AMTROL INC.
Hydronic Technologies

THERM-X-TROL®

THERMAL EXPANSION ABSORBERS

The Best Solution for
Controlling Thermal Expansion

AMTROL INC.

THERM-X-TROL® Expansion Tanks

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What Is Thermal Expansion?

With modern plumbing codes mandating backflow prevention, thermal expansion can cause pressure buildup in domestic water systems. When demand is put upon a potable water system, hot water is drawn from the water heater. Cold water from the supply line enters the water heater to replenish it. The colder water is heated to replace the hot water used. With the installation of a backflow preventer, check valve or pressure reducing valve on the supply line, the water heater and the system piping form a closed plumbing system under pressure.

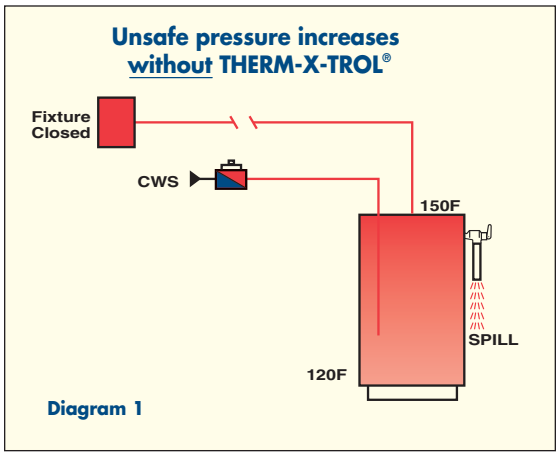
As the water is heated, thermal expansion occurs. Pressure increases until the relief valve opens and the expanded water "spills" from the water heater. This "spillage" results in wasted BTU's and a potential safety hazard for the homeowner (See Diagram1).

Closed Potable Hot Water System without THERM-X-TROL

Backflow preventer, pressure reducing valve or meter causes expanded (heated) water to build pressure causing the relief valve to open resulting in…

- Wasted BTU's
- Shortened water heater life
- Wasted municipal water and sewer dollars
- Potential safety hazard for homeowner

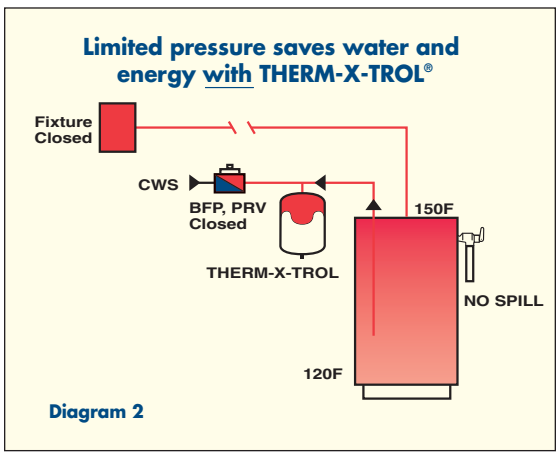
The THERM-X-TROL is designed to eliminate this problem by providing control of maximum pressures at a level below the relief valve setting. It also provides an additional space in the system to accommodate the increased volume of water created by thermal expansion, returning it to the system when hot water delivery is demanded. Maximum pressure is kept well below the relief valve setting by the THERM-X-TROL, with its pre-charged air cushion that is separated from system water. The relief valve does not open, therefore "spillage" is eliminated (Diagram 2).



Closed Potable Hot Water System with THERM-X-TROL

Expanded (heated) water is absorbed by THERM-X-TROL which means…

- Water heater and fixtures are protected
- Eliminates BTU and water waste, saving money and energy
- No dangerous pressure build up in the system
- Relief valves will not operate
- Potential safety hazard reduced



THERM-X-TROL®: The Market Leader

- #1 choice of Professional Installers in USA
- Safest and most cost effective way to control Thermal Expansion
- Easy to install - Maintenance free
- Manufactured in USA since 1965
- The innovator of Thermal Expansion Control in Closed Potable Hot Water Systems since 1965
- Broadest line of sizes and models
- Recognized Industry leader in Quality, Design, Manufacturing, Delivery and Service
- Extensive Network of Plumbing & Heating Wholesale Distributors
- First to obtain ANSI/NSF61, IAPMO, SBCCI & City of Los Angeles listings
- First to offer 5 year limited warranty

Product Features

Deep Drawn Steel Domes for maximum strength & pressure rating

Rigid Poly-Propylene Liner for Corrosion Resistant Reservoir

Butyl diaphragm for long life expectancy. Tested to over 250,000 cycles

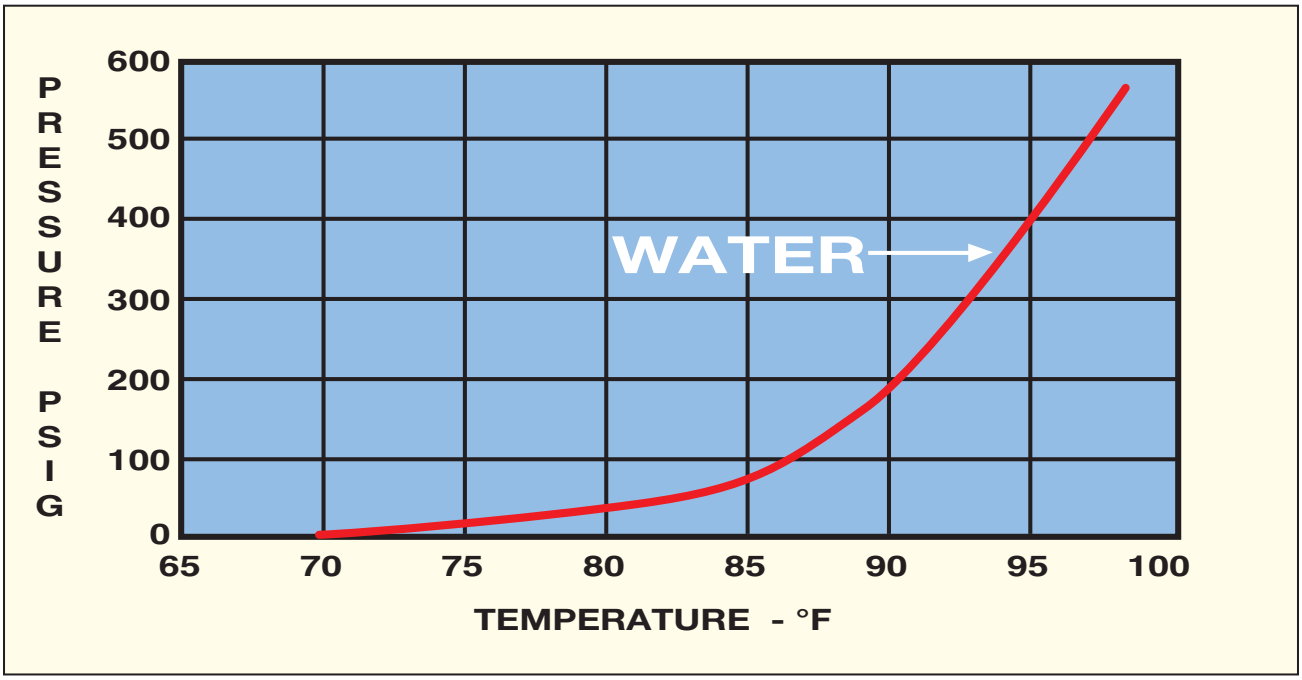
Diaphragm Hoop Ring mechanically grooved for permanent air-tight seal

Welded Steel Construction

Welded Air Charge Fitting with Protective Plastic Cap for Corrosion Resistance and Maximum Air-Tight Seal

Specifications and Sizing

Pressure vs. Temperature Increase in Closed Piping Systems



Sizing Procedure - For Special Applications

The procedure for sizing the Therm-X-Trol® for any application depends on four (4) vital pieces of information:

1. ASME or non-ASME requirement
2 Calculated thermally expanded water volume
3. Minimum water pressure experienced at the tank location
4. Maximum water pressure allowable at the tank location

The tank required for any application can be sized with the following equation:

Tv = Design Pressure Factor X expanded water

Where Tv is the total Thermal-X-Trol volume required in gallons.

Example: A 240 gallon water heater with a 150°F aquastat setting is installed with a 125 psi maximum pressure requirement. For a static supply line pressure of 60 psi, what Therm-X-Trol model is required for critical protection?

Critical Sizing AMTROL® Therm-X-Trol®
1. Total Water Heater Volume (Gallons)
2. Water Expansion Factor (Table I)
3. Calculate Expanded Water (Gallons) (Line 1 x Line 2)
4. Design Pressure Factor (Table II)
5. Therm-X-Trol Volume Required (Gallons) (Line 3 x Line 4)
6. Select Therm-X-Trol Model (pg. 12 & 13)

Critical Sizing AMTROL® Therm-X-Trol®: *EXAMPLE*	
1. Total Water Heater Volume (Gallons)	*240*
2. Water Expansion Factor (Table I)	*0.0179*
3. Calculate Expanded Water (Gallons) (Line 1 x Line 2) = (240 x .0179)	*4.3*
4. Design Pressure Factor (Table II)	*2.1*
5. Therm-X-Trol Volume Required (Gallons) (Line 3 x Line 4) = (4.3 x 2.1)	*9.0*
6. Select Therm-X-Trol Model (pg. 12 & 13)	*ST-25V*

ST30V-C

Note: The Therm-X-Trol air pressure should be equal to static line pressure.

For conditions not shown in table, use equation:

$$DPF = \frac{\text{Max. Allow. Pressure + 14.7}}{\text{Max. Allow. Pressure - Line Pressure}}$$

TABLE I Expansion Factor

Operating (Design) Temperature of Water Heater (Tank)	Expansion Factor* (Percentage of Water Volume Increase)	
100˚F	0.0062	0.6%
120˚F	0.0100	1.0%
130˚F	0.0124	1.2%
140˚F	0.0150	1.5%
150˚F	0.0179	1.8%
160˚F	0.0209	2.0%
170˚F	0.0242	2.4%
180˚F	0.0276	2.8%

** Based on the initial temperature of 40˚F*

TABLE II Design Pressure Factor: DPF

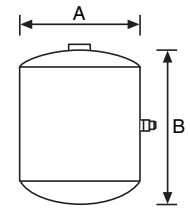
Maximum Allowable Pressure	Line Pressure psi	Design Pressure Factor (DPF)
100	40	1.9
	50	2.3
	60	2.9
	70	3.8
	80	5.7
125	40	1.6
	50	1.9
	60	2.1
	70	2.5
	80	3.1
150	40	1.5
	50	1.6
	60	1.8
	70	2.1
	80	2.4

Typical Installations and Specifications

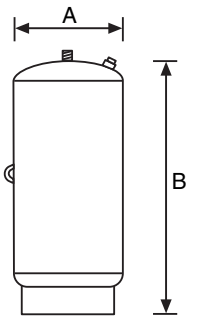
Typical Installations

Recommended Applications include:

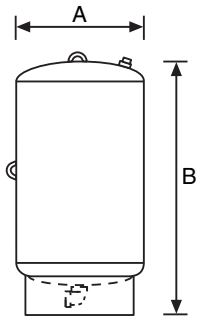
- Residential Water Heaters
- Laundromats
- Hospitals and Nursing Homes
- Car Washes
- Dishwashers
- Plant Washrooms
- Hotels and Motels
- Restaurants
- Schools and Dormitories



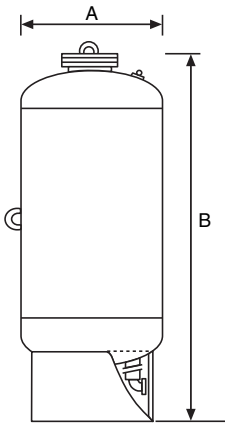
ST-5-C, ST-12-C



ST-20V-C to ST-70V-C



ST-80V-C to ST-210V-C



ST-447-C to ST-457-C

THERM-X-TROL® ASME Specifications

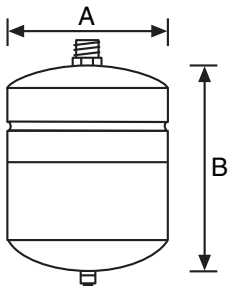
Model No.	Max. Working Pressure (PSIG)	Total Volume (Gals.)	Diameter (A)	Height (B)	System Connection	Ship Weight (lbs)
ST-5-C	150	2.1	10"	10 3/8"	3/4" NPT	21
ST-12-C	150	6.4	12"	15 5/8"	3/4" NPT	26
ST-20V-C	150	8.0	12"	19 1/2"	3/4" NPT	41
ST-30V-C	150	14.0	16 1/4"	19 1/8"	3/4" NPT	84
ST-42V-C	150	17.5	16 1/4"	24 1/4"	3/4" NPT	90
ST-60V-C	150	25.0	16 1/4"	34"	3/4" NPT	96
ST-70V-C	150	34.0	16 1/4"	45 3/4"	3/4" NPT	123
ST-80V-C	150	53.0	24"	40 1/2"	1 1/4" NPT	229
ST-120V-C	150	66.0	24"	47 3/4"	1 1/4" NPT	258
ST-180V-C	150	77.0	24"	52 5/8"	1 1/4" NPT	288
ST-210V-C	150	90.0	24"	60"	1 1/4" NPT	318
ST-447-C	125	53.0	24"	45 1/4"	2" NPT	263
ST-448-C	125	80.0	24"	59 1/8"	2" NPT	308
ST-449-C	125	106.0	24"	73 1/8"	2" NPT	353
ST-450-C	125	132.0	24"	86 5/8"	2" NPT	391
ST-451-C	125	158.0	30"	73 1/4"	2" NPT	508
ST-452-C	125	211.0	30"	91"	2" NPT	760
ST-453-C	125	264.0	36"	85 5/8"	3" NPT	810
ST-454-C	125	317.0	36"	98"	3" NPT	914
ST-455-C	125	370.0	36"	110 3/8"	3" NPT	1,018
ST-456-C	125	422.0	48"	81 7/8"	3" NPT	1,655
ST-457-C	125	528.0	48"	97 1/4"	3" NPT	1,925

Maximum Allowable Working Temperature: ST-5-C through ST-210V-C: 200°F; ST-447-C through ST-457-C: 240°F Standard Factory Precharge: 55 PSIG.
All Models listed by NSF 61 (excluding ST-447-C through ST-457-C). ST-447-C through ST-457-C are replaceable bladder design.

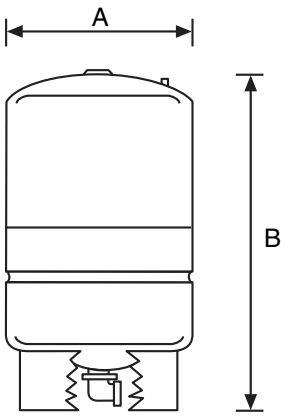
Non-ASME THERM-X-TROL®

General Usage

- Office Buildings
- Apartment Buildings
- Dormitories
- Elderly Housing
- Extended Care Facilities
- Condominiums/Large Residential
- Food Service (other than Restaurants)
- Laundromats
- Hospitals
- Other General-Use Hot Water Systems



ST-5, ST-12



ST-25V through ST-210V

THERM-X-TROL Non-ASME Specifications

Model No.	Total Volume (Gals.)	Diameter (A)	Height (B)	System Connection	Ship Weight (lbs)
ST-5	2.0	8"	12 5/8"	3/4" NPT	5
ST-8	3.2	9"	15"	3/4" NPT	7
ST-12	4.4	11"	15"	3/4" NPT	9
ST-25V	10.3	15 3/8"	19 1/4"	1" NPT	23
ST-30V	14.0	15 3/8"	23 7/8"	1" NPT	25
ST-42V	20.0	15 3/8"	31 5/8"	1" NPT	33
ST-60V	34.0	22"	29 5/8"	1 1/4" NPT	61
ST-80V	44.0	22"	36"	1 1/4" NPT	69
ST-180V	62.0	22"	46 3/4"	1 1/4" NPT	92
ST-210V	86.0	26"	47 1/4"	1 1/4" NPT	123
ST-451	158.0	73 1/4"	30"	2" NPT	508
ST-452	211.0	91"	30"	2" NPT	760
ST-453	264.0	85 5/8"	36"	3" NPT	810
ST-454	317.0	98"	36"	3" NPT	914
ST-455	370.0	110 3/8"	36"	3" NPT	1,018
ST-456	422.0	81 7/8"	48"	3" NPT	1,655
ST-457	528.0	97 1/4"	48"	3" NPT	1,925

Maximum Working Pressure: 150 PSI. All Models listed by NSF 61 (excluding ST-451 – ST-457); Maximum Allowable Working Temperature: ST-5 through ST-210V: 200°F; ST-451 through ST-457: 240°F; Standard Factory Precharge: 40 PSIG (ST-5 – ST-210V); 55 PSIG (ST-451 – ST-457)

THERM-X-TROL®

THERM-X-TROL

The THERM-X-TROL from AMTROL is designed to protect domestic water heaters from the effects of thermal expansion. Installation is easy; just tee it into the cold water inlet (before the water heater) as shown in Diagram 3.

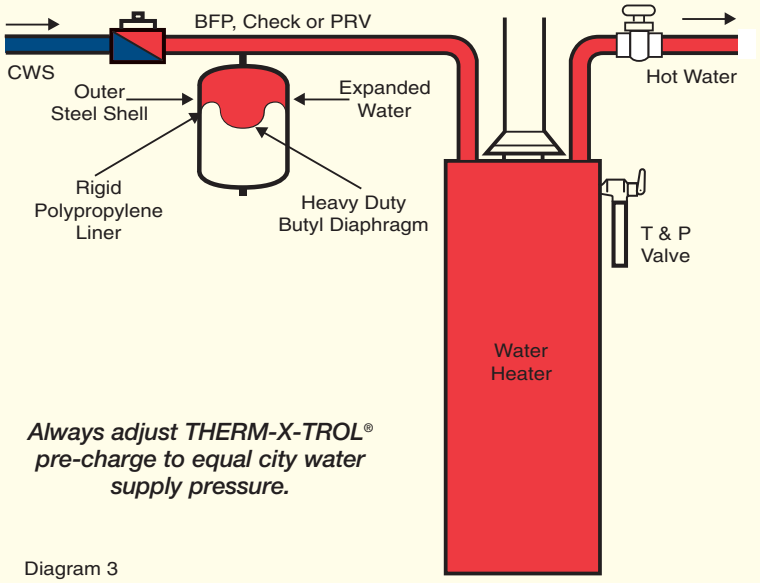


Diagram 3

If your Plumbing Code requires a Backflow Preventer, Check Valve or Pressure Reducing Valve... You Need a THERM-X-TROL® on Every Job!

THERM-X-TROL Quick-Sizing Chart

Sizing Charts are based on 40°F incoming water temperature and a 150psi T & P safety relief valve.

Water Heater* Size (gals.)	Static Supply Pressure (psi)**		
	40	60	80
40	ST-5	ST-5	ST-5
50	ST-	5 ST-5	ST-5
60	ST-	5 ST-5	ST-8
80	ST-	8 ST-8	ST-12
120	ST-12	ST-12	ST-25V

Max. Temp. Setting 140°F

Water Heater* Size (gals.)	Static Supply Pressure (psi)**		
	40	60	80
40	ST-5	ST-5	ST-5
50	ST-	5 ST-5	ST-8
60	ST-	8 ST-8	ST-8
80	ST-	8 ST-8	ST-12
120	ST-12	ST-12	ST-25V

Max. Temp. Setting 150°F

Water Heater* Size (gals.)	Static Supply Pressure (psi)**		
	40	60	80
40	ST-8	ST-8	ST-8
50	ST-	8 ST-8	ST-12
60	ST-	8ST-12	ST-25V
80	ST-12	ST-25V	ST-25V
120	ST-25V	ST-25V	ST-25V

Max. Temp. Setting 180°F

* For multiple heater, use th total volume of the heaters plus any storage tanks.

** Therm-X-Trol Precharge must be set to equal Static Supply Pressure prior to installation.

AMTROL INC.®

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