Maintenance sheet 5M2054-1

A. Troubleshooting

If the error code is displayed on the built-in controller and/or the remote controller, refer to Section B

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

- Check to see if a recirculation timer is active. If not, it will take time for the hot water to get from the heater to the fixture.
- Check the recirculation pump for proper flow.
- The inlet filters on the return and inlet connections may need to be cleaned.

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

- Compare the flow and temperature. Refer to "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 fully open, the gas line is sized properly, and the gas supply pressure is within specified limits. Refer to "Gas supply and gas pipe sizing" in the Installation manual.
- Check the set temperature on the built-in controller/remote controller. If necessary, change the set temperature with the controller or the DIP switch setting. Refer to Section E.
- Refer to "Water circuit" in this section.
- Is the Easy-Link System set up correctly?

<<The water is too hot>>

· Check the set temperature and lower it, if necessary.

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

- Refer to "Power supply circuit" and "Water circuit" in this section.
- Is the Easy-Link System set up correctly?

<<Fluctuation in hot water temperature>>

- Check the filters on the cold water inlet and return connection to see if they are clogged. (Part #406) • Check to see if the gas valve is fully open, that the gas line is sized properly, and that the supply gas pressure is within specified limits.
- Check for a cross connection between cold water lines and hot water lines.
- Refer to "Water circuit" in this section.
- Is the Easy-Link System set up correctly?

<<Unit does not ignite when water goes through the water heater>>

- Refer to "Power supply circuit" and "Water circuit" in this section.
- Check to see if the filters on the cold water inlet and return connection are clogged. (Part #406)
- · Check to see if the inlet temperature is too high.

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

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

<< Abnormal sounds from water heater>>

 Abnormal sounds from the water heater are caused by limited air supply or an incorrect installation. The water heater needs more combustion air. Refer to the "101" error code in the section B.

<< Power supply circuit>>

- 1. Check the power supply, and make sure that the water heater has 120 VAC.
- 2. Is the power switch inside the water heater turned on? (Part #706)
- 3. Press the "ON/OFF" button on the built-in/remote controller, and make sure that the STAND BY LED is lit. Run the water heater.
- Check to see if the green LED on the PCB (Part #701) is lit. If so, the power supply circuit for the water heater is under normal condition; refer to "Water circuit" in this section.
- 5. Check the fuse on the surge box (Part #703), and if it has a brown spot, replace it.
- 6. If the green LED on the PCB (Part #701) is not lit, some electrical parts may be broken. Consult the manufacturer.

<<Water circuit>>

- 1. Press the "ON/OFF" button of the built-in/remote controller, and make sure that the STAND BY LED is lit. 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 connections and cross connections.
- 4. Check to see if the filters on the cold water inlet and return connection are clogged or if there is sediment bult up in the filters. (Part #406)
- Check for debris or obstructions in the fixtures.
- 6. Check to see if the water ways in the water heater are frozen. If so, thaw them. Refer to the installation manual to protect your water heater from freezing.
- 7. Make sure that the inlet water pressure is higher than 40 psi. If it is lower than 40 psi, increase the pressure.
- 8. Check the wiring connections and for breakage of wires (Part #402).
- 9. Check to see if the motor drive of the flow adjustment valve (Part #402) is locked due to scale buildup. Also check for water leakage. If these symptoms are present, consult the manufacturer.

B. Error codes Error codes 341, 751, and 941 apply to Indoor model only.

031: Incorrect DIP switch setting

• Check the DIP switch settings on the PCB. Refer to Section E.

101: Warning for the "991" error code

- Check the gas type on the rating plate of the water heater.
- Check to see if there is any blockage in the intake air and/or exhaust. 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 "Vent termination 651: Flow adjustment valve fault (Only Easy-Link System) clearances" in the Installation manual.
- Check the total vent length. Refer to "Venting instructions" in the Installation manual.
- · Check the altitude/elevation of the area where the water heater is installed. Refer to "Highaltitude installation" in Section E. Change the DIP switch settings.
- Check to see if there is grease and/or dirt in the burner (Part #101) and fan motor (Part #103), especially if the water heater has been installed in a contaminated area
- · Check for dust and lint in the heat exchanger.
- Check the manifold pressure of the water heater. Refer to the rating plate of the water heater.

111: Ignition failure

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

121: Loss of flame

- · Check the gas supply and inlet gas pressure.
- Check to see if the Hi-limit switch (Part #412) is properly functioning.
- Check for disconnections/breakage of wires (Part #413, 708, 709, 711), burn marks on the PCB (Part #701), and/or soot on the flame rod (Part #108). If the O.H.C.F (Part #413) has a breakage, Consult the manufacturer.
- . Check for leaks from the heat exchanger (Part #401).
- Check for dust and lint in the nozzles of the manifold (Part #102).
- Check the current of the flame rod (Part #108). Refer to #3 in "Appendix A," Section C.

311,321,331,341,351: Disconnected/short-circuited thermistor

- Check for disconnections/breakage of wires and/or debris on the thermistors (Part #407, 408, 411, 718, 731).
- Check the thermistor resistance. Refer to "Appendix D" in Section C.

391: Air-fuel ratio rod failure

• Check for disconnections/breakage of wires (Part #709) and/or soot on the flame rod (Part #108).

441: Flow sensor failure

- Check for disconnections/breakage of wires and/or debris on the flow sensor impeller (Part #402).
- Check the filter on the return connection to see if it is clogged. (Part #406)
- Check to see if the water in the nump pine system has frozen.

510,551: Abnormal main gas solenoid valve and gas solenoid valve

- Check for connection/breakage of wires (Part #708) and/or burn marks on the computer board (Part #701)
- Reset the 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.

611: Fan motor fault

- · Check for disconnections/breakage of wires, dust buildup in the fan motor (Part #103) and/or burn marks on the PCB (Part #701).
- · Check for frozen/corrosion of connectors of the fan motor (Part #103).
- · Check the voltage between the blue wire and each wire of the fan motor (Part #103). Refer to "Appendix B" in Section C.

631: Pump fault

Check for disconnections/breakage of wires in the pump (Part #726). Check to see if the water in the pump has frozen (Part #726).

- Inspect the flow adjustment valve (Part #402) for disconnected or broken wires. Also chcek for a locked motor drive due to scale buildup, and/or water leakage
- Check the voltage between the black and red wires. Refer to "Appendix F" in Section C.

661: Bypass valve fault

- Inspect the bypass valve (Part #403) for disconnected or broken wires. Also cheek for a locked
- motor drive due to scale buildup, and/or water leakage. Check the voltage between the brown and red wires. Refer to "Appendix F" in Section C.

701: PCB fault

- Check for disconnections/breakage of wires (Part #714), and check the resistance between the white and red wires. Refer to "Appendix A" in Section C.
- Check the outlet thermistor (Part #408) for proper readings as it may need to be cleaned.

711: Gas solenoid valve drive circuit failure

- Refer to the "111" and "121" error codes in this section
- 721: False flame detection Clean the flame rod (Part #108)
- · Check for leaks from the heat exchanger (Part #401).

741: Miscommunication between water heater and remote controller

- Check the model type of the remote controller. Model No. 100276687 (TM-RE43) is the correct one. Inspect the connections between the water heater and remote controller. Refer to "TEMPERATURE REMOTE CONTROLLER" in the Installation manual.
- Check the power supply of the water heater.
- If this error code appears only on the green LED on 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).
- If this error code appears on both the PCB (Part #701) and the remote controller, replace the remote controller. 751: Miscommunication between water heater and built-in controller

Check the power supply of the water heater.

- If this error code appears only on the green LED in the PCB (Part #701), check the voltage on the built-in controller terminal on the PCB. Refer to "Appendix E" in Section C.
- If this error code appears only on the built-in controller, replace the PCB (Part #701).
- If this error code appears on both the PCB (Part #701) and the built-in controller, replace the temperature controller 761: Miscommunication between Parent unit and Child units in Easy-Link System

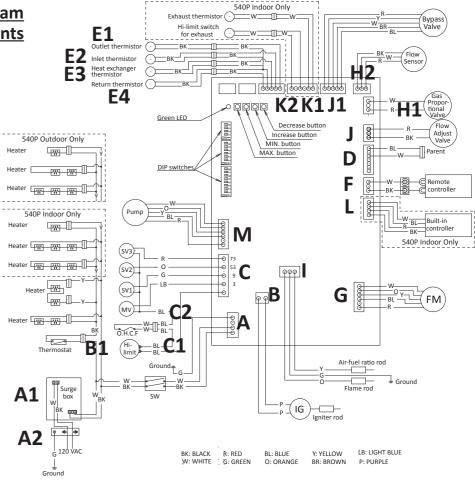
· Make sure that the connections between the parent unit and the child units are correct. Refer to the "Easy-Link System" section in the Installation manual

- 941: Abnormal exhaust temperature (Indoor model) • Check for disconnections/breakage of wires, dust buildup in the fan motor (Part #103) and/or hurn marks on the PCB (Part #701)
- Check the resistance of the exhaust thermistor. Refer to "Appendix D" in Section C.
- Check to see if the inlet and return water temperature is higher than 140°F (60°C) in the recircu-

991: Imperfect combustion

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

C. Wiring diagram and checkpoints



Appendix A (Error code 111)

Check the following points during ignition stage.

#1. Refer to checkpoint "B" on the wiring diagram above. Check the voltage between purple wires. (Normal: 108 to 132 VAC) Is the voltage within normal range?

Yes >>Replace the igniter assembly (Part #711). No >>Go to Error code in Section B.

#2. Refer to checkpoints "C" and "H1" on the wiring diagram above. Check the voltages below: C: Between the blue and light blue wires (#3). (Normal: 93 to 120 VDC) C: Between the blue and orange wires (#53). (Normal: 93 to 120 VDC)

H1: Between the white and red wires. (Normal: 1 to 15 VDC) Are these voltage within normal range? Yes >>Replace the gas valve assembly (Part #102).

No >>Replace the PCB (Part #701). #3. Check the current through the orange flame rod wire (Part #709). (Normal: more than 5 µA)

> Is the current normal when there is a flame? Yes >>Replace the PCB (Part #701). No >>Replace the flame rod (Part #108).

Appendix B (Error code 611)

- Refer to checkpoint "G" in the diagram above and check the voltage
- Between the red and blue wires. (Normal: 132 to 192 VDC)
- Between the yellow and blue wires. (Normal: 13 to 17 VDC)

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

 Between the orange and blue wires. (Normal: 2.0 to 6.5 VDC) Are all of the voltages within normal range? Yes >>Replace the fan motor (Part #103).

Appendix C (Error code 510 and 551)

er to checkpoint **"C"** in the diagram above and check the voltage on each valve on the gas valve assembly.

- Between the blue and light blue wires (#3). (Normal: 93 to 120 VDC)
- Between the blue and green wires (#9). (Normal: 93 to 120 VDC)
- Between the blue and orange wires (#53). (Normal: 93 to 120 VDC)
- Between the blue and red wires (#73). (Normal: 93 to 120 VDC) Are all of the voltages within normal range?

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

Appendix D (Error code 311, 321, 331, 341, 351 and 941)

- Check the resistance between the black wires. • Outlet thermistor "E1" (Find the marking of No. 113 on the connector.)
- Inlet thermistor "E2" (Find the marking of No. 42 on the connector.)
- Heat exchanger thermistor "E3" (Find the marking of No. 12 on the connector.) • Return thermistor "E4" (Find the marking of No. 14 on the connector.)
- 50 59 68 77 86 95 °C 10 15 20 25 30 35 kΩ 15.4 12.6 10.3 8.5 7.0 5.9

Appendix D (Error code 311, 321, 331, 341, 351 and 941)

Check the resistance between the white wires.

Exhaust thermistor "K1"

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

No >> Replace the defective thermistor. (Part #407/408/411/718/731)

Are all of the checkpoints normal?

Appendix E (Error code 741 and 751) Error code 741: Refer to checkpoint "F" on the wiring diagram. Error code **751**: Refer to checkpoint "L" on the wiring diagram. Check the voltage between the black and white wires.

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

(Normal: 11 to 25 VDC)

Is the voltage within normal range? Yes >>Replace the built-in/remote controller. (Part #722/724)

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

Appendix F (Error code 651 and 661) Error code 651: Refer to checkpoint "J" on the wiring diagram. Check the voltage between the black and red wires. (Normal: 7 to 16 VDC)

Error code 661: Refer to checkpoint "J1" on the wiring diagram. Check the voltage between the brown and red wires. (Normal: 3 to 11 VDC)

Is the voltage within normal range?

Yes >>Error code 651: Replace the flow adjustment valve.

(Part #402).

>>Error code 661: Replace the bypass valve (Part #403). No >> Replace the PCB (Part #701).

Appendix G (Error code 631)

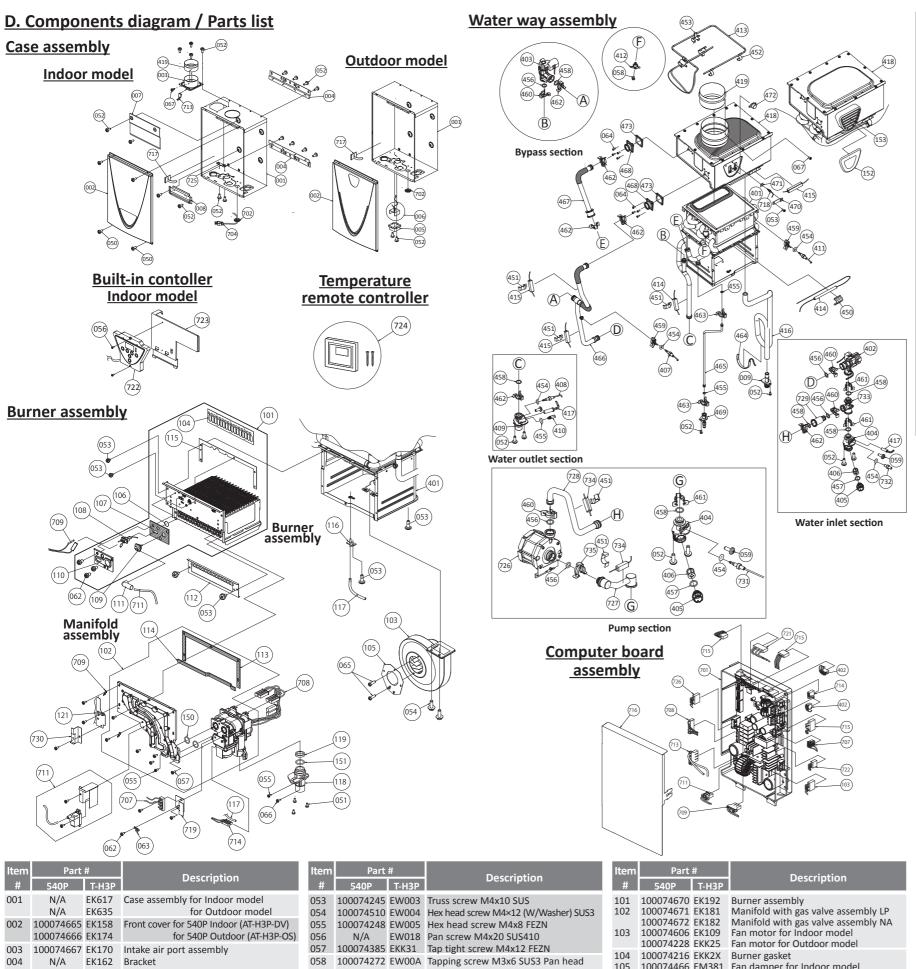
Refer to checkpoint "M" in the diagram above and check the voltage

- Between the blue and red wires. (Normal: 140 to 200 VDC)
- Between the blue and yellow wires. (Normal: 14 to 16 VDC) • Between the blue and orange wires. (Normal: 1 to 6.5 VDC)

Are all of the voltages within normal range?

Yes >>Replace the pump assembly (Part #726).

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



Item Part #		#	Description				
#	540P T-H3P		Description				
001	N/A N/A	EK617 EK635	Case assembly for Indoor model for Outdoor model				
002	100074665 100074666		Front cover for 540P Indoor (AT-H3P-DV) for 540P Outdoor (AT-H3P-OS)				
003 004 005 006 007	100074667 N/A 100074668 100276679 N/A	EK162 EK190	Intake air port assembly Bracket Junction box Power supply cord assembly Back guard panel				
008 009	N/A 100074203	EK160 EKH23	Chamber fixing plate Condensate drain port				
050 051 052	100074210 100074509 100074211	EW001	Truss screw M4×12 (W/Washer) SUS410 Truss screw M4×10 (W/Washer) SUS410 Truss screw M4×10 (Coated) SUS3				

Item	m Part #		Description		
#	540P	Т-НЗР	Description		
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	N/A	EW018	Pan screw M4x20 SUS410		
057	100074385	EKK31	Tap tight screw M4x12 FEZN		
058	100074272	EW00A	Tapping screw M3x6 SUS3 Pan head		
059	100074512	EW009	Tapping screw M4x6 SUS3 Truss head		
060	100076269	EKK37	Tap tight screw M4x12		
061	N/A	EK191	Plus bind Screw M3x6 FEZN		
062	100074244	EW00D	Pan screw M4x8 MFZN		
063	100074233	EM167	Wire clamp 60		
064	N/A	EK230	Screw M4x10		
065	100074514	EW00B	Screw M3x6 SUS3 Binding head		
066	100074247	EW006	Pan screw M4x10		
067	N/A	EK739	Pan screw M4x10 for 3" adapter		

Item	em Part #		Description			
#	540P	T-H3P	Description			
101 102 103	100074670 100074671 100074672 100074606	EK181 EK182 EK109	Burner assembly Manifold with gas valve assembly LP Manifold with gas valve assembly NA Fan motor for Indoor model			
104 105 106 107	100074228 100074216 100074466 100074218 100074219	EKK2X EM381 EKK2V	Fan motor for Outdoor model Burner gasket Fan damper for Indoor model Burner window Rod holder gasket			
108 109 110 111	100074673 100074222 100074221 100074223	EKK0F EKK32	Flame rod Igniter rod Rod holder Rod cap			
112113	100074674 100074675 100074229	EK169	Burner damper LP Burner damper NA Manifold gasket A			

E. DIP switch settings on the computer board



- Turn off the power supply to the water heater before changing the DIP switch settings.
 The dark squares indicate the correct DIP switch positions.
 Failure to observe these warnings could lead to carbon monoxide poisoning, severe personal injury, or death.

Upper bank of DIP switches

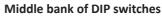
Description

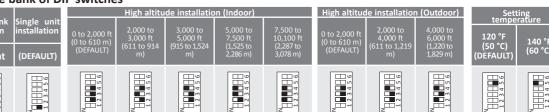
454 100076303 EZM04 O-ring P4 FKM 455 100076305 EZM06 O-ring P6 FKM 456 100076306 EZM14 O-ring P14 FKM 457 100076307 EZM15 O-ring P15 FKM

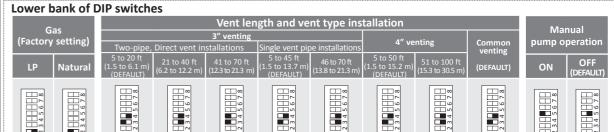
458 100076308 EZM16 O-ring P16 FKM 459 100074282 EKH30 Fastener "4-11" 460 100074290 EKK24 Fastener "14-22" 461 100074410 EM192 Fastener "16A"

462 100074389 EKK39 Fastener "16-25A" 463 100074297 EX12K Fastener "6-15" 464 100074686 EK217 Flat heater 465 100276674 EK625 Drain tube

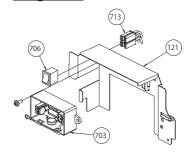












				466	100276640	EK624	Cold pipe
Item #	540P	Т-НЗР	Description	469	100074691 100074692	EK226 EK228	
114			Manifold gasket B				Thermistor fixing plate
115 116 117	100074217 E 100074227 E 100074528 E	KK2D	Burner holder gasket Pressure port Combustion chamber tube	471 472 473		EKH6G	Exhaust thermistor gasket Hi-limit switch for exhaust Gasket
118	100074616 E	K117	Gas inlet	701	100276677	EK628	Computer board
119 121		K618	Gas inlet ring Surge box plate		100076100	EK280	Rubber grommet Surge box 120 VAC wire for Indoor model
	100074533 E 100074242 E 100074678 E 100074679 E	K042 K157	O-ring P18 NBR (Black) O-ring P20 NBR (Black) Silicon ring for Outdoor model Exhaust port for Outdoor model	706 707 708		EK165	120 VAC Power ON-OFF switch Remote controller wire Gas valve wire
			Primary heat exchanger assembly	709 711	N/A 100276678		Flame rod wire Igniter assembly
402 403 404	100074624 100074625 100074377	EKD58		713	N/A N/A	EK631 EK636	Switch wire with thermostat for Indoor for Outdoor
405 406	100074381 100074382	EKK2B EKK2C	Inlet drain plug Inlet water filter	714 715	100074657 N/A	EK632	Proportional gas valve wire 24V cables for Indoor model
			Inlet thermistor	716	N/A 100074375	EK638 FKK1M	for Outdoor model Computer board cover
408			Outlet thermistor	717	N/A	EX13C	Cable clamp
409 410 411		EKK2E	Outlet drain plug Heat exchanger thermistor	718 719	100074644	EK152	Exhaust thermistor for Indoor model Remote fixing plate
412			Hi-Limit switch	721 722			Exhaust Hi-limit switch wire Temperature controller for Indoor model
413	100074334	EK333	Overheat-cut-off fuse	723	N/A		Fixing plate
414	100074682			724			Temperature remote controller
415			Inlet heater for Indoor model Inlet heater for Outdoor model	725 726		EK620	Pump fixing plate Recirculation pump assembly
	100074685 100074629			727 728	100276639	EK623	Pump inlet pipe Pump outlet pipe
418 419	100074701	EK256	Secondary heat exchanger for Indoor model Secondary heat exchanger for Outdoor model 3" PVC adapter	730 731	N/A 100276681	EK627 EK640	Pump connection PCB fixing plate Return thermistor
			Pipe heater fixing plate		100276683		5. 5
451	100074310	EK031	Heater fixing plate 16	733 734	100276686 100076326	EK643	Three way connection
			Fuse fixing plate 18 Fuse fixing plate 14				Fastner "12.7"
433	1000/4331	LNUZJ	i use fixing plate 14				