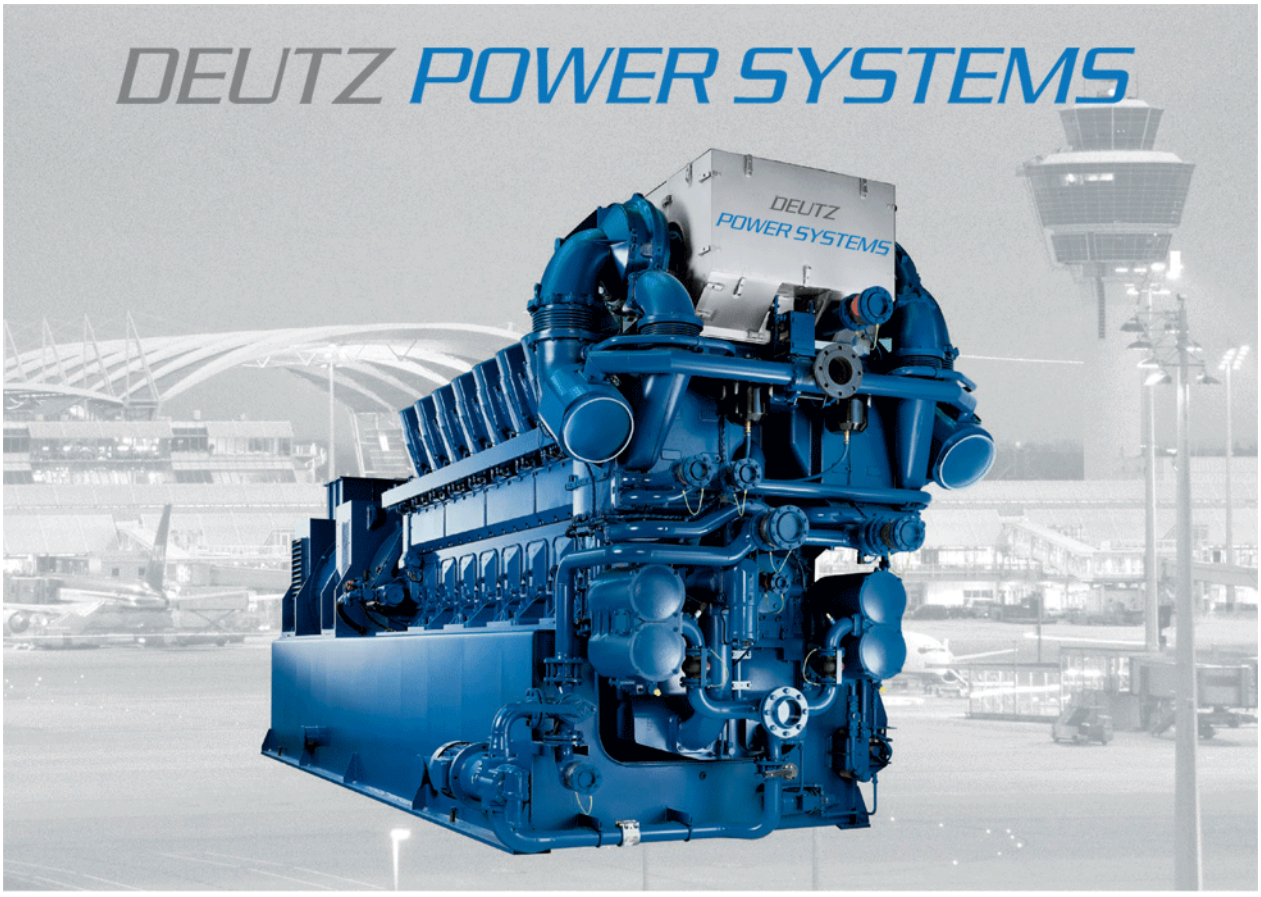
DEUTZ POWER SYSTEMS

System manual

TEM *Evolution* System

Operation log



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This documentation applies for the following series:

TBG 616
TBG 620
TCG 2016, TCG 2016K
TCG 2020, TCG 2020K
TCG 2032

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Contents

1 Notes

This system description is part of the documentation of the TEM-Evo system.

Observe absolutely the following documents:

Documentation of DEUTZ Power Systems concerning the genset

- Documentation of DEUTZ Power Systems concerning the plant
- Operating instructions of DEUTZ Power Systems concerning the TEM System Evolution
- System manuals for the TEM-Evo system
- Provisions of the regulatory authorities and professional associations

Furthermore you must follow the rules valid in the operational area and the prescriptions for preventing accidents.

Symbol	Meaning	Explanation
	**Safety**	You will find this symbol at all safety instructions. Please observe these notes carefully. Give safety instructions to the operating personnel.
	**Note**	Important note concerning functionality. Not observing can lead to malfunctions.
	**Information**	More detailed information: Please read carefully the indicated system manuals.

Table 1: Symbol explanation

2 Functional description

Logging function

All important events (e.g. starting flow, faults, etc.) are logged and saved in the operation log of the TEM-Evo system.

Operation

During operation current events, such as starting flow, feedbacks of valve limit stops or adjustment orders of the valves are logged. Stops of the genset are logged and can be retraced via the operation log and the histories.

Commissioning

Using the operation log results in easy and efficient commissioning and monitoring of the genset.

The following events are registered indicating date and time.

Type of event	Entry for	Number of entries
fault	occurrence/acknowledgement	200
alarm	occurrence/acknowledgement	200
message	appears/disappears	200
parameters	parameter change	100
system message	occurrence	200

Table 2: Events

Partial logs

Every type of event is continuously written into a particular partial log. The maximum number of saved events is limited (see Table 2). When exceeding the limit the oldest events will be overwritten. In the fault and warning logs only the acknowledged events will be overwritten.

The operation log is saved in the TEM-Evo PLC and can be displayed on the operating terminal or via remote visualization (TEM-Evo PC-Package).

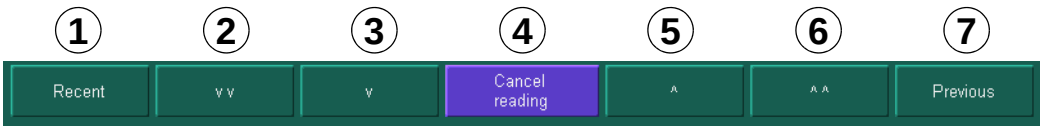
3 Operating terminal mask

You can reach the operation log from the TEM-Evo operating terminal or with TEM-Evo PC-Package via the main menu bar.

1. Display of the pushbutton operation log
2. Acknowledgement of faults/alarms
3. Update of display operation log
4. **Pending**
   only pending faults/alarms are displayed
   Display **All**
   the entire operation log is displayed
5. Display filter:
   display of faults
   display of alarms
   display of messages
   display of parameters
6. File: Loading and saving of the operation log (depending on the level of access)

Figure 1: Operation log

Navigation operation log



	Push button	Function	Remark
1.	Latest	Move to last entry	
2.	v v	Move forward by a half page	
3.	v	Move forward to next entry	
4.	Abort reading	Push button and status display of operation log	The operation log is read again from the control. The procedure can be aborted by pressing the push button.
	^		The operation log of the file is displayed.
	–		The operation log is displayed.
5.	^	Move back by one entry	
6.	^ ^	Move back by a half page	
7.	Oldest	Move to the first entry	

Display of operation log

Status bar

The first column displays the operating status of the genset. The operation log and the histories allow very fast diagnostics of break-downs.

Column 1	Format
Status	4 single-coloured bars

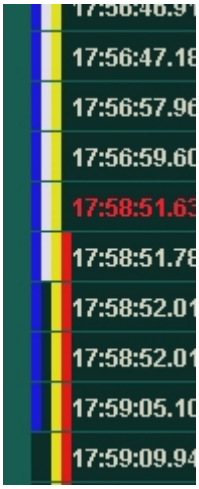
	Bar color	Meaning
	blue	engine running
	white	load run
	yellow	status alarm
	red	status fault

Table 3: Status bar

Date/time

Each event is registered indicating date and time. The date is displayed in the first title line. For data changes the date is indicated in a separate line.

Column 2	Format	Example
date	<day>.<month>.<year>	07.09.2004
time	<hour>:<minute>:<second>:<millisecond>	13:24:02:992

Identification

In column 3 find displayed the name of the event (here identification).

Column 3	Format	Example
Identification	Message in clear text	"Starter"

Note

Measuring points are marked with their names in the DEUTZ P&I-diagram (e.g. T207 for cooling water engine inlet).

Derived values (e.g. filtered measured values) contain an additional digit (e.g. E198.2 actual power filtered).

Type:

The type of event indicates the type of the event.

Column 4	Format	Example
type:	clear text	"fault"

Event

The event column states precisely the type of the event.

Column 5	Format	Example
event	clear text or abbreviation	"ackn."

actual value

The actual value column indicates

- the actual value
  of a controlled value when an event occurrs
  or
- a currently entered value (for parameter changes and manual entries)

Column 6	Format	Example
Actual value	entry in clear text	"90°C"

Symbol

The following symbols are displayed in the 7th column:

Column 7	Format	Example
Symbol	Symbol	

Symbol	Explanation
	not reaching a limit value with fault e.g. lube oil pressure too low
	not reaching a limit value with alarm e.g. lube oil pressure too low
	not reaching a limit value with message e.g. pre-heating failure
	exceeding a limit value with fault e.g. overtemperature jacket water inlet
	exceeding a limit value with alarm e.g. overtemperature jacket water inlet
	exceeding a limit value with message e.g. power reduction for overtemperature receiver
	parameter change

Limit value

The limit value column contains exceeded/not reached limit values or fault codes.

Column 8	Format	Example
Limit value	<value> <unit>	"96,0°C" "2 code"

Type of event		Explanation
Fault	measured value	limit value and unit
	all other	fault code
Alarm	measured value	limit value and unit
	all other	fault code
Parameters	changes	display of overwritten parameter values

Table 4: Limit value column

Tageswechsel

Bar with weekday + date horizontally over all columns

Figure 2: Day changeover operation log

Push button

Push button	Explanation
	**Acknowledge pending faults** Faults can only be acknowledged if they have been selected before (see filter selection)
	**Acknowledge pending alarms** Alarms can only be acknowledged if they have been selected before (see filter selection)
	**Update:** New entries are currently read and displayed
	**Pending**/Display **All** (faults/alarms) **Pending**: only the pending alarms/faults are displayed Display **All**: All entries are displayed, the display depends on the filter selection Press the push button to read in again the data from the control
Push buttons filter selection	
	**Faults:** Display faults/do not display
	**Alarms:** Display alarms/do not display
	**Messages:** Display messages/do not display
	**Parameters:** Display parameter changes/do not display
	System (depending on level of access): Display system messages/do not display
	**File:** Save operation log read saved operation log

Figure 3: Operation log push button

4 Fault Code

The following list contains the fault code occurring in the TEM-Evo system. Some fault codes are the result of a combination of several errors. If this is the case the fault codes are added e.g.

"AKR system fault 3" is combined of	
AKR system error 2	no camshaft signal
AKR system fault code1	no gear ring signal

Table 5: fault codes

This means that the anti-knock governor can neither recognise a camshaft signal nor a gear ring signal, fault code 3 appears.

4.1 Anti-knock governor (AKR)

Identification / type	actual value column	limit value column	Meaning
AKR system fault	Alarm		Bit-coding
	1	0	no gear ring signal
	2	0	no camshaft signal
	4	0	camshaft and gear ring signals mixed
	8	0	invalid tooth number
	16	0	setup/value invalid see AKR fault address and AKR set value.
	64	0	type of motor changed during engine running
AKR fault address	Alarm		more detailed information on AKR system errors, Bit 4 (Code 16)
	Xxxx	255	address where an invalid value was transferrred to the AKR.
AKR set value	Alarm		more detailed information on AKR system errors, Bit 4 (Code 16)
	Xxxx	-32768	xxxx = invalid value, that was transferred to the AKR
AKR knock sensor fault bank A	Alarm		bit-coding
	1	0	knock sensor fault code cylinder A1
	2	0	knock sensor fault code cylinder A2
	4	0	knock sensor fault code cylinder A3
	8	0	knock sensor fault codecylinder A4
	16	0	knock sensor fault code cylinder A5
	32	0	knock sensor fault codecylinder A6
	64	0	knock sensor fault code cylinder A7
	128	0	knock sensor fault codecylinder A8
	256	0	knock sensor fault code cylinder A9
	512	0	knock sensor fault codecylinder A10

Table 6: fault code anti-knock governor

Identification / type	actual value column	limit value column	Meaning
AKR knock sensor fault bank B	Alarm		bit-coding
	1	0	knock sensor fault code cylinder B1
	2	0	knock sensor fault codecylinder B2
	4	0	knock sensor fault code cylinder B3
	8	0	knock sensor fault codecylinder B4
	16	0	knock sensor fault code cylinder B5
	32	0	knock sensor fault codecylinder B6
	64	0	knock sensor fault code cylinder B7
	128	0	Knock sensor fault code cylinder B8
	256	0	knock sensor fault code cylinder B9
	512	0	knock sensor fault code cylinder B10
AKR function block	Alarm 1		error on AKR function call Tasksw_init
		513	initialization fault code of the AKR board
		-1	vector fault code on FB call
AKR function block	Alarm 2		fault code on AKR function call Tasksw_write
		547	timeout (500 ms)
		-1	vector fault code on FB call
AKR function block	Alarm 3		fault code on AKR function call Tasksw_read
		549	timeout (500 ms)
		550	fault code at application function number
		-1	vector fault code on FB call
AKR function block	Alarm 4		fault code on AKR function call AKRinit
		-1	vector fault code on FB call

Table 6: fault code anti-knock governor

Identification / type	actual value column	limit value column	Meaning
AKR function block	Alarm 5		fault code on AKR function call AKRwrite
		579	timeout (500 ms)
		-1	vector fault code on FB call
AKR function block	Alarm 6		fault code on AKR function call AKRread
		581	timeout (500 ms)
		-1	vector fault code on FB call

Table 6: fault code anti-knock governor

4.2 Ignition system (ZA)

Identification / type	actual value column	limit value column	Meaning
ZA fault code	Fault		bit-coding
	1	0	no gear ring signal
	2	0	no camshaft signal
	4	0	camshaft and gear ring signals mixed
	8	0	invalid tooth number
	16	0	supply voltage not allowed
	32	0	overspeed
	64	0	capacitor not charged
	128	0	setup invalid
	256	0	watch-dog alarm or short supply voltage decrease
	512	0	TDC impulse too late
	1024	0	stack overflow
	2048	0	stack underflow
	4096	0	test byte
	8192	0	dpr writing/reading error
	16384	0	fault code EPROM-check sum
	-32768	0	fault code EEPROM BCC test
ZA capacitor discharge bank A	Alarm		bit-coding
	1	0	no capacitor discharge at ignition on cylinder A1
	2	0	no capacitor discharge at ignition on cylinder A2
	4	0	no capacitor discharge at ignition on cylinder A3
	8	0	no capacitor discharge at ignition on cylinder A4
	16	0	no capacitor discharge at ignition on cylinder A5
	32	0	no capacitor discharge at ignition on cylinder A6

Table 7: fault codes ignition system

Identification / type	actual value column	limit value column	Meaning
	64	0	no capacitor discharge at ignition on cylinder A7
	128	0	no capacitor discharge at ignition on cylinder A8
	256	0	no capacitor discharge at ignition on cylinder A9
	512	0	no capacitor discharge at ignition on cylinder A10
ZA capacitor discharge bank B	Alarm		bit-coding
	1	0	no capacitor discharge at ignition on cylinder B1
	2	0	no capacitor discharge at ignition on cylinder B2
	4	0	no capacitor discharge at ignition on cylinder B3
	8	0	no capacitor discharge at ignition on cylinder B4
	16	0	no capacitor discharge at ignition on cylinder B5
	32	0	no capacitor discharge at ignition on cylinder B6
	64	0	no capacitor discharge at ignition on cylinder B7
	128	0	no capacitor discharge at ignition on cylinder B8
	256	0	no capacitor discharge at ignition on cylinder B9
	512	0	no capacitor discharge at ignition on cylinder A10
ZA basic initialization	Fault		
	-1		vector fault code on FB call
ZA initialization serial connection	Fault		
	257		invalid baud rate
	258		baud rate setting error
	259		invalid channel number
	260		low level ISRs initialization failed
	-1		vector fault code on FB call
ZA condition serial connection S	Fault		

Table 7: fault codes ignition system

Identification / type	actual value column	limit value column	Meaning
	2		link timeout
	-1		vector fault code on FB call
ZA condition serial connection W	Alarm		bit-coding
	1		break-, parity-, frame-, overrun errors
	2		no free send buffer in the AKR-ISR; the telegram for ignition points was not sent
	4		response timeout
	8		ZA has sent not requested characters
	16		transmission fault in communication
	32		invalid length of ZA response telegram
	64		no STX at requested place in the response
	128		invalid function codes in the response
	256		no ETX at requested place in the response
	512		fault in Block Check Code in response telegram
ZA send telegram setup	Fault		
	-1		vector fault code on FB call
ZA send telegram operation	Fault		
	-1		vector fault code on FB call
ZA send telegram energies	Fault		
	-1		vector fault code on FB call
ZA send telegram test mode	Fault		
	-1		vector fault code on FB call
ZA enquire telegram			
	-1		vector fault code on FB call

Table 7: fault codes ignition system

Identification / type	actual value column	limit value column	Meaning
ZA read telegram	Fault		
	129		vector fault on call of the FB ZaReadEnergies
	130		vector fault on FB ZaReadStatusError
	131		vector fault on FB call ZaReadOperating
	132		vector fault on FBon FB call FB ZaReadTiming1
	133		vector fault on FB call ZaReadTiming2
	134		vector fault on FB call ZaReadBasicData

Table 7: fault codes ignition system

4.3 I/O module (CAN)

The first two bytes of the CAN telegram are coded in the limit value column. The first byte is multiplied by 256.

Identification / type	actual value column	limit value column	Meaning
CAN-bus collective fault		0	
	No.		Fault on set-up of the CAN-connection (no. = initialization phase)
CAN bus collective alarm	5128		incorrect ServiceBit coding (No. = number of the incorrect service
		256 + No.	incorrect CAN-ID
		512 + No.	incorrect service number
		1024 + No.	incorrect module number
		2048 + No.	incorrect channel number
		4096 + No.	incorrect data length
		8192 + No.	incorrect data
CAN bus collective alarm	5129	module ×100 + channel	output setting or resetting fault
CAN bus collective alarm	5251		faulty EEPROM configuration Bit coding (Nr. = DIP-switch setting of the module)
		256 + No.	EM1-module has deviating DIP setting
		512 + No.	EM2-module has deviating DIP setting
		768 + No.	EM3-module has deviating DIP setting
		1024 + No.	EM4-module has deviating DIP setting
		1280 + No.	EM5-module has deviating DIP setting
CAN bus collective alarm	5253		internal bus open, coding
		#R × 256 + #EM	#R = number of registers (1 ... 46) #EM = number of the modules (1 ... 31)
CAN bus collective alarm	5254		incorrect (double) module configuration, coding

Table 8: Fault codes I/O module

Identification / type	actual value column	limit value column	Meaning
		#O × 256 + #S	#O = position of the second double module (1 ... 31) #S = setting of the second double module (1 ... 31)
CAN bus collective alarm	5255		CAN or node fault (No. = 1, if module configuration does not match EEPROM configuration)
		256 + Nr	overflow in software in-buffer
		512 + Nr	overflow in software send buffer
		1024 + Nr	overflow in CAN chip in-buffer
		2048 + Nr	CAN chip alarm limit reached

Table 8: Fault codes I/O module

4.4 I/O-Controller (CAN)

Identification / type	Code 1 actual value column	Code 2 limit value column	Meaning
CAN-bus collective fault	0	0	CAN connection to *I/O-Controller* interrupted
	-1		CAN master deactivated
I/O-Controller: Module CMxxx-n	Alarm -1	0	Life-Guarding fault
I/O-Controller: Module CMxxx-n	Alarm		Fault message of the module (emergency message)
	32	1	CM2AI: Current of the transmitter supply too high
	35	1	CM8DIO: Short circuit at output
	48	1	CM2AI: Supply voltage of the transducer failed
	80	1	CAN-ID can not be read
		2	data transfer fault with EEPROM
	97	1	internal CAN software initialization fault
		2	internal CAN software fault
	129	1	LP receiver buffer full
		2	CAN overrun
		4	CAN bus-off
		8	CAN fault status-bit reset
		16	CAN fault code status-bit reset
		32	LP send buffer full
		64	HP receiver buffer full
		128	HP send buffer full
		256	node started
		512	node stopped
		1024	timeout node-guarding
		2048	resume node-guarding
		4096	preoperational mode demanded

Table 9: Fault codes *I/O-Controller*

Identification / type	Code 1 actual value column	Code 2 limit value column	Meaning
		8192	communication reset demanded
		16384	node reset demanded
		-32767	connection to node separated

Table 9: Fault codes *I/O-Controller*

4.5 Seed governor (DZR)

Identification / type	actual value column	limit value column	Meaning
DZR error code Init 0	Fault		Parametrization error, value range for parameter injured
	1	0	real speed invalid
	2	0	parameter ""11100 DZR tooth number"
	4	0	parameter "11100 DZR tooth number" tooth number changed with the engine running
	8	0	parameter "21100 DZR p-reduction"
	16	0	parameter "11101 DZR position zero load
	32	0	parameter "11102 DZR position full load
	64	0	parameter"21101 DZR damping"
	128	0	parameter"11103 DZR max. filling low speed
	256	0	parameter "11104 DZR low speed
	512	0	parameter"11105 DZR max. filling high speed
	1024	0	parameter "11106 DZR high speed
	2048	0	parameter "21102 DZR p-increase"
	4096	0	parameter "21103 DZR I-increase
	8192	0	parameter "21104 DZR d-increase"
	16384	0	parameter "11107 DZR Actuator type
DZR error code Init 1			Parametrization error, value range for parameter not respected
	1	0	DZR card A not available
	2	0	DZR card B not available
	4	0	parameter "11110 offset torque unit B against A for 0%" or parameter "11110 offset torque unit B against A for 100%"
		0	fault not assigned to an exact DZR card
		1	DZR card, throttle valve A
		2	DZR card, throttle valve B

Table 10: Fault codes speed governor

Identification / type	actual value column	limit value column	Meaning
		3	DZR card, throttle valves A and B
DZR set value fault	Alarm		bit-coding
	1		range exceeded for set speed
	2		range exceeded for set position
	4		DZR-test mode in control mode not permitted
DZR unbalance	Alarm		bit-coding
	16384		The new balancing value for the position signal is out of tolerance range.
	-32768		The new balancing value for the external voltage measurement is out of tolerance range.

Table 10: Fault codes speed governor

4.6 Stepper motor card (SMK)

Identification / type	actual value column	limit value column	Meaning
Stepper motorcard	Alarm		
	1		block not initialized
	255		SMK card not available
Stepper motor card B	Alarm		
	1		block not initialized
	255		SMK card not available
Stepper motor board gas press. ctrl. B	Alarm		
	1		block not initialized
	255		SMK card not available

Table 11: Fault codes stepper motor card

4.7 Sensor faults

Faults of external sensor signals are registered in the operation log as follows:

Type:	Event	Explanation
fault	appears	fault is registered
fault	sen. ackn.	fault is acknowledged

Table 12: Sensor faults

For the different sensor types NiCr-Ni, PT100 and 20 mA there can be different message types (fault codes) due to the different data processing when the measuring circuit is interrupted and the measuring cables are mixed.

Identification / type	actual value column	limit value column	Meaning
NiCr-Ni-sensors	**Fault**		**Genset cabinet**
T461–T470 A1–A10 combustion chamber T471–T780 B1–B10 combustion chamber	xxxxx	2	Voltage supply ±15 V ±15 V of the analogous input card VME32AI missing or line break in a combustion chamber temperature measuring circuit xxxxx = measured value display in 1/10 °C 10785 = 1078,5 °C (measuring range final value)
T201 Receiver / fault T378 receiver B	xxxxx	2	Voltage supply ±15 V ±15 V of the analogous input card VME32AI missing or line break in a receiver temperature measuring circuit xxxxx = measured value display in 1/10 °C 10785 = 1078,5 °C (measuring range final value)
T494 exhaust after ATL A T495 exhaust after ATL B / fault	xxxxx	2	Voltage supply ±15 V ±15 V of the analogous input card VME32AI missing or line break in a combustion chamber temperature measuring circuit xxxxx = measured value display in 1/10 °C 10785 = 1078,5 °C (measuring range final value)

Table 13: Sensor faults NiCr-Ni

Identification / type	actual value column	limit value column	Meaning
PT100-sensors	**Fault/ alarm**		**Genset cabinet**
T204 cold junction A T205 cold junction B alarm / fault T203 air inlet T206 cooling water engine outlet T207 cooling water engine inlet T208 lube oil T209 generator winding U T210 generator winding V T211 generator winding W T459 generator bearing A T460 generator bearing B T377 air inlet B T202 cooling water GK inlet T487 generator air inlet T488 generator air inlet	xxxxx	1	Voltage supply ±15 V ±15 V of the analogous input card VME32AI missing or line break in a measuring circuit xxxxx = measured value display in 1/10 °C 10785 = 1078,5 °C

Table 14: Sensor faults PT100

Identification / type	actual value column	limit value column	Meaning
4...20 mA-inputs	**Fault**		**Genset cabinet**
P145 crank case pressure / fault P196 lube oil pressure before filter P302 lube oil pressure after filter L234 lubrication oil level S492 speed ATL A S493 speed ATL B P371 starter air	xxxxx		Voltage supply ±15 V ±15 V of the analogous input card VME32AI missing or line break in a measuring circuit xxxxx = measured value display in µA

Table 15: Sensor faults 4...20 mA inputs

Identification / type	actual value column	limit value column	Meaning
Speed governor board	**Fault**		**Genset cabinet**
E149 supply voltage / fault			wire break in the measuring circuit of the supply voltage or supply voltage < 12 V, measured value in 1/10 V
G197.2 DZR Ukal 0% G177.2 DZR B Ukal 0% / fault			DZR calibration: position voltage below range limit in position 0 %< measured value in 1/100 V
G197.3 DZR Ukal 100% G177.3 DZR B Ukal 100% / fault			DZR calibration: position voltage exceeding range limit in position 0 %< measured value in 1/100 V
G197 Throttle valve position G177 Throttle valve position B / fault			DZR calibration: value range of position voltage too small measured value in 1/10 %- negative: line V+ disconnected positive: line V- or P disconnected
S200 engine speed / fault			gear ring signal missing measured value in 1/10 1/min

Table 16: Sensor faults speed governor

.

Identification / type	actual value column	limit value column	Meaning
Sensor faults 4...20 mA inputs	**Alarm/ fault**		**Auxiliaries cabinet I/O-Controller or intelligent busbar**
T286 exhaust after engine T287 exhaust after KAT T288 exhaust after AWT T458 jacket water after KWT T291 heating water flow T289 heating water return T386 heating water before SWT T290 heating water before KWT T385 heating water before AWT T384 heating water at emergency cooler S397 position HK control valve S000 NK control valve T412 cooling water exhaust pipe S000 position GK control valve Q311 CH4 value Q000 NOx value E199 demand analogous E198 actual power generator parametrizable measured value 01–12	sensor signal in µA	1	line break in an analogous measuring circuit (4 ... 20 mA-Signal)

Table 17: Sensor faults 4...20 mA inputs auxiliaries cabinet

4.8 Parameter faults

Internal system faults, e.g. component self test faults are indicated as parameter faults. Parameter faults of external sensor signals are registered in the operation log as follows:

Type:	Event	actual value	Explanation
Fault	System	10	fault is registered
fault	Sys. ackn.		fault is acknowledged

Table 18: Parameter faults

Name	Explanation
Exxxx	electric value
Fxxxx	flow rate
Gxxxx	gap, length, position
Hxxxx	manual entry, manual operation
Lxxxx	level
Pxxxx	pressure
Qxxxx	quality value, capacity
Sxxxx	speed, r.p.m., frequency
Txxxx	temperature
DZR	speed governor
ZA	ignition system
AKR	anti-knock governor

Table 19: Identification parameter

Identification / type	actual value column	limit value column	Meaning
Xxxxx	Fault		
	1		invalid computing operation
	2		setup for bus input
	3		sensor parametrized, but not connected to bus module
	4		input self test fault
	5		parameter checksum fault in bus module EEPROM
	6		faulty parametrized monitoring reservation
	7		double I/O allocation
	8		3964 parametrizing fault
	9		*I/O-Controller*, I/O module collective fault at CAN module input/output
	10		parameter out of permitted range
	11		task fault
		1	task timeout
		2	task stopped
	12		*I/O-Controller*, I/O module channel parametrized, but does not exist on CAN node
	13		*I/O-Controller*, intelligent busbar CAN-Timeout
	14		*I/O-Controller*, intelligent busbar CAN index table complete
	15		*I/O-Controller*, intelligent busbar Send-DO was impoossible (CAN)
	16		*I/O-Controller*, I/O module output short-circuit or faulty output voltage supply
	17		*I/O-Controller* Input signal not verisimilar
	18		*I/O-Controller* incorrect module type
	19		*I/O-Controller* Timeout Life Guarding
	20		*I/O-Controller* Fault Life Guarding (Toggle Bit)

Table 20: Parameter faults

Identification / type	actual value column	limit value column	Meaning
	21		*I/O-Controller* Module not ready
	22		*I/O-Controller* Fault PDO configuration
	23		*I/O-Controller* No CAN-communikation
	24		*I/O-Controller* Boot-up during running operation

Table 20: Parameter faults

4.9 Control program

Identification / type	actual value column	limit value column	Meaning
Initialization control programm	fault		
	wNr		fault during control program initialization phase wNr = data base ID
		1	double allocation
		2	double allocation data model or invalid data model position
		3	overflow analogous monitoring
		4	overflow binarzy monitoring
		5	overflow monitoring orders/parameter
Condition PLC program	fault		self monitoring of the control program
	1		reset while engine is running
	2		voltage failure (AC-Fail)

Table 21: Faults control program

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