DMC5
Documentation of
Errors and Warnings

Version 2.0

1   Document History

Version	Date	Name	Comment
1.0	09.06.2010	Peter Oehry	New document (SW-FW-DMC5-01-01-17)
1.1	07.07.2010	Peter Oehry	Update to SW-FW-DMC5-01-01-18
1.2	15.09.2010	Peter Oehry	Update to SW-FW-DMC5-02-01-01
1.3	07.02.2011	Peter Oehry	Update to SW-FW-DMC5-02-01-02 - E_IntSupply - OscLim Active
1.3a	10.02.2011	Peter Oehry	Add condition for KL15 active on: - E_DcCurr - E_IntSupply - E_AC_Overcurr Correction of typos.
1.3b	20.04.2011	Peter Oehry	Correct typo on E_ SpeedSensor. Event Log Data for "Encoder Error Counter" is 0x1000 instead of 0x8000
2.0	14.12.2011	Peter Oehry	Change document version to 2.x Correct typos in: - Error 0x00000080 (EventLog) - Error 0x00400000 (EventLog)

2   Introduction

This document describes the different errors and warning available in the DMC5. It will also give a hint to find the reason for the error/warning condition.

To understand this document you should be familiar with the basics of configuring and operating the DMC5.

3 Table of contents

4 Error Bitmap

All errors are characterised by the following table.

Description	Description of the error. (What is it for?)
Precondition	What condition has to be prior so that the error will be checked? For example if the DMC has to be running for a certain error to be active.
Condition	The condition that will be checked to detect the error condition.
Delay	The time the error condition is true before setting the error flag.
Monitor Type	The type of the error monitoring. It can be Start-Up or Cyclic for example.
Reset condition	Condition to clear the error.
Diagnostic	Further information to analyse the error condition.
Event Log	Information on the event log entry for the specified error.

4.1 E_ SpdSensSupply (0x00000001)

Description	Check the feedback signal of the voltage regulator which drives the external speed sensor.
Precondition	HV Ready
Condition	External HW Signals is LOW
Delay	-
Monitor Type	Cyclic with 1500Hz
Reset condition	Clear Error
Diagnostic	The error will be set if the current of the voltage regulator is too high. There might be a short circuit on the external circuit. In rare cases the error can be set if the internal supply falls down very quickly.
Event Log	ERROR: Speed Sensor Supply failed no additional data

4.2 E_ SpeedSensor (0x00000002)

Description	Checks the plausibility of the speed sensor signal.
Precondition	DMC_State >= DMC_READY
Condition	Two condition with a OR dependency • Encoder Error Counter counts too many errors in a specified time. • Position Error Counter counts too many errors in a specified time.
Delay	-
Monitor Type	Cyclic with 1500Hz
Reset condition	Clear Error
Diagnostic	See text coming below this table.
Event Log	ERROR: Speed Sensor got invalid data Data: • 0x1000 | ("Encoder Error Counter" & 0x0FFF) if it was the first condition • 0x4000 | ("Position Error Counter" & 0x0FFF) if it was the second condition

Encoder Errors are detected, when the change of the position signal is physically not possible. Such a position change is ignored by the DMC and the "Encoder Error counter RT" will be incremented. The absolute position signal is sampled periodically to supervise the speed signal. This supervisor calculates the expected tick difference for the last period and increments a second Speed Counter. This speed counter is compared with the real Speed Counter. The difference is stored in the "Encoder lost pos Counts" variable. The position supervisor system has the following variables accessible with the PARAM tool. All Error counters should be zero all the time.

Parameter	Description
[26:8] Rotor Position	The actual read position from position sensor. The counts from 0 .. 47 for one electrical revolution.
[26:9] Speed Counter	The value from the quadrature counter (speed counter). It has 96 ticks per electrical revolution.
[26:10] Encoder Error Counter RT	The realtime value of the "Encoder Error counter" if this value is > 5 the error will be set.
[26:11] Encoder Error Counter	Cumulated counter that counts all detected invalid position transitions. The position sensor works bad if this counter counts regularly.
[26:12] Encoder lost pos Counts	We calculate a Speed Counter value out of the absolute position signal. This Parameter represents the difference between these two counters. A difference of up to +/- 10 ticks is normal. If the value counts away the speed signal might be bad.
[26:13] Position Error Counter	Encoder lost pos Counts dynamically reduced by the amount of accepted differences. If this Value is > 20 the error will be set.

4.3 E_ CanLimMsgInvalid (0x00000004)

Description	DMC_LIM Message has invalid Data or DLC
Precondition	Reception of DMC_LIM Message
Condition	DLC is wrong or sent data are invalid or out of specified range.
Delay	-
Monitor Type	On reception of CAN Message
Reset condition	Clear Error
Diagnostic	Check the CAN data in respect to our CAN Specification.
Event Log	ERROR: Message has invalid data (ID) Data: The ID of the CAN Message

4.4   E_ CanCtrlMsgInvalid (0x00000008)

Description	DMC_CTRL Message has invalid Data or DLC
Precondition	Reception of DMC_CTRL Message
Condition	DLC is wrong or sent data are invalid or out of specified range.
Delay	-
Monitor Type	On reception of CAN Message
Reset condition	Clear Error
Diagnostic	Check the CAN data in respect to our CAN Specification.
Event Log	ERROR: Message has invalid data (ID) Data: The ID of the CAN Message

4.5   E_ CanLimMsgLost (0x00000010)

Description	Timeout of DMC_LIM CAN Message
Precondition	DMC_State >= DMC_INIT Message DMC_LIM is active (ID > 0x000) Timeout for DMC_LIM is active (Timeout time > 0)
Condition	If state = DMC_INIT: No reception of DMC_LIM message after 5 sec. If state > DMC_INIT: No reception of DMC_LIM message for specified timeout time.
Delay	-
Monitor Type	Cyclic (1500 Hz)
Reset condition	Clear Error
Diagnostic	Check CAN traffic and the configuration of the ID's
Event Log	ERROR: Message Lost (ID) Data: The ID of the CAN Message

4.6   E_ SkyVlt (0x00000020)

Description	Overvoltage Sky converter or HW Signal of DC overvoltage. The Sky converter is a part of the internal supply of the DMC.
Precondition	(DMC_State = DMC_STANDBY) OR (DMC_State >= DMC_READY)
Condition	If State = DMC_STANDBY: Latched HW Signal can not be cleared within 20ms If State >= DMC_READY: HW Signal detected.
Delay	The HW Signal switches off the power stage immediately.
Monitor Type	Cyclic (1500Hz when State >= READY) (1500Hz when State = STANDBY)
Reset condition	Clear Error
Diagnostic	The parameter [22:11] Shift Register Data contains information about the exact reason of the error. Bit 0x0800: DC Overvoltage hardware Signal Bit 0x0400: Sky Overvoltage hardware Signal Bit 0x0200: Driver logic Lowside not released Bit 0x0100: Driver logic highside not released Both errors can be a reaction to a short circuit condition. So it is not unusual that this error and a hardware short circuit is set simultaneously.
Event Log	ERROR: Hardware shutdown Data: • 0x0004 – Error was set during STANDBY. • 0x1000 – Error was set when state was >= READY ERROR: New HW error code (data) Shift register data that are able to identify the HW error. (See also Diagnostic above)

4.7   E_ VltMeas (0x00000040)

Description	Detects difference of redundant voltage measurement.
Precondition	-
Condition	Difference of both voltage measurements is greater than 20V abs(UBatt – Ubatt_Red) >20V
Delay	-
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear error
Diagnostic	Check Parameters [24:1] "U Batt" and [24:2] "U Batt Redundant" to decide which measurement is wrong.
Event Log	ERROR: UBatt Voltage redundancy failed Data: Voltage difference in 1/20V

4.8 E_ ShortCircuit (0x00000080)

Description	Power stage hardware signal to detect short circuit.
Precondition	(DMC_State = DMC_STANDBY) OR (DMC_State >= DMC_READY)
Condition	If State = DMC_STANDBY: Latched HW Signal can not be cleared within 20ms If State >= DMC_READY: HW Signal detected.
Delay	The HW Signal switches off the power stage immediately.
Monitor Type	Cyclic (1500Hz when State >= READY) (1500Hz when State = STANDBY)
Reset condition	Clear Error
Diagnostic	The parameter [22:11] Shift Register Data contains information about the exact reason of the error. Bit 0x0001: Phase R – main switch low side Bit 0x0002: Phase R – pre switch high side Bit 0x0004: Phase R – main switch high side Bit 0x0008: Phase R – pre switch low side Bit 0x0010: Phase S – main switch low side Bit 0x0020: Phase S – pre switch high side Bit 0x0040: Phase S – main switch high side Bit 0x0080: Phase S – pre switch low side Bit 0x1000: Phase T – main switch low side Bit 0x2000: Phase T – pre switch high side Bit 0x4000: Phase T – main switch high side Bit 0x8000: Phase T – pre switch low side
Event Log	ERROR: Hardware short circuit detected Data: • 0x0004 – Error was set during STANDBY. • 0x2000 – Error was set when state was >= READY ERROR: New HW error code (data) Shift register data that are able to identify the HW error. (See also Diagnostic above)

4.9 E_ CanCtrlMsgLost (0x00000100)

Description	Timeout of DMC_CTRL CAN Message
Precondition	DMC_State >= DMC_INIT Message DMC_CTRL is active (ID > 0x000) Timeout for DMC_CTRL is active (Timeout time > 0)
Condition	If State = DMC_INIT: No reception of DMC_CTRL Message after 5 sec. If State > DMC_INIT: No reception of DMC_CTRL Message for specified Timeout time.
Delay	-
Monitor Type	Cyclic (1500 Hz)
Reset condition	Clear Error
Diagnostic	Check CAN traffic and the configuration of the ID's
Event Log	ERROR: Message Lost (ID) Data: The ID of the CAN Message

4.10 E_ TempDmc (0x00000200)

Description	Severe over temperature of inverter unit.
Precondition	-
Condition	When one of the following conditions is true: • TempPowerStage > TPowMax • TempPowerStage > 140°C • TempComTrafoNtc > TComTrafoMax • TempComTrafoNtc > 150°C • TempSys > 100° • Too many temperature sensors have invalid data
Delay	-
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear Error
Diagnostic	Check parameters in motor table and measured temperatures. The module temperatures can only be measured when HV Ready condition is given. Defect temperature Sensors can be detected by Parameter Temperature Error Bitmap [23:28]. See Temperature Sensor Warning for detailed code description.
Event Log	ERROR: Overtemperature(code) Data: 0x0001 over temperature PowerStage Data: 0x0002 over temperature Sys PCB Data: 0x0010 over temperature ComTrafoNtc ERROR: Temperature Sensor failed (code HighWord) ERROR: Temperature Sensor failed (code LowWord) Data: HighWord or LowWord Temperature Error Bitmap. See Temperature Sensor Warning for detailed code description. Event is set every time the status of the error bitmap changes.

4.11 E_ TempMot (0x00000400)

Description	Severe over temperature of motor. This can be the PTC signal or the measured temperature.
Precondition	-
Condition	When one of the following conditions is true. • TempMotor > TMotMax • PTC Signal active
Delay	None for TempMotor 4ms for PTC Signal
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear Error
Diagnostic	Check parameters in motor table and measured temperatures. Check cable to the motor.
Event Log	ERROR: Overtemperature(code) Data: 0x1000 over temperature TempMotor Data: 0x2000 PTC signal was active

4.12 E_ Speed (0x00000800)

Description	Overspeed detected
Precondition	-
Condition	(SpdAct > NmaxSevere) OR (SpcAct < NminSevere)
Delay	-
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear Error
Diagnostic	
Event Log	ERROR: Severe Overspeed Data: value of omega

4.13 E_ UV (0x00001000)

Description	DC Undervoltage
Precondition	DMC_State >= DMC_READY
Condition	UBatt < 120V
Delay	-
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear Error
Diagnostic	Check DC connection and DC source
Event Log	ERROR: Undervoltage Software Level Data: actual battery voltage in 1/20V

4.14 E_ OV (0x00002000)

Description	DC voltage was too high. The detection of a DC over voltage is critical and has to bee fast.
Precondition	-
Condition	UBatt > 460V
Delay	-
Monitor Type	Cyclic (48kHz)
Reset condition	Clear Error
Diagnostic	Did the battery switch off?
Event Log	ERROR: Overvoltage Software Level Data: actual battery voltage in 1/20V

4.15 E_ DcCurr (0x00004000)

Description	DC Overcurrent
Precondition	-
Condition	((I DC > IdcMax + 20A) OR (I DC < IdcMin - 20A) AND (KL15=active))
Delay	4ms
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear Error
Diagnostic	Check IdcMax IdcMin Parameter
Event Log	ERROR: Overcurrent DC Data: actual dc current in 1/20A

4.16 E_ Init (0x00008000)

Description	Error during initialisation
Precondition	-
Condition	There are many conditions that are checked. See Event Log below.
Delay	-
Monitor Type	Start-Up
Reset condition	Error is not clearable. The reason has to be resolved and the DMC needs a restart.
Diagnostic	Check parameters Check motor table Most typical Errors: 0x0070: A new DMC is shipped with an invalid rotor offset to prevent unintentional behaviour caused by a completely wrong parameter. The right rotor offset that matches the connected motor has to be entered manually. 0x0080: If a motor table is downloaded to the DMC that does not know of the com trafo derating this init error is set. It might be necessary to update the table or to switch to parameter set 1 and enter valid derating parameters.
Event Log	ERROR: Initialisation (source of failure) 0x0001: Parameter [10:1] Motor Index is out of range 0x0002: Invalid identification of DMC parameter set 0x0003: Invalid version of DMC parameter set 0x0010: Invalid motor type of selected parameter set 0x0020: Parameter [10:23] fGu is invalid 0x0030: Parameter [10:24] fGi is invalid 0x0040: run request is set on startup (see E_CanComStartup) 0x0050: Motor Param data table has an invalid version. 0x0060: Parameter [01:16] Number of power modules is invalid. 0x0070: Parameter Rotor Offset [01:11] is invalid or not set. 0x0080: Comtrafo derating has invalid parameters. Parameter [10:34] or [10:35] (derating may not have zero values) **Errors in motor table** 0x0100: Version code of motor table not supported (VER_HI) 0x0200: Version code of motor table not supported (VER_LO) 0x0300: Invalid header in motor table 0x0400: Unsupported feature in motor table 0x0500: Invalid motor type of default motor parameter set 0x0600: Invalid CRC of default motor parameter set 0x0700: Invalid motor temperature sensor table 0x1000: Invalid HSM table information 0x2000: Invalid GSB table information 0x3000: Invalid LQ table information 0x4000: Invalid LD table information 0x5000: Invalid WMAT table information 0x6000: Invalid PMAT table information 0x7000: Invalid SCALE_TRQ in motor table

4.17 E_ AN_IN (0x00010000)

Description	A configured analog input potentiometer has detected an error condition
Precondition	-
Condition	Analog input voltage is higher than it is plausible for the configured potentiometer value.
Delay	-
Monitor Type	Cyclic (1500Hz)
Reset condition	Error is not cleareable
Diagnostic	Check the wiring and the configuration on the potentiometer.
Event Log	ERROR: Analog input failed (ErrorMask) 0x0001: Analog input 0 (not implemented) 0x0002: Analog input 1 (not implemented) 0x0004: Analog input 2 (not implemented) 0x0008: Analog input 3 (not implemented)

4.18 E_DriverSD (0x00400000)

Description	Driver Shutdown error. The error is set when the driver logic was not released. (Shutdown by EXT_AW or ISU)
Precondition	DMC_State > DMC_READY (or DMC_State = DMC_STANDBY)
Condition	@> DMC_READY: When hardware detected a shutdown of the driver @DMC_STANDBY: When driver not released and DMC_EnableRq=TRUE
Delay	The HW Signal switches off the power stage immediately.
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear Error
Diagnostic	Powerstage can be switched of by external hardware Signal EXT_AW1 / EXT_AW2 or by the ISU. The State of the signals can be monitored with the following signals: • DMC_W_DriverSD • DMC_I_ExtAw1 • DMC_I_ExtAw2 The parameter [22:11] Shift Register Data contains information about the exact reason of the error. Bit 0x0800: DC Overvoltage hardware Signal Bit 0x0400: Sky Overvoltage hardware Signal Bit 0x0200: Driver logic Lowside not released Bit 0x0100: Driver logic highside not released
Event Log	ERROR: Hardware shutdown 0x0008: Shutdown @DMC_STANDBY 0x1000: Shutdown @>DMC_READY ERROR: New HW error code (data) See diagnostic above for hardware code

4.19 E_ PowerMismatch (0x00800000)

Description	Plausibility Error between electrical and mechanical Power. This error is not implemented yet.
Precondition	-
Condition	-
Delay	-
Monitor Type	-
Reset condition	-
Diagnostic	-
Event Log	-

4.20 E_CanCtrl2MsgLost (0x01000000)

Description	Timeout of DMC_CTRL2 CAN Message
Precondition	DMC_State >= DMC_INIT Message DMC_CTRL2 is active (ID > 0x000) Timeout for DMC_CTRL2 is active (Timeout time > 0)
Condition	If State = DMC_INIT: No reception of DMC_CTRL2 Message after 5 sec. If State > DMC_INIT: No reception of DMC_CTRL2 Message for specified Timeout time.
Delay	-
Monitor Type	Cyclic (1500 Hz)
Reset condition	Clear Error
Diagnostic	Check CAN traffic and the configuration of the ID's
Event Log	ERROR: Message Lost (ID) Data: The ID of the CAN Message

4.21 E_ MotEEPROM (0x02000000)

Description	Motor EEPROM software module has detected an error.
Precondition	
Condition	• An EEPROM was expected but no EEPROM was detected • Error state from de EEPROM software module
Delay	-
Monitor Type	Cyclic (1500 Hz)
Reset condition	DMC has to be restarted
Diagnostic	The Parameter [22:13] MotEEPROM_Error gives information about the error.
Event Log	ERROR: EEPROM motor failed (err code) 0x02: communication timeout 0x04: SPI handler was net ready when it should have been 0x08: CRC of data section is invalid 0x10: EEPROM did not allow write sequence 0x20: Invalid data in data section 0x40: communication was not released by superior system

4.22 E_ Storage (0x04000000)

Description	Data consistency check failed
Precondition	-
Condition	See Event Log description
Delay	-
Monitor Type	Start-Up
Reset condition	-
Diagnostic	Check parameters and recalculate CRC.
Event Log	ERROR: CRC Error 0x0001: CRC error of internal flash 0x0002: CRC error of external flash 0x8002: a CRC error of the external flash was detected during last run (restore of persistent error) 0x0010: CRC of configuration parameters is wrong 0x0020: CRC of active motor parameter set is wrong 0x0040: configuration parameters were changed during init process 0x0080: motor parameters were changed during init process

4.23 E_ KL15Lost (0x08000000)

Description	KL15 was lost when DMC was running
Precondition	DMC_State >= DMC_PRERUN
Condition	KL15 hardware Signal is low
Delay	1.33ms
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear Error
Diagnostic	Normally the DMC will switch off if KL15 goes low. But this will take some time. So you will see this error if the KL15 comes back before the DMC hardware switched off.
Event Log	-

4.24 E_ CanComStartup (0x10000000)

Description	
Precondition	DMC_State = DMC_INIT
Condition	EnableRq = TRUE
Delay	-
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear Error
Diagnostic	• Check DMC_CTRL Message. The EnableRq should not be sent before the DMC announces to be ready. • Another possible reason is an unintended restart of the DMC5
Event Log	ERROR: Initialisation (source of failure) Data: 0x0040: run request is set on startup

4.25 E_ IntSupply (0x20000000)

Description	Supervisor of the internal Supply
Precondition	UBatt > 120V
Condition	There are several conditions that can trigger this error • During Startup: Timeout of the internal Supply. • During Running: ((U15V > 16V) OR (U15V < 13.8V) AND (KL15=active)) • Reference voltage of current sensors is out of range (deviation of > 10%)
Delay	• During Running: 4ms • Reference voltage of current sensors: no delay
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear Error
Diagnostic	Check the value of [22:8] 15V Internal Supply when the Battery or HV supply is connected. If it is not within the allowed value the internal supply does not work.
Event Log	ERROR: Internal Supply Error Data: 0x0001 – startup timeout Data: 0x0010 – 15V value out of range Data: 0x0020 – Reference voltage of current sensors is out of range

4.26 E_ AC_Overcurr (0x40000000)

Description	Switch off if ac current limiter failed to work
Precondition	-
Condition	((IacAct > IacMaxDyn + 10A) AND (KL15=active)) **Note:** IacMaxDyn = maximum current determined by temperature limiter)
Delay	-
Monitor Type	Cyclic (1500Hz)
Reset condition	Clear Error
Diagnostic	The ac current limiter tries to reduce the commanded torque to limit the ac current. One reason might be if the needed ac current for 0Nm is higher than the maximum allowed ac current. The maximum allowed ac current is reduced by the derating curves of the motor and the inverter.
Event Log	-

4.27 E_ OS_Trap (0x80000000)

Description	The error is set when an unexpected event in the operating system occurred. These events can be: • Watchdog reset of the cpu • Unexpected exception • crash of the OS
Precondition	-
Condition	One of the error events
Delay	-
Monitor Type	Event triggered / Start-Up
Reset condition	-
Diagnostic	If you see this error please report it to BRUSA
Event Log	ERROR: System Restart due to error (Reason) 0x0001: application mode change (not an error) 0x0002: crash of the OS (TRAP) 0x0010: Illegal code exception 0x0020: Illegal slot exception 0x0040: cpu address exception 0x0080: dtc address exception 0x0800: watchdog 0x8000: restart requested (not an error) **For crash of OS:** ERROR: System Trap (ErrorCode)

5 Sensor Warning Bitmap

5.1 System check active (0x0001)

After a Start-Up the DMC checks the CRC of the internal and the external flash. The external flash is a 4MB flash and will take some time to be checked. This check is done in background and the DMC can be used as normal. This warning bit indicates that the system check is still active. The CRC checking is finished as soon as the warning disappears.

5.2 Ext AW2 (0x0002)

External Shutdown path EXT_AW2 (Pin 18) is switched off.

5.3 Ext AW1 (0x0004)

External Shutdown path EXT_AW1 (Pin 17) is switched off.

5.4 OscLim Active (0x0008)

The Signal is active when the oscillation limit controller is active. The active controller is then allowed to influence the TrqRq in both directions to dampen oscillations.

5.5 Driver shutdown (0x0400)

A Shutdown path is active and does not release the power stage. It can be one of the following:
- EXT_AW1 (external)
- EXT_AW2 (external)
- ISU (internal)

5.6 Power mismatch (0x0800)

For the current firmware this warning is for testing only.

The warning indicates a mismatch between electrical power and mechanical power. The exact criteria is not yet defined.

5.7 Speed sensor (0x1000)

This warning will be active if the speed sensor signal is bad but not bad enough to set the speed sensor error. See also the error description of E_ Speed (0x00000800).
The warning is active when:
- more than 20 lost position counts were detected
- more than 10 invalid position transitions were detected

5.8 HV undervoltage(0x2000)

The warning indicates that the DC voltage is below de DC under voltage level. It might be useful to see why the DMC is not getting into the DMC_READY state.

5.9 ModMaxLim (0x4000)

The maximum modulation limiter is active. It depends on the quality of the motor table if this is necessary and therefore normal for a certain machine.
The limiter will get active if there is not enough DC voltage to drain the current into the machine. To bring the current controller back to valid working point it increases the d-current in the motor. As long as it is possible the q-current is reduced to achieve the same ac rms current as requested by the model. The increase of the d-current is limited to 50A peak.

5.10 Temperature sensor warning (0x8000)

The warning is active if a temperature sensor is out of range or has invalid data. If a temperature sensor of a group of sensors is invalid the derating and error temperature for that group will start 10° earlier.

The Parameter Temperature Error Bitmap [23:28] gives detailed information about the defect temperature sensor.

The following event logs are generated if the error bitmap changes
ERROR: Temperature Sensor failed (code HighWord)
ERROR: Temperature Sensor failed (code LowWord)

Code	Description
0x80000000	E_TEMPSENS_SYS1
0x40000000	E_TEMPSENS_SYS2
0x08000000	E_TEMPSENS_COMTRAFO1
0x04000000	E_TEMPSENS_COMTRAFO2
0x02000000	E_TEMPSENS_COMTRAFO3
0x00800000	E_TEMPSENS_MODULE_R1
0x00400000	E_TEMPSENS_MODULE_S1
0x00200000	E_TEMPSENS_MODULE_T1
0x00080000	E_TEMPSENS_MODULE_R2
0x00040000	E_TEMPSENS_MODULE_S2
0x00020000	E_TEMPSENS_MODULE_T2
0x00008000	E_TEMPSENS_MODULE_R3
0x00004000	E_TEMPSENS_MODULE_S3
0x00002000	E_TEMPSENS_MODULE_T3
0x00000040	E_OVERTEMP_SYS
0x00000020	E_OVERTEMP_COMTRAFO
0x00000010	E_OVERTEMP_MODULE
0x00000008	E_TEMPSENS_MOTOR
0x00000004	E_TEMPSENS_SYS
0x00000002	E_TEMPSENS_COMTRAFO
0x00000001	E_TEMPSENS_MODULE

6 Torque limitation

Torque limitation is signalled by limitation bits located in the DMC_TRQS message. The torque controller is calculated with a frequency of 1500Hz. Only one limiter can be active during one of these cycles. If the DMC_TRQS message is configured to be sent every 10ms there are about 15 cycles between. All active limiter bits will be cumulated during this time. Therefore it is possible that more than one limiter bits are set in one CAN message.

6.1 TrqLimitation

General bit to signal that the commanded torque has been limited by one of the following limiter.

6.2 TrqLim

Torque is limited by maximum allowed or configured torque.

6.3 SlewrateLim

Torque is limited by maximum allowed torque or speed slew rate.

6.4 PowLim

Torque is limited by maximum allowed mechanical power.

6.5 SpdLim

Torque is limited by maximum allowed speed. The speed direction can be positive or negative.

6.6 CLim

The torque is limited by maximum motoring or regenerating dc current.

6.7 VLim

The torque is limited by dc voltage limits.

6.8 TempMotorLim

The torque is limited by high motor temperature.

6.9 TempDmcLim

The torque is limited by high temperature inside the DMC.

6.10 IacLim

The torque is limited by maximum allowed ac current.

6.11 ModelLim

The torque is limited by the motor model. This will mean that the motor cannot make more torque at the current working point which depends on the current speed and dc voltage.

7 Event Log

The Event Log is a powerful mechanism to get a sort of al log file out of the DMC. Use the PARAM tool to configure the logging level and to get the Event Log.

Each Event Log entry has the following elements:

- Category
- Level (Error, Warning, Info, Debug)
- ID (Event ID)
- Timestamp
- additional Data (16 bit)

All events are stored in ring buffer in a non-volatile memory section. By selecting the level and the categories you can adjust the amount of messages that are stored in the memory.

- All events with the level Error are always stored.
- Events that have a level equal or higher (more critical) of the selected level and match one of the selected categories will also be stored.

7.1 Detailed description of Event Log entries

Entries with the level Error are described in chapter "Error Bitmap".

Category	CAN
Level	WARNING
Message	WARNING: Can Message Overrun (MsgBuffer)
Description	The message buffer was overwritten with new data before the cpu was able to read the information from the buffer. This can occur on heavy cpu load, when in the same time a message for the DMC was sent within a very short time.
Data	Number of message buffer affected.

Category	CAN
Level	WARNING
Message	WARNING: Can Filter Missconfigured (ID)
Description	The warning occurs if the receive routine has a CAN message in the queue and does not know what to do with it.
Data	Identifier of the affected CAN message.

Category	CAN
Level	INFO
Message	INFO: Can Terminal Buffer full
Description	Too many data for the emulated CAN terminal were sent at a time.
Data	-

Category	Statemachine
Level	INFO
Message	INFO: State changed (State)
Description	The state of the internal state controller has changed. It is expected, that this event occurs quite often.
Data	0x0000: DMC_OFF 0x0010: DMC_INIT 0x0020: DMC_ERROR 0x0021: DMC_CLR_ERROR_Entry 0x0022: DMC_CLR_ERROR 0x0030: DMC_STANDBY 0x0040: DMC_READY 0x0045: DMC_PRERUN 0x0050: DMC_RUNNING

Category	Statemachine
Level	WARNING
Message	WARNING: too high AC Current allowed (current)
Description	The Parameter [10:12] IacMax has a higher value than allowed. When this occurs on parameter set 0 the Parameter will be reduced to the max allowed value. This will generate a CRC error! You have to copy the date to a different parameter set.
Data	AC Current in A

Category	Measurement
Level	INFO
Message	INFO: New HW error code (data)
Description	Is sent when the shift register data have changed and no error is present.
Data	data from the shift register

Category	Storage
Level	INFO
Message	INFO: Storage data got updated
Description	Stored data where updated. For example on a firmware update to 01-01-17
Data	Which data where updated? 0x0010: E_STORAGE_PARAM 0x0020: E_STORAGE_MOT_PARAM

Category	Storage
Level	INFO
Message	INFO: EEPROM motor (action code)
Description	An action was taken to communicate with the EEPROM in the motor.
Data	0x8000: Read + Status 0x4000: Write + Status 0x00: EEPROM_UNINIT 0x01: EEPROM_BUSY 0x02: EEPROM_DATA_READY 0x03: EEPROM_NOT_AVAILABLE 0x04: EEPROM_ERROR

Category	Storage
Level	WARNING
Message	WARNING: Update wrong Backup Data
Description	Backup dataset had invalid CRC and needed to be rewritten.
Data	Affected data section: 0x0010: E_STORAGE_PARAM 0x0020: E_STORAGE_MOT_PARAM

Category	Storage
Level	INFO
Message	INFO: Load backup parameter
Description	CRC of dataset was wrong but backup data seemed to be ok. The DMC has reloaded those backup data. In most cases the reason for this is that some parameters were changed and the user has forgotten to request the update of the CRC value.
Data	Affected data section: 0x0010: E_STORAGE_PARAM 0x0020: E_STORAGE_MOT_PARAM

Category	OSEK
Level	INFO
Message	INFO: System Startup (OS_APPMODE)
Description	-
Data	0x0001: Default start up 0x0002: start up for flash programming