Maintenance and Troubleshooting

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Maintenance and Inspections

Modern AC drives are based on solid state electronics technology, including ICs, resistors, capacitors, transistors, cooling fans, relays, etc. These components have a limited life under normal operation. Preventive maintenance is required to operate the GS20(X) drive in its optimal condition, and to ensure a long life. We recommend that a qualified technician perform a regular inspection of the GS20(X) drive. Some items should be checked once a month, and some items should be checked yearly.

NOTE: All inspections should be accomplished with Safety in mind with due and required caution. Some of these Inspection items may require the Drive to be powered down, while others may require power to be applied. Proper safety precautions including the use of PPE are/may be required. Please review cautionary statements in each section

Monthly Inspection

Check the following items at least once a month.

1) *Make sure the motors are operating as expected.*
2) *Make sure the drive installation environment is normal.*
3) *Make sure the enclosure and drive cooling systems are operating as expected.*
4) *Check for irregular vibrations or sounds during operation.*
5) *Make sure the motors are not overheating during operation.*
6) *Check the input voltage to the* GS20(X) *drive and make sure the voltage is within the operating range. Check the voltage with a voltmeter.*

Annual Inspection

Check the following items once annually.

1) *Check the torque of the GS20(X) power and control terminal screws and tighten if necessary. They may loosen due to vibration or changing temperatures.*
2) *Make sure the conductors and insulators are not corroded or damaged.*
3) *Check the resistance of cable insulation with a megohmmeter.*
4) *Clean off any dust and dirt with a vacuum cleaner. Pay special attention to cleaning the ventilation ports and PCBs. Always keep these areas clean. Accumulation of dust and dirt in these areas can cause unforeseen failures.*
5) *Recharge the capacitors of any drive that is in storage or is otherwise unused.*

Recharge Capacitors (for drives not in service)

Recharge the DC link before using any drive that has not been operated within a year:

1) *Disconnect the motor from the drive.*
2) *Apply input power to the drive for 2 hours.*

If the drive is stored or is otherwise unused for more than a year, the drive's internal DC link capacitors should be recharged before use. Otherwise, the capacitors may be damaged when the drive starts to operate. We recommend recharging the capacitors of any unused drive at least once per year.

DISCONNECT AC POWER AND ENSURE THAT THE INTERNAL CAPACITORS HAVE FULLY DISCHARGED BEFORE INSPECTING THE GS20(X) DRIVE! WAIT AT LEAST FIVE MINUTES AFTER ALL DISPLAY LAMPS HAVE TURNED OFF.

CAUTION

- ☑ Wait 5 seconds after a fault has been cleared before performing reset via keypad or input terminal.
- ☑ When the power is off after 5 minutes for ≤ 30hp models and 10 minutes for ≥ 40hp models, please confirm that the capacitors have fully discharged by measuring the voltage between + and -. The voltage between + and - should be less than 25VDC.
- ☑ Only qualified personnel can install, wire and maintain drives. Please take off any metal objects, such as watches and rings, before operation. And only insulated tools are allowed.
- ☑ Never reassemble internal components or wiring.
- ☑ Make sure that installation environment complies with regulations without abnormal noise, vibration and smell.

Recommended Inspection Schedules

Before the check-up, always turn off the AC input power and remove the cover. Wait at least 10 minutes after all display lamps have gone out, and then confirm that the capacitors have fully discharged by measuring the voltage between DC+ and DC-. The voltage between DC+ and DC-should be less than 25VDC.

Ambient environment

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
Check the ambient temperature, humidity, vibration and see if there are any dust, gas, oil or water drops	Visual inspection and measurement with equipment with standard specification	◯		
If there are any dangerous objects	Visual inspection	◯		

Voltage

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
Check if the voltage of main circuit and control circuit is correct	Measure with multimeter with standard specification	◯		

Digital Keypad Display

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
Is the display clear for reading	Visual inspection	◯		
Any missing characters	Visual inspection	◯		

Mechanical parts

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
If there is any abnormal sound or vibration	Visual and audible inspection		◯	
If there are any loose screws	Tighten the screws		◯	
If any part is deformed or damaged	Visual inspection		◯	
If there is any color change due to overheating	Visual inspection		◯	
If there is any dust or dirt	Visual inspection		◯	

Recommended Inspection Schedules (continued)

Main circuit

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
If there are any loose or missing screws	Tighten or replace the screw	◯		
If any drive or wiring insulation is deformed, cracked, damaged or has changed color due to overheating or aging	Visual inspection **NOTE: Ignore any color change of copper plate**		◯	
If there is any dust or dirt	Visual inspection		◯	

Terminals and wiring of main circuit

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
If the terminal color or the placement has changed due to overheating	Visual inspection		◯	
If the wiring insulation is damaged or there has been a color change	Visual inspection		◯	
If there is any damage	Visual inspection	◯		

DC capacity of main circuit

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
If there is any liquid leaking, color change, crack or deformation	Visual inspection	◯		
If the capacitor safety vent is bulging or inflated.	Visual inspection	◯		
Measure static capacity when required (if drive overloads/faults during normal operation)	Measure with multimeter with standard specification	◯		

Recommended Inspection Schedules (continued)

Resistor of main circuit

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
If there is any peculiar smell or insulation cracks due to overheating	Visual inspection, smell	◯		
If there is any disconnection or discoloration	Visual inspection	◯		
If the connection is damaged	Measure with a multimeter with standard specifications	◯		

Transformer and reactor of main circuit

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
If there is any abnormal vibration or peculiar smell	Visual, audible inspection and smell	◯		

Magnetic contactor and relay of main circuit

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
If there are any loose screws	Visual and audible inspection	◯		
If the contact works correctly	Visual inspection	◯		

Printed circuit board and connector of main circuit

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
If there are any loose screws and connectors	Tighten the screws and press the connectors firmly in place		◯	
If there is any peculiar smell and/or color change	Visual and smell inspection		◯	
If there is any crack, damage, deformation or corrosion	Visual inspection		◯	
If there is any liquid leakage or deformation in capacity	Visual inspection		◯	

Recommended Inspection Schedules (continued)

Cooling fan of cooling system

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
If there is any abnormal sound or vibration	Visual, audible inspection and turn the fan with hand (turn off the power before operation) to see if it rotates smoothly		◯	
If there is any loose screw	Tighten the screw		◯	
If there is any color change due to overheating	Change the fan		◯	

Ventilation channel of cooling system

Check Items	Methods and Criteria	Maintenance Period		
		Daily	Half Year	One Year
If there is any obstruction in the heat sink, air intake or air outlet	Visual inspection		◯	

Please use a clean lint free cloth for cleaning and use a dust cleaner to remove dust when necessary.

Troubleshooting

Warning Codes

The GS20(X) drive has a comprehensive diagnostic system that includes several different warning codes. The most common warning codes can be read on the digital keypad display.

For communication errors, "Upper unit" is referring to the Master controller of the serial network. Always ensure the communication settings of the drive (P09.01 and P09.04) match those of the master controller and network.

Warning Codes					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
n/a	0	No error	n/a	n/a	n/a
CE1	1	Communication error 1 (CE1) RS-485 Modbus illegal function code.	Action Level	When the function code is 03, 06, 10, and 63	1) Check if the communication command is correct 2) Verify the wiring and grounding of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 3) Check if the setting for P09.04 is the same as the setting for the upper unit. 4) Check the cable and replace it if necessary.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	"Warning" occurs when P09.02=0 and the motor drive keeps running. The drive resets automatically when receiving the correct function code.	
			Reset condition	Immediately reset	
			Record	N/A	
CE2	2	Communication error 2 (CE2) RS-485 Modbus illegal data address	Action Level	When the input data address is incorrect	1) Check if the communication command is correct. 2) Verify the wiring and grounding of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 3) Check if the setting for P09.04 is the same as the setting for the upper unit. 4) Check the cable and replace it if necessary.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	"Warning" occurs when P09.02=0 and the motor drive keeps running. The drive resets automatically when receiving the correct data address.	
			Reset condition	Immediately reset	
			Record	N/A	
CE3	3	Communication error 3 (CE3) RS-485 Modbus illegal data value	Action Level	When the length of communication data is too long	1) Check if the communication command is correct. 2) Verify the wiring and grounding of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 3) Check if the setting for P09.04 is the same as the setting for the upper unit. 4) Check the cable and replace it if necessary.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	"Warning" occurs when P09.02=0 and the motor drive keeps running. The drive resets automatically when receiving the correct communication data value.	
			Reset condition	Immediately reset	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
CE4	4	Communication error 4 (CE4) RS-485 Modbus data is written to read-only address	Action Level	When the data is written to read-only address	1) Check if the communication command is correct 2) Verify the wiring and grounding of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 3) Check if the setting for P09.04 is the same as the setting for the upper unit. 4) Check the cable and replace it if necessary.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	"Warning" occurs when P09.02=0 and the motor drive keeps running. The drive resets automatically when receiving the correct written address of communication data.	
			Reset condition	Immediately reset	
			Record	N/A	
CE 10	5	Communication error 10 (CE10) RS-485 Modbus transmission time-out	Action Level	When the communication time exceeds the detection time of P09.03 communication time-out	1) Check if the upper unit transmits the communication command within the setting time for P09.03. 2) Verify the wiring and grounding of the communication circuit. It is recommended to separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 3) Check if the setting for P09.04 is the same as the setting for the upper unit. 4) Check the cable and replace it if necessary.
			Action Time	P09.03	
			Warning setting parameter	N/A	
			Reset method	"Warning" occurs when P09.02=0 and the motor drive keeps running. The drive resets automatically when receiving the next communication packet.	
			Reset condition	Immediately reset	
			Record	N/A	
SE 1	7	Save error 1 (SE1) Keypad COPY error 1: Keypad copy time-out	Action Level	"SE1" warning occurs when the GS4-KPD optional keypad does not transmit the COPY command to the drive, and does not transmit any data to the drive again in 10 ms at the time you copy the parameters to the drive.	SE1: The causes of error are mostly communication problems between the keypad and control board. Potential causes include communication signal interference and the unacceptable communication command to the Slave. Check if the error occurs randomly, or only occurs when copying certain parameters (the error displays on the upper right corner of the copy page). If you cannot clear the error, please contact AutomationDirect Technical Support.
			Action Time	10 ms	
			Warning setting parameter	N/A	
			Reset method	Manual reset (or cycle power)	
			Reset condition	Immediately reset	
			Record	N/A	
SE2	8	Save error 2 (SE2) Keypad COPY error 2: parameter writing error	Action Level	"SE2" warning occurs when writing the parameters incorrectly at the time you copy parameters to the drive. For example, you copy the new firmware version with added parameters to the drive with old firmware version.	SE2: In this stage, the copied data has been transmitted to the Slave. The Slave compares and processes the copied data, and then saves the data to the Data ROM. During the process, the data error (should be attribution error) may occur, or the data cannot be saved to EEPROM. At this time, the warning occurs. Check the status of Data ROM and remove the error causes first. If you cannot clear the error, please contact AutomationDirect Technical Support.
			Action Time	N/A	
			Warning setting parameter	N/A	
			Reset method	Manual reset (or cycle power)	
			Reset condition	Immediately reset	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
oHI	9	IGBT over-heating warning (oH1) The AC motor drive detects IGBT overheating and exceeds the protection level of oH1 warning. (When P06.15 is higher than the IGBT overheating protection level, the drive shows oH1 error without displaying oH1 warning.)	Action Level	P06.15	1) Check the ambient temperature. 2) Regularly inspect the ventilation hole of the control cabinet. 3) Change the installed location if there are heating objects, such as braking resistors, in the surroundings. 4) Install/add cooling fan or air conditioner to lower the temperature inside the cabinet. 5) Check for and remove obstructions or replace the cooling fan. 6) Increase ventilation space of the drive. 7) Decrease loading. 8) Decrease the carrier wave. 9) Replace the drive with higher capacity model.
			Action Time	"oH1" warning occurs when IGBT temperature is higher than P06.15 setting value.	
			Warning setting parameter	N/A	
			Reset method	Auto-reset	
			Reset condition	The drive auto-resets when IGBT temperature is lower than oH1 warning level minus (–) 5°C	
			Record	N/A	
PI d	11	PID feedback error (PID) PID feedback loss (warning for analog feedback signal; works only when PID enables)	Action Level	When the analog input is lower than 4 mA (only detects analog input 4–20 mA)	1) Check the PID feedback wiring and tighten the terminals. 2) Replace the cable. 3) Replace the feedback device. 4) If the PID error still occurs after checking all the wiring, contact AutomationDirect Technical Support.
			Action Time	P08.08	
			Warning setting parameter	P08.09 setting is: 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: Warn and operate at last frequency	
			Reset method	1) Auto: "Warning" occurs when P08.09=0 or 3. The "Warning" automatically clears when the feedback signal is larger than 4 mA. 2) Manual: "Error" occurs when P08.09=1 or 2. You must reset manually.	
			Reset condition	Immediately reset	
			Record	Records when P08.09=1 or 2 ("Error"). Does not record when P08.09=3 ("Warning").	

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Warning Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**	**Corrective Action**
AnL	12	AI2 analog signal loss (AnL) Analog input current loss (including all analog 4–20 mA signals)	Action Level: When the analog input is lower than 4 mA (only detects analog input 4–20 mA) Action Time: Immediately act Warning setting parameter: P03.19 setting is: 0: Disable 1: Continue operation at the last frequency (warning, keypad displays ANL) 2: Decelerate to 0 Hz (warning, keypad displays ANL) 3: Stop immediately and display "ACE" Reset method: 1) Auto: "Warning" occurs when P03.19=1 or 2. The "Warning" automatically clears when the feedback signal is larger than 4 mA. 2) Manual: "Error" occurs when P03.19=3. You must reset manually. Reset condition: Immediately reset Record: Does not record when P03.19=1 or 2 ("Warning").	1) Check the AI2 wiring and tighten the terminals. 2) Replace the cable. 3) Replace the external device. 4) If the AnL error still occurs after checking all the wiring, contact AutomationDirect Technical Support.
uC	13	Under current (uC) Low current	Action Level: P06.71 Action Time: P06.72 Warning setting parameter: P06.73 setting is: 0: No function 1: Fault and coast to stop 2: Fault and ramp to stop by the 2nd deceleration time 3: Warn and continue operation Reset method: 1) Auto: "Warning" occurs when P06.73=3. The "Warning" automatically clears when the output current is larger than (P06.71+0.1 A). 2) Manual: "Error" occurs when P06.73=1 or 2. You must reset manually. Reset condition: Immediately reset Record: Does not record when P06.73=3 and uC displays ("Warning").	1) Check for a broken motor cable, then exclude the connection issue of the motor and its load. 2) Verify low current protection settings. If needed, set the proper settings for P06.71, P06.72 and P06.73. 3) Check the loading status and make sure the loading matches the motor capacity.
oSPd	17	Over speed warning (oSPd) Over speed warning	Action Level: The encoder feedback speed > P10.10 Action Time: P10.11 Warning setting parameter: P10.12=0 0: Warn and continue operation Reset method: "Warning" automatically clears when the drive stops Reset condition: "Warning" automatically clears when the drive stops Record: N/A	1) Verify setting of P10.25. Decrease value if needed. 2) Verify bandwidth setting for ASR speed control and increase the bandwidth setting if needed. 3) Reset motor parameter and run parameter tuning. 4) Verify the wiring of the control circuit, and the wiring/grounding of the main circuit to prevent interference.

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
dAvE	18	Deviation Warning (dAvE) Over speed deviation warning	Action Level	P10.13	1) Verify parameter setting for slip error and reset value for P10.13 and P10.14 if needed. 2) Reset ASR parameters and set proper accel./ decel. time. 3) Verify motor status and remove any causes if the motor is locked. 4) Check status of the mechanical brake and verify the action timing of the system if the brake is not released. 5) Verify torque limit and adjust parameters P06.12 and P11.17-P11.20 as needed. 6) Verify the wiring of the control circuit, and the wiring/grounding of the main circuit to prevent interference.
			Action Time	P10.14	
			Warning setting parameter	P10.15 Encoder Stall and Slip Error Action =0 0: Warn and continue operation	
			Reset method	"Warning" automatically clears when the drive stops	
			Reset condition	After the drive stops	
			Record	N/A	
PHL	19	Phase loss (PHL) Input phase loss warning	Action Level	One of the phases outputs less than P06.47	1) Verify the wiring of the main circuit. 2) Verify a single-phase power input is not being used on a three-phase model. Use the model with voltage that matches the power. 3) If the power of main circuit works well, check if the MC of the main circuit is broken. Cycle the power after verifying the power is normal. If PHL still occurs, contact AutomationDirect Technical Support. 4) Tighten the terminal screws with the torque listed in the user manual. 5) Verify the input cable is not broken. Make sure the wiring is correct. Replace the broken part of the cable if needed. 6) Verify the three-phase power is not unbalanced.
			Action Time	P06.46	
			Warning setting parameter	P06.45 Output Phase Loss Detection Action (OPHL) =0 0: Warn and continue operation	
			Reset method	"Warning" automatically clears when the drive stops	
			Reset condition	After the drive stops	
			Record	N/A	

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Warning Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**	**Corrective Action**
oL 1	20	Over-torque 1 (ot1) Over-torque 1 warning	Action Level: P06.07 Action Time: P06.08 Warning setting parameter: P06.06 Over-torque Detection Selection (Motor 1) =1 or 3 0: No function 1: Continue operation after over-torque detection during constant speed operation 2: Stop after over-torque detection during constant speed operation 3: Continue operation after over-torque detection during RUN 4: Stop after over-torque detection during RUN Reset method: When the output current < P06.07, the ot1 warning automatically clears Reset condition: When the output current < P06.07, the ot1 warning automatically clears Record: N/A	1) Configure the settings for P06.07 and P06.08 again. 2) Check for mechanical error and remove the causes of malfunction. 3) Verify load and decrease the loading or replace with a motor with larger capacity if load is too high. 4) Verify accel/decel time and increase the setting values for P01.12–P01.19 (accel./ decel. time) if work cycle is too short. 5) Verify V/F voltage and adjust the V/F curve (Motor 1, P01.01–P01.08), especially the setting value for the mid-point voltage (if the mid-point voltage is set too small, the load capacity decreases at low-speed). 6) Replace motor with a larger capacity motor. 7) Check for overload during low-speed operation and decrease the loading during low-speed operation or increase the motor capacity. 8) Verify torque compensation and adjust P07.26 torque compensation gain until the output current decreases and the motor does not stall. 9) Correct the parameter settings for speed tracking. Start the speed tracking function. Adjust the maximum current for P07.09 speed tracking.

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
oL2	21	Over-torque (ot2) Over-torque 2 warning	Action Level	P06.10	1) Configure the settings for P06.10 and P06.11 again. 2) Check for mechanical error and remove the causes of malfunction. 3) Verify load and decrease the loading or replace with a motor with larger capacity if load is too high. 4) Verify accel/decel time and increase the setting values for P01.12–P01.19 (accel./ decel. time) if work cycle is too short. 5) Verify V/F voltage and adjust the V/F curve (Motor 2, P01.35–P01.42), especially the setting value for the mid-point voltage (if the mid-point voltage is set too small, the load capacity decreases at low-speed). 6) Replace motor with a larger capacity motor. 7) Check for overload during low-speed operation and decrease the loading during low-speed operation or increase the motor capacity. 8) Verify torque compensation and adjust P07.71 torque compensation gain until the output current decreases and the motor does not stall. 9) Correct the parameter settings for speed tracking. Start the speed tracking function. Adjust the maximum current for P07.09 speed tracking.
			Action Time	P06.11	
			Warning setting parameter	P06.09 Over-torque Detection Selection (Motor 2) =1 or 3 0: No function 1: Continue operation after over-torque detection during constant speed operation 2: Stop after over-torque detection during constant speed operation 3: Continue operation after over-torque detection during RUN 4: Stop after over-torque detection during RUN	
			Reset method	When the output current < P06.10, the ot2 warning automatically clears	
			Reset condition	When the output current < P06.10, the ot2 warning automatically clears	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
oH3	22_1	Motor over-heating (oH3) PTC Motor overheating warning. The AC motor drive detects the temperature inside the motor is too high	Action Level	P03.00=6 (PTC), PTC input level > P06.30 PTC level (default=50%)	1) Check if motor is locked and clear the motor lock status. 2) Verify load and decrease the loading or replace with a motor with larger capacity if load is too high. 3) Verify ambient temperature and change the installed location if there are heating devices in the surroundings, or install/add cooling fan or air conditioner to lower the ambient temperature. 4) Check the cooling system and ensure it's working normally. 5) Verify the motor fan is working and replace the fan if needed. 6) Verify duration of low speed operation. Decrease low-speed operation time. Change to dedicated motor for the drive. Increase the motor capacity. 7) Verify accel/decel time and increase setting values for P01.12–P01.19 (accel./ decel. time) if working cycle is too short. 8) Verify V/F voltage and adjust settings for P01.01–P01.08 (V/F curve), especially the setting value for the mid-point voltage (if the mid-point voltage is set too small, the load capacity decreases at low-speed). 9) Verify the motor rated current matches the motor nameplate and configure the correct rated current value of the motor if needed. 10) Check the connection between PTC thermistor and the heat protection. 11) Verify stall prevention setting and set the stall prevention to the proper value if needed. 12) Check for unbalanced three-phase motor impedance. Replace the motor if needed. 13) Verify harmonics and reduce harmonics if too high.
			Action Time	Immediately act	
			Warning setting parameter	Error treatment: P06.29 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: No warning When P06.29=0 and when the temperature is ≤ P06.30 level, the oH3 warning automatically clears. When P06.29=0 ("Warning"), it automatically resets.	
			Reset method	When P06.29=0, oH3 displays as "Warning". When the temperature is ≤ P06.30 level, the oH3 warning automatically clears.	
			Reset condition	When the temperature is ≤ P06.30 level, the oH3 warning automatically clears.	
			Record	N/A	
oSL	24	Over slip warning (oSL) Over slip warning. By using the maximum slip (P10.29) as the base, when the drive outputs at constant speed, and the F>H or F<H exceeds P07.29 level and P.07.30 setting time, 100% P07.29 = P10.29.	Action Level	When the drive outputs at constant speed, and F>H or F<H exceeds the P07.29 level	1) Check the motor parameter. 2) Verify load and decrease the loading if needed. 3) Verify the parameter settings for oSL protection (P07.29, P07.30, and P10.29) are correctly set.
			Action Time	P07.30	
			Warning setting parameter	P07.31=0 Warning 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: No warning	
			Reset method	When P07.31=0 and when the drive outputs at constant speed, and F>H or F<H no longer exceeds the P07.29 level, the oSL warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
tUn	25	Auto tuning (tUn) Parameter auto-tuning is processing. When running auto-tuning, the keypad displays "tUn".	Action Level	When running P05.00 motor parameter auto-tuning, the keypad displays "tUn".	When the auto-tuning is finished, the warning automatically clears.
			Action Time	N/A	
			Warning setting parameter	N/A	
			Reset method	When auto-tuning is finished and no error occurs, the warning automatically clears.	
			Reset condition	When auto-tuning is finished and no error occurs.	
			Record	N/A	
oPHL	28	Output phase loss (oPHL) Output phase loss of the drive	Action Level	P06.47	1) Check for unbalanced three-phase motor impedance and replace the motor if needed. 2) Check the cable and replace if needed. 3) Ensure a three-phase motor is being used. 4) Check if the control board cable is loose. If yes, reconnect the cable and run the drive to test. If the error still occurs, contact AutomationDirect Technical Support. 5) Check if the three-phase current is balanced with a current clamp meter. If the current is balanced and the oPHL error still shows on the display, contact AutomationDirect Technical Support. 6) Verify the drive's capacity matches or exceeds the motor's.
			Action Time	N/A	
			Warning setting parameter	P06.45 setting is: 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: No warning	
			Reset method	If P06.45 is set to 0, the oPHL warning automatically clears after the drive stops.	
			Reset condition	N/A	
			Record	N/A	
SE3	30	Copy model error 3 (SE3) Keypad COPY error 3: copy model error	Action Level	"SE3" warning occurs when different drive identity codes are found during copying parameters.	It is mainly to prevent parameter copies between different HP/models.
			Action Time	Immediately act when the error is detected	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	N/A	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
oL3	31	Over-torque (ot3) Over-torque 3 warning	Action Level	P14.75	1) Configure the settings for P14.75 and P14.76 again. 2) Check for mechanical error and remove the causes of malfunction. 3) Verify load and decrease the loading or replace with a motor with larger capacity if load is too high. 4) Verify accel/decel time and increase the setting values for P01.12–P01.19 (accel./ decel. time) if work cycle is too short. 5) Verify V/F voltage and adjust the V/F curve (Motor 3, P01.54–P01.61), especially the setting value for the mid-point voltage (if the mid-point voltage is set too small, the load capacity decreases at low-speed). 6) Replace motor with a larger capacity motor. 7) Check for overload during low-speed operation and decrease the loading during low-speed operation or increase the motor capacity. 8) Verify torque compensation and adjust P07.73 torque compensation gain until the output current decreases and the motor does not stall. 9) Correct the parameter settings for speed tracking. Start the speed tracking function. Adjust the maximum current for P07.09 speed tracking.
			Action Time	P14.76	
			Warning setting parameter	P14.74 Over-torque Detection Selection (Motor 3) =1 or 3 0: No function 1: Continue operation after over-torque detection during constant speed operation 2: Stop after over-torque detection during constant speed operation 3: Continue operation after over-torque detection during RUN 4: Stop after over-torque detection during RUN	
			Reset method	When the output current < P14.75, the ot3 warning automatically clears	
			Reset condition	When the output current < P14.75, the ot3 warning automatically clears	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
oL4	32	Over-torque (ot4) Over-torque 4 warning	Action Level	P14.78	1) Configure the settings for P14.78 and P14.79 again. 2) Check for mechanical error and remove the causes of malfunction. 3) Verify load and decrease the loading or replace with a motor with larger capacity if load is too high. 4) Verify accel/decel time and increase the setting values for P01.12–P01.19 (accel./ decel. time) if work cycle is too short. 5) Verify V/F voltage and adjust the V/F curve (Motor 3, P01.63–P01.70), especially the setting value for the mid-point voltage (if the mid-point voltage is set too small, the load capacity decreases at low-speed). 6) Replace motor with a larger capacity motor. 7) Check for overload during low-speed operation and decrease the loading during low-speed operation or increase the motor capacity. 8) Verify torque compensation and adjust P07.75 torque compensation gain until the output current decreases and the motor does not stall. 9) Correct the parameter settings for speed tracking. Start the speed tracking function. Adjust the maximum current for P07.09 speed tracking.
			Action Time	P14.79	
			Warning setting parameter	P14.77 Over-torque Detection Selection (Motor 4) =1 or 3 0: No function 1: Continue operation after over-torque detection during constant speed operation 2: Stop after over-torque detection during constant speed operation 3: Continue operation after over-torque detection during RUN 4: Stop after over-torque detection during RUN	
			Reset method	When the output current < P14.78, the ot4 warning automatically clears	
			Reset condition	When the output current < P14.79, the ot4 warning automatically clears	
			Record	N/A	
PLod	50	PLC opposite defect (PLod) PLC download error warning	Action Level	During PLC downloading, the program source code detects incorrect address (e.g. the address exceeds the range), then the PLod warning occurs.	Verify the data number used when downloading the PLC program and use the correct data number.
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	N/A	
			Reset method	Check if the program is correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	
PLSu	51	PLC save memory error (PLSv) Data error during PLC operation	Action Level	The program detects incorrect written address (e.g. the address exceeds the range) during PLC operation, then the PLSv warning occurs.	Make sure the written address is correct and download the program again.
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	N/A	
			Reset method	Check if the program is correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
PLdA	52	Data defect (PLdA) Data error during PLC operation	Action Level	The program detects incorrect written address when translating the program source code (e.g. the address exceeds the range) during PLC downloading, then PLdA warning occurs.	Check if the upper unit transmits the correct command.
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	N/A	
			Reset method	Check if the program is correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	
PLFn	53	Function defect (PLFn) PLC download function code error	Action Level	The program detects incorrect command (unsupported command) during PLC downloading, then PLFn warning occurs.	Check the drive firmware and if not the latest version, download and install the latest version from the ADC support website
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	N/A	
			Reset method	Check if the program is correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	
PLor	54	PLC buffer overflow (PLor) PLC register overflow	Action Level	When PLC runs the last command and the command exceeds the maximum capacity of the program, then PLor warning occurs.	Follow the steps below to reset the PLC software: 1) Disable PLC 2) Reset the PLC program (P00.02=6) 3) Enable PLC 4) Re-download the PLC program
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	N/A	
			Reset method	Check if the program is correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
PLFF	55	Function defect (PLFF) Function code error during PLC operation	Action Level	The program detects incorrect command (unsupported command) during PLC operation, then PLFF warning occurs.	When starting the PLC function and there is no program in the PLC, the PLFF warning occurs. This is a normal warning, please download the program.
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	NA	
			Reset method	Check if the program is correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	
PLSn	56	Checksum error (PLSn) PLC checksum error	Action Level	PLC checksum error is detected after the drive is powered on, then PLSn warning occurs.	Follow the steps below to reset the PLC software: 1) Disable PLC 2) Reset the PLC program (P00.02=6) 3) Enable PLC 4) Re-download the PLC program
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	NA	
			Reset method	Check if the program is correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	
PLEd	57	No end command (PLEd) PLC end command is missing	Action Level	The "End" command is missing. Until the last command is executed, the PLEd warning occurs.	Follow the steps below to reset the PLC software: 1) Disable PLC 2) Reset the PLC program (P00.02=6) 3) Enable PLC 4) Re-download the PLC program
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	NA	
			Reset method	Check if the program is correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	
PLCr	58	PLC MCR error (PLCr) PLC MCR command error	Action Level	The MC command is detected during PLC operation, but there is no corresponding MCR command, then the PLCr warning occurs.	The MC command cannot be used continuously for 9 times. Check and reset the program, then re-download the program.
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	NA	
			Reset method	Check if the program is correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
PLdF	59	PLC download fail (PLdF) PLC download failure	Action Level	PLC download failure due to momentary power loss during download. After the power is again present, the PLdF warning occurs.	Check for programming errors, if they exist, correct and download the program again.
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	NA	
			Reset method	Check for programming errors, if they exist, correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	
PLSF	60	PLC scan time fail (PLSF) PLC scan time exceeds the maximum allowable time	Action Level	When the PLC scan time exceeds the maximum allowable time (400 ms), the PLSF warning occurs.	Check for Source Code errors, if they exist, correct and download the program again.
			Action Time	Immediately act when the fault is detected	
			Warning setting parameter	NA	
			Reset method	Check for programming errors, if they exist, correct and download the program again. If the fault does not exist, the warning automatically clears.	
			Reset condition	N/A	
			Record	N/A	
ECLv	71	ExCom power loss (ECLv) Low voltage of the communication card	Action Level	The 5V power that the drive provides to the communication card is too low	1) Make sure the communication card is well inserted and not loose. 2) Use the same communication card with another GS20 drive to check if the ECLv warning still occurs. If yes, replace with a new communication card; if not, replace the drive. 3) Use another communication card to test if the ECLv warning still occurs on the same drive. If not, replace the card; if yes, replace the drive.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Cycle the power	
			Reset condition	N/A	
			Record	N/A	
ECtt	72	ExCom test mode (ECtt) The communication card is in the test mode	Action Level	The communication card is in the test mode	Cycle the power
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Cycle the power and enter the normal mode	
			Reset condition	N/A	
			Record	N/A	
ECFF	75	ExCom factory defect (ECFF) Factory default setting error	Action Level	Factory default setting error	Use GSoft2 to download a new parameter set into the drive.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Cycle the power	
			Reset condition	N/A	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
EC iF	76	ExCom inner error (ECiF) Serious internal error	Action Level	Internal memory saving error	1) Verify the wiring of the control circuit, and the wiring/grounding of the main circuit to prevent interference. 2) Cycle the power. 3) Reset to the default value and check if the error still exists. If yes, replace the communication card.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Cycle the power	
			Reset condition	N/A	
			Record	N/A	
ECEF	80	Ethernet link fail (ECEF) The Ethernet cable is not connected	Action Level	Hardware detection	1) Re-connect the cable 2) Replace the cable
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	N/A	
			Record	N/A	
ECCS	82	Checksum error (ECCS) Checksum error for the communication card and the drive	Action Level	Software detection	Verify the wiring of the control circuit, and the wiring/grounding of the main circuit to prevent interference.
			Action Time	N/A	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Immediately reset	
			Record	N/A	
ECrF	83	Return defect (ECrF) Communication card returns to the default setting	Action Level	Communication card returns to the default setting	No actions required.
			Action Time	N/A	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Immediately reset	
			Record	N/A	
ECo0	84	Modbus TCP over (ECo0) Modbus TCP exceeds the maximum communication value	Action Level	Hardware detection	1) Verify the Master communication value does not exceed the allowable number of communication cards. If it does, decrease the Master communication value. 2) Check if the connection is occupied due to not disconnecting the Modbus TCP while the upper unit is connected without communicating. If it is, revise the program of the upper unit to disconnect the connection while the communication is not used for a long time. 3) Check if a new Modbus TCP connection is built whenever the upper unit is connected to the communication card. If so, revise the program of the upper unit to use the same Modbus TCP connection when connecting to the same communication card.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Immediately reset	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
ECo1	85	EtherNet/IP over (ECo1) EtherNet/IP exceeds the maximum communication value	Action Level	Hardware detection	1) Verify the Master communication value does not exceed the allowable number of communication cards. If it does, decrease the Master communication value. 2) Check if the connection is occupied due to not disconnecting the Modbus TCP while the upper unit is connected without communicating. If it is, revise the program of the upper unit to disconnect the connection while the communication is not used for a long time. 3) Check if a new Modbus TCP connection is built whenever the upper unit is connected to the communication card. If so, revise the program of the upper unit to use the same Modbus TCP connection when connecting to the same communication card.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Immediately reset	
			Record	N/A	
EC iP	86	IP fail (ECiP) IP setting error	Action Level	Software detection	1) Reset IP 2) Contact MIS to check if DHCP Server works normally
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Immediately reset	
			Record	N/A	
ECbY	88	ExCom busy (ECbY) Communication card busy: too many packets are received	Action Level	Software detection	Decrease communication packets
			Action Time	N/A	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	N/A	
			Record	N/A	
ECCb	89	ExCom card break (ECCb) Communication card break off warning	Action Level	Communication card break off	Re-install the communication card
			Action Time	N/A	
			Warning setting parameter	N/A	
			Reset method	Auto-resets after the communication card is re-installed	
			Reset condition	Immediately reset	
			Record	N/A	
CPLP	90	Copy PLC: password error (CPLP) Copy PLC password error. When PLC copy is processing and the PLC password is incorrect, the CPLP warning occurs.	Action Level	PLC password is incorrect	Reset and enter the correct PLC password
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Directly reset	
			Record	N/A	
CPL0	91	Copy PLC: Read mode error (CPL0) Copy PLC read mode error	Action Level	Incorrect process when copying the PLC read mode	Cycle the power and copy the PLC read mode again
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Directly reset	
			Record	N/A	

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Warning Codes (continued)					
Display on GS20(X) Keypad	**ID No.**	**Warning Name and Description**	**Action and Reset**		**Corrective Action**
CPL1	92	Copy PLC: Write mode (CPL1) Copy PLC write mode error	Action Level	Incorrect process when copying the PLC write mode	Cycle the power and copy the PLC write mode again
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Directly reset	
			Record	N/A	
CPLu	93	Copy PLC: version error (CPLv) Copy PLC version error. When a non-GS20(X) built-in PLC is copied to the GS20(X) drive, the CPLv warning occurs.	Action Level	Software detection	Check if the copied PLC program is for GS20(X). If not, use the correct GS20(X) PLC program.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Directly reset	
			Record	N/A	
CPLS	94	Copy PLC: size error (CPLS) Copy PLC capacity error	Action Level	Software detection	Check if the copied PLC program is for GS20(X). Use the correct capacity for the GS20(X) PLC program.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Directly reset	
			Record	N/A	
CPLF	95	Copy PLC: PLC function (CPLF) Copy PLC function must be executed when PLC is disabled.	Action Level	Software detection	Disable the PLC function first, and then run the PLC copy function again.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Directly reset	
			Record	N/A	
CPLt	96	Copy PLC: time-out (CPLt) Copy PLC time-out	Action Level	Software detection	The GS20-KPD cannot be removed during the PLC copy process
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Manual reset	
			Reset condition	Directly reset	
			Record	N/A	
ictn	101	InrCOM time-out (ictn) Internal communication time-out	Action Level	When P09.31= (-1) – (-10) (no -9) and the internal communication between Master and Slave is abnormal, the ictn warning occurs.	1) Verify the wiring and grounding of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 2) Check if the setting for P09.04 is the same as the setting for the upper unit 3) Check the cable and replace it if necessary.
			Action Time	Immediately act	
			Warning setting parameter	N/A	
			Reset method	Auto-reset	
			Reset condition	The warning automatically clears when the communication is back to normal condition	
			Record	N/A	

Fault Codes

The GS20(X) drive has a comprehensive fault diagnostic system that include a variety of fault messages. When a fault is detected, the GS20(X) drive will shut down in order to protect internal components. The following faults are displayed as shown on the GS20(X) digital keypad display.

For communication errors, "Upper unit" is referring to the Master controller of the serial network. Always ensure the communication settings of the drive (P09.01 and P09.04) match those of the master controller and network.

Gaps in the fault ID numbers below are set aside as "reserved" faults for possible future use. Should your GS20(X) drive repeatedly display a reserved fault, please note the fault ID number and contact AutomationDirect technical support.

Fault Codes				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
ocA	1	Over-current during acceleration (ocA) Output current exceeds three times of the rated current during acceleration. When ocA occurs, the drive closes the gate of the output immediately, the motor runs freely, and the display shows an ocA error.	Action Level	300% of the rated current
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Check acceleration time. If too short: a) Increase the acceleration time b) Increase the acceleration time of S-curve c) Set auto-acceleration and auto-deceleration parameter (P01.44) d) Set over-current stall prevention function (P06.03) e) Replace the drive with a larger capacity model. 2) Check the motor cable and remove causes of any short circuits, or replace the cable before turning on the power. 3) Check the motor insulation value with megger. Replace the motor if the insulation is poor. 4) Check if the output current during the whole working process exceeds the AC motor drive's rated current. If yes, replace the AC motor drive with a larger capacity model. 5) Reduce the load or increase the capacity of AC motor drive. 6) Check the motor capacity (the rated current on the motor's nameplate should ≤ the rated current of the drive). 7) Check the action timing of the contactor and make sure it is not turned ON/OFF when the drive outputs the voltage. 8) Adjust the V/F curve setting and frequency/voltage. When the fault occurs, and the frequency voltage is too high, reduce the voltage. 9) Adjust the torque compensation (refer to P07.26 torque compensation gain) until the output current reduces and the motor does not stall. 10) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference. 11) Enable speed tracking during start-up of P07.12. 12) Correct the parameter settings for speed tracking. a) Start the speed tracking function. b) Adjust the maximum current for P07.09 speed tracking. 13) Check the settings for P00.11 control mode: a) For IM, P00.11=0, 1, 2, 5 b) For PM, P00.11=2 14) Increase the AC motor drive's capacity. 15) Install AC reactor(s) on the output side (U/V/W).

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
ocA	1	ocA (continued)	Corrective Actions (cont'd)	16) In the case of hardware failure, the ocA occurs due to the short circuit or ground fault at the output side of the drive. a) Check for possible short circuits between terminals with the electric meter: b) B1 corresponds to U, V and W; DC- corresponds to U, V and W; corresponds to U, V and W. c) If short circuit occurs, contact AutomationDirect Technical Support. 17) Check the stall prevention setting and set the stall prevention to the proper value.
ocd	2	Over-current during deceleration (ocd) Output current exceeds three times of the rated current during deceleration. When ocd occurs, the drive closes the gate of the output immediately, the motor runs freely, and the display shows an ocd error.	Action Level	300% of the rated current
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Check if the deceleration time is too short. If so: a) Increase the deceleration time b) Increase the deceleration time of S-curve c) Set auto-acceleration and auto-deceleration parameter (P01.44) d) Set over-current stall prevention function (P06.03) e) Replace the drive with a larger capacity model 2) Check if the mechanical brake of the motor activates too early. 3) Check the motor cable and remove causes of any short circuits, or replace the cable before turning on the power. 4) Check the motor insulation value with megger. Replace the motor if the insulation is poor. 5) Check if the output current during the whole working process exceeds the AC motor drive's rated current. If yes, replace the AC motor drive with a larger capacity model. 6) Check the impulsive change of the load and reduce the load or increase the capacity of AC motor drive as needed. 7) Verify the motor capacity, the rated current on the motor's nameplate should ≤ the rated current of the drive. 8) If using an ON/OFF controller at the (U/V/W) drive output, check the action timing of the contactor and make sure it is not turned ON/OFF when the drive outputs the voltage. 9) Adjust the V/F curve settings and frequency/voltage. When the fault occurs, and the frequency voltage is too high, reduce the voltage. 10) Adjust the P07.26 torque compensation gain until the output current reduces and the motor does not stall. 11) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference. 12) Check the length of the motor cable. If it is too long, increase the AC motor drive's capacity or install AC reactor(s) on the output side (U/V/W). 13) In the case of a hardware error, the ocd occurs due to the short circuit or ground fault at the output side of the drive. a) Check for possible short circuits between terminals with the electric meter: b) B1 corresponds to U, V and W; DC- corresponds to U, V and W; corresponds to U, V and W. c) If short circuits occurs, contact AutomationDirect Technical Support. 14) Verify the stall prevention setting and set the stall prevention to the proper value.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
ocn	3	Over-current during steady operation (ocn) Output current exceeds three times of the rated current during constant speed. When ocn occurs, the drive closes the gate of the output immediately, the motor runs freely, and the display shows an ocn error.	Action Level	300% of the rated current
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Check the motor cable and remove causes of any short circuits, or replace the cable before turning on the power. 2) Check for possible shaft lock, burnout or aging insulation of the motor. a) Check the motor insulation value with megger. Replace the motor if the insulation is poor. 3) Check for impulsive change of the load, and reduce the load or increase the capacity of AC motor drive. 4) Check motor capacity (the rated current on the motor's nameplate should ≤ the rated current of the drive) 5) If using an ON/OFF controller at the drive output, check the action timing of the contactor and make sure it is not turned ON/OFF when the drive outputs the voltage. 6) Adjust the V/F curve settings and frequency/voltage. When the fault occurs, and the frequency voltage is too high, reduce the voltage. 7) Adjust P07.26 torque compensation gain until the output current reduces and the motor does not stall. 8) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference. 9) Check the length of the motor cable. If too long: a) Increase the AC motor drive's capacity. b) Install AC reactor(s) on the output side (U/V/W). 10) In the case of hardware failure, the ocn may occur due to a short circuit or ground fault at the output side of the drive. a) Check for possible short circuit between terminals with the electric meter: b) B1 corresponds to U, V and W; DC- corresponds to U, V, and W; corresponds to U, V, and W. c) If short circuits occurs, contact AutomationDirect Technical Support.
GFF	4	Ground fault (GFF) When the drive detects grounding short circuit on the output terminals (U/V/W), the drive closes the gate of the output immediately, the motor runs freely, and the display shows a GFF error.	Action Level	N/A
			Action Time	N/A
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Check for motor burnout or aging insulation. a) Check the motor insulation value with megger. b) Replace the motor if the insulation is poor. 2) Check the cable for short circuits and replace the cable if needed. 3) If the motor cable length exceeds 100 m, decrease the setting value for the carrier frequency and take remedies to reduce stray capacitance. 4) Verify the grounding and wiring of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 5) Cycle the power after checking the status of motor, cable, and cable length. If GFF still exists, contact AutomationDirect Technical Support. 6) Refer to the corrective actions for ocn. 7) Refer to the corrective actions for ocA. 8) Refer to the corrective actions for ocd.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
oc5	6	Over-current at stop (ocS) Over-current or hardware failure in current detection at stop. Cycle the power after ocS occurs. If the hardware failure occurs, the display shows cd1, cd2 or cd3.	Action Level	300% of the rated current
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference. 2) Check if other error codes such as cd1–cd3 occur after cycling the power. If yes, return to the factory for repair.
ovA	7	Over-voltage during acceleration (ovA) DC bus over-voltage during acceleration. When ovA occurs, the drive closes the gate of the output, the motor runs freely, and the display shows an ovA error.	Action Level	120V/230V series: 410VDC 460V series: 820VDC 575V series: 1116VDC
			Action Time	Immediately act when the DC bus voltage is higher than the level
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset only when the DC bus voltage is lower than 90% of the over-voltage level
			Record	Yes
			Corrective Actions	1) Check acceleration. If too slow: a) Decrease the acceleration time b) Use a braking unit or DC bus c) Replace the drive with a larger capacity model. 2) Check the setting for stall prevention level. If the value is lower than no-load current, adjust it to be higher than no-load current. 3) Check if the input voltage is within the rated AC motor drive input voltage range, and check for possible voltage spikes. 4) If the phase-in capacitor or active power supply unit acts in the same power system, the input voltage may surge abnormally in a short time. In this case, install an AC reactor. 5) Check for regenerative voltage of motor inertia. If regenerative voltage is being generated: a) Use over-voltage stall prevention function (P06.01) b) Use auto-acceleration and auto-deceleration setting (P01.44) c) Use a braking unit or DC bus 6) Check if the over-voltage Fault occurs after acceleration stops, which indicates acceleration time is too short. Do the following: a) Increase the acceleration time b) Set P06.01 over-voltage stall prevention c) Increase the setting value for P01.25 S-curve acceleration arrival time 2 7) The ground short circuit current charges the capacitor in the main circuit through the power. Check if there is a ground fault on the motor cable, wiring box, or its internal terminals. 8) If using a braking resistor or brake unit, check the wiring. 9) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
ovd	8	Over-voltage during deceleration (ovd) DC bus over-voltage during deceleration. When ovd occurs, the drive closes the gate of the output immediately, the motor runs freely, and the display shows an ovd error.	Action Level	120V/230V series: 410VDC 460V series: 820VDC 575V series: 1116VDC
			Action Time	Immediately act when the DC bus voltage is higher than the level
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset only when the DC bus voltage is lower than 90% of the over-voltage level
			Record	Yes
			Corrective Actions	1) Deceleration time may be too short, resulting in too much regenerative energy. a) Increase the setting value of P01.13, P01.15, P01.17 and P01.19 (deceleration time) b) Connect a braking resistor, braking unit or DC bus on the drive. c) Reduce the braking frequency. d) Replace the drive with a larger capacity model. e) Use S-curve acceleration/deceleration. f) Use over-voltage stall prevention (P06.01). g) Use auto-acceleration and auto-deceleration (P01.44). h) Adjust the braking level (P07.01 or the bolt position of the braking unit). 2) Verify that the setting for stall prevention level is larger than no-load current 3) Check if the input voltage is within the rated AC motor drive input voltage range, and check for possible voltage spikes. 4) If the phase-in capacitor or active power supply unit acts in the same power system, the input voltage may surge abnormally in a short time. In this case, install an AC reactor. 5) The ground short circuit current charges the capacitor in the main circuit through the power. Check if there is ground fault on the motor cable, wiring box, or its internal terminals. 6) If using a braking resistor or braking unit, check the wiring. 7) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference.
ovn	9	Over-voltage during constant speed (ovn) DC bus over-voltage at constant speed. When ovn occurs, the drive closes the gate of the output immediately, the motor runs freely, and the display shows an ovn error.	Action Level	120V/230V series: 410VDC 460V series: 820VDC 575V series: 1116VDC
			Action Time	Immediately act when the DC bus voltage is higher than the level
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset only when the DC bus voltage is lower than 90% of the over-voltage level
			Record	Yes
			Corrective Actions	1) Check for impulsive change of the load, then do the following: a) Connect a brake resistor, braking unit or DC bus to the drive. b) Reduce the load. c) Replace the drive with a larger capacity model. d) Adjust the braking level (P07.01 or bolt position of the brake unit). 2) Verify the stall prevention level setting is higher than no-load current. 3) Check for regenerative voltage, then enable over-voltage stall prevention function (P06.01) or use a braking unit or DC bus 4) Check if the input voltage is within the rated AC motor drive input voltage range, and check for possible voltage spikes. 5) If the phase-in capacitor or active power supply unit acts in the same power system, the input voltage may surge abnormally in a short time. In this case, install an AC reactor. 6) The ground short circuit current charges the capacitor in the main circuit through the power. Check if there is ground fault on the motor cable, wiring box, or its internal terminals. 7) If using a braking resistor or braking unit, check the wiring. 8) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
ouS	10	Over-voltage at stop (ovS) Over-voltage at stop	Action Level	120V/230V series: 410VDC 460V series: 820VDC 575V series: 1116VDC
			Action Time	Immediately act when the DC bus voltage is higher than the level
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset only when the DC bus voltage is lower than 90% of the over-voltage level
			Record	Yes
			Corrective Actions	1) Check if the input voltage is within the rated AC motor drive input voltage range, and check for possible voltage spikes. 2) If the phase-in capacitor or active power supply unit acts in the same power system, the input voltage may surge abnormally in a short time. In this case, install an AC reactor. 3) The ground short circuit current charges the capacitor in the main circuit through the power. Check if there is ground fault on the motor cable, wiring box, or its internal terminals. 4) If using a braking resistor or braking unit, check the wiring. 5) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference. 6) Check if other error codes such as cd1–cd3 occur after cycling the power. If yes, contact AutomationDirect Technical Support.
LuA	11	Low-voltage during acceleration (LvA) DC bus voltage is lower than P06.00 setting value during acceleration	Action Level	P06.00 (120V/230V series = 180VDC 460V series = 360VDC 575V series = 450VDC)
			Action Time	Immediately act when the DC bus voltage is lower than P06.00
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset when the DC bus voltage is higher than P06.00 + 30 V
			Record	Yes
			Corrective Actions	1) Improve power supply condition. 2) Adjust voltage to the power range of the drive 3) Check the power system and increase the capacity of power equipment if needed. 4) The load may be too heavy. If so: a) Reduce the load. b) Increase the drive capacity. c) Increase the acceleration time. 5) Check the DC bus and install DC reactor(s). 6) Check for a short circuit plate or DC reactor installed between terminal +1 and +2. Connect short circuit plate or DC reactor between terminal +1 and +2. 7) If the error still exists, contact AutomationDirect Technical Support.
Lud	12	Low-voltage during deceleration (Lvd) DC bus voltage is lower than P06.00 setting value during deceleration	Action Level	P06.00 (120V/230V series = 180VDC 460V series = 360VDC 575V series = 450VDC)
			Action Time	Immediately act when the DC bus voltage is lower than P06.00
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset when the DC bus voltage is higher than P06.00 + 30 V
			Record	Yes
			Corrective Actions	1) Improve power supply condition. 2) Adjust voltage to the power range of the drive 3) Check the power system and increase the capacity of power equipment if needed. 4) The fault may be triggered by sudden load. If so: a) Reduce the load. b) Increase the drive capacity. 5) Check the DC bus and install DC reactor(s).

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
Lun	13	Low-voltage at constant speed (Lvn) DC bus voltage is lower than P06.00 setting value at constant speed	Action Level	P06.00 (120V/230V series = 180VDC 460V series = 360VDC 575V series = 450VDC)
			Action Time	Immediately act when the DC bus voltage is lower than P06.00
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset when the DC bus voltage is higher than P06.00 + 30 V
			Record	Yes
			Corrective Actions	1) Improve power supply condition. 2) Adjust voltage to the power range of the drive 3) Check the power system and increase the capacity of power equipment if needed. 4) The fault may be triggered by sudden load. If so: a) Reduce the load. b) Increase the drive capacity. 5) Check the DC bus and install DC reactor(s).
LuS	14	Low-voltage at stop (LvS) DC bus voltage is lower than P06.00 setting value at stop or a hardware failure in voltage detection had occurred.	Action Level	P06.00 (120V/230V series = 180VDC 460V series = 360VDC 575V series = 450VDC)
			Action Time	Immediately act when the DC bus voltage is lower than P06.00
			Fault setting parameter	N/A
			Reset method	Manual / Auto: 120V/230V series: Lv level + 30VDC + 500ms 460V series: Lv level + 60VDC + 500ms 575V series: Lv level + 75VDC + 500ms
			Reset condition	500 ms
			Record	Yes
			Corrective Actions	1) Improve power supply condition. 2) Check if the power specification matches the drive. 3) Adjust voltage to the power range of the drive. 4) Cycle the power after checking the power. If LvS error still exists, return to the factory for repair. 5) Check the power system. 6) Increase the capacity of power equipment. 7) Install DC reactor(s).
orP	15	Phase loss protection (orP) Phase loss of power input	Action Level	When DC bus ripple is higher than the protection level, and the output current exceeds 50% of the rated current, the drive starts counting. When the counting value reaches the upper limit, an orP error occurs.
			Action Time	The action time varies with different output current.
			Fault setting parameter	P06.53
			Reset method	Manual reset
			Reset condition	Immediately reset when DC bus is higher than P07.00
			Record	Yes
			Corrective Actions	1) Verify the wiring of the main circuit power is installed correctly. 2) Check that a single-phase power supply is not being used with a three-phase model. Choose the model whose power matches the voltage. 3) Power voltage changes can trigger this fault. If the main circuit power works normally, verify the main circuit. Cycle the power after checking the power, if orP error still exists, contact AutomationDirect Technical Support. 4) Check for loose terminal wiring, tighten the terminal screws according to the torque described in the user manual. 5) Verify the input cable is undamaged and replace if needed. 6) Check for unbalanced three-phase input power.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
oH1	16	IGBT overheating (oH1) IGBT temperature exceeds the protection level. Protection level is model default of P06.15 + 5°C	Action Level	Depending on the model power, model default of P06.15 +5°C. When the setting for P06.15 is higher than the oH1 level, oH1 error occurs instead of oH1 warning. An IGBT overheating error occurs, and the drive stops.
			Action Time	Immediately when limit is reached.
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset only when IGBT temperature is lower than oH1 error level minus (-) 10°C
			Record	Yes
			Corrective Actions	1) Check the ambient temperature. 2) Regularly inspect the ventilation hole of the control cabinet. 3) Change the installed location if there are heating objects, such as braking resistors, in the surroundings. 4) Install/add cooling fan or air conditioner to lower the temperature inside the cabinet. 5) Check for and remove obstructions or replace the cooling fan. 6) Increase ventilation space of the drive. 7) Decrease loading. 8) Decrease the carrier wave. 9) Replace the drive with higher capacity model.
tH1o	18	IGBT temperature detection failure (tH1o) IGBT hardware failure in temperature detection	Action Level	NTC broken or wiring failure
			Action Time	When the IGBT temperature is higher than the protection level, and detection time exceeds 100 ms, the tH1o protection activates.
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	Wait for 10 minutes, and then cycle the power. Check if tH1o protection still exists. If yes, contact AutomationDirect Technical Support.
oL	21	Over load (oL) The AC motor drive detects excessive drive output current. Overload capacity: • Variable Torque (VT): Sustains for one minute when the drive outputs 120% of the drive's rated output current. Sustains for three seconds when the drive outputs 150% of the drive's rated output current. • Constant Torque (CT): Sustains for one minute when the drive outputs 150% of the drive's rated output current. Sustains for three seconds when the drive outputs 200% of the drive's rated output current.	Action Level	Based on overload curve and derating curve.
			Action Time	When the load is higher than the protection level and exceeds allowable time, the oL protection activates.
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Reduce the load. 2) Increase the setting value for P01.12–P01.19 (accel./decel. time) 3) Adjust the settings for P01.01–P01.08 (V/F curve), especially the setting value for the mid-point voltage (if the mid-point voltage is set too low, the load capacity decreases at low speed). Refer to the V/F curve selection of P01.43. 4) Replace the drive with a larger capacity model. 5) If the oL only occurs during low-speed operations: a) Reduce the load during low-speed operation. b) Increase the drive capacity. c) Decrease the carrier frequency of P00.17. 6) Adjust P07.26 Torque Compensation Gain until the output current reduces and the motor does not stall. 7) Verify stall prevention is set to the proper value. 8) Check the status of three-phase motor and verify the cable is not broken or screws are loose. 9) Verify the parameter settings for speed tracking. a) Start the speed tracking function. b) Adjust the maximum current for P07.09 speed tracking.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
EoL 1	22	Electronics thermal relay 1 protection (EoL1) Electronics thermal relay 1 protection. The drive coasts to stop once it activates.	Action Level	Start counting when the output current > 150% of the motor 1 rated current
			Action Time	P06.14 (If the output current is larger than 105% of the motor 1 rated current again within 60 sec., the counting time reduces and is less than P06.14)
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Reduce the load. 2) Increase the setting value for P01.12–P01.19 (accel./decel. time) 3) Adjust the settings for P01.01–P01.08 (V/F curve), especially the setting value for the mid-point voltage (if the mid-point voltage is set too low, the load capacity decreases at low speed). Refer to the V/F curve selection of P01.43. 4) If the EoL1 only occurs during low-speed operations: a) Replaced the drive with a dedicated VFD model. b) Increase the motor capacity. 5) If using a VFD dedicated motor, verify P06.13=1: Standard motor (motor with fan on the shaft). 6) Verify motor rated current and reset if needed. 7) Verify motor rated frequency and reset if needed. 8) If using one drive to run multiple motors, set P06.13=2: Disable, and install thermal relay on each motor. 9) Set stall prevention to the proper value. 10) Adjust P07.26 torque compensation gain until the current reduces and the motor does not stall. 11) Check the status of the fan, or replace the fan. 12) Replace the motor.
EoL2	23	Electronic thermal relay 2 protection (EoL2) Electronic thermal relay 2 protection. The drive coasts to stop once it activates.	Action Level	Start counting when the output current > 150% of the motor 2 rated current
			Action Time	P06.28 (If the output current is larger than 105% of the motor 2 rated current again within 60 sec., the counting time reduces and is less than P06.28)
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Reduce the load. 2) Increase the setting value for P01.12–P01.19 (accel./decel. time) 3) Adjust the settings for P01.35–P01.42 (V/F curve), especially the setting value for the mid-point voltage (if the mid-point voltage is set too low, the load capacity decreases at low speed). Refer to the V/F curve selection of P01.43. 4) If the EoL2 only occurs during low-speed operations: a) Replaced the drive with a dedicated VFD model. b) Increase the motor capacity. 5) If using a VFD dedicated motor, verify P06.27=1: Standard motor (motor with fan on the shaft). 6) Verify motor rated current and reset if needed. 7) Verify motor rated frequency and reset if needed. 8) If using one drive to run multiple motors, set P06.27=2: Disable, and install thermal relay on each motor. 9) Set stall prevention to the proper value. 10) Adjust P07.71 torque compensation gain until the current reduces and the motor does not stall. 11) Check the status of the fan, or replace the fan. 12) Replace the motor.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
oH3	24_1	Motor overheating (oH3) PTC Motor overheating (PTC) (P03.00–P03.01=6 PTC), when PTC input > P06.30, the fault treatment acts according to P06.29.	Action Level	PTC input value > P06.30 setting (Default = 50%)
			Action Time	Immediately act
			Fault setting parameter	P06.29 setting is: 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: No warning
			Reset method	When P06.29=0, oH3 is a "Warning". The "Warning" is automatically cleared. When P06.29=1 or 2, oH3 is a "Fault". You must reset manually.
			Reset condition	Immediately reset
			Record	When P06.29=1 or 2, oH3 is a "Fault", and the fault is recorded.
			Corrective Actions	1) Check if motor is locked and remove the motor shaft lock. 2) Verify load and decrease the loading or replace motor with a higher capacity model if load is too high. 3) Verify ambient temperature and change the installation location if there are heating devices in the surroundings, or install/add cooling fan or air conditioner to lower the ambient temperature. 4) Check the cooling system and ensure it's working normally. 5) Verify the motor fan is working and replace the fan if needed. 6) Verify duration of low speed operation. a) Decrease low-speed operation time. b) Change to dedicated motor for the drive. c) Increase the motor capacity. 7) Verify accel/decel time and increase setting values for P01.12–P01.19 (accel./ decel. time) if working cycle is too short. 8) Verify V/F voltage and adjust settings for P01.01–P01.08 (V/F curve), especially the setting value for the mid-point voltage (if the mid-point voltage is set too small, the load capacity decreases at low-speed). 9) Verify the motor rated current matches the motor nameplate and configure the correct rated current value of the motor if needed. 10) Check the connection between PTC thermistor and the heat protection. 11) Verify stall prevention is set correctly and adjust the value if needed. 12) Check for unbalanced three-phase motor impedance. Replace the motor if needed. 13) Verify harmonics and reduce harmonics if too high.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
oH3	24_2	Motor overheating (oH3) PT100 RTD Motor overheating (PT100) (P03.00–P03.01=11 PT100). When PT100 input > P06.57 (default = 7V), the fault treatment acts according to P06.29.	Action Level	PT100 RTD input value > P06.57 setting (default = 7V)
			Action Time	Immediately act
			Fault setting parameter	P06.29 setting is: 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: No warning
			Reset method	When P06.29=0 and the temperature < P06.56, oH3 is automatically cleared. When P06.29=1 or 2, oH3 is a "Fault". You must reset manually.
			Reset condition	Immediately reset
			Record	When P06.29=1 or 2, oH3 is a "Fault", and the fault is recorded.
			Corrective Actions	1) Check if motor is locked and remove the motor shaft lock. 2) Verify load and decrease the loading or replace motor with a higher capacity model if load is too high. 3) Verify ambient temperature and change the installation location if there are heating devices in the surroundings, or install/add cooling fan or air conditioner to lower the ambient temperature. 4) Check the cooling system and ensure it's working normally. 5) Verify the motor fan is working and replace the fan if needed. 6) Verify duration of low speed operation. a) Decrease low-speed operation time. b) Change to dedicated motor for the drive. c) Increase the motor capacity. 7) Verify accel/decel time and increase setting values for P01.12–P01.19 (accel./ decel. time) if working cycle is too short. 8) Verify V/F voltage and adjust settings for P01.01–P01.08 (V/F curve), especially the setting value for the mid-point voltage (if the mid-point voltage is set too small, the load capacity decreases at low-speed). 9) Verify the motor rated current matches the motor nameplate and configure the correct rated current value of the motor if needed. 10) Check the connection of PT100 RTD. 11) Verify stall prevention is set correctly and adjust the value if needed. 12) Check for unbalanced three-phase motor impedance. Replace the motor if needed. 13) Verify harmonics and reduce harmonics if too high.
ot1	26	Over torque 1 (ot1) When the output current exceeds the over-torque detection level (P06.07) and exceeds over-torque detection time (P06.08), and when P06.06 or P06.09 is set to 2 or 4, the ot1 error displays.	Action Level	P06.07
			Action Time	P06.08
			Fault setting parameter	P06.06 setting is: 0: No function 1: Continue operation after over-torque detection during constant speed operation 2: Stop after over-torque detection during constant speed operation 3: Continue operation after over-torque detection during RUN 4: Stop after over-torque detection during RUN
			Reset method	When P06.06=1 or 3, ot1 is a "Warning". The warning is automatically cleared when the output current < (Pr.06-07 – 5%) When P06.06=2 or 4, ot1 is a "Fault". You must reset manually.
			Reset condition	Immediately reset
			Record	When P06.06=2 or 4, ot1 is a "Fault", and the fault is recorded.
			Corrective Actions	1) Verify the settings for P06.07 and P06.08. 2) Check for mechanical failure and remove any causes of malfunction. 3) Reduce the load or replace the motor with a higher capacity model. 4) Increase the setting values for P01.12–P01.19 (accel./decel. time) 5) Adjust the V/F curve (Motor 1, P01.01–P01.08), especially the setting value for the mid-point voltage (if the mid-point voltage is set too low, the load capacity decreases at low speed). 6) If error occurs during low-speed operation: a) Decrease low-speed operation time. b) Increase the motor capacity. 7) Adjust P07.26 torque compensation gain until the current reduces and the motor does not stall. 8) Very speed tracking settings and correct the parameter settings as needed. a) Start the speed tracking function. b) Adjust the maximum current for P07.09 speed tracking.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
oL2	27	Over torque 2 (ot2) When the output current exceeds the over-torque detection level (P06.10) and exceeds over-torque detection time (P06.11), and when P06.09 is set to 2 or 4, the ot2 error displays.	Action Level	P06.10
			Action Time	P06.11
			Fault setting parameter	P06.09 setting is: 0: No function 1: Continue operation after over-torque detection during constant speed operation 2: Stop after over-torque detection during constant speed operation 3: Continue operation after over-torque detection during RUN 4: Stop after over-torque detection during RUN
			Reset method	When P06.09=1 or 3, ot2 is a "Warning". The warning is automatically cleared when the output current < (P06.10 – 5%). When P06.09=2 or 4, ot2 is a "Fault". You must reset manually.
			Reset condition	Immediately reset
			Record	When P06.09=2 or 4, ot2 is a "Fault", and the fault is recorded.
			Corrective Actions	1) Verify the settings for P06.10 and P06.11. 2) Check for mechanical failure and remove any causes of malfunction. 3) Reduce the load or replace the motor with a higher capacity model. 4) Increase the setting values for P01.12–P01.19 (accel./decel. time) 5) Adjust the V/F curve (Motor 1, P01.35–P01.42), especially the setting value for the mid-point voltage (if the mid-point voltage is set too low, the load capacity decreases at low speed). 6) If error occurs during low-speed operation: a) Decrease low-speed operation time. b) Increase the motor capacity. 7) Adjust P07.71 torque compensation gain until the current reduces and the motor does not stall. 8) Very speed tracking settings and correct the parameter settings as needed. a) Start the speed tracking function. b) Adjust the maximum current for P07.09 speed tracking.
uC	28	Under current (uC) Low current detection	Action Level	P06.71
			Action Time	P06.72
			Fault setting parameter	P06.73 setting is: 0: No function 1: Fault and coast to stop 2: Fault and ramp to stop by the 2nd deceleration time 3: Warn and continue operation
			Reset method	When P06.73=3, uC is a "Warning". The warning is automatically cleared when the output current > (P06.71+0.1A). When P06.73=1 or 2, uC is a "Fault". You must reset manually.
			Reset condition	Immediately reset
			Record	When P06.71=1 or 2, uC is a "Fault", and the fault is recorded.
			Corrective Actions	1) Confirm the motor cable is connected properly. 2) Verify settings of P06.71, P06.72, and P06.73 and set to correct values if needed. 3) Check if the load is too low and whether the motor capacity matches the load.
cF2	31	EEPROM read error (cF2) Internal EEPROM cannot be read	Action Level	Firmware internal detection
			Action Time	cF2 acts immediately when the drive detects the fault
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	1) Press "RESET" key or reset the parameter to the default setting. If cF2 still occurs, contact AutomationDirect Technical Support. 2) Cycle the power, if cF2 error still occurs, contact AutomationDirect Technical Support.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
cd1	33	U-phase error (cd1) U-phase current detection error when power is ON	Action Level	Hardware detection
			Action Time	cd1 acts immediately when the drive detects the fault
			Fault setting parameter	N/A
			Reset method	Power-off
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Cycle the power, if cd1 error still occurs, contact AutomationDirect Technical Support.
cd2	34	V-phase error (cd2) V-phase current detection error when power ON	Action Level	Hardware detection
			Action Time	cd2 acts immediately when the drive detects the fault
			Warning setting parameter	N/A
			Reset method	Power-off
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Cycle the power, if cd2 error still occurs, contact AutomationDirect Technical Support.
cd3	35	W-phase error (cd3) W-phase current detection error when power ON	Action Level	Hardware detection
			Action Time	cd3 acts immediately when the drive detects the fault
			Warning setting parameter	N/A
			Reset method	Power-off
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Cycle the power, if cd3 error still occurs, contact AutomationDirect Technical Support.
Hd0	36	cc hardware error (Hd0) cc (current clamp) hardware protection error when power is ON	Action Level	Hardware detection
			Action Time	Hd0 acts immediately when the drive detects the fault
			Fault setting parameter	N/A
			Reset method	Power-off
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Cycle the power, if Hd0 error still occurs, contact AutomationDirect Technical Support.
Hd1	37	oc hardware error (Hd1) oc hardware protection error when power is ON	Action Level	Hardware detection
			Action Time	Hd1 acts immediately when the drive detects the fault
			Fault setting parameter	N/A
			Reset method	Power-off
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Cycle the power, if Hd1 error still occurs, contact AutomationDirect Technical Support.
AUE	40	Auto-tuning error (AUE) Motor auto-tuning error	Action Level	Hardware detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	1) This error can occur if you press the STOP key during auto-tuning. Re-execute auto-tuning. 2) Check motor capacity and related parameters. a) Set the correct parameters P01.01–P01.02. b) Set P01.00 larger than the motor rated frequency. 3) Check the motor wiring. 4) Check for motor shaft lock and remove cause of lock if needed. 5) Check for electromagnetic contactor at output (U/V/W) and make sure the electromagnetic valve is OFF. 6) Verify load. If too heavy: a) Reduce the load. b) Replace the motor with a larger capacity model. 7) Check if accel/decel time is too short, then increase the setting values for P01.12–P01.19 (accel./decel. time) if needed.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
AFE	41	PID loss AI2 (AFE) PID feedback loss (analog feedback signal is only valid when the PID function is enabled)	Action Level	When the analog input < 4 mA (only detects 4–20 mA analog input)
			Action Time	P08.08
			Fault setting parameter	P08.09 setting is: 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: Warn and operate at last frequency
			Reset method	When P08.09=3 or 4, AFE is a "Warning". When the feedback signal is > 4 mA, the "Warning" is automatically cleared. When P08.09=1 or 2, AFE is a "Fault". You must reset manually.
			Reset condition	Immediately reset
			Record	When P08.09=1 or 2, AFE is a "Fault", and the fault is recorded; when P08.09=3 or 4, AFE is a "Warning", and the warning is not recorded.
			Corrective Actions	1) Check the PID feedback cable and tighten the terminal. Replace the cable with a new one if needed. 2) Check for feedback device failure and replace the device with a new one. 3) Check all the wiring. If AFE fault still exists, contact AutomationDirect Technical Support.
PGF2	43	PG feedback loss (PGF2) P10.00 and P10.02 is not set in the PG control mode. When press "RUN" key, PGF2 fault occurs.	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	1) Reset encoder parameters (P10.00 and P10.02) 2) Verify correct control mode is selected (P00.11=1).
PGF3	44	PG feedback stall (PGF3) Under PG mode, when the motor frequency exceeds the encoder observer stall level (P10.10) and starts to count, the fault time is longer than the detection time of encoder observer stall (P10.11), then PGF3 fault occurs.	Action Level	P10.10
			Action Time	P10.11
			Fault setting parameter	P10.12 setting is: 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	1) Reset encoder parameter (P10.01) 2) Value for P01.00 may be too low, set a higher value. 3) Reset ASR parameters. Verify accel/decel times and reset if needed. 4) Reset PG feedback stall values, P10.10 and P10.11.
PGF4	45	PG slip error (PGF4) Under PG mode, when the motor frequency exceeds encoder observer slip range (P10.13) and starts to count, the fault time is longer than the detection time of encoder observer slip (P10.14), PGF4 fault occurs.	Action Level	P10.13
			Action Time	P10.14
			Fault setting parameter	P10.15 setting is: 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop
			Reset method	Auto: When P10.15=0, PGF4 is a "Warning". When the deviation between the output frequency and motor frequency is smaller than the encoder observer slip range, the warning is automatically cleared. Manual: When P10.15=1 or 2, PGF4 is a "Fault" and you must reset manaully.
			Reset condition	Immediately reset
			Record	When P10.15=1 or 2, PGF4 is a "Fault" and the fault is recorded.
			Corrective Actions	1) Reset PG feedback parameters (P10.13 and P10.14) 2) Reset ASR parameters. Verify accel/decel times and reset if needed. 3) Reset encoder parameters (P0.01). 4) Verify torque limit and set new values if needed (P06.12, P11.17-P11.20) 5) Check for and resolve any causes of motor shaft lock. 6) Check the mechanical brake has released correctly and verify the timing of the system.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
ACE	48	AI2 loss (ACE) Analog input loss (including all the 4–20 mA analog signal)	Action Level	When the analog input is < 4 mA (only detects 4–20 mA analog input)
			Action Time	Immediately act
			Fault setting parameter	P03.19 setting is: 0: Disable 1: Continue operation at the last frequency (warning, ANL is displayed on the keypad) 2: Decelerate to stop (warning, ANL is displayed on the keypad) 3: Stop immediately and display ACE
			Reset method	When P03.19=1 or 2, ACE is a "Warning". When analog input signal is > 4 mA, the warning is automatically cleared. When P03.19=3, ACE is a "Fault". You must reset manually.
			Reset condition	Immediately reset
			Record	When P03.19=3, ACE is a "Fault", and the fault is recorded.
			Corrective Actions	1) Check the AI2 feedback cable and tighten the terminal. Replace the cable with a new one if needed. 2) Check for external device failure and replace the device with a new one. 3) Check all the wiring. If ACE fault still exists, contact AutomationDirect Technical Support.
EF	49	External fault (EF) External fault. When the drive decelerates based on the setting of P07.20, the EF fault displays on the keypad.	Action Level	DIx=10: External fault (EF) and the DI terminal is ON
			Action Time	Immediately act
			Fault setting parameter	P07.20 setting is: 0: Coast to stop 1: Stop by the 1st deceleration time 2: Stop by the 2nd deceleration time 3: Stop by the 3rd deceleration time 4: Stop by the 4th deceleration time 5: System deceleration 6: Automatic deceleration (P01.46)
			Reset method	Manual reset
			Reset condition	Manual reset only after the external fault is cleared (terminal status is recovered)
			Record	Yes
			Corrective Actions	Press RESET key after the fault is cleared.
EF1	50	Emergency stop (EF1) When the contact of DIx=EF1 is ON, the output stops immediately and displays EF1 on the keypad. The motor is in free running.	Action Level	DIx=28: Emergency Stop (EF1) and the DI terminal is ON
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Manual reset only after the external fault is cleared (terminal status is recovered)
			Record	Yes
			Corrective Actions	Verify if the system is back to normal condition, and then press "RESET" key to go back to the default.
bb	51	External base block (bb) When the contact of DIx=bb is ON, the output stops immediately and displays bb on the keypad. The motor is in free running.	Action Level	DIx=11: Base Block (BB) and the DI terminal is ON
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	The display "bb" is automatically cleared after the fault is cleared.
			Reset condition	N/A
			Record	No
			Corrective Actions	Verify if the system is back to normal condition, and then press "RESET" key to go back to the default.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
Pcod	52	Password is locked (Pcod) Entering the wrong password three consecutive times through P00.07	Action Level	Entering the wrong password three consecutive times
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Power-off
			Record	Yes
			Corrective Actions	1) Input the correct password after rebooting the motor drive. 2) If you forget the password, do the following steps: a) Step 1: Input 9999 and press ENTER. b) Step 2: Repeat step 1. Input 9999 and press ENTER. (You need to finish step 1 and step 2 within 10 seconds. If you don't finish the two steps in 10 seconds, try again.) 3) The parameter settings return to the default when the "Input 9999" process is finished.
CE1	54	Illegal command (CE1) Communication command is illegal	Action Level	When the function code is not 03, 06, 10, or 63.
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	No
			Corrective Actions	1) Check if the communication command is correct. 2) Verify the wiring and grounding of the communication circuit. It is recommended to separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 3) Check if the setting for P09.04 is the same as the setting for the upper unit. 4) Check the cable and replace it if necessary.
CE2	55	Illegal data address (CE2) Data address is illegal	Action Level	When the data address is correct.
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	No
			Corrective Actions	1) Check if the communication command from the upper limit is correct. 2) Verify the wiring and grounding of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 3) Check if the setting for P09.04 is the same as the setting for the upper unit. 4) Check the cable and replace it if necessary.
CE3	56	Illegal data value (CE3) Data value is illegal	Action Level	When the data length is too long
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	No
			Corrective Actions	1) Check if the communication command from the upper limit is correct. 2) Verify the wiring and grounding of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 3) Check if the setting for P09.04 is the same as the setting for the upper unit. 4) Check the cable and replace it if necessary.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
CE4	57	Data is written to read-only address (CE4) Data is written to read-only address	Action Level	When the data is written to read-only address.
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	No
			Corrective Actions	1) Check if the communication command from the upper limit is correct. 2) Verify the wiring and grounding of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 3) Check if the setting for P09.04 is the same as the setting for the upper unit. 4) Check the cable and replace it if necessary.
CE10	58	Modbus transmission time-out (CE10) Modbus transmission time-out occurs	Action Level	When the communication time exceeds the detection time for P09.03 communication time-out.
			Action Time	P09.03
			Fault setting parameter	P09.02 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: No warning, no fault, and continue operation
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	1) Check if the upper unit transmits the communication command within the setting time for P09.03. 2) Verify the wiring and grounding of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 3) Check if the setting for P09.04 is the same as the setting for the upper unit. 4) Check the cable and replace it if necessary.
ydc	61	Y-connection / Δ-connection switch error (ydc) An error occurs when Y-Δ switches	Action Level	1) ydc occurs when the confirmation signals of Y-connection and Δ-connection are conducted at the same time. 2) If any of confirmation signals is not conducted within P05.25, ydc occurs.
			Action Time	P05.25
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Can be reset only when the confirmation signal of Y-connection is conducted if it is Y-connection, or when the confirmation signal of Δ-connection is conducted if it is Δ-connection.
			Record	Yes
			Corrective Actions	1) Check if the electromagnetic valve works normally during switch. If not, replace it. 2) Check if related parameters are all set up and set correctly. 3) Check the wiring of the Y-Δ switch function.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
dEb	62	Deceleration energy backup error (dEb) When P07.13 is not 0, and the power is suddenly off, causing the DC bus voltage lower than the dEb action level, the dEb function acts and the motor ramps to stop. Then dEb displays on the keypad.	Action Level	When P07.13 is not 0, and the DC bus voltage is lower than the level of dEb.
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	When P07.13=2 (dEb with auto-acceleration / auto-deceleration, the drive outputs the frequency after the power is restored): dEb is automatically cleared. When P07.13=1 (dEb with auto-acceleration / auto-deceleration, the drive does not output the frequency after the power is restored): The drive stops when dEb acts and the rotation speed becomes 0 Hz, then the drive can be reset manually.
			Reset condition	Auto: The fault is automatically cleared. Manual: When the drive decelerates to 0 Hz.
			Record	Yes
			Corrective Actions	1) Check that the power system is not unstable or off. 2) If another large load operates in the same power system: a) Replace power system with a larger capacity model. b) Ensure the large load system is on a different power system.
oSL	63	Over slip error (oSL) On the basis of the maximum slip limit set via P10.29, the speed deviation is abnormal. When the motor drive outputs at constant speed, F>H or F<H exceeds the level set via P07.29, and it exceeds the time set via P07.30, oSL shows. oSL occurs in induction motors only.	Action Level	P07.29 100% of P07.29 = the maximum limit of the slip frequency (P10.29)
			Action Time	P07.30
			Fault setting parameter	P07.31 setting is: 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: No warning
			Reset method	P07.31=0 is a warning. When the motor drive outputs at constant speed, and F>H or F<H does not exceed the level set via P07.29 anymore, oSL warning will be cleared automatically. When P07.31=1 or 2, oSL is an error, and it needs to reset manually.
			Reset condition	Immediately reset
			Record	P07.31=1 or 2, oSL is "Fault", and the fault is recorded.
			Corrective Actions	1) Verify the group 5 motor parameters. 2) Decrease the load 3) Check the setting of oSL protection function related parameters P07.29, P07.30, and P10.29
SrL 1	72	STO Loss 1 (STL1) STO1–SCM1 internal loop detection error	Action Level	Hardware detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Hardware failure, and cannot reset. Cycle the power.
			Reset condition	N/A
			Record	Yes
			Corrective Actions	1) Verify the STO1 and SCM1 short circuit lines are connected. Re-connect the short circuit line if needed. Ensure all wiring is correct. 2) Verify the connections at the drive control terminals. 3) If issue still persists, contact AutomationDirect Technical Support.
Sro	76	STO (STo) Safety Torque Off function active	Action Level	Hardware detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	When P06.44=1 and after STo error is cleared, it automatically resets. When P06.44=0 and after STo error is cleared, reset it manually.
			Reset condition	Reset only after STo error is cleared.
			Record	Yes
			Corrective Actions	1) Reset the STO1/SCM1 and STO2/SCM2 switch (ON) and cycle the power. 2) Verify the connections at the drive control terminals. 3) If issue still persists, contact AutomationDirect Technical Support.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
SrL2	77	STO Loss 2 (STL2) STO2–SCM2 internal loop detection error	Action Level	Hardware detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Hardware failure, and cannot reset. Cycle the power.
			Reset condition	N/A
			Record	Yes
			Corrective Actions	1) Verify the STO2 and SCM2 short circuit lines are connected. Re-connect the short circuit line if needed. Ensure all wiring is correct. 2) Verify the connections at the drive control terminals. 3) If the issue persists, contact AutomationDirect Technical Support.
SrL3	78	STO Loss 3 (STL3) STO1–SCM1 and STO2–SCM2 internal loop detection error	Action Level	Hardware detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Hardware failure, and cannot reset. Cycle the power.
			Reset condition	N/A
			Record	Yes
			Corrective Actions	1) Verify the STO1 and SCM1 or STO2 and SCM2 short circuit lines are connected. Re-connect the short circuit line if needed. Ensure all wiring is correct. 2) Verify the connections at the drive control terminals. 3) If the issue persists, contact AutomationDirect Technical Support.
Aoc	79	U-phase over-current before run (Aoc) U-phase short circuit detected when the output wiring detection is performed before the drive runs.	Action Level	300% of the rated current
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault clears
			Record	Yes
			Corrective Actions	1) Check if the motor's internal wiring and the UVW wiring of the drive output terminal are correct. 2) Check the motor cable and remove causes of any short circuits, or replace the cable before turning on the power. 3) Check the motor insulation value with megger. Replace the motor if the insulation is poor. 4) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference. 5) Check the length of the motor cable. If it's too long: a) Increase the AC motor drive's capacity. b) Install AC reactor(s) on the output side (U/V/W). 6) The Aoc may occur due to a short circuit or ground fault at the output side of the drive. Check for possible short circuits between terminals with an electric meter: a) B1 corresponds to U, V and W; DC- corresponds to U, V and W; corresponds to U, V and W. b) If short circuit occurs, contact AutomationDirect Technical Support.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
boc	80	V-phase over-current before run (boc) V-phase short circuit detected when the output wiring detection is performed before the drive runs.	Action Level	300% of the rated current
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault clears
			Record	Yes
			Corrective Actions	1) Check if the motor's internal wiring and the UVW wiring of the drive output terminal are correct. 2) Check the motor cable and remove causes of any short circuits, or replace the cable before turning on the power. 3) Check the motor insulation value with megger. Replace the motor if the insulation is poor. 4) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference. 5) Check the length of the motor cable. If it's too long: a) Increase the AC motor drive's capacity. b) Install AC reactor(s) on the output side (U/V/W). 6) The Aoc may occur due to a short circuit or ground fault at the output side of the drive. Check for possible short circuits between terminals with an electric meter: a) B1 corresponds to U, V and W; DC- corresponds to U, V and W; corresponds to U, V and W. b) If short circuit occurs, contact AutomationDirect Technical Support.
coc	81	W-phase over-current before run (coc) W-phase short circuit detected when the output wiring detection is performed before the drive runs.	Action Level	300% of the rated current
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault clears
			Record	Yes
			Corrective Actions	1) Check if the motor's internal wiring and the UVW wiring of the drive output terminal are correct. 2) Check the motor cable and remove causes of any short circuits, or replace the cable before turning on the power. 3) Check the motor insulation value with megger. Replace the motor if the insulation is poor. 4) Verify the wiring of the control circuit and the wiring/grounding of the main circuit to prevent interference. 5) Check the length of the motor cable. If it's too long: a) Increase the AC motor drive's capacity. b) Install AC reactor(s) on the output side (U/V/W). 6) The Aoc may occur due to a short circuit or ground fault at the output side of the drive. Check for possible short circuits between terminals with an electric meter: a) B1 corresponds to U, V and W; DC- corresponds to U, V and W; corresponds to U, V and W. b) If short circuit occurs, contact AutomationDirect Technical Support.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
oPL 1	82	Output phase loss U phase (oPL1) U phase output phase loss	Action Level	P06.47
			Action Time	P06.46 P06.48: Use the setting value of P06.48 first. If DC braking function activates, use that of P06.46.
			Fault setting parameter	P06.45 setting is: 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: No warning
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	P06.45=1 or 2 is "Fault", and the fault is recorded.
			Corrective Actions	1) Check for unbalanced three-phase motor impedance. If unbalanced, replace the motor. 2) Verify motor is wired correctly. Check the cable condition and replace the cable if necessary. 3) Ensure a single-phase motor is not being used with a three-phase drive 4) Check the flat cable of the control board. Re-do the wiring and test again if the flat cable is loose. If the fault still exists, contact AutomationDirect Technical Support. 5) Verify that the three-phase current is balanced with a current clamp meter. If it is balanced and the oPL1 fault still exists, contact AutomationDirect Technical Support. 6) Make sure the capacity of the drive and motor match each other.
oPL2	83	Output phase loss V phase (oPL2) V phase output phase loss	Action Level	P06.47
			Action Time	P06.46 P06.48: Use the setting value of P06.48 first. If DC braking function activates, use that of P06.46.
			Fault setting parameter	P06.45 setting is: 0: Warn and keep operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: No warning
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	When P06.45=1 or 2, oPL2 is a "Fault", and the fault is recorded.
			Corrective Actions	1) Check for unbalanced three-phase motor impedance. If unbalanced, replace the motor. 2) Verify motor is wired correctly. Check the cable condition and replace the cable if necessary. 3) Ensure a single-phase motor is not being used with a three-phase drive 4) Check the flat cable of the control board. Re-do the wiring and test again if the flat cable is loose. If the fault still exists, contact AutomationDirect Technical Support. 5) Verify that the three-phase current is balanced with a current clamp meter. If it is balanced and the oPL2 fault still exists, contact AutomationDirect Technical Support. 6) Make sure the capacity of the drive and motor match each other.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
oPL3	84	Output phase loss W phase (oPL3) W phase output phase loss	Action Level	P06.47
			Action Time	P06.46 P06.48: Use the setting value of P06.48 first. If DC braking function activates, use that of P06.46.
			Fault setting parameter	P06.45 setting is: 0: Warn and continue operation 1: Fault and ramp to stop 2: Fault and coast to stop 3: No warning
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	When P06.45=1 or 2, oPL3 is a "Fault", and the fault is recorded.
			Corrective Actions	1) Check for unbalanced three-phase motor impedance. If unbalanced, replace the motor. 2) Verify motor is wired correctly. Check the cable condition and replace the cable if necessary. 3) Ensure a single-phase motor is not being used with a three-phase drive 4) Check the flat cable of the control board. Re-do the wiring and test again if the flat cable is loose. If the fault still exists, contact AutomationDirect Technical Support. 5) Verify that the three-phase current is balanced with a current clamp meter. If it is balanced and the oPL3 fault still exists, contact AutomationDirect Technical Support. 6) Make sure the capacity of the drive and motor match each other.
oL3	87	Low frequency overload protection (oL3) Low frequency and high current protection	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	1) Enhance the heat dissipation capacity for the cabinet. 2) Lower the carrier frequency (P00.17). 3) Decrease the voltage settings that correspond to frequency below 15 Hz in the V/F curve. 4) Set P00.11=0 (V/F, general control mode). 5) Replace the drive with a higher power model.
roPd	89	Rotor position detection error (roPd) Rotor position detection error protection	Action Level	Reset the software
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	1) Check the motor cable for damage and replace if needed. 2) Check the motor coil, if damaged replace the motor. 3) IGBT may be broken. If so, contact AutomationDirect Technical Support. 4) Cycle the power. If roPd still occurs during operation, contact AutomationDirect Technical Support.
Cd10	97	Ethernet Card Timeout (CD10) Ethernet communication has not been received from the external controller (within the Ethernet Timeout window).	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediate reset
			Record	Yes
			Corrective Actions	1) Initiate Ethernet communications from the master controller again. 2) Disable checking for Ethernet Timeout in P9.94.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
ictE	111	InrCOM time-out error (ictE) Internal communication overtime error	Action Level	P09.31=-1 – -10 (there is no -9), when the internal communication between Slave and Master is abnormal, ictE fault occurs.
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Automatically reset after the internal communication is normal
			Reset condition	N/A
			Record	Yes
			Corrective Actions	1) Verify the wiring and grounding of the communication circuit. Separate the communication circuit from the main circuit, or wire in 90 degree for effective anti-interference performance. 2) Verify the setting for P09.04 is the same as the setting for the upper unit. 3) Check the cable and replace it if necessary.
CP20	121	Internal communication error (CP20) Internal communication time-out	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	N/A
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Contact AutomationDirect Technical Support.
CP22	123	Internal communication error (CP22) Abnormal internal communication	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	N/A
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Contact AutomationDirect Technical Support.
CP30	124	Internal communication error (CP30) Abnormal internal communication	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	N/A
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Contact AutomationDirect Technical Support.
CP32	126	Internal communication error (CP32) Abnormal internal communication	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	N/A
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Contact AutomationDirect Technical Support.
CP33	127	Internal communication error (CP33) Abnormal internal communication	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	N/A
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Contact AutomationDirect Technical Support.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
oL3	128	Over-torque 3 (ot3) When the output current exceeds the over-torque detection level (P14.75) and exceeds over-torque detection time (P14.76), and when P14.74 is set to 2 or 4, the ot3 error displays.	Action Level	P14.75
			Action Time	P14.76
			Fault setting parameter	P14.74 setting is: 0: No function 1: Continue operation after over-torque detection during constant speed operation 2: Stop after over-torque detection during constant speed operation 3: Continue operation after over-torque detection during RUN 4: Stop after over-torque detection during RUN
			Reset method	When P14.74=1 or 3, ot3 is a "Warning". The warning is automatically cleared when the output current < P14.75. When P14.74=2 or 4, ot3 is a "Fault". You must reset manually.
			Reset condition	Immediately reset
			Record	P14.74=2 or 4, ot3 is a "Fault", and the fault is recorded.
			Corrective Actions	1) Configure the settings for P14.75 and P14.76 again. 2) Check for mechanical error and remove the causes of malfunction. 3) Verify load and decrease the loading or replace with a motor with larger capacity if load is too high. 4) Verify accel/decel time and increase the setting values for P01.12–P01.19 (accel./ decel. time) if work cycle is too short. 5) Verify V/F voltage and adjust the V/F curve (Motor 3, P01.54–P01.61), especially the setting value for the mid-point voltage (if the mid-point voltage is set too small, the load capacity decreases at low-speed). 6) Replace motor with a larger capacity motor. 7) Check for overload during low-speed operation and decrease the loading during low-speed operation or increase the motor capacity. 8) Verify torque compensation and adjust P07.73 torque compensation gain until the output current decreases and the motor does not stall. 9) Correct the parameter settings for speed tracking. Start the speed tracking function. Adjust the maximum current for P07.09 speed tracking.
oL4	129	Over-torque 4 (ot4) When the output current exceeds the over-torque detection level (P14.78) and exceeds over-torque detection time (P14.79), and when P14.77 is set to 2 or 4, the ot4 error displays.	Action Level	P14.78
			Action Time	P14.79
			Fault setting parameter	P14.77 setting is: 0: No function 1: Continue operation after over-torque detection during constant speed operation 2: Stop after over-torque detection during constant speed operation 3: Continue operation after over-torque detection during RUN 4: Stop after over-torque detection during RUN
			Reset method	When P14.77=1 or 3, ot3 is a "Warning". The warning is automatically cleared when the output current < P14.75. When P14.77=2 or 4, ot3 is a "Fault". You must reset manually.
			Reset condition	Immediately reset
			Record	P14.77=2 or 4, ot3 is a "Fault", and the fault is recorded.
			Corrective Actions	1) Configure the settings for P14.78 and P14.79 again. 2) Check for mechanical error and remove the causes of malfunction. 3) Verify load and decrease the loading or replace with a motor with larger capacity if load is too high. 4) Verify accel/decel time and increase the setting values for P01.12–P01.19 (accel./ decel. time) if work cycle is too short. 5) Verify V/F voltage and adjust the V/F curve (Motor 3, P01.63–P01.70), especially the setting value for the mid-point voltage (if the mid-point voltage is set too small, the load capacity decreases at low-speed). 6) Replace motor with a larger capacity motor. 7) Check for overload during low-speed operation and decrease the loading during low-speed operation or increase the motor capacity. 8) Verify torque compensation and adjust P07.75 torque compensation gain until the output current decreases and the motor does not stall. 9) Correct the parameter settings for speed tracking. Start the speed tracking function. Adjust the maximum current for P07.09 speed tracking.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
EoL3	134	Internal communication error (EoL3) Electronic thermal relay 3 protection. The drive coasts to stop once it activates.	Action Level	Start counting when output current > 150% of the motor 3 rated current.
			Action Time	P14.81 (If the output current is larger than 105% of the motor 3 rated current again within 60 sec., the counting time reduces and is less than P14.81)
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Reduce the load. 2) Increase the setting value for P01.12–P01.19 (accel./decel. time) 3) Adjust the settings for P01.54–P01.61 (V/F curve), especially the setting value for the mid-point voltage (if the mid-point voltage is set too low, the load capacity decreases at low speed). Refer to the V/F curve selection of P01.43. 4) If the EoL3 only occurs during low-speed operations: a) Replaced the drive with a dedicated VFD model. b) Increase the motor capacity. 5) If using a VFD dedicated motor, verify P14.80=1: Standard motor (motor with fan on the shaft). 6) Verify motor rated current and reset if needed. 7) Verify motor rated frequency and reset if needed. 8) If using one drive to run multiple motors, set P14.80=2: Disable, and install thermal relay on each motor. 9) Set stall prevention to the proper value. 10) Adjust P07.73 torque compensation gain until the current reduces and the motor does not stall. 11) Check the status of the fan, or replace the fan. 12) Replace the motor.
EoL4	135	Internal communication error (EoL4) Electronic thermal relay 4 protection. The drive coasts to stop once it activates.	Action Level	Start counting when the output current > 150% of the motor 4 rated current.
			Action Time	P14.83 (If the output current is larger than 105% of motor 4 rated current again within 60 sec., the counting time reduces and is less than P14.83)
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Reduce the load. 2) Increase the setting value for P01.12–P01.19 (accel./decel. time) 3) Adjust the settings for P01.62–P01.70 (V/F curve), especially the setting value for the mid-point voltage (if the mid-point voltage is set too low, the load capacity decreases at low speed). Refer to the V/F curve selection of P01.43. 4) If the EoL4 only occurs during low-speed operations: a) Replaced the drive with a dedicated VFD model. b) Increase the motor capacity. 5) If using a VFD dedicated motor, verify P14.82=1: Standard motor (motor with fan on the shaft). 6) Verify motor rated current and reset if needed. 7) Verify motor rated frequency and reset if needed. 8) If using one drive to run multiple motors, set P14.82=2: Disable, and install thermal relay on each motor. 9) Set stall prevention to the proper value. 10) Adjust P07.75 torque compensation gain until the current reduces and the motor does not stall. 11) Check the status of the fan, or replace the fan. 12) Replace the motor.

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Fault Codes (continued)				
Display on GS20(X) Keypad	**ID No.**	**Fault Name and Description**	**Action, Reset, and Corrective Action**	
Hd6	140	oc hardware error (Hd6) GFF hardware protection error when power is ON.	Action Level	Hardware detection
			Action Time	Immediately act when the fault is detected
			Fault setting parameter	N/A
			Reset method	Power-off
			Reset condition	N/A
			Record	Yes
			Corrective Actions	Cycle the power. If Hd6 still exists, contact AutomationDirect Technical Support.
b49FF	141	GFF occurs before run (b4GFF) The ground short circuit detected when the output wiring detection is performed before the drive runs.	Action Level	250% of the rated current
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Reset in five seconds after the fault is cleared
			Record	Yes
			Corrective Actions	1) Check if the motor's internal wiring and the UVW wiring of the drive output terminal are correct. 2) Check the motor cable and remove causes of any short circuits, or replace the cable before turning on the power. 3) Check the motor insulation value with megger. Replace the motor if the insulation is poor.
AUE 1	142	Auto-tune error 1 (AuE1) No feedback current error when the motor parameter automatically detects	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	1) Verify the motor is wired correctly. 2) If a contactor is used as an open state on the output side of the drive (U/V/W), check if the contactor coil is closed.
AUE2	143	Auto-tune error 2 (AuE2) Motor phase loss error when the motor parameter automatically detects	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	1) Verify that the motor is wired correctly and no wires are broken. 2) Confirm that the motor works normally outside of auto-tuning. 3) If an electromagnetic contactor is used as an open state on the output side of the drive (U/V/W), verify that the three phases of the electromagnetic valve are all closed.
AUE3	144	Auto-tune error 3 (AuE3) No load current I_0 measurement error when the motor parameter automatically detects.	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediately reset
			Record	Yes
			Corrective Actions	1) Check the settings for P05.01 / P05.13 / P05.34. 2) Confirm that the motor works normally outside of auto-tuning.
AUE5	149	Auto-tune error 5 (AuE5) The rotor resistance measuring error when the motor parameter automatically detects	Action Level	Software detection
			Action Time	Immediately act
			Fault setting parameter	N/A
			Reset method	Manual reset
			Reset condition	Immediate reset
			Record	Yes
			Corrective Actions	1) Verify that the motor is wired correctly and no wires are broken. 2) Confirm that the motor works normally outside of auto-tuning. Possibly test with standard across-the-line starter."

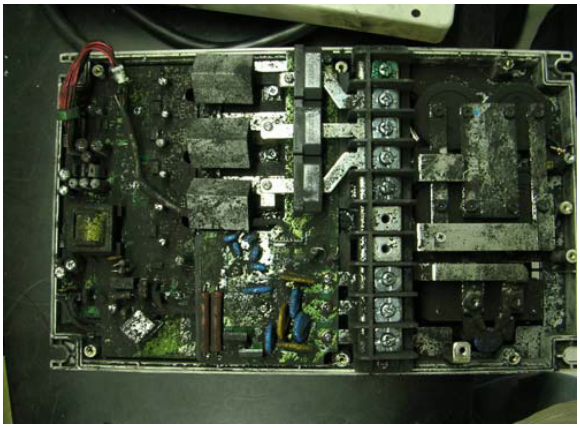
Typical AC Drive Problems and Solutions

Grease and Dirt Problems

In those industries where grease and dirt are common. Please be aware of the possible damage that grease, oil, and dirt, may cause to your GS20(X) drive:

1) *Electronic components that silt up with greasy oil may cause the drive to burn out or even explode.*
2) *Most greasy dirt contains corrosive substances that may damage the drive.*

Solution:
Install the GS20(X) drive in a suitable enclosure to protect it from grease and dirt. Clean and remove grease and dirt regularly to prevent damage of the drive.



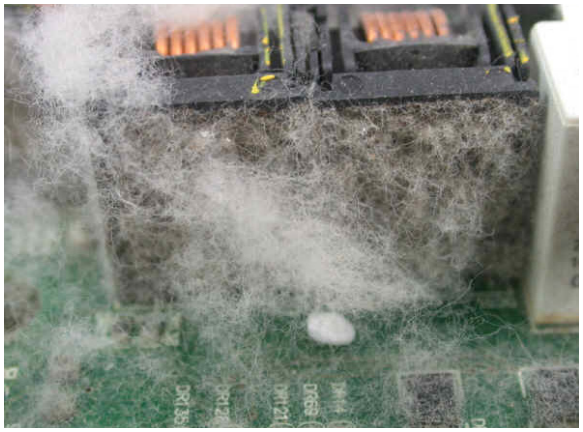
Fiber Dust Problem

Problems related to fiber dust are typical in the textile industry. Please be aware of the possible damage that fiber dust may cause to your GS20(X) drive:

1) *Fiber dust that accumulates or adheres to the fans will result in poor ventilation and cause overheating problems.*
2) *Textile plant environments with high humidity levels may experience GS20(X) drive failure or damage as a result of wet fiber dust adhering to components within the drive.*

Solution:

Install the GS20(X) drive in a suitable enclosure to protect it from fiber dust. Clean and remove fiber dust regularly to prevent damage to the drive.

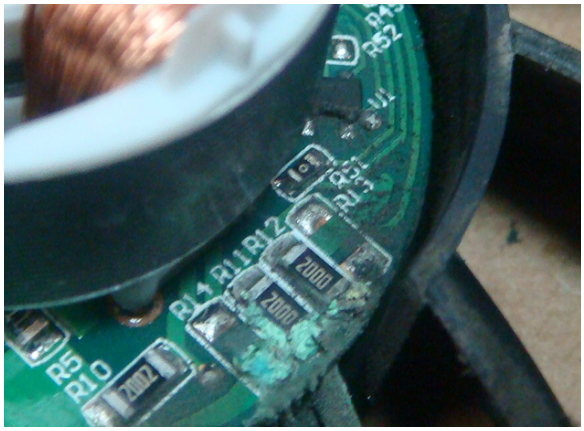


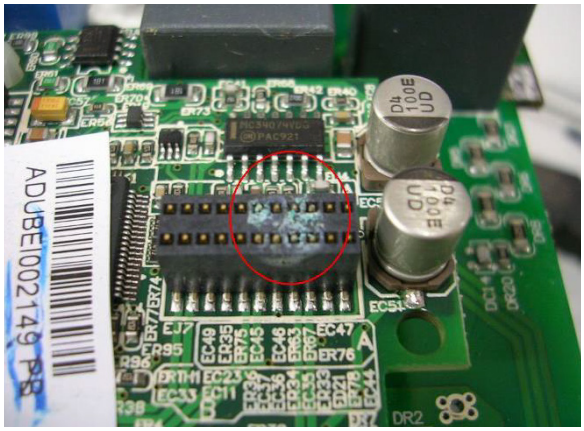
Corrosion Problem

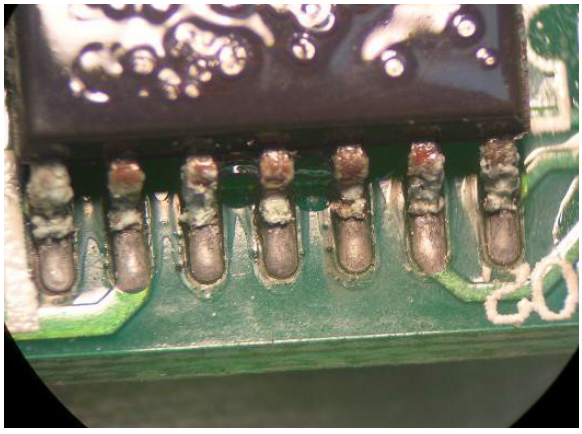
Corrosion problems may occur if any fluids or liquid in vapor form flows into the GS20(X) drive. Please be aware of the damage that corrosion may cause to your drive.

- *Corrosion of internal components may cause the GS20(X) drive to malfunction and possibly explode.*

Solution:
Install the GS20(X) drive in a suitable enclosure to protect it from fluids. Clean the drive regularly to prevent corrosion.





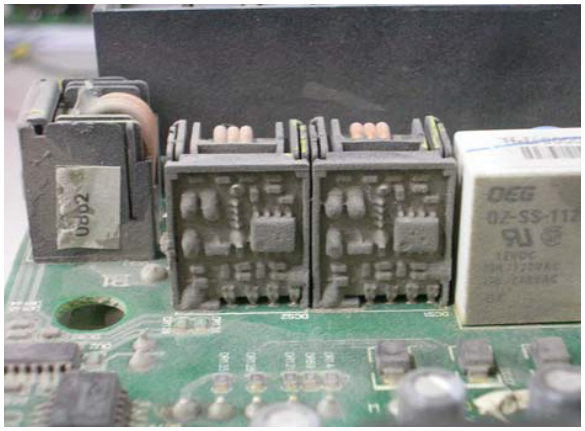


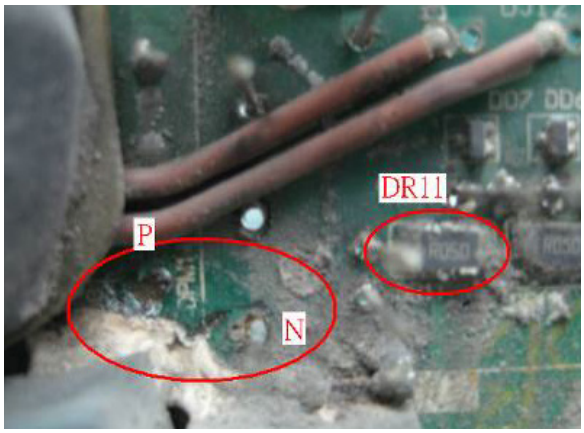
Industrial Dust Problem

Serious industrial dust pollution frequently occurs in stone processing plants, flour mills, cement plants, and so on. Please be particularly aware of any metal dust, filings or if metalized vapor is present as these may cause damage to your drives:

1) *Dust accumulating on electronic components may cause overheating problems and shorten the service life of the drive.*
2) *Conductive dust may damage the circuit board and may cause the drive to explode.*

Solution:
Install the GS20(X) drive in a suitable enclosure and protect it from dust. Clean the cabinet and ventilation filter regularly for good ventilation.





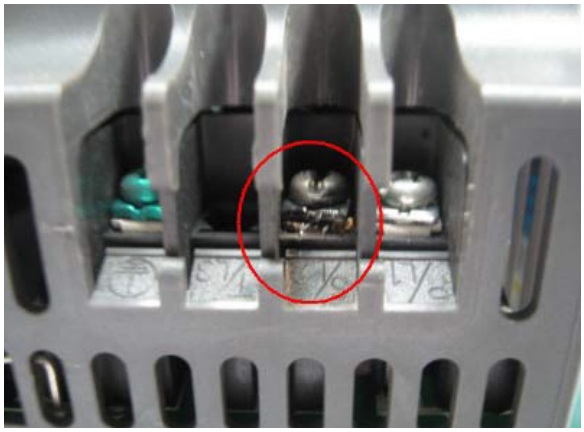
Wiring and Installation Problem

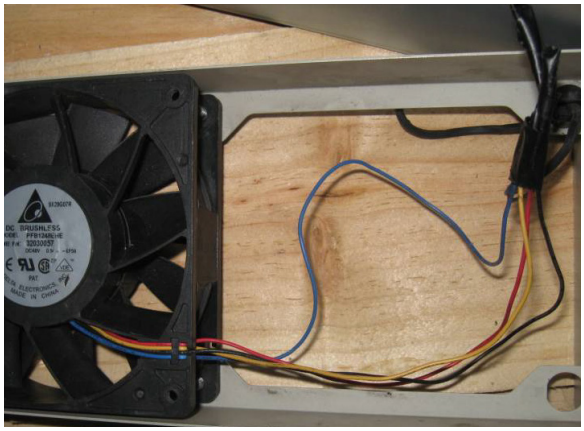
When wiring the GS20(X) drive, the most common problems are connection to the wrong terminal or poor wiring practice. Please be aware of the possible damage that poor wiring practice may cause to your GS20(X) drive:

1) *Screw terminals where the wire is not fully inserted or the terminal screw is not adequately tightened may result in sparking or high temperature due to a high resistance connection.*
2) *If circuit boards in the GS20(X) drive have been modified, components on the affected boards may have been damaged.*

Solution:

Inspect all power and control terminal connections in the GS20(X) drive to ensure adequate wire insertion. Do not attempt to disassemble or repair control boards in the GS20(X) drive.





Digital Input/Output Terminal Problems

Problems with digital I/O are usually the result of improper termination, or failure to segregate control wiring from power wiring. This may result in errant signals due to induced voltage, capacitive coupling or electrical noise. Incorrect voltage levels applied to the digital I/O terminals can damage the I/O circuitry of the drive.

- *Input/Output circuit may burn out when the terminal usage exceeds its limit.*

Solution:

Refer to the user manual for multi-function input output terminals usage and follow the specified voltage and current. DO NOT exceed the specification limits.