

Maintenance sheet

JTH2
73W003

A. Troubleshooting

If the error code is indicated on the 3-digit 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>>

- 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 #409)
- 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 lit.
- Check if the filter on the cold water inlet cleaned. (Part #409)

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

- This is normal. After operation has stopped, the fan motor keeps running for 35 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 "Error 101" in the Section B.

<<Power supply circuit>>

- 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. Restart the water heater.
- Check if that the 3-digit 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.
- Check the fuse on the surge box (Part #715), 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 3-digit 7-Seg LED on the PCB (Part #701) isn't lit, some electrical parts can be broken. Consult the manufacturer.

<<Water circuit>>

- If you set the remote controller, turn the power button on and then the green LED will lit.
- 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 to operate.
- Check for reverse connection and cross connection.
- Check if the filter on the cold water inlet cleaned. (Part #409)
- 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 installation manual to protect your water heater from freeze.
- Check if the inlet water pressure is higher than 40 psi. And if it's lower than 40 psi, need to increase the pressure.
- Check for connections and breakage of wires (Part #423, 429).
- Check if the motor drive of the water control valve (Part #423) is locked due to scale buildup, and/or water leakage, Consult the manufacturer.

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

- Check for connection/breakage of wires and/or debris on impeller (Part #429, 708).

510,551: Abnormal Main and Gas Solenoid Valve

- Check for connection/breakage of wires (Part #705) 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 #118). Refer to the "Appendix C" in Section C.

611,621*: Fan motor and Exhaust Fan motor fault

- Check for connection/breakage of wires, dust buildup in the fan motor/Exhaust fan motor (Part #114,124) and/or burn marks on the computer board (Part #701).
- Check for frozen/corrosion of connectors of the fan motor (Part #114,124).
- Check voltage between blue wire and each wire of the fan motor (Part #114,124) during operation. Refer to the "Appendix B" in Section C.

631: Abnormal External Pump

- Check whether the pump connected to PCB (Part #701) works properly.

651,661: Water control valve fault (Only Easy-Link system)

- Check the water control valve (Part #423), connection/breakage of wires (Part #423), motor drive locked 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 #708) and/or burn marks on the computer board (Part #701).

711: Hi-limit switch trip/ Gas solenoid valve drive circuit failure

- Check connection/breakage of wires (Part #705) and/or burn marks on the computer board (Part #701).

721: False flame detection

- Clean the flame rod (Part #106).
- For indoor models, check if condensate drain is installed on the vent collar of the water heater.
- Check if there is leaking from heat exchanger (Part #401 or 456).

741: Miscommunication between water heater and remote controller

- Check the model type of the remote controller. Model name 9007603005 (TM-RE30) is the correct one.
- Inspect for the connections between the water heater and remote controller. Refer to "Remote controller connections" section in the Installation manual.
- Check the power supply of the water heater.
- If this error code appears only the 3-digit 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.
- If this error code appears only remote controller, replace the PCB (Part #701).
- If this error code appears both the PCB (Part #701) and the remote controller, replace the remote controller.

761: Miscommunication between Parent unit and Child units for Easy-link system (Only 520H models)

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

941*: Abnormal exhaust temperature (Only 520H and 320H Direct Vent Indoor)

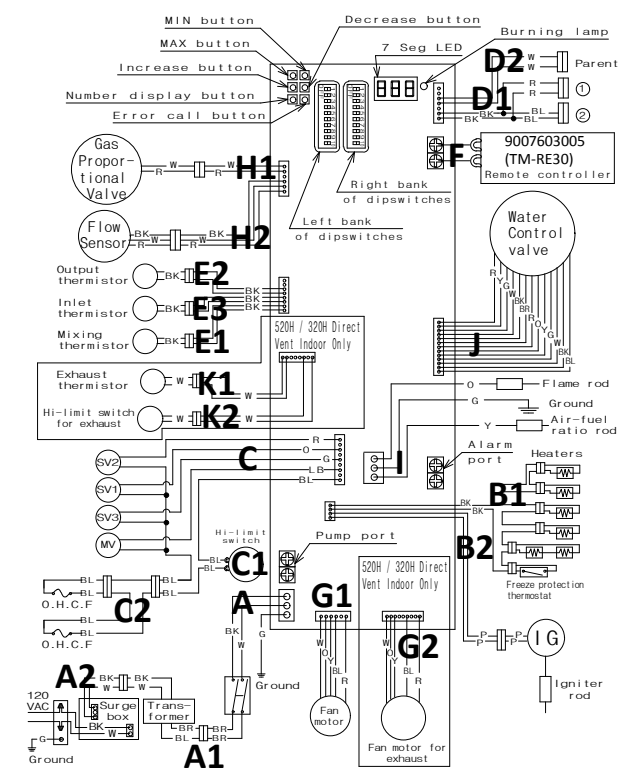
- Check if the set temperature is higher than 140°F (60°C) and the system is Recirculation.
- Check exhaust thermistor resistance. Refer to the "Appendix D" in Section C.

991: Imperfect combustion

- Refer to the "Error code 101" in this section.

C. Wiring Diagram and check point of the Water heater

BK: BLACK R: RED W: WHITE BL: BLUE P: PURPLE
G: GREEN O: ORANGE Y: YELLOW BR: BROWN LB: LIGHT BLUE



Appendix A (For error code 111)

Check these points during ignition stage.

- Refer check point "B2" on the wiring diagram above. Check voltage between purple wires. (Normal: 90 to 110 VAC)
 - This Check point is normal?**
 - Yes >> Replace the igniter (Part #123)**
 - No >> Go to Next**
- Refer check point "C" and "H1" on the wiring diagram above. Check the voltage bellows.
 - 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 #118)**
 - No >> Replace the PCB. (Part #701)**
- Check current thought the orange flame rod wire (Part #710). (Normal: more than 1μA)
 - This check point is normal during operation?**
 - Yes >> Replace the PCB. (Part #701)**
 - No >> Replace the flame rod. (Part #106)**

Appendix B (For error code 611 and 621)

Refer check point "G1" & "G2" 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 and Exhaust fan motor. (Part #114&124)**
- No >> Replace the PCB. (Part #701)**

Appendix C (For error code: 510 and 551)

Refer 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 #118)**
- No >> Replace the PCB. (Part #701)**

Appendix D (For error code: 311, 321, 331, 341 and 941)

- 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 |

- Exhaust thermistor (Find the marking of No.52 on the connector) Check point "K1"

Check resistance between white wire and white wire.

| Temperature | °F | 50 | 59 | 68 | 77 | 86 | 95 |
|-------------|----|------|------|------|------|-----|-----|
| | °C | 10 | 15 | 20 | 25 | 30 | 35 |
| Resistance | kΩ | 19.5 | 15.9 | 13.0 | 10.7 | 8.9 | 7.4 |

All check points are normal?

- Yes >> Replace the PCB. (Part #701)**
- No >> Replace the wrong thermistor. (Part #422, 433, 418, 706)**

Appendix E (For error code: 741)

Refer check point "F" on the wiring diagram above.

Check voltage on the remote controller terminal on the PCB. (Normal: 11 to 25 VDC)

This check point is normal?

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

Appendix F (For error code: 651 and 661)

Refer check point "J" on the wiring diagram above.

Check voltage between blue wire and brown wire. (Normal: 13 to 16 VDC)

This check point is normal?

- Yes >> Replace the Water control valve. (Part #423)**
- No >> Replace the PCB. (Part #701)**

B. Error codes *The 341, 621 and 941 error codes are applied to the 520H and 320H Direct Vent Indoor model only.

031: Incorrect dipswitch setting

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

101: Warning for the "991" error code

- Check the gas type of the water heater. If it's wrong gas type model, replace the water heater to correct one.
- 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 clearances" of the installation manual.
- If the water heater is installed as a direct-vent system, check whether there are enough distance between the intake air terminal and the exhaust terminal. Refer to the "Vent termination clearances" of the installation manual.
- Check if the total vent length doesn't exceed 50 ft and the # of elbows is less than 5Ea.
- Check the altitude/elevation of area of where the water heater installed. Refer to the "High-altitude function" of the Section D. And change the dipswitch settings.
- Check if there is grease and/or dirt in the burner (Part #101), and the fan motor (Part #114), especially if the water heater has been installed in a contaminated area.
- Check if there is dust and lint in heat exchanger.
- Check the manifold pressure of the water heater. Refer to installation manual.

111: Ignition failure

- Check gas supply and inlet gas pressure.
- Check if the Hi-limit switch (Part #432) is properly functioning.
- Check for connection/breakage of wires (Part #110, 404, 704, 705, 710, 719), burn marks on the computer board (Part #701), and/or soot on the flame rod (Part #106). And then if O.H.C.F (Part #008 and/or #404) is 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 valves assembly (Part #118) when water heater goes into combustion.
- (Only no sparking and/or kick sound) Check voltage on each wire to gas valves assembly (Part #118) and/or the igniter (Part #123). Refer to the "Appendix A" in Section C.
 - *No sparking sound >>>> Refer to the #1 at "Appendix A" in Section C.
 - *No kick sound >>>> Refer to the #2 at "Appendix A" in Section C.
- Check if there is leaking from heat exchanger (Part #401 or 456)
- Check if there is dust and lint in nozzles of the manifold (Part #118).
- Check current on the flame rod (Part #106). Refer to the #3 at "Appendix A" in Section C.

121: Loss of flame

- Check gas supply and inlet gas pressure.
- Check if the Hi-limit switch (Part #432) is properly functioning.
- Check for connection/breakage of wires (Part #110, 404, 704, 705, 710, 719), burn marks on the computer board (Part #701), and/or soot on the flame rod (Part #106). And then if O.H.C.F (Part #008 and/or #404) is breakage, Consult the manufacturer.
- Check if there is leakage from heat exchanger (Part #401 or 456).
- Check if there is dust and lint in nozzles of the manifold (Part #118).
- Check current on the flame rod (Part #106). Refer to the #3 at "Appendix A" in Section C.

311,321,331,341*: Disconnected/short-circuited thermistor

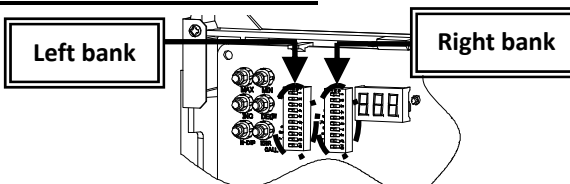
- Check for connection/breakage of wires and/or debris on thermistor (Part #422, 433, 418, 706, 707,721).
- Check thermistor resistance. Refer to the "Appendix D" in Section C.

391: Air-fuel Ratio Rod failure

- Check for connection/breakage of wires (Part #710) and/or soot on the AFR rod. (Part #106).

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

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 Gas Type and Model Type dipswitch should already be properly preset from the factory.

| Gas type | Model type |
|-------------|---|
| Propane | 520H Direct Vent Indoor and 320H Direct Vent Indoor |
| Natural Gas | 520H Outdoor and 320H Outdoor |

| High-altitude function | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| DEFAULT (0 to 2,500 ft) | FM+ (2,500 to 4,000 ft) | FM++ (4,000 to 5,000 ft) | Over 5,000 ft: |
| Consult the manufacturer | Consult the manufacturer | Consult the manufacturer | Consult the manufacturer |

FM speed is increased automatically.

<Right bank of dipswitches>

Easy-Link system

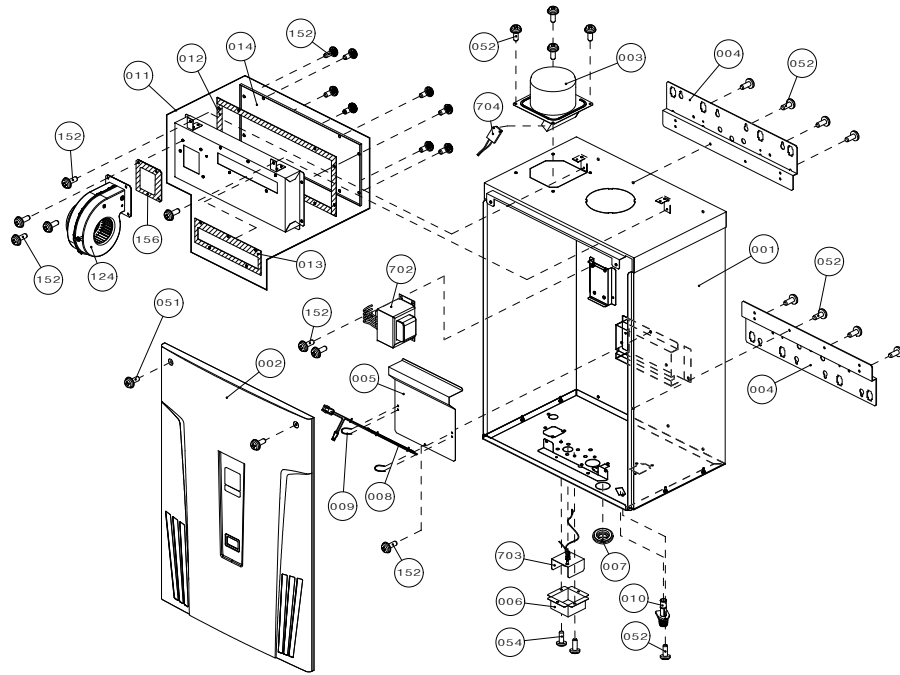
| Parent Unit | Child Unit |
|-------------|------------|
| DEFAULT | DEFAULT |

Single unit is the same as the child unit.

E. Components Diagram / Parts List

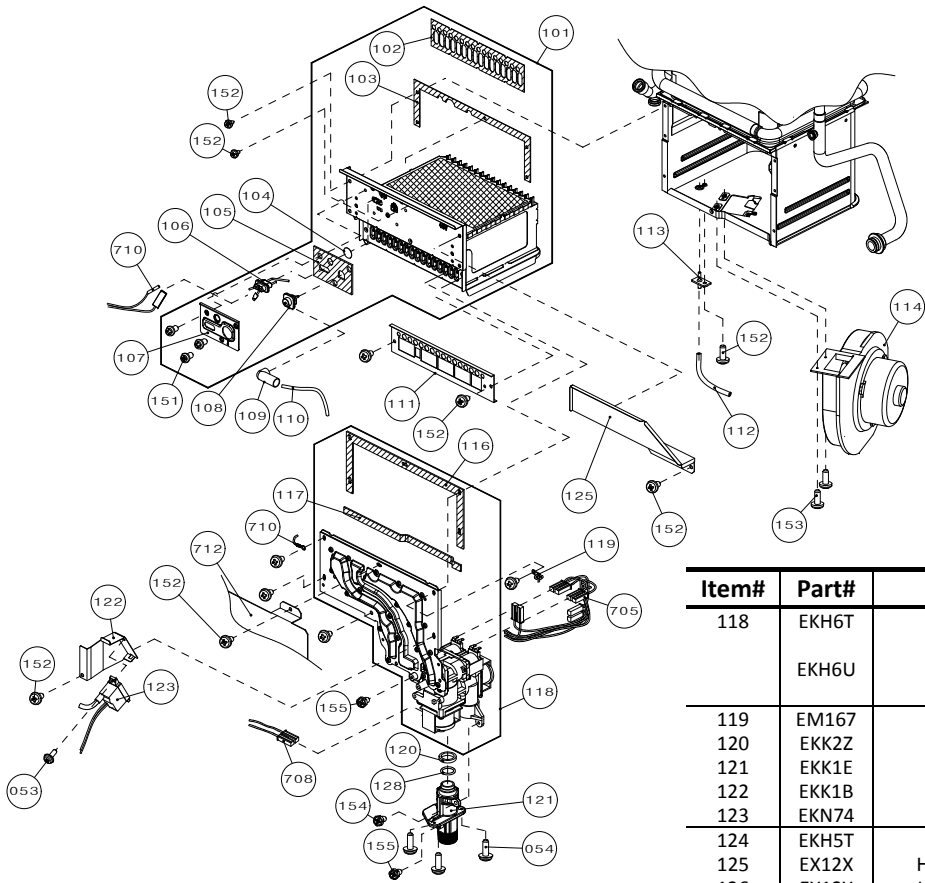
Case assembly

520H Direct Vent Indoor and 320H Direct Vent Indoor



| Item# | Part# | Description |
|-------|-------|---|
| 001 | EKH5B | Case assembly for 520H Indoor and 320H Indoor |
| 002 | EKH5M | Front cover for 520H Indoor and 320H Indoor |
| 003 | EV00K | Intake air port assembly |
| 004 | EM335 | Bracket |
| 005 | EKH5D | Back guard panel |
| 006 | EKJ64 | Junction box |
| 007 | EX13M | Rubber bush |
| 008 | EM484 | O.H.C.F for combustion chamber |
| 009 | EKK22 | Fastener |
| 010 | EKH23 | Condensate drain port |
| 011 | EKH5K | Duct |
| 012 | EKH4G | Duct gasket A |
| 013 | EKH4K | Duct gasket B |
| 014 | EKH73 | Duct cover plate |
| 051 | EW000 | Screw M4x12 (W/Washer) |
| 052 | EW002 | Screw M4x10 (Coated) |
| 053 | EX010 | Pan screw M4x10 |
| 054 | EW02B | Screw M4x10 |
| 055 | EW023 | Pan screw M3x10 |

Burner assembly

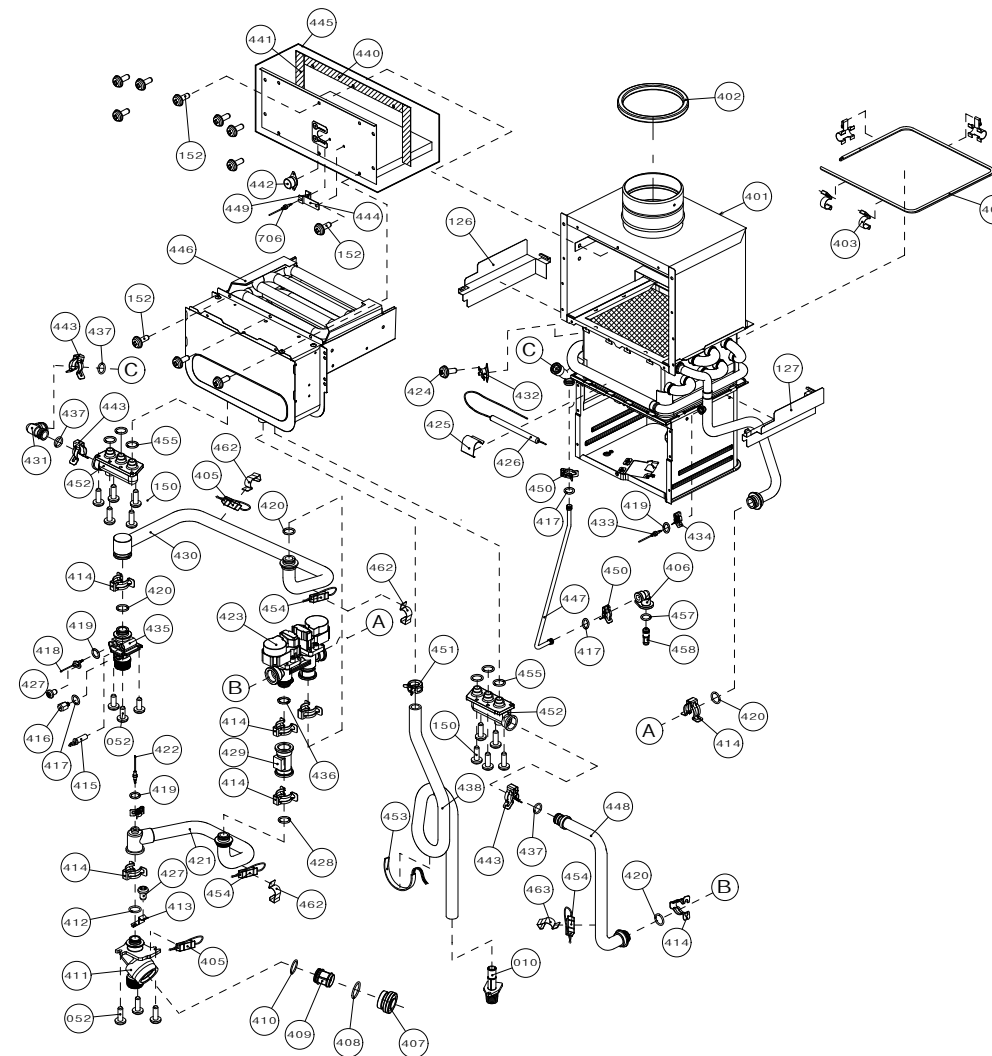


| Item# | Part# | Description |
|-------|-------|---------------------------|
| 101 | EKH5W | Burner assembly |
| 102 | EKK2X | Burner gasket |
| 103 | EKK0G | Burner holder gasket |
| 104 | EKK2V | Burner window |
| 105 | EKK2W | Rod holder gasket |
| 106 | EKK0E | Flame rod |
| 107 | EKK32 | Rod holder |
| 108 | EKK0F | Igniter rod |
| 109 | EKN61 | Rod cap |
| 110 | EKK2M | High voltage ignite cable |
| 111 | EKH5G | Damper |
| 112 | EKK2N | Combustion chamber tube |
| 113 | EKK2D | Pressure port |
| 114 | EKK25 | Fan motor |
| 116 | EKK2Y | Manifold gasket A |
| 117 | EKK2K | Manifold gasket B |

| Item# | Part# | Description |
|-------|-------|--|
| 118 | EKH6T | Manifold assembly with gas valve assembly LP |
| | EKH6U | Manifold assembly with gas valve assembly NA |
| 119 | EM167 | Wire clamp 60 |
| 120 | EKK2Z | Gas inlet ring |
| 121 | EKK1E | Gas inlet |
| 122 | EKK1B | Igniter plate |
| 123 | EKN74 | Igniter |
| 124 | EKH5T | Fan motor for exhaust |
| 125 | EX12X | HX protection plate (Front) |
| 126 | EX12Y | HX protection plate (Right) |
| 127 | EX12Z | HX protection plate (Left) |
| 128 | EK042 | O-ring P20 NBR |
| 150 | EW012 | Screw M4x8 |
| 151 | EW00D | Pan screw M4x8 |
| 152 | EW003 | Screw M4x10 |
| 153 | EW00H | Screw M4x12 (W/Washer) |
| 154 | EW006 | Pan screw M4x10 |
| 155 | EW005 | Hex head screw M4x8 |
| 156 | EKH4V | Flange gasket for fan motor |

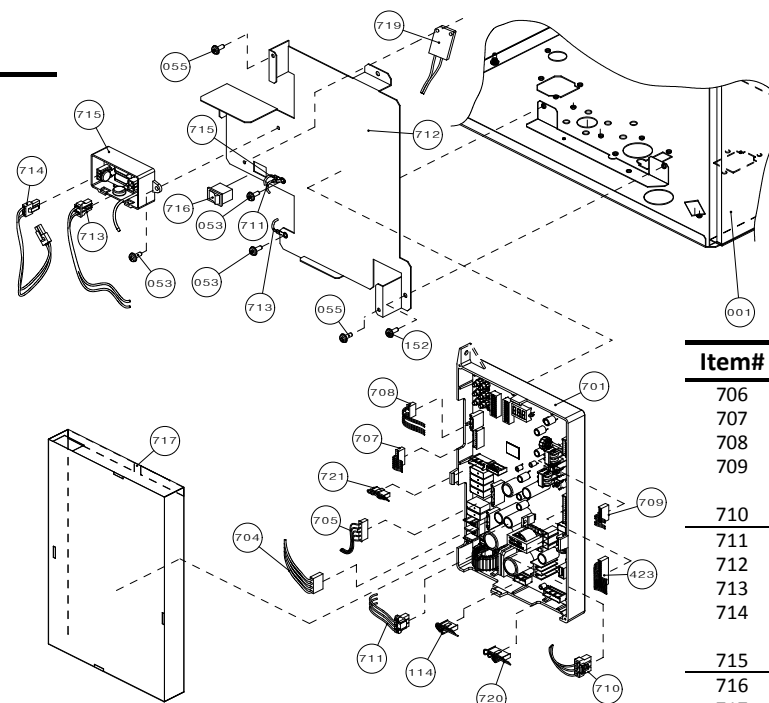
Water way assembly

520H Direct Vent Indoor and 320H Direct Vent Indoor



| Item# | Part# | Description |
|-------|-------|--|
| 401 | EKH5P | Heat exchanger assembly for 520H Indoor and 320H Indoor |
| 402 | EKN50 | Silicon ring |
| 403 | EKK26 | Fuse fixing plate 18 |
| 404 | EX02A | Overheat-cut-off fuse |
| 405 | EX002 | Heater 101 |
| 406 | EKH40 | Drain port |
| 407 | EM222 | Filter plug |
| 408 | EZM25 | O-ring P25 FKM |
| 409 | EX006 | Water inlet filter |
| 410 | EZN21 | O-ring JASO# 1021 FKM |
| 411 | EM404 | Water inlet |
| 412 | EZN16 | O-ring JASO# 1016 FKM |
| 413 | EX021 | Heater plate |
| 414 | EX01H | Fastener "16AG" |
| 415 | EKK2P | Outlet heater |
| 416 | EK239 | Outlet drain plug |
| 417 | EZM06 | O-ring P6 FKM |
| 418 | EX00H | Mixing thermistor |
| 419 | EZM04 | O-ring P4 FKM |
| 420 | EZM16 | O-ring P16 FKM |
| 421 | EKH74 | Cold pipe |
| 422 | EKK38 | Inlet thermistor |
| 423 | EKH32 | Water control valve |
| 424 | EW00A | Screw M3x6 |
| 425 | EKK27 | Pipe heater fixing plate |
| 426 | EKJ47 | Pipe heater 120 |
| 427 | EW00L | Pan screw M4x6 (W/Washer) |
| 428 | EZM15 | O-ring P15 FKM |
| 429 | EKH33 | Flow sensor |
| 430 | EKH75 | Hot pipe |
| 431 | EX137 | Joint elbow |
| 432 | EKN34 | Hi-limit switch |
| 433 | EKK2T | Output thermistor |
| 434 | EKH30 | Fastener "4-11" |
| 435 | EKJ02 | Water outlet |
| 436 | EZN17 | O-ring JASO# 1017 FKM |
| 437 | EZM14 | O-ring P14 FKM |
| 438 | EKH6H | Drain tube |
| 440 | EKH4H | Secondary heat exchanger plate gasket A |
| 441 | EKH4J | Secondary heat exchanger plate gasket B |
| 442 | EKH6G | Hi-limit switch for exhaust |
| 443 | EKK24 | Fastener "14-22" |
| 444 | EX13H | Thermistor fixing plate |
| 445 | EKH5N | Secondary heat exchanger plate |
| 446 | EKH6X | Secondary heat exchanger |
| 447 | EKH66 | Drain pipe |
| 448 | EKH78 | Secondary heat exchanger out plate |
| 449 | EX13L | Exhaust thermistor gasket |
| 450 | EX12K | Fastener "6-15" |
| 451 | EKH1Y | Band B |
| 452 | EX13B | Header |
| 453 | EX13P | Flat heater |
| 454 | EX13R | 3 array heater |
| 455 | EZM12 | O-ring P12 FKM |
| 457 | EZF03 | O-ring P3 EPDM |
| 458 | EX13A | Secondary heat exchanger drain plug |
| 462 | EKH38 | Heater fixing plate 20 |
| 463 | EK031 | Heater fixing plate 16 |
| 701 | EKH4E | Computer board for 520H models |
| | EKH7W | Computer board for 320H models |
| 702 | EM296 | Transformer |
| 703 | EKJ66 | Junction box inner plate |
| 704 | EKH79 | Freeze protection and EH-IG wire for 520H Indoor and 320H Indoor |
| 705 | EKH6V | Gas valve wire |

Computer board assembly



| Item# | Part# | Description |
|-------|-------|------------------------------------|
| 706 | EKH6E | Exhaust thermistor assembly |
| 707 | EKH6J | Thermistors wire |
| 708 | EKK12 | Proportional gas valve wire |
| 709 | EKH6F | Multi-cable |
| | | (Only 520H models) |
| 710 | EKH69 | Flame rod wire |
| 711 | EKH6D | Switch wire |
| 712 | EKH71 | PCB fixing plate |
| 713 | EKK3C | AC120V wire |
| 714 | EKH6C | AC120V Transformer connecting wire |
| | | Surge box |
| 715 | EKH67 | Surge box |
| 716 | EKK4V | AC120V power ON-OFF switch |
| 717 | EKH68 | PCB cover |
| 718 | EC00X | Nylon clamp |
| 720 | EKH6A | Exhaust fan motor wire |
| 721 | EKH6B | Exhaust thermistor wire |