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APPLICATION NOTE

Drive Applications Support Library

Application Note	AN-P2-059
Title	CAN Bus Operation
Related Products	P2 Series AC Drives
Level: 4	1 - Fundamental - No previous experience necessary. 2 - Basic - Some basic drives knowledge recommended. 3 - Advanced - Some basic drives knowledge required. 4 - Expert - Good experience in topic of subject matter recommended.

General:

This document provides an overview of the CAN bus functionality that is implemented in the Bardac P2 series drive, detailing which addresses are used to read and write data to / from the P2 in a CAN network.

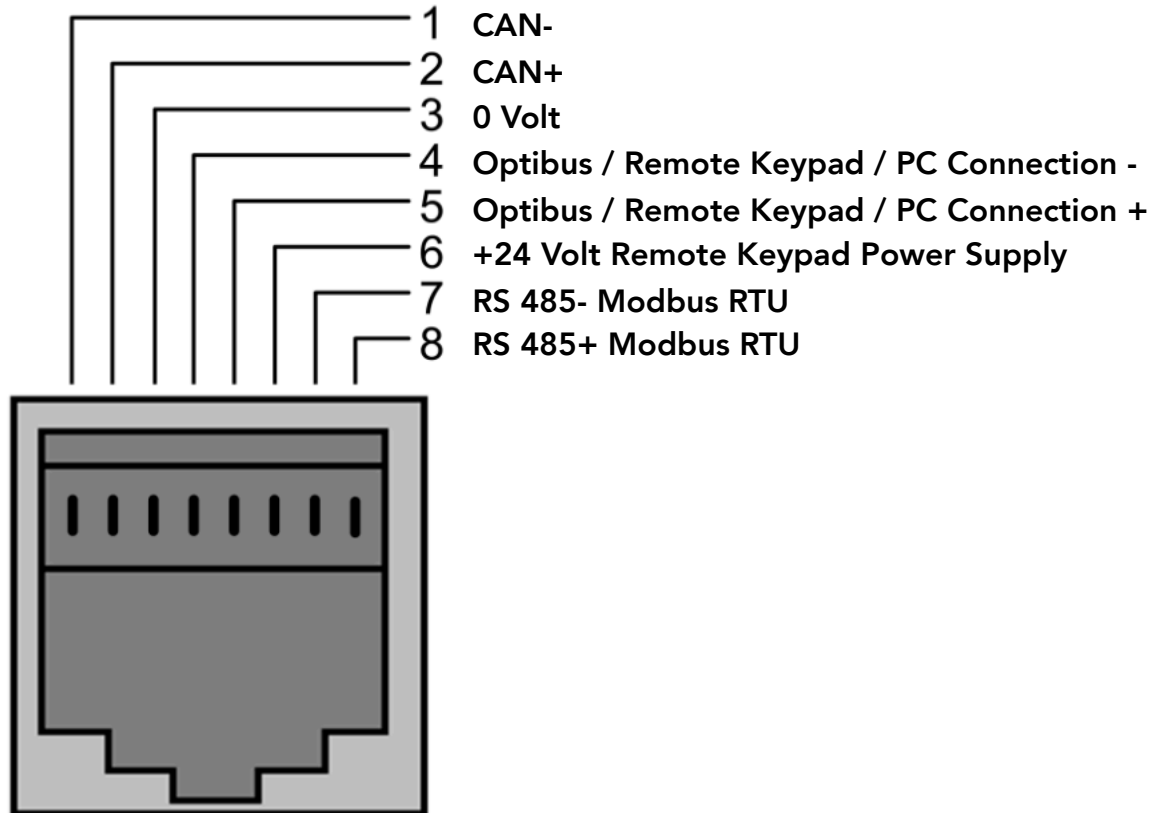
Bardac Drives adopts a policy of continuous improvement, and whilst every effort has been made to provide accurate and up to date information, the information contained in this document should be used for guidance purposes only and does not form the part of any contract.

About P2 Series CANopen:

CANopen communication profile is implemented according to the speciation DS301 version 4.02 of CAN in automation (www.can-cia.de). Specific device profiles such as DS402 are not supported.

[continued on next page]

RJ45 Data Connection Pin Configuration:



Operation Setup:

CANopen communication can be enabled by setting parameter P1-12=6.

The required baud rate can be set using parameter P5-02. Available baud rates are 125kbps, 250kbps, 500kbps, 1Mbps.

P2 Series COB ID:

Table 1: Messages and COB-IDs

Type	COB-ID	Function	
NMT	000h	Network management	
Sync	080h	Synchronous message COB-ID can be configured to other value.	
Emergency	080h + Node address	Emergency message COB-ID can be configured to other value.	
PDO1 (TX)	180h + Node address	Process data object. PDO1 is pre-mapped and enabled by default. PDO2 is pre-mapped and disabled by default. Transmission mode, COB-ID and mapping can be configured.	
PDO1 (RX)	200h + Node address		
PDO2 (TX)	280h + Node address		
PDO2 (RX)	300h + Node address		
SDO (TX)	580h + Node address	SDO channel can be used for drive parameter access.	
SDO (RX)	600h + Node address		
Error Control	700h + Node address	Guarding and Heartbeat function are supported. COB-ID can be configured to other value.	

The P2 series provides the following COB-ID and functions:

Note:

1. P2 SDO channel only supports expedited transmission.
2. P2 drives can only support up to 2 Process Data Objects (PDO). All PDOs are pre-mapped, however PDO2 is disabled by default. Table 2 gives the default PDO mapping information.
3. Customer configuration (mapping) will **NOT** be saved during power down. This means CANopen configuration will restore to its default condition each time drive is powered up.

Table 2: PDO Default Mapping					
	Objects No.	Mapped Object	Length	Mapped Function	Transmission Type
RX PDO 1	1	2000h	Unsigned 16	Control command register	254 Valid immediately
	2	2001h	Integer 16	Speed reference	
	3	2002h	Integer 16	Torque reference	
	4	2003h	Unsigned 16	User ramp reference	
TX PDO 1	1	200Ah	Unsigned 16	Drive status register	254 Send after receiving RX PDO 1
	2	200Bh	Integer 16	Motor speed Hz	
	3	200Dh	Unsigned 16	Motor current	
	4	200Eh	Integer 16	Motor torque	
RX PDO 2	1	0006h	Unsigned 16	Dummy	0
	2	0006h	Unsigned 16	Dummy	
	3	0006h	Unsigned 16	Dummy	
	4	0006h	Unsigned 16	Dummy	
TX PDO 2	1	200Fh	Unsigned 16	Motor power	0
	2	2010h	Integer 16	Drive temperature	
	3	2011h	Unsigned 16	DC bus value	
	4	200Ch	Integer 16	Motor speed (Internal data format)	

CANopen specific Object table:

CANopen communication function can be enabled by set drive parameter P1-12=6.

CAN communication baud rate can be setup by using parameter P5-02.

P2 drives provide the following COB-ID and functions:

Table 3: Communication Profile Object Dictionary

Index	Sub index	Function	Access	Type	PDO Map	Default Value
1000h	0	Device type	RO	Unsigned 32	N	0
1001h	0	Error register	RO	Unsigned 8	N	0
1002h	0	Manufacturer status register	RO	Unsigned 16	N	0
1005h	0	COB-ID Sync	RW	Unsigned 32	N	00000080h
1008h	0	Manufacturer device name	RO	String	N	ODP2
1009h	0	Manufacturer hardware version	RO	String	N	x.xx
100Ah	0	Manufacturer software version	RO	String	N	x.xx
100Ch	0	Guard time [1ms]	RW	Unsigned 16	N	0
100Dh	0	Life time factor	RW	Unsigned 8	N	0
1014h	0	COB-ID EMCY	RW	Unsigned 32	N	00000080h+Node ID
1015h	0	Inhibit time emergency [100us]	RW	Unsigned 16	N	0
1017h	0	Producer heart beat time [1ms]	RW	Unsigned 16	N	0
1018h	0	Identity object No. Of entries	RO	Unsigned 8	N	4
	1	Vendor ID	RO	Unsigned 32	N	
	2	Product code	RO	Unsigned 32	N	Drive depended
	3	Revision number	RO	Unsigned 32	N	x.xx
	4	Serial number	RO	Unsigned 32	N	e.g. 1234/56/789
1200h	0	SDO parameter No. of entries	RO	Unsigned 8	N	2
	1	COB-ID client -> server (RX)	RO	Unsigned 32	N	00000600h+Node ID
	2	COB-ID server -> client (TX)	RO	Unsigned 32	N	00000580h+Node ID

Table 3: Communication Profile Object Dictionary

Index	Sub index	Function	Access	Type	PDO Map	Default Value
1400h	0	RX PDO1 comms param No. Of entries	RO	Unsigned 8	N	2
	1	RX PDO1 COB-ID	RW	Unsigned 32	N	00000200h+Node ID
	2	RX PDO1 transmission type	RW	Unsigned 8	N	254
1401h	0	RX PDO2 comms param No. of entries	RO	Unsigned 8	N	2
	1	RX PDO2 COB-ID	RW	Unsigned 32	N	80000300h+Node ID
	2	RX PDO2 transmission type	RW	Unsigned 8	N	0
1600h	0	RX PDO1 mapping / No. of entries	RW	Unsigned 8	N	4
	1	RX PDO1 1st mapped object	RW	Unsigned 32	N	20000010h
	2	RX PDO1 2nd mapped object	RW	Unsigned 32	N	20010010h
	3	RX PDO1 3rd mapped object	RW	Unsigned 32	N	20020010h
	4	RX PDO1 4th mapped object	RW	Unsigned 32	N	20030010h
1601h	0	RX PDO2 mapping / No. of entries	RW	Unsigned 8	N	4
	1	RX PDO2 1st mapped object	RW	Unsigned 32	N	00060010h
	2	RX PDO2 2nd mapped object	RW	Unsigned 32	N	00060010h
	3	RX PDO2 3rd mapped object	RW	Unsigned 32	N	00060010h
	4	RX PDO2 4th mapped object	RW	Unsigned 32	N	00060010h
1800h	0	TX PDO1 comms param No. of entries	RO	Unsigned 8	N	3
	1	TX PDO1 COB-ID	RW	Unsigned 32	N	40000180h+Node ID
	2	TX PDO1 transmission type	RW	Unsigned 8	N	254
	3	TX PDO1 inhibit time [100us]	RW	Unsigned 16	N	0

Table 3: Communication Profile Object Dictionary

Index	Sub index	Function	Access	Type	PDO Map	Default Value
1801h	0	TX PDO2 comms param No. of entries	RO	Unsigned 8	N	3
	1	TX PDO2 COB-ID	RW	Unsigned 32	N	C0000280h+Node ID
	2	TX PDO2 transmission type	RW	Unsigned 8	N	0
	3	TX PDO2 Inhibit time [100us]	RW	Unsigned 16	N	0
1A00h	0	TX PDO1 mapping / No. of entries	RW	Unsigned 8	N	4
	1	TX PDO1 1st mapped object	RW	Unsigned 32	N	200A0010h
	2	TX PDO1 2nd mapped object	RW	Unsigned 32	N	200B0010h
	3	TX PDO1 3rd mapped object	RW	Unsigned 32	N	200D0010h
	4	TX PDO1 4th mapped object	RW	Unsigned 32	N	200E0010h
1A01h	0	TX PDO2 mapping / No. of entries	RW	Unsigned 8	N	4
	1	TX PDO2 1st mapped object	RW	Unsigned 32	N	200F0010h
	2	TX PDO2 2nd mapped object	RW	Unsigned 32	N	20100010h
	3	TX PDO2 3rd mapped object	RW	Unsigned 32	N	20110010h
	4	TX PDO2 4th mapped object	RW	Unsigned 32	N	200C0010h

PDO transmission type:

Various transmission modes can be selected for each PDO.

For RX PDO, the following modes are supported:

Table 4: RX PDO Transmission Mode

Transmission Type	Mode	Description
0 - 240	Synchronous	The received data will be transferred to the drive active control register when the next sync message is received.
254, 255	Asynchronous	The received data will be transferred to the drive active control register immediately without delay.

For TX PDO, the following modes are supported:

Table 5: TX PDO Transmission Mode

Transmission Type	Mode	Description
0	Acyclic synchronous	TX PDO will only be sent out if the PDO data has changed and PDO will be transmitted on reception of SYNC object.
1 - 240	Cyclic synchronous	TX PDO will be transmitted synchronously and cyclically. The transmission type indicates the number of SYNC object that are necessary to trigger TX PDO.
254	Asynchronous	TX PDO will only be transferred once corresponding RX PDO has been received.
255	Asynchronous	TX PDO will only be transferred anytime if PDO data value has changed.

Manufacturer specific Object table:

P2 manufacturer specific object dictionary is defined as follows:

Manufacturer Specific Profile Area – Control & Status					
Index	Sub Index	Function	Access	Type	PDO Map
2000h	0	Control command register	RW	Unsigned 16	Y
2001h	0	Speed reference	RW	Integer 16	Y
2002h	0	Torque reference	RW	Integer 16	Y
2003h	0	User ramp reference	RW	Unsigned 16	Y
2004h	0	Speed reference (internal format)	RW	Integer 16	Y
200Ah	0	Drive status register	RO	Unsigned 16	Y
200Bh	0	Motor speed Hz	RO	Unsigned 16	Y
200Ch	0	Motor speed (internal format)	RO	Unsigned 16	Y
200Dh	0	Motor current	RO	Unsigned 16	Y
200Eh	0	Motor torque	RO	Integer 16	Y
200Fh	0	Motor power	RO	Unsigned 16	Y
2010h	0	Drive temperature	RO	Integer 16	Y
2011h	0	DC bus value	RO	Unsigned 16	Y
2012h	0	Digital input status	RO	Unsigned 16	Y
2013h	0	Analog input 1 (percentage)	RO	Unsigned 16	Y
2014h	0	Analog input 2 (percentage)	RO	Unsigned 16	Y
2015h	0	Analog output 1	RO	Unsigned 16	Y
2016h	0	Analog output 2	RO	Unsigned 16	Y
2017h	0	User relay output 1	RO	Unsigned 16	Y
2018h	0	User relay output 2	RO	Unsigned 16	Y
2019h	0	Reserved	RO	Unsigned 16	Y
201Ah	0	Reserved	RO	Unsigned 16	Y
201Bh	0	Reserved	RO	Unsigned 16	Y

Manufacturer Specific Profile Area – Control & Status					
201Ch	0	Reserved	RO	Unsigned 16	Y
201Dh	0	Reserved	RO	Unsigned 16	Y
201Eh	0	Reserved	RO	Unsigned 16	Y

Drive Specific Object Reference

Object 2000h: Control command register

2000h Control Command Register				
Bit 15 ~ Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	Coast stop	Reset	Fast stop	Run

If bit 0 is set, drive will start to run provided the certain condition is met.

If bit 1 is set, drive will do fast stop. This bit will override run bit if set

If bit 3 is set, drive will perform coast stop. This bit will override run and fast stop bits if set.

Bit 2 is used to reset the drive under trip conditions. This reset function is edge active (0 ⇔ 1)

Object 2001h: Speed reference (Hz)

The data value of this object provides speed reference in Hz format. Data includes once decimal place.

For example, if data value is 500, this means the speed reference is 50.0Hz. If data value is 125, the desired speed reference will be 12.5Hz. If data value set to -1234 (0xFB2E), the speed reference will be -123.4Hz.

Object 2002h: Torque reference (%)

The data value of this object provides torque reference in percentage. Data includes once decimal place.

For example, if data value is 500, this means the torque reference is 50.0% of motor rated torque. If data value is 1250, the desired torque reference will be 125%

Object 2003h: User ramp reference (0.01s)

The data value of object this set the user ramp time. Value contains one decimal place.

For example, if data value is 30, this means the require user ramp time is 0.3s. If data value is 1234, the desired ramp time will be 12.34s

Object 2004h: Speed reference (IDL internal format)

The data value of this object provides speed reference in IDL internal data format, which will provide higher resolution control result.

If motor base frequency $\leq 100\text{Hz}$, data value 3000 means speed reference is set to 50Hz.

If motor base frequency $\leq 200\text{Hz}$, data value 3000 means speed reference is set to 100Hz.

If motor base frequency $> 200\text{Hz}$, data value 3000 means speed reference is set to 200Hz.

Object 200Ah: Drive status register

200Ah Drive Status Register			
Bit 15 ~ Bit 8	Bit 7 ~ Bit 3	Bit 1	Bit 0
Trip code if bit 1 is set to 1	Reserved	Trip	Run

If bit 0 is set, drive is in run condition.

If bit 1 is set, drive is in trip condition

Bit 8 to Bit 15 provides error/trip code when drive is in trip condition. (Error code is not provided here)

Object 200Bh : Motor speed (Hz)

The data value of this object provides motor speed information in Hz unit. Data includes once decimal place.

For example, if data value is 500=50.0Hz, -125=-12.5Hz

Object 200Ch : Motor speed (IDL internal format)

The data value of this object provides motor speed information in IDL internal data format. See object 2004h for more information about this speed format

Object 200Dh : Motor current (A)

The data value of this object provides motor current information. Value contains one decimal place.

For example, if data value is 30, this means the motor current is 3.0A

Object 200Eh : Motor torque (Q12)

The data value of this object provides motor output torque information. Value is in Q12 format, 4096 = 100%.

Object 200Fh : Motor power (kW)

The data value of this object provides motor output power information. Value contains two decimal places.

For example, 1234=12.34kW

Drive Parameters:

All User Adjustable parameters in Groups 1 to 8 can be accessed by CAN. For further details regarding the parameter functions, please refer to the P2 User Guide.

Type definitions are defined as follows:

WORD Hexadecimal Word

U16 Unsigned 16 Bit Value

S16 Signed 16 Bit Value

Manufacturer Specific Profile Area – Parameter Group 1								
Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark
2065h	0	P1-01	Maximum Speed / Frequency	RW	U16	3000 = 50.0Hz	N	2000h + 101d
2066h	0	P1-02	Maximum Speed / Frequency	RW	U16	3000 = 50.0Hz	N	2000h + 102d
2067h	0	P1-03	Acceleration Time	RW	U16	300 = 30.0s	N	
2068h	0	P1-04	Deceleration Time	RW	U16	300 = 30.0s	N	
2069h	0	P1-05	Stopping Mode	RW	U16		N	
206Ah	0	P1-06	Energy Optimiser	RW	WORD		N	
206Bh	0	P1-07	Motor Rated Voltage	RW	U16	230 = 23 V	N	
206Ch	0	P1-08	Motor Rated Current	RW	U16	1 = 0.1A	N	
206Dh	0	P1-09	Motor Rated Frequency	RW	U16	50 = 50Hz	N	
206Eh	0	P1-10	Motor Rated Speed	RW	U16	1500 = 1500rpm	N	
206Fh	0	P1-11	Boost Voltage	RW	S16	-1 = Auto 0 = Disabled 1 = 0.1%	N	
2070h	0	P1-12	Control Mode	RW	U16		N	
2071h	0	P1-13	I/O Configuration	RW	U16		N	...
2072h	0	P1-14	Parameter Access	RW	U16		N	2000h + 114d

Manufacturer Specific Profile Area – Parameter Group 2								
Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark
20C9h	0	P2-01	Preset speed 1	RW	U16	3000 = 50.0Hz	N	2000h + 201d
20CAh	0	P2-02	Preset speed 2	RW	U16	3000 = 50.0Hz	N	...
20CBh	0	P2-03	Preset speed 3	RW	U16	3000 = 50.0Hz	N	
20CCh	0	P2-04	Preset speed 4	RW	U16	3000 = 50.0Hz	N	
20CDh	0	P2-05	Preset speed 5	RW	U16	3000 = 50.0Hz	N	
20CEh	0	P2-06	Preset speed 6	RW	U16	3000 = 50.0Hz	N	
20CFh	0	P2-07	Preset speed 7	RW	U16	3000 = 50.0Hz	N	
20D0h	0	P2-08	Preset speed 8	RW	U16	3000 = 50.0Hz	N	
20D1h	0	P2-09	Skip frequency centre point	RW	U16	3000 = 50.0Hz	N	
20D2h	0	P2-10	Skip frequency band	RW	U16	3000 = 50.0Hz	N	
20D3h	0	P2-11	Analog output 1 function select	RW	U16		N	
20D4h	0	P2-12	Analog output 1 format	RW	U16		N	
20D5h	0	P2-13	Analog output 2 function select	RW	U16		N	
20D6h	0	P2-14	Analog output 2 format	RW	U16		N	
20D7h	0	P2-15	User relay 1 output function select	RW	U16		N	
20D8h	0	P2-16	User relay 1 upper limit	RW	U16	1 = 0.1%	N	
20D9h	0	P2-17	User relay 1 lower limit	RW	U16	1 = 0.1%	N	
20DAh	0	P2-18	User relay 2 output function select	RW	U16		N	

Manufacturer Specific Profile Area – Parameter Group 2								
Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark
20DBh	0	P2-19	User relay 2 upper limit	RW	U16	1 = 0.1%	N	
20DCh	0	P2-20	User relay 2 lower limit	RW	U16	1 = 0.1%	N	
20DDh	0	P2-21	Display scaling factor	RW	U16	1 = 0.001	N	
20DEh	0	P2-22	Display scaling source	RW	U16		N	
20DFh	0	P2-23	Zero Speed holding time	RW	U16	1 = 0.1	N	
20E0h	0	P2-24	Effective switching frequency	RW	U16	S2...S3 1=0.01s S2...S3 1=0.1s	N	
20E1h	0	P2-25	Fast deceleration ramp time	RW	U16	1	N	
20E2h	0	P2-26	Spin start enable	RW	WORD	1 = 0.01	N	
20E3h	0	P2-27	Standby mode	RW	U16		N	
20E4h	0	P2-28	Slave speed scaling control	RW	U16	1 = 0.1	N	
20E5h	0	P2-29	Slave Speed scaling factor	RW	S16		N	
20E6h	0	P2-30	Analog input 1 format	RW	U16	1 = 0.1	N	
20E7h	0	P2-31	Analog input 1 scaling	RW	U16	1 = 0.1	N	
20E8h	0	P2-32	Analog input 1 offset	RW	S16		N	
20E9h	0	P2-33	Analog input 2 format	RW	U16	1 = 0.1	N	
20EAh	0	P2-34	Analog input 2 scaling	RW	U16	1 = 0.1	N	
20EBh	0	P2-35	Analog input 2 offset	RW	S16		N	
20ECh	0	P2-36	Start mode select	RW	U16		N	

Manufacturer Specific Profile Area – Parameter Group 2

Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark
20EDh	0	P2-37	Keypad restart speed	RW	U16		N	
20EEh	0	P2-38	Mains loss stop control	RW	U16		N	
20EFh	0	P2-39	Parameter Lock	RW	WORD		N	
20F0h	0	P2-40	Extended parameter access code definition	RW	U16		N	2000h + 240d

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Manufacturer Specific Profile Area – Parameter Group 3

Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark
212Dh	0	P3-01	User PID Proportional Gain	RW	U16	1 = 0.1	N	2000h + 301d
212Eh	0	P3-02	User PID Integral time constant	RW	U16	1 = 0.1	N	...
212Fh	0	P3-03	User PID Differential time constant	RW	U16	1 = 0.01	N	
2130h	0	P3-04	User PID operating mode	RW	WORD		N	
2131h	0	P3-05	User PID reference select	RW	U16	1 = 1	N	
2132h	0	P3-06	User PID digital reference	RW	U16	1 = 0.1%	N	
2133h	0	P3-07	User PID controller output high limit	RW	U16	1 = 0.1%	N	
2134h	0	P3-08	User PID controller output low limit	RW	U16	1 = 0.1%	N	
2135h	0	P3-09	User PID output control	RW	U16		N	

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Manufacturer Specific Profile Area – Parameter Group 4

Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark
219Ah	0	P4-10	V/F characteristic adjustment frequency	RW	U16	1 = 0.1%	N	
219Bh	0	P4-11	V/F characteristic adjustment voltage	RW	S16	1 = 0.1%	N	

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Manufacturer Specific Profile Area – Parameter Group 5

Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark
21F5h	0	P5-01	Fieldbus drive address	RW	U16	1 =1	N	2000h + 501d
21F6h	0	P5-02	CANbus baudrate	RW	WORD	0 = 125kbps 1 = 250kbps	N	...
21F7h	0	P5-03	Modbus baudrate	RW	WORD	0 = 9.6kbps 1 = 19.2kbps	N	
21F8h	0	P5-04	Modbus data format	RW	WORD	0 = N-1 1 = N-2	N	
21F9h	0	P5-05	Comms loss timeout	RW	U16	1 = 0.1s	N	
21FAh	0	P5-06	Communications loss action	RW	WORD		N	
21FBh	0	P5-07	Fieldbus ramp control	RW	WORD		N	
21FCh	0	P5-08	Fieldbus PDO 4 Select	RW	WORD		N	
2200h	0	P5-12	Fieldbus PDO 3 Select	RW	WORD		N	
2201h	0	P5-13	Fieldbus PDI 4 Select	RW	WORD		N	
2202h	0	P5-14	Fieldbus PDI 3 Select	RW	WORD		N	

Manufacturer Specific Profile Area – Parameter Group 6								
Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark
2259h	0	P6-01	Firmware Upgrade enable	RW	U16		N	2000h + 601d
215Ah	0	P6-02	Auto thermal management	RW	WORD		N	...
215Bh	0	P6-03	Auto-reset delay time	RW	U16		N	
215Ch	0	P6-04	User relay hysteresis band	RW	U16	1 = 0.1%	N	
215Dh	0	P6-05	Encoder feedback enable	RW	WORD		N	
215Eh	0	P6-06	Encoder PPR	RW	U16		N	
215Fh	0	P6-07	Speed error trip level	RW	U16	1 = 0.1%	N	
2160h	0	P6-08	Max speed ref frequency	RW	U16		N	
2161h	0	P6-09	Speed Droop Control	RW	U16	1 = 0.1%	N	
2162h	0	P6-10	Enable PLC operation	RW	WORD		N	
2163h	0	P6-11	Speed hold time on enable	RW	U16	1 = 0.1s	N	
2164h	0	P6-12	Speed hold time on disable	RW	U16	1 = 0.1s	N	
2165h	0	P6-13	Hoist mode brake release delay	RW	U16	1 = 0.1s	N	
2166h	0	P6-14	Hoist mode brake apply delay	RW	U16	1 = 0.1s	N	
2167h	0	P6-15	Torque threshold for hoist brake release	RW	U16	1 = 0.1%	N	
2168h	0	P6-16	Torque threshold timeout	RW	U16	1 = 0.1s	N	
2169h	0	P6-17	Max Torque limit timeout	RW	U16	1 = 0.1s	N	
216Ah	0	P6-18	DC injection braking voltage	RW	U16	0 = Auto 1 = 0.1%	N	
216Bh	0	P6-19	Brake resistor value	RW	U16	1 = 1	N	
216Ch	0	P6-20	Brake resistor power	RW	U16	1 = 0.01kw	N	

Manufacturer Specific Profile Area – Parameter Group 6

Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark
216Dh	0	P6-21	Brake chopper UT duty cycle	RW	U16	1 = 0.1%	N	
216Eh	0	P6-22	Reset cooling fan run-time	RW	WORD		N	
216Fh	0	P6-23	Reset kWh meter	RW	WORD		N	
2170h	0	P6-24	Service time interval	RW	U16	1=1	N	
2171h	0	P6-25	Reset service indicator	RW	WORD	1=1	N	
2172h	0	P6-26	Analog output 1 scaling	RW	U16	1 = 0.1	N	
2173h	0	P6-27	Analog output 1 offset	RW	S16	1 = 0.1%	N	
2174h	0	P6-28	P0-80 display value index	RW	U16		N	
2175h	0	P6-29	Save User Parameters as default	RW	WORD		N	
2276h	0	P6-30	Level 3 access code	RW	U16		N	2000h + 630d

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Manufacturer Specific Profile Area – Parameter Group 7

Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark
22BDh	0	P7-01	Motor Stator resistance	RW	U16	1 = 0.001ohm	N	2000h + 701d
22Beh	0	P7-02	Motor Rotor resistance	RW	U16	1 = 0.001ohm	N	...
22BFh	0	P7-03	Motor stator inductance	RW	U16	1 = 0.0001H	N	
22C0h	0	P7-04	Motor Magnetising Current	RW	U16	1 = 0.1A	N	
22C1h	0	P7-05	Motor Leakage Coefficient	RW	U16	1 = 0.001	N	
22C2h	0	P7-06	Motor Stator inductance (PM only)	RW	U16	1 = 0.0001H	N	

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Manufacturer Specific Profile Area – Parameter Group 8									
Index	Sub Index	Parameter	Function	Access	Type	Scaling	PDO Map	Remark	
2325h	0	P8-05	Accel Ramp 4	RW	U16	S2...S3 1 = 0.01s S4...S7 1 = 0.1s	N		
2326h	0	P8-06	Speed boundary - Accel ramp 3 → 4	RW	U16	3000 = 50.0Hz	N		
2327h	0	P8-07	Decel Ramp 4	RW	U16	S2...S3 1 = 0.01s S4...S7 1 = 0.1s	N		
2328h	0	P8-08	Speed boundary - Accel ramp 4 → 3	RW	U16	3000 = 50.0Hz	N		
2329h	0	P8-09	Decel Ramp 3	RW	U16	S2...S3 1 = 0.01s S4...S7 1 = 0.1s	N		
232Ah	0	P8-10	Speed boundary - Accel ramp 3 → 2	RW	U16	3000 = 50.0Hz	N		
232Bh	0	P8-11	Decel Ramp 2	RW	U16	S2...S3 1 = 0.01s S4...S7 1 = 0.1s	N		
232Ch	0	P8-12	Speed boundary - Accel ramp 2 → 1	RW	U16	3000 = 50.0Hz	N		
232Dh	0	P8-13	Ramp select by Preset Speed	RW	WORD		N		
232Eh	0			RW			N		
232Fh	0	P8-15		RW	-		N	2000h + 815d	

Drive error code information:

In the event of a trip, an error code is returned in the High Byte of the drive status word. The fault values correspond to the following table

Fault Code	No.	Description	Fault Code	No.	Description
no-Flt	00	No Fault	AtF-01	40	Measured motor stator resistance varies between phases

Fault Code	No.	Description	Fault Code	No.	Description
OI-b	01	Brake channel over current	AtF-02	41	Measured motor stator resistance is too large
OL-br	02	Brake resistor overload	AtF-03	42	Measured motor inductance is too low
O-I	03	Instantaneous over current	AtF-04	43	Measured motor inductance is too large
I.t-trp	04	Motor Thermal Overload (I2t)	AtF-05	44	Measured motor parameters are not convergent
SAFE-1	05	Safety input circuit error (Processor output)	AtF-06	45	Reserved
O-Volt	06	Over voltage on DC bus	AtF-07	46	Reserved
U-Volt	07	Under voltage on DC bus	AtF-08	47	Reserved
O-t	08	Heatsink over temperature	AtF-09	48	Reserved
U-t	09	Under temperature	AtF-10	49	Reserved
P-dEF	10	Factory Default parameters have been loaded	SC-F01	50	Modbus comms loss fault
E-trip	11	External trip	SC-F02	51	CANopen comms loss trip
SC-ObS	12	Optibus comms loss	SC-F03	52	Anybus module comms loss trip
FLt-dc	13	DC bus ripple too high	SC-F04	53	IO card comms loss trip
P-LOSS	14	Input phase loss trip	SC-F05	54	Reserved
h O-I	15	Instantaneous over current on drive output	SC-F06	55	Reserved
th-Flt	16	Faulty thermistor on heatsink	SC-F07	56	Reserved
dAtA-F	17	Internal memory fault (IO)	SC-F08	57	Reserved
4-20 F	18	4-20mA Signal Lost	SC-F09	58	Reserved
dAtA-E	19	Internal memory fault (DSP)	SC-F10	59	Reserved
U-dEF	20	User Default Parameters Loaded	OF-01	60	Internal link to option module loss
F-Ptc	21	Motor PTC thermistor trip	OF-02	61	Option module in exceptional condition
FAN-F	22	Cooling Fan Fault	OF-03	62	Reserved
O-hEAt	23	Environmental temperature too high	OF-04	63	Reserved
O-torq	24	Maximum torque limit trip / Over torque (HVAC)	OF-05	64	Reserved

Fault Code	No.	Description	Fault Code	No.	Description
U-torq	25	Output torque too low (hoist) / Under torque (HVAC)	OF-06	65	Reserved
Out-F	26	Drive output fault	OF-07	66	Reserved
Err-01	27	Reserved	OF-08	67	Reserved
Err-02	28	Reserved	OF-09	68	Reserved
SAFE-2	29	Safety input circuit error (Buffer output)	OF-10	69	Reserved
Enc-01	30	Encoder comms/data loss	PLC-01	70	Unsupported PLC function block
Enc-02	31	Encoder speed error	PLC-02	71	PLC program over size
Enc-03	32	Incorrect Encoder PPR count set in parameters	PLC-03	72	Divide by 0
Enc-04	33	Encoder Channel A Fault	PLC-04	73	Lower limit large than higher limit
Enc-05	34	Encoder Channel B Fault	PLC-05	74	Table function block index overflow
Enc-06	35	Encoder Channels A & B Fault	PLC-06	75	Reserved
Enc-07	36	RS485 data channel error (servo)	PLC-07	76	Reserved
Enc-08	37	IO comms loss (servo)	PLC-08	77	Reserved
Enc-09	38	Wrong type encoder (servo)	PLC-09	78	Reserved
Enc-10	39	KTY trip (servo)	PLC-10	79	Reserved