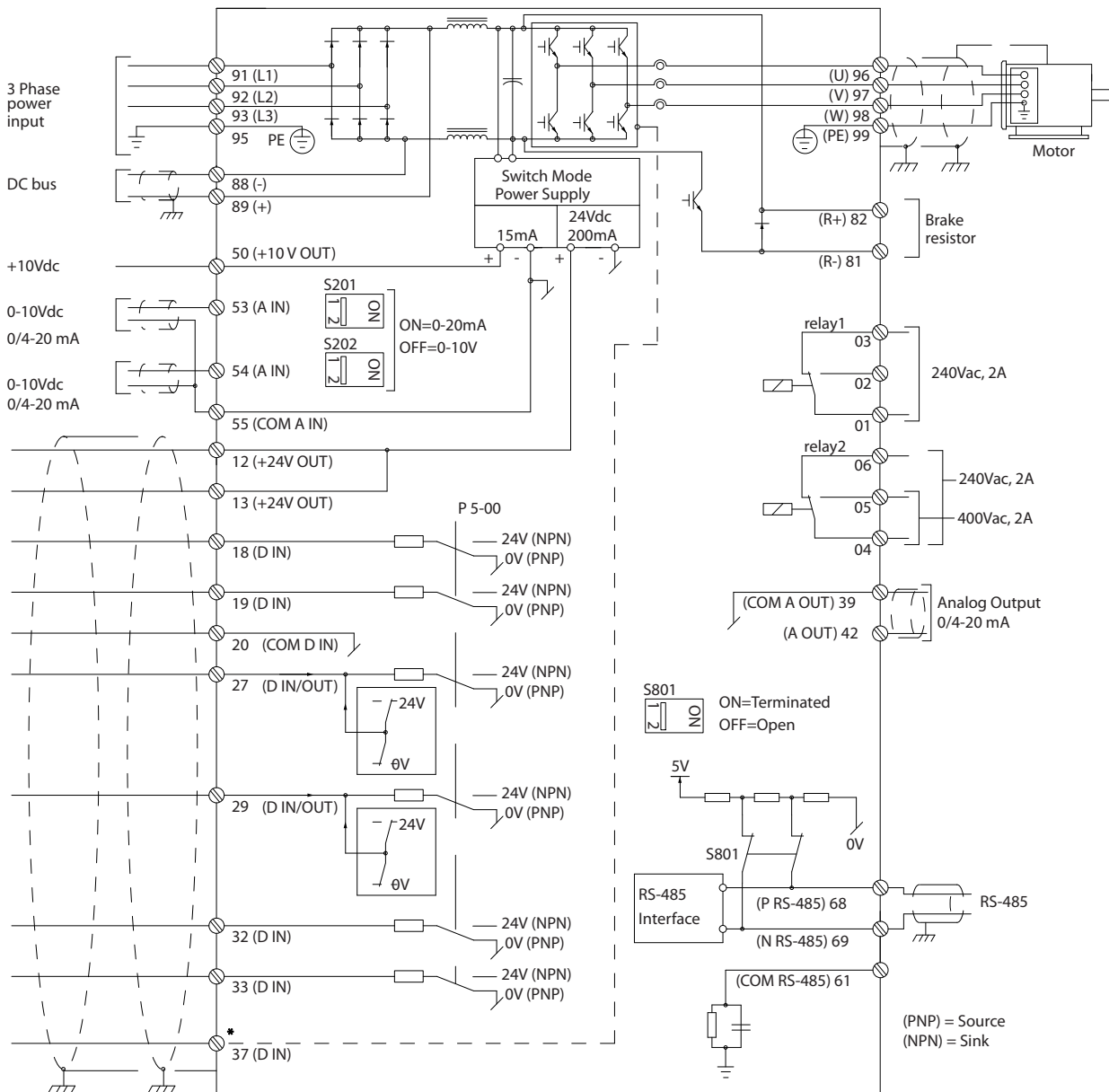




Quick Reference Guide

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130BA544.11

Illustration 2.1 Diagram showing all electrical terminals. (Terminal 37 present for units with Safe Stop Function only.)

2 How to Programme

2.1 Local Control Panel

2.1.1 How to Operate Graphical LCP (GLCP)

The following instructions are valid for the GLCP (LCP 102).

The GLCP is divided into four functional groups

1. Graphical display with Status lines.
2. Menu keys and indicator lights (LEDs) - selecting mode, changing parameters and switching between display functions.
3. Navigation keys and indicator lights (LEDs).
4. Operation keys and indicator lights (LEDs).

Graphical display

The LCD-display is back-lit with a total of 6 alpha-numeric lines. All data is displayed on the LCP which can show up to five operating variables while in [Status] mode.

Display lines

- a. **Status line** Status messages displaying icons and graphics.
- b. **Line 1-2** Operator data lines displaying data and variables defined or chosen by the user. By pressing the [Status] key, up to one extra line can be added.
- c. **Status line** Status messages displaying text.

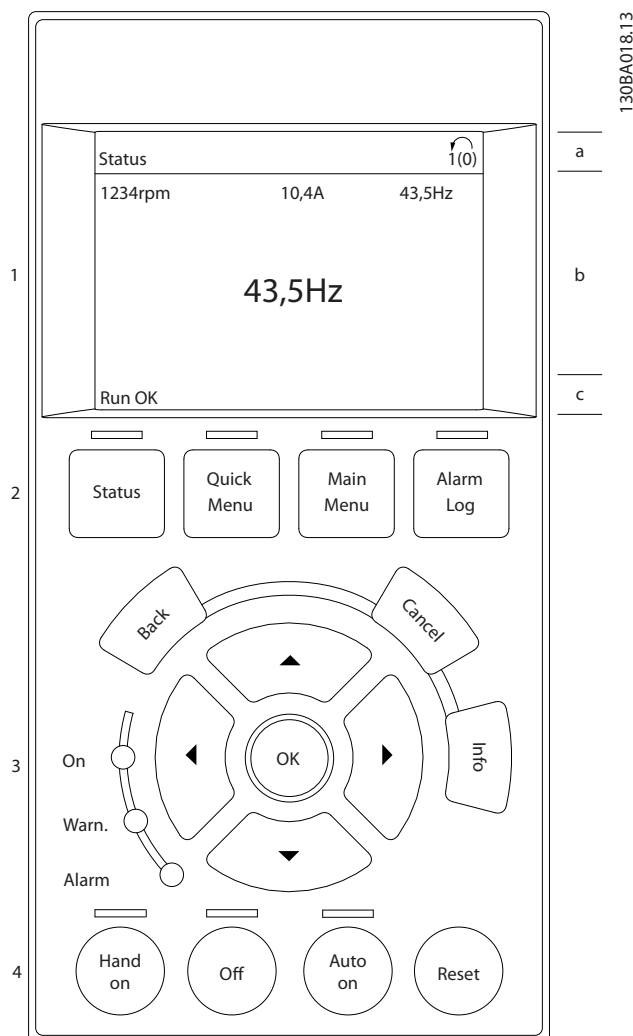


Illustration 2.1

The display is divided into 3 sections

Top section (a) shows the status when in status mode or up to 2 variables when not in status mode and in the case of Alarm/Warning.

The number of the Active Set-up (selected as the Active Set-up in *0-10 Active Set-up*) is shown. When programming in another Set-up than the Active Set-up, the number of the Set-up being programmed appears to the right in brackets.

The **Middle section** (b) shows up to 5 variables with related unit, regardless of status. In case of alarm/warning, the warning is shown instead of the variables.

5.5.1 Quick Menu Structure

Q3-1 General Settings	0-24 Display Line 3 Large	1-00 Configuration Mode	Q3-31 Single Zone Ext. Set Point	20-70 Closed Loop Type
Q3-10 Adv. Motor Settings	0-37 Display Text 1	20-12 Reference/Feedback Unit	1-00 Configuration Mode	20-71 PID Performance
1-90 Motor Thermal Protection	0-38 Display Text 2	20-13 Minimum Reference/Feedb.	20-12 Reference/Feedback Unit	20-72 PID Output Change
1-93 Thermistor Source	0-39 Display Text 3	20-14 Maximum Reference/Feedb.	20-13 Minimum Reference/Feedb.	20-73 Minimum Feedback Level
1-29 Automatic Motor Adaptation (AMA)	Q3-2 Open Loop Settings	6-22 Terminal 54 Low Current	20-14 Maximum Reference/Feedb.	20-74 Maximum Feedback Level
14-01 Switching Frequency	Q3-20 Digital Reference	6-24 Terminal 54 Low Ref./Feedb. Value	6-10 Terminal 53 Low Voltage	20-79 PID Autotuning
4-53 Warning Speed High	3-02 Minimum Reference	6-25 Terminal 54 High Ref./Feedb. Value	6-11 Terminal 53 High Voltage	Q3-32 Multi Zone / Adv
Q3-11 Analog Output	3-03 Maximum Reference	6-26 Terminal 54 Filter Time Constant	6-12 Terminal 53 Low Current	1-00 Configuration Mode
6-50 Terminal 42 Output	3-10 Preset Reference	6-27 Terminal 54 Live Zero	6-13 Terminal 53 High Current	3-15 Reference 1 Source
6-51 Terminal 42 Output Min Scale	5-13 Terminal 29 Digital Input	6-00 Live Zero Timeout Time	6-14 Terminal 53 Low Ref./Feedb. Value	3-16 Reference 2 Source
6-52 Terminal 42 Output Max Scale	5-14 Terminal 32 Digital Input	6-01 Live Zero Timeout Function	6-15 Terminal 53 High Ref./Feedb. Value	20-00 Feedback 1 Source
Q3-12 Clock Settings	5-15 Terminal 33 Digital Input	20-21 Setpoint 1	6-22 Terminal 54 Low Current	20-01 Feedback 1 Conversion
0-70 Date and Time	Q3-21 Analog Reference	20-81 PID Normal/ Inverse Control	6-24 Terminal 54 Low Ref./Feedb. Value	20-02 Feedback 1 Source Unit
0-71 Date Format	3-02 Minimum Reference	20-82 PID Start Speed [RPM]	6-25 Terminal 54 High Ref./Feedb. Value	20-03 Feedback 2 Source
0-72 Time Format	3-03 Maximum Reference	20-83 PID Start Speed [Hz]	6-26 Terminal 54 Filter Time Constant	20-04 Feedback 2 Conversion
0-74 DST/Summertime	6-10 Terminal 53 Low Voltage	20-93 PID Proportional Gain	6-27 Terminal 54 Live Zero	20-05 Feedback 2 Source Unit
0-76 DST/Summertime Start	6-11 Terminal 53 High Voltage	20-94 PID Integral Time	6-00 Live Zero Timeout Time	20-06 Feedback 3 Source
0-77 DST/Summertime End	6-12 Terminal 53 Low Current	20-70 Closed Loop Type	6-01 Live Zero Timeout Function	20-07 Feedback 3 Conversion
Q3-13 Display Settings	6-13 Terminal 53 High Current	20-71 PID Performance	20-81 PID Normal/ Inverse Control	20-08 Feedback 3 Source Unit
0-20 Display Line 1.1 Small	6-14 Terminal 53 Low Ref./Feedb. Value	20-72 PID Output Change	20-82 PID Start Speed [RPM]	20-12 Reference/Feedback Unit
0-21 Display Line 1.2 Small	6-15 Terminal 53 High Ref./Feedb. Value	20-73 Minimum Feedback Level	20-83 PID Start Speed [Hz]	20-13 Minimum Reference/Feedb.
0-22 Display Line 1.3 Small	Q3-3 Closed Loop Settings	20-74 Maximum Feedback Level	20-93 PID Proportional Gain	20-14 Maximum Reference/Feedb.
0-23 Display Line 2 Large	Q3-30 Single Zone Int. Set Point	20-79 PID Autotuning	20-94 PID Integral Time	6-10 Terminal 53 Low Voltage

6-11 Terminal 53 High Voltage	20-21 Setpoint 1	22-22 Low Speed Detection	22-21 Low Power Detection	22-87 Pressure at No-Flow Speed
6-12 Terminal 53 Low Current	20-22 Setpoint 2	22-23 No-Flow Function	22-22 Low Speed Detection	22-88 Pressure at Rated Speed
6-13 Terminal 53 High Current	20-81 PID Normal/ Inverse Control	22-24 No-Flow Delay	22-23 No-Flow Function	22-89 Flow at Design Point
6-14 Terminal 53 Low Ref./Feedb. Value	20-82 PID Start Speed [RPM]	22-40 Minimum Run Time	22-24 No-Flow Delay	22-90 Flow at Rated Speed
6-15 Terminal 53 High Ref./Feedb. Value	20-83 PID Start Speed [Hz]	22-41 Minimum Sleep Time	22-40 Minimum Run Time	1-03 Torque Characteristics
6-16 Terminal 53 Filter Time Constant	20-93 PID Proportional Gain	22-42 Wake-up Speed [RPM]	22-41 Minimum Sleep Time	1-73 Flying Start
6-17 Terminal 53 Live Zero	20-94 PID Integral Time	22-43 Wake-up Speed [Hz]	22-42 Wake-up Speed [RPM]	Q3-42 Compressor Functions
6-20 Terminal 54 Low Voltage	20-70 Closed Loop Type	22-44 Wake-up Ref./FB Difference	22-43 Wake-up Speed [Hz]	1-03 Torque Characteristics
6-21 Terminal 54 High Voltage	20-71 PID Performance	22-45 Setpoint Boost	22-44 Wake-up Ref./FB Difference	1-71 Start Delay
6-22 Terminal 54 Low Current	20-72 PID Output Change	22-46 Maximum Boost Time	22-45 Setpoint Boost	22-75 Short Cycle Protection
6-23 Terminal 54 High Current	20-73 Minimum Feedback Level	2-10 Brake Function	22-46 Maximum Boost Time	22-76 Interval between Starts
6-24 Terminal 54 Low Ref./Feedb. Value	20-74 Maximum Feedback Level	2-16 AC brake Max. Current	22-26 Dry Pump Function	22-77 Minimum Run Time
6-25 Terminal 54 High Ref./Feedb. Value	20-79 PID Autotuning	2-17 Over-voltage Control	22-27 Dry Pump Delay	5-01 Terminal 27 Mode
6-26 Terminal 54 Filter Time Constant	Q3-4 Application Settings	1-73 Flying Start	22-80 Flow Compensation	5-02 Terminal 29 Mode
6-27 Terminal 54 Live Zero	Q3-40 Fan Functions	1-71 Start Delay	22-81 Square-linear Curve Approximation	5-12 Terminal 27 Digital Input
6-00 Live Zero Timeout Time	22-60 Broken Belt Function	1-80 Function at Stop	22-82 Work Point Calculation	5-13 Terminal 29 Digital Input
6-01 Live Zero Timeout Function	22-61 Broken Belt Torque	2-00 DC Hold/Preheat Current	22-83 Speed at No-Flow [RPM]	5-40 Function Relay
4-56 Warning Feedback Low	22-62 Broken Belt Delay	4-10 Motor Speed Direction	22-84 Speed at No-Flow [Hz]	1-73 Flying Start
4-57 Warning Feedback High	4-64 Semi-Auto Bypass Set-up	Q3-41 Pump Functions	22-85 Speed at Design Point [RPM]	1-86 Trip Speed Low [RPM]
20-20 Feedback Function	1-03 Torque Characteristics	22-20 Low Power Auto Set-up	22-86 Speed at Design Point [Hz]	1-87 Trip Speed Low [Hz]

5.5.2 Main menu structure

1-0*	Load and Motor	1-90	Motor Thermal Protection	1-90	Motor Thermal Protection	4-17	Torque Limit	5-65	Pulse Output Max Freq #29
1-0*	General Settings	1-91	Motor External Fan	1-91	Motor External Fan	4-18	Current Limit	5-66	Terminal X30/6 Pulse Output Variable
1-00	Configuration Mode	1-93	Thermistor Source	1-93	Thermistor Source	4-19	Max Output Frequency	5-68	Pulse Output Max Freq #X30/6
1-03	Torque Characteristics	2-0*	Brakes	2-0*	Brakes	4-5*	Adj. Warnings	5-8*	I/O Options
1-06	Clockwise Direction	2-00	DC Hold/Preheat Current	2-00	DC Hold/Preheat Current	4-50	Warning Current Low	5-80	AHF Cap Reconnect Delay
1-1*	Motor Selection	2-01	DC Brake Current	2-01	DC Brake Current	4-51	Warning Current High	5-9*	Bus Controlled
0-01	Language	2-02	DC Braking Time	2-02	DC Braking Time	4-52	Warning Speed Low	5-90	Digital & Relay Bus Control
0-02	Motor Speed Unit	2-03	DC Brake Cut In Speed [RPM]	2-03	DC Brake Cut In Speed [RPM]	4-53	Warning Speed High	5-93	Pulse Out #27 Bus Control
0-03	Regional Settings	2-04	Low Speed Filter Time Const.	2-04	Low Speed Filter Time Const.	4-54	Warning Reference Low	5-94	Pulse Out #27 Timeout Preset
0-04	Operating State at Power-up	2-05	High Speed Filter Time Const.	2-05	High Speed Filter Time Const.	4-55	Warning Reference High	5-95	Pulse Out #29 Bus Control
0-05	Local Mode Unit	2-06	Parking Current	2-06	Parking Current	4-56	Warning Feedback Low	5-96	Pulse Out #29 Timeout Preset
0-1*	Set-up Operations	2-07	Parking Time	2-07	Parking Time	4-57	Warning Feedback High	5-97	Pulse Out #X30/6 Bus Control
0-10	Active Set-up	2-1*	Brake Energy Funct.	2-1*	Brake Energy Funct.	4-58	Missing Motor Phase Function	5-98	Pulse Out #X30/6 Timeout Preset
0-11	Programming Set-up	2-10	Brake Function	2-10	Brake Function	4-6*	Speed Bypass	6-5*	Analog In/Out
0-12	This Set-up Linked to	2-11	Brake Resistor (ohm)	2-11	Brake Resistor (ohm)	4-60	Bypass Speed From [RPM]	6-0*	Analog I/O Mode
0-13	Readout: Linked Set-ups	2-12	Brake Power Limit (kW)	2-12	Brake Power Limit (kW)	4-61	Bypass Speed From [Hz]	6-00	Live Zero Timeout Time
0-14	Readout: Prog. Set-ups / Channel	2-13	Brake Power Monitoring	2-13	Brake Power Monitoring	4-62	Bypass Speed To [RPM]	6-01	Live Zero Timeout Function
0-2*	LCP Display	2-15	Brake Check	2-15	Brake Check	4-63	Bypass Speed To [Hz]	6-02	Fire Mode Live Zero Timeout Function
0-20	Display Line 1.1 Small	2-16	AC brake Max. Current	2-16	AC brake Max. Current	4-64	Semi-Auto Bypass Set-up	6-1*	Analog Input 53
0-21	Display Line 1.2 Small	2-17	Over-voltage Control	2-17	Over-voltage Control	5-5*	Digital In/Out	6-10	Terminal 53 Low Voltage
0-22	Display Line 1.3 Small	3-0*	Reference / Ramps	3-0*	Reference / Ramps	5-0*	Digital I/O mode	6-11	Terminal 53 High Voltage
0-23	Display Line 2 Large	3-02	Minimum Reference	3-02	Minimum Reference	5-00	Digital I/O Mode	6-12	Terminal 53 Low Voltage
0-24	Display Line 3 Large	3-03	Maximum Reference	3-03	Maximum Reference	5-01	Terminal 27 Mode	6-13	Terminal 53 High Current
0-25	My Personal Menu	3-04	Reference Function	3-04	Reference Function	5-02	Terminal 29 Mode	6-14	Terminal 53 High Current
0-3*	LCP Custom Readout	3-1*	References	3-1*	References	5-1*	Digital Inputs	6-15	Terminal 53 Low Ref./Feedb. Value
0-30	Custom Readout Unit	3-10	Preset Reference	3-10	Preset Reference	5-10	Terminal 18 Digital Input	6-16	Terminal 53 Filter Time Constant
0-31	Custom Readout Min Value	3-11	Jog Speed [Hz]	3-11	Jog Speed [Hz]	5-11	Terminal 19 Digital Input	6-17	Terminal 53 Live Zero
0-32	Custom Readout Max Value	3-13	Reference Site	3-13	Reference Site	5-12	Terminal 27 Digital Input	6-2*	Analog Input 54
0-37	Display Text 1	3-14	Preset Relative Reference	3-14	Preset Relative Reference	5-13	Terminal 29 Digital Input	6-20	Terminal 54 Low Voltage
0-38	Display Text 2	3-15	Reference 1 Source	3-15	Reference 1 Source	5-15	Terminal 32 Digital Input	6-22	Terminal 54 High Voltage
0-39	Display Text 3	3-16	Reference 2 Source	3-16	Reference 2 Source	5-16	Terminal 33 Digital Input	6-23	Terminal 54 Low Current
0-4*	LCP keypad	3-17	Reference 3 Source	3-17	Reference 3 Source	5-17	Terminal X30/3 Digital Input	6-24	Terminal 54 High Current
0-40	[Hand on] Key on LCP	3-19	Jog Speed [RPM]	3-19	Jog Speed [RPM]	5-18	Terminal X30/4 Digital Input	6-25	Terminal 54 Low Ref./Feedb. Value
0-41	[Off] Key on LCP	3-4*	Ramp 1	3-4*	Ramp 1	5-19	Terminal 37 Safe Stop	6-26	Terminal 54 High Ref./Feedb. Value
0-42	[Auto on] Key on LCP	3-41	Ramp 1 Ramp Up Time	3-41	Ramp 1 Ramp Up Time	5-3*	Digital Outputs	6-27	Terminal 54 Filter Time Constant
0-43	[Reset] Key on LCP	3-42	Ramp 1 Ramp Down Time	3-42	Ramp 1 Ramp Down Time	5-30	Terminal 27 Digital Output	6-3*	Analog Input X30/11
0-44	[Off/Reset] Key on LCP	3-5*	Ramp 2	3-5*	Ramp 2	5-31	Terminal 29 Digital Output	6-30	Terminal X30/11 Low Voltage
0-45	[Drive Bypass] Key on LCP	3-51	Ramp 2 Ramp Up Time	3-51	Ramp 2 Ramp Up Time	5-32	Terminal 29 Digital Output	6-31	Terminal X30/11 High Voltage
0-5*	Copy/Save	3-52	Ramp 2 Ramp Down Time	3-52	Ramp 2 Ramp Down Time	5-33	Terminal X30/6 Digi Out (MCB 101)	6-34	Terminal X30/11 Low Ref./Feedb. Value
0-50	LCP Copy	3-8*	Other Ramps	3-8*	Other Ramps	5-4*	Relays	6-35	Terminal X30/11 High Ref./Feedb. Value
0-51	Set-up Copy	3-80	Jog Ramp Time	3-80	Jog Ramp Time	5-40	Function Relay	6-36	Terminal X30/11 Filter Time Constant
0-6*	Password	3-81	Quick Stop Ramp Time	3-81	Quick Stop Ramp Time	5-41	On Delay, Relay	6-37	Terminal X30/11 Live Zero
0-60	Main Menu Password	3-82	Starting Ramp Up Time	3-82	Starting Ramp Up Time	5-42	Off Delay, Relay	6-4*	Analog Input X30/12
0-61	Access to Main Menu w/o Password	3-90	Step Size	3-90	Step Size	5-5*	Pulse Input	6-40	Terminal X30/12 Low Voltage
0-65	Personal Menu Password	3-91	Ramp Time	3-91	Ramp Time	5-50	Term. 29 Low Frequency	6-41	Terminal X30/12 High Voltage
0-66	Access to Personal Menu w/o Password	3-92	Power Restore	3-92	Power Restore	5-51	Term. 29 High Frequency	6-44	Terminal X30/12 High Voltage
0-7*	Clock Settings	3-93	Maximum Limit	3-93	Maximum Limit	5-52	Term. 29 Low Ref./Feedb. Value	6-45	Terminal X30/12 High Ref./Feedb. Value
0-70	Date and Time	3-94	Minimum Limit	3-94	Minimum Limit	5-53	Term. 29 High Ref./Feedb. Value	6-46	Terminal X30/12 High Ref./Feedb. Value
0-71	Date Format	3-95	Ramp Delay	3-95	Ramp Delay	5-54	Pulse Filter Time Constant #29	6-47	Terminal X30/12 Filter Time Constant
0-72	Time Format	4-1*	Motor Limits	4-1*	Motor Limits	5-55	Term. 33 Low Frequency	6-5*	Analog Output 42
0-74	DST/Summertime	4-10	Motor Speed Direction	4-10	Motor Speed Direction	5-56	Term. 33 High Frequency	6-50	Terminal 42 Output
0-76	DST/Summertime Start	4-11	Motor Speed Low Limit [RPM]	4-11	Motor Speed Low Limit [RPM]	5-57	Term. 33 Low Ref./Feedb. Value	6-51	Terminal 42 Output Min Scale
0-77	DST/Summertime End	4-12	Motor Speed High Limit [RPM]	4-12	Motor Speed High Limit [RPM]	5-58	Term. 33 High Ref./Feedb. Value	6-52	Terminal 42 Output Max Scale
0-79	Clock Fault	4-13	Motor Speed Low Limit [Hz]	4-13	Motor Speed Low Limit [Hz]	5-59	Pulse Filter Time Constant #33	6-53	Terminal 42 Output Bus Control
0-81	Working Days	4-14	Motor Speed High Limit [Hz]	4-14	Motor Speed High Limit [Hz]	5-6*	Pulse Output	6-54	Terminal 42 Output Timeout Preset
0-82	Additional Working Days	4-16	Torque Limit Motor Mode	4-16	Torque Limit Motor Mode	5-62	Terminal 27 Pulse Output Variable	6-55	Terminal 42 Output Filter
0-83	Additional Non-Working Days					5-63	Pulse Output Max Freq #27	6-6*	Analog Output X30/8
0-89	Date and Time Readout						Terminal 29 Pulse Output Variable	6-60	Terminal X30/8 Output

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6-61	Terminal X30/8 Min. Scale	9-00	Setpoint	10-39	Devicenet F Parameters	12-94	Broadcast Storm Protection	14-55	Output Filter
6-62	Terminal X30/8 Max. Scale	9-07	Actual Value	11-1*	LonWorks	12-95	Broadcast Storm Filter	14-59	Actual Number of Inverter Units
6-63	Terminal X30/8 Output Bus Control	9-15	PCD Write Configuration	11-0*	LonWorks ID	12-96	Port Config	14-6*	Auto Derate
6-64	Terminal X30/8 Output Timeout Preset	9-16	PCD Read Configuration	11-0*	Neuron ID	12-98	Interface Counters	14-60	Function at Over Temperature
8-*	Comm. and Options	9-18	Node Address	11-1*	LON Functions	12-99	Media Counters	14-61	Function at Inverter Overload
8-0*	General Settings	9-22	Telegram Selection	11-10	Drive Profile	13-*	Smart Logic	14-62	Inv. Overload Derate Current
8-01	Control Site	9-23	Parameters for Signals	11-15	LON Warning Word	13-0*	SLC Settings	15-*	Drive Information
8-02	Control Source	9-27	Parameter Edit	11-17	XIF Revision	13-00	SL Controller Mode	15-0*	Operating Data
8-03	Control Timeout Time	9-28	Process Control	11-18	LonWorks Revision	13-01	Start Event	15-00	Operating Hours
8-04	Control Timeout Function	9-44	Fault Message Counter	11-2*	LON Param. Access	13-02	Stop Event	15-01	Running Hours
8-05	End-of-Timeout Function	9-45	Fault Code	11-21	Store Data Values	13-03	Reset SLC	15-02	kWh Counter
8-06	Reset Control Timeout	9-47	Fault Number	12-*	Ethernet	13-1*	Comparators	15-03	Power Up's
8-07	Diagnosis Trigger	9-52	Fault Situation Counter	12-0*	IP Settings	13-10	Comparator Operand	15-04	Over Temp's
8-08	Readout Filtering	9-53	Profibus Warning Word	12-00	IP Address Assignment	13-11	Comparator Operator	15-05	Over Volt's
8-09	Communication Charset	9-63	Actual Baud Rate	12-01	IP Address	13-12	Comparator Value	15-06	Reset kWh Counter
8-1*	Control Settings	9-64	Device Identification	12-02	Subnet Mask	13-2*	Timers	15-07	Reset Running Hours Counter
8-10	Control Profile	9-65	Profile Number	12-03	Default Gateway	13-20	SL Controller Timer	15-08	Number of Starts
8-13	Configurable Status Word STW	9-67	Control Word 1	12-04	DHCP Server	13-4*	Logic Rules	15-1*	Data Log Settings
8-3*	FC Port Settings	9-68	Status Word 1	12-05	Lease Expires	13-40	Logic Rule Boolean 1	15-10	Logging Source
8-30	Protocol	9-71	Profibus Save Data Values	12-06	Name Servers	13-41	Logic Rule Operator 1	15-11	Logging Interval
8-31	Address	9-72	ProfibusDriveReset	12-07	Domain Name	13-42	Logic Rule Boolean 2	15-12	Trigger Event
8-32	Baud Rate	9-75	DO Identification	12-08	Host Name	13-43	Logic Rule Operator 2	15-13	Logging Mode
8-33	Parity / Stop Bits	9-80	Defined Parameters (1)	12-09	Physical Address	13-44	Logic Rule Boolean 3	15-14	Samples Before Trigger
8-34	Estimated cycle time	9-81	Defined Parameters (2)	12-1*	Ethernet Link Parameters	13-5*	States	15-2*	Historic Log
8-35	Minimum Response Delay	9-82	Defined Parameters (3)	12-10	Link Status	13-51	SL Controller Event	15-20	Historic Log: Event
8-36	Maximum Response Delay	9-83	Defined Parameters (4)	12-11	Link Duration	13-52	SL Controller Action	15-21	Historic Log: Value
8-37	Maximum Inter-Char Delay	9-84	Defined Parameters (5)	12-12	Auto Negotiation	14-*	Special Functions	15-22	Historic Log: Time
8-4*	FC MC protocol set	9-90	Changed Parameters (1)	12-13	Link Speed	14-0*	Inverter Switching	15-23	Historic Log: Date and Time
8-40	Telegram Selection	9-91	Changed Parameters (2)	12-14	Link Duplex	14-00	Switching Pattern	15-3*	Alarm Log
8-42	PCD write configuration	9-92	Changed Parameters (3)	12-2*	Process Data	14-01	Switching Frequency	15-30	Alarm Log: Error Code
8-43	PCD read configuration	9-93	Changed Parameters (4)	12-20	Control Instance	14-03	Overmodulation	15-31	Alarm Log: Value
8-5*	Digital/Bus	9-94	Changed Parameters (5)	12-21	Process Data Config Write	14-04	PWM Random	15-32	Alarm Log: Time
8-50	Coasting Select	9-99	Profibus Revision Counter	12-22	Process Data Config Read	14-1*	Mains On/Off	15-33	Alarm Log: Date and Time
8-52	DC Brake Select	10-*	CAN Fieldbus	12-27	Primary Master	14-10	Mains Failure	15-4*	Drive Identification
8-53	Start Select	10-00	Common Settings	12-28	Store Data Values	14-11	Mains Voltage at Mains Fault	15-40	FC Type
8-54	Reversing Select	10-01	CAN Protocol	12-29	Store Always	14-12	Function at Mains Imbalance	15-41	Power Section
8-55	Set-up Select	10-02	Baud Rate Select	12-3*	EtherNet/IP	14-2*	Reset Functions	15-42	Voltage
8-56	Preset Reference Select	10-05	Readout Transmitt Error Counter	12-30	Warning Parameter	14-20	Reset Mode	15-43	Software Version
8-7*	BACnet	10-06	Readout Receive Error Counter	12-31	Net Reference	14-21	Automatic Restart Time	15-44	Ordered Typecode String
8-70	BACnet Device Instance	10-07	Readout Bus Off Counter	12-32	Net Control	14-22	Operation Mode	15-45	Actual Typecode String
8-72	MS/TP Max Masters	10-1*	DeviceNet	12-33	CIP Revision	14-23	Typecode Setting	15-46	Frequency Converter Ordering No
8-73	MS/TP Max Info Frames	10-10	Process Data Type Selection	12-34	CIP Product Code	14-25	Trip Delay at Torque Limit	15-47	Power Card Ordering No
8-74	"I-Am" Service	10-11	Process Data Config Write	12-35	EDS Parameter	14-26	Trip Delay at Inverter Fault	15-48	LCP Id No
8-75	Initialisation Password	10-12	Process Data Config Read	12-37	COS Inhibit Timer	14-28	Production Settings	15-49	SW ID Control Card
8-8*	FC Port Diagnostics	10-13	Warning Parameter	12-4*	Modbus TCP	14-3*	Current Limit Ctrl.	15-50	SW ID Power Card
8-80	Bus Message Count	10-14	Net Reference	12-40	Status Parameter	14-30	Current Lim Ctrl, Proportional Gain	15-51	Frequency Converter Serial Number
8-81	Bus Error Count	10-15	Net Control	12-41	Slave Message Count	14-31	Current Lim Ctrl, Integration Time	15-53	Power Card Serial Number
8-82	Slave Messages Rcvd	10-2*	COS Filters	12-42	Slave Exception Message Count	14-32	Current Lim Ctrl, Filter Time	15-55	Vendor URL
8-83	Slave Error Count	10-20	COS Filter 1	12-8*	Other Ethernet Services	14-4*	Energy Optimising	15-56	Vendor Name
8-84	Slave Messages Sent	10-21	COS Filter 2	12-80	FTP Server	14-40	VT Level	15-5*	Option IDent
8-85	Slave Timeout Errors	10-22	COS Filter 3	12-81	HTTP Server	14-41	AEO Minimum Magnetisation	15-60	Option Mounted
8-89	Diagnosics Count	10-23	COS Filter 4	12-82	SMTP Service	14-42	Minimum AEO Frequency	15-61	Option SW Version
8-9*	Bus Jog / Feedback	10-3*	Parameter Access	12-89	Transparent Socket Channel Port	14-5*	Environment	15-62	Option Ordering No
8-91	Bus Jog 1 Speed	10-30	Array Index	12-90	Cable Diagnostic	14-50	RFI Filter	15-63	Option Serial No
8-94	Bus Jog 2 Speed	10-31	Store Data Values	12-91	Auto Cross Over	14-51	Slot A Option SW Version	15-70	Option in Slot A
8-95	Bus Feedback 1	10-32	Devicenet Revision	12-92	IGMP Snooping	14-52	Fan Control	15-72	Option in Slot B
8-96	Bus Feedback 2	10-33	Store Always	12-93	Cable Error Length	14-53	Fan Monitor	15-73	Slot B Option SW Version
9-*	Profibus	10-34	Devicenet Product Code						

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15-74	Option in Slot C0	16-66	Digital Output [bin]	20-12	Reference/Feedback Unit	21-21	Ext. 1 Proportional Gain	22-4*	Sleep Mode
15-75	Slot C0 Option SW Version	16-67	Pulse Input #29 [Hz]	20-13	Minimum Reference/Feedb.	21-22	Ext. 1 Integral Time	22-40	Minimum Run Time
15-76	Option in Slot C1	16-68	Pulse Input #33 [Hz]	20-14	Maximum Reference/Feedb.	21-23	Ext. 1 Differentiation Time	22-41	Minimum Sleep Time
15-77	Slot C1 Option SW Version	16-69	Pulse Output #27 [Hz]	20-2*	Feedback/Setpoint	21-24	Ext. 1 Dif. Gain Limit	22-42	Wake-up Speed [RPM]
15-78	Parameter Info	16-70	Pulse Output #29 [Hz]	20-21	Feedback Function	21-3*	Ext. CL 2 Ref/Fb.	22-43	Wake-up Speed [Hz]
15-92	Defined Parameters	16-71	Relay Output [bin]	20-22	Setpoint 1	21-30	Ext. 2 Ref./Feedback Unit	22-44	Wake-up Ref./FB Difference
15-93	Modified Parameters	16-72	Counter A	20-23	Setpoint 2	21-31	Ext. 2 Minimum Reference	22-45	Setpoint Boost
15-98	Drive Identification	16-73	Counter B	20-23	Setpoint 3	21-32	Ext. 2 Maximum Reference	22-46	Maximum Boost Time
15-99	Parameter Metadata	16-75	Analog In X30/11	20-3*	Feedb. Adv. Conv.	21-33	Ext. 2 Reference Source	22-5*	End of Curve
16-0*	Data Readouts	16-76	Analog In X30/12	20-30	Refrigerant	21-34	Ext. 2 Feedback Source	22-50	End of Curve Function
16-0*	General Status	16-77	Analog Out X30/8 [mA]	20-31	User Defined Refrigerant A1	21-35	Ext. 2 Setpoint	22-51	End of Curve Delay
16-00	Control Word	16-8*	Fieldbus & FC Port	20-32	User Defined Refrigerant A2	21-37	Ext. 2 Reference [Unit]	22-6*	Broken Belt Detection
16-01	Reference [Unit]	16-80	Fieldbus CTW 1	20-33	User Defined Refrigerant A3	21-38	Ext. 2 Feedback [Unit]	22-60	Broken Belt Function
16-02	Reference [%]	16-82	Fieldbus REF 1	20-34	Duct 1 Area [m ²]	21-39	Ext. 2 Output [%]	22-61	Broken Belt Torque
16-03	Status Word	16-84	Comm. Option STW	20-35	Duct 1 Area [in ²]	21-4*	Ext. CL 2 PID	22-62	Broken Belt Delay
16-05	Main Actual Value [%]	16-85	FC Port CTW 1	20-36	Duct 2 Area [m ²]	21-40	Ext. 2 Normal/Inverse Control	22-7*	Short Cycle Protection
16-09	Custom Readout	16-86	FC Port REF 1	20-37	Duct 2 Area [in ²]	21-41	Ext. 2 Proportional Gain	22-75	Short Cycle Protection
16-1*	Motor Status	16-9*	Diagnosis Readouts	20-38	Air Density Factor [%]	21-42	Ext. 2 Integral Time	22-76	Interval between Starts
16-10	Power [kW]	16-90	Alarm Word	20-6*	Sensorless	21-43	Ext. 2 Differentiation Time	22-77	Minimum Run Time
16-11	Power [hp]	16-91	Alarm Word 2	20-60	Sensorless Unit	21-44	Ext. 2 Dif. Gain Limit	22-78	Minimum Run Time Override
16-12	Motor Voltage	16-92	Warning Word	20-69	Sensorless Information	21-5*	Ext. CL 3 Ref/Fb.	22-79	Minimum Run Time Override Value
16-13	Frequency	16-93	Warning Word 2	20-70	Closed Loop Type	21-50	Ext. 3 Ref./Feedback Unit	22-8*	Flow Compensation
16-14	Motor Current	16-94	Ext. Status Word	20-71	PID Performance	21-51	Ext. 3 Minimum Reference	22-80	Flow Compensation
16-15	Frequency [%]	16-95	Ext. Status Word 2	20-72	PID Output Change	21-52	Ext. 3 Maximum Reference	22-81	Square-linear Curve Approximation
16-16	Torque [Nm]	16-96	Maintenance Word	20-73	Minimum Feedback Level	21-53	Ext. 3 Reference Source	22-82	Work Point Calculation
16-17	Speed [RPM]	18-*	Info & Readouts	20-74	Maximum Feedback Level	21-54	Ext. 3 Feedback Source	22-83	Speed at No-Flow [RPM]
16-18	Motor Thermal	18-0*	Maintenance Log	20-79	PID Autotuning	21-55	Ext. 3 Setpoint	22-84	Speed at No-Flow [Hz]
16-22	Torque [%]	18-00	Maintenance Log: Item	20-81	PID Normal/ Inverse Control	21-57	Ext. 3 Reference [Unit]	22-85	Speed at Design Point [RPM]
16-26	Power Filtered [kW]	18-01	Maintenance Log: Action	20-82	PID Start Speed [RPM]	21-58	Ext. 3 Feedback [Unit]	22-86	Speed at Design Point [Hz]
16-27	Power Filtered [hp]	18-02	Maintenance Log: Date and Time	20-84	PID Start Speed [Hz]	21-59	Ext. 3 Output [%]	22-87	Pressure at Rated Speed
16-3*	Drive Status	18-3*	Fire Mode Log	20-83	PID Anti Windup	21-6*	Ext. CL 3 PID	22-88	Pressure at Design Point
16-30	DC Link Voltage	18-10	Fire Mode Log: Event	20-84	PID Proportional Gain	21-60	Ext. 3 Normal/Inverse Control	22-89	Flow at Design Point
16-32	Brake Energy /s	18-11	Fire Mode Log: Time	20-91	PID Integral Time	21-61	Ext. 3 Proportional Gain	22-90	Flow at Rated Speed
16-33	Brake Energy /2 min	18-12	Fire Mode Log: Date and Time	20-94	PID Derivative Time	21-62	Ext. 3 Integral Time	23-*	Time-based Functions
16-34	Heatsink Temp.	18-31	Inv. Max. Current	20-95	PID Closed Loop Type	21-63	Ext. 3 Differentiation Time	23-00	ON Time
16-35	Inverter Thermal	18-32	Inv. Nom. Current	20-96	Ext. CL 1 Autotuning	21-64	Ext. 3 Dif. Gain Limit	23-01	ON Action
16-36	Inv. Max. Current	18-33	Analog Input X42/1	21-00	Ext. CL Autotuning	22-0*	Miscellaneous	23-02	OFF Time
16-37	Inv. Max. Current	18-31	Analog Input X42/3	21-01	PID Performance	22-00	External Interlock Delay	23-03	OFF Action
16-38	SL Controller State	18-32	Analog Input X42/5	21-02	PID Output Change	22-01	Power Filter Time	23-04	Occurrence
16-39	Control Card Temp.	18-33	Analog Out X42/7 [V]	21-1*	Ext. Closed Loop	22-2*	No-Flow Detection	23-0*	Timed Actions Settings
16-40	Logging Buffer Full	18-34	Analog Out X42/9 [V]	21-00	Closed Loop Type	22-20	Low Power Auto Set-up	23-08	Timed Actions Mode
16-41	Logging Buffer Full	18-35	Analog Out X42/11 [V]	21-01	PID Performance	22-21	Low Power Detection	23-09	Timed Actions Reactivation
16-43	Timed Actions Status	18-36	Analog Input X48/2 [mA]	21-02	PID Output Change	22-22	Low Speed Detection	23-1*	Maintenance
16-49	Current Fault Source	18-37	Temp. Input X48/4	21-03	Minimum Feedback Level	22-23	No-Flow Function	23-10	Maintenance Item
16-5*	Ref. & Feedb.	18-38	Temp. Input X48/7	21-04	Maximum Feedback Level	22-24	No-Flow Delay	23-11	Maintenance Action
16-50	External Reference	18-39	Temp. Input X48/10	21-09	PID Autotuning	22-26	Dry Pump Function	23-12	Maintenance Time Base
16-52	Feedback [Unit]	18-5*	Ref. & Feedb.	21-1*	Ext. CL 1 Ref/Fb.	22-27	Dry Pump Delay	23-13	Maintenance Time Interval
16-53	Digi Pot Reference	20-*	Drive Closed Loop	21-10	Ext. 1 Ref./Feedback Unit	22-3*	No-Flow Power Tuning	23-14	Maintenance Date and Time
16-54	Feedback 1 [Unit]	20-00	Feedback 1 Source	21-11	Ext. 1 Minimum Reference	22-30	No-Flow Power	23-1*	Maintenance Reset
16-55	Feedback 2 [Unit]	20-01	Feedback 1 Conversion	21-12	Ext. 1 Maximum Reference	22-31	Power Correction Factor	23-15	Reset Maintenance Word
16-56	Feedback 3 [Unit]	20-02	Feedback 2 Source Unit	21-13	Ext. 1 Reference Source	22-32	Low Speed [RPM]	23-16	Maintenance Text
16-58	PID Output [%]	20-03	Feedback 2 Source	21-14	Ext. 1 Feedback Source	22-33	Low Speed [Hz]	23-5*	Energy Log
16-6*	Inputs & Outputs	20-04	Feedback 2 Conversion	21-15	Ext. 1 Setpoint	22-34	Low Speed Power [kW]	23-50	Energy Log Resolution
16-60	Digital Input	20-05	Feedback 2 Source Unit	21-17	Ext. 1 Reference [Unit]	22-35	Low Speed Power [HP]	23-51	Period Start
16-61	Terminal 53 Switch Setting	20-06	Feedback 3 Source	21-18	Ext. 1 Feedback [Unit]	22-36	High Speed [RPM]	23-53	Energy Log
16-62	Analog Input 53	20-07	Feedback 3 Source Unit	21-19	Ext. 1 Output [%]	22-37	High Speed [Hz]	23-54	Reset Energy Log
16-63	Terminal 54 Switch Setting	20-08	Feedback 3 Conversion	21-2*	Ext. CL 1 PID	22-38	High Speed Power [kW]	23-6*	Trending
16-64	Analog Input 54	20-08	Feedback 3 Source Unit	21-20	Ext. 1 Normal/Inverse Control	22-39	High Speed Power [HP]	23-60	Trend Variable

23-61	Continuous Bin Data	25-41	Ramp Up Delay	26-44	Terminal X42/7 Timeout Preset	99-06	DAC 3 scale
23-62	Timed Bin Data	25-42	Staging Threshold	26-5* Analog Out X42/9		99-07	DAC 4 scale
23-63	Timed Period Start	25-43	Destaging Threshold	26-50	Terminal X42/9 Output	99-08	Test param 1
23-64	Timed Period Stop	25-44	Staging Speed [RPM]	26-51	Terminal X42/9 Min. Scale	99-09	Test param 2
23-65	Minimum Bin Value	25-45	Staging Speed [Hz]	26-52	Terminal X42/9 Max. Scale	99-10	DAC Option Slot
23-66	Reset Continuous Bin Data	25-46	Destaging Speed [RPM]	26-53	Terminal X42/9 Bus Control	99-11	RFI 2
23-67	Reset Timed Bin Data	25-47	Destaging Speed [Hz]	26-54	Terminal X42/9 Timeout Preset	99-12	Fan
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23-80	Power Reference Factor	25-50	Lead Pump Alternation	26-60	Terminal X42/11 Output	99-14	Paramdb requests in queue
23-81	Energy Cost	25-51	Alternation Event	26-61	Terminal X42/11 Min. Scale	99-15	Secondary Timer at Inverter Fault
23-82	Investment	25-52	Alternation Time Interval	26-62	Terminal X42/11 Max. Scale	99-16	No of Current Sensors
23-83	Energy Savings	25-53	Alternation Timer Value	26-63	Terminal X42/11 Bus Control	99-20	HS Temp. (PC1)
23-84	Cost Savings	25-54	Alternation Predefined Time	26-64	Terminal X42/11 Timeout Preset	99-21	HS Temp. (PC2)
24** Appl. Functions 2		25-55	Alternate if Load < 50%	31** Bypass Option		99-22	HS Temp. (PC3)
24-0* Fire Mode		25-56	Staging Mode at Alternation	31-00	Bypass Mode	99-23	HS Temp. (PC4)
24-00	Fire Mode Function	25-58	Run Next Pump Delay	31-01	Bypass Start Time Delay	99-24	HS Temp. (PC5)
24-01	Fire Mode Configuration	25-59	Run on Mains Delay	31-02	Bypass Trip Time Delay	99-25	HS Temp. (PC6)
24-02	Fire Mode Unit	25-8* Status		31-03	Test Mode Activation	99-26	HS Temp. (PC7)
24-03	Fire Mode Min Reference	25-80	Cascade Status	31-10	Bypass Status Word	99-27	HS Temp. (PC8)
24-04	Fire Mode Max Reference	25-81	Pump Status	31-11	Bypass Running Hours	99-29	Platform Version
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24-06	Fire Mode Reference Source	25-83	Relay Status	35** Sensor Input Option		99-90	Options present
24-07	Fire Mode Feedback Source	25-84	Pump ON Time	35-0* Temp. Input Mode		99-91	Motor Power Internal
24-09	Fire Mode Alarm Handling	25-85	Relay ON Time	35-00	Term. X48/4 Temp. Unit	99-92	Motor Voltage Internal
24-1* Drive Bypass		25-86	Reset Relay Counters	35-01	Term. X48/4 Input Type	99-93	Motor Frequency Internal
24-10	Drive Bypass Function	25-9* Service		35-02	Term. X48/7 Temp. Unit	99-94	Imbalance derate [%]
24-11	Drive Bypass Delay Time	25-90	Pump Interlock	35-03	Term. X48/7 Input Type	99-95	Temperature derate [%]
24-9* Multi-Motor Funct.		25-91	Manual Alternation	35-04	Term. X48/10 Temp. Unit	99-96	Overload derate [%]
24-90	Missing Motor Function	26-0* Analog I/O Option		35-05	Term. X48/10 Input Type		
24-91	Missing Motor Coefficient 1	26-0* Analog I/O Option		35-06	Temperature Sensor Alarm Function		
24-92	Missing Motor Coefficient 2	26-00	Terminal X42/1 Mode	35-1* Temp. Input X48/4			
24-93	Missing Motor Coefficient 3	26-01	Terminal X42/3 Mode	35-14	Term. X48/4 Filter Time Constant		
24-94	Missing Motor Coefficient 4	26-02	Terminal X42/5 Mode	35-15	Term. X48/4 Temp. Monitor		
24-95	Locked Rotor Function	26-1* Analog Input X42/1		35-16	Term. X48/4 Low Temp. Limit		
24-96	Locked Rotor Coefficient 1	26-10	Terminal X42/1 Low Voltage	35-17	Term. X48/4 High Temp. Limit		
24-97	Locked Rotor Coefficient 2	26-11	Terminal X42/1 High Voltage	35-2* Temp. Input X48/7			
24-98	Locked Rotor Coefficient 3	26-14	Term. X42/1 Low Ref./Feedb. Value	35-24	Term. X48/7 Filter Time Constant		
24-99	Locked Rotor Coefficient 4	26-15	Term. X42/1 High Ref./Feedb. Value	35-25	Term. X48/7 Temp. Monitor		
25** Cascade Controller		26-16	Term. X42/1 Filter Time Constant	35-26	Term. X48/7 Low Temp. Limit		
25-0* System Settings		26-17	Term. X42/1 Live Zero	35-27	Term. X48/7 High Temp. Limit		
25-00	Cascade Controller	26-2* Analog Input X42/3		35-3* Temp. Input X48/10			
25-02	Motor Start	26-20	Terminal X42/3 Low Voltage	35-34	Term. X48/10 Filter Time Constant		
25-04	Pump Cycling	26-21	Terminal X42/3 High Voltage	35-35	Term. X48/10 Temp. Monitor		
25-05	Fixed Lead Pump	26-24	Term. X42/3 Low Ref./Feedb. Value	35-36	Term. X48/10 Low Temp. Limit		
25-06	Number of Pumps	26-25	Term. X42/3 High Ref./Feedb. Value	35-37	Term. X48/10 High Temp. Limit		
25-2* Bandwidth Settings		26-26	Term. X42/3 Filter Time Constant	35-4* Analog Input X48/2			
25-20	Staging Bandwidth	26-27	Term. X42/3 Live Zero	35-42	Term. X48/2 Low Current		
25-21	Override Bandwidth	26-3* Analog Input X42/5		35-43	Term. X48/2 High Current		
25-22	Fixed Speed Bandwidth	26-30	Terminal X42/5 Low Voltage	35-44	Term. X48/2 Low Ref./Feedb. Value		
25-23	SBW Staging Delay	26-31	Terminal X42/5 High Voltage	35-45	Term. X48/2 High Ref./Feedb. Value		
25-24	SBW Destaging Delay	26-34	Term. X42/5 Low Ref./Feedb. Value	35-46	Term. X48/2 Filter Time Constant		
25-25	OBW Time	26-35	Term. X42/5 High Ref./Feedb. Value	35-47	Term. X48/2 Live Zero		
25-26	Destage At No-Flow	26-36	Term. X42/5 Filter Time Constant	99** Devol support			
25-27	Stage Function	26-37	Term. X42/5 Live Zero	99-00	DAC 1 selection		
25-28	Stage Function Time	26-4* Analog Out X42/7		99-01	DAC 2 selection		
25-29	Destage Function	26-40	Terminal X42/7 Output	99-02	DAC 3 selection		
25-30	Destage Function Time	26-41	Terminal X42/7 Min. Scale	99-03	DAC 4 selection		
25-4* Staging Settings		26-42	Terminal X42/7 Max. Scale	99-04	DAC 1 scale		
25-40	Ramp Down Delay	26-43	Terminal X42/7 Bus Control	99-05	DAC 2 scale		

NOTE

OVC can not be activated when running a PM motor (when 1-10 Motor Construction is set to [1] PM non salient SPM).

Mains Drop-out

During a mains drop-out, the frequency converter keeps running until the intermediate circuit voltage drops below the minimum stop level, which is typically 15% below the frequency converter's lowest rated supply voltage. The mains voltage before the drop-out and the motor load determines how long it takes for the inverter to coast.

Static Overload in VVC^{plus} mode

When the frequency converter is overloaded (the torque limit in 4-16 Torque Limit Motor Mode/4-17 Torque Limit Generator Mode is reached), the controls reduces the output frequency to reduce the load.

If the overload is excessive, a current may occur that makes the frequency converter cut out after approx. 5-10 sec.

Operation within the torque limit is limited in time (0-60 sec.) in 14-25 Trip Delay at Torque Limit.

2.13.1 Motor Thermal Protection

This is the way Danfoss is protecting the motor from being overheated. It is an electronic feature that simulates a bimetal relay based on internal measurements. The characteristic is shown in Illustration 2.21

It is clear that at lower speed the ETR cuts off at lower heat due to less cooling of the motor. In that way the motor are protected from being over heated even at low speed. The ETR feature is calculating the motor temperature based on actual current and speed. The calculated temperature is visible as a read out parameter in 16-18 Motor Thermal in the frequency converter.

The thermistor cut-out value is > 3kΩ.

Integrate a thermistor (PTC sensor) in the motor for winding protection.

Motor protection can be implemented using a range of techniques: PTC sensor in motor windings; mechanical thermal switch (Klixon type); or Electronic Thermal Relay (ETR).

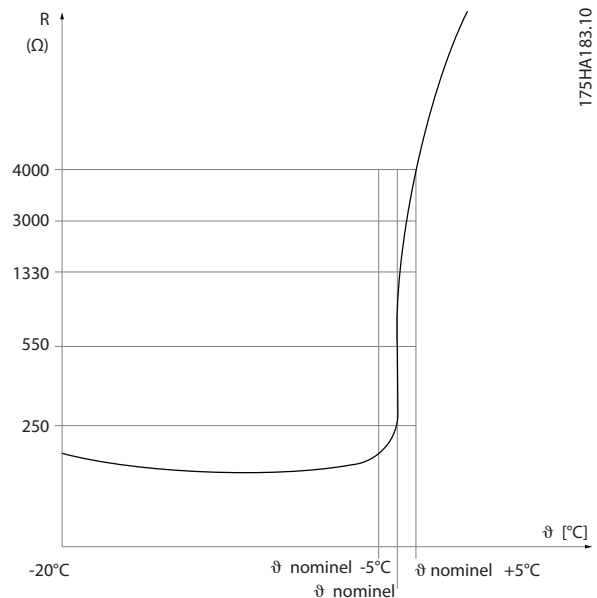
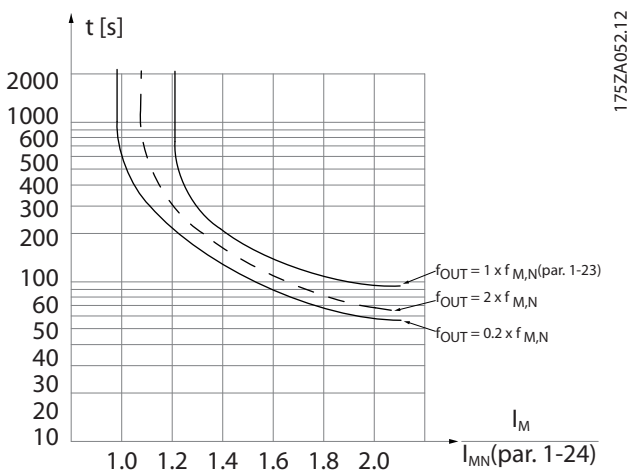
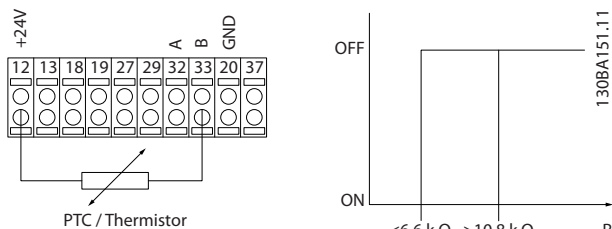


Illustration 2.21 The X-axis is showing the ratio between I_{motor} and I_{motor} nominal. The Y-axis is showing the time in seconds before the ETR cuts off and trips the frequency converter. The curves are showing the characteristic nominal speed at twice the nominal speed and at 0,2x the nominal speed.

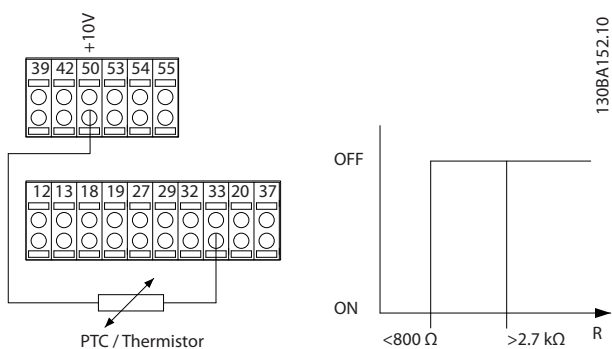
Using a digital input and 24V as power supply:
 Example: The frequency converter trips when the motor temperature is too high.

Parameter set-up:
 Set 1-90 Motor Thermal Protection to Thermistor Trip [2]
 Set 1-93 Thermistor Source to Digital Input 33 [6]



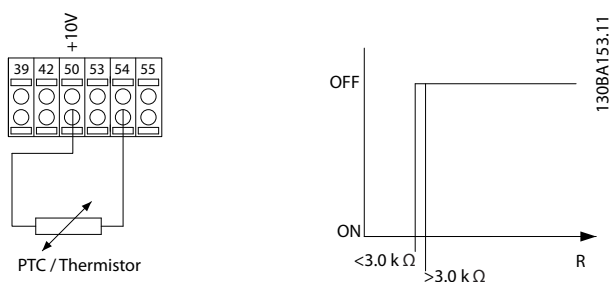
Using a digital input and 10V as power supply:
 Example: The frequency converter trips when the motor temperature is too high.

Parameter set-up:
 Set 1-90 Motor Thermal Protection to Thermistor Trip [2]
 Set 1-93 Thermistor Source to Digital Input 33 [6]



Using an analog input and 10V as power supply:
 Example: The frequency converter trips when the motor temperature is too high.

Parameter set-up:
 Set 1-90 Motor Thermal Protection to Thermistor Trip [2]
 Set 1-93 Thermistor Source to Analog Input 54 [2]
 Do not select a reference source.



Input	Supply Voltage V	Threshold
Digital/analog	Cut-out Values	Cut-out Values
Digital	24	< 6.6k Ω - > 10.8k Ω
Digital	10	< 800 Ω - > 2.7k Ω
Analog	10	< 3.0k Ω - > 3.0k Ω

NOTE

Check that the chosen supply voltage follows the specification of the used thermistor element.

Summary

With the Torque limit feature the motor is protected for being overloaded independent of the speed. With the ETR the motor is protected for being over heated and there is no need for any further motor protection. That means when the motor is heated up the ETR timer controls for how long time the motor can be running at the high temperature before it is stopped in order to prevent over heating. If the motor is overloaded without reaching the temperature where the ETR shuts of the motor, the torque limit is protecting the motor and application for being overloaded.

ETR is activated in 1-90 Motor Thermal Protection and is controlled in 4-16 Torque Limit Motor Mode. The time before the torque limit warning trips the frequency converter is set in 14-25 Trip Delay at Torque Limit.

8.7.4 Fault Messages

The warning/alarm information below defines each warning/alarm condition, provides the probable cause for the condition, and details a remedy or troubleshooting procedure.

WARNING 1, 10 Volts low

The control card voltage is below 10V from terminal 50. Remove some of the load from terminal 50, as the 10V supply is overloaded. Max. 15mA or minimum 590Ω.

This condition can be caused by a short in a connected potentiometer or improper wiring of the potentiometer.

Troubleshooting

Remove the wiring from terminal 50. If the warning clears, the problem is with the customer wiring. If the warning does not clear, replace the control card.

WARNING/ALARM 2, Live zero error

This warning or alarm will only appear if programmed by the user in *6-01 Live Zero Timeout Function*. The signal on one of the analog inputs is less than 50% of the minimum value programmed for that input. This condition can be caused by broken wiring or faulty device sending the signal.

Troubleshooting

Check connections on all the analog input terminals. Control card terminals 53 and 54 for signals, terminal 55 common. MCB 101 terminals 11 and 12 for signals, terminal 10 common. MCB 109 terminals 1, 3, 5 for signals, terminals 2, 4, 6 common).

Check that the frequency converter programming and switch settings match the analog signal type.

Perform Input Terminal Signal Test.

WARNING/ALARM 4, Mains phase loss

A phase is missing on the supply side, or the mains voltage imbalance is too high. This message also appears for a fault in the input rectifier on the frequency converter. Options are programmed at *14-12 Function at Mains Imbalance*.

Troubleshooting

Check the supply voltage and supply currents to the frequency converter.

WARNING 5, DC link voltage high

The intermediate circuit voltage (DC) is higher than the high voltage warning limit. The limit is dependent on the frequency converter voltage rating. The unit is still active.

WARNING 6, DC link voltage low

The intermediate circuit voltage (DC) is lower than the low voltage warning limit. The limit is dependent on the frequency converter voltage rating. The unit is still active.

WARNING/ALARM 7, DC overvoltage

If the intermediate circuit voltage exceeds the limit, the frequency converter trips after a time.

Troubleshooting

Connect a brake resistor

Extend the ramp time

Change the ramp type

Activate the functions in *2-10 Brake Function*

Increase *14-26 Trip Delay at Inverter Fault*

WARNING/ALARM 8, DC under voltage

If the intermediate circuit voltage (DC link) drops below the under voltage limit, the frequency converter checks if a 24V DC backup supply is connected. If no 24V DC backup supply is connected, the frequency converter trips after a fixed time delay. The time delay varies with unit size.

Troubleshooting

Check that the supply voltage matches the frequency converter voltage.

Perform input voltage test

Perform soft charge circuit test

WARNING/ALARM 9, Inverter overload

The frequency converter is about to cut out because of an overload (too high current for too long). The counter for electronic, thermal inverter protection gives a warning at 98% and trips at 100%, while giving an alarm. The frequency converter *cannot* be reset until the counter is below 90%.

The fault is that the frequency converter is overloaded by more than 100% for too long.

Troubleshooting

Compare the output current shown on the LCP with the frequency converter rated current.

Compare the output current shown on the LCP with measured motor current.

Display the Thermal Drive Load on the LCP and monitor the value. When running above the frequency converter continuous current rating, the counter should increase. When running below the frequency converter continuous current rating, the counter should decrease.

See the derating section in the *Design Guide* for more details if a high switching frequency is required.

WARNING/ALARM 10, Motor overload temperature

According to the electronic thermal protection (ETR), the motor is too hot. Select whether the frequency converter gives a warning or an alarm when the counter reaches 100% in *1-90 Motor Thermal Protection*. The fault occurs when the motor is overloaded by more than 100% for too long.

Troubleshooting

Check for motor overheating.

Check if the motor is mechanically overloaded

Check that the motor current set in *1-24 Motor Current* is correct.

Ensure that Motor data in parameters 1-20 through 1-25 are set correctly.

If an external fan is in use, check in *1-91 Motor External Fan* that it is selected.

Running AMA in *1-29 Automatic Motor Adaptation (AMA)* may tune the frequency converter to the motor more accurately and reduce thermal loading.

WARNING/ALARM 11, Motor thermistor over temp

The thermistor might be disconnected. Select whether the frequency converter gives a warning or an alarm in *1-90 Motor Thermal Protection*.

Troubleshooting

Check for motor overheating.

Check if the motor is mechanically overloaded.

When using terminal 53 or 54, check that the thermistor is connected correctly between either terminal 53 or 54 (analog voltage input) and terminal 50 (+10V supply) and that the terminal switch for 53 or 54 is set for voltage. Check *1-93 Thermistor Source* selects terminal 53 or 54.

When using digital inputs 18 or 19, check that the thermistor is connected correctly between either terminal 18 or 19 (digital input PNP only) and terminal 50. Check *1-93 Thermistor Source* selects terminal 18 or 19.

WARNING/ALARM 12, Torque limit

The torque has exceeded the value in *4-16 Torque Limit Motor Mode* or the value in *4-17 Torque Limit Generator Mode*. *14-25 Trip Delay at Torque Limit* can change this from a warning only condition to a warning followed by an alarm.

Troubleshooting

If the motor torque limit is exceeded during ramp up, extend the ramp up time.

If the generator torque limit is exceeded during ramp down, extend the ramp down time.

If torque limit occurs while running, possibly increase the torque limit. Be sure the system can operate safely at a higher torque.

Check the application for excessive current draw on the motor.

WARNING/ALARM 13, Over current

The inverter peak current limit (approximately 200% of the rated current) is exceeded. The warning lasts about 1.5 secs., then the frequency converter trips and issues an alarm. This fault may be caused by shock loading or fast acceleration with high inertia loads. If extended mechanical brake control is selected, trip can be reset externally.

Troubleshooting

Remove power and check if the motor shaft can be turned.

Check that the motor size matches the frequency converter.

Check parameters 1-20 through 1-25. for correct motor data.

ALARM 14, Earth (ground) fault

There is current from the output phases to earth, either in the cable between the frequency converter and the motor or in the motor itself.

Troubleshooting:

Remove power to the frequency converter and repair the earth fault.

Check for earth faults in the motor by measuring the resistance to ground of the motor leads and the motor with a megohmmeter.

ALARM 15, Hardware mismatch

A fitted option is not operational with the present control board hardware or software.

Record the value of the following parameters and contact your Danfoss supplier:

15-40 FC Type

15-41 Power Section

15-42 Voltage

15-43 Software Version

15-45 Actual Typecode String

15-49 SW ID Control Card

15-50 SW ID Power Card

15-60 Option Mounted

15-61 Option SW Version (for each option slot)

ALARM 16, Short circuit

There is short-circuiting in the motor or motor wiring.

Remove power to the frequency converter and repair the short circuit.

WARNING/ALARM 17, Control word timeout

There is no communication to the frequency converter. The warning will only be active when *8-04 Control Word Timeout Function* is NOT set to OFF.

If *8-04 Control Word Timeout Function* is set to *Stop* and *Trip*, a warning appears and the frequency converter ramps down until it stops then displays an alarm.

Troubleshooting

Check connections on the serial communication cable.

Increase *8-03 Control Word Timeout Time*

Check the operation of the communication equipment.

Verify a proper installation based on EMC requirements.

ALARM 18, Start failed

The speed has not been able to exceed *1-77 Compressor Start Max Speed [RPM]* during start within the allowed time. (set in *1-79 Compressor Start Max Time to Trip*). This may be caused by a blocked motor.

WARNING 23, Internal fan fault

The fan warning function is an extra protective function that checks if the fan is running/mounted. The fan warning can be disabled in *14-53 Fan Monitor* ([0] Disabled).

For the D, E, and F Frame filters, the regulated voltage to the fans is monitored.

Troubleshooting

Check for proper fan operation.

Cycle power to the frequency converter and check that the fan operates briefly at start up.

Check the sensors on the heatsink and control card.

WARNING 24, External fan fault

The fan warning function is an extra protective function that checks if the fan is running/mounted. The fan warning can be disabled in *14-53 Fan Monitor* ([0] Disabled).

Troubleshooting

Check for proper fan operation.

Cycle power to the frequency converter and check that the fan operates briefly at start up.

Check the sensors on the heatsink and control card.

WARNING 25, Brake resistor short circuit

The brake resistor is monitored during operation. If a short circuit occurs, the brake function is disabled and the warning appears. The frequency converter is still operational but without the brake function. Remove power to the frequency converter and replace the brake resistor (see *2-15 Brake Check*).

WARNING/ALARM 26, Brake resistor power limit

The power transmitted to the brake resistor is calculated as a mean value over the last 120 seconds of run time. The calculation is based on the intermediate circuit voltage and the brake resistance value set in *2-16 AC brake Max. Current*. The warning is active when the dissipated braking is higher than 90% of the brake resistance power. If *Trip* [2] is selected in *2-13 Brake Power Monitoring*, the frequency converter will trip when the dissipated braking power reaches 100%.

WARNING/ALARM 27, Brake chopper fault

The brake transistor is monitored during operation and if a short circuit occurs, the brake function is disabled and a warning is issued. The frequency converter is still operational but, since the brake transistor has short-circuited, substantial power is transmitted to the brake resistor, even if it is inactive.

Remove power to the frequency converter and remove the brake resistor.

WARNING/ALARM 28, Brake check failed

The brake resistor is not connected or not working. Check *2-15 Brake Check*.

ALARM 29, Heatsink temp

The maximum temperature of the heatsink has been exceeded. The temperature fault will not reset until the temperature falls below a defined heatsink temperature. The trip and reset points are different based on the frequency converter power size.

Troubleshooting

Check for the following conditions.

Ambient temperature too high.

Motor cable too long.

Incorrect airflow clearance above and below the frequency converter

Blocked airflow around the frequency converter.

Damaged heatsink fan.

Dirty heatsink.

ALARM 30, Motor phase U missing

Motor phase U between the frequency converter and the motor is missing.

Remove power from the frequency converter and check motor phase U.

ALARM 31, Motor phase V missing

Motor phase V between the frequency converter and the motor is missing.

Remove power from the frequency converter and check motor phase V.

ALARM 32, Motor phase W missing

Motor phase W between the frequency converter and the motor is missing.

Remove power from the frequency converter and check motor phase W.

ALARM 33, Inrush fault

Too many power-ups have occurred within a short time period. Let the unit cool to operating temperature.

WARNING/ALARM 34, communication fault

The fieldbus on the communication option card is not working.

WARNING/ALARM 36, Mains failure

This warning/alarm is only active if the supply voltage to the frequency converter is lost and *14-10 Mains Failure* is NOT set to [0] *No Function*. Check the fuses to the frequency converter and mains power supply to the unit.

ALARM 38, Internal fault

When an internal fault occurs, a code number defined in the table below is displayed.

Troubleshooting

Cycle power

Check that the option is properly installed

Check for loose or missing wiring

It may be necessary to contact your Danfoss supplier or service department. Note the code number for further troubleshooting directions.

No.	Text
0	Serial port cannot be initialised. Contact your Danfoss supplier or Danfoss Service Department.
256-258	Power EEPROM data is defective or too old
512-519	Internal fault. Contact your Danfoss supplier or Danfoss Service Department.
783	Parameter value outside of min/max limits
1024-1284	Internal fault. Contact your Danfoss supplier or the Danfoss Service Department.
1299	Option SW in slot A is too old
1300	Option SW in slot B is too old
1302	Option SW in slot C1 is too old
1315	Option SW in slot A is not supported (not allowed)
1316	Option SW in slot B is not supported (not allowed)
1318	Option SW in slot C1 is not supported (not allowed)
1379-2819	Internal fault. Contact your Danfoss supplier or Danfoss Service Department.
2820	LCP stack overflow
2821	Serial port overflow
2822	USB port overflow
3072-5122	Parameter value is outside its limits
5123	Option in slot A: Hardware incompatible with control board hardware
5124	Option in slot B: Hardware incompatible with control board hardware
5125	Option in slot C0: Hardware incompatible with control board hardware
5126	Option in slot C1: Hardware incompatible with control board hardware
5376-6231	Internal fault. Contact your Danfoss supplier or Danfoss Service Department.

ALARM 39, Heatsink sensor

No feedback from the heatsink temperature sensor.

The signal from the IGBT thermal sensor is not available on the power card. The problem could be on the power card, on the gate drive card, or the ribbon cable between the power card and gate drive card.

WARNING 40, Overload of digital output terminal 27

Check the load connected to terminal 27 or remove short-circuit connection. Check *5-00 Digital I/O Mode* and *5-01 Terminal 27 Mode*.

WARNING 41, Overload of digital output terminal 29

Check the load connected to terminal 29 or remove short-circuit connection. Check *5-00 Digital I/O Mode* and *5-02 Terminal 29 Mode*.

WARNING 42, Overload of digital output on X30/6 or overload of digital output on X30/7

For X30/6, check the load connected to X30/6 or remove the short-circuit connection. Check *5-32 Term X30/6 Digi Out (MCB 101)*.

For X30/7, check the load connected to X30/7 or remove the short-circuit connection. Check *5-33 Term X30/7 Digi Out (MCB 101)*.

ALARM 45, Earth fault 2

Earth (ground) fault on start up.

Troubleshooting

Check for proper earthing (grounding) and loose connections.

Check for proper wire size.

Check motor cables for short-circuits or leakage currents.

ALARM 46, Power card supply

The supply on the power card is out of range.

There are three power supplies generated by the switch mode power supply (SMPS) on the power card: 24V, 5V, +/- 18V. When powered with 24V DC with the MCB 107 option, only the 24V and 5V supplies are monitored. When powered with three phase mains voltage, all three supplies are monitored.

Troubleshooting

Check for a defective power card.

Check for a defective control card.

Check for a defective option card.

If a 24V DC power supply is used, verify proper supply power.

WARNING 47, 24V supply low

The 24 V DC is measured on the control card. The external 24V DC backup power supply may be overloaded, otherwise contact your Danfoss supplier.

WARNING 48, 1.8V supply low

The 1.8V DC supply used on the control card is outside of allowable limits. The power supply is measured on the control card. Check for a defective control card. If an option card is present, check for an overvoltage condition.

WARNING 49, Speed limit

When the speed is not within the specified range in *4-11 Motor Speed Low Limit [RPM]* and *4-13 Motor Speed High Limit [RPM]*, the frequency converter will show a warning. When the speed is below the specified limit in *1-86 Trip Speed Low [RPM]* (except when starting or stopping) the frequency converter will trip.

ALARM 50, AMA calibration failed

Contact your Danfoss supplier or Danfoss Service Department.

ALARM 51, AMA check U_{nom} and I_{nom}

The settings for motor voltage, motor current, and motor power are wrong. Check the settings in parameters 1-20 to 1-25.

ALARM 52, AMA low I_{nom}

The motor current is too low. Check the setting in *4-18 Current Limit*.

ALARM 53, AMA motor too big

The motor is too big for the AMA to operate.

ALARM 54, AMA motor too small

The motor is too small for the AMA to operate.

ALARM 55, AMA Parameter out of range

The parameter values of the motor are outside of the acceptable range. AMA will not run.

56 ALARM, AMA interrupted by user

The AMA has been interrupted by the user.

ALARM 57, AMA internal fault

Try to restart AMA again. Repeated restarts may over heat the motor.

ALARM 58, AMA internal fault

Contact your Danfoss supplier.

WARNING 59, Current limit

The current is higher than the value in *4-18 Current Limit*. Ensure that Motor data in parameters 1-20 through 1-25 are set correctly. Possibly increase the current limit. Be sure the system can operate safely at a higher limit.

WARNING 60, External interlock

A digital input signal is indicating a fault condition external to the frequency converter. An external interlock has commanded the frequency converter to trip. Clear the external fault condition. To resume normal operation, apply 24V DC to the terminal programmed for external interlock. Reset the frequency converter.

WARNING 62, Output frequency at maximum limit

The output frequency has reached the value set in *4-19 Max Output Frequency*. Check the application to determine the cause. Possibly increase the output frequency limit. Be sure the system can operate safely at a higher output frequency. The warning will clear when the output drops below the maximum limit.

WARNING/ALARM 65, Control card over temperature

The cutout temperature of the control card is 80° C.

Troubleshooting

- Check that the ambient operating temperature is within limits.
- Check for clogged filters.
- Check fan operation.
- Check the control card.

WARNING 66, Heatsink temperature low

The frequency converter is too cold to operate. This warning is based on the temperature sensor in the IGBT module.

Increase the ambient temperature of the unit. Also, a trickle amount of current can be supplied to the frequency converter whenever the motor is stopped by setting *2-00 DC Hold/Preheat Current* at 5% and *1-80 Function at Stop*

ALARM 67, Option module configuration has changed

One or more options have either been added or removed since the last power-down. Check that the configuration change is intentional and reset the unit.

ALARM 68, Safe stop activated

Loss of the 24V DC signal on terminal 37 has caused the filter to trip. To resume normal operation, apply 24V DC to terminal 37 and reset the filter.

The temperature sensor on the power card is either too hot or too cold.

Troubleshooting

- Check that the ambient operating temperature is within limits.
- Check for clogged filters.
- Check fan operation.
- Check the power card.

ALARM 70, Illegal FC configuration

The control card and power card are incompatible. Contact your supplier with the type code of the unit from the nameplate and the part numbers of the cards to check compatibility.

ALARM 71, PTC 1 safe stop

Safe Stop has been activated from the MCB 112 PTC Thermistor Card (motor too warm). Normal operation can be resumed when the MCB 112 applies 24V DC to T-37 again (when the motor temperature reaches an acceptable level) and when the Digital Input from the MCB 112 is deactivated. When that happens, a reset signal must be sent (via Bus, Digital I/O, or by pressing [RESET]).

ALARM 72, Dangerous failure

Safe Stop with Trip Lock. The Dangerous Failure Alarm is issued if the combination of safe stop commands is unexpected. This is the case if the MCB 112 VLT PTC Thermistor Card enables X44/10 but safe stop is somehow not enabled. Furthermore, if the MCB 112 is the only device using safe stop (specified through selection [4] or [5] in *5-19 Terminal 37 Safe Stop*), an unexpected combination is activation of safe stop without the X44/10 being activated. The following table summarizes the unexpected combinations that lead to Alarm 72. Note that if X44/10 is activated in selection 2 or 3, this signal is ignored! However, the MCB 112 will still be able to activate Safe Stop.

ALARM 80, Drive initialised to default value

Parameter settings are initialised to default settings after a manual reset. Reset the unit to clear the alarm.

ALARM 92, No flow

A no-flow condition has been detected in the system. 22-23 *No-Flow Function* is set for alarm. Troubleshoot the system and reset the frequency converter after the fault has been cleared.

ALARM 93, Dry pump

A no-flow condition in the system with the frequency converter operating at high speed may indicate a dry pump. 22-26 *Dry Pump Function* is set for alarm. Troubleshoot the system and reset the frequency converter after the fault has been cleared.

ALARM 94, End of curve

Feedback is lower than the set point. This may indicate leakage in the system. 22-50 *End of Curve Function* is set for alarm. Troubleshoot the system and reset the frequency converter after the fault has been cleared.

ALARM 95, Broken belt

Torque is below the torque level set for no load, indicating a broken belt. 22-60 *Broken Belt Function* is set for alarm. Troubleshoot the system and reset the frequency converter after the fault has been cleared.

ALARM 96, Start delayed

Motor start has been delayed due to short-cycle protection. 22-76 *Interval between Starts* is enabled. Troubleshoot the system and reset the frequency converter after the fault has been cleared.

WARNING 97, Stop delayed

Stopping the motor has been delayed due to short cycle protection. 22-76 *Interval between Starts* is enabled. Troubleshoot the system and reset the frequency converter after the fault has been cleared.

WARNING 98, Clock fault

Time is not set or the RTC clock has failed. Reset the clock in 0-70 *Date and Time*.

WARNING 200, Fire mode

This indicates the frequency converter is operating in fire mode. The warning clears when fire mode is removed. See the fire mode data in the alarm log.

WARNING 201, Fire mode was active

This indicates the frequency converter had entered fire mode. Cycle power to the unit to remove the warning. See the fire mode data in the alarm log.

WARNING 202, Fire mode limits exceeded

While operating in fire mode one or more alarm conditions have been ignored which would normally trip the unit. Operating in this condition voids unit warranty. Cycle power to the unit to remove the warning. See the fire mode data in the alarm log.

WARNING 203, Missing motor

With a frequency converter operating multi-motors, an under-load condition was detected. This could indicate a missing motor. Inspect the system for proper operation.

WARNING 204, Locked rotor

With a frequency converter operating multi-motors, an overload condition was detected. This could indicate a locked rotor. Inspect the motor for proper operation.

WARNING 250, New spare part

A component in the frequency converter has been replaced. Reset the frequency converter for normal operation.

WARNING 251, New typecode

The power card or other components have been replaced and the typecode changed. Reset to remove the warning and resume normal operation.
