



H20 Series Inverter Alarms

Machine Display	Inverter Display	Description	Probable Cause
A-01 A-02 A-03	0C1 0C2 0C3	Over Current – Fast and high rise of motor currents	1-Motor short circuit or grounding 2- Short circuit or grounding of inverter out-put wiring 3- Unexplained frequency drop due to failure of door lock safety system
A-04	None	Failure of inverter relay K-2	1-Defect in wiring 2-Washer micro processor break down 3-Error in inverter parameters
A-06 A-07 A-08	0U1 0U2 0U3	Over voltage-Over voltage in the DC link circuit	1-Incorrect voltage supply 2-Error in inverter parameters 3-Unexplained frequency drop due to failure of door lock safety system 4-Failure of inverter output phase due to motor defect or bad connection
None	LU	Low Voltage	1-Faulty supply voltage 2-KA1 relay failure
A-b	Lin	Input Phase Loss-Phase failure or unbalanced voltage between the inverter supply phases.	1-Faulty supply voltage 2-Unbalanced voltage between phases 3-Faulty supply wiring between KA1 relay and inverter 4-Blown fuse
A-11 A-13	0H1 0H3	Inverter Overheating-To high temperature detected by the inverter temperature control.	1-Inverter filter blocked or obstructed 2-Inverter fan failure 3-Ambient temperature to high
A-12	0H2	Motor Overheating-Disconnection of motor thermal protection (klixon) between CM & X1 terminals at the inverter	1-Faulty motor 2-Bad motor bearings 3-Faulty motor cooling fan 4-Low supply voltage 5-High supply voltage 6-Unbalanced voltage between phases
A-16	dbH	Braking Resistor over heating	1-Error in inverter parameters

A-17 A-19	OL OLU	Overload-Motor currents higher than defined as an alarm, including current value and time constant.	1-Drum rotation restricted 2-Drain or pump blocked or bad 3-Faulty motor or bad connection 4-Faulty motor bearings or drum bearings
A-1F	Er1	Failure in inverter information	1-Error in inverter parameters
A-21	Er3	Failure in inverter information	1-Error in inverter parameters
A-26 A-00 COM	Er8	Communication failure between the micro processor and the inverter	1-Lose connection of communication cable 2-No DC voltage from micro (5vdc) 3-Faulty power supply to inverter 4-Faulty micro processor 5-Faulty inverter
A-40 A-55	None	Parameter error	1-Error in inverter parameters



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H20 Series Inverter

Troubleshooting The Power Up Process to the Inverter

When your machine is turned on and begins a cycle, you find that the motor doesn't turn or the inverter doesn't power up, here are a few things to look for.

Start by removing the top of the machine with the proper key. After the top is removed you need to remove the large back lower cover. Using a torx head screwdriver remove all the screws. Then using a 10mm socket loosen the 4 bolts at the bottom of the machine. The back panel should then pull upward and out from the machine.

Located on the lower left side of the machine you will see a gray rectangle device with a keypad and wires running to and from it. This is the inverter drive. An inverter drive is used to power a motor so that things like speed and power consumption can be regulated. An AC inverter is a very efficient way to operate a three-phase motor.

On your machine a relay is used to turn on the inverter. The relay is located right above the inverter itself. It is a small relay with wires running in and out from it. Continental labels the relay in its schematics as KA1. A relay is essentially a switch that is turned on and off. In this case the relay turns on the power to the inverter.

On the **H2018 & H2030 models** your inverter will never power up until the door of the machine is locked. When a cycle is started the computer supplies the thermal actuator with 230 volts and when activated it closes a switch to lock the door and when door is locked the KA1 relay is activated sending power to the inverter.

On the **H2055 through the H2255 models** as soon as the door is shut you can hear the cooling fans come on and at that point the KA1 relay closes sending power to the inverter.

The following steps check to ensure that the inverter is being supplied with the correct amount of voltage when the door is locked or door closed, depending on machine model.

Alarm/CON indicates that the inverter and the microprocessor are not able to communicate. The most common problem is that the inverter is not being powered correctly to enable the communication process.

1. Disconnect all power to the washer and remove rear panels to access the invert drive system.

2. Remove the inverter covering along with its display to allow access to the internal parts of the inverter.
3. Remove from the cover the four screws holding the inverter display keypad and remove display keypad from cover and plug display keypad back onto inverter for testing.
4. Turn on power to washer and follow steps **5 & 6 for H2018 and H2030 models** and **steps 7 & 8 for H2055 through H2255 models** to verify power supply to inverter.

The power up process starts with the door circuit locking or door closing, depending on machine model. Door circuit and when activated sends line voltage through relay to inverter filter power the KA1 relay. The voltage flows through the filter into the topside of inverter allowing inverter to power up.

5. For H2018 & H2030 models power up your machine and start a cycle, wait for the door to lock.
6. As soon as the door locks the KA1 relay should close sending line voltage to the L1 & L2 connection points and the inverter display is on. If you have power to inverter and no inverter display it indicates that the inverter has failed. If you do not have line voltage at L1 & L2 connection points then back track through filter to KA1 relay to see where power supply is being lost.
7. For the H2055 through H2255 models turn on power to unit and close the door.
8. As soon as the door closes the KA1 relay should close sending line voltage to the L1, L2 and L3 connection points and the inverter display is on. If you have power to inverter and no inverter display it indicates the inverter has failed. If you do not have line voltage at L1, L2 and L3 connection points then back track through filter to KA1 relay to see where power supply is being lost.

H2018 & H2030 Models

Checking the relay for proper operation use the diagrams

Showing single-phase KA1 relays.

1. For models H2018 & H2030, using a voltage meter set to measure AC voltage (250 volts minimum), check the power coming into the relay with machines power supply on.
2. To measure the power coming into the relay for single-phase models, place the red meter lead on wire #N, terminal #2 and black meter lead on wire #L1 terminal #8. The meter reading at this time should be between 208 volts and 240 volts same as machines power supply. (See figure 1).
3. This test indicates that the relay KA1 has correct power to input side of relay so that when relay is energized it will transfer that power source to contact points #2 & #4.

4. Using the same voltage meter settings, the output of the relay needs to be checked.
5. Place the red meter lead on the relay terminal #2 and the black meter lead on the relay terminal #4 and start the cycle. As soon as the door locks and the relay energize you should have a meter reading between 208 volts and 240 volts same as machines power supply.
6. If you had the proper voltage readings at all check points you can be sure that there is no problem with the door lock or the relay. If your inverter still doesn't power up, there is either a problem with the EMI filter or the inverter drive itself. When electric power comes from the relay KA1 it first goes to the EMI filter before reaching the drive. The EMI filter reduces harmful noise that can interfere with the machines operation. The inverter is mounted directly to the EMI filter which is used as an inverter base.

H2055 Thru H2255 Models

Checking the relay for proper operation use the diagrams

Showing three phase KA1 relay

1. For models H2055 thru H2255 using a voltage meter set to measure AC voltage (250 volts minimum), check the power coming into the relay with machines power supply on.
2. To measure the power coming into the relay for three phase models. Place a meter lead on terminal 1L1 wire #L1 and a meter lead on terminal 3L2 wire #L2 and your meter should read 230 volts. Next place a meter lead on terminal 3L2 wire #L2 and a meter lead on terminal 5L3 wire #L3 and your meter should read 230 volts. Next place a meter lead on terminal 5L3 wire #L3 and a meter lead on terminal 1L1 and your meter should read 230 volts.
3. If all readings are correct at 230 volts the test indicates that the KA1 relay has correct power to input side of relay so that when relay is energized it will transfer that power source to contact points 2T1, 4T2 and 6T3.
4. Using the same voltage meter settings, the output of the relay needs to be checked.
5. Close the loading door and the motor cooling fans should engage and the relay energizes sending the supply voltage to relay outputs. Place a meter lead on terminal 2T1 wire #2L1 and a meter lead on terminal 4T2 wire 2L2 and your meter should read 230 volts. Next place a meter lead on terminal 4T2 wire #2L2 and a meter lead on terminal 6T3 wire #2L3 and your meter should read 230 volts. Next place a meter lead on terminal 6T3 wire #2L3 and a meter lead on terminal 2T1 wire # 2L1 and your meter should read 230 volts.

6. If you have the proper readings at all check points you can be sure that there is no problem with the door hinge switch or the relay. If your inverter still doesn't power up, there is either a problem with the EMI filter or the inverter drive itself. When electric power transfers through the relay KA1 it first goes to the EMI filter before reaching the drive. The EMI filter reduces harmful noise that can interfere with machine operation. The inverter is mounted directly to the EMI filter which is used as an inverter base.

Follow these steps to check the EMI filter for proper operation.

H2018, H2030 & H2055 single phase Models

1. At the bottom of the filter where the wires are attached from the relay place a meter lead on Blue wire connection and a meter lead on wire number 1L1 and you should read between 208 volts and 240 volts.
2. The power travels through the filter at same level as it is supplied so when we check the out put power at topside of the filter it should be same as the input power.
3. At the top of the filter place a meter lead on wire L1L and a meter lead on wire L2L and verify the voltage output.

H2055 through H2255 three phase Models

1. At the bottom of the filter where the wires are attached from the relay place a meter lead on wire number 2L1 and a meter lead on wire number 2L2 and you should read between 208 volts and 240 volts. Next place a meter lead on wire number 2L2 and a meter lead on wire number 2L3 and you should read same as first reading. Next place a meter lead on wire number 2L3 and a meter lead on wire number 2L1 and you should read same as first and second reading.
2. Again the power travels trough the filter at same level as it is supplied so when we check the out put power at topside of the filter it should be same as the input power.
3. At the top of the filter place a meter lead on wire number L1 and a meter lead on wire number L2 and take reading. Then place a meter lead on wire number L2 and a meter lead on wire number L3 and take reading. Then place a meter lead on wire number L3 and a meter lead on wire number L1 and take reading. All meter reading should be same as reading on bottom of filter.

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Figure 1 KA1 Relay

Single Phase

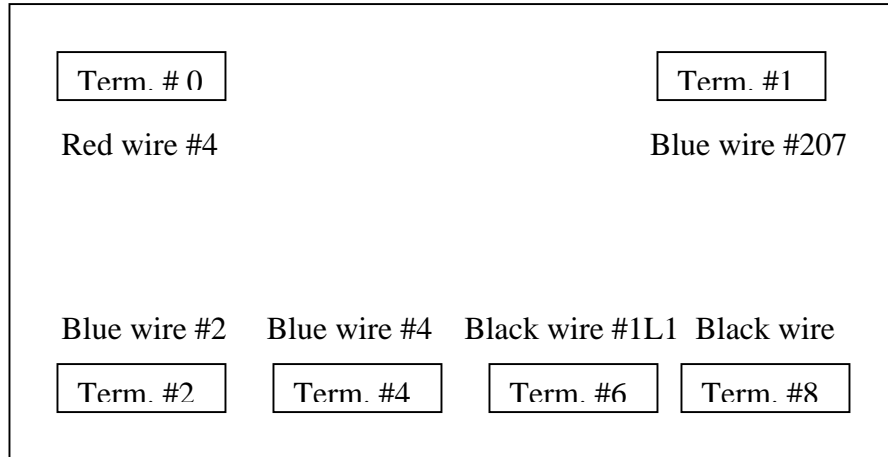
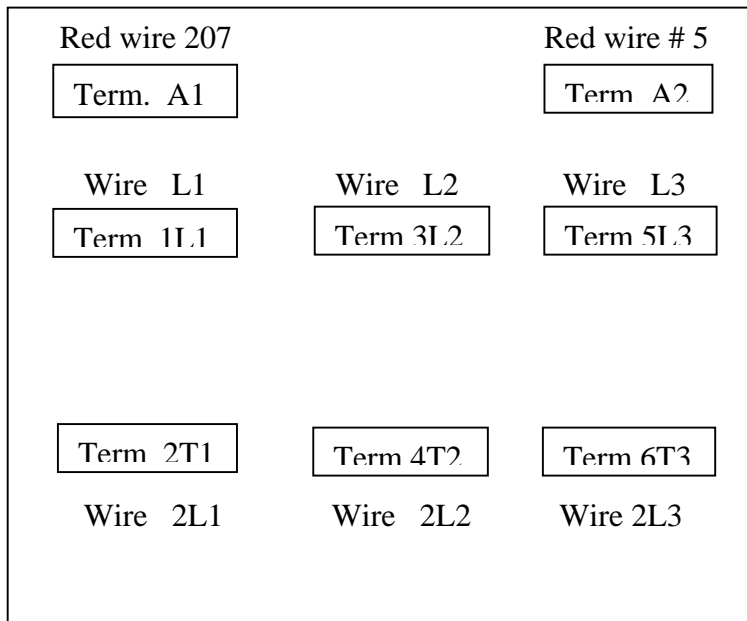


Figure 1 KA1 Relay

Three Phase



Over Current

Inverter Code	OC1 During acceleration	OC2 During deceleration	OC3 Constant speed
Machine Display	A-01	A-02	A-03

06/07/05

What is happening within machine?

Fast and high-rise of motor current - If the inverter output current momentarily exceeds the over current detection level due to an over current in the motor or a short-circuit or a ground fault in the output circuit, the protective function is activated.

What are probable reasons?

Motor short-circuit or ground fault at motor connection terminals (U, V or W) at inverter output.

Short-circuit or grounding of output wiring from inverter to motor.

Restriction of basket rotation including bad bearings, belt tension and load condition.

What are things to check out?

Check motor ground and machine ground connections, ensure these connections are tight and corrosion free and verify that your ground is good to machine.

Check motor wiring from drive to motor for possible fraying or break.

Check motor bearings for noise or failure.

Check motor winding resistance value to determine if each winding has same value (value depends on model of washer). Each winding should read equal, within 1 or 2 ohms of resistance.

Remove belt and check basket rotation for any restriction of drum movement.

Disconnect the motor wires from drive and connect motor direct to line voltage, motor will operate at a steady speed. Using an Amp meter take amp readings on each phase to determine motor current usage. These readings should be the same within 1 amp of each other.

With motor disconnected from inverter, jumper the motor overloads connections on inverter (cm and X1) and start machine. This will allow the inverter to operate correctly and you can verify motor power output voltage of the inverter. To get an accurate voltage reading it is suggested that an analog meter be used rather than a digital meter.

Inverter Control Error

Inverter code	No alarm report
Machine display	A-04

06/07/05

What is happening within the machine?

Failure in the relay K2 inverter Control – The inverter does not recognize that the relay is closed on the microprocessor board.

Possible reasons for this error:

Open circuit at microprocessor board or inverter.

Failure of microprocessor.

Things you can check out:

Check connections on the inverter at points CM and X2; ensure that they are tight and free of contaminants. Make sure that the red wire is connected to CM terminal and black wire is connected to X2 terminal on inverter.

Check connections at the microprocessor X18; ensure that the connector plug is correct. Continuity check of the X18 cable can be done by removing wires from CM and X2 and connecting them together. Remove the terminal connection at X18 and using a Ohm meter place meter leads at both wire connections on plug to verify resistance through cable.

Over Voltage

Inverter Code	OU1 During Acceleration	OU2 During deceleration	OU3 Constant speed
Machine display	A-06	A-07	A-08

06/07/05

What is happening within the machine?

Incorrect voltage is being supplied to the machine DC link circuit – If the DC link circuit voltage of the main circuit exceeds the over-voltage detection level due to an increase in the regenerating current from the motor, the output is shut down.

What are possible reasons for the problem?

Incorrect supply voltage to unit (above 240 volts or below 208 volts).

Failure on the inverter output phase, by motor defect or bad connections.

Restriction of basket rotation including bad bearings, belt tension or load condition.

What are things to check out?

Using a voltage meter measure across the terminals where your machine is connected to power supply. Set up your meter to measure AC voltage with setting of 250 volts minimum. Measure from L1 to L2 and L2 to L3 then from L1 to L3. Ensure that all these voltage readings are no more than +/- 2 volts of each other and in the range of 208 to 240 volts.

Check the wiring from drive to motor for possible fraying or break.

Check the motor connections for corrosion and ensure they are tight.

Remove belt and check basket rotation for any restriction of drum movement.

Check belt tension.

Check load to insure linen is distributed correctly and the tumble action seems correct as inverter machines motor can generate currents when drum turns faster than drive setting.

Low Voltage

Inverter Display	LU
Machine Display	None

06/07/05

What is happening within the machine?

There is an under voltage in the DC link circuit. The supply voltage to the inverter is below 180 volts for a short period of time.

What are possible reasons for the problem?

Improper level of voltage supplied to the inverter. (below 180 volts)

Note: The alarm message appears on the inverter display, at the end of each program when the door unlocks and relay KA1 disconnection. The microprocessor recognizes the situation and does not consider it as an alarm.

Things you can check out:

Using a voltage meter measure across the terminals where your machine is connected to power. Set up your meter to measure AC voltage with setting of 250 volts. Measure from L1 to L2, L1 to L3 and L2 to L3. Ensure that all these voltage readings are no more than +/- 2 volts of each other and in the range of 208 to 240 volts.

Check input power to KA1 relay to verify voltage in the range of 208-240 volts. Check output power from KA1 relay to drive filter to verify voltage in range of 208-240 volts.

IN-PUT PHASE LOSS

Inverter Code	Lin
Machine Display	A-b

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What is happening within the machine?

Input Phase Loss-Phase failure or unbalanced voltage between the inverter supply phases.

Possible reason for this error:

Faulty supply voltage to unit.

Unbalanced voltage between L1, L2 and L3 on three phase systems

Z1 filter failed.

Failed KA1 relay.

Blown fuse.

Things you can check out:

Using a voltmeter check supply voltage from L1, L2 and L3 phase to ground. You should have between 110 volts up to 125 volts. The end reading should be within +/- 2 volts of each other.

Check supply voltage input to KA1 relay and then check the output voltage from KA1 relay. The input voltage should match the output voltage. If the output is lower than the input, replace the relay.

When checking the supply voltage you can verify power supply regarding a blown fuse. With power on and meter set for voltage place one meter lead on one side of fuse and the other lead on opposite side of fuse. If fuse is bad you will have a voltage reading above 100 volts, if fuse is good you will have no reading.

Using an ohmmeter, verify continuity across filter. Using a voltmeter verify voltage input and output.

Inverter Over Heating

Inverter Code	OH1	OH3
Machine display	A-11	A-13

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What is happening within the machine?

The inverter has over heated-If the temperature of the heat sink rises due to a cooling fan failure or cooling air passage is blocked it will trip the inverters protective device.

What are possible reasons for the problem?

Inverter cooling fan failure.

Inverter venting filter blocked or obstructed.

Ambient temperature too high

What are things to check?

With the unit on and inverter powered up check the cooling fan located on top of the inverter to verify it is working.

Check the inverter housing and back panel grills to make sure they are clean and that there is an unobstructed fresh air supply to inverter.

Make sure the washer's linen load is correct according to machine capacity.

Motor Overheating

Inverter Code	OH2
Machine Display	A-12

06/07/05

What is happening within machine?

Motor overload protection (klixon) have open circuit.

What are possible reasons for the problem?

Drain restriction or blockage.

Loose wire connection at motor plug, contactor, machine wiring or power supply.

Low or high voltage supply, most common is low voltage.

Incorrect rotation of drum in spin mode it should always be clockwise when viewing from front.

Faulty motor.

What are things to check out?

Check drain operation to insure machine drains all water in a timely manor. This should be from 15 to 20 seconds at the most for any unit up through 50 lb capacity and 30 to 40 seconds for models above 50 lb capacity.

Check motor plug connections for any sign of burnt wiring normally caused by loose connections. Check contactor voltage across the inputs and outputs for any voltage drop. Check machine supply wiring connections for any burnt wiring.

Check supply voltage to machine to verify it is within the 208-240-voltage range across all phases.

Check drum rotation when spin contactor is activated to insure the basket is rotating in a clockwise direction. If not make correction at machine supply wiring.

Visibly view motor for any burnt condition if none found ohm out motor windings for in consist readings before replacing motor.

Braking Resistor Overheating

Inverter Code	dbH
Machine Display	A-16

06/08/05

What is happening within the machine?

The DC braking resistor has over heated due to excessive on/off operations. On smaller units from H2018 through the H2055 the resistor is internal to inverter and for larger units the resistor is external.

What are possible reasons for the problem?

Frequent deceleration of washtub on on/off operation.

Loose wiring connection at external resistor or burnt resistor.

Things you can check out.

Visual inspection of smaller drives normally show resistor failure and if found replace drive.

Check wiring connections to external resistor for loose or burnt wiring.

Visual check of external resistor for burnt area.

Using an ohm meter check continuity of external resistor.

Motor Overload Currents

Inverter Code	OL	OLU
Machine display	A-17	A-19

06/07/05

What is happening within the machine?

Motor currents higher than defined as an alarm, including current value and time constant or and function that will cause the motor to draw more current than allowed.

What are possible reasons for this alarm?

Drum rotation restricted.

Drain restricted or blocked.

Faulty motor bearings or drum bearings.

Excessive load.

What are things to check out?

Remove drive belt and rotate drum to verify it turns freely and that the drum bearings are moving freely.

Check drain system to insure machine drains within time limits. Drain times for up to 50 lb capacity are 15 to 30 seconds and for larger machines 30 to 45 seconds.

Remove drive belt and check motor bearings for wear and noise.

Remove portion of linen load and retry.

Parameter Failure

Inverter Code	Er1	Er3	None
Machine Display	A-1F	A-21	A40-50

06/07/05

What is happening within the machine?

Failure in inverter information or parameter error.

What are Possible reasons for the problem?

Bad equipment ground to machine; a neutral may have contaminated ground.

If inverter was changed and inverter was interchanged with upgraded part, the microprocessor's EPROM chip needs to be upgraded also.

Inverter failure.

What are things to check out?

First step is to verify that machines ground is correct. Using an ohm meter set at lowest possible setting, place one meter lead on ground wire and other lead on cold water pipe and you should not see more than 0.3 reading +/- 0.3 ohms of resistance. Next place one meter lead on ground wire and other lead on machine cabinet using a low voltage setting, to see if there is any voltage present on ground system. Maximum allowed is 5 vac at any surge point with normal being 0 vac.

Verify that the serial plate on inverter is identical to the replacement part. If not then the EPROM needs to be changed also.

Reinstall the download parameters from the machines microprocessor to the drive.

Place machine in "CONF" mode by turning of power to unit. Modify the setup switch on board to left and turn power back on and display should read "CONF". For PM models press key #9 on keypad and display will read "Conu". Press "Enter/Start" and display will read "Load". Press "Enter/Start and display will read "Sure". Make sure door is shut and latched and press #1 key and display will read "Wait" till the door locks and then the display will read "Load 51". Press "Enter/Start" and the display will read "ConF". Turn off power and move setup switch back to the right and turn power back on.

Communication Failure

Inverter Display	Er8	Er8	Er8
Machine Display	A-26	A-00	COM

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What is happening within the machine?

Communication failure between microprocessor and inverter. The microprocessor stores the parameters that the drive requires to operate correctly. If the microprocessor and the inverter fail to connect to each other the alarm is activated.

What are possible reasons for the problem?

Loss of dc voltage signal from microprocessor or bad microprocessor.

Cable connection bad at micro and/or inverter.

Failure of inverter to power up or bad inverter.

Bad Inductance (L1)

What are things to check?

Remove the communication cable at micro position X-14. Set meter for dc voltage reading at lowest possible setting and place meter lead on each pin at micro X-14 to verify the micro is producing the 5 volts dc required to communicate. If you don't have the 5 volts dc replace micro and if you do have the 5 volts dc check cable.

Replace cable on X-14 connection at micro and go to inverter and locate the connection points of communication cable at terminals DX+ and DX-. Make sure red wire is connected to DX- and that black wire is connected to DX+. Next set meter at lowest dc voltage setting and place a meter lead on each connection to verify that you have the 5 volts dc required for communication link.

Check inverter power up by placing washer in cycle and press start button. Place meter for 250 volt setting and as soon as door locks check across L1 & L2 for single-phase models and L1 to L2 & L2 to L3 for three phase models. You should have line voltage to inverter and inverter should have a display indicating it is powered. If you have line voltage present and no inverter display, replace inverter.

Check inductance coil for continuity, if no continuity replace.