

TRM

TEMPERATURE RESET MODULE



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Temperature Reset Module

The TRM is an injection mixing module specifically designed for hydronic systems. It improves system controllability by enabling dynamic zone level EWT adjustment. Typically installed with modern Chilled Beams and radiant systems, this module helps minimize piping, GPM, and pump HP required to condition a building. At the same time, allowing the use of sensible only hydronic systems in spaces with high dew point fluctuation (ex. operable windows).



Temperature Reset Module (TRM)



Close Coupler (CC)



Zone Circulator (ZC)

THE TRM CONCEPT AND FUNCTION

Concept

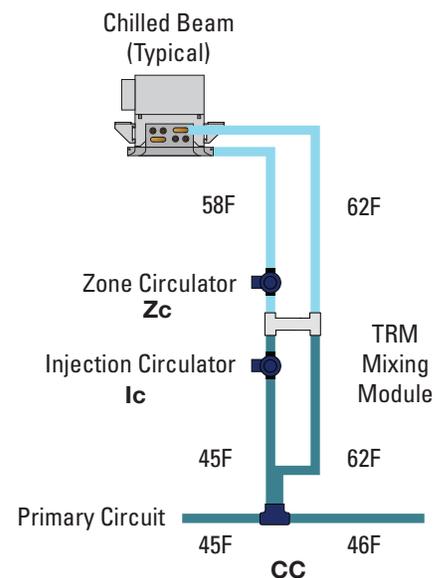
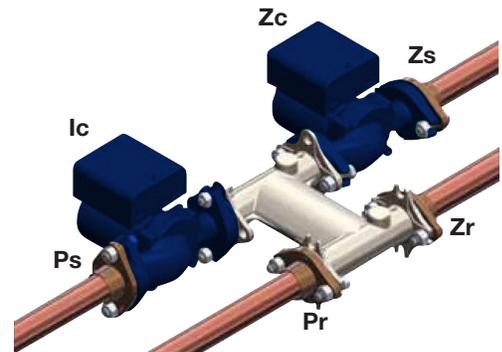
The image on the right illustrates how the water supply from the primary circuit enters the TRM through Port (Ps). The return water from the Injection Loop enters the TRM through Terminal (Zr). The entering water will be maintained at an adjustable offset above the space dew point to ensure that condensation does not occur. If the entering water temperature into the zone is higher than the desired temperature, the Injection Circulator (IC) will activate to inject cold primary water into the zone loop. This blended water is then sent through the zone via the Zone Circulator (Zc) to satisfy the zone sensible load requirements and exits the module via the Primary Return (Pr) back into the primary loop. TRMs are available to handle flows of up to 30 GPM.

In this system, each zone is essentially decoupled from the primary loop. Each TRM will operate automatically to control the load in the zone. Chilled Beams in each zone and the TRMs are easily connected to the primary loop through a Close Coupler (CC). This design ensures no pressure drop between takeoffs.

Function

The TRM system gives building operators the potential to reduce water flow rates of chilled beam or radiant cooling systems to similar levels as conventional all air systems. This allows the peak power demand of the waterside transport system to be reduced even further, at the same time allowing the use of a single pipe system that can reduce the amount of piping by 75%. This system has historically been used in radiant heating systems to lower the high temperature (180°F) boiler water down to the 100°-120°F needed for radiant floor heating.

This principal can simply be reversed to bring cold entering water (40°- 45°F) up to above dew point (55°+) in sensible only cooling systems. The image to the right shows a typical piping layout for a Temperature Reset Module that allows the cold 45°F water to be mixed up to 58° needed at the Chilled Beams to avoid condensation.



TRM Injection Mixing Circuit

APPLICATIONS

In a typical Chilled Beam (Figure 1) system two individual water transport systems will be required. The first system will deliver lower temperature (40°-45°F) chilled water for the DOAS and other latent handling devices. The second system will deliver medium temperature chilled water (55°-60°F) to the Chilled Beams and other sensible only devices.

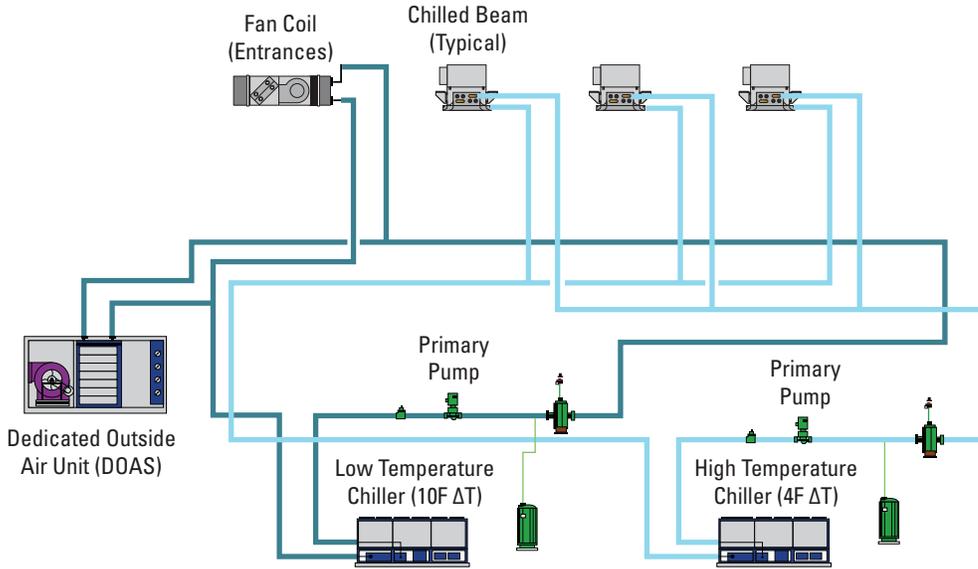


Figure 1 — Traditional 2-Pipe Loop with Sensible and Latent Cooling Devices

The TRM is not constrained by the primary supply water temperature and can deliver chilled water to each zone at a temperature above the dew point with precision.

The simplicity of the TRM concept allows a single pipe size for the primary distribution system. The total BTU load and ΔT determine the required flow and piped sizes through the primary loop. Once the primary loop is sized, the secondary loop can be sized based on the individual zone flow requirements. Pressure drops associated with piping lengths, balancing valves, check valves, etc do not need to be accounted for when sizing the main primary loop pump. This allows for a smaller primary pump and a simpler overall piping design.

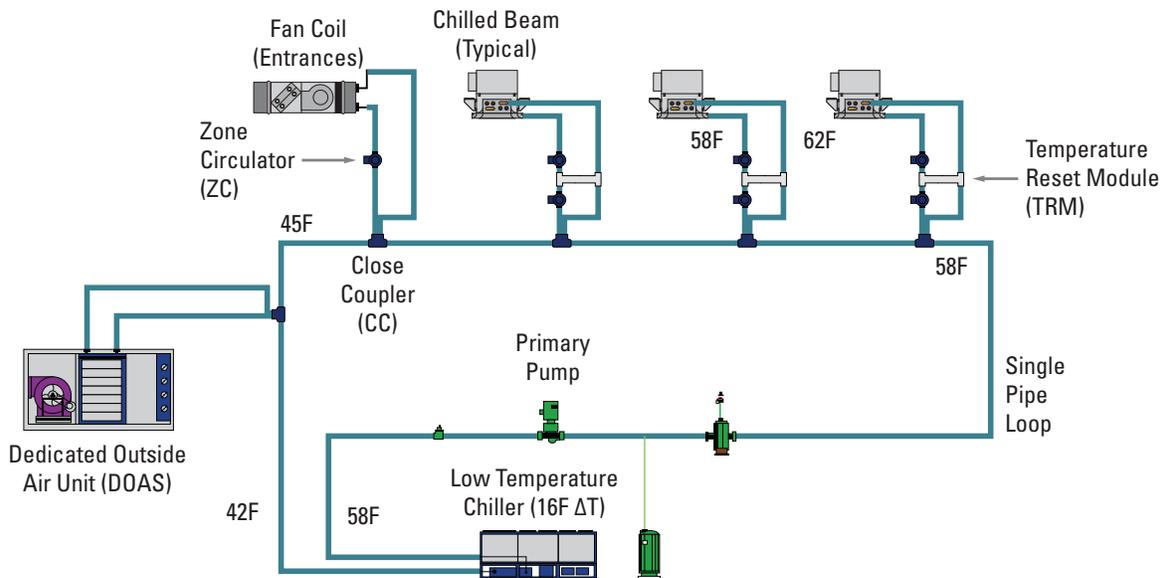


Figure 2 - TRM Single Pipe Loop Cooling with Latent and Sensible Cooling Devices

TRM Temperature Reset Module

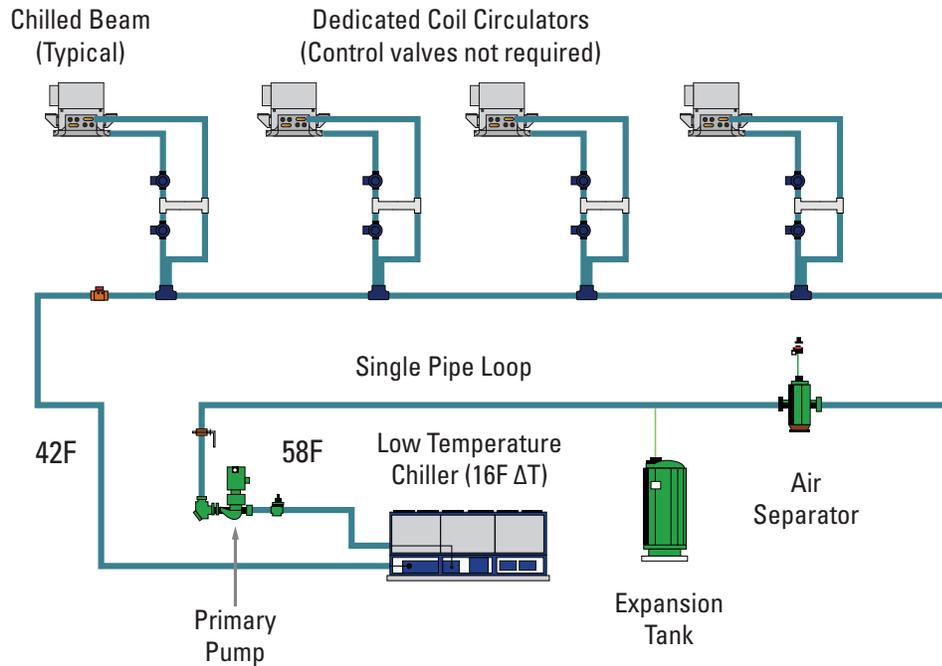


Figure 3 — Single Pipe Cooling with Sensible Devices Only

With the TRM, Chilled Beams and other sensible only cooling devices can safely be applied in zones with operable windows, exit doors, and spaces with high dew point fluctuation.

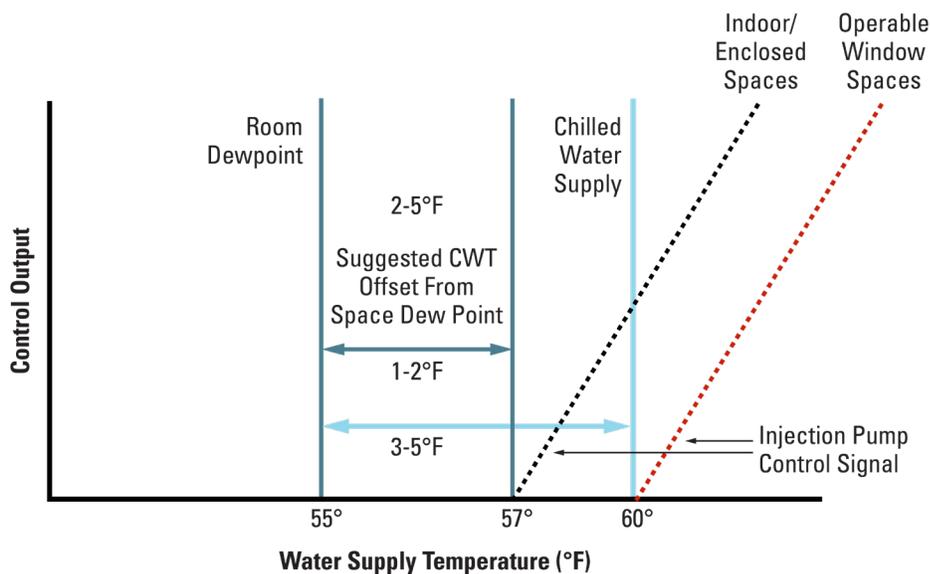


Figure 4 — Chilled Water Supply Temperature Sequence

REDUCED SYSTEM PRESSURE DROP

- + No mixing valves
- + No balancing valves

LOWER OPERATING COST

- + Reduced pump head on primary pump
- + Less energy consumption by primary pump

LOWER MAINTENANCE COST

- + Self-lubricating inline pumps
- + 50+ year lifespan

LOWER INSTALLED COST

- + Reduced length of pipe required
- + No balancing or mixing valves

A. IMPROVED ZONE CONTROL

- + Individual room dew point monitoring
- + Real time entering water temperature adjustment

SELECTION PROCEDURE

Selecting the Injection Circulator

The primary loop of the TRM handles the supply water off the main system loop and is connected via a Close Coupler. This circulator is the **Injection Circulator (IC)** and is selected for the loop **flow** of 3.53 gpm and the actual pressure drop of the circuit.

This circuit utilizes a high delta T ($62^{\circ}\text{F} - 45^{\circ}\text{F} = 17^{\circ}\text{F}$) and a very low flow since it takes supply water at 45°F and injects it into the terminal loop in order to achieve an entering water temperature of 58°F with a leaving temperature of 62°F .

20' of 3/4" pipe	=	9.3 ft.
(2) 3/4" ball valves	=	.28 ft.
(1) Close Coupler	=	.2 ft.
Total Head		<u>1.41 ft.</u>

In order to make the circulator selection, you must determine the **head** in this circuit.

Using the pump curves shown, select the **Injection Circulator (IC)** for 3.53 gpm @ 1.41 ft. head.

The proper selection of the **Injection Circulator (IC)** is **model 0504**.

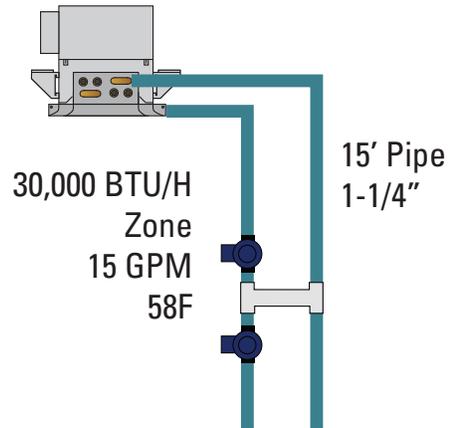
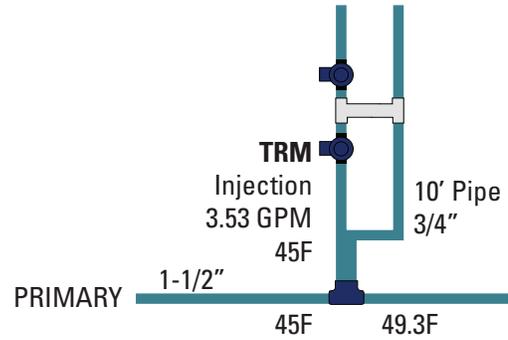
Selecting the TRM Zone Circulator

The zone circulator shown is selected in the same manner as the primary circulator. However, this time you must remember that you are working in an entirely different loop that has a flow that is much more than that in the primary loop.

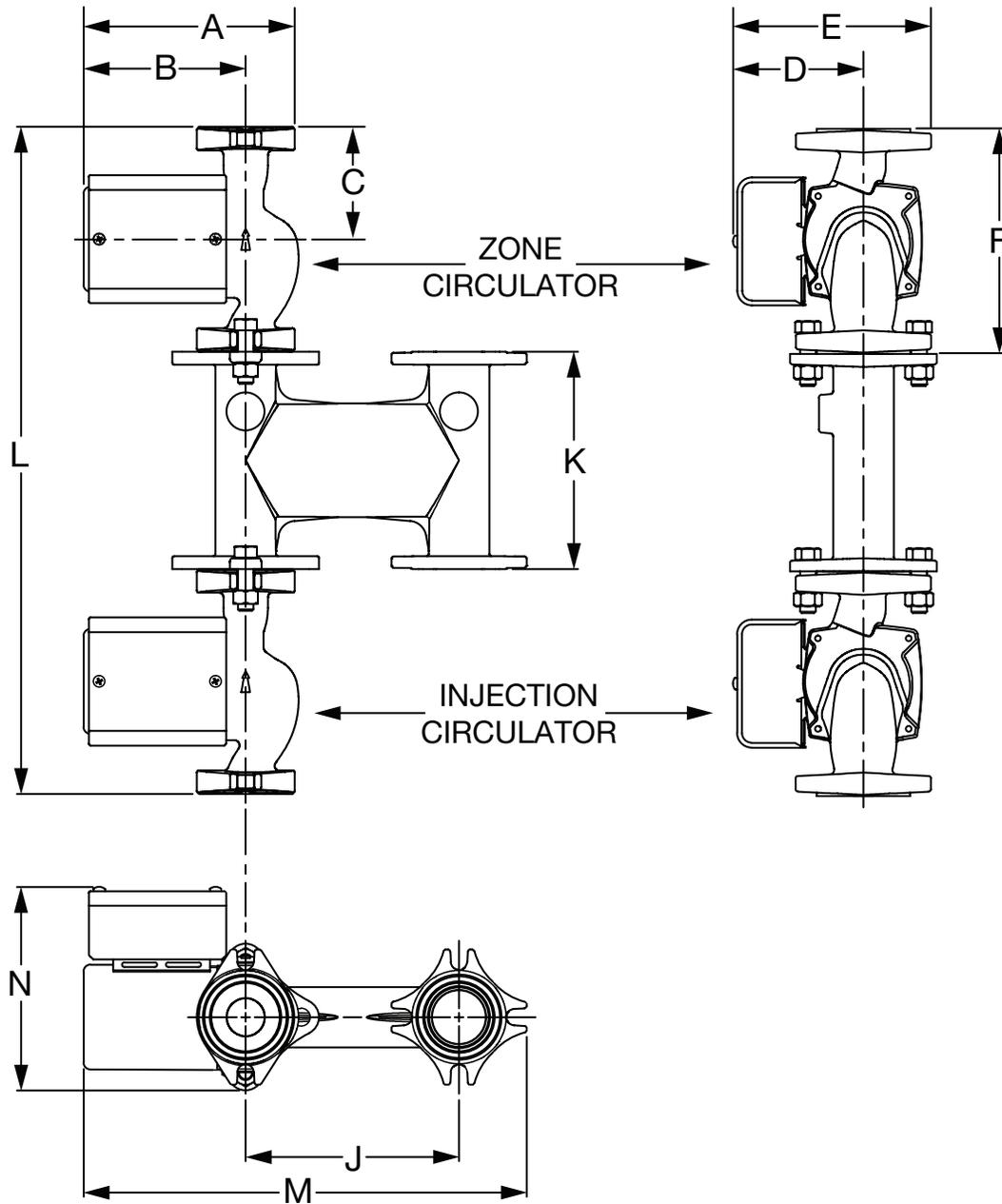
In this example, the flow is 15.0 GPM through the zone loop. Next you determine the head in the zone loop.

30' of 1-1/4" pipe	=	1.4 ft.
Terminal Pressure Drop	=	<u>8.0 ft.</u>
Total Head		9.4 ft.

Using the pump curves shown in the installation manual, select the **Zone Circulator (ZC)** for 15.0 gpm @ 9.4 ft. head. The proper selection of the **Zone Circulator (ZC)** is **model 1016**.



DIMENSIONAL DATA



All Parts Feature Flanged Connections

DIMENSIONAL DATA

Model Code	Injection Circulator	Zone Circulator	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	J (mm)	K (mm)	L (mm)	M (mm)	N (mm)	Ship Weight lbs (Kg)
TRM-0504I-0504Z-Y	0504	0504	159	159	81	75	127	162	152	156	479	362	127	19 (8.6)
TRM-0504I-0508Z-Y	0504	0508	149	114	81	75	127	162	152	156	479	318	127	23 (10.4)
TRM-0504I-1008Z-Y	0504	1008	114	114	81	75	127	162	152	156	479	318	127	23 (10.4)
TRM-0504I-1016Z-Y	0504	1016	81	146	83	84	140	165	152	156	483	349	137	31 (14.1)
TRM-0504I-1024Z-Y	0504	1024	75	162	76	98	152	165	152	156	483	365	151	30 (13.6)
TRM-0504I-2006Z-Y	0504	2006	127	144	81	86	140	162	152	156	479	348	138	24 (10.9)
TRM-0508I-0504Z-Y	0508	0504	162	159	81	75	127	162	152	156	479	362	127	19 (8.6)
TRM-0508I-0508Z-Y	0508	0508	152	114	81	75	127	162	152	156	479	318	127	23 (10.4)
TRM-0508I-1008Z-Y	0508	1008	156	114	81	75	127	162	152	156	479	318	127	23 (10.4)
TRM-0508I-1016Z-Y	0508	1016	479	146	83	84	140	165	152	156	483	349	137	31 (14.1)
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TRM-0508I-2006Z-Y	0508	2006	127	144	81	86	140	162	152	156	479	348	138	24 (10.9)
TRM-1008I-0504Z-Y	1008	0504	159	159	81	75	127	162	152	156	479	362	127	19 (8.6)
TRM-1008I-0508Z-Y	1008	0508	149	114	81	75	127	162	152	156	479	318	127	23 (10.4)
TRM-1008I-1008Z-Y	1008	1008	151	114	81	75	127	162	152	156	479	318	127	23 (10.4)
TRM-1008I-1016Z-Y	1008	1016	184	146	83	84	140	165	152	156	483	349	137	31 (14.1)
TRM-1008I-1024Z-Y	1008	1024	191	162	76	98	152	165	152	156	483	365	151	30 (13.6)
TRM-1008I-2006Z-Y	1008	2006	178	144	81	86	140	162	152	156	479	348	138	24 (10.9)
TRM-1016I-0504Z-Y	1016	0504	159	159	81	75	127	162	152	156	479	362	127	19 (8.6)
TRM-1016I-0508Z-Y	1016	0508	149	114	81	75	127	162	152	156	479	318	127	23 (10.4)
TRM-1016I-1008Z-Y	1016	1008	151	114	81	75	127	162	152	156	479	318	127	23 (10.4)
TRM-1016I-1016Z-Y	1016	1016	184	146	83	84	140	165	152	156	483	349	137	31 (14.1)
TRM-1016I-1024Z-Y	1016	1024	191	162	76	98	152	165	152	156	483	365	151	30 (13.6)
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TRM-1024I-0504Z-Y	1024	0504	159	159	81	75	127	162	152	156	479	362	127	19 (8.6)
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TRM-1024I-1016Z-Y	1024	1016	184	146	83	84	140	165	152	156	483	349	137	31 (14.1)
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TRM-2006I-0504Z-Y	2006	0504	159	159	81	75	127	162	152	156	479	362	127	19 (8.6)
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TRM-2006I-2006Z-Y	2006	2006	178	144	81	86	140	162	152	156	479	348	138	24 (10.9)

FREQUENTLY ASKED QUESTIONS

What exactly is the TRM Mixing Block?

The TRM Mixing Block is a unique Price innovation that is comprised of a 4-connection hydraulic separator manifold incorporating two circulators that provide variable temperatures of water to a secondary loop when connected to a single-temperature primary loop. It is a complete injection mixing station in a compact, factory-assembled package.

How does it work?

The Injection Circulator (IC) provides a variable flow from the cold primary loop into the zone loop while needed to temper the zone water. A second Zone Circulator (ZC) is used to maintain flow throughout the zone. This second circulator can function with either variable flow or constant flow depending on the design requirements. Together these two circulators allow for precise control of the entering water temperatures into the zone loop resulting in very close space condition control.

What does it replace in a conventional system?

The TRM eliminates the need for mixing (balancing) valves, bypass control valves, and check valves in the secondary loop. The TRM injection system controls the loop temperature through its variable speed circulator. In addition, each circulator contains a built-in flow check to prevent “ghost” flows and, when used with the Price Close Coupler, there is no need for two close-coupled T’s in each secondary circuit.

Does it cost more than the components it replaces?

The TRM costs slightly more than the valves and accessories that it replaces in the secondary loop circuit. However, the savings in primary system piping cost, installation labor, balancing expense, and energy savings make it a highly cost effective addition to any of today’s modern space conditioning systems.

What is its warranty?

Each Price circulator carries a three year flange-to-flange warranty. Unlike most control valves, these wet-rotor circulators contain no seals to leak and require no adjustments. And should one fail in use, it is easily repaired due to its unique replaceable cartridge design. All moving parts are contained in a single assembly that does not require the circulator to be removed from the TRM in order effect a change.

What are its maintenance requirements?

There are no maintenance requirements with the TRM Mixing Block.



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