The second generation.
The MIRA Advantages

Less Tissue Damage

Slow freezing and refreezing produce large ice crystals that destroy cell membranes and cause excessive tissue damage. Under such conditions, inadvertent freezing of extraocular tissues, including the lids, may cause unnecessary postoperative patient discomfort, depigmentation, and alopecia. Both the rate of freezing and thawing are important. In fact, slow thawing causes even more tissue damage than slow freezing. Both increase the size of the ice crystals in the tissues. Fast freezing and thawing, however, produce delicate intracellular crystal formation. This is less destructive and is useful in treating retinal detachment. Thus a very fast freeze and defrost cycle is preferable to a slower one. For this fundamentally significant reason, MIRA offers the fastest freeze and defrost system available. The MIRA Ophthalmic Cryo is the only cryo that provides instantaneous freezing and defrosting with all tip-freeze-only probes. This is because the MIRA cryo is the only cryo designed and optimized specifically for ophthalmic use. Our instant freeze and defrost feature also allows you to operate more quickly, thus improving your efficiency and productivity.

Better Visibility and Maneuverability

The unique MIRA design means that all of our cryo probes have tip-freeze-only. Visibility and surgical maneuverability are enhanced by eliminating the need for bulky insulating boots or sleeves. The tip-freeze-only feature also reduces the risk of inadvertent freezing of surrounding tissues.

Probes For All Applications

MIRA's wide variety of probes includes straight, curved, and hammerhead in a variety of sizes for retina, vitreous, ROP, tumor, glaucoma, and cataract surgery. All of our probes are made of durable stainless steel and come equipped with protective tip covers. For added convenience, our probes are completely autoclavable. MIRA also offers you the possibility of custom designing a probe to suit your own individual needs. Please call our Product Manager or Director of Research & Development if you have an idea for a probe design that would render a cryo procedure easier, faster, or more efficient.

No Manual Pressure Adjustments Required

With MIRA's efficient design, a separate tip temperature measuring device is not necessary. Consistent probe tip temperature is easy to set and maintain with highly accurate console settings. A selection is made from the three most commonly used temperature settings, -25°C, -55°C, and -85°C. The inner console mechanism automatically regulates the gas pressure needed to produce these temperatures at the probe tip. No manual pressure adjustments are necessary.

Will Not Startle Ambulatory Patients

The MIRA cryo is the quietest cryo available. It was specifically designed to eliminate noise in both the console unit and the probe. This quiet operation can help you achieve a calming office environment for the unanesthetized, apprehensive patient.
“Only the MIRA Ophthalmic Cryo provides instantaneous freezing and defrosting with all tip-freeze-only probes.”

Makes the Surgeon’s Task Easier
MIRA has designed its new cryo with the surgeon’s needs in mind. Our new tubing with enhanced flexibility and natural downward positioning of the probe tip are intended to make the vitreoretinal specialist’s work easier. Our probe tubing is a full nine feet long in order to provide the surgeon with a greater range of motion. With reduced coil memory, the tubing will not offer resistance when maneuvering the probe or spontaneously recoil when placed upon an operating table. Another benefit of the unique MIRA design is that the handle remains at a comfortable temperature – even during extended freezing procedures. This is because the warm incoming gas completely surrounds the central tube of cold exhaust gas, thus insulating the probe handle.

Completely Safe
Most importantly, MIRA has kept your safety in mind. Our new cryo is totally non-electric and there is absolutely no danger of N₂O exposure. The exhaust gas exits through the probe jack directly back into the console. This eliminates the need for a separate exhaust tube between the probe and the console. Within the console, the gas is contained in a sealed system so that no leakage into the surrounding air is possible. The used gas is removed from the console through a rear exhaust hose.

Fast Installation and Disassembly
MIRA has also thought about the nurse’s needs. Installation and removal of various probes is fast and easy. Push it in, pull it out – that is all there is to it. There are no cumbersome dual connections for intake and exhaust, and no time consuming screw threads.
“The most advanced instrument currently available.”

The MIRA design is optimized specifically for ophthalmic use.

MIRA’s exclusive design, based on the Joule-Thomson principle, utilizes a high pressure system in both the freeze and defrost modes. This system guarantees instantaneous freezing and defrosting. When the footswitch is depressed, high pressure gas is forced along the narrow periphery, through a narrow orifice, and into a larger volume chamber in the tip. This sudden expansion of the gas causes an instantaneous heat loss, thereby abruptly freezing the probe tip. The console temperature selector automatically regulates the gas pressure. This allows a preset frozen tip temperature to be maintained in direct contact with the tissue to be treated.

Our unique rapid defrost occurs when the footswitch is released and the high pressure gas is forced in the reverse direction. This sudden compression of the gas causes an instantaneous gain in heat, instantly warming the tip.
The MIRA Cryo offers a number of advantages during retinal detachment surgery and procedures. Because the probe is kept warm except at its tip during freezing, application of a protective silicone rubber sleeve over its shaft to protect adjacent tissues is not necessary. The handle never gets excessively cold so that no electrical warming is needed. In fact, there are no electrical connections at all, eliminating any fire hazard from the source. The only consumable is CO$_2$ or N$_2$O gas that operates the equipment even in remote areas. [The MIRA Cryo] is my first choice for cryo procedures."

Ronald C. Pruett, M.D.$^2$

"The most advanced machine currently available (manufactured by MIRA) functions with either CO$_2$ or N$_2$O. It has the capacity to freeze and thaw faster than other apparatus. A remarkable feature is that it freezes at the tip only. This eliminates the danger of freezing adjacent tissue. The temperature of the tip can be preset to maintain a constant temperature. The pressure of the gas never needs additional adjustment."

Charles L. Schepens, M.D.$^3$

**Reliable Operation**

The new MIRA cryo, with its simplified console design and 60 second purging cycle, was designed to provide you with many years of reliable service. Because there are fewer valves and moving parts, there are fewer possible malfunctions. The cryo is also easier to service if something does eventually wear out. This design is more efficient, lighter in weight, and quieter to operate. All mechanical parts are precision crafted on MIRA's modern Computerized Numerically Controlled (CNC) equipment.
Practical Office System
Our efficient design does not stop at just the cryo console and probes. We have also improved our office cryo carrier. The wheel diameter is large enough to allow easy movement over carpet and thresholds. For added convenience, both our single and dual carriers can accept either small diameter or large diameter cylinders. A dual switchover valve on the two cylinder carrier allows continued operation of the cryo while an empty cylinder is removed for refill.

Durable Construction
MIRA has taken extra steps to ensure the unit's expected long life. All probe handles are made of stainless steel. Both probe tips and connector jacks come equipped with protective covers. Because of the corrosive nature of CO₂ and N₂O gases, our gas cylinder pressure lines are made of copper tubing to reduce the risk of damage to these lines. Replaceable microfiber filters can be fitted above the gas cylinder connections. These filters are highly recommended, especially for high humidity climates and countries where gas contamination is a problem. The cryo filter removes condensed water, oil droplets, other liquids, and solid particles from the gas. Using a filter will help extend the life of your probes by preventing these contaminants from clogging the gas flow passages.

One Year Warranty
MIRA manufactures only the highest quality products, and our new cryo is no exception. The MIRA Cryo comes with a one year warranty on both materials and workmanship. If a repair is ever needed, we will respond with prompt, efficient service.
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Dimensions</th>
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<tbody>
<tr>
<td>CR4010</td>
<td>Curved Retinal Probe</td>
<td>2.8 mm diameter x 25.4 mm length</td>
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<tr>
<td>CR4022</td>
<td>Straight Cataract Probe</td>
<td>2.1 mm diameter x 27.0 mm length</td>
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<td>Curved Cataract Probe</td>
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<td>Mini Curved Cataract Probe</td>
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<td>Curved Glaucoma Probe</td>
<td>3.4 mm diameter x 25.4 mm length</td>
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<td>Vitreous Probe</td>
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<td>Mini Vitreous Probe</td>
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<td>Hammerhead Probe</td>
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<td>Baby Hammerhead Probe</td>
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<td>Gaynon ROP Probe</td>
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<td>CR4090</td>
<td>Retinoblastoma Probe</td>
<td>1.5 mm diameter x 35.0 mm length, 10 mm radius</td>
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References
CR4000 Specifications

Console Dimensions: Width 5 inches (13.3 cm)
Height 6.5 inches (16.5 cm)
Depth 11 inches (27.9 cm)

Weight: 16 pounds (7.3 kg)

Front Panel Gauge: Indicates incoming cylinder gas pressure

Front Panel 3 Position
Temperature Selector: -25°C, -55°C, -85°C, tolerance ±5°C

Front Panel
On/Off Switch: Turns console on/off (controls gas lines)

Footswitch: Controls freezing operation
(depress to freeze, release to defrost)

Power Source: Operates on CO₂ or N₂O gas
(no electrical power required)

Cryo Filters
- CR4400 Microfiber Filter Retrofit
- CR4350 Replacement Microfiber Filters (box of 10)

Gas Connectors
- CR4210 Handtight CGA N₂O for C cylinder
- CR4220 Handtight CGA CO₂ for C cylinder
- CR4230 Handtight Br. Whit. N₂O for C cylinder
- CR4240 Handtight Br. Whit. CO₂ for C cylinder
- CR4250 Universal T-yoke N₂O or CO₂ for E cylinder
  (available for export only)
- CR4280 T-Yoke N₂O for E cylinder
- CR4290 T-Yoke CO₂ for E cylinder
- CR4310 Handtight CGA N₂O for C cylinder with filter
- CR4320 Handtight CGA CO₂ for C cylinder with filter
- CR4330 Handtight Br. Whitworth N₂O for C cylinder with filter
- CR4340 Handtight Br. Whitworth CO₂ for C cylinder with filter
- CR4380 T-Yoke N₂O for E cylinder with filter
- CR4390 T-Yoke CO₂ for E cylinder with filter

Gas Cylinders (Empty) & Covers
- CR4410 8 inch C cylinder for N₂O
- CR4420 4 inch E cylinder for N₂O
- CR4430 8 inch C cylinder for CO₂
- CR4440 4 inch E cylinder for CO₂
- CR4411 C size cylinder cover
- CR4421 E size cylinder cover

Cryo Accessories
- CR4160 25 foot exhaust hose
- CR4260 60 inch pressure hose connection
- CR4350 Replacement microfiber filters (10 per box)
- CR4400 Microfiber cryo filter assembly (cylinder connector and hoses not included)

Cryo Systems

CR4001 Ophthalmic Cryo Includes:
- CR4000 Ophthalmic cryo console with footswitch
- CR4260 60 inch pressure hose connection
- CR4160 Exhaust hose
- CR4310 Handtight CGA N₂O for C cylinder,
  complete with filter assembly
- CR4010 2.5 mm curved retinal probe
- CR4023 2 mm curved cataract probe

CR4002 Ophthalmic Office Cryo Includes:
- CR4000 Ophthalmic cryo console with footswitch
- CR4260 60 inch pressure hose connection
- CR4160 25 foot exhaust hose
- CR4310 Handtight CGA N₂O for C cylinder,
  complete with filter assembly
- CR4140 Single cylinder cryo equipment carrier
- CR4010 2.5 mm curved retinal probe

CR4000 Ophthalmic Cryo Includes:
- CR4000 Ophthalmic cryo console with footswitch
- CR4260 60 inch pressure hose connection
- CR4160 25 foot exhaust hose
- CR4310 Handtight CGA N₂O for C cylinder,
  complete with filter assembly

Cryo Carriers
- CR4140 Single cylinder cryo carrier with one 30 inch hose
  (holds either 1 C or 1 E cylinder)
- CR4150 Dual cylinder cryo carrier with two 30 inch hoses & one
  switchover valve (holds either 2 C or 2 E cylinders)