COLORMETRY

CMU-124H

2001 Model

User Manual

MIURA BOILER CO.,LTD.

IN OUR CONTINUING EFFORT TO IMPROVE OUR PRODUCT, IMFORMATION IN THIS MANUAL MAY BE CHANGED WITHOUT NOTICE.

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Introduction

We appreciate your purchase of the Colormetry system.

This user's manual covers instructions for the use of your Colormetry system. Please read through this manual and understand the contents before using the system.
We also recommend that the manual be kept nearby for reference when operating the Colormetry system.
Operate the system only in accordance with the instructions given in this manual.
We will under no circumstances whatsoever be liable for damages arising from user's failure to follow the instructions given in this manual.

(Some details of the instructions contained in this manual may be different from the actual system purchased. The instructions are also subject to change without prior notice.)

⚠ CAUTION

The Colormetry system is a hardness-leakage monitoring system that monitors the hardness of water and issues a hardness-leakage alarm. It is not a system that remedies (effects recovery from) hardness leakage itself.

How this manual is organized

This manual consists of ten chapters listed below. We recommend that you familiarize yourself with the objectives and contents of each, and keep the manual handy for reference.

Organization

Chapter 1 Safety warnings/Precautions
Explains danger and precautionary signs that apply to the handling, installation, wiring and maintenance of the Colormetry system.

Chapter 2 Before You Start
Covers accessories and ordering information.

Chapter 3 Specifications
Gives specifications and depicts an overview and external view of the Colormetry system.

Chapter 4 Description
Summarizes the Colormetry system and explains the monitoring methods, functions, remote signal applications and evaluation method. It answers the question “What is the Colormetry system?”

Chapter 5 Installation
Shows how to install and wire the Colormetry system.

Chapter 6 Settings and Start Up
Guides you through set up and test run. Perform the setup and start the system by following the instructions given in items 6-1 through 6-5.

Chapter 7 Digital display description
Explains the messages displayed in all three modes.

Chapter 8 Maintenance
Explains daily maintenance the Colormetry system and how to replace the reagent cartridge, fiber filter cartridge and constant-flow regulator valve.

Chapter 9 Troubleshooting
Explains what action should be taken in the event of error, how to clear alarm and how to verify error records.

Chapter 10 Warranty
To have the product covered by the warranty, fill out the Warranty Registration card and mail it to MIURA BOILER immediately following the installation.

Table of contents

Chapter 1 Safety Warning/Precautions

Explains danger and precautionary signs that apply to the handling, installation, wiring and maintenance of the Colormetry system.

In addition to the following descriptions for WARNING, CAUTION and NOTE, which are shown in each chapter in this manual, Chapter 1 includes all descriptions for WARNING, CAUTION and NOTE, each of which is mentioned in every chapter in order to ensure safe operation.

It is the responsibility and duty of all personnel involved in the operation, installation and maintenance of this equipment to fully understand the WARNING, CAUTIONS, and NOTES by which hazards are to be reduced or eliminated.
Personnel must become thoroughly familiar with all aspects of safety and equipment prior to operation, installation and maintenance of the equipment.

WARNING

This sign indicates a situation in which incorrect handling might result in death or injury to the operator, or that may result in damage to property.

CAUTION

This sign indicates precautions for the prevention of damage to the equipment.

NOTE

Instructions for effective operation and information that may become useful are explained here.

Introduction

⚠ CAUTION

The Colormetry system is a hardness-leakage monitoring system that monitors the hardness of water and issues a hardness-leakage alarm. It is not a system that remedies (effects recovery from) hardness leakage itself.

Chapter 2

⚠ CAUTION

The customer would be required to procure the appropriate fasteners for installation of the Colormetry unit if the supplied mounting brackets are not suitable for the location.
The customer may also need additional plumbing parts, depending on the location.

Chapter 4

NOTE

It is recommended to connect a remote signal wherever possible to prevent false detections and avoid recovery operations.
The signal for adding water, if available, should be connected as the first priority.
If only remote regeneration signal from water softer is connected, a false detection of hardness leakage may result from monitoring the stagnant water while the water is stopped, or a system error may occur due to the lack of flow. A remote signal-input arrangement, as shown in examples [2]-1 and [2]-2, is recommended.

⚠ CAUTION

If no remote signal is connected, be sure to set ("the monitoring is enabled by remote signal being turned off") [SRte Sgl Off] mode (which is the factory setting).

⚠ CAUTION

If the remote signal setting is for “Monitoring is enabled by remote signal being turned on" [SRte Sgl On], periodically check to verify that automatic monitoring is performed.
If no remote signal is available due to a signal problem, the monitoring process will never be initiated.

NOTE

External-alarm master contact will not be cancelled until the condition is evaluated as normal.

Chapter 5

⚠ CAUTION

The reagent cartridge's receptacle is plugged when the system is delivered. Never remove the plug until installation is complete. (See Fig. 2.)
Note: If the plug is removed, the stirrer inside may roll out and get lost. An extra stirrer is attached to the back of the front cover in case one is lost.

⚠ CAUTION

- Do not connect the drain-water pipe to other plumbing.
- Be sure to drain it to open air.
- Exercise care in keeping the drain-water pipe free of kinks.
  An obstructed drain-water pipe may cause water leakage and misevaluation.

⚠ CAUTION

In case the drain-water pipe is clogged and the internal pressure builds up, the system will relieve the pressure through either of methods (1) and (2) shown below. These methods cause drain water to leak down through the bottom of the system. Be sure not to leave anything underneath the system.

(1) Water leaks out of the pipe connection at the bottom.
(2) Water leaks out of the internal piping.
Water will drain out of the drain holes in the bottom of the system.

⚠ CAUTION

Exercise care in keeping the tubing free of kinks.

⚠ CAUTION

Where zinc or copper plumbing is used, zinc or copper ions would dissolve and stagnate in the water. The reagent in this system reacts with zinc and copper ions. Take the sample water as close to the water softener as possible to avoid the effects of ions dissolving out of the plumbing.

⚠ WARNING

- Use a dedicated power supply line having the specified capacity. Insufficient capacity may cause fire.
- Provide a ground fault interrupter with an overcurrent-protection function to prevent electric shock.
- Use a supplied wire or a larger cross section, or the wire may overheat and cause a fire.
- Ground the grounding terminal to prevent electric shock and malfunction.
- Be sure to clamp the wires down, or undue force exerted on them may damage the system.
- The wires must have a drooping slack to prevent water leakage from running down the wires and causing a short circuit.

⚠ CAUTION

The system starts operating as soon as the power is turned on (system is plugged in). Activate it only when it is ready for a test run.

⚠ CAUTION

- If a contact representing the feeding of water is available, connect this on a highest priority. If not, set up the start and stop time on the LCD display to avoid monitoring during water stoppage and softener regeneration, or a system error may occur.
- Refer to Section 4-3, “Method and examples of utilizing remote signals,“ on page 24 for remote signal functions, and connect a signal to suit the installation.

⚠ CAUTION

Turning a relay on and off generates sufficient back EMF across its coil to destroy a transistor on the opening of the relay. Be sure to connect a surge suppresser in order to protect the transistor.

⚠ CAUTION

- Before installing a reagent cartridge, always check the manufacture date on the package. (The cartridge life is about one year from the date of manufacture, and is used up within approximately four months of installation.)
- When installing a reagent cartridge, push it in slowly, keeping the nozzle and check tube from hitting the main unit.
- Be sure to push the cartridge lever back into the main unit, or the cartridge may come off and water may leak when water pressure is applied for operation.
- Never remove the check tube from the end nozzle of the reagent cartridge. Do not touch the check tube. Otherwise, the reagent injection volume may be affected.

⚠ WARNING

- Do not use the reagent cartridge for the use other than in the Colormetry system.
- Never disassemble the reagent cartridge. Reagent may splatter onto the skin or into the eyes.
- Dispose of the fully intact reagent cartridge as plastic refuse.
- If the reagent gets on the skin or in the eyes, rinse immediately with water.

⚠ CAUTION

Be sure to perform the checks listed in the foregoing before startup.

Chapter 6

⚠ CAUTION

Change the DSW-3 and DSW-4 settings according to the M-alkaline value of the raw water. Note that an evaluation error may result from a setting that is incompatible with the M-alkaline value of the sample water.

Do not change the settings other than DSW-3 and DSW-4, or the system may malfunction.

⚠ WARNING

Be sure to check the following before turning on the power:

[1] The power-supply voltage is correct. (24 V or 110 V transformer to 24 V)
[2] The wiring and piping are correct.
[3] The reagent cartridge is properly installed.
[4] The system's water pressure is on and ready to feed water.

⚠ CAUTION

If the battery has been charged, be sure to review and set all items described in "Setting mode" on page 60 after exiting the status-verification test mode.

NOTE

If the "Wash Cfm F" or "Wash F" alarm occurs during a test run or initial feeding after replacing the fiber filter – (even though the main feed-water valve is open and pressure is provided) -- take the action shown below. This is an initial phenomenon caused by bubbles in the filter casing. It is not a system problem.

The buzzer sounds on the alarm. Press the Manual Monitor switch to stop the buzzer, then press the switch again to force monitoring (that is, to feed the system). If the alarm recurs, repeat this process.

If a couple of repetitions will not stop the recurrence of an alarm, try monitoring with the constant-flow regulator valve (black rubber plate) removed. If the removal eliminates the alarm, restore the constant-flow regulator washer and perform another monitoring to verify that no alarm recurs.

If the fiber filter cartridge is replaced while the power is on, the system would not automatically enter the status-verification test mode. Press the Manual Monitor switch to monitor (to feed the water) to verify that no alarm occurs. If the alarm recurs, repeat the process.

NOTE

[1] If no remote signal is connected for operation, set the system up for monitoring is enabled by remote signal being turned "off" state.
[2] If a "now feeding water" signal is available from the site, connect the signal and set up the Colormetry system to prevent evaluation and operational errors.

NOTE

Note that if the Up switch is used to switch the display from the installation date to the current date, and then either the Item or Indicator switch is pressed to confirm (update) the setting, the old date (before updating) will no longer be available.

Chapter 8

⚠ CAUTION

Freezing may crack the fiber filter cartridge, filter casing or monitor container inside the main unit.

⚠ CAUTION

The maximum pressure of raw water to the Colormetry system is 71 psi. Pressure beyond that may cause water leakage due to deformations in the internal connections or gaskets. Be sure to use it under the specified pressure.
The drain end must open into the air. Back pressure at the drain end may cause an internal water leakage.
The main unit has a relief hole in the bottom to quickly drain away internally leaked water and prevent short circuits.
Do not place any object underneath the installed system that may get wet in the unlikely event of internal leakage.
Be sure to keep the feed-water and drain-water pipes free of kinks.

⚠ WARNING

(1) Do not remove the front cover from the main unit.
(2) Do not disassemble the Colormetry unit.

⚠ CAUTION

- Replace the cartridge with the power left on but only while the system is in monitor standby mode.
- Never remove the check tube attached to the nozzle of the reagent cartridge (refer to Section 3-2-2, “External appearance of reagent cartridge,” on page 18.) Keep the fingers off the check tube too, since doing so may affect the amount of injection.
- When installing a new cartridge, push it down slowly, being careful not to let the nozzle and check tube hit main unit.

⚠ WARNING

Be sure to dispose of the used reagent cartridge only after completely discarding the remaining reagent from the reagent cartridge.

⚠ CAUTION

If the reagent cartridge being used is temporarily removed for reinstallation later, do not press the Manual Monitor switch. The buzzer will stop automatically within one minute. Pressing the Manual Monitor switch will reset the timer for cartridge replacement, thereby rendering the automatically displayed replacement date meaningless.

⚠ CAUTION

About the reagent cartridge

[1] The reagent cartridge has a definite life. Finish a cartridge within one year of its date of manufacture, that is stated on the cartridge box. (A cartridge is used up in about four months.)
[2] Do not store cartridges for a long period of time. If they are to be stored, select a cool, dark place.
[3] Do not break the seal on the reagent cartridge bag until the moment of installation. Doing so will accelerate its deterioration.
[4] Do not touch the nozzle or tube of the reagent cartridge. Doing so will affect the injection level, and in the worst case may stop monitoring.
[5] Do not use the reagent cartridge for other than the Colormetry system.
[6] Never disassemble a reagent cartridge. Reagent may splatter onto the skin or in the eyes.
[7] Dispose of the reagent cartridge, assembled intact, as plastic waste.
[8] If the reagent gets on the skin or in the eyes, immediately rinse it off with water.

⚠ CAUTION

Water spills around the main unit when replacing the fiber filter. Do not leave things underneath the unit that should not get wet.

⚠ CAUTION

There is a constant-flow regulator washer on the end of the filter casing. If the washer is not found on the filter casing when it is removed from the main unit, the washer may have been left behind in the filter mount of the main unit. Remove the washer without scratching the mount.

Chapter 2 Before you start

Covers accessories and ordering information.

2-1 Included accessories

Check the shipped packages for the following parts and accessories, that are furnished with the CMU-124H.

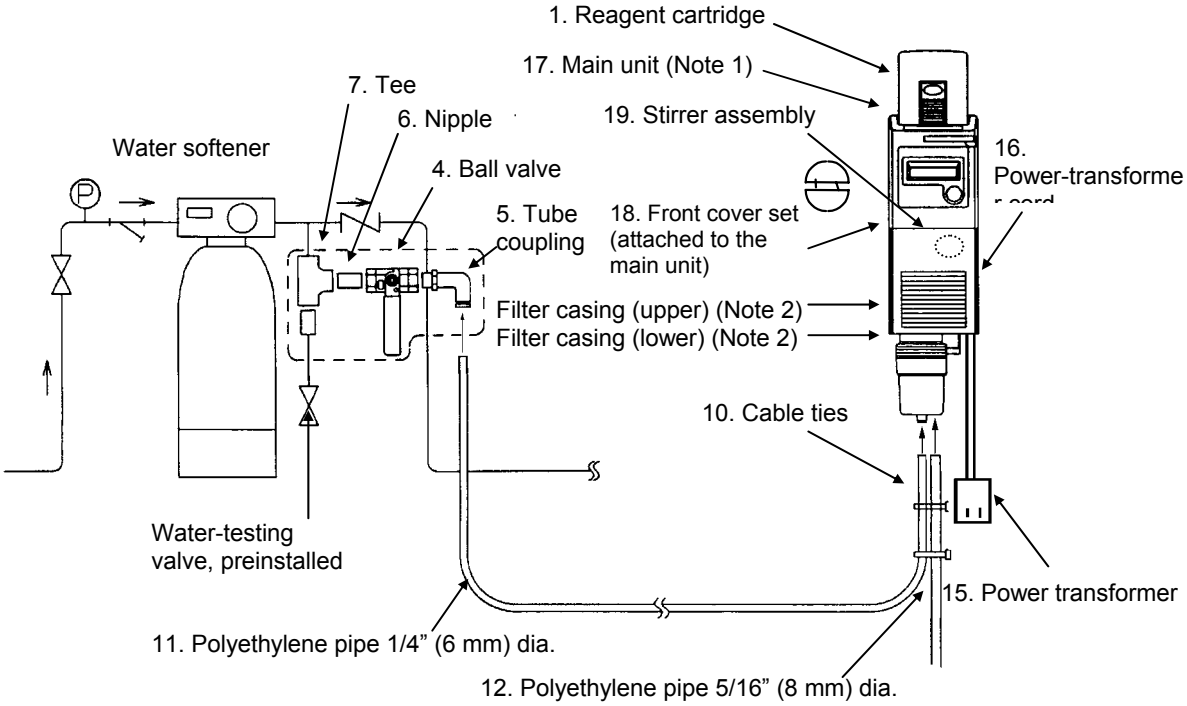
- If a part or accessory is missing from the shipped package, contact your dealer.

⚠ CAUTION

The customer would be required to procure the appropriate fasteners for installation of the Colormetry unit if the supplied mounting brackets are not suitable for the location.
The customer may also need additional plumbing parts, depending on the location.

[1]	Reagent cartridge	1 ea.
[2]	Filter-casing assembly	1 ea.
[3]	Fiber filter set	1 ea.
[4]	Ball valve, 1/4"B (8A)	1 ea.
[5]	Tube coupling 1/4” (6 mm) dia. - PT 1/4	1 ea.
[6]	Nipple 1/4”B (8A)	2 ea.
[7]	Tee 1/4”B (8A)	1ea.
[8]	Mounting bracket	1 ea.
[9]	Screw	2 ea.
[10]	Cable ties	2 ea.
[11]	Polyethylene pipe, 1/4” (6 mm) dia.	16.4 ft. (5 m)
[12]	Polyethylene pipe, 5/16” (8 mm) dia.	9.8 ft (3 m)
[13]	User’s Manual	1 copy
[14]	Operator’s instruction plate	1 ea.
[15]	Power-transformer	1 ea.
[16]	Power transformer cord	1 ea.
[17]	Main unit	1 set
[18]	Front cover set	1 ea. (attached to the main unit)
[19]	Spare stirrer assembly	1 ea. (glued to the back of the front cover)

Locations for connecting accessories



Note 1: There are no parts in the main unit that are replaceable by the customer. In case of failure, contact the manufacturer.

Note 2: The filter casing (upper), filter casing (lower) and tube couplings (installed at the bottom of the filter casing) are not available as single pieces, and must be ordered as item no. 3, filter-casing assembly.

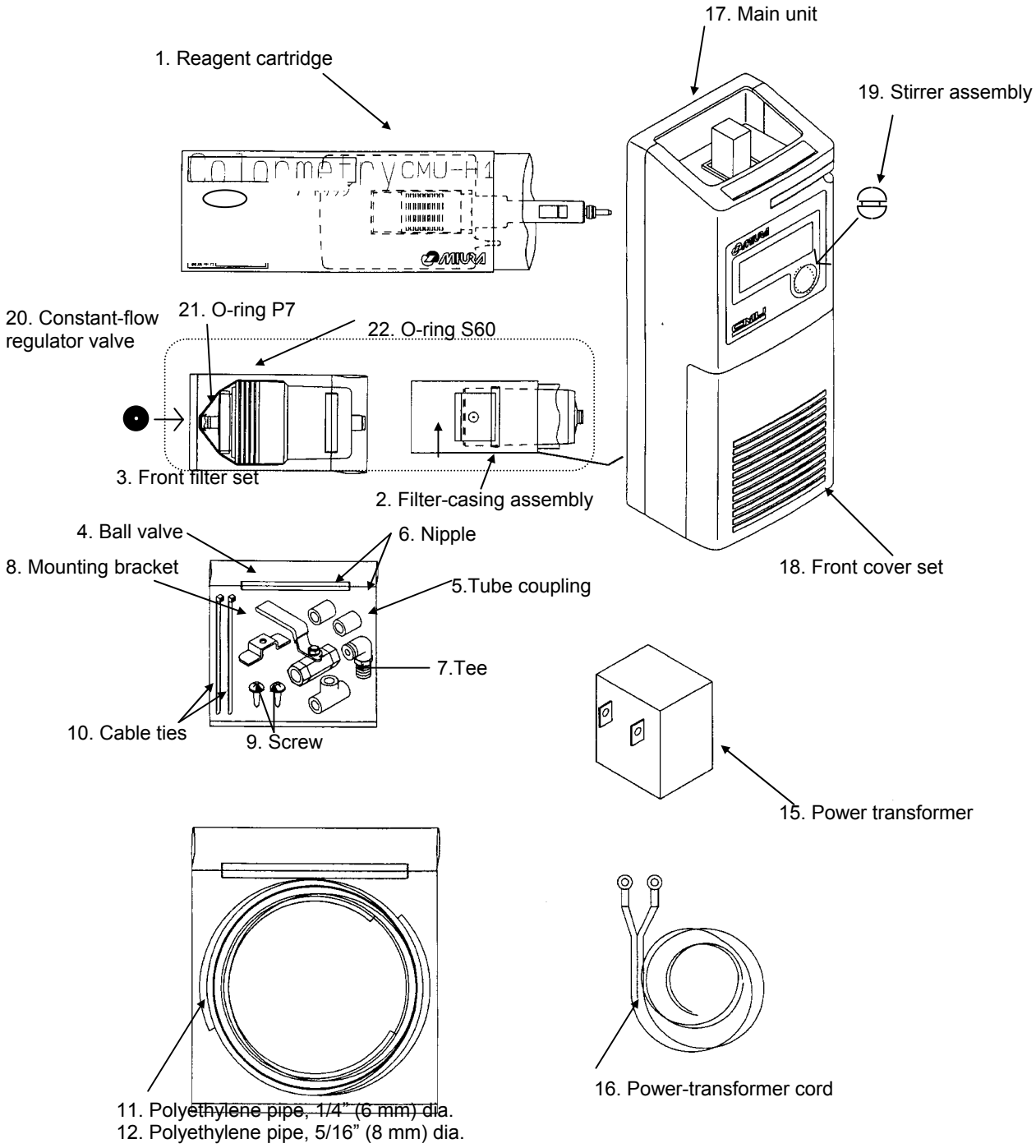
2-2 Information for ordering accessories

- To order, call or fax MIURA authorized representative.
- Please fill out the following form and enter the necessary quantity in the following list for ordering via facsimile.

COMPANY NAME			
ADDRESS	Billing:	Shipping: Attn:	
PHONE NO.		FAX NO.	
AUTORIZED BY	PRINT (NAME)	DATE	
	SIGNATURE	PO #	

Article No.	Specifications	Quantity	Remarks
1	Reagent cartridge CMU-H2		
2	Filter casing assy CMU-110		
3	Fiber filter set CHU-110		Note 1
4	Ball valve ZS-400		Note 2
5	Tube coupling EL6-PT1/4		
6	Nipple 1/4B (8A)		
7	Tee 1/4B (8A)		
8	Mounting bracket CMU-110		
9	Screw		
10	Cable tie T18R		
11	Polyethylene pipe ∅1/4" (∅6 mm)		Inlet 16.4 ft. (5 m)
12	Polyethylene pipe ∅5/16" (∅8 mm)		Outlet (Note 3)
13	User's manual		
14	Operator's instruction plate CMU-124H		
15	Power transformer		
16	Power transformer cord		
17	Colormetry main unit CMU-124H		Note 4
18	Front cover set CMU-110		Note 5
19	Stirrer assembly CMU-110		
20	Constant-flow regulator valve CMU-110		
21	O-ring P7		
22	O-ring S60		

Note 1: The fiber filter set includes a fiber filter and constant-flow regulator valve.
Note 2: Item nos. 4 through 10 are provided as a set.
Note 3: Item nos. 11 and 12 are provided as a set.
Note 4: The main unit does not include the filter-casing assembly, reagent cartridge, etc.
Note 5: The front cover set includes the front cover and stirrer assembly.


17. Main unit
1. Reagent cartridge
19. Stirrer assembly
20. Constant-flow regulator valve
21. O-ring P7
22. O-ring S60
3. Front filter set
2. Filter-casing assembly
18. Front cover set
4. Ball valve
6. Nipple
8. Mounting bracket
5.Tube coupling
7.Tee
10. Cable ties
9. Screw
15. Power transformer
11. Polyethylene pipe, 1/4" (6 mm) dia.
12. Polyethylene pipe, 5/16" (8 mm) dia.
16. Power-transformer cord

Chapter 3 Specifications

Gives specifications and depicts an overview and external view of the Colormetry system.

3-1 Specifications

3-1-1 General specifications

Power-supply voltage:	AC 24 V, 50/60 Hz, single-phase
Power consumption:	20 W (during monitoring)
Power-supply fluctuation:	±15%
Ambient operating temperature:	41°F ~ 122°F (5°C ~ 50°C)
Ambient storage temperature:	14°F ~ 122°F (-10°C ~ 50°C) (must be without dew condensation in the main unit)
Raw water temperature:	41°F ~ 104°F (5°C ~ 40°C)
Humidity:	20% min.-- 90% max. RH without ice or dew condensation
Raw water pressure:	7.1 ~ 71 psi (0.05 ~ 0.5 MPa), (0.5 ~ 5 kg/cm^2)

3-1-2 Physical data

Installation method:	Indoor, wall mounted
External dimensions:	5” (W) X 4” (L) X 20-1/4” (H) (125 mm (W) X 100 mm (L) X 515 mm (H))
Mass:	4.6 lb (2.1 kg)

3-1-3 Monitoring capabilities

Evaluation method:	Via the colorimetric method
Evaluation ranges:	Hardness displayable in 5 ranges: In mg/L - < 1, < 2, < 3, < 5, 5 and over
Alarm ranges:	1 mg/L and up, 2 mg/L and up , 3 mg/L and up, 5 mg/L and up (Select one) **DO NOT SET ABOVE 1 mg/L for boiler water**.
Reagent cartridge replacement cycle:	Approximately every 4 months * Based on hourly monitoring, 24 hours a day
Alarm output:	Sounding of a buzzer and SPDT contact Contact capacity: AC 24 V (use the supplied transformer to step down from the AC 110 V to 24 V and supply 24 V to the main unit), 1 A, dry contact
Signal output during monitoring:	Open-collector output (capacity: DC 24 V, 70 mA)
Remote signal input:	AC 24 V with voltage, “NO” or “NC” contact input

3-1-4 Water-feed and drainage

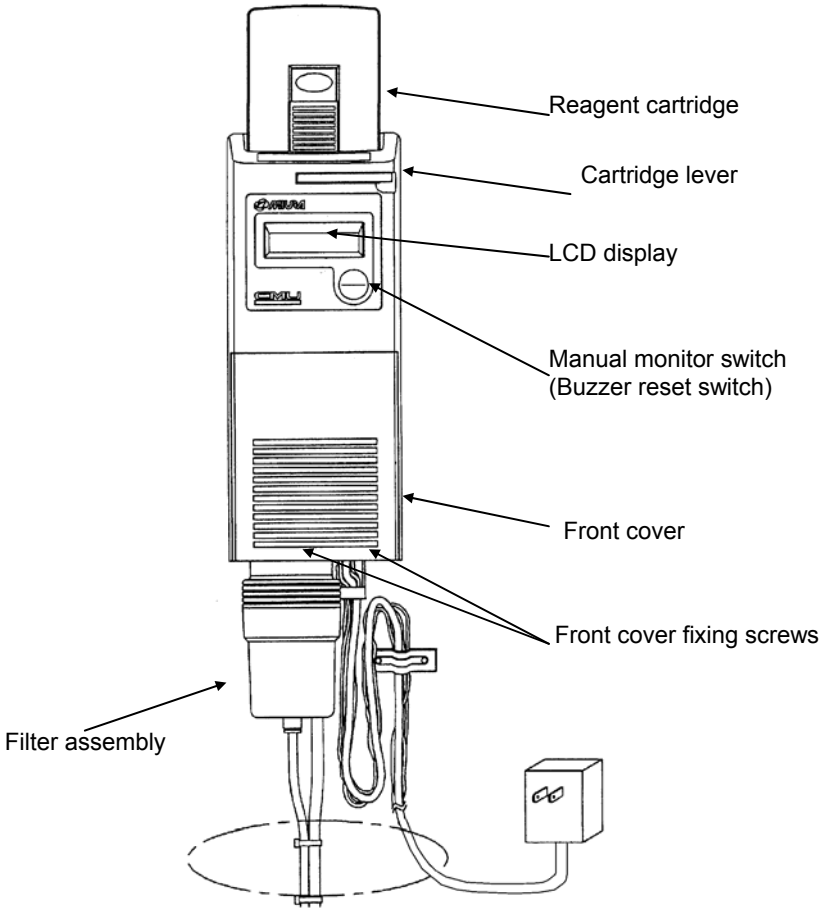
Fiber filter:	Cartridge type (standard accessory) Material: Polyethylene
Constant-flow regulator valve:	Material: EPDM
Feed-water connection diameter:	For connecting 1/4” (6 mm) external dia. pipe (supplied)
Drain-water connection diameter:	For connecting 5/16” (8 mm) external dia. pipe (supplied)

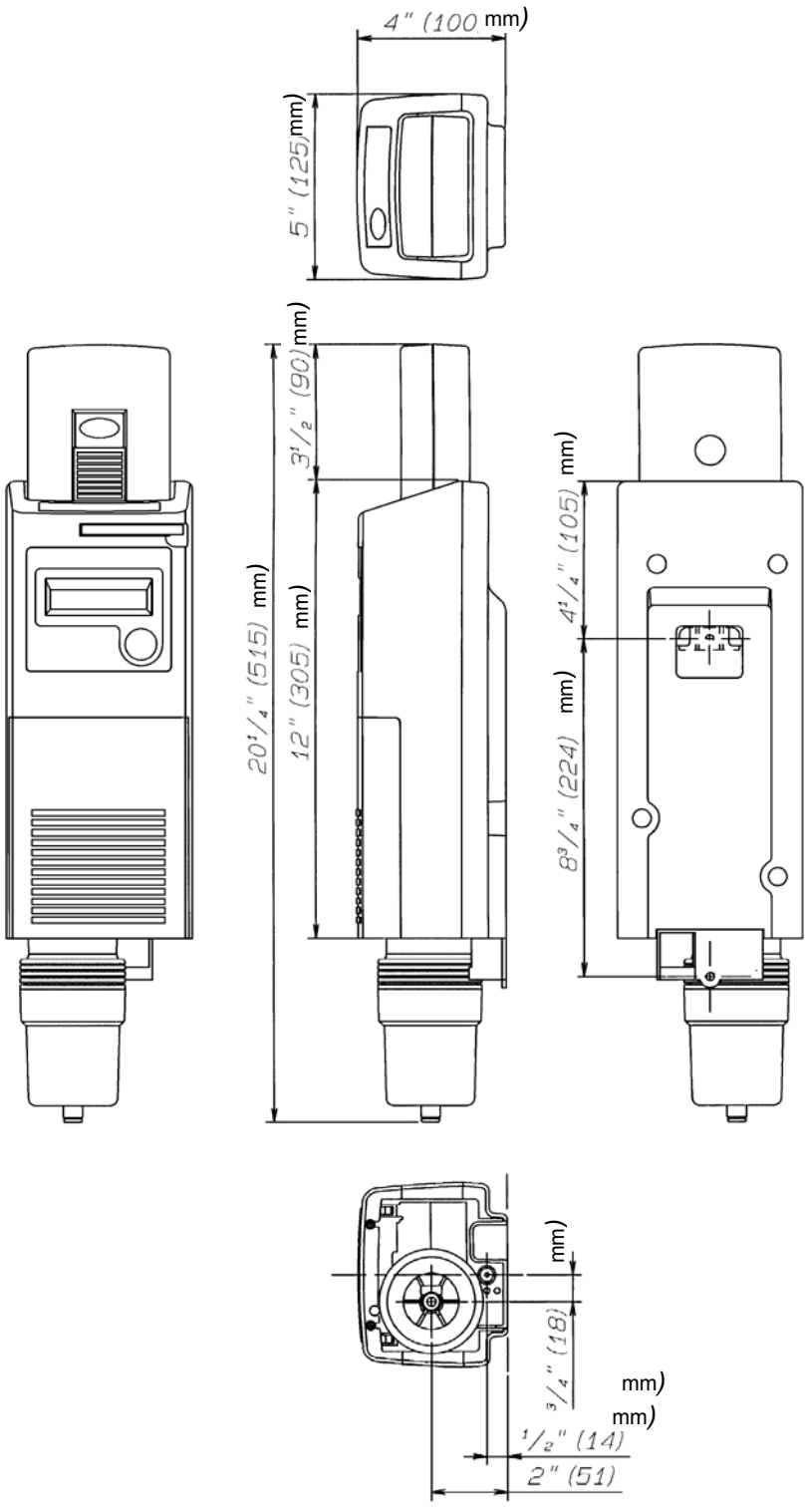
3-1-5 Accessories (refer to Chapter 2, “Before you start,” for further details.)

- Reagent cartridge
- Feed-water pipe, 1/4” (6 mm) dia., 16.4 ft. (5 m) long
- Drain-water pipe, 5/16 (8 mm) dia., 9.8 ft (3 m) long
- Filter casing and fiber filter (cartridge type)
- Ball valve and other plumbing parts
- Installation parts for wall-mounting bracket and other miscellaneous parts
- Operator’s instruction plate

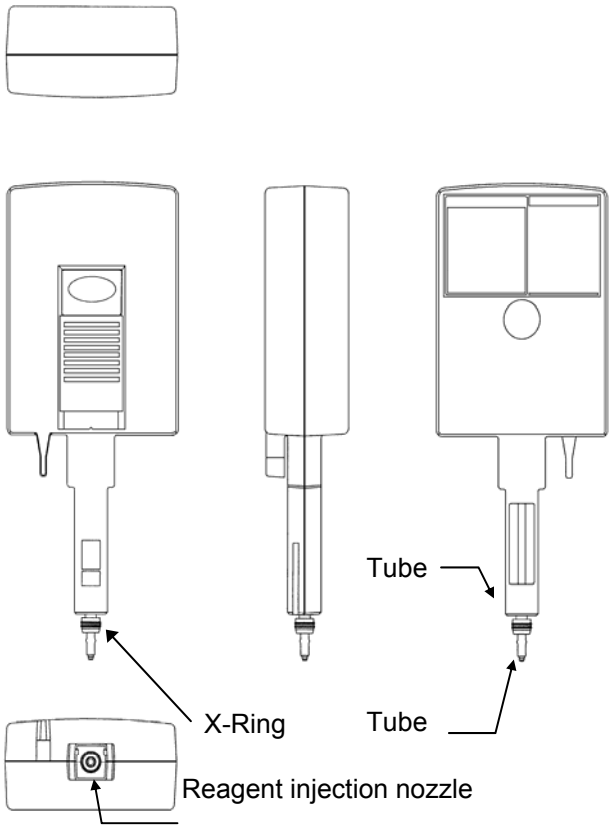
3-2 Overview

3-2-1 Colormetry system configuration

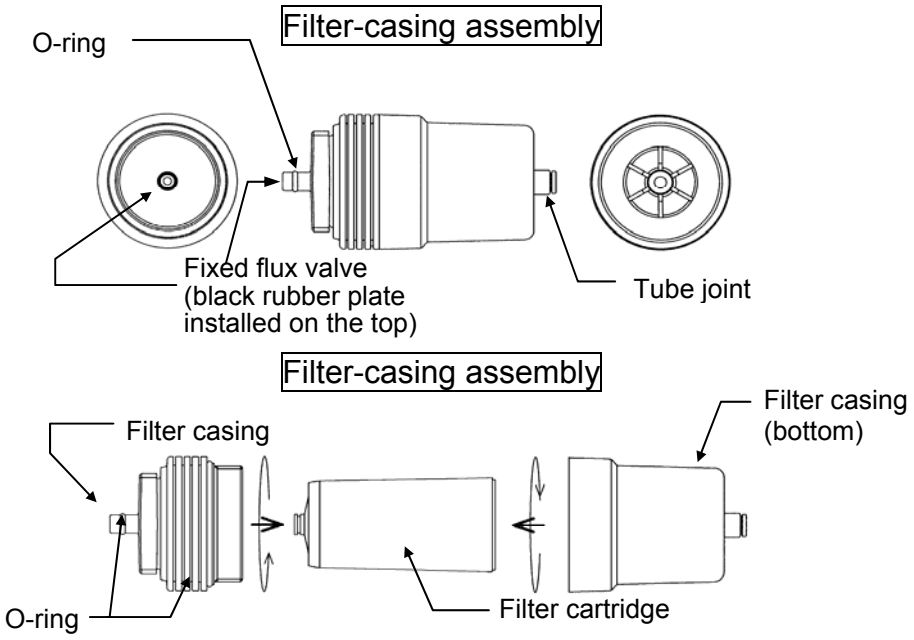



4" (100 mm)
5" (125 mm)
3 1/2" (90 mm)
20 1/4" (515 mm)
12" (305 mm)
4 1/4" (105 mm)
8 3/4" (224 mm)
3/4" (18 mm)
1/2" (14 mm)
2" (51 mm)

3-2-2 External appearance of reagent cartridge



External view of filter casing



Chapter 4 Description

Summarizes the Colormetry system and explains the monitoring methods, functions, remote signal applications and evaluation method. It answers the question “What is the Colormetry system?”

4-1 Outline

4-1-1 Summary of Colormetry system

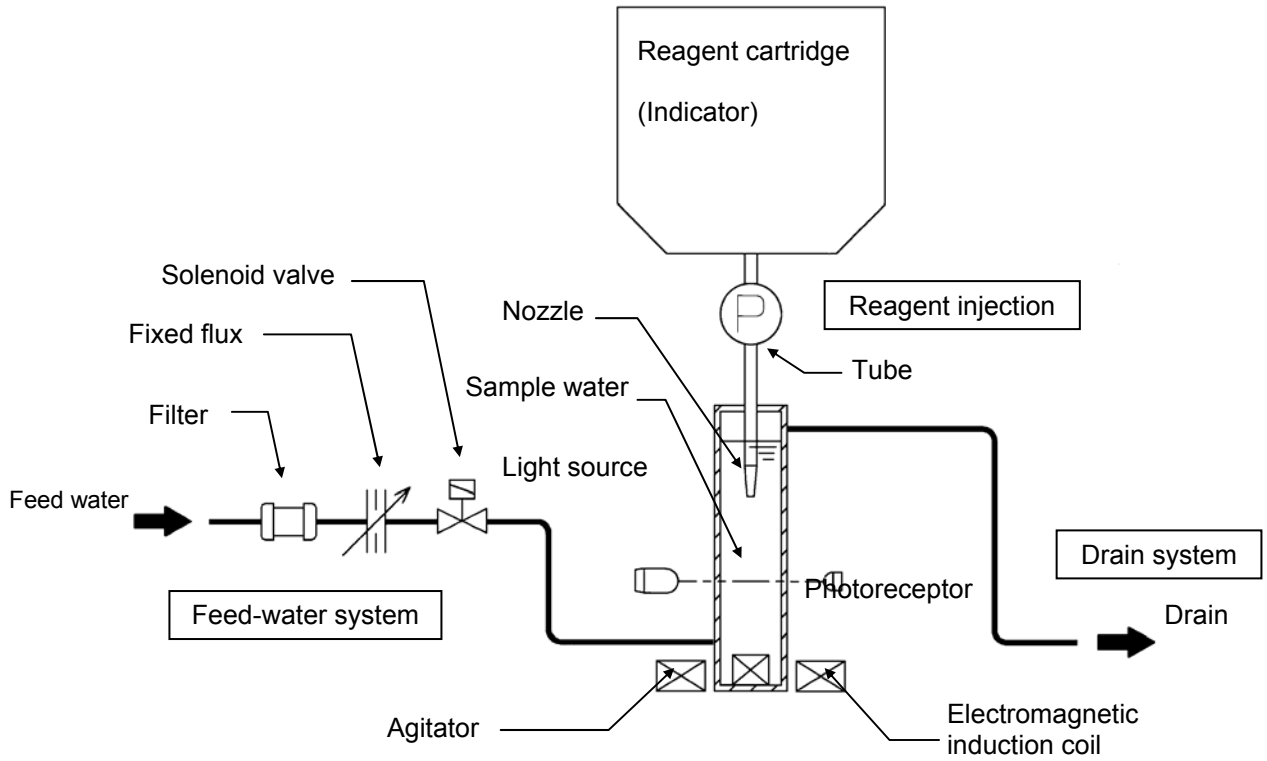
The Colormetry system monitors the concentration of calcium ions and other particles in water through the use of colormetry.
In a colormetry process the ionic calcium and other concentration in water is monitored by allowing a reagent to react against the target ions and others, and monitoring the transmissivity of the resultant coloration for light by a specific wavelength. An example procedure is to check for hardness leakage via the coloration of a hardness indicator. The Colormetry system electronically automates the entire process.
Basically, the system has been developed as part of a processing system for boiler water.
Colormetry automatically and regularly implements the process of sampling water, injecting the reagent, stirring and evaluating the result, thereby obviating the conventional manual procedure.
The system allows the detection of low-level ionic concentrations, reducing maintenance to a minimum. The system has been designed with emphasis on reliability of monitoring results. The manually selectable conditions--for instance, verifying monitor upon the detection of hardness leakage--prevent temporary fluctuations from triggering alarms.
Other features include the external alarm output, DDI-compatible, self-diagnostic function, and message display, as well as the suspension (by remote signal input) of monitoring while the water softener is regenerating or the water feed is stopped.

Refer to 4-2, “Features” on page 22.

4-1-2 Colormetry layout

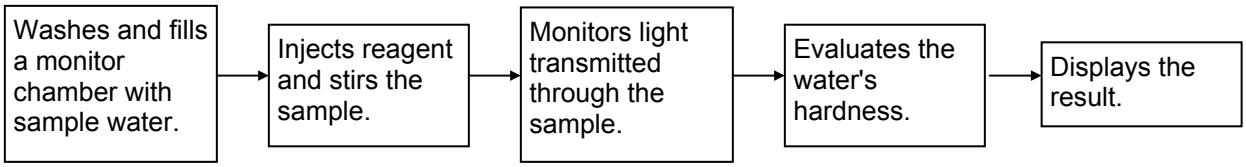
Colormetry consists of the reagent cartridge (the indicator), reagent injector mechanism, monitoring system and water-feed and drainage systems.

Colormetry layout



4-1-3 Operating principles of Colormetry

The Colormetry system operates as follows:



[1] Washing and filling the monitor container with sample water
A solenoid valve opens, filling the monitor container with sample water. The old sample water remaining in the container is pushed out, and the container is washed at the same time.

[2] Injecting reagent and stirring sample water
The solenoid valve closes, and the injection pump injects the reagent into the sample water. The stirrer coil, activated at the same time, mixes the water and reagent.
The reagent causes coloration of the sample water in accordance with the hardness components of the water.

[3] Monitoring the sample water
A light source is activated to project light into the sample water. The light receptor electronically monitors the light transmitted through the sample water. The intensity of the transmitted light varies, depending on the color of the sample water. These variations are caused by light absorption in the water, which varies with the color of the water.

[4] Evaluating the concentration and displaying the result
The concentration is evaluated from the monitoring value, and the results are indicated on the LCD display.

4-2 Features

The Colormetry system has the following features:

[1] Monitors hardness leakage automatically

- The monitoring process is fully automated, saving a significant amount of work by eliminating the need for complicated manual procedures.

[2] Requires no periodic calibration

- The system needs no cumbersome periodic calibrations.

[3] Includes a built-in timer
(Refer to the setting instructions in Section 6-3, “About items to be set in Setting mode,” on page 60.)

- Monitoring period may be set as desired (e.g., daily between 9 a.m. and 5 p.m.).
- Interval for each monitoring may set as desired.
  (The interval is selectable in 30-minute increments between 30 and 180 minutes.)

[4] Detects low hardness leakage
(Refer to Section 4-5, “Evaluation method,” on page 31 for details.)

- The evaluation ranges are 0 – 1 mg/L, 1 – 2 mg/L and over 2 mg/L.

[5] Evaluates hardness leakage with higher accuracy
(Refer to Section 4-5, “Evaluation method,” on page 31 for details.)

- The alarm set point may be set to activate either on “1 mg/L and over” or “2 mg/L and over.”
- When an abnormal condition is detected, monitoring is repeated a number of times (called abnormal-condition retries; selectable between one and three times) to prevent a temporary fluctuation from triggering an alarm. In addition, such an abnormality must be repeated in a series of monitoring at a preset interval for a number of times (called response (alarm) cycle; also selectable between one and three times). When all of these monitoring results indicate an abnormal condition, it is evaluated that hardness leakage exists and the alarm is set-off.

[6] Indicates data on the display screen
(Refer to Chapter 7, “Digital display description,” on page 65 for details.)

- The display indicates the abnormality, as evaluated, and the causes of major system problems.

[7] Offers a self-diagnostic function
(Refer to Section 4-5-2, “How the system operates in evaluating an abnormal condition,” on page 32 for details.)

- When it is evaluated that there is a leakage of hardness, the buzzer sounds. SPDT contact may also be used to send an alarm remotely.
- If a problem occurs in the system, a typical cause will be displayed in the same manner as the hardness leakage.

[8] Stores historical records of hardness leakage
(Refer to Section 9-3, “Verifying error records,” on page 93.)

- The system stores the records of occurrence date and time, duration, and recovery date and time for each of the three latest incidents of hardness leakage. These records may be utilized to analyze the causes of hardness leakage.

[9] Requires minimal maintenance
(For details, refer to Chapter 8, “Maintenance,” on page 69.)

- The reagent cartridge may be replaced using a one-touch action. The reagent needs no replacement for approximately four months in typical applications.
  (Note that more frequent replacement may be necessary, depending on the application.)

[10] Compact in design, easy to install
(For details, refer to Section 5-2, “How to install the main unit,” on page 39.)

- The main unit is installed easily on a wall.
- Installation is a simple process.
- It is the most compact design ever for a system of this type.

[11] About advanced features
Colormetry offers the following features:

- Remote signal input function (refer to Section 4-3, “Method and examples of utilizing remote signals,“ on page 24.)
  Connecting the remote regeneration signal from water softener prevents a false detection that can occur, for instance, while the water softener is regenerating, thus providing more accurate evaluation.

- External-alarm master contact output
  The alarm’s contact output may be used to transmit a hardness-leakage alarm to a remote location.

- In-monitoring output (DDI compatible)
  A system output is available for monitoring.

(Refer to Section 5-4, "How to wire the system,” on page 45 for functional input.)

4-3 Method and examples of utilizing remote signals

(For specific signal input methods, refer to Section 5-4-3, “Remote signal input,” on page 48.)

4-3-1 About remote signals

Monitoring while the water softener is regenerating may erroneously indicate hardness leakage. An attempt to monitor with the water feed stopped would return either hardness leakage in stagnant water in the plumbing or a system error due to a lack of flow.
Conventional hardness leakage alarm system suffered from such detection errors and required the resulting false alarm to be manually reset. The Colormetry system provides the following two methods, which may be used simultaneously, to avoid false alarms:

<Method No.1: Utilizing the timer function>

Monitor Start time [SStart] and Monitor stop time [SStop] settings limit the period during which monitoring is performed. The provision helps avoid the regeneration time and off-hours of the water softener.
Example

Given the water softener settings of
Regenerating time: 11:00 p.m.
Boiler operating period: 8:00 a.m. through 5:00 p.m.
↓
Set Monitor Start time [SStart] at 8:00 a.m., and stopping time at 5:00 p.m.
(No monitoring by the Colormetry system at 11:00 p.m.)

<Method No. 2: Utilizing the remote signal feature>

Connecting the external contact with voltage may **allow Colormetry monitoring only while the water softener is turned on, or to suspend monitoring while the water softener is regenerating**. (If no voltage is available through an external contact closure, the Colormetry power supply may be utilized.)

The purpose of remote signals: To prevent a false detection while the water softener is regenerating or the feed water is stopped.

4-3-2 Detailed descriptions of remote signals

The remote signal input may be activated to enable monitoring in either of two methods - (1) the “off” state, or (2) the “on” state. The two processing methods are selectable in the Setting mode [Set Mode]. Both methods achieve the same objective (of preventing false detections), though they process the signal differently.

[1] Monitoring is enabled by remote signal being turned “Off” [SRte Sgl Off] (the factory setting)

☆ The off state of the remote signal input; (the external contact is open, giving no voltage input) This permits scheduled monitoring at Monitor intervals [SIntvl] as preset in Setting mode [Set Mode].

☆ Monitor interval [SIntvl] may be set in 30-minute increments up to 180 minutes. (Refer to Section 6-3, “About items to be set in Setting mode,” on page 60.)

Example: Inputting a remote regeneration signal from water softer.

Connecting a water-softener contact, if available, to the Colormetry system as a remote signal input, which turns on (closes) during regeneration, will disable scheduled monitoring. When the softener contact turns off (opens) at the completion of regeneration (that is, the remote signal is off), scheduled monitoring is again enabled.

[2] Monitoring is enabled by Remote-Signal “On” [SRte Sgl On]

The on state of the remote signal input (the external contact closes, inputting a voltage to the Colormetry system) will enable monitoring at Monitor interval [SIntvl].

Example No. [2]-1: Inputting the feed water (to a water softener, etc.) signal

Connecting a contact, if available is being turned a water softener or the like, which turns on (closes) while feeding water, to the Colormetry system as a remote signal input, will enable monitoring only while feeding water. When the feed water stops or the softener regenerates, and the contact turns off (opens), no scheduled monitoring is performed.

Example No. [2]-2: Inputting a control signal of motor valve or solenoid valve

An input signal from a motor valve or solenoid valve that controls the feed water will enable monitoring only while the valve is open and signal is in the “on” state (contact is closed).

Example No. [2]-3: Inputting a supply tank water-level control signal

When a “Requesting feed water” signal is input from the equipment that controls the water level of a supply tank, monitoring is performed only for the duration of the request (that is, while feeding water).

NOTE

It is recommended to connect a remote signal wherever possible to prevent false detections and avoid recovery operations.
The signal for adding water, if available, should be connected as the first priority.
If only remote regeneration signal from water softer is connected, a false detection of hardness leakage may result from monitoring the stagnant water while the water is stopped, or a system error may occur due to the lack of flow. A remote signal-input arrangement, as shown in examples [2]-1 and [2]-2, is recommended.

⚠ CAUTION

If no remote signal is connected, be sure to set ("the monitoring is enabled by remote signal being turned off") [SRte Sgl Off] mode (which is the factory setting).

4-3-3 About the remote signal delayed time

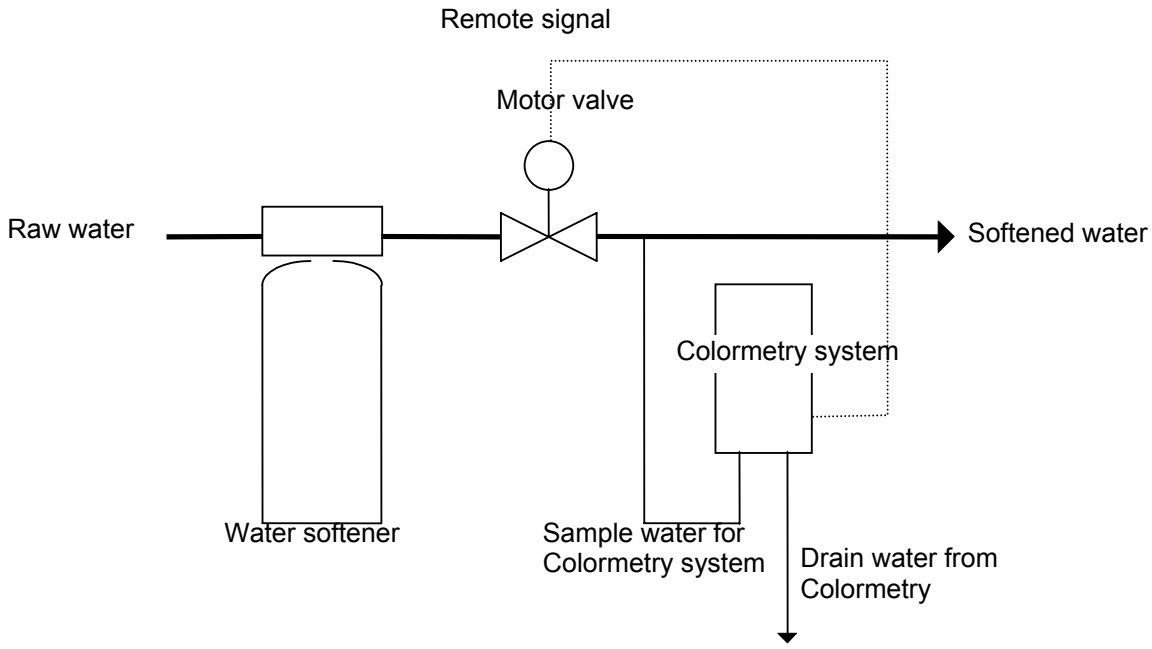
The purpose of Remote-signal delay time [SRte Sgl dl]:

This setting determines the number of seconds the monitoring is to be delayed following the remote signal input.

The delay function is not normally required except for preventing false evaluation, especially in the example shown below.

Example of delay:

It is recommended that the Colormetry sample be taken from as close to the water softener outlet as practical. (Refer to Chapter 5, “Installation,” on page 37 for details.) In the case, however, where a sample is taken, as illustrated, off the secondary of a motor valve or the like, requiring a certain amount of time to open fully, a wash-flow error [Wash Flow F] may occur due to insufficient sample-water pressure when the remote signal is first connected.
(For details on setting the delay, refer to Section 6-3, “About items to be set in Setting mode,” on page 60.)



To prevent such a problem, select Remote signal delay time [SRte Sgl d1] setting and ensure the required pressure (7.1 ~ 71 psi) at the Colormetry inlet (0 ~ 30 seconds).

4-4 About Colormetry monitor timing

4-4-1 Automatic monitoring

The basic interval at which the Colormetry system monitors is set in Monitor interval [SLntvl] setting (settable in 30-minute increments over the 0 ~ 180 min. range; refer to Section 6-3, “About items to be set in Setting mode,” on page 60).
Monitor Start time, which occurs at Monitor interval [SIntvl], will be referenced to the occurrence of one of the events listed below. The actual monitor time occurs only after the time set in Setting mode [Set Mode] elapses following the reference event.

a. When the power is first turned on.
b. Upon resetting.
c. When the Monitor interval [SIntvl] setting is changed to a smaller value (a shorter interval) than the current value.

[1] If no remote signal is connected

Monitoring is performed at Monitor interval [SIntvl].

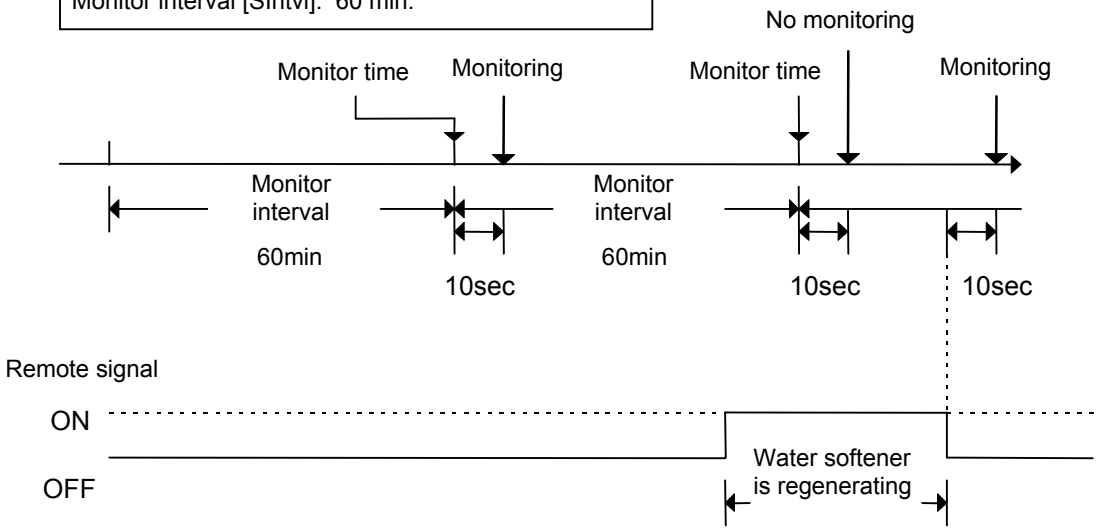
[2] If a remote signal is connected

a. *If the remote signal setting is for (Monitoring is enabled by remote signal being turned “off”) [SRte Sgl Off]:*

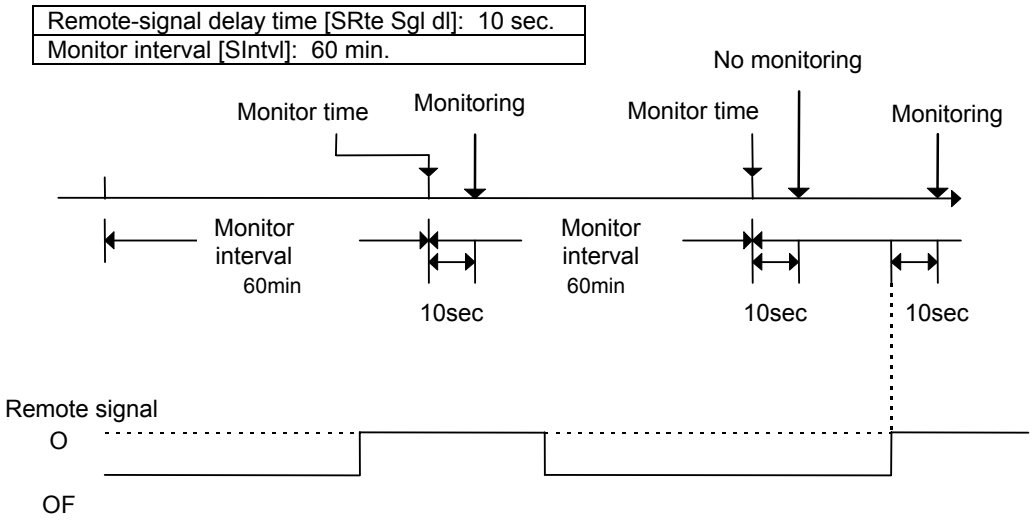
(Example of remote signal – Remote regeneration signal from water softener)

- If the remote signal has been off continuously and for longer than specified in the Remote-signal delay time [SRte Sgl dl] setting at the monitor time following Monitor interval [SIntvl], actual monitoring will start.
- If, on the other hand, the remote signal has been on at a monitor time after Monitor interval [SIntvl] lapses, the system will enter monitor standby mode until the remote signal goes off. After the remote signal goes off, actual monitoring will start when the remote signal has remained off as long as set in the Remote-signal delay time [SRte Sgl dl] setting.

Remote-signal delay time [SRte Sgl dl]: 10 sec.
Monitor interval [SIntvl]: 60 min.



b. *If the remote signal setting is for (Monitoring is enabled by remote signal being turned "on") [SRte Sgl On]:*
(Example of remote signal – Remote regeneration signal from water softener)
- If the remote signal has been on continuously and for <u>longer</u> than specified in the Remote signal delay time [SRte Sgl dl] setting at a monitor time following Monitor interval [SIntvl], actual monitoring will start.
- If the remote signal is "off" at a monitor time following Monitor interval [SIntvl], the system enters Monitor standby mode until the remote signal turns "on". After the remote signal switches "on", actual monitoring will start when the remote signal has remained "on" as long as set in Remote signal delay time [SRte Sgl dl] setting.



For details on remote signals and remote signal delay time, refer to Section 4-3, "Method and examples of utilizing remote signals," on page 24.

Precautions on operation

Where a remote signal is connected and, if the remote signal is turned to disable monitoring after the solenoid valve in the Colormetry system turns to closed state from the open state (from water discharging from the drain tube to the stopping of drainage), the monitoring results will remain valid. The monitoring results before the solenoid valve enters the closed state (stopping water discharge from the drain tube) will be processed as follows:
(If the remote signal turns to disabled monitoring, the monitoring process will still be carried out to completion.)

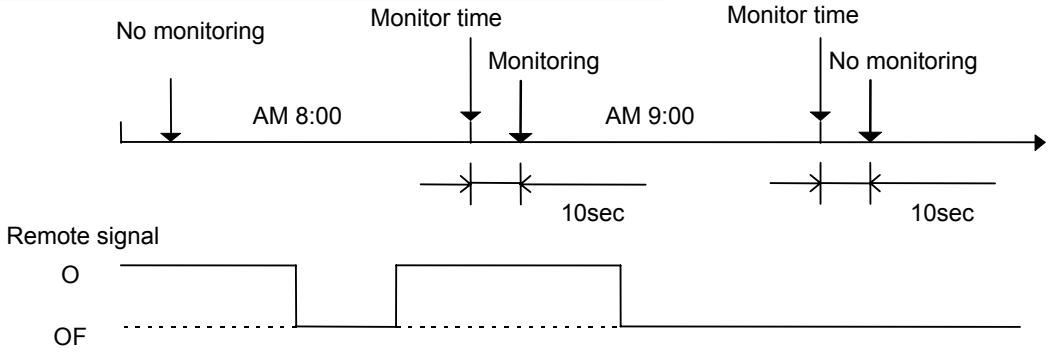
a. If the concentration is evaluated as being lower than the Alarm set point (setting):
The result will be displayed as usual.
b. <u>If the concentration is evaluated as being higher than the Alarm set point (setting):
The evaluation is invalidated and a blank bar ("Result: -----") is displayed.</u>

[3] If the Monitor Start time [SStart] and Stop time [SStop] are set up (when the timer function is used)

a. If it becomes the Monitor time after the Monitor interval [SIntvl] has elapsed, but it is not Monitor Start time yet, the system will enter Monitor standby mode until Monitor Start time, at which point monitoring will be performed.
b. If no remote signal is connected, monitoring will be performed at Monitor interval [SIntvl] only during the period between Monitor Start time [SStart] and Stop time [SStop].
c. If a remote signal is connected, monitoring will be performed in the same manner as in paragraph 2 above, “If a remote signal is connected,” only during the period between Monitor Start time [SStart] and Stop time [SStop].

Example:

Monitor start time [SStart]	AM 8:00
Monitor stop time [SStop]	PM 6:00
Monitor interval [SIntvl]	60 min.
Monitoring is enabled by remote signal being turned on	[SRte Sgl ON]
Remote signal delay time [SRte Sgl dl]	10 sec



d. If it becomes “Monitor stop time” [SStop] during the monitoring process, the system will enter “Monitor standby” mode upon the completion of that monitoring.

⚠ CAUTION

If the remote signal setting is for “Monitoring is enabled by remote signal being turned on" [SRte Sgl On], periodically check to verify that automatic monitoring is performed.
If no remote signal is available due to a signal problem, the monitoring process will never be initiated.

4-4-2 Manual monitoring

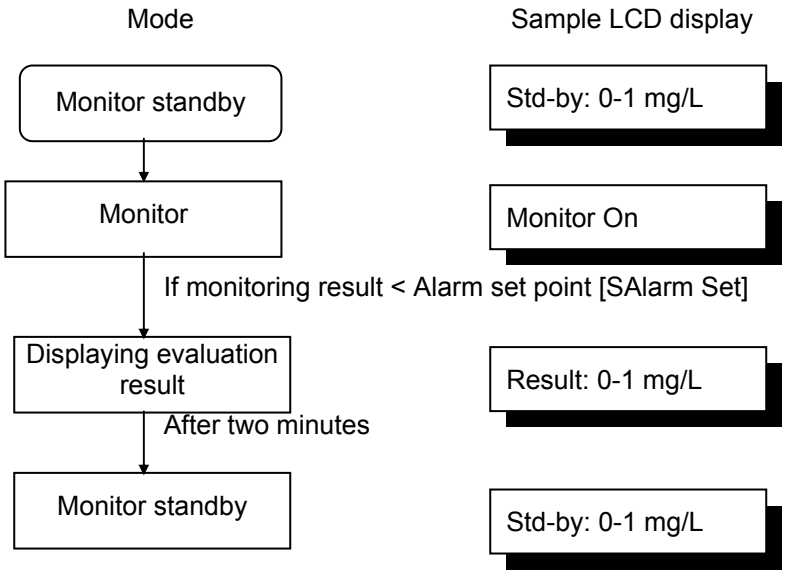
Press the “Manual Monitor” switch to monitor regardless of the Monitor interval, Remote signal, Monitor start or stop time settings.
(The monitoring process will not be initiated, if the reagent cartridge is expanded. The system may initiate the status-verification test for a system error.)

4-5 Evaluation method

The system evaluates ionic concentrations to three levels: 0 – 1 mg/L, 1 – 2 mg/L, and over 2 mg/L.
Alarm set point may be set to trigger either at 1 mg/L and up, or 2 mg/L and up.
The evaluation method is the same for the automatic and manual monitor settings.

4-5-1 How a normal evaluation is processed

If a monitoring result is below the Alarm set point [SAlarm Set], as set in Setting mode [Set Mode], it will be evaluated as normal. The result of such evaluation will be displayed and monitoring is complete. The system enters Monitor standby mode in two minutes after completion of monitoring.



Name of mode	Display indication (example)	Alarm*	Bz*	Remarks
Displaying evaluation result	Result: 0-1 mg/L	OFF	OFF	To be displayed for two minutes following monitoring (Note 1)
Monitor standby	Std-by: 0-1 mg/L	OFF	OFF	To be displayed two minutes after monitoring (Note 1)

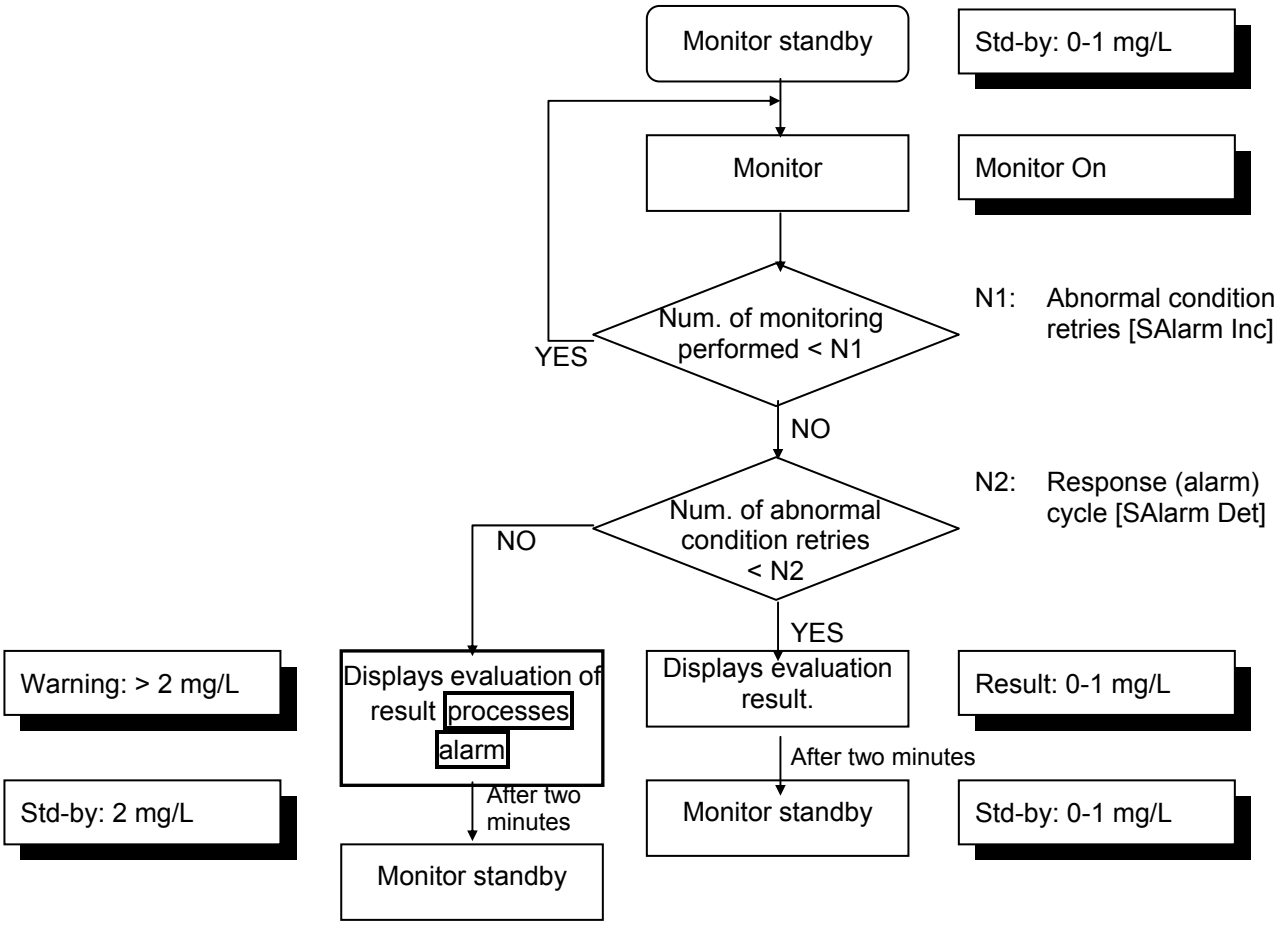
* Alarm: External-alarm master-contact output Bz: Buzzer output

Note 1: The sample display, shown in the table, represents an evaluation within the 0 – 1 mg/L range. If the alarm set point is set at 2 mg/L and it is evaluated to be in the 1 – 2 mg/L range, the LCD display will read [******** 1-2mg/L].

4-5-2 How the system operates in evaluating an abnormal condition

[1] If an evaluation result exceeds alarm set point [SAlarm Set] (the "1 mg/L and up," or "2 mg/L and up" setting), monitoring is repeated the number of times as set (between one and three times) in Abnormal-condition retries [SAlarm Inc] setting. If all retry results have exceeded alarm set point [SAlarm Set], only then will the monitor result will be determined as abnormal.
If, on the other hand, all retry results are lower than alarm set point [SAlarm Set] setting, the condition will be determined to be normal and monitoring will be terminated.

[2] However, an abnormal evaluation made in step (1) alone would not trigger an abnormal-condition alarm (that is, to sound buzzer and close the slave-remote output contact).
An abnormal-condition alarm is given only on the occurrence of an abnormal condition repeated for Response (alarm) cycle [SAlarm Det] (selectable between one and three times) in automatic monitoring at Monitor interval [SIntvl] (selectable between 30 and 180 minutes in 30-minute intervals) or in manually initiated monitoring.

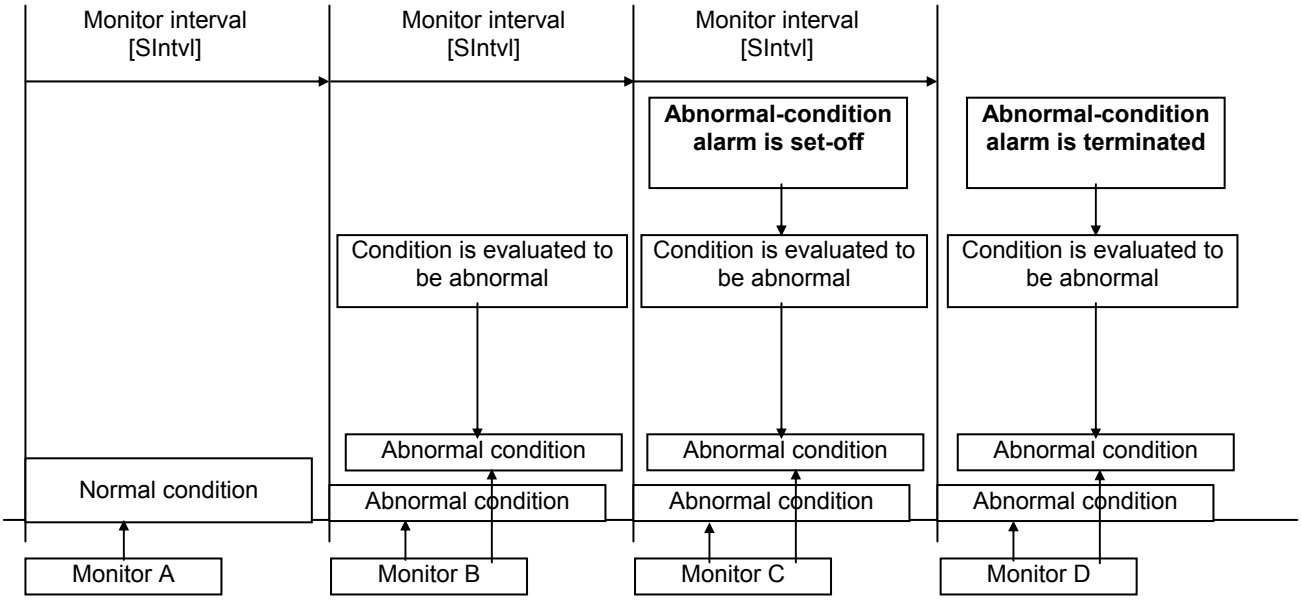


[3] If an abnormal condition occurs repeatedly in a series of automatic monitoring at Monitor interval [SIntvl], or in manually initiated monitoring, the abnormal-condition alarm will stay on continuously.

[4] An abnormal-condition alarm is automatically terminated (the buzzer stops and the slave alarm's output-contact opens) when the condition is determined to be normal in automatic monitoring at Monitor interval [SIntvl], or in manually initiated monitoring.

Example of Monitor no. 1:

Abnormal-condition retry [SAlarm Inc] setting: 2
Response cycle [SAlarm Det] setting: 2



Monitor A: The result is below the alarm set point (setting), and therefore the condition is deemed to be normal.

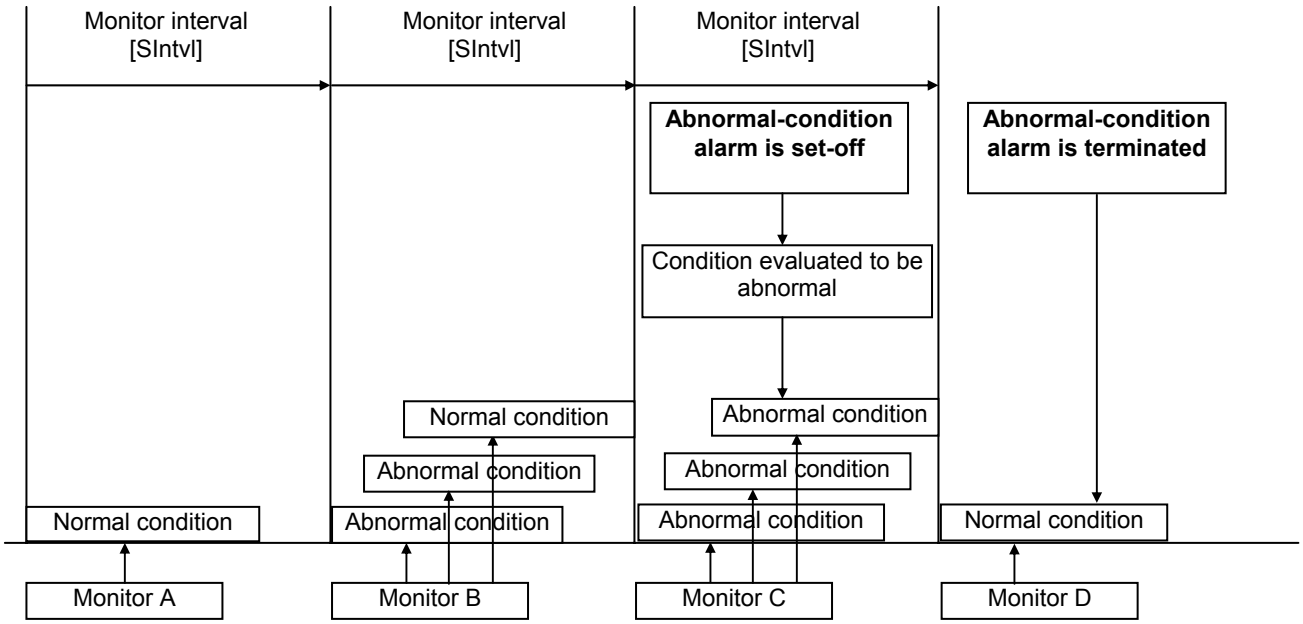
Monitor B: The result has exceeded the alarm set point. Since the abnormal condition retry setting is for two times, another monitoring is performed, which again exceeded the alarm set point. The condition in monitor B is therefore evaluated to be abnormal.

Monitor C: As was the case with monitor B, the first two results have exceeded the alarm set point. The result of monitor C, therefore, is also evaluated to be abnormal.
An abnormal condition has been verified twice -- in monitor B and C -- so that an abnormal-condition alarm is now issued.

Monitor D: The result has exceeded the alarm set point on two consecutive occasions.
The subsequent result has again been evaluated as an abnormal condition, following an already issued abnormal-condition alarm. Therefore, the alarm will continue.

Example of monitor no. 2:

Abnormal condition retry [SAlarm Inc] setting: 3
Response (alarm) cycle [SAlarm Det] setting: 1



Monitor A: The result is below the alarm set point (setting), and therefore the condition is considered normal.

Monitor B: The result has exceeded the alarm set point. Since the abnormal-condition retry setting is for three times, another monitoring is performed, which again exceeded the alarm set point. The third retry result, however, is below the alarm set point, and so passes as normal. Monitor B is therefore evaluated to represent a normal condition.

Monitor C: The first three results have exceeded the alarm set point.
With an abnormal condition verified once, an abnormal-condition alarm is now issued.

Monitor D: The result is below the alarm set point.
Since the result has been evaluated to be normal, the abnormal-condition alarm is now automatically terminated.

Remarks: If a result has exceeded the alarm set point but a subsequent result is invalidated so that the series of monitorings fails to satisfy the abnormal-condition retry [SAlarm Inc] requirement, the evaluation of the series will still be abnormal.

4-5-2-1 Display and output on abnormal condition (Note 1)

Name of mode	Display indication (a sample)	Alarm*	Bz*	Remarks
Displaying evaluation result	Result: > 2 mg/L	OFF	OFF	To be displayed for two minutes following monitoring (Note 2)
Monitor standby	Std-by: > 2 mg/L	OFF	OFF	To be displayed two minutes after monitoring (Note 2)

* Alarm: External-alarm master-contact output Bz: Buzzer output

Note 1: The sample indications shown in the table will remain displayed from the time of evaluating an abnormal condition until the abnormal condition alarm is issued.

Note 2: The sample display represents an evaluation exceeding 2 mg/L.
If the alarm set point is set at1 mg/L and the condition is evaluated to be in the 1 – 2 mg/L range, the LCD display will read [******** >1 mg/L].

4-5-2-2 Display and output on abnormal evaluation (refer to Section 4-5-2, "How the system operates in evaluating an abnormal condition," on page 32.)

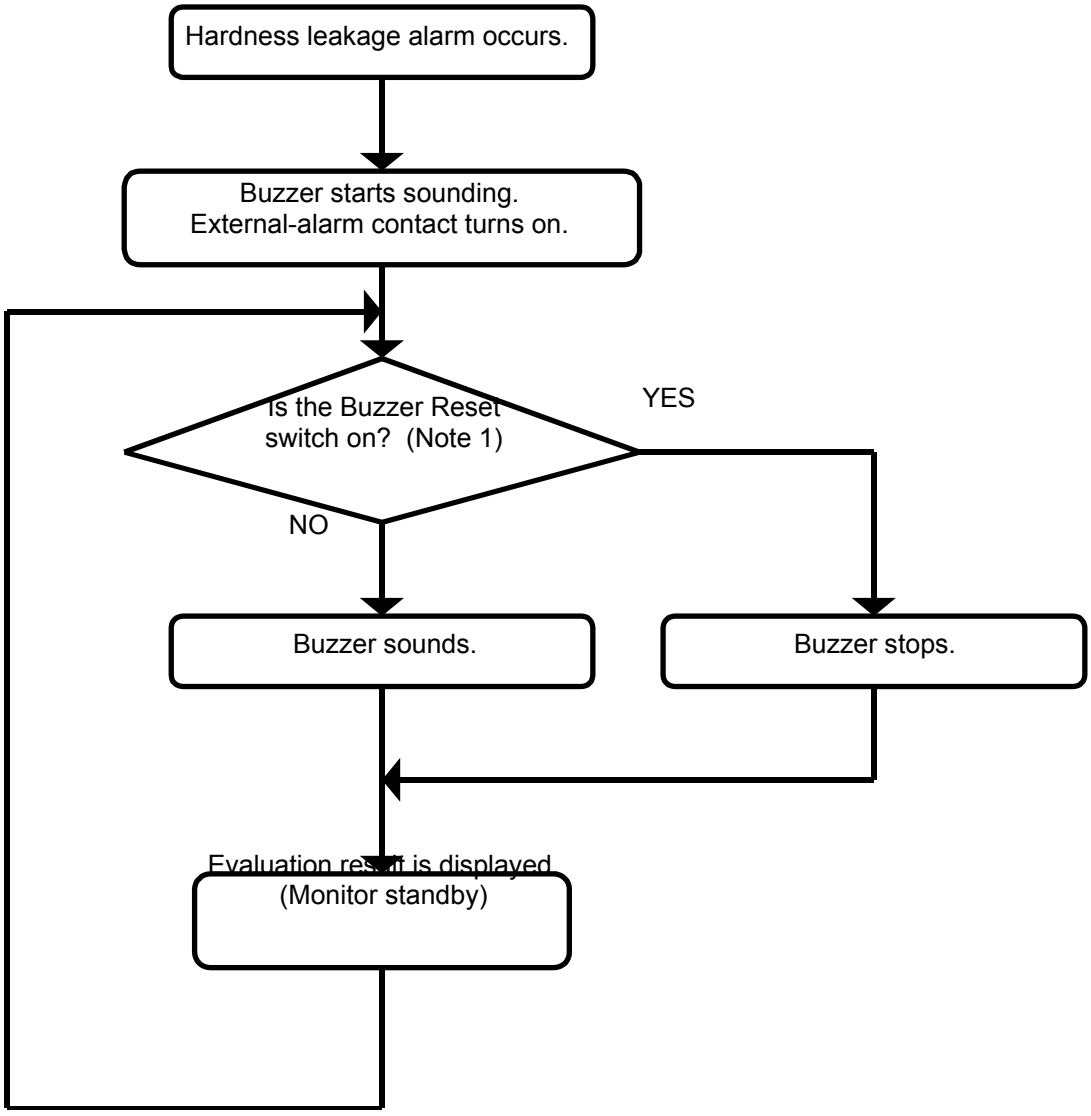
a. During an abnormal-condition alarm, the buzzer sounds and the external alarm's master contact closes.
b. When an abnormal-condition alarm is issued, pressing the Buzzer Reset switch on the front of the main unit will stop the buzzer.
The external-alarm's master contact, however, will remain closed until the condition is evaluated as normal in an automatic monitoring at Monitor interval [SIntvl], or monitoring initiated manually.
c. Once the buzzer is stopped by pressing the Buzzer Reset switch, it will remain disabled even if the immediately subsequent evaluation happens to be abnormal.
If, however, a condition is once evaluated as normal in automatic monitoring at Monitor interval [SIntvl] or manually initiated monitoring, then a subsequent occurrence of the abnormal-condition alarm will sound the buzzer.

Name of mode	Display indication (a sample)	Alarm*	Bz*	Remarks
Displaying evaluation result	Warning: > 2 mg/L	ON	ON	(Note 1)
Monitor standby	Warning: > 2 mg/L	ON	OFF	This is the result of pressing, the Buzzer reset switch once.

* Alarm: External-alarm master-contact output Bz: Buzzer output

Note 1: The sample display represents an evaluation exceeding 2 mg/L.
If the alarm set point is set at 1 mg/L and it is evaluated to be in the 1 – 2 mg/L range, the LCD display will read [******** >1 mg/L].
When the abnormal-condition alarm has been issued, the LCD display will remain the same even after two minutes have elapsed.

4-5-2-3 Workings of hardness leakage alarm and action to take



Note 1: The Buzzer Reset switch also functions as a manual monitor switch.
[1] The buzzer sounds on the occurrence of an abnormal condition.
[2] The buzzer stops on pressing the Buzzer Reset switch.
(The system will not automatically enter Manual monitor mode at this time. To start manual monitor, press the Buzzer Reset switch again.)
(The LCD display will remain the same.)

NOTE

External-alarm master contact will not be cancelled until the condition is evaluated as normal.

Chapter 5 Installation

Shows how to install and wire the Colormetry system.

We recommend that the user read this chapter before installation of the Colormetry for safety of operation.

5-1 Pre-installation checklist

[1] The raw water pressure range (both static and dynamic) must always be 7.1 to 71 psi (0.5 to 5 kg/km^2). If the pressure is outside that range, a pressurizing unit or pressure-reducing valve will be required.

[2] Use the system with raw water in the 41 to 104°F (5 to 40°C) range. Using water outside that range may damage the internal components.

[3] Use the system in an ambient temperature range of 41 to 122°F (5 to 50°C). Temperatures outside this range may cause deterioration of the reagent.

[4] The system is designed to hang on a wall. Install it indoors, away from rain.

[5] Avoid a location subject to direct sunlight.

[6] Install the system in such a way that the length of feed-water line between the water softener and the system is within 16.4 ft (5 m).

[7] The power supply transformer is specified at AC 24 V, 20 W. A 110 ~ 120 VAC source is required near the system.

[8] The Polyethylene drain pipe included in the system is 9.8 ft (3 m) long, requiring a nearby drainage trough.

[9] Provide sufficient work space around the installed system for maintenance and operation.

5-2 How to install the main unit

⚠ CAUTION

The reagent cartridge's receptacle is plugged when the system is delivered. Never remove the plug until installation is complete. (See Fig. 2.)
Note: If the plug is removed, the stirrer inside may roll out and get lost. An extra stirrer is attached to the back of the front cover in case one is lost.

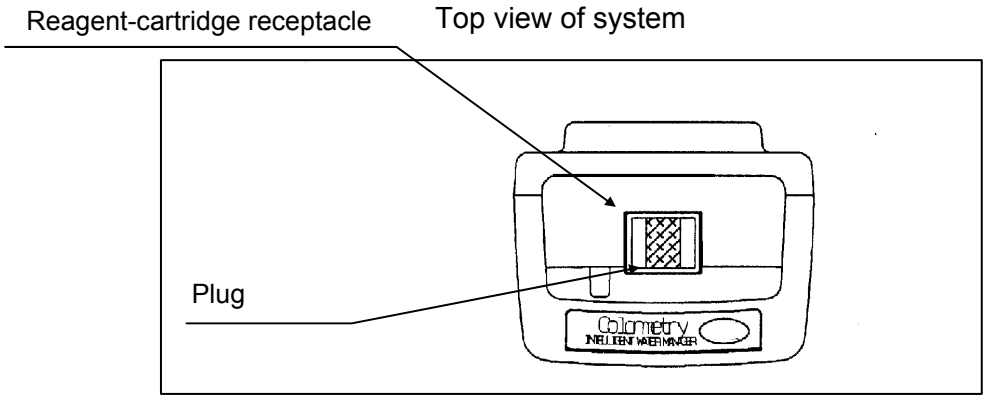


Fig. 2

Installing the main unit (refer to Fig. 3)

(1) Screw the mounting bracket, supplied with the unit where the system is to be installed. The system should be installed at a height to allow for easy reading of the LCD display.
Note: Mount the bracket with its rounded side up.

(2) Hook the system on the bracket mounted on the wall and screw down the bottom end of the mounting bracket.

Installed system side view

Side view of system

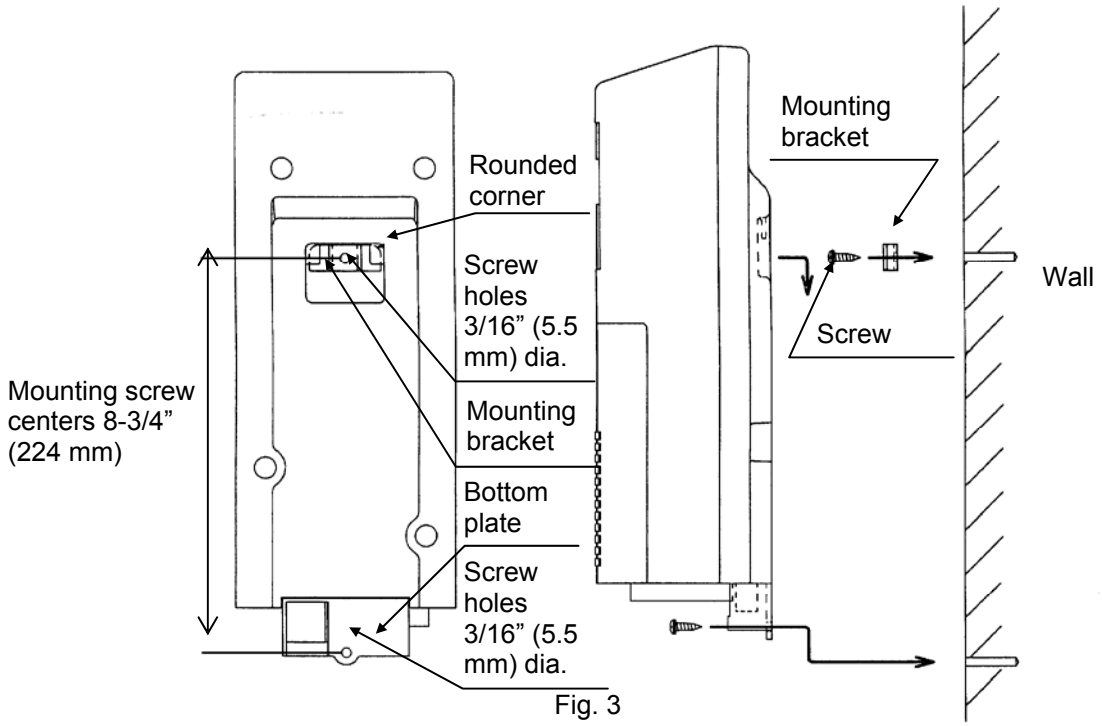


Fig. 3

Bottom view of system

Side view of system

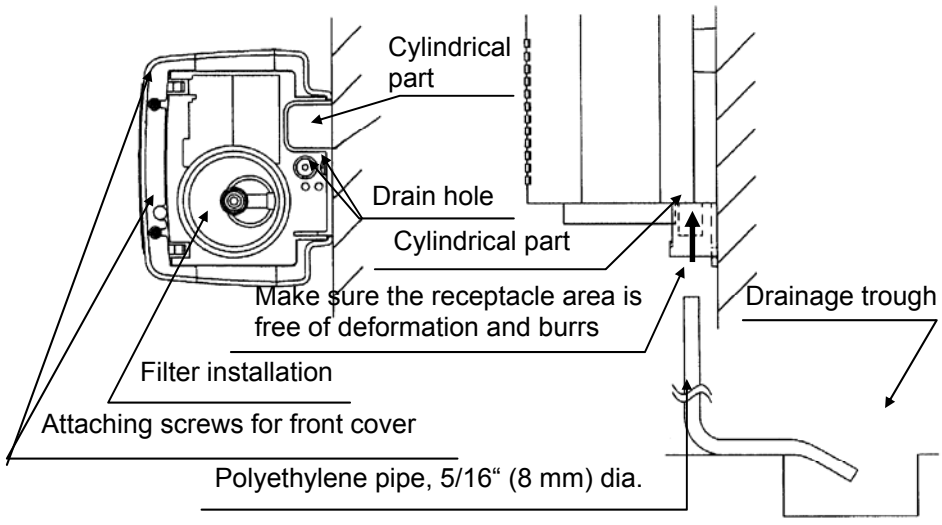


Fig. 3

5-3 Plumbing

5-3-1 Drain-water pipe (refer to Fig. 4)

(1) Cut the included polyethylene pipe, 5/16” (8 mm) dia., to the length required for drainage.

(2) Insert one end of the polyethylene pipe into the tubular connection at the bottom of the system. Run the other end into a drainage trough.
Note: The insertion of the polyethylene pipe into the tubular connection and the bottom requires some force. Check the connection for excessive deformation or burrs before inserting the pipe.

⚠ CAUTION

- Do not connect the drain-water pipe to other plumbing.
- Be sure to drain it to open air.
- Exercise care in keeping the drain-water pipe free of kinks.
  An obstructed drain-water pipe may cause water leakage and misevaluation.

⚠ CAUTION

In case the drain-water pipe is clogged and the internal pressure builds up, the system will relieve the pressure through either of methods (1) and (2) shown below. These methods cause drain water to leak down through the bottom of the system. Be sure not to leave anything underneath the system.

(1) Water leaks out of the pipe connection at the bottom.
(2) Water leaks out of the internal piping.
Water will drain out of the drain holes in the bottom of the system.

5-3-2 Feed-water line (refer to Fig. 5)

(1) Take the feed-water line off the outlet side of the water softener. (The feed-water line connection may be made from the water softener's water sampling valve.)

(2) Pre-cut the included polyethylene pipe, 1/4" (6 mm) dia., to the length required for the installation, and firmly insert the end into the tube coupling.

(3) Assemble the filter according to the following procedure (refer to Fig. 6):
   [1] Take the filter-casing assembly out of the bag. Remove the tape from the end.
   Note: There is a constant-flow regulator valve installed at the end of the casing. Be careful not lose the washer during installation.
   A spare constant-flow regulator washer is attached to the filter-cartridge box. The spare may be used to replace a lost washer.
   [2] The filter casing comes apart into two sections. To take them apart, rotate the top and bottom sections in the direction of arrow.
   [3] Remove the filter cartridge from the box (bag). Align the outlet end of the cartridge in the center of the top casing. Insert the cartridge all the way, then firmly tighten the bottom casing.

(4) Insert the polyethylene pipe firmly into the tube coupling on the bottom casing.

(5) Screw the filter casing into the bottom plate on the system. There is no need for tightening it hard, since the O-ring at the end of filter casing will provide a good seal.

(6) Use the included cable ties to bundle the 1/4" (6 mm) dia. Polyethylene tube to the 5/16" (8 mm) dia. polyethylene pipe.
(Doing so will prevent the 5/16" (8 mm) tube from dropping out of the system if external force is exerted upon it.)
Bundle them together about 6 to 8 inches (150 to 200 mm) away from the bottom of the filter casing. If it is tied too close to the filter casing, undue prying force may be exerted on the tube coupling and cause leakage.

⚠ CAUTION

Exercise care in keeping the tubing free of kinks.

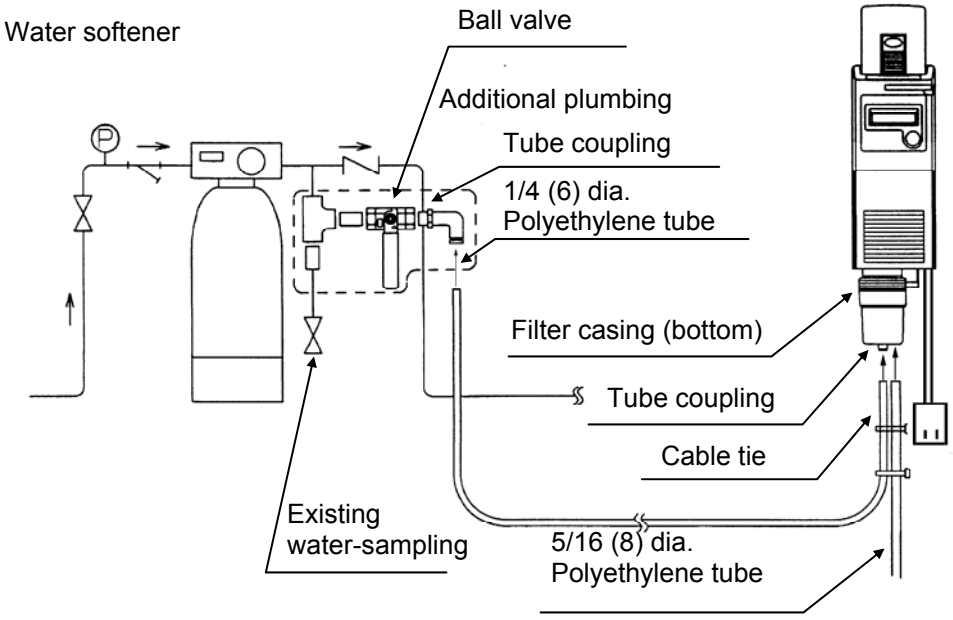
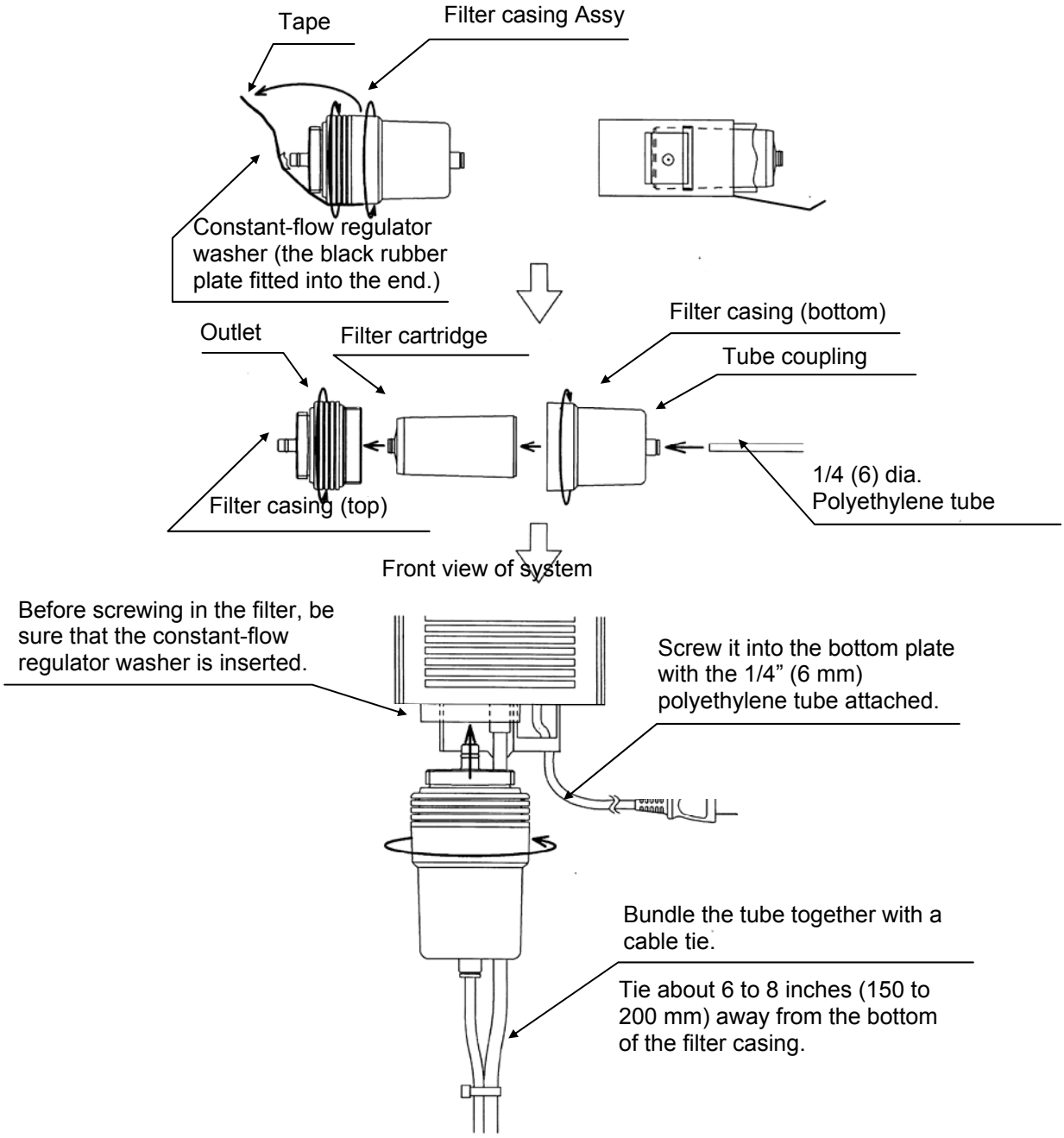


Fig. 5

⚠ CAUTION

Where zinc or copper plumbing is used, zinc or copper ions would dissolve and stagnate in the water. The reagent in this system reacts with zinc and copper ions. Take the sample water as close to the water softener as possible to avoid the effects of ions dissolving out of the plumbing.


Tape
Filter casing Assy
Constant-flow regulator washer (the black rubber plate fitted into the end.)
Outlet
Filter cartridge
Filter casing (bottom)
Tube coupling
Filter casing (top)
1/4 (6) dia. Polyethylene tube
Front view of system
Before screwing in the filter, be sure that the constant-flow regulator washer is inserted.
Screw it into the bottom plate with the 1/4” (6 mm) polyethylene tube attached.
Bundle the tube together with a cable tie.
Tie about 6 to 8 inches (150 to 200 mm) away from the bottom of the filter casing.

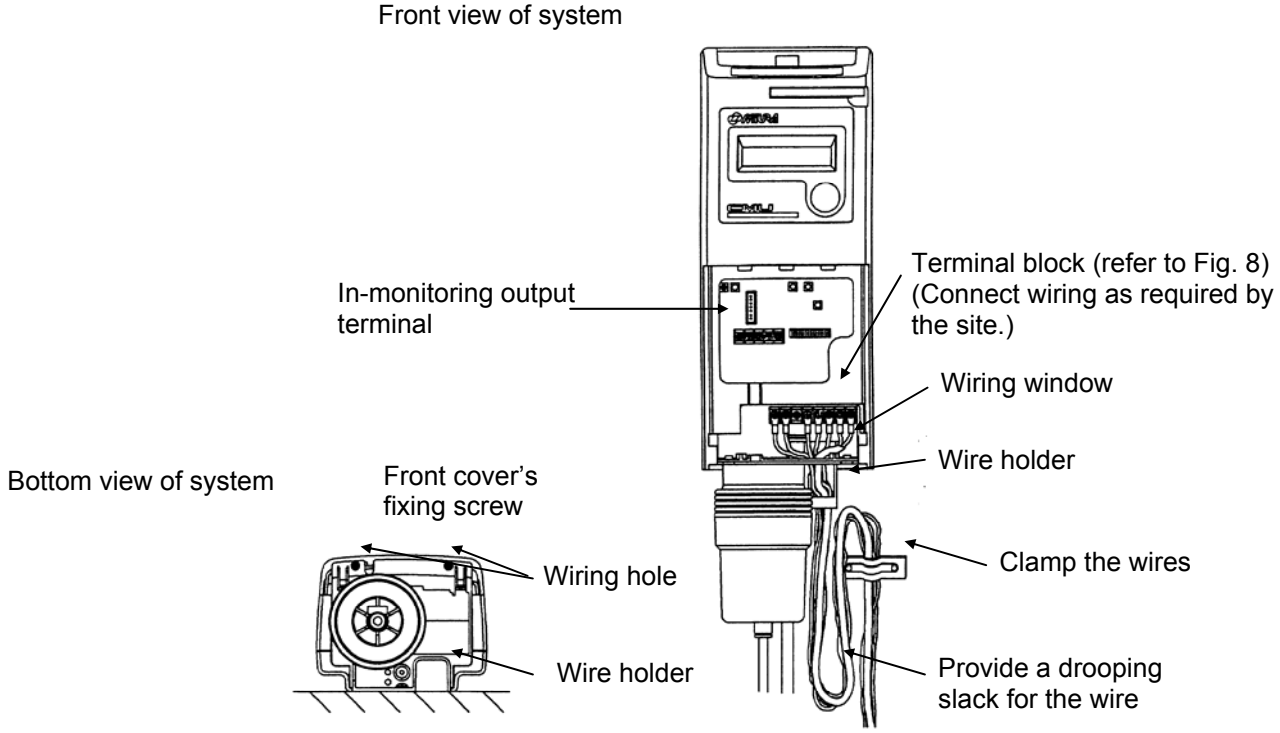
5-4 How to wire the system

5-4-1 Routing the wires (Refer to Fig. 7)

(1) Loosen the screw at the bottom of the system and remove the front cover.
(2) Pass the wires through the wire holder and wire hole in the bottom plate. Gather and connect the wires to the terminal block on the circuit board.
(3) Provide a drooping slack in the wires, and clamp them down.

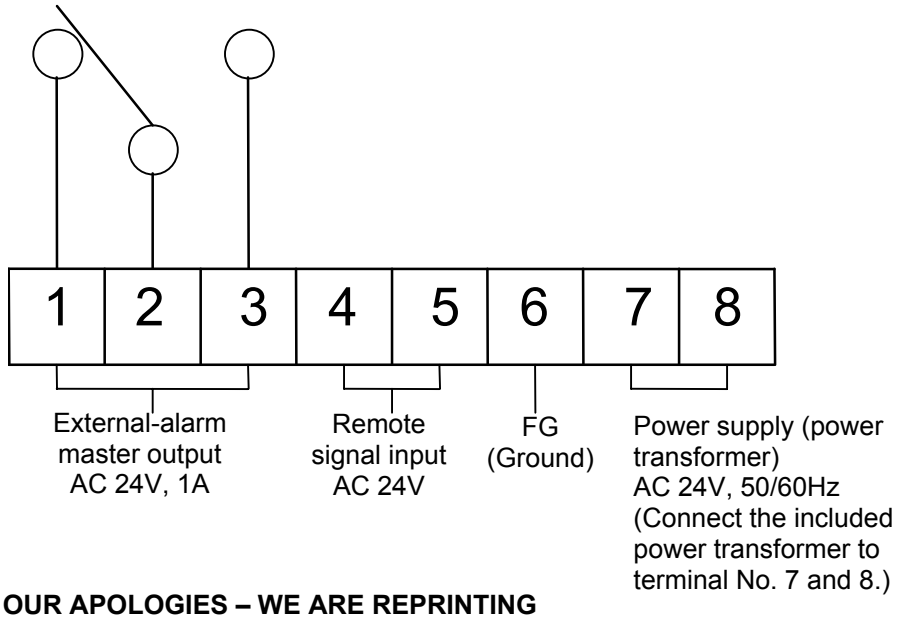
⚠ WARNING

- Use a dedicated power supply line having the specified capacity. Insufficient capacity may cause fire.
- Provide a ground fault interrupter with an overcurrent-protection function to prevent electric shock.
- Use a supplied wire or a larger cross section, or the wire may overheat and cause a fire.
- Ground the grounding terminal to prevent electric shock and malfunction.
- Be sure to clamp the wires down, or undue force exerted on them may damage the system.
- The wires must have a drooping slack to prevent water leakage from running down the wires and causing a short circuit.



⚠ CAUTION

The system starts operating as soon as the power is turned on (system is plugged in). Activate it only when it is ready for a test run.



NOTE: OUR APOLOGIES – WE ARE REPRINTING
2001 Model HAS 9 PINS – SPARE PIN AFTER 5 – THEN NEXT PIN IS ONE SIDE OF TRANSFORMER, NEXT PIN IS GROUND AND LAST PIN IS OTHER SIDE OF TRANSFORMER . IF YOU REQUIRE CLARIFICATION, PLEASE FAX SERVICE DPARTMENT AT 519-758-8111

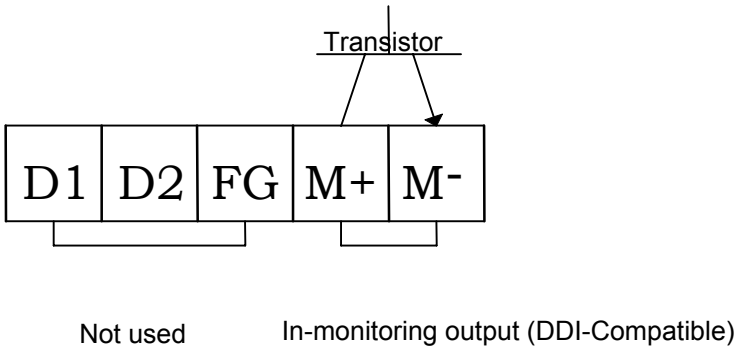


Fig. 8

5-4-2 External-alarm master contact output

- This is a SPDT contact. Connect it as required for installation.
  Contact capacity: AC 24 V, 1 Amp.
  Note: If an inductive load such as a relay is used, connect a spark suppresser (CR or a varister) across it.

- A boiler equipped with a XJ1 controller (model LX, EX or WX series) can be configured as shown in Fig. 9 to indicate a caution, “Check softener” message on the boiler display in case of an abnormal condition alarm or a Colormetry system error.

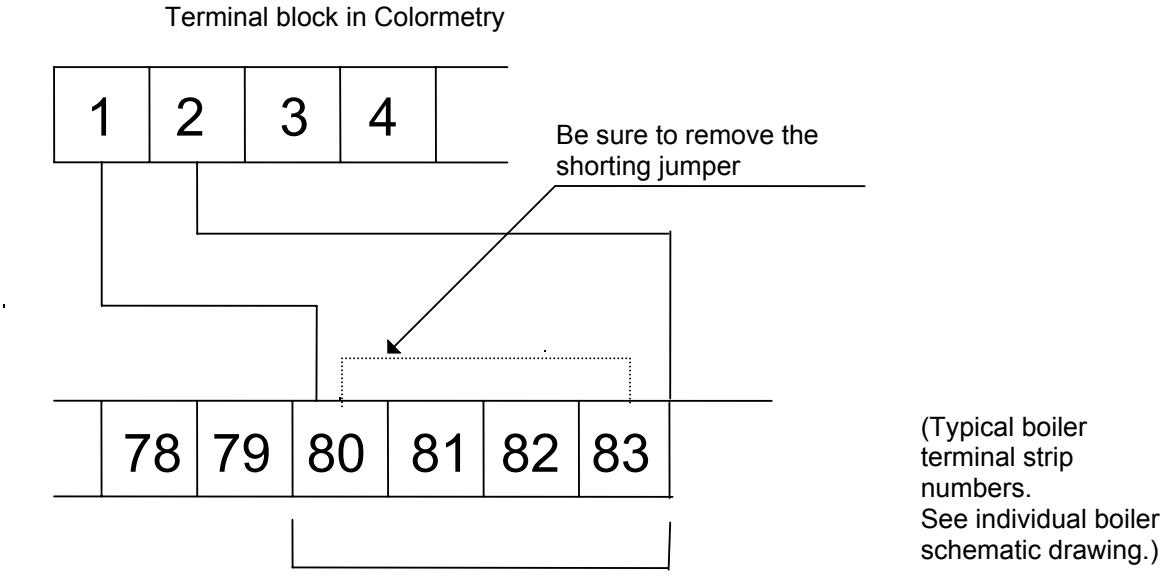


Fig. 9

5-4-3 Remote signal input

Connecting a AC 24 V contact with voltage (AC 24 V) enables the system to be remotely controlled for starting and stopping of monitoring.

In addition, a remote signal may be utilized in either mode -- the “on” state or “off” state - to start or stop monitoring. (Either the “a” or “b” contact may be used.)

Wire a voltage input (AC 24 V) as shown in Fig. 10, and a nonvoltage input as described in Fig. 11, below.

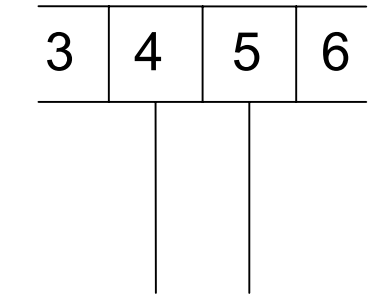


Fig. 10

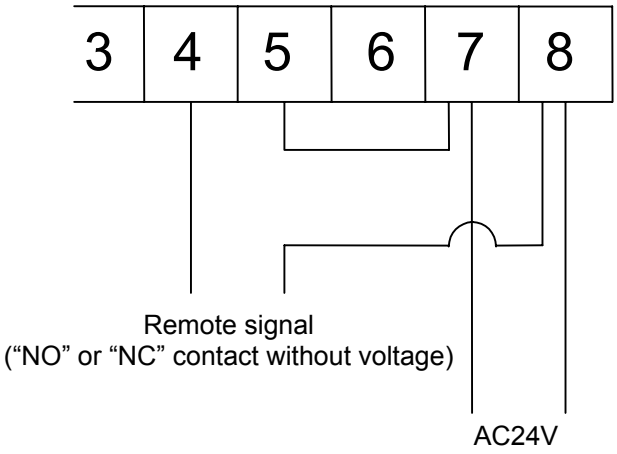


Fig. 11

If no remote signal is connected, monitoring will be performed automatically at the monitor interval set in the LCD display.

⚠ CAUTION

- If a contact representing the feeding of water is available, connect this on a highest priority. If not, set up the start and stop time on the LCD display to avoid monitoring during water stoppage and softener regeneration, or a system error may occur.
- Refer to Section 4-3, “Method and examples of utilizing remote signals,“ on page 24 for remote signal functions, and connect a signal to suit the installation.

5-4-4 In-monitoring output

This is an open-collector output that turns on only during the monitoring process to indicate that monitoring is in progress.
External DC power supply is required.
Capacity: DC 24 V, 70 mA.
Refer to Fig. 12 to connect the output as required.

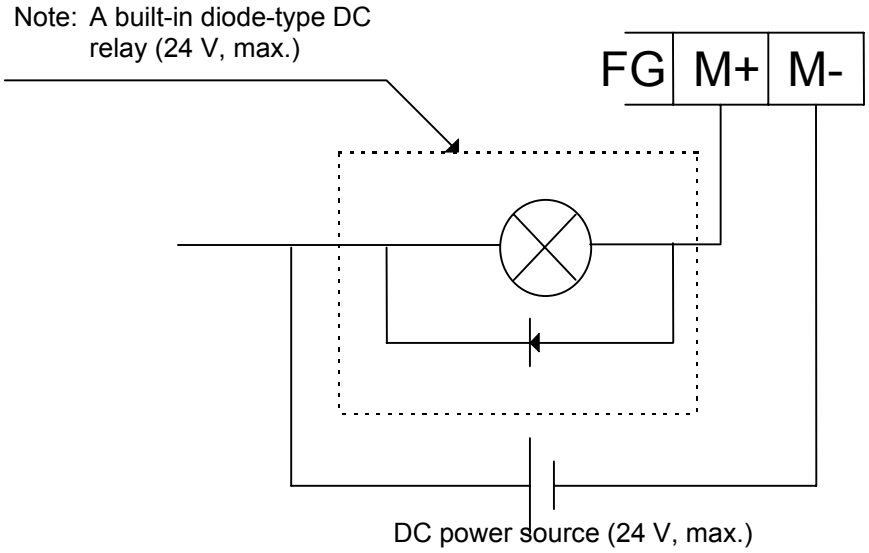


Fig. 12

Note: A DC relay with a coil-type surge-suppressing diode is recommended.
If an ordinary type DC relay is to be used, connect a diode in parallel with the relay.

⚠ CAUTION

Turning a relay on and off generates sufficient back EMF across its coil to destroy a transistor on the opening of the relay. Be sure to connect a surge suppresser in order to protect the transistor.

5-5 Installing the reagent cartridge

(1) Remove the plug from the reagent cartridge receptacle in the system.
(2) Completely pull out the cartridge lever, which is located at the front of the system.
(3) Take the reagent cartridge out of its box (bag).
(4) Insert the reagent cartridge into the receptacle firmly.
(5) Push the cartridge lever back in and check to see that it is completely returned into the system.
Note: If the reagent cartridge lifts up when the cartridge lever is pushed in, reinsert the cartridge.
Note: If the bottom of the horizontal line in the cartridge's surface design is not lined up approximately with the edge of the cover on the main unit, insert the cartridge again.

⚠ CAUTION

- Before installing a reagent cartridge, always check the manufacture date on the package. (The cartridge life is about one year from the date of manufacture, and is used up within approximately four months of installation.)
- When installing a reagent cartridge, push it in slowly, keeping the nozzle and check tube from hitting the main unit.
- Be sure to push the cartridge lever back into the main unit, or the cartridge may come off and water may leak when water pressure is applied for operation.
- Never remove the check tube from the end nozzle of the reagent cartridge. Do not touch the check tube. Otherwise, the reagent injection volume may be affected.

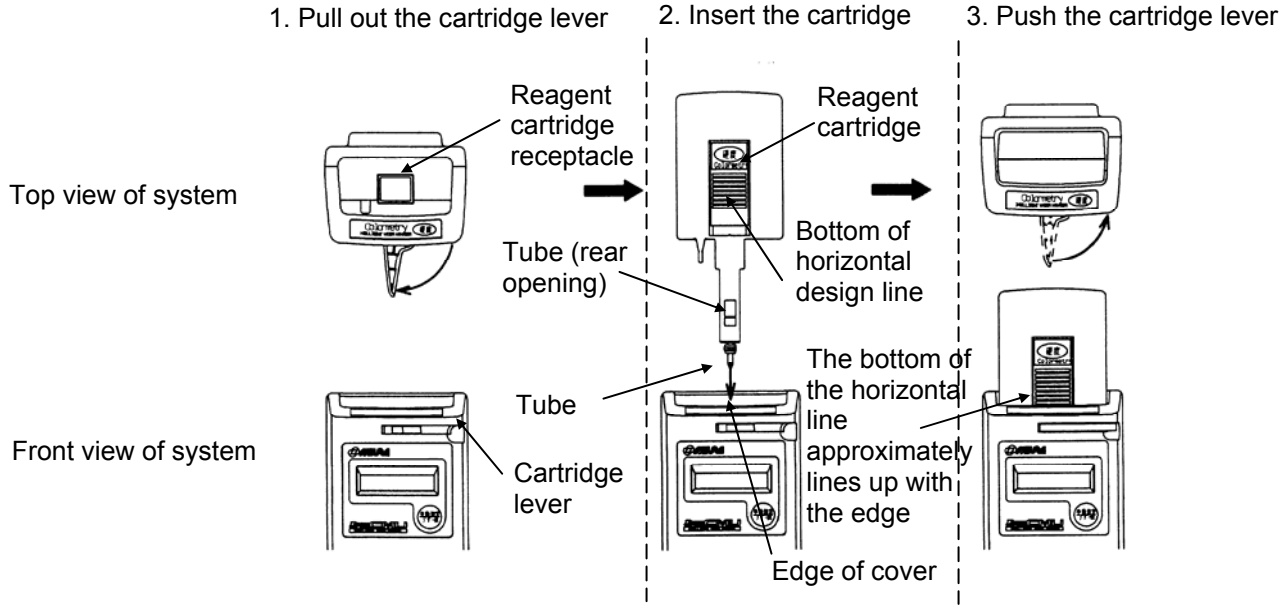


Fig. 13

⚠ WARNING

- Do not use the reagent cartridge for the use other than in the Colormetry system.
- Never disassemble the reagent cartridge. Reagent may splatter onto the skin or into the eyes.
- Dispose of the fully intact reagent cartridge as plastic refuse.
- If the reagent gets on the skin or in the eyes, rinse immediately with water.

5-6 Final check of installation and wiring prior to startup

Checking installation conditions

(1) The Colormetry system is designed for indoor installation only. Is the installation free of rain water and out of direct sunlight?

(2) Is the operating environment appropriate (water pressure, water temperature and ambient temperature)?

(3) Is the system firmly attached to a wall surface, etc.?

(4) Is the reagent cartridge correctly installed and the cartridge lever positively locked in?

(5) Is the filter assembly installed correctly?
- [1] Is the fiber filter cartridge properly set into the filter casing?
- [2] Is the constant-flow regulator washer (a black rubber plate) installed at the end of the filter casing?
- [3] Are the top and bottom halves of the filter casing tightly assembled together?
- [4] Is the filter assembly correctly mounted onto the main unit?

(6) Is there anything under the system that should not get wet?

(7) Is the system free of excessive scratches or dirt?

Checking the wiring

(1) The system is specified for AC 24 V at 20 W. Is the accessory transformer for converting AC 110 volt to 24 volts installed? Is the power-supply line correct (voltage, capacity and wire diameter)?

(2) Is a ground fault interrupter with overcurrent protection installed in the power-supply line?

(3) Is the system's grounding terminal connected?

(4) Are the wiring connections correct?

(5) Is the wiring provided with a drooping loop just ahead of clamping point?

(6) Have the terminals been retightened to be sure?

Checking the plumbing

(1) Are the feed-water and drain-water pipe connections correctly made?

(2) Are the feed-water and drain-water pipes free of kinks or flattening?

(3) Is the drain-water pipe open to the air and independent of other plumbing?

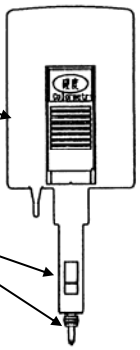
(4) With the water pressure turned on, are there any leaks in the connections?

⚠ CAUTION

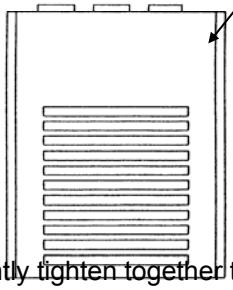
Be sure to perform the checks listed in the foregoing before startup.

System operating environment
- The specified ambient temperature range is 41 to 104°F (5 to 40°C).
- Operate the system indoors only.
- Avoid direct sunlight on the system.

- Store the cartridges in a cool, dark place.
- Do not disassemble the cartridge.
- Do not pull on the cartridge during the monitoring process.
- If the reagent gets on the skin or into the eyes, rinse it off with water immediately.



- Pull up the lever.
  Insert a reagent cartridge. Push the lever back into the main unit. Verify that the lever is pushed fully into the main unit.
- Do not touch the pipe at the tip or at the opening.
- Do not remove the plug until installation is complete.
- Do not use.
- Do not press the switch hard or press it with a sharp object.
- Be sure to install the front cover after the test run.
- Do not use (D1, D2 and FG).
- Be careful to avoid electric shock during the test run.
- Set the system at the time of the test run.
- Connect the wiring here.



- Lightly tighten together the top and bottom halves of the filter casing.
- Exercise care in arranging the pipe, without making it bend.
- Be sure to clamp the wires.
- Be sure to provide a drooping loop.
- Be sure to drain it into the open air.

- The specified raw water pressure (both static and dynamic) range is 7.1 psi to 71 psi (0.05 through 0.5 Mpa).
- The specified temperature range of supply water is 41 to 104°F (5 to 40°C).

Chapter 6 Settings and Start up

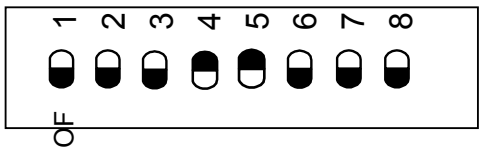
Guides you through set up and test run. Perform the setup and start the system by following the instructions given in items 6-1 through 6-5.

6-1 Setting up the system

The items described below must be set in order for the system to operate properly.
The system will operate as set at the factory. However, change the settings as required for each installation.

Setting the DIP switch
Before turning the power on, open the front cover in the main unit and check the Dip-switch setting. Change the setting as required. (Refer to Fig. 1)

Set the DIP switch (SW2) on the main board to set the following items:



(Note) 1··· DSW-1

(1) Selecting the type of monitoring

DSW-1	DSW-2	DSW-5
OFF	OFF	ON

DSW-1, -2 and -5 need no changes, as they have been set at the factory. Simply verify the settings shown in the table above.
If the settings are correct, a “HARDNESS MONITOR” message is displayed when the power is turned on.

If the settings are incorrect, a “DIP SW Err” message will be indicated when the power is turned on or when initializing at a reset.

(2) Setting for M-alkaline value

DSW-3	DSW-4	M-alkaline value	Remarks
OFF	OFF	Under 60 mg/L	
ON	OFF	60 mg/L and over, but under 120 mg/L	
OFF	ON	120 mg/L and over, but under 300 mg/L	Factory setting
ON	ON	300 mg/L and over, but under 500 mg/L	

⚠ CAUTION

Change the DSW-3 and DSW-4 settings according to the M-alkaline value of the raw water. Note that an evaluation error may result from a setting that is incompatible with the M-alkaline value of the sample water.

Do not change the settings other than DSW-3 and DSW-4, or the system may malfunction.

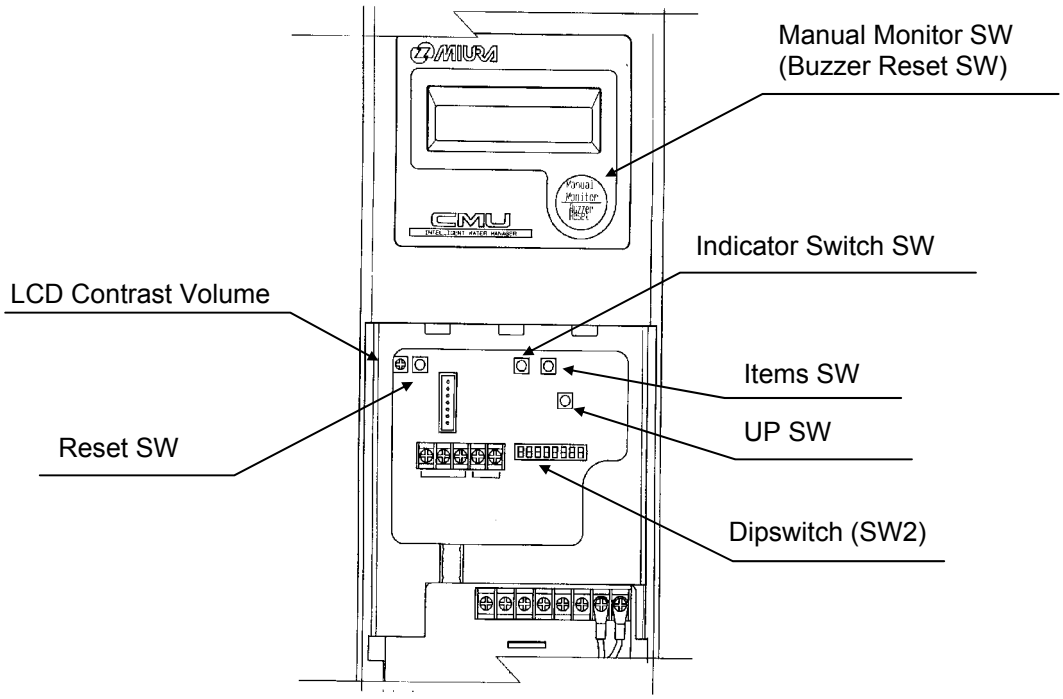


Fig. 1

Main switches used for setting and start up of the system

6-2 Checking the system operation and settings

⚠ WARNING

Be sure to check the following before turning on the power:
- [1] The power-supply voltage is correct. (24 V or 110 V transformer to 24 V)
- [2] The wiring and piping are correct.
- [3] The reagent cartridge is properly installed.
- [4] The system's water pressure is on and ready to feed water.

6-2-1 Turning the power on

Turn on the power. Some units have the data-memory backup battery already charged, while others do not. Check the system accordingly.

(1) If the data-memory backup battery has been charged by the time the power is turned on, or when reinitialized from a reset:
- [1] Check to verify that a "CPUver...." message is displayed when the power is first turned on.
- [2] Next, verify that a "MHardness Mon" message is displayed.
- [3] The system then enters the status-verification test mode.

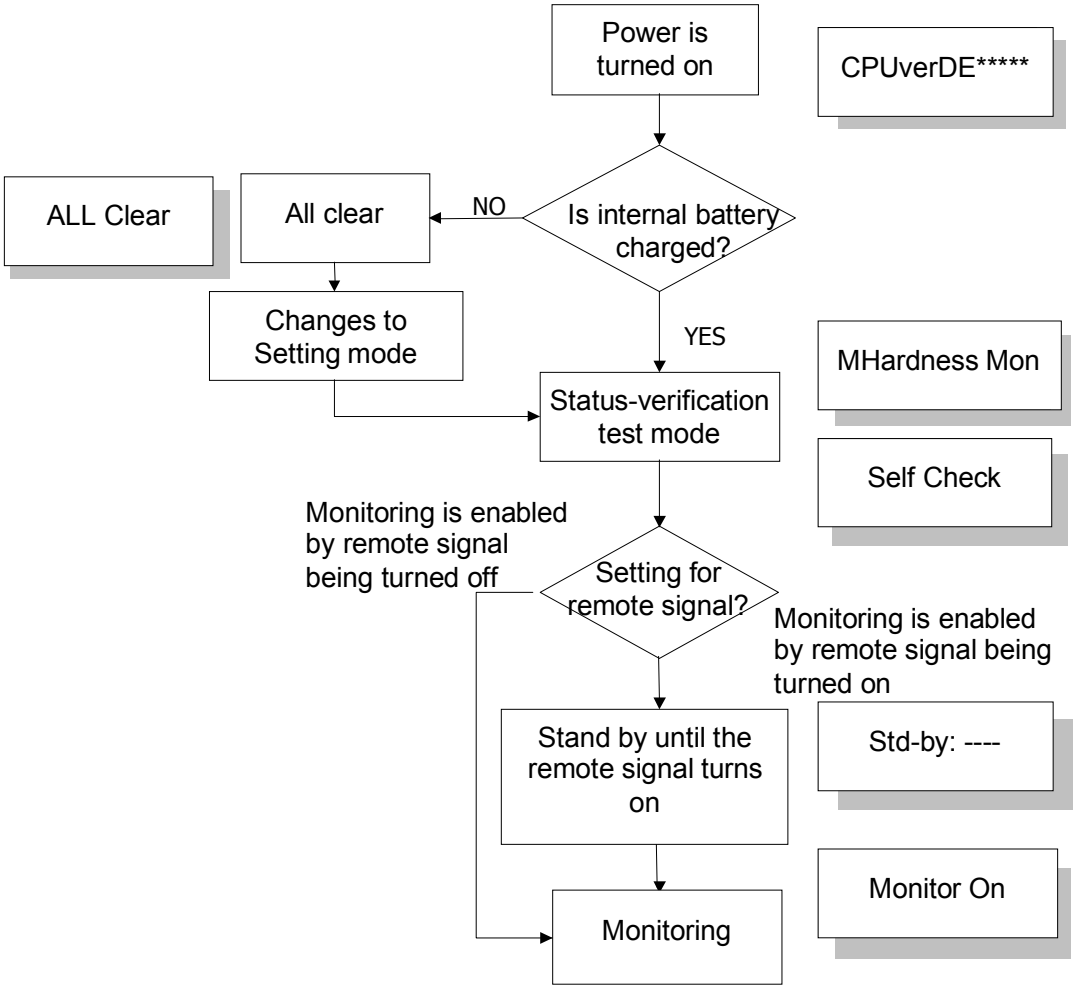
(2) If the data-memory backup battery has not been charged when the power is turned on, or when reinitialized after executing an complete reset.
- [1] Check to see that a "CPUver..." message is displayed when the power is first turned on.
- [2] Verify that an "All Clear" message is displayed.
- [3] The mode changes to Setting mode.
  Refer to Section 6-3, "About items to be set in Setting mode," on page 60 to set the items. Be sure to set the current date, time and cartridge-installation date.
- [4] When all settings have been made, press the Indicator switch.
- [5] Verify that a "MHardness Mon" message is displayed.
- [6] The mode automatically changes to the status-verification test mode to verify correct system operation.

(3) If the LCD display is hard to read, adjust it with the "Contrast Adjust" potentiometer.

⚠ CAUTION

If the battery has been charged, be sure to review and set all items described in "Setting mode" on page 60 after exiting the status-verification test mode.

Flowchart for Colormetry operational processes when turning on the power



6-2-2 Status-verification test mode

This is the mode that automatically tests the system for proper operation.

- If the system is working correctly, the status verification is complete in about two minutes. At its completion the buzzer sounds and monitoring starts.
  Note: If the remote signal setting is for "Monitoring is enabled by remote signal being turned on," the system will stand by for monitoring as of the completion of the status verification until the remote signal turns on.

- If a normal condition is not verified, the status verification (self-check) is repeated. The status verification will be repeated up to five times until the system checks out as normal. Repetition will require some time. Wait until the final results are displayed.

- During a repeated self-check, a "Self-Check Retry" indication is added to the displayed status message.

- If repeated retries fail to verify normal conditions, the buzzer will sound and an error message will be indicated in the LCD display. The self-check stops and the system will then enter system error standby (self-diagnostic error) mode.

NOTE

If the "Wash Cfm F" or "Wash F" alarm occurs during a test run or initial feeding after replacing the fiber filter – (even though the main feed-water valve is open and pressure is provided) -- take the action shown below. This is an initial phenomenon caused by bubbles in the filter casing. It is not a system problem.

The buzzer sounds on the alarm. Press the Manual Monitor switch to stop the buzzer, then press the switch again to force monitoring (that is, to feed the system). If the alarm recurs, repeat this process.

If a couple of repetitions will not stop the recurrence of an alarm, try monitoring with the constant-flow regulator valve (black rubber plate) removed. If the removal eliminates the alarm, restore the constant-flow regulator washer and perform another monitoring to verify that no alarm recurs.

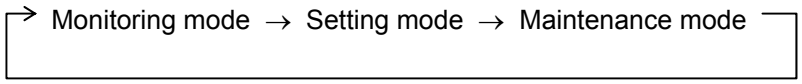
If the fiber filter cartridge is replaced while the power is on, the system would not automatically enter the status-verification test mode. Press the Manual Monitor switch to monitor (to feed the water) to verify that no alarm occurs. If the alarm recurs, repeat the process.

6-3 About items to be set in Setting mode

These items set up the Colormetry system for operation. Be sure to follow these procedures to set them, since they are also important in understanding monitoring and administering cartridge replacement.

How to enter and exit the Setting mode

Each press of the indicator switch changes the modes as follows:
(Refer to Fig. 1 for the switch location.)



- To enter Setting mode: Press the indicator switch to switch mode.
- To exit from Setting mode: Press the indicator switch to exit the setting mode.

The mode will automatically return to the monitoring mode if no switch is pressed for 10 minutes.

How to input item settings

[1] In the Setting mode, press the Item switch as required to select an item to be set.
[2] Press the Up switch to vary the setting.
(To vary a setting over a wide range, hold the Up switch for over a second to start varying the indication at a faster rate.)
[3] To make the changed valve valid, switch the screen in which the change/setting is made to another screen by pressing the "Item" or “Indicator” switch.

Item	Sample indication	Setting range	Setting increment	Factory setting	Remark
Current date	SDate 06/23/99	97/01/01 ~ 20/12/31	1		Note 1
Current time	STime 15:28	00:00 ~ 23:59	1		Note 1
Monitor interval	SIntvl 060min	000 min ~ 180 min	30 min	060 min	Note 2
Monitor start time	SStart 08:30	00:00 ~ 23:59, 24:--	1	24:--	Note 3
Monitor stop time	SStop 20:30	00:00 ~ 23:59	1	Stop	Note 3
Remote signal function	SRet Sgl Off	Monitor by remote signal on Monitor by remote signal off		Monitoring is enabled by remote signal being turned off	Note 4
Remote signal delay	SRet Sgl Dl 10s	0 sec ~ 30 sec	1 sec	0 sec	Note 5
Alarm set point	SAlarm Set 2.0mg/L	1 mg/L, 2 mg/L	1 mg/L	2 mg/L	Note 6
Abnormal condition	SAlarm Inc No:2	1 to 3 time	1	2 times	Note 7
Response (alarm) cycle	SAlarm Det No:2	1 to 3 times	1	2 times	Note 8
Reagent cartridge installation date	SC Rpl 06/23/99	97/01/1 ~ 20/12/31			Note 9

Note 1. Current date and time: Set these without fail.

Note 2. Monitor interval:
This sets the interval at which monitoring will be performed. It is set at 60 minutes at the factory, so no change is required except for special circumstances. Be aware that if a 000 min is set, monitoring will be performed continuously.

Note 3. Monitor start and stop times:
These determine the start and end times of the monitoring period.
The factory settings are for continuous 24-hour monitor, "24: --." Switching the items will not display the stop time, which is not applicable to continuous 24-hour monitor.
In setting the times to suit the installation, if the start and stop times are set to the same time, continuous 24-hour monitor will take effect.

Note 4. Remote signal functions:
The Colormetry system may be set to monitor or stand by for an external remote signal. Make settings according to the requirements at the installation.

[1] Monitor is enabled by remote signal being turned off state (a factory setting)
Under this setting, monitoring is performed if the remote signal is being turned off at the time the monitor interval has elapsed. For instance, monitoring can be inhibited while the water softener is regenerating, if a remote regeneration signal from water softener is input.

[2] Monitoring is enabled by remote signal being turned on
Monitoring is performed if the remote signal is on at the moment the monitor interval has elapsed. For instance, monitoring for hardness leakage may be performed only while water is being fed, if a feed water-control signal is input.

NOTE

[1] If no remote signal is connected for operation, set the system up for monitoring is enabled by remote signal being turned "off" state.

[2] If a "now feeding water" signal is available from the site, connect the signal and set up the Colormetry system to prevent evaluation and operational errors.

Note 5. Remote signal delay time:
This sets the number of seconds for which monitoring is to be delayed after receiving the remote signal at Colormetry system. Set it as required. The factory setting is zero.

Note 6. Alarm set point:
The system allows setting up a specific concentration at which to issue the Abnormal-condition alarm. The setting may be either 1 mg/L or 2 mg/L. The factory setting is 2 mg/L.

Note 7. Abnormal-condition retry:
If a evaluation is higher than the alarm set point (Note 6 above), monitoring is repeated the number of times set by this item to reverify the result.

[1] If all repeated monitoring is higher than the alarm set point, that particular monitoring session is determined to be abnormal.
(The actual abnormal-condition alarm is issued only if the condition set in response (alarm) cycle is satisfied.)

[2] If a repeated monitoring is below the alarm set point, the monitoring session is determined to be normal and is closed.

Note 8. Response (alarm) cycle:
If an abnormality, as determined in the procedure described in abnormal-condition retry (Note 7 above) continuously repeats the number of times set in this item, an abnormal-condition alarm will be issued.

For detailed descriptions of items in notes 4 and 5, refer to page 24 under “Method and examples of utilizing remote signals.”

The relationship between the items in notes 2, 7 and 8 and the issuance of the abnormal-condition alarm is also explained (with illustration) in Section 4-5, “Evaluation method.” Set this item after carefully reviewing the evaluation method.

Note 9. Reagent cartridge installation date:
The item updates the installation date of the reagent cartridge. Each alternate press of the Up switch alternatively indicates the cartridge installation date or the current date. Normally, the installation (replacement) of the cartridge with the power turned on will automatically update the installation date, so there is no need to set this item.

If a cartridge is installed with the power turned off, such as during a test run, subsequent restoration of the power will not automatically update the installation date. If the date must be updated, press the Up switch to update it.

NOTE

Note that if the Up switch is used to switch the display from the installation date to the current date, and then either the Item or Indicator switch is pressed to confirm (update) the setting, the old date (before updating) will no longer be available.

6-4 Verifying monitor operation

Verify whether monitoring is being performed properly after all items have been set.

Checking the monitor operation (1)

A “Monitor On” message is indicated in the display during monitor operation, regardless of whether it is an automatic or manual session. When the monitoring is complete, a “Result: ****” message is indicated. Two minutes after monitoring, the message changes to “Std-by:********.”
First, verify that the system is under pressure and ready to feed water. Check for correct monitor operation by pressing the Manual Monitor switch to initiate the monitoring process.
If an error occurs during the monitoring process, the system will assume the system error standby (self-diagnostic error mode).

Checking the monitor operation (2)

Verify that monitoring is being performed properly at the monitor interval or controlled correctly via the remote signal. To do so, use the following procedure:

[1] Verify that the system is under pressure and ready to feed water.

[2] Set the monitor interval at 000 min. in Setting mode.
This setting allows continuous monitoring between the monitor start and stop times as set in Setting mode.
Set the monitor start and stop times as desired.

[3] If no remote signal is connected, verify that the system will continuously perform monitoring between the monitor start and stop times.
If a remote signal is connected, check to see that monitoring is performed on the remote signal being turned on or off during the period between monitor start and stop times.

[4] After checking monitor operation, restore the monitor interval and monitor start and stop times to their original settings.

6-5 Verifying the issuance of an abnormal-condition alarm

Deliberately create an abnormal condition and verify the sounding of the buzzer operation or the closure of the external alarm's master contact output. Use the following procedure for verification:

[1] Turn the no.1 switch (DSW-1) in the DIP switch to "On."
Refer to "Setting the DIP switch" on page 55.

[2] Press the Reset switch to reinitialize the system.
Refer to Section 9-4, "How to reset," on page 97.

[3] Verify that a "DIP SW Err" message is indicated in the LCD display, the buzzer sounds and the external alarm's master contact closes.

[4] After so verifying, return the no. 1 switch (DSW-1) to the "Off" position and press the Reset switch to reinitialize the system.

[5] Since an abnormality has been caused deliberately, an error will be recorded in the system's error record. (Refer to Section 9-3, "Verifying error records (How to use Maintenance mode)," on page 93.)
If such a test record is undesirable, it may be deleted through the All Reset procedure (refer to Section 9-4, "How to reset," on page 97). This procedure, however, will delete all new settings and restore the factory settings. Select new settings again in Setting mode.

Chapter 7 Digital display description

Explains the messages displayed in all three modes.

7-1 Monitoring Mode

	Display	Description
1	CPUverDE111012	CPU version
2	Hardness Monitor	Hardness monitor
3	Pump Start Cfm	During verification of the pump in its home position
4	Self Check	Self check
5	Self Check Retry	Self check retry
6	Std-by: ----	Waiting for monitoring stage
7	Std-by: 0-1mg/L	Monitor stand-by: 1mg/L or less
8	Std-by: 1-2mg/L	Monitor stand-by: Between 1mg/L and 2mg/L
9	Std-by: >2mg/L	Monitor stand-by: 2mg/L or more
10	Monitor On	Monitoring ionic concentration(hardness)
11	Monitor On Retry	Monitor on retry
12	Result: 0-1mg/L	Result: 1mg/L or less
	Std-by: 0-1mg/L	Monitor stand-by: 1mg/L or less
13	Result: 1-2mg/L	Result: Between 1mg/L and 2mg/L
	Std-by: 1-2mg/L	Monitor stand-by: Between 1mg/L and 2mg/L
14	Result: >2mg/L	Result: 2mg/L or more
	Std-by: >2mg/L	Monitor stand-by: 2mg/L or more
15	Warning: >1mg/L	Hardness leakage detected: 1mg/L or more
16	Warning: >2mg/L	Hardness leakage detected: 2mg/L or more
17	Cartridge OFF	Cartridge disconnected
18	Cartridge OFF F	Cartridge disconnected fault
19	Pump Cfm F	Pump confirmation error
20	Pump F	Reagent injection pump fault
21	Wash F	Insufficient pre-wash
22	Wash Cfm F	Faulty confirmation on pre-wash
23	Injection Cfm F	Faulty confirmation on reagent injection
24	Injection F	Incomplete reagent injection
25	Wash Flow F	Insufficient water flow for wash
26	Photo Rpt F	Photorecepter fault
27	SW ON Cfm	Switch ON confirmed after cartridge replacement
28	Dip SW Err	Dip switch error
29	New Cartridge	Need cartridge replacement

7-2 Set Mode

	Display	Description
1	SDate 06/23/99	S Date (m/d/y) 06/23/99
2	STime 15:28	S Time 15:28
3	SIntvl 060min	S Monitor interval 60 min
4	SStart 08:30	S Start time 08:30
5	SStop 20:30	S Finish time 20:30
6	SRet Sgl Off	S Monitor by remote signal off
7	SRet Sgl On	S Monitor by remote signal on
8	SRet Sgl Dl 10s	S Remote signal time delay
9	SAlarm Set2.0mg/L	S Alarm set at 2mg/L
10	SAlarm Inc No:2	S 2 consecutive incidents set alarm off
	SAlarm Inc No:3	S 3 consecutive incidents set alarm off
11	SAlarm Det No:3	S 2nd leakage detection set alarm off
12	SC Rpl 06/23/99	S Cartridge replacement date(m/d/y)

S: Indicate Set Mode

7-3 Maintenance Mode

	Display	Description
1	MHardness 2.0mg/L	M Result hardness 2.0mg/L
2	MCPUver DE111012	M CPU version
3	M06/23/99 15:28	M Date(m/d/y) & time
4	MHardness Mon	M Hardness monitor
5	MIN-OUT Mode *	M Input-output mode
6	MOUT1 1111 1111	M Output1 1111 1111
7	MOUT2 1111 1111	M Output2 1111 1111
8	MIN1 1111 1111	M Input1 1111 1111
9	MIN2 1111 1111	M Input2 1111 1111
10	MAD FF FF <FIG---	M AD FF FF FF
11	MAD (Thmsta): FF	M AD Thermista: FF FF
12	MAD(R): FF <FIG---	M AD(R): FF FF
13	MAD(-): 00 00	M AD(-): 00 00
14	MAD(G): FF <FIG---	M AD(G): FF FF
15	MWash Pd 9.99S	M Pre Wash period 9.99 secoud
16	MMAlkal < 60mg/L	M Set M-alkalinity at 60mg/L or less
	MMAlkal < 120mg/L	M Set M-alkalinity at 60mg/L to 120mg/L
	MMAlkal < 300mg/L	M Set M-alkalinity at 120mg/L to 300mg/L
	MMAlkal <500mg/L	M Set M-alkalinity at 300mg/L to 500mg/L
17	MWL: <TBL---	M select from LED wavelength table: L
	MWL: S	M select from LED wavelength table: S
18	MOp Stus: <FIG---	M Operation status: FF
19	MAlarm Content *	M Alarm description
20	MError1: 11111111	M Error table 1: 11111111
21	Merror2: 11111111	M Error table 2: 11111111
22	MCartridge Dta *	M Cartridge data
23	MC Exc 06/23/99	M Cartridge replacement data(m/d/y)
24	MC Hrs 999999	M Cartridge used hours since replacement: 999999
25	MRgt Inj Fqc9999	M Reagent injection frequency since cartridge replacement: 9999
26	MLeakage Log1 *	M Hardness leakage record 1
27	MDate 06/23/99	M Date of Hardness leakage(m/d/y) 06/23/99
28	MTime 15:28	M Time of Hardness leakage 15:28
29	MEvl Stg Conc: 2	M Evaluation standard at concentration of 2
30	MLeakage Min9999	M Total leakage minute: 9999min.
31	MRset 06/23/99	M Date of reset (m/d/y): 06/23/99
32	MRset Time 15:28	M Time of reset: 15:28
33	MStm Fault Log1*	M System error record 1
34	MBlk Out Log1 *	M black out record 1

M: Indicate Maintenance Mode

Maintenance Mode display can be changed by pressing the “Items” switch.
In the event a * mark appears, mode/display can be changed by pressing the “UP” switch.

Chapter 8 Maintenance

Explains daily maintenance the Colormetry system and how to replace the reagent cartridge, fiber filter cartridge and constant-flow regulator valve.

8-1 Routine care

(1) Daily inspection items

[1] Verifying the results of monitoring (weekly)
Use an ordinary hardness-indicator reagent to check for evaluation errors due to a possible system malfunction. Record the results.
An ordinary hardness-indicator reagent may be too low in sensitivity to compare the monitoring of minute hardness leakage against the Colormetry system. If the monitoring results of the two are obviously different, the system may have developed a problem.
Note: Use a low-range hardness indicator for this comparison (gpg range is not suitable).

[2] Verifying the results of automatic monitoring (weekly)
Check for proper automatic monitoring.
Where a remote signal is connected, but does not turn on due to a problem, the system will not enter the monitor status.

[3] Checking the state of feed water and drain pipes (as needed)
Check to see if the pipe is free of bends.
Bent pipe will prevent the adequate feeding of water. A bent drain tube will create back pressure, and in the worst case may cause water leakage.

[4] Replacing the reagent cartridge (every three to four months)
(Refer to Section 8-3, “Replacing the reagent cartridge,” on page 73.)
Replace the cartridge when a “New Cartridge” message appears in the display.

[5] Replacing the fiber filter cartridge and constant-flow regulator valve (as needed)
Refer to Section 8-4, “Replacing fiber filter cartridge and constant-flow regulator valve,” on page 77.)

(2) About verifying the amount of hardness leakage on the occurrence of hardness-leakage alarm (as needed)
The alarm trigger levels of hardness leakage are as low as 1 mg/L and 2 mg/L for the Colormetry system. These levels may be too low to be compared against the results of an ordinary hardness-indicator reagent evaluation method.
To verify the amount of hardness leakage, perform an analysis of water on Ca, Mg, Zn and Cu.
In comparison between the Colormetry system evaluation and water analysis, the results of the two may differ if the time and location of sample collection are different. For water analysis, obtain a sample from the Colormetry system's drain, as well, for comparison against the system evaluation result.

Recommended periodic maintenance schedule.

No.	Item	1 week	3 ~ 4 weeks	As Needed
[1]	Verifying the results of monitoring	●		
[2]	Verifying the automatic monitor operation	●		
[3]	Checking the state of feed-water and drain-pipes			●
[4]	Replacing the reagent cartridge		●	
[5]	Replacing the fiber filter cartridge and constant-flow regulator valve			●
[6]	Verifying the level of hardness leakage on the occurrence of hardness-leakage alarm			●

(3) About the prevention of freezing

If there is a risk of freezing in an installation in a cold region, but no protection against freezing has been applied to it, close the main feed-water line valve to the Colormetry system and drain the water at the supply end. (Drain the filter casing also, and remove and store the fiber filter cartridge in a nonfreezing area. Freezing may damage the fiber.)

If possible, drain the water from the monitor cell. If it is too difficult to do so, pull the cartridge lever and remove the reagent cartridge from the main unit.

⚠ CAUTION

Freezing may crack the fiber filter cartridge, filter casing or monitor container inside the main unit.

8-2 General information

⚠ CAUTION

The maximum pressure of raw water to the Colormetry system is 71 psi. Pressure beyond that may cause water leakage due to deformations in the internal connections or gaskets. Be sure to use it under the specified pressure.
The drain end must open into the air. Back pressure at the drain end may cause an internal water leakage.
The main unit has a relief hole in the bottom to quickly drain away internally leaked water and prevent short circuits.
Do not place any object underneath the installed system that may get wet in the unlikely event of internal leakage.
Be sure to keep the feed-water and drain-water pipes free of kinks.

⚠ WARNING

(1) Do not remove the front cover from the main unit.
(2) Do not disassemble the Colormetry unit.

8-3 Replacing the reagent cartridge

Replace the cartridge in accordance with the procedure given below so that the system will provide a long service life.

(1) How Colormetry determines it is time for a new cartridge

The Colormetry system will determine that it is due for a new reagent cartridge when 3,500 hours have elapsed or after the reagent pump has operated 3,500 times following the installation of a new cartridge.

(2) What Colormetry will do at that time

It will display a [New Cartridge] message and issue an alarm. Even if Buzzer Reset is pressed to stop the buzzer, the buzzer will sound again after a week until the timer counter for the reagent cartridge is reset. The external alarm's master output contact will remain on, likewise. If no spare cartridge is available, obtain and reload one immediately.

If a “Reagent injection confirmation error” [Injection Cfm F] or “Reagent injection error” [Injection F] is displayed, press the reagent bag with a finger through the hole in the back of the cartridge to check for the remaining reagent. If none is felt in the bag, replace the cartridge immediately.

- How to replace the old cartridge

Replace the old cartridge according to the flowchart on the next page.

The power must be left on during replacement work. Start working in the Standby for Measurement mode.

The timer counter for cartridge replacement will automatically be reset.

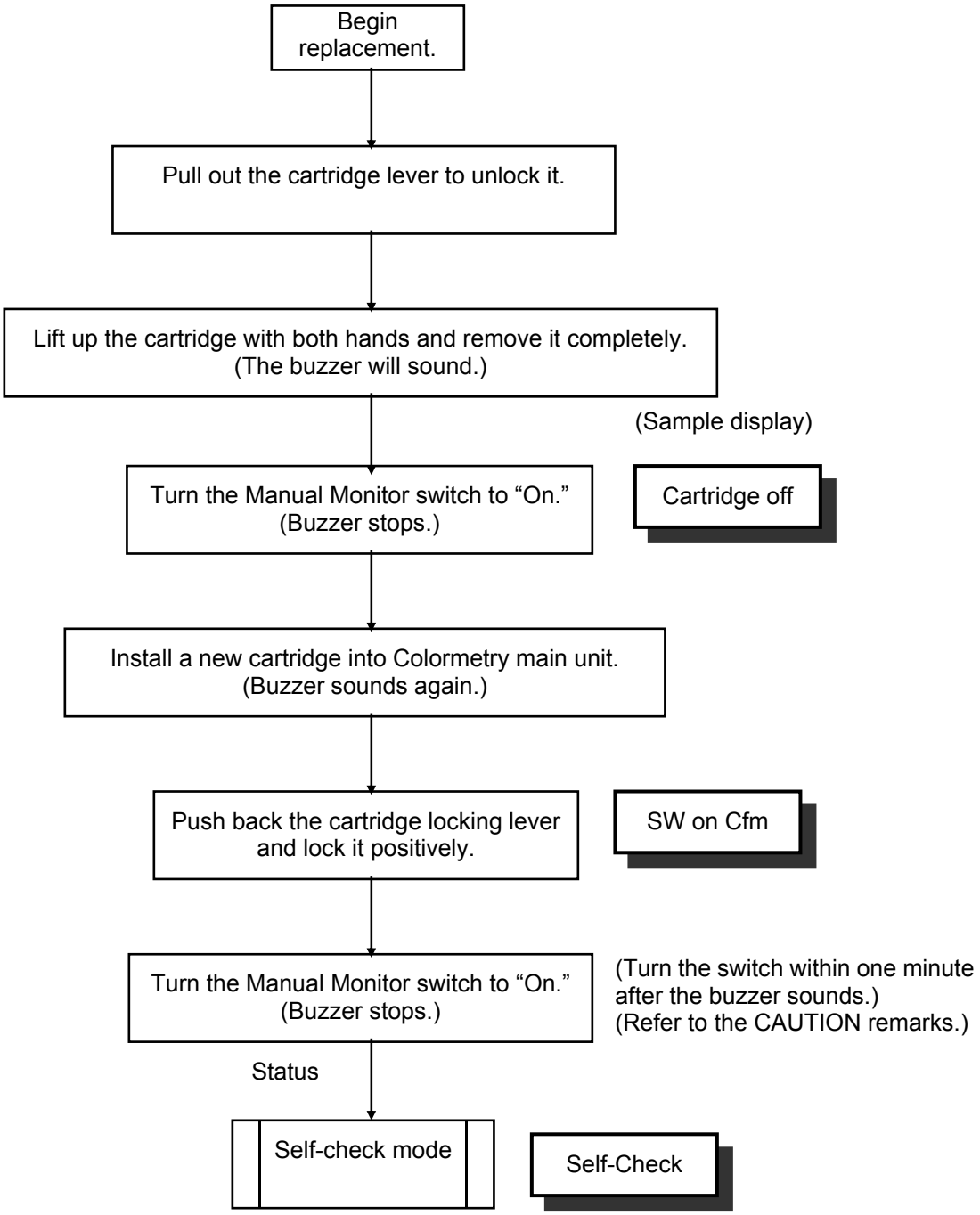
If a reagent cartridge is replaced (or installed) with the power shut off, the timer counter for cartridge replacement will not be reset automatically. In such a case, you must without fail manually enter the date the reagent cartridge was replaced. Refer to the section entitled, "About items to be set in Setting mode" on page 62 for instructions.

⚠ CAUTION

- Replace the cartridge with the power left on but only while the system is in monitor standby mode.
- Never remove the check tube attached to the nozzle of the reagent cartridge (refer to Section 3-2-2, “External appearance of reagent cartridge,” on page 18.) Keep the fingers off the check tube too, since doing so may affect the amount of injection.
- When installing a new cartridge, push it down slowly, being careful not to let the nozzle and check tube hit main unit.

WARNING

Be sure to dispose of the used reagent cartridge only after completely discarding the remaining reagent from the reagent cartridge.


Begin replacement.
Pull out the cartridge lever to unlock it.
Lift up the cartridge with both hands and remove it completely.
(The buzzer will sound.)
(Sample display)
Turn the Manual Monitor switch to “On.”
(Buzzer stops.)
Cartridge off
Install a new cartridge into Colormetry main unit.
(Buzzer sounds again.)
Push back the cartridge locking lever and lock it positively.
SW on Cfm
Turn the Manual Monitor switch to “On.”
(Buzzer stops.)
(Turn the switch within one minute after the buzzer sounds.)
(Refer to the CAUTION remarks.)
Status
Self-check mode
Self-Check

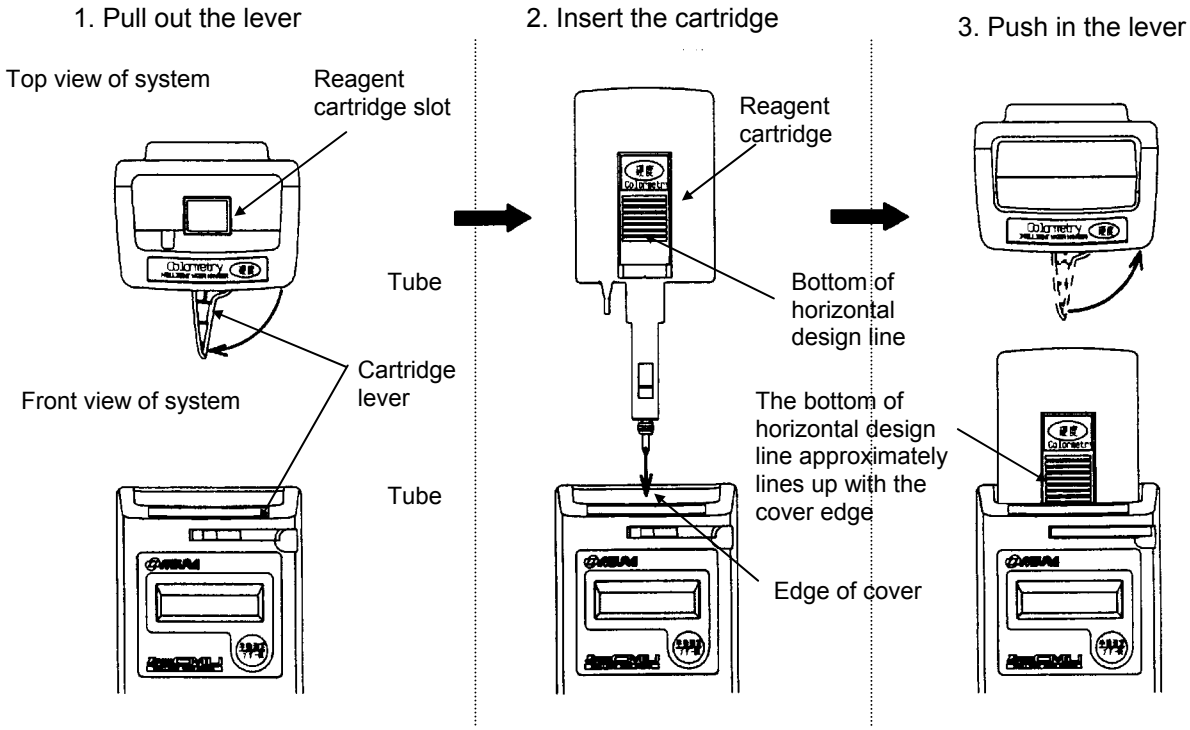


Fig. 15

⚠ CAUTION

If the reagent cartridge being used is temporarily removed for reinstallation later, do not press the Manual Monitor switch. The buzzer will stop automatically within one minute. Pressing the Manual Monitor switch will reset the timer for cartridge replacement, thereby rendering the automatically displayed replacement date meaningless.

⚠ CAUTION

About the reagent cartridge

[1] The reagent cartridge has a definite life. Finish a cartridge within one year of its date of manufacture, that is stated on the cartridge box. (A cartridge is used up in about four months.)

[2] Do not store cartridges for a long period of time. If they are to be stored, select a cool, dark place.

[3] Do not break the seal on the reagent cartridge bag until the moment of installation. Doing so will accelerate its deterioration.

[4] Do not touch the nozzle or tube of the reagent cartridge. Doing so will affect the injection level, and in the worst case may stop monitoring.

[5] Do not use the reagent cartridge for other than the Colormetry system.

[6] Never disassemble a reagent cartridge. Reagent may splatter onto the skin or in the eyes.

[7] Dispose of the reagent cartridge, assembled intact, as plastic waste.

[8] If the reagent gets on the skin or in the eyes, immediately rinse it off with water.

8-4 Replacing fiber filter cartridge and constant-flow regulator valve

(1) When to replace

If the water flow is small even though the supply pressure is within the specified range, the fiber filter or constant-flow regulator valve is clogged or has deteriorated. Specifically, when one of the following alarms is issued in the self-diagnostic error mode, clogging or deterioration of the filter or washer should be suspected, if nothing else:

[1] "Wash error" [Wash F]
[2] "Reagent injection error" [Injection F]
[3] "Wash water flow insufficient" [Wash Flow F]

The lifespan of the fiber filter should be about a year on city water, but may be shorter depending on the water quality and supply pressure. Even if none of the above alarms is issued, it should be replaced after a year as a rule of thumb.

When replacing the fiber filter, also install the new constant-flow regulator washer that comes with the replacement filter.

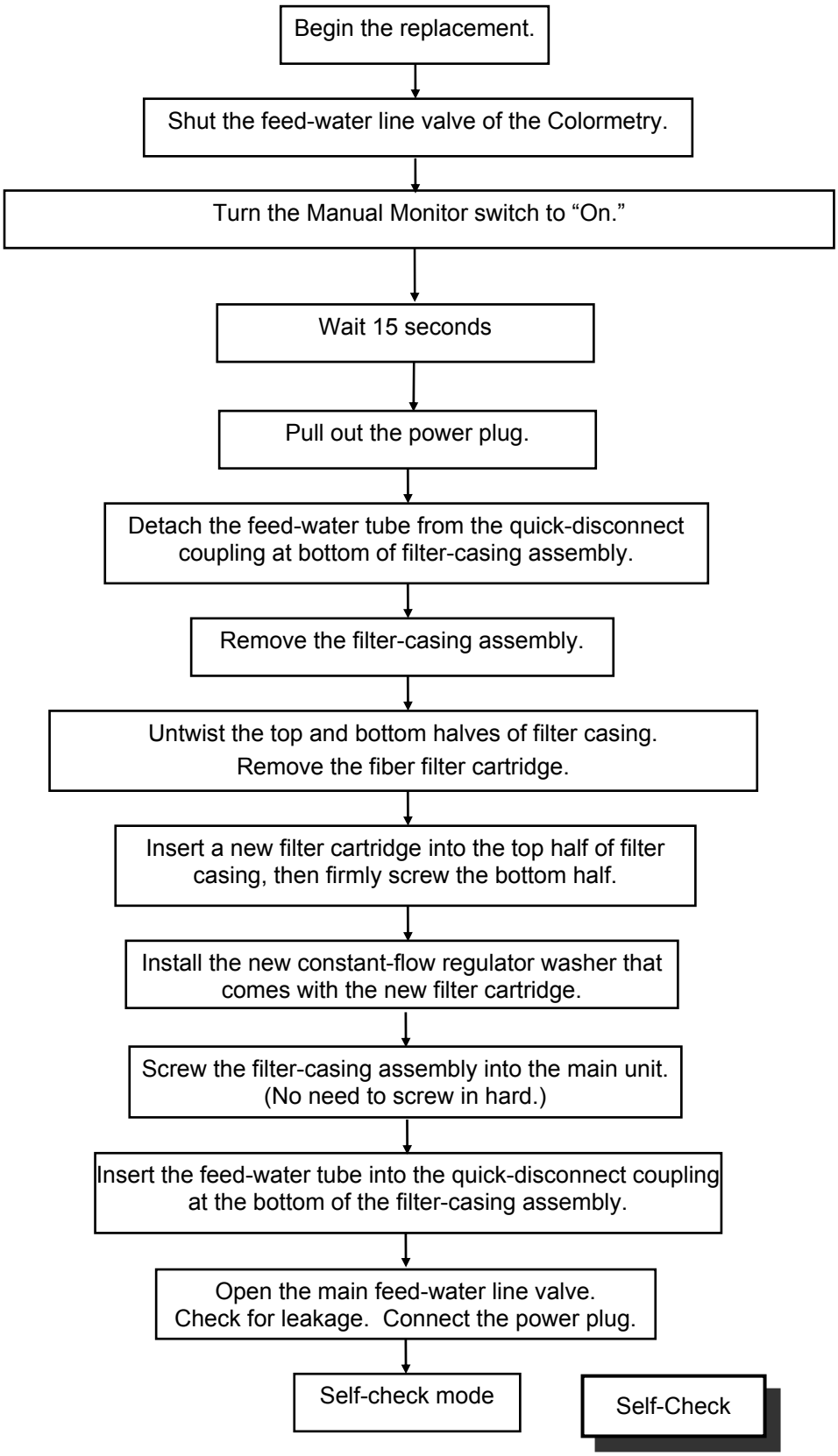
(2) How to replace

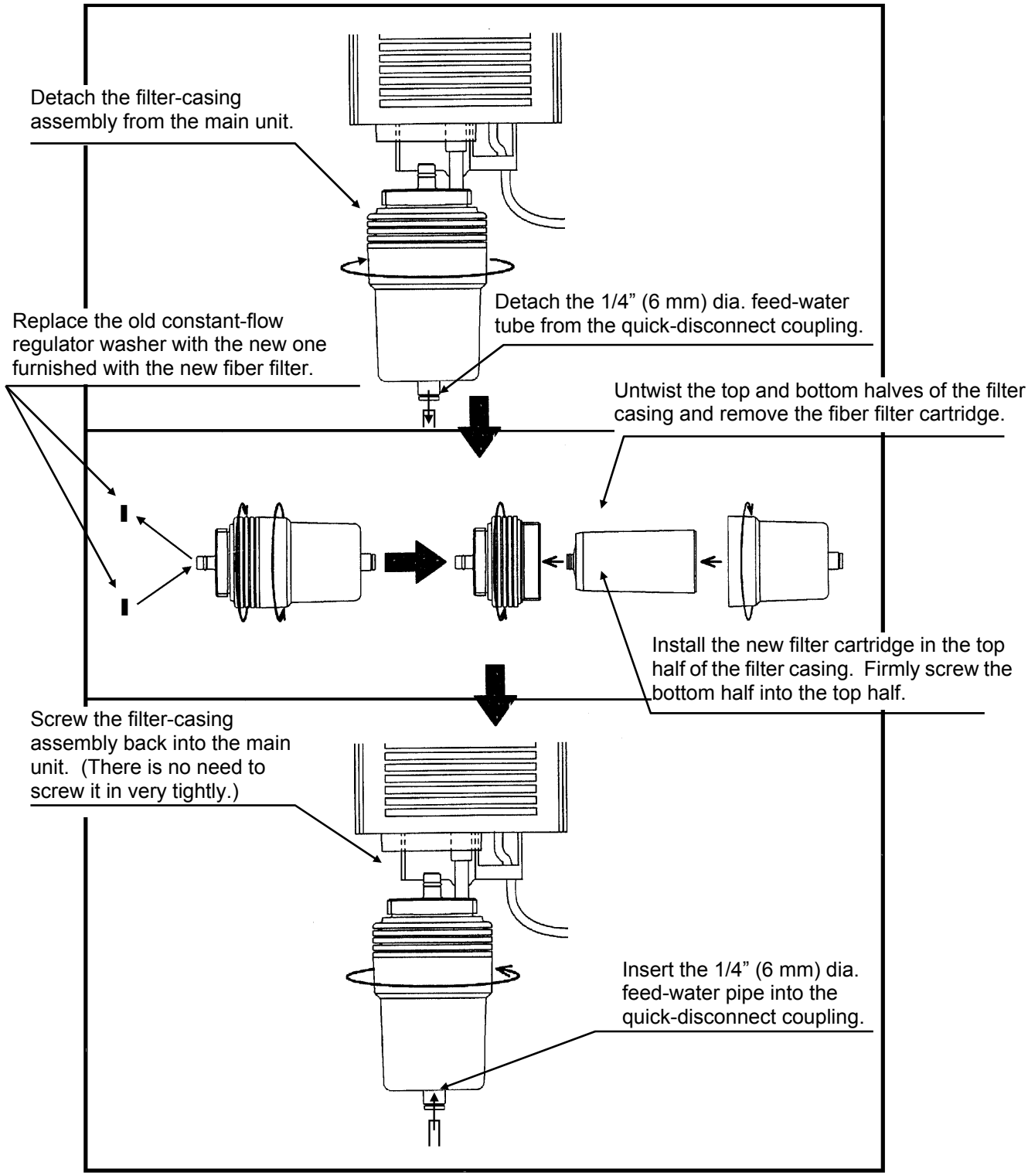
⚠ CAUTION

Water spills around the main unit when replacing the fiber filter. Do not leave things underneath the unit that should not get wet.

⚠ CAUTION

There is a constant-flow regulator washer on the end of the filter casing. If the washer is not found on the filter casing when it is removed from the main unit, the washer may have been left behind in the filter mount of the main unit. Remove the washer without scratching the mount.


Begin the replacement.
Shut the feed-water line valve of the Colormetry.
Turn the Manual Monitor switch to “On.”
Wait 15 seconds
Pull out the power plug.
Detach the feed-water tube from the quick-disconnect coupling at bottom of filter-casing assembly.
Remove the filter-casing assembly.
Untwist the top and bottom halves of filter casing.
Remove the fiber filter cartridge.
Insert a new filter cartridge into the top half of filter casing, then firmly screw the bottom half.
Install the new constant-flow regulator washer that comes with the new filter cartridge.
Screw the filter-casing assembly into the main unit.
(No need to screw in hard.)
Insert the feed-water tube into the quick-disconnect coupling at the bottom of the filter-casing assembly.
Open the main feed-water line valve.
Check for leakage. Connect the power plug.
Self-check mode
Self-Check


Detach the filter-casing assembly from the main unit.
Detach the 1/4” (6 mm) dia. feed-water tube from the quick-disconnect coupling.
Replace the old constant-flow regulator washer with the new one furnished with the new fiber filter.
Untwist the top and bottom halves of the filter casing and remove the fiber filter cartridge.
Install the new filter cartridge in the top half of the filter casing. Firmly screw the bottom half into the top half.
Screw the filter-casing assembly back into the main unit. (There is no need to screw it in very tightly.)
Insert the 1/4” (6 mm) dia. feed-water pipe into the quick-disconnect coupling.

Chapter 9 Troubleshooting

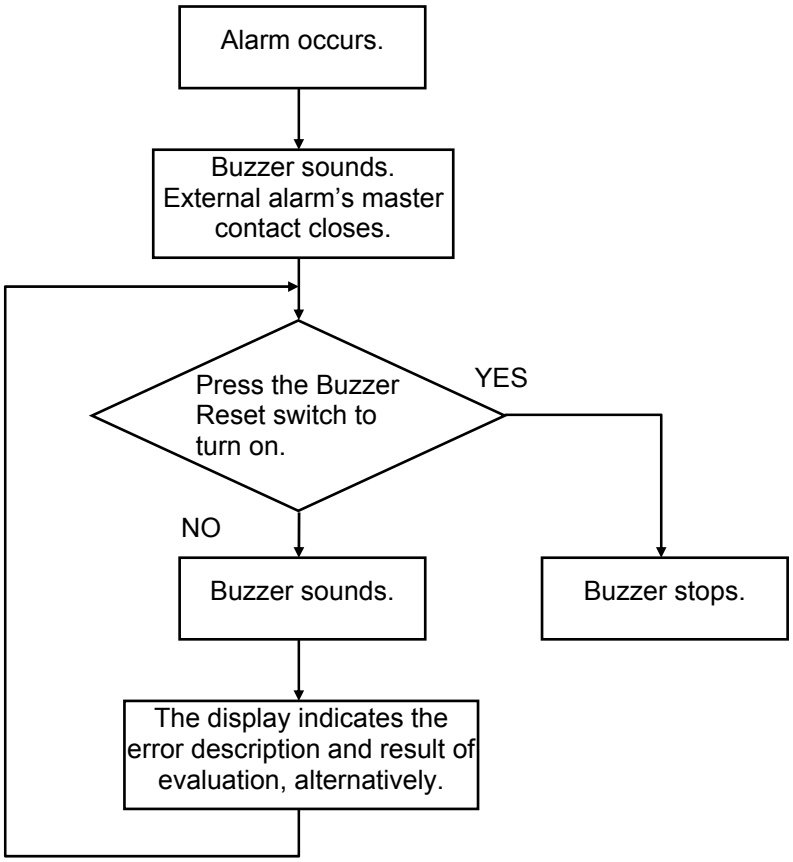
Explains what action should be taken in the event of error, how to clear alarm and how to verify error records.

9-1 About error indications and how to clear alarms

On the occurrence of an error, a typical example of a possible cause of the error is indicated in the LCD display. Refer to the “Troubleshooting” flowchart for other causes.
If an error could not be cleared, contact your dealer immediately.

Error indications on an alarm (common to all errors in the self-check error mode)

When an error occurs, the system sounds a buzzer and the external alarm’s master output contact closes. The LCD display will alternately indicate the error description and most recent result of evaluation (or, “****:- - - -,“ if no evaluation is being made). (Note: Only the error description will be indicated in case of a DIP switch setting error.)

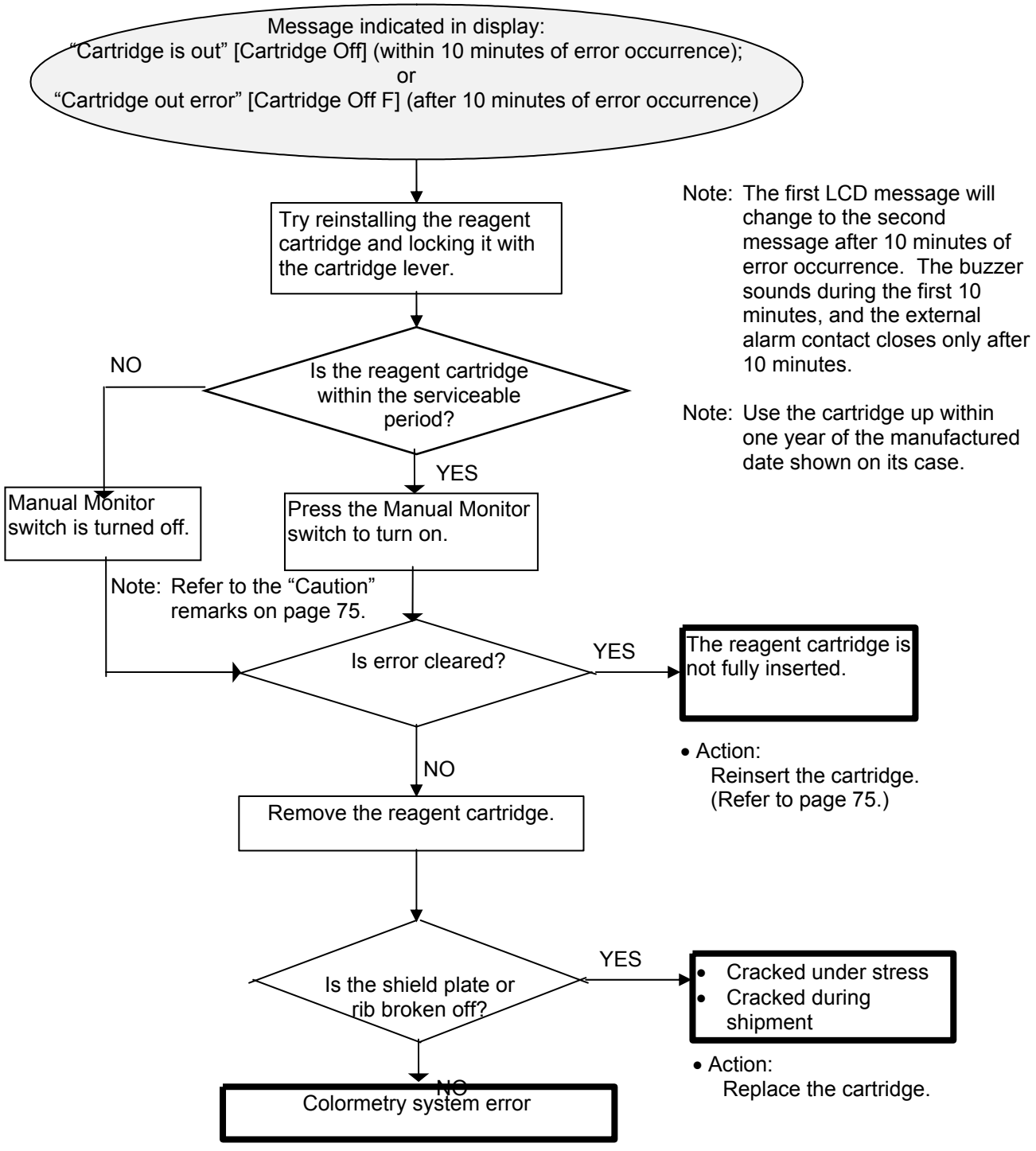


How to clear alarm

- With the buzzer sounding, press the Buzzer Reset (Manual Monitor) switch to stop it. Pressing the switch will not start the Manual-monitoring mode. Pressing the switch once again will start the Self-check or Monitor mode. The external alarm's master contact will not be reset until the condition is evaluated as normal again.
- If the conditions for monitoring are satisfied, monitoring will start even if an alarm is on. Alarm will automatically be cleared if the cause for system error is solved. However, if the error is due to disattachment of the cartridge, monitoring (self-check mode) will not start until attachment of the cartridge is confirmed. Monitoring will not start either on a DIP switch setting error, until the correct settings are made and system is restarted.

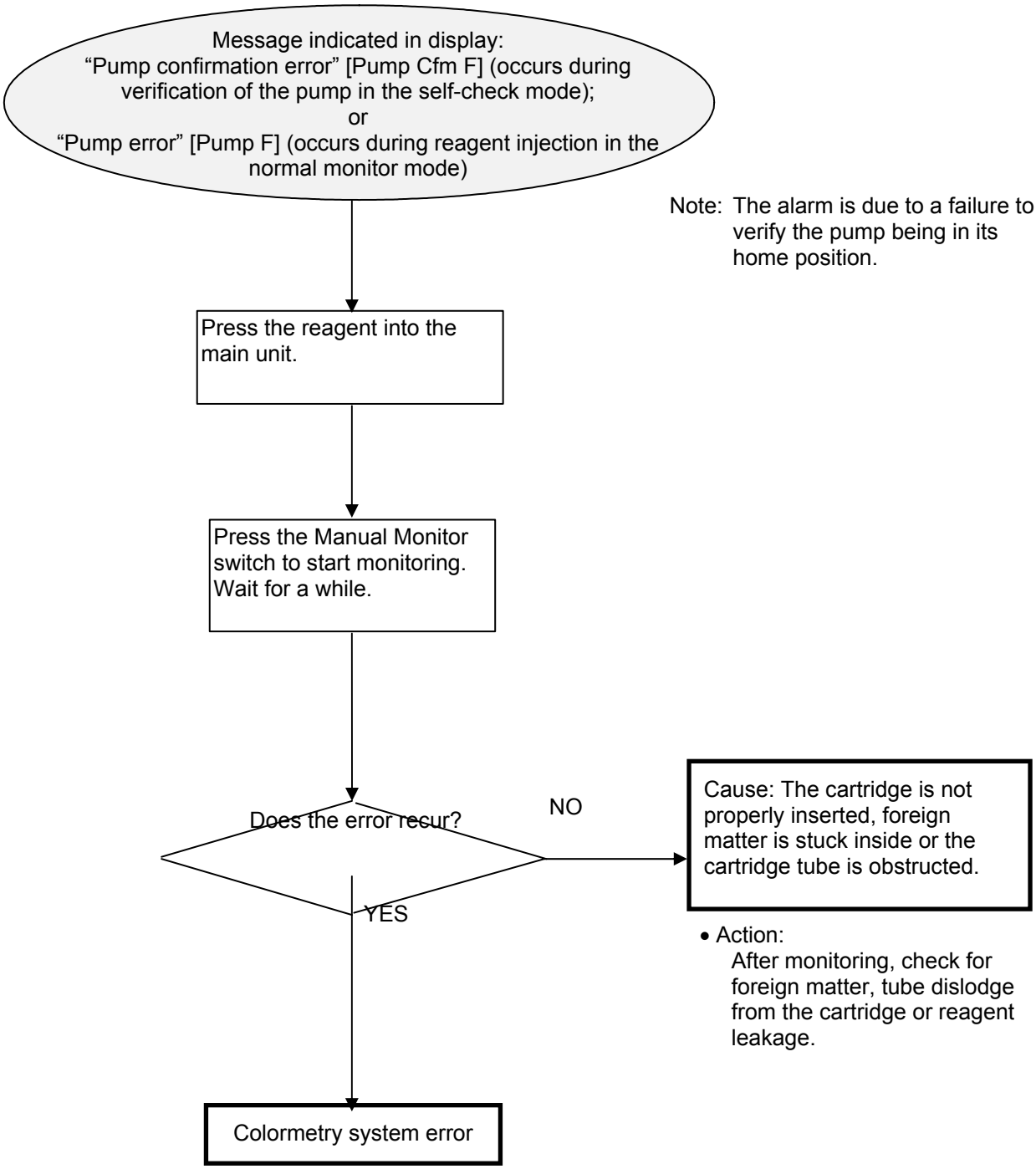
Note: The Buzzer Reset switch also functions as the Manual Monitor switch.

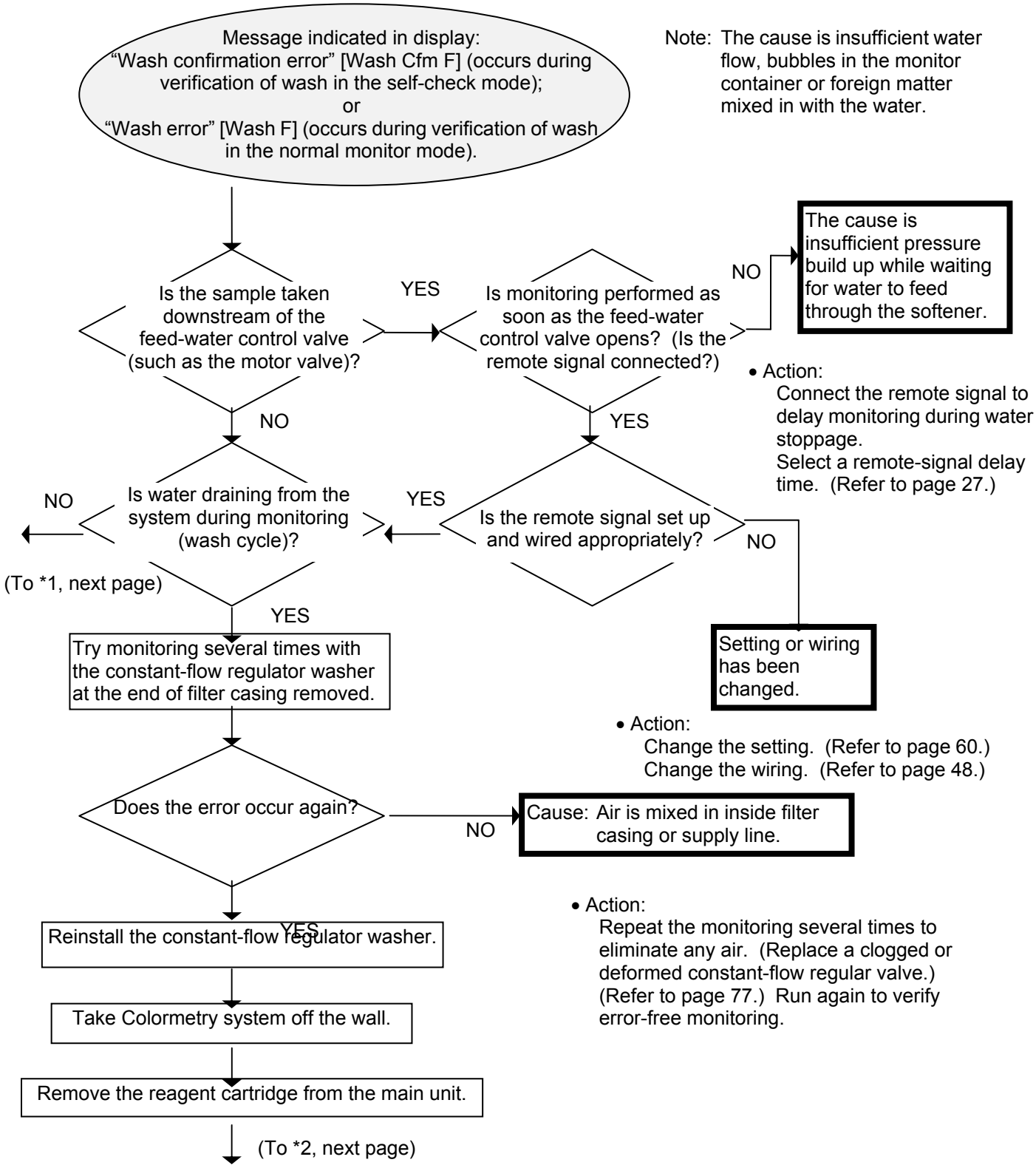
9-2 Troubleshooting

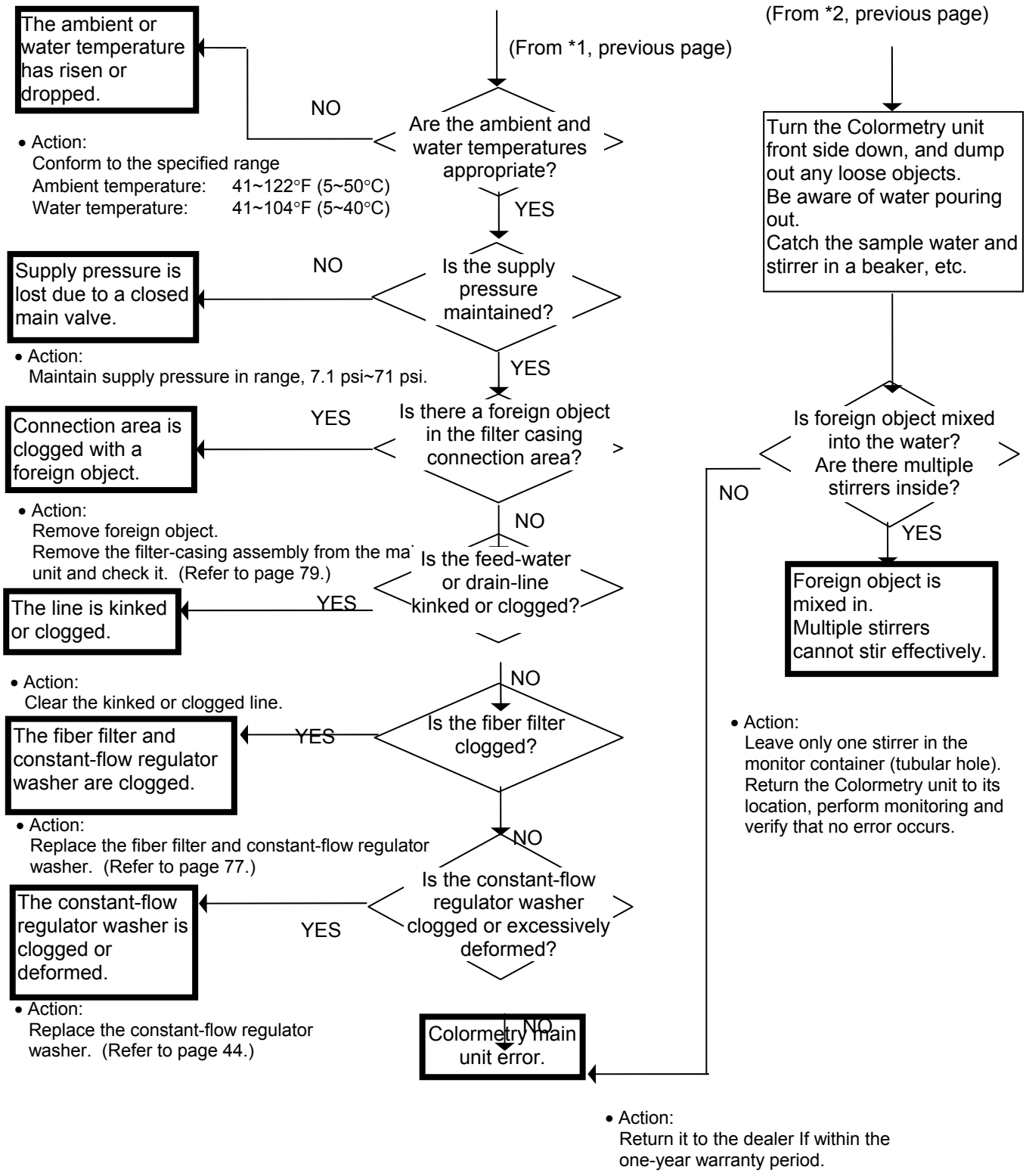


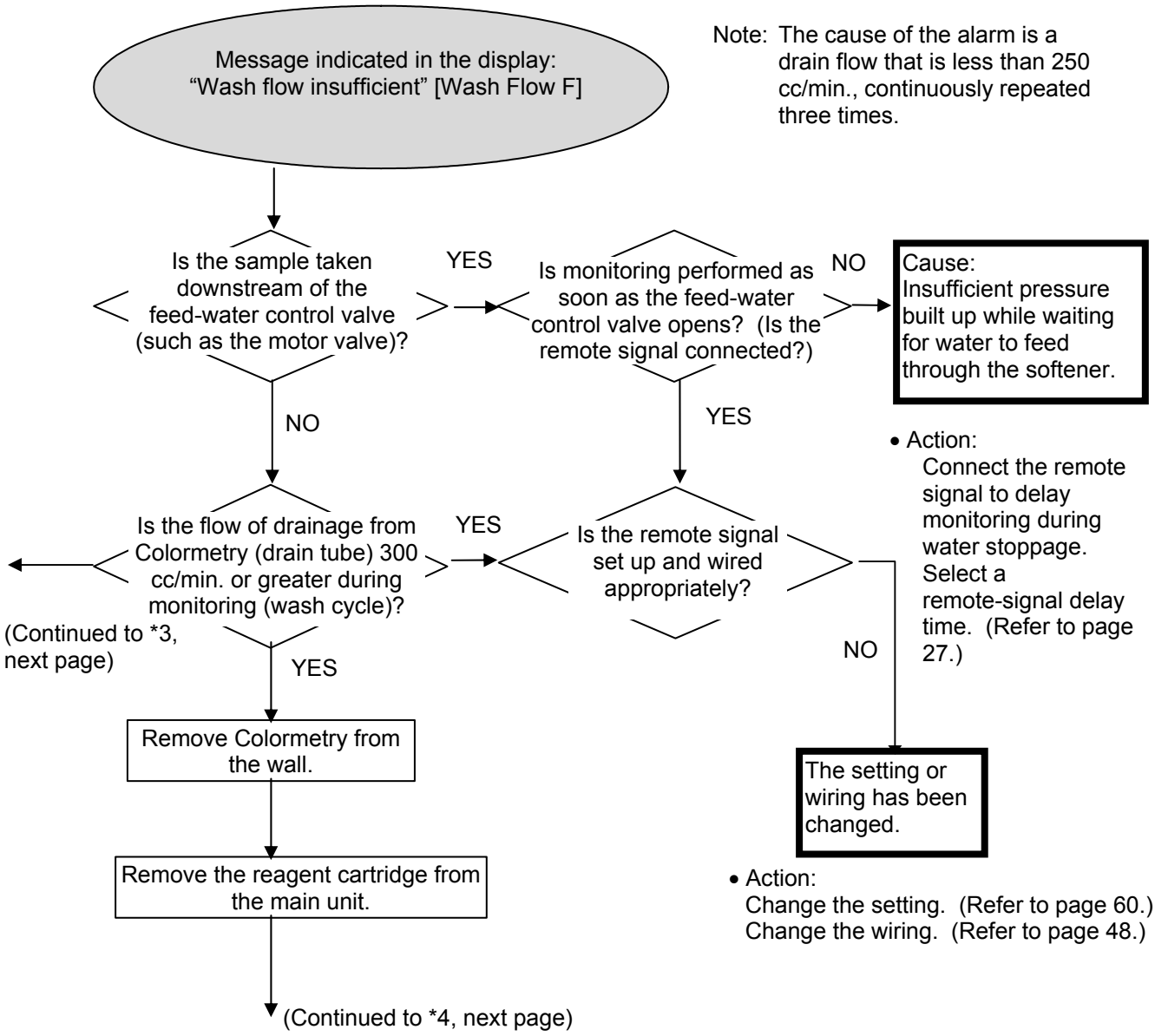
Note: The first LCD message will change to the second message after 10 minutes of error occurrence. The buzzer sounds during the first 10 minutes, and the external alarm contact closes only after 10 minutes.

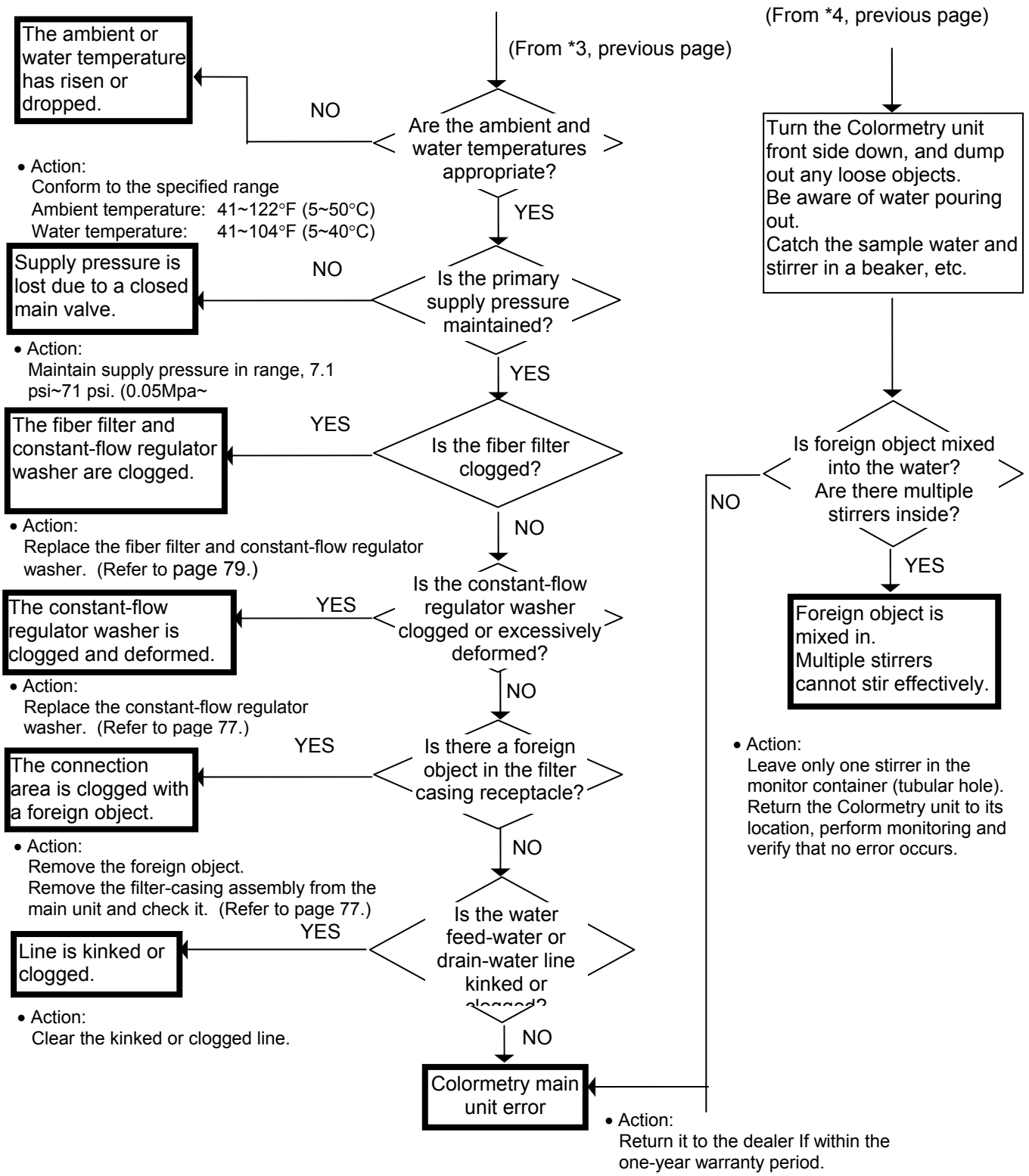
Note: Use the cartridge up within one year of the manufactured date shown on its case.

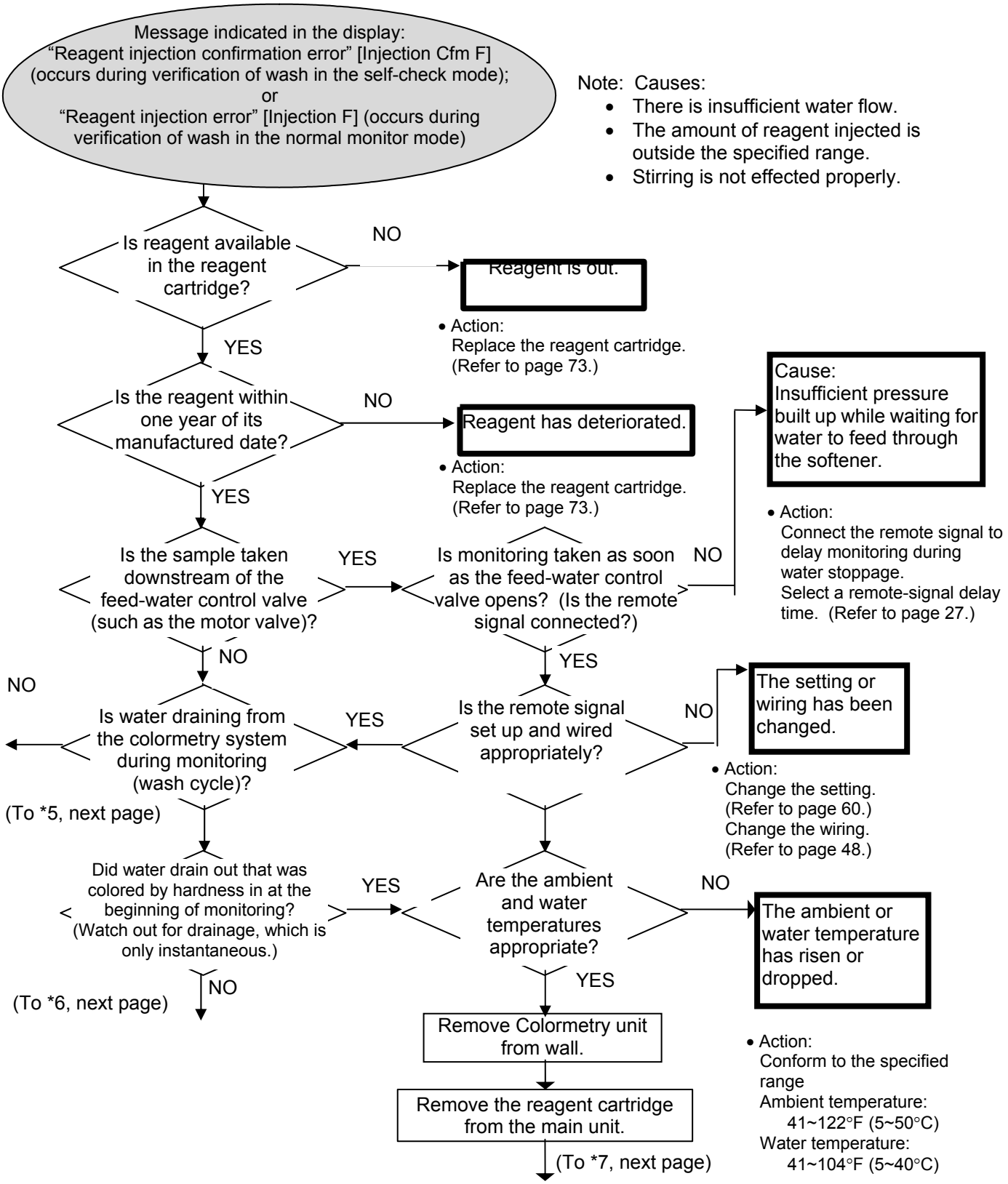

Message indicated in display:
“Pump confirmation error” [Pump Cfm F] (occurs during verification of the pump in the self-check mode);
or
“Pump error” [Pump F] (occurs during reagent injection in the normal monitor mode)
Note: The alarm is due to a failure to verify the pump being in its home position.
Press the reagent into the main unit.
Press the Manual Monitor switch to start monitoring. Wait for a while.
Does the error recur?
NO
YES
Cause: The cartridge is not properly inserted, foreign matter is stuck inside or the cartridge tube is obstructed.
• Action:
After monitoring, check for foreign matter, tube dislodge from the cartridge or reagent leakage.
Colormetry system error
• Action:
Return it to the dealer if within the one-year warranty period.

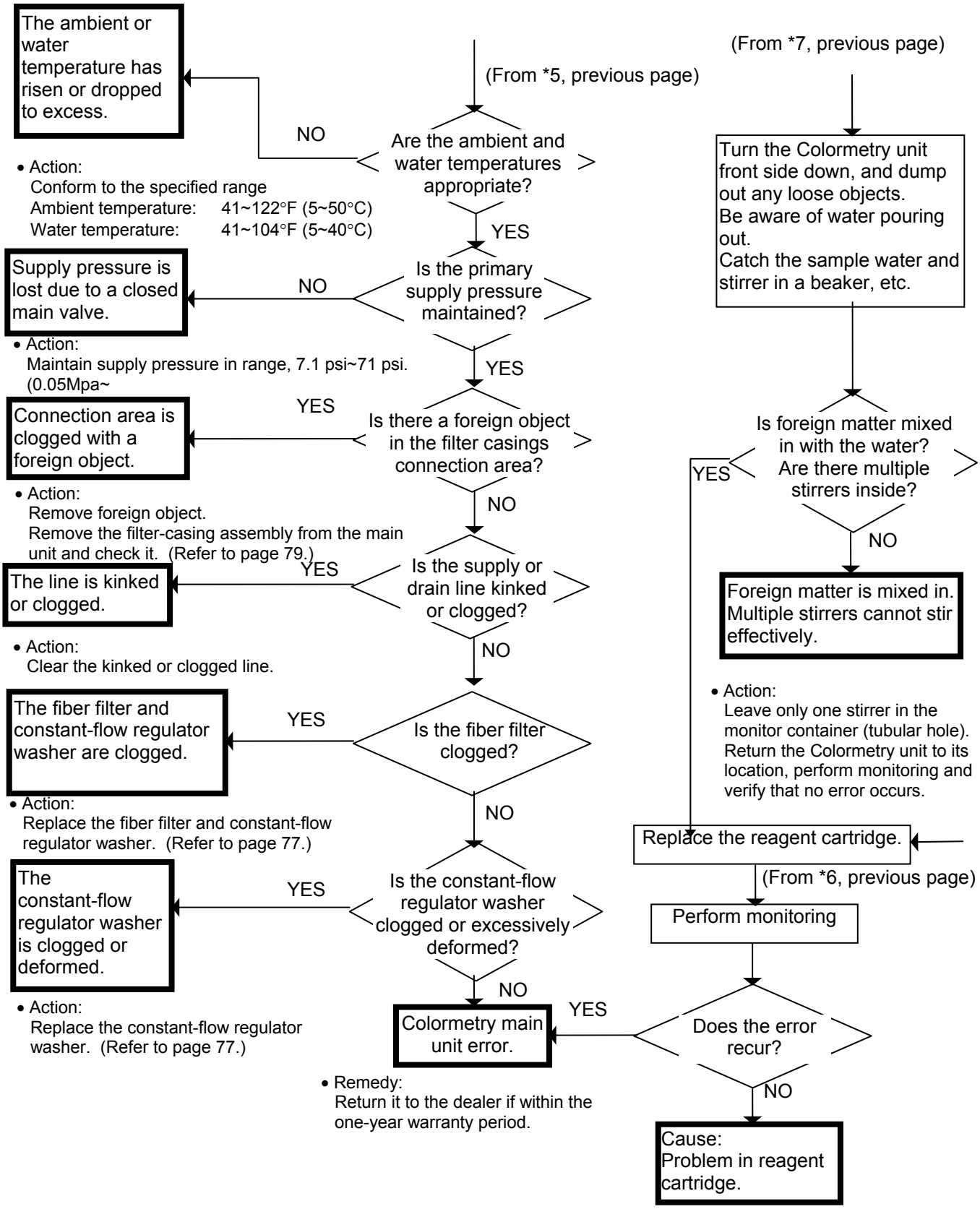

Message indicated in display:
"Wash confirmation error" [Wash Cfm F] (occurs during verification of wash in the self-check mode);
or
"Wash error" [Wash F] (occurs during verification of wash in the normal monitor mode).
Note: The cause is insufficient water flow, bubbles in the monitor container or foreign matter mixed in with the water.
Is the sample taken downstream of the feed-water control valve (such as the motor valve)?
YES
Is monitoring performed as soon as the feed-water control valve opens? (Is the remote signal connected?)
NO
The cause is insufficient pressure build up while waiting for water to feed through the softener.
• Action:
Connect the remote signal to delay monitoring during water stoppage.
Select a remote-signal delay time. (Refer to page 27.)
NO
YES
Is water draining from the system during monitoring (wash cycle)?
NO
YES
Is the remote signal set up and wired appropriately?
NO
(To *1, next page)
YES
Try monitoring several times with the constant-flow regulator washer at the end of filter casing removed.
Setting or wiring has been changed.
• Action:
Change the setting. (Refer to page 60.)
Change the wiring. (Refer to page 48.)
Does the error occur again?
NO
Cause: Air is mixed in inside filter casing or supply line.
YES
Reinstall the constant-flow regulator washer.
• Action:
Repeat the monitoring several times to eliminate any air. (Replace a clogged or deformed constant-flow regular valve.) (Refer to page 77.) Run again to verify error-free monitoring.
Take Colormetry system off the wall.
Remove the reagent cartridge from the main unit.
(To *2, next page)

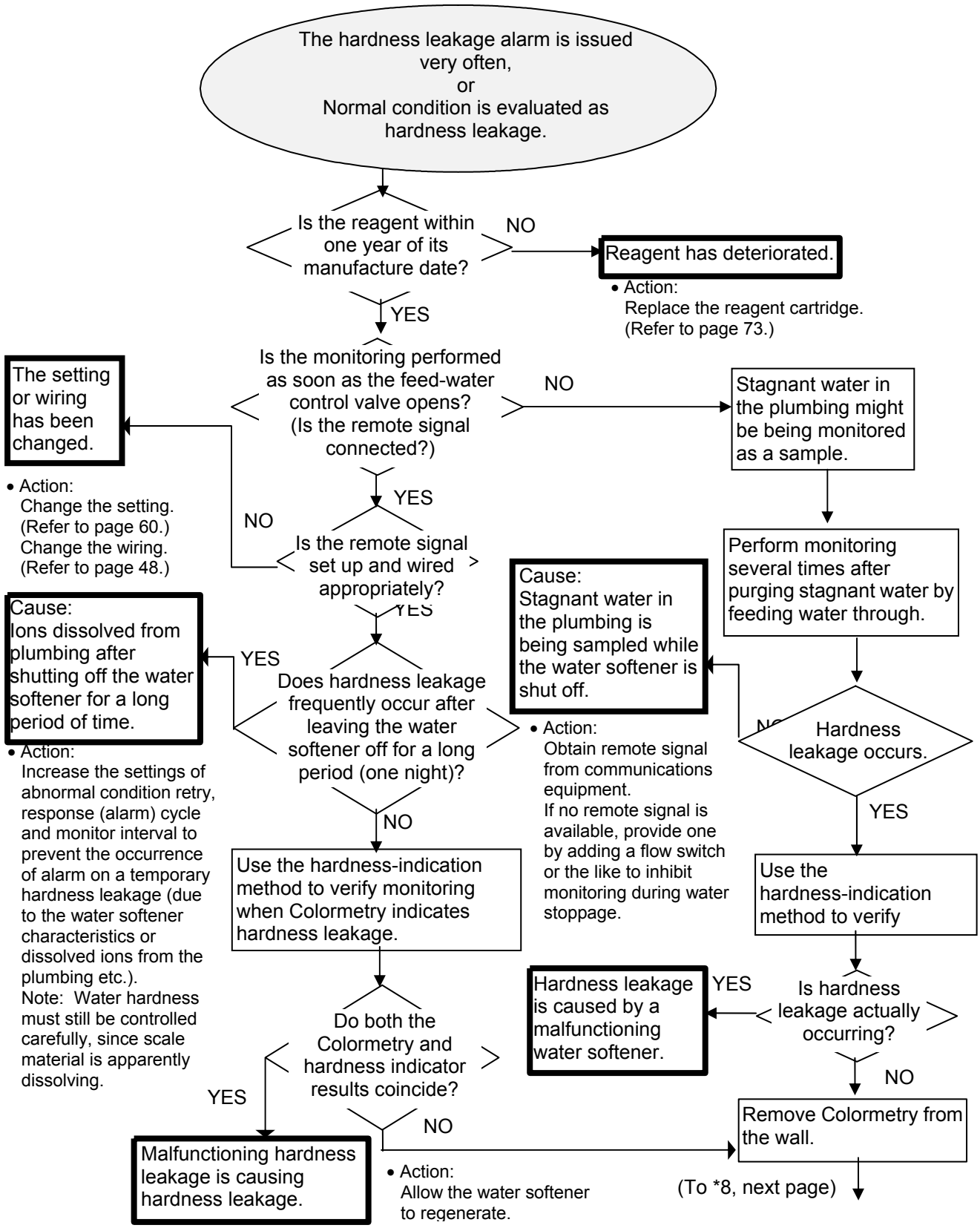

(From *1, previous page)
Are the ambient and water temperatures appropriate?
NO
The ambient or water temperature has risen or dropped.
• Action:
Conform to the specified range
Ambient temperature: 41~122°F (5~50°C)
Water temperature: 41~104°F (5~40°C)
YES
Is the supply pressure maintained?
NO
Supply pressure is lost due to a closed main valve.
• Action:
Maintain supply pressure in range, 7.1 psi~71 psi.
YES
Is there a foreign object in the filter casing connection area?
YES
Connection area is clogged with a foreign object.
• Action:
Remove foreign object.
Remove the filter-casing assembly from the ma
unit and check it. (Refer to page 79.)
NO
Is the feed-water or drain-line kinked or clogged?
YES
The line is kinked or clogged.
• Action:
Clear the kinked or clogged line.
NO
Is the fiber filter clogged?
YES
The fiber filter and constant-flow regulator washer are clogged.
• Action:
Replace the fiber filter and constant-flow regulator washer. (Refer to page 77.)
NO
Is the constant-flow regulator washer clogged or excessively deformed?
YES
The constant-flow regulator washer is clogged or deformed.
• Action:
Replace the constant-flow regulator washer. (Refer to page 44.)
NO
Colormetry main unit error.
• Action:
Return it to the dealer If within the one-year warranty period.
(From *2, previous page)
Turn the Colormetry unit front side down, and dump out any loose objects.
Be aware of water pouring out.
Catch the sample water and stirrer in a beaker, etc.
Is foreign object mixed into the water? Are there multiple stirrers inside?
NO
YES
Foreign object is mixed in.
Multiple stirrers cannot stir effectively.
• Action:
Leave only one stirrer in the monitor container (tubular hole).
Return the Colormetry unit to its location, perform monitoring and verify that no error occurs.

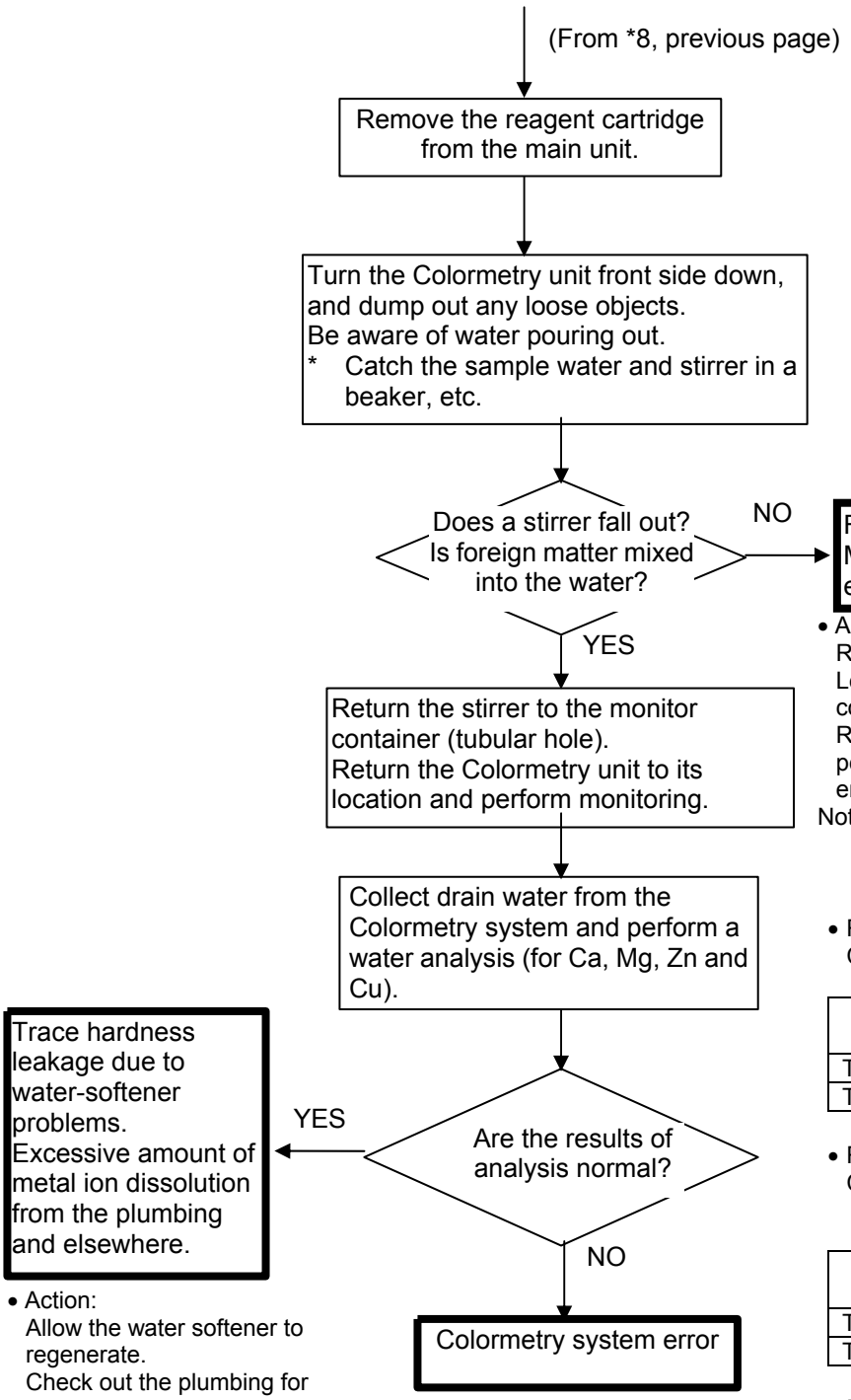

Message indicated in the display:
“Wash flow insufficient” [Wash Flow F]
Note: The cause of the alarm is a drain flow that is less than 250 cc/min., continuously repeated three times.
Is the sample taken downstream of the feed-water control valve (such as the motor valve)?
YES
Is monitoring performed as soon as the feed-water control valve opens? (Is the remote signal connected?)
NO
Cause:
Insufficient pressure built up while waiting for water to feed through the softener.
NO
YES
• Action:
Connect the remote signal to delay monitoring during water stoppage. Select a remote-signal delay time. (Refer to page 27.)
Is the flow of drainage from Colormetry (drain tube) 300 cc/min. or greater during monitoring (wash cycle)?
YES
Is the remote signal set up and wired appropriately?
(Continued to *3, next page)
NO
YES
Remove Colormetry from the wall.
The setting or wiring has been changed.
Remove the reagent cartridge from the main unit.
• Action:
Change the setting. (Refer to page 60.)
Change the wiring. (Refer to page 48.)
(Continued to *4, next page)


(From *3, previous page)
Are the ambient and water temperatures appropriate?
NO
The ambient or water temperature has risen or dropped.
• Action:
Conform to the specified range
Ambient temperature: 41~122°F (5~50°C)
Water temperature: 41~104°F (5~40°C)
YES
Is the primary supply pressure maintained?
NO
Supply pressure is lost due to a closed main valve.
• Action:
Maintain supply pressure in range, 7.1 psi~71 psi. (0.05Mpa~
YES
Is the fiber filter clogged?
YES
The fiber filter and constant-flow regulator washer are clogged.
• Action:
Replace the fiber filter and constant-flow regulator washer. (Refer to page 79.)
NO
Is the constant-flow regulator washer clogged or excessively deformed?
YES
The constant-flow regulator washer is clogged and deformed.
• Action:
Replace the constant-flow regulator washer. (Refer to page 77.)
NO
Is there a foreign object in the filter casing receptacle?
YES
The connection area is clogged with a foreign object.
• Action:
Remove the foreign object.
Remove the filter-casing assembly from the main unit and check it. (Refer to page 77.)
NO
Is the water feed-water or drain-water line kinked or clogged?
YES
Line is kinked or clogged.
• Action:
Clear the kinked or clogged line.
NO
Colormetry main unit error
• Action:
Return it to the dealer If within the one-year warranty period.
(From *4, previous page)
Turn the Colormetry unit front side down, and dump out any loose objects.
Be aware of water pouring out.
Catch the sample water and stirrer in a beaker, etc.
Is foreign object mixed into the water? Are there multiple stirrers inside?
NO
YES
Foreign object is mixed in.
Multiple stirrers cannot stir effectively.
• Action:
Leave only one stirrer in the monitor container (tubular hole).
Return the Colormetry unit to its location, perform monitoring and verify that no error occurs.


Message indicated in the display:
"Reagent injection confirmation error" [Injection Cfm F]
(occurs during verification of wash in the self-check mode);
or
"Reagent injection error" [Injection F] (occurs during verification of wash in the normal monitor mode)
Note: Causes:
There is insufficient water flow.
The amount of reagent injected is outside the specified range.
Stirring is not effected properly.
Is reagent available in the reagent cartridge?
NO
Reagent is out.
• Action:
Replace the reagent cartridge.
(Refer to page 73.)
YES
Is the reagent within one year of its manufactured date?
NO
Reagent has deteriorated.
• Action:
Replace the reagent cartridge.
(Refer to page 73.)
YES
Is the sample taken downstream of the feed-water control valve (such as the motor valve)?
YES
Is monitoring taken as soon as the feed-water control valve opens? (Is the remote signal connected?)
NO
Cause:
Insufficient pressure built up while waiting for water to feed through the softener.
• Action:
Connect the remote signal to delay monitoring during water stoppage.
Select a remote-signal delay time. (Refer to page 27.)
NO
YES
NO
Is water draining from the colormetry system during monitoring (wash cycle)?
YES
Is the remote signal set up and wired appropriately?
NO
The setting or wiring has been changed.
• Action:
Change the setting.
(Refer to page 60.)
Change the wiring.
(Refer to page 48.)
(To *5, next page)
Did water drain out that was colored by hardness in at the beginning of monitoring?
(Watch out for drainage, which is only instantaneous.)
YES
Are the ambient and water temperatures appropriate?
NO
The ambient or water temperature has risen or dropped.
(To *6, next page)
NO
YES
Remove Colormetry unit from wall.
Remove the reagent cartridge from the main unit.
(To *7, next page)
• Action:
Conform to the specified range
Ambient temperature:
41~122°F (5~50°C)
Water temperature:
41~104°F (5~40°C)


(From *5, previous page)
Are the ambient and water temperatures appropriate?
NO
The ambient or water temperature has risen or dropped to excess.
• Action:
Conform to the specified range
Ambient temperature: 41~122°F (5~50°C)
Water temperature: 41~104°F (5~40°C)
YES
Is the primary supply pressure maintained?
NO
Supply pressure is lost due to a closed main valve.
• Action:
Maintain supply pressure in range, 7.1 psi~71 psi. (0.05Mpa~
YES
Is there a foreign object in the filter casings connection area?
YES
Connection area is clogged with a foreign object.
• Action:
Remove foreign object.
Remove the filter-casing assembly from the main unit and check it. (Refer to page 79.)
NO
Is the supply or drain line kinked or clogged?
YES
The line is kinked or clogged.
• Action:
Clear the kinked or clogged line.
NO
Is the fiber filter clogged?
YES
The fiber filter and constant-flow regulator washer are clogged.
• Action:
Replace the fiber filter and constant-flow regulator washer. (Refer to page 77.)
NO
Is the constant-flow regulator washer clogged or excessively deformed?
YES
The constant-flow regulator washer is clogged or deformed.
• Action:
Replace the constant-flow regulator washer. (Refer to page 77.)
NO
Colormetry main unit error.
• Remedy:
Return it to the dealer if within the one-year warranty period.
(From *7, previous page)
Turn the Colormetry unit front side down, and dump out any loose objects.
Be aware of water pouring out.
Catch the sample water and stirrer in a beaker, etc.
Is foreign matter mixed in with the water? Are there multiple stirrers inside?
YES
NO
Foreign matter is mixed in. Multiple stirrers cannot stir effectively.
• Action:
Leave only one stirrer in the monitor container (tubular hole). Return the Colormetry unit to its location, perform monitoring and verify that no error occurs.
Replace the reagent cartridge.
(From *6, previous page)
Perform monitoring
Does the error recur?
YES
NO
Cause:
Problem in reagent cartridge.


The hardness leakage alarm is issued very often, or Normal condition is evaluated as hardness leakage.
Is the reagent within one year of its manufacture date?
NO
Reagent has deteriorated.
• Action: Replace the reagent cartridge. (Refer to page 73.)
YES
Is the monitoring performed as soon as the feed-water control valve opens? (Is the remote signal connected?)
NO
Stagnant water in the plumbing might be being monitored as a sample.
YES
Is the remote signal set up and wired appropriately?
NO
The setting or wiring has been changed.
• Action: Change the setting. (Refer to page 60.) Change the wiring. (Refer to page 48.)
YES
Does hardness leakage frequently occur after leaving the water softener off for a long period (one night)?
YES
Cause: Ions dissolved from plumbing after shutting off the water softener for a long period of time.
• Action: Increase the settings of abnormal condition retry, response (alarm) cycle and monitor interval to prevent the occurrence of alarm on a temporary hardness leakage (due to the water softener characteristics or dissolved ions from the plumbing etc.). Note: Water hardness must still be controlled carefully, since scale material is apparently dissolving.
NO
Use the hardness-indication method to verify monitoring when Colormetry indicates hardness leakage.
Cause: Stagnant water in the plumbing is being sampled while the water softener is shut off.
• Action: Obtain remote signal from communications equipment. If no remote signal is available, provide one by adding a flow switch or the like to inhibit monitoring during water stoppage.
Perform monitoring several times after purging stagnant water by feeding water through.
Hardness leakage occurs.
YES
Use the hardness-indication method to verify
Is hardness leakage actually occurring?
YES
Hardness leakage is caused by a malfunctioning water softener.
NO
Remove Colormetry from the wall.
(To *8, next page)
Do both the Colormetry and hardness indicator results coincide?
YES
Malfunctioning hardness leakage is causing hardness leakage.
NO
• Action: Allow the water softener to regenerate.



- Action:
  Remove any foreign matter.
  Leave only one stirrer in the monitor container (tubular hole).
  Return the Colormetry unit to its location, perform monitoring and verify that no error occurs.

Note: Metal ions, Zn, Cu, etc., react the same way as the hardness indication method.

- Action:
  Allow the water softener to regenerate.
  Check out the plumbing for corrosion.
  Avoid the use of material that is prone to dissolution of metallic ions (such as white gas plumbing).

- Action:
  Return it to the dealer if within the one-year warranty period.

- Results of evaluation of zinc ions by Colormetry

Unit: mg/L

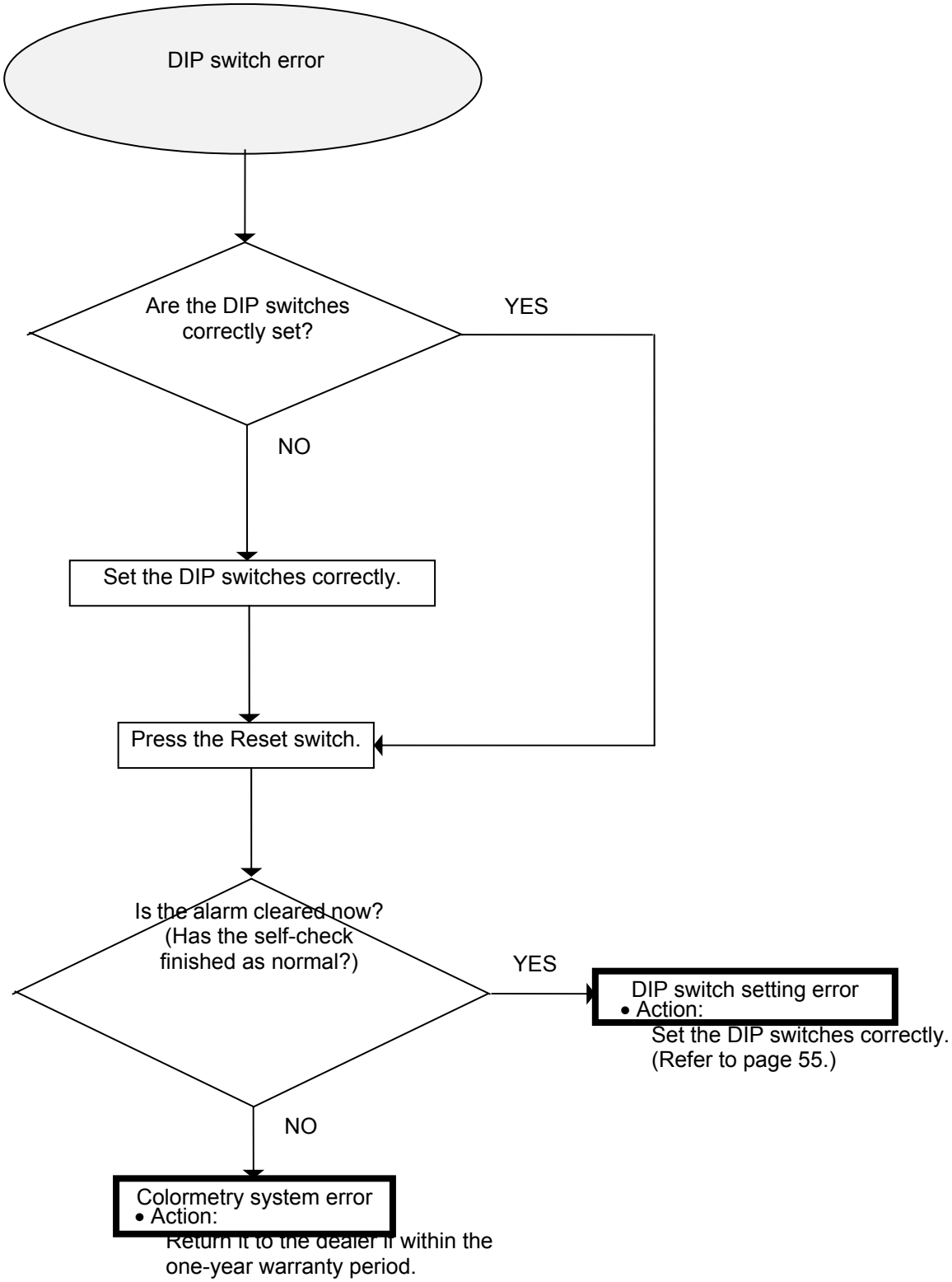
	Zn concentration		
	0.5	1.0	2.0
Total hardness 0	1	1.5	3
Total hardness 1	2	2.5	5

- Results of evaluation of copper ions by Colormetry

Unit: mg/L

	Cu concentration		
	0.5	1.0	2.0
Total hardness 0	0.75	1.8	5
Total hardness 1	2	3.3	5

- Results of evaluation of iron-ion concentration by Colormetry
  Colormetry monitoring is not especially affected by iron.

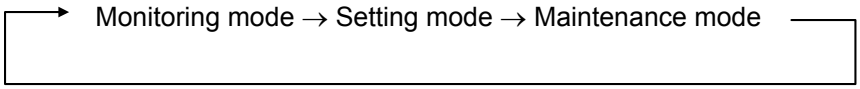

DIP switch error
Are the DIP switches correctly set?
YES
NO
Set the DIP switches correctly.
Press the Reset switch.
Is the alarm cleared now? (Has the self-check finished as normal?)
YES
DIP switch setting error
• Action:
Set the DIP switches correctly.
(Refer to page 55.)
NO
Colormetry system error
• Action:
Return it to the dealer if within the one-year warranty period.

9-3 Verifying error records (How to use Maintenance mode)

Historical records of hardness leakage and system errors may be checked in Maintenance mode. Additionally, input and output status and other abnormalities may also be displayed in Maintenance mode, but they are not required during on-site repairs.
Normally useful items in the records are listed below.

Starting and exiting from Maintenance mode

Each depression of the display indicator switch changes modes as follows:



- Starting Maintenance mode: Press the display indicator switch as required to start Maintenance mode.
- Exiting from Maintenance mode: Press the indicator to exit from Maintenance mode.

If no switch is operated for 10 minutes, however, the mode changes to Monitoring mode automatically.

Items displayed in Maintenance mode

In the table shown below, the items under category 1 are selected by the Item switch, and those under category 2 by the Up switch.

Category 1	Category 2	LCD display (an example)	Range of indicated values
M Result hardness		MHardness 2.0 mg/L	(Note 1)
M CPU version		MCPUver DE111012	***…CPU version
M Date(m/d/y) & time		M06/23/99 15:28	
Type of monitoring		Mhardness Mon	
M Input-output mode		MIN-OUT Mode *	(Note 2)
	M Output1	MOUT1 1111 1111	0000 0000-1111 1111
	M Output2	MOUT2 1111 1111	0000 0000-1111 1111
	M Input1	MIN1 1111 1111	0000 0000-1111 1111
	M Input1	MIN2 1111 1111	0000 0000-1111 1111
	M AD FF FF FF	MAD FF FF FF	00 00 00-FF FF FF
	M AD Thermista: FF	MAD (Thmsta): FF	00-FF
	M AD(R): FF FF	MAD(R): FF FF	00 00-FF FF
	M AD(-): 00 00	MAD(O): 00 00	
	M AD(G): FF FF	MAD(G): FF FF	00 00-FF FF
	M Pre Wash period 9.99 second	MWash Pd 9.99S	
	M Set M-alkalinity	MMAlkal<60mg/L	Under 60/300 and up
	M select from LED wavelength table	MWL:L	S/L
	M Operation status	MOp Stus: FF	00-FF
M Alarm description		MAlarm Content *	
	M Error table 1	MError1: 11111111	00000000-11111111
	M Error table 2	MError2: 11111111	00000000-11111111
M Cartridge data (Note 3)		MCartridge Dta *	
	M Cartridge replacement date(m/d/y)	MC Exc 06/23/99	
	M Cartridge used hours since replacement	MC Hrs 999999	00000-999999 (hours)
	M Reagent injection frequency since cartridge replacement	MRgt Inj Fqc 9999	0000-9999 (times)

Category 1	Category 2	LCD display (an example)	Range of indicated values
M Hardness leakage record 1 (Note 4)		MLeakage Log 1	
	M Date of Hardness leakage(m/d/y)	MDate 06/23/99	
	M Time of Hardness leakage	MTime 15:28	
	M Evaluation standard at concentration	MEvl Std Conc: 2	0-2
	M AD(R): FF FF	MAD(R): FF FF	00 00-FF FF
	M AD(－): 00 00	MAD(-): 00 00	
	M AD(G): FF FF	M AD(G): FF FF	00 00-FF FF
	M Total leakage minute	MLeakage Min9999	0000-9999 (minutes)
	M Date of reset(m/d/y)	MRset 06/23/99	
	M Time of reset	MRset Time 15:28	
M Hardness leakage record 2	(Same as “M Hardness leakage record 1”)		
M Hardness leakage record 3	(Same as “M Hardness leakage record 1”)		
M System error record 1 (Note 5)		MStm Fault Log 2	
	M Date of System error(m/d/y)	MDate 06/23/99	
	M Time of System error	MTime 15:28	
	M Error table 1	MError1: 11111111	00000000-11111111
	M Error table 2	MError2: 11111111	00000000-11111111
	M Date of reset(m/d/y)	MRset 06/23/98	
	M Time of reset	MRset Time 15:28	
M System error record 2	(Same as M system error record 1)		
M System error record 3	(Same as M system error record 1)		
M black out record 1 (Note 6)		MBlk Out Log 1 *	
	M Date of black out(m/d/y)	MDate 06/23/99	
	M Time of black out	MTime 15:28	
	M Date of reset(m/d/y)	MRset 06/23/99	
	M Time of reset	MRset Time 15:28	
M black out record 2	(Same as “M System error record 1”)		
M black out record 3	(Same as “M System error record 1”)		

Note 1: If the results of monitoring are in the 0—1mg/L, 1—2 mg/L , 2—5 mg/L, and 5 mg/L and up, the indicated values will be 0.0 mg/L, 1.0 mg/L, and 2.0 mg/L, and 5.0 mg/L, respectively. If the result is abnormal, the indicated value will be 9.9 mg/L.

Note 2: If a “>” symbol is indicated in the LCD display, it means there is an item to be selected by Up switch. Normally, the procedure is not utilized except in case of “M Set M-alkalinity.”

Note 3: The category indicates the date of cartridge installation, cumulative hours used and number of times used (number of times the injection pump has operated) since the date of installation.
When the number of hours or times used has reached 3,500 hours or times, a message to replace the reagent cartridge is displayed.

Note 4: The historical data for up to three most recent occurrences of hardness leakage is stored.
The cumulative operating time of hardness leakage, [M Total leakage minutes], counts time only if the remote signal function is set for “Monitoring in remote signal-on state.”

Note 5: The historical data for up to three most recent system errors is stored in this category.
The error table for the category describes previously occurred system errors.
The LCD indications of the error table in this category also corresponds to the table referred to in Note 5.
The LCD display will indicate [1] for the description of an error, as is the case with Note 6.

<Error table>

	B7	B6	B5	B4	B3	B2	B1	B0
Error code (1)	Replace reagent	Reagent-injection error	Reagent injection-pump error	Light-receptor error	Wash error	Reagent-injection error (K)	Wash error (K)	Reagent injection-pump error (K)
Error code (2)	Abnormal concentration	***	***	***	***	Decreased sample flow	DIP switch setting error	Cartridge out

Note: The notation (K) shows an error that has occurred in the self-check mode only.

Note 6: The historical data will be stored on up to three most recent power outage.

The error code describes an error currently occurring in the system. An error and a normal state are indicated by a [1] and [0], respectively.
[Example] In case of a reagent-injection error
Displays: M Table 1 = 0100 0000

9-4 How to reset

Ordinarily, no resetting action is required.

(1) Normal reset

All setting data and historical data is preserved when a reset is executed.

[1] How to execute a reset

Detach the front cover from the front side of the main unit, then press the Reset switch.

[2] How system operates when the Reset switch is pressed

Refer to Section 6-2-1, “(1) If the data-memory backup battery has been charged by the time the power is turned on, or when reinitialized from a reset,” on page 57.

(2) All reset

When an all reset is executed, all setting data and historical record data will be initialized.

[1] How to execute an All Reset

a. Detach the front cover on the front of the main unit, and turn DIP switch DSW-8 to “On.”
b. With DSW-8 turned to “On,” press the Reset switch.
c. Check the display to verify that an “All clear” message is indicated following a “CPU version” message. When the “All clear” message disappears, return the DSW-8 to “Off.”

[2] About the system after reset is executed

Refer to Section 6-2-1, “(2) If the data-memory backup battery has not been charged when the power is turned on, or when reinitialized after executing an complete reset,” on page 57.

Chapter 10 Warranty

To have the product covered by the warranty, fill out the Warranty Registration card and mail it in the envelope provided to MIURA BOILER CO.,LTD. immediately following the installation.

99.5.12

Warranty
of The Miura Boiler CO.,LTD. Colormetry
1 Year Limited Warranty

Miura Boiler Co.,Ltd. (Miura), at its sole option, will repair or replace at no charge any Miura's Colormetry, if found to be defective in workmanship or material within twelve months from the date of purchase. To qualify for this warranty, the purchaser must return Miura's warranty card together with a copy of the invoice from the supplier which is dated within one month of the date of purchase. This warranty does not extend to the cartridge of the Colormetry.

To qualify for this warranty, the Colormetry must be operated in accordance with the conditions of service specified in Miura's Installation and Operation Manuals and addendums. Furthermore, hardness in the water must have been checked by titration or any other method at least once a week and recorded to ascertain that the Colormetry is running correctly. Miura will not be responsible for the purchaser's failure to conduct the above routine checking and recordation, and any failure to detect the malfunction of the Colormetry is the sole responsibility of the purchaser.

This warranty will not be applicable if any repairs are performed by any one other than an authorized Miura technician or if any parts other than Miura approved parts have been installed.

All claims for warranty are to be presented in writing to Miura for review within fifteen days of discovery of any defects.

The above limited warranty is extended by Miura to the original purchaser only and is not assignable or transferable to subsequent purchasers or lessees.

MIURA EXTENDS NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR SUITABILITY FOR PURPOSE WITH RESPECT TO THE COLORMETRY OR WITH RESPECT TO SERVICES PROVIDED BY MIURA. EXCEPT AS PROVIDED HEREIN, UNDER NO CIRCUMSTANCES WILL MIURA BE LIABLE TO PURCHASER UNDER ANY TORT, NEGLIGENCE, STRICT LIABILITY, CONTRACT OR OTHER LEGAL OR EQUITABLE THEORY, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOST PROFITS OR SAVINGS OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE COLORMETRY OR FOR PURCHASER'S COST OF EFFECTING COVER, TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW. PURCHASER SHALL INDEMNIFY AND HOLD HARMLESS MIURA, ITS OFFICERS, AGENTS AND EMPLOYEES FROM AND AGAINST ANY AND ALL LIABILITIES, DAMAGES AND LOSSES, INCLUDING COSTS AND EXPENSES IN CONNECTION THEREWITH, FOR DEATH OF OR INJURY TO ANY PERSONS WHOMSOEVER AND FOR THE LOSS OF, DAMAGE TO OR DESTRUCTION OF ANY PROPERTY WHATSOEVER, CAUSED BY, ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE USE OF THE COLORMETRY BY PURCHASER.

MIURA BOILER CO.,LTD.

Miura Boiler Colormetry Warranty Registration Card

Colormetry serial #_____

Purchased from _____

Your name _____

Street Address _____

City _____ State _____ Zip _____

Date Purchased _____ Where Installed _____

Colormetry will be used for :_____

Signature _____

MARKET SURVEY

What brand of boilers do you currently operate?

Manufacturer:_____ Boiler HP:_____

What distributor or Eng. company did you buy the boilers from.

_____

How many years have you used them for :_____

Are they: (circle) Water tube Fire tube Steam generator Coil tube

What pressure do you operate your boilers at ? _____psi

What do you like about them?

_____

What do you dislike about your boilers?

_____

What type of fuels do you use in boilers?(circle)

NGas #2Oil #6Oil Amber Propane

IF YOU LIKE THEM, please tell us who does the following for you:

Water Treatment (Chemicals) _____

Boiler Maintenance _____

Installation/Construction _____

Water Softener maker _____

Do you have any plans for buying boilers in the near future ?

_____