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# **Dodeca™ Stainer**

## **Instruction Manual**

**Catalog Numbers**

**165-3400**

**165-3401**

**BIO-RAD**

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## Safety

### Caution/Warning



The shaking motion of the Dodeca stainer is controlled by the shaker motor attached to the lid. The shaker motor is powered by an external 12V DC regulated power adapter with universal input (included). The shaker motor control unit that switches on the power to the shaker motor and controls the shaker speed contains a 0.5 A type-T fuse.



The Dodeca stainers have passed tests for operation at temperatures between ambient and 40° C, with relative humidity between 0 and 95% non-condensing. Operating the Dodeca stainer outside these conditions is not recommended by Bio-Rad and will void the warranty.

The following guidelines should be observed and followed when using a Dodeca stainer.

1. Always connect the Dodeca stainer power adapter to a 3-prong, grounded AC outlet, using the 3-prong AC power cord provided with the Dodeca stainer.
2. Do not operate the Dodeca stainer in extreme humidity (>95%) or where condensation can short the internal electrical circuits of the shaker motor and shaker motor control unit.
3. Disconnect the power adapter from the power outlet when not in use.
4. Do not remove the lid prior to turning off the power switch located on the shaker motor control unit. This may result in damage to the components.
5. Do not detach the shaker motor from lid prior to turning off the power switch located on the shaker motor control unit.
6. Keep all the electrical components dry, and to protect the electrical components store them attached to the lid in the appropriate recessed areas.

### Important

This instrument is intended for laboratory use only.

Bio-Rad's Dodeca stainers are designed and certified to meet IEC 61010-1<sup>1</sup> safety standards. Certified products are safe to use when operated in accordance with the instruction manual.

This instrument should not be modified or altered in any way. Alteration of this instrument will void the manufacturer's warranty, void the IEC 61010-1 certification, and create a potential safety hazard for the user.

Bio-Rad is not responsible for any injury or damage caused by the use of this instrument for purposes other than those for which it is intended, or by modifications of the instrument not performed by Bio-Rad or an authorized agent.

<sup>1</sup> IEC 61010-1 is an internationally accepted safety standard for laboratory instruments.

## Section 1 Product Introduction

### 1.1 Overview

The Dodeca™ Stainer is a high-throughput gel staining device designed primarily for large format 2-D polyacrylamide gels. The Dodeca stainer comes in two sizes, large and small. Each size accommodates up to 12 gels (for gel size compatibility see Tables 1A and 1B). By processing up to 12 gels, the Dodeca stainers match the capacity of the PROTEAN IEF cell for first dimension isoelectric focusing and the PROTEAN Plus Dodeca cell for second dimension separation to help streamline the 2-D gel electrophoresis workflow.

The Dodeca stainers have an integrated shaking mechanism (patent pending), therefore no external shaking device is needed. The shaker motor, attached to the lid, causes the shaking rack to oscillate. This oscillating motion results in equally efficient staining of all twelve gels in the shaking rack. A shaker control unit, which sits on the lid, contains the power switch and controls the oscillating speed.

The staining trays hold the gels in place during staining to prevent breakage. Various tray configurations are available to provide the best fit for the selected gel size (see Tables 1A and 1B). These trays are also used to transport gels throughout the laboratory. The stained gel easily slides off the open side of the staining tray onto an imager or spot cutter platform.

The shaking rack holds up to 12 staining trays as a single unit for easy handling. Built-in handles make it easy to place the shaking rack inside the solution tank. The various staining solutions are added via the reagent access door built into the lid. Reagent removal is achieved via two drain ports incorporated at the base of the solution tank.



Fig. 1 A. Large Dodeca Stainer.

## 1.2 Size Availability

The Dodeca stainer is available in two sizes to primarily optimize the staining reagent volumes, and also to eliminate gel breakage due to excessive or constricted movement. Each tank size has a dedicated shaking rack and staining trays with optional tray attachments to accommodate various gel sizes.

Select the correct Dodeca stainer and staining tray size/configuration, and determine if the tray attachments are needed from the table below.

**Table 1 A. Gel Size Compatibility**

### Large Dodeca Stainer

Bio-Rad's Second-dimension Gel Types	Gel size (W x L)	Dodeca Stainer and Staining Tray size/configuration	Maximum Number of gels accommodated
PROTEAN Plus precast gels	25.6 x 23 cm	Large	12 (1 per tray)
PROTEAN Plus handcast gels (using the Hinged Spacer Plates)	25 x 20.5 cm	Large (each staining tray requires one tray attachment <sup>2</sup> )	12 (1 per tray)

### Small Dodeca Stainer

Bio-Rad's Second-dimension Gel Types	Gel size (W x L)	Dodeca Stainer and Staining Tray size/configuration	Maximum Number of gels accommodated
PROTEAN Plus handcast gels (using the Hinged Spacer Plates)	20 x 20.5 cm	Small	12 (1 per tray)
PROTEAN II XL precast or handcast gels	18.5 x 20 cm 18.3 x 19.3 cm		
PROTEAN II xi precast or handcast gels	16 x 20 cm 16 x 16 cm		
Criterion precast and handcast gels	13.3 x 8.7 cm requires one tray attachment)	Small (each staining tray	24 (2 per tray)

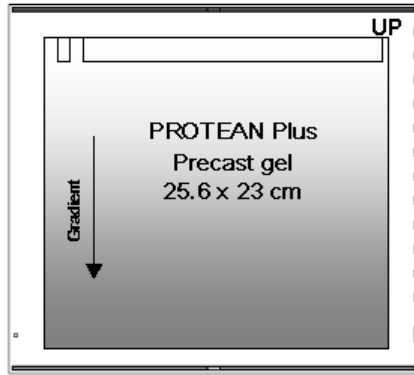
<sup>2</sup> The tray attachments are included with catalog numbers 165-3400 (large) and 165-3401 (small). They are also available to order separately, see the ordering information in Appendix B, page 19.

**Table 1 B. Gel/Tray Orientation**

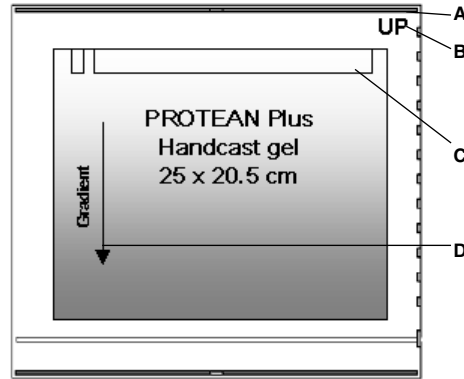
The following illustrations indicate the proper orientation to place the gels on the staining trays. The illustration also shows the proper tray configuration for each gel size as detailed in Table 1A.

**Large Dodeca Stainer**

**Large Staining Tray**

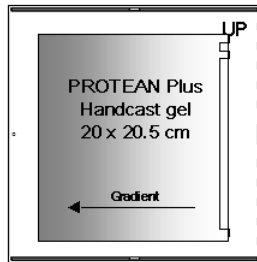


**Large Staining Tray with attachment**

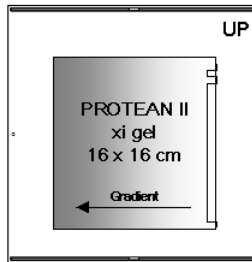


**Small Dodeca Stainer**

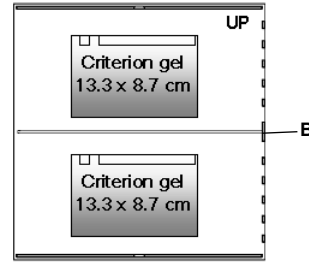
**Small Staining Tray**



**Small Staining Tray**



**Small Staining Tray with attachment**



**Illustration Labels.**

- A. The "UP" label, molded into the staining trays, helps to properly orient the gels on the trays and to stack the trays correctly in the shaking rack.
- B. Tray attachment (see page 5 for detailed description).
- C. IPG-well to load the ReadyStrip™ IPG strip.
- D. Arrow indicates the direction of the gradient gel, from low %T down to high %T.

## Section 2 Unpacking and Assembly

### 2.1 Unpacking the Unit

When you receive the Dodeca stainer, carefully inspect the container for any damage that may have occurred during shipping. Severe damage to the container may indicate damage to the Dodeca stainer itself. If you suspect damage to the unit contact Bio-Rad Laboratories (1-800-4BIO-RAD) or your local Bio-Rad office.

Contents include:

- Solution Tank, qty 1
- Shaking Rack, qty 1
- Translucent Staining Trays, qty 12
- White Development Tray, qty 1
- Tray attachments, qty 12
- Lid, qty 1
- Shaker Control Unit (with cord to attach to the shaker motor), qty 1
- Shaker Motor, qty 1
- Power adapter and cord, qty 1
- Gel Clip, qty 1
- Instruction Manual
- Warranty card
- Declaration of conformity

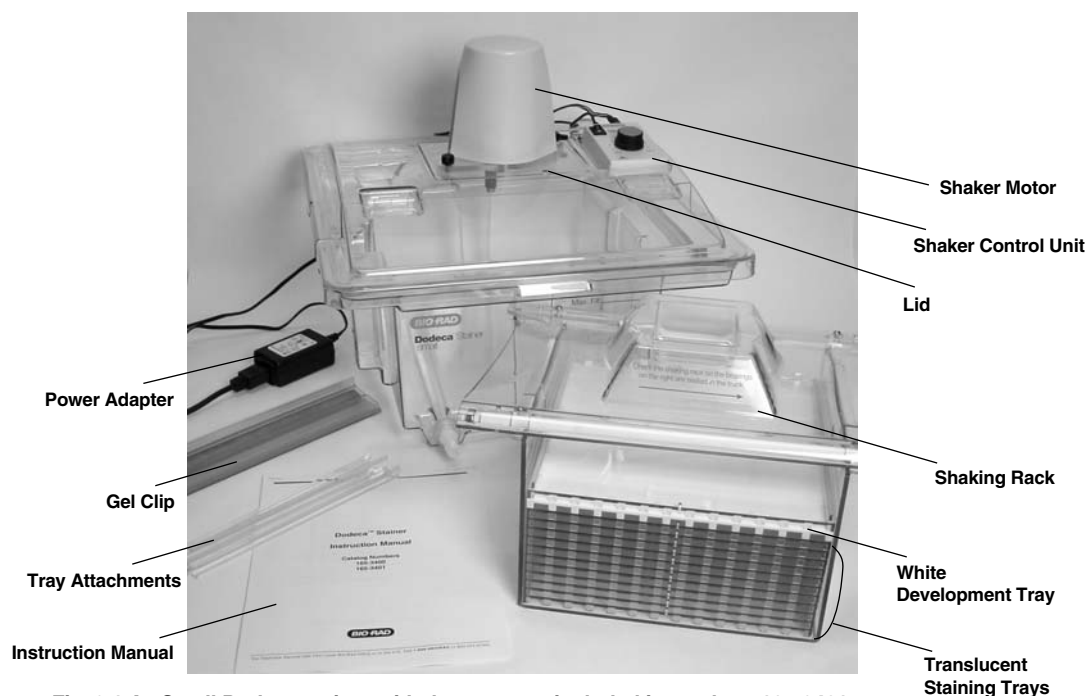


Fig. 2.1 A. Small Dodeca stainer with the contents included in catalog #165-3401.

## 2.2 Unit Assembly

- 2.2.1 Prior to assembly and use, wash the Dodeca stainer components (solution tank, staining trays, and shaking rack) with a non-scratch pad and mild detergent followed by a complete rinse with distilled water. For additional maintenance guidelines and chemical compatibility information see section 6, pages 14-15.
- 2.2.2 Place the Dodeca stainer on a level surface in a convenient location and near a grounded electrical outlet. Position the Dodeca stainer so that the drain ports in the solution tank are accessible. Proper location and position of the tank is important, since once the tank is filled and in operation it should not be moved.
- 2.2.3 Attach the shaker motor to the lid, by tightening the black thumbscrews. Position the shaker motor so the small hook at the bottom and the plug inlet at the top are facing the opposite direction from the reagent access door.
- 2.2.4 Assembling the drainage system.
- Remove the stopcocks and tubing from the bag.
  - Attach the ends of the short piece of tubing to the drain port fittings at the base of the solution tank.
  - Add the white clamps over the short piece of tubing and drain port fitting. Tighten the clamp to ensure a complete seal to prevent leaks.  
**Note:** It may be easier to use pliers to tighten the white clamps.
  - Ensure the long piece of tubing reaches your desired receptacle/reservoir.
  - Make sure the stopcocks are in the closed position prior to pouring in any solutions.



## 2.3 Components and Accessories

The Dodeca Stainer components can be separated into two categories, mechanical and electrical components.

### 2.3.1 Mechanical Components

#### Staining Trays

There are thirteen (13) stackable, staining trays that hold the gels during the staining process. The "UP" label is used to properly orient the gels on the trays and align the trays while stacking. Twelve of the thirteen trays are clear to observe the gel motion during staining. One staining tray is white to hold the top gel to monitor the final development, which is especially important for silver staining. The staining trays are also used to transport the stained gels throughout the laboratory.

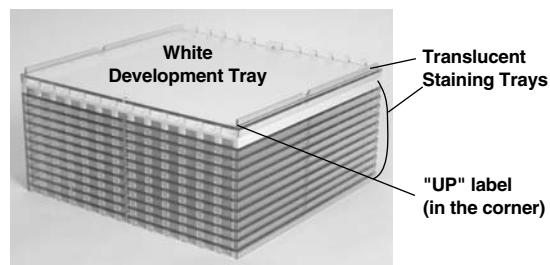


Fig. 2.3.1 A. Staining trays stacked with the maximum number (13).

#### Tray Attachments

The tray attachments are narrow strips of plastic that connect to the staining trays. They confine the gel to an appropriate area of the tray, according to its size, to prevent excessive movement and breakage. See Tables 1A and 1B (pages 2 and 3, respectively) for details and illustrations of when to use the tray attachments.

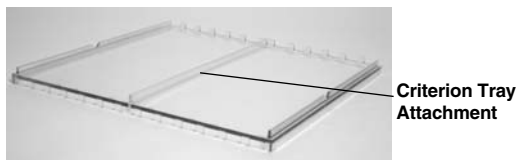


Fig. 2.3.1 B. Close-up of a Criterion tray attachment on a small staining tray.

#### Shaking Rack

The shaking rack holds up to 13 stacked staining trays. The "UP" label on the bottom of the shaking rack aligns with the "UP" label on the staining trays. The trays are securely held in place via a restraining bar. The restraining bar is lowered and locked to hold the staining trays in position during the staining process. The shaking rack holds the trays at a slight angle to improve reagent flow and remove air bubbles. The shaking rack is suspended in the tank via the stainless steel wheels (bearings). The metal wheels are placed inside a track (channel) on one side in the solution tank. This allows the shaking rack to gently glide side to side when the shaker is turned on. The shaking rack also has built-in handles for placing it in and out of the solution tank.

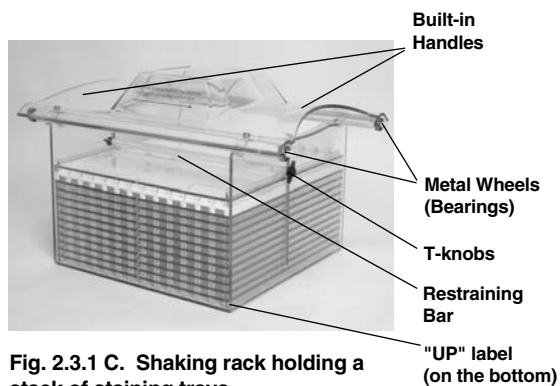


Fig. 2.3.1 C. Shaking rack holding a stack of staining trays.

### Solution Tank

The solution tank is available in two sizes, large and small. Each holds a dedicated shaking rack and staining trays. The tank has two built-in drain ports for rapid reagent removal.

**Note:** It is recommended to position the drain ports towards a convenient receptacle to facilitate solution drainage.



Fig. 2.3.1 D. Solution tank.

### Lid

The lid contains the shaker motor, shaker control unit, and the reagent access door. The reagent access door is used to easily pour staining solutions into the solution tank.

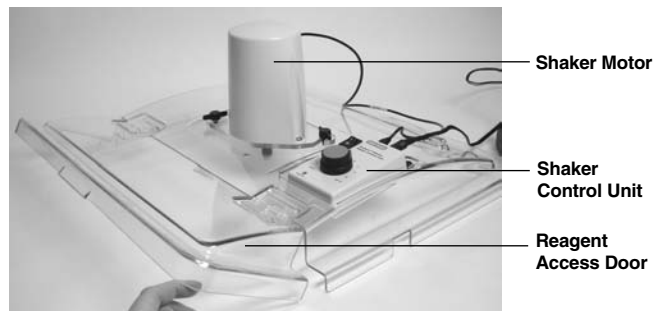


Fig. 2.3.1 E. Lid with the shaker motor installed and the shaker control unit seated in the recessed area.

## 2.3.2 Electrical Components

**Caution:** Make sure the electrical components remain dry during reagent exchange, operation, and cleaning to prevent any damage to the components and potential danger to the user.

### Shaker Motor

The shaker motor, attached to the lid, interlocks with the suspended shaking rack and works to oscillate the shaking rack. The patent-pending shaking motion is gentle to protect gels from breaking.

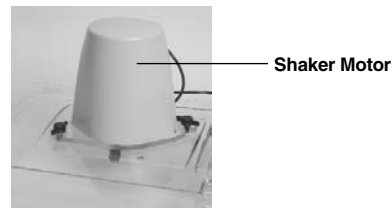


Fig. 2.3.2 A. Shaker motor.

### Shaker Control Unit

The shaker control unit, positioned in a recessed area in the lid, contains the power switch and controls the oscillating speed of the shaking rack (via a control knob). An external transformer supplies power to the system.

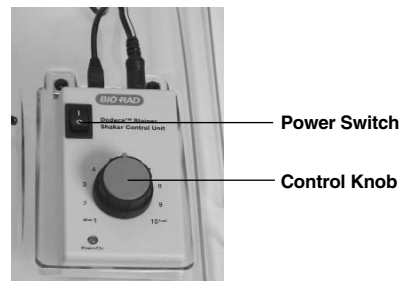


Fig. 2.3.2 B. Shaker control unit.

### 2.3.3 Accessories

The Dodeca stainer accessories add further convenience to working with large format gels. **Gel Clip**

The gel clip facilitates large format gel handling and eliminates gel breakage by minimizing direct hands-on gel manipulation. The gel clip gently, but securely, clamps along one entire edge of a gel, distributing the weight evenly so that the gel can be easily lifted without tearing. The gel clip is used to transfer a gel from a glass plate to a staining tray. Once the gel is stained, the gel clip can be used to transfer the gel from the staining tray to an imager or spot cutter platform. The gel clip can be used with any gel size.

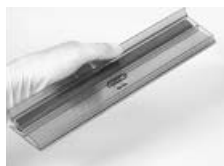


Fig. 2.3.3 A. The Gel Clip.



Fig. 2.3.3 B. Clamping onto a PROTEAN Plus precast gel (25.6 X 23 cm).



Fig. 2.3.3 C. Lifting the gel off the glass plate.

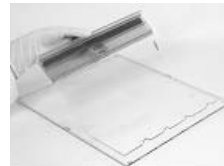


Fig. 2.3.3 D. Transferring the gel to a large staining tray.

### Storage Boxes

The storage boxes are available for storing gels, while placed on the staining trays. The storage boxes accommodate up to 4 gels (on the staining trays) plus one additional tray to hold the top gel in position. Two sizes are available to hold the appropriate staining tray size.



Fig. 2.3.3 E. Large and small storage boxes shown with 5 staining trays stacked inside.

## Section 3 Operation

### 3.1 Preparation

#### 3.1.1 Introduction

Load the appropriate amount of sample per gel according to the sensitivity of the stain. For silver stain, all the gels processed should contain approximately the same amount of protein load, to prevent over or under development. Development time is dependent on the amount of protein loaded per gel and it is stopped simultaneously for the entire stack of gels in the Dodeca stainer.

#### 3.1.2 Reagent Solutions

Refer to the stain instruction manual for detailed reagent preparation.

**Note:** Keep in mind that reagent and water quality are key factors to obtain optimal staining results.

The large Dodeca stainer requires 10 liters of solutions and the small Dodeca stainer requires 7 liters. The working volume of solutions prepared may be adjusted according to the number of trays used. Refer to Table 5A, page 13, for solution volumes calculations.

### 3.2 Dodeca Stainer Setup

- 3.2.1 Determine the staining tray configuration needed for your gel size from Table 1A. Gel Size Compatibility.
- 3.2.2 Ensure the Dodeca stainer is properly cleaned before use. See Section 5 Maintenance.

### 3.3 Transferring Gels to the Staining Trays

- 3.3.1 Open the gel cassette and detach the gel from the spacers and IPG strip (for 2-D gels) by sliding the green gel releaser tool (catalog #165-3320), razor blade, or equivalent along the entire length of each spacer.

**Note:** Gels that are not completely released from the spacer can easily tear.

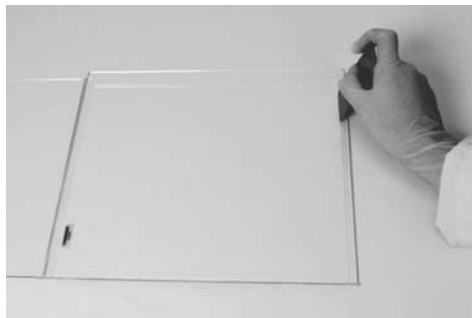


Fig. 3.3.1 A. Detaching the gel from the spacers using the gel releaser tool.

3.3.2 Prewet the staining tray with a small amount of distilled water to help prevent the gel from sticking to the tray surface.

3.3.3 Use the gel clip to lift the gel off the glass plate and transfer it to the staining tray.

- a. Wet the gel clip and borders of the gel with distilled water to prevent the gel from sticking to the gel clip.
- b. Slide the lower edge of the gel clip under the gel. Position the gel clip about 1.5 cm under the gel for complete contact with the high friction grip of the upper edge of the gel clip.

**Note:** Gradient gels are weaker at the top of the gel since it is made of lower %T. To prevent tearing, lift gels using the side or bottom edge. When lifting the gel from the bottom it may be easiest to position the bottom side of the gel away from you and grip the gel clip using two hands and slide it towards you under the gel.

- c. Lift the gel slowly off the glass plate and place onto the staining trays as illustrated in Table 1B. Gel size and tray selection determine the gel orientation.

**Note:** Orient the tray so the "UP" label is properly positioned prior to transferring (see Table 1B).

**Note:** Gel orientation is important. During the staining process the gel will swell in size and extra space should be available to accommodate the expansion without constricting the gel. Gradient gels show increased swelling from low to high %T. This results in a trapezoidal shaped gel that can rotate and lodge in the tray if not positioned correctly.

### 3.4 Staining Tray and Shaking Rack Assembly

3.4.1 Stack the staining trays in the same orientation, aligning the "UP" labels on each tray. The staining trays can be positioned inside the shaking rack one by one or as an entire stack of trays.

- a. First stack the translucent trays (up to 11) with gels.

**Note:** A minimum of four gels is recommended when silver staining.

- b. Then place the white development tray with gel on top of the stack.
- c. Finally, place the cover tray (translucent tray without a gel) on top of the white tray to prevent the top gel from floating around.

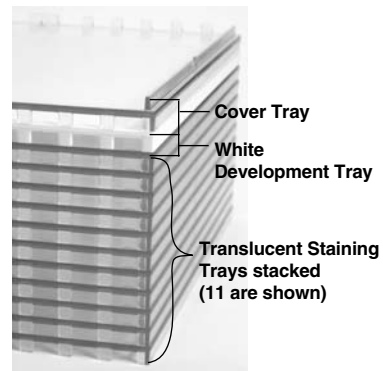


Fig. 3.4.1A. Properly stacked staining trays.

- 3.4.2 Lower the restraining bar into the semicircular notches on both sides of the top tray to secure the stack of staining trays. Tighten the black T-knobs on the side of the shaking rack to lock the restraining bar in place. This prevents the stack of trays from sliding out of the shaking rack.

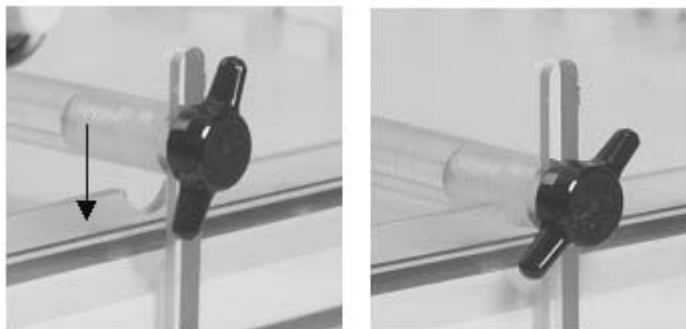


Fig. 3.4.2 A. Lowering the restraining bar into position.

### 3.5 Placing the Shaking Rack into the Solution Tank

- 3.5.1 Use the built-in handles to place the shaking rack into the solution tank. Orient the shaking rack according to the label on top of the rack. This will properly orient the angle of the shaking rack and accurately align the metal wheels (bearings).
- 3.5.2 Place the lid on the solution tank with the reagent access door facing front, making sure the shaker motor on the lid engages in the slot on the shaking rack as the lid is lowered.
- 3.5.3 Connect the electrical components.
- Connect the shaker motor to the shaker control unit.
  - Place the shaker control unit in the designated recessed area on the lid.
  - Connect the shaker control unit to the power adapter.
  - Make sure the power is switched off and the speed setting is at zero.
  - Plug the power adapter into the wall outlet.

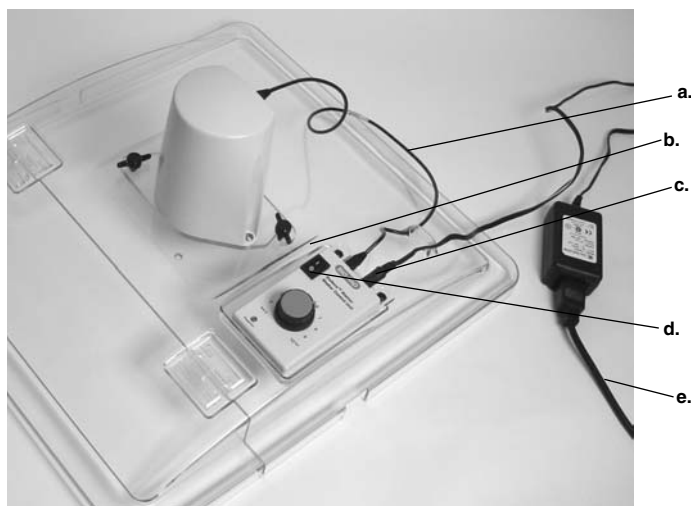


Fig. 3.5.3 A. Connecting the electrical components.

### 3.6 Filling the Solution Tank

- 3.6.1 Make sure the drain ports (stopcocks) are closed.
- 3.6.2 Open the reagent access door and add the reagent.  
**Note:** Pour the reagents against the wall of the staining tank to avoid excess splashing.
- 3.6.3 Add reagent until it reaches 0.5 cm above the top cover tray.

### 3.7 Starting the Staining Procedure

- 3.7.1 Turn the power switch on the shaker control unit on.
- 3.7.2 Slowly increase the speed until the gels move freely. See Table 3.7A for recommended speed settings by gel type and size.  
**Important:** Acrylamide gels may temporarily adhere to the staining trays during the first few minutes of the first staining step. It is recommended to increase the speed from 6–10 for a short while, to facilitate the release of the gels. Do not leave the gels unattended during this time. After the gels have been freed from the trays, slow down the speed to the recommended setting for the rest of the process to prevent gel damage.  
**Note:** Switch the power to the shaker motor OFF whenever solutions are being exchanged.

**Table 3.7 A. Recommended speed settings according to gel size and type.**

The shaker speed should be adjusted according to gel size and number of gels, to achieve optimum results. The ideal shaking speed should move all gels synchronously from side to side, while remaining gentle enough not to damage the acrylamide matrix.

Staining Process	Gel Size	No. of Trays (excludes cover tray)	Shaker Control Unit Setting
Standard Processing (less than 6 hrs)	Large format*	1–6 trays	3–4
		7–12 trays	4–5
	Criterion*	1–6 trays	4–5
		7–12 trays	5–6
Overnight Incubation		1–12 trays	1–2

\* Large format includes gel sizes 16 x 16 cm up to 25.6 x 23 cm. Criterion gels are sized 13.3 x 8.7 cm.

### 3.8 Draining the Solution Tank

- 3.8.1 Connect tubing to the drain ports (stopcocks).
- 3.8.2 Place the tubing in an appropriately sized reservoir or sink. To achieve maximum draining speed, use both drain ports and place the reservoir 3–4 feet below the Dodeca stainer.
- 3.8.3 Open the drain ports (stopcocks) to begin draining the reagent from the tank.

### 3.9 Unit Disassembly

- 3.9.1 Turn off the power switch and disconnect the power cord.
- 3.9.2 Drain the solution tank.
- 3.9.3 Remove the lid.
- 3.9.4 Remove the shaking rack.
- 3.9.5 Release the restraining bar.
- 3.9.6 Remove the staining trays with gels.
- 3.9.7 Wash the Dodeca stainer components according to the maintenance guidelines in Section 6.

## Section 4 Gel Handling and Storage

Eliminating direct handling of fragile acrylamide gels throughout the staining process is possible by following the gel handling and storage procedures below.

### 4.1 Gel Handling

- a. Use the gel clip to remove the gel from the glass plates and transfer it to the staining tray.  
**Note:** The staining tray can be used as a tool to transport gels around the laboratory.
- b. Transfer the gel onto an imager or spot cutter platform by sliding it off the staining tray or using the gel clip to lift the gel. There must be sufficient water underneath the gel so it can slide freely.
- c. Use the gel clip to transfer the gel back onto the staining tray.  
**Note:** If numerous spots are cut out of the gel, the integrity of the gel may be compromised. It may be difficult to lift the gel using the gel clip. The best method for lifting a gel once a lot of spots (200 or more) have been removed is to use the spot cutter gel cutting sheet that is already under the gel or slide a separation sheet (used for handcasting gels) under the gel to lift it up.

### 4.2 Gel Storage

- a. Up to 4 gels (on the staining trays) plus one additional tray to hold the top gel in position can be placed in the appropriate storage box.
- b. Fill the storage box with storage solution (usually distilled water) to cover the gels completely. See chemical compatibility, Section 6, for incompatible solutions.
- c. Place the lid on the storage box.  
**Note:** The storage box can be placed in the refrigerator (4°C) if desired.



## Section 5

### Stain Solution Compatibility and Protocols

The Dodeca stainers are compatible with Bio-Safe colloidal G-250 Coomassie Blue stain, Coomassie Brilliant Blue R-250 stain, SYPRO Ruby protein gel stain, and the NEW mass spectroscopy compatible Dodeca Silver Stain kit.

The Dodeca stainers are compatible with Bio-Rad's Dodeca Silver Stain kit and the original Silver Stain kit (catalog #161-0443, based on Merrill's protocol). However, the Dodeca Silver Stain kit is recommended over the original Silver Stain kit because it has been optimized to reduce background when used with the Dodeca stainers. In addition, the volume of the Dodeca Silver Stain kit was designed to better accommodate the throughput capacity of the Dodeca stainers. A minimum of four gels is recommended when silver staining using the Dodeca stainers.

**Important:** The Dodeca stainers are NOT compatible with the Bio-Rad Silver Stain Plus kit chemistry (catalog #161-0449).

**Note:** It is recommended to have dedicated instruments for fluorescent and Coomassie based processes to prevent cross contamination. Residual Coomassie stain in the system quenches the fluorescent signal causing weak or no detection.

**Table 5 A. Solution Volume Calculations\***

Dodeca Stainer and Staining tray sizes	Volume calculations for using less than 12 trays	Volume for 12 trays
Small	$(500 \text{ ml} \times \text{No. of trays}) + 1\text{L}$	7L
Large	$(750 \text{ ml} \times \text{No. of trays}) + 1.5\text{L}$	10L

Sample calculations:

If you are staining 8 gels (on 8 trays) in the small Dodeca stainer, the total solution volume would be calculated as follows:  $(500 \text{ ml} \times 8) + 1\text{L} = 5 \text{ liters}$

If you are staining 5 gels (on 5 trays) in the large Dodeca stainer, the total solution volume would be calculated as follows:  $(750 \text{ ml} \times 5) + 1.5\text{L} = 5.25 \text{ liters}$

\* The cover tray is not counted when calculating working solution volumes.

Below are brief protocols. Please see the individual stain instruction manuals for detailed protocols and staining component descriptions.

#### 5.1 Bio-Safe Colloidal Coomassie Stain

Step	Solution(s)	Time	No. of Cycles
1. Fix	40% Methanol 10% Acetic acid	30 minutes–overnight	1
2. Stain	Bio-Safe	1 hour–overnight	1
3. Destain	H <sub>2</sub> O	30 minutes	2 or 3

## 5.2 SYPRO Ruby Protein Gel Stain

Step	Solution(s)	Time	No. of Cycles
1. Fix	40% Methanol 10% Acetic acid	30 minutes–overnight	1
2. Stain	SYPRO Ruby	3 hours to overnight	1
3. Rinse*	10% Methanol 7% Acetic acid	30–60 minutes	1
4. Rinse	H <sub>2</sub> O	30–60 minutes	1

\* This rinse step is recommended to minimize background fluorescence and to prevent excessive gel swelling.

## 5.3 Dodeca Silver Stain Kit

The Dodeca Silver Stain kit is specifically formulated for ease-of-use with the Dodeca stainer. This silver stain kit reduces clean up time by minimizing silver deposits on the Dodeca stainer (compared to the Bio-Rad Silver Stain kit). In addition, stained protein samples are amenable to mass spectrometry protein identification analysis without further sample modification. See the Dodeca Silver Stain kit instruction manual (part #411-0150) for detailed instructions on how to prepare solutions.

**Note:** A minimum of four gels is recommended when silver staining using the Dodeca stainers.

Step	Solution(s)	Time	No. of Cycles
1. Fixing	40% Ethanol 10% Acetic acid	30 min–overnight	1
2. Sensitizing	Sensitizer Concentrate Background Reducer Concentrate	30 min	1
3. Rinsing	H <sub>2</sub> O	10 min	3
4. Staining	Silver Reagent Concentrate	20–30 min	1
5. Rinsing	H <sub>2</sub> O	1 min	1
6. Developing	Development Buffer Concentrate Background Reducer Concentrate Image Developer Concentrate	10–30 min (variable)	1
7. Stop/ Storage	5% Acetic Acid	10 min–overnight	1
8. Rinsing	H <sub>2</sub> O	10 minutes	1

## **Section 6**

### **Maintenance and Chemical Compatibility**

#### **Maintenance**

To clean the components of the Dodeca stainer, follow the instructions below. The Dodeca stainer components are not dishwasher compatible.

#### **Cleaning the Solution Tank, Staining Trays, and Shaking Rack**

After each run, wash the solution tank, staining trays, and shaking rack thoroughly with a non-scratch pad and mild detergent (Bio-Rad Cleaning Concentrate diluted to the recommended working concentration, catalog #161-0722) followed by a complete rinse with distilled water.

**Note:** For optimum results with fluorescent and silver staining, it is essential to maintain clean components. These stains are more susceptible to contaminants in the solution tank than Coomassie based stains. Residual Coomassie Brilliant Blue quenches the fluorescent signal. Protein or metallic contaminants will catalyze non-specific formation of metallic silver. Users may choose to utilize separate Dodeca stainers for each stain used in the laboratory.

If more stringent cleaning is needed, use the reagents listed below. We recommend performing a 5 minute rinse followed by a thorough rinse with distilled water. Avoid exposing the stainer to these chemicals for a prolonged amount of time.

- 2% Bleach (0.1% Sodium hypochlorite)
- 70% Ethanol
- 20% Hydrogen peroxide
- 50% w/v (7.8M) Nitric acid

#### **Cleaning the Lid**

First, remove the shaker motor and the shaker control unit from the lid. Then, wash using a non-scratching pad and a mild detergent followed by a complete rinse with distilled water.

Please see the chemical compatibility section below for incompatible chemicals.

### **Chemical Compatibility**

The Dodeca stainer components and storage boxes are NOT compatible with the following chemicals. Use of these chemicals voids all warranties.

- > 20% Acetic acid
- Ammonium hydroxide
- Dimethyl formamide
- Dimethylsulfoxide (DMSO)
- Ethyl acetate
- >25% Hydrochloric acid
- Aromatic hydrocarbons (Toluene, Benzene, etc.)
- Chlorinated solvents (Carbon tetrachloride, Ethylene chloride, etc.)
- > 50% (7.8 M) Nitric acid
- > 20% Sulfuric acid
- Silicone oil
- > 15% Sodium hydroxide
- Trichloroacetic acid
- Ketones (Acetone, etc.)

Call 1-800-4-BIORAD or your local Bio-Rad representative for technical information regarding additional chemical compatibility of the Dodeca stainers with various other laboratory reagents.

## Section 7 Troubleshooting

### General Troubleshooting

Problem	Cause	Solution
1. Uneven stain, and/or gel breakage	<p>a. Staining tray is too large for the gel size. Gels will rotate during staining and can get lodged in a diagonal position.</p> <p>Or, the staining tray is too small for the gel size. The gel size after swelling exceeds the staining tray dimensions and the gel will lodge in the tray</p> <p><b>Note:</b> Gradient gels show increased swelling from low to high %T. This results in a trapezoidal shaped gel that can rotate and lodge in the tray if not positioned correctly</p>	<p>a. Select the proper tray and tray attachments, if needed, for your gel size (see Table 1A)</p> <p>Position the gel correctly on the staining tray (see Table 1B)</p> <p>Don't increase the shaking speed beyond the recommended speed setting for more than a few minutes (see Table 3.7A)</p> <p>For overnight incubations always decrease speed to #3</p>
2. Uneven stain	a. Gels sticking to tray surface	<p>a. Add a small amount of deionized water onto the tray before loading the gel</p> <p>Release the gels by increasing the speed (6–10) on the shaker control unit for a few minutes. As soon as all the gels are loose, return to the recommended speed setting (see Table 3.7A)</p>
3. Top gel stained unevenly, damaged, or dried out	a. Insufficient amount of reagent in the tank	a. Fill the tank with reagent until it reaches 0.5 cm above the top cover tray
4. The solution tank is not draining	a. The drain ports are blocked	a. Prior to use, make sure the drain ports are unblocked to ensure proper draining
5. The shaker motor seems loose and is rocking too much on top of the lid	a. The black T-knobs are loose	a. Tighten the black T-knobs that hold the shaker motor on top of the lid
6. The shaking rack (with trays inside) is difficult to remove from the tank.	a. The solution tank is not drained.	a. Drain the staining solutions from the tank prior to removing the shaking rack.

### ***Silver Stain Troubleshooting***

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
7. Dark background	a. Low quality reagents or contaminated water	a. Contaminants will catalyze non-specific formation of metallic silver. Use high purity reagents and deionized water
	b. Over development of the gel	b. Monitor the development step carefully and stop quickly by draining through both drain ports (stopcocks). Then quickly add the stop solution through the reagent access door of the lid. The drain/fill cycle should be no longer than 3 minutes
	c. Overloaded protein sample	c. Adjust the protein sample load so it is appropriate for this detection method
	d. Incorrect preparation of silver stain solutions	d. Refer to the silver stain instruction manual, paying special attention to the image developer concentrate amounts
8. Poor sensitivity	a. Inactive reagents or inaccurate dilution or incorrect incubation times	a. Use the silver stain kit components within their recommended shelf life  Confirm solution preparation and incubation times are correct. Pay special attention to the amount of image developer concentrate
	b. Low protein sample load	b. Adjust the protein sample load so it is appropriate for this detection method

### ***Sypro Ruby Troubleshooting***

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
9. Weak or no fluorescent signal	a. Residual Coomassie stain in the system inhibits the fluorescent signal	a. Clean the Dodeca stainer thoroughly before switching from Coomassie based stain to fluorescent stains
	b. Low protein sample load	b. Adjust the protein sample load so it is appropriate for this detection method

## Appendix A

### Dodeca Stainer and Accessories Specifications

	Dimensions (W x D x H, cm) Large	Dimensions (W x D x H, cm) Small	Material
<b>Overall Dodeca stainer</b> <sup>7</sup>	41.3 x 46.2 x 38.9	41.3 x 46.2 x 38.9	Various (see below)
Weight	9.1 kg	7.5 kg	
<b>Number of gels</b> <sup>8</sup>	Up to 12 large format	Up to 12 large format Up to 24 Criterion	
<b>Shaker Device</b>	Built-in Shaker Motor	Built-in Shaker Motor	
<b>Maximum staining solution volume</b>	10 liters	7 liters	

#### Components

##### Staining Trays

Translucent Trays	27.5 x 30.7 x 1.4	23.6 x 24 x 1.4	Polyethylene Terephthalate G Copolymer (PETG)
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White Development tray	27.5 x 30.7 x 1.4	23.6 x 24 x 1.4	PETG
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Tray attachments	0.3 x 30.3 x 0.5	0.3 x 23.2 x 0.5	PETG, translucent
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##### Shaking Rack

Rack	30.7 x 35.8 x 22.7	23.7 x 35.8 x 22.7	PETG, translucent
Bearings	Diameter: 1.59 cm Length: 0.5 cm	1.59 cm 0.5 cm	SV30 Stainless Steel

##### Solution Tank

Tank	32.1 x 37.9 x 22.1	28.6 x 30.9 x 22.1	PETG, translucent
Drain Fittings	Diameter: 2.9 cm Length: 3.2 cm	2.9 cm 3.2 cm	Polypropylene

##### Lid

Overall	41.3 x 46.2 x 6.8	41.3 x 46.2 x 6.8	PETG, translucent
Motor case	8.9 x 16.3 x 11.6	8.9 x 16.3 x 11.6	Acrylonitrile butadiene styrene/Polycarbonate (ABS/PC), cadet gray

Hinges for reagent access door			Acrylic, translucent
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#### Accessories

##### Gel Clip

Overall	5.5 x 25 x 3	5.5 x 25 x 3	Polyvinyl chloride (PVC), translucent
Spring			Stainless Steel
Hinge			Polyurethane

Storage Box	29.5 x 32.5 x 7.0	25.7 x 25.7 x 7.0	PETG
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<sup>7</sup> The overall width and depth are determined by the lid dimensions.

<sup>8</sup> A minimum of 4 gels is recommended when silver staining.

## Appendix B Warranty and Ordering Information

### Warranty

The Dodeca stainer components are warranted for 1 year against defects in materials and workmanship. If any defects should occur during this warranty period, Bio-Rad Laboratories will replace the defective parts without charge. However, the following defects are specifically excluded:

- Defects caused by improper operation.
- Repairs or modifications performed by anyone other than Bio-Rad Laboratories or their authorized agent.
- Damage caused by accidental misuse.
- Damage caused by disaster.
- Common replacement parts including platinum wire and power cables.
- Damage caused by the use of organic solvents, please see Section 6 (pg. 14–15) for incompatible chemicals that will void all warranties if used.

For inquiries or to request repair service, contact your local Bio-Rad office

### Warranty Information

Model \_\_\_\_\_

Catalog Number \_\_\_\_\_

Date of Delivery \_\_\_\_\_

Serial Number \_\_\_\_\_

Invoice Number \_\_\_\_\_

Purchase Order Number \_\_\_\_\_

### Ordering Information

Catalog Number	Description
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#### *Dodeca Stainer*

165-3400	<b>Dodeca Stainer, Large, 100-240 V</b> , includes 13 trays (12 translucent and 1 white), 12 tray attachments, shaking rack, solution tank, lid with shaker, shaker control unit, one gel clip, and instructions
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165-3401	<b>Dodeca Stainer, Small, 100-240 V</b> , includes 13 trays (12 translucent and 1 white), 12 Criterion tray attachments, shaking rack, solution tank, lid with shaker, shaker control unit, one gel clip, and instructions
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#### *Dodeca Stainer Accessories*

165-3414	<b>Gel Clip</b> , 1
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165-3429	<b>Storage Box, Large</b> , holds up to 4 gels with large staining trays, 1
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165-3430	<b>Storage Box, Small</b> , holds up to 4 gels with large staining trays, 1
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<b>Catalog Number</b>	<b>Description</b>
<b><i>Dodeca Stainer Replacement Parts</i></b>	
165-3415	<b>Dodeca Stainer Tray, Large</b> , replacement, 2 pack
165-3416	<b>Dodeca Stainer Tray, Small</b> , replacement, 2 pack
165-3417	<b>Dodeca Stainer Tray attachment, Large</b> , fits on large trays, required for PROTEAN Plus 25 cm handcast gels, 2 pack
165-3418	<b>Dodeca Stainer Criterion Tray attachment</b> , fits on small trays, required for Criterion gels, 2 pack
165-3419	<b>Dodeca Stainer White Development Tray, Large</b> , 1
165-3420	<b>Dodeca Stainer White Development Tray, Small</b> , 1
165-3421	<b>Dodeca Stainer Shaking Rack, Large</b> , replacement, 1
165-3422	<b>Dodeca Stainer Shaking Rack, Small</b> , replacement, 1
165-3423	<b>Dodeca Stainer Solution Tank, Large</b> , replacement, 1
165-3424	<b>Dodeca Stainer Solution Tank, Small</b> , replacement, 1
165-3425	<b>Dodeca Stainer Lid with Shaker Motor, 100-240 V</b> , replacement, fits both tank sizes
165-3426	<b>Dodeca Stainer Lid without Shaker Motor</b> , replacement, fits both tank sizes
165-3427	<b>Dodeca Stainer Shaker Motor, 100-240 V</b> , replacement
165-3428	<b>Dodeca Stainer Shaker control unit</b> , replacement
<b><i>Dodeca Stainer and Stains</i></b>	
165-3403	<b>Dodeca Stainer and Dodeca Silver Stain Kit, Large, 100-240 V</b> , includes one large Dodeca stainer (165-3400) and one Dodeca silver stain kit for the large tank (161-0480), instructions
165-3404	<b>Dodeca Stainer and Dodeca Silver Stain Kit, Small, 100-240 V</b> , includes one small Dodeca stainer (165-3401) and one Dodeca silver stain kit for the small tank (161-0481), instructions
165-3405	<b>Dodeca Stainer and Bio-Safe Coomassie Stain, Large, 100-240 V</b>
165-3406	<b>Dodeca Stainer and Bio-Safe Coomassie Stain, Small, 100-240 V</b>
165-3407	<b>Dodeca Stainer and SYPRO Ruby Stain, Large, 100-240 V</b>
165-3408	<b>Dodeca Stainer and SYPRO Ruby Stain, Small, 100-240 V</b>



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Life Science  
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