*e*Stain™ L1 
Protein Staining System

For fast coomassie blue staining of protein in mini polyacrylamide gels

GenScript
Make Research Easy

Version 09302022

Table of Contents

Important Notice

eStain™ L1 Protein Staining Device and accessories

Please verify that all parts listed below are included within your package

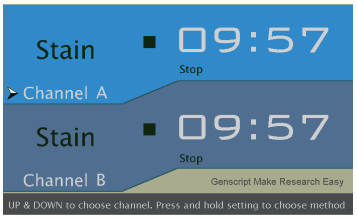
Component	Cat. NO.	Quantity
*e*Stain™ L1 Protein Staining Device	L00657	1
*e*Stain Gel holder (Installed inside the device)	L00658	2
Power Cord	-	1
Forceps	-	1
Shovel (for cutting gels)	-	1
Stainless steel Tray	-	1
*e*Stain Small Two Pass Screw Cap (Fit 5 L and 10 L container)	L00663	1
Liquid container (5 L)	L00661-5	3

Orderable reagents for eStain™ L1 system

Component	Cat. NO.	Quantity
*e*Stain L1C Protein Staining Kit	L00753	-

For best performance, please assemble the instrument following the instruction listed in the Table

Caution: Please empty the pipeline by pressing UP and SETTING at the same time before moving or relocating the instrument

Step	Description
1	Check that the Power Cord supplied with the unit is compatible with local socket format (see instrument specifications).
2	Place *e*Stain™ L1 on a leveled laboratory bench.
3	Keep the area around the device clear, especially at the back of the instrument, to ensure adequate ventilation.
4	Ensure that the AC power switch at the back of the instrument is in the Off position.
5	Connect the inlets and outlet pipes from the instrument with the color-matched liquid container as instructed below: **Staining reagent container** ● Blue **Destaining reagent container** ● Green **Waste container** ○ white or colorless
6	Turn on the power switch forthe *e*Stain® L1. The machine will start a self-test, after which the screen will display the working interface (right). The machine is ready for use. 

Warranty

GenScript warrants that *e*Stain™ L1 Protein Staining Device will be free from defects in material and workmanship for a period of one year from the date of purchase or an accumulative working time of 10,000 minutes (Channel A+B), whichever comes first. If any defects occur during this warranty period, GenScript will, at its option, repair or replace the product at no charge to you.

Notice: Damage caused by improper transportation, or any of the following actions are excluded:

- Improper operation.
- Repair or modification done by any other party than GenScript or an authorized agent
- Use of fittings or other spare parts supplied by any other party than GenScript.
- Damages caused by disasters.
- Corrosion due to the use of improper solvent or sample.

For consultation and maintenance services, please contact GenScript customer service and provide the following information. If sending the instrument to GenScript for repair (with GenScript's consent), please ensure proper packaging to avoid unnecessary damage during transportation.

Instrument model: _____
Instrument serial number:_____
Order number: _____
Date of delivery: _____

1. Overview

1.1 Instrument Overview

*e*Stain™ L1 is a highly efficient protein PAGE gel staining system, which uses Coomassie Brilliant Blue and a patented protein staining technology developedby Genscript. *e*Stain™ L1 staining system integrates the traditional three steps of fixing- staining-destaining into one step and can stain/destain two protein PAGE gels simultaneously in 10 minutes or less.

*e*Stain™ L1 protein PAGE gel staining system consists of two parts, one is the *e*Stain™ L1 protein staining instrument, and the other is the *e*Stain™ L1 protein staining kit which includes the consumables required for the staining/destaining. After electrophoresis, transfer the PAGE gel onto the gel holder following the instruction and insert the gel holder into the staining chamber. Simply press the start button to start the staining process. The instrument automatically pumps in/out the staining/destaining buffers and no additional reagents or operations are needed. *e*Stain™ L1 works with all types of precast as well as homemade mini PAGE gels. Compared with the conventional staining methods, gels stained by *e*Stain™ L1 have crisp blue bands with minimum or no background. *e*Stain™ L1 also offers superior sensitivity compared to conventional methods and can detect as low as 12.5 ng of protein.

Important note

*e*Stain protein staining kit is a one-time-usage consumable for protein PAGE gel staining. One *e*Stain kit can stain about 40 gels.

Important features of the *e*Stain™ L1 Protein Staining System include:

- Stain/destain PAGE gel (s) in 10 minutes or less with Coomassie Brilliant Blue
- Easy to use, convenient
- Staining/destaining buffers are pumped in/out automatically and no other reagents are needed
- Much more efficient than the traditional staining method
- Compatible with different types of mini PAGE gels

1.2 Instrument Specifications

*e*Stain™ L1 Protein Staining Device

Weight:	7.58 Kg
Dimensions:	410 mm (L) × 270 mm (W) × 260 mm (H)
Electrical Parameters:	110-120 V, 220-240 V, 50/60 Hz, 10 A
Built-in Features:	Digital display, alarm, press key, light LED
Compatibility:	Suitable for fast Coomassie blue staining of proteins in mini polyacrylamide gels
Materials:	ABS, PP, Titanium, Plasticized silicone, Stainless steel
Operating Temperature:	15-40 ℃
Forceps:	Stainless steel
Shovel:	Polycarbonate
Tray:	Stainless steel

Avoid acetone, dimethyl sulfoxide, and acetic acid, these reagents can erode or damage the device.

*e*Stain Gel Holder

Dimensions:	110 mm (L) × 130 mm (W) × 14 mm (H)
Compatible membrane Dimension:	100 mm x 100 mm
Weight:	60 g
Materials:	ABS

1. Overview

1.3 Ordering Information

Consumables

Component	Package	Cat. NO.
*e*Stain L1C Staining Kit	1 kit	L00753

Some reagents may crystallize at low temperature, equilibrate and ensure the reagent is fully dissolved before use

***e*Stain L1C Staining Kit**
(Cat No. L00753)

Component	Size	Quantity	Cat. NO.
Concentrated Staining Solution	2 L	1	M00706
Concentrated Destaining Solution	2 L	1	M00707
*e*Stain Filter Paper	50 pk	1	L00660

M00706 and M00707 cannot be purchased separately

Instrument Consumables List

Component	Size	Cat. NO.
Liquid Container	5 L	L00661-5
	10 L	L00661-10
*e*Stain Small Two Pass Screw Cap (Fit 5 L and 10 L container)	3 pk	L00663
*e*Stain Gel Holder	2 pk	L00658
Tube	10 m	L00662-10
	20 m	L00662-20
Instrument Cover	-	L00667

1.4 Maintenance

To ensure the quality of gel staining, we recommend regular maintenance of the instrument

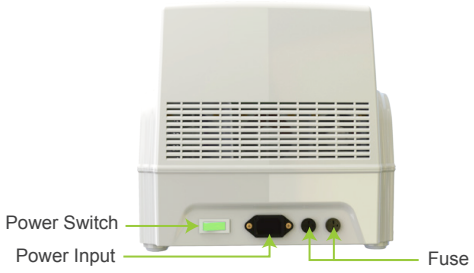
Component	Maintenance description
Gel Holder	1. Per 50 times use, immerse the gel holder in 75% alcohol (or per 900 ml 75% ethanol and 100 ml concentrated cleaning solution) for 4 hours. After that rinse the gel holder with distilled water and dry. User can also immerse the gel holder in 75% ethanol after each use and rinse with distilled water before the next use. 2. If there are brown spots on the fabric, immerse the gel holder in 1 M NaOH for 6-12 hours and then clean with a soft brush. After that, continue with process 1.
Channel and pipeline	Per 100 gels use, it is recommended to clean the channel and pipeline with the following procedures: 1. Press the UP and SETTING keys at the same time until the unit beeps. The Instrument will begin to empty the pipeline. 2. Prepare 2 L cleaning solution (instructed below). * 3. Set program. Method 4 is set as a cleaning program (user can also customize a program by setting the staining cycles to 4, each cycles times to 5 min, and equilibrium cycle and destain cycle to 0). 4. Insert the staining solution inlet pipe into the cleaning solution. 5. Run the cleaning program at Channel A and Channel B. 6. After the end of cleaning program, press the UP and SETTING at the same time until the instrument beeps. Then instrument will begin to empty the pipeline. 7. Connect the staining solution inlet pipe back to staining solution container and set the program to the one that is normally used. Now the channel and pipeline cleaning is finished.
Notices	If the instrument will be left unused over a week, Please run the emptying program 2 times before disconnecting the power supply. (as described in the Channel and pipline cleaning section above). Change the covers of the staining solution and destaining solution to sealed screw caps to prevent the solutions from evaporating.
	Relocate the instrument: Please ensure that the pipelines are empty before moving or relocating the instrument. Ensure that the instrument remains level during the moving process to prevent leakage of the solutions

2. Instruction contents

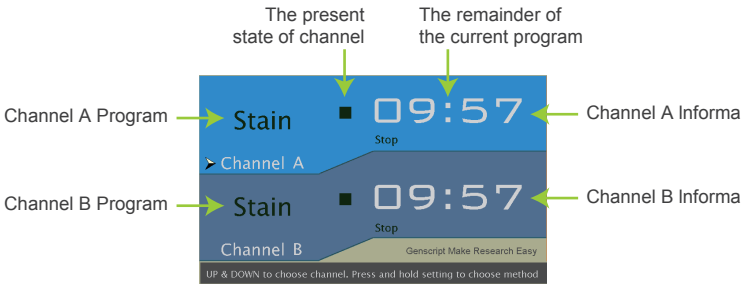
2.1 Instrument display and feature locations

eStain™ L1 Protein Staining Device TOP View

eStain™ L1 Protein Staining Device BACK View



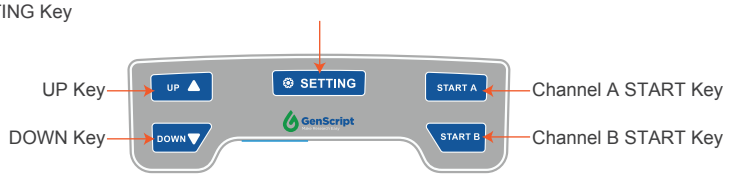
eStain™ L1 Protein Staining Device Display



Note: The display will change depending on the selection you have made. It will display a Working Interface, Method Interface, Parameters Interface or Engineering Interface which can each be used to customize settings and programs (please see details: Advanced Instruction)

*e*Stain™ L1 Protein Staining Device Keypad

*e*Stain™ L1 Protein Staining Device Keypad as shown in the following



Keypad function

Operation key	Interface	Function
UP	Working Interface	UP
	Method Interface	UP
	Parameters Interface	Increase cycle number / Increase reaction time
	Engineering Interface	Increase initial liquid inlet time / Increase the pipeline emptying time
DOWN	Working Interface	DOWN
	Method Interface	DOWN
	Parameters Interface	Reduce cycle number / Reduce reaction time
	Engineering Interface	Reduce initial liquid inlet time / Reduce the pipeline emptying time
SETTING	Working Interface	Long press to enter Method Interface
	Method Interface	Short press to select the highlighted program, and return to Working Interface
		Long press to enter the current Parameters interface
	Parameters Interface	Short press to move and highlight the next variable
		Long press save, exit and use the selected program
	Engineering Interface	short press to move and highlight the next variable
START A	Working Interface	Short press, Channel A starts to run program
		Long press, Channel A stops and is forced to empty
START B	Working Interface	Short press, Channel B starts to run program
		Long press, Channel B stops and is forced to empty

2. Instruction contents

2.1 Instrument display and feature locations

Keypad function

Operation key	Interface	Function
	Working Interface	Press all together until beeps, Channel A starts to run Destain Program
	Working Interface	Press all together until beeps, Channel B starts to run Destain Program
	Working Interface	Press all together until beeps, Channel A starts to run Equilibrium Program
	Working Interface	Press all together until beeps, Channel B starts to run Equilibrium Program
	Working Interface	Press all together until beeps, display Engineering Interface
	Working Interface	Press all together until beeps, instrument starts emptying pipeline

2.2 General guidelines and Buffer Preparation

Use the following recommendations for best results:

- Wear gloves at all times during the entire staining procedures to prevent contamination of filter papers and gels.
- Always use the kits before the specified expiration date printed on the package.
- Some solutions may crystallize at low temperatures. Please equilibrate and ensure the reagent is fully dissolved before use.

*e*Stain™ L1 protein staining device related consumables can be found at 1.3

Preparation for eStain L1C Staining Kit (L00753)

eStain L1C Protein Staining Solution (Cat. No. L00753) has to be diluted before use as instructed below.

Staining Solution

Please dilute the concentrated staining solution as below. Mix well before use.

* Isopropanol must be ACS reagent, ≥99.5%.

Step	Volume	Total Volume
1	Prepare a clean 5L empty bottle.	0
2	Add 2L M00706 Concentrated Staining Solution into 5L bottle.	2L
3	Add 1L Isopropanol* into step 2 bottle and mix well.	3L
4	Add 2L ddH2O into step 3 bottle and mix well.	5L

Destaining Solution

Please dilute the concentrated destaining solution as below. Mix well before use.

Step	Volume	Total Volume
1	Prepare a clean 5L empty bottle.	0
2	Add 1L M00707 Concentrated Destaining Solution into 5L bottle.	1L
3	Add 4L ddH2O into step 2 bottle and mix well.	5L

2. Instruction contents

2.3 Using the Pre-programmed Staining method

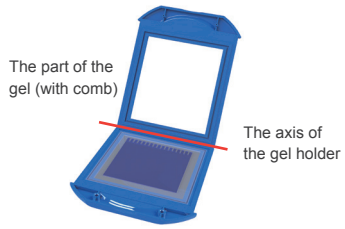
Staining procedure

1. Add distilled water into the tray provided
2. After electrophoresis, carefully remove the pre-run gel from the gel cassette and briefly rinse the gel with distilled water for 1 min.

Notice: If you're using precast gels from Life Technology, please remove the upper thicker part of the gel beneath the comb before staining to ensure the gel is in close contact with the filter paper.

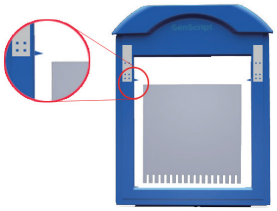
3. Open the gel holder and place it on the table with the fabric side down

4. Carefully place the gel on the fabric side of the gel holder. Ensure that the upper part of the gel (with comb) points to the axis of the gel holder and is as close to the axis as possible (as shown in the picture).



5. Pre-wet a piece of filter paper (provided) with distilled water and place it on top of the gel.

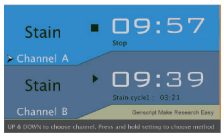
6. Close the gel holder.



7. Choose a Channel and insert the gel holder into the channel as show on the right.

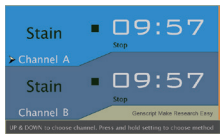
Note: Please ensure the fabric side of the gel hold is facing the user before inserting it into the Channel.

8. Press the corresponding channel to start the program. The timer of the corresponding channel starts to countdown.



9. The instrument beeps as the program countdown to 0.

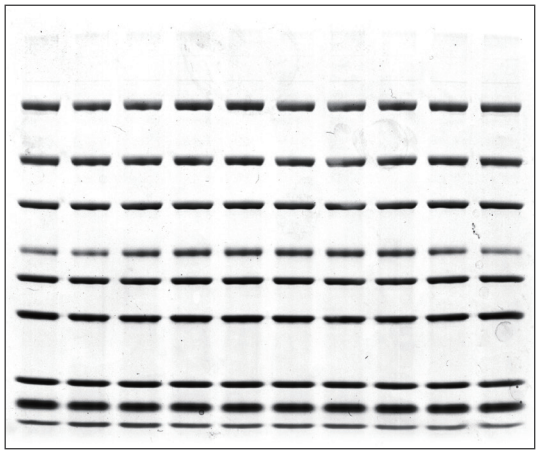
10. The channel stops flashing and the screen returns to normal.



Examples

Uniformity Test

Gel: ExpressPlus PAGE Gel, 4-12%, 10 wells (Genscript, M41210)
Samples: PAGE-MASTER Protein Standard Plus, 5 µl (GenScript, MM1397-500)
Program: Pre-programmed Stain
Time: 9 min 30 s



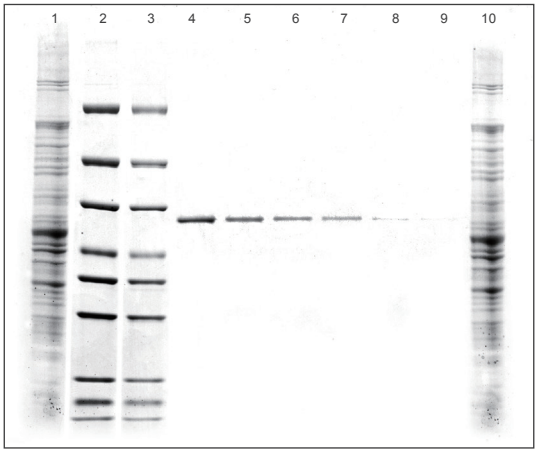
2. Instruction contents

2.3 Using the Pre-programmed Staining method

Sensitivity Test

Gel: ExpressPlus PAGE Gel, 4-12%, 10 wells (Genscript, M41210)
Program: Pre-programmed Stain
Time: 9 min 30 s

1. *E.coli* cell lysis	
2. PAGE-MASTER Protein Standard Plus, 5 µl (GenScript, MM1397-500)	
3. PAGE-MASTER Protein Standard Plus, 2.5 µl (GenScript, MM1397-500)	
4. BSA 200 ng	5. BSA 100 ng
6. BSA 50 ng	7. BSA 25 ng
8. BSA 12.5 ng	9. BSA 6.25 ng
10. *E.coli* cell lysis	

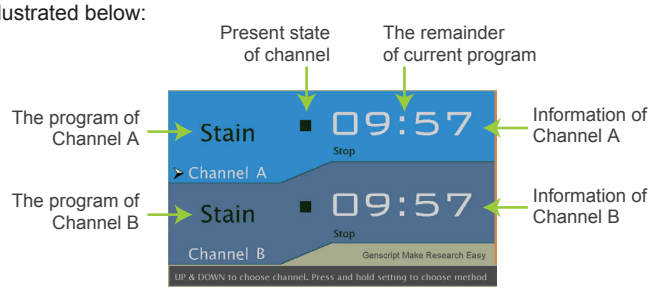


2.4 Advanced Instruction

The instrument has four interfaces: Working interface, Method Interface, Parameters Interface, and Engineering Interface

2.4.1 Working Interface

After turning on the power, the instrument enters the Working Interface as illustrated below:



The meanings of state icon

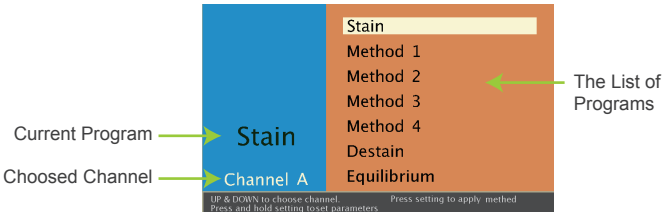
Icons	Meanings	Description
	Working	The channel program is running
	Stops	The channel program stops
	Waiting	The channel is waiting
	Finished	The channel program finished
 Flashing	Channel Emptying	The channel is emptying its pipeline
	Waiting for Channel to empty the pipeline	The channel is waiting for another channel to empty the pipeline
 Two alternate display	insufficient Solution and Waiting	Press START after replacing the solution to empty the channel and to continue
 Two channel alternate display	Pipeline Emptying	Emptying the solution in the pipeline

2. Instruction contents

2.4 Advanced Instruction

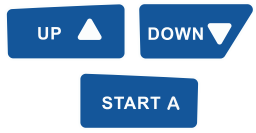
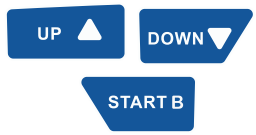
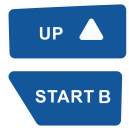
2.4.2 Method Interface

*e*Stain™ L1 has 7 methods: Stain, Destain, Equilibrium and 4 custom methods.Followthe instruction below to enter the Method Interface.

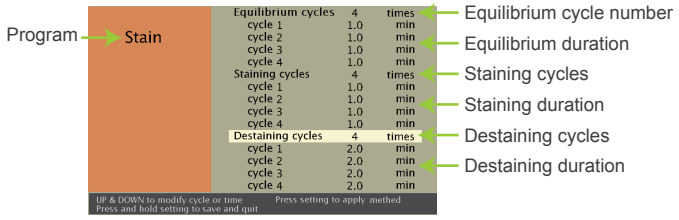


1. Press UP or DOWN to select the channel to highlight
2. Press SETTING until beeps to enter the program interface
3. Select the method to use or switch by pressing UP or DOWN
4. When finished, press SETTING and return to the Working Interface

To modify, press SETTING until beeps to enter the Parameters Interface

Program	Function	Fast Operation	Description
Stain	Staining		Applicable to most gels
Destain	Destaining		Press all together until beeps, Channel A runs Destain Program
			Press all together until beeps, Channel B runs Destain Program
Equilibrium	Equilibrium		Press all together until beeps, Channel A runs Equilibrium Program
			Press all together until beeps, Channel B runs Equilibrium Program
Method 1-4	Custom methods		The setting can be stored

2.4.3 Parameters Interface



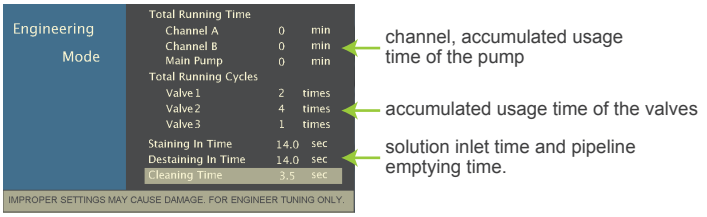
The workflow of *e*Stain™ L1 contains equilibrium cycles, staining cycles and destaining cycles. In this interface, you can set the number of cycles for the equilibrium, staining and destaining program, and the duration for each cycle

Note: Cycle number can be set to 0-4 range and each cycle time can be set to 0-5 minutes.

1. When cycles number is highlighted, press UP or DOWN to change the number of cycles
2. Press SETTING to highlight or switch between different variables
3. Press UP or DOWN to increase or decrease the highlighted cycle time
4. When all parameters are set, press SETTING until beeps to save the setting and return to the Working Interface. The channel will use the program just saved

2.4.4 Engineering Interface

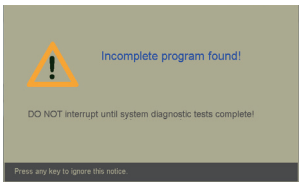
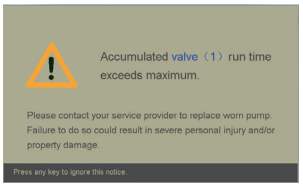
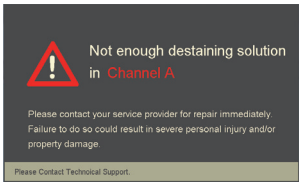
In this interface, users can check the accumulated usage time for the pump and valves. Users can also set the solution inlet time and pipeline emptying time.

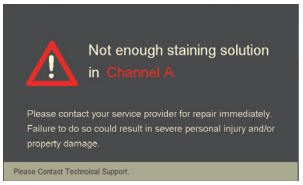
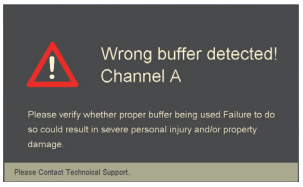
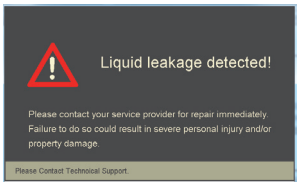


Note: Channel, pump and valves have certain lifetime. The instrument will show a reminder when the set value is reached (see chart). Please contact the Engineer for replacement for safety

Channel A	10000 min
Channel B	10000 min
Main pump	10000 min
valve1	100000 times
Valve2	100000 times
Valve3	100000 times

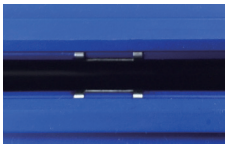
3. Troubleshooting

Problems	Description of the problem	Solution
starting up (Q1~Q2)	Q1 	The instrument detected there is an incomplete program from the latest working session. The channels were forced to empty for safety purposes. Please wait for the instrument to complete the self-check and return to the Working Interface.
	Q2 	The accessory highlighted in the blue part maybe Valve (1), Valve (2), Valve(3), Channel A, or Channel B The lifetime of the part highlighted in blue has reached its recommended maximum value. Users are advised to contact GenScript to replace the corresponding components, so as to avoid unnecessary losses Return to working interface by press any button.
During Operation Q3~Q6	Q3  	Not enough equilibrium/destaining solution in channel A. Causes and Solutions 1. Not enough solution or the opening of the tube is above the solution. Please add more corresponding solution. 2. There are twists in the tubes which blocks solutions from being pumped in. Please untwist the tubes. 3. The ends of the tubes form a seal with the bottom of the container. Please shorten the tube or make a slope cut at the end of the tube. 4. Automatic adjustment due to pressure changes. No special actions required. Press any key to return to the main menu. Take the steps as instructed. Press START A to continue the process. If the red part in the display panel is Channel B, press START B to continue the process.

Problems	Description of the problem	Solution
	Q4 	Not enough staining solution in Channel A Reasons and Solutions: 1. Not enough solution or the end of the tube is above the solution. Please add more staining solution or insert the tube into the solution. 2. There are twists on the tubes which block the solution from being pumped in. Please untwist on the tubes. 3. The ends of the tubes might have formed a seal with the bottom of the container. Please shorten the tube or make a slope cut at the end of the tube. 4. Automatic adjustment due to the pressure changes. No special actions required. Press any key to return to the main menu. Take the steps as instructed. Press START A to continue the process. If the red part in the display panel is Channel B, press START B to continue the process.
	Q5 	Each channel has its own current overload protection, this warning means that the staining chamber is overloaded Causes and solutions: 1. High concentration of staining and destaining solution. This could be that the concentrated solutions are not diluted correctly; 2. The channel is running without a gel holder inserted or the gel holder is not fully inserted into the chamber. The machine will empty the corresponding solutions.
	Q6 	There are leakage detectors placed in the machine. The warning means there is leakage in the machine. For your safety, please power off the machine and contact GenScript immediately. Do not try to move or use the machine before the problem is solved.

3. Troubleshooting

Problems	Description of the problem	Solution
Other devicer elated issues. (Q7~Q8)	Q7 machine repeatedly gives "Not enough solutions" warnings.	Please check the tubes to see if there are twists and that the end of the tubes form a seal with the bottom of the container, If not, please enter the "engineering interface" to change the initiating time
	Q8 Channel A and Channel B have different running time even they use the same program or parameters. Or the time of different runs using the same channel and program are different.	1. Channel A and B have independent detectors to check the steps of the staining process, so the running time between the two channels may be different. 2. The pumping time is determined by the solution level in the reaction chamber and will be different between each run. The machine automatically calculate an estimated running time based on the time used by the previous run. If the actual pumping time is shorter than the previous run, machine will skip the spare time and result in a shorter running time than estimated.
Staining result (Q9~Q12)	Q9 Dark or unclean background of the stained gel	1. The electrophoresis process has significant impact on the staining results. We strongly recommend customers to use fresh electrophoresis buffer each time. Try to avoid PAGE gels with high concentration of ions. 2. Run one or more destaining program to further destain the gel. 3. If the PAGE gels contain high concentration of ions or with reused electrophoresis buffer, please run an equilibrating program before staining. 4. Please check the reaction chamber after the run. If there are lot of residual solution in the chamber, please contact our engineers.

Problems	Description of the problem	Solution
	Q10 Spots on the gel	1. Air bubbles between the gel and filter paper might occasionally cause such problems, run an additional destaining program to remove the spots. 2. Edge effect: sometimes will also cause such problems on the edges of gel, run an additional destaining program to remove the spots.
	Q11 Only half of the gel is stained 	1. Carefully check the solution detectors located at the top of the reaction chamber to see if there are residual gels or papers built up on the detectors. If there are, please carefully remove them with a forceps. 2. Clean the detectors with a filter paper and rerun the staining program.
	Q12 Large blue area at the bottom of gels.	The gel is far away from the gel holder connection axis. Re-place the gel as instructed and run a separate destaining program to remove the staining.

4. Technical Support

Visit the GenScript web site at www.genscript.com for:

1. Technical resources, including manuals, vector maps and sequences, application notes, MSDSs, FAQs, formulations, citations, handbooks, etc.
2. Complete technical support contact information
3. Access to the GenScript Online Catalog
4. Additional product information and special offers

For more information or technical assistance, call, write, fax, or email.

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