

Mechanically Refrigerated Thermal Platform

The ESS, Inc. MRTP thermal platform systems rely upon a closed loop mechanical refrigeration cooling system. This eliminates the need for expendable refrigerants such as liquid nitrogen and liquid carbon dioxide. Eliminating the non-reusable refrigerants also eliminates the purchasing cost and handling expenses, not to mention the associated icing and water condensation.

The MRTP utilizes a quiet and efficient mechanical refrigeration system that recirculates the refrigerant in a closed loop circuit. Only environmentally friendly zero-ozone depleting refrigerants are used. Proprietary design features provide fast ramp rates with efficient heat removal. The system is small, lightweight and portable. A single AC outlet is all that is needed to operate it. The system uses a fan-cooled condenser that rejects heat into the room. If a water-cooling source is available, the system can be ordered with a water-cooled condenser. If many systems will operate in the same room, you should consider a water-cooling circuit to remove the heat rejected by the refrigeration cycle.

There are two types of MRTP systems. The first type called single stage uses one refrigeration circuit to cool the thermal platform. The second type called cascade uses two refrigeration circuits in series to achieve thermal platform temperatures as low as -65°C .

Single Stage Systems

Single Stage MRTP systems heat and cool a thermal platform very efficiently. They have rapid heating with good cooling rates down to about -20°C or -25°C . They will cool down below -35°C but the rate of change

decreases rapidly below -20°C or -25°C . This is because a single stage system uses a single compressor and a single type of refrigerant. The refrigerant used has a boiling point near -40°C . Once the temperature differential between the thermal platform and refrigerant is less than 15° or 20°C then thermal transfer is slower and the platform cools much less rapidly.



Cascade Systems

Cascade MRTP systems heat and cool a thermal platform very efficiently. They have rapid heating with good cooling rates down to about -50°C or -55°C . They will cool down below -65°C but the rate of change decreases rapidly below -50°C . This is because the refrigerant used has a boiling point near -70°C . Once the temperature differential between the thermal platform and refrigerant falls below 15° or 20°C , then thermal transfer is slower and the platform cools much less rapidly. A cascade system uses two compressors and two different types of refrigerant. This allows it to economically and reliably reach temperatures that are much lower than a single stage system is able to achieve.

Three configurations are available. The first configuration has a flexible umbilical that connects the thermal platform to the chiller cabinet and the platform can be used right on top of the cabinet, this the upright cabinet configuration, shown in the first picture. In the second configuration is very similar except that the cabinet is deeper and not as high so that the platform can be used on a table or rack shelf, this the under bench configuration. The last one is coming in the next few weeks and presents a platform attached to the front of the cabinet, which is integrated into a work shelf.



Optional accessories are also available such as a polycarbonate cover, an adapter plate, a hold down clamp, a clam shell, dry-box desiccator, a low pressure purge kit, and a high pressure purge kit.

Benefits:

- No need for LN₂ or LCO₂ so purchasing and handling expenses are eliminated.
- Only a simple AC outlet is required to run the MRTTP system
- The system is small, lightweight and portable
- Single Stage Systems have rapid heating and cooling rates down to -25° C and a range to -35° C
- Cascade Systems have rapid heating and cooling rates down to -55° C and a range to -65° C

Features:

<i>µP based digital control</i>
<i>Cascade control software</i>
<i>Additional user device probe</i>
<i>Programmable ramp & soak profiling</i>
<i>Environmentally friendly refrigerants</i>
<i>Programmable ramp to set point</i>
<i>Fast thermal ramp rates</i>
<i>Flexible platform positioning with use of umbilical cord</i>
<i>Simple robust design and construction</i>
<i>Quiet efficient operation</i>
<i>EIA 232 and IEEE-488 GPIB interfaces</i>



Thermal Platform Sizes	6-3/4" X 6-3/4" (170mm X 170mm) 6-3/4" X 13-1/4" (170mm X 335mm) 10" X 15" (250mm X 375mm) 11" X 11" (280mm X 280mm) Optional sizes are also available as 3.375" X 6-3/4", 11" X 22" and 24" X 24"
Standard Cabinet Dimensions	28" wide X 28" deep X 35" tall (710mm X 710mm X 890mm)
Portability	Easily moved on four rubber castors
Refrigerants	Non CFC zero ozone depletion HFC type
Thermal Platform	High strength aluminum alloy
Heating	Resistance AC element
Cooling	Expansion of refrigerant
Platform Surface	Ground for flatness and plated for durability
Control Method	Pulsed width modulation with proportional, integral, derivative control techniques
Fixturing	Four 1/4-20 stainless steel threaded inserts in platform
Platform to Cabinet Interface	Single six foot 2- 1/2 diameter insulated umbilical cord with flexible conduit or direct mount
Compressor	Fully hermetic type
Condenser	Fan-cooled tube and fin (optional water cooled)
Expansion Device	Thermostatic type (TXV)
Evaporator	Silver-brazed aluminum and copper alloy
Compressor Management	Hot gas bypass, liquid injection and pressure controlled
Platform Chassis	Corrosion resistant, stainless steel sheet metal construction
Failsafe	Redundant independent latching safety systems
Cabinet	Powder coated sheet metal construction with locking castors
Condensing Unit Base	Corrosion resistant powder coated steel
Facilities Requirements	Varies based on system ordered. Consult factory
Remote Communications	Standard EIA 232 serial communications or optional IEEE-488 GPIB interface
Temperature Range	Single stage system: -30° C to +130° C or Cascade system: -60° C to +130° C
Thermal Ramp Rate	Varies based on mass and load of device under test. No load rate can be as fast as 30° C/minute



Standard MRTP Systems Dimensions of the Plate, Chassis and Cabinet

P/N	Compressor hp	Plate	Plate Chassis	Cabinet
MRTP36S.33	3/4 single	3.375" x 6.75"	attached	W 19" L 24" H 16.5"
MRTP36C.33	1/3 cascade	3.375" x 6.75"	attached	W 19" L 24" H 16.5"
MRTP6S.75	3/4 single	6.75" x 6.75"	W 7.75" L 13.25" H 3.45"	W 28" L 28" H 35"
	optional cabinet size			W 28" L 28" H 25"
MRTP6C.75	3/4 cascade	6.75" x 6.75"	W 7.75" L 13.25" H 3.45"	W 28" L 28" H 35"
	optional cabinet size			W 28" L 40" H 25"
MRTP613S1	1 single	6.75" x 13.25"	W 14.25" L 13.25" H 3.45"	W 28" L 28" H 35"
	optional cabinet size			W 28" L 28" H 25"
MRTP613C1	1 cascade	6.75" x 13.25"	W 14.25" L 13.25" H 3.45"	W 28" L 28" H 35"
	optional cabinet size			W 28" L 40" H 25"
MRTP1015S1.5	1.5 single	10" x 15"	W 16" L 16.5" H 3.45"	W 28" L 28" H 35"
	optional cabinet size			W 28" L 28" H 25"
MRTP1015C1.5	1.5 cascade	10" x 15"	W 16" L 16.5" H 3.45"	W 28" L 28" H 35"
	optional cabinet size			W 28" L 40" H 25"
MRTP11S1.5	1.5 single	11" x 11"	W 12" L 18" H 3.45"	W 28" L 28" H 35"
	optional cabinet size			W 28" L 28" H 25"
MRTP11C1.5	1.5 cascade	11" x 11"	W 12" L 18" H 3.45"	W 28" L 28" H 35"
	optional cabinet size			W 28" L 40" H 25"
MRTP1122S2	2.25 scroll	11" x 22"	W 23" L 16.75" H 3.45"	W 28" L 40" H 25"
MRTP1122C2	2.25 scroll cascade	11" x 22"	W 23" L 16.75" H 3.45"	W 34" L 48" H 35"
MRTP24S3	3 scroll	24" x 24"	W 25" L 31" H 3.45"	W 34" L 48" H 35"
MRTP24C3	3 scroll cascade	24" x 24"	W 25" L 31" H 3.45"	W 34" L 48" H 35"