

Culligan®



**CULLIGAN® MARK 1000
AUTOMATIC WATER CONDITIONER
Installation and Operating Instructions
Models from 1991**

CULLIGAN INTERNATIONAL COMPANY/NORTHBROOK, IL & SUBSIDIARIES OR DIVISIONS
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Attention Culligan Customers:

Your local independently-operated Culligan dealer employs trained service and maintenance personnel who are experienced in the installation, function and repair of Culligan equipment. This publication is written specifically for the purpose of training and guiding these individuals and is intended for their use.

We encourage Culligan users to learn about Culligan products, but we believe that product knowledge is best obtained by consulting with your Culligan dealer. Untrained individuals who use this manual assume the risk of any resulting property damage or personal injury.

CULLIGAN[®] MARK 1000 AUTOMATIC WATER CONDITIONER Installation and Operating Instructions Models from 1991

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Introduction

SAFE PRACTICES

Throughout this manual there are paragraphs set off by special headings.

NOTICE: Notice is used to emphasize installation, operation or maintenance information which is important, but does not present any hazard.

Example: **NOTICE:** *The nipple must extend no more than 1 inch above the cover plate.*

CAUTION: Caution is used when failure to follow directions could result in damage to equipment or property.

Example: **CAUTION:** *Disassembly While Under Water Pressure Can Result In Flooding.*

WARNING: Warning is used to indicate a hazard which could cause injury or death if ignored.

Example: **WARNING! ELECTRICAL SHOCK HAZARD! UNPLUG THE UNIT BEFORE REMOVING THE TIMER MECHANISM OR COVER PLATES!**

SERIAL NUMBERS

The control assembly serial number is on the side of the timer case.

The media tank serial number is on the top edge of the tank side wall.

NOTICE: *Do not remove or destroy the serial number decals. They must be referenced on requests for warranty repair or replacement.*

This publication is based on information available when approved for printing. Continuing design refinement could cause changes that may not be included in this publication.

Specifications

Culligan® Mark 1000 Water Softeners

	30M 9-INCH MODEL	45M 12-INCH MODEL
Control Valve Type	5-Cycle, Rotary Disk	5-Cycle, Rotary Disk
Timer	Electronic Meter	Electronic Meter
Inlet/Outlet Size	1 in (25 mm)	1 in (25 mm)
Overall Conditioner Height	52 in (1 320 mm)	52 in (1 320 mm)
Media Tank Dimensions (Dia. X Ht.)	9 in X 45 in (230 mm x 1 140 mm)	12 in X 45 in (300 mm x 1 140 mm)
Salt Storage Tank Dimensions (Dia. X Ht.)	18 in X 43 in (460 mm x 1 090 mm)	18 in X 43 in (460 mm x 1 090 mm)
Exchange Media, Type and Quantity	Cullex® Resin, 1.0 Ft ³ (28 L)	Cullex Resin, 1.5 Ft ³ (42 L)
Underbedding, Type and Quantity	No Underbedding	Cullsane® Media, 30 lb (14 kg)
High Efficiency Operation¹		
Exchange Capacity, @ Salt Dosage Per Recharge	14,200 gr @ 3 lb (920 g @ 1.4 kg)	21,300 gr @ 4.5 lb (1 380 g @ 2.0 kg)
Salt Efficiency	4,733 gr/lb (676 g/kg) salt	4,733 gr/lb (676 g/kg) salt
Water Consumption	21 gal (79 L)	35 gal (132 L)
Recharge Time	48 min	50 min
Exchange Capacity, @ Salt Dosage Per Recharge	22,300 grains @ 7 lb (1 450 g @ 3.2 kg)	31,600 grains @ 8 lb (2 050 g @ 3.6 kg)
	26,100 grains @10 lb (1 700 g @ 4.5 kg)	36,100 grains @ 12 lb (2 340 g @ 5.4 kg)
Freeboard to Resin ²	15.25 in (390 mm)	16.25 in (410 mm)
Salt Storage Capacity	375 lb (170 kg)	375 lb (170 kg)
Rated Service Flow @ Pressure Drop	11 gpm @ 14.8 psi (42 L/min @ 100 kPa)	12.0 gpm @ 9.5 psi (45 L/min 66 kPa)
Peak Service Flow @ Pressure Drop	15.8 gpm @ 25 psi (60 L/min @ 170 kPa)	19.5 gpm @ 21.5 psi (74 L/min @ 150 kPa)
Total Hardness, Maximum	75 gpg (1 280 mg/L)	100 gpg (1 710 mg/L)
Total Iron, Maximum	5 mg/L	5 mg/L
Hardness to Iron Ratio, Minimum	8:1 (27:1)	8:1 (27:1)
Operating Pressure	20 - 120 psi (140-830 kPa)	20 - 120 psi (140-830 kPa)
Operating Temperature	33 - 120° F (1-49° C)	33 - 120° F (1-49° C)
Electrical Requirements	120 VAC/60 Hz	120 VAC/60 Hz
Electrical Power Consumption	3 W	3 W
Drain Flow, Maximum ³	2 gpm (7.6 L/min)	3.5 gpm (13 L/min)
Recharge Time, Average ⁴	65 minutes	70 minutes
Recharge Water Consumption, Average ⁴	55 gallons (210 L)	110 gallons (420 L)

¹High efficiency operation may not be suitable on your water supply. Consult the dealer for further information.

²Measured from top of resin to top edge of tank opening.

³Backwash at 120 psi (830 kPa).

⁴10 minute backwash, 10 lb (4.5 kg) salt dosage (30M, 9-inch model), 15 lb (6.8 kg) salt dosage (45M, 12-inch model), 20 lb (9.1 kg) salt dosage (60M, 16-inch model) or 30 lb (14 kg) salt dosage (90M, 16-inch model).

Specifications

Culligan® Mark 1000 Water Softeners

	60M 16-INCH MODEL	90M⁵ 16-INCH MODEL
Control Valve Type	5-Cycle, Rotary Disk	5-Cycle, Rotary Disk
Timer	Electronic Meter	Electronic Meter
Inlet/Outlet Size	1 in (25 mm)	1 in (25 mm)
Overall Conditioner Height	52½ in (1 330 mm)	52½ in (1 330 mm)
Media Tank Dimensions (Dia. X Ht.)	16 in X 45½ in (410 mm x 1 160 mm)	16 in X 45½ in (410 mm x 1 160 mm)
Salt Storage Tank Dimensions (Dia. X Ht.)	18 in X 43 in (460 mm x 1 090 mm)	18 in X 43 in (460 mm x 1 090 mm)
Exchange Media, Type and Quantity	Cullex® Resin, 2.0 Ft ³ (57 L)	Cullex Resin, 3.0 Ft ³ (85 L)
Underbedding, Type and Quantity	Cullsian® Media, 60 lb (27 kg)	Cullsian Media, 60 lb (27 kg)
High Efficiency Operation¹		
Exchange Capacity, @ Salt Dosage Per Recharge	25,900 gr @ 6 lb (1 675 g @ 2.7 kg)	37,875 gr @ 9 lb (2 454 g @ 9.5 kg)
Salt Efficiency	4,317 gr/lb salt (616 g/kg)	4,208 gr/lb salt (676 g/kg)
Water Consumption	47 gal (180 L)	50 gal (190 L)
Recharge Time	49 min	51 min
Exchange Capacity, @ Salt Dosage Per Recharge	38,893 grains @ 14 lb (2 520 g @ 6.4 kg) 48,990 Grains @ 20 lb (3 174 g @ 9.1 kg)	62,970 grains @ 21 lb (4 340 g @ 9.5 kg) 85,470 grains @ 30 lb (5 070 g @ 13 kg)
Freeboard to Resin ²	22.0 in (560 mm)	13.5 in (340 mm)
Salt Storage Capacity	375 lb (170 kg)	375 lb (170 kg)
Rated Service Flow @ Pressure Drop	19 gpm @ 15 psi (72 L/min @ 100 kPa)	19 gpm @ 15 psi (72 L/min @ 100 kPa)
Peak Service Flow @ Pressure Drop	25 gpm @ 25 psi (95 L/min @ 170 kPa)	24 gpm @ 25 psi (91 L/min @ 170 kPa)
Total Hardness, Maximum	100 gpg (1 710 mg/L)	100 gpg (1 710 mg/L)
Total Iron, Maximum	5 mg/L	5 mg/L
Hardness to Iron Ratio, Minimum	8:1 (27:1)	8:1 (27:1)
Operating Pressure	20 - 120 psi (140-830 kPa)	20 - 120 psi (140-830 kPa)
Operating Temperature	33-120° F (1-49° C)	33-120° F (1-49° C)
Electrical Requirements	120 VAC/60 Hz	120 VAC/60 Hz
Electrical Power Consumption	3 W	3 W
Drain Flow, Maximum ³	6.0 gpm (23 L/min)	6.0 gpm (23 L/min)
Recharge Time, Average ⁴	70 minutes	75 minutes
Recharge Water Consumption, Average ⁴	178 gallons (670 L)	215 gallons (810 L)

¹High efficiency operation may not be suitable on your water supply. Consult the dealer for further information.

²Measured from top of resin to top edge of tank opening.

³Backwash at 120 psi (830 kPa).

⁴10 minute backwash, 10 lb (4.5 kg) salt dosage (30M, 9-inch model), 15 lb (6.8 kg) salt dosage (45M, 12-inch model), 20 lb (9.1 kg) salt dosage (60M, 16-inch model) or 30 lb (14 kg) salt dosage (90M, 16-inch model).

⁵Optional Dealer Upgrade.

Preparation

COMPONENT DESCRIPTION

The water conditioner is shipped from the factory in three cartons. Remove all components from their cartons and inspect them before starting installation.

Control Valve Assembly - Includes the 5-cycle regeneration control valve and electronic timer assembly. A small parts package contains installation hardware and consumer literature, including an Owners Guide and warranty policy.

Media Tank - Contains the center opening Tripl-Hull™ media tank complete with Cullex® ion exchange resin, underbedding and outlet manifold.

Salt Storage Tank Assembly - Includes salt storage container with support plate and Dubl-Safe™ brine refill valve and chamber.

TOOLS AND MATERIALS

The following tools and supplies will be needed, depending on installation method. Observe all applicable codes.

All Installations

- Safety goggles
- Phillips screwdrivers, small and medium tip
- Gauge Assembly (PN 00-3044-50 or equivalent).
- Silicone lubricant (PN 00-4715-07 or equivalent) - **DO NOT USE PETROLEUM-BASED LUBRICANTS**
- A bucket, preferably light-colored
- Towels

Special Tools

- Torch, solder and flux for sweat copper connections
- Threading tools, pipe wrenches and thread sealer for threaded connections
- Saw, solvent and cement for plastic pipe connections

Materials

- Brine line, 5/16" (PN 00-3031-28 or equivalent)
- Drain line, 1/2" (PN 00-3030-82, gray, semi-flexible; or PN 00-3319-46, black, semi-rigid; or equivalent)
- Thread sealing tape
- Pressure reducing valve (if pressure exceeds 120 psi [830 kPa], PN 00-4009-00 or equivalent)
- Pipe and fittings suited to the type of installation
- Water softener salt (rock, solar or pellet salt formulated specifically for water softeners)

BYPASS VALVES

A bypass valve is included with the control valve assembly.

APPLICATION

Water quality - Verify that raw water hardness and iron are within limits. Note the hardness for setting the salt dosage and recharge frequency.

Pressure - If pressure exceeds 120 psi (830 kPa), install a pressure reducing valve (see materials checklist). On private water systems, make sure the minimum pressure (the pressure at which the pump starts) is greater than 20 psi (140 kPa). Adjust the pressure switch if necessary.

⚠ CAUTION: *The use of a pressure reducing valve may limit the flow of water in the household.*

Temperature - Do not install the unit where it might freeze, or next to a water heater or furnace or in direct sunlight.

LOCATION

Space requirements - Allow 6 - 12 inches (150 - 300 mm) behind the unit for plumbing and drain lines and 4 feet (1.3 meters) above for service access and filling the salt container.

Floor surface - Choose an area with a solid, level floor free of bumps or irregularities. **Bumps, cracks, stones and other irregularities can cause the salt storage tank bottom to crack when filled with salt and water.**

Drain facilities - Choose a nearby drain that can handle the rated drain flow (floor drain, sink or stand pipe). Refer to the Drain Line Chart, Table 1, page 8, for maximum drain line length.

NOTICE: *Most codes require an anti-siphon device or air-gap.*

Electrical facilities - A 6-foot grounded cord is provided. The customer should provide a 3-prong grounded receptacle, preferably one **not** controlled by a switch that can be turned off accidentally. Observe local electrical codes.

⚠ WARNING: ELECTRICAL SHOCK HAZARD! DO NOT REMOVE THE GROUNDING PRONG! IF THE RECEPTACLE IS DESIGNED ONLY FOR 2-PRONG PLUGS, OBTAIN A 3-PRONG ADAPTER AND GROUND IT SECURELY TO THE RECEPTACLE. DO NOT USE EXTENSION CORDS.

Installation

PLACEMENT

Refer to Fig. 1.

- Set the media tank on a solid, level surface near water, drain and electrical facilities.
- Set the brine system on a flat, smooth, solid surface as near the media tank as possible.

INLET MANIFOLD

(High Efficiency, 60M & 90M Units Only)

An inlet basket strainer is included with the 60M and 90M models.

- Locate the basket strainer in the control valve box.
- Locate the O-ring seal on the control's tank connection. Lubricate it lightly with silicone lubricant.
- Screw the manifold into the manifold sleeve. Do not cross thread the manifold.

NOTICE: When mounting the control to the tank, make sure the outlet manifold aligns with the opening of the manifold.

MOUNT THE CONTROL VALVE

See Figure 2.

- Remove and discard the cover that protects the tank opening.
- Locate the O-ring seal on the control's tank connection. Lubricate it lightly with silicone lubricant.
- Align the outlet manifold with the center opening in the control valve.
- Turn the control assembly onto the tank until it seats firmly.
- Position the unit with the inlet and outlet connections to the rear.

PLUMBING CONNECTIONS

The plumbing connects to the control valve through two 1-inch sweat adapters held by compression fittings (Fig. 3). Find them in the parts pack. If threaded connections are needed, provide appropriate thread-to-sweat adapters and preassemble them to the adapters as far as possible before connecting them to the control.

CAUTION: Close The Inlet Supply Line And Relieve System Pressure Before Cutting Into The Plumbing! Flooding Could Result.

CAUTION: The Culligan® Mark 1000 Control Valve Inlet Is On The LEFT Side When Facing Front, Unlike Other Culligan Controls Where The Inlet Is On The Right. Improper Connection Could Result In Resin Discharge Into The Service Piping.

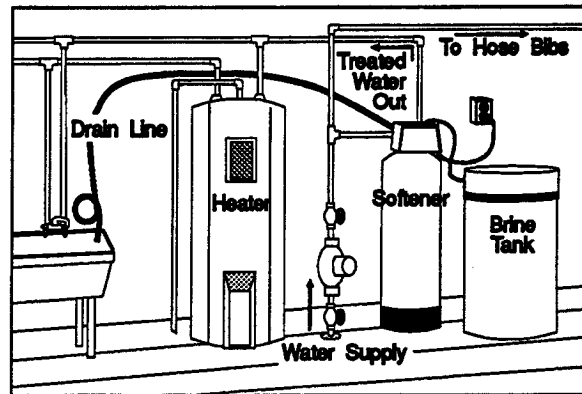


Fig. 1

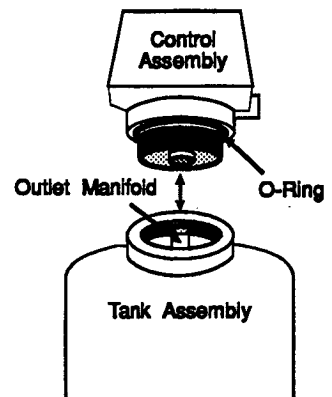


Fig. 2

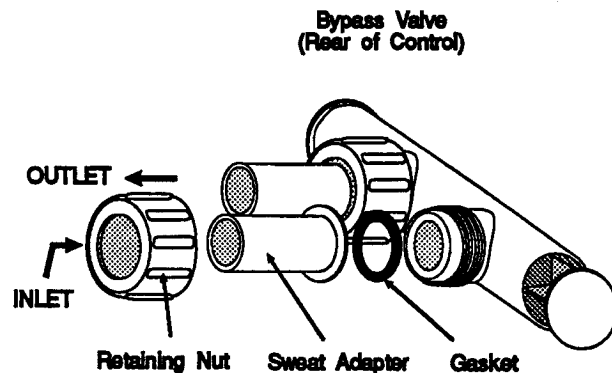


Fig. 3

CAUTION: When Making Sweat Connections, Cover The Control And Tank Top To Protect Them From Marrying Or Contamination With Spattered Flux And Solder!

CONNECT THE BRINE LINE

- Locate the brine connection on the right side of the valve body (Fig. 4). Wrap the threads with thread sealing tape.
- Measure a length of brine line sufficient to reach from the brine tank to the brine fitting, then add four feet (1.3 meters). Cut the ends squarely and cleanly.
- Remove the brine valve from the brine tank and remove the white nut and insert placed on the float rod. Return the float rod to its original position.
- Find a tubing nut and an elbow adapter fitting in the small parts pack.
- Assemble the brine tubing to the control valve as shown in Fig. 5. Make sure the tubing end is cut cleanly at a right angle. Push it into the elbow adapter until it bottoms.
- Connect the brine line to the brine valve. Tighten finger tight plus 1/2 turn.

NOTICE: The salt dosage is based on the brine refill rate. The brine valve should contain a 0.45 gpm (1.7 L/min) refill flow control, as indicated on the top of the brine valve assembly.

For the 60M and 90M models, replace the 0.45 gpm (1.7 L/min) flow control with the 0.80 gpm (3.0 L/min) flow control located in the small parts package.

DRAIN LINE CONNECTION

Refer to Table 1, page 8, for drain line length and height limitations, and to Fig 4.

- Find a 1/2" barbed hose fitting in the small parts pack. Install it in the opening in the rear of the control valve.
- Route a length of 1/2" drain line from the drain fitting to the drain.
- Find the 1/2" pipe clamp in the small parts pack. Fasten the drain line to the fitting.
- Secure the drain line to the drain to prevent its movement during regeneration. A loop in the end of the tube will keep it filled with water and will reduce splashing at the beginning of each regeneration cycle.

NOTICE: Observe all plumbing codes. Most codes require an antisiphon device or air gap at the discharge point!

FILL THE SALT STORAGE CONTAINER

Fill the salt storage container with water until the level reaches about 1 inch above the salt support plate.

Pour salt into the container. Fill to within a few inches of the top.

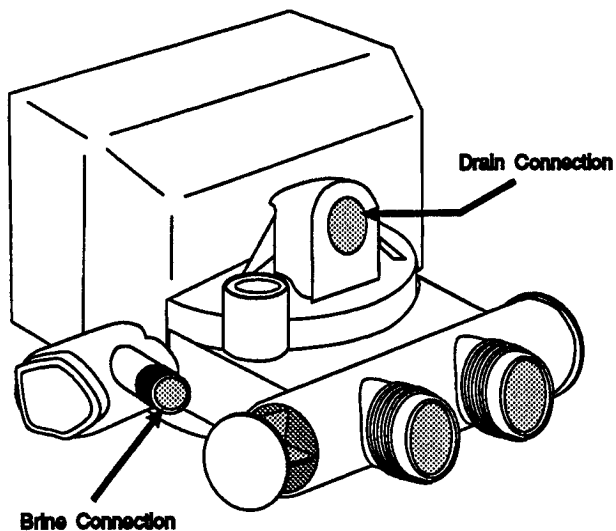


Fig. 4

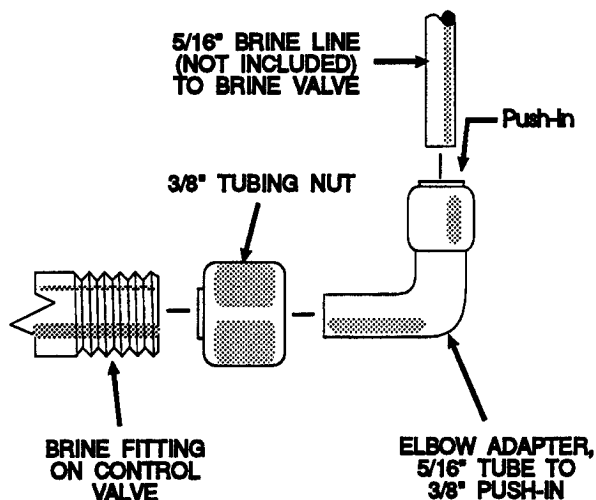


Fig. 5

**TABLE 1A - DRAIN LINE LENGTH LIMITS, FEET (METERS)
CULLIGAN® MARK 1000 WATER SOFTENER, 9" MODEL**

Average Water Pressure	HEIGHT OF DRAIN DISCHARGE ABOVE FLOOR UPON WHICH SOFTENER SITS										
	4 In (0.1 m)	1 Ft (0.30 m)	2 Ft (0.60 m)	3 Ft (0.90 m)	4 Ft (1.2 m)	5 Ft (1.5 m)	6 Ft (1.8 m)	7 Ft (2.1 m)	8 Ft (2.4 m)	9 Ft (2.7 m)	10 Ft (3.0 m)
30 Psi (210 kPa)	56 (17)	50 (15)	40 (12)	30 (9.1)	20 (6.1)	10 (3.0)	--	--	--	--	--
50 Psi (340 kPa)	112 (34)	103 (31)	96 (29)	86 (26)	76 (23)	66 (20)	56 (17)	46 (14)	36 (11)	26 (7.9)	16 (4.9)
70 Psi (480 kPa)	143 (44)	131 (40)	127 (39)	117 (36)	107 (33)	97 (30)	87 (27)	77 (23)	67 (20)	57 (17)	47 (14)
90 Psi (620 kPa)	153 (47)	147 (45)	137 (42)	127 (39)	117 (36)	107 (33)	97 (30)	87 (27)	77 (23)	67 (20)	57 (17)
120 Psi (830 kPa)	159 (48)	153 (47)	143 (44)	133 (41)	123 (37)	113 (34)	103 (31)	93 (28)	83 (25)	73 (22)	63 (19)

**TABLE 1B - DRAIN LINE LENGTH LIMITS, FEET (METERS)
CULLIGAN MARK 1000 WATER SOFTENER, 12" MODEL**

Average Water Pressure	HEIGHT OF DRAIN DISCHARGE ABOVE FLOOR UPON WHICH SOFTENER SITS										
	4 In (0.10 m)	1 Ft (0.30 m)	2 Ft (0.60 m)	3 Ft (0.90 m)	4 Ft (1.2 m)	5 Ft (1.5 m)	6 Ft (1.8 m)	7 Ft (2.1 m)	8 Ft (2.4 m)	9 Ft (2.7 m)	10 Ft (3.0 m)
30 Psi (210 kPa)	44 (13)	38 (12)	28 (8.5)	18 (5.5)	--	--	--	--	--	--	--
50 Psi (340 kPa)	103 (31)	93 (28)	87 (27)	77 (23)	67 (20)	57 (17)	47 (14)	37 (11)	27 (8.2)	17 (5.2)	7 (2.1)
70 Psi (480 kPa)	129 (39)	123 (37)	113 (34)	103 (31)	93 (28)	83 (25)	73 (22)	63 (19)	53 (16)	43 (13)	33 (10)
90 Psi (620 kPa)	145 (44)	139 (42)	129 (39)	119 (36)	109 (33)	99 (30)	89 (27)	79 (24)	69 (21)	59 (17)	49 (14)
120 Psi (830 kPa)	153 (47)	147 (45)	137 (42)	127 (39)	117 (36)	107 (33)	97 (30)	87 (27)	77 (23)	67 (20)	57 (17)

**TABLE 1C - DRAIN LINE LENGTH LIMITS, FEET (METERS)
CULLIGAN MARK 1000 WATER SOFTENER, 16" MODEL**

Average Water Pressure	HEIGHT OF DRAIN DISCHARGE ABOVE FLOOR UPON WHICH SOFTENER SITS										
	4 In (0.1 m)	1 Ft (0.30 m)	2 Ft (0.6 m)	3 Ft (0.9 m)	4 Ft (1.2 m)	5 Ft (1.5 m)	6 Ft (1.8 m)	7 Ft (2.1 m)	8 Ft (2.4 m)	9 Ft (2.7 m)	10 Ft (3.0 m)
30 Psi (210 kPa)	10 (3.0)	9 (2.7)	6 (1.8)	-	--	--	--	--	--	--	--
50 Psi (340 kPa)	22 (6.7)	21 (6.4)	18 (5.4)	16 (4.9)	14 (4.2)	12 (3.7)	10 (3.0)	8 (2.4)	-	-	-
70 Psi (480 kPa)	27 (8.2)	26 (7.9)	24 (8.2)	22 (6.7)	20 (6.1)	18 (5.4)	16 (4.8)	14 (4.2)	12 (3.6)	10 (3.0)	8 (2.4)
90 Psi (620 kPa)	30 (9.1)	29 (8.8)	27 (8.2)	25 (7.6)	23 (7.0)	21 (6.4)	19 (5.7)	17 (5.2)	15 (4.6)	13 (3.9)	11 (3.3)
120 Psi (830 kPa)	32 (9.7)	31 (9.4)	29 (8.8)	27 (8.2)	25 (7.6)	22 (6.7)	20 (6.1)	18 (5.4)	16 (4.9)	14 (4.3)	12 (3.7)

Settings

All electronic timer settings are adjustable. Set the timer according to water conditions and customer preferences. Use the following tables to determine total capacity, reserve capacity and salt settings. All settings are made from the exterior.

WATER USE AND CAPACITY METERING

A small water meter mounted in the control valve continuously measures the amount of water used. The timer is programmed for the volume of water that can be treated after each regeneration. It signals the timer when the capacity is used up.

DELAYED REGENERATION

To prevent recharge during peak water usage, the timer delays regeneration until a preset time of day (2:00 am is the factory setting). That time can be changed to suit customer needs.

RESERVE CAPACITY

To insure uninterrupted conditioned water from the time the meter signals the need for regeneration and the time when regeneration occurs, a reserve capacity can be programmed. The timer automatically provides a 200 gallon (760 liter) reserve. The reserve setting can be changed to any value between zero and the total capacity setting.

NOTICE: For salt efficient operation, the reserve should be set to as small a value as possible. A setting equal to one half to one full day's normal capacity requirement is sufficient for most customers.

CAPACITY AND SALT SETTINGS

Before setting the timer, calculate the gallons of capacity needed, gallons of reserve capacity and salt dosage information, and record the values here:

- Gallons of water used per day (actual, or estimate from Table 2) _____
- Unit capacity _____ @ salt dosage _____ (Table 3)
- Divide unit capacity by water hardness; result: _____ Gallons Total Capacity.
- Reserve Capacity (use default or set) _____
- Length of Cycle 3 (Table 3) _____
- Brine Valve "A" Dimension (Table 3) _____

Daily Capacity and Reserve Capacity

From Table 2, find the daily capacity needed based on water usage or the number of people in the household.

TABLE 2 - DAILY WATER USAGE

Persons in Household	Gallons per Day (Liters per Day)
2	150 (570)
3	225 (850)
4	300 (1 100)
5	375 (1 400)
6	450 (1 700)
7	525 (2 000)
8	600 (2 300)
9	675 (2 600)
10	750 (2 800)

TABLE 3A - UNIT CAPACITY AND SALT SETTINGS

SALT PER RECHARGE, LB (KG)	TOTAL CAPACITY, GRAINS (GRAMS)		REFILL TIME (CYCLE 3) MINUTES	BRINE VALVE "A" DIMENSION in (mm)
	MODEL 9", 30M	MODEL 12", 45M		
3 (1.4)	14,200 (920)	—	3	2 1/2 (64)
6 (2.7)	21,000 (1 360)	26,100 (1 690)	5	5 1/2 (140)
9 (4.1)	24,900 (1 610)	32,300 (2 090)	8	8 1/2 (220)
12 (5.4)	27,800 (1 800)	36,100 (2 340)	10	11 3/8 (290)
15 (6.8)	—	39,150 (2 540)	13	14 3/8 (370)
18 (8.2)	—	42,900 (2 780)	15	17 1/4 (440)

TABLE 3B - UNIT CAPACITY AND SALT SETTINGS

SALT PER RECHARGE, LB (KG)	TOTAL CAPACITY, GRAINS (GRAMS)		REFILL TIME (CYCLE 3) MINUTES	BRINE VALVE "A" DIMENSION in (mm)
	MODEL 16", 60M	MODEL 16", 90M		
6 (2.7)	28,400 (1 840)	—	3	5 1/2 (140)
9 (4.1)	36,300 (2 350)	42,600 (2 760)	4	8 1/2 (220)
12 (5.4)	41,900 (2 720)	50,900 (3 300)	6	11 3/8 (290)
15 (6.8)	46,300 (3 000)	57,500 (3 730)	7	14 3/8 (370)
18 (8.2)	49,900 (3 230)	62,900 (4 080)	9	17 1/4 (440)
21 (9.5)	52,900 (3 430)	66,900 (4 340)	10	20 1/4 (510)
24 (11)	—	71,400 (4 630)	12	23 1/4 (590)
27 (12)	—	74,800 (4 850)	13	26 1/8 (660)
30 (14)	—	78,300 (5 070)	15	29 1/8 (740)

Select a reserve capacity based on daily capacity needs; the default setting is 200 gallons (760 liters).

Unit Capacity

From Table 3A or 3B:

- Select a unit capacity and salt used per regeneration that meets with the daily capacity needs.

NOTICE: Lower salt dosages are more salt-efficient than high salt dosages, but require higher water usage. Higher salt dosages, although less salt-efficient, require lower water usage because the unit may not regenerate as often. Select a salt dosage that provides at least one full day's capacity needs.

- Divide the gallons total capacity by the gallons of water used per day. If the result is less than 1, select a higher capacity and salt dosage and recalculate.
- At that capacity, note the length of time required for Cycle 3 and the brine valve "A" dimension.

Each of the three regeneration cycles is adjustable. Cycle 3, Fast Rinse/Refill, **must** be adjusted according to the desired salt dosage. The factory settings for cycles 1 (backwash) and 2 (brine and slow rinse) are suitable for virtually all operating conditions and may be used as-is. See the notes in the "Set-Up or Change Settings" section, which follows.

Brine Valve "A" Dimension

Set the brine valve float to coincide with the salt dosage setting. Refer to Fig. 6.

- Lift the brine valve from the brine chamber.
- Find the correct "A" dimension from the table.
- Set the distance from the top of the filter screen to the bottom of the float accordingly.

SET-UP OR CHANGE SETTINGS

Refer to Fig. 7 and follow the sequence in Fig. 8 on page 10 to set up or change the timer settings.

Cycles 1 and 2 may be changed, if desired, to improve resin bed cleansing or to conserve water. There are no hard and fast rules, because conditions vary widely between installation sites. Use the following comments as a guide.

Cycle 1 - Backwash

Backwash removes accumulated sediment and loosens the resin bed. It should last long enough for the discharge water to run clear. Increase the time if turbidity is heavy. The time may be reduced (to not less than 5 minutes) if the water is very clear.

Cycle 2 - Brine and Slow Rinse

The brine and rinse cycle must last long enough to allow complete brine draw and rinse.

Time the cycle, testing the water at the drain periodically starting about 20 minutes into the cycle.

Place a finger into the drain stream, shake off the excess, and touch the tongue (**DO NOT direct the drain stream into the mouth**). A bitter taste means that hardness is still being exchanged off of the resin. A salty taste means that most of the hardness has been removed.

The cycle may be ended as soon as the salty taste disappears (add 5 minutes to allow for minor variations in pressure and brine volume).

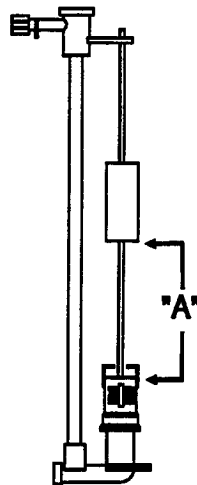


Fig. 6

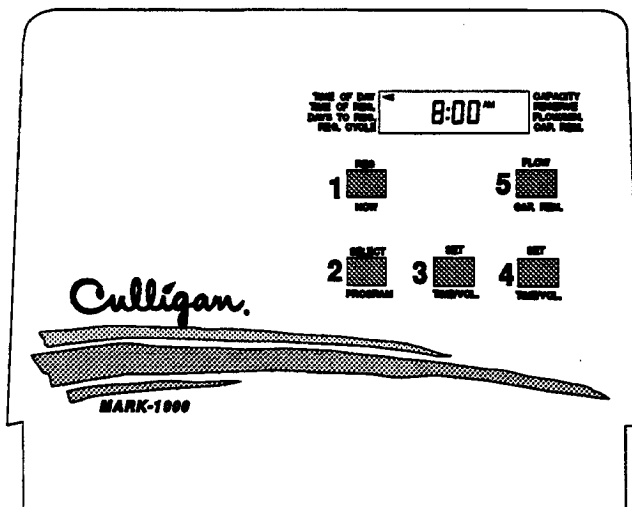


Fig. 7

FIG. 8 - SETTING-UP OR CHANGING TIMER SETTINGS TIMER SETTING SEQUENCE

1. Plug in

TIME OF DAY TIME OF RECH. DAYS TO RECH. RECH. CYCLE	1000	GAL CAPACITY RESERVE FLOWMTR. CAP. REML
--	------	---

Displays gallons capacity remaining (1000 gal. at start-up).

2. Press 2

TIME OF DAY TIME OF RECH. DAYS TO RECH. RECH. CYCLE	8:00 AM	CAPACITY RESERVE FLOWMTR. CAP. REML
--	---------	--

Displays time of day.

Press 3 to set hours, 4 to set minutes.

3. Press 2

TIME OF DAY TIME OF RECH. DAYS TO RECH. RECH. CYCLE	2:00 AM	CAPACITY RESERVE FLOWMTR. CAP. REML
--	---------	--

Displays recharge time.

Press 3 to set hours, 4 to set minutes.

4. Press 2

TIME OF DAY TIME OF RECH. DAYS TO RECH. RECH. CYCLE	4	CAPACITY RESERVE FLOWMTR. CAP. REML
--	---	--

Displays **backup timed regeneration**, the interval at which the unit will regenerate in the absence of a signal from the meter.

Press 3 to increase, 4 to decrease (set to a value 1 or 2 days longer than expected recharge interval).

5. Press 2

TIME OF DAY TIME OF RECH. DAYS TO RECH. RECH. CYCLE	1000	GAL CAPACITY RESERVE FLOWMTR. CAP. REML
--	------	---

Displays the total capacity setting.

Press 3 to increase, 4 to decrease (100 gallon increments. The default is 1000 gallons).

6. Press 2

TIME OF DAY TIME OF RECH. DAYS TO RECH. RECH. CYCLE	200	GAL CAPACITY RESERVE FLOWMTR. CAP. REML
--	-----	---

Displays the reserve capacity setting.

Press 3 to increase, 4 to decrease (10 gallon increments. The default is 200 gallons).

7. Press 2

TIME OF DAY TIME OF RECH. DAYS TO RECH. RECH. CYCLE	CYCLE TIME 1:10 MIN	CAPACITY RESERVE FLOWMTR. CAP. REML
--	---------------------------	--

Displays the length of Cycle 1.

Press 3 to increase, 4 to decrease (1 minute increments). The factory setting is 10 minutes.

8. Press 2

TIME OF DAY TIME OF RECH. DAYS TO RECH. RECH. CYCLE	CYCLE TIME 2:60 MIN	CAPACITY RESERVE FLOWMTR. CAP. REML
--	---------------------------	--

Displays the length of Cycle 2.

Press 3 to increase, 4 to decrease (1 minute increments). The factory setting is 60 minutes.

9. Press 2

TIME OF DAY TIME OF RECH. DAYS TO RECH. RECH. CYCLE	CYCLE TIME 3:05 MIN	CAPACITY RESERVE FLOWMTR. CAP. REML
--	---------------------------	--

Displays the length of Cycle 3.

Press 3 to increase, 4 to decrease (1 minute increments) The factory setting is 5 minutes.

10. Press 2

TIME OF DAY TIME OF RECH. DAYS TO RECH. RECH. CYCLE	8:00 AM	CAPACITY RESERVE FLOWMTR. CAP. REML
--	---------	--

Displays time of day.

Operation

START-UP

NOTICE: A sanitizing agent is added to the softener at the factory. Flush the tank to drain with a minimum of 40 gallons of water, or initiate a full recharge, before putting the unit into service.

- Close the main water supply valve.
- Set the bypass valve to bypass.
- All faucets in the installation site should be closed.
- Direct the drain line discharge into a bucket where flow can be observed.
- Plug the unit into a 120 volt, 60 hertz, single phase grounded, 3-wire receptacle (or 2-wire receptacle with grounded 3-prong adapter).
- Set the timer to the correct time of day.
- Open the main supply valve.
- On the timer, press "1" on the timer face to start the regeneration cycle.
- Slowly shift the bypass toward the "Soft Water" position until water flows.
- Allow the unit to fill slowly until water flows from the drain line.
- When flow to drain is established, open the bypass fully. Watch the drain line discharge for signs of resin. If resin particles appear, reduce the flow. Increase the flow again when resin no longer appears in the discharge.
- When the unit is filled with water, return the timer to the service position by pressing buttons 3 and 5 simultaneously.

NOTICE: Unplugging the control will NOT affect the timer settings.

USING THE DISPLAY TO MONITOR OPERATION

Figure 9 shows how to monitor unit performance by using the timer's display window.

BEFORE LEAVING THE INSTALLATION SITE:

Flush the sanitizing solution from the unit by running it to drain or initiating a full recharge cycle (Press "1" on the timer face).

The water heater will hold hard water for several days. To ensure soft hot water immediately, drain the water heater and allow it to refill with soft water.

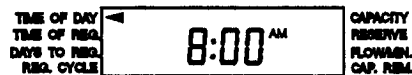
Make sure the brine tank is filled with water to the level of the float. Fill the tank with a hose, or put the unit into a full recharge so that the brine refill cycle will fill the tank.

Explain the operation of the softener and bypass valve to the customer. Give the customer the Owner's Guide and warranty policy. Make sure the customer knows that there will be new sounds associated with the recharging of the unit. Advise the customer to periodically check and replenish the salt supply.

Clean up the unit and the installation site, removing any soldering or pipe threading residues from the equipment with a damp towel.

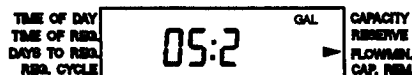
FIG. 9 - MONITORING OPERATION

1. In Service



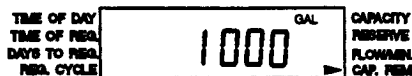
Displays time of day.

2. Press 5



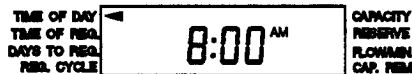
Displays current flow rate in gallons per minute.

3. Press 5



Displays capacity remaining in gallons.

4. Press 5



Displays time of day.