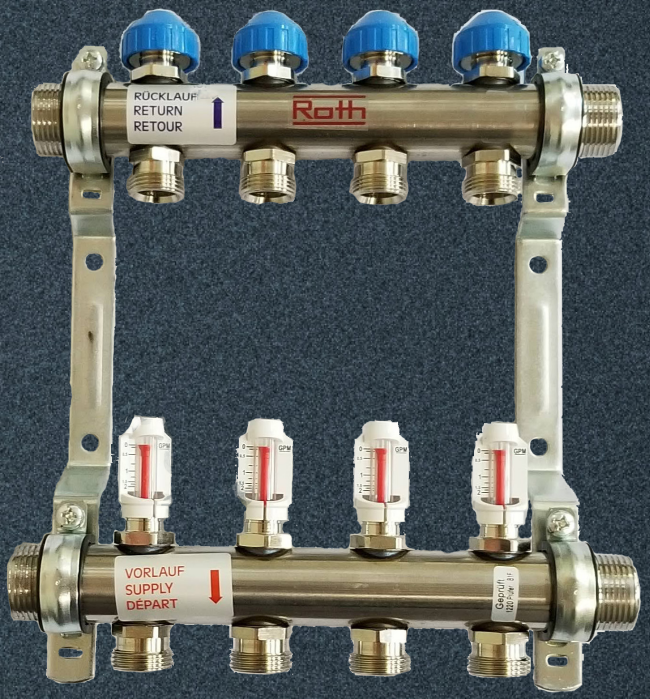
Installation and Operating Instructions



Roth Stainless Steel Manifold Line

V.8.2020

Living full of energy

Roth Industries, Inc
PO Box 245
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Stainless Steel Manifold System Installation and Operation Manual

Product Cautions

Prior to starting work, the installer must read, understand and heed these installation and operating instructions. The manifolds may only be installed, adjusted and maintained by trained contractors.Trainees may only work on the product under the supervision of an experienced person. Only if the above instructions have been adhered to will Roth Industries, Inc. accept any liability in line with statuatory provisions. Every instruction contained in these installation and operating instructions is to be heeded when using the manifolds.

Intended Use

The manifolds are used for distributing and regulating the volume of flow in low temperature heating and cooling systems. The manifolds will operate more efficiently and with greater longevity with the use of high quality fluid with a low concentration of the minerals that create hard water. In the case of systems using heating fluid which contains corrosive particles and other contaminants, dirt traps or filters with a mesh size of no more than 0.8 mm (.032”, 800 micron) should be installed in order to protect the measuring and control devices.

The maximum permissible continuous operating pressure is 145 psi @ 176°F (10 bar @ 80°C). During the pressure test, the return control valves must be closed. Using the manifolds for any purpose other that set out in these instructions constitutes improper use. Roth Industries, Inc. accepts no liability for damage resulting from improper use of it’s manifolds.

For safety and guarantee reasons, no conversion or modification is permitted.

Roth Industries, Inc. accepts no liability if connections and accessories made by other manufacturers are used.

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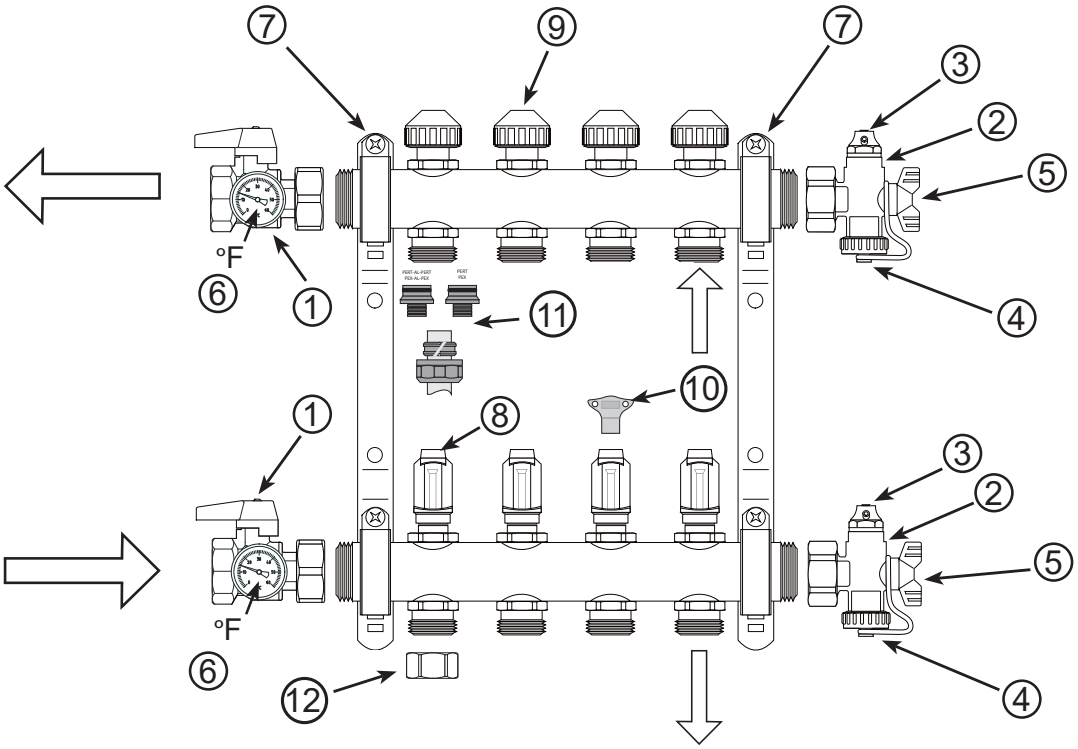
Product description

- Constructed of “Eco” friendly, non-polished stainless steel
- Available in 1” and 1 1/4” trunk sizes, 2 - 12 loop connections
- Sets include:
  - Straight isolation ball valves on trunk supply and return connections (1)
  - Fill/drain/vent tees (2)
  - Manual air vents (3)
  - Fill/drain vent with 3/4” garden hose thread (4)
  - 1/4 Turn valve (5)
  - Temperature gauges on supply and return isolation ball valves (6)
  - Steel mounting brackets with rubber isolators (7)
  - Flowmeters on supply manifold outlets with 0 - 2gpm scale (8)
  - Flow regulator valves with manual multi-turn operators on return manifold inlets (9)
  - Flow adjustment key (10)
- Isolation ball valves and fill/drain/vent tees can be connected on either end of the supply/return trunks
- 3/4” Euroconical compression fittings (11) used to attach tubing to manifold inlets/outlets (sold separately)
- Circuits not used can be shut off and protected with a loop cap (12) (sold separately)



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Unpacking, inspection and assembly

Inspection

Inspect package upon receipt to ensure all contents are included and for damage during shipping

Package contents

Supply and return manifold trunks attached to support brackets
- Supply manifold includes flowmeters
- Return manifold includes flow control valves w/ blue covers

Supply straight isolation ball valve - red - 1” or 1 1/4” (FPT)
Return straight isolation ball valve - blue - 1” or 1 1/4” (FPT)
End tee with manual air vent and fill/drain valve (2)
Temperature gauges (2)
Loop labels
Installation and Operation Manual

Assembly

Attach red handled isolation ball valve on the supply manifold trunk with flowmeters*
Attach blue handled isolation ball valve on the return manifold trunk with flow control valves*
Attach end tee to opposite end of each manifold trunk*
* Can be attached to either end of the manifold trunk
Insert temperature gauges into the isolation ball valves

Accessories (ordered and sold separately)

Description	Part No.
Loop Actuator 24V 4-wire	2340055354
Automatic Air Vent	2315021004
Differential Pressure Bypass Valve -1”	2315021005
Manifold Extension Fittings 1”	2315021006
Loop Cap - 3/4” w/ Gasket	2315021007
Trunk Cap - 1”	2315021008
Trunk Cap - 1 1/4”	2315021009
Manifold Trunk Coupling - 1”	2315021010
Manifold Trunk Coupling - 1 1/4”	2315021011

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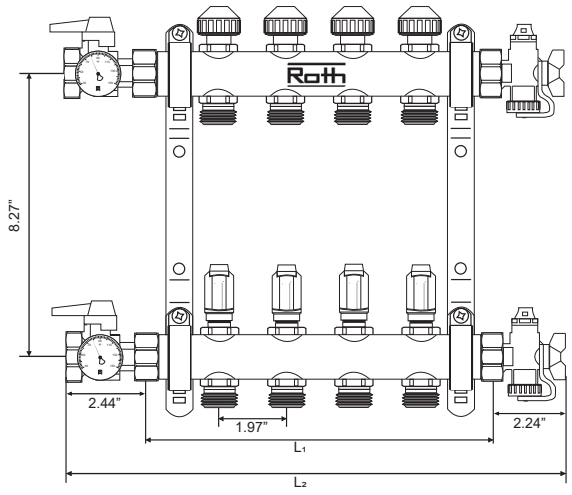
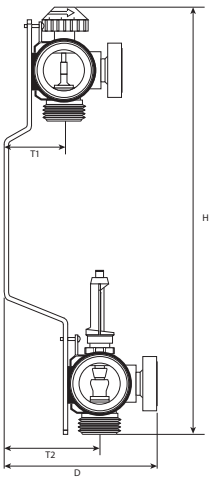
Stainless Steel Manifold System Installation and Operation Manual

Dimensions





Dimension	1"	1 1/4"
T1 (inch)	1.54	1.69
T1 (mm)	39	43
T2 (inch)	2.52	2.68
T2 (mm)	64	68
D (inch)	3.39	3.7
D (mm)	86	94
H (inch)	11.5	11.9
H (mm)	292	303

Part No.	Description	Length (L_1)		Length (L_2)	
		Inches	mm	Inches	mm
2315020002	1" Stainless Steel Manifold Set 2 Loops	6.3	160	11	279
2315020003	1" Stainless Steel Manifold Set 3 Loops	8.3	210	13	329
2315020004	1" Stainless Steel Manifold Set 4 Loops	10.3	260	15	379
2315020005	1" Stainless Steel Manifold Set 5 Loops	12.2	310	17	429
2315020006	1" Stainless Steel Manifold Set 6 Loops	14.2	360	19	479
2315020007	1" Stainless Steel Manifold Set 7 Loops	16.2	410	21	529
2315020008	1" Stainless Steel Manifold Set 8 Loops	18.1	460	23	579
2315020009	1" Stainless Steel Manifold Set 9 Loops	20.1	510	25	629
2315020010	1" Stainless Steel Manifold Set 10 Loops	22	560	27	679
2315020011	1" Stainless Steel Manifold Set 11 Loops	24	610	29	729
2315020012	1" Stainless Steel Manifold Set 12 Loops	26	660	31	779
2315020103	1 1/4" Stainless Steel Manifold Set 3 Loops	8.3	210	13	329
2315020104	1 1/4" Stainless Steel Manifold Set 4 Loops	10.3	260	15	379
2315020105	1 1/4" Stainless Steel Manifold Set 5 Loops	12.2	310	17	429
2315020106	1 1/4" Stainless Steel Manifold Set 6 Loops	14.2	360	19	479
2315020107	1 1/4" Stainless Steel Manifold Set 7 Loops	16.2	410	21	529
2315020108	1 1/4" Stainless Steel Manifold Set 8 Loops	18.1	460	23	579
2315020109	1 1/4" Stainless Steel Manifold Set 9 Loops	20.1	510	25	629
2315020110	1 1/4" Stainless Steel Manifold Set 10 Loops	22	560	27	679
2315020111	1 1/4" Stainless Steel Manifold Set 11 Loops	24	610	29	729
2315020112	1 1/4" Stainless Steel Manifold Set 12 Loops	26	660	31	779

Part #	Description
	PE-RT/PEX Fittings
2315021000	Manifold Tubing Fitting Assembly - 3/8" pkg of 10
2315021001	Manifold Tubing Fitting Assembly - 1/2" pkg of 10
2315021002	Manifold Tubing Fitting Assembly - 5/8" pkg of 10
2315021003	Manifold Tubing Fitting Assembly - 3/4" pkg of 2
	Alu-Laser Plus Fittings*
2347131300	Manifold Tubing Fitting Assembly - 3/8" pkg of 10
2347002331	Manifold Tubing Fitting Assembly - 1/2" pkg of 10
2347002332	Manifold Tubing Fitting Assembly - 5/8" pkg of 10

* - Brass fittings

Specifications

Parameter	Value
Maximum Operating Temperature	176°F (80°C)
Minimum Operating Temperature	14°F (-10°C)
Maximum Operating Pressure	87 psi (6 bar)
Recommended Test Pressure (24 hr.)	87 psi (6 bar)
Temperature Gauge Range	32°F - 212°F (0°C - 100°C)
Flowmeter Range	0 - 2 gpm (0 - 7.5 lpm)

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Mounting

Location Guidelines

- The manifold system must be accessible for future inspection and maintenance.
- The supply/return and loop tubing should have an unobstructed approach and any bend radius must be large enough to prevent kinking.
- Manifold systems should not be located in flood prone areas or exposed to the elements.
- Avoid exposing tubing to direct sunlight, even through a door or window. Long term exposure to UV rays will cause the tubing to deteriorate.
- If manifold systems are located in an unconditioned space, appropriate measure must be taken to prevent damage from freezing.
- Manifold must be level/plumb depending on mounting orientation.

Orientation

The RSS manifold set can be mounted in any position, however the following conditions may occur when the manifolds are mounted in positions other than the upright position (loop tubing approaching from the bottom):

- Upside down (loop tubing approacing from the top)
  - Dirt may accumulate in the flow meters over time. This will not have any effect on the flow rate but may cause flow indicators to give false readings or stop working altogether.
  - The flow meters will indicate flow, however they will lose some of their precision. The flowmeters may indicate up to 20% less than actual flow.
  - The manual air vents must be inverted to operate as intended.
- Vertical position ((loop tubing approaching from either side)
  - Dirt may accumulate in the flow indicators with the same effect as above.
  - The flow meters will indicate flow, however they will lose some ot their precision. The flowmeters may indicate up to 20% less than actual flow.
  - The manual air vent will operate as intended if it is located at the top of the manifold

Notification: Conditions above do not qualify for warranty replacement.

Attachment

- There are four mounting holes in the bracket set for attaching the manifold set using the appropriate fasteners for the mounting surface material.
- When using a manifold cabinet, attach the manifold to the C profile rails using the supplied bolts. Refer to manifold cabinet instructions for further information.

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Pipe connections

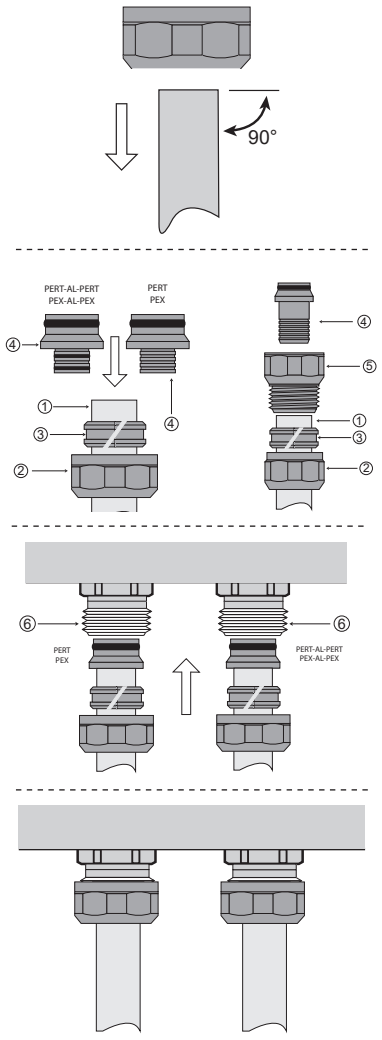
Manifold trunk connections

- The manifold trunks each have a 1” or 1 1/4” male BSPP thread for attaching the ball valve assemblies and flush/fill and vent tees, with flat jonts. The union nuts on the assemblies are to be tightened with a 38 mm wrench to 26 - 33 ft. lbs. (35-45Nm). Do not use pipe thread sealant.

Supply and return connections

- The ball valve assemblies each have a 1” or 1 1/4” FNPT thread. Threaded adaptors should be fastened to the ball valves using a pipe thread sealant.

Tubing Connections



Instructions for 3/8”, 1/2” & 5/8” fitting assemblies:

- Cut tubing at a right angle and clean edges of any burrs.
- If attachiing PERT-AL-PERT or PEX-AL-PEX be sure to bevel inside edge with a reaming tool.
- Push compression nut (2) and split ring (3) over the tubing (1).
- Insert euroconical fitting (4) into the tubing all the way to the backstop.
- Push the euroconical fitting into the threaded manifold fitting (6) until it seats.
- Push the split ring up the tubing leaving approximately 1/8” of tubing at the end.
- Push compression nut up onto threaded manifold fitting and hand tighten.
- Using two wrenches (24mm and 30mm) tighten the compression nut to approximately 18 lb. ft. (25-30 Nm).

Instructions for 3/4” fitting assemblies:

- Cut tubing at a right angle and clean edges of any burrs.
- Push compression nut (2) and split ring (3) over the tubing (1).
- Insert tubing through adapter (5).
- Insert euroconical fitting (4) into the tubing all the way to the backstop.
- Push the euroconical fitting into the threaded manifold fitting on the (6) until it seats.
- Thread adapter (5) onto threaded fitting on the manifold (6) and hand tighten.
- Push the split ring up the tubing until it makes contact with the adapter (5).
- Push compression nut up onto threaded adapter (5) and hand tighten.
- Using two wrenches (24mm and 30mm) tighten first the adaptor and then the compression nut to approximately 18 lb. ft. (25-30 Nm).

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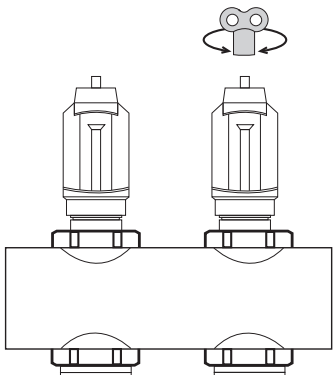
Filling and Purging

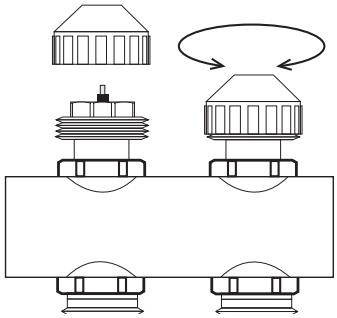
Caution - It is important that the direction of flow be from the supply manifold (with flowmeters) to the return manifold (with control valve & blue cap).

Note: All control valves and flowmeters are shipped in the fully open position.



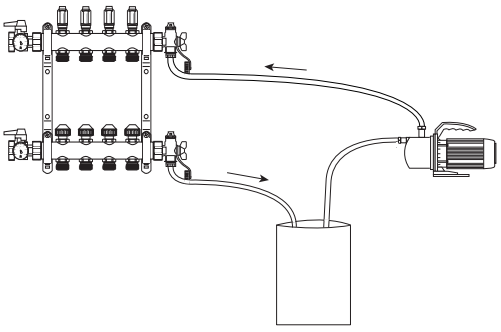
Filling

- Close supply and return isolation ball valves on trunks.
- Close the air vents.
- Open, if needed, all flow meters using flow adjustment key.
- Open all control valves, if needed, by turning blue caps counter clockwise.
- Remove caps and attach service hoses to fill/drain valves.
- Open 1/4 turn valves on fill/drain valves.
- Add fluid at the supply manifold through the tubing and exiting at the return manifold fill/drain valve.
- When a full stream of fluid exits the return hose open the manual air vents until fluid seeps out and close.
- When system is filled, close fill/drain 1/4 turn valves.



Air Purging

- Close all control valves by turning blue cap clockwise with the exception of the loop closest to the supply and return isolation ball valves.
- The flow meters can be closed using flow adjustment key. **However this is not necessary for filling and purging the system.** It is best to keep the flowmeters in the fully open position.
- Open 1/4 turn valves on fill/drain valves.
- Circulate fluid from the supply manifold to the return manifold until there are no visible air bubbles in the fluid. A velocity greater than 2 ft./sec is needed to move trapped air bubbles in the tubing and manifolds. See flow rate velocity chart in addendum.
- When using a jet pump, pull fluid from a reservoir, pump through the circuit and back into the reservoir keeping the hoses in the reservoir to maintain a closed circuit. Circulate until there are no bubbles in the returning fluid.
- Close control valve and repeat with next circuit until all circuits have been individually purged.



Caution: Please avoid high differential pressure (> 14 psi) and pressure shocks.

If flowmeter is closed off, the following order must be observed when opening to avoid malfunctioning and damage: First open the flowmeter, then the control valve. Sequence must be observed!

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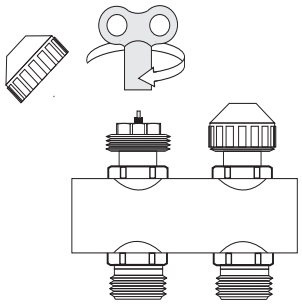
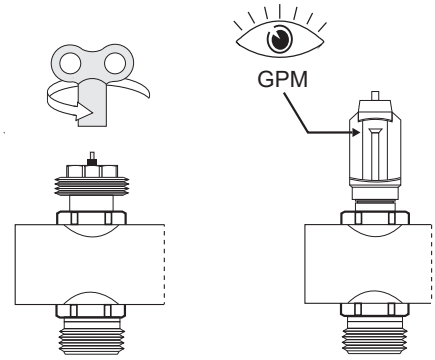
Flow Adjustment



Before adjusting the flow make sure all flowmeters are fully open.

Remove blue plastic cap on the return control valve. Close the valve by turning the air vent key clockwise.

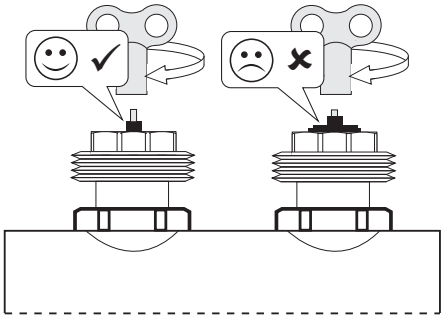


Adjust the required flow rate by turning the regulation spindle of the return control valve to the left.

View the actual flow at the flowmeter.

After all the circuits are adjusted, check the flow rates and re-adjust if necessary.

Note: The flowmeter is <u>not</u> used to regulate flow. This is done only at the return control valve.

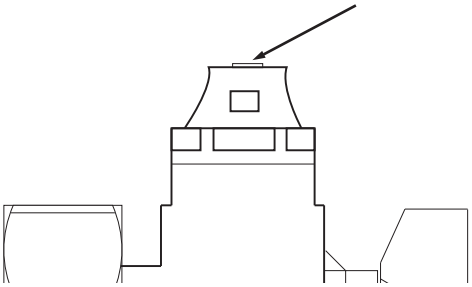


The fine thread of the adjusting spindle must not be seen above the edge of the size 19 hex.

Based on closed status, the valve is open (full flow) after 2.5 to 3 turns to the left.

Once the circuits are adjusted, screw the blue caps back on the return control valves. This protects the valves from accidental adjustment and from getting dirty.

Air Venting



The RSS manifold is equipped with a manual (coin) air vent on the supply and return manifold. Using a screwdriver (or coin) turn the valve counterclockwise until air seeps out. Close the valve when a solid fluid stream comes out.

Vent the manifold during filling and purging procedure and at the beginning of each heating season.

Note: Air vents are not intended to serve as a substitue for an air separator sized to handle the volumetric requirements of the entire hydronic system.

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Pressure Testing

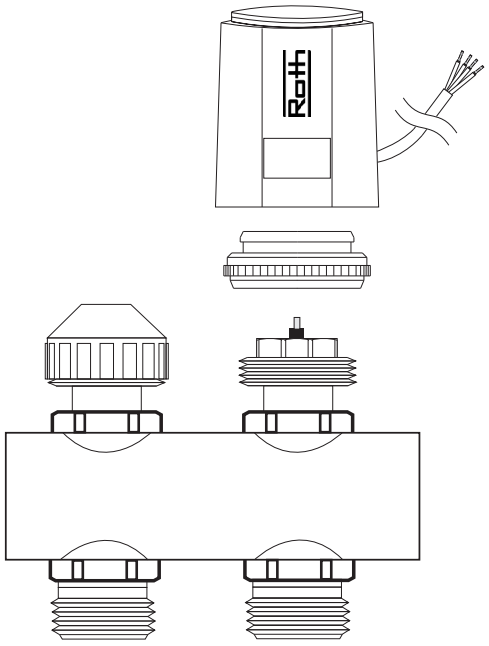
Air test

- Close air vents and return control valves.
- Pressurize system to 87 psi (6 bar) for a minimum of 2 hours.
- Pressure drop allowance after this test is a maximum of 3 psi (0.2 bar)
- If pressure drop is greater, use leak detection fluid or ultrasonic leak detector to determine source of leak.

Fluid test

- Pressurize system to 87 psi (6 bar) for a minimum of 24 hours.
- If pressure drop occurs, check for leaks.
- Use caution when pressure testing with water in colder climates where freezing could occur.

Circuit Actuator



Circuit actuators are used to control multiple zones from one manifold by opening and closing individual return control valves.

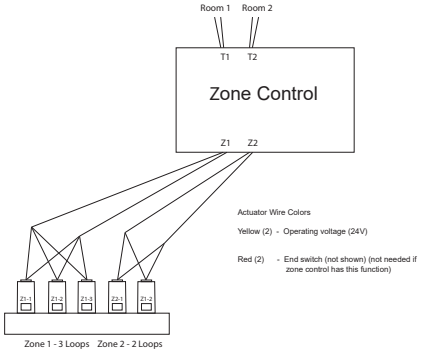
Installation

- Remove return control valve cap.
- Screw actuator adaptor onto control valve threads.
- Install actuator onto the adaptor. The actuator will snap onto the adaptor.
- When removing the actuator depress the release button on the front of the actuator and pull the actuator up.
- The end switch activates/deactivates, if wired, approximately 3 min. into cycle.

Note: Actuator is shipped in a “half-opened” position. This makes it easier for initial install. The actuator must be activated and run through 1 or 2 cycles before it will fully close.

Technical Specifications	
Operating Voltage	24V
Operating Power	1W
Actuating Force	22.48 lbf
End switch	24V, 0.5A
Cycle time Open Close	 3.5 min. 3.5 min.

Roth Actuator Wiring Diagram



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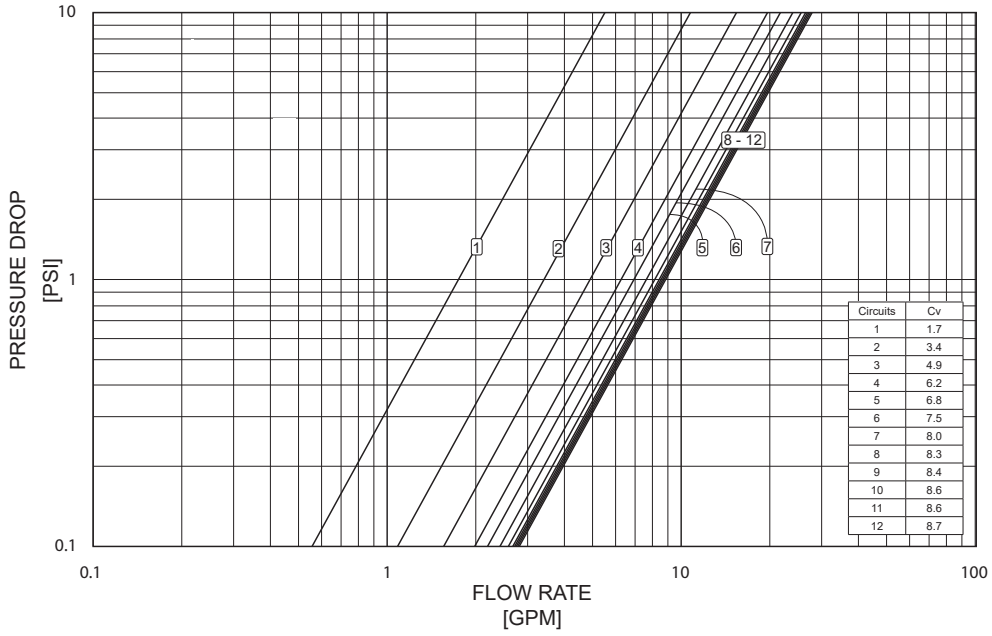
Addendum

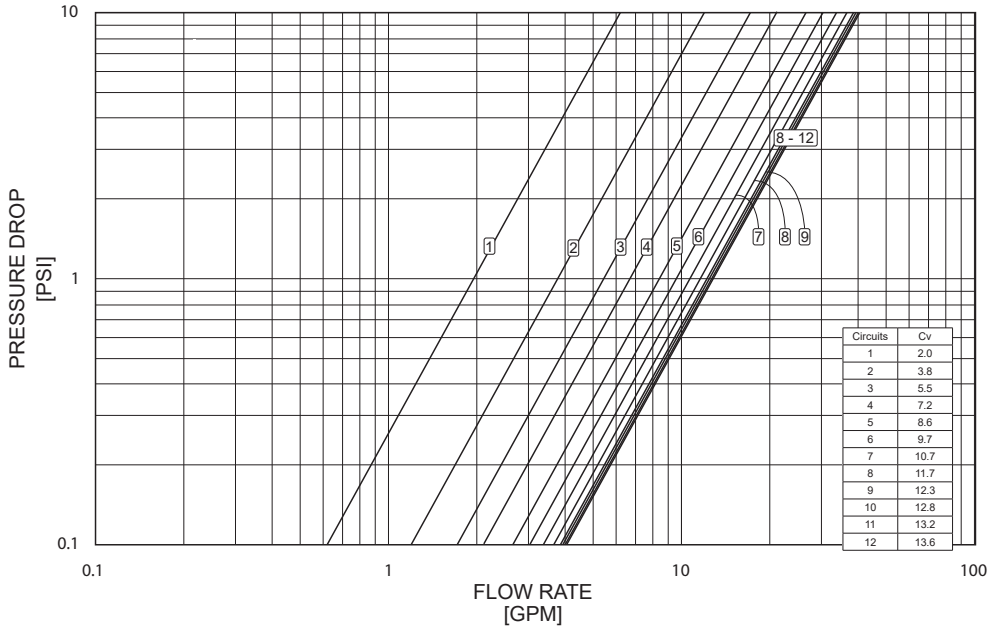
Pressure Drop Charts

Roth Stainless Steel Manifold Set - 1”
Pressure Drop Graph



Circuits	Cv
1	1.7
2	3.4
3	4.9
4	6.2
5	6.8
6	7.5
7	8.0
8	8.3
9	8.4
10	8.6
11	8.6
12	8.7

Roth Stainless Steel Manifold Set - 1 1/4”
Pressure Drop Graph



Circuits	Cv
1	2.0
2	3.8
3	5.5
4	7.2
5	8.6
6	9.7
7	10.7
8	11.7
9	12.3
10	12.8
11	13.2
12	13.6

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Addendum (cont'd)

Velocity/Flow Chart

Tubing size/type	Flow velocity (v) Flow rate (f)	Minimum flow rate (based on 2 ft/sec) gpm	Maximum flow rate (based on 4 ft/sec) gpm
3/8" PERT/PEX	v = 3.15 f	0.6	1.3
1/2" PERT/PEX	v = 1.73 f	1.2	2.5
5/8" PERT/PEX	v = 1.20 f	1.7	3.3
3/4" PERT/PEX	v = 0.88 f	2.3	4.6
3/8" AluLaser	v = 3.33 f	0.6	1.2
1/2" AluLaser	v = 1.84 f	1.1	2.2
5/8" AluLaser	v = 1.09 f	1.9	3.7
3/4" AluLaser	v = 0.66 f	3.0	6.1

Manifold Cabinets

Part No.	Width in. (mm)	Height in. (mm)	Depth in. (mm)	Border in. (mm)	Maximum # Loops
Recessed					
2315022000	21.5 (545)	26.18 (665)	4.53-6.7 (115-170)	23.6 (600)	5
2315022001	27.4 (695)	26.18 (665)	4.53-6.7 (115-170)	29.5 (750)	9
2315022002	41.2 (1045)	26.18 (665)	4.53-6.7 (115-170)	43.3 (1100)	12
Surface Mount					
2315022003	23.6	26.18 (665)	5.1 (130)	N/A	6
2315022004	29.5	26.18 (665)	5.1 (130)	N/A	10
2315022005	43.3	26.18 (665)	5.1 (130)	N/A	12

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Addendum (cont'd)

Replacement Parts

Part Number	Description
2315021012	Fill/Drain/Vent Tee (3/4" GHT) - 1"
2315021013	Fill/Drain/Vent Tee (3/4" GHT) - 1 1/4"
2315021014	Fill/Drain Valve Fitting Gasket - 1"
2315021015	Fill/Drain Valve Fitting Gasket - 1 1/4"
2315021016	Manual Air Vent
2315021017	Supply/Return Ball Valve Assembly - 1" (set of 2)
2315021018	Supply/Return Ball Valve Assembly - 1 1/4" (set of 2)
2315021021	Temperature Gauge
2315021022	Flowmeter Valve Assembly w/Seals - 1"
2315021023	Flowmeter Valve Assembly w/Seals - 1 1/4"
2315021024	Flowmeter Valve Nipple - 1"
2315021025	Flowmeter Valve Nipple - 1 1/4"
2315021026	Flowmeter Adjustment Tool
2315021027	Regulation Valve Assembly w/Seals
2315021028	Regulation Valve Cap - Blue
2315021029	Mounting Bracket Assembly - 1"
2315021030	Mounting Bracket Assembly - 1 1/4"