

PREMAPPED MESSAGES CONTENT

Message ID CAN	Dir.	rate [ms]	DLC	Signal Name	type	unit	min	max	offset	gain	byte n°	bit n°	OD Index	OD SubIndex	Description	Notes
0x300 + n (n = CAN node number) <i>Receive Process Data Object 2 (RxPDO2 - BCL)</i>	receive	adjustable by loop time determined by VCU (PLC) suggested value < 500ms	8	HMI Drive Battery Current Limit	u16	Amp	0	7000	0	1/10	0,1	0	4000h	00h	Resolution is 0,1A	See note 1)
				HMI Regenerative Battery Current Limit	u16	Amp	0	7000	0	1/10	2,3	16	4001h	00h	Resolution is 0,1A	See note 1)
				HMI Battery Discharge Indicator value	u16	%	0	1000	0	1/10	4,5	32	3844h	00h	Resolution is 0,1%	See note 1)
				<i>not used</i>	u8						6	48	3845h	00h		
				Roll Over Counter Rx PDO2	u8	#	0	255	0	1	7	56	382bh	00h	send a 8 bit roll over counter	This counter has to be increased by 1 at every message sent by VCU and reset when overflow 255
0x180 + n (n = CAN node number) <i>Transmit Process Data Object 1 (TxPDO1 - MS)</i>	transmit	adjustable by controllers	8	Actual Speed RPM	s16	r.p.m.	-32768	32767	0	1	0,1	0	3832h	00h		See note 1)
				Battery Current	s16	Amp	-32768	32767	0	1/10	2,3	16	383eh	00h	Resolution is 0,1A	See note 1)
				Roll Over Counter Tx PDO1	u8	#	0	255	0	1	4	32	3822h	00h		See note 2)
				Fault Code	u8	#	0	255	0	1	5	40	3840h	00h	See controller fault codes	
				Fault Subcode	u16	#	0	65535	0	1	6,7	48	3841h	00h	See controller sub fault codes	See note 1)
0x280 + n (n = CAN node number) <i>Transmit Process Data Object 2 (TxPDO2 - DS)</i>	transmit	adjustable by controllers	8	Motor current	s16	Amp	-32768	32767	0	1/10	0,1	0	382ch	00h	Resolution is 0,1A	See note 1)
				Drive Status Indicator	u8	#	0	255	0	1	2	16	3838h	00h	See Table 1	
				Speed limit indicator	u8	#	0	255	0	1	3	24	383bh	00h	See Table 2	
				Actual Torque %4096	s16	%	-4096	4096	0	100/4096	4,5	32	3834h	00h		See note 1)
				Torque limit indicator	u8	#	0	255	0	1	6	48	383ah	00h	See Table 3	
				Roll Over Counter Tx PDO2	u8	#	0	255	0	1	7	56	3823h	00h		See note 2)
0x380 + n (n = CAN node number) <i>Transmit Process Data Object 3 (TxPDO3 - CS)</i>	transmit	adjustable by controllers	8	Controller Temperature	u8	°C	0	255	-51	1	0	0	3837h	00h		
				Motor Temperature	u8	°C	0	255	-51	1	1	8	3836h	00h		
				Motor Limit Indicator	u8	#	0	255	0	1	2	16	3839h	00h	See Table 4	
				Roll Over Counter Tx PDO3	u8	#	0	255	0	1	3	24	3824h	00h		See note 2)
				Battery Voltage	u16	V	0	2050	0	1/10	4,5	32	383fh	00h	Resolution is 0,1V	See note 1)
				Digital outputs status	bool	#	0	1	0	1	6	48	3819h	00h		
				Digital outputs status (D01 bit 0)	bool	#	0	1	0	1	6	48				
				Digital outputs status (D02 bit 1)	bool	#	0	1	0	1	6	49				
				Digital outputs status (D03 bit 2)	bool	#	0	1	0	1	6	50				
				Digital outputs status (D04 bit 3)	bool	#	0	1	0	1	6	51				
0x480 + n (n = CAN node number) <i>Transmit Process Data Object 4 (TxPDO4 - IS)</i>	transmit	adjustable by controllers	8	Battery Dischrge Indicator value	u8	%	0	100	0	1	7	56	3843h	00h	1 % resolution	
				Analogue input 1	u16	%	0	4096	0	100/4096	0,1	0	3803h	00h		See note 1)
				Analogue input 2	u16	%	0	4096	0	100/4096	2,3	16	3804h	00h		See note 1)
				Analogue input 3	see note3)	%	see note3)	4096	0	100/4096	4,5	32	3805h	00h		See note 1)
				Digital Inputs Status	u8		0	255	0	1	6	48	3807h	00h		
				Bit 0 Input1 Forward direction (<i>Pump Pot / Switch 1</i>)	bool		0	1	0	1	6	48			(in italics for pump application)	
				Bit 1 Input2 Reverse direction (<i>Pump Switch 2</i>)	bool		0	1	0	1	6	49			(in italics for pump application)	
				Bit 2 Input3 FootSwitch (<i>Pump Switch 3</i>)	bool		0	1	0	1	6	50			(in italics for pump application)	
				Bit 3 Input4 Seat/Enable (<i>Pump Switch 4</i>)	bool		0	1	0	1	6	51			(in italics for pump application)	
				Bit 4 input5 Speed Lim.1 (<i>Pump Switch 5</i>)	bool		0	1	0	1	6	52			(in italics for pump application)	
				Bit 5 Input6 Speed Lim. 2 (<i>Pump Switch 6</i>)	bool		0	1	0	1	6	53			(in italics for pump application)	
				Bit 6 Input7 Handbrake / Speed Lim. 3 (<i>Pump Inhibit</i>)	bool		0	1	0	1	6	54			(in italics for pump application)	
				<i>not used</i>	bool		0	1	0	1	6	55			For future use.	
				Roll Over Counter Tx PDO4	u8		0	255	0	0	7	56	3825h	00h		See note 2)

Note 1: data protocol is using Intel Data Format for word (16 bits data). For example in TPDO1 Motor Status message, signal "Actual Speed in RPM", byte 0 is the low byte of "Actual Speed RpM" value and byte 1 is the High byte of "Actual Speed RPM" value.

Note 2: Each TxPDO has its own u8 roll over counter. Customer VCU/PLC can use it for safety check of TX PDO communication

Note 3: AD3 assumes different meanings according to parameter "9.6 Control Via CAN type "CANctTyp"" BE AWARE if it is used as Steer Pot the format is s16 and minimum value -4096 (-100%), if it is used as Speed Limit format is u16 and minimum is 0.

RxPDO1 PREMAPPED CONTENT ACCORDING TO DIFFERENT CONTROL MODES

Remote Input Mode, Sigma2N Traction & Pump

Message ID CAN	Dir.	rate [ms]	DLC	Signal Name	type	unit	min	max	offset	gain	byte n°	bit n°	OD Index	OD SubIndex	Description	Notes
0x200 + n (n = CAN node number) Receive Process Data Object 1 (RxPDO1 - DC)	recieve	adjustable by loop time determined by VCU	8	HMI Analog Input 1 - Accel	u16	%	0	4096	0	100/4096	0,1	0	3800h	00h		See note 1)
				HMI Analog Input 2 - Brake	u16	%	0	4096	0	100/4096	2,3	16	3801h	00h		See note 1)
				HMI Analog Input 3 - Steer	see note2)	%	see note2)	4096	0	100/4096	4,5	32	3802h	00h		See note 1)
				HMI Digital Inputs Status	u8		0	255	0	1	6	48	3806h	00h		
				Bit 0 Input1 Forward direction (Pump Pot / Switch 1)	bool		0	1	0	1	6	48			(in italics for pump application)	
				Bit 1 Input2 Reverse direction (Pump Switch 2)	bool		0	1	0	1	6	49			(in italics for pump application)	
				Bit 2 Input3 FootSwitch (Pump Switch 3)	bool		0	1	0	1	6	50			(in italics for pump application)	
				Bit 3 Input4 Seat/Enable (Pump Switch 4)	bool		0	1	0	1	6	51			(in italics for pump application)	
				Bit 4 input5 Speed Lim.1 (Pump Switch 5)	bool		0	1	0	1	6	52			(in italics for pump application)	
				Bit 5 Input6 Speed Lim. 2 (Pump Switch 6)	bool		0	1	0	1	6	53			(in italics for pump application)	
				Bit 6 Input7 Handbrake / Speed Lim. 3 (Pump Inhibit)	bool		0	1	0	1	6	54			(in italics for pump application)	
				not used	bool		0	1	0	1	6	55			For future use.	
				Roll Over Counter Rx PDO1	u8		0	255	0	0	7	56	382ah	00h	send a roll over counter	This counter has to be increased by 1 at every VCU loop and reset when overflow at 255

Remote Input Mode, SigmaLITE Traction

Message ID CAN	Dir.	rate [ms]	DLC	Signal Name	type	unit	min	max	offset	gain	byte n°	bit n°	OD Index	OD SubIndex	Description	Notes
0x200 + n (n = CAN node number) Receive Process Data Object 1 (RxPDO1 - DC)	recieve	adjustable by loop time determined by VCU	8	Accelerator	u16	%	0	4096	0	100/4096	0,1	0	3875h	00h		See note 1)
				Footbrake	u16	%	0	4096	0	100/4096	2,3	16	3876h	00h		See note 1)
				Steerpot OR Speed limit OR Torque limit	see note 7)	%	see note 7)	4096	0	100/4096	4,5	32	3877h or 3848h or	00h		See note 1)
				HMI preset Byte #1	u8		0	255	0	1	6	48	387Ah	00h		
				Forward	bool		0	1	0	1	6	48				
				Reverse	bool		0	1	0	1	6	49				
				Footswitch	bool		0	1	0	1	6	50				
				Seatswitch/interlock	bool		0	1	0	1	6	51				
				Speed #1	bool		0	1	0	1	6	52				
				Speed #2	bool		0	1	0	1	6	53				
				Handbrake	bool		0	1	0	1	6	54				
				not used	bool		0	1	0	1	6	55				
				Roll Over Counter Rx PDO1	u8		0	255	0	0	7	56	382ah	00h	send a roll over counter	This counter has to be increased by 1 at every VCU loop and reset when overflow at 255

Remote Input Mode, SigmaLITE Pump

Message ID CAN	Dir.	rate [ms]	DLC	Signal Name	type	unit	min	max	offset	gain	byte n°	bit n°	OD Index	OD SubIndex	Description	Notes
0x200 + n (n = CAN node number) Receive Process Data Object 1 (RxPDO1 - DC)	recieve	adjustable by loop time determined by VCU	8	Speed #1 accelerator	u16	%	0	4096	0	100/4096	0,1	0	3875h	00h		See note 1)
				Speed #2 accelerator	u16	%	0	4096	0	100/4096	2,3	16	388Ah	00h		See note 1)
				not used							4,5	32				
				HMI preset Byte #1	u8		0	255	0	1	6	48	387Ah	00h		
				Speed #1 activation	bool		0	1	0	1	6	48				
				Speed #2 activation	bool		0	1	0	1	6	49				
				Speed #3 activation	bool		0	1	0	1	6	50				
				Speed #4 activation	bool		0	1	0	1	6	51				
				Speed #5 activation	bool		0	1	0	1	6	52				
				Powersteer activation	bool		0	1	0	1	6	53				
				Pump inhibit	bool		0	1	0	1	6	54				
				not used	bool		0	1	0	1	6	55				
				Roll Over Counter Rx PDO1	u8		0	255	0	0	7	56	382ah	00h	send a roll over counter	This counter has to be increased by 1 at every VCU loop and reset when overflow at 255

Setpoint Mode, traction speed profile

Message ID CAN standard	Dir.	rate [ms]	DLC	Signal Name	type	unit	min	max	offset	gain	byte n°	bit n°	OD Index	OD SubIndex	Description	Notes
0x200 + n (n = CAN node number) Receive Process Data Object 1 (RxPDO1 - DC)	recieve	adjustable by loop time determined by VCU	8	Speed Setpoint RPM	s16	r.p.m.	-32768	32767	0	1	0,1	0	3833h	00h		See note 1)
				not used							2	16	3845h	00h		
				not used							3	24	3845h	00h		
				Roll Over Counter Rx PDO1	u8	#	0	255	0	1	4	32	382ah	00h	send a roll over counter	
				HMI Torque Limit %4096	u16	%	0	4096	0	100/4096	5,6	40	3847h	00h	Active only if selected in CAN menu	See note 1) See note3) See note4)
				not used								7	56	3845h	00h	

Setpoint mode, traction torque profile

Message ID CAN standard	Dir.	rate [ms]	DLC	Signal Name	type	unit	min	max	offset	gain	byte n°	bit n°	OD Index	OD SubIndex	Description	Notes
0x200 + n (n = CAN node number) Receive Process Data Object 1 (RxPDO1 - DC)	recieve	adjustable by loop time determined by VCU	8	Torque Setpoint %4096	s16	%	-4096	4096	0	100/4096	0,1	0	3835h	00h		See note 1)
				not used						2	16	3845h	00h			
				not used						3	24	3845h	00h			
				Roll Over Counter Rx PDO1	u8	#	0	255	0	1	4	32	382ah	00h	send a roll over counter	
				HMI Speed Limit RPM	u16	r.p.m.	0	65535	0	1	5,6	40	3846h	00h	Active only if selected in CAN menu	See note 1) See note3) See note5)
				not used							7	56	3845h	00h		

Setpoint Mode, pump speed profile

Message ID CAN standard	Dir.		rate [ms]	DLC	Signal Name		type	unit	min	max	offset	gain	byte n°	bit n°	OD Index	OD SubIndex	Description	Notes	
0x200 + n (n = CAN node number) Receive Process Data Object 1 (RxPDO1 - DC)	recieve		adjustable by loop time determined by VCU	8	Speed Setpoint RPM		s16	r.p.m.	0	32767	0		1	0,1	0	3833h	00h		See note 1) See note 6)
					not used								2	16	3845h	00h			
					not used									3	24	3845h	00h		
					Roll Over Counter Rx PDO1		u8	#	0	255	0		1	4	32	382ah	00h	send a roll over counter	
					not used									5	40	3845h	00h		
					not used									6	48	3845h	00h		
					not used									7	56	3845h	00h		

- Note 1: data protocol is using Intel Data Format for word (16 bits data). For example in TPDO1 Motor Status message Motor Speed in Rpm byte 0 is the low byte of "Motor Speed" value and byte 1 is the High byte of "Motor Speed" value.
- Note 2: AD3 assumes different meanings according to parameter "9.6 Control Via CAN type "CANCTyp"" BE AWARE if it is used as Steer Pot the format is s16 and minimum value -4096 (-100%), if it is used as Speed Limit format is u16 and minimum is 0.
- Note 3: Speed and Torque Limit in Setpoint mode are active, respectively, only in Torque and Speed Control mode and anyway only if they are configured through parameter "9.6 Control Via CAN type "CANCTyp""
- Note 4: If Torque limit sent greater than 799% (i.e. #32767) it will be cut to 0%
- Note 5: If Speed limit sent greater than 32767 rpm it will be cut to 0
- Note 6) Value <0 will be cut to 0
- Note 7) The content of these 2 bytes depends on "M7.2-2 RxPDO premapped configuration"

GENERIC CAN OPEN MESSAGES CONTENT

Message ID CAN	Dir.	rate [ms]	DLC	Signal Name	type	unit	min	max	offset	gain	byte n°	bit n°	OD Index	OD SubIndex	Description	Notes
0x600 + n (n = CAN node number) Receive Service Data Object (RxSDO)	receive	determined by VCU	8	RxSDO control field	u8	#	0	255	0	1	0	0				
				Data size indicated	bool		0	1	0	1	0	0				Set to 1 if data size is indicated
				Expedite transfer info	bool		0	1	0	1	0	1				Set to 1 if expedite transfer
				Data size	2x bool		0	3	0	1	0	2,3				Number of empty bytes from 4 to 7
				Reserved	bool		0	0	0	1	0	4				Keep to 0
				Command specifier	3x bool		0	7	0	1	0	5,6,7			See Table 5	
				Target index	u16	#	0	0xFFFF	0	1	1,2	8				
				Target subindex	u8	#	0	255	0	1	3	24				
				SDO content	u32	#	0		0	1	4,5,6,7	32				
0x580 + n (n = CAN node number) Transmit Service Data Object (TxSDO)	transmit	responds as soon as it receives RxSDO	8	TxSDO control field	u8	#	0	255	0	1	0	0				
				Data size indicated	bool		0	1	0	1	0	0				Set to 1 if data size is indicated
				Expedite transfer info	bool		0	1	0	1	0	1				Set to 1 if expedite transfer
				Data size	2x bool		0	3	0	1	0	2,3				Number of empty bytes from 4 to 7
				Reserved	bool		0	0	0	1	0	4				Keep to 0
				Command specifier	3x bool		0	7	0	1	0	5,6,7			See Table 6	
				Target index	u16	#	0	0xFFFF	0	1	1,2	8				
				Target subindex	u8	#	0	255	0	1	3	24				
				SDO content	u32	#	0		0	1	4,5,6,7	32				
0x700 + n (n = CAN node number) Heartbeat (HB)	transmit	adjustable by controllers	1	Node state	u8	#	0	255	0	1	0	0			See Table 7	
0x000 Network Management (NMT)	receive	determined by VCU	2	Operation required	u8	#	0	255	0	1	0	0			See Table 8	
				Target node	u8	#	0	127	0	1	1	8				

TABLE 5

CS	Meaning
0	Download segment request
1	Download initiate request
2	Upload initiate request
3	Upload segment request

TABLE 6

CS	Meaning
0	Upload segment response
1	Download segment response
2	Upload initiate response
3	Download initiate response

TABLE 7

Value	Node status
0x00	BootUp
0x04	Stopped
0x05	Operational
0x7F	Preoperational

TABLE 8

Value	Required operation
0x01	Go to operational
0x02	Go to stopped
0x80	Go to pre-operational
0x81	Reset node

TABLES 1 TO 4

Table 1	Drive status indicator
0	No configuration
1	Waiting for hardware ready
2	Neutral & not pulsing
3	Fordward drive
4	Reverse drive
5	Direction braking
6	Neutral braking
7	Foot braking
8	Hill hold
9	Forward restraint hill hold
10	Reverse restraint hill hold

Table 2	Speed limit indicator
0	No limitation
1	Motor speed
2	Speed limit forward or reverse
3	Speed 1 limit
4	Speed 2 limit
5	Speed 3 limit
6	Speed 4 limit
7	Speed 5 limit
8	Speed 6 limit
9	Inching speed limit
10	BDI speed limit
11	controller temperature too high limit
12	hand brake limit
13	Speed Limit Via Can
14	Steer pot limit
15	Other speed limit
16	Analogue speed limit
17	Low voltage speed limit
18	High controller temperature speed limit
19	High motor temperature speed limit
20	Other motor speed limit
21	Dual motor fail speed limit
22	Steerpot bell-shaped limit

Table 3	Torque limit indicator
0	No limitation
1	Controller temperature
2	Motor temperature
3	Performance table current limit
4	Timed current limit
5	I2t current limit step 1
6	I2t current limit step 2
7	I2t current limit step 3
8	High voltage limit
9	Low voltage limit
10	hand brake limit
11	advanced mode SPD1 mode
12	advanced mode SPD2 mode
13	Battery Max. Current Limit
14	Battery Regen Current Limit
15	Other torque limit
16	Torque limiting to hold speed limit
17	No torque during braking limiting
18	Restraint Hill hold torque limit
19	Both Advanced mode limit & AI torque limit
20	AI torque limit
21	Trq limit via CAN
22	Other motor drive torque limit
23	Other motor brake torque limit
24	Generator torque limit

Table 4	Motor limit indicator
0	No limitation
1	Torque limit
2	Speed limit
3	No able to hold torque
4	Not able to hold speed
5	Not able to hold flux
6	Not able to hold flux current
7	Not able to hold circle limitation
8	Not able to hold hexagon limit
9	Circle limitation
10	no able to positioning