Contents

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1.1.1. Introduction

The frequency converter control board is program selectable for use with the Johnson controls Metasys N2 protocol. Metasys N2 is a master/slave control network. The physical layer is RS-485 compatible, half duplex 9600 baud shielded twisted pair. The N2 software protocol is designed to be general in nature to accommodate the unique properties each device type may have. Every device connection to the N2 network can be thought of as a small data manager. Data points in the database are classified as analog I/O (floating point), binary I/O or integer data points - floats, integers or bytes. Each data type has its own unique structure defined in the Metasys N2 system Protocol Specification for Vendors.

The information in this manual is intended to provide you with comprehensive information on how to install and set up the frequency converter for communication over a Metasys network.

For specific information on operation of the drive, refer to the *VLT® HVAC Drive Operating Instructions, MG.11.Ax.yy.*

1.1.2. About this Manual

This manual is for both instructional and for reference purposes. This manual can also serve as a guideline when you specify and optimize your communication system.
It is highly recommended that you read this manual in its entirety before initiating any programming. It is assumed that the user has full knowledge of the capabilities and limitation of the controller node in addition to full knowledge of the frequency converter.

1.1.3. References

In addition to this manual, the following two manuals should be consulted: *VLT® HVAC Drive Operating Instruction, MG.11.Ax.yy* and *Johnson Controls METASYS N2 System Protocol Specification for Vendors, Johnson Controls number 04-3402-22, rev A.*

2

2

2.1.1. Abbreviations and Definitions

Abbreviations and definitions

ACK	Acknowledge
ADF	Internal Floating Points
ADI	Internal Integers
AI	Analog Inputs
AO	Analog Outputs
BI	Binary Inputs
BO	Binary Outputs
COS	Change Of State
HPFB	High Performance Field Bus
JCI	Johnson Controls Inc. developers of the METASYS N2 protocol
N2	METASYS N2
N2 master	A N2 master is either a PC with JCI software or a dedicated JCI controller
NAK	Not acknowledged
NPA	N2 Point Address (Each N2 Point Type has a address range from 0 to 255)
NPT	N2 Point Type
PAR	Parameter Number

2.1.2. Network Connection

Connect signal wires to terminal 68 (N+) and terminal 69 (N-) on main control board of the drive. If shielded cabling is used, connect one end of the shield to terminal 61. This terminal is connected to ground via an internal RC link. It is highly recommended to use twisted-pair cables to reduce the differential mode interference between the conductors

Torque Specifications:	4.5 in.lb. (0.5 Nm)
Control wire:	18 - 24 AWG, shielded, twisted pair
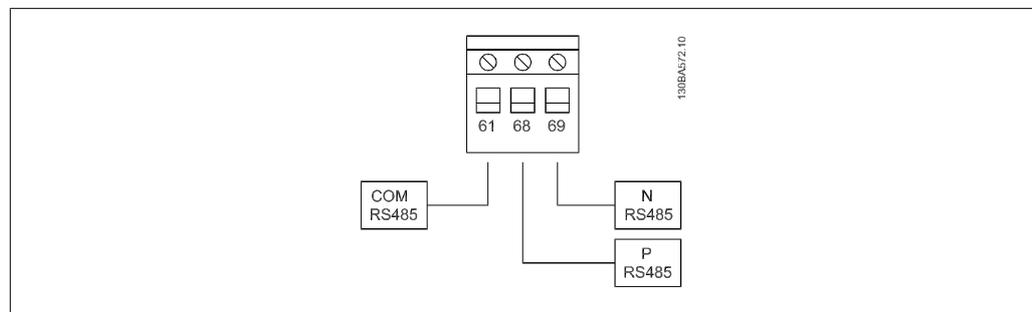
2.1.3. Hardware Set-up

RS 485 Bus Connection:
One or more frequency converters can be connected to a control (or master) using the RS485 standardized interface. Terminal 68 is connected to the P signal (TX+, RX+), while terminal 69 is connected to the N signal (TX-,RX-). If more than one frequency converter is connected to a master, use parallel connections.

2
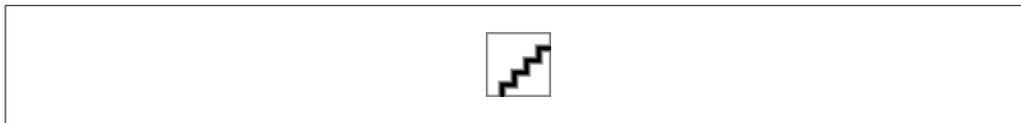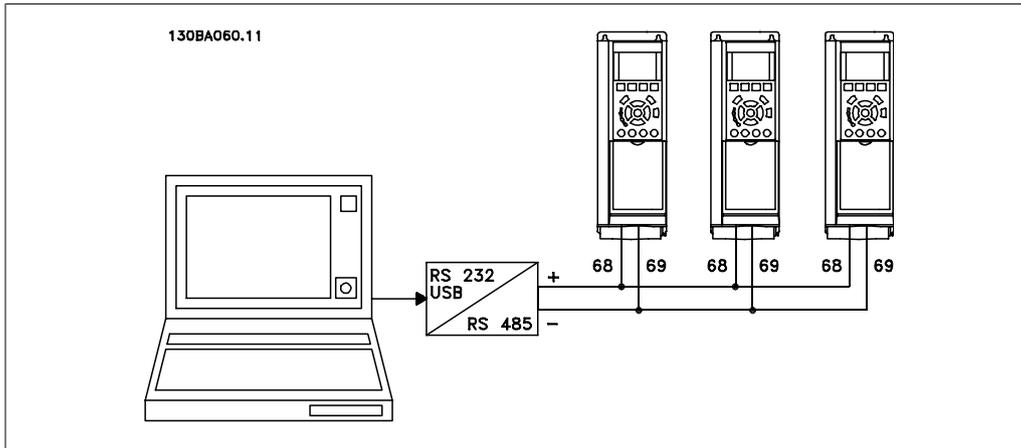
Illustration 2.1: Bus termination switch

In order to avoid potential equalizing currents in the screen, earth the cable screen via terminal 61, which is connected to the frame via an RC-link.

Bus termination: The RS485 bus must be terminated by a resistor network at both ends. For this purpose, set switch S801 on the control card to "ON". For more information, see the paragraph: Switches S201, S202 and S801.

NB!
Communication protocol must be set to FC MC par. 8-30.

2.1.4. Error Codes

Error codes

Error Code 00	is issued after power up or after a time out where all overridden points were released, as long as no Identify yourself command has been issued by the master.
Error Code 01	is issued if the command is not supported or not known by the drive.
Error Code 02	is issued if the received telegram has a checksum error.
Error Code 03	is issued if the N2 telegram receive buffer exceeds 256 characters.
Error Code 05	is issued if the received N2 telegram is too long.
Error Code 10	is issued the data is out of expected range
Error Code 11	is issued when: 1. A point attributes or attribute bit is unused. 2. A point attributes or attribute bit is for JCI use only. 3. An internal data point attribute for current value can not be changed while running
Error Code 12	is issued when: 1. The N2 master tries to change attribute 2 bit 6 "Current State" on a BO and the drive is tripped. 2. The N2 master tries to change attribute 2 bit 6 "Current State" on a BO and the drive is trip locked except for BO 5 "reset"

2.1.5. VLT Parameters

The following parameters may need to be manually set for each drive in the Metasys N2 network. Refer to the Installation, Operation and Maintenance Manual for the frequency converter for programming.

Parameter list

FC PARAMETER	DESCRIPTION	DEFAULT	DESIRED SETTING
8-01	Control side	Digital & Ctrl. Word	
8-02	Control source	FC Port	FC Port
8-03	Control word timeout	60 s	1-18000 s
8-30	Protocol	FC	Metasys N2
8-31	Address	1	1-255
8-32	Baud rate	9600	Fixed to 9600
8-33	Parity	Even, 1stop	Fixed to No Parity, 1stop
8-37	Max Inter-char delay		25 s for Metasys N2

2.1.6. General Commands (Acknowledged)

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VLT Response	Command	Subcommand	NPA Object no.	Attribute Message Type	Error Code	Comments
ACK	0	4	-	Poll Message No Acknowledge	-	The slave is to respond with any data points, analog or binary I/O that have been flagged for COS
ACK	0	5	-	Poll message With Acknowledge	-	The slave is to respond with any data points, analog or binary I/O that have been flagged for COS
ACK	0	9	-	Status update Message	-	Slave device must respond with device manufacturing model number (Par. 621), days in service (Par. 600) and device status
ACK	F	-	-	Identify Device Type	-	Slave device responds with an identification number of 10H to indicate non JCI device
ACK	0	0	-	Synch Time	-	The internal clock is syncronized by this command
ACK, no action	8	0	-	Upload	-	Optional, no support in the frequency converter
ACK, no action	8	1	-	Upload	-	Optional, no support in the frequency converter
ACK, no action	8	3	-	Upload Record	-	Optional, no support in the frequency converter
ACK, no action	8	4	-	Upload Complete	-	Optional, no support in the frequency converter
ACK, no action	9	0	-	Download	-	Optional, no support in the frequency converter
ACK, no action	9	1	-	Download	-	Optional, no support in the frequency converter
ACK, no action	9	3	-	Download	-	Record optional, no support in the frequency converter
ACK, no action	9	4	-	Download Complete	-	Optional, no support in the frequency converter
NAK	0	1	-	Read Memory	01	Slave device memory read based on memory addresses
NAK	0	8	-	Warm Start	01	JCI use only

Table 2.1: No Region, Attribute Number and -type in this table.

2.1.7. Analog Input Commands (Acknowledged)

VLT Re-sponse	Com-mand	Sub-com-mand	Re-gion	NPA Object no.	Attrib-ute No.	Attribute Message Type		Comments
ACK	1	-	1	0-23	1	Byte	Read Analog Input	Read Object Configura-tion attribute associ-ated with each individ-ual point
ACK	1	-	1	0-23	2	Byte	Read Analog Input	[1] Read Object Status attribute associated with each individual point
ACK	1	-	1	0-23	3	Float	Read Analog Input	[2] Read Analog Input Value attribute associ-ated with each individ-ual point
ACK	1	-	1	0-23	8	Float	Read Analog Input	Read Low Alarm attrib-ute associated with each individual point
ACK	1	-	1	0-23	9	Float	Read Analog Input	Read Low Warning at-tribute associated with each individual point
ACK	1	-	1	0-23	10	Float	Read Analog Input	Read High Warning at-tribute associated with each individual point
ACK	1	-	1	0-23	11	Float	Read Analog Input	Read High Alarm attrib-ute associated with each individual point
ACK	1	-	1	0-23	12	Float	Read Analog Input	Read Differential attrib-ute associated with each individual point
ACK	2	-	1	0-23	1	Byte	Write Analog Input	Write to Object Config-uration attribute associ-ated with each individ-ual point
ACK	2	-	1	0-23	8	Float	Write Analog Input	Write to Low Alarm Lim-it attribute associated with each individual point
ACK	2	-	1	0-23	9	Float	Write Analog Input	Write to Low Warning Limit attribute associ-ated with each individ-ual point
ACK	2	-	1	0-23	10	Float	Write Analog Input	Write to High Warning Limitattribute associ-ated with each individ-ual point
ACK	2	-	1	0-23	11	Float	Write Analog Input	Write to High Alarm Limit attribute associ-ated with each individ-ual point
ACK	2	-	1	0-23	12	Float	Write Analog Input	Write to Differential at-tribute associated with each individual point
ACK, no ac-tion	7	2	1	0-23	-	Float	Override Ana-log inputs	Analog inputs are "out-puts" from the frequen-cy converter and should not be written over by the network controller
ACK, no ac-tion	7	3	1	0-23	-	-	Override Ana-log Release	Analog inputs are "out-puts" from the frequen-cy converter and should not be written over by the network controller
ACK, no ac-tion	7	7	1	0-23	-	-	Write Analog Input Attributes	Optional command for slave devices. Only used for N2 commis-sioning purposes

Table 2.2: No Error code in this table.

2

2.1.8. Analog Input Commands (Not Acknowledged)

VLT Re-sponse	Com-man d	Re-gio n	NPA Ob-ject no.	Attribu-te No.	Attribute Mes-sage Type		Er-ror Cod e	Comments
NAK	1	1	0-23	4	Float	Read Ana-log Input	11[1]	Read Linear Ranging Parameter 1 attrib-ute associated with each individual point. (JCI use only)
NAK	1	1	0-23	5	Float	Read Ana-log Input	11[1]	Read Linear Ranging Parameter 2 attrib-ute associated with each individual point. (JCI use only)
NAK	2	-	0-23	2	Byte	Write Ana-log Input	11[1]	Object Status write-able
NAK	2	-	0-23	3	Float	Write Ana-log Input	11[1]	Analog Input Value not writeable
NAK	2	-	0-23	4	Float	Write Ana-log Input	11[1]	Write to Linear Ranging Parameter 1 attribute associ-ated with each indi-vidual point. (JCI use only)
NAK	2	-	0-23	5	Float	Write Ana-log Input	11[1]	Write to Linear Ranging Parameter 2 attribute associ-ated with each indi-vidual point. (JCI use only)
NAK	2	-	0-23	6	Float	Write Ana-log Input	11[1]	Write to Linear Ranging Parameter 3 attribute associ-ated with each indi-vidual point. (JCI use only)
NAK	2	-	0-23	7	Float	Write Ana-log Input	11[1]	Write to Linear Ranging Parameter 4 attribute associ-ated with each indi-vidual point. (JCI use only)
NAK	2	-	0-23	13	Inte-ger	Write Ana-log Input	11[1]	Write to Filter Weight attribute as-sociated with each individual point. (JCI use only)
NAK	2	-	0-23	14	Float	Write Ana-log Input	11[1]	Write to AI Offset at-tribute associated with each individual point. (JCI use only)

[1] Error code 11 is used because attributes are considered as fields/records in the point map database.

Table 2.3: No Subcommand coloumn in this table.

2.1.9. Analog Output Commands (Acknowledged)

VLT Response	Command	Sub command	Region	NPA Object no.	Attribute No.		Attribute Message Type	Comments
ACK	1	-	3	0-2	1	Byte	Read Analog Output	Read Object Configuration attribute associated with each individual point
ACK	1	-	3	0-2	2	Byte	Read Analog Output	Read Object Status attribute associated with each individual point
ACK	0	9	-	-	-	-	Status update Message	Slave device must respond with device manufacturing model number (Par. 621), days in service (Par. 600) and device status
ACK	1	-	3	0-2	3	Float	Read Analog Output	Read Current Value attribute associated with each individual point
ACK	2	-	3	0-2	1	Byte	Write Analog Output	Write to Object Configuration attribute associated with each individual point
ACK	7	2	3	0-2	-	Float	Override Analog Output	Write to analog output current value (frequency setpoint)
ACK	7	2	3	0-2	-	Float	Override Analog Output	Write to analog output current value (frequency setpoint)
ACK	7	3	3	0-2	-	-	Override Release	Set the current value, the value that it was before the 1. Override Command was issued
ACK, no action	7	7	3	0-2	-	-	Write Analog Output	Optional command for slave devices. Only used for N2 Attributes commissioning purposes. Not to be implemented at this time
ACK, no action	7	8	3	0-2	-	-	Read Analog Output Attributes	Optional command for no action slave devices. Only used for N2 commissioning purposes. Not to be implemented at this time

Table 2.4: No Error Code coloumn in this table.

2

2.1.10. Analog Output Commands (Not Acknowledged)

VLT Re-sponse	Com-mand	Re-gion	NPA Ob-ject no.	Attrib-ute No.	Attribute Message Type		Error Code	Comments
0-2	1	3	0-2	4	Float	Read Ana-log Output	11[1]	Read Low Linear Ranging Parameter attribute associated with each nindividual point. (JCI use only)
NAK	1	3	0-2	5	Float	Read Ana-log Output	11[1]	Read High Linear Ranging Parameter attribute associated with each individual point. (JCI use only)
NAK	2	3	0-2	2	Byte	Write Ana-log Output	11[1]	Object Status not writeable
NAK	2	3	0-2	3	Float	Write Ana-log Output	11[1]	Write to Current Val-ue structure attrib-utes associated with each individual point. (N2 does not support this, override func-tion must be used)
NAK	2	3	0-2	4	Float	Write Ana-log Output	11[1]	Write Debouncing Value in msec attrib-ute associated with each individual point. (JCI use only)
NAK	2	3	0-2	5	Float	Write Ana-log Output	11[1]	Write Accumulator value attribute asso-ciated with each indi-vidual point. (JCI use only)
[1] Error code 11 is used because attributes are considered as fields/records in the point map database.								

Table 2.5: No Subcommand coloumn in this table.

2.1.11. Binary Input (BI) Commands (Acknowledged)

VLT Re-sponse	Com-mand	Sub-com-mand	Re-gion	NPA Ob-ject no.	Attribute No.	Attribute Mes-sage Type		Comments
ACK	1	-	2	0-135	1	Byte	Read Bi-nary In-put	Read Object Con-figuration attribute associated with each individual point
ACK	1	-	2	0-135	2	Byte	Read Bi-nary In-put	Read Object Status attribute associ-ated with each in-dividual point
ACK	2	-	2	0-135	1	Byte	Write Bi-nary In-put	Write to Object Configuration at-tribute associated with each individu-al point
ACK, no action	7	2	2	0-135	-	Byte(0/1)	Override Binary In-put	Binary inputs are "outputs" from the frequency convert-er and should not be written over by the network con-troller. (Status word, Warnings, and Alarms)
ACK, no action	7	3	2	0-135	-	-	Overri-deRelease	Binary inputs are "outputs" from the drive and should not be written over by the network controller. (Status word, Warnings and Alarms)
ACK, no action	7	7	2	0-135	-	-	Write Bi-nary In-put	Optional command for slave devices. Only Attributes used for N2 com-missioning purpo-ses. Not to be im-plemented at this time
ACK, no action	7	8	2	0-135	-	-	Read Bi-nary In-put	Optional command for Attributes slave devices. Only used for N2 commission-ing purposes. Not to be implemented at this time

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2

2.1.12. Binary Input (BI) Commands (Not Acknowledged)

VLT Response	Command	Region	NPA Object no.	Attribute No.	Attribute Message Type		Error Code	Comments
NAK	2	2	0-135	2	Byte	Write Binary Input	11[1]	Object Status not writeable
NAK	2	2	0-135	3	Integer	Write Binary Input	11[1]	Write Debouncing Value in msec attribute associated with each individual point. (JCI use only)
NAK	2	2	0-135	4	Integer32	Write Binary Input	11[1]	Write Accumulator value attribute associated with each individual point (JCI use only)

Table 2.6: No Subcommand coloumn in this table.

2.1.13. Binary Output Commands (Acknowledged)

VLT Response	Com-mand	Subcom-mand	Re-gion	NPA Ob-ject no.	Attribute No.		Attribute Message Type	Comments
ACK	1	-	4	0-10	1	Byte	Read Binary Output	Read structure attributes associated with each individual point
ACK	1	-	4	0-10	2	Byte	Read Binary Output	Read structure attributes associated with each individual point
ACK	2	-	4	0-10	1	Byte	Write Binary Output	Write to Object Configuration attribute associated with each individual point
ACK	7	2	4	0-10	-	Byte(0/1)	Override Binary Output	Write to binary output current state (VLT control word)
ACK	7	2	4	0-10	-	Byte(0/1)	Override Binary Output	Write to binary output current state (VLT control word)
ACK	7	3	4	0-10	-	-	Override Release	Set the current value, the value that it was before the 1. Override Command was issued
ACK, no action	1	-	4	0-10	3	Integer	Read Binary Output	Read Minimum On-time attribute associated with each individual point. Return value = 0
ACK, no action	1	-	4	0-10	4	Integer	Read Binary Output	Read Minimum Off-time attribute associated with each individual point. Return value = 0
ACK, no action	1	-	4	0-10	5	Integer	Read Binary Output	Read Maximum Cycles/Hour attribute associated with each individual point. Return value = 0
ACK, no action	2	-	4	0-10	3	Integer	Write Binary Output	Write Minimum On-time attribute associated with each individual point
ACK, no action	2	-	4	0-10	4	Integer	Write Binary Output	Write Minimum Off-time attribute associated with each individual point
ACK, no action	2	-	4	0-10	5	Integer	Write Binary Output	Write Maximum Cycles/Hour attribute associated with each individual point
ACK, no action	7	7	4	0-10	-	-	Write Binary Output	Optional command for slave devices. Only Attributes used for N2 commissioning purposes
ACK, no action	7	8	4	0-10	-	-	Read Binary Output	Optional command for slave devices. Only Attributes used for N2 commissioning purposes

Table 2.7: No Error Code coloumn in this table.

2

2.1.14. Binary Output (BO) Commands (Not Acknowledged)

VLT Response	Command	Region	NPA Object no.	Attribute No.	Attribute Message Type		Error Code	Comments
NAK	1	4	0-10	6	Integer	Read Binary Output	11[1]	Read Interstage on delay attribute associated with each individual point. (JCI use only)
NAK	1	4	0-10	7	Integer	Read Binary Output	11[1]	Read Interstage off delay attribute associated with each individual point. (JCI use only)
NAK	2	4	0-10	2	Byte	Write Binary Output	11[1]	Object Status not writeable
NAK	2	4	0-10	6	Integer	Write Binary Output	11[1]	Write Interstage on delay attribute associated with each individual point. (JCI use only)
NAK	2	4	0-10	7	Integer	Write Binary Output	11[1]	Write Interstage off delay attribute associated with each individual point. (JCI use only)

[1] Error code 11 is used because attributes are considered as fields/records in the point map database.

Table 2.8: No Subcommand coloumn in this table.

2.1.15. Internal Integers (ADI) Commands (Acknowledged)

VLT Response	Command	Subcommand	Region	NPA Object no.	Attribute No.	Attribute Message Type		Comments
ACK	1	-	6	0-254	1	Integer	Read Internal Parameter of object type integer (16 bit)	Read Object Status associated with each individual point
ACK	1	-	6	0-254	2	Integer	Read Internal Parameter of object type integer (16bit)	Read Current Value attribute associated with each individual point
ACK	2	-	6	0-254	-	Integer	Write Internal Parameter of object type integer (16bit)	Write to Current Value attribute associated with each individual point
ACK	7	2	6	0-254	-	Integer	Override Internal Parameter of object type Integer (16 bit)	Write to internal parameter current value (set-up parameters for VLT)
ACK	7	3	6	0-254	-	-	Override Release	Set the current value, the value that it was before the 1. Override Command was issued

Table 2.9: No Error Code coloumn in this table.

2.1.16. Internal Floating Point Commands (Acknowledged)

VLT Response	Command	Subcom-mand	Re-gion	NPA Object no.	Attribute No.	Attribute	Message Type	Comments
ACK	1	-	5	0-101	1	Byte	Read Internal Parameter of object type float	Read Object Status associated with each individual point
ACK	1	-	5	0-101	2	Float	Read Internal Parameter of object type float	Read Current Value attribute associated with each individual point
ACK	2	-	5	0-101	-	Float	Write Internal Parameter of object type float	Write to Current Value attribute associated with each individual point
ACK	2	-	5	0-101	-	Float	Write Internal Parameter of object type float	Write to Current Value attribute associated with each individual point
ACK	7	2	5	0-101	-	Float	Override Internal Parameter of object type float	Write to internal parameter current value (set-up parameters for VLT)
ACK	7	3	5	0-101	-	-	Override Release	Set the current value, the value that it was before the 1. Override Command was issued

Table 2.10: No Error Code coloumn in this table.

2

2.2.1. Start-up of the Frequency Converter

Use the frequency converter keypad mounted either on the drive or remote. Use the Extended Menu key to access the 8-00 group parameters (serial communication). The settings shown below are typical. Some settings may be changed to meet the application requirements. The settings below will serve as a good starting reference. Refer to the operating instruction manual for instructions on changing parameters and programming the drive.

Examples of typical settings. Program the following:

Parameter:	Setting:
Parameter 8-30 Protocol	[3] Metasys N2
Parameter 8-31 Address	1 (Default)
Parameter 8-32 FC Port Baudrate	[2] 9600 Baud (fixed at 9600 for N2 protocol)
Parameter 8-50 Coasting Select	[3] Logic OR
Parameter 8-52 DC brake Select	[3] Logic OR
Parameter 8-53 Start Select	[3] Logic OR
Parameter 8-54 Reversing Select	[0] Digital input
Parameter 8-55 Set-up Select	[3] Logic OR
Parameter 8-56 Preset Reference Select	[3] Logic OR
Parameter 8-94 Bus Feedback 1	0
Parameter 8-95 Bus Feedback 2	0

NB!
Send an F command to begin communications between the master and the drive!

Example 1:

F command	Setting:
Device address	XX
Char1 command	F
Checksum	YY

Telegram code:
>XXFYY <CR>

Issue a run command through the master, to the device:

Example 2:

Bus start, BO override command:	Setting:
Device address	XX
Char1 command	7
Char1 subcommand	2
Char2 region	04
Char2 object number (NPA)	04 (Start)
Char2 override value	01 (Active)
Checksum	YY

Telegram code:
>XX72040401YY <CR>

Issue a frequency reference through the master, to the device:

Example 3:

Over-ride analog output, speed (50%) change command:	Setting:
Device address	XX
Char1 command	7
Char1 subcommand	2
Char2 region	03
Char2 object number (NPA)	00
Char8 override value *	4E 00 00 00 override value = 50% speed (IEEE floating point, format)
Checksum	YY

Telegram code:
>XX7203004E000000<CR>

To calculate override value for speed: refer to Scaling of Bus Reference and Bus Feedback. Issue an override release command through the master to the device:

Example 4:

Bus stop, BO over-ride release command:	Setting:
Device address	XX
Char1 command	7
Char1 subcommand	2
Char2 region	04
Char2 object number (NPA)	04 (Start)
Char8 override value *	00 (Not active)
Checksum	Y

Telegram code:
>XX72040400YY <CR>

If the preceding commands were issued, the drive should have accelerated to 50% after the speed reference was issued. After the override release, the drive should have stopped.

2.2.2. Scaling of Bus Reference and Feedback

Reference/feedback	Scaling	Float	IEEX hex
20%	20 * 16384/100	3276.8	454C CCCD
50%	50 * 16384/100	8192	4600 0000
100%	100 * 16384/100	16384	4680 0000
200%	200 * 16384/100	32767	46FF FE00
-100%	-100 * 16384/100	-16384	C680 0000
-200%	-200 * 16384/100	-32768	C700 0000

Table 2.11: Reference/feedback values

The reference/feedback value is the percentage of the range of parameter 3-02 and 3-03. Values within the ranges 100% to 200% and -200% to -100% applies only to the reference. The Float representation of the value 200% must be limited to maximum 32767 and minimum -32768.

2

2.2.3. Status Update Request

A Status Update Request will cause the drive to report its current operating status. The status codes, descriptions and associated alarms are shown in the chart below.

The Device Status Code consists of two parts. The Least Significant Byte, (LSB) of the hex number is the Alarm Number. The Most Significant Byte (MSB) indicates if the alarm is a normal trip (01) that can be reset automatically or manually, or if the alarm is a trip lock (02) requiring cycling power to the drive.

Status codes with associated alarms and descriptions

Device Status Code1	Alarm No.	Description
0x0000	-	Device OK
0x0102	2	Live zero error
0x0204	4	Phase fault (Trip lock)
0x0107	7	Over voltage
0x0108	8	Under voltage
0x0109	9	Inverter overloaded
0x010A	10	Motor overloaded
0x010B	11	Motor thermistor
0x010C	12	Current limit
0x020D	13	Over current (Trip lock)
0x020E	14	Earth fault (Trip lock)
0x020F	15	Switch mode fault (Trip lock)
0x0210	16	Short circuit (Trip lock)
0x0111	17	Standard bus time out
0x0112	18	HPFB time out
0x0116	22	Auto optimization not OK
0x021D	29	Heat sink temperature to high (Trip lock)
0x011E	30	Motor phase U missing
0x011F	31	Motor phase V missing
0x0120	32	Motor phase W missing
0x0122	34	Profibus communication error
0x0225	37	Inverter fault (Trip lock)
0x013C	60	Safety interlock
0x0263	99	Unknown fault (Trip lock)

Read / Write Notes
A write command to an ADF (Internal Floating Point) or BD (Internal Byte) point type will be stored in the drive's EEPROM.

> **NB!**
> If write command is issued to an overridden point, the new value will not be stored in the drive's EEPROM.

2.2.4. Override/Override Release Commands and Time Out, 8-04 (Setting [20], N2 Override release)

The way the overridden points are released is very important to the way the drive will behave during the override release time out or for release commands issued by the N2 master. This is due to the fact that the active setup can be changed to a different setup. If one would release the active setup before the values that have been overridden in that setup, the backup values would then be restored to the wrong setup, leaving the overridden values in the old setup unchanged.

The release after override time out:
During an override release time-out, all points which are overridden, will be released in the order, which they are specified in Appendix POINTMAP:

1. Release Analog Outputs from point address (NPA) 0 to 255.

2. Release Binary Outputs from point address (NPA) 0 to 255.

3. Release Internal Floating Points from point address (NPA) 0 to 255.

4. Release Internal Integer Points from point address (NPA) 0 to 255.

5. Release Internal Byte points from point address (NPA) 0 to 255.

2.2.5. Change of State (COS)/POLLING

A change of state occurs when a new command has been issued for the drive. This command can be issued through the bus or through a drive related status change or command. The master can issue a series of poll commands to the network devices to get an update on any status changes from the time of the last polling. When polling a frequency converter for the first time after a network has been powered up after an F command has been issued, a 0/4 poll command must be issued.

2.2.6. Handling of Poll Message Commands

The Identity Command will cause the drive to report all AI, AO, BI and BO points, which are available when the next Poll (0/4) is received. The drive also supports COS for AI and BI point types. The drive is limited to responding with up to 200 ASCII characters, so multiple messages may need to be sent before all available points have been reported.

Upon receiving the Poll (0/4), the frequency converter will begin exporting the requested information. The frequency converter will continue to export new information upon receiving the 0/5 Poll until it has sent all requested information. Then it will respond to a new 0/5 Poll with an ACK response to indicate all information has been transmitted and complete the Poll sequence receiving a 0/4 Poll before sending the ACK response will cause the frequency converter to re-transmit its latest response.

The drawing below illustrates the AI COS handling.

2
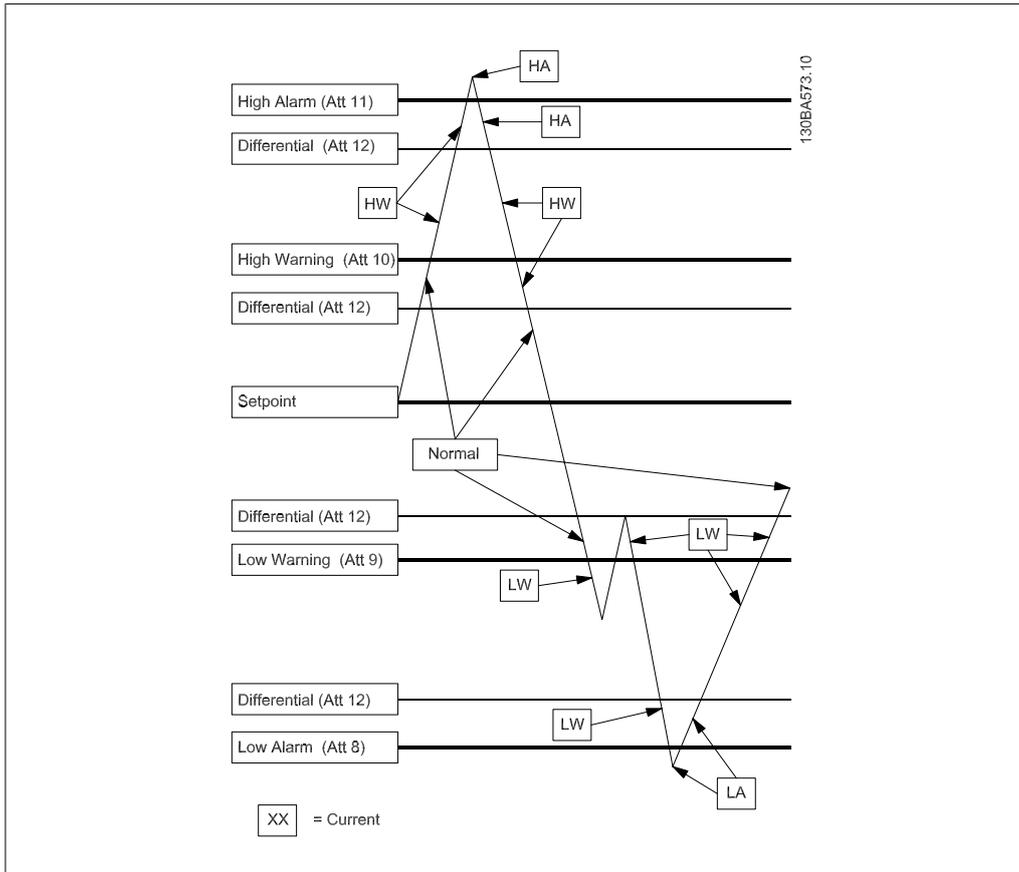
For AI:

Alarm Enable or Warning Enable must be set in the Object Configuration Attribute (Attribute 1). Low/High Alarm limits (Attribute 8, 11) or Low/High Warning limits (Attribute 9, 10) must be programmed. Differential Value (Attribute 12) must also be programmed.

For BI:

Alarm Enable must be set in the Object Configuration Attribute (Attribute 1).

Normal state must be programmed in the Object Configuration Attribute (Attribute 1)

Att XX = Attribute number, HA = High alarm, LA = Low alarm, HW = High Warning, LW = Low Warning

The AI COS alarms will only be cleared when the point value goes below the high alarm/warning or above the low alarm/warning limit by more than the programmed differential value (Attribute 12).

The BI COS will set the Alarm (Object Status bit 4) if COS enabled (Object Configuration Bit 0) is set, Alarm Enabled (Object configuration bit 3) is set, and Current State (Object Status bit 6) is different from Normal State (Object Configuration bit 1).

3.1.1. Analog Inputs (AI)

NPT	NPA	UNIT	DESCRIPTION	RANGE	PARAME-TER NUMBER
AI	0	%	Reference [%]	-	16-02
AI	1	-	Reference [Unit]	-	16-01
AI	2	-	Feedback	-	16-52
AI	3	Hz	Frequency	-	16-13
AI	4	-	User defined readout	-	16-09
AI	5	A	Current	-	16-14
AI	6	kW	Power	-	16-10
AI	7	hp	Power	-	16-11
AI	8	V	Output Voltage	-	16-12
AI	9	V	DC Voltage	-	16-30
AI	10	%	Motor Thermal Protection	-	16-18
AI	11	%	Inverter Thermal Protection	-	16-35
AI	12	V	Terminal 53 analog	-	16-62
AI	13	V	Terminal 54 analog	-	16-64
AI	14		Reserved	-	
AI	15		Reserved	-	
AI	16	%	External reference	-	16-50
AI	17	C	Heat sink temperature	-	16-34
AI	18	Hour	Operating hours	-	15-00
AI	19	Hour	Running hours	-	15-01
AI	20	kWh	kWh counter	-	15-02
AI	21	-	Number of Power-ups	-	15-03
AI	22	-	Number of Over temps	-	15-04
AI	23	-	Number of Over voltages	-	15-05
AI	24		Start Ups		15-08
AI	25		Torque [%]		16-22
AI	26		Speed [rpm]		16-17
AI	27		Analog Input, GPIO X30/11		16-75
AI	28		Analog Input, GPIO X30/12		16-76
AI	29		Analog Input X42/1	-20.000 to +20.000	18-20
AI	30		Analog Input, X42/3	-20.000 to +20.000	18-21
AI	31		Analog Input, X42/5	-20.000 to +20.000	18-22
AI	40		Bypass Running Hours	$0-2^{32}/10$	31-11

The default values are shown in bold on the following pages. Any point not listed on the following pages is reserved for future use.

Some Metasys software uses an object number range from 0 to 255, other Metasys software uses the range 1 to 254. The latter software will interpret object number 0 as 1, and 1 as 2, etc. To access the proper point with this Metasys software, add 1 to the NPA number in the tables.

3.1.2. Binary Inputs (BI)

NPT	NPA	UNIT	DESCRIPTION	RANGE	PARAMETER NUMBER
BI	0	-	Timers Status	**0=OK** , 1=Limit	16-84
BI	1	-	Current Status	**0=OK** , 1=Limit	16-84
BI	2	-	Voltage Status	**0=OK** , 1=Limit	16-84
BI	3	-	Inverter Status	**0=OK** , 1 =Stall, Auto-start	16-84
BI	4	-	Running Status	**0=Not Running , 1**=Running	16-84
BI	5	-	Frequency Status	**0=Out of Range , 1**=In Range	16-84
BI	6	-	Control Status	**0=Local , 1**= Bus	16-84
BI	7	-	Reference Status	**0=Not on Ref., 1**=On Ref.	16-84
BI	8	-	Warning Status	**0=No Warning** , 1= Warning	16-84
BI	9	-	Tripped Status	**0=No Trip** , 1=Tripped	16-84
BI	10	-	Drive Enabled Status	**0=Not Enabled** , 1=Enabled	16-84
BI	11	-	Drive Ready Status	**0=Not Ready** , 1=Ready	16-84
BI	12	-	Drive Controller Status	**0=Not Ready** , 1=Ready	16-84
BI	16	-	AMA-ze suspicious UNOM	**0=OK** , 1=Warning	16-92
BI	17	-	AMA-ze suspicious INOM	**0=OK** , 1=Warning	16-92
BI	18	-	AMA-ze motor too big	**0=OK** , 1=Warning	16-92
BI	19	-	AMA-ze motor too small	**0=OK**, 1=Warning	16-92
BI	20	-	Frequency low	**0=OK** , 1=Warning	16-92
BI	21	-	Frequency high	**0=OK** , 1=Warning	16-92
BI	22	-	Current low	**0=OK** , 1=Warning	16-92
BI	23	-	Profibus warning	**0=OK** , 1=Warning	16-92
BI	24	-	Output frequency limited	**0=OK** , 1=Warning	16-92
BI	25	-	Current high	**0=OK** , 1=Warning	16-92
BI	26	-	Feedback low	**0=OK** , 1=Warning	16-92
BI	27	-	Feedback high	**0=OK** , 1=Warning	16-92
BI	28	-	Reference low	**0=OK** , 1=Warning	16-92
BI	29	-	10 Volt low	**0=OK**, 1=Warning	16-92
BI	30	-	Live zero error	**0=OK** , 1=Warning	16-92
BI	31	-	Phase loss	**0=OK** , 1=Warning	16-92
BI	32	-	DC link voltage high	**0=OK** , 1=Warning	16-92
BI	33	-	DC link voltage low	**0=OK** , 1=Warning	16-92
BI	34	-	DC link over voltage	**0=OK** , 1=Warning	16-92
BI	35	-	DC link under voltage	**0=OK** , 1=Warning	16-92
BI	36	-	VLT thermal	**0=OK** , 1=Warning	16-92
BI	37	-	Motor thermal	**0=OK**, 1=Warning	16-92
BI	38	-	Motor thermistor	**0=OK** , 1=Warning	16-92
BI	39	-	Current limit	**0=OK** , 1=Warning	16-92
BI	40	-	Over current	**0=OK** , 1=Warning	16-92
BI	41	-	Standard bus time-out	**0=OK** , 1=Warning	16-92
BI	42	-	HPFB time-out	**0=OK** , 1=Warning	16-92
BI	43	-	EEPROM error power card	**0=OK** , 1=Warning	16-92

Binary Inputs (BI), continued..

NPT	NPA	UNIT	DESCRIPTION	RANGE	PARAMETER NUMBER
BI	44	-	EEPROM error control card	**0=OK**, 1=Warning	16-92
BI	45	-	Reference high	**0=OK**, 1=Warning	16-92
BI	48	-	External fault(Safety interlock)	**0=OK**, 1=Alarm	16-90/91
BI	49	-	Current low	**0=OK**, 1=Alarm	16-90/91
BI	50	-	Inverter fault	**0=OK**, 1=Alarm	16-90/91
BI	51	-	Profibus fault	**0=OK**, 1=Alarm	16-90/91
BI	52	-	Missing motor phase U	**0=OK**, 1=Alarm	16-90/91
BI	53	-	Missing motor phase V	**0=OK**, 1=Alarm	16-90/91
BI	54	-	Missing motor phase W	**0=OK**, 1=Alarm	16-90/91
BI	55	-	Over temperature	**0=OK**, 1=Alarm	16-90/91
BI	56	-	Live zero	**0=OK**, 1=Alarm	16-90/91
BI	57	-	Phase loss	**0=OK**, 1=Alarm	16-90/91
BI	58	-	DC link over voltage	**0=OK**, 1=Alarm	16-90/91
BI	59	-	DC link under voltage	**0=OK**, 1=Alarm	16-90/91
BI	60	-	VLT thermal	**0=OK**, 1=Alarm	16-90/91
BI	61	-	Motor thermal	**0=OK**, 1=Alarm	16-90/91
BI	62	-	Motor thermistor	**0=OK**, 1=Alarm	16-90/91
BI	63	-	Current limit	**0=OK**, 1=Alarm	16-90/91
BI	64	-	Over current	**0=OK**, 1=Alarm	16-90/91
BI	65	-	Earth fault	**0=OK**, 1=Alarm	16-90/91
BI	66	-	Supply fault	**0=OK**, 1=Alarm	16-90/91
BI	67	-	Short circuit	**0=OK**, 1=Alarm	16-90/91
BI	68	-	Std bus time-out	**0=OK**, 1=Alarm	16-90/91
BI	69	-	HPFB time-out	**0=OK**, 1=Alarm	16-90/91
BI	70	-	AMA fault	**0=OK**, 1=Alarm	16-90/91
BI	71	-	Trip lock	**0=Trip**, **1**=Trip lock	16-90/91
BI	72	-	Unknown fault	**0=OK**, 1=Alarm	16-90/91
BI	83	-	Start inhibit	**0=FALSE**, 1=TRUE	16-94/95
BI	84	-	Control ready	**0=FALSE**, 1=TRUE	16-94/95
BI	85	-	Unit ready	**0=FALSE**, 1=TRUE	16-94/95
BI	86	-	Relay 123	**0=FALSE**, 1=TRUE	16-94/95
BI	87	-	Enabled	**0=FALSE**, 1=TRUE	16-94/95
BI	88	-	DC stop	**0=FALSE**, 1=TRUE	16-94/95
BI	89	-	Stop	**0=FALSE**, 1=TRUE	16-94/95
BI	90	-	Standby	**0=FALSE**, 1=TRUE	16-94/95
BI	91	-	Jog request	**0=FALSE**, 1=TRUE	16-94/95
BI	92	-	Jogging	**0=FALSE**, 1=TRUE	16-94/95
BI	93	-	Freeze request	**0=FALSE**, 1=TRUE	16-94/95
BI	94	-	Freeze output	**0=FALSE**, 1=TRUE	16-94/95
BI	95	-	Run request	**0=FALSE**, 1=TRUE	16-94/95
BI	96	-	Run request signal	**0=FALSE**, 1=TRUE	16-94/95
BI	97	-	Hand mode	**0=Auto mode**, **1**=Hand mode	16-94/95

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Binary Inputs (BI), continued..

NPT	NPA	UNIT	DESCRIPTION	SELECTION	PARAMETER NUMBER
BI	98	-	Off	**0=FALSE** , 1=TRUE	16-94/95
BI	99	-	Local Reference	**0=Remote ref.**, **1**=Local ref.	16-94/95
BI	100	-	Running	**0=FALSE**, 1=TRUE	16-94/95
BI	101	-	Running at reference	**0=FALSE** , 1=TRUE	16-94/95
BI	102	-	Reverse direction	**0=FALSE** , 1=TRUE	16-94/95
BI	103	-	Ramping	**0=FALSE** , 1=TRUE	16-94/95
BI	104	-	Start forward reverse	**0=FALSE** , 1=TRUE	16-94/95
BI	105	-	Adaptive tuning running	**0=FALSE** , 1=TRUE	16-94/95
BI	106	-	Adaptive tuning finished	**0=FALSE** , 1=TRUE	16-94/95
BI	107	-	Sleep mode	**0=FALSE** , 1=TRUE	16-94/95
BI	108	-	Sleep boost	**0=FALSE** , 1=TRUE	16-94/95
BI	109	-	Start delay	**0=FALSE** , 1=TRUE	16-94/95
BI	110	-	OVC active (Auto ramp)	**0=FALSE** , 1=TRUE	16-94/95
BI	112	-	Reverse	**0=FALSE** , 1=TRUE	16-80
BI	113	-	Setup MSB	**0=FALSE** , 1=TRUE	16-80
BI	114	-	Setup LSB	**0=FALSE** , 1=TRUE	16-80
BI	115	-	Catch up or Relay 04 Out 45	**0=FALSE** , 1=TRUE	16-80
BI	116	-	Slow down or Relay 01 Out 42	**0=FALSE** , 1=TRUE	16-80
BI	117	-	Reserved, always 0.	**0=FALSE**	16-80
BI	118	-	Jog	**0=FALSE** , 1=TRUE	16-80
BI	119	-	Reset	**0=FALSE** , 1=TRUE	16-80
BI	120	-	Start	**0=FALSE** , 1=TRUE	16-80
BI	121	-	Freeze output	**0=FALSE** , 1=TRUE	16-80
BI	122	-	Q-stop	**0=FALSE** , 1=TRUE	16-80
BI	123	-	Coast	**0=FALSE** , 1=TRUE	16-80
BI	124	-	Switch 3 on inverse or DC brake	**0=FALSE** , 1=TRUE	16-80
BI	125	-	Switch 2on inverse or Preset ref. MSB	**0=FALSE** , 1=TRUE	16-80
BI	126	-	Switch 1 on inverse or Preset ref. LSB	**0=FALSE** , 1=TRUE	16-80
BI	128	-	Terminal 33	**0=FALSE** , 1=TRUE	16-60:0
BI	129	-	Terminal 32	**0=FALSE** , 1=TRUE	16-60:1
BI	130	-	Terminal 29	**0=FALSE** , 1=TRUE	16-60:2
BI	131	-	Terminal 27	**0=FALSE** , 1=TRUE	16-60:3
BI	132	-	Terminal 19	**0=FALSE** , 1=TRUE	16-60:4
BI	133	-	Terminal 18	**0=FALSE** , 1=TRUE	16-60:5
BI	134	-	Terminal 37	**0=FALSE** , 1=TRUE	16-60:6
BI	135	-	GPIO Terminal X30/3	**0=FALSE** , 1=TRUE	16-60:7

Binary Inputs (BI), continued..

NPT	NPA	UNIT	DESCRIPTION	SELECTION	PARAMETER NUMBER
BI	136	-	GPIO Terminal X30/2	**0=FALSE** , 1=TRUE	16-60:8
BI	137	-	GPIO Terminal X30/1	**0=FALSE** , 1=TRUE	16-60:9
BI	140	-	ECB Test mode	1= ECB running in Test mode	31-10:0
BI	141	-	ECB Drive Mode	1= running in Drive mode	31-10:1
BI	142	-	ECB Automatic By-pass Mode	1= running in Automatic Bypass mode	31-10:2
BI	143	-	ECB Bypass mode	1= running in Bypass mode	31-10:3
BI	144	-	ECB Off Mode	1= ECB in Off mode	31-10:4
BI	145	-	ECB Motor running from Bypass/Drive	1= The motor is running from Bypass or Drive	31-10:5
BI	146	-	ECB Overload Trip	1= ECB has detected an overload trip	31-10:6
BI	147	-	ECB M2 Contactor Fault	1= M2 Contactor Fault detected	31-10:7
BI	148	-	ECB M3 Contactor Fault	1= M3 Contactor Fault detected	31-10:8
BI	149	-	ECB External Interlock	1= External Interlock fault detected	31-10:9
BI	150	-	ECB Manual Bypass Override	Manual bypass Override input is true	31-10:10

The values marked in **bold** are default values

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3.1.3. Analog Outputs (AO)

NPT	NPA	UNIT	DESCRIP-TION	RANGED	PARAMETER NUMBER
AO	0	%	Bus reference[1]	-200 to 200 Proportionally mapped into the range -32768 to 32767	-
AO	1		Bus feedback 1	Please refer to [4]	8-94
AO	2		Bus feedback 2	Please refer to [4]	8-95
AO	3		Bus feedback 3	Please refer to [4]	8-96
AO	4		Analog Output Term 42		6-53
AO	5		Pulse Output Term 27		5-93
AO	6		Pulse Output Term 29		5-95
AO	7		GPIO Analog Output Terminal X30/8		6-63
AO	8		Analog Option Output Terminal X42/7		26-53
AO	9		Analog Option Output Terminal X42/9		26-63
AO	10		Analog Option Output Terminal X42/11		26-73

[1] Please refer to scaling of Bus Reference and Feedback, Section on Scaling or Bus Reference and Feedbacks.

3.1.4. Binary Outputs (BO)

NPT	NPA	UNIT	DESCRIPTION	RANGE [1]	PARAMETER NUMBER
BO	0	-	DC brake inverse	**0=Not Active** , 1=Active	CTW
BO	1	-	Coast inverse	**0=Not Active** , 1=Active	CTW
BO	2	-	Stop inverse	**0=Not Active** , 1=Active	CTW
BO	3	-	Freeze output inverse	**0=Not Active** , 1=Active	CTW
BO	4	-	Start	**0=Not Active** , 1=Active	CTW
BO	5	-	Reset	**0=Not Active** , 1=Active	CTW
BO	6	-	Jogging	**0=Not Active** , 1=Active	CTW
BO	8	-	Relay01	**0=Not Active** , 1=Active	CTW
BO	9	-	Relay04	**0=Not Active** , 1=Active	CTW
BO	10	-	Reversing	**0=Not Active** , 1=Active	CTW
BO	11		Preset ref. LSB		CTW
BO	12		Preset ref. MSB		CTW
BO	13		Reserved		CTW
BO	14		Reserved		CTW
BO	15		Reserved		CTW
BO	20		Output Terminal 27		5-90:0
BO	21		Output Terminal 29		5-90:1
BO	22		Output Terminal X30/6		5-90:2
BO	23		Output Terminal X30/7		5-90:3
BO	24		CC Relay 1		5-90:4
BO	25		CC Relay 2		5-90:5
BO	26		Option B Relay 1		5-90:6
BO	27		Option B Relay 2		5-90:7
BO	28		Option B Relay 3		5-90:8
BO	29		Reserved		5-90:9
BO	30		Reserved		5-90:10
BO	31		Reserved		5-90:11
BO	32		Reserved		5-90:12
BO	33		Reserved		5-90:13
BO	34		Reserved		5-90:14
BO	35		Reserved		5-90:15
BO	36		Option C Relay 1		5-90:16
BO	37		Option C Relay 2		5-90:17
BO	38		Option C Relay 3		5-90:18
BO	39		Option C Relay 4		5-90:19
BO	40		Option C Relay 5		5-90:20
BO	41		Option C Relay 6		5-90:21
BO	42		Option C Relay 7		5-90:22
BO	43		Option C Relay 8		5-90:2
BO	44		Reserved		5-90:24
BO	45		Reserved		5-90:25
BO	46		Reserved		5-90:26
BO	47		Reserved		5-90:27
BO	48		Reserved		5-90:28
BO	49		Reserved		5-90:29
BO	50		Reserved		5-90:30
BO	51		Reserved		5-90:31
BO	52		ECB Activate		31-90

1) The values in **BOLD** are the default values.

3.1.5. Internal Floating Point (ADF)

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NPT	NPA	UNIT	DESCRIPTION	RANGE	PARAMETER NUMBER
ADF	0	-	Custom Display Readout		0-30
ADF	10	kW	Motor power		1-20
ADF	11	V	Motor voltage		1-22
ADF	12	Hz	Motor frequency		1-23
ADF	13	A	Motor Current(IM.N)		1-24 (mAmp)
ADF	14	RPM	Motor nom. Speed		1-25
ADF	15	V	Start Voltage		?
ADF	16	%	Resonance damping		1-64
ADF	17	Sec	Break away torque boost		?
ADF	18	Sec	Start delay		1-71 (mSec!)
ADF	19	%	Preheat DC-current		2-00
ADF	20	%	DC brake current		2-01
ADF	21	Sec	DC braking time		2-02
ADF	22	Hz	DC brake cut-in frequency		2-04
ADF	30	Hz	Output freq. low limit(FMIN)		4-12
ADF	31	Hz	Output freq. high limit(FMAX)		4-19
ADF	32	Unit	Min reference (RefMIN)		3-02
ADF	33	Unit	Max. reference (RefMAX)		3-03
ADF	34	Sec	Ramp Up Time		3-41
ADF	35	Sec	Ramp Down Time		3-42
ADF	36	Hz	Jog Frequency		3-11
ADF	37	%	Digital Reference 1		3-10:0
ADF	38	%	Digital Reference 2		3-10:1
ADF	39	%	Digital Reference 3		3-10:2
ADF	40	%	Digital Reference 4		3-10:3
ADF	41	A	Current Limit		4-51
ADF	42	Hz	Frequency bypass bandwidth		4-61:0
ADF	43	Hz	Frequency 1 Bypass		4-63:0
ADF	44	Hz	Frequency 2 Bypass		4-61:1
ADF	45	Hz	Frequency 3 Bypass		4-63:1
ADF	46	Hz	Frequency 4 Bypass		4-61:2
ADF	47	A	Warning Current Low(ILOW)		4-63:2
ADF	48	A	Warning Current High(IHIGH)		4-61:3
ADF	49	Hz	Warning Freq. Low(FLOW)		4-63:3

Internal Floating Point (ADF), continued..

NPT	NPA	UNIT	DESCRIPTION	RANGE	PARAMETER NUMBER
ADF	50	A	Warning Current Low(I_{LOW})		224
ADF	51	A	Warning Current High (I_{HIGH})		225
ADF	52	Hz	Warning Freq. Low(F_{LOW})		4-52
ADF	53	Hz	Warning Freq. High(F_{HIGH})		4-53
ADF	54	Unit	Warning Low Ref.(Ref_{LOW})		4-54
ADF	60	Unit	Warning High Ref.(Ref_{HIGH})		4-55
ADF	61	Unit	Warning Low FB.(FB_{LOW})		4-56
ADF	62	Unit	Warning High FB.(FB_{HIGH})		4-57
ADF	63	V	Terminal 53 min. scale V		6-10
ADF	64	V	Terminal 53 max. scale V		6-11
ADF	65	V	Terminal 54 min. scale V		6-20
ADF	66	V	Terminal 54 max. scale V		6-21
ADF	67	A	Terminal 54 min. scale mA		6-12
ADF	68	A	Terminal 54 max. scale mA		6-13
ADF	69	Hz	Term.42 output puls scale		5-62
ADF	70	Hz	Term.45 output puls scale		5-65
ADF	71	Sec	CC Relay 1 ON Delay	0.01 to 600.00	5-41:0
ADF	72	Sec	CC Relay 1 OFF Delay	0.01 to 600.00	5-42:0
ADF	73	Sec	CC Relay 2 ON Delay	0.01 to 600.00	5-41:1
ADF	74	Sec	CC Relay 2 OFF Delay	0.01 to 600.00	5-42:1
ADF	75	Hz	Pulse reference max. freq.		5-50
ADF	76	Hz	Pulse feedback max. freq.		5-51
ADF	80	Sec	Automatic restart time		14-21
ADF	81	Sec	Sleep mode timer		22-40
ADF	82	Hz	Sleep frequency(F_{SLEEP})		
ADF	83	Hz	Wake up frequency(F_{WAKEUP})		22-43
ADF	84	%	Boost setpoint		22-45
ADF	85	kHz	Switch Frequency		14-01
ADF	86	Unit	Minimum feedback(FB_{MIN})		Display scale
ADF	87	Unit	Maximum feedback (FB_{MAX})		Display scale
ADF	88	Unit	Set point 1		21-15
ADF	89	Unit	Set point 2		
ADF	90	Hz	PID Start frequency		
ADF	91	-	PID Proportional gain		
ADF	92	Sec	PID Integration time		
ADF	93	Sec	PID Differentiation time		
ADF	94	-	PID D-gain limit		
ADF	95	Sec	PID Feedback filter time		
ADF	101	-	Override release time		

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Internal Floating Point (ADF), continued..

NPT	NPA	UNIT	DESCRIPTION	RANGE	PARAMETER NUMBER
ADF	110	Sec	Option B Relay 1 ON Delay	0.01 to 600.00	5-41:6
ADF	111	Sec	Option B Relay 1 OFF Delay	0.01 to 600.00	5-42:6
ADF	112	Sec	Option B Relay 2 ON Delay	0.01 to 600.00	5-41:7
ADF	113	Sec	Option B Relay 2 OFF Delay	0.01 to 600.00	5-42:7
ADF	114	Sec	Option B Relay 3 ON Delay	0.01 to 600.00	5-41:8
ADF	115	Sec	Option B Relay 3 OFF Delay	0.01 to 600.00	5-42:8
ADF	120	V	Analogue Input X42/1 Low Voltage	0.07 to 10.00	26-10
ADF	121	V	Analogue Input X42/1 High Voltage	0.07 to 10.00	26-11
ADF	122	V	Analogue Input X42/3 Low Voltage	0.07 to 10.00	26-20
ADF	123	V	Analogue Input X42/3 High Voltage	0.07 to 10.00	26-21
ADF	124	V	Analogue Input X42/5 Low Voltage	0.07 to 10.00	26-30
ADF	125	V	Analogue Input X42/6 High Voltage	0.07 to 10.00	26-31
ADF	130	%	Analogue output X42/7 Timeout preset	0.00 to 100.00	26-53
ADF	131	%	Analogue output X42/9 Timeout preset	0.00 to 100.00	26-64
ADF	132	%	Analogue output X42/11 Timeout preset	0.00 to 100.00	26-74
ADF	140		ECB Bypass Start timer delay	0-60	31-01
ADF	141		ECB Drive Trip Bypass delay	0-300	31-02

[1] "Feedback" if closed loop - and "100 Hz" if open loop

[2] Unit is power dependent

[3] The drive must be stopped to change this point

[4] The point is global in all 4 setups

[5] Not availabele in all units.

3.1.6. Internal Integers (ADI)

NPT	NPA	UNIT	DESCRIPTION	RANGE	PARAMETER NUMBER
ADI	0	-	Language Selection		0-01
ADI	1	-	Setup Copy Function		0-51
ADI	2	-	Custom readout unit		0-30
ADI	3	-	Large readout		0-23
ADI	4	-	Small readout 1		0-20
ADI	5	-	Small readout 2		0-21
ADI	6	-	Small readout 3		0-22
ADI	7	-	Unit of local reference		
ADI	8	-	Hand start button		0-40
ADI	9	-	Off/Stop button		0-41
ADI	10	-	Auto start button		0-42
ADI	11	-	Reset button		0-43
ADI	12	-	Data change lock		?
ADI	13	-	Operating state at power up		0-04
ADI	20	-	Configuration mode		1-00
ADI	21	-	VT Characteristics		Na.
ADI	22	-	Automatic motor adaptation		1-29
ADI	23	-	Motor preheat		?
ADI	24	-	Motor thermal protection		1-90
ADI	30	-	Frequency range		4-10
ADI	31	-	Reference site		3-00 needed?
ADI	32	-	Auto ramping		?
ADI	33	-	Reference function		3-04 ?
ADI	40	-	Digital input 18		5-10
ADI	41	-	Digital input 19		5-12
ADI	42	-	Digital input 27		5-13
ADI	43	-	Digital input 29		5-14
ADI	44	-	Digital input 32		5-15
ADI	45	-	Digital input 33		5-16
ADI	46	-	Analog input 53		16-62
ADI	47	-	Analog input 54		16-64
ADI	50	-	Analog input 60		
ADI	51	Sec	Live zero time out		6-00
ADI	52	-	Live zero function		6-01
ADI	53	-	Signal output 42		6-50
ADI	55	-	CC Relay 1 Function	0 to 255	5-40:0
ADI	56	-	CC Relay 2 Function	0 to 255	5-40:1
ADI	57		Option B Relay 1 Function	0 to 255	5-40:6
ADI	58		Option B Relay 2 Function	0 to 255	5-40:7
ADI	59		Option B Relay 3 Function	0 to 255	5-40:8
ADI	60	-	Reset function		14-20
ADI	61	-	Flying start		1-73
ADI	62	-	Noise reduction method		14-04
ADI	63	-	Function at low current		22-60

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Internal Integers (ADI), continued..

NPT	NPA	UNIT	DESCRIPTION	RANGE	PARAMETER NUMBER
ADI	64	Sec	Trip delay on over-load		14-25
ADI	65	-	Reference/Feedback unit		20-12
ADI	66	-	Feedback conversion		20-07
ADI	67	-	Two feedback calcu-lation		20-20
ADI	68	-	PID Normal/Inverse		20-81
ADI	69	-	PID Anti windup		20-91
ADI	80	-	Coasting		8-50
ADI	81	-	DC Brake		8-52
ADI	82	-	Start		8-53
ADI	83	-	Reversing		8-54
ADI	84	-	Selection of setup		8-55
ADI	85	-	Selection of speed		8-56
ADI	90	-	Reset kWh counter		1-06
ADI	91	-	Reset running hours counter		15-07
ADI	92	-	Operation mode		14-22
ADI	100	-	Active setup		0-10
ADI	101		Analogue Input X42/1 mode	0 to 3	26-00
ADI	102		Analogue Input X42/3 mode	0 to 3	26-01
ADI	102		Analogue Input X42/5 mode	0 to 3	26-02
ADI	103		Analogue Input X42/7 mode	0 to 145	26-50
ADI	104		Analogue Input X42/9 mode	0 to 145	26-60
ADI	105		Analogue Input X42/11 mode	0 to 145	26-70
ADI	110		ECB Bypass mode	0 to 4	31-00
ADI	254	-	Active setup		

[3] Drive must be stopped to change this point

[4] The point is global in all 4 setups

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