

Thermal Control Solutions

Thermal Controls Product Catalog

Thermal Actuators



Thermostatic Valves and Manifolds



Pressure Relief Valves



Mechanical Thermostats & Switches



Vernatherm by Vernet is ISO 9001:2015 Certified

ISO 9001:2015 is an international quality standard developed by the International Organization for Standardization (ISO), a worldwide federation of national standards bodies representing some 130+ countries. The standard covers all aspects of an organization's activities, including identifying its key processes, defining roles and responsibilities, policies and objectives, documentation requirements, the importance of understanding and meeting customer requirements, communication, resource requirements, training, product and process planning, design processes, purchasing, production and service, monitoring and measurement of products and processes, customer satisfaction, internal audit, management review, and improvement processes.

AS 9100 Aerospace Quality System Standard

AS 9100: Aerospace Quality System Standard; Safety, airworthiness, product conformity and reliability are all key aspects of AS9100, the aerospace quality standard. These quality requirements are crucial to aerospace OEMs, which maintain high levels of liability for their product standard. Because product performance can be affected by a failure to handle parts and materials correctly, AS9100 addresses the complexity and diversity of the industry's supply chain. The standard takes into consideration the complete life cycle of aerospace products.

The Federal Aviation Administration (FAA) defines individual manufacturing approvals through its Federal Aviation Regulations (FARs) and laws mandating compliance. Subsequently, AS9100 is rapidly becoming a prerequisite for doing production in the aerospace business, as many original equipment manufacturers (OEMs) only work with suppliers that are certified to the aerospace standard. Also, many International Aerospace Quality Group (IAQG) member companies have deployed AS9100 within their own organizations.

Vernatherm by Vernet is also ISO/TS 16949 compliant.

Please visit our website to view our official ISO certification documents.



About Vernatherm by Vernet



History

For over eighty years, Vernatherm by Vernet has been the global leader of thermal control devices for many industries requiring precise control. Our controls are utilized by the Aerospace, Automotive, HVAC, Heat Exchanger, and Compressor industries. Vernatherm by Vernet has a history of working with and supplying products for government contracts.

Quality

At Vernatherm by Vernet, we intend to exceed our customers' expectations. Throughout the history of our company, we have earned a reputation for delivery of a quality product on time. It is this reputation for quality that has earned Vernatherm some of the industry's highest certifications including ISO-9001:2015 and AS-9100.

Markets

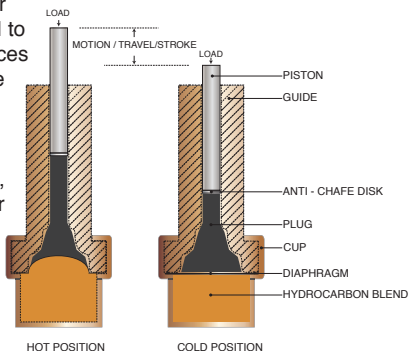
Our Vernatherm products can be found in applications for a variety of industries. They include the Automotive, Aerospace, HVAC, Heat Exchanger, Oil Cooler, and Industrial Control industries. Our products can be custom designed by our engineers to suit your technical control requirements. Our Vernatherm by Vernet control products include aerospace thermostats, fuel heaters, temperature control valves, mixing valves, and CNC Machined Manifolds for customers such as Allied Signal, Pratt and Whitney, Howden Fluid Systems, Textron, IMI Marston (UK), and BEHR (Germany).

Thermal Actuators

What Are Thermal Actuators?

Thermal actuators extend a piston upon temperature increase without the need for any external power source.

The diagram on the right shows a change in temperature that causes the thermally sensitive material to expand. When the thermal actuator is expanding, it applies pressure to the rubber plug which is forced into reduced diameters in the piston guide to achieve mechanical advantage. This extruding action pushes the piston, which causes movement, or what we call “motion.” As the material is allowed to cool, a load pushes back on the piston. This forces the material to contract and effectively resets the system for the next cycle.



The expansion/contraction of these thermal actuators can be utilized to operate a valve, mechanical linkage, electric switch, or any other device. The plug and diaphragm type are proven to be the most reliable style for any application.

Why Choose Vernatherm by Vernet?

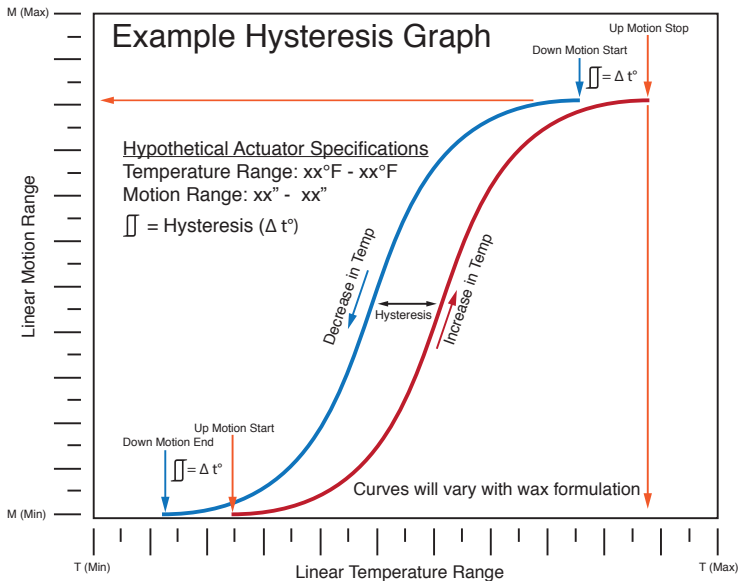
Vernatherm’s temperature range is the largest selection available today. Any temperature range between 30F and 300F can be accommodated. Our thermal expansion material blend gives us an edge over our competitors’ standard operating temperatures. When a customer chooses Vernet’s thermal actuators, the customer is in complete control of what temperature range they receive.

Our thermal actuators may be applied in a variety of different applications because our sizes range from miniature to large and heavy duty units. Whatever the size, these fast acting self-actuating thermal actuators produce high forces and long travel distances, enabling the effective control of your system without the need for any electrical power.



Thermal Actuators

The curve below demonstrates what you would see if you graphed the performance of one of our thermal actuators. Our expansion curves graphically display an actuator's performance as it heats up and cools down. Hysteresis is defined as the differential between the graphed upstroke and downstroke, this differential is caused by the thermal inertia within the actuator.



Typical characteristics of a hysteresis / performance curve are:

- Temperature Range
- Temp increase vs. Motion
- Temp decrease vs. Motion

An actuator's piston extends when it senses a thermal increase and retracts when it is cooled. The temperature points when this occurs are not identical. The difference between the two points is called "hysteresis". Hysteresis is deliberate and will prevent unnecessary switching/modulation between temperatures that frequently fall above and below the set point.

To a limited degree we can increase or decrease the hysteresis value to suit your application needs. These characteristics are eventually discovered when you work with our engineers. You do not need to know the value of hysteresis required by your application; samples will be provided along with engineering consultation.

Thermal Actuator Applications

Aerospace - Our thermal actuators are used on all major aerospace platforms, and have been for over 30 years due to their precision and reliability. They are used to control fuel and oil temperature, on all APUs, and in cabin environmental systems, just to name a few.

Automotive - A thermal bypass valve can be used to bypass an automotive oil cooler when cooling is not necessary. Upon temperature increase, the valve uses the oil cooler as needed to maintain a specified pre-set optimum temperature. This technology is used in OEM production and aftermarket products.

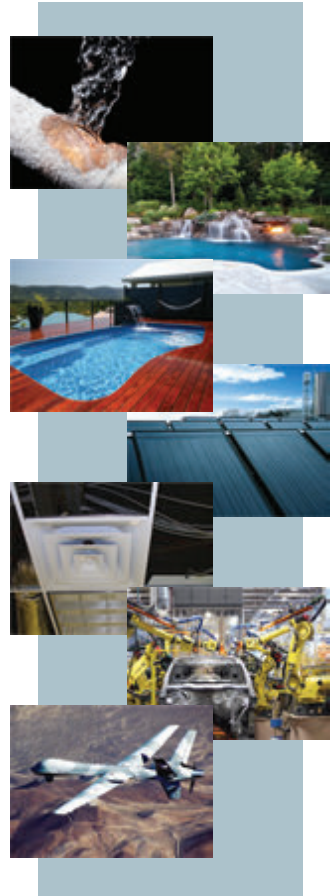
VAV Diffusers - A standard thermal actuator can be integrated into a mechanical linkage as part of an HVAC diffuser. The actuator senses internal room temperature and allows or restricts air flow, depending on temperature demand. This technology will keep all rooms at a specific pre-set temperature, thus reducing energy consumption and eliminating hot and cold spots within a building.

Freeze Protection - Freeze protection can be accomplished by installing a thermal actuator powered freeze protection valve. The thermal actuator inside the valve is set so that when the temperature drops low enough to freeze, the valve opens causing water to flow and thus preventing freezing.

Pump Protection - A thermal discharge valve is used to minimize internal temperature spikes within a pump when flow is restricted or prevented while the pump is in operation. They should be installed onto your pump's evacuation port prior to use. This allows non-circulating water to be discharged from the pump when it reaches dangerous seal damaging temperatures. Discharge fluid can be easily diverted back into your system, or drain.

Scald Protection - Public facilities must ensure the safety of those they serve. A preset thermal actuator can be used to provide scald protection when incorporated into a valve. This is the best way to ensure safety, as this product is non-electric, self powered, and will always perform exceptionally.

UV Purification - A thermal discharge unit can be installed into UV purification systems to ensure and maintain optimal purification temperature. This unit will discharge water when it senses temperature above optimal levels, and automatically close when the optimal temperature is reached. This is a great non-electric, self-controlled, and self-powered addition to any UV purification system.



Thermal Actuator Series Information

Our thermal actuators all operate by thermal expansion and conform to a set of standard actuator principles. We offer many styles of actuators; from light duty to heavy, with return springs, threads, and other engineered ways of integration. Every customer has unique requirements and all of our actuators are designed specifically for each individual customer. The classes of actuators featured within the table are organized by “stroke” length, and pushing “force”. Based on your needs of “stroke” and “force” your actuator class will be determined, and then its geometry.

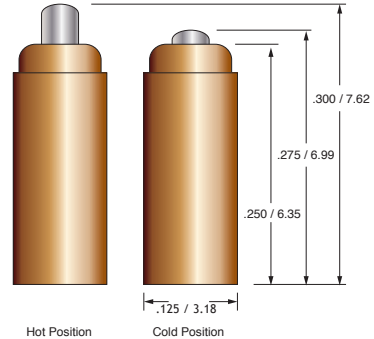


Actuators shown here reflect a small sample of configurations

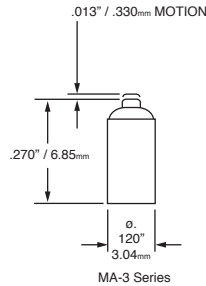
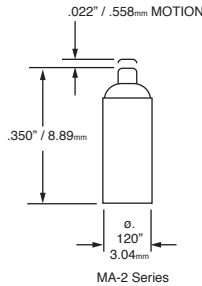
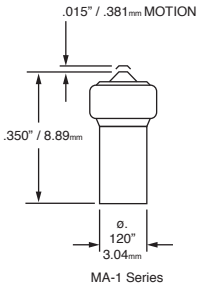
S: .005"-.150" F: 10 lbs-20 lbs	S: .005"-.250" F: 10 lbs-30 lbs	S: .005"-.475" F: 10 lbs-50 lbs	S: .005"-.500" F: 10 lbs-100 lbs
Class A	Class B	Class C	Class D
Light Duty			Heavy Duty
S = Stroke: xxx" - xxx" (inches) F = Force: xxx lbs - xxx lbs			

Micro-Thermal Actuators

Our micro-thermal actuators are the smallest wax actuators available today. These unique actuators operate the same way our standard actuators do however the forces they deliver are scaled down due to size. With micro-actuators, thermal actuator technology can be applied in a variety of new ways opening up a world of engineering possibility.



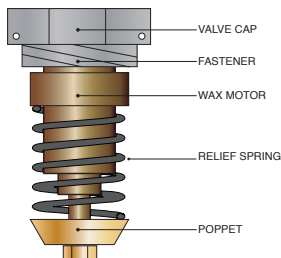
ACTUATORS



Control Valves

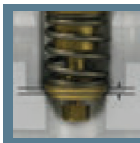
Vernatherm's multi-port thermostatic valves maintain proper operating temperatures within precise mechanical systems. These valves are powered by our own reliable thermal actuators and designed individually for each customer's application specific requirements.

These valves are usually installed in systems where fluid temperature is critical. Installed in parallel with a heat exchanger, the valve monitors fluid temperature and initiates cooling when needed. When cooling is not required, the valve simply diverts fluid away from the heat exchanger.

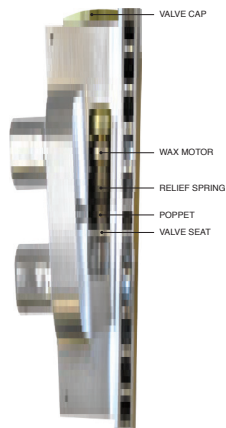


In the event that your heat exchanger becomes clogged and fluid cannot pass through the heat exchanger the valve's safety pressure relief function will activate. When this happens the valve opens and bypasses the exchanger branch all together. This will prevent pressure build up and system damage. All of our multi-port thermal valves* are designed with this safety feature.

CONTROL VALVES



Safety Pressure Relief: Under normal pressure, the valve stays closed, directing the hot fluid to be cooled by the heat exchanger. Excessive pressure pushes up on the valve, compressing the spring and allowing fluid to flow straight out of the system without being directed by the heat exchanger. When the valve is closed, it sits at the bottom line. Excessive pressure pushes the spring to move the valve to the upper position pictured in the diagram.



*(2,3,4 port valves)



The sides of the valves have been removed to display internal parts

Pressure Relief Control Valves

Pressure relief valves are valves used to control or limit the pressure in a system or vessel which can build up by a process upset, instrument or equipment failure, and or fire. Pressure is relieved by allowing the pressurized fluid to flow from an auxiliary passage out of the system. The relief valve is designed and set to open at a predetermined pressure. This

protects other equipment from being subjected to forces that exceed design limits. When the set pressure is exceeded, the relief valve becomes the "path of least resistance" as the valve is forced open and a portion of the fluid is diverted through the auxiliary route.

As fluid is diverted, the pressure inside the vessel drops. Once the internal forces reach the valve's re-seating pressure the valve will close. The blowdown is usually stated as a percentage of set pressure and refers to how much the pressure needs to drop before the valve re-seats. The blowdown can vary from roughly 2-20%, and some valves have adjustable blowdowns.



Custom Pressure Relief -

Many customers need special sizes and configurations when dealing with pressure relief applications. We offer complete flexibility when you work with our engineers. Some custom features include miniature sizes, low pressure settings, adjustable functions, and thermal bypass features.

Present an idea to our engineers and they will work together to generate a solution tailored to your needs.



Cartridge Pressure Relief -

A valve special in the way that it contains the valve head and the valve seat. This valve does not require a manifold to function, typically this valve is inserted into an open ended pipe with an elbow where the valve blocks flow unless the pressure setting is exceeded.



Poppet Pressure Relief -

A valve that is designed to be installed within a machined housing specifically configured for the valve which will contain the valve seat. The manifold or housing contains ports & fittings mandated by your specific system design. The poppet pressure relief valve will regulate system pressure according to your unique specifications when installed within the manifold.





Product Highlights

- CNC machined parts
- Flexible features and options
- Repeatable
- No external power
- Maintenance free
- Selectable temperature range
- Replaceable actuator cartridge
- Safety pressure relief
- Multiple port sizes & types

Our four port thermostatic control valves control system temperature by actively monitoring fluid temperature in real-time while adjusting flow accordingly between a heat exchanger and a bypass loop. Like many of our valves, our four port thermostatic valves are available in a variety of sizes, materials, port types, and temperatures.

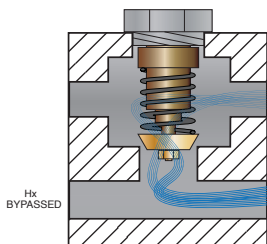


Fig 1. Valve State: "Opened"

The valve will bypass the cooler when the fluid is cool enough. Pressure differential between the cooler and the bypass enables the bypass to occur without any additional components.

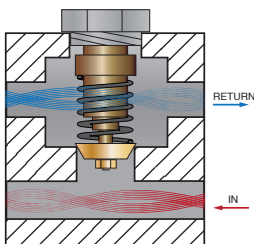


Fig 2. Valve State: "Closed"

When system fluid requires cooling the valve closes automatically. Fluid must flow through the cooler when the valve is closed. The chilled fluid crosses over the sensing unit of the valve and out into the system.

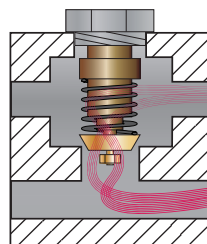


Fig 3. Valve State: "Pressure Relief"

If the cooler becomes restricted or blocked the pressure relief feature on the valve activates bypassing the cooler.

Temperature Range	Rubber Seals	Port Types	Materials	Max Pressure
30-300°F -1-149°C	Viton Nitrile HNBR Buna-N	NPT BSP SAE AN	Stainless Steel Aluminum Brass Steel	600 psi 41.37 bar

Three Port Thermostatic Mixing Valves

Vernatherm by Vernet's three port mixing valves utilize CNC machined valve bodies, thermal actuators, and a spool valve. The three port mixing valve features two inlets, and a single outlet for the mix temperature. This valve will shuttle between the hot and cold "inlet feeds" to appropriately mix your fluid to the desired temperature.

Upon in-feed temperature fluctuation within your system, this valve will dynamically meter either side to achieve your required output temperature.



Product Highlights

- 100% CNC Parts
- Customizable
- Repeatable
- No external power
- No maintenance
- Selectable temperature range
- Replaceable actuator cartridge
- Safety pressure relief
- Multiple port sizes available

Valve Options

Mix Temperature Range	Rubber Seals	Port Size Range	Materials
70-250°F / 21-121°C <i>Inlet dependent</i>	Viton Nitrile HNBR Buna-N	.25"-1.5" I.D. 6.35-38.1 mm	Stainless Steel Aluminum Brass Steel

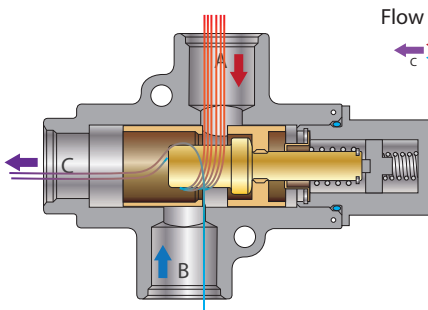


Fig1: Restricted cold flow into port B

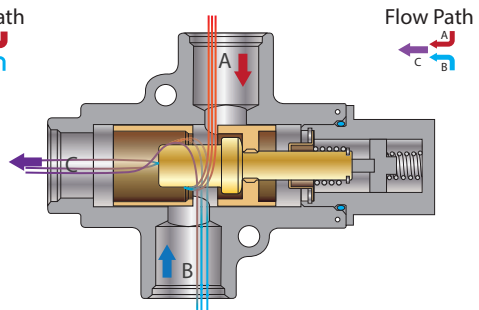


Fig2: 50 / 50 mix between hot and cold inputs

Vernatherm's three port thermostatic control valves ensure proper operating temperature of any mechanical system thanks to our patented aerospace technology used for accurate thermal management. The valves have a broad selectable thermal range that spans from 30°F to 300°F. The valves will be set to your specific temperature range by our in-house engineers and technicians. Your valves will arrive ready to install into your system.

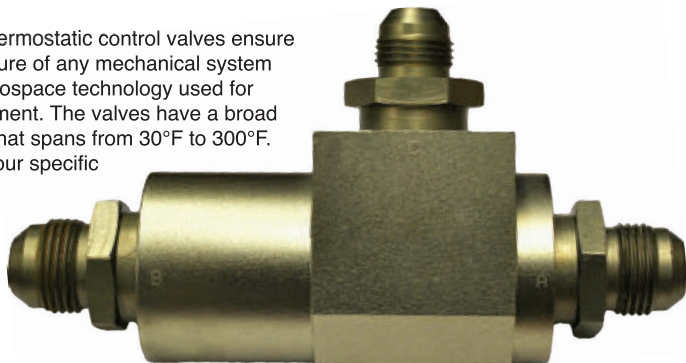


Figure 1. Valve anodized with male AN-8 ports

Product Highlights

- 100% CNC Parts
- Customizable
- Repeatable
- No external power
- No maintenance
- Selectable temperature range
- Replaceable actuator cartridge
- Safety pressure relief
- Multiple port sizes available

Our three port valves are utilized within systems where temperature regulation is critical. The valves are typically installed in-line within a system and plumbed to a diversion line. The diversion port is plumbed to or away from a heat exchanger properly sized to control your system's thermal properties. Optimal temperature is maintained by diverting to or away from the heat exchanger dynamically and in real-time while the system is running. The valve operates independently through thermal expansion and senses your system's fluid temperature 100% of the time requiring no power source.

Valve Options

Temperature Range	Rubber Seals	Port Types	Materials
30-300°F / -1-149°C	Viton Nitrile HNBR Buna-N	NPT BSP SAE AN	Stainless Steel Aluminum Brass Steel

Port Size: .250" / 6.35mm
Bleed Rate: .07 GPM / .38 l/m

Port Size: .500" / 12.7mm
Bleed Rate: .10 GPM / .50 l/m

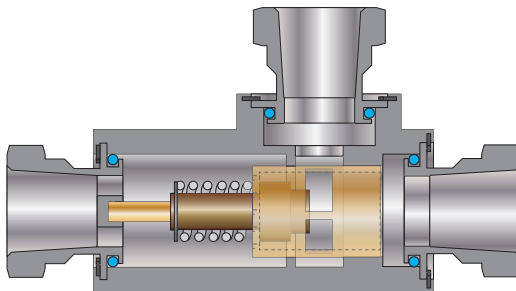
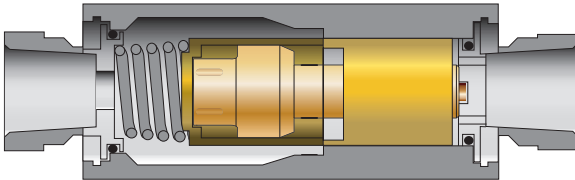


Figure 2. Valve cross-section shown in "hot" position

Two Port Thermostatic Control Valves

Vernatherm by Vernet's Two Port Thermostatic Control Valves thermally control in-line fluids in any system. The valves dynamically sense fluid temperature flowing through and a thermal actuator reacts in real time to constrict or allow flow based on the customer's thermal requirements.

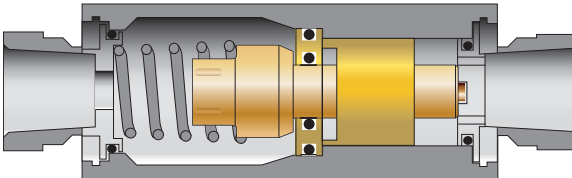
Bleed Through 2 - Port Valve



Port Size	Bleed Rate
.25" / 6.35	Bleed: .07 GPM / .50 l/m
.50" / 12.7	Bleed: .10 GPM / .38 l/m

Our standard line of two port valves feature a bleed through function which permits a small flow of system fluid through the valve to aid in the reaction time of the thermal actuator that is responsible for opening and closing the valve.

Positive Shut Off 2 - Port Valve



Port Size	Bleed Rate
.25" / 6.35	Bleed: .00 GPM / .00 l/m
.50" / 12.7	Bleed: .00 GPM / .00 l/m

Our positive shut off valve can be utilized in special applications where a bleed rate cannot be tolerated. These valves are designed with internal seals to prevent the passage of fluid when closed; the proper material for the rubber seals is selected based on your system's fluid to ensure compatibility.

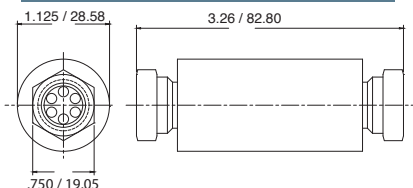
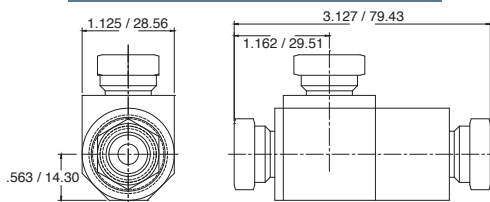
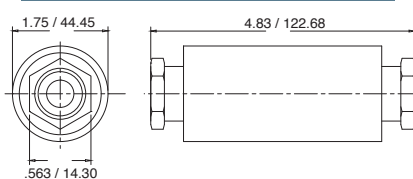
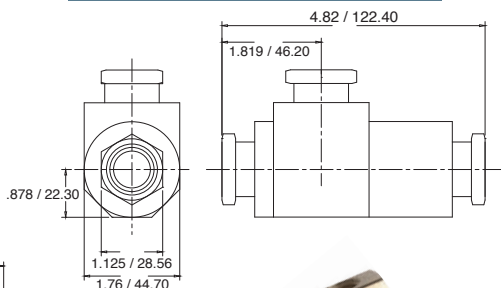
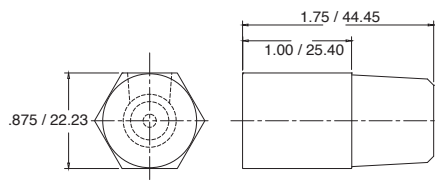
Like our three port valves our two port valves can be customized with a variety component materials, port sizes, types, and configurations. Speak with one of our engineers if you have additional requirements.

CONTROL VALVES

Valve Options			
Temperature Range	Rubber Seals	Port Types	Materials
30-300°F / -1-149°C	Viton Nitrile HNBR Buna-N	NPT BSP SAE AN	Stainless Steel Aluminum Brass Steel

Control Valve Series Information

2-Port (in/mm)	Flow Rate (gallon/m liter/m)	Pressure Limit (psi / bar)
Ø .25" / 6.35	15 / 56.78	400 / 27.58
Ø .50" / 12.7	24 / 90.85	400 / 27.58
3-Port (in/mm)	Flow Rate (gallon/m liter/m)	Pressure Limit (psi / bar)
Ø .25" / 6.35	15 / 56.78	400 / 27.58
Ø .50" / 12.7	25 / 94.63	400 / 27.58
Thermal Relief (in/mm)	Flow Rate (gallon/m liter/m)	Pressure Limit (psi / bar)
Ø A: (f).25/6.35 B: (m).75"/19.05	4 / 15.14	400 / 27.58

1/4" Ø Two Port Valve

1/4" Ø Three Port Valve

1/2" Ø Two Port Valve

1/2" Ø Three Port Valve

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Note: Drawings not to scale



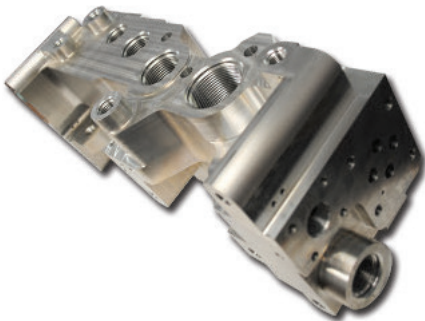
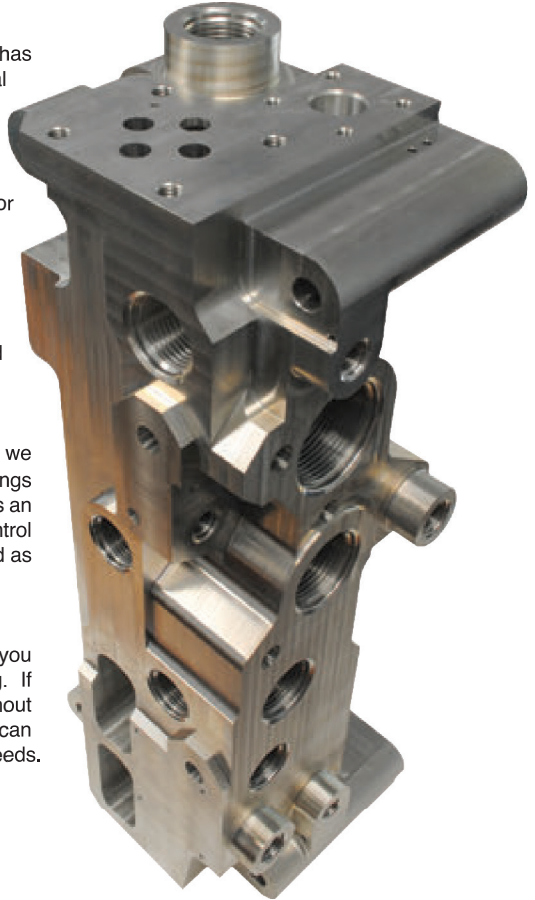
CNC Machined Valve Manifolds

Over the past 80 years Vernatherm has been providing high quality precise thermal actuators and valves to the aerospace industry.

Our actuators and valves do not act alone and cannot perform without a manifold or housing. Vernatherm offers a turn-key thermal control solution by offering manifolds and housings for our actuators and valves, eliminating the need to source an additional vendor to create the solution you are looking for. This ensures maximum compatibility and functionality to save you time and money.

With our 5-axis machining capability, we can CNC machine complex manifolds / housings with ease and accuracy. These manifolds act as an integral component, providing our thermal control valves with a valve seat and ports to divert fluid as the application requires.

If you already have a design in mind, you can simply provide us with a technical drawing. If you only have a general idea and are without technical drawings and data our engineers can help you find the proper solution to suit your needs.



Valve Manifold Capabilities

Machining Capabilities

The amalgamation of traditional machining techniques paired with cutting edge, state of the art machining technology enables us to bring you quality, complex parts in a timely fashion at reasonable prices. We have fully embraced CAD-CAM and 3-D modeling; through their integration we have streamlined the design to fabrication process into one operation that saves time and money. Our valves are machined on CNC lathes and 4 & 5 axis machining centers.

Customers with specific design requirements can easily send us a 3-D Part file, usually STEP, IGES, or any Solidworks compatible file and we can translate into our specific machine language will be satisfactory.

Vernatherm by Vernet will work with you to generate a reliable solution specifically tailored to your application's needs. Our panel of thermal dynamic and mechanical engineers will help solve the most complicated thermal control issues using their years of experience and cutting edge technology.

Prototype Capabilities

Our engineers will develop prototypes using customer provided criteria to develop three dimensional concept models that perform functional simulations. Customer feedback will be utilized to ultimately develop a working prototype ready for production. When ready the customer has the final say to bring their technology out of the prototype stage and into production.

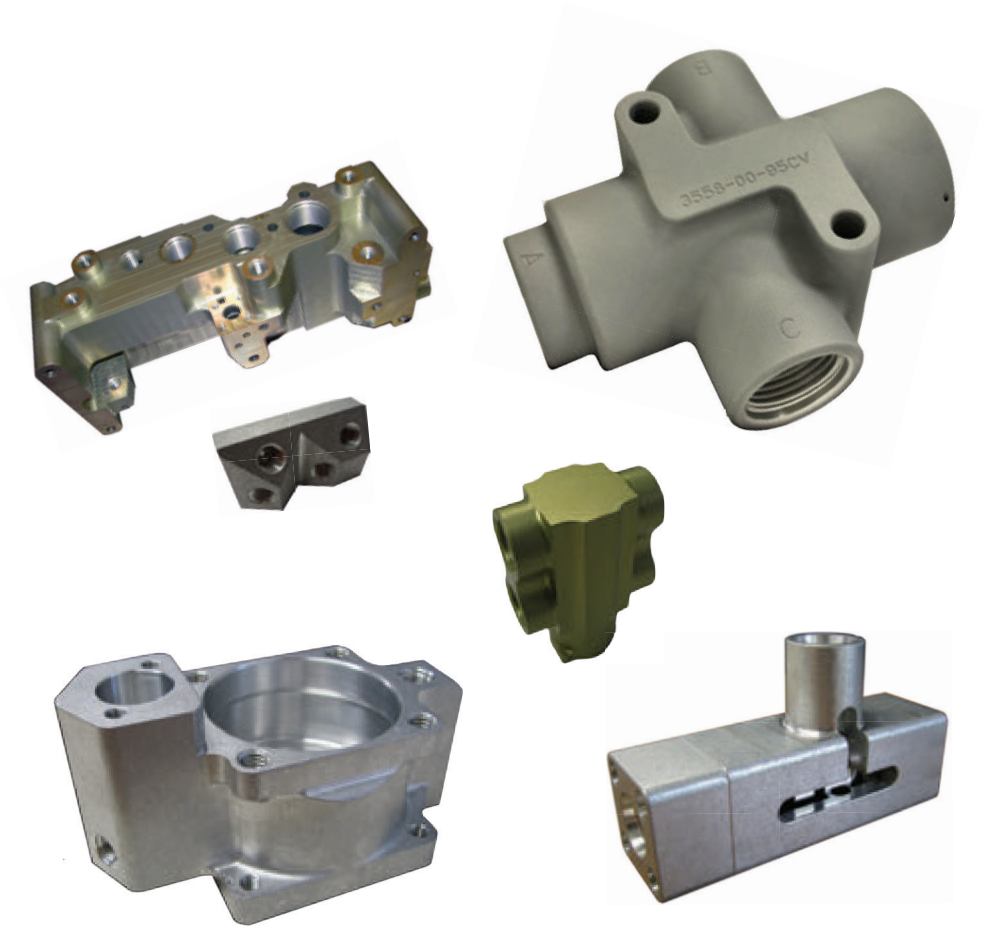
Confidentiality Agreements


While dealing with confidential information and issues, we are happy to sign confidentiality agreements when necessary; our customers are our most valuable asset.

In dealing with your prototypes, Vernet can even provide assistance in the areas of patents and trademark security.



Examples of Machined Manifolds





World leader of wax-based
thermal actuators, valves, & controls.

Vernet Group designs, manufactures, & markets
innovative thermal solutions to serve its
customers around the globe.

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