# Maintenance sheet <sup>110</sup><sub>620064-5</sub>

# A. Troubleshooting

If the error code is indicated on the Red LED (Refer to the Section C) on the PCB (Part #701) of the water heater (and/or the remote controller), refer to Section B.

#### << It takes a long time to get hot water at the fixtures >>

- · The time it takes to deliver hot water from the water heater to your fixtures depends on the length of piping between the two. The longer the distance or the bigger the pipes, the longer it will take to get hot water.
- If you would like to receive hot water to your fixtures more quickly, you may want to consider a hot water recirculation system.

## << The water is not hot enough or turns cold and stays cold >>

- · Compare the flow and temperature. Refer to the "Output temperature chart" in the Installation manual.
- Check cross plumbing between cold water lines and hot water lines.
- Check if the gas supply valve is open fully, the gas line is sized properly and the gas supply pressure is within specified limits. Refer to the "Gas supply and gas pipe sizing" in the Installation manual.
- · Check the set temperature, and change the set temperature with the remote controller if it is installed or the DIP switch setting. Refer to Section D. Refer to the "Water circuit" in this section.

## <<The water is too hot>>

Check the set temperature and lower

#### <<The hot water is not available when a fixture is opened>>

 Refer to the "Power supply circuit" and "Water circuit" in this section. · Check if the gas supply valve is fully open, the gas line is sized properly, and the gas supply pressure is within specified limits.

#### <<Fluctuation in hot water temperature>>

- Check if the filter on the cold water inlet is cleaned (Part #406).
- Check if the gas line is sized properly and the supply gas pressure is within specified limits.
- · Check for cross connection between cold water lines and hot water lines.

# Refer to the "Water circuit" in this section.

#### << Unit does not ignite when water goes through the water heater>> Refer to the "Power supply circuit" and "Water circuit" in this section

- · If you use the remote controller, turn the power button on and then check if the set temperature will be displayed on the screen.
- Check if the filter on the cold water inlet is cleaned (Part #406).
- **B. Error codes**

The numbers in parentheses below are the numbers of blinking of the Red LED on the PCB to indicate the error codes.

#### 03 (One flash): Incorrect DIP switch setting\*

#### Check the DIP switch settings on the PCB. Refer to Section D.

#### 10 (Five flashes): Warning for the "99" error code

- Check the gas type of the house (and/or the building). If it's an incorrect gas type model, replace 39 (Two flashes): Air-fuel ratio rod failure\* the water heater to the correct one.
- Check for and remove any blockage in the vent system. Refer to "Venting instructions" in the Installation manual
- If the water heater is installed as a direct-vent system, check whether there is enough distance between the intake air terminal and the exhaust terminal. Refer to the "Vent termination clearances" in the Installation manual.
- Verify the total equivalent vent length hasn't exceeded 50 ft (15.2 m) with no more than 5 elbows deducting 5 ft (1.5 m) for each elbow used in the venting system. Refer to "Venting instructions" in the Installation manual
- Check the altitude/elevation of area of where the water heater is installed. Refer to the "Highaltitude function" of Section D. And change the DIP switch settings.
- Check if there is grease and/or dirt in the burner (Part #101) and the fan motor (Part #103). especially if the water heater has been installed in a contaminated area
- Check if there is dust and lint in the heat exchanger.
- Check the manifold pressure of the water heater. Refer to the rating plate of the water heter.

### 11 (Three flashes): Ignition failure\*

- Check the gas supply and inlet gas pressure.
- Check if the Hi-limit switch (Part #412) is functioning properly.
- Check for connection/breakage of wires (Part #413, 708, 709, 712), burn marks on the computer board (Part #701), and/or soot on the flame rod (Part #108). And then if the O.H.C.F (Part #413) has a breakage, consult the manufacturer.
- Check if there is a buzzing spark ignition sound coming from the burner (Part #101) when water heater prepares for combustion
- Listen for the double "clunk" sound coming from the gas valve assembly (Part #102) when water heater goes into combustion.
- (Only if no sparking and/or clunk sound) Check the voltage on each wire to gas valve assembly (Part #102) and/or the igniter (Part #711). Refer to "Appendix A" in Section C.
  - \*No sparking sound >>>>> Refer to #1 at "Appendix A" in Section C.
  - \*No clunk sound >>>>> Refer to #2 at "Appendix A" in Section C.
- Check if there is leaking from the heat exchanger (Part #401).
- Check if there is dust and lint in nozzles of the manifold (Part #102).
- Check the current on the flame rod (Part #108). Refer to #3 at "Appendix A" in Section C.

## 12 (Three flashes): Loss of flame\*

- Check the gas supply and inlet gas pressure.
- Check if the Hi-limit switch (Part #412) is functioning properly.
- Check for connection/breakage of wires (Part #413, 708, 709, 712), burn marks on the computer board (Part #701), and/or soot on the flame rod (Part #108). And then if the O.H.C.F (Part #413) has a breakage, consult the manufacturer.
- Check if there is leaking from the heat exchanger (Part #401).
- Check if there is dust and lint in nozzles of the manifold (Part #102). • Check the current on the flame rod (Part #108). Refer to #3 at "Appendix A" in Section C.

## <<The fan motor is still spinning after operation has stopped>>

• This is normal. After operation has stopped, the fan motor keeps running from 15 to 70 seconds in order to re-ignite quickly, as well as purge all the exhaust gas out of the flue.

· An abnormal sound from the water heaters is caused by not enough air supply or incorrect installations. The water heater needs more combustion air. Refer to the "10" error code in the section B.

#### << Power supply circuit>>

- If the remote controller is installed, press the "ON/OFF" button of the remote controller, and make sure that the set temperature is displayed on the remote controller. Restart the water heater.
- Is the power switch inside water heater turned on? (Part #706)
- Check if the Red LED on the PCB (Part #701) of the water heater is lit for a few seconds right after the power is supplied. If so, the power supply circuit of the water heater is under normal condition. Next, refer to the "Water circuit" in this section.
- · Check the fuse on the surge box (Part #703), and if it has a brown spot, need to replace it.
- Check the power supply, and make sure that the water heater has 120 VAC.
- If the Red LED on the PCB (Part #701) isn't lit, some electrical parts can be broken. Consult the manufacturer.

#### <<Water circuit>>

- If you use the remote controller, turn the power button on and then check if the set temperature will be displayed on the screen.
- · Open all hot water faucets, and make sure that there is enough water flow. This water heater needs at least 0.5 GPM (1.9 L/m) water flow (at the default set temperature) to operate
- Check for reverse connection and cross connection.
- Check if the filter on the cold water inlet is cleaned (Part #406).
- · Check if there is no debris or obstruction on the fixtures.
- · Check if water ways in the water heater are frozen. If so, unfreeze them. And refer to the Installation manual to protect your water heater from freezing.
- · Check if the inlet water pressure is higher than 40 psi. If it's lower than 40 psi, increase the
- pressure
- · Check for connections and breakage of wires (Part #402).
- Check if the motor drive of the flow adjustment valve (Part #402) is locked due to scale buildup, and/or water leakage. If so, consult the manufacturer.

#### 31,32 (Two flashes): Disconnected/short-circuited thermistor\*

- · Check for connection/breakage of wires and/or debris on the thermistor (Part #407, 408).
- · Check the thermistor resistance. Refer to "Appendix D" in Section C.

- Check for connection/breakage of wires (Part #709) and/or soot on the flame rod (Part #108). 51.55 (Six flashes): Abnormal gas solenoid valve and main gas valve
- · Check for connection/breakage of wires (Part #708) and/or burn marks on the computer board (Part #701).
- Reset power supply of the water heater.
- Check the voltage of each valve on the gas valve assembly (Part #102). Refer to "Appendix C" in Section C.

#### 61 (Four flashes): Fan motor fault\*

- · Check for connection/breakage of wires, dust buildup in the fan motor (Part #103) and/or burn marks on the computer board (Part #701).
- · Check to see if the fan motor connectors are frozen or corroded (Part #103).
- Check the voltage between blue wire and each wire of the fan motor (Part #103), and check resistance between white wire and red wire. Refer to "Appendix B" in Section C.

#### 70 (One flash): Computer board fault\*

· Check for connection/breakage of wires (Part #714) and/or burn marks on the computerboard (Part #701).

#### 72 (Six flashes): False flame detection\*

- Clean the flame rod (Part #108).
- For indoor models, check if a condensate drain is installed on the vent collar of the water heater. Check if there is leaking from the heat exchanger (Part #401).

#### 74: Miscommunication between water heater and remote controller

- Check the model type of the remote controller. Model No. 100112183 (TK-RE02) is the correct one
- · Inspect the connections between the water heater and remote controller. Refer to the "Temperature Remote controller" in the Installation manual.
- Check the power supply of the water heater.

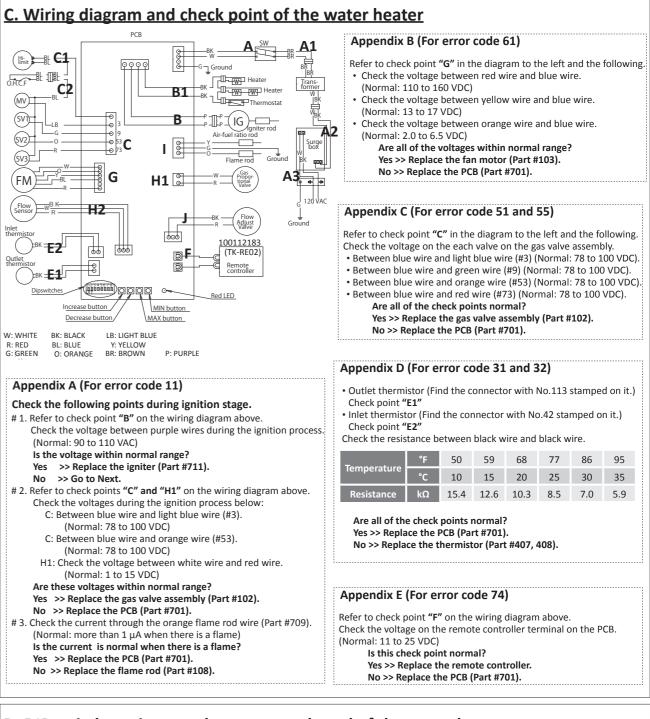
99 (Five flashes): Imperfect combustion\*

Refer to the "10" error code in this section

- If this error code appears only on the Red LED in the PCB (Part #701), check the voltage on the remote controller terminal on the PCB. Refer to "Appendix E" in Section C.
- If this error code appears only on the remote controller, replace the PCB (Part #701).

\*These error codes will be cleared when water flow stops.

• If this error code appears on both the PCB (Part #701) and the remote controller, replace the remote controller.



# D. DIP switch settings on the computer board of the water heater

# Change the DIP switch settings when the power supply is turned off. The dark squares indicate the correct DIP switch positions. DEFAULT is the factory setting. The DIP switches have certain special functions and generally should not need adjustment.

Gastype					
Propane	ON 1 2 3 4 5 6 7 8 OFF	Natural gas	ON 12345678 OFF		
The Gas type DIP switch should already be properly preset from the factory.					

PCB

 $\varphi \varphi \varphi \varphi$ 

0 53 0 73 C

G

LB: LIGHT BLUE

Check the following points during ignition stage.

# 1. Refer to check point "B" on the wiring diagram above.

Check the voltages during the ignition process below:

C: Between blue wire and light blue wire (#3).

C: Between blue wire and orange wire (#53).

Yes >> Replace the gas valve assembly (Part #102).

(Normal: more than 1 uA when there is a flame)

Is the current is normal when there is a flame?

Y: YELLOW BR: BROWN

H2

66

Increase button

Decrease buttor

Appendix A (For error code 11)

Is the voltage within normal range?

Yes >> Replace the igniter (Part #711).

(Normal: 78 to 100 VDC)

(Normal: 78 to 100 VDC)

Are these voltages within normal range?

(Normal: 1 to 15 VDC)

No >> Replace the PCB (Part #701).

Yes >> Replace the PCB (Part #701).

They have settings for four functions, shown below.

High-altitude function

FM speed is increased automatically.

DEFAULT 0 to 2,000 ft (0 to 610 m)

FM+

2,001 to 4,000 ft

(611 to 1,219 m)

FM++

4,001 to 6,000 ft

(1,200 to 1,829 m)

ON 12345678

ON 12345678

ON 12345678

OFF

Gas type

110 Indoo

110 Outdoo

No >> Replace the flame rod (Part #108).

(Normal: 90 to 110 VAC)

No >> Go to Next.

BK: BLACK

BL: BLUE O: ORANGE

R1

H1 🛱

600

MIN button

P: PURPLE

MAX button

Heater

∭Lí(G)-⊡-

Gas Propor-tional Valve

Flow Adjust Valve

100112183

(TK-RE02)

Air-fue

Heater

**C**2

-- 0

₩.C.F

(MV)

(SV1)

(sv2)

SV3L

FM

)=BK **=E2**L

)=BK **-E1** 

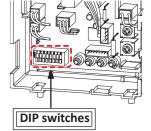
Qutlet

W: WHITE

R: RED G: GREEN

Mod	lel type
r	ON 12345678
or	ON 1 2 3 4 5 6 7 8

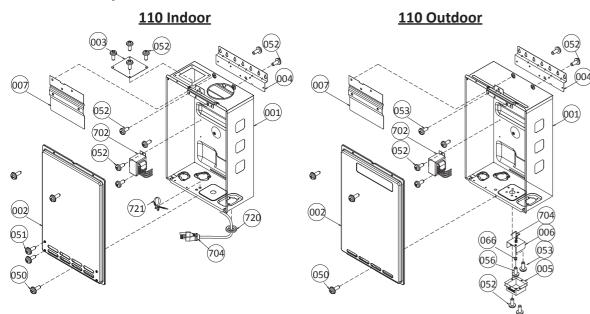
The Model type DIP switch should already be properly preset from the factory.



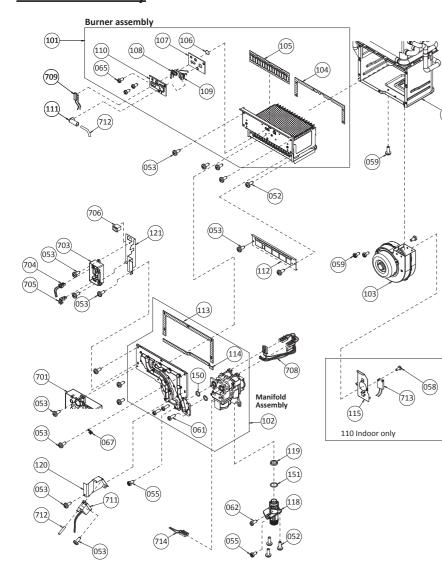
Temperature set			
113 °F (45 °C)	ON 1 2 3 4 5 6 7 8		
122 °F (50 °C) Default	ON 12345678		
131 °F (55 °C)	ON 1 2 3 4 5 6 7 8 OFF		
140 °F (60 °C)	ON 12345678		

# E. Components diagram / Parts list

# Case assembly



_			
Bui	rner	assembly	



Part #		ŧ	
Item #	110	T-KJr2	Description
#	model	model	
001	100074343	EK415	Case assembly for 110 Indoor
	100074356	EK432	for 110 Outdoor
002	100074347	EK419	Front cover for 110 Indoor
	100074357	EK433	for 110 Outdoor
003	100074602	EK401	Air blockage plate for 110 Indoor
004	100074368	EKJ09	Bracket
005	100074199	EKJ64	Junction box
006	100074313	EKJ66	Junction box inner plate
007	100074522	EX00M	Back guard panel for 110 model
050	100074210	EW000	Truss screw M4×12 (W/Washer) SUS410
051	100074509	EW001	Truss screw M4×10 (W/Washer)
052	100074211	EW002	Truss screw M4×10 (Coated) SUS3
053	100074245	EW003	Truss screw M4x10 SUS
054	100074510	EW004	Hex head screw M4×12 (W/Washer) SUS3
055	100074248	EW005	Hex head screw M4x8 FEZN
056	100074555	EX014	Truss screw M4x10
058	100074511	EW008	Pan head screw M3x10 SUS
059	100074246	EW00H	Pan screw M4x12 (W/Washer)
061	100074385	EKK31	Tap tight screw M4x12 FEZN
062	100074247	EW006	Pan screw M4x10
063	100074272	EW00A	Pan head screw M3x6 SUS3
064	100074512	EW009	Truss head screw M4x6 SUS3
065	100074244	EW00D	Pan screw M4x8 MFZN
066	100074328	EC00X	Nylon clamp
067	100074233	EM167	Wire clamp 60

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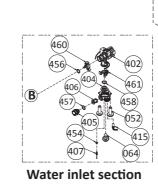
Exhaust section for 110 Outdoor

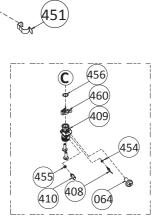
Part #

(154)

(053)

(152)





В

Water way assembly

(453)

(401)

(414)

(463)

(413)

<sup>7</sup>(450)

412

(452)

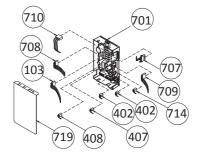
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Water outlet section

#	110 model	T-KJr2 model	Description
101	100074345	EK417	Burner assembly for 110
102	100074353 100074349	EK429 EK421	Manifold with gas valve assembly LP for 110 Manifold with gas valve assembly NA for 110
103	100074531	EX02E	Fan motor for 110
104	100074525	EX00V	Burner holder gasket for 110
105 106 107	100074216 100074218 100074219	EKK2X EKK2V EKK2W	Burner gasket Burner window Rod holder gasket
108	100074523	EX00R	Flame rod for 110
109	100074556	EX00S	Igniter rod for 110
110 111	100074524 100074223	EX00U EKN61	Rod holder for 110 Rod cap
112	100074354	EK430	Burner damper for 110
113 114 115	100074229 100074230 100074344	EKK2Y EKK2K EK416	Manifold gasket A Manifold gasket B Fan damper for 110 Indoor
118 119 120	100074235 100074234 100074236	EKK1E EKK2Z EKK1B	Gas inlet Gas inlet ring Igniter plate
121	100074397	EKK4H	Surge box plate for 110
150 151 152	100074533 100074242 100074553	EZP18 EK042 EK442	O-ring P18 NBR (Black) O-ring P20 NBR (Black) Silicon ring for 110 Outdoor
153	100074400	EKK53	Rain protection plate in Exhaust chamber for 110 Outdoor
154	100074403	EKK56	Exhaust port

# **Computer board assembly**



tom	Part #		
ltem	110	T-KJr2	Description
#	model	model	
401	100074346 100074350	EK418 EK426	Heat exchanger assembly for 110 Indoor for 110 Outdoor
402	100074351	EK427	Flow adjustment valve/Flow sensor for 110
404	100074377	EKK1U	Water inlet
405	100074381	EKK2B	Inlet drain plug
406	100074382	EKK2C	Inlet water filter
407	100074398	EKK4J	Inlet thermistor for 110
408	100074402	EKK55	Outlet thermistor for 110
409	100074378	EKK1V	Water outlet
410	100074383	EKK2E	Outlet drain plug
412	100074412	EM212	Hi-Limit switch for 110
413	100074334	EK333	Overheat-cut-off fuse
414	100074384	EKK2R	Heater
415	100074263	EKK2P	Inlet heater
450	100074273	EKK27	Pipe heater fixing plate
451	100074310	EK031	Heater fixing plate 16
452	100074251	EKK26	Fuse fixing plate 18
453	100074331	EK029	Fuse fixing plate 14
454	100076303	EZM04	O-ring P4 FKM
455	100076305	EZM06	O-ring P6 FKM
456	100076306	EZM14	O-ring P14 FKM
457	100076307	EZM15	O-ring P15 FKM
458	100076308	EZM16	O-ring P16 FKM
460	100074290	EKK24	Fastener "14-22"
461	100074410	EM192	Fastener "16A"
463	100074250	EKN50	Silicon ring for 110 Indoor

ltom	Part #		
ltem #	110 model	T-KJr2 model	Description
701 702	100074348 100074366	EK420 EKH09	Computer board for 110 model Transformer
703 704	100074352 100074601 100074406	EK428 EK146 EKK5M	Surge box AC120V wire for Indoor models AC120V wire for 110 Outdoor
705	100074339	EK408	Transformer wire for 110 model
706 707	100074326 100074338	EKK4V EK407	AC120V Power ON-OFF switch Switch wire for 110 model
708	100074391	ЕККЗК	Gas valve wire for 110
709	100074355	EK431	Flame rod wire for 110 model
710	100074393 100074394	EKK3R EKK40	EH-IG wire for 110 Indoor EH-IG wire with freeze protection thermostat for 110 Outdoor
711 712	100074237 100074224	EKN74 EKK2M	lgniter High voltage igniter cable
713	100074369	EKJ59	Freeze protection thermostat for 110 Indoor
714 719	100074404 100074396	EKK58 EKK49	Proportional gas valve wire for 110 Computer board cover for 110
720 721	N/A N/A	EK148 EW022	Rubber grommet for Indoor model Cable strap for Indoor model
722	100112183	TK-RE02	Temperature remote controller for 110

# <u>Temperature</u> remote controller

