A. Troubleshooting

If the error code is indicated on the 7-Seg-LED on the PCB (Part #701) of the water heater (and/or the remote controller), refer to Section B.

<< It takes 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 quicker, 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" of the installation manual.
- · Check cross plumbing between cold water lines and hot water lines.
- Check if the gas supply valve fully open, the gas line sized properly and the gas supplies pressure enough. Refer to the "Gas supply and gas pipe sizing" of the installation manual.
- Check the set temperature, and change the dipswitch setting. Refer to Section D.
- · Refer to "Water circuit" in this section.

<<The water is too hot>>

B. Error codes

111: Ignition failure

031: Incorrect dipswitch setting

heater to correct one.

101: Warning for the "991" error code

clearances" of the installation manual.

termination clearances" of the installation manual.

Check if there is dust and lint in heat exchanger

2. Check if the Hi-limit switch (Part #412) is properly functioning.

O.H.C.F (Part #413) is breakage. Consult the manufacturer.

7. Check if there is leaking from heat exchanger (Part #401)

8. Check if there is dust and lint in nozzles of the manifold (Part #102).

2. Check if the Hi-limit switch (Part #412) is properly functioning.

O.H.C.F (Part #413) is breakage, Consult the manufacturer.

5. Check if there is dust and lint in nozzles of the manifold (Part #102).

4. Check if there is leakage from heat exchanger (Part #401).

1. Check gas supply and inlet gas pressure.

water heater prepares for combustion.

1. Check gas supply and inlet gas pressure.

*No sparking sound

*No kick sound

121: Loss of flame

when water heater goes into combustion.

Check the set temperature, lower setting temperature.

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

Refer to the "Power supply circuit" and "Water circuit" in this section.

<<Fluctuation in hot water temperature>>

- Check if the filter on the cold water inlet cleaned. (Part #406)
- Check if the gas line sized properly and the supply gas pressure sufficient.
- Check for cross connection between cold water lines and hot water lines.
- · Refer to "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 the green LED will

· Check the gas type of the water heater. If it's wrong gas type model, replace the water

· Check if there is any blockage (For example, Damper sticking, Vent Flaps installed on the

terminator, Snow build up around terminator, Installed in a closet (No ventilation or lack

of combustion air)) in the intake air and/or exhaust. Refer to the "Vent termination

· If the water heater is installed as a direct-vent system, check whether there is enough

· Check the altitude/elevation of area of where the water heater installed. Refer to the

· Check if there is grease and/or dirt in the burner (Part #101) and the fan motor (Part

3. Check for connection/breakage of wires (Part #413, 708, 709, 712), burn marks on the

4. Check if there is a buzzing spark ignition sound coming from the burner (Part #101) when

5. Listen for the double "clunk" sound coming from the gas valve assembly (Part #102)

6. (Only no sparking and/or kick sound) Check voltage on each wire to gas valves assembly

9. Check current on the flame rod (Part #108). Refer to the #3 at "Appendix A" in Section C.

3. Check for connection/breakage of wires (Part #413, 708, 709, 712), burn marks on the

6. Check current on the flame rod (Part #108). Refer to the #3 at "Appendix A" in Section C.

computer board (Part #701), and/or soot on the flame rod (Part #108). And then if

>>>> Refer to the #1 at "Appendix A" in Section C.

>>>> Refer to the #2 at "Appendix A" in Section C.

(Part #102) and/or the igniter (Part #711). Refer to the "Appendix A" in Section C.

computer board (Part #701), and/or soot on the flame rod (Part #108). And then if

• Check if the total vent length doesn't exceed 50 ft and the # of elhows is less than 5Fa

"High-altitude function" of the Section D. And change the dipswitch settings.

#103), especially if the water heater has been installed in a contaminated area.

· Check the manifold pressure of the water heater. Refer to installation manual.

distance between the intake air terminal and the exhaust terminal. Refer to the "Vent

Check if the filter on the cold water inlet cleaned. (Part #406)

Check the dipswitch settings on the PCB. Refer to Section D.

· Refer to "Water circuit" in this section.

<<The fan motor 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.

<<Abnormal sound from water heater>>

An abnormal sound from the water heaters is caused by not enough air supply or wrong installations. The water heater needs more combustion air. Refer to the "101" error code in the section B

<< Power supply circuit>>

<<Water circuit>>

- 1. If the remote controller installed, press the "ON/OFF" button of the remote controller, and make sure that the green LED on the "ON/OFF" button of the remote controller is lit.
- 2. Check if that the 7-Seg LED on the PCB (Part #701) of the water heater is lit. If so, the power supply circuit of the water heater is under normal condition. Next, refer to the "Water circuit" in this section.
- 3. Check the fuse on the surge box (Part #703), and if it has a brown spot, need to replace it.
- 4. Check the power supply, and make sure that the water heater has 120 VAC. 5. If the 7-Seg LED on the PCB (Part #701) isn't lit, some electrical parts can be broken.

Consult the manufacturer.

- 1. If you set the remote controller, turn the power button on and then the green LED will
- 2. Open all hot water faucets, and make sure that there is enough water flow. This water heater needs at least 0.5 GPM water flow (at the default set temperature) to operate
- 3. Check for reverse connection and cross connection.
- 4. Check if the filter on the cold water inlet cleaned. (Part #406)
- 5. Check if there is no debris or obstruction on the fixtures.
- 6. Check if water ways in the water heater are frozen. If so, unfreeze them. And refer to installation manual to protect your water heater from freeze
- 7. Check if the inlet water pressure is higher than 40 psi. And if it's lower than 40 psi, need to increase the pressure.
- 8. Check for connections and breakage of wires (Part #402).
- 9. Check if the motor drive of the flow adjustment valve (Part #402) is locked due to scale buildup, and/or water leakage. Consult the manufacturer.

311,321,331: Disconnected/short-circuited thermistor

Check for connection/breakage of wires and/or debris on thermistor (Part #407, 408, 411, 716).

· Check thermistor resistance. Refer to the "Appendix D" in Section C.

391: Air-fuel Ratio Rod failure

Check for connection/breakage of wires (Part #709) and/or soot on the AFR rod. (Part #108).

441: Flow Sensor failure (Only Easy-Link system)

Check for connection/breakage of wires and/or debris on the flow sensor impeller (Part #402.717)

510: Abnormal Main and Solenoid 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 voltage on the each valve on the gas valves assembly (Part #102). Refer to the "Appendix C" in Section C.

611: 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 for frozen/corrosion of connectors of the fan motor (Part #103).
- · Check voltage between blue wire and each wire of the fan motor (Part #103), and check resistance between white wire and red wire. Refer to the "Appendix B" in Section C.

651: Flow adjustment valve fault (Only Easy-Link system)

- Inspect the flow adjustment valve (Part #402), for connection/breakage of wires (Part #718), locked motor drive due to scale buildup, and/or water leakage.
- Check voltage between black wire and red wire. Refer to the "Appendix F" in Section C.

701: Computer board fault

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

721: False flame detection

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

741: Miscommunication between water heater and remote controller

- 1. Check the model type of the remote controller. Model No. 9007603005 (TM-RE30) is the
- 2. Inspect the connections between the water heater and remote controller. Refer to the "Remote controller connections" of the Installation manual.
- 3. Check the power supply of the water heater.
- 4. If this error code appears only the 7-Seg LED on the PCB (Part #701), check the voltage on the remote controller terminal on the PCB. Refer to the "Appendix E" in Section C.
- 5. If this error code appears only remote controller, replace the PCB (Part #701). 6. If this error code appears both the PCB (Part #701) and the remote controller, replace the

761: Miscommunication between Parent unit and Child units for Easy-link system

Check if the connections between the parent unit and the child units are correct. Refer to "Easy-Link system" section in the Installation manual.

991: Imperfect combustion

Refer to the "101" error code in this section.

Surgesson 120 VAC Green Yellow R BK Red Black Ground Orange Purple **A3** LB rans-BR BR Ground SW A1 ₩H1 Heate B1³³ • 73 0 <u></u> -(€v3) **D**1 D D MAX button MIN button Increase button

 ${\sf C.}$ Wiring Diagram and check point of the Water heater

Appendix A (For error code 111)

Decrease button

Red LED

Error call button

7 Seg LED

Check these points during ignition stage.

#1. Refer to check point "B" on the wiring diagram above. Check voltage between purple wires (Normal: 90 to 110 VAC)

This Check point is normal?

>> Replace the igniter (Part #711)

No >> Go to Next

2. Refer to check point "C" and "H1" on the wiring diagram above Check the voltage bellows.

9007603005 (TM-RE30)

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

(Normal: 78 to 100 VDC)

C: Between blue wire and orange wire (#53). (Normal: 78 to 100 VDC)

H1: Check the voltage between white wire and red wire. (Normal: 1 to 15 VDC)

These check points are normal?

Yes >> Replace the gas valves assembly. (Part #102) >> Replace the PCB. (Part #701)

#3. Check current thought the orange flame rod wire (Part #709). (Normal: more than 1uA)

>> Replace the flame rod. (Part #108)

This check point is normal during operation? Yes >> Replace the PCB. (Part #701)

Appendix B (For error code 611)

Refer to check point "G" in the diagram to the left and followings. Check voltage between red wire and blue wire.

(Normal: 110 to 160 VDC)

- · Check voltage between yellow wire and blue wire.
- (Normal: 13 to 17 VDC) Check voltage between orange wire and blue wire (Normal: 2.0 to 6.5 VDC)

All check points are normal?

Yes >> Replace the fan motor. (Part #103)

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

Appendix C (For error code 510)

Refer to check point "C" in the diagram to the left and followings. Check voltage on the each valve on the gas valves assembly

- Between blue wire and light blue wire (#3). (Normal: 78 to 100 VDC)
- Between blue wire and green wire (#9). (Normal: 78 to 100 VDC)
- Between blue wire and orange wire (#53). (Normal: 78 to 100 VDC)

Between blue wire and red wire (#73). (Normal: 78 to 100 VDC)

All check points are normal?

Yes >> Replace the gas valves assembly. (Part #102) No >> Replace the PCB. (Part #701)

Appendix D (For error code 311, 321 and 331)

- · Mixing thermistor (Find the marking of No.113 on the connector) Check point "E1"
- Output thermistor (Find the marking of No.12 on the connector) Check point "E2"
- Inlet thermistor (Find the marking of No.42 on the connector) Check point "E3"

Check resistance between black wire and black wire.

	Temperature	°F	50	59	68	77	86	95
-		°C	10	15	20	25	30	35
!	Resistance	kΩ	15.4	12.6	10.3	8.5	7.0	5.9

All check points are normal?

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

No >> Replace the wrong thermistor. (Part #407, 408, 411)

Appendix E (For error code 741)

Refer to check point "F" on the wiring diagram above. Check voltage on the remote controller terminal on the PCB. (Normal: 11 to 15 VDC)

This check point is normal?

Yes >> Replace the remote controller. No >> Replace the PCB. (Part #701)

Appendix F (For error code 651)

Refer to check point "J" on the wiring diagram above. Check voltage between black wire and red wire. (Normal: 7 to 16 VDC)

This check point is normal?

Yes >> Replace the Flow adjustment valve. (Part #402) No >> Replace the PCB. (Part #701)

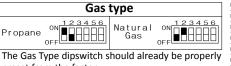
D. Dipswitch Settings on the computer board of the water heater

E2

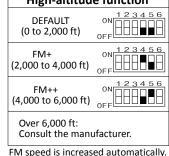
Change the dipswitch settings when the power supply is turning off. The dark square is the direction the dipswitch should be set to. DEFAULT is the factory setting.

<Left bank of dipswitches>

The **left bank** has certain special functions and generally should not need adjustment.

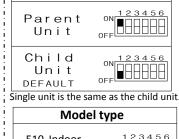


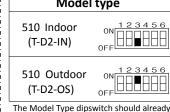
preset from the factory High-altitude function



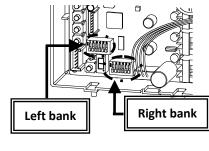
<Right bank of dipswitches>

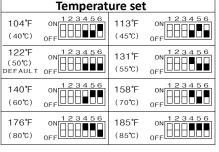
The right bank has settings for three functions, shown below. Easy-Link system





be properly preset from the factory

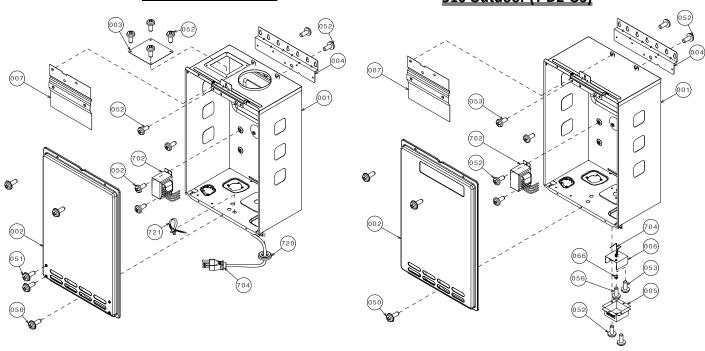




E. Components Diagram / Parts List

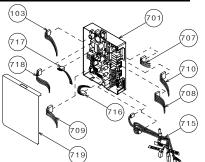
Case assembly

510 Indoor (T-D2-IN) 510 Outdoor (T-D2-OS)

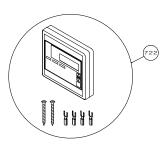


Item#	Pa	rt#	Description	
item#	510 models	T-D2 models		
001	319143-151	EK402	Case assembly for 510 Indoor (T-D2-IN)	
	319143-211	EKK41	Case assembly for 510 Outdoor (T-D2-OS)	
002	319143-174	EK434	Front cover for 510 Indoor (T-D2-IN)	
	319143-175	EK435	Front cover for 510 Outdoor (T-D2-OS)	
003	319143-150	EK401	Air blockage plate	
			(Only 510 Indoor and T-D2-IN)	
004	319143-184	EKJ09	Bracket	
005	319143-014	EKJ64	Junction box	
006	319143-128	EKJ66	Junction box inner plate	
007	319143-221	EKK5H	Back guard panel	
050	319143-025	EW000	Screw M4x12 (W/Washer)	
051	319143-325	EW001	Screw M4x10 (W/Washer)	
052	319143-026	EW002	Screw M4x10 (Coated)	
053	319143-060	EW003	Screw M4×10	
054	319143-326	EW004	Hex head screw M4x12 (W/Washer)	
055	319143-063	EW005	Hex head screw M4x8	
056	319143-372	EX014	Screw M4x10	
057	319143-330	EW00B	Screw M3x6 SUS3	
058	319143-327	EW008	Screw M3x10	
059	319143-061	EW00H	Pan screw M4x12 (W/Washer)	
060	319143-332	EW024	Pan screw M4x10 FEZN	
061	319143-201	EKK31	Tap tight screw M4x12 FEZN	
062	319143-062	EW006	Pan screw M4x10	
063	319143-087	EW00A	Screw M3x6	
064	319143-328	EW009	Screw M4x6	
065	319143-059	EW00D	Pan screw M4x8	
066	319143-143	EC00X	Nylon clamp	
067	319143-048	EM167	Wire clamp 60	

Computer board assembly

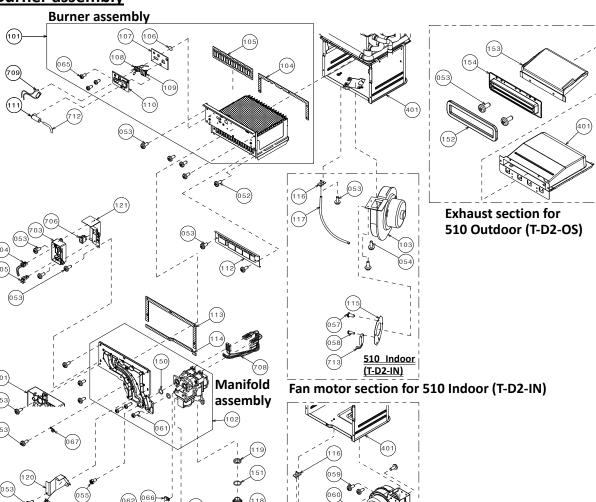


<u>Temperature</u> remote controller



Item#	Pa	rt#	Description		
iteiii#	510 models	T-D2 models	Description		
701	319143-179	EK439	Computer board		
702	319143-182	EKH09	Transformer		
703	319143-168	EK428	Surge box		
704	319143-427	EK146	AC120V wire for Indoor models		
	319143-138	EKK3C	AC120V wire for Outdoor models		
705	319143-180	EK440	Transformer wire		
706	319143-141	EKK4V	AC120V Power ON-OFF switch		
707	319143-181	EK441	Switch wire		
708	319143-188	EKK10	Gas valve wire		
709	319143-189	EKK11	Flame rod wire		
710	319143-187	EKKOZ	EH-IG wire for 510 Indoor (T-D2-IN)		
	319143-210	EKK40	EH-IG wire with freeze protection		
			thermostat for 510 Outdoor (T-D2-OS)		
711	319143-052	EKN74	Igniter		
712	319143-039	EKK2M	High voltage igniter wire		
713	319143-185	EKJ59	Freeze protection thermostat		
			(Only 510 Indoor and T-D2-IN)		
714	319143-133	EKK12	Proportional gas valve wire		
715	319143-204	EKK36	Pump and multi cable		
716	319143-195	EKK1Z	Thermistors wire		
717	319143-203	EKK35	RS-VG wire		
718	319143-202	EKK33	Water valves wire		
719	319143-191	EKK1M	Computer board cover		
720	319143-426	EK148	Rubber grommet for Indoor models		
721	319143-425	EW022	Cable strap for Indoor models		
722	319143-000	ER015	Temperature remote controller		

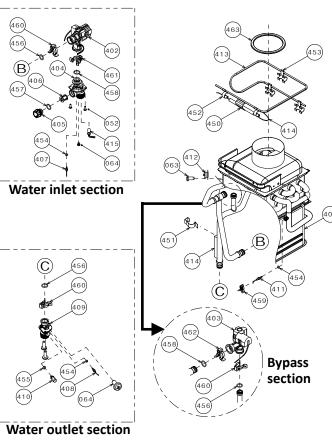
Burner assembly



Fan motor section for 510 Outdoor (T-D2-OS)

	Part#				
ltem#	510	T-D2	Description		
	models	models	_		
101	319143-030	EKH5W	Burner assembly		
102	319143-046	EKH6T	Manifold assembly with		
			gas valve assembly LP		
	319143-368	EKK5K	Manifold assembly with		
			gas valve assembly NA		
103	319143-043	EKK25	Fan motor for		
			510 Indoor (T-D2-IN)		
	319143-217	EKK54	Fan motor for		
			510 Outdoor (T-D2-OS)		
104	319143-032	EKK0G	Burner holder gasket		
105	319143-031	EKK2X	Burner gasket		
106	319143-033	EKK2V	Burner window		
107	319143-034	EKK2W	Rod holder gasket		
108	319143-035	EKK0E	Flame rod		
109	319143-037	EKKOF	Igniter rod		
110	319143-036	EKK32	Rod holder		
111	319143-038	EKN61	Rod cap		
112	319143-156	EK412	Burner damper		
113	319143-044	EKK2Y	Manifold gasket A		
114	319143-045	EKK2K	Manifold gasket B		
115	319143-367	TU001	Fan damper		
			(Only 510 Indoor and T-D2-IN)		
116	319143-042	EKK2D	Pressure port		
117	319143-041	EKK2N	Combustion chamber tube		
			for 510 Indoor (T-D2-IN)		
	319143-344	EX019	Combustion chamber tube		
440	240442.050	FILLAF	for 510 Outdoor (T-D2-OS)		
118	319143-050	EKK1E	Gas inlet		
119	319143-049	EKK2Z	Gas inlet ring		
120	319143-051	EKK1B	Igniter plate		
121	319143-176	EK436	Surge box plate		
150 151	319143-350	EZP18	O-ring P18 NBR (Black)		
151	319143-057 319143-206	EKO42	O-ring P20 NBR (Black)		
152	319143-206	EKK3G	Silicon ring (Only 510 Outdoor and T-D2-OS)		
153	319143-216	EKK53	Rain protection plate in		
133	313143-210	ENNOS	Exhaust chamber		
			(Only 510 Outdoor and T-D2-OS)		
154	319143-219	EKK56	Exhaust port		
134	313143-219	ENNOU	· ·		
			(Only 510 Outdoor and T-D2-OS)		

Water way assembly



		Part	#	Description	
	Item#	510	T-D2		
		models	models		
	401	319143-369	TU002	Heat exchanger	
3)				assembly for 510	
				Indoor (T-D2-IN)	
		319143-177	EK437	Heat exchanger	
				assembly for 510	
				Outdoor (T-D2-OS)	
	402	319143-178	EK438	Flow adjustment valve/	
				Flow sensor	
	403	319143-186	EKK0U	Bypass valve	
	404	319143-193	EKK1U	Water inlet	
	405	319143-197	EKK2B	Inlet drain plug	
	406	319143-198	EKK2C	Inlet water filter	
	407	319143-085	EKK38	Inlet thermistor	
_	408	319143-190	EKK1A	Mixing thermistor	
(401)	409	319143-194	EKK1V	Water outlet	
	410	319143-199	EKK2E	Outlet drain plug	
	411	319143-096	EKK2T	Output thermistor	
	412	319143-095	EKN34	Hi-Limit switch	
	413	319143-149	EK333	Overheat cut-off-fuse	
	414	319143-200	EKK2R	Heater	
	415	319143-078	EKK2P	Inlet heater	
	450	319143-088	EKK27	Pipe heater fixing plate	
	451	319143-125	EK031	Heater fixing plate 16	
	452	319143-066	EKK26	Fuse fixing plate 18	
	453	319143-146	EK029	Fuse fixing plate 14	
	454	319143-082	EZM04	O-ring P4 FKM	
	455	319143-080	EZM06	O-ring P6 FKM	
	456	319143-100	EZM14	O-ring P14 FKM	
	457	319143-091	EZM15	O-ring P15 FKM	
	458	319143-083	EZM16	O-ring P16 FKM	
	459	319143-097	EKH30	Fastener "4-11"	
	460	319143-105	EKK24	Fastener "14-22"	
	461	319143-226	EM192	Fastener "16A"	
	462	319143-205	EKK39	Fastener "16-25A"	
	463	319143-065	EKN50	Silicon ring	
į				(Only 510 Indoor and T-D2-IN)	