
Chapter 5

DIAGNOSTICS AND FAULT FINDING

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Chapter 5 **DIAGNOSTICS AND FAULT FINDING**

INTRODUCTION

The 584S Frequency Inverters provide comprehensive diagnostic, alarm and trip facilities. These facilities minimise the possibility of damage to the drive, motor and associated components under unusual or fault conditions. The diagnostics and alarm information, available at the MMI display, enables ready identification of these conditions. In the event that a fault is traced to the drive, the drive should be returned to the manufacturer - no corrective maintenance should be attempted.

DIAGNOSTICS

The Diagnostics menu allows the user to monitor the operation of the drive. Diagnostics that can be monitored are described in the following paragraphs. These diagnostics are read-only.

Speed Setpoints

There are two total speed setpoint diagnostics available in the Diagnostics menu:

SPEED SP (Hz)	This displays the speed setpoint in Hz.
SPEED SP (RPM)	This displays the speed setpoint in RPM. In order for this diagnostic to operate correctly, information concerning the number of motor pole-pairs has to be entered in the SETUP PARAMETERS menu (see SPEED FEEDBACK chapter 4).

The manual and auto setpoints are also available:

AUTO SP (Hz)	This displays the auto setpoint in Hz. When the MANUAL/AUTO digital input (terminal 27) is connected to +24V (terminal 18), the total speed setpoint becomes equal to the auto setpoint.
MANUAL SP (Hz)	This displays the manual setpoint in Hz. When the MANUAL/AUTO digital input (terminal 27) is connected to 0V (terminal 19), the total speed setpoint becomes equal to the manual setpoint.
LOCAL SP (Hz)	This displays the local setpoint in Hz. When the local mode is selected the total speed setpoint becomes equal to the local setpoint.

Drive Frequency

The output **DRIVE FREQUENCY** is displayed in Hz.

Motor Current

MOTOR CURRENT is displayed as a percentage of the drive output current. This can be scaled to read as a percentage of the motor rated current using the **OP CURRENT CAL** parameter described in Chapter 4.

NOTE: The **MOTOR CURRENT** diagnostic may show a different value to the **MOTOR LOAD** diagnostic, especially on light loads. This is because even on no-load the motor draws typically 30% magnetising current.

Motor Load

The estimated **MOTOR LOAD** (torque) is displayed as a percentage of the drive output current. It is assumed that 100% load corresponds to 100% output current. This can be scaled to read as a percentage of the motor rated current using the **OP CURRENT CAL** parameter described in Chapter 4.

Overload Status

The **OVERLOAD STATUS** indicates to the user whether the current limit is active or not.

NORMAL indicates that the current limit is **not** active. **OVERLOAD** indicates that the current limit **is** active.

Ext Torque Limit

The setting of the torque limit analogue input (terminal 5) is displayed as a percentage of the drive output current. This can be scaled to read as a percentage of the motor rated current using the **OP CURRENT CAL** parameter described in Chapter 4.

PID Diagnostics

The PID diagnostics available from the DIAGNOSTICS menu are as follows:

PID ERROR	This is displayed as percentage of the LIMIT FREQUENCY parameter. Note that the default value of the LIMIT FREQUENCY is 120Hz.
PID CLAMPED	This indicates whether the output of the internal PID has saturated.
PID OUTPUT	This output of the internal PID is displayed in Hz.

Speed Feedback

There are two speed feedback diagnostics available in the DIAGNOSTICS menu:

SPEED FB (Hz)	This displays the speed feedback in Hz.
SPEED FB (RPM)	This displays the speed feedback in RPM.

NOTE: In order for these diagnostics to operate correctly, the drive must be connected to an encoder via the speed feedback option card. The speed feedback must be enabled and the correct number of encoder lines entered in the **SETUP PARAMETERS** menu. Information concerning the number of motor pole-pairs must also be correctly entered.

Torque Mode

The **TORQUE MODE** diagnostic indicates whether the drive is rated for **CONST TORQUE** applications (100% continuous rating with 150% overload for 60s) or **QUADRATIC TORQUE** applications (higher continuous rating with less overload capability).

Drive Status

DRIVE STATUS is a 16 bit hexadecimal number representing the status of the drive as follows:

Bit No.	Function	Hex. Value
0	Drive stopped	0x0001
1	Drive running	0x0002
2	Drive at zero speed	0x0004
3	Drive at speed setpoint	0x0008
4	Drive running with I*t warning	0x0010
5	Not Used	0x0020
6	Not used	0x0040
7	External trip	0x0080
8	DC link overvoltage trip	0x0100
9	DC link undervoltage trip	0x0200
10	Overcurrent trip	0x0400
11	I*t trip	0x0800
12	Stall trip	0x1000
13	4-20mA control trip	0x2000
14	Heatsink overtemperature trip	0x4000
15	Motor overtemperature trip	0x8000

Example 1

DRIVE STATUS
0x000A

This indicates that the drive is running at the speed setpoint since 0x0008 hex + 0x0002 hex = 0x000A hex.

Example 2

DRIVE STATUS
0x8001

This indicates that the drive has stopped with a motor overtemperature trip since 0x8000 hex + 0x0001 hex = 0x8001hex.

NOTE: It is not necessary to look at **DRIVE STATUS** if a trip occurs since the drive will always display an alarm message in plain text. Further information on alarm messages can be found in "ALARMS" in this chapter.

Digital Inputs

The status of the digital inputs is represented as an 16 bit hexadecimal number as follows:

Bit No.	Digital Input	Hex. Value
0	Run	0x0001
1	Framp	0x0002
2	Direction	0x0004
3	External Trip	0x0008
4	Jog	0x0010
5	Preset 1	0x0020
6	Preset 2	0x0040
7	Manual/Auto	0x0080
8	Local	0x0100
9	Prog	0x0200
10	Direction	0x0400
11	Jog	0x0800
12	Stop	0x1000
13	Start	0x2000
14	Reserved	0x4000
15	Not used	0x8000

Bits 0-7 are active high

Bits 8-15 are active low

Example 1

DIGITAL STATUS
0xFF21

This indicates that the drive is running and preset speed 1 is selected.

ALARMS

If the drive trips then the display immediately shows a message indicating the reason for the trip. Alarm conditions are reset by removing and re-applying the RUN signal on terminal 20. The alarm message can be cleared from the display by pressing the "E" key. However the message will be stored in the drive's non-volatile memory. It can be retrieved by using the **LAST ALARM** menu.

The error message contained in the **LAST ALARM** menu can be cleared by simply pressing the down arrow key while viewing this parameter. This operation also clears the alarm message from the drive's non volatile memory.

The possible alarm messages are:

LINK UNDERVOLTS

The DC link voltage is too low. Possible reasons for this alarm message are:

- (a) The mains voltage is too low;
- (b) The mains supply has been lost;
- (c) One of the three phases of the supply is missing.

LINK OVERVOLTAGE

The DC link voltage is too high. Possible reasons for this alarm message are:

- (a) The mains voltage is too high;
- (b) Trying to decelerate a large inertia load too quickly.

LINK OVERCURRENT

The DC link current is too high. Possible reasons for this alarm message are:

- (a) Trying to accelerate a large inertia load too quickly;
- (b) Trying to decelerate a large inertia load too quickly;
- (c) Application of shock load;
- (d) Short circuit between motor phases;
- (e) Short circuit between motor phase and earth;
- (f) Too long output cables or too many parallel motors;
- (g) Voltage boost set too high.

HEATSINK TEMP

The drive heatsink temperature is too high. Possible reasons for this alarm message are:

- (a) The ambient air temperature is too high;
- (b) A drive cooling fan has failed.:
- (c) Poor ventilation.

MOTOR TEMP

The motor temperature is too high. Possible reasons for this alarm message are:

- (a) Prolonged operation of the motor at low speed without forced cooling;
- (b) Excessive load;
- (c) Motor voltage rating incorrect:
- (d) Voltage boost set too high.

MOTOR STALLED

The motor has stalled. Possible reasons for this alarm message are:

- (a) Motor loading too great;
- (b) **MOTOR I LIMIT** parameter set too low;
- (c) **STALL TRIP TIME** parameter too low;
- (d) Voltage boost set too high.

CURRENT LOOP LOSS

The current loop setpoint signal has been lost. This alarm is activated if the auto setpoint has been configured as 4/20mA or 20/4mA and the current falls below 3mA.

EXTERNAL TRIP

24V not present on Ext. Trip (Terminal 23).

FAULT OR BRAKING

Parameters cannot be saved when the drive is unhealthy or braking (stopping). Toggle run signal to clear alarm.

CHECKSUM FAILED

Hardware error.

EE VERSION ERROR

Hardware error.

EE WRITE ERROR

Hardware error.