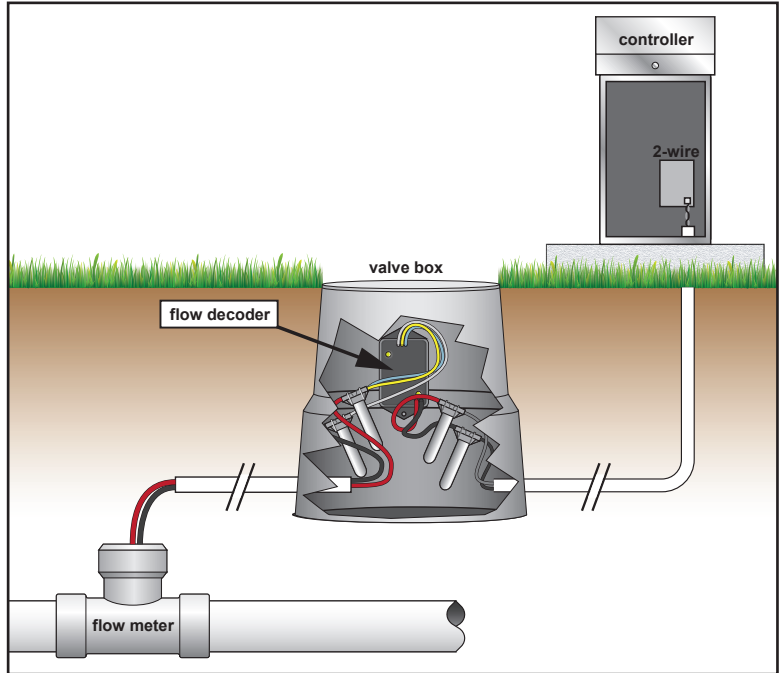
TW-DAC-FLOW Decoder

Installation Guide

Introduction

Toro's TW-DAC-FLOW (hereafter referred to as 'FLOW') decoder is a two-wire decoder that is designed to work with most flow sensors and flow meters that produce a pulsed output. The FLOW decoder transmits the pulse data between the flow device and the controller.

A flow sensor or flow meter measures the movement of the water as it moves past a sensor typically in pulses per gallon. Toro controllers convert the pulse reading into a gallons per minute (GPM) value. The K-value and Offset accounts for pipe size when calculating water usage.

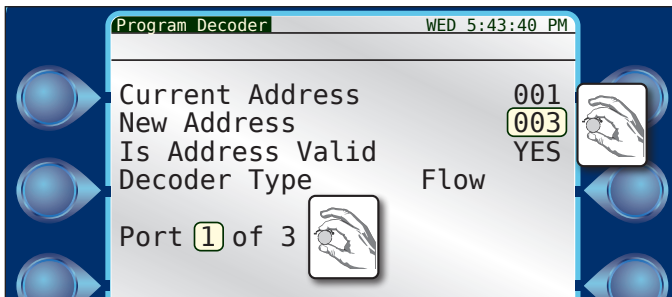
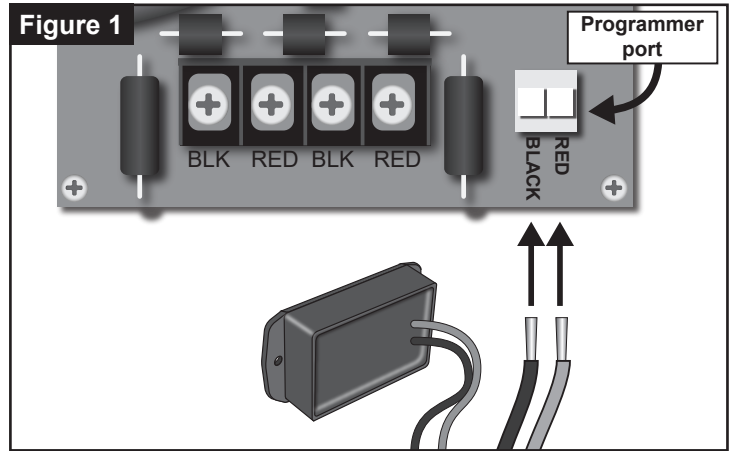


Addressing the Sensor

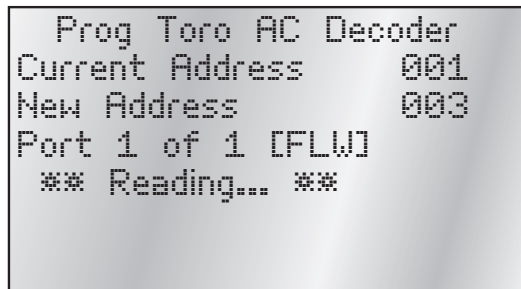
Before installing the sensor into the field, we must assign an address to the sensor to establish communication.

To assign an address to the sensor:

1. At the controller, connect the sensor physically to the programmer port on the two-wire gateway.
 - Decoder output board must be FW version 2.5 or higher to program flow and moisture decoder addresses.
2. Go to the Program Decoder screen.
 - for the **DX3**: select Setup --> Page 2 --> Program Decoder.
 - for the **Sentinel**: press the Option button, scroll to Prog Toro AC Decoder, hit Enter.



DX3 screen



Sentinel screen

3. Assign an address to the sensor in the New Address field:
 - DX3 can be assigned 1,2, or 3
 - Sentinel can be assigned 3, 4, or 5

Addressing the Sensor (continued)

4. Disconnect the decoder and mark it with the new address. It is now ready to install in the field.

Pro Tip: Station, flow and moisture decoders can also be programmed using the second generation field programmer TW-PROG-2.

Installation Instructions

1. Power off the two-wire controller during the installation of any two-wire device.
2. Install the FLOW decoder as close to the flow device as possible. Follow the flow meter manufacturer's specifications for required straight pipe before and after the flow meter for accurate readings.
3. Connect the red and black wires from the FLOW decoder to the red and black wires from the two-wire field. Be sure to maintain polarity by connecting red to red and black to black. Use 3M™ BR/Y-6 or equivalent moisture-resistant connectors for all of these connections. Leave 24 to 36 inches of slack on the two-wire to allow for easy installation and maintenance.
4. Depending on the flow device, connect the white, yellow, and blue wires from the FLOW decoder to the wires from the flow device. Use 3M™ DBR/Y-6 or equivalent moisture-resistant connectors for all of these connections.
 - For devices with two wires, see page 3.
 - For devices with three wires, see page 4.
5. Verify communications from the controller to the FLOW decoder (see **Communication Verification Procedures**, next page).

Communication Verification Procedures

For the DX3 and Sentinel communication verification procedures to work, the following firmware and software versions must be met or exceeded:

DX3 and Laguna

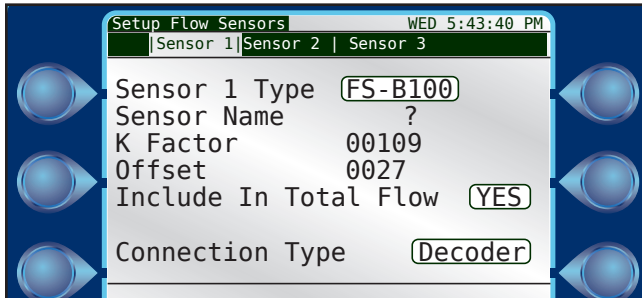
- DX3 firmware: 4.0.71 or higher
- Laguna software: 2.0.768.0 or higher

Sentinel

- Sentinel firmware: 3.60.14 or higher
- Sentinel software: 3.3.4.8 or higher

DX3 Verification Procedure

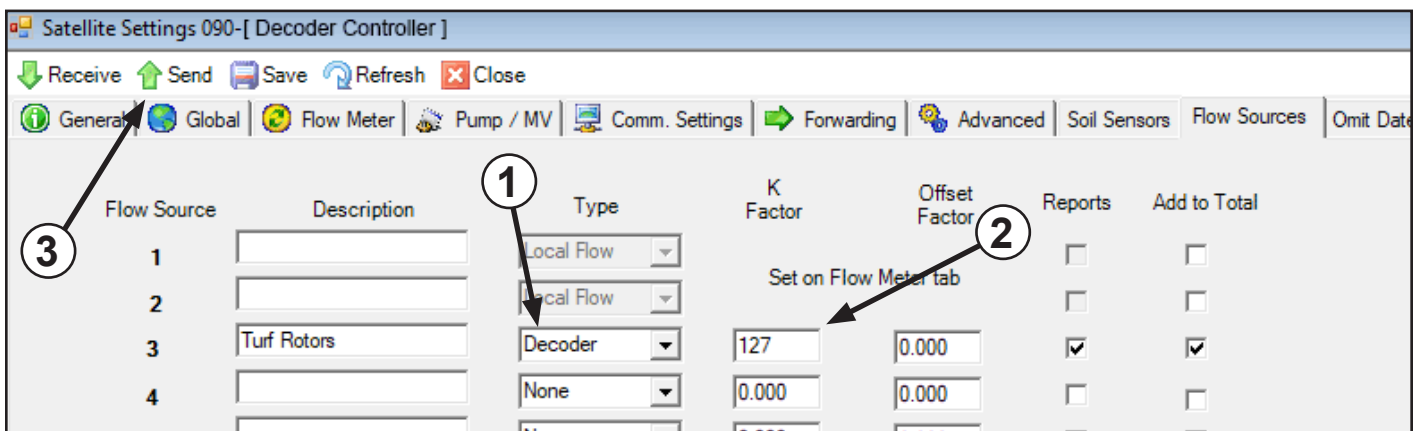
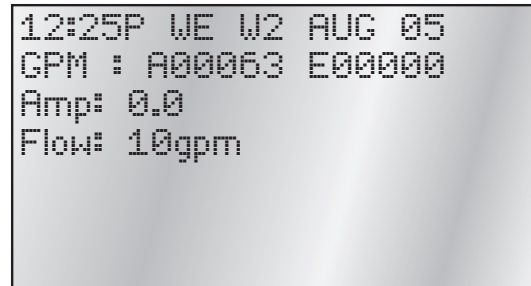
1. Add the sensor to the controller.
Select Setup --> Flow --> Flow Sensors.



2. Select the correct flow sensor or adjust the K and Offset values for a custom sensor.
3. Upon setting the connection type to Decoder, the controller will immediately generate a communication alert for the decoder; this is normal. Assuming the flow sensor is a) wired correctly, b) addressed properly, and c) connection type has been set correctly, the alert will disappear within one minute. Communication between the controller and decoder is setup. Flow readings can now be monitored and viewed in the same manner as conventionally wired flow sensors.

Sentinel Verification Procedure

1. At the WMS central software (see below), set the flow sensor type to Decoder (1). Set the K & Offset values (2). Send to the controller (3).
2. Upon setting the connection type to Decoder, the controller will immediately generate a communication alert for the decoder; this is normal. Assuming the flow sensor is a) wired correctly, b) addressed properly, and c) connection type has been set correctly, the alert will disappear within one minute. Communication between the controller and decoder is setup. Flow readings can now be monitored and viewed in the same manner as conventionally wired flow sensors.



WMS central software

Flow Decoder with Two Wires

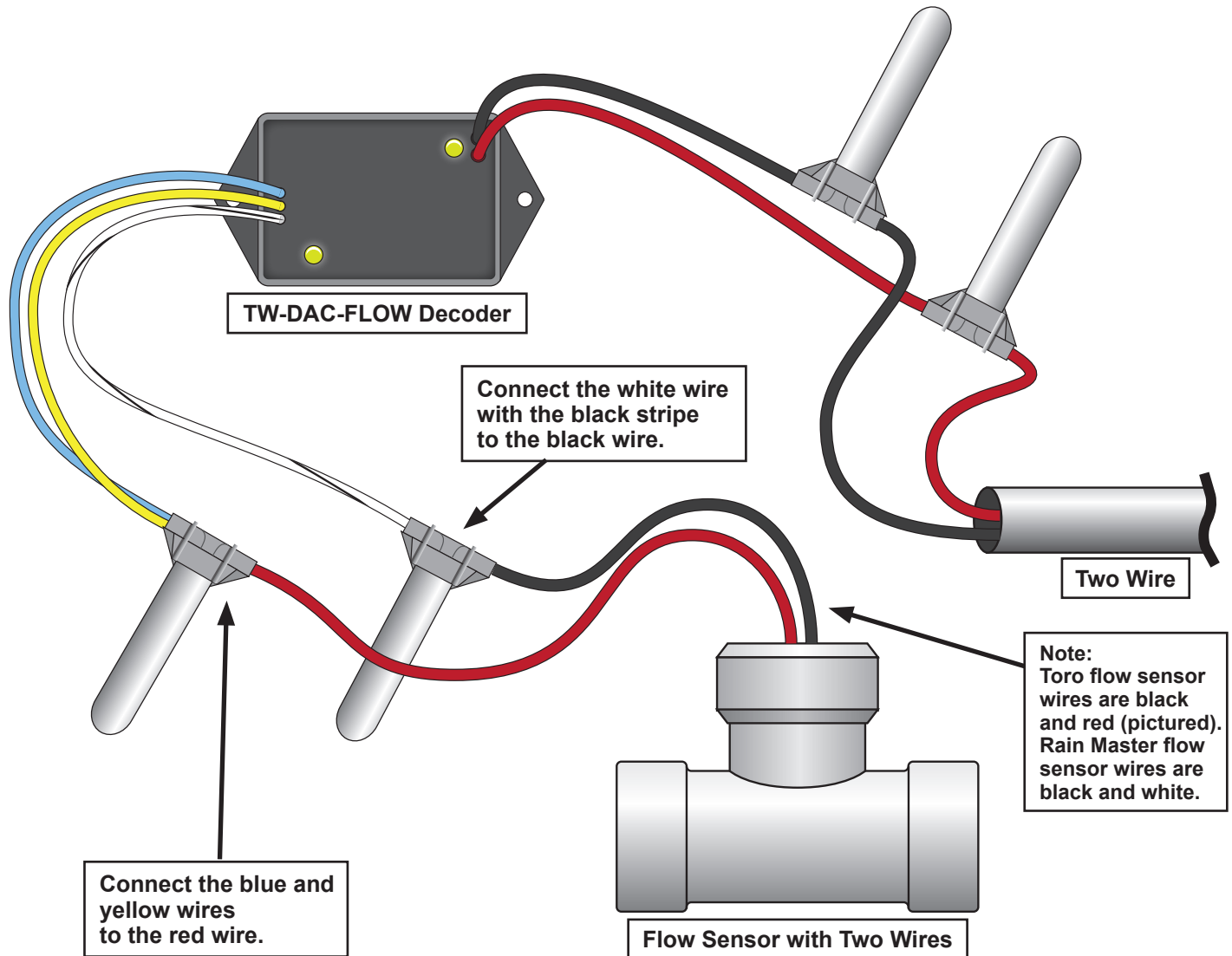
(Data Industrial Flow and Similar Two-Wire Sensors)

TW-DAC-FLOW Decoder Wire Key


Blue wire = power

Yellow wire = sensor

White wire with black stripe = common



IMPORTANT: Connect the blue wire only when power needs to be supplied to the flow sensor.

 If additional wire is needed, use TW-CAB-14 wire for connections to the 2-wire path and EV-CAB-SEN wire for connections to the flow sensor pulsed output..

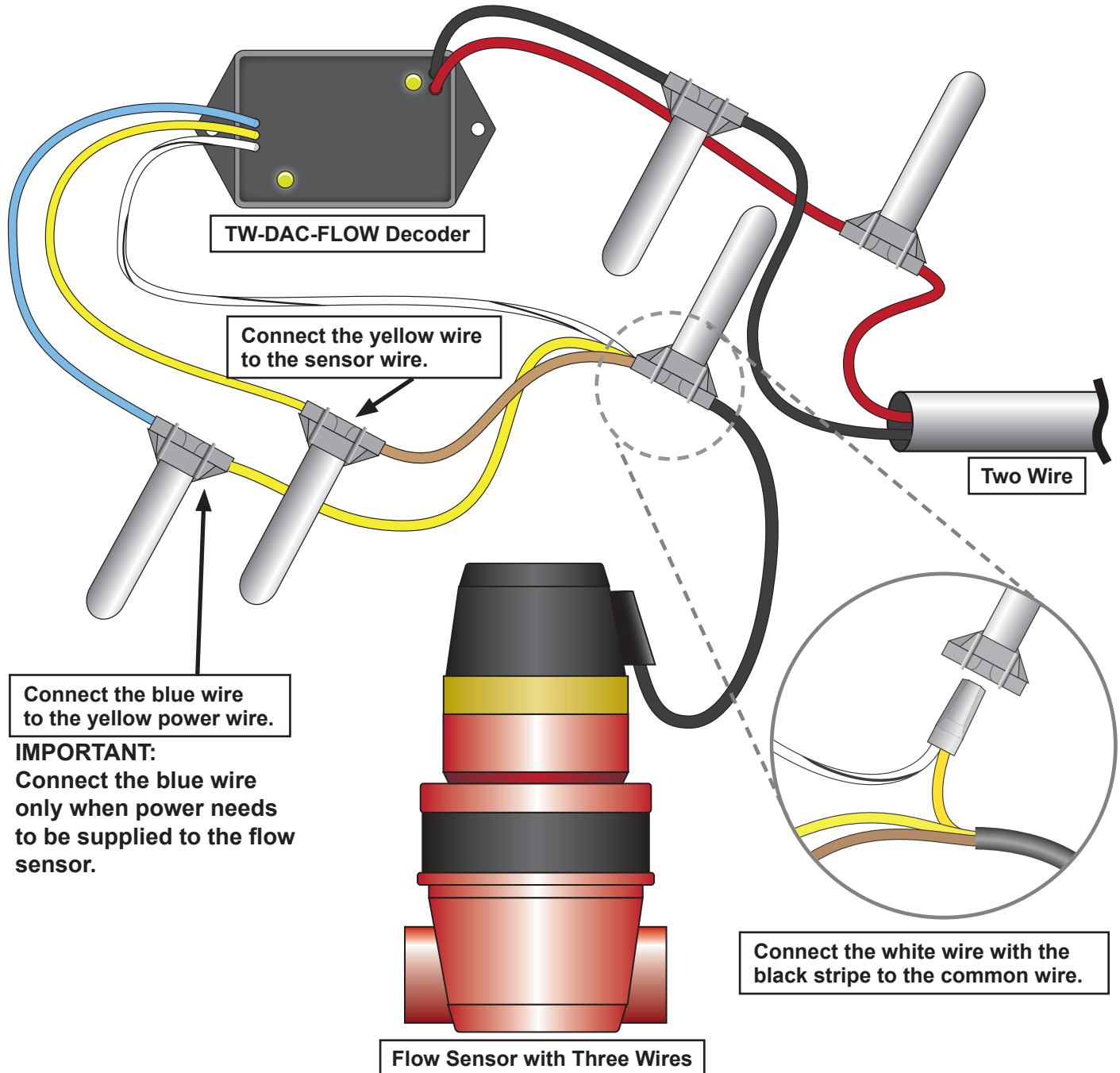
Notes

- You must use a water meter register that provides at least 10 pulses per gallon. A Reed Switch Register does not generate enough pulses per gallon for meaningful flow measurements for many installations.
- You must have a water meter and register (pipe size and flow rate) that will generate at least 100 pulses per minute to have reasonable flow readings. 200 pulses per minute is better.
- For Data Industrial sensors, the maximum wire length from flow decoder to flow sensor is 1,000'.

Flow Decoder with Three Wires

(Three-Wire Water Meters)

TW-DAC-FLOW Decoder Wire Key
Blue wire = power
Yellow wire = sensor
White wire with black stripe = common



Notes

- You must use a water meter register that provides at least 10 pulses per gallon. A Reed Switch Register does not generate enough pulses per gallon for meaningful flow measurements for many installations.
- You must have a water meter and register (pipe size and flow rate) that will generate at least 100 pulses per minute to have reasonable flow readings. 200 pulses per minute is better.
- For Data Industrial sensors, the maximum wire length from flow decoder to flow sensor is 1,000'.


Common K-Values and Offsets

Flow Sensor Selection Chart

Flow Sensor Model	Pipe Connection Size	Suggested Operating Range	Maximum Water Pressure	Rain Master K Value	Rain Master Offset Value	Toro K Value	Toro Offset Value	Body Material	Connection Type
FS-B100	1"	2 - 40 GPM	400 psi	109	27	0.399	0.105	Brass	NPT female
FS-B125	1 ¼"	3 - 60 GPM	400 psi	209	32	0.766	0.125	Brass	NPT female
FS-B150	1 ½"	4 - 80 GPM	400 psi	291	24	1.066	0.094	Brass	NPT female
FS-B200	2"	10 - 100 GPM	200 psi	750	0	2.747	0	Brass	NTP female with copper male adapter
FS-B250	2 ½"	16 - 160 GPM	200 psi	1021	370	3.740	1.445	Brass	NTP female
FS-150	1 ½"	5 - 100 GPM	100 psi @ 68F	457	0	1.674	0	PVC	Slip
FS-200	2"	10 - 200 GPM	100 psi @ 68F	776	104	2.842	0.406	PVC	Slip
FS-300	3"	20 - 300 GPM	100 psi @ 68F	2268	483	8.308	1.887	PVC	Slip
FS-400	4"	40 - 500 GPM	100 psi @ 68F	3752	834	13.744	3.258	PVC	Slip
FS-10	1"	.86 - 52 GPM	240 psi	87	6	0.319	0.105	PVC	Socket
FS-B15	1 ½"	3 - 90 GPM	250 psi	208	34	0.762	0.133	Brass	FIPT
FS-15	1 ½"	1.8 - 108 GPM	240 psi	177	205	0.648	0.801	PVC	Socket
FS-20	2"	2.8 - 170 GPM	240 psi	325	256	1.190	1	PVC	Socket
RM-S30	3"	6 - 288 GPM	150 psi	751	431	2.751	1.684	PVC	Saddle
RM-S40	4"	10 - 480 GPM	150 psi	1237	303	4.531	1.184	PVC	Saddle
RM-S60	6"	45 - 1080 GPM	150 psi	2839	903	10.399	3.527	PVC	Saddle
FS-INSERT-B	3 to 40 inches	Varies. Call factory.	400 psi	Varies. Call factory.		Varies. Call factory.		Requires pipe saddle with 2" female NPT	



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 For more information, please visit www.toro.com/CAProp65.

Patent: www.ttcopats.com