

Chromalox®

Installation, Operation

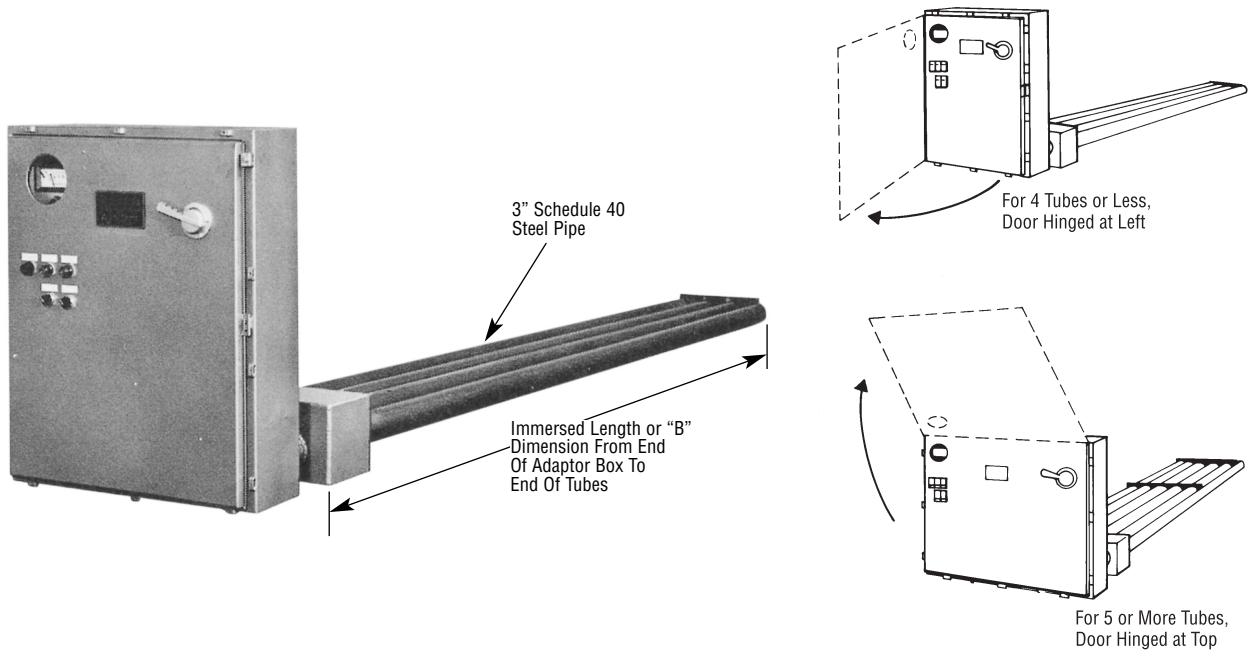
and

RENEWAL PARTS IDENTIFICATION

SERVICE REFERENCE

DIVISION 4		SECTION RST
SALES REFERENCE	(Supersedes PN400-2)	PN400-3
		161-049178-001
DATE	MAY, 1986	

Type RST and RSTO Unitary Electric Immersion Heaters



Specifications – Table A

Tank		Holding Temperature (°F)	kW	Amperes**		Model †	Heater					
Capacity	Dimensions			240V	480V		Adapter Box Dimensions (In.)			"B" Dimension*	No. Tubes	Approximate Net Weight (Lbs.)
							Height	Depth	Length			
8,000 Gal.	8' (Dia.) x 21'6"	175	15	37.0	18.5	RST (or) RSTO-21915	8½	8¼	20	19'	2	560
		225	20	49.0	24.5	RST (or) RSTO-21920	8½	8¼	20	19'	2	560
		275	25	61.2	30.6	RST (or) RSTO-21925	8½	8¼	20	19'	2	560
		325	30	73.0	36.5	RST (or) RSTO-51530	8½	8¼	35	15'	5	1100
		375	38	92.4	46.2	RST (or) RSTO-52038	8½	8¼	35	19'6"	5	1300
10,000 Gal.	10'6" (Dia.) x 15'6"	175	18	44.3	22.2	RST (or) RSTO-31518	8½	8¼	25	15'	3	635
		225	24	58.7	29.4	RST (or) RSTO-41524	8½	8¼	30	15'	4	905
		325	36	87.6	43.8	RST (or) RSTO-61536	8½	8¼	40	15'	6	1270
		375	45	109.2	54.6	RST (or) RSTO-81545	8½	8¼	50	14'6"	8	1710
12,000 Gal.	10'6" (Dia.) x 18'6"	175	20	49.0	24.5	RST (or) RSTO-31720	8½	8¼	25	17'	3	695
		225	26	63.5	31.7	RST (or) RSTO-41726	8½	8¼	30	16'6"	4	925
		275	32	78.0	39.0	RST (or) RSTO-51732	8½	8¼	35	16'6"	5	1135
		325	40	97.2	48.6	RST (or) RSTO-61740	8½	8¼	40	17'	6	1440
		375	48	116.4	58.2	RST (or) RSTO-71848	8½	8¼	45	17'6"	7	1620
15,000 Gal.	10'6" (Dia.) x 23'3"	175	22	54.0	27.0	RST (or) RSTO-31922	8½	8¼	25	18'8"	3	725
		225	30	73.0	36.5	RST (or) RSTO-41930	8½	8¼	30	19'	4	1055
		275	36	87.6	43.8	RST (or) RSTO-51936	8½	8¼	35	18'6"	5	1230
		325	45	109.2	54.6	RST (or) RSTO-61945	8½	8¼	40	19'	6	1530
		375	56	136.0	68.0	RST (or) RSTO-72156	8½	8¼	45	20'6"	7	1830
20,000 Gal.	10'6" (Dia.) x 30'10½"	175	24	58.7	29.4	RST (or) RSTO-32024	8½	8¼	25	19'6"	3	755
		225	36	87.6	43.8	RST (or) RSTO-42336	8½	8¼	30	23'	4	1205
		275	48	116.4	58.2	RST (or) RSTO-52548	8½	8¼	35	25'	5	1605
		325	60	145.2	72.6	RST (or) RSTO-62660	8½	8¼	40	25'6"	6	1790
		375	72	174.2	87.1	RST (or) RSTO-72672	8½	8¼	45	26'	7	2260

*Heated length is four inches shorter than "B" dimension.

**All amperes based on 3-phase 60 cycle power.

† T suffix letter indicates 7 day 24 hour time clock, F suffix letter indicates flange mounting instead of adaptor box.

GENERAL

The Chromalox Unitary Electric Immersion Heater, Type RST or RSTO, is a thoroughly engineered pretested package designed to give years of service virtually maintenance free and shipped ready for installation in storage tank. They provide low watt density heating over a large heating surface with precise temperature control for such materials as asphalt, fuel oil, pitch and tar, liquid sugar, lube oils, linseed oil, and many other heat sensitive compounds.

The heating elements, either metal sheath (RST) or open coil (RSTO) are housed in 3" Schedule 40 carbon steel pipes which are

welded into the tank adaptor box. Once the Unitary Immersion Heater is welded into your tank, the heating elements are removable without draining the tank.

The control panel contains a master circuit-breaker which is safety-interlocked so the door cannot be opened when the power is on, two contactors, a two-step indicating thermostat with the temperature range of 50 to 400°F*, over-temperature cutout with manual reset, control relay, selector switches, pilot lights, and a 120V control circuit transformer.

*Optional ranges available are 50 to 300°F or -20 to 120°F.

INSTALLATION

DANGER: Hazard of Explosion or Fire. The tank must be purged of all flammable vapors prior to cutting or welding.

1. Select a location for this installation according to the following:
 - A. Heating elements are removable thru the lower half of the control enclosure but adequate room must be provided for this purpose. This removal length for the RST would be equal to the length "B" dimension as tabulated in the Specifications Table 1. The element removal length for the RSTO is 3 foot since it can be bent on a 12" radius.
 - B. The control enclosure should not be located where it will be in direct sun light or be affected by any other heating equipment in the area.
2. Cut a rectangular hole in the tank approximately 1/4" larger than the adapter box dimensions tabulated on the Specification Table 1.
3. Install heater tube supports on 10 foot centers before installing Immersion Heater assembly (refer to Figure 1). Do not anchor the heater tubes to the supports as the tubes must be allowed to expand.

Note: Heater tubes should be level or slightly inclined away from the control panel.
4. Insert heater tubes and position adapter box as per Figure 1.
5. Weld adapter box to tank insuring that the weld is liquid tight.
6. Tank suction pipe should be mounted at least 2" above the level of the heaters. A separate line can be provided to drain tank after heaters have been de-energized.

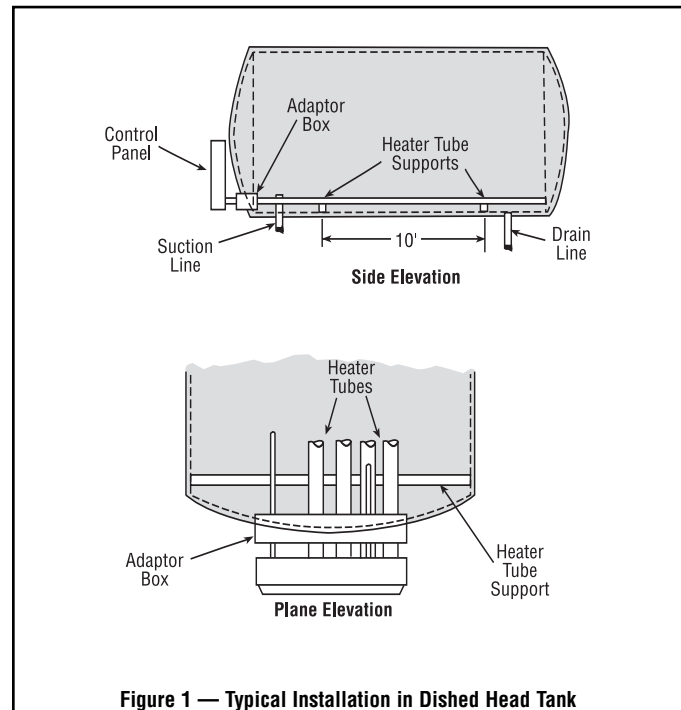


Figure 1 — Typical Installation in Dished Head Tank

WIRING

CAUTION: Hazard of Electric Shock. The Unitary Immersion Heater must be grounded using grounding means provided in the control box and employing wiring in accordance with National Electrical Code.

1. This heater assembly is completely prewired. The only wiring necessary is the terminals L1, L2, L3 on the main circuit breaker and the grounding lug in the control panel.

Note: All electrical connections should be checked and tightened if necessary. These sometimes loosen during transit.
2. The Unitary Immersion Heaters's internal wiring is per the typical wiring diagram (Figure 2) with the kW loads being tabulated in Table 2.

Table 2

Model	kW/Circuit	
	A	B
RST (or) RSTO-21915	7.5	7.5
RST (or) RSTO-21920	10.0	10.0
RST (or) RSTO-21925	12.5	12.5
RST (or) RSTO-51530	18.0	12.0
RST (or) RSTO-52038	22.8	15.2
RST (or) RSTO-31518	12.0	6.0
RST (or) RSTO-41524	12.0	12.6
RST (or) RSTO-61536	18.0	18.0
RST (or) RSTO-81545	22.5	22.5
RST (or) RSTO-31720	13.3	6.7
RST (or) RSTO-41726	13.0	13.0
RST (or) RSTO-51732	19.2	12.8
RST (or) RSTO-61740	20.0	20.0
RST (or) RSTO-71848	27.4	20.6
RST (or) RSTO-31922	14.7	7.3
RST (or) RSTO-41930	15.0	15.0
RST (or) RSTO-51936	21.6	14.4
RST (or) RSTO-61945	22.5	22.5
RST (or) RSTO-72156	32.0	24.0
RST (or) RSTO-32024	16.0	8.0
RST (or) RSTO-42336	18.0	18.0
RST (or) RSTO-52548	28.8	19.2
RST (or) RSTO-62660	30.0	30.0
RST (or) RSTO-72672	41.1	31.9

WIRING

Typical Wiring Diagram for Type RST and RSTO

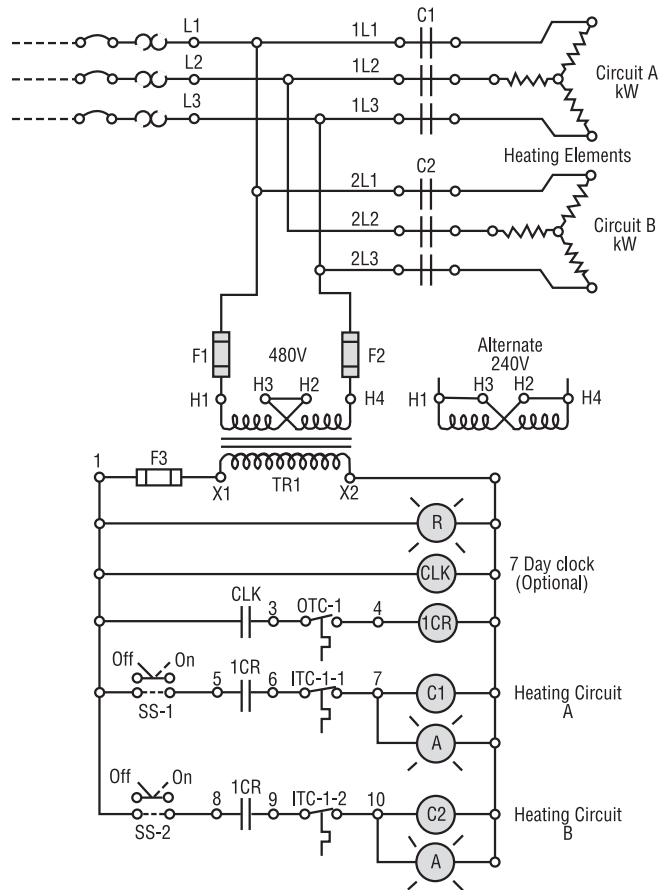


Figure 2

OPERATION

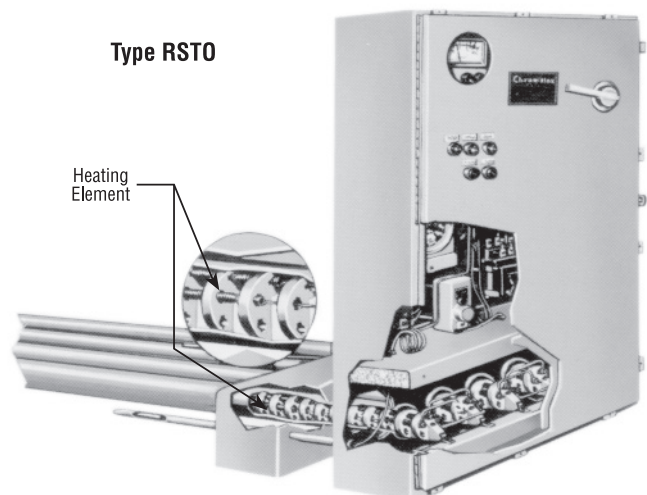
CAUTION: To avoid possible damage to the heater, do not energize until the tank is filled with fluid. Recommended fluid level is 2" above the heater tube or pipe.

1. Turn the master circuit breaker off and open the control box door.
2. Set the indicating temperature control at the desired temperature and the over-temperature cutout 50°F above this temperature.
3. Close the control box door and turn the circuit breaker on. To energize the heater circuits, turn the on-off selector switch to the "on" position.

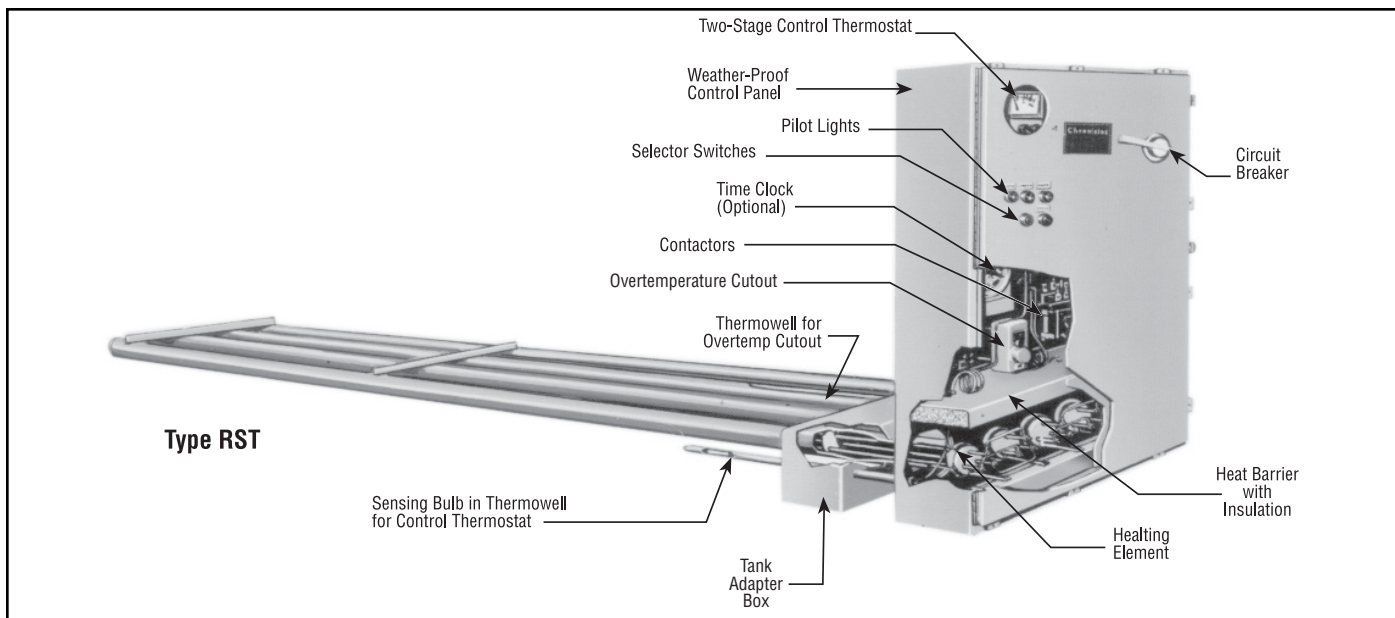
MAINTENANCE

CAUTION: Hazard of Electrical Shock. Disconnect all power before servicing or replacing the heaters.

1. To remove the heating element, first turn the circuit breaker to the off position. Then open the control box door and remove the screws from the sheet metal isolating panel located in the lower half of the control box.
2. When removing the heating elements, make certain that the terminals and the ceramic insulators (RSTO type only) do not contact oil or any other liquid foreign matter.
Note: Chromalox cannot be responsible for failures or damage caused by contamination on the ceramic insulators.
3. Next remove the element wiring and finally the element mounting screw. Now pull the element straight out of the heating tube.
4. **Note:** Check electrical connections at heater terminals and tighten if necessary. This will help avoid hot terminals which could destroy wiring insulation or heater terminals.



MAINTENANCE



OPTIONAL EQUIPMENT

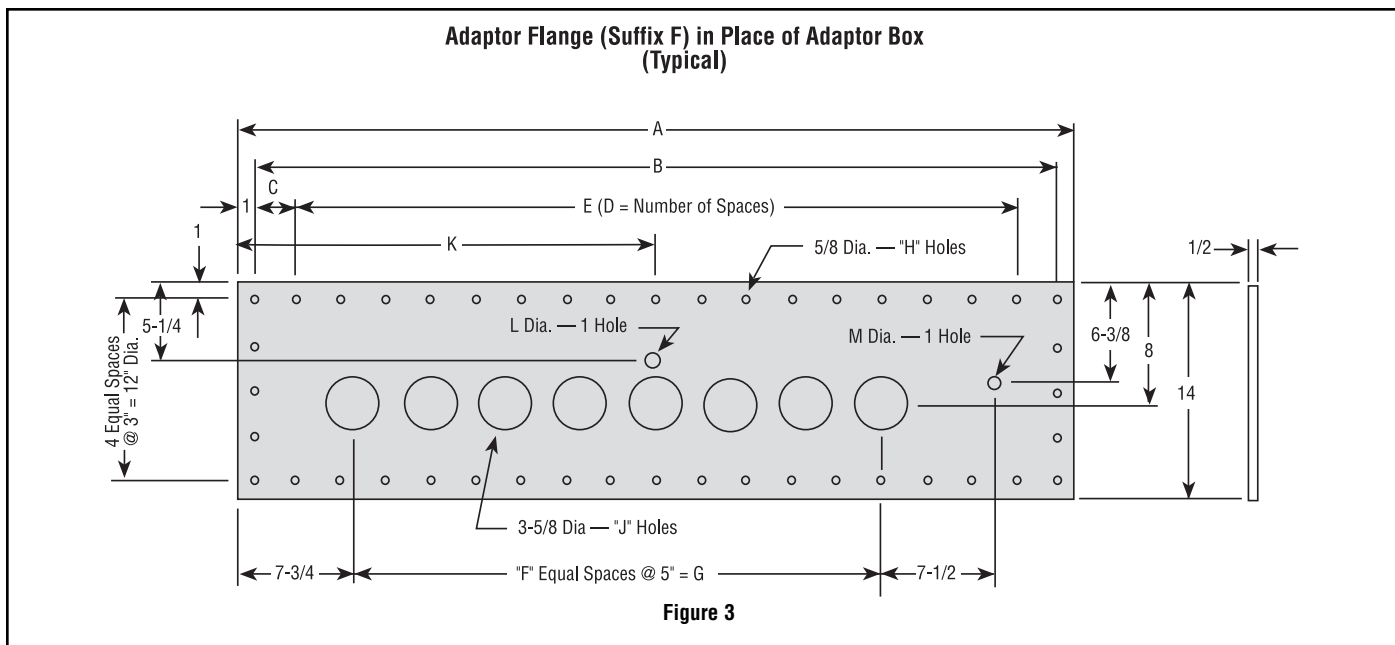


Table 3

No. Tubes	A	B	C	D	E	F	G	H	J	K	L	M	Gasket P/N
1	20½	18½	1¾	5	15	—	—	22	1	7¾	15/16	13/16	132-122539-001
2	25½	23½	2¾	6	18	1	5	24	2	7¾	15/16	13/16	132-122539-002
3	30½	28½	2¾	8	24	2	10	28	3	12¾	15/16	13/16	132-122539-003
4	35½	33½	1¾	10	30	3	15	32	4	12¾	15/16	13/16	132-122539-004
5	40½	38½	2¾	11	33	4	20	34	5	12¾	15/16	13/16	132-122539-005
6	45½	43½	2¾	13	39	5	25	38	6	17¾	15/16	13/16	132-122539-006
7	50½	48½	1¾	15	45	6	30	42	7	22¾	15/16	13/16	132-122539-007
8	55½	53½	2¾	16	48	7	35	44	8	22¾	15/16	13/16	132-122539-008

CHROMALOX TYPE TMC 7-DAY TIMER (SUFFIX T)

TMC 7-day Calendar, Electric Dial Timer is used to provide automatic start-up/off-on control of large tank heaters or could be set up for non-peak operation. Standard features: 7-day calendar dial permits different on/off schedules on different days of week. 2 to 14 replaceable trippers for up to 4 on/off operations per day, up to 28 on/off operations per week. 3 hour minimum on or off time; 21 hour maximum on or off time. Independent 4-pole design

allows SPST, DPST, SPDT switching. Manual on/off lever transfers switch operation without disturbing daily or weekly preset schedule. Heavy duty synchronous motor suitable for operation between -40°F and +140°F. Switch slider bar assures positive switching. Heavy duty terminals accommodate up to AWG No. 8 Wire.

OPTIONAL EQUIPMENT

OPERATION

“Off” Setting – de-energized the entire control circuit, thus de-energizing all heating circuits in the system.

“Automatic” Setting – allows the Day-Night Clock Panel to cycle the control system according to the program clock dial tripper settings.

To Set Trippers – refer to picture for typical setup of a Seven Day Program. Two trippers must be used for each day; an “A” tripper for switching from “Night Setback” to “Day Operation” and a “B” tripper for switching from “Day Operation” to “Night Setback”.

WARNING: To set the correct day and time at beginning of initial start-up, ROTATE THE PROGRAM CLOCK DIAL CLOCKWISE ONLY. DO NOT ATTEMPT TO TURN POINTER!

Adjusting and Maintenance of Time Switch:

1. Periodically check trippers to insure that they are tightly fastened to Program Clock dial.

WARNING: Tighten trippers with fingers only!

2. Rotate Program Clock dial CLOCKWISE one hour in Spring to adjust for daylight savings time (in areas where required). In Fall, carefully rotate clock dial CLOCKWISE approximately one full turn to reset at correct day and time for standard time. Check all trippers to insure they have not moved during rotation.

3. The Program Clock motor is permanently lubricated. Lubrication of other parts is not required.

4. The Program Clock switch contacts are factory set and need no field adjustment.



Model	Renewal Part No.	Operation	Volts 60 Hz	Switch	Amps
TMC71	311-057070-001	Seven Day	120	4 Pole 2 N.O. 2 N.C.	40

TYPE RST RENEWAL PARTS IDENTIFICATION

Model	240 Volts					480 Volts				
	Element	Circuit Breaker	Contact #1	Contact #2	Fuse	Element	Circuit Breaker	Contact #1	Contact #2	Fuse
RST-21915	157-120541-001	104-071818-024	072-120812-012	072-120812-012	128-114696-012	157-120541-002	104-071818-020	072-120812-012	072-120812-012	128-114696-029
RST-21920	157-120541-003	104-071818-025	072-120812-008	072-120812-008	128-114696-012	157-120541-004	104-071818-022	072-120812-012	072-120812-012	128-114696-029
RST-21925	157-120541-005	104-071818-028	072-120812-008	072-120812-008	128-114696-012	157-120541-006	104-071818-022	072-120812-012	072-120812-012	128-114696-029
RST-51530	157-120541-007	104-071818-028	072-120812-008	072-120812-009	128-114696-012	157-120541-008	104-071818-024	072-120812-008	072-120812-012	128-114696-029
RST-52038	157-120541-023	104-071818-045	072-120812-009	072-120812-009	128-114696-012	157-120541-024	104-071818-026	072-120812-008	072-120812-012	128-114696-029
RST-31518	157-120541-007	104-071818-025	072-120812-012	072-120812-008	128-114696-012	157-120541-008	104-071818-020	072-120812-012	072-120812-012	128-114696-029
RST-41524	157-120541-007	104-071818-026	072-120812-008	072-120812-008	128-114696-012	157-120541-008	104-071818-022	072-120812-012	072-120812-012	128-114696-029
RST-61536	157-120541-007	104-071818-046	072-120812-009	072-120812-009	128-114696-012	157-120541-008	104-071818-026	072-120812-008	072-120812-008	128-114696-029
RST-81545	157-120541-029	104-071818-049	072-120812-009	072-120812-009	128-114696-012	157-120541-030	104-071818-028	072-120812-008	072-120812-008	128-114696-029
RST-31720	157-120541-009	104-071818-025	072-120812-012	072-120812-008	128-114696-012	157-120541-010	104-071818-022	072-120812-012	072-120812-012	128-114696-029
RST-41726	157-120541-015	104-071818-028	072-120812-009	072-120812-009	128-114696-012	157-120541-016	104-071818-024	072-120812-012	072-120812-012	128-114696-029
RST-51732	157-120541-019	104-071818-045	072-120812-009	072-120812-009	128-114696-012	157-120541-020	104-071818-026	072-120812-008	072-120812-012	128-114696-029
RST-61740	157-120541-009	104-071818-045	072-120812-009	072-120812-009	128-114696-012	157-120541-010	104-071818-026	072-120812-008	072-120812-008	128-114696-029
RST-71848	157-120541-031	104-071818-046	072-120812-009	072-120812-010	128-114696-013	157-120541-032	104-071818-028	072-120812-009	072-120812-009	128-114696-029
RST-31922	157-120541-011	104-071818-026	072-120812-008	072-120812-009	128-114696-012	157-120541-012	104-071818-022	072-120812-012	072-120812-008	128-114696-029
RST-41930	157-120541-001	104-071818-029	072-120812-009	072-120812-009	128-114696-012	157-120541-002	104-071818-024	072-120812-008	072-120812-008	128-114696-029
RST-51936	157-120541-021	104-071818-045	072-120812-009	072-120812-009	128-114696-012	157-120541-022	104-071818-026	072-120812-008	072-120812-008	128-114696-029
RST-61945	157-120541-001	104-071818-046	072-120812-009	072-120812-009	128-114696-012	157-120541-002	104-071818-028	072-120812-008	072-120812-008	128-114696-029
RST-72156	157-120541-033	104-071818-020	072-120812-010	072-120812-010	128-114696-013	157-120541-034	104-071818-029	072-120812-009	072-120812-009	128-114696-029
RST-32024	157-120541-013	104-071818-026	072-120812-008	072-120812-009	128-114696-012	157-120541-014	104-071818-022	072-120812-012	072-120812-008	128-114696-029
RST-42336	157-120541-017	104-071818-045	072-120812-009	072-120812-009	128-114696-012	157-120541-018	104-071818-026	072-120812-008	072-120812-008	128-114696-029
RST-52548	157-120541-025	104-071818-046	072-120812-009	072-120812-010	128-114696-013	157-120541-026	104-071818-028	072-120812-008	072-120812-008	128-114696-029
RST-62660	157-120541-027	104-071819-020	072-120812-010	072-120812-010	128-114696-013	157-120541-028	104-071818-029	072-120812-009	072-120812-009	128-114696-011
RST-72672	157-120541-035	104-071817-016	072-120812-010	072-120812-010	128-114696-013	157-120541-036	104-071818-029	072-120818-009	072-120812-009	128-114696-011

TYPE RSTO RENEWAL PARTS IDENTIFICATION

Model	240 Volts					480 Volts				
	Element	Circuit Breaker	Contacto #1	Contacto #2	Fuse	Element	Circuit Breaker	Contacto #1	Contacto #2	Fuse
RSTO-21915	063-120517-001	104-071818-024	072-120812-012	072-120812-012	128-114696-012	063-120517-002	104-071818-020	072-120812-012	072-120812-012	128-114696-029
RSTO-21920	063-120517-003	104-071818-025	072-120812-008	072-120812-008	128-114696-012	063-120517-042	104-071818-022	072-120812-012	072-120812-012	128-114696-029
RSTO-21925	063-120517-043	104-071818-028	072-120812-009	072-120812-009	128-114696-012	063-120517-006	104-071818-022	072-120812-012	072-120812-012	128-114696-029
RSTO-51530	063-120517-007	104-071818-028	072-120812-009	072-120812-009	128-114696-012	063-120517-008	104-071818-024	072-120812-008	072-120812-012	128-114696-029
RSTO-52038	063-120517-023	104-071818-045	072-120812-009	072-120812-009	128-114696-012	063-120517-024	104-071818-026	072-120812-008	072-120812-012	128-114696-029
RSTO-31518	063-120517-007	104-071818-025	072-120812-012	072-120812-008	128-114696-012	063-120517-008	104-071818-020	072-120812-012	072-120812-012	128-114696-029
RSTO-41524	063-120517-007	104-071818-026	072-120812-009	072-120812-009	128-114696-012	063-120517-008	104-071818-022	072-120812-012	072-120812-012	128-114696-029
RSTO-61536	063-120517-007	104-071818-045	072-120812-009	072-120812-009	128-114696-012	063-120517-008	104-071818-026	072-120812-008	072-120812-008	128-114696-029
RSTO-81545	063-120517-037	104-071818-046	072-120812-009	072-120812-009	128-114696-012	063-120517-037	104-071818-028	072-120812-008	072-120812-008	128-114696-029
RSTO-31720	063-120517-009	104-071818-025	072-120812-012	072-120812-008	128-114696-012	063-120517-010	104-071818-022	072-120812-012	072-120812-012	128-114696-029
RSTO-41726	063-120517-015	104-071818-028	072-120812-009	072-120812-009	128-114696-012	063-120517-016	104-071818-024	072-120812-012	072-120812-012	128-114696-029
RSTO-51732	063-120517-019	104-071818-045	072-120812-009	072-120812-009	128-114696-012	063-120517-020	104-071818-026	072-120812-008	072-120812-012	128-114696-029
RSTO-61740	063-120517-009	104-071818-045	072-120812-009	072-120812-009	128-114696-012	063-120517-010	104-071818-026	072-120812-008	072-120812-008	128-114696-029
RSTO-71848	063-120517-031	104-071818-046	072-120812-009	072-120812-010	128-114696-013	063-120517-032	104-071818-028	072-120812-009	072-120812-009	128-114696-029
RSTO-31922	063-120517-011	104-071818-026	072-120812-008	072-120812-009	128-114696-012	063-120517-012	104-071818-022	072-120812-012	072-120812-008	128-114696-029
RSTO-41930	063-120517-001	104-071818-029	072-120812-009	072-120812-009	128-114696-012	063-120517-002	104-071818-024	072-120812-008	072-120812-008	128-114696-029
RSTO-51936	063-120517-021	104-071818-045	072-120812-009	072-120812-009	128-114696-012	063-120517-022	104-071818-026	072-120812-008	072-120812-008	128-114696-029
RSTO-61945	063-120517-001	104-071818-046	072-120812-009	072-120812-009	128-114696-012	063-120517-002	104-071818-028	072-120812-008	072-120812-008	128-114696-029
RSTO-72156	063-120517-033	104-071818-020	072-120812-010	072-120812-010	128-114696-013	063-120517-034	104-071818-029	072-120812-009	072-120812-009	128-114696-029
RSTO-32024	063-120517-013	104-071818-026	072-120812-008	072-120812-009	128-114696-012	063-120517-014	104-071818-022	072-120812-012	072-120812-008	128-114696-029
RSTO-42336	063-120517-017	104-071818-045	072-120812-009	072-120812-009	128-114696-012	063-120517-018	104-071818-026	072-120812-008	072-120812-008	128-114696-029
RSTO-52548	063-120517-025	104-071818-046	072-120812-009	072-120812-010	128-114696-013	063-120517-026	104-071818-028	072-120812-008	072-120812-008	128-114696-029
RSTO-62660	063-120517-027	104-071819-020	072-120812-010	072-120812-010	128-114696-013	063-120517-028	104-071818-029	072-120812-009	072-120812-009	128-114696-011
RSTO-72672	063-120517-035	104-071817-016	072-120812-010	072-120812-010	128-114696-013	063-120517-036	104-071818-029	072-120812-009	072-120812-009	128-114696-011

PARTS COMMON TO ALL RST AND RSTO

Window Kit	168-071922-001	Hand Switch . . . . .	.292-122885-001
Temperature Control	300-121011-006	Contacts N.O. for Switch . . . . .	.071-122886-001
Overtemperture Control	300-057515-003	Fuse Block 2 Poles . . . . .	.129-050365-001
Control Relay 2 Poles . . . . .	.072-120461-018	Breaker Handle NEMA IV Handle . . . . .	.139-071820-013
Pilot Lights . . . . .	.213-122884-003	Optional Equipment	
Amber Lens . . . . .	.213-122884-007	Time Clock 7-day . . . . .	.311-057070-001
Red Lens . . . . .	.213-122884-004	Adapter Flange Gasket . . . . .	.See Table 3 – Optional Equipment

Limited Warranty:
Please refer to the Chromalox limited warranty applicable to this product at
<http://www.chromalox.com/customer-service/policies/termsofsale.aspx>.

Chromalox®
PRECISION HEAT AND CONTROL
2150 N. RULON WHITE BLVD., OGDEN, UT 84404
Phone: 1-800-368-2493 www.chromalox.com