FREQUENCY INVERTER
FOR INTERFERENCE-FREE, QUIET AND
DEPENDABLE MOTOR CONTROL

NFO Sinus®
G2

Serial Interface
Manual
NFO Sinus

Contents

1   Preface

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2   Introduction

The intention of this document is to be used when designing equipment for communication with NFO Sinus through the built in serial interface.

The document describes the serial interface protocol in detail. Through this protocol, the serial interface can be used for parameter setting as well as run control of the inverter without any extra options.

This version (V5.0) of the document applies to NFO Sinus with Coprocessor firmware Ver 4.21 or later. For older firmware versions, use V4.0 of this document.

3   Hardware

The serial interface can be either RS232 or RS485, chosen by jumper setting. In case of RS232 a RJ45 connector is used, in case of RS485 a twisted pair is connected to the terminals. All connections are reached by removing the lower front panel of the inverter. See the Operation and Installation Manual for detailed information.

4   Character transmission

The communication protocol is based on asynchronous character transmission. The characters are coded either as 7 data bits, 1 stop bit and even parity or 8 data bits, 1 stop bit and no parity. Transmission rate is 1200, 2400, 4800 or 9600 bit/sec.

Both the character code and transmission rate is stored as parameters in the inverter and can be changed either by the keypad or by commands through the serial channel. A change comes into effect as soon as it has been received.

5 Messages

The inverter recognises two types of messages:
ENQUIRY, a question, asking for the value of a parameter.
SELECT, command specifying the new value of a parameter.

The inverter responds by three different types of messages:
REPLY, a response containing the current value of a parameter.
ACK, acknowledge.
NAK, not acknowledge.

The five different message types, assembled by data fields, are described below. After that, each field is described individually. All are based on ASCII characters.

ENQUIRY:

EOT	ADR	PARAMETER	ENQ

SELECT:

EOT	ADR	STX	PARAMETER	=	VALUE	ETX	BCC

REPLY:

ADR	STX	PARAMETER	=	VALUE	ETX	BCC

ACK:

ADR	ACK

NAK:

ADR	NAK

EOT   Control character "End-Of-Transmission" code 4 (04H)

ENQ   Control character "ENQuiry" code 5 (05H)

STX   Control character "Start-of-TeXt" code 2 (02H)

ETX   Control character "End-of-TeXt" code 3 (03H)

ACK   Control character "ACKnowledge" code 6 (06H)

NAK   Control character "Not-AcKnowledge" code 21 (15H)

=   Equals sign code 61 (3DH)

ADR	Inverter address. One character, coded by adding 32 to the address. Valid addresses are 0 to 95. Code 32 (20H) to 127 (7FH).
PARAMETER	Parameter address Five characters which identify the parameter. The first character is a prefix, which is the same for all parameters. The parameter prefix is followed by a four position hexadecimal number.
VALUE	Parameter value Four characters, hexadecimal number gives the value range -32768 (8000H) to +32767 (7FFFH). Sent as ASCII characters.
BCC	Check sum. One character calculated with the XOR function from all characters, starting with the character after STX, to ETX.

Example
A SELECT message to address 1 which gives parameter 25 the value of 100 has the following appearance:
04H 21H 02H 45H 30H 30H 31H 39H 3DH 30H 30H 36H 34H 03H 71H

6 Message flow

The inverter never sends messages on its own initiative, only as the answer to incoming messages.

The inverter ignores incoming messages with parity faults or incorrect check sum characters. Answers are only given to ENQUIRY and SELECT messages with correct addresses.

The address is saved as a parameter and can be given values in the interval from 1 to 94. Address 0 is reserved for point-to-point communication. All inverters, irrespective of programmed address, answer to point-to-point messages. Address 0 may only be used if only one inverter is connected to a host computer. Address 95 is used to send SELECT messages at the same time to all connected inverters (broadcast). When an inverter receives a SELECT message with address 95, it obeys the command, irrespective of programmed address, but does not send a return message. The inverter's address parameter can be changed from the keypad as well as via the serial channel. The new address comes into force as soon as the command has been received.

A correctly received ENQUIRY message is answered by a REPLY type message, containing the current value of the relevant parameter. If the ENQUIRY message contains an invalid parameter, this is answered by NAK.

SELECT messages are answered by ACK if the parameter is valid, the value is within permissible limits, the check sum is correct and the specified command is permissible at current program status, otherwise NAK.

7   Error Handling

If any fault occurs, the motor will be stopped and it will not be possible to re-start until the fault has been mended and acknowledged. On the serial channel, this means that no commands can be executed. All SELECT messages will be answered by NAK. ENQUIRY messages are answered as usual. The error cause is indicated by the inverter status. The current inverter status is displayed with text in the inverter display and as a value in the inverter status parameter, readable through the serial interface. Acknowledging can be done via the keypad or by reading inverter status via an ENQUIRE message on the serial channel. It is also possible to read the status without acknowledge of any errors through a different parameter.

If a serial channel fault occurs, a fault flag is set, which specifies the type of fault. When a fault flag has been set, the inverter status will specify a serial fault on condition that the fault occurred during control from the serial channel. The serial interface fault flags are collected in a separate parameter and are collectively zeroed by reading this parameter via an ENQUIRE message on the serial channel.

There is one exception from the above. If the inverter receives a SELECT/MODE/STOP-message to address 95 (broadcast), it will be executed even if a serial fault is present. Additionally, in this case, the serial fault will be acknowledged and all serial fault flags will be reset.

When a serial channel fault occurs during motor control or parameter manipulation through the serial interface or because of a manual take-over at the keypad, also the serial interface mode will be changed. The serial interface mode is read/writable through the serial interface.

When a SELECT message is responded by NAK, the first measure should be to read/acknowledge the inverter status to determine the reason for the NAK. If the inverter status indicates serial interface fault, the serial interface fault flags also has to be read/acknowledged.

It is possible to use a time-out function as a protection against interruptions in serial communication. When this function is used, new messages must arrive on the serial channel all the time, within a specified time-out time. If the time-out time is exceeded, this is interpreted as a serial channel fault. The time-out time is specified as a parameter. Setting the time-out time to 0 will disable the time-out function.

Serial channel faults can not be acknowledged from the keypad, and do not affect control of the inverter from other sources than the serial channel.

8   Parameter Description

Table 1 shows parameters available from the serial channel as well as from the keypad/display of the inverter. The parameters are arranged in groups in the same order as they appears on the display, For a detailed description of each parameter, see the Operation and Installation Manual. (*) Means value depends on inverter type.

ID	Name	Description	Range	Dec. digits	Unit	Type
E0008	P-Nom	Nominal motor output (RMS)	1 – 10000	2	kW	Init
E0009	U-Nom	Nominal motor voltage (RMS)	1 – 1000		V	Init
E000F	f-Nom	Nominal motor frequency	1 – 500		Hz	Init
E0010	N-Nom	Nominal motor speed	5 – 32765		rpm	Init
E0011	I-Nom	Nominal motor current (RMS)	1 – (*)	1	A	Init
E0015	cos φ	Motor cos φ	1 – 100	2		Init
E0002	R-stat	Motor stator resistance	1 – (*)	2	Ω	Init
E0001	R-rot	Motor rotor resistance	1 – (*)	2	Ω	Init
E0004	L-main	Motor main inductance	(*)	4	H	Init
E0003	Sigma	Motor leak inductance	1 - 1000	3		Init
E0005	I-magn	Magnetisation current setpoint (RMS)	0 – (I-limt – 1)	2	A	Init
E0018	I-limt	Maximum motor current (RMS)	(I-magn + 1) – (*)	2	A	Init
E0030	Mode	Control mode	*Freque = 0* *PI-reg = 1* *Torque = 2* *Speed = 3*			Init
E001D	Accel	Acceleration time from 0 to f-Nom	2 – 5000	1	s	Init/Run
E001C	Retard	Retardation time from f-Nom to 0	2 - 5000	1	s	Init/Run
E002C	RunDly	Start delay.	0 - 3600		s	Init/Run
E0088	DC-Brk	Motor DC braking before startup.	0 - 3600		s	Init/Run
E0098	AinSet	Type of setpoint at analogue input.	*0-20mA = 3* *4-20mA = 4* *+/-20mA = 5* *0-10V = 6* *2-10V = 7* *+/-10V = 8* *Pot 10k = 9*			Init
E0033	AutoStart	Autostart mode	*OFF = 0* *ON = 1*			Init/Run
E00BB	EnergySave	Energy save function	*OFF = 0* *ON = 1*			Init/Run

E0032	StMode	Stop mode	Brake = 1 Release = 0			Init/Run
E0006	Kp-spd	Amplification speed regulator	1 – (*)	2		Init/Run
E0017	Ti-spd	Integration time speed regulator	1 - 1000	2	s	Init/Run
E0051	Byp-fr	Bypass frequency	0 – 1500	1	Hz	Init/Run
E0050	Byp-bw	Bypass frequency bandwidth	0 - 1500	1	Hz	Init/Run
E0038	AnyBus	Field bus protocol	PPO3 = 3			Init/Run
E0031	OpMode	Setpoint source, frequency	Terminal = 129 Analogue F = 3 Analogue R = 5 Fix-1 F = 11 Fix-2 F = 19 Fix-3 F = 27 Fix-4 F = 35 Fix-5 F = 43 Fix-6 F = 51 Fix-7 F = 59 Fix-1 R = 13 Fix-2 R = 21 Fix-3 R = 29 Fix-4 R = 37 Fix-5 R = 45 Fix-6 R = 53 Fix-7 R = 61 AnyBus = 193			Init/Run
E0041	F-fix1	Fixed frequency 1	0 – 1500	1	Hz	Init/Run
E0042	F-fix2	Fixed frequency 2	0 - 1500	1	Hz	Init/Run
E0043	F-fix3	Fixed frequency 3	0 – 1500	1	Hz	Init/Run
E0044	F-fix4	Fixed frequency 4	0 - 1500	1	Hz	Init/Run
E0045	F-fix5	Fixed frequency 5	0 – 1500	1	Hz	Init/Run
E0046	F-fix6	Fixed frequency 6	0 - 1500	1	Hz	Init/Run
E0047	F-fix7	Fixed frequency 7	0 – 1500	1	Hz	Init/Run
E000D	Fr-Min	Lowest frequency when running with analogue setpoint.	0 - 1500	1	Hz	Init/Run
E000B	Fr-Max	Highest frequency when running with analogue setpoint.	0 - 1500	1	Hz	Init/Run

E0089	OpMode	Setpoint source, speed.	*Terminal = 129* *Analogue F = 3* *Analogue R = 5* *Fix-1 F = 11* *Fix-2 F = 19* *Fix-3 F = 27* *Fix-4 F = 35* *Fix-5 F = 43* *Fix-6 F = 51* *Fix-7 F = 59* *Fix-1 R = 13* *Fix-2 R = 21* *Fix-3 R = 29* *Fix-4 R = 37* *Fix-5 R = 45* *Fix-6 R = 53* *Fix-7 R = 61* *AnyBus = 193*			Init/Run
E008A	C-fix1	Fixed speed 1	0 – 9000		rpm	Init/Run
E008B	C-fix2	Fixed speed 2	0 – 9000		rpm	Init/Run
E008C	C-fix3	Fixed speed 3	0 – 9000		rpm	Init/Run
E008D	C-fix4	Fixed speed 4	0 – 9000		rpm	Init/Run
E008E	C-fix5	Fixed speed 5	0 – 9000		rpm	Init/Run
E008F	C-fix6	Fixed speed 6	0 – 9000		rpm	Init/Run
E0090	C-fix7	Fixed speed 7	0 – 9000		rpm	Init/Run
E0091	Sp-Min	Lowest speed when running with analogue setpoint.	0 – 9000		rpm	Init/Run
E0092	Sp-Max	Highest speed when running with analogue setpoint.	0 – 9000		rpm	Init/Run
E0035	OpMode	Setpoint source, torque.	*Terminal = 129* *Analogue F = 3* *Analogue R = 5* *Fix-1 F = 11* *Fix-2 F = 19* *Fix-3 F = 27* *Fix-4 F = 35* *Fix-5 F = 43* *Fix-6 F = 51* *Fix-7 F = 59* *Fix-1 R = 13* *Fix-2 R = 21* *Fix-3 R = 29* *Fix-4 R = 37* *Fix-5 R = 45* *Fix-6 R = 53* *Fix-7 R = 61*			Init/Run
E0061	T-fix1	Fixed torque 1.	1 – 200		%	Init/Run
E0062	T-fix2	Fixed torque 2.	1 – 200		%	Init/Run
E0063	T-fix3	Fixed torque 3.	1 – 200		%	Init/Run
E0064	T-fix4	Fixed torque 4.	1 – 200		%	Init/Run
E0065	T-fix5	Fixed torque 5.	1 – 200		%	Init/Run

E0066	T-fix6	Fixed torque 6.	1 – 200		%	Init/Run
E0067	T-fix7	Fixed torque 7.	1 – 200		%	Init/Run
E000E	Tq-Min	Lowest torque when running with analogue setpoint.	1 – 200		%	Init/Run
E000C	Tq-Max	Highest torque when running with analogue setpoint.	1 – 200	0	%	Init/Run
E0026	Max-Fr	Maximum frequency under torque control.	0 - 1500	1	Hz	Init/Run
E0036	OpMode	Setpoint source, regulator	*Terminal = 129* *Analogue F = 3* *Analogue R = 5* *Fix-1 F = 11* *Fix-2 F = 19* *Fix-3 F = 27* *Fix-4 F = 35* *Fix-5 F = 43* *Fix-6 F = 51* *Fix-7 F = 59* *Fix-1 R = 13* *Fix-2 R = 21* *Fix-3 R = 29* *Fix-4 R = 37* *Fix-5 R = 45* *Fix-6 R = 53* *Fix-7 R = 61* *Temp F = 258* *Temp R = 259*			Init/Run
E0039	R-fix1	Fixed setpoint 1 (The Unit* is taken from parameter, E000A)	+/-20000	1	Unit*	Init/Run
E003A	R-fix2	Fixed setpoint 2	+/-20000	1	Unit*	Init/Run
E003B	R-fix3	Fixed setpoint 3	+/-20000	1	Unit*	Init/Run
E003C	R-fix4	Fixed setpoint 4	+/-20000	1	Unit*	Init/Run
E003D	R-fix5	Fixed setpoint 5	+/-20000	1	Unit*	Init/Run
E003E	R-fix6	Fixed setpoint 6	+/-20000	1	Unit*	Init/Run
E003F	R-fix7	Fixed setpoint 7	+/-20000	1	Unit*	Init/Run
E004B	Setmin	Value at min. input signal from setpoint input.	+/-20000	1	Unit*	Init/Run
E004C	Setmax	Value at max. input signal from setpoint input.	+/-20000	1	Unit*	Init/Run
E009A	Actmin	Value at min. input signal from actual value input.	+/-20000	1	Unit*	Init/Run
E009B	Actmax	Value at max. input signal from actual value input.	+/-20000	1	Unit*	Init/Run
E0049	T-Min	Min. temperature.	+/-100		°C	Init/Run
E004A	T-Max	Max. temperature.	+/-100		°C	Init/Run
E0052	RegAmp	Amplification process regulator.	1 or -1			Init/Run
E0040	RegKp	Reduction of process regulator P-channel.	0 - 100	2		Init/Run
E0048	RegTi	Integration time process regulator.	10 - 2000	1	s	Init/Run

E009E	Min-fr	Min. frequency from regulator.	0 - 1500	1	Hz	Init/Run
E0025	Max-fr	Max. frequency from regulator.	0 - 1500	1	Hz	Init/Run
E000A	Unit*	Regulator units. This is the unit of the setpoint and actual value that the regulator works on. It is used as a character string after the values on the inverter display.	None = 0 Pa = 1 kPa = 2 bar = 3 rpm = 4 m^3/s = 5 l/s = 6 m^3/h = 7 l/h = 8 ppm = 9 % = 10 V = 11			Init/Run
E0034	AinAct	Scaling of actual value input.	0-10V = 0 2-10V = 1 +/-10V = 2			Init/Run
E0059	ReMode	Function relay function	Disable = 0 Running = 1 Run Fwd = 2 Run Rev = 3 Run Setp = 4 Run Freq = 5			Init/Run
E005A	ReFreq	Switch frequency in ReMode = Run Freq	0 -1500	1	Hz	Init/Run
E005B	V-Out	Analogue voltage output	Disable = 0 Freque = 1 Speed = 2 Torque = 3			Init/Run
E005C	V-Max	Scale factor for analogue voltage output.	0-1000	2	V	Init/Run
E005D	F-Out	Analogue frequency output	Disable = 0 Freque = 1 Speed = 2 Torque = 3			Init/Run
E005E	F-Max	Scale factor for analogue frequency output.	0-32000		Hz	Init/Run
E00A9	SiAdr	Serial interface address.	0 – 95			Init/Run
E00A8	SiBaud	Serial interface baudrate.	1200 bps = 16 2400 bps = 32 4800 bps = 64 9600 bps = 128			Init/Run
E00AA	SiProt	Serial interface character coding.	7 bit even parity = 0 8 bit no parity = 1			Init/Run
E00AB	SioTot	Serial interface timeout.	0 – 250	1	s	Init/Run
E00DA	U-rms	Output voltage (RMS)		0	V	Readonly
E0095	I-rms	Output current (RMS)		2	A	Readonly
E00D9	P-out	Output active power		0	W	Readonly
E00DB	PF	Output powerfactor		2		Readonly
E0014	DClink	DC Link voltage		1	V	Readonly

E0020	FrqSet	Current frequency setpoint.		1	Hz	Readonly
E00B6	FrqAct	Electrical frequency.		1	Hz	Readonly
E0096	SpdSet	Current speed setpoint (*Speed* mode)		0	rpm	Readonly
E0094	SpdAct	Rotor speed (estimated actual value, *Speed* mode)			rpm	Readonly
E0021	TrqSet	Current torque setpoint (as % of nominal motor torque)			%	Readonly
E0097	TrqAct	Current torque (as % of nominal motor torque)		1	%	Readonly
E004E	RegSet	Setpoint process regulator.		1	Unit*	Readonly
E004F	RegAct	Actual value process regulator.		1	Unit*	Readonly
E004D	PT1000	Temperature PT1000 temp. sensor.		1	°C	Readonly
E0058	M-Temp	Estimated relative motor temp.		1	%	Readonly
E0027 E0127	OpTime	Total time inverter has been live. A 24-bit value placed with its lower 16 bits in the first parameter and the higher 8 bits in the second.	0-16777215	1	h	Readonly
E0028 E0128	RnTime	Total time motor has been running. A 24-bit value placed with its lower 16 bits in the first parameter and the higher 8 bits in the second.	0-16777215	1	h	Readonly
E00DD E00DE	BrTime	Total time brake chopper output has been active. A 24-bit value placed with its lower 16 bits in the first parameter and the higher 8 bits in the second.	0-9999999	0	s	Readonly
E0200-E02FF	E-logg	See chapter 9.				
E002A	RstDly	Time from when fault disappears to restart.	0 – 3600		s	Init/Run
E002B	TrTime	Time inverter must run perfectly not to stop.	0 – 3600		s	Init/Run
E0037	AC Fail / AC Err	Phase error / Mode.	*Disable = 0 Ind = 64 Alarm = 128 Error = 192*			Init/Run
E00A0	AC Fail / Delay	Phase error / Delay.	0 - 255	1	s	Init/Run
E00A1	AC Fail / ErrCnt	Phase error / Tries.	0 - 255			Init/Run
E00B9	AC Fail / IT-Gnd	Phase error / Inverter connected to IT-ground system.	*OFF = 0 ON = 1*			Init/Run
E009F	Temp Hi / ErrCnt	Heatsink overheated / Tries.	*0 – 255*			Init/Run
E001B	PTC Temp / PTCTmp	Motor overheated / Mode.	*Disable = 0 Ind = 64 Alarm = 128 Error = 192*			Init/Run

E0072	PTC Temp / ErrCnt	Motor overheated / Tries.	*0 – 255*			Init/Run
E0055	OverLoad / Overld	Power monitor / Mode.	*Disable = 0* *Ind = 64* *Alarm = 128* *Error = 192*			Init/Run
E00B7	OverLoad / ErrCnt	Power monitor / Tries.	*0 – 255*			Init/Run
E0056	OverLoad / F-Cool	Power monitor / Forced Cooling.	0 - 10000			Init/Run
E0057	OverLoad / S-Temp	Power monitor / Surround temperature.	+/-100		°C	Init/Run
E005F	Ain Fail / AinErr	Analogue setpoint out of range / Mode.	*Disable = 0* *Ind = 64* *Alarm = 128* *Error = 192*			Init/Run
E00A2	Ain Fail / ErrCnt	Analogue setpoint out of range / Tries.	*0 – 255*			Init/Run
E0022	DC Low / ErrCnt	Voltage in DC link too low. / Tries.	*0 – 255*			Init/Run
E0023	DC High / ErrCnt	Voltage in DC link too high. / Tries.	*0 – 255*			Init/Run
E00A3	GND Fail / GndErr	Ground fail / Mode	*Disable = 0* *Ind = 64* *Alarm = 128* *Error = 192*			Init/Run
E00A4	ImagnLow / ImagLow	Magnetisation current out of range / Mode	*Disable = 0* *Ind = 64* *Alarm = 128* *Error = 192*			Init/Run
E00A5	ImagnLow / ErrCnt	Magnetisation current out of range / Tries	*0 – 255*			Init/Run
E00A6	Cur Low / Cur Low	Output current too low / Mode	*Disable = 0* *Ind = 64* *Alarm = 128* *Error = 192*			Init/Run
E00A7	Cur Low / ErrCnt	Output current too low / Tries	*0 – 255*			Init/Run
E00B2	Cur High / CurHigh	Output current too High / Mode	*Disable = 0* *Ind = 64* *Alarm = 128* *Error = 192*			Init/Run
E00B5	Cur High / Delay	Output current too high / Delay	0 - 255	1	s	Init/Run
E00B3	Cur High / ErrCnt	Output current too high / Tries	*0 – 255*			Init/Run
E002E	Run Fail / RunFail	Rotor locked, start failure. / Mode	*Disable = 0* *Ind = 64* *Alarm = 128* *Error = 192*			Init/Run

E00AF	Run Fail / ErrCnt	Rotor locked, start failure. / Tries	*0 – 255*			Init/Run
E002F	Bus Fail / Auto Reset	Field bus fault auto reset	*OFF = 0* *ON = 1*			Init/Run
E00D8	Bus Fail / Auto Stop	Stop motor at Field bus stop	*OFF = 0* *ON = 1*			Init/Run

Table 1. Parameters, sorted by parameter group

Table 2 shows parameters that are used when communicating with the inverter through the serial interface. These parameters are not accessible from the keypad/display, with exception of "Inv St" that is displayed as text on the top row of the display when not in parameter read/write mode.

ID	Name	Description		Range	Dec. digits	Unit	Type
E00E8	Inv St	Inverter status with acknowledge.		See Table 3			
E00E9		Inverter status without acknowledge.					
E00AC	SioErr	Serial interface fault flags		See Table 4			
E0029	MODE	Control mode.		See Chap. 9			
E00AD	SCMD	Start/Stop-command.		See Chap. 9			
E001E	Setpoint, used when SCMD indicates digital setpoint. Unit and range depends on the value of parameter Mode (E0030).	Freque, PI-reg	+/- 1500	1	Hz	Init/Run
		Speed	+/- 9000		rpm	
		Torque	+/- 200		%	

Table 2. Parameters used for serial interface control

Table 3 Shows the coding of parameter Inv St. Faults indicated by this parameter has internal flags that are set when the corresponding fault occurs. The disappearance of the fault does not reset the flag. The flags can be reset either from the keypad or by reading Inv St (E00E8) through the serial interface. The exception is the Sio Fail flag than is reset by reading the SioErr parameter.

Value	Display Text	Requires ACK	Inverter status
0	Erased		This value is passed when an empty entry of the Error Log is read.
1	Par Fail	X	Some parameter when starting up was outside permitted range or reset to factory setting command was given at power up.
2	AC Fail	X	Phase error, power supply phases not symmetrical (3-phase supply inverters only)
3	Temp Hi	X	Inverter heat sink temperature too high.
4	PTC Temp	X	Motor overheating, thermistor input limit exceeded.
5	Overload	X	The power monitor has tripped. The motor connected has been working under overload for too long time.

6	Ain Fail	X	Analogue setpoint input signal outside set range.
7	DC Low	X	DC link voltage too low.
8	DC High	X	DC link voltage too high
9	GND Fail	X	Earth leak current in one or more motor phases too high.
10	ImagnLow	X	Magnetising current in motor too high or too low.
11	Cur Low	X	Current in one or more motor phases too low.
12	Cur High	X	Current in one or more motor phases too high.
13	Run Fail	X	Inverter did not acquire control of motor when starting.
14	Sio Fail	X	Serial communication fault. Acknowledged by reading parameter SioErr
15	Bus Fail		Field bus fault
16	TunFailP	X	Autotuning failed
17	TunFailM	X	Autotuning failed
18	NFO Fail	X	Internal fault.
19	CopReset	X	
20	NfoReset	X	
21	CommRest	X	
22	ParRange	X	
23	ExeTimeE	X	
24	Stop		Keypad control, motor switched off
25	Wait…		Start delay active, inverter waiting for permission to start motor.
26	Brake Ch		Brake chopper on.
27	Cur Limt		Current limit set has been reached.
28	Tuning		Autotuning in progress.
29	St still		Keypad control, motor stationary, run with nominal value 0.
30	Final fr		Keypad control, setpoint achieved.
31	Loc Acc		Keypad control, motor speed increases.
32	Loc Ret		Keypad control, motor speed decreases.
33	Ext Stby		Motor switched off, waiting for run signal from terminal.
34	Ext Run		Motor switched on, run signal from terminal.
35	Ext Acc		Motor switched on, run signal from terminal, motor speed increases.
36	Ext Ret		Motor switched on, run signal from terminal, motor speed decreases.
37	Sio Stby		Serial interface control, motor switched off.
38	Sio Run		Serial interface control, motor switched on.
39	Sio Acc		Serial interface control, motor switched on, motor speed increases.
40	Sio Ret		Serial interface control, motor switched on, motor speed decreases.
41	Bus Stby		Fieldbus control, motor switched off.
42	Bus Run		Fieldbus control, motor switched on.
43	Bus Acc		Fieldbus control, motor switched on, motor speed increases.
44	Bus Ret		Fieldbus control, motor switched on, motor speed decreases.
45	TuningOK		Full tuning successful
46	RsMeasOK		Rs measurement successful

47	ParClcOK		Parameter calculation successful

Table 3 Values for parameter Inv St (E00E8, E00E9, & Error Log).

Bit	SioErr, Serial interface fault flags.
0	Inverter blocked due to alarm, specified by Inv St.
1	Incorrect parity.
2	Incorrect Check sum.
3	Incorrect message structure.
4	Timeout in serial interface communication.
5	Incorrect parameter prefix.
6	Command not permitted in current mode.
7	Unknown parameter.
8	Attempt to read unreadable parameter.
9	Attempt to write unwriteable parameter.
10	Parameter value out of range.
14	Receive buffer overrun.

Table 4 Serial interface fault flags in SioErr (E00AC) parameter.

9 Reading the Error Log

The Error Log occupies 256 parameter positions (ID E0200-E02FF). It consists of 128 entries of two 16-bit words each. The first entry (ID E0200-E0201) holds the most resent error, the second entry (ID E0202-E0203) holds the second most resent, and so on. The two words form the time-stamp and the error-code of the error. The error code is an eight-bit value positioned in the MSB half of the high order ID. The time-stamp is a 24-bit value where the least significant 16 bits are taken from the low order ID and the eight most significant bits are taken from the LSB half of the high order ID. The error code is interpreted from Table 3. The time-stamp is the "OpTime" value when the error occurred given in 1/10 hour. Error code 0 "Erased" indicates an empty entry and that all entries beyond also is empty.

10 Control through serial interface

The three parameters, MODE, SMODE and SCMD control the inverter. Reading the MODE parameter with ENQUIRY gives one of the values of Table 5.

Value	MODE (E0029)	Control mode.
0	INHIBIT	Inverter not available for serial interface control.
1	STOP	Wait mode.
2	EXT	Inverter controlled by another interface.
3	SIO	Serial interface mode.

Table 5 Value of MODE (E0029) parameter.

To support control through the serial channel, the inverter first has to be put in MODE/SIO. This is done with a SELECT message and value as in Table 5. If the inverter is in MODE/INHIBIT, the inverter is controlled from another source and thus does not permit any changes in MODE. MODE/STOP (if not in MODE/INHIBIT) has the same effect as pressing the <STOP> button on the keyboard, MODE/EXT as pressing <SHIFT+STOP> in stop-mode.

Once the inverter is in MODE/SIO, one can change parameter-values and control the motor through SELECT messages. Start/Stop commands is given via parameter SCMD. This parameter takes a number of different commands listed in Table 15. The command specifies the source of the setpoint, when digital setpoint is specified the parameter E001E is used as setpoint. Parameter SCMD is only writeable, and can thus not be read with ENQUIRY.

Meaning of individual bits, values in binary form.												Value (decimal)	Command / Source for setpoint
				TRM	PAR	PS3	PS2	PS1	REV	FWD	RUN		
0	X	X	X	X	X	X	X	X	X	X	0	All even.	Stop
0	0	0	0	0	0	0	0	0	0	1	1	3	Analogue input, forward.
0	0	0	0	0	0	0	0	0	1	0	1	5	Analogue input, reverse.
0	0	0	0	0	0	0	0	1	0	1	1	11	Fix-1 forward.
0	0	0	0	0	0	0	0	1	1	0	1	13	Fix-1 reverse.
0	0	0	0	0	0	0	1	0	0	1	1	19	Fix-2 forward.
0	0	0	0	0	0	0	1	0	1	0	1	21	Fix-2 reverse.
0	0	0	0	0	0	0	1	1	0	1	1	27	Fix-3 forward.
0	0	0	0	0	0	0	1	1	1	0	1	29	Fix-3 reverse.
0	0	0	0	0	0	1	0	0	0	1	1	35	Fix-4 forward.
0	0	0	0	0	0	1	0	0	1	0	1	37	Fix-4 reverse.
0	0	0	0	0	0	1	0	1	0	1	1	43	Fix-5 forward.
0	0	0	0	0	0	1	0	1	1	0	1	45	Fix-5 reverse.
0	0	0	0	0	0	1	1	0	0	1	1	51	Fix-6 forward.
0	0	0	0	0	0	1	1	0	1	0	1	53	Fix-6 reverse.
0	0	0	0	0	0	1	1	1	0	1	1	59	Fix-7 forward.
0	0	0	0	0	0	1	1	1	1	0	1	61	Fix-7 reverse.
0	0	0	0	0	1	0	0	0	0	0	1	65	Par. OpMode.
0	0	0	0	1	0	0	0	0	0	0	1	129	Terminal.
0	0	0	1	0	0	0	0	0	0	0	1	257	Digital Setpoint
0	0	1	0	0	0	0	0	0	0	0	1	513	Full Tuning
0	0	1	1	0	0	0	0	0	0	0	1	769	Basic Tuning
0	1	0	0	0	0	0	0	0	0	0	1	1025	Rs Measure
0	1	0	1	0	0	0	0	0	0	0	1	1281	Parameter Calculation
1	0	0	0	0	0	0	0	0	0	0	0	2048	Erase Error Log

Table 6 Values of SCMD (E00AD) parameter.