



CANopen

Technical Guide

for Delta ASDA-A2

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Manual Overview

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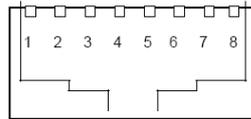
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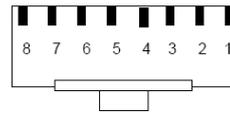
Commissioning

Connectors - Pinout

Pin Assignment (RJ-45) for CAN bus Wiring



Female



Male

Pin No.	Signal Name	Description
1	CAN_H	CAN_H bus line
2	CAN_L	CAN_L bus line
3	CAN_GND	Ground
4	---	Reserved
5	---	Reserved
6	---	Reserved
7	CAN_GND	Ground
8	---	Reserved

Baudrate Settings

Baudrate and Bus Length

Baudrate	Bus Length
1Mbps	25m
750Kbps	50m
500Kbps(Default)	100m
250Kbps	250m
125Kbps	500m

Essential Protocol

- CANopen protocol: NMT, SYNC, SDO, PDO, EMCY
- SDO transfer for reading and writing parameters and communication settings.
- PDO sends/receives along with time-trigger, event-trigger, sync cyclic and sync acyclic.
- Node Guarding
- Heartbeat

Unnecessary Functionality

- Time Stamp

CANopen Operation Mode

Set Keypad P1-01 to **0B_h** for CANopen mode.

Set Keypad P3-00 to Node Id for range 01_h~7F_h.

Set Keypad P3-01 to **0403_h** for Baudrate 1Mbps (0: 125Kbps; 1: 250Kbps; 2: 500 Kbps; 3: 750Kbps; 4:1Mbps).

Operation

Operating Modes

Profile Position Mode

Description

Servo drive (hereinafter “Drive”) receives position command from host (external) controller (hereinafter “Host”) and then control servo motor to reach target position.

Pulse Unit Definition:

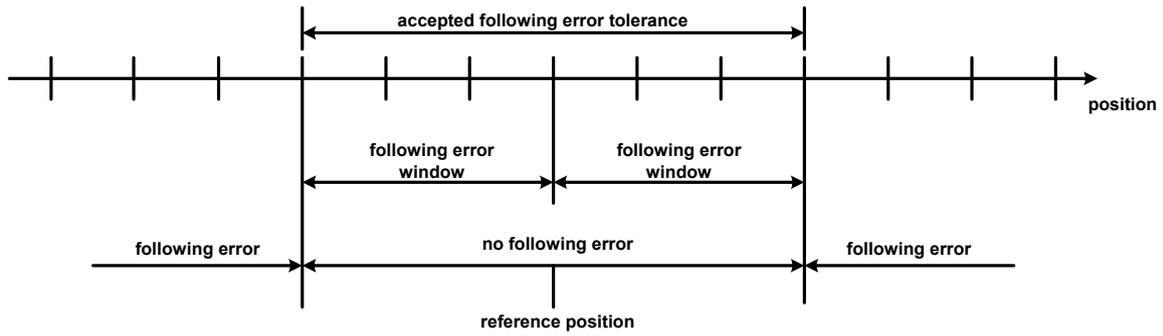
$$\text{Pulse} = \text{Position of user unit} : \text{No. of} \frac{\text{Pulse}}{\text{Rev}} = 1280000 \times \frac{\text{OD} - 6093_{\text{h}} \text{ Sub2}}{\text{OD} - 6093_{\text{h}} \text{ Sub1}}$$

Operation Procedure

1. Setting 【Mode of operations:6060_h】 to profile position mode(1).
2. Setting 【Target position:607A_h】 to target position. (unit: pulse)
3. Setting 【Profile velocity:6081_h】 to profile velocity. (unit: pulse per second)
4. Setting 【Profile acceleration:6083_h】 to plan acceleration slope. (millisecond from 0rpm to 3000rpm)
5. Setting 【Profile deceleration:6084_h】 to plan deceleration slope. (millisecond from 0rpm to 3000rpm)
6. Setting 【Controlword:6040_h】 to servo on drive and make motor work.
7. Query 【Statusword:6064_h】 to get feedback position of motor.
8. Query 【Statusword:6041_h】 to get drive status of following error、set-point acknowledge and target reached.

(Additional)

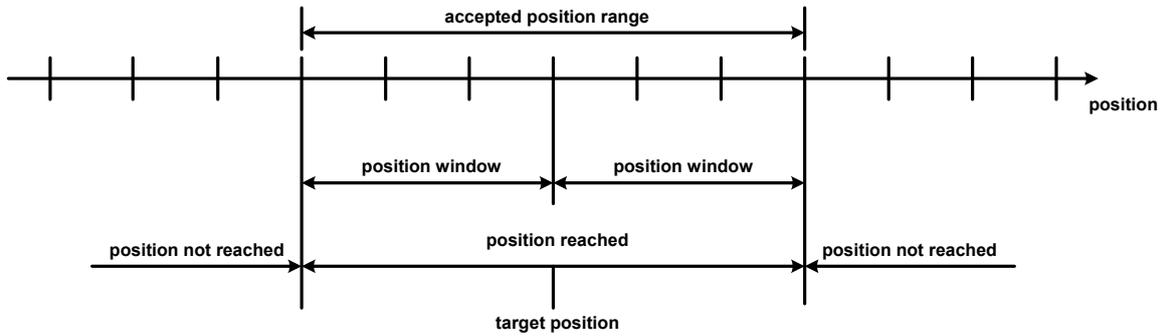
1. Host could get more information about profile position mode.
 - Query 【Position demand value:6062_h】 to get internal position command. (unit: pulse)
 - Query 【Position actual value*:6063_h】 to get actual position value. (unit: increments)
2. Following error
 - Setting 【Following error window:6065_h】 to define range of tolerated position values symmetrically to the position demand value. (unit: pulse)
 - Query 【Following error actual value:60F4_h】 to get actual value of following error. (unit: pulse)



Reference position

3. Position window

- Setting【Position window:6067_h】to define a symmetrical range of accepted positions relatively to the target position. (unit: pulse)
- Setting 【Position window time:6068_h】 to plan time of activation of target reached. (unit: millisecond)



Position reached

Associated Object List

Index	Name	Type	Attr.
6040 _h	Controlword	UNSIGNED16	RW
6041 _h	Statusword	UNSIGNED16	RO
6060 _h	Modes of operation	INTEGER8	RW
6061 _h	Modes of operation display	INTEGER8	RO
6062 _h	Position demand value	INTEGER32	RO
6063 _h	Position actual value*	INTEGER32	RO
6064 _h	Position actual value	INTEGER32	RO
6065 _h	Following error window	UNSIGNED32	RW
6067 _h	Position window	UNSIGNED32	RW
6068 _h	Position window time	UNSIGNED16	RW
607A _h	Target position	INTEGER32	RW
6081 _h	Profile velocity	UNSIGNED32	RW
6083 _h	Profile acceleration	UNSIGNED32	RW

Index	Name	Type	Attr.
6084 _h	Profile deceleration	UNSIGNED32	RW
6093 _h	Position factor	UNSIGNED32	RW
60F4 _h	Following error actual value	INTEGER32	RO
60FC _h	Position demand value	INTEGER32	RO

(Please refer to the following “Details of Objects” section for more detailed description)

Interpolation Position Mode

Description

- The Host sends a broadcast SYNC frame (0x80) cyclically.
- With each PDO, the Host sends the next reference position X_i , the difference ΔX_i and controlword to the drive.
- While the next SYNC receiving, the drive interpolates from X_{i-1} to X_i .
- There is no input data buffer because it would cause delay.

Extrapolation, Jitter Compensation

- When SYNC object is delayed, the interpolator should generate with the last acceleration and extrapolate predicted speed and position.
- When the SYNC delays for 2*cycle, Drive should stop and send out an error message.

PDO Rx/Tx Mapping record

- PDOs from Host to Drive
 - 32 bit reference position [position increment]
 - 16 bit symmetrical difference [increments]

$$\Delta X_i = (X_{i+1} - X_{i-1})/2$$
 (it is also the same as velocity)
 - 16 bit control word.

PDO from Host to Drive (Every PDO contain 8 bytes field like below)

32 bit reference position	16 bit difference	16 bit controlword
---------------------------	-------------------	--------------------

Operation Procedure

1. Setting 【Mode of operations:6060_h】 to interpolation position mode(7).
2. Setting 【Interpolation sub mode select:60C0_h】 to Interpolation mode.
 - If 60C0_h is [0] or [-1], Host **need** to send [60C1h Sub-3] and Drive will work more precisely.
 - If 60C0_h is [-2], Host **does not send** [60C1h Sub-3]. It could save calculating time of Host and Drive could work also.
3. Setting 【Communication Cycle period:1006_h】 to predict SYNC interval.
The unit of this object is microsecond.
It is recommended to set this value for multiple of 1000 microsecond.

4. Setting PDO Communication & Mapping parameters via SDO.

Example:

- Setting 1400h Sub-1 for PDO RxCobId.
- Setting 1400h Sub-2 for PDO receive type [0x01] normally.

If using these steps, Host need to send SYNC and PDO data every Communication cycle.

5. Drive PDO Rx: Total 4 items.

- 60C1_h Sub-1 for Pos Cmd (Low word)
- 60C1_h Sub-2 for Pos Cmd (High word)
- 60C1_h Sub-3 for Symmetrical Difference (optional)
- 6040_h Sub-0 for ControlWord.

6. Drive PDO Tx content could be set up to requirement of Host.

7. Receive NMT from Host to start or stop operation.

Note :

Because of difference of each oscillator, user must change parameter of P3-09 to make drive to auto modify internal timer to match SYNC object period)

Associated Object List

Index	Name	Type	Attr.
6040 _h	Controlword	UNSIGNED16	RW
6041 _h	Statusword	UNSIGNED16	RO
6060 _h	Modes of operation	INTEGER8	RW
6061 _h	Modes of operation display	INTEGER8	RO
6093 _h	Position factor	UNSIGNED32	RW
60C0 _h	Interpolation sub mode select	INTEGER16	RW
60C1 _h	Interpolation data record	ARRAY	RW

(Please refer to the following “Details of Objects” section for more detailed description)

Homing Mode

Description

This mode could help drive to seek the home position. The user can specify the speeds, acceleration and the method of homing.

Operation Procedure

1. Setting 【Mode of operations:6060_h】 to homing mode(6).
2. Setting 【Home offset:607C_h】
3. Setting 【Homing method:6098_h】 , method range is 1~35. (refer to OD-9098_h definition below)
4. Setting 【Homing speeds:6099_h Sub-1】 to set speed during search for switch. (unit: rpm)
5. Setting 【Homing speeds:6099_h Sub-2】 for set speed during search for zero. (unit: rpm)

6. Setting 【Homing acceleration:609A_h】 for homing acceleration. (unit: millisecond from 0rpm to 3000rpm)
7. Setting 【Controlword:6040_h】 to servo on drive and make motor work.
8. Find Home Switch and do homing.
9. Query 【Statusword:6041_h】 to get drive status.

Associated Object List

Index	Name	Type	Attr.
6040 _h	Controlword	UNSIGNED16	RW
6041 _h	Statusword	UNSIGNED16	RO
6060 _h	Modes of operation	INTEGER8	RW
6061 _h	Modes of operation display	INTEGER8	RO
607C _h	Home offset	INTEGER32	RW
6093 _h	Position factor	UNSIGNED32	RW
6098 _h	Homing method	INTEGER8	RW
6099 _h	Homing speeds	ARRAY	RW
609A _h	Homing acceleration	UNSIGNED32	RW

(Please refer to the following “Details of Objects” section for more detailed description)

Profile Velocity Mode

Description

Drive could receive velocity command and plan acceleration and deceleration.

Operation Procedure

1. Setting 【Mode of operations:6060_h】 to profile velocity mode(3).
2. Setting 【Controlword:6040_h】 to servo on drive and make motor work.
(After drive switch to servo-on, internal velocity command will be reset and OD-60FF_h will be cleared.)
3. Setting 【Profile acceleration:6083_h】 to plan acceleration slope. (millisecond from 0rpm to 3000rpm)
4. Setting 【Profile deceleration:6084_h】 to plan deceleration slope. (millisecond from 0rpm to 3000rpm)
5. Setting 【Target velocity:60FF_h】. The unit of Target velocity is 0.1rpm.
(If drive already servo-on, the drive will work immediately while receiving velocity command. OD-60FF_h will be cleared to zero if OD-6060_h[Mode] changed, Servo-Off or Quick-Stop is activated.)
6. Query 【Statusword:6041_h】 to get drive status.

(Additional)

1. Host could get information about velocity mode.
 - Query 【Velocity demand value:606B_h】 to get internal velocity command. (unit: 0.1rpm)
 - Query 【Velocity actual value:606C_h】 to get actual velocity value. (unit: 0.1rpm)
2. Host could set velocity monitor threshold.
 - Setting 【Velocity window:606D_h】 to allocate velocity reached zone. (unit: 0.1rpm)
 - Setting 【Velocity window time:606E_h】 to plan time of activation of velocity reached. (unit: millisecond)
 - Setting 【Velocity threshold:606F_h】 to allocate zero speed level. (unit: 0.1rpm)

Associated Object List

Index	Name	Type	Attr.
6040 _h	Controlword	UNSIGNED16	RW
6041 _h	Statusword	UNSIGNED16	RO
6060 _h	Modes of operation	INTEGER8	RW
6061 _h	Modes of operation display	INTEGER8	RO
606B _h	Velocity demand value	INTEGER32	RO
606C _h	Velocity actual value	INTEGER32	RO
606D _h	Velocity window	UNSIGNED16	RW
606E _h	Velocity window time	UNSIGNED16	RW
606F _h	Velocity threshold	UNSIGNED16	RW
60FF _h	Target velocity	INTEGER32	RW

(Please refer to the following “Details of Objects” section for more detailed description)

Profile Torque Mode

Description

Drive could receive torque command and plan profile torque slope.

Operation Procedure

1. Setting 【Mode of operations:6060_h】 to profile torque mode(4).
2. Setting 【Controlword:6040_h】 to servo on drive and make motor work.
 (After drive switch to servo-on, internal torque command will be reset and OD-6071_h will be cleared. It means the procedure is drive servo-on then start receiving torque command)
3. Setting 【Torque slope:6087_h】 to plan torque slope time. (unit: millisecond from 0 to 100% rated torque)
4. Setting 【Target torque:6071_h】 to target torque. The unit is given per thousand of rated torque. (OD-6071_h will be cleared to zero if OD-6060_h[Mode] changed, Servo-Off or Quick-Stop is activated.)

(Additional)

1. Host could get information about torque mode.
 - Query 【Torque demand value:6074_h】 to get output value of the torque limit function. (unit: per thousand of rated torque)
 - Query【Torque rated current:6075_h】to get the rated current depending on the motor and drive type. (unit: multiples of milliamp)
 - Query 【Torque actual value:6077_h】 to get instantaneous torque in the drive motor. (unit: per thousand of rated torque)
 - Query 【Current actual value:6078_h】 to get instantaneous current in the drive motor. (unit: per thousand of rated current)

Associated Object List

Index	Name	Type	Attr.
6040 _h	Controlword	UNSIGNED16	RW
6041 _h	Statusword	UNSIGNED16	RO
6060 _h	Modes of operation	INTEGER8	RW
6061 _h	Modes of operation display	INTEGER8	RO
6071 _h	Target torque	INTEGER16	RW
6074 _h	Torque demand value	INTEGER16	RO
6075 _h	Motor rated current	UNSIGNED32	RO
6077 _h	Torque actual value	INTEGER16	RO
6078 _h	Current actual value	INTEGER16	RO
6087 _h	Torque slope	UNSIGNED32	RW

(Please refer to the following “Details of Objects” section for more detailed description)

Object Dictionary Entries

Specifications for Objects

Object Type

Object Name	Comments
VAR	A single value such as an UNSIGNED8, Boolean, float, INTEGER16 etc.
ARRAY	A multiple data field object where each data field is a sample variable of the SAME basic data type e.g. array of UNSIGNED16 etc. Sub-index 0 is of UNSIGNED8 and therefore not part of the ARRAY data
RECORD	A multiple data field object where the data fields may be any combination of simple variables. Sub-index 0 is of UNSIGNED8 and therefore not part of the RECORD data

Data Type

Please refer to CANopen Standard 301.

Overview of Object Group 1000_h

Index	Object Type	Name	Data Type	Access	Mappable
CANopen DS301					
1000 _h	VAR	Device type	UNSIGNED32	RO	N
1001 _h	VAR	Error register	UNSIGNED8	RO	Y
1003 _h	ARRAY	Pre-defined error field	UNSIGNED32	RW	N
1005 _h	VAR	COB-ID SYNC	UNSIGNED32	RW	N
1006 _h	VAR	Communication cycle period	UNSIGNED32	RW	N
1010 _h	ARRAY	Store parameters	UNSIGNED32	RW	N
1011 _h	ARRAY	Restore default parameters	UNSIGNED32	RW	N
1014 _h	VAR	COB-ID EMCY	UNSIGNED32	RO	N
1018 _h	RECORD	Identity Object	UNSIGNED32	RO	N
101A _h	ARRAY	Error Counter	UNSIGNED32	RW	N
1400 _h ~03 _h	RECORD	Receive PDO parameter	UNSIGNED16/32	RW	N
1600 _h ~03 _h	RECORD	Receive PDO mapping	UNSIGNED32	RW	N
1800 _h ~03 _h	RECORD	Transmit PDO parameter	UNSIGNED16/32	RW	N
1A00 _h ~03 _h	RECORD	Transmit PDO mapping	UNSIGNED32	RW	N

Overview of Object Group 6000_h

Index	Object Type	Name	Data Type	Access	Mappable
CANopen DS402					
6040 _h	VAR	Controlword	UNSIGNED16	RW	Y
6041 _h	VAR	Statusword	UNSIGNED16	RO	Y
605B _h	VAR	Shutdown option code	INTEGER16	RW	N
605E _h	VAR	Fault reaction option code	INTEGER16	RW	N
6060 _h	VAR	Modes of operation	INTEGER8	RW	Y
6061 _h	VAR	Modes of operation display	INTEGER8	RO	Y
6062 _h	VAR	Position demand value	INTEGER32	RO	Y
6063 _h	VAR	Position actual value*	INTEGER32	RO	Y
6064 _h	VAR	Position actual value	INTEGER32	RO	Y
6065 _h	VAR	Following error window	UNSIGNED32	RW	Y
6067 _h	VAR	Position windows	UNSIGNED32	RW	Y
6068 _h	VAR	Position window time	UNSIGNED16	RW	Y
606B _h	VAR	Velocity demand value	INTEGER32	RO	Y
606C _h	VAR	Velocity actual value	INTEGER32	RO	Y
606D _h	VAR	Velocity window	UNSIGNED16	RW	Y
606E _h	VAR	Velocity window time	UNSIGNED16	RW	Y
606F _h	VAR	Velocity threshold	UNSIGNED16	RW	Y
6071 _h	VAR	Target torque	INTEGER16	RW	Y
6074 _h	VAR	Torque demand value	INTEGER16	RO	Y
6075 _h	VAR	Motor rated current	UNSIGNED32	RO	Y
6077 _h	VAR	Torque actual value	UNSIGNED16	RO	Y
6078 _h	VAR	Current actual value	INTEGER16	RO	Y
607A _h	VAR	Target position	INTEGER32	RW	Y
607C _h	VAR	Home Offset	INTEGER32	RW	Y
6081 _h	VAR	Profile velocity	UNSIGNED32	RW	Y
6083 _h	VAR	Profile acceleration	UNSIGNED32	RW	Y
6084 _h	VAR	Profile deceleration	UNSIGNED32	RW	Y
6085 _h	VAR	Quick stop deceleration	UNSIGNED32	RW	Y
6087 _h	VAR	Torque slope	UNSIGNED32	RW	Y
6093 _h	ARRAY	Position factor	UNSIGNED32	RW	Y
6098 _h	VAR	Homing method	INTEGER8	RW	Y
6099 _h	ARRAY	Homing speeds	UNSIGNED32	RW	Y

Index	Object Type	Name	Data Type	Access	Mappable
CANopen DS402					
609A _h	VAR	Homing acceleration	UNSIGNED32	RW	Y
60C0 _h	VAR	Interpolation sub mode select	INTEGER16	RW	Y
60C1 _h	ARRAY	Interpolation data record	UNSIGNED16	RW	Y
60C2 _h	RECORD	Interpolation time period	SIGNED8	RW	Y
60F4 _h	VAR	Following error actual value	INTEGER32	RO	Y
60FC _h	VAR	Position demand value	INTEGER32	RO	Y
60FF _h	VAR	Target velocity	INTEGER32	RW	Y
6502 _h	VAR	Supported drive modes	UNSIGNED32	RO	Y
Delta parameter definition					
2xxx	VAR	Keypad Mapping	INTEGER16/32	RW	Y

Details of Objects

Object 1000_h: Device Type

INDEX	1000 _h
Name	Device type
Object Code	VAR
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	04020192 _h

Device	Additional Information		Device Profile Number
	Mode bits	Type	
Bit	31~24	23~16	15~0
Drive	0x04	0x02	0x0192

Object 1001_h: Error Register

INDEX	1001 _h
Name	Error register
Object Code	VAR
Data Type	UNSIGNED8
Access	RO
PDO Mapping	Yes
Value Range	UNSIGNED8
Default Value	0

Object 1003_h: Pre-defined Error Field

INDEX	1003 _h
Name	Pre-defined error field
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No

Sub-Index	0
Description	Number of errors
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	0~5
Default Value	0

Sub-Index	1~5
Description	Standard error field
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0

Object 1005_h: COB-ID SYNC message

INDEX	1005 _h
Name	COB-ID SYNC message
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	80 _h

Object 1006_h: Communication Cycle Period

INDEX	1006 _h
Name	Communication cycle period
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0

Object 1010_h: Store parameters

INDEX	1010 _h
Name	Store parameters
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No

Sub-Index	0
Description	Largest sub-index supported
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	1
Default Value	1

Sub-Index	1
Description	Save all parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	1

	MSB			LSB
ASCII	e	v	a	s
hex	65h	76h	61h	73h

Signature

Object 1011_n: Restore default parameters

INDEX	1011 _n
Name	Restore default parameters
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No

Sub-Index	0
Description	Largest sub-index supported
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	1
Default Value	1

Sub-Index	1
Description	Restore all default parameters
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	1

	MSB			LSB
ASCII	d	a	o	l
hex	64h	61h	6Fh	6Ch

Signature

Object 1014_h: COB-ID Emergency Object

INDEX	1014 _h
Name	COB-ID Emergency message
Object Code	VAR
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	80 _h + Node-ID

Object 1018_h: Identity Object

INDEX	1018 _h
Name	Identity Object
Object Code	RECORD
Data Type	Identity
Access	RO
PDO Mapping	No

Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	3
Default Value	3

Sub-Index	1
Description	Vendor ID
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	1DD _h

Sub-Index	2
Description	Product code
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	6000 _h

Sub-Index	3
Description	Revision number
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	02000001 _h

Object 101A_h: Error Counter

INDEX	101A _h
Name	Error Counter
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No

Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	4
Default Value	4

Sub-Index	1
Description	Current Rx Error Counter
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0

Sub-Index	2
Description	Current Tx Error Counter
Data Type	UNSIGNED32
Access	RO
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0

Sub-Index	3
Description	Rx Error Counter Max
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0

Sub-Index	4
Description	Tx Error Counter Max
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0

Object 1400_h ~ 1403_h: Receive PDO Communication Parameter

INDEX	1400 _h ~ 1403 _h
Name	Receive PDO parameter
Object Code	RECORD
Data Type	PDO CommPar
Access	RW
PDO Mapping	No

Sub-Index	0
Description	Largest sub-index supported
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	2
Default Value	2

Sub-Index	1
Description	COB-ID used by PDO
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	Default Node-ID: 0 Index 1400 _h : 200 _h + Node-ID Index 1401 _h : 300 _h + Node-ID Index 1402 _h : 400 _h + Node-ID Index 1403 _h : 500 _h + Node-ID

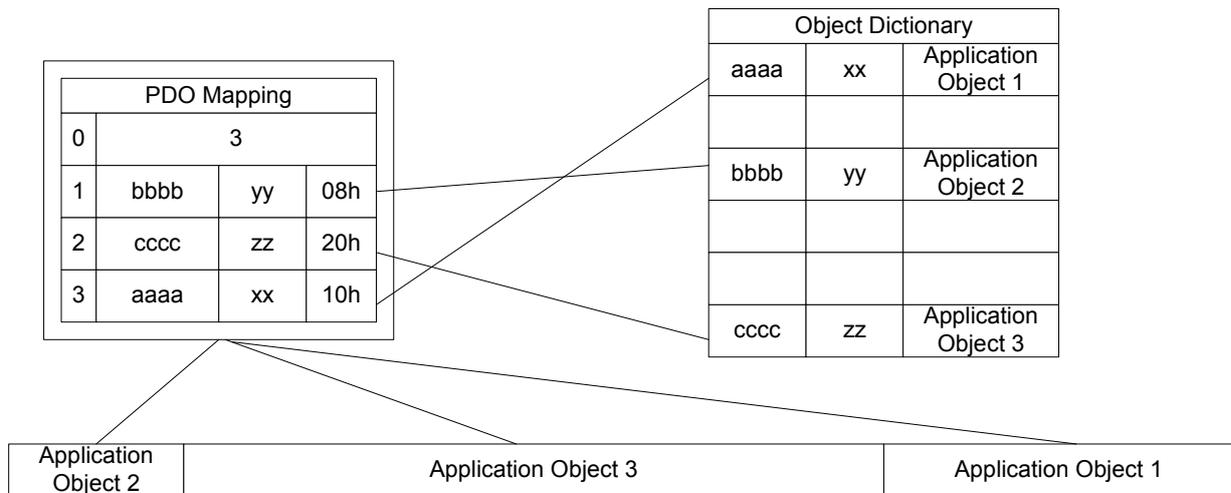
Sub-Index	2
Description	Reception type
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Object 1600_h ~ 1603_h: Receive PDO Mapping Parameter

INDEX	1600 _h ~ 1603 _h
Name	Receive PDO mapping
Object Code	RECORD
Data Type	PDO Mapping
Access	RW
PDO Mapping	No

Sub-Index	0
Description	Number of mapped application objects in PDO
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	0: deactivated 1~8: activated
Default Value	0

Sub-Index	1~8
Description	PDO mapping for the nth application object to be mapped
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0



Object 1800_h ~ 1803_h: Transmit PDO Communication Parameter

INDEX	1800 _h ~ 1803 _h
Name	Transmit PDO parameter
Object Code	RECORD
Data Type	PDO CommPar
Access	RW
PDO Mapping	No

Sub-Index	0
Description	Largest sub-index supported
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	3
Default Value	3

Sub-Index	1
Description	COB-ID used by PDO
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	Default Node-ID: 0 Index 1800 _h : 180 _h + Node-ID Index 1801 _h : 280 _h + Node-ID Index 1802 _h : 380 _h + Node-ID Index 1803 _h : 480 _h + Node-ID

Sub-Index	2
Description	Transmission type
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	UNSIGNED8
Default Value	0

Sub-Index	5
Description	Event timer
Data Type	UNSIGNED16
Access	RW
PDO Mapping	No
Value Range	0: not used UNSIGNED16
Default Value	0

Object 1A00_h ~ 1A03_h: Transmit PDO Mapping Parameter

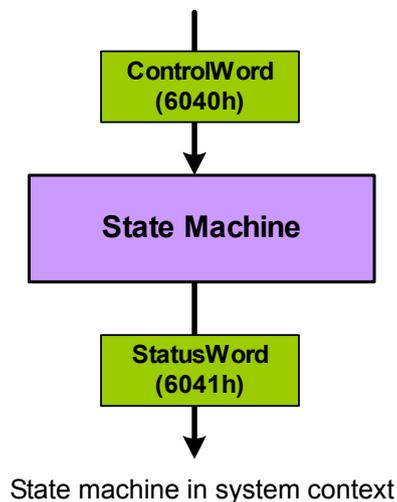
INDEX	1A00 _h ~ 1A03 _h
Name	Transmit PDO mapping
Object Code	RECORD
Data Type	PDO Mapping
Access	RW
PDO Mapping	No

Sub-Index	0
Description	Number of mapped application objects in PDO
Data Type	UNSIGNED8
Access	RW
PDO Mapping	No
Value Range	0: deactivated 1~8: activated
Default Value	0

Sub-Index	1~8
Description	PDO mapping for the nth application object to be mapped
Data Type	UNSIGNED32
Access	RW
PDO Mapping	No
Value Range	UNSIGNED32
Default Value	0

Object 6040_n: Controlword

INDEX	6040 _n
Name	Controlword
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	0



Bit Definition

15~9	8	7	6~4	3	2	1	0
N/A	Halt	Fault reset	Operation mode specific	Enable operation	Quick stop	Enable voltage	Switch on

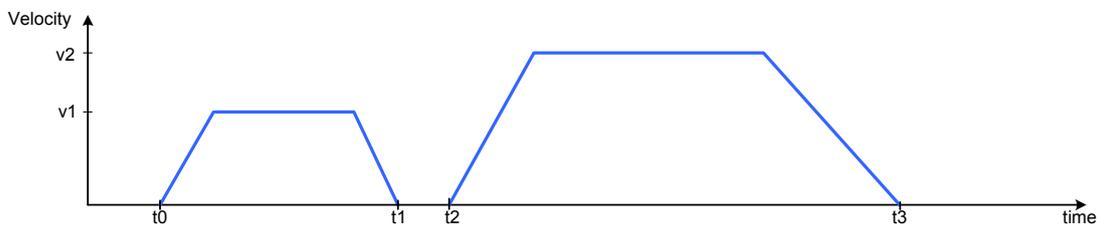
Note :

It means Host would send OD-6040_h for **08_h** to make Drive servo-on.

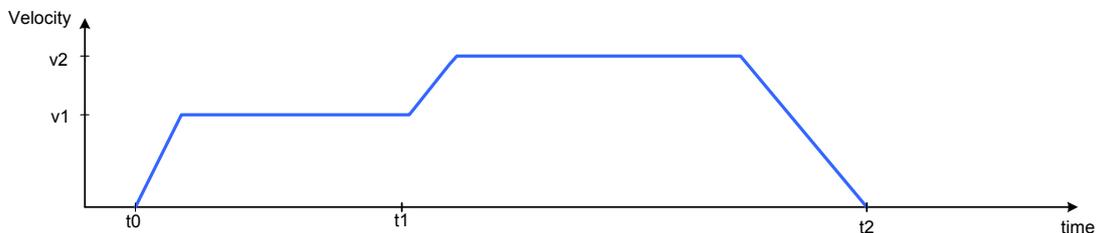
Bit	Operation mode				
	pp	hm	ip	pv	pt
4	New set-point (positive trigger)	N/A	Enable ip mode	N/A	N/A
5	Change set immediately	N/A	N/A	N/A	N/A
6	abs/rel	N/A	N/A	N/A	N/A

Abbreviation:

- pp** Profile Position Mode
- hm** Homing Mode
- ip** Interpolated Position Mode
- pv** Profile Velocity Mode
- pt** Profile Torque Mode



Single set-point



Change setting immediately

Object 6041_h: Statusword

INDEX	6041 _h
Name	Statusword
Object Code	VAR
Data Type	UNSIGNED16
Access	RO
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	0

Bit Definition

15~11	10	9	8~6	5	4	3	2	1	0
Operation / Manufacturer Specific	Target reached	Remote	N/A	Quick stop	N/A	Fault	Operation enabled	Switched on	Ready to switch on

Operation mode					
	pp	hm	ip	pv	pt
12	Set-point acknowledge	Homing attained	IP mode active	Zero Speed	N/A
13	Following error	Homing error	N/A	N/A	N/A
14	N/A	N/A	Sync OK	N/A	N/A
15	N/A	N/A	N/A	N/A	N/A

Object 605B_h: Shutdown option code

INDEX	605B _h
Name	Shutdown option code
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	0
Comment	0:Disable drive function -1:Dynamic break enable

Object 605E_h: Fault reaction option code

INDEX	605E _h
Name	Fault reaction option code
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	2
Comment	0:Disable drive, motor is free to rotate 1:slow down on slow down ramp 2:slow down on quick stop ramp

Object 6060_h: Modes of operation

INDEX	6060 _h
Name	Modes of operation
Object Code	VAR
Data Type	INTEGER8
Access	RW
PDO Mapping	Yes
Value Range	INTEGER8
Default Value	0
Comment	0:Reserved 1:Profile position mode 3:Profile velocity mode 4:Profile torque mode 6:Homing mode 7:Interpolation position mode

Object 6061_h: Modes of operation display

INDEX	6061 _h
Name	Modes of operation display
Object Code	VAR
Data Type	INTEGER8
Access	RW
PDO Mapping	Yes
Value Range	INTEGER8
Default Value	0

Object 6062_h: Position demand value

INDEX	6062 _h
Name	Position demand value
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	Pos cmd calculated by Interpolation theory Unit: pulse

Object 6063_h: Position demand value

INDEX	6063 _h
Name	Position actual value*
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	Unit: increments

Object 6064_h: Position actual value

INDEX	6064 _h
Name	Position actual value
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	Unit: pulse

Object 6065_h: Following error window

INDEX	6065 _h
Name	Following error window
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	0
Comment	Unit: pulse

Object 6067_h: Position window

INDEX	6067 _h
Name	Position window
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Comment	Unit: pulse

Object 6068_h: Position window time

INDEX	6068 _h
Name	Position window time
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Comment	Unit: millisecond

Object 606B_h: Velocity demand value

INDEX	606B _h
Name	Velocity demand value
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Comment	Unit: 0.1rpm

Object 606C_h: Velocity actual value

INDEX	606C _h
Name	Velocity actual value
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Comment	Unit: 0.1rpm

Object 606D_h: Velocity window

INDEX	606D _h
Name	Velocity window
Object Code	VAR
Data Type	INTEGER16
Access	RO
PDO Mapping	Yes
Value Range	INTEGER16
Comment	Unit: 0.1rpm

Object 606E_h: Velocity window time

INDEX	606E _h
Name	Velocity window time
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Comment	Unit: millisecond

Object 606F_h: Velocity threshold

INDEX	606F _h
Name	Velocity threshold
Object Code	VAR
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Comment	Unit: 0.1rpm

Object 6071_h: Target torque

INDEX	6071 _h
Name	Target torque
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Comment	Unit: per thousand of rated torque

Object 6074_h: Torque demand value

INDEX	6074 _h
Name	Torque demand value
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Comment	Unit: per thousand of rated torque

Object 6075_h: Motor rated current

INDEX	6075 _h
Name	Motor rated current
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Comment	Unit: milliamp

Object 6077_h: Torque actual value

INDEX	6077 _h
Name	Torque actual value
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Comment	Unit: per thousand of rate torque

Object 6078_h: Current actual value

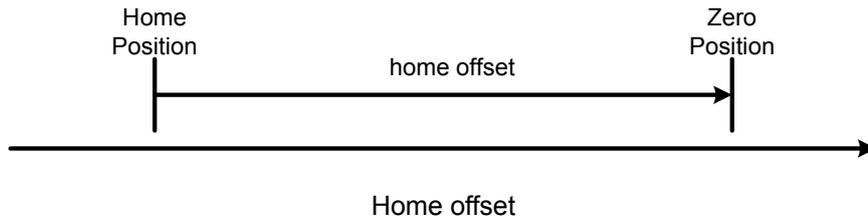
INDEX	6078 _h
Name	Current actual value
Object Code	VAR
Data Type	INTEGER16
Access	RO
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	0
Comment	Unit: per thousand of rated current

Object 607A_h: Target position

INDEX	607A _h
Name	Target position
Object Code	VAR
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	For Profile position mode 6060 _h =1 Unit: pulse

Object 607C_h: Home offset

INDEX	607C _h
Name	Home offset
Object Code	VAR
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32
Default Value	0
Comment	Unit : pulse



Object 6081_h: Profile velocity

INDEX	6081 _h
Name	Profile Velocity
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	10000
Comment	For Profile position mode 6060 _h =1 Unit: pulse per second

Object 6083_h: Profile acceleration

INDEX	6083 _h
Name	Profile acceleration
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	1~UNSIGNED32
Default Value	200
Comment	For Profile position mode 6060 _h =1 Unit: millisecond (time from 0rpm to 3000rpm)

Object 6084_h: Profile deceleration

INDEX	6084 _h
Name	Profile deceleration
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	1~UNSIGNED32
Default Value	200
Comment	For Profile position mode 6060 _h =1 Unit: millisecond (time from 0rpm to 3000rpm)

Object 6085_h: Quick stop deceleration

INDEX	6085 _h
Name	Quick stop acceleration
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	0
Comment	Unit: millisecond (time from 0rpm to 3000rpm)

Object 6087_h: Torque slope

INDEX	6087 _h
Name	Torque slope
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	0
Comment	Unit: millisecond (time from 0 to 100% rated torque)

Object 6093_h: Position factor

INDEX	6093 _h
Name	Position factor
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Comment	Position factor = Numerator / Feed_constant

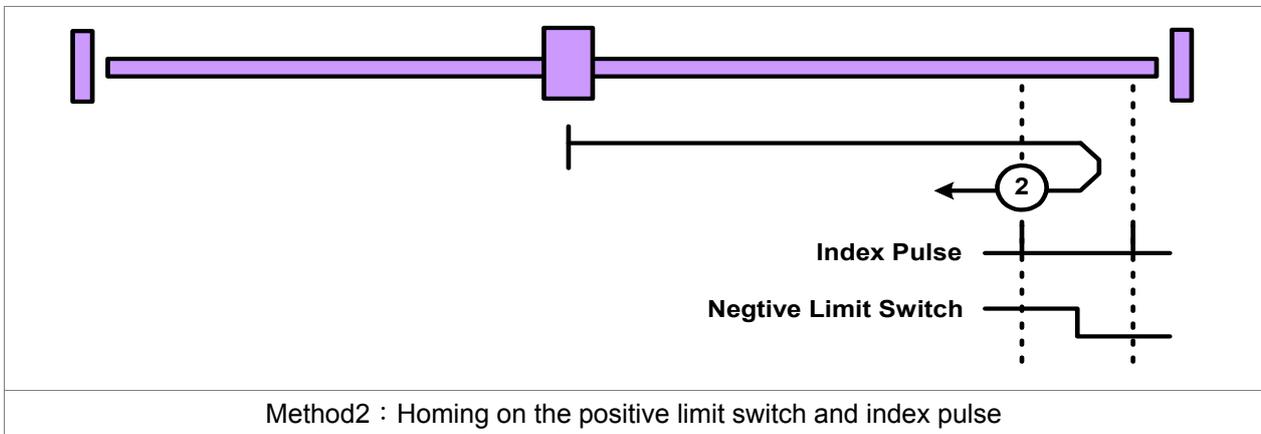
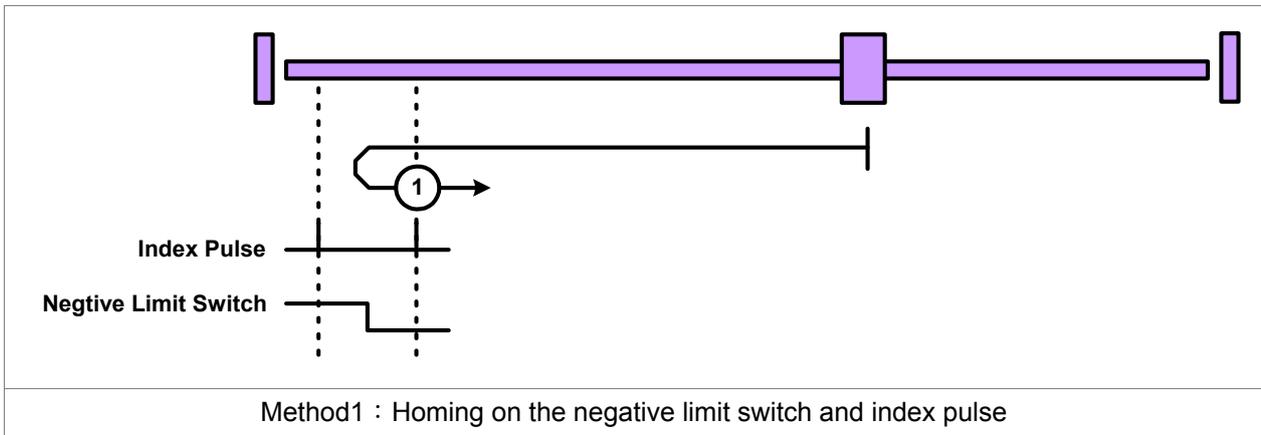
Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	2
Default Value	2

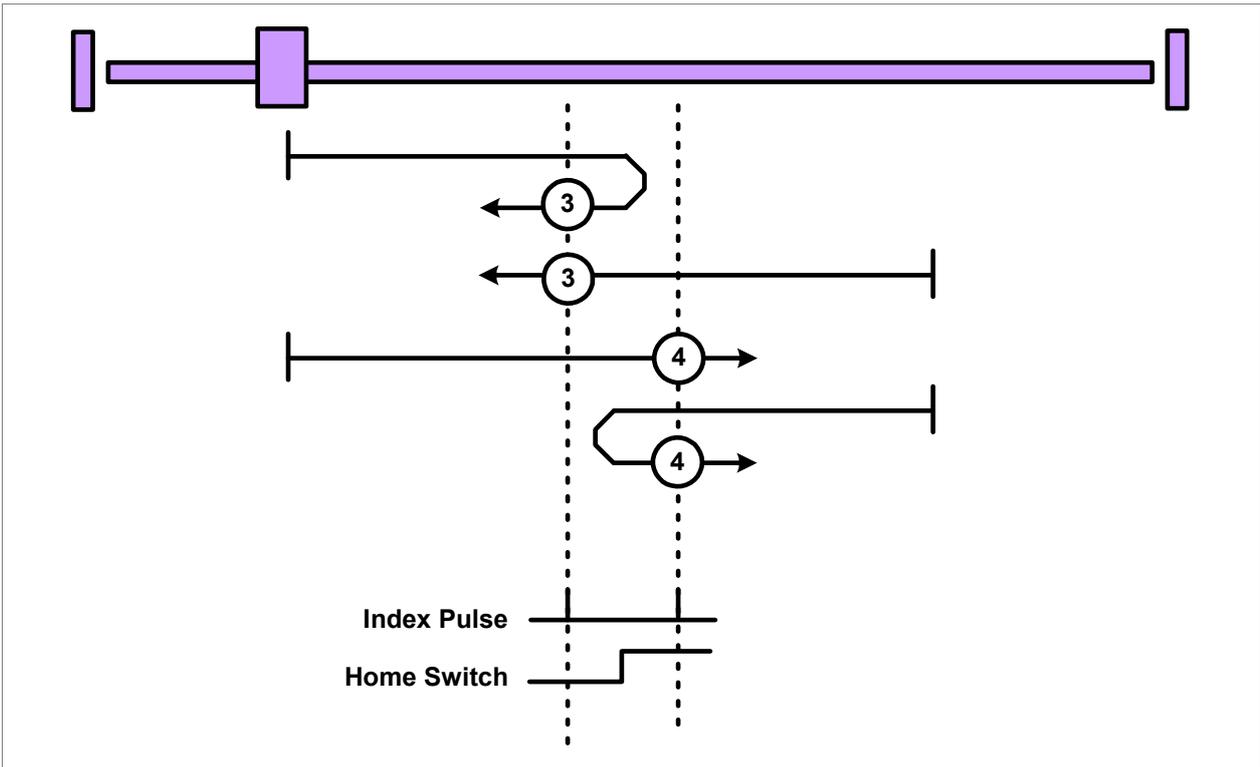
Sub-Index	1
Description	Numerator
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Default Value	1
Comment	Same as P1-44

Sub-Index	2
Description	Feed_constant
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Default Value	1
Comment	Same as P1-45

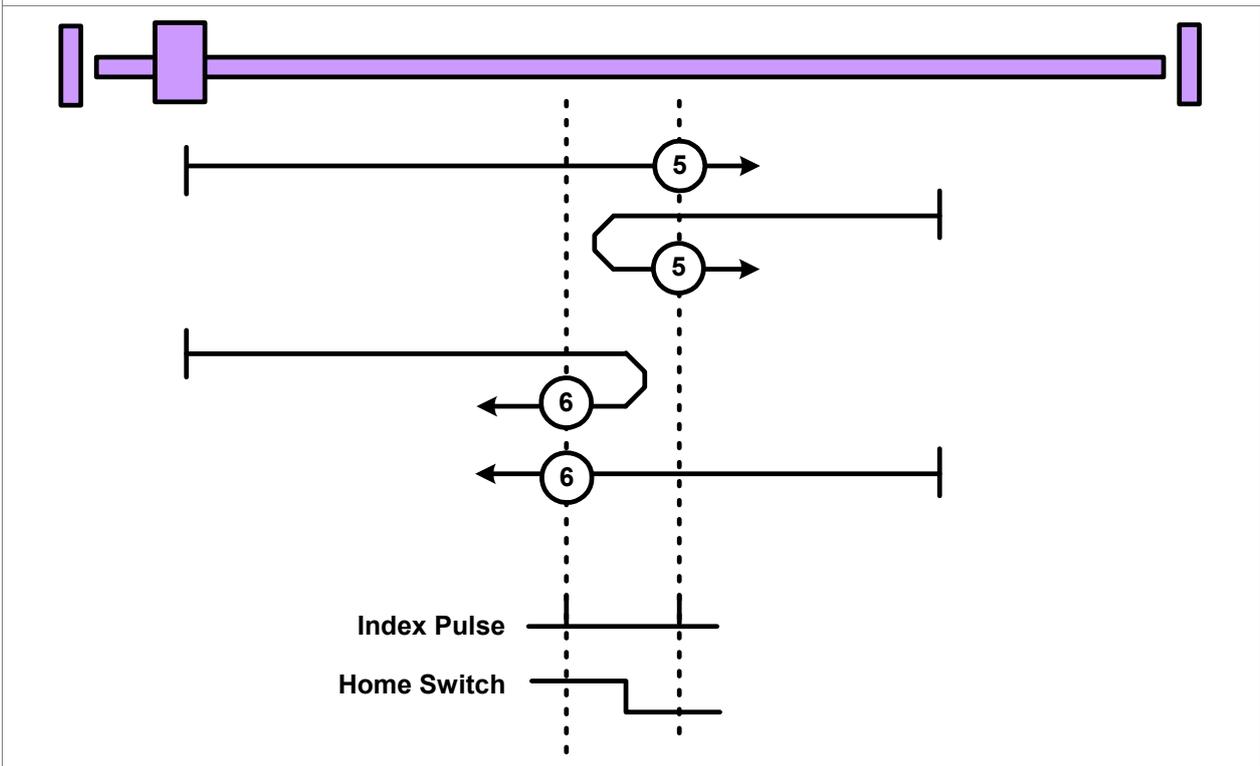
Object 6098_h: Homing method

INDEX	6098 _h
Name	Homing method
Object Code	VAR
Data Type	INTEGER8
Access	RW
PDO Mapping	Yes
Value Range	0~35
Default Value	0

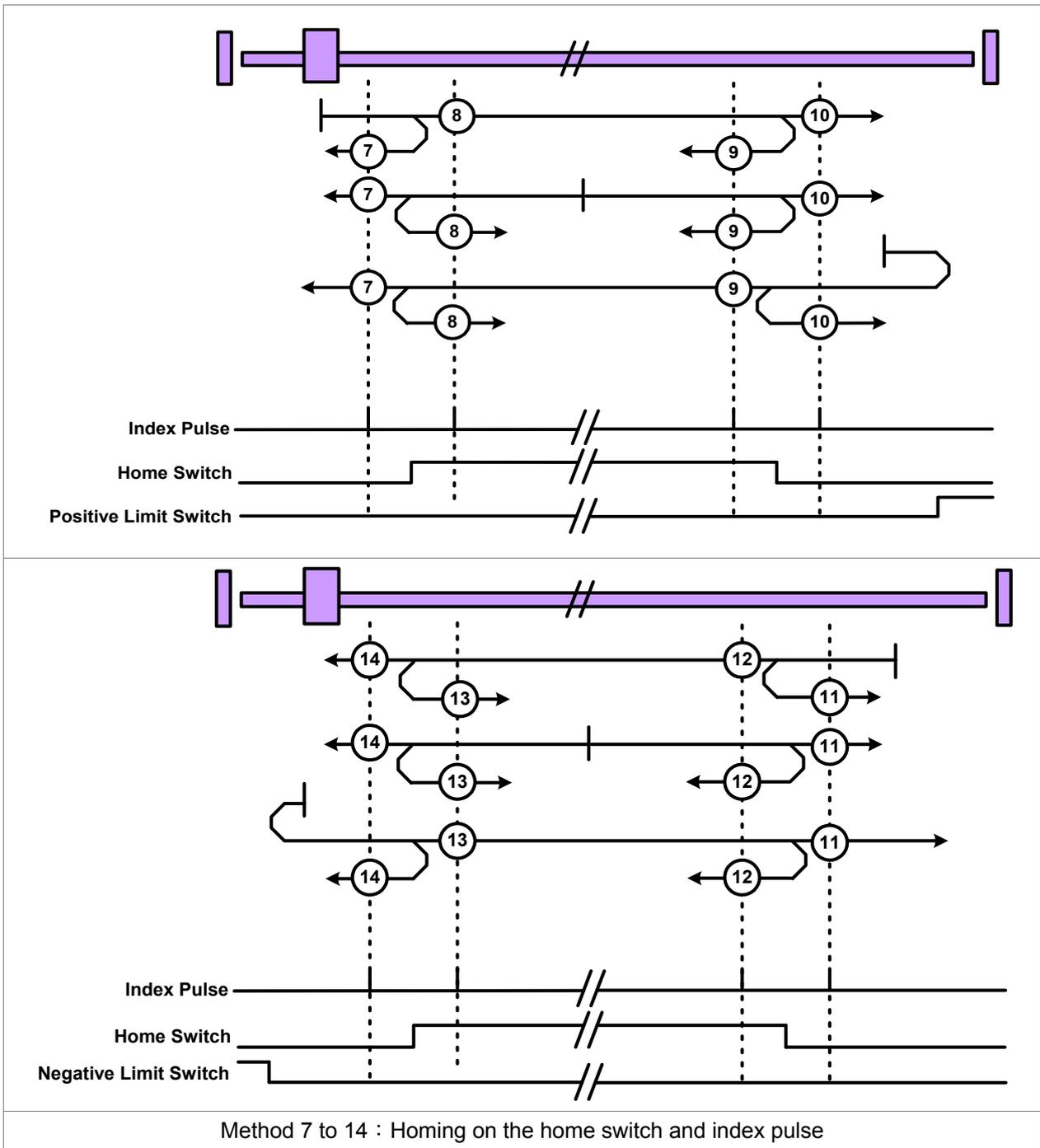




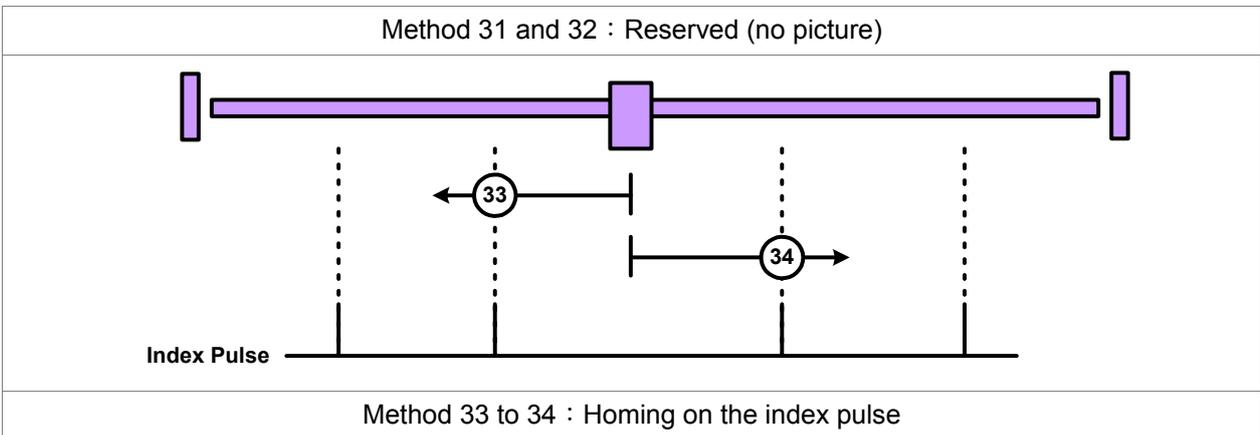
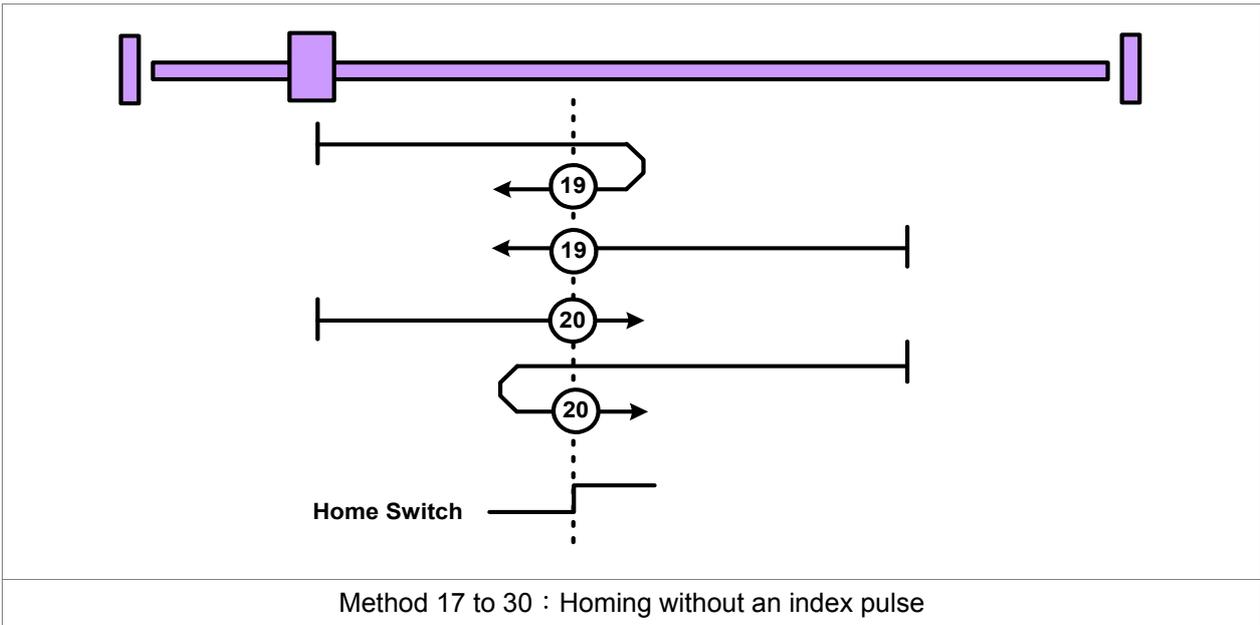
Method 3 and 4 : Homing on the positive home switch and index pulse



Method 5 and 6 : Homing on the negative home switch and index pulse



Method 15 and 16 : Reserved (no picture)



Method 35 : Homing on the current position (no picture)

Object 6099_h: Homing speeds

INDEX	6099 _h
Name	Homing speeds
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes

Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	Yes
Value Range	2
Default Value	2

Sub-Index	1
Description	Speed during search for switch
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	1~2000
Default Value	100
Comment	Uint:rpm

Sub-Index	2
Description	Speed during search for zero
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	1~500
Default Value	20
Comment	Uint:rpm

Object 609A_h: Homing acceleration

INDEX	609A _h
Name	Homing acceleration
Object Code	VAR
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	100
Comment	Unit: millisecond (time of acc from 0rpm to 3000rpm)

Object 60C0_h: Interpolation sub mode select

INDEX	60C0 _h
Name	Interpolation sub mode select
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	0
Comment	0, -1: manufacturer specific (Delta ASDA-A2 definition -- need pos difference[OD-60C1sub3]) -2: manufacturer specific (Linear interpolation -- not need pos difference[OD-60C1sub3])

Object 60C1_h: Interpolation data record

INDEX	60C1 _h
Name	Interpolation data record
Object Code	ARRAY
Data Type	UNSIGNED32
Access	RW
PDO Mapping	Yes
Comment	Set this record by PDO every T msec before SYNC message Where T is specified by 1006 _h

Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	3
Default Value	3

Sub-Index	1
Description	Pos_Cmd (Low Word)
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	0
Comment	Unit: low word of 32-bit pulse

Sub-Index	2
Description	Pos_Cmd (High Word)
Data Type	UNSIGNED16
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED16
Default Value	0
Comment	Unit: high word of 32-bit pulse

Sub-Index	3
Description	Velocity – Pos_Cmd difference
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	0
Comment	$\Delta X_i = (X_{i+1} - X_{i-1})/2$ (it is also the same as velocity) Unit: pulse

Object 60C2_h: Interpolation time period

INDEX	60C2 _h
Name	Interpolation time period
Object Code	RECORD
Data Type	UNSIGNED8
Access	RW
PDO Mapping	Yes
Comment	The unit of <i>the interpolation time unit</i> is given in 10 ^{<i>interpolation time index</i>} seconds

Sub-Index	0
Description	Number of entries
Data Type	UNSIGNED8
Access	RO
PDO Mapping	No
Value Range	2
Default Value	2

Sub-Index	1
Description	Interpolation time units
Data Type	UNSIGNED8
Access	RW
PDO Mapping	Yes
Value Range	UNSIGNED8
Default Value	1

Sub-Index	2
Description	Interpolation time index
Data Type	INTEGER8
Access	RW
PDO Mapping	Yes
Value Range	-128~63
Default Value	-3

Object 60F4_h: Following error actual value

INDEX	60F4 _h
Name	Following error actual value
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Comment	Unit: pulse

Object 60FC_h: Position demand value*

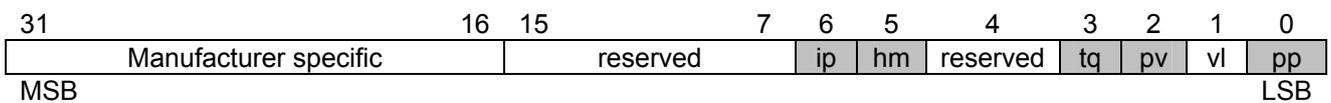
INDEX	60FC _h
Name	Position demand value*
Object Code	VAR
Data Type	INTEGER32
Access	RO
PDO Mapping	Yes
Value Range	INTEGER32
Comment	Unit: increment

Object 60FF_h: Target velocity

INDEX	60FF _h
Name	Target velocity
Object Code	VAR
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32
Comment	Unit: 0.1rpm

Object 6502_h: Supported drive modes

INDEX	6502 _h
Name	Supported drive modes
Object Code	VAR
Data Type	UNSIGNED32
Access	Ro
PDO Mapping	Yes
Value Range	UNSIGNED32
Default Value	6D _h

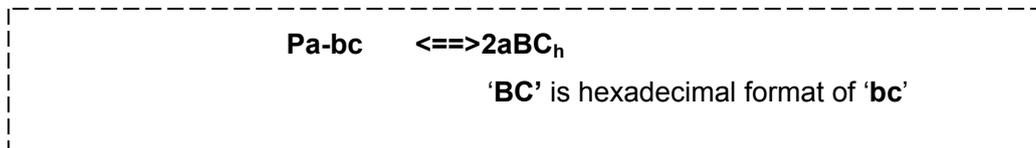


Object 2xxx_h: Keypad mapping

INDEX	2xxx _h
Name	Keypad mapping register
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	N/A

Object 2xxx is defined Keypad mapping.

If user wants to use CANopen protocol for simulate Keypad press, he or she could read and write Keypad parameter via SDO protocol.



Example 1:Object 2300_h: Node-ID 【P3-00】

INDEX	2300 _h
Name	Node-ID
Object Code	VAR
Data Type	INTEGER16
Access	RW
PDO Mapping	Yes
Value Range	INTEGER16
Default Value	7F _h

Example 2:Object 212C_h: Electronic Gear 【P1-44】

INDEX	212C _h
Name	Electronic Gear
Object Code	VAR
Data Type	INTEGER32
Access	RW
PDO Mapping	Yes
Value Range	INTEGER32

Diagnostics and Troubleshooting

CANopen Communication Fault Messages

Emergency Object

Byte	0	1	2	3	4	5	6	7
Content	Emergency Error Code		Error register	Panel Alarm Code		N/A		

Fault Messages			
Display	Fault Name	Fault Description	Clearing Method
AL185	CANbus error	CANbus off or Error Rx/Tx Counter exceeds 128.	Host send "Reset node" command to its slave or restart the servo drive.
AL170	Life guard error or heartbeat error	Drive can't negotiate with Host	Host send "Reset node" command to its slave or restart the servo drive.
AL111	CANopen SDO receive buffer overrun	SDO Rx buffer overrun is detected (receive two or more SDO packets in 1ms).	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL112	CANopen PDO receive buffer overrun	PDO Rx buffer overrun is detected (receive two or more PDO (same COBID) packets in 1ms).	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL121	Index error occurs when accessing CANopen PDO object.	The specified Index in the message does not exist.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL122	Sub-index error occurs when accessing CANopen PDO object.	The specified Sub-index in the message does not exist.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).

Fault Messages			
Display	Fault Name	Fault Description	Clearing Method
AL123	Data type (size) error occurs when accessing CANopen PDO object.	The data length in the message does not match the specified object.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL124	Data range error occurs when accessing CANopen PDO object.	The data in the message has exceeded the data range of the specified object.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL125	CANopen PDO object is read-only and write-protected.	The specified object in the message is read-only and write-protected (cannot be changed).	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL126	CANopen PDO object does not support PDO.	The specified object in the message does not support PDO.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL127	CANopen PDO object is write-protected when Servo On.	The specified object in the message is write-protected (cannot be changed) when Servo On.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL128	Error occurs when reading CANopen PDO object from EE-PROM.	An error occurs when loading the default settings from EE-PROM at start-up. All CANopen objects return to their default settings automatically.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL129	Error occurs when writing CANopen PDO object into EE-PROM.	An error occurs when writing the current settings into EE-PROM.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).

Fault Messages			
Display	Fault Name	Fault Description	Clearing Method
AL130	EE-PROM invalid address range	The amount of the data saved in EE-PROM has exceeded the space determined by the firmware. Maybe the firmware version has been upgraded, and it causes that the data of old firmware version saved in EE-PROM cannot be used.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL131	EE-PROM checksum error	The data saved in EE-PROM has been damaged and all CANopen objects return to their default settings automatically.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL132	Password error	The parameter is password protected when using CANopen communication to access the parameter. The users must enter the valid password to unlock the parameter.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL301	CANopen SYNC failed	The synchronous communication with the external controller has failed.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL302	CANopen SYNC signal error	The CANopen SYNC signal is received too early.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL303	CANopen SYNC time out	The CANopen SYNC signal is not received within the specified time.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).

Fault Messages			
Display	Fault Name	Fault Description	Clearing Method
AL304	CANopen IP command failed	Internal command of CANopen IP mode cannot be sent and received.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).
AL305	SYNC period error	Object 0x1006 data error. SYNC period 1006h value is invalid.	Host send "Reset node" command to its slave or reset the fault by sending the control word (0x6040) through CAN communication (the value of CANopen object 0x6040 should be reset).

Error Code Table

Display	Description	32bit-ErrorCode (16bit-ErrorCode + 16bit-Additional Info)
AL001	Overcurrent	2310-0001 _h
AL002	Overvoltage	3110-0002 _h
AL003	Undervoltage	3120-0003 _h
AL004	Motor error	7122-0004 _h
AL005	Regeneration error	3210-0005 _h
AL006	Overload	3230-0006 _h
AL007	Overspeed	8400-0007 _h
AL008	Abnormal pulse control command	8600-0008 _h
AL009	Excessive deviation	8611-0009 _h
AL010	Reserved	0000-0010 _h
AL011	Encoder error	7305-0011 _h
AL012	Adjustment error	6320-0012 _h
AL013	Emergency stop activated	5441-0013 _h
AL014	Reverse limit switch error	5443-0014 _h
AL015	Forward limit switch error	5442-0015 _h
AL016	IGBT temperature error	4210-0016 _h
AL017	Memory error	5330-0017 _h
AL018	Encoder output error	7306-0018 _h
AL019	Serial communication error	7510-0019 _h
AL020	Serial communication time out	7520-0020 _h

Display	Description	32bit-ErrorCode (16bit-ErrorCode + 16bit-Additional Info)
AL021	Reserved	Reserved
AL022	Input power phase loss	3130-0022 _h
AL023	Pre-overload warning	3231-0023 _h
AL024	Encoder initial magnetic field error	7305-0024 _h
AL025	Encoder internal error	7305-0025 _h
AL026	Encoder internal error	7305-0026 _h
AL027	Encoder data error	7305-0027 _h
AL030	Motor protection error	7121-0030 _h
AL031	U,V,W wiring error	3300-0031 _h
AL040	Ful closed-loop excessive deviation	8610-0040 _h
AL099	DSP firmware upgrade	5500-0099 _h
AL201	CANopen Data Initial Error	6310-0201 _h
AL283	Forward software limit	5444-0283 _h
AL285	Reverse software limit	5445-0285 _h
AL185	CANbus error	8120-0185 _h
AL170	Life guard error or heartbeat error	8130-0170 _h
AL111	CANopen PDO receive buffer overrun	8110-0111 _h
AL112	Index error occurs when accessing CANopen PDO object.	8110-0112 _h
AL121	Sub-index error occurs when accessing CANopen PDO object.	8200-0121 _h
AL122	Data type (size) error occurs when accessing CANopen PDO object.	8200-0122 _h
AL123	Data range error occurs when accessing CANopen PDO object.	8200-0123 _h
AL124	CANopen PDO object is read-only and write-protected.	8200-0124 _h
AL125	CANopen PDO object does not support PDO.	8200-0125 _h
AL126	CANopen PDO object is write-protected when Servo On.	8200-0126 _h
AL127	Error occurs when reading CANopen PDO object from EE-PROM.	8200-0127 _h
AL128	CANbus error	8200-0128 _h
AL129	Error occurs when writing CANopen PDO object into EE-PROM.	8200-0129 _h
AL130	EE-PROM invalid address range.	8200-0130 _h
AL131	EE-PROM checksum error.	8200-0131 _h
AL132	Password error	8200-0132 _h

Display	Description	32bit-ErrorCode (16bit-ErrorCode + 16bit-Additional Info)
AL301	CANopen SYNC failed	6200-0301 _h
AL302	CANopen SYNC signal error	6200-0302 _h
AL303	CANopen SYNC time out	6200-0303 _h
AL304	CANopen IP command failed	6200-0304 _h
AL305	SYNC period error	6200-0305 _h

SDO Error Message Abort Codes

Abort Code	Description
05040001 _h	Client/server command specifier not valid or unknown
06010002 _h	Attempt to write a read only object
06020000 _h	Object does not exist in the object dictionary
06040041 _h	Object cannot be mapped to the PDO
06040042 _h	The number and length of the objects to be mapped would exceed PDO length
06060000 _h	Access failed due to an hardware error(store or restore error)
06070010 _h	Data type does not match, length of service parameter does not match
06090011 _h	Sub-index does not exist
06090030 _h	Value range of parameter exceeded(only for write access)
08000000 _h	General error
080000a1 _h	Object error when reading from EEPROM
080000a2 _h	Object error when writing to EEPROM
080000a3 _h	Invalid Range when accessing EEPROM
080000a4 _h	Checksum error when accessing EEPROM
080000a5 _h	Password error when writing encryption zone
08000020 _h	Data cannot be transferred or stored to the application (store or restore signature error)
08000021 _h	Data cannot be transferred or stored to the application because of the local control(store or restore while wrong state)
08000022 _h	Object is on the fly

Reference

1. CANopen Application Layer and Communication Profile, CiA Draft Standard 301, Version 4.02,
Date: 13 February 2002
2. CANopen Device Profile Drives and Motion Control, CiA Draft Standard Proposal 402, Version 2.0,
Date: 26 July 2002