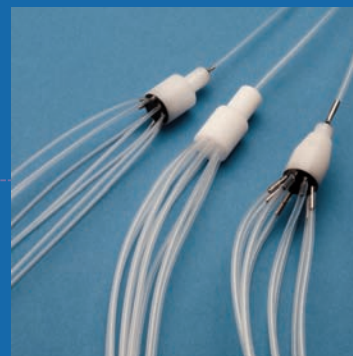
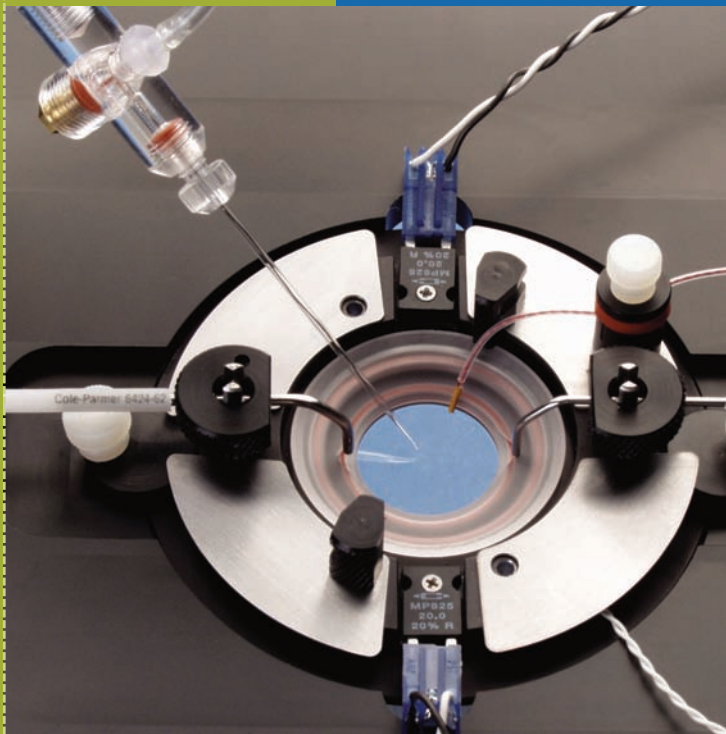


Integrated Components for Live-Cell Imaging



chambers,
perfusion and
temperature
control

Recording / Imaging Chambers

Modular Design

Warner's open bath recording chambers are a family of chambers designed to fill a large number of imaging and recording needs. The modular design consists of two parts; a polycarbonate chamber (insert) and an anodized aluminum platform (holder). The platform clamps the chamber providing a seal between the chamber and coverslip. Heated platforms are used where chamber warming is required. The design of the platforms permits quick removal of the chamber for exchange of the coverslip.

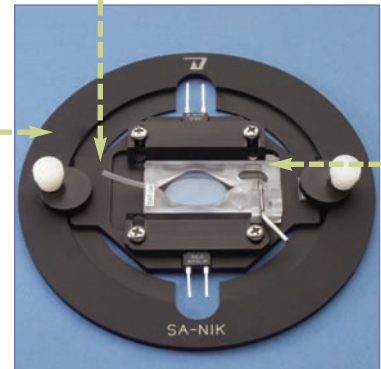
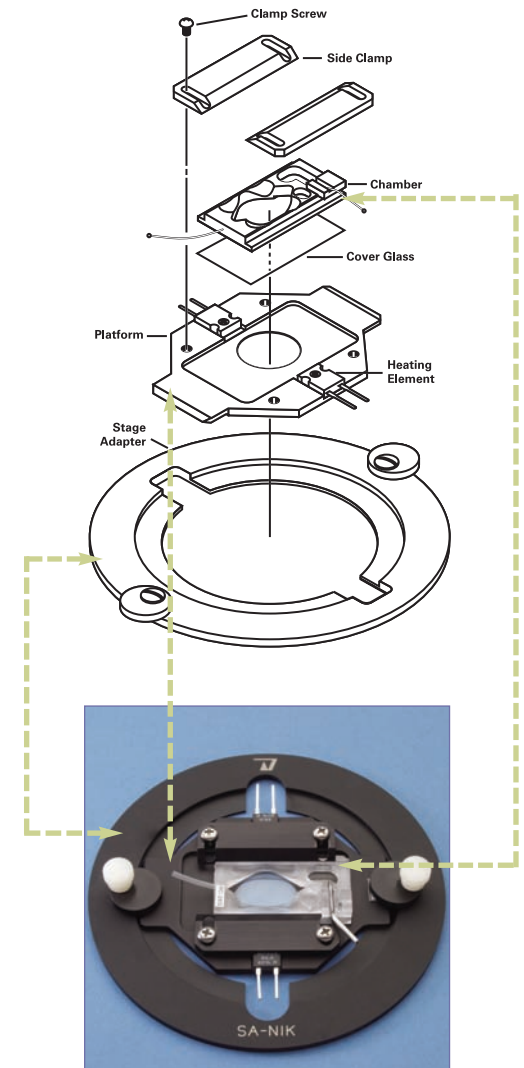
Stage Adapters are designed to allow the mounting of Warner imaging and recording products onto a microscope. We have a wide variety of stage adapters to fit most commonly used microscope stages including stock stages from Nikon, Olympus, Zeiss, and Leica. We also have stage adapters compatible with 3rd party stages from Prior, Ludl, and Marzhauser to name a few.

A typical, complete system includes chamber, temperature control, and stage adapter

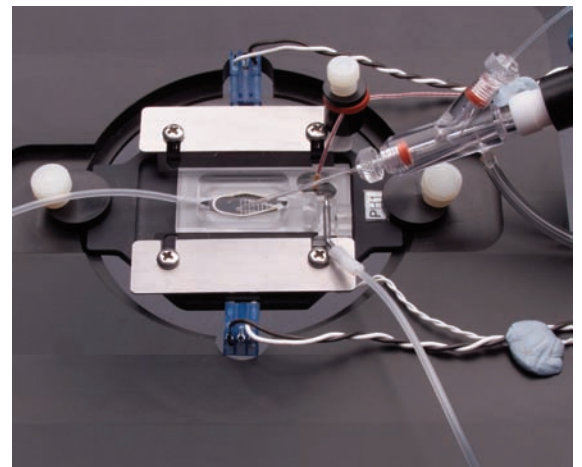
Order #	Model	Product
64-0235	RC-26G	Large Bath Recording Chamber
64-0255	SHD-26GH/2	Slice Anchor for RC-26G (2 mm)
64-0101	TC-344B	Dual Channel Heater Controller
64-0106	CC-28	Cable Assembly for Heater Platforms
64-0102	SH-27B	Solution Heater
64-0284	PH-1	Chamber Heater Platform
64-xxxx	SA-xxxx	Stage Adapter

Accessories

64-0378	111-KIT	Silicone grease kit
64-0755	PE-160/10	Polyethylene tubing, PE-160, 10 ft
64-0220	FR-50	Flow Valve
64-1578	GBM10	Gas bubbler manifold for 10 cc syringe holder
64-1588	GBM60	Gas bubbler manifold for 60 cc syringe holder
64-0210	MP-6	MP Series perfusion manifold 6 to 1 ports



Chamber and platform with Nikon inverted stage adapter



RC-22 chamber with slice anchor and patch electrode

An Integrated Systems Approach

Heated Platform

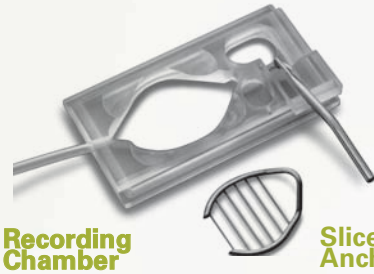


Platforms function as the base for Series 20 chambers and provide clamping to make a seal between the chamber and coverslip.

Stage Adapter



Stage adapters are available for all major microscopes and stages currently on the market.



Recording Chamber

Slice Anchor

Our chamber selection guide, available online and in our print catalog is useful for choosing the best chamber for your experiment. The guide lists chambers by application, bath type, bath volume, and coverslip size.

Cable Assembly



The CC-28 cable provides power to the heated platform. There are also 2 thermistors on the cable used to maintain and monitor the desired temperature of the sample.



Solution Heater

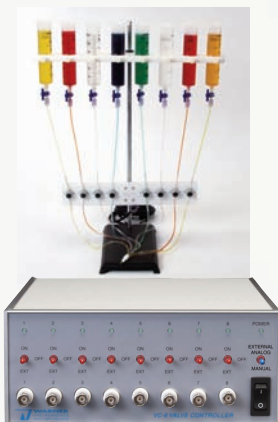
In-line solution heaters are a simple and effective way to warm solutions flowing into Series 20 Chambers.



Temperature Controllers



Available in dual and single channel versions for heat only and peltier driven peripherals. All temperature controllers use ultra low noise power supplies for sensitive electrophysiology recording.



Valve Controllers

Our perfusion valve control systems are robust, easy to operate, and designed to control six or eight valves. Several types of valves to choose from, gravity or pressure driven systems available.

Open Bath Recording / Imaging Chambers

Designed for:

- Electrophysiological recordings
- Optical imaging
- Tissue slice and cell cultures
- Low profile design permits maximum electrode access to the bath
- Stage adapters for all microscope stages

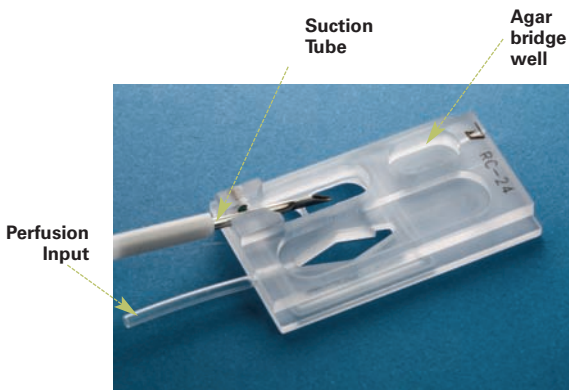
Open Bath Recording and Imaging Chambers

Warner open bath chambers incorporate diamond-shaped fluidics yielding laminar flow throughout the bath. The low profile design allows for excellent electrode access without interfering with optical measurements. Chambers with larger baths (e.g., RC-26) allow for insertion of round coverslips into the assembly facilitating rapid screening of cultured cells.

Slice anchors are offered for many chamber models. Hold-downs press-fit into the respective chamber and are not weight dependent.

The **RC-24** and **RC-24E** chambers allow for very fast solution exchange for a variety of applications. These recording chambers feature the smallest bath volumes of Warner's open style chambers.

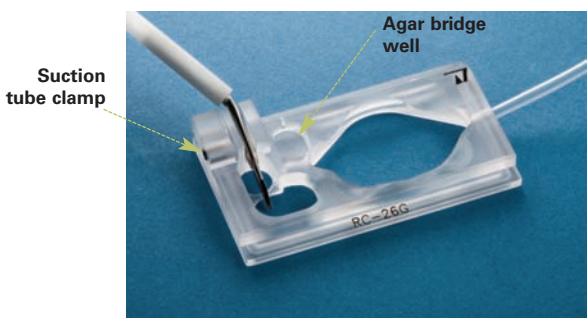
- Designed for physiological measurements of cell cultured coverslips
- Both perfusion and aspiration ports on same side of chamber
- Very small bath volume facilitates very fast solution exchange



RC-24



RC-22C



RC-26G



JG-23

The **RC-22** and **RC-22C** are small volume, open bath recording chambers designed for tissue and brain slice studies.

- Applications include patch clamp, intracellular / extracellular recordings, and imaging
- Small bath volume facilitates rapid solution exchange
- Tissue slice anchor included

The **RC-26**, **RC26G**, and **RC26GLP** are large volume open diamond bath recording chambers that can accommodate large specimens such as slice preparations.

- Designed for patch clamp studies
- Can be used with tissue slice samples or cell cultured coverslips
- Large imaging area
- Can be used with upright or inverted microscopes
- Tissue slice anchors available

JG-23 Series chambers have a special sloped surface and bath atrium that enables ultra quiet solution delivery.

- Eliminates vibration associated with solution exchange
- Incorporates Warner's diamond fluidics
- Multiplexed solution delivery is possible without the potential of solution switching artifacts
- Reduces 60Hz interference from perfusion line

Closed Bath Imaging Chambers

- Closed bath chamber designs
- Diamond fluidics
- Ideal for fluorescence, calcium, and time-lapse imaging studies
- Stage adapters for all microscope stages

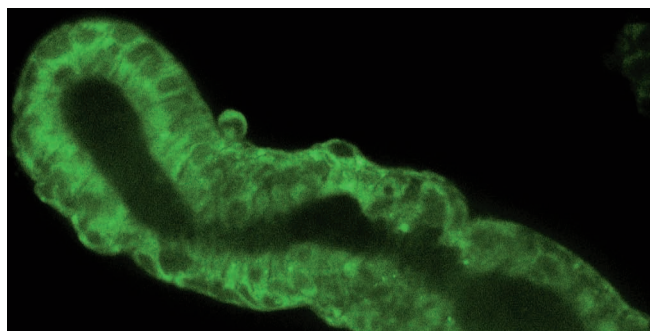
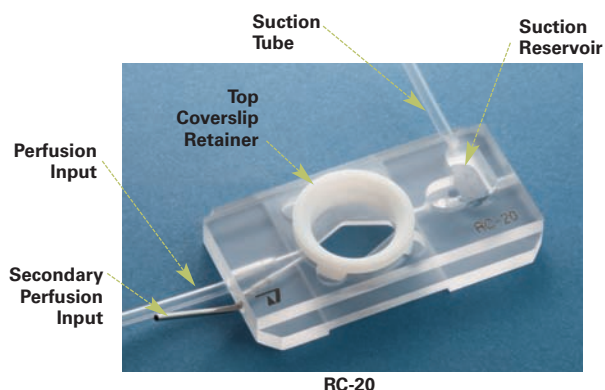


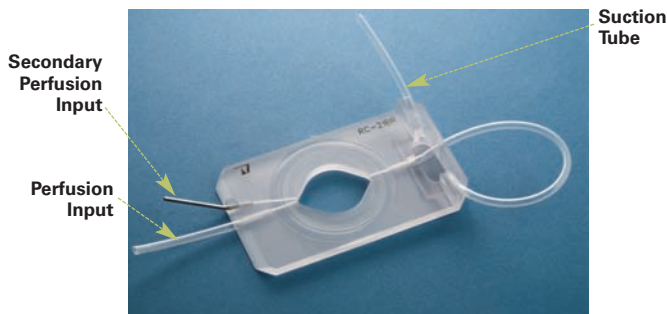
Image courtesy of John Geible using the JG-23 chamber

The **RC-20** and **RC-20H** are very low volume imaging chambers featuring fast solution exchange and short working distances. An access port (Hamilton syringe compatible) at the bath input may be used to inject substances into the solution flow or to remove gas bubbles.

- Fast solution exchange, bath volume 48 μ l/mm RC-20, 90 μ l/mm for RC-20H
- Both chambers use 15 mm #1 thickness coverslips top and bottom
- Gas tight design at the chamber interface



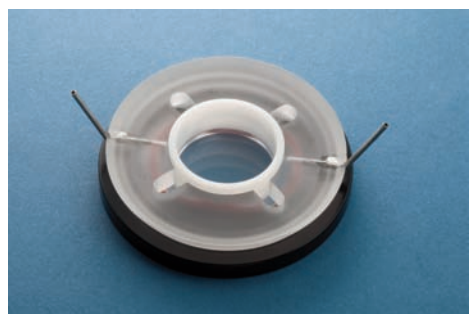
RC-20



RC-21BR

The **RC-21B** and **RC-21BR** chambers feature a closed bath, short working distances, and laminer solution flow. Distance between the top and bottom coverslip is 2.5 mm and total bath volume is 358 μ l.

- Uses 22 mm square or 25 mm round coverslips
- Large optical imaging area
- Good access for upright or inverted microscopes



RC-43C

The Series 40 family of chambers was designed for research requiring the fast exchange of round coverslips.

Series 40 chambers are compatible with Warner's QE-1 Quick Exchange Platform, DH-35iL and DH-40iL Culture Dish Incubators.

- Dual O-ring seal system enables quick coverslip exchange that's ideal for rapid screening assays
- Closed bath design promotes both smooth continuous solution exchange and a stable imaging focus
- Anodized aluminum base insures good heat transfer



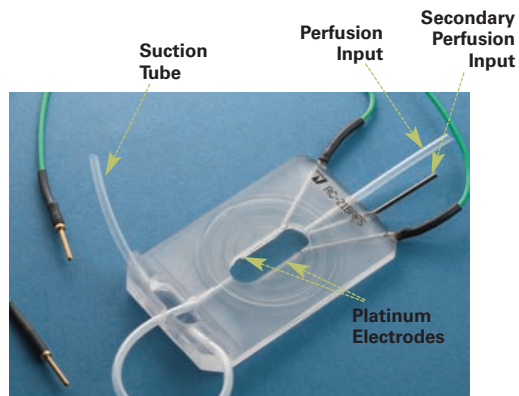
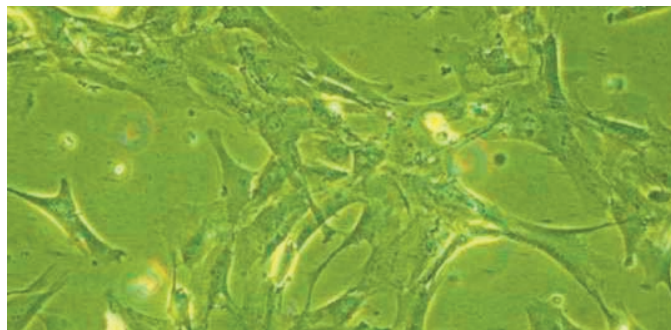
RC-37WC

RC-37 Series inserts enable on-microscope assays using the popular glass bottomed 35 mm cell culture dishes.

- Eliminates vibration associated with solution exchange
- Designed for glass bottomed 35 mm cell culture dishes
- Incorporates Warner's diamond bath fluidics
- Ideal for rapid screening assays
- For use with DH-35iL platform

Field Stimulation Imaging Chambers

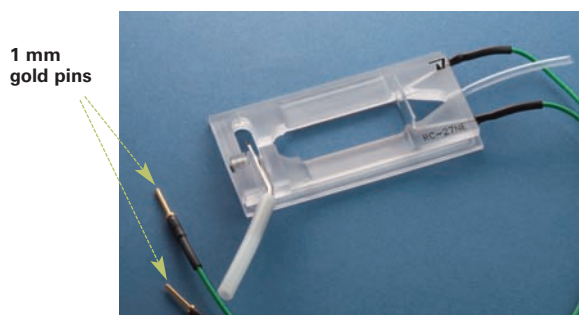
- Designed for studies involving cardiac myocytes
- Open and closed bath chamber designs
- Ideal for fluorescence, calcium, and time-lapse imaging studies
- Stage adapters for all microscope stages



RC-21BRFS

The **RC-21BRFS** is a small volume, closed bath imaging chamber designed for field stimulation studies. It uses a pair of 25 mm round coverslips to form the top and bottom of the chamber, and the total bath volume is 263 μ L. Two platinum wire electrodes are attached to the parallel sides of the oval-shaped bath. The connecting wires are 15 cm long and are terminated in 1 mm pins

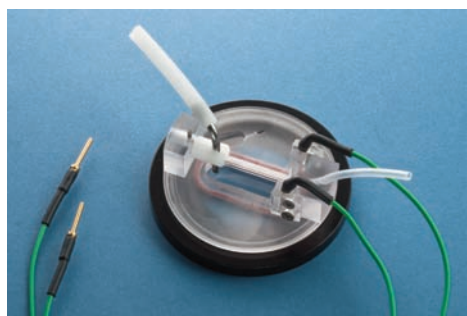
- Closed bath design
- Small volume with slotted bath
- Gas tight design at the chamber interface



RC-27NE

The **RC-27NE** is a narrower open bath chamber with embedded platinum electrodes to support studies using field stimulation.

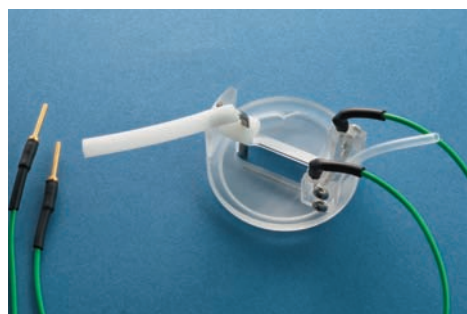
- Designed for field stimulation studies
- Rectangular, open-bath chamber
- Narrow bath
- Accommodates tissue or brain slice specimens
- Applications include patch clamp, and physiological measurements on cultured cells



RC-47FSLP

The **RC-47FSLP** chamber includes a pair of platinum wires epoxied onto the parallel sides of the oval shaped bath. The connecting wires are terminated in 1 mm pins.

- Dual O-ring seal system enables quick coverslip exchange that's ideal for rapid screening assays
- Platinum electrodes for applications requiring electric field stimulation
- Anodized aluminum base ensures good heat transfer



RC-37WS

The **RC-37WS** and **RC-37FS** perfusion chamber inserts are designed for applications requiring field stimulation and incorporate a pair of platinum electrodes into the periphery of the bath area.

- Designed for glass bottomed 35 mm cell culture dishes
- Platinum electrodes for field stimulation studies
- Narrow bath
- For use with DH-35iL platform

Valve Controllers

Perfusion Control Systems

- Integrated spill sensor
- Choice of 3 valve types
- 8 channel system
- Manual and computer controllable



Model VC-8 Controller

Valve Control Systems

The VC-8 Valve Control System lies at the heart of a multi-valve perfusion system designed to automate and control the delivery of solutions to imaging and recording chambers. Its flexible design allows the system to be used in diverse applications.

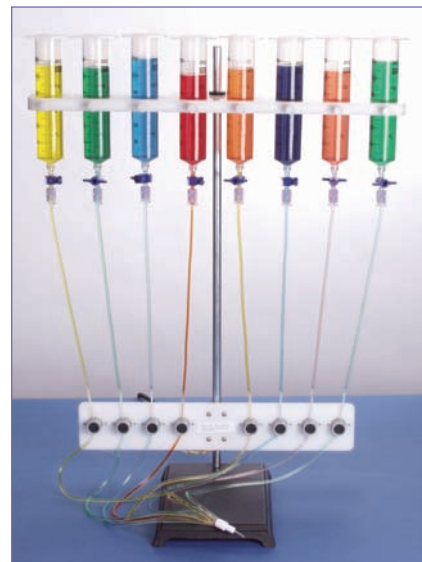
The complete system includes a powered valve controller, a valve bracket with valves, connecting cable, C-Flex™ tubing, an MP Series manifold, ring stand, eight 60 cc syringes, 25 feet of Tygon tubing and an assortment of tubing connectors.

A new and exciting feature to the VC-8 system is the Spill Sensor Probe.

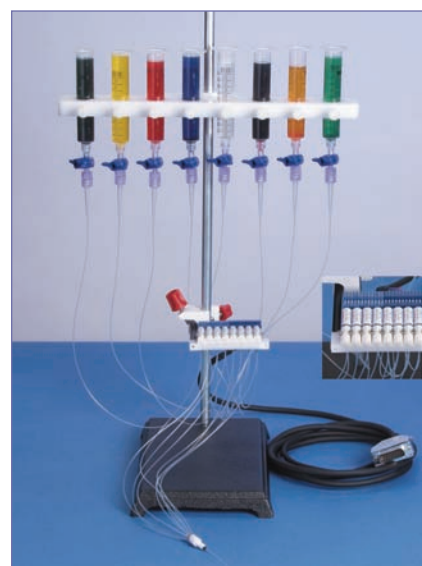
This probe is used to detect the presence of an overflow condition on the microscope and, when activated, will automatically shut off all valves protecting your valuable equipment.

The controller can independently regulate the function of up to eight valves. Individual valves can be controlled via a manual switch, an external analog signal or an external digital (TTL) signal. An event marker pulse, generated each time a valve is switched on, is provided at the rear of the instrument for recording into your acquisition system. Valve transitions (opened or closed) occur at full power to insure rapid response times and are then held in place at less than half power to prevent heat transfer to solutions.

While pinch valves are standard equipment, additional valve options include Teflon and Lee miniature types. Pinch valves are dual acting with both normally open and normally closed sides. Regardless of the valve type, splitting the valve input line with a Y-connector allows solution to flow to waste while the valve is in the off position.



Pinch Valve System



Mini-Valve System

Order #	Model	Product
64-0185	VC-8P	Valve Control System/8 pinch valves
64-0186	VC-8M	Valve Control System/8 mini valves
64-0187	VC-8T	Valve Control System/8 Teflon valves

Closed Bath Chambers for Confocal Imaging

Designed for

- Shear/flow studies
- Optical imaging
- Cell culture studies
- Fits all Nikon microscopes



Image courtesy of Alison North Rockefeller University

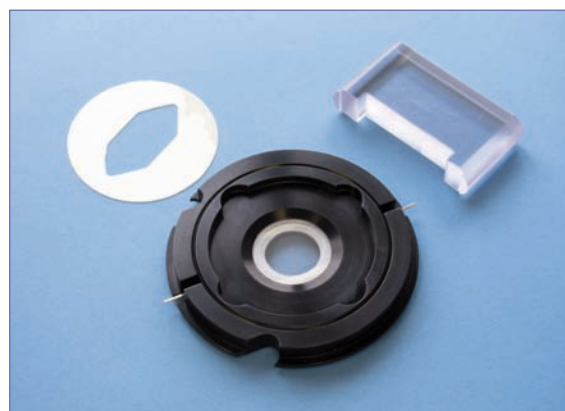
The RC-30, and RC-31 closed bath chambers are low profile with special features for use with confocal microscopes. The closed bath design allows for the use of high NA apertures with a minimum of distortion in the image. The bath area is formed using a customizable silicone gasket sandwiched between top and bottom coverslips. This design allows for fast solution exchange in a user specified geometry and volume.

Pre-cut, 250 μm and 375 μm thick gaskets are supplied with each chamber; a wide cut to access the full aperture window and a slotted version for fast solution exchange. Blank gaskets are also supplied permitting full customization of the bath area. Gaskets may be stacked and thinner (e.g. 100 μm) gaskets are also available.

The platform has a large viewing area and is beveled to allow easy access of the microscope objective.

A typical, complete package includes chamber, temperature control, and stage adapter

Order #	Model	Product
64-0321	RC-30HV	Confocal Imaging Chamber
64-0346	GS-30S20/4	Slotted Bath Gaskets 10 pkg.
64-0330	GS-30L/10	Large Bath Gaskets 10 pkg.
64-0101	TC-344B	Dual Channel Heater Controller
64-0106	CC-28	Cable Assembly for Heater Platforms
64-0103	SF-28	Solution Heater Slow Flow
64-xxxx	SA-30 xxx	Stage Adapter



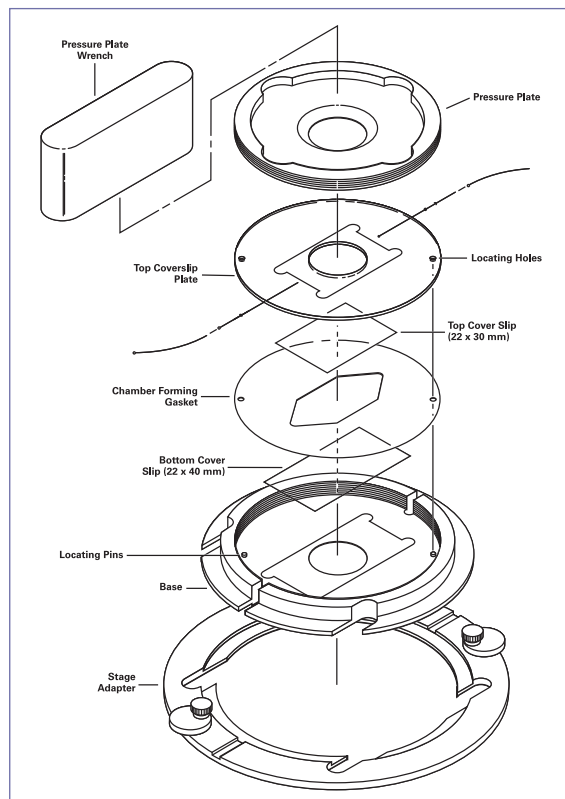
RC-30HV

The RC-30HV has a 17.7 mm Viewing Aperture and uses 22 x 30 mm and 22 x 40 mm coverslips.



RC-31

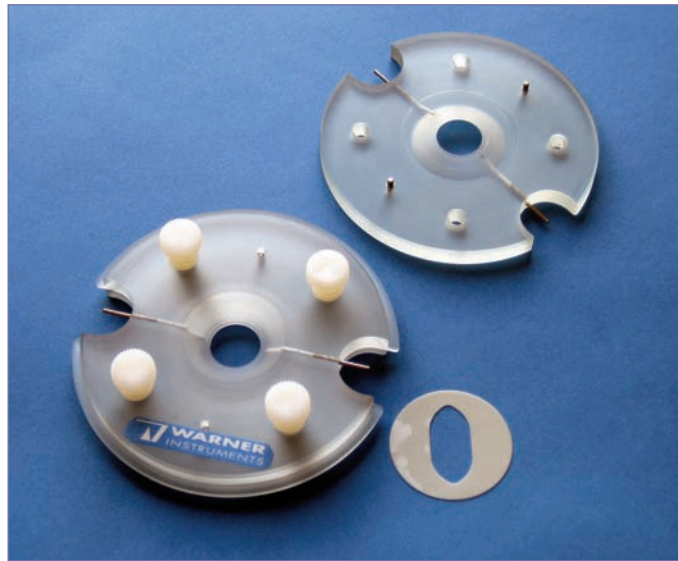
The RC-31 has a 25 mm viewing aperture and uses 30 mm top coverslip and 40 mm bottom coverslip.



ProFlow Shear Flow Chamber

- Computer designed gaskets optimized for well-defined, well-controlled shear-flow
- Based on technology developed at the Case Western Reserve University
- Single- and dual-channel capable chamber
- Made from polycarbonate for easy cleanup

Warner's new PFC-1 ProFlow chamber is based on the designs of Dr. Melissa Knothe Tate, currently of the Case Western Reserve University.

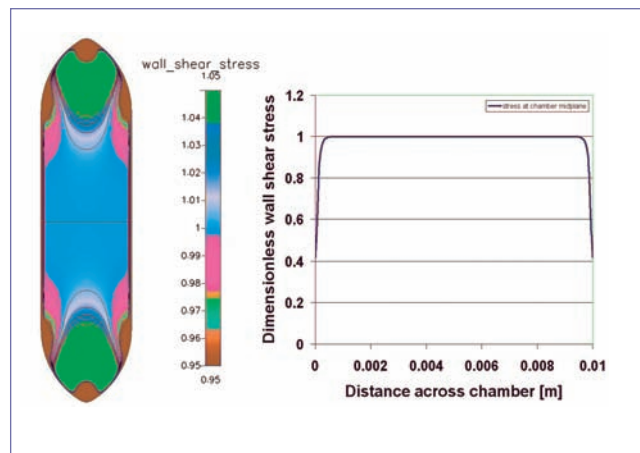


PFC-1

The chamber uses silicone gaskets, similar in approach to our popular RC-30 chamber, to form a closed-bath area sandwiched between two opposing glass coverslips. However, the ProFlow chamber uses specially designed gaskets that optimize the shear-flow dynamics within the bath. This optimized design results in a nearly uniform shear flow across the entire width of the bath. This allows the shear force to be more easily calculated when these gaskets are used.

Precut gaskets are manufactured from medical-grade silicone, are 0.375 mm thick, and can be stacked to achieve bath heights in multiples of a single gasket. Gaskets are supplied in packs of 10 and can be purchased separately.

The system consists of a top plate and two bottom plates. One bottom plate allows the formation of a single-sided flow chamber for use with cultured cells, and the other bottom plate allows the formation of a double-sided flow chamber for use with isolated sections or for conditions where controlled flow is desired on both sides of a structure.



The PFC-1 is designed to fit into our Series 30 stage adapters.

The PFC-1 comes complete with chamber top, two chamber bases, 0.375 mm thickness precut gaskets (10 pk), 15 mm round coverslips (# 1.5 thickness, 100 pk, CS-15R15), 25 mm round coverslips (#2 thickness, 50 pk, CS-25R20) and PE-90 tubing (10 ft).

Order #	Model	Product
64-1860	PFC-1	ProFlow Imaging Chamber
64-1861	-	ProFlow Gaskets 0.375 mm thick 10 pk
64-0713	CS-15R15	Cover glass 15 mm, #1.5 thickness, 100 pk
64-0722	CS-25R25	Cover glass 25 mm, #1.5 thickness, 100 pk
64-xxxx	SA-30 xxx	Stage Adapter

Quick Exchange Heated Platform with Perfusion Model QE-1

Designed For

- Cell culture studies
- Rapid screening assays
- Quick replacement of dish or chamber
- Series 40 chambers and 35 mm culture dishes
- Open design for easy access

Quick Exchange Platform

The QE-1 is a versatile base for both RC-40 chambers and 35 mm glass bottom culture dishes. The platform is at home on both upright and inverted microscopes and includes resistive heating elements. The base has a 25 mm aperture, tapered on the bottom to allow objective access and a magnetic stainless steel strip along its upper perimeter.

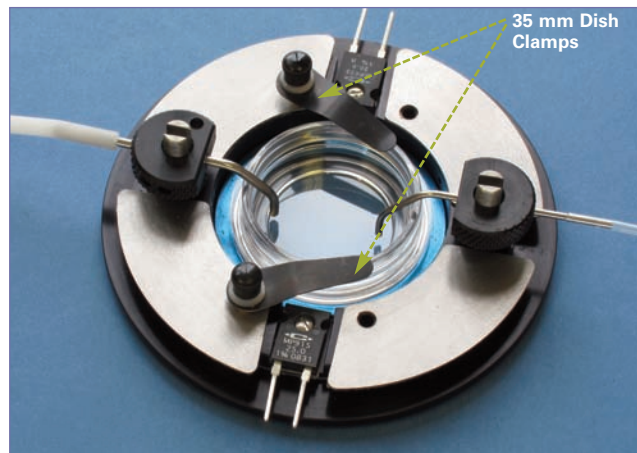
Removable perfusion and suction tubes feature set-screw locks for the horizontal location, and adjustable presets on a vertical post for setting the bath height. These adjustments allow easy and exact repositioning during multiple chamber replacements.

35 mm adapter rings are supplied with the QE-1 for Corning, Falcon and Willco dishes and an available MC-1 Magnetic Clamp Kit provides a variety of holding tools.

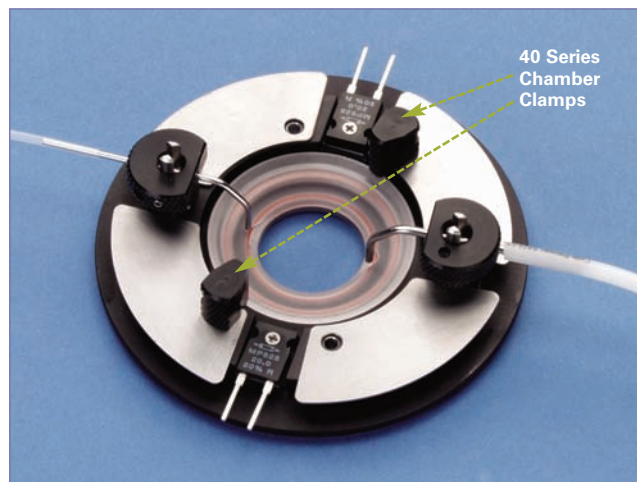
Stage adapters are available for all microscopes. Custom or modified stage adapters are also available.

A typical, complete package includes chamber, temperature control, and stage adapter.

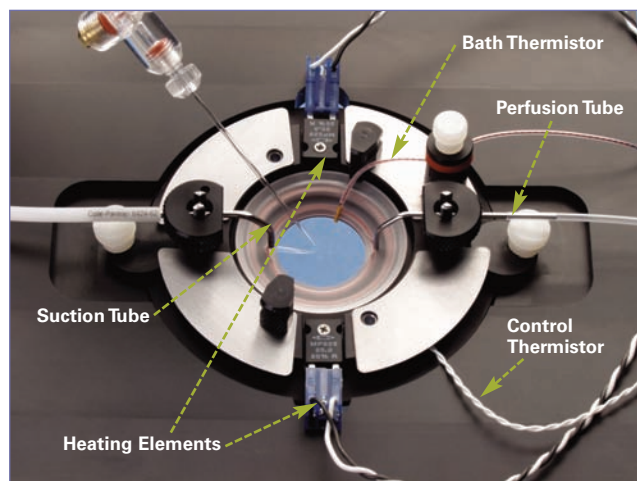
Order #	Model	Product
64-0375	QE-1	Quick Exchange Heated Base w/Perfusion and Adapter Ring Kit
64-0367	RC-40LP	Quick Change Chamber 25 mm Low Profile
64-1416	SHD-40/15	Slice Anchor for RC-40LP (1.5 mm)
64-0101	TC-344B	Dual Channel Heater Controller
64-0106	CC-28	Cable Assembly for Heater Platforms
64-0102	SH-27B	Solution Heater
64-xxxx	SA-xxxx	Stage Adapter



Model QE-1 with 35 mm glass bottom dish



Model QE-1 with RC-42LP low profile 15 mm coverslip chamber



QE-1 with Series 40 Chamber and Stage Adapter

Heated / Cooled Platforms for 35 mm Petri Dishes and Chambered Coverglass

Designed For:

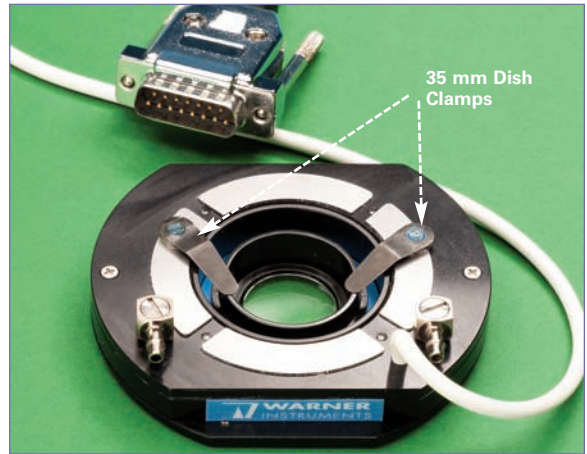
- Cell / tissue culture studies
- Rapid screening assays
- Temperature control from 5° to 50°C
- 35 mm culture dishes / chambered slide designs
- Open design for easy access

Heated and Cooled Platforms

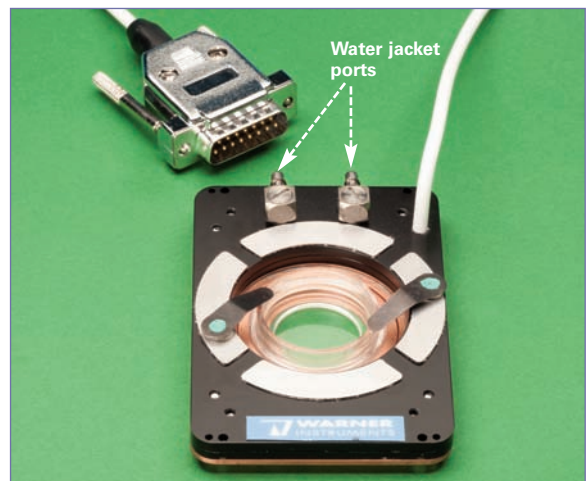
Warner's peltier-driven platforms offer the ability to cool specimens which may be sensitive at ambient temperature. Peltier-cooled stages include an integral water jacket that when coupled to a secondary liquid cooling module, LCS-1 offer rapid cooling of specimens. Precise temperature control is possible when used with our low noise CL-100 single channel or CL-200 dual channel bipolar temperature controllers.

The QE-1 HC and TB3 CCD include 35 mm adapter rings for use with Corning, Falcon and Willco dishes, the TB3 CS accepts 4 and 8 well chambered slides.

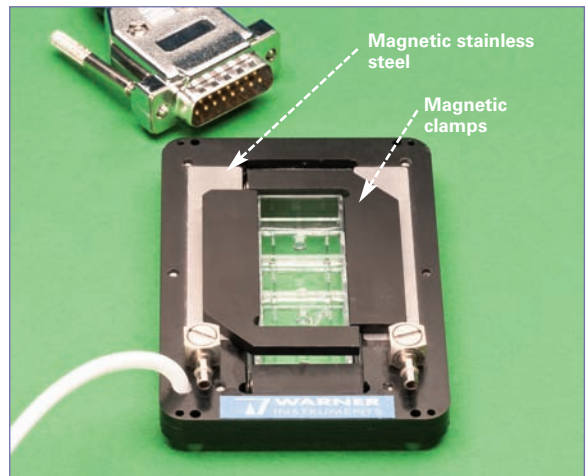
Stage adapters are available for all microscopes, in addition the TB3 CCD and TB3 CS are designed to fit into the Prior NZ100 and NZ200 stages.



Model QE-1HC with 35 mm glass bottom dish



Model TB3 CCD fits into Prior NZ100 and NZ200



TB-3 CS temperature control for chamber slides

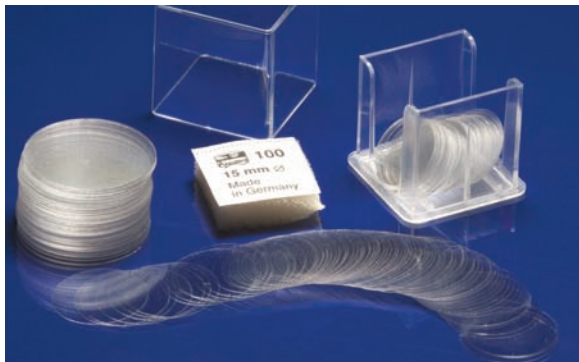


A typical, complete package includes platform, temperature control, liquid cooling system, and stage adapter.

Order #	Model	Product
64-1659	QE-1HC	Quick Exchange Stage Incubator
64-0352	CL-100	Bipolar Temperature Controller
64-1922	LCS-1	Liquid Cooling System
64-xxxx	SA-xxxx	Stage Adapter
To add an in-line heater cooler replace CL-100 with CL-200		
64-1708	CL-200	Bipolar Temperature Controller Dual Channel
64-0353	SC-20	Solution Heater/Cooler Two Line

Chamber Accessories

Coverslips



- Available in #1.0 (0.15 mm), #1.5 (0.17 mm) and #2.0 (0.22 mm) thickness
- Available in round, square and rectangular geometries
- New 3 mm round for cranial window technique
- Stocked in depth for fast delivery

High quality borosilicate glass coverslips are essential for microscopy and imaging. Please check our website for a full list of sizes and thickness.

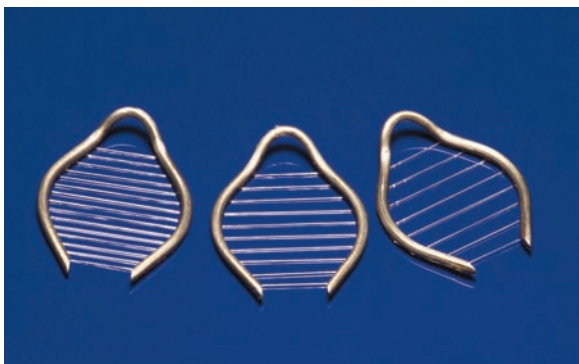
Silicone Grease Kit



An artist's acrylic brush is an effective tool for applying silicone lubricant to a glass coverslip and polycarbonate chamber. This convenient package includes a tube of Dow Corning® 111 Valve Lubricant & Sealant, two acrylic paint brushes (sized #2 and #4), and several pallets. By "painting" the grease onto the bottom surface of a polycarbonate chamber, it is easy to evenly spread lubricant and create a water-tight seal.

Order #	Model	Product
64-0678	111-Kit	Silicone Grease Kit
64-0275	111	Silicone Grease

Slice Anchors



- Slice anchors are constructed for an easy press-fit into the chamber's bath area
- The user can thus control the cord line pressure applied to the tissue slice
- Most anchors consist of type 316 stainless steel with Lycra® threads, finished with a plastic coating
- Plastic anchors are also available for the RC-27L chambers

The Slice Anchors are available for the Series 20 and Series 40 families of tissue slice recording chambers. Please check our website for a full list of anchors.

Suction and Perfusion Tubes



- Available in Classic and Micro-Slit designs
- All tubes made from Type 316 stainless steel

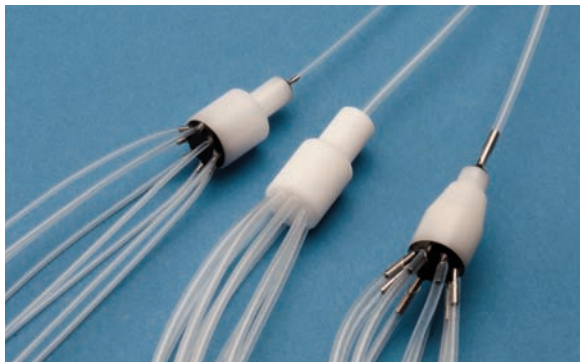
Warner Instruments produces suction tubes designed to make it easier to set and maintain the bath solution height.

Micro Slit Design

This innovative tube design has three equally spaced micro-slits at the front entry face and one micro-slit on the rear side of the sipper for air entry. This helps eliminate ground loops and tidal action in the bath and works equally well in all chambers but excels in the large bath chambers.

Perfusion Accessories

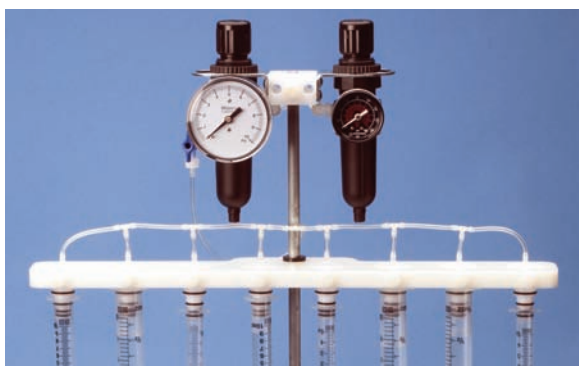
Manifolds



- Manifold inputs converge to the common output with a minimum of dead space
- Designed for use with PE-160, PE-50, and PE-10 polyethylene tubing
- Can also be used with other tubings with similar dimensions

Warner's various perfusion manifold models are based upon the dimensions of the input vs. output polyethylene tubing used. When connected to a chamber via a short length of tubing, very rapid solution changes are possible.

Pressurized Perfusion Kits



- Upgrades any gravity-feed perfusion system to a pressurized system
- Universal reservoir plug fits 5, 10, and 20 ml syringes
- Dual regulators ensure uniform fluid delivery

The latest accessory for Warner perfusion valve control systems is a simple, yet effective pressurization kit. The clever design of the universal reservoir plug allows for easy insertion into 5, 10, or 20 ml BD syringes. This system is especially useful for overcoming high flow resistance in small diameter tubing such as PE-50.

Syringe Holders



- Modular and fixed syringe holder designs
- Made from high quality Delrin and 316 stainless steel

The modular syringe holder system offers users the ability to assemble a family of differently sized syringes into a single apparatus. Fixed size syringe holders are available for 10, 60, and 140 cc syringes. Modular holders can accommodate 5, 10, 20, 30, 60, and 140 cc syringes. See our website for complete ordering information and holder size chart.

Vacuum Flow Regulator



The FR-50/FR-55S is a convenient tool to adjust both solution flow rates and vacuum pressure in a variety of applications. Solution flow is adjustable from zero to a maximum of 10 mL/min (measured with a solution head of 30 cm) and the units have calibrated adjustment rings to permit returning to a predetermined setting.

Order #	Model	Product
64-0220	FR-50	Flow Valve
64-0221	FR-50S	Flow Valve with On-Off Switch

Temperature Control Systems



Dual Channel CL-200 Bipolar Temperature Controller

Temperature Controllers

- Monopolar single and two channel units for heating
- Bipolar single and two channel units for heating and cooling
- Slow ramped DC power for quiet operation
- Single control temperature set
- Auto and manual controls
- Three feedback speeds selectable



Single Channel CL-100 Bipolar Temperature Controller

Temperature Control

Warner temperature control systems are easy to operate. Highly filtered DC power supplies and slow-ramped analog switching circuitry deliver power without adding noise to the system. Peripherals include in-line solution heaters and coolers, chamber and platform heaters and coolers, and solution reservoir heaters.

Available in dual and single channel models, and with or without cooling, Warner temperature controllers provide ideal thermal regulation where solution flow is intermittent to flow rates as high as 10ml/minute.



Dual Channel TC-344B Resistive Temperature Controller

Abbreviated Specifications

TC-324B/TC344B (per channel)
 Max. Output Voltage: 12 V DC
 Max. Output Current: 1.5 Amps
 Max. Output Power: 18 W (8 Ω load)
 Manual Voltage Range: 0 to 12 V
 Temperature Range: Ambient to 50°C

CL-100/CL-200 (per channel)
 Max. Output Voltage: ±15 V DC
 Max. Output Current: 2.4 Amps
 Max. Output Power: 36 W (8 Ω load)
 Manual Voltage Range: 0 to ±15 V
 Temperature Range: 0 to 50°C Peltier-device



Single Channel TC-324B Resistive Temperature Controller

For complete specification please check our full line catalog or visit our Web Site.

Order #	Model	Product
64-0100	TC-324B	Heater Controller, Single Channel
64-0101	TC-344B	Heater Controller, Dual Channel
64-0352	CL-100	Bipolar Temperature Controller
64-1708	CL-200	Bipolar Temperature Controller Dual Channel

Solution Heaters / Coolers

In-line Solution Heaters / Coolers

In-line solution heating and cooling is the simplest and most effective method of warming perfusion solutions. Warner Instruments provides a wide variety of solution heaters including single channel slow-flow and fast-flow models.



Single line Heaters SH-27B and SF-28

The in-line solution heater is connected to the chamber via a short length of tubing such that the warmed perfusate flows directly into the bath. Depending on bath volume and flow rate, in-line solution heating alone may be sufficient for many applications.

Specifications

Maximum Temperature: 50°C
 Maximum Flow Rate at 37°C: 2 ml/minute SF-28
 10 ml/minute SH-27B
 Internal Dead Volume: 250 µl
 Perfusion lines: Type 316 Stainless Steel
 0.032" ID x 0.062" OD

Physical Dimensions:

Body: 12.5 mm diameter X 125 mm long
 Weight: 39 grams
 Cable Length: 1.9 meters
 Warranty: one year

Multi-Line Solution In-line Heaters SHM-6 and SHM-8

Multi-channel solution heaters (the 6-channel SHM-6 and 8-channel SHM-8, respectively) are also available. A minimal dead space manifold at the heater output in the 6-to-1 or 8-to-1 version allows for use in any application where from 2 to 8 perfusion lines are required to be connected to a single input port.



Multi Line Heaters

Specifications

Maximum Temperature: 50°C
 Maximum Flow Rate at 37°C: 5 ml/minute (total)
 Internal Dead Volume: 225 µl
 Manifold Dead Volume: 30 µl (input of manifold to output tip)
 Perfusion lines: Type 316 Stainless Steel
 0.032" ID x 0.062" OD

Physical Dimensions:

Body: 16.5 mm diameter X 165 mm long
 Weight: 104 grams
 Cable Length: 1.9 meters
 Warranty: one year

SC-20 Dual In-Line Solution Heater/cooler

The SC-20 Dual In-Line Solution Heater/Cooler utilizes Peltier thermoelectric devices to regulate temperature both above and below ambient levels.



In-Line Heater/Cooler

Specifications

Minimum Temperature: 0°C (2 ml/minute max flow)
 Maximum Temperature: 50°C
 Maximum Flow Rate at 5°C: 5 ml/minute
 Accuracy: ±0.1°C
 Internal Dead Volume: 330 µl
 Perfusion lines: Type 316 Stainless Steel
 0.032" ID x 0.062" OD
 Water Jacket Ports: Type 316 Stainless Steel
 0.12" ID x 0.147" OD
 Controller: Model CL-100 Bipolar Controller

Physical Dimensions:

Body: 21 mm diameter X 165 mm long
 Weight: 109 grams
 Cable Length: 1.9 meters
 Connector Type: 15 pin Male "D"
 Warranty: one year

Order #	Model	Product
64-0102	SH-27B	Solution Heater
64-0103	SF-28	Slow Flow Solution Heater
64-0104	SHM-6	Solution Heater Six Line
64-0105	SHM-8	Solution Heater Eight Line
64-0353	SC-20	Solution Heater/Cooler Two Line



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