-185 C to +150 C  -300 F to +302 F

# PTS & HPG

## Portable Temperature Servos, High Pressure Gas Servos

**Description:**

Bemco portable servo conditioners provide a closed loop flow of controlled temperature air or gas to an insulated enclosure or structure. Bemco high pressure gas servo conditioners provide air or gas at up to two atmospheres of pressure to heat exchangers and thermal shrouds.

Because of the high level of technology involved, Bemco is one of the very few companies to offer high pressure gas servo conditioners with temperature ranges up to -185 C to 150 C.

Starting in the 1950's, Bemco has been making these systems for over 50 years. We have used our extensive experience in this highly technical area to improve our already industry leading line of portable temperature servo conditioners.

Why settle for the appearance of testing when you can have a system that actually works?

Choose Bemco, the true experts in ducted conditioned air and gas supply.

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**Bemco PTS-185/150C-600, -300 F to +302, 600 cfm, liquid nitrogen cooled Portable Temperature Servo Conditioner**

**Contact us for a free quotation or additional information.**

**Bemco Inc, since 1951**

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# Portable Temperature Servo

## PTS-V Air and Gas Conditioners

PTS

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### PTS-V Portable Temperature Servos, Liquid Nitrogen

| Model Number | Flow, scfm @ 4 in$H_2O$ | Heater Watts | Maximum Load Cooling, Watts | ~ Loop Rise Full Load, C | Temperature Range, C | Cooling Type | Refrigeration Horsepower | Circulating Gas |
|---|---|---|---|---|---|---|---|---|
| PTS2LD-V | 200 | 2000 | 820 @ -70 C | 5 @ -70 | -70 to +150 | $LN_2$ Direct | None | $GN_2$ |
| PTS2LH-V | 200 | 2000 | 820 @ -70 C | 5 @ -70 | -70 to +150 | $LN_2$ HeatX | None | Air |
| PTS2LDL-V | 200 | 2000 | 1620 @ -170 C | 5 @ -170 | -180 to +150 | $LN_2$ Direct | None | $GN_2$ |
| PTS2LHL-V | 200 | 2000 | 1350 @ -150 C | 5 @ -150 | -160 to +150 | $LN_2$ HeatX | None | Air |
| PTS5LD-V | 500 | 4000 | 2050 @ -70 C | 5 @ -70 | -70 to +150 | $LN_2$ Direct | None | $GN_2$ |
| PTS5LH-V | 500 | 4000 | 2050 @- 60 C | 5 @ -70 | -70 to +150 | $LN_2$ HeatX | None | Air |
| PTS5LDL-V | 500 | 4000 | 4040 @ -170 C | 5 @ -170 | -180 to +150 | $LN_2$ Direct | None | $GN_2$ |
| PTS5LHL-V | 500 | 4000 | 3390 @- 150 C | 5 @ -150 | -160 to +150 | $LN_2$ HeatX | None | Air |
| PTS10LD-V | 1000 | 6000 | 4110 @ -70 C | 5 @ -70 | -70 to +150 | $LN_2$ Direct | None | $GN_2$ |
| PTS10LH-V | 1000 | 6000 | 4110 @ -70 C | 5 @ -70 | -70 to +150 | $LN_2$ HeatX | None | Air |
| PTS10LDL-V | 1000 | 6000 | 8080 @ -170 C | 5 @ -170 | -180 to +150 | $LN_2$ Direct | None | $GN_2$ |
| PTS10LHL-V | 1000 | 6000 | 6770 @ -150 C | 5 @ -150 | -160 to +150 | $LN_2$ HeatX | None | Air |
| PTS15LD-V | 1500 | 9000 | 6160 @ -70 C | 5 @ -70 | -70 to +150 | $LN_2$ Direct | None | $GN_2$ |
| PTS15LH-V | 1500 | 9000 | 6160 @ -70 C | 5 @ -70 | -70 to +150 | $LN_2$ HeatX | None | Air |
| PTS15LDL-V | 1500 | 9000 | 12120 @ -170 C | 5 @ -170 | -180 to +150 | $LN_2$ Direct | None | $GN_2$ |
| PTS15LHL-V | 1500 | 9000 | 10160 @ -150 C | 5 @ -150 | -160 to +150 | $LN_2$ HeatX | None | Air |

## PTS-V Portable Temperature Conditioners

The standard line of PTS-V Portable Temperature Servo Conditioners feature a number of outstanding, sometimes Bemco exclusive, features that make them easier to use, more reliable, and more precise than ever before.

Every PTS-V includes an adjustable variable speed drive motor on the blower to allow precise flow balancing. The interior conditioning structure is easily accessible through a large insulated hinged door and on heat exchanger models, liquid nitrogen use is conserved by a separate liquid nitrogen level control system.

PTS-V's are furnished as free standing caster mounted systems, ready to provide a reliable and precisely controlled flow of temperature conditioned gas or air. Bemco's Portable Temperature Servos

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# Portable Temperature Servo

## PTS-V Air and Gas Conditioners

PTS

Environmental Test and Space Simulation Systems

| PTS-V Portable Temperature Servos, Mechanical Refrigeration | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model Number | Flow, scfm @ 4 in$H_2O$ | Heater Watts | Maximum Load Cooling, Watts | ~ Loop Rise Full Load, C | Temperature Range, C | Cooling Type | Refrigeration Horsepower | Circulating Gas |
| PTS2MN-V | 200 | 2000 | 670 @ -25 C | 5 @ -25 C | -35 to +150 | Single Stage | 1 | Air or $GN_2$ |
| PTS2MF-V | 200 | 2000 | 780 @ -60 C | 5 @ -60 C | -70 to +150 | Cascade | 1 x 1 | Air or $GN_2$ |
| PTS5MN-V | 500 | 4000 | 1680 @ -25 C | 5 @ -25 C | -35 to +150 | Single Stage | 3 | Air or $GN_2$ |
| PTS5MF-V | 500 | 4000 | 1960 @ -60 C | 5 @ -60 C | -70 to +150 | Cascade | 3 x 3 | Air or $GN_2$ |
| PTS10MN-V | 1000 | 6000 | 3360 @ -25 C | 5 @ -25 C | -35 to +150 | Single Stage | 5 | Air or $GN_2$ |
| PTS10MF-V | 1000 | 6000 | 3910 @ -60 C | 5 @ -60 C | -70 to +150 | Cascade | 5 x 5 | Air or $GN_2$ |
| PTS15MN-V | 1500 | 9000 | 5040 @ -25 C | 5 @ -25 C | -35 to +150 | Single Stage | 10 | Air or $GN_2$ |
| PTS15MF-V | 1500 | 9000 | 6160 @ -60 C | 5 @ -60 C | -70 to +150 | Cascade | 10 x 10 | Air or $GN_2$ |

include a 304 series stainless steel welded liner with high temperature fiberglass insulation. No asbestos is used in construction. Outer cases and machinery enclosures are fabricated from cold rolled steel finished in Bemco Blue. Conditioning compartment doors feature dual gaskets to greatly reduce thermal losses near the door face.

Four swivel casters with wheel locks are standard on all models.

All electrical wiring meets the United States National Electric Code. U.L and CSA approved components are used where possible.

## Air Circulation:

Air is recirculated by a high pressure, non-sparking aluminum blower mounted in a scroll discharging through an appropriately sized duct cuff. Air is returned to the conditioner through a second, matched duct cuff. Insulated duct pairs and duct clamps for attachment to your test load are available as an option.

The blower is driven by a vertically mounted motor with dual ball bearing races, connected by a large diameter extended stainless steel shaft. Motor speed and total system air flow can be adjusted to match load conditions. A minimum flow is required to prevent heater burnout.

Fast-response, open type heaters, raise temperature as required.

## Instrumentation:

Each PTS-V includes a microprocessor based programmable 1/4-DIN solid state 256-step ramping temperature controller with a 4-line LCD interface display and a large red LED display.

An RS232 and RS485 interface is standard. The protocol is Modbus™. LabVIEW™ drivers are available.

Temperature control is + or - 1 C (+ or - 1.8 F) guaranteed, + or - 0.15 C (+ or - 0.25 F) typical.

## $LN_2$ Cooling:

For those systems that include liquid nitrogen cooling, either a direct nitrogen injection system or a liquid nitrogen heat exchanger is supplied.

Liquid nitrogen systems include dual liquid solenoids, one for proportional control and one to act as an interlock to prevent run away in the event of a solenoid failure. A liquid line strainer and a relief valve are also included.

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# Portable Temperature Servo

## PTS-V Air and Gas Conditioners

**PTS**

When an air to $LN_2$ heat exchanger system is selected, a liquid nitrogen level control system is provided. The level control system prevents fluid blow-through in the event that the heat exchanger system is calling for more cooling but is already full of liquid nitrogen due to previous demand.

Air to $LN_2$ exchanger systems with heat exchangers are specified when you prefer air as the circulating medium.

## Mechanical Cooling:

Mechanically refrigerated systems are selected when operating cost versus first cost is a primary consideration. Mechanically refrigerated systems can be optionally furnished with liquid nitrogen boost cooling to allow operation down to -180 C. In some cases, special provisions must be made to isolate the refrigeration system from this cold temperature.

When a mechanically refrigerated system is specified, a proportionally controlled cascade, two compressor refrigeration system for -70 C ultimate temperature systems, and a single stage, one compressor refrigeration system for -35 C ultimate temperature systems is provided.

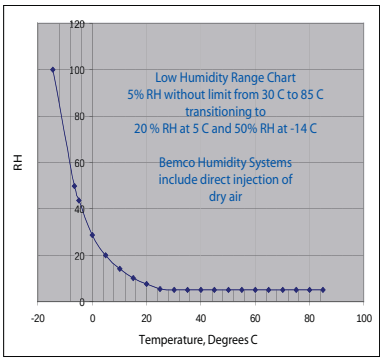
These systems utilize modern environmentally friendly refrigerants to cool the circulating air or gas. The refrigeration system includes automatic hot gas bypass and suction cooling unloading. Cascade systems also feature Bemco's exclusive, high performance coaxial cascade heat exchanger.

All systems have thermal and current sensors on each compressor as well as numerous safety and reliability protection systems for dependable operation. Standard systems all have water cooled condensing. Air cooled condensing is optionally available.

## Humidity Option:

Mechanically cooled PTS systems can be specified with humidity control. If this option is selected, humidity is increased by a Bemco mass transfer vapor generator and decreased by the direct injection of -73 C (-100 F) dew point dry air.

Humidity is sensed by a direct reading electronic humidity sensor accurate to + or - 2% RH over the dew point temperature range of -20 C to 85 C (-4 F to 185 F).

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# High Pressure Gas Servo

## HPG Air and Gas Conditioners

HPG

| HPG High Pressure Gas Servo Conditioners x 2 Atmospheres | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model Number | Flow, scfm @10 in$H_2O$ | Heater Watts | Maximum Load Cooling, Watts | ~ Loop Rise Full Load, C | Temperature Range, C | Cooling Type | Refrigeration Horsepower | Circulating Gas |
| HPG1LD | 100 | 2000 | 1620 @ -170 C | 5 @ -170 | -180 to +150 | $LN_2$ Direct | None | $GN_2$ |
| HPG1LH | 100 | 2000 | 1350 @ -150 C | 5 @ -150 | -160 to +150 | $LN_2$ HeatX | None | Air |
| HPG1MF | 100 | 2000 | 670 @ -25 C | 5 @ -25 C | -35 to +150 | Single Stage | 3 | Air or $GN_2$ |
| HPG1MN | 100 | 2000 | 780 @ -60 C | 5 @ -60 C | -70 to +150 | Cascade | 3 x 3 | Air or $GN_2$ |
| HPG2LD | 200 | 4000 | 3230 @ -170 C | 5 @ -170 | -180 to +150 | $LN_2$ Direct | None | $GN_2$ |
| HPG2LH | 200 | 4000 | 2710 @ -150 C | 5 @ -150 | -160 to +150 | $LN_2$ HeatX | None | Air |
| HPG2MF | 200 | 4000 | 1350 @ -25 C | 5 @ -25 C | -35 to +150 | Single Stage | 5 | Air or $GN_2$ |
| HPG2MN | 200 | 4000 | 1570 @ -60 C | 5 @ -60 C | -70 to +150 | Cascade | 5 x 5 | Air or $GN_2$ |
| HPG5LD | 500 | 9000 | 8080 @ -170 C | 5 @ -170 | -180 to +150 | $LN_2$ Direct | None | $GN_2$ |
| HPG5LH | 500 | 9000 | 6770 @ -150 C | 5 @ -150 | -160 to +150 | $LN_2$ HeatX | None | Air |
| HPG5MF | 500 | 9000 | 3360 @ -25 C | 5 @ -25 C | -35 to +150 | Single Stage | 10 | Air or $GN_2$ |
| HPG5MN | 500 | 9000 | 3910 @ -60 C | 5 @ -60 C | -70 to +150 | Cascade | 10 x 10 | Air or $GN_2$ |

## HPG High Pressure Gas Conditioners

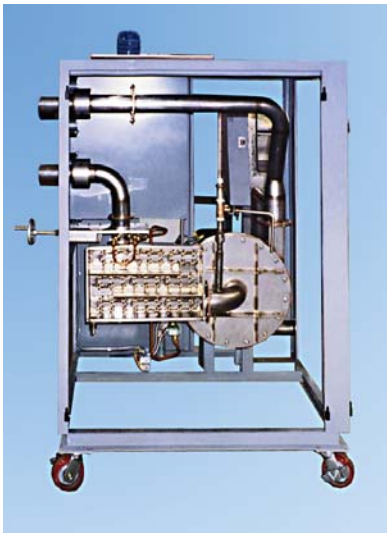
Bemco HPG, High Pressure Gas Conditioners are similar to the PTS Portable Temperature Conditioners except they are designed for continuous operation at up to two atmospheres (29.4 psia) of pressure.

This higher base operating pressure doubles the gas density per cfm of circulating air or gaseous nitrogen allowing the use of smaller connecting tubes while also increasing thermal capability.

Besides operating at a higher base pressure, HPG Conditioners are equipped with high pressure blowers capable of delivering full rated flow at a loop pressure drop of up to 10 inches of water.

HPG Conditioners are available to circulate gaseous nitrogen or air. Direct nitrogen injection systems are always nitrogen circulating systems.

All HPG systems include a high pressure blower mounted in a high pressure scroll discharging through an appropriately sized duct or tubing connection. Air or nitrogen is returned to the conditioner through a second, matched duct or tubing connection. Wide temperature range tubing or flexible metal tubing is always used with these



A Bemco HPG High Pressure Gas Conditioner shown in construction.

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# High Pressure Gas Servo

## HPG Air and Gas Conditioners

HPG

systems due to the higher operating pressures involved.

The high pressure blower is driven by an externally mounted motor with dual ball bearing races, through a Bemco high pressure and low temperature shaft seal connected by a large diameter extended stainless steel shaft.

Like the PTS systems, HPG motor speed and total system air flow can be adjusted to match load conditions using a variable speed solid state drive. A minimum flow is required to prevent heater burnout.

Fast-response, open type, or sheath heaters, depending on the system temperature range, raise temperature as required.

### Instrumentation:

Each HPG Conditioner includes a microprocessor based programmable 1/4-DIN solid state 256-step ramping temperature controller with a 4-line LCD interface display and a large red LED display.

An RS232 and RS485 interface is standard. The protocol is Modbus™. LabVIEW™ drivers are available.

Temperature control is + or - 1 C (+ or - 1.8 F) guaranteed, + or - 0.15 C (+ or - 0.25 F) typical.

### $LN_2$ Cooling:

For those systems that include liquid nitrogen cooling, either a direct nitrogen injection system or a liquid nitrogen heat exchanger is supplied.

Liquid nitrogen systems include dual liquid solenoids, one for proportional control and one to act as an interlock to prevent run away in the event of a solenoid failure. A liquid line strainer and a relief valve are also included.

### Mechanical Cooling:

When a mechanically refrigerated system is specified, a proportionally controlled cascade, two compressor refrigeration system for -70 C ultimate temperature systems, and a single stage, one compressor refrigeration system for -35 C ultimate temperature systems is provided.

These systems utilize modern environmentally friendly refrigerants to cool the circulating air or gas. The refrigeration system includes automatic hot gas bypass and suction cooling unloading. Cascade systems also feature Bemco's exclusive, high performance coaxial cascade heat exchanger.

All systems have thermal and current sensors on each compressor as well as numerous safety and reliability protection systems for dependable operation.

### Options:

The same options available for the Portable Servo Conditioners are also available with the HPG Conditioners.

These systems make an ideal compliment to a thermal shroud and are sometimes directly integrated with space chambers as shown in the picture above.

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# Portable Conditioners

## PITC Plug-in Temperature Conditioners

PITC

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The PITC (Plug-in Temperature Conditioner) fits through a hole in the side of a conditioned enclosure to provide a controlled source of conditioned air.

The PITC, with a temperature range of -70 to +177 C, was first introduced in the late 1950's by Bemco's Conrad/Missimer Division.

Today, the modernized version of this system is the ideal solution where short run or infrequent tests are required, test specimens are unusual in size or shape, initial capital costs must be held low, or test needs are frequently changed.

The answer is a Bemco PITC-70/177C Plug-in Temperature Conditioner and your insulated box. You can easily make one, we will guide you, or we can create an optimized enclosure for you.

With a PITC there is no need to "bread-board" your own conditioning and control systems. You don't need insulated ducts, and your insulated box can be made of expendable materials.

All you have to do is mount the PITC in a hole in the side of your suitably insulated cabinet, bolt the PITC in place, attach 115 VAC - 1 Phase - 60 Hertz power, hook up a nitrogen bottle, turn on the system, and set the temperature control.

PITC's come completely wired, piped, and ready to run.

## PITC's Include:

Welded, 300 series stainless steel interior construction and a carbon steel outer case painted Bemco Blue. PITC's are insulated with high temperature fiberglass. No asbestos is used in construction.

Air recirculation rate is 300 cfm, heating is with 2,000 watts of open type electric heaters, and cooling is by direct injection of liquid nitrogen controlled by a proportionally actuated solenoid valve.

Overall dimensions are 19 inches deep, 12 inches wide, and 15-1/2 inches high. Weight is 65 pounds. The PITC requires a 10-3/8 wide x 13-7/8 inch cutout for mounting. Insulated wall thickness should not exceed 4 inches.

Each PITC is furnished with a microprocessor based programmable 1/8-DIN, solid state, 10 step ramping controller that utilizes an adaptive control algorithm to precisely control chamber temperature. The control features dual 4 digit displays. An advanced control algorithm improves sensor accuracy by more than 50%.

Temperature in the PITC discharge air is sensed by a precision thermocouple. An EIA-485 Modbus interface is standard.

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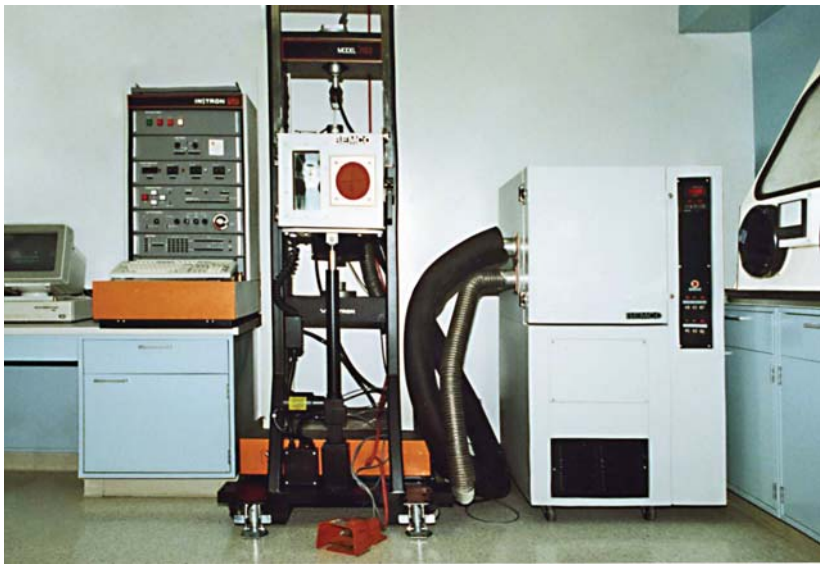
# Portable & HPG Servo
## Accessories

PTS



## Matching Enclosures

Thermally insulated enclosures manufactured from temporary materials or fabricated using the same high quality techniques employed on Bemco's F Series of Temperature Chambers for the selected PTS or HPG conditioner are available.

Thermal Base Plates and Thermal Shrouds for use with an HPG Conditioner are also offered. Please request a Bemco AH Bulletin.

## Mechanical Options:

- For PTS systems, a set of two appropriately sized insulated ducts with duct cuffs and clamps for both ends. Standard duct length is 8 feet each.
- For HPG systems, a set of two appropriately sized insulated hoses or flexible metal tubes with connectors on both ends. Standard hose or tube length is 8 feet each.
- Desiccant Drier purge with dual tower 10 cfm desiccant drier, pressure regulator, gauge, flow measuring and regulating valved rotameter and vent.
- Refrigeration gauges (two per compressor) mounted in the refrigeration package.

## Optional Instruments

- 24 hour or 7 day, digital indicating, self chart printing, circular recorders for temperature.
- Single-pen or multi-pen strip chart recorders.
- Programmable logic control sequencing of test processes. Bemco recommends Allen Bradley (ABB) PLC's and software.
- Gas flow volume or mass flow, display or control instruments.
- Set of two, one high and one low, microprocessor-based, FM Approved temperature safety controls.
- A low flow safety control with an audible and visual alarm system.
- Touchscreen HMI's (Human Machine Interfaces).
- RS232, RS485 and Ethernet communication interfaces.
- Engraved or silk screened graphic control panels.

## Distribution Panels

As a further convenience, we offer our PTS-DII and HPG-DII Gas Distribution Panels to individually distribute, monitor, and protect one or more of your high value products from the higher than required flow of a larger PTS or HPG Conditioner.

These systems are individually assembled to match the product being tested. They can be designed for mounting in standard Electronic Industries Association (EIA) 19" or 24" relay rack consoles or as free standing, wall, table, or floor mounted systems.

Contact your Bemco technical representative for a free analysis of your application.

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