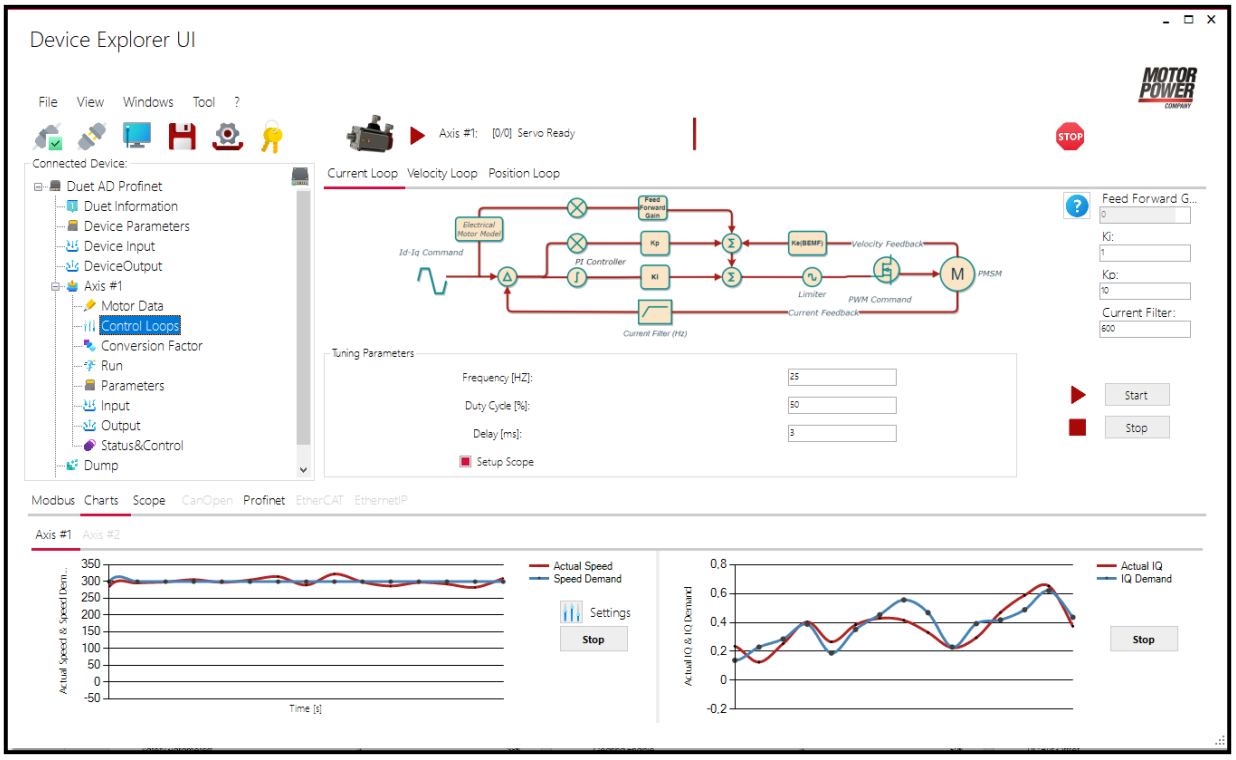
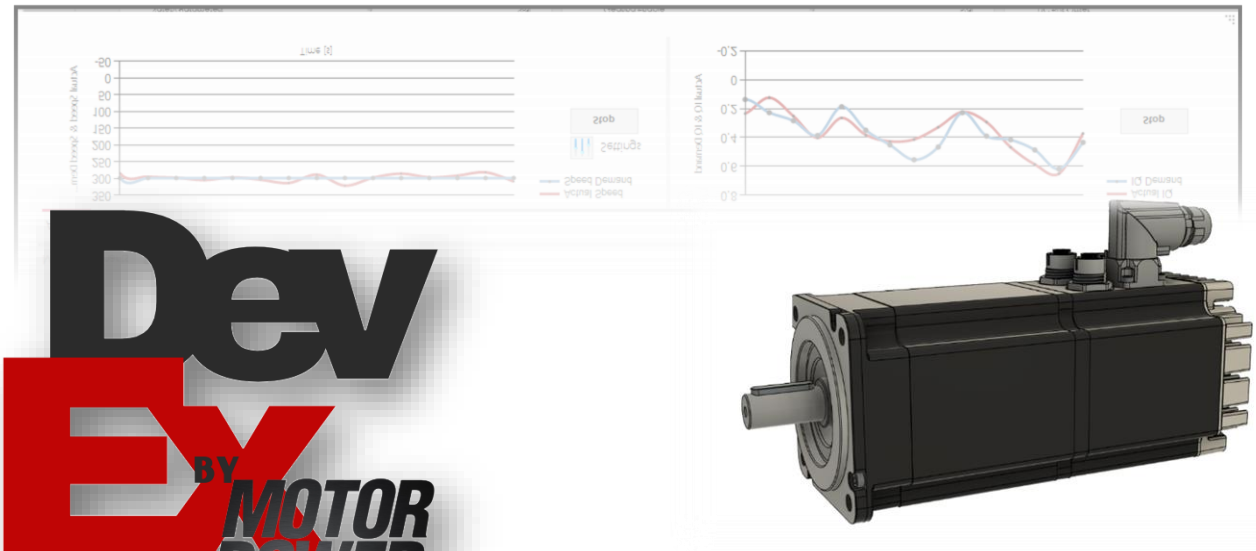
Software Manual

FOR DUET AD





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C.F. e P.IVA IT 01308390358

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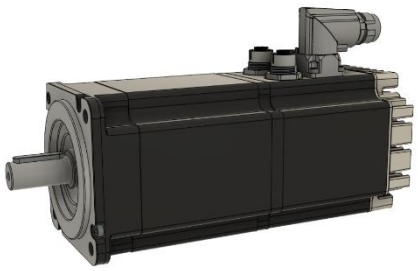
Version	Date	Author	Note
1.0	19/01/2023	Michele Piacentini	Second release

Introduction

Scope

This manual describes, in detail, the software used with the Motor Power Company drive DUET AD. It is an integral part of the drives documentation set.



DUET AD is an Integrated motor drive 48V operation up to 700W nominal power.

The UI support a set of devices from Motor Power Company, for more information regarding single supported drive please visit: http://www.motorpowergroup.com.

Software organization

The internal software is organized into 3 different layers

- Boot loader
- Motion Control Firmware
- Application Software
- Ethernet Fieldnus Stack (if preset).

The Boot Loader is the software who is taking care of the device boot-up. If no firmware is present the bootloader will wait until an new firmware is loaded on the device. The boot loader always ensure a save restore of the device under any condition.

The Motion Control Firmware, is the software that take care of the Device communications RS-485 Modbus and CanOpen/Industrial Ethernet communication, and the implementation of the Motion control Functionality.

The Application software is an additional software that use the Communication and Motion Control functionality of the Device to solve dedicated application. Check http://www.motorpowergroup.com for existing advanced functionality.

Communication with the Host

The Motor Power Company drives can operate via MODBUS (RTU via RS-485 or TCP/IP) or CANopen communication or many industrial Ethernet fieldbus (EtherCAT-PROFINET-Ehernet I/P) depending on the device and part number.

This chapter discusses MODBUS communication. Refer to the specific device fieldbus Implementation manual for detailed information about operation with CANopen/Industrial Ethernet networking.

The RS-485 Protocol (Modbus - RTU)

The protocol that is actually running on the RS-485, is the Standard MODBUS RTU.

For more information on this protocol, please refer to the official website (http://www.modbus.org/)

The standard parameter for RS-485 configuration are

Parameter	Value
Speed (baud/s)	*460800*
Parity	*None*
Stop Bits	*1*
Dta bits	*8*

The Device Explorer interface can communicate via MODBUS with many baud rates,

	**NOTE:** Only expert operators have to change this value. Changing and saving slave ID or baud rate for ModBus RTU communication could cause device to not working properly.

The modbus slave address in 247 and actually is a fixed value.

Command Supported

Actually not all the command implemented in the modbus protocol are available. Here below you can find a list of the supported commands

Command Code	Command Description
3	*READ_HOLDING_REGISTERS*
6	*WRITE_SINGLE_REGISTER*
16	*WRITE_MULTIPLE_REGISTERS*

For more information regarding Modbus protocol, please refer to Modbus official documentation (http://www.modbus.org/)

Each Register is the minimum information that you can store into the drive and it's size is 16 bits (WORD)

MODBUS TCP/IP Protocol.

The protocol that is actually running on the TCP/IP connection, is the Standard MODBUS TCP/IP.

Only devices with Industrial Ethernet communication such as PROFINET, Ethernet/IP and EtherCAT (via EoE) support MODBUS TCP/IP.

The IP address of the device depends on the network configuration actually used for the device.

For more information on this protocol, please refer to the official website (http://www.modbus.org/)

The modbus slave address in 247 and actually is a fixed value.

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Each Register is the minimum information that you can store into the drive and it's size is 16 bits (WORD).

Drive Memory Organization

Device Explorer UI exchange information via ModBus to drive for diagnostic/configuration or other desired operation. All the parameters necessary to run the drive are mapped into the Modbus address. The maximum number of allowable registers are 65.535, actually only a few are used and described in this manual.

Layout for standard address

The memory of any supported Motor Power Company Drive is organized into 3 different area, Parameters, Input and Outputs.

Address	Length	Memory Area	Saved to Flash	Type
0-511	512	Parameters	YES	RW
512-639	128	Inputs	NO	RW
640-767	128	Outputs	NO	RO

Parameters

The device Parameters memory values are used for general, axis1 or axis2 parametrization. All the parameters can be stored into the Serial Flash of the Drive and will be restored at next boot.

Note: not all devices support Axis2 parameters. Not all the registers per memory area are used.

Address	Length	Memory Area
0-127	128	Generic Parameters
128-319	192	Axis Parameters
320-511	192	Unusedf

Inputs

This memory area is used to send general, axis1 and axis2 commands to the Drive, like Servo On or Target Position. These values can be read and Written, but not saved on the flash.

Note: not all devices support Axis2 inputs. Not all the registers per memory area are used.

Address	Length	Memory Area
512-539	28	Generic Inputs

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540-589	*50*	*Axis1 Inputs*
590-639	*50*	*Unused*

Outputs

This memory area is used to show the general, axis1 or axis2 status of the Drive. All the data present in this memory are updated real time and can be read and shown to the user. This memory is read Only and not saved on the Flash

Note: not all devices support Axis2 Outputs. Not all the registers per memory area are used.

Address	Length	Memory Area
640-667	*28*	*Generic Outputs*
668-717	*50*	*Axis1 Outputs*
668-717	*50*	*Unused*

32 bit Parameters and Variables

When is necessary to provide the storage to la long (32bit) variable, 2 consecutive memory area of 16bits will be used

Space	Variable
16bit	*VARIABLE_LOW_VALUE*
16bit	*VARIABLE_HIGH_VALUE*

Main Parameters Table

Parameter Name	Modbus Addr	CO Addr	Modbus Type	CO Type	Access	Min	Max	Default	Change	Description	Notes
Acceleration	0x009B (154)	0x6083	U32	UINT32	r/w	0	UINT32	3000	IMM/ BEG	[rpm/s] The object profile_acceleration determines the maximum acceleration used during a positioning motion	
Acceleration Factor Div	0x00F2 (242)	0x6097 0x02	U32	UINT32	r/w	1	UINT32	60	IMM		
Acceleration Factor Num	0x00F0 (240)	0x6097 0x01	U32	UINT32	r/w		UINT32	4096	IMM		
Analog Input	0x029F (671)	0x2205 0x01	S16	INT16	r	-	-	-	-	Actual value for analog input in mV	
Analog Input Offset	0x0083 (132)	-	U16	-	r/w	0	1000	0	IMM	[mV]	
Analog Input Filter	0x0084 (133)	-	U16	-	r/w	0	U16	100	IMM	[Hz]	
Analog Input Safe Zero	0x0083 (131)	-	U16	-	r/w	0	1000	0	IMM	[mV]	
Begin	0x0223 (547)	-	U16	-	w	-	-	-	IMM	Bit4 of ControlWord. On Profile Position Mode: A rising edge signals that a new position parameter set should be taken over. On Homing Mode: A rising edge starts the configured search for reference. A falling edge stops the search immediately. On Interpolated Position Mode: This bit has to be set to evaluate the interpolation data. It will be acknowledged by the bit ip_mode_active in the statusword.	
Bootloader Version	0x0295 (664)	-	U16	-	r	-	-	-	-	Bootloader FW version of the device	
Brake Turn Off Delay	0x00C7 (199)	-	U16	-	r/w	0	3000	50	IMM	[ms]	
Brake Turn On Delay	0x00C6 (198)	-	U16	-	r/w	0	3000	50	IMM	[ms]	
BUS Nominal Voltage	0x0002 (2)	0x2201	U16		r/w	12	65	48	IMM	DC BUS working voltage for the device in Volts	
Can BitRate	0x000A (10)	-	U16	-	r/w	0	3	1	BOOT	0 = 1000 kbps 1 = 500 kbps 2 = 250 kbps 3 = 125 kbps	
CO_Node_ID	0x0008 (8)	-	U16	-	r/w	1	127	1	BOOT	Can open node ID of the device	

Control Mode	0x0080 (128)	0x6060	S16	INT8	r/w	0	-	3	BEG	1 = Profile Positioning Mode (position controller with positioning operation). 3 = Profile Velocity Mode (speed controller with setpoint ramp). 4 = Torque Profile Mode (torque controller with setpoint ramp). 6 = Homing mode (homing operation). 7 = Interpolated Position Mode. 8 = Cyclic Synchronous Position Mode	Do not is effective while the motor is enabled.
Control Mode Display	0x029E (670)	0x6061	S16	INT8	r	-	-	-	-	The current operating mode of the servo controller.	
Control Word	0x021C (540)	0x6040	U16	UINT16	r/w	-	-	-	IMM	DS-402 ControlWord	
Current Actual Value	0x02A2 (674)	0x6078	S16	INT16	r	-	-	-	-	The actual current value of the motor can be read via this object in thousandths of the nominal current (object 6075h). In A/100 with MODBUS Parameters.	In A/100 with MODBUS Parameters .
Current Demand	0x02A4 (676)	0x6074	S16	INT16	r	-	-	-	-	The current demand torque can be read in thousandths of motor_rated_torque (6076h) via this object. The internal limitations of the servo controller will be considered (current limit values and I²t control). In A/100 with MODBUS Parameters.	In A/100 with MODBUS Parameters .
Current Ki	0x0087 (135)	0x60F6 0x02	U16	UINT16	r/w	0	65535	500	IMM	Current control loop integral gain.	
Current Kp	0x0086 (134)	0x60F6 0x01	U16	UINT16	r/w	0	65535	400	IMM	Current control loop proportional gain.	
Current Target	0x0228 (552)	0x6071	S16	INT16	r/w	-	-	-	BEG	This parameter is the input value for the torque controller in Profile Torque Mode. It is specified as thousandths of the nominal torque (object 6076h). In A/100 with MODBUS Parameters.	In A/100 with MODBUS Parameters .
DC Bus Voltage	0x028D (653)	0x6079	U16	UINT16	r	24	65	48	-	DC Bus Voltage. Specified in mV.	
Deceleration	0x009D (156)	0x6084	U32	UINT32	r/w	0	65535	3000	IMM/ BEG	[rpm/s] The object profile_deceleration specifies the maximum deceleration used during a positioning motion	
Drive Temperature	0x0296 (662)	0x2220	S16	INT16	r	-	-	-	-	Actual drive temperature in C°/100	
Enable	0x0222 (546)	-	U16	-	w	-	-	-	IMM	Rising edge: Put the servo in OPERATION_ENABLE Falling edge: Put the servo in SWITCH_ON_DISABLED	
Enable Analog Input	0x0081 (129)	-	U16	-	r/w	0	1	1	IMM		
Encoder Lines per Revolution	0x0094 (148)	0x605A	U32	UINT32	r/w	1024	1024	1024	IMM	Encoder Lines per revolution	
Fault Register	0x029D (669)	0x60F3	U16	UINT16	R	-	-	-	-	Bit 0 = Over Voltage	
Fault Reset	0x0224 (548)	-	U16	-	w	-	-	-	IMM		

Firmware Version	0x0280 (640)	0x100A	U16	VS	r	-	-	-	-	FW version of the device	
Following Error TimeOut	0X00AE (174)	0x6066	U16	UINT16	-	-	-	-	IMM	[ms] When a following error occurs longer than the defined value of the time-out given in multiples of milliseconds, the corresponding bit 13 following error in the status word will be set to one. The reaction of the drive when a following error occurs, is manufacturer specific.	
Following Error Window	0x00A2(162)	0x6065	U32	UINT32	-	-	-	-	IMM	If the actual position is outside the following error window[cnt], for a longer time than following error timeout[ms], a trailing error occurs and statusword bit 13 will be set.	
Halt	0x0225 (549)	-	U16	-	w	-	-	-	IMM	Bit8 of ControlWord.	
Home Offset	0x00A7 (190)	0x607C	S32	UINT32	r/w	-	-	-	IMM	The home offset object is the difference between the zero position for the application and the machine home position (found during homing), it is measured in position units. During homing the machine home position is found and once the homing is completed the zero position is offset from the home position by adding the home offset to the home position. All subsequent absolute moves shall be taken relative to this new zero position.	
Homing Acceleration	0x00B2 (186)	0x609A	U32	UINT32	r/w	-	-	-	IMM/BEG	The homing acceleration establishes the acceleration to be used for all accelerations and decelerations with the standard homing modes and is given in acceleration units.	
Homing I^2t Threshold	0x00C4 (196)	-	U16	-	r/w	0	100	100	IMM/BEG	I2T threshold time parameters for Homing [%]	
Homing I^2t Threshold Timeout	0x00C5 (197)	-	U16	-	r/w	-	-	-	IMM/BEG	I2T threshold time parameters [ms]	
Homing Mode	0x00A5 (179)	0x6098	S16	INT8	r/w	-	-	-	IMM/BEG	-17 See the functional description -18 See the functional description 0 No homing operation required 1 - 35 See the functional description	
Homing Speed to switch	0x00B6 (182)	0x6099 0x01	U32	UINT32	r/w	0	3000	500	IMM/BEG	Speed during search for switch	
Homing Speed to zero	0x00B8 (184)	0x6099 0x02	U32	UINT32	r/w	0	3000	500	IMM/BEG	Speed during search for zero	

Homing Status	0x02BE (702)	-	U16	-	r	-	-	-	-	Status of the actual homing procedure. Read CanOpen device manual fore more information.	
Homing Timeout	0x00BC (188)	-	U16	UINT16	r/w	-	-	60	IMM/ BEG	Timeout for homing procedure [s].	
I2t Protection Type	0x0100 (256)	0x2F83	U16	UINT16	r/w	1	0	1	IMM	Temperature protection behaviour.	
I2t Time	0x0092 (146)	0x6410	U16	UINT16	r/w	10	3200	3000	IMM	[ms]	
Industrial Ethernet Application Firmware Version	0x1772 (6002)		U32	-	r	-	-	-	-	[a,b,c,d] Major, Minor, Revision, Build	Only with MODBUS TCP/IP
Industrial Ethernet Stack Firmware Version	0x1770 (6000)		U32	-	r	-	-	-	-	[a,b,c,d] Major, Minor, Revision, Build	Only with MODBUS TCP/IP
Input 1 Function	0x0014 (20)	-	U16	-	r/w	0	10	0	IMM	Function value code associated to this input. See Installation Manual for details.	
Input 1 Polarity	0x0022 (34)	-	U16	-	r/w	0	1	0	IMM	0 – True Logic; 1 – Inverted Logic.	
Input 2 Function	0x0015 (21)	-	U16	-	r/w	0	10	0	IMM	Function value code associated to this input. See Installation Manual for details.	
Input 2 Polarity	0x0023 (35)	-	U16	-	r/w	0	1	0	IMM	0 – True Logic; 1 – Inverted Logic.	
Input 3 Function	0x0016 (22)	-	U16	-	r/w	0	10	0	IMM	Function value code associated to this input. See Installation Manual for details.	
Input 3 Polarity	0x0024 (36)	-	U16	-	r/w	0	1	0	IMM	0 – True Logic; 1 – Inverted Logic.	
Input 4 Function	0x0017 (23)	-	U16	-	r/w	0	10	0	IMM	Function value code associated to this input. See Installation Manual for details.	
Input 4 Polarity	0x0025 (37)	-	U16	-	r/w	0	1	0	IMM	0 – True Logic; 1 – Inverted Logic.	
Inputs Status	0x02C1 (705)	0x60FD	U16	UINT32	r	-	-	-	-	Indicates the state of the digital inputs.	
Load Inertia	0x0105 (261)	-	U16	-	r/w	0	65535	0	IMM	Load inertia in (Kg/cm^2)/100	
Max Current	0x008F (143)	0x6073	U16	UINT32	r/w	-	-	-	IMM	Peak motor current A/100 if MODBUS, in mA for CanOpen	
Max Motor Velocity	0x0097 (151)	0x6080	U32	UINT32	r/w	0	6000	4500	-	-	

Negative Torque Limit	0x00FF (255)	-	U16	-	r/w	1	100	100	IMM	Torque Negative limit associate to Negative limit Input function in % of Imax.	
Output 1 Function	0x001E (30)	-	U16	-	r/w	0	6	0	IMM	Output Function code associated to relative Out number. See Installation Manul.	Brake 1 function is active and usable only on Virtual Output 4
Output 1 Polarity	0x002C (44)	-	U16	-	r/w	0	1	0	IMM	0 – True Logic; 1 – Inverted Logic.	
Output 2 Function	0x001F (31)	-	U16	-	r/w	0	6	0	IMM	Output Function code associated to relative Out number. See Installation Manul.	Brake 1 function is active and usable only on Virtual Output 4
Output 2 Polarity	0x002D (45)	-	U16	-	r/w	0	1	0	IMM	0 – True Logic; 1 – Inverted Logic.	
Output Status	0x0298 (664)	0x60FE 0x01	U16	UINT32	r	-	-	-	-	Indicates the state of the digital outputs.	
Overvelocity	0x00A8 (168)	-	U32	UINT32	r/w	0	6000	7000	IMM	Maximium allowed velocity value.	
Position Actual Value	0x02B4 (692)	0x6064	S32	INT32	r	-	-	-	-	Actual position. This value is given to the position controller by the angle encoder.	
Position Demand	0x02B8 (696)	0x6062	S32	INT32	r	-	-	-	-	This position is fed into the position controller by the trajectory generator	
Position Error	0x02B6 (694)	-	S32	-	r	-	-	-	-	Actual Error between the position target/setpoint of the controller and the actual position.	
Position Factor Div	0x00E9 (233)	0x6093 0x02	U32	UINT32	r/w	0	65535	1	IMM		
Position Factor Num	0x00E7 (231)	0x6093 0x01	U32	UINT32	r/w	0	65535	1	IMM		
Position Kp	0x008A (138)	0x60FB 0x01	U16	UINT16	r/w	0	65535	1000	IMM	Position control loop proportional gain.	
Position Radius	0x00A4 (164)	0x6067	U32	UINT32	r/w	0	-	-	IMM	[cnt]	
Position Radius Time	0x00AF (175)	0x6068	U16	UINT16	r/w	0	-	-	IMM	[ms]	
Position Target	0x022B (555)	0x607A	S32	INT32	r/w	-	-	-	BEG	The object target_position determines the destination the servo controller moves to.	
Position Tracking Error	0x02BA (698)	0x60F4	S32	INT32	r	-	-	-	-	Actual Error between the position demand of the controller and the actual speed.	
Positive Torque Limit	0x00FE (254)	-	U16	-	r/w	1	100	100	IMM	Torque Negative limit associate to Negative limit Input function in % of Imax.	

Post Homing Action	0x00BD (189)	-	S16	-	r/w	-	-	-	IMM/BEG		
Post Homing Speed	0x00C1 (193)	-	U32	UINT32	r/w	-	-	-	IMM/BEG		
Profile Velocity	0x00A1 (161)	0x6081	U32		r/w	100	6000	3000	IMM	[rpm]	
Quick Stop Option Code	0x0103 (259)	0x605A	U16	UINT16	r/w	0	-	2	IMM	[ms]	
Rated Current	0x008E (142)	0x6075	U16	UINT32	r/w	-	-	-	IMM	Rated motor current in A/100, in mA for CanOpen	
Save to EEPROM	0x0200 (512)	0x1010 0x01	U16		w	0	1	0	IMM	Save servo parameters to EEPROM.	
Serial Number	0x0288 (648)	0x1018 0x01	U32	UINT32	r	-	-	-	-	Serial Number of the device	
Set Default Parameters	0x0203 (515)		U16		w	-	-	-	IMM	Set servo parameters to default values.	
Set Immediatly	0x0226 (550)	-	U16	-	w	-	-	-	IMM	Bit5 of ControlWord. Only on Profile Position Mode: If this bit is cleared a current positioning order will be processed before starting a new one. If this bit is set a current positioning order will be interrupted by the new one.	
Status Word	0x029C (668)	0x6041	U16	UINT16	r	-	-	-		DS-402 StatusWord	
Stop Deceleration	0x009E (158)	0x6085	U32	UINT32	r/w	0	65535	3000	IMM/BEG	[rpm/s]	
Torque Filter	0x00C9 (201)	-	U16	-	r/w	0	65535	600	IMM	Torque filter cutoff freq in Hz	
Use Relative Position	0x0227 (551)	-	U16	-	w	-	-	-	IMM	Bit6 of ControlWord. Only on Profile Position Mode: If this bit is set, the target_position of the current positioning job, will be added to the position_demand_value of the position controller.	
Velocity Actual Value	0x02AA (682)	0x606C	S32	INT32	r	-	-	-	-	Actual velocity value.	
Velocity Demand	0x02AE (686)	-	S32	INT32	r	-	-	-	-	It will be influenced by the ramp generator and the trajectory generator respectively.	
Velocity Error Radius	0x00A6 (166)	0x2100	U32	UINT32	r/w	0	-	-	IMM	Velocity error threshold radius [rpm]	

Velocity Error Radius Time	0x00B1 (177)	0x2101	U16	UINT16	r/w	0	-	-	IMM	[ms]	
Velocity Factor Div	0x00EE (238)	0x6096 0x02	U32	UINT32	r/w	0	65535	60	IMM		
Velocity Factor Num	0x00EC (236)	0x6096 0x01	U32	-	r/w	0	65535	4096	IMM		
Velocity Filter	0x00C8 (200)	-	U16	-	r/w			300	IMM	Velocity feedback filter cutoff freq in Hz	
Velocity Ki	0x0089 (137)	0x60F9 0x02	U16	UINT16	r/w	0	65535	500	IMM	Velocity control loop integral gain.	
Velocity Kp	0x0088 (136)	0x60F9 0x01	U16	UINT16	r/w	0	65535	500	IMM	Velocity control loop proportional gain.	
Velocity Radius	0x00AA (170)	0x606D	U32	UINT32	r/w	0	-	-	IMM	If the difference between target and actual velocity is smaller than the velocity radius [rpm], for a longer time than velocity radius time [ms], then statusword bit 10 will be set.	
Velocity Radius Time	0x00B2 (178)	0x606E	U16	UINT16	r/w	0	-	-	IMM		
Velocity Target	0x0229 (553)	0x60FF	S32	INT32	r/w	-	-	-	IMM	The object target_velocity is the setpoint for the ramp generator.	
Velocity Threshold	0X00AC (172)	0x606F	U32	UINT32	r/w	0	-	-	IMM/ BEG	As soon as the actual velocity exceeds the velocity threshold [rpm],	
Velocity Threshold Time	0X00B0 (176)	0x6070	U16	UINT16	r/w	0	-	-	IMM/ BEG	longer than the velocity threshold time [ms], statusword bit 12 is cleared.	
Velocity Tracking Error	0x02B0 (688)	-	S32	-	r	-	-	-	-	Actual Error between the speed demand of the controller and the actual speed.	

Generic Parameters

In this chapter we will describe all the generic parameters and their functionality

Serial Port Baud Rate

With this parameter it will be possible to change the RS-485 port baud rate. The change will be activated at next reboot.

Parameter	Serial Port Baud Rate
Address	5
Base Address	0
Access	R/W
Default Values	2
Range	[0-3]
Activatiom	Reboot

PARAMETER VALUE	BAUD RATE
0	57600
1	115200
2	230400
3	460800
4	921600
5	1843200

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CanBus Parameters

With the following parameters it will be possible to configure the Can Network functionality.

CO_Node_ID

Parameter	CanBus Address Axis1
Address	8
Base Address	0
Access	R/W
Default Values	1
Range	[1-127]
Activation	REBOOT

CAN Bit Rate

Parameter	CanBus Network Speed
Address	10
Base Address	0
Access	R/W
Default Values	0
Range	[0-3]
Activation	REBOOT

list of possible configuration

Bit Rate	Parameter Value
1MB	0
500kbps	1
250kbps	2
125kbps	3

BUS Nominal Voltage

DC Bus nominal working voltage for the device. In [V].

Parameter	CanBus Network Speed
Address	2
Base Address	0
Access	R/W
Default Values	48
Range	[24-65]
Activation	IMMEDIATLY
CANopen Object ID	0x2201

list of possible configuration

Bit Rate	Parameter Value
1MB	0
500kbps	1
250kbps	2
125kbps	3

PWM Frequency

It's possible to change the PWM frequency.

Parameter	Pwm Frequency
Address	*3*
Base Address	*0*
Access	*R/W*
Default Value	*8/16*
Range	*[4-16]*
Activation	*REBOOT*

NOTE:

Only expert operators have to change this value. This value will change the heating of the system and if increased to much may damage the drive.

If this value will be changed all the gains (Current Loop, Velocity Loop, and Position Loop have to be changed) in order to prevent instability, which may damage the drive and/or the motor.

Input functionality

From parameters 20 to 23 we can find the Input functionality. The Drive have several non committed I/O that the user can program with the functionality he needs.

Parameter	I[n] Input Functionality
Address	*20+[n]*
Base Address	*0*
Access	*R/W*
Default Value	*0*
Range	*[0-100]*
Activation	*IMMEDIATE*

Where [n] = [0-4]

list of possible configuration

Value	Input Functionality
0	*Generic Input (No function)*
1	*Positive Limit Switch*
3	*Negative Limit Switch*
5	*Enable*
9	*Emergency Stop*
11	*Fault Reset*
18	*Home Switch*
20	*Positive JOG*
22	*Negative JOG*
24	*Positive Torque Limit*
26	*Negative Torque Limit*
28	*Torque Limit*
39	*Analog Input Polarity*
44	*Enable and Dir CW*
45	*Enable and Dir CCW*

Input Logic

These parameters defines the logic level of the digital inputs.

Parameter	I[n] Input Logic
Address	*34+[n]*
Base Address	*0*
Access	*R/W*
Default Values	*0*
Range	*[0-1]*
Activation	*IMMEDIATE*

Where [n] = [0-4]

list of possible values

Value	Input Functionality
0	*Negative Logic*
1	*Positive Logic*

Output Functionality

From parameters 30 to 31 we can find the Output functionality. The Drive have several non committed I/O that the user can program with the functionality he needs.

Parameter	O[n] Output Functionality
Address	*30+[n]*
Base Address	*0*
Access	*R/W*
Default Values	*0*
Range	*[0-100]*
Activation	*IMMEDIATELY*

Where [n] = [0-1]

list of possible configuration

Value	*Output Functionality*
0	*General Purpose*
1	*Brake Axis1 (**Use Virtual Output4 Only**)*
3	*Drive OK*
5	*In Position*
7	*Homed*
9	*Velocity feedback*

Output Logic

These parameters defines the logic level of the digital inputs.

Parameter	I[n] Input Logic
Address	44+[n]
Access	R/W
Default Values	0
Range	[0-1]
Activation	IMMEDIATELY

Where [n] = [0-1]

list of possible values

Value	Output Functionality
0	Negative Logic
1	Positive Logic

Scope Variables

The internal scope configuration can be saved into the serial Flash of the drive for this reason in the Generic Parameter we can find an array of value that define the Scope variables configuration

Parameter	S[n] Scope Configuration
Address	*120+[n]*
Access	*R/W*
Default Values	*0*
Range	*[0-65535]*
Activation	*IMMEDIATE*

Where [n] = [0-7]

The scope configuration is a structure that define which Scope channel will be used and the value saved in this track.

bit	Value
[15-13]	*Channel*
[12-10]	*Reserved*
[9-0]	*[9-0]*

The list of value is available on appendix D of this manual.

Axis Parameters

In this chapter we will describe all the parameters necessary to configure the Drive and the Motor

Motor Data

Here below are listed all the necessary motor information.

Motor Poles

Parameter	Motor Poles
Address	*141*
Access	*R/W*
Default Values	*8*
Range	*[2-100]*
Activation	*REBOOT*

Refer to Motor Power Company Catalougues to find the Pole Pairs, to enter the right value you must use the following rule:

- Motor Poles = 2 * Motor Poles Pair

NOTE: Only expert operators have to change this value. Changing the motor poles will radically modify drive commutations and behaviour

Rated Current/Nominal current

The nominal current defines the maximum allowed continuous motor phase current, in amperes Arms. This parameter is used to protect the motor from over-current, and the load from excessive torques. The motor current (torque) command is normally limited to its peak limit, as defined by Imax Peak Current.

The nominal current cannot be higher then the nominal current of the Drive.

This value is expressed in *Arms/100*

Parameter	In Nominal Current
Address	*142*
Access	*R/W*
Default Values	*1700*
Range	*[0 to 70000]*
Activation	*IMMEDIATLY*
CANopen Object ID	*0x6075*

Max Current/Imax Peak Current

This parameter is used to protect the motor (or the drive) from over-current, and to protect the load from excessive torque. It's possible to use peak current for a time of I2T Time, after that time we will get an Overload Error.

Parameter	In Nominal Current
Address	*143*
Access	*R/W*
Default Values	*5000*
Range	*[1-7000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6073*

This value is internally from the drive to it's maximum limits.

This value is expressed in Arms/100

I2T Time

This parameter define for how much time is possible to use the Peak current.

This value will affect the Motor Usage Output Variable.

Parameter	*I2T time*
Address	*146*
Access	*R/W*
Default Values	*2500 ms*
Range	*[1-3500]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6410*

This value is expressed in ms

I2T Protection Type

This parameter define the type of protection used for motor overload protection.

Parameter	*I2T time*
Address	*256*
Access	*R/W*
Default Values	*1*
Range	*[0-1]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x2F83*

Value	*I2T Protection Type*
0	*Motor Rated Current Error Occurs*
1	*Current Limitation on In once I2T exceeds.*

Max Motor Velocity

Represent the maximum velocity of the motor represented in User Units. All the internal calculation of the drive use this value as a reference. In order to optimize your system please set this parameter close to your application requirement.

Parameter	Max Motor Velocity
Address	*151 (32bit)*
Access	*R/W*
Default Values	*3000 [User Units]*
Range	*[0 - 4.294.967.296]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6080*

Motor Kt (Torque Constant)

Torque constant of the motor used in control algorithm for feedforward.

Parameter	Kt
Address	*144*
Access	*R/W*
Default Values	*100 [1/100 Nm/Arms]*
Range	*[0 - 65535]*
Activation	*IMMEDIATE*

Motor Inertia

Motor inertial to be used for the control algorithm in $\frac{Kg}{cm^2}/100$.

Parameter	Kt
Address	*260*
Access	*R/W*
Default Values	*0*
Range	*[0 - 65535]*
Activation	*IMMEDIATE*

Load Inertia

Load inertial to be used for the control algorithm in $\frac{Kg}{cm^2}/100$.

Parameter	Kt
Address	*261*
Access	*R/W*
Default Values	*0*
Range	*[0 - 65535]*
Activation	*IMMEDIATE*

Feedback Data

Here are listed all the parameters related to the feedback used to drive the motor.

Encoder Lines Per Revolution (LPR)

This parameter represent the number of lines of the Encoder mounted on the motor, the final resolution after interpolation will be:

- Pulses per revolution = LPR * 4

Parameter	Encoder PPR
Address	*149 (32bit)*
Access	*R/W*
Default Values	*1024*
Range	*[0 - 4.294.967.296]*
Activation	*REBOOT*
CANopen Object ID	*0x605A*

When you change this parameter, it's important that you Save to Flash and Reboot the device, before running the motor.

NOTE: **Only expert operators have to change this value. Changing the PPR will radically modify drive commutations and behaviour**

Position Feedback Polarity

This parmeter allow to switch the motor direction.

Parameter	Position Feedback Polarity
Address	*230*
Access	*R/W*
Default Values	*0*
Range	*[0]*
Activation	*IMMEDIATE*

Position Feedback Phase

This parmeter set an offset on the commutation phase angle.

Parameter	Position Feedback Phase
Address	*229*
Access	*R/W*
Default Values	*90*
Range	*[0-359]*
Activation	*IMMEDIATE*

NOTE: **Only expert operators have to change this value.**

If this parameter is not set correctly may damage the motor.

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Control Mode/ Modes of operation

The drive can operate in different mode. It's configuration is a parameter because we need that the servo will start in the preferred mode at next boot up.

Parameter	Mode of Operation
Address	*128*
Access	*R/W*
Default Values	*3*
Range	*[-5 8]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6060*

Actually the following modes of operation are supported:

Value	Mode of operation
-5	*Stepper Mode*
-4	*Current Tuning Mode*
-3	*Velocity Tuning Mode*
-1	*Position Tuning Mode*
1	*Profile Position Mode*
3	*Profile Velocity Mode*
4	*Current Mode*
6	*Homing Mode*
7	*Interpolated Position Mode (Only DUET AD CO)*
8	*Cyclic Sync Position Mode (Only DUET AD EtherCAT)*

Current Gains

Current Kp

Proportional Gain of current Loop

Parameter	KP Current
Address	134
Access	R/W
Default Values	30
Range	[0-65535]
Activation	IMMEDIATE
CANopen Object ID	0x60F6 0x01

Current Ki

Integral Gain for current loop

Parameter	KI Current
Address	135
Access	R/W
Default Values	10
Range	[0-65535]
Activation	IMMEDIATE
CANopen Object ID	0x60F6 0x02

Velocity Gains

Velocity Kp

Proportional Gain of velocity Loop

Parameter	***KP** velocity*
Address	*136*
Access	*R/W*
Default Values	*70*
Range	*[0-65535]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x60F9 0x01*

Velocity Ki

Integral Gain for velocity loop

Parameter	***KI velocity***
Address	*137*
Access	*R/W*
Default Values	*1*
Range	*[0-65535]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x60F9 0x02*

Position Gains

Position Kp

Proportional Gain of position Loop

Parameter	KP Position
Address	*138*
Access	*R/W*
Default Values	*100*
Range	*[0-65535]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x60FB 0x01*

Other controller parameters

Current Filter

This parameter allow to introduce a low pass filter in the current feedback The parameter specify the cut-off frequency. If the parameter in 0 the filter is disabled.

Parameter	Torque filter
Address	*210*
Access	*R/W*
Default Values	*700 [Hz]*
Range	*[0-10.000]*
Activation	*IMMEDIATE*

Torque Filter

This parameter allow to introduce a low pass filter in the current control loop. The parameter specify the cut-off frequency. If the parameter in 0 the filter is disabled.

Parameter	Torque filter
Address	*201*
Access	*R/W*
Default Values	*700 [Hz]*
Range	*[0-10.000]*
Activation	*IMMEDIATE*

Velocity Filter

This parameter allow to introduce a low pass filter in the velocity control loop. The parameter specify the cut-off frequency. If the parameter in 0 the filter is disabled.

Parameter	Velocity filter
Address	*200*
Access	*R/W*
Default Values	*0 [Hz]*

Range	*[0-10.000]*
Activation	*IMMEDIATE*

Velocity Feed Forward

This parameter defines how much of the position reference derivative is fed as a reference to the speed controller.

Parameter	***Velocity feed forward***
Address	*139*
Access	*R/W*
Default Values	*1000*
Range	*[0 1000]*
Activation	*IMMEDIATE*

Acceleration Feed Forward

This parameter defines how much of the velocity reference derivative is fed as a reference to the current controller.

Parameter	***Acceleration feed forward***
Address	*140*
Access	*R/W*
Default Values	*1000*
Range	*[0 1000]*
Activation	*IMMEDIATE*

Conversion Factors

Acceleration factor num

The factor n is calculated from the factor for numerator divided by the factor for denominator

This factor converts acceleration in internal drive units (increments/seconds^2)

$$Acceleratuin\ Units = \frac{Encoder\ Increment}{s^2} * \frac{\text{Acceleratio Factor Num}}{\text{Acceleratio Factor Div}}$$

Parameter	Acceleration factor Num
Address	*240-241*
Access	*R/W*
Default Values	*4096*
Range	*U32*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6097 0x01*

Acceleration factor Div

The factor n is calculated from the factor for numerator divided by the factor for denominator

This factor converts acceleration in internal drive units (increments/seconds^2)

$$Acceleratuin\ Units = \frac{Encoder\ Increment}{s^2} * \frac{\text{Acceleratio Factor Num}}{\text{Acceleratio Factor Div}}$$

Parameter	Acceleration factor Div
Address	*242-243*
Access	*R/W*
Default Values	*60*
Range	*U32*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6097 0x02*

Velocity factor Num

The factor n is calculated from the factor for numerator divided by the factor for denominator

This factor converts velocity in internal drive units (increments/seconds)

$$\text{Vel } Units = \frac{Encoder\ Increment}{s} * \frac{\text{Vel Factor Num}}{\text{Vel Factor Div}}$$

Parameter	Vel factor Num
Address	*236-237*
Access	*R/W*
Default Values	*4096*
Range	*U32*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6096 0x01*

Velocity factor Div

The factor n is calculated from the factor for numerator divided by the factor for denominator

This factor converts velocity in internal drive units (increments/$seconds$)

$$\text{Vel } Units = \frac{Encoder\ Increment}{s} * \frac{\text{Vel Factor Num}}{\text{Vel Factor Div}}$$

Parameter	Vel factor Div
Address	*238-239*
Access	*R/W*
Default Values	*60*
Range	*U32*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6096 0x02*

Position factor Num,

The factor n is calculated from the factor for numerator divided by the factor for denominator

This factor converts Position in internal drive units.

$$\text{Pos } Units = Enc\ Increments * \frac{\text{Pos Factor Num}}{\text{Pos Factor Div}}$$

Parameter	Pos factor Div
Address	*231-232*
Access	*R/W*
Default Values	*1*
Range	*U32*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6093 0x01*

Position factor Div,

The factor n is calculated from the factor for numerator divided by the factor for denominator

This factor converts Position in internal drive units.

$$\text{Pos } Units = Enc\ Increments * \frac{\text{Pos Factor Num}}{\text{Pos Factor Div}}$$

Parameter	Pos factor Div
Address	*233-234*
Access	*R/W*
Default Values	*1*
Range	*U32*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6093 0x02*

Analog Input Functionality

It's possible to use the Analog Input as automatic command generator in Current mode and in Velocity Mode.

Enable Analog Input

Parameter	Enable Analog Input
Address	129
Access	R/W
Default Values	0
Range	[0-1]
Activation	IMMEDIATE

Attention!!!! the activation is immediate and if the Servo is on and the Analog input different then zero, the motor will move.

The Gains of the analog input command are calculated as following in the 2 different configuration modes:

Current mode:

$$1V = \frac{Imax * 1000}{10}[A]$$

Where Imax is the Parameter that define the Peak current of the motor.

Velocity Mode

$$1V = \frac{Max\ MotorVelocity * 1000}{10}[User\ Units]$$

Where Max Motor Velocity is the parameter that define the Maximum mechanical velocity of the motor.

Analog Safe Zero

It's possible to define a dead-band window for the analog input, in order to allow steady condition when the command is next to 0.

Parameter	Analog Safe Zero
Address	131
Access	R/W
Default Values	0 [mV]

Range	*[0-10000]*
Activation	*IMMEDIATE*

Analog Offset

If the analog command is not well balanced is possible to define and offset to set the zero value in the correct position.

Parameter	***Analog Offset***
Address	*132*
Access	*R/W*
Default Values	*0 [mV]*
Range	*[-10000 10000]*
Activation	*IMMEDIATE*

It's possible to use the Utility present in the Motor Power Company Drive User Interface to easily calculate the analog offset coming from the controller.

Analog Filter

If the analog command source is not stable or noisy, it possible to use this parameter to apply a Low Pass filter on the Analog Command Value.

A value of 0 means that the filter is disabled.

Parameter	*Analog Filter*
Address	*133*
Access	*R/W*
Default Values	*0 [Hz]*
Range	*[0 10.000]*
Activation	*IMMEDIATE*

Analog Input Polarity

This parameter allows to reverse the sign of the analog input value (Ex. Change the speed direction). It this parameter is 1 the sign of the analog value will be changed.

Parameter	*Analog Input Polarity*
Address	*130*
Access	*R/W*
Default Values	*0*
Range	*[0 1]*
Activation	*IMMEDIATE*

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Brake Parameters

These parameters defines the timing of the brake system in the motor when at least one of the digital outputs has been configured with the Brake Functionality.

For safety reasons, a brake-active output releases the brake so that the brake is activated when the drive is not powered on.

For this reason the brake output should always defined as active low.

When the brake is released at motor start, the drive allows the brake time to disengage before motion begins. During this time, the drive keeps the motor in its starting position. When the motor is turned off, the drive first commands the brake to engage. Then, for a time, it keeps the motor in place while the brake actually engages.

DUET AD supports brake resistor.

Brake TurnOn Delay

It is the time in ms for Brake disengaging, before starting any movement.

Parameter	*Brake TurnOn Delay*
Address	*198*
Access	*R/W*
Default Values	*50 [ms]*
Range	*[0 5000]*
Activation	*IMMEDIATE*

Brake TurnOff Delay

It is the time in ms for the Brake to be engaged before the motor shut down.

Parameter	*Brake TurnOff Delay*
Address	*199*
Base Address	*Axis1=128 , Axis2=320*
Access	*R/W*
Default Values	*50*
Range	*[0 5000]*
Activation	*IMMEDIATE*

Safety Parameters

Over Velocity

To avoid not proper operation it's possible to define a safe speed range. The Over Speed parameter define this window.

Parameter	*Over velocity*
Address	*168-169*
Access	*R/W*
Default Values	*7000*
Range	*[0 10000]*
Activation	*IMMEDIATE*

Homing Parameters

In this chapter are described all the parameters related with the homing functionality embedded into the drives.

Homing Method

This parameter describe set the type of homing function will be used in the next execution.

For a complete description of homing functionality refer to the drive CANOpen/EtherCAT Manuals.

Parameter	*Homing method*
Address	*179*
Access	*R/W*
Default Values	*0*
Range	*[-128 128]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6098*

List of allowed values

With Index	***Without Index***	***Homing Method Description***
-2	***-18***	*Positive Hard Homing*
-1	***-17***	*Negative Hard Homing*
1	***17***	*Negative Limit Switch*
2	***18***	*Positive Limit Switch*
3	***19***	*Positive Home Switch (Low)*
6	***22***	*Positive Home Switch (High)*
7	***23***	*Positive Home Switch (Low) + PLS*
8	***24***	*Positive Home Switch (High) + PLS*
9	***25***	*Home Switch (Low) + Positive Initial Move*
10	***26***	*Home Switch (High) + Positive Initial Move*
11	***27***	*Negative Home Switch (Low) + NLS*

12	***28***	*Negative Home Switch (High) + NLS*
13	***29***	*Home Switch (Low) + Negative Initial Move*
14	***30***	*Home Switch (High) + Negative Initial Move*
33		*Homing to Index + Negative Move*
34		*Homing to Index + Positive Move*
	35	*Homing on current position*

Home Offset

This parameter define the value that will be stored in the position counter when the homing condition is reached.

Parameter	*Home Offset*
Address	*190*
Access	*R/W*
Default Values	*0*
Range	*[-2147483647 2147483648]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x607C*

Homing Speed to Switch

This parameter set the speed that the homing function use to reach the Home switch in rpm.

Parameter	*Homing Speed to Switch*
Address	*182-183*
Access	*R/W*
Default Values	*500 [rpm]*
Range	*[0 10000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6099 0x01*

Homing speed to zero

This parameter set the speed that the homing function use to reach the Index in rpm.

Parameter	*Homing Speed to Index*
Address	*184-185*
Access	*R/W*
Default Values	*500 [rpm]*
Range	*[0 10000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6099 0x02*

Homing Acceleration

This parameter define the homing acceleration and deceleration value in rpm/s.

Parameter	*Homing Acceleration*
Address	*186-187*
Access	*R/W*
Default Values	*0 [rpm/s]*
Range	*[0 2147483648]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x609A*

Post homing action

This parameter define what happen after the homing condition is reached.

Parameter	*Post homing action*
Address	*189*
Access	*R/W*
Default Values	*0*
Range	*[0 10]*

Activation	*IMMEDIATE*

List of allowed values

Value	***Description***
0	*Do Nothing*
1	*Move to Post Homing Offset*

Post homing Offset

This parameter define the position where move the motor if the Post homing action "Move to Post Homing Offset" is activated.

Parameter	*Home Offset*
Address	*190-191*
Access	*R/W*
Default Values	*0*
Range	*[-2147483647 2147483648]*
Activation	*IMMEDIATE*

Post homing speed

This parameter define the speed in rpm of the post homing action .

Parameter	*Post homing Speed*
Address	*192-193*
Access	*R/W*
Default Values	*0 [rpm]*
Range	*[0 10000]*
Activation	*IMMEDIATE*

For Acceleration ad Deceleration of the port homing action is used the Homing Acceleration value.

Homing Timeout

This parameter define the homing timeout in [s]. If the homing function will not be reached during this time an error will rise.

Parameter	*Homing timeout*
Address	*188*
Access	*R/W*
Default Values	*0 [s]*
Range	*[0 65535]*
Activation	*IMMEDIATE*

Homing I2t Threshold Value

This parameter define the % of I2t value that rise and homing reached action

Parameter	*Homing I2t Threshold Value*
Address	*196*
Access	*R/W*
Default Values	*0 [%]*
Range	*[1 100]*
Activation	*IMMEDIATE*

Homing Current Threshold Timeout

This parameter define the time [ms] where the Homing current threshold value condition have to be active before rising a homing reached action.

Parameter	*Homing Current Threshold Timeout*
Address	*197*
Access	*R/W*
Default Values	*0 [ms]*
Range	*[0 65535]*
Activation	*IMMEDIATE*

Profile Parameters

In this paragraph describe all the parameters useful for configuring the internal speed and position Interpolator.

Profile Mode

This parameter is used in Velocity mode. If the value is 1 it enable the speed profiler to use acceleration, deceleration and smoothing limits.

Parameter	*Profile Mode*
Address	*153*
Access	*R/W*
Default Values	*1*
Range	*[0 1]*
Activation	*IMMEDIATE*

Interp Max Vel-Profile Max Velocity

This parameter set the maximum velocity [rpm] of the position profile generator.

Parameter	*Interp Max Vel*
Address	*161-162*
Access	*R/W*
Default Values	*3000*
Range	*[0 4294967295]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6081*

Acceleration

This parameter set the maximum acceleration [User Units] used by velocity and position profiler.

Parameter	*Acceleration*
Address	*154-155*
Access	*R/W*
Default Values	*1000*

Range	*[0 4294967295]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6083*

Deceleration

This parameter set the maximum deceleration [User Units] used by velocity and position profiler.

Parameter	*Deceleration*
Address	*156-157*
Access	*R/W*
Default Values	*1000*
Range	*[0 4294967295]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6084*

Stop Deceleration

This parameter set the deceleration [User Units] used by velocity and position profiler under special conditions.

Parameter	*Deceleration*
Address	*158-159*
Access	*R/W*
Default Values	*1000*
Range	*[0 4294967295]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6085*

Velocity Radius

This parameter configure the target velocity window. If the velocity is between this window the status word bit will reflect this situation.

Parameter	*Velocity radius*
Address	*170-171*
Access	*R/W*
Default Values	*100 [rpm]*
Range	*[0 10000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x606D*

Velocity Radius Time

This parameter configure the time [ms] after that the velocity radius will activate the status word bit.

Parameter	*Velocity radius time*
Address	*178*
Access	*R/W*
Default Values	*50 [ms]*
Range	*[0 10000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x606D*

Velocity Threshold

This parameter set the minimum velocity [User Units] value after that the status word will report that the axis is moving.

Parameter	*Velocity threshold*
Address	*172-173*
Access	*R/W*
Default Values	*10 [rpm]*
Range	*[0 10000]*
Activation	*IMMEDIATE*

CANopen Object ID	*0x606F*

Velocity Threshold Time

This parameter set the time [ms] value after that the status word will report that the axis is moving.

Parameter	*Velocity threshold time*
Address	*176*
Access	*R/W*
Default Values	*50*
Range	*[0 10000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6070*

Velocity Error Radius

This parameter set the velocity error window. If the velocity will leave the window a warning bit will be set in the status word.

Parameter	*Velocity error radius*
Address	*166-167*
Access	*R/W*
Default Values	*100 [rpm]*
Range	*[0 10000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x2100*

Velocity Error Radius Time

This parameter set the time in [ms] after that the velocity radius error will occur

Parameter	*Velocity error radius Time*
Address	*177*
Access	*R/W*
Default Values	*100 [rpm]*
Range	*[0 10000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x2101*

Position Radius

This parameter define the Target Reached window defined in counts.

Parameter	*Position radius*
Address	*164-165*
Access	*R/W*
Default Values	*100 [counts]*
Range	*[ ]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6067*

Position Radius Time

This parameter define the time [ms] after that the position reached flag will be set in the status word.

Parameter	*Position radius time*
Address	*175*
Access	*R/W*
Default Values	*10 [ms]*
Range	*[0 10000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6068*

Following Error Window

This parameter define a range of tolerated position values symmetrical to the Position Demand Value. If the Position Actual Value is out of the Following error window for Following Error timeout.

Parameter	*Following Error Window*
Address	*162-163*
Access	*R/W*
Default Values	*500 [Counts]*
Range	*[0 2^{31}]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6065*

Following Error Timeout

This parameter set the timeout in [ms] for the Following Error Window

Parameter	*Following Error Timeout*
Address	*174*
Access	*R/W*
Default Values	*0 [ms]*
Range	*[0 10000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6066*

Polarity

This parameter allow to change the polarity of position and speed.

Parameter	*Polarity*
Address	*231*
Access	*R/W*
Default Values	*0*
Range	*[0 255]*
Activation	*IMMEDIATE*

The following table show the list of possible values:

Bit	*Description*
0	*reserved*
1	*reserved*
2	*reserved*
3	*reserved*
4	*reserved*
5	*reserved*
6	*Velocity Polarity*

7	Position Polarity

Software Position Limits

Positive Software Limit High

Parameter	Positive software Limit High
Address	208-209
Access	R/W
Default Values	2147483647
Range	[-2147483648;2147483647]
Activation	Immediate

Positive Software Limit Low

Parameter	Positive software Limit High
Address	206-207
Access	R/W
Default Values	-2147483648
Range	[-2147483648;2147483647]
Activation	Immediate

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Position Modulo

Position Modulo High Value

Parameter	*Position Modulo High Value*
Address	*204-205*
Access	*R/W*
Default Values	*2147483648*
Range	*[-2147483648;2147483647]*
Activation	*IMMEDIATE*

Position Modulo Low Value

Parameter	*Position Modulo Low Value*
Address	*202-203*
Access	*R/W*
Default Values	*-2147483648*
Range	*[-2147483648;2147483647]*
Activation	*IMMEDIATE*

Other Axis Parameters

Status Word Masking

For compatibility reasons it's possible to use this mask to hide the Manufacturer specific bit of the Status word. The mask affect all status word, please change only the 2 most significative bits if needed.

Parameter	*Status Word Masking*
Address	*255*
Access	*R/W*
Default Values	*65535*
Range	*[0, 65535]*
Activation	*REBOOT*

Boot NMT Status

With this parameter is possible to select the Boot NMT status.

Parameter	*Boot NMT Status*
Address	*252*
Access	*R/W*
Default Values	*0*
Range	*[0, 0x04]*
Activation	*REBOOT*

List of possible values:

Value	*Description*
0x00	*Pre-Operational*
0x04	*Operational*

Quick Stop Option Code

This parameter establishes the axis behaviou during halt/quickstop operation on controlword.

Parameter	*Quick Stop Option Code*
Address	*259*
Access	*R/W*
Default Values	*2*
Range	*[0, 2, 6]*
Activation	*Immediate*
CANopen Object ID	*0x605A*

Value	***Description***
0	*Disable drive*
2	*Slow down on quick stop ramp and transit into Switch On Disabled*
6	*Slow down on quick stop ramp and stay in Quick Stop Active*

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Static PDO Mapping

The following parameters allow the user to define a static PDO mapping for RPDO and TPDO 1,2.
For a detailed description of these parameter refer to spefic device CANOpen/EtherCAT Manual.

Parameter	*Static PDO Mapping*
Address	*264-315*
Base Address	*Axis1=128 , Axis2=320*
Access	*R/W*
Default Values	*-*
Range	*[0x0, 0xFFFFFFFF]*
Activation	*REBOOT*

Address	*Description*	
264-265	*CanOpen @ 1400,01*	*COB ID RPDO1*
268	*CanOpen @ 1400,02*	*Transmission Type*
270	*CanOpen @ 1600,00*	*Number Of Entries*
272-273	*CanOpen @ 1600,01*	*RPDO1 Mapping 0*
274-275	*CanOpen @ 1600,02*	*RPDO1 Mapping 1*
276-277	*CanOpen @ 1600,03*	*RPDO1 Mapping 2*
278-279	*CanOpen @ 1600,04*	*RPDO1 Mapping 3*
288-289	*CanOpen @ 1800,01*	*COB ID TPDO1*
292	*CanOpen @ 1800,02*	*Transmission Type*
294	*CanOpen @ 1800,03*	*Inhibit Time*
295	*CanOpen @ 1800,05*	*Event Timer*
298	*CanOpen @ 1A00,0*	*Number Of Entries*
300-301	*CanOpen @ 1A00,01*	*TPDO1 Mapping 0*
302-303	*CanOpen @ 1A00,02*	*TPDO1 Mapping 1*
304-305	*CanOpen @ 1A00,03*	*TPDO1 Mapping 2*
306-307	*CanOpen @ 1A00,04*	*TPDO1 Mapping 3*

266-267	*CanOpen @ 1401,01*	*COB ID RPDO2*
269	*CanOpen @ 1401,02*	*Transmission Type*
271	*CanOpen @ 1601,00*	*Number Of Entries*
280-281	*CanOpen @ 1601,01*	*RPDO2 Mapping 0*
282-283	*CanOpen @ 1601,02*	*RPDO2 Mapping 1*
284-285	*CanOpen @ 1601,03*	*RPDO2 Mapping 2*
286-287	*CanOpen @ 1601,04*	*RPDO2 Mapping 3*
290-291	*CanOpen @ 1801,01*	*COB ID TPDO2*
293	*CanOpen @ 1801,02*	*Transmission Type*
296	*CanOpen @ 1801,03*	*Inhibit Time*
297	*CanOpen @ 1801,05*	*Event Timer*
299	*CanOpen @ 1A01,0*	*Number Of Entries*
308-309	*CanOpen @ 1A01,01*	*TPDO2 Mapping 0*
310-311	*CanOpen @ 1A01,02*	*TPDO2 Mapping 1*
312-313	*CanOpen @ 1A01,03*	*TPDO2 Mapping 2*
314-315	*CanOpen @ 1A01,04*	*TPDO2 Mapping 3*

Note: To disable a Static PDO mapping the Msb (Most significant bit) must be set.

Example:

Parameter 136:

0x80000181	***PDO DISABLED***
0x00000181	***PDO ENABLED***

Torque Limits

Positive Torque Limit

Parameter	Positive Torque Limit
Address	254
Access	R/W
Default Values	100
Range	[0 100]%
Activation	Immediate

Negative Torque Limit

Parameter	Negative Torque Limit
Address	255
Access	R/W
Default Values	100
Range	[0 100]%
Activation	Immediate

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JOG Parameters

JOG Positive

This is the speed of positive JOG in user units

Parameter	*JOG Positive Axis*
Address	*244-245*
Access	*R/W*
Default Values	*0*
Range	*[-2147483648;2147483647]*
Activation	*Immediate*

JOG Negative Axis

This is the speed of negative JOG in user units

Parameter	*JOG Negative*
Address	*246-247*
Access	*R/W*
Default Values	*0*
Range	*[-2147483648;2147483647]*
Activation	*Immediate*

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Generic Inputs

With the generic inputs is possible to send general command useful for the drive. All the commands will be activated only on the rising edge transition.

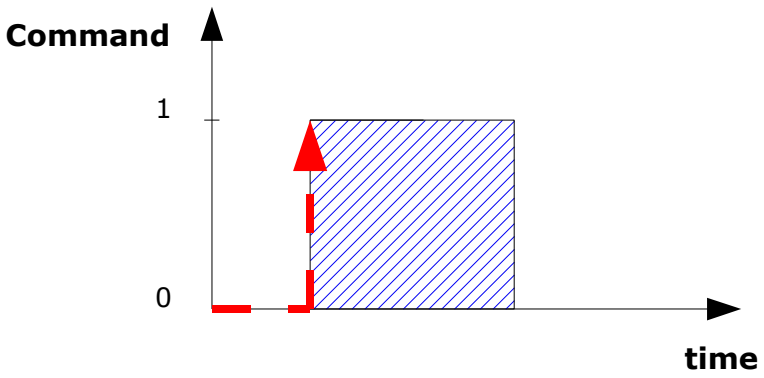

FIGURE 1

Save To Flash

With this command is possible to save the actual configuration present in the RAM into the E2PROM (non volatile memory) so it will be available at next boot.

This command will save all the Parameters (Generic, Axis1 and Axis2)

	The communication with the drive will be lost for some second when this command is executed. During the execution of this command both the servo must be switched off.

Parameter	*Save to flash*
Address	*512*
Access	*R/W*
Default Values	*0*
Range	*[0,1]*
Activation	*Immediate*
CANopen Object ID	*0x1010 0x01*

Set Default Parameters

This command will copy the default parameter configuration into the RAM. A save to Flash have to be done after this operation.

Input	*Set default parameters*
Address	*515*
Access	*R/W*
Default Values	*0*
Range	*[0,1]*
Activation	*IMMEDIATE*

It is important to reboot the device after this operation.

Reset Drive

This command will perform a software Reset of the Drive. If an upper board is present please always remove the 24 V Backup Voltage to perform a safe Drive Reset.

Input	*Reset Drive*
Address	*516*
Access	*R/W*
Default Values	*0*
Range	*[0,1]*
Activation	*IMMEDIATE*

It is important to Reset the Drive only if the Servo are disabled.

Start Bootloader

This parameter will force the drive to switch to Bootloader mode, and allow a new firmware to be loaded on the device.

Input	*Start Bootloader*
Address	*517*
Access	*R/W*
Default Values	*0*
Range	*[0,1]*

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Axis Inputs

With Axis input is possible to send command to each axis of the device and set the set point for all the mode of operation.

Control Word

The internal state machine of each single axis is commanded from one single command that is the Control Word. The control word act as a CANOpen/EtherCAT Control Word, for more information on it's bits please refer to the device CANOpen/EtherCAT Manual.

Input	*Control Word*
Address	*540*
Access	*R/W*
Default Values	*0*
Range	*[0,65535]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6040*

For faster and easyer use of the system, we took some important bit of the control word and we put into different inputs. Changing these inputs will immediately change the status of the Control Word.

Enable

This input allow the user to turn of the servo.

Input	*Enable*
Address	*546*
Access	*R/W*
Default Values	*0*
Range	*[0,1]*
Activation	*RISING-EDGE*

Note: All the parameter and the Control Filter must be correcly set befor the motor can move correctly.

Begin

This input allow the user to commit one set point depending on the actual mode of operation.

Input	*Begin*
Address	*547*
Access	*R/W*
Default Values	*0*
Range	*[0,1]*
Activation	*RISING-EDGE*

Fault Reset

This input allow to reset all the fault present on the system. If all the error are reset the changes will be visible both on the error register and the Status Word.

Input	*Fault Reset*
Address	*548*
Access	*R/W*
Default Values	*0*
Range	*[0,1]*
Activation	*RISING-EDGE*

Halt

This input allow the user to stop the actual movement both in Position and Velocity mode. The axis will be stopped (0 Velocity) with the Stop Deceleration.

Input	*Halt*
Address	*549*
Access	*R/W*
Default Values	*0*
Range	*[0,1]*
Activation	*RISING-EDGE*

Set immediately

This input reflect exactly the Control Word bit and allow the user to define if the following command activated with the Begin bit will be executed immediately or it will wait the execution of a previuos command.

If this bit is set to 1 all the commands will be executed immediately.

Input	*Set immediately*
Address	*550*
Access	*R/W*
Default Values	*0*
Range	*[0,1]*
Activation	*IMMEDIATE*

Use Relative Position

This input is necessary to define if the Position set point of the next position command is absolute or relative.

If this bit is set to 1 the next position command will be relative.

Input	*Set immediately*
Address	*551*
Access	*R/W*
Default Values	*0*
Range	*[0,1]*
Activation	*IMMEDIATE*

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Targets

Current Target

This input define the Current Target in [mA] of the Current Loop. The new set point will be activated with the Begin command.

Input	*Current target*
Address	*552*
Access	*R/W*
Default Values	*0*
Range	*[0 - 15000]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x6071*

If the operation mode is Stepper Mode (-5) this will be the mandatory current command.

Speed Target

This input define the speed target in [rpm]. The new set point will be activated with the Begin command. The speed target will be affected by Profile mode paramenter.

Input	*Speed Target*
Address	*553-554*
Access	*R/W*
Default Values	*0 [rpm]*
Range	*INT32*
Activation	*IMMEDIATE*
CANopen Object ID	*0x60FF*

If the operation mode is Stepper Mode (-5) this will be the speed command . Please take care that all the calculation are done with the motor PPR and the conversion factor even if no feedback is connected.

Position Target

This input define the position target in [counts]. The new set point will be activated with the Begin command. The speed target will be affected by "Use relative position" bit of the Control Word.

Input	*Position target*
Address	*554-555*
Access	*R/W*
Default Values	*0 [count]*
Range	*INT32*
Activation	*IMMEDIATE*
CANopen Object ID	*0x607A*

If the operation mode is Stepper Mode (-5) this will electrical angle where the motor has to move, and the range is between 0 and 36000.

Generic Outputs

These variable show the status of the servo drive, and the most important variables. These values are read only and are updated real time by the drive.

Firmware Version

This output value contain the firmware version of the device.

Output	*Firmware version*
Address	*640*
Access	*R*
Unit	*[-]*
Range	*[0 - 65535]*
Type	*U16*
CANopen Object ID	*0x100A*

How to read Firmware Version: Take the 5 digit number of this Ouput and split as follows:

aa.bb.c

Value	**Description**
aa	*Version*
bb	*Revision*
c	*Minor*

Bootloader Firmware Version

This output value contain the bootloader firmware version of the device.

Output	*Firmware version*
Address	*664*
Access	*R*
Unit	*[-]*
Range	*[0 - 65535]*
Type	*U16*

How to read Bootloader Firmware Version: Take the 5 digit number of this Ouput and split as follows:

aa.bb.c

Value	Description
aa	*Version*
bb	*Revision*
c	*Minor*

Flash Status

This output show if the status bits of the internal flash.

Output	Flash Status
Address	*667*
Access	*R*
Unit	*[-]*
Range	*[0 65535]*
Type	*UNSIGNED*

List of possible Values:

Bit	Description
0-10	*Current parameter being saved*
11	*Reserved*
12	*Reserved*
13	*Default parameters Loaded*
14	*Parameters Stored Correctly*
15	*Parameters Loaded Correctly*

DC Bus Voltage

This Value show the DC Bus Voltage expressed in [V].

	Output DC Bus
Address	*653*
Access	*R*
Unit	*[V]*
Range	*[0 120]*
Type	*Int*
CANopen Object ID	*0x6079*

Drive Temperature

This Value show the drive board temperature in [C°/100].

	Output DC Bus
Address	*653*
Access	*R*
Unit	*[C°/100]*
Range	*[0 120]*
Type	*Int*
CANopen Object ID	*0x2220*

Input bits

This output show the status of the real input bit. Each bit of this word rapresent the status of each input pin.

Output	*Input bits*
Address	*663*
Access	*R*
Unit	
Range	*[0 - 65535]*
Type	*bit*
CANopen Object ID	*0x60FD*

Output status

This value show the status of the Digital Outputs.

Each bit corresponds to an output.

Output	*Digital Input*
Address	*664*
Access	*R*
Unit	
Range	*[0 - 65535]*
Type	*bit*
CANopen Object ID	*0x60FE 0x01*

Can Bus Outputs

The following output values show the status of the Can Variables and the Can Register of the DSP.

Vendor ID

The vendor ID is a specific code given by Cia (Can in Automation http://www.cancia.org/).

This value is provided for CanOpen compatibility reasons.

Output	*Vendor ID*
Address	*641-642*
Access	*R*
Unit	*-*
Range	*[0 - 2^{32}]*
Type	*Long (32 bit)*
CANopen Object ID	*0x1018 0x01*

Product Code

The Product Code is a specific identification given by Motor Power Company for this Device. This value is provided for CANOpen/EtherCAT compatibility reasons.

Output	*Product Code*
Address	*643-644*
Access	*R*
Unit	*-*
Range	*[0 - 2^{32}]*
Type	*Long (32 bit)*
CANopen Object ID	*0x1018 0x02*

Revision Number

The Revision Number is a specific code given by Motor Power Company for this Device. This value is provided for CANOpen/EtherCAT compatibility reasons.

Output	Revision Number
Address	645-646
Access	R
Unit	-
Range	[0 - 2^{32}]
Type	Long (32 bit)
CANopen Object ID	0x1018 0x03

Serial Number

The Serial Number is a unique code given by Motor Power Company for this Device. This value is provided for CANOpen/EtherCAT compatibility reasons.

Output	Serial Number
Address	648-649
Access	R
Unit	-
Range	[0 - 2^{32}]
Type	Long (32 bit)
CANopen Object ID	0x1018 0x04

CAN Status Register

Specific CAN Status register.

Output	Can Status Register
Address	658
Base Address	640
Access	R
Unit	-
Range	[0 - 65536]
Type	Int (16 bit)

CAN Error Register

Specific CAN Status register.

Output	*Can Status Register*
Address	*659*
Access	*R*
Unit	*-*
Range	*[0 - 2^{32}]*
Type	*uint (16 bit)*

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Axis Outputs

Status Word

This output report the status of the internal state machine of drive. Refer to CANOpen/EtherCAT Manual for more information.

Output	*Status word*
Address	*668*
Access	*R*
Unit	*-*
Range	*[0 - 65535]*
Type	*uint (16 bit)*
CANopen Object ID	*0x6041*

Fault Register

This output report if the Axis has one fault or is correctly running. Each bit of the Fault register rapresent a fault condition. It's possible to have one ore more fault condition activated.

Output	***Fault Register***
Address	*669*
Access	*R*
Unit	*-*
Range	*[0 - 65535]*
Type	*uint (16 bit)*
CANopen Object ID	*0x60F3*

The following error are allowed on the drive system:

Bit	Error
0	*OVER_VOLTAGE*
1	*UNDER_VOLTAGE*
2	*PEAK_MOTOR_CURRENT*
3	*RATED_MOTOR_CURRENT*
4	*SHORT_CIRCUIT*
8	*POSITION_TRACKING_ERROR*
9	*VELOCITY_TRACKING_ERROR*
10	*OVERVELOCITY*
12	*DRIVE_OVERTEMPERATURE*
13	*FIELDBUS_CYCLE_TIME*

Control Mode Display

This output show the actual mode of operation configured.

Output	Control mode display
Address	*670*
Access	*R*
Unit	*-*
Range	*[0 - 65535]*
Type	*uint (16 bit)*
CANopen Object ID	*0x6061*

For a list of possible value check Modes of Operation parameter.

Analog Input

This output show the value that the ADC read from the Axis Analog Input in [mV].

Output	*Analog Input*
Address	*671*
Access	*R*
Unit	*[mv]*
Range	*[0 - 65535]*
Type	*uint (16 bit)*
CANopen Object ID	*0x2205 0x01*

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Current Output

The following outputs are all the important value for the current controller.

Iq Target

This value is the IQ Current set point in [A/100].

Output	Iq target
Address	676
Access	R
Unit	[A/100]
Range	[0 - 65535]
Type	int (16 bit)
CANopen Object ID	0x6071

Actual Iq

This value is the IQ Current value [A/100].

Output	Actual Iq
Address	674
Access	R
Unit	[A/100]
Range	[-32767 32768]
Type	int (16 bit)
CANopen Object ID	0x6078

Iq Error

This value is the difference between IqTarget and Actual Iq value [A/100]. This value will feed the Current Profiler to generate a IqDemand.

Output	Iq error

Address	*675*
Access	*R*
Unit	*[A/100]*
Range	*[-32767 32768]*
Type	*int (16 bit)*

Actually the Current Interpolator is not active so IqTarget will feed immediately the Iq Demand.

Iq Demand

This value is the Actual Iq Demand. This is the real actual current demand.

Output	*Iq demand*
Address	*676*
Access	*R*
Unit	*[A/100]*
Range	*[-32767 32768]*
Type	*int (16 bit)*
CANopen Object ID	*0x6074*

Iq Tracking Error

This value is the difference between IqDemand and Actual Iq value [A/100], ence the real error that is present on the current controller.

Output	*Iq tracking error*
Address	*676*
Access	*R*
Unit	*[A/100]*
Range	*[-32767 32768]*
Type	*int (16 bit)*

Velocity Outputs

The following outputs represent all the important value for the speed controller.

Velocity Target

This value is the Speed set-point that feed the speed profiler [rpm].

Output	*Velocity target*
Address	*680-681*
Access	*R*
Unit	*[rpm]*
Range	*[-32767 32768]*
Type	*int (16 bit)*
CANopen Object ID	*0x60FF*

Actual Velocity

This value represent the actual speed of the motor [rpm].

Output	*Actual velocity*
Address	*682-683*
Access	*R*
Unit	*[rpm]*
Range	*[-32767 32768]*
Type	*int (16 bit)*
CANopen Object ID	*0x606C*

Velocity Error

This value represent the difference between Velocity Target and Actual velocity [rpm].

Output	*Velocity error*
Address	*684-685*
Access	*R*
Unit	*[rpm]*
Range	*[-32767 32768]*
Type	*int (16 bit)*

Velocity Demand

This value represent the actual velocity demand coming from the speed profiler.

Output	*Velocity demand*
Address	*686-687*
Access	*R*
Unit	*[rpm]*
Range	*[-32767 32768]*
Type	*int (16 bit)*

Velocity Tracking Error

This value rapresent the difference between Velocity Demand and Actual Velocity value [rpm], ence the real error that is present on the speed controller.

Output	*Velocity tracking error*
Address	*688-689*
Access	*R*
Unit	*[rpm]*
Range	*[-32767 32768]*
Type	*int (16 bit)*

Position Outputs

The following outputs represent all the important value for the position controller.

Position Target

This value is the position set-point [Counts].

Output	*Position target*
Address	*690-691*
Access	*R*
Unit	*[counts]*
Range	*[-2147483648;2147483647]*
Type	*long (32 bit)*
CANopen Object ID	*0x607A*

Actual Position

This value is the position actual of the motor [Counts]

Output	*Actual position*
Address	*692-693*
Access	*R*
Unit	*[counts]*
Range	*[-2147483648;2147483647]*
Type	*long (32 bit)*
CANopen Object ID	*0x6064*

Position Error

This value is the difference between Position Target and Actual Position [Counts]. This error will feed the Position Profiler.

Output	*Position error*
Address	*694-695*
Access	*R*
Unit	*[counts]*
Range	*[-2147483648;2147483647]*
Type	*long (32 bit)*

Position Demand

This value is the output of the Position Profiler, ence the Actual Position Demand [Counts]

Output	*Position demand*
Address	*696-697*
Access	*R*
Unit	*[counts]*
Range	*[-2147483648;2147483647]*
Type	*long (32 bit)*

Position Tracking Error

This value is the difference between Position Demand and Actual Position [Counts]. This error of the Position Loop.

Output	*Position tracking error*
Address	*698-699*
Access	*R*
Unit	*[counts]*
Range	*[-2147483648;2147483647]*
Type	*long (32 bit)*
CANopen Object ID	*0x60F4*

In Position

This value is a flag that report that the position of the the motor is within the limit, so the movement is completed.

Output	*In position*
Address	*700*
Access	*R*
Unit	*[-]*
Range	*[0 1]*
Type	*bool (1 bit)*

Other Output Parameters

Homing Status

Output	*Homing Status*
Address	*702*
Access	*R*
Unit	*[-]*
Range	*[0 10]*
Type	*Unsigned Int*

This parameter show the status of the homing process. The status can have the following values:

Bit	*Error*
0	*Idle*
1	*Moving to Switch*
2	*Moving from Switch*
3	*Moving From Limit Switch*
4	*Moving to Zero*
5	*Halted*
6	*Timeout*
7	*Error*
8	*Attained – Axis Still Moving*
9	*Post Homing Action*
10	*Completed*

Motor Usage

This value show the percentage use of the motor. If the value reach 100%, the motor will be stopped with I2T error.

Output	*Motor Usage*
Address	*704*
Access	*R*
Unit	*[%]*
Range	*[0 100]*
Type	*Int (16 bit)*

Axis Enabled

This value is 1 when the servo is enabled. This parameter can be used in connection with Enable (Input) to create a safe protocol.

Output	*Axis Enabled*
Address	*703*
Access	*R*
Unit	*[bit]*
Range	*[0 1]*
Type	*Bool*

Input State

Indicates the state of digital inputs. Each bit corresponds to a digital input (if present).

Output	*Input State*
Address	*704*
Access	*R*
Unit	*[bit]*
Range	*[0 1]*
Type	*Bool*
CANopen Object ID	*0x60FD*

NMT State

This value show the actual status of the CANOpen/EtherCAT network on the axis.

Output	*NMT state*
Address	*706*
Access	*R*
Unit	*[-]*
Range	*[0 20]*
Type	*Int (16 bit)*

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User Program Functionality

In this Chapter are listed all the relevant user program Input output and parameter

User Program Active-Enable User Program

This parameter allow the start of the User Function

Parameter	*User Program active*
Address	*14*
Base Address	*0*
Access	*R/W*
Default Values	*0*
Range	*[0 - 1]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x2300 0x01*

User Program Type

This parameter allow to pass one parameter to the user User Function.

Parameter	*User Program Type*
Address	*15*
Base Address	*0*
Access	*R/W*
Default Values	*0*
Range	*[0 - 65535]*
Activation	*IMMEDIATE*
CANopen Object ID	*0x2300 0x02*

Ethernet Fieldbus Parameters

Industrial Ethernet Stack Firmware Version

This output value contain the Ethernet Fieldbus Stack firmware version of the device.

Only readable with MODBUS TCP/IP

Output	*Firmware version*
Address	*6000-6001*
Access	*R*
Unit	*[-]*
Range	*-*
Type	*String*

How to read Firmware Version: Take the bytes of this Ouput and split as follows in orders:

a.b.c.d

Value	***Description***
a	*Major*
b	*Minor*
c	*Revision*
d	*Build*

Industrial Ethernet Application Firmware Version

This output value contain the Ethernet Fieldbus Application firmware version of the device.

Only readable with MODBUS TCP/IP

Output	*Firmware version*
Address	*6002-6003*
Access	*R*
Unit	*[-]*
Range	*-*

Type	*String*

How to read Firmware Version: Take the bytes of this Ouput and split as follows in orders:

a.b.c.d

	Value	**Description**
a		*Major*
b		*Minor*
c		*Revision*
d		*Build*

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