MPODmaster enhancement

for iseg

Multi-Channel High Voltage Power Supply Module

12/10/2009

New implemented items:

Item	Type	Access	Unit	Range
outputCurrentRiseRate	float value	read-write	[A/s]	2 - 100% of the nominal value
outputCurrentFallRate	float value	read-write	[A/s]	2 - 100% of the nominal value
outputTripTimeMaxCurrent	integer	read-write	[ms]	8 – 4000 ms (resolution 8ms)

DESCRIPTION
The outputTripTimeMaxCurrent defines a span for the time out function. The activity depends from the programmed bit field outputFailureMaxCurrent of the item outputSupervisionBehavior. A write value of 0 ms is switching off the delayed trip function which was defined in the bit field outputFailureMaxCurrent of outputSupervisionBehavior before.

Adaptation of items:

Item	Type	Access	Status bits / Switch functions
outputStatus	bits	read	outputEnableKill (13) outputEmergencyOff (14)
outputSwitch	integer	read-write	Off (0), On (1), resetEmergencyOff (2), setEmergencyOff (3), clearEvents (10)

DESCRIPTION
Read: An enumerated value which shows the current state of the output channel.
Write: Change the state of the channel.

If the channel is On, and the write value is Off, then the channel will switch off.
If the channel is Off, and the write value is On, and if no other signals (mainInhibit, outputInhibit, outputEmergencyOff or outputFailureMaxCurrent) are active, then the channel will switch on.

If the write value is resetEmergencyOff, then the channel will leave the state EmergencyOff.
A write of clearEvents is necessary before the voltage can ramp up again.
If the write value is setEmergencyOff, then the channel will have the state EmergencyOff, which means that the High Voltage will switch off without a ramp and reset of the outputVoltage to null volt.

If the write value is clearEvents, then all failure messages of the outputStatus will be reset (all channel events, all module events and the state EmergencyOff.

Item	Type	Access	Switch functions
groupsSwitch	integer	write	Off (0), On (1), resetEmergencyOff (2), setEmergencyOff (3), disableKill (4), enableKill (5), clearEvents (10)

DESCRIPTION
Read: This function is not defined with groups of output channels.

Write: Switch the state of all channels of a group.
If any channel is On, and the write value is Off, then all channels will switch off.
If any channel is Off, and the write value is On, and if no other signals (mainInhibit, outputInhibit, outputEmergencyOff or outputFailureMaxCurrent) are active, then all channels will switch on.

If the write value is resetEmergencyOff, then all channels will leave the state EmergencyOff.
A write of clearEvents is necessary before the voltage can ramp up again.
If the write value is setEmergencyOff, then all channels will have the state EmergencyOff, which means that the High Voltage will switch off without a ramp and reset of the outputVoltage to null volt.

If the write value is disableKill, then all channels will switch to disableKill.
If the write value is enableKill, then all channels will switch to enableKill.

If the write value is clearEvents, then all failure messages of the outputStatus will be reset (all channel events, all module events and the state EmergencyOff).

Item	Type	Access
outputSupervisionBehavior	integer	read-write

DESCRIPTION
A bit field packed into an integer which define the behaviour of the output channel / power supply after failures.
For each supervision value, a two-bit field exists. The enumeration of this value (..L+..H*2) is:
WIENER LV devices
- 0   ignore the failure
- 1   switch off this channel
- 2   switch off all channels with the same group number
- 3   switch off the complete crate.

iseg HV devices
- 0   ignore the failure
- 1   switch off this channel by ramp down the voltage
- 2   switch off this channel by set a internal EmergencyOff
- 3   switch off the whole board of the HV module by set EmergencyOff.

The position of the bit fields in the integer value are:
Bit 0, 1:   outputFailureMinSenseVoltage
Bit 2, 3:   outputFailureMaxSenseVoltage
Bit 4, 5:   outputFailureMaxTerminalVoltage
Bit 6, 7:   outputFailureMaxCurrent
Bit 8, 9:   outputFailureMaxTemperature
Bit 10, 11: outputFailureMaxPower
Bit 12, 13: outputFailureInhibit
Bit 14, 15: outputFailureTimeout

The iseg HV devices can use the bit fields:
outputFailureMaxCurrent   support of the function delayed trip
outputFailureInhibit   support of the optional hardware function EXTERNAL INHIBIT per channel

The channel state have to be in disableKill for a proper work of the configuration of the behaviour for the functions above.

outputFailureMaxCurrent   The programmed activity will released when the actual current exceeded permanently the value of the item outputCurrent over the span of the programmed time out (set via the item outputTripTimeMaxCurrent).

outputFailureInhibit   The programmed activity will released when an external channel inhibit occurs.

	outputFailureMaxCurrent	outputFailureInhibit
ignore the failure	0	0
switch off this channel by ramp down the voltage	64	4096
switch off this channel by set a internal EmergencyOff	128	8192
switch off the whole board of the HV module by set EmergencyOff	192	12288

The table shows the corresponding decimal values for relevant bit fields.

Minimal firmware releases for the function delayed trip and the external channel inhibit of outputSupervisionBehavior:

Name of firmware	Release	Date	Description	Device class
E16D0	4.25	05/08/09	EDS 16 channel per PCB, distributor module, range of Vmax from $V_{O\,max}$ to ($V_{O\,max}-$ 1kV)	21
E16D1	4.25	05/08/09	EDS 16 channel per PCB, distributor module	21
E08C0	2.22	02/23/09	EHS 8 channel per PCB, common GND module	24
E08F0	2.27	12/18/08	EHS 8 channel per PCB, floating GND module	25
E08F2	4.06	06/23/09	EHS 8 channel per PCB, floating GND module, 2 ranges for measurement of current	26
E08B0	1.02	07/10/09	EBS 8 bipolar channels per PCB, distributor module	28

The table brings a comparison between the SNMP items on a high layer and the EDCP/DCP instruction as bit transfer on a low layer
(use the links to the ehs_eds_multi_channel_can.pdf and ehq_multi_channel_can.pdf)

SNMP Namespace	SNMP Items	EDCP / DCP Items	Device Class	Access	Type
outputTable					bit
	outputStatus			read	
	outputOn(0)	DCP.StatusChannel.o (OFF/ON)	all		
	outputInhibit(1)	DCP.StatusChannel.i (INHIBIT)	all		
	outputFailureMaxTerminalVoltage(4)	DCP.StatusChannel.v (voltage limit error)	all		
	outputFailureMaxCurrent(5)	EDCP.ChannelEventStatus.ETRP / DCP.StatusChannel.t (current trip)	>20 / 0 -7		
	outputCurrentLimited(10)	EDCP.ChannelStatus.isCC / DCP.StatusChannel.t (current trip)	>20 / 7		
	outputRampUp(11)	DCP.StatusChannel.Ramping (with evaluation of channel adjustments)	all		
	outputRampDown(12)	DCP.StatusChannel.Ramping (with evaluation of channel adjustments)	all		
	outputEnableKill(13)	EDCP.ModuleControl.setKILena / DCP.StatusChannel.k (kill function)	>20 / 0 - 3		
		/ DCP.GeneralStatus.kilena	6, 7		
	outputEmergancyOff(14)	EDCP.ModuleEventStatus.EEMCY	>20		
	outputEventStatus (in preparation)	EDCP.EventChannelStatus	>20	read-write	bit
	outputVoltageRiseRate	EDCP.VoltageRampSpeed*EDCP.VoltageNominal	>20	read-write	float
		DCP.RampSpeed*DCP.NominalValue.Vmax/Resolution	0 - 2		
		DCP.RampSpeed*DCP.NominalValueChannel.Vmax/Resolution	6, 7		
	outputVoltageFallRate	EDCP.VoltageRampSpeed*EDCP.VoltageNominal	>20	read-write	float
		DCP.RampSpeed*DCP.NominalValue.Vmax/Resolution	0 - 2		
		DCP.RampSpeed*DCP.NominalValueChannel.Vmax/Resolution	3, 6, 7		
	outputSupervisionBehavior			read-write	bit
	outputFailureMaxCurrent	delayed trip function per channel as a derivation of the TripGroup	>20		
	outputFailureInhibit	monitoring INHIBIT per channel as a derivation of the MonitoringGroup	>20		
	outputMeasurementSenseVoltage	EDCP.VoltageMeasure	>20	read-only	float
		DCP.ActualVoltage*DCP.NominalValue.Vmax/Resolution	0 - 2		
		DCP.ActualVoltage*DCP.NominalValueChannel.Vmax/Resolution	3, 6, 7		
	outputMeasurementTerminalVoltage	EDCP.VoltageMeasure	>20 / 0 - 2	read-only	float
		DCP.ActualVoltage*DCP.NominalValue.Vmax/Resolution			
		DCP.ActualVoltage*DCP.NominalValueChannel/Resolution	3, 6, 7		

outputMeasurementCurrent		EDCP.CurrentMeasure	>20	read-only	float
		DCP.ActualCurrent*DCP.NominalValue.Imax/Resolution	0 - 2		
		DCP.ActualCurrent*DCP.NominalValueChannel.Imax/Resolution	3, 6, 7		
outputMeasurementTemperature		EDCP.BoardTemperature / DCP.BoardTemperature/10	>20 / <20	read-only	integer
outputSwitch				read-write	bit
	Off(0)	DCP.ChannelON_OFF	all	read-write	
	On(1)	DCP.ChannelON_OFF	all	read-write	
	resetEmegencyOff(2)	DCP.EmergencyCutOff	all	read-write	
	setEmergencyOff(3)	DCP.EmergencyCutOff	all	read-write	
	clearEvents(10)	EDCP.ChannelEventStatus	>20	write-only	
		EDCP.ModuleEventStatus	>20		
		EDCP.ModulEventChannelStatus	<20		
		DCP.GroupStatus1 VoltageLimits	<20		
		DCP.GroupStatus2 Hardware current limits	<20		
		DCP.GroupStatus3 Current trips	0 - 3		
		DCP.GroupStatus4 Fast regulation error	7		
		DCP.GroupStatus4 INHIBIT			
outputVoltage		EDCP.VoltageSet	>20	read-write	float
		DCP.SetVoltage*DCP.NominalValue.Vmax/Resolution	0 -2		
		DCP.SetVoltage*DCP.NominalValueChannel.Vmax/Resolution	3, 6, 7		
outputCurrent		EDCP.CurrentSet	>20	read-write	float
		DCP.SetSoftwareCurrentTrip*DCP.NominalValue.Imax/Resolution	0 -2		
		DCP.SetCurrent*DCP.NominalValueChannel.Imax/Resolution	6, 7		
outputConfigMaxSenseVoltage		EDCP.VoltageNominal	>20	read-only	float
		DCP.NominalValue.Vmax	0 - 2		
		DCP.NominalValueChannel.Vmax	3, 6, 7		
outputConfigMaxTerminalVoltage		EDCP.VoltageNominal	>20	read-only	float
		DCP.NominalValue.Vmax	0 -2		
		DCP.NominalValueChannel.Vmax	3, 6, 7		

	outputConfigMaxCurrent	EDCP.CurrentNominal	>20	read-only	float
		DCP.NominalValue.Imax	0 -2		
		DCP.NominalValueChannel.Imax	3, 6, 7		
	outputCurrentRiseRate	EDCP.CurrentRampSpeed*EDCP.VoltageNominal	>20	read-write	float
	outputCurrentFallRate	EDCP.CurrentRampSpeed*EDCP.VoltageNominal	>20	read-write	float
	outputTripTimeMaxCurrent	TripGroup.Timeout-time	>20	read-write	integer
	outputModule	DCP.SerialNumber	all	read-only	
outputModule					
	outputStatus (in preparation)	EDCP.ModuleStatus	all	read-only	bit
	outputEventStatus (in preparation)	EDCP.ModuleEventStatus	>20	read-write	bit
	outputHardwareLimitVoltage (in preparation)	EDCP.VoltageMax	all	read-only	float
	outputHardwareLimitCurrent (in preparation)	EDCP.CurrentMax	all	read-only	float
	outputThresholdArmErrorDetction (in preparation)	EDCP.ThresholdArmErrorDetction	all	read-write	float
	outputSerialNumber (in preparation)	EDCP.SerialNumber	all	read-only	unsigned
	outputFirmwareRelease (in preparation)	EDCP.FirmwareRelease	all	read-only	unsigned
	outputNameOfFirmware (in preparation)	EDCP.NameOfFirmware	>20	read-only	string
outputGroup					
	MonitoringGroup (in preparation)	EDCP.MonitoringGroup	>20	read-write	unsigned
	TripGroup (in preparation)	EDCP.TripGroup	>20	read-write	unsigned
groupsTable			all	write-only	bits
	groupsSwitch				
		Off(0)	DCP.ChannelON_OFF(0)	all	
		On(1)	DCP.ChannelON_OFF(0xffff)	all	
		resetEmergencyOff(2)	DCP.EmergencyCutOff(0)	all	
		setEmergencyOff(3)	DCP.EmergencyCutOff(0xffff)	all	

diableKill(4)	EDCP.ModulControl.setKill=false	all
	DCP.StatusChannel.k=false	0 - 3
	DCP.GeneralStatus.kilena=false	6, 7
enableKill(5)	EDCP.ModulControl.setKill=true	all
	DCP.StatusChannel.k=true	0 - 3
	DCP.GeneralStatus.kilena=true	6, 7
clearEvents(10)	EDCP.ModulControl.doClear=true	>20
	DCP.GroupStatus1 VoltageLimits=0xffff	<20
	DCP.GroupStatus2 Hardware current limits=0xffff	<20
	DCP.GroupStatus3 Current trips=0xffff	<20
	DCP.GroupStatus4 Fast regulation error=0xffff	<20
	DCP.GroupStatus4 INHIBIT=0xffff	<20

Example of necessary SNMP commands for the delayed trip function:

snmpset -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 groupsSwitch.u100 i 4
disableKill

snmpset -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputVoltage.u100 F 60
60.000000 V

snmpset -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputSwitch.u100 i 1
On

snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputVoltage.u100
60.000000 V

snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputMeasurementSenseVoltage.u100
60.104588 V

snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputMeasurementCurrent.u100
0.000001 A

snmpgetx -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputMeasurementCurrent.u100
0.000000735 A

snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputSupervisionBehavior.u100
0

snmpset -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputSupervisionBehavior.u100 i 64
64

snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputSupervisionBehavior.u100
64

snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputTripTimeMaxCurrent.u100
0 ms

snmpset -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputTripTimeMaxCurrent.u100 i 3000
3000 ms /* delay of 3 sconds */

snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputStatus.u100
"80 "   /* outputOn */

snmpgetx -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputMeasurementCurrent.u100
0.000000735 A

snmpsetx -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputCurrent.u100 F 0.0000007
0.000000700 A

snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputStatus.u100
"04 08 " /*outputFailureMaxCurrent, outputRampDown */

snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputStatus.u100
"04 "   /* outputFailureMaxCurrent */

snmpset -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputSwitch.u100 i 10
clearEvents

snmpsetx -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputCurrent.u100 F 0.00001
0.000010000 A

snmpset -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputSwitch.u100 i 1
On

snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputStatus.u100
"80 10 " /* outputOn, outputRampUp */

/* a load has been switched on channel 0 to bring them in state CC current limited */
snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputStatus.u100
"80 20 " /* outputOn, outputCurrentLimited */
         .
         .
         .
snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputStatus.u100
"80 20 "   /* outputOn, outputCurrentLimited */

/* the delayed trip fuction ramps the voltage after 3 seconds to zero */
snmpget -Oqv -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.16.222 outputStatus.u100
"04 08 "   /* outputFailureMaxCurrent, outputRampDown */