8.22
ALARMS 414 (DIGITAL SERVO SYSTEM IS ABNORMAL)

Points
Check details by CNC’s diagnostic function and LED display on the servo amplifier.

1) DGN 0200

<table>
<thead>
<tr>
<th>#7</th>
<th>#6</th>
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<tbody>
<tr>
<td>LV</td>
<td>OVC</td>
<td>HCA</td>
<td>HVA</td>
<td>DCA</td>
<td>FBA</td>
<td>OFA</td>
<td></td>
</tr>
</tbody>
</table>

2) LED display on the servo amplifier

3) DGN 0204

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<tr>
<td>OFS</td>
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* An alarm detected on the servo amplifier is also displayed at DGN 200.

• When DGN200 shows “1”

DGN 0200

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#5(OVC): Over current alarm
#4(HCA): Abnormal current alarm  → LED [8] lights
#3(HVA): Over current alarm  → LED [1] lights
#1(FBA): Disconnection alarm
#0(OFA): Overflow alarm
1) Servo amp LED [2] turns on (control power shortage)

(START)

Check +5V power at check terminal of servo unit

Voltage is normal?

YES

NO

Servo amplifier is faulty

Check input power to the controller

* Power should be 200/220/230VAC –15% across terminal T1(13) and (14)

Is voltage normal?

NO

YES

Input voltage is abnormal

Servo amplifier is faulty

2) Servo amp LED [3] turns on (DC power shortage)

(START)

Breaker off?

YES

Turn off breaker and check again

NO

Check input voltage of servo amp.

* Power should be 200/220/230VAC, –15% among terminal board T1(2)–(3)–(4).

Is voltage normal?

NO

YES

Servo amplifier is faulty

Input voltage is abnormal
**#5(OVC): Over current detection by software**

(START)

- Check current at check terminal IR and IS at servo amplifier and compare with rated current of motor

- Larger than 1.4 times?
  - NO
  - YES

  - Move axis at low speed and measure current at IR and IS, and compare with rated current

- Within rated current?
  - YES
  - NO

  - Machine load is large. Check load at machine side.

  * 1.7 times for motor 20S or larger.

- Check servo parameters 2040, 2041, 2056, 2057 with parameter list.

  - Correct?
    - NO
    - YES

      - Servo amplifier is faulty
      - Main CPU or option 2 board is faulty.

      - Correct parameters.

- From 1st axis to 4th axis are main CPU board. 5th axis or later are option 2 board.

**NOTE:** When the main CPU board is replaced, all the data in memory is lost. Reset NC data, referring to chapter 3 "input/output of data".
• #4(HCA): Abnormal current alarm (Servo amp. LED:[8] lights)

(START)

Give a move command and check whether the alarm is generated

Alarmed ?

NO

YES

Remove motor power line and turn on power

* Take care that vertical axis may drop.

YES

Alarmed ?

NO

Servo amp. is faulty.

- Short circuit between power lines
- Grounding of power lines
- Poor insulation of motor
DC voltage in servo amp. is excessive.

1. **#3(HVA): Over voltage alarm (Servo amp. LED [1] lights)**

2. Confirm status when an alarm is generated.

3. Does the alarm generate during deceleration?
   - **NO**
   - Confirm input voltage of servo amplifier
   - Is voltage normal?
     - **NO**
     - Input power voltage is abnormal
     - **YES**
     - Power should be within 200/220/230VAC among 3 phases of terminal T1(2),(3) and (4)

4. **YES**
   - Check feed rate
   - Servo amp. is faulty

5. Does the alarm generate during rapid traverse?
   - **NO**
   - Servo amp. is faulty
   - **YES**

6. Is acc/dec time is correct?
   - Isn't load inertial too large?
   - Is friction reduced by aging of machine?
   - Set acc./dcc. time constant larger as a temporary measure

Refer to acc./dec. parameters 1600 and so on.
• **#2(DCA): Discharge alarm**

1. Servo amp LED 4 lights (discharge control circuit is abnormal)

   (START)
   
   Generate at power on?  
   
   YES  
   
   NO  
   
   Generate during deceleration?  
   
   YES  
   
   NO  
   
   Generate during lowering of vertical axis  
   
   NO  
   
   YES  
   
   Servo amp. is faulty  
   
   Balancer adjustment failure  
   
   - Mechanical load inertia is large  
   - Resistance for friction due to aging of machine is reduced.

   Set a larger acc./dec. time constant as a temporary measure. *Take care that deceleration distance becomes longer.

   Separate type discharge resistor must be added

   Check by motor load current during up/down movement
2 Servo amp LED 5 lights (discharge circuit overheat)

(START)

Generate at power on?

YES

Is unit hot?

NO

Check resistance across terminals T1(15) and (16).

0Ω?

NO

Measure load current

NO

Is larger than rated current?

YES

· Check ambient temperature rise
· Lower cutting condition

NO

· Machine side load is large
· Insulation of motor is poor

YES

Measure resistance across 3 and 4 at terminal board of separate type discharge unit.

0Ω?

NO

Separate type discharge unit is faulty

YES

Disconnection of cable between separate type discharge unit and servo amp.

Wired?

NO

Short-circuit across 15 and 16 of terminal board T1

NO

Servo amp. is faulty.

Check whether separated discharge unit is connected(Across 15 and 16 of T1)

TH –3 –15
TH –4 –16
0V ALM

Separate type discharge unit is faulty

TH –3 –15
TH –4 –16
0V ALM

Separate type discharge unit Servo amp. (C series)
#1(FBA): DISCONNECTION ALARM

Position detection signal line is disconnected or short-circuited.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>ALD</td>
<td>EXP</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

| 1 | – | – | 0 | Built-in serial pulse coder disconnection |
| 1 | – | – | 1 | Separate type position detector connection |
| 0 | – | – | 0 | Pulse coder disconnection (software) |

→ JF\(x\)
→ SCALE\(x\)

**NOTE**
This alarm is related with full-closed system.

**Causes**

1. Signal cable is disconnected or short-circuited.
2. Serial pulse coder or position detector is faulty. Refer to Notes 1.
3. Main CPU board or option 2 board is faulty. Refer to Notes 2.

**CAUTION**

1. After the pulse coder is replaced, reference position or machine’s standard position is different from former one. Adjust and set it correctly.
2. When the main CPU board is replaced, all the data stored in memory is lost. Set NC data again, referring to chapter 3 “input/output of data”.

From 1st axis to 4th axis are main CPU board. 5th axis or later are option 2 board.
• #0(OFA): Overflow alarm causes

1. Wrong setting of servo parameters 1800s.
2. Main CPU (1 axis to 4 axes) or option 2 board (5 axes or more)

CAUTION
When the main CPU board is replaced, all the data stored in memory is lost. Set NC data again, referring to chapter 3 “input/output of data”.

When 1 is displayed at DGN 204

<table>
<thead>
<tr>
<th>DGN</th>
<th>0204</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#7</td>
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</table>

#6(OFS): A/D converter used for current feedback in the digital servo is abnormal.

#5(MCC): Contacts of electromagnetic contactor in the servo amp. is blown. → LED 7 lights.

Serial pulse coder C is an incremental pulse coder.

• #6(OFS): A/D converter is abnormal

Main CPU board or option 2 board is faulty
When the main CPU board is replaced, all the data stored in memory is lost.
Set NC data again, referring to chapter 3 “input/output of data”.

• #5(MCC): Contacts of electro–magnetic contactor is blown within servo amp.

(START)

Check LED of servo amplifier

LED [7] Contacts of electro–magnetic contactor is blown in servo amplifier

[7]?

NO (Not lit)

YES

Check input power voltage of servo amp.

<Normal input power voltage>

AC200/220/230V

+10%, −15%

Correct?

YES

Servo amplifier is faulty

NO

Check magnetics circuit
## LED display

<table>
<thead>
<tr>
<th>Display</th>
<th>Meaning</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power off</td>
<td>Power to the servo converter is not supplied.</td>
<td></td>
</tr>
<tr>
<td>NOT READY</td>
<td>Internal MMC (electro–magnetic contactor) is not turned on.</td>
<td></td>
</tr>
<tr>
<td>READY</td>
<td>Internal MMC is turned on and the motor becomes ready.</td>
<td></td>
</tr>
<tr>
<td>HV Excessive voltage alarm</td>
<td>DC voltage for driving main circuit is considerably high.</td>
<td></td>
</tr>
<tr>
<td>LV5V Control power low alarm</td>
<td>+5V of control power is abnormally low.</td>
<td></td>
</tr>
<tr>
<td>LVDC DC link voltage low alarm</td>
<td>DC voltage for main circuit is extremely low.</td>
<td></td>
</tr>
<tr>
<td>DCSW Abnormal regenerative control circuit</td>
<td>Regenerative discharge energy in short time is large or regenerative discharge circuit is faulty.</td>
<td></td>
</tr>
<tr>
<td>DCOH Excessive regenerative discharge</td>
<td>Average regenerative discharge energy is large or frequency of acc./dec. is large.</td>
<td></td>
</tr>
<tr>
<td>OH Servo amplifier overheat</td>
<td>Lights when thermostat in the servo amplifier functions.</td>
<td></td>
</tr>
<tr>
<td>MCC Electro–magnetic contactor</td>
<td>Contacts of electro–magnetic contactor is blown.</td>
<td></td>
</tr>
<tr>
<td>HCL L axis excess current</td>
<td>Lights when a large current flows through the main circuit of L axis.</td>
<td></td>
</tr>
<tr>
<td>HCM M axis excess current</td>
<td>Lights when a large current flows through the main circuit of M axis.</td>
<td></td>
</tr>
<tr>
<td>HCLM Excess current</td>
<td>Lights when a large current flows through the main circuit of L axis and M axis.</td>
<td></td>
</tr>
</tbody>
</table>

### NOTE

1st axis is L, 2nd axis is M.

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### LVDC alarm

When the electro–magnetic contactor is turned on in the servo amp. or DC voltage for the main circuit becomes low, this LED is lit.

Causes are;

1) Input voltage is insufficient.
2) Contacts of electro–magnetic contactor in servo amp. is poor.
3) Power circuit in servo amp. is abnormal.
• DCSW alarm

This alarm is lit when the transistor for regenerative discharging turns on more than 1 second.
Its causes are;
1) Malfunction of servo amplifier such as regenerative discharge circuit.
2) Regenerative discharge energy is excessive due to cutting conditions.

• DCOH alarm

This alarm is lit when regenerative discharge resistance is overheated and the thermost operates.
Its causes are;
1) Average discharge energy is excessive due to frequent acc./dec. or no use of balancer in vertical axis
2) Functioning of a thermostat in the power transformer when thermostat signal TH1 and TH2 are connected.

• MCC alarm

When turning on MCC, if the contacts are already on.

• Check terminals on servo amp.

When you open the cover of the terminal board, you can see the check terminal below LED.

<table>
<thead>
<tr>
<th>Terminal name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>OV</td>
<td>0V</td>
</tr>
<tr>
<td>5V</td>
<td>Control power +5V(+5 ± 0.25)</td>
</tr>
<tr>
<td>IRL</td>
<td>R-phase motor current of L axis</td>
</tr>
<tr>
<td>ISL</td>
<td>S-phase motor current of L axis</td>
</tr>
<tr>
<td>IRM</td>
<td>R-phase motor current of M axis</td>
</tr>
<tr>
<td>ISM</td>
<td>S-phase motor current of M axis</td>
</tr>
</tbody>
</table>

• Terminal name and meaning

<table>
<thead>
<tr>
<th>Type of unit</th>
<th>A/V</th>
<th>Type of unit</th>
<th>(A/V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A06B–6066–H002</td>
<td>1/1</td>
<td>Left side L axis/Right side M axis</td>
<td></td>
</tr>
<tr>
<td>A06B–6066–H003</td>
<td>3/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A06B–6066–H004</td>
<td>10/10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A06B–6066–H006</td>
<td>20/20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• Current/volt

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• Current waveform