Technical documentation

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Using SNMP with CC24, iCSmini and SHR

Document history

Version	Date	Major changes
2.4.	2023-01-05	Add an example to output a whole table of SNMP items
2.3.	2022-05-30	Add information for higher precision output
2.2	2020-02-19	Add SNMP OID suffixes explanation Add literature hint for **W-IE-NE-R** MPOD manual (References)
2.1	2020-02-05	Add installation hints for Ubuntu Linux and Windows 10 Add SNMP item description for outputTripActionMaxCurrent, outputTripAction-ExternalInhibit and some more details to outputSupervisionBehavior Add an example for the Delayed Trip function of the HV devices
2.0	2020-01-17	Fixed typos, improved descriptions
1.1	2019-12-11	Outlined SNMP instructions
1.0	2019-11-13	Initial Version

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The information in this manual is subject to change without notice. We take no responsibility for any mistake in the document. We reserve the right to make changes in the product design without reservation and without notification to the users. We decline all responsibility for damages and injuries caused by an improper use of the device.

Safety

This section contains important security information for the installation and operation of the device. Failure to follow safety instructions and warnings can result in serious injury or death and property damage.

Safety and operating instructions must be read carefully before starting any operation.

We decline all responsibility for damages and injuries caused which may arise from improper use of our equipment.

Depiction of the safety instructions

DANGER!

DANGER!

"Danger!" indicates a severe injury hazard. The non-observance of safety instructions marked as "Danger!" will lead to possible injury or death.

WARNING!

WARNING!

"Warning!" indicates an injury hazard. The non-observance of safety instructions marked as "Warning!" could lead to possible injury or death.

CAUTION!

CAUTION!

Advices marked as "Caution!" describe actions to avoid possible damages to property.

INFORMATION

INFORMATION

Advices marked as "Information" give important information.

Read the manual.

Attention high voltage!

Important information.

Intended Use

The device may only be operated within the limits specified in the data sheet. The permissible ambient conditions (temperature, humidity) must be observed. The device is designed exclusively to control high voltage systems as specified in the data sheet. Any other use not specified by the manufacturer is not intended. The manufacturer is not liable for any damage resulting from improper use.

Qualification of personnel

A qualified person is someone who is able to assess the work assigned to him, recognize possible dangers and take suitable safety measures on the basis of his technical training, his knowledge and experience as well as his knowledge of the relevant regulations.

General safety instructions

- Observe the valid regulations for accident prevention and environmental protection.
- Observe the safety regulations of the country in which the product is used.
- Observe the technical data and environmental conditions specified in the product documentation.
- You may only put the product into operation after it has been established that the high-voltage device complies with the country-specific regulations, safety regulations and standards of the application.
- The high-voltage power supply unit may only be installed by qualified personnel.

Important security information

DANGER!

DANGER!

This device generates high voltages or is part of or attached to high voltage supplying systems.
High voltages are dangerous and may be fatal.

USE CAUTION WHILE WORKING WITH THIS EQUIPMENT.
BE AWARE OF ELECTRICAL HAZARDS.

Always follow at the minimum these provisions:

- High voltages must always be grounded
- Do not touch wiring or connectors without securing
- Never remove covers or equipment
- Always observe humidity conditions
- Service must be done by qualified personnel only

WARNING!

WARNING!

RAMP DOWN VOLTAGES!
Before insertion or removal of crate controller, please make sure, that all voltages are ramped down, modules are switched off and power cord is disconnected.

CAUTION!

CAUTION!

When remote controlling the high voltage systems, make sure that nobody is near the high voltage or can be injured.

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CHECK COMPATIBILITY!
Please check compatibility list first.

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1 Introduction

SNMP (Simple Network Management Interface) is a network protocol to control and monitor remote computers. It was originally developed for administration tasks, but can as well be used for industrial control. The station that is controlled resp. monitored runs a SNMP server, the controlling station uses the SNMP client.

The protocol allows a resource and timing efficient communication to the remote device. Client applications and libraries are available for a wide range of computers and operating systems.

2 iseg SNMP server

The iseg SNMP server is based on the net-snmp project and was developed as fully compatible replacement for the WIENER MPOD SNMP server (see Appendix). The iseg SNMP server is part of the iseg Communication Server iCS-2 running under Linux on a CC24, iCSmini, or SHR.

3 SNMP namespace configuration

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Before the SNMP server can be used, a namespace configuration file describing the hardware connected to CC24, iCSmini or SHR needs to be created and the SNMP service must be started.

The namespace configuration can be performed with the iCSconfig web interface. Enter the IP-Address of the CC24 or iCSmini in a web browser, sign in with user name and password and then select the iSCconfig dialog.

1. Configure the connected modules and store this configuration in iCSconfig.xml
    - Select the dialog iCSconfig ➞ hardware
    - Make sure that the crate back plane respectively the connected modules (via CAN, USB or RS232) are switched on.
    - Press the button *rescan hardware* and then *auto configuration* to generate a default configuration file
    - *Save the configuration at the end.*

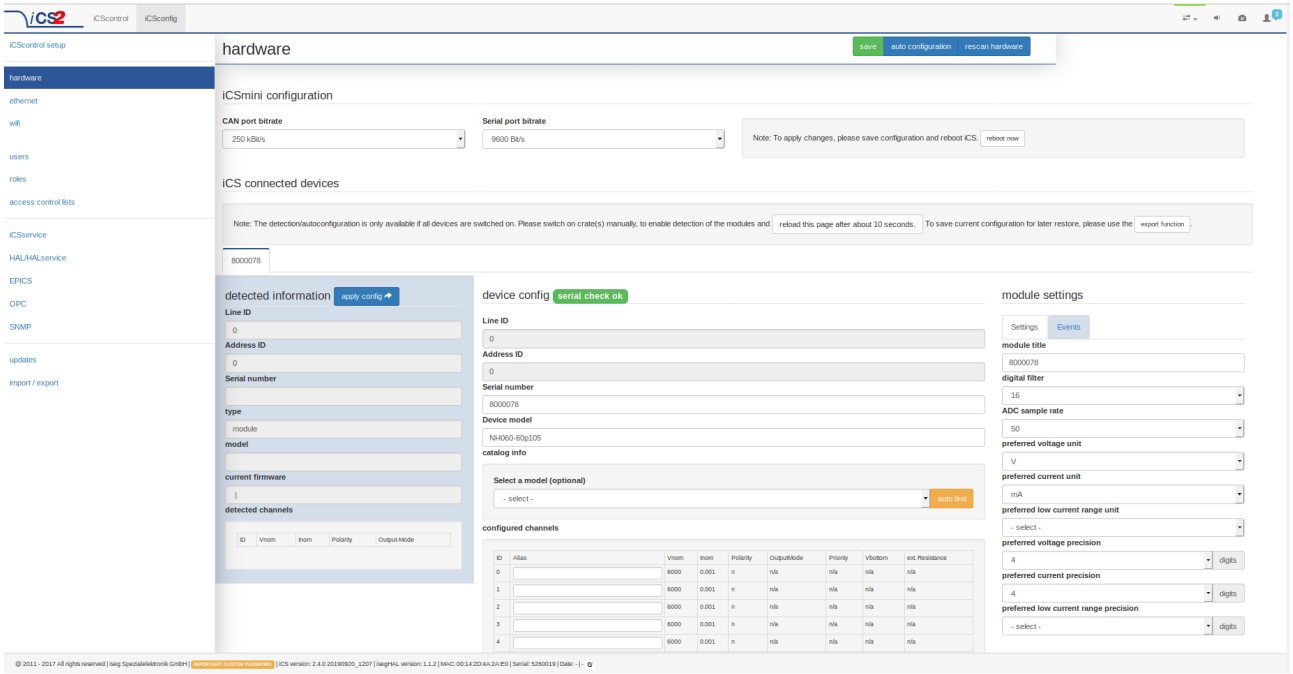

Figure 1: Configure the connected modules

2. Configure the SNMP namespace
   - Select the dialog iCSconfig ➜ SNMP
   - The *generate configuration* button generates the SNMP data points for all the connected modules.
   - The generated .sub file can be *downloaded* in order to compare the configuration result.
   - Switch on *autostart SNMP interface* and save the configuration.
   - *Press start SNMP to start the SNMP server immediately.*

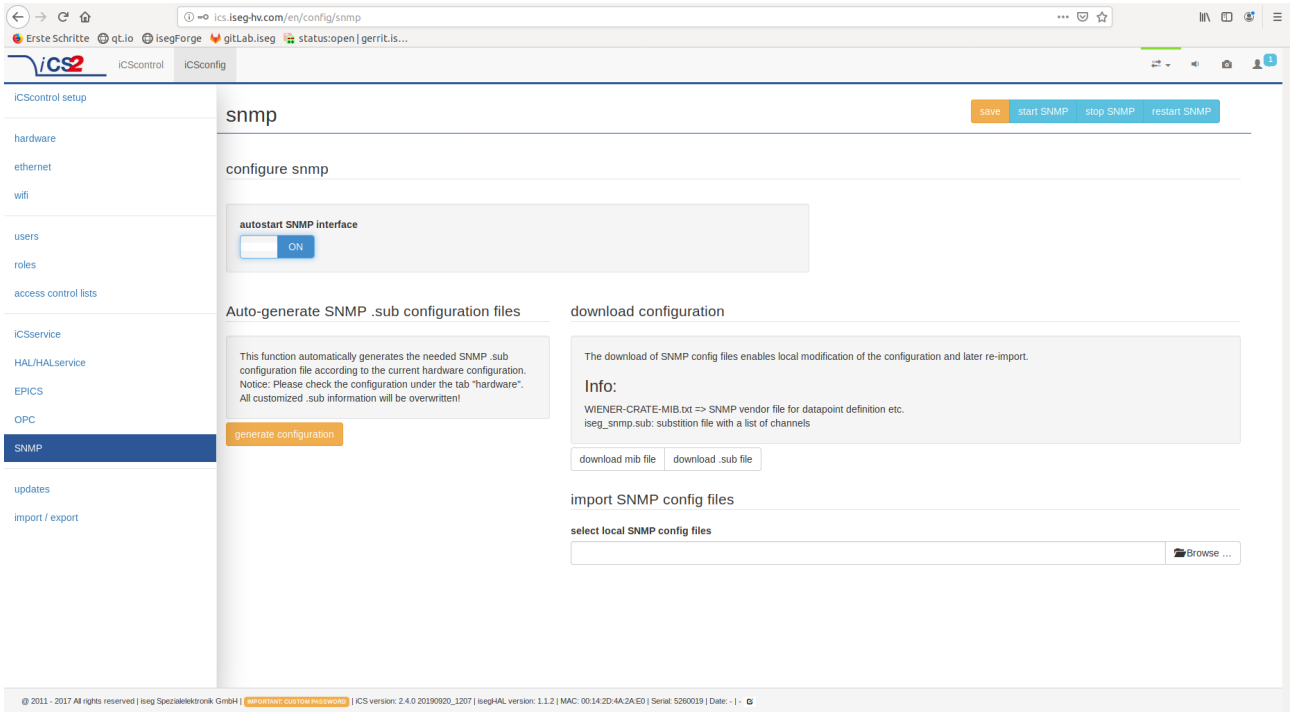

Figure 2: SNMP configuration dialog

4 Net-SNMP

4.1 Ubuntu Linux installation

sudo apt-get install snmp libsnmp-dev

sudo apt-get install snmp-mibs-downloader

sudo download mibs

WEB interface iCSconfig ➜ SNMP via button “download mib file”

open a terminal

sudo cp ~/Downloads/WIENER-CRATE-MIB.txt *usr*share/snmp/mibs

4.2 Windows 10 installation

https://sourceforge.net/net-snmp/5.7-binaries/net-snmp-5.7.0-1.x86.exe/download

WEB interface iCSconfig ➜ SNMP via button “download mib file”

Windows key ➜ cmd ➜ Enter

copy Downloads\WIENER-CRATE-MIB.txt c:\usr\share\snmp\mibs

4.3 General information

Net-SNMP is a collection of open source SNMP programs and libraries, which can be used to access the CC24, iCSmini or SHR via the Simple Network Management Protocol. Please see http://net-snmp.sourceforge.net/ for more details.

The possible SNMP calls to the iseg SNMP server are described in the WIENER-CRATE-MIB (Management Information Base) file. In order to perform SNMP calls to any iseg or WIENER product, the current WIENER-CRATE-MIB file must be stored on the PC doing the calls. Some more standard SNMP MIB files must also be stored at that location (at least SNMPv2-CONF.txt, SNMPv2-MIB.txt, SNMPv2-SMI.txt, SNMPv2-TC.txt, and SNMPv2-TM.txt)

By default that location is:

- On Linux: /usr/share/snmp/mibs
- On Windows: C:\usr\share\snmp\mibs

A copy of WIENER-CRATE-MIB file is ready for download from iCS-2. Use the button “download mib file” in the dialog iCSconfig ➜ SNMP.

Beside providing a C library to do SNMP call, net-snmp also has ready-made command line programs to perform SNMP communication. The most commonly used programs are:

- **snmpwalk** – returns a group of parameters / items (multiple read)
- **snmpget** – returns a specific parameter (read)
- **snmpset** – sets a specific parameter (write)

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Please see the net-snmp description and help files for detailed instructions and options.

All parameters defined for the iCS-2 system as well as crates, iCSmini or SHR are contained within the WIENER-CRATE-MIB.txt file. This file is human-readable and also contains detailed descriptions of all parameters.

SNMP uses so-called communities to restrict the access to the items. The following community groups are used in the iseg SNMP server:

- "public": for all read operations
- "guru": to change parameters

A fast and easy way to begin using SNMP is to use command line arguments. The command line arguments specified in this document are based on netSNMP. The command line syntax is equal for all operating systems.

For all WIENER-CRATE-MIB items, a quick help text can be shown by using:

```
snmptranslate -On -Td WIENER-CRATE-MIB::xxxx
```

Example:

```
snmptranslate -On -Td WIENER-CRATE-MIB::outputName
.1.3.6.1.4.1.19947.1.3.2.1.2
outputName OBJECT-TYPE
-- FROM      WIENER-CRATE-MIB
-- TEXTUAL   CONVENTION DisplayString
SYNTAX       OCTET STRING (1..4)
DISPLAY-HINT "255a"
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION  "A textual string containing a short name of the
             output. If the crate is equipped with an alphanumeric
             display, this string is shown to identify a output channel.
             "
::= { iso(1) org(3) dod(6) internet(1) private(4) enterprises(1) wiener(19947)
crate(1) output(3) outputTable(2) outputEntry(1) 2 }
```

A first communication with the CC24 crate can be done using the snmpwalk to confirm the existence of the power supply at the given IP address.

```
snmpwalk -Cp -Oqv -v 2c -M $path -m +WIENER-CRATE-MIB -c public $ip
```

with:

snmpwalk:	This command will retrieve a block of information.
-v 2c:	This parameters specifies which version of the SNMP to use. WIENER devices use SNMP 2C.
-M $path:	This parameter should be replaced with the path to the WIENER-CRATE-MIB.txt file. It is not needed in case the default path is used.
-m +WIENER-CRATE-MIB:	This parameter tells the command to look at the WIENER-CRATE-MIB to resolve the OID name.
-c public:	This specifies which community of values can be accessed.
$ip:	This must be replaced with the IP address of the CC24 crate.

Example for crate with IP address 192.168.16.80:

```
snmpwalk -v 2c -m +WIENER-CRATE-MIB -c public 192.168.16.80
```

returns:

```
SNMPv2-MIB::sysDescr.0 = STRING: iseg iCS (5230200, isegHAL 1.0.2.8)
SNMPv2-MIB::sysObjectID.0 = OID: WIENER-CRATE-MIB::sysMainSwitch.0
DISMAN-EVENT-MIB::sysUpTimeInstance = Timeticks: (91278) 0:15:12.78
SNMPv2-MIB::sysContact.0 = STRING: \"iseg Spezialelektronik GmbH (support@iseg-hv.de) and WIENER\"
SNMPv2-MIB::sysName.0 = STRING: iseg-iCS2-5230200
SNMPv2-MIB::sysLocation.0 = STRING: iCS in the lab
SNMPv2-MIB::sysServices.0 = INTEGER: 79
```

A list of all available parameters or sub-parameters as for instance channels can be obtained using

the command snmpwalk with the parameter “crate”. To get all parameters use:

```
snmpwalk -Cp -Oqv -v 2c -M $path -m +WIENER-CRATE-MIB -c public $ip crate
```

```
snmpwalk -v 2c -m +WIENER-CRATE-MIB -c public 192.168.16.80 crate
```

Example:

```
snmpget -v 2c -M $path -m +WIENER-CRATE-MIB -c public $ip sysMainSwitch.0
WIENER-CRATE-MIB::sysMainSwitch.0 = INTEGER: OFF(0)
```

This indicates that the CC24 crate is currently off. To better understand the call above we will break it down by parameter:

snmpget:	This command will retrieve a value about the CC24 crate or one of the channels it houses.
-v 2c:	This parameters specifies which version of the SNMP to use. WIENER devices use SNMP 2C.
-M $path:	This parameter should be replaced with the path to the WIENER-CRATE-MIB.txt file.
-m +WIENER-CRATE-MIB:	This parameter tells the command to look at the WIENER-CRATE-MIB to resolve the OID name.
-c public:	This specifies which community of values can be accessed.
$ip:	This should be replaced with the IP address of the CC24 crate.
sysMainSwitch.0:	This is the register you wish to retrieve.

Since we we know from the call above that the crate is off, we may want to turn it on. To turn CC24 on, we can use the command:

```
snmpset -v 2c - path -m +WIENER-CRATE-MIB -c guru $ip sysMainSwitch.0 i 1
```

Most of the parameters for snmpset are the same as snmpget, the new parameters are highlighted below:

- **i:** Since sysMainSwitch.0 is an integer value, we specify the value to be an integer with.
- **1:** This is the value we wish to write. In this case we write ‘one’ to set the main switch to on.

For most of the write commands (snmpset) the access type has to be changed from public to guru.

4.4 SNMP outputTable, Channel commands

The outputTable contains all HV / LV channel objects which represent the properties for a channel data point of the front end device.

Further it is possible obtain the array of names or values for a specific parameter. The following command provides a list of all existing output channels:

```
snmpwalk -Cp -Oqv -v 2c -M $path -m +WIENER-CRATE-MIB -c public $ip outputName
```

Example:

```
snmpwalk -v 2c -m +WIENER-CRATE-MIB -c public 192.168.16.80 outputName
```

returns for a CC24 system with 2 ISEG EHS HV modules (8 channels each) in slot 1 and 2:

```
WIENER-CRATE-MIB::outputName.u100 = STRING: U100
WIENER-CRATE-MIB::outputName.u101 = STRING: U101
WIENER-CRATE-MIB::outputName.u102 = STRING: U102
WIENER-CRATE-MIB::outputName.u103 = STRING: U103
WIENER-CRATE-MIB::outputName.u104 = STRING: U104
WIENER-CRATE-MIB::outputName.u105 = STRING: U105
WIENER-CRATE-MIB::outputName.u106 = STRING: U106
WIENER-CRATE-MIB::outputName.u107 = STRING: U107
WIENER-CRATE-MIB::outputName.u200 = STRING: U200
WIENER-CRATE-MIB::outputName.u201 = STRING: U201
WIENER-CRATE-MIB::outputName.u202 = STRING: U202
WIENER-CRATE-MIB::outputName.u203 = STRING: U203
WIENER-CRATE-MIB::outputName.u204 = STRING: U204
WIENER-CRATE-MIB::outputName.u205 = STRING: U205
WIENER-CRATE-MIB::outputName.u206 = STRING: U206
WIENER-CRATE-MIB::outputName.u207 = STRING: U207
```

This example returns 16 index numbers.

4.5 Module/Channel mapping to SNMP OID suffixes

SNMP is addressing all channels of all modules of one CC24 crate as one single array (or, to be exact, table). A specific item is identified by the OID prefix (e.g. WIENER-CRATE-MIB::outputName), a separating dot and the OID suffix defining the module and channel.

The syntax of the OID suffix is: u<module_number (1 digit)><channel_number (2 digits)>

without leading zeros (so the OID suffix of the very first channel of the module 0 (next to the CC24 controller) is u0 (not u00 or u000, leading zeros haven to be removed).

The module number (0-9) and channel number (0-47 for a 48 channel module), where the first digit is defined by the slot number and the following two by the channel of the particular module in this slot:

Crate Slot	Module Number	Channel Number	OID suffix textual form	corresponding OID suffix index (numerical form, don't use in standard situations)
1	0	0 to 47	u0, u1, .. u47	1, 2, .. 48
2	1	0 to 47	u100, u101, .. u147	101, 102, .. 148
...	...	...	...	...
10	9	0 to 47	u900, u901, .. u947	901, 902, .. 948

Table 1

Please note that the textual OID suffix should be used in all standard situations. The textual OID suffix is translated to it's corresponding numerical value by the SNMP client, so no need for the user to do it.

In case of master-slave crate systems, there will be an additional digit for the crate number, just use u1000.. .. u1947 for the second crate, and so on:

OID suffix = 1000 • crate + 100 • module number + channel number

index = 1000 • crate + 100 • module number + channel number + 1

(crate: 1 ... 4 and 8 ... 11, module: 0 ... 9 , channel: 0 ... 47)

To see all output channel set voltage values use snmpwalk with outputVoltage:

```
snmpwalk -Cp -Oqv -v 2c -M $path -m +WIENER-CRATE-MIB -c public $ip outputVoltage
```

Example:

```
snmpwalk -v 2c -m +WIENER-CRATE-MIB -c public 192.168.16.80 outputVoltage
```

returns for a CC24 system with one 8 channel ISEG EHS HV module in slot 2:

```
WIENER-CRATE-MIB::outputVoltage.u200 = Opaque: Float: 100.000000 V
WIENER-CRATE-MIB::outputVoltage.u201 = Opaque: Float: 200.000000 V
WIENER-CRATE-MIB::outputVoltage.u202 = Opaque: Float: 300.000000 V
WIENER-CRATE-MIB::outputVoltage.u203 = Opaque: Float: 400.000000 V
WIENER-CRATE-MIB::outputVoltage.u204 = Opaque: Float: 500.000000 V
WIENER-CRATE-MIB::outputVoltage.u205 = Opaque: Float: 600.000000 V
WIENER-CRATE-MIB::outputVoltage.u206 = Opaque: Float: 700.000000 V
WIENER-CRATE-MIB::outputVoltage.u207 = Opaque: Float: 800.000000 V
```

After obtaining information about the power supplies or a list of channels and parameters, it is useful to be able to write or read information about it. This can be done using the **snmpget** and **snmpset** commands.

```
snmpget -Oqv -v 2c -M $path -m +WIENER-CRATE-MIB -c guru $ip name.index
```

```
snmpset -v 2c -M $path -m +WIENER-CRATE-MIB -c guru $ip name.index format value
```

The most common kind of call you will want is to get data from the power supply. This is easily done via the snmpget command. The example below retrieves information about whether the power for channel 0 is on. If you wish to test this example on your own system replace “$path” with the path to WIENER-CRATE-MIB.txt (/usr/share/snmp/mibs by default and “$ip” with the ip address of your CC24 (see following examples).

```
snmpget -v 2c -M $path -m +WIENER-CRATE-MIB -c public $ip outputSwitch.0
WIENER-CRATE-MIB::outputSwitch.0 = INTEGER: OFF(0)
```

For most of the write commands (snmpset) the access type has to be changed from public to guru. A complete list of value names that can be written or read via SNMP can be found in the WIENER-CRATE-MIB but commonly needed values are:

Value Name	Type	Access	Unit	Comments
outputVoltage	Float	R/W	V	Channel voltage set
outputCurrent	Float	R/W	A	Channel current set
outputMeasurementSenseVoltage	Float	R	V	Actual channel voltage at sense line
outputMeasurementTerminalVoltage	Float	R	V	Actual channel voltage at terminal
outputMeasurementCurrent	Float	R	A	Actual channel current
outputConfigMaxSenseVoltage	Float	R	V	Nominal voltage for sense line
outputConfigMaxTerminalVoltage	Float	R	V	Nominal voltage for terminal
outputConfigMaxCurrent	Float	R	A	Nominal current
outputSwitch	Integer	R/W	–	Turns channel ON / OFF, Emergency off, reset error flags
outputVoltageRiseRate	Float	R/W	V/s	Channel voltage ramp rate up
outputVoltageFallRate	Float	R/W	V/s	Channel voltage ramp rate down
outputCurrentRiseRate	Float	R/W	A/s	Channel current ramp rate up
outputCurrentFallRate	Float	R/W	A/s	Channel current ramp rate down
outputStatus	Bits	R	–	Channel status information

Table 2

For example, to read the channel set voltage use:

```
snmpget -Oqv -v 2c -M $path -m +WIENER-CRATE-MIB -c guru $ip outputVoltage.index
```

Example:

```
snmpget -v 2c -m +WIENER-CRATE-MIB -c public 192.168.2.25 outputVoltage.u0
WIENER-CRATE-MIB::outputVoltage.u0 = Opaque: Float: 0.000000 V
```

Write and read individual set voltages, “guru” access needed for writing!

```
snmpset -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.2.25 outputVoltage.u101 F 200
WIENER-CRATE-MIB::outputVoltage.u101 = Opaque: Float: 200.000000 V
```

Note the “F” before the 200, this indicates that the value is a floating point number. This value can be read back via:

```
snmpget -v 2c -m +WIENER-CRATE-MIB -c public 192.168.2.25 outputVoltage.u101
WIENER-CRATE-MIB::outputVoltage.u101 = Opaque: Float: 200.000000 V
```

Turning Channels ON/OFF - The individual channels of an CC24 system low or high voltage module can be turned on or off using the snmpset command. To turn on channel Ux:

```
snmpset -Oqv -v 2c -M $path -m +WIENER-CRATE-MIB -c guru $ip outputSwitch.index i 1
```

The same channel can be turned off with:

```
snmpset -Oqv -v 2c -M $path -m +WIENER-CRATE-MIB -c guru $ip outputSwitch.index i 0
```

The outputSwitch can also be used for emergency-off and to reset error flags. The matching values are:

```
{off(0), on(1), resetEmergencyOff(2), setEmergencyOff(3), clearEvents(10)}
```

Print the output table items comma separated:

```
snmptable -v 2c -Cf ";" -c public 192.168.16.137 WIENER-CRATE-MIB::outputTable
```

Item	Type	Access	Switch functions
OutputSwitch	Integer	W	off (0) on (1) resetEmergencyOff (2) setEmergencyOff (3) clearEvents (10)

Example:

```
snmpset -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.2.25 outputSwitch.u101 i 1
```

CC24 low and high voltage modules have programmable voltage ramp speeds. The WIENER low voltage modules allow different ramp up and down values for each channel, whereas most of ISEG modules have a common ramp speed for all channels. This means, changing the channel ramp up and down changes the ramp speed for all channels in the module! One exception is the SHR, which has separate ramp up and down speeds for each channel.

For write access “guru” is needed:

```
snmpset -Oqv -v 2c -M $path -m +WIENER-CRATE-MIB -c guru
$ipoutputVoltageRiseRate.index F value
```

Example:

```
snmpset -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.2.25 outputVoltageRiseRate.u101 F
10
WIENER-CRATE-MIB::outputVoltageRiseRate.u101 = Opaque: Float: 10.000000 V/s

snmpget -v 2c -m +WIENER-CRATE-MIB -c public 192.168.2.25 outputVoltageRiseRate.u101
WIENER-CRATE-MIB::outputVoltageRiseRate.u101 = Opaque: Float: 10.000000 V/s
```

Item	Type	Access	Switch functions
outputSupervisionBehavior	Integer	R/W	to control INHIBIT and Delayed Trip function. Contains bit field sections with a range of two bits for any function. 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.

A bit field packed into an integer which define the behavior 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:

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

4.5.1 iseg High Voltage, Channel special commands

Item	Type	Access	Unit	Range
outputVoltageRiseRate	Float	R/W	V/s	1 mV/s – 20% • VoltageNominal 1% • VoltageNominal (KILL enabled)

Note that most of HV modules have one common value for ramping up and down for all channels. This value can be set or read by using any channel number of the particular module as index. EHS, EDS and EBS modules typically have a ramp rate range from 1 mV/s – 20% • VoltageNominal (max. nominal voltage). In case KILL is enabled, the maximum ramp rate is reduced to 1% • VoltageNominal in order to lower the risk of unwanted trips during voltage ramp cycles.

```
snmpset -Oqv -v 2c -M $path -m +WIENER-CRATE-MIB -c guru $ip

outputVoltageRiseRate.index      F value
```

Item	Type	Access	Unit	Range
outputCurrentRiseRate	Float	R/W	A/s	(2% – 100%) * CurrentNominal

Note that most of HV modules accesses for the outputCurrentRiseRate and outputCurrentFallRate one common data point and therefore will be reply always the same value.

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The HV modules with the latest firmware kernel supports different rise and fall rates for current and voltage per channel.

Item	Type	Access	Unit	Range
outputTripTimeMaxCurrent	Float	R/W	ms	8 – 4000 ms

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

Item	Type	Access	Status bits
outputStatus	Bits	W	outputEnableKill (13) outputEmergency (14) outputVoltageBottomReached (21)

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

Item	Type	Access	Status bits
outputSwitch	Bits	R/W	off (0) on (1) resetEmergencyOff (2) setEmergencyOff (3) clearEvents (10)

Read to request the state of channel switches.

Write to switch the state of the channel:

- If the channel is On, and the write value is Off, then the channel will switch off by ramping down the High Voltage.
- 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 by ramping up the High Voltage.
- If the write value is resetEmergencyOff, then the channel will leave the state EmergencyOff and go to Off. Further, writing clearEvents is necessary before the voltage can be switched on again.
- If the write value is setEmergencyOff, then the channel will enter to the state EmergencyOff, which means that the High Voltage will shut down without ramp and reset the outputVoltage to null volt. Switching on of High Voltage is not possible in state EmergencyOff.
- 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 function
outputSupervisionBehavior	Integer	R/W	to control INHIBIT and Delayed Trip function. Contains bit field sections with a range of two bits for any function. 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.

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:

The iseg HV devices can use the bit fields:

Bit 6, 7: outputFailureMaxCurrent

Bit 12, 13: outputFailureInhibit

Item	Type	Access	Switch function
outputTripActionMaxCurrent	Integer	R/W	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.

Item	Type	Access	Switch function
outputTripActionExternalInhibit	Integer	R/W	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.

outputFailureMaxCurrent support of the function delayed trip

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

outputFailureInhibit support of the optional hardware function EXTERNAL INHIBIT per channel

The programmed activity will start when an external channel inhibit occurs

The channel have to be in state disableKill to guarantee a proper behavior of the functions above.

Example to the delayed trip function:

Configure module slot 1, channel 1 to voltage ramp down after a trip is occurred because the current exceeds 100µA for more than 2 Seconds.

```
snmpset -v2c -m WIENER-CRATE-MIB -c guru 192.168.2.25 outputSupervisionBehavior.u101 i
64

snmpset -v2c -m WIENER-CRATE-MIB -c guru 192.168.2.25 outputTripTimeMaxCurrent.u101 i
2000

snmpset -v2c -m WIENER-CRATE-MIB -c guru 192.168.2.25 outputCurrent.u101 F 0.0001

snmpget -v2c -m WIENER-CRATE-MIB -c guru 192.168.2.25 outputTripActionMaxCurrent.u101

WIENER-CRATE-MIB::outputTripActionMaxCurrent.u101 = INTEGER: 1

snmpget -v2c -m WIENER-CRATE-MIB -c guru 192.168.2.25 outputStatus.u101

WIENER-CRATE-MIB::outputStatus.u101 = BITS: 04 00 40 outputFailureMaxCurrent(5)
outputLowCurrentRange(17)
```

4.5.2 iseg Load, Channel commands

iseg load modules provide switchable resistors and a ripple measurement capacitor to test and evaluate iseg High Voltage modules. The load module provides internal voltage and current measurements, as well as a switchable measurement output.

The load modules only provide a limited instruction set, which is documented below.

Item	Type	Access	Unit
outputMeasurementTerminalVoltage	Float	R	V
outputMeasurementCurrent	Float	R	A

The items outputMeasurementTerminalVoltage and outputMeasurementCurrent return the voltage and current measured in the load unit. These values are only measured, if the external measurement and ripple measurement are turned off.

Item	Type	Access	Status bits
outputSwitch	Bits	R/W	clearEvents(10) setExternalAndRippleMeasurementOff(20) setExternalMeasurementOn(21) setRippleMeasurementOn(22) setExternalAndRippleMeasurementOn(23)

The item outputSwitch allows to activate or deactivate external measurements for a channel via the measurement outputs on the front panel of the load unit:

- The value setExternalAndRippleMeasurementOff deactivates all measurements outputs for the channel.
- The value setExternalMeasurementOn activates the voltage and current measurement outputs of the channel.
- The value setRippleMeasurementOn activates the ripple measurement output of the channel.
- The value setExternalAndRippleMeasurementOn activates all three measurement outputs of the channel.

INFORMATION

INFORMATION

The measurement output can only be activated for one channel at the same time. If an output is activated for a channel, the previously switched channel is deactivated.

If an external measurement output is activated, no internal measurement will be executed. In order to reactivate the internal measurement, the external measurement must be completely deactivated. If the current output status is unknown, this can be done by writing setExternalAndRippleMeasurementOn and then setExternalAndRippleMeasurementOff for an arbitrary channel.

INFORMATION

INFORMATION

All other SNMP items from the branch outputTable branch are readable for compatibility reasons, but will not be used by the load unit.

4.5.3 WIENER MPV, Channel special commands

Item	Type	Access
outputUserConfig	Integer32 (0..127)	R/W

A bit field packed into an integer which define the behavior of the output channel.

Usable for WIENER LV devices only.

The position of the bit fields in the integer value are:

- Bit 0: Voltage ramping at switch off:
  - 0: Ramp down at switch off.
  - 1: No ramp at switch off (immediate off)
- Bit 1, 2: Set different regulation modes, dependent on the cable inductance:
  - 0: fast: short cables, up to 1 meter.
  - 1: moderate: cables from 1 to 30 meter.
  - 2: fast: identical to 0 (should not be used)
  - 3: slow: cables longer than 30 meter.
- Bit 3: Internal sense line connection to the output (MPOD only):
  - 0: The sense input at the sense connector is used for regulation.
  - 1: The output voltage is used for regulation. Any signals at the sense connector are ignored.
- Bit 4: Enable External Inhibit input.
  - 0: The external inhibit input is ignored.
  - 1: The external inhibit input must be connected to a voltage source to allow switch on.
- Bit 5: Disable Global Inhibit inputs.
  - 0: The global inhibit/interlock inputs of the system is active.
  - 1: The global inhibit/interlock inputs of the system is ignored.
- Bit 6: Automatic Power On.
  - 0: After switching the main system switch ON, the output is not switched on automatically. A separate outputSwitch command is required.
  - 1: After switching the main system switch ON, the output is switched on automatically. If 'Disable Global Inhibit' (bit 5) is set, the output will be switched on regardless of the global inhibit/interlock signals.

4.6 Access to channel groups

To access multiple units the groupsSwitch function provides access to all channels in the CC24 crate by the index:

- 0: All iseg and all WIENER HV channels.
- 64: All iseg HV channels.
- 128: All WIENER LV channels

Item	Type	Access	Switch functions
groupsSwitch	Integer	W	off (0) on (1) resetEmergencyOff (2) setEmergencyOff (3) disableKill (4), enableKill (5), clearEvents (10)

Example switch all channels of all modules on:

```
snmpset -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.0.80 groupsSwitch.0 i 1
WIENER-CRATE-MIB::groupsSwitch.0 = INTEGER: on(1)
```

Example switch all channels off:

```
snmpset -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.0.80 groupsSwitch.0 i 0
WIENER-CRATE-MIB::groupsSwitch.0 = INTEGER: off(0)
```

Example switch all high voltage channels (ISEG modules) off:

```
snmpset -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.0.80 groupsSwitch.64 i 0
WIENER-CRATE-MIB::groupsSwitch.64 = INTEGER: off(0)
```

Example RESET ISEG HV Modules after Safetyloop error:

```
snmpset -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.0.80 groupsSwitch.64 i 10
WIENER-CRATE-MIB::groupsSwitch.64 = INTEGER: clearEvents(10)
```

4.7 Access to iseg channel groups

Item	Type	Access	Switch functions
groupsSwitch.64	Integer	W	off (0) on (1) resetEmergencyOff (2) setEmergencyOff (3) disableKill (4), enableKill (5), disableAdjust(6), enableAdjust(7), clearEvents(10)

Write to switch the state of all channels of group 64 (all high voltage modules):

- If any channel is On, and the write value is Off, then all channels will switch off by ramping down the High Voltages.
- 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 by ramping up High Voltages.
- 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 enter to the state EmergencyOff, which means that the High Voltage will switch off without a ramp and reset of the outputVoltage to null volt. Switching on of High Voltage is not possible in state EmergencyOff.
- 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 disableAdjust, then all channels will switch off the function for High Voltage fine adjustment.
- If the write value is enableAdjust, then all channels will switch on the function for High Voltage fine adjustment.
- 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).

4.8 SNMP moduleTable, Module commands

The moduleTable contains all HV / (LV) objects which represent the properties of the whole module front end.

```
snmptranslate -On -Td WIENER-CRATE-MIB::moduleIndex
.1.3.6.1.4.1.19947.1.3.6.1.1
moduleIndex OBJECT-TYPE
  -- FROM WIENER-CRATE-MIB
  SYNTAX INTEGER {ma0(1), ma1(2), ma2(3), ma3(4), ma4(5), ma5(6), ma6(7), ma7(8),
  ma8(9), ma9(10)}
  MAX-ACCESS not-accessible
  STATUS current
DESCRIPTION     "A unique number for each HV/LV module. Its value

      ranges between 1 and the total number of HV/LV modules.

      Note, index 1 corresponds to ma0."

::= { iso(1) org(3) dod(6) internet(1) private(4) enterprises(1) wiener(19947)
crate(1) output(3) moduleTable(6) moduleEntry(1) 1 }
```

All iseg High Voltage modules provide some common data points as snmp items under the moduleTable entry point.

```
snmpwalk -v 2c -m +WIENER-CRATE-MIB -c guru 192.168.178.63 moduleTable
WIENER-CRATE-MIB::moduleIndex.ma0 = INTEGER: ma0(1)
WIENER-CRATE-MIB::moduleDescription.ma0 = STRING: "iseg, E08F7, 8, 8150004, 02.27"
WIENER-CRATE-MIB::moduleAuxiliaryMeasurementVoltage0.ma0 = Opaque: Float: 24.148500 V
WIENER-CRATE-MIB::moduleAuxiliaryMeasurementVoltage1.ma0 = Opaque: Float: 5.015030 V
WIENER-CRATE-MIB::moduleHardwareLimitVoltage.ma0 = Opaque: Float: 101.991997 %
WIENER-CRATE-MIB::moduleHardwareLimitCurrent.ma0 = Opaque: Float: 102.010002 %
WIENER-CRATE-MIB::moduleRampSpeedVoltage.ma0 = Opaque: Float: 20.000000 %
WIENER-CRATE-MIB::moduleRampSpeedCurrent.ma0 = Opaque: Float: 50.000000 %
WIENER-CRATE-MIB::moduleStatus.ma0 = BITS: 00 EE 00 00 moduleIsNoSumError(8)
moduleIsNoRamp(9) moduleSafetyLoopIsGood(10) moduleIsGood(12) moduleSupplyIsGood(13)
moduleTemperatureIsGood(14)
WIENER-CRATE-MIB::moduleEventStatus.ma0 = BITS: 00 00 00 00
WIENER-CRATE-MIB::moduleEventChannelStatus.ma0 = BITS: 00 00 00 00
WIENER-CRATE-MIB::moduleDoClear.ma0 = INTEGER: nothing(0)
WIENER-CRATE-MIB::moduleAuxiliaryMeasurementTemperature0.ma0 = Opaque: Float:
27.087400 degr.C
WIENER-CRATE-MIB::moduleAuxiliaryMeasurementTemperature1.ma0 = Opaque: Float:
27.087400 degr.C
WIENER-CRATE-MIB::moduleAuxiliaryMeasurementTemperature2.ma0 = Opaque: Float:
27.087400 degr.C
WIENER-CRATE-MIB::moduleAuxiliaryMeasurementTemperature3.ma0 = Opaque: Float:
27.087400 degr.C
```

Item	Type	Access	Comment
moduleDescription	Octet string	R	Company name, firmware name, channel number, serial number.
moduleAuxiliaryMeasurementVoltage0	Float	R	Returns the measurement value of the line supply 24 Volt.
moduleAuxiliaryMeasurementVoltage1	Float	R	Returns the measurement value of the line supply 5 Volt.
moduleHardwareLimitVoltage	Float	R	Returns the V_{max} value of the front panel in percent.
moduleHardwareLimitVoltage	Float	R	Returns the I_{max} value of the front panel in percent.
moduleRampSpeedVoltage	Float	R/W	Module voltage ramp speed of all channels in percent of outputConfigMaxTerminalVoltage
moduleRampSpeedCurrent	Float	R/W	Module current ramp speed of all channels in percent of outputConfigMaxCurrent
moduleStatus	Bits	R	ModuleIsKillEnable (15) ModuleTemperatureIsGood (14) moduleSupplyIsGood (13) moduleIsGood (12) moduleIsEventActive (11) moduleSafetyLoopIsGood (10) moduleIsNoRamp (9) moduleIsNoSumError (8) moduleIsInputError (6) moduleHardwareLimitVoltageIsGood (5) moduleNeedService (4) moduleIsHighVoltageOn (3) moduleIsLiveInsertion (2) moduleIsFineAdjustment (0)
moduleEventStatus	Bits	R/W	ModuleEventTemperatureNotGood (14) moduleEventSupplyNotGood (13) moduleEventSafetyLoopNotGood (10) moduleEventInputError (6) moduleHardwareLimitVoltageNotGood (5) moduleEventService (4) moduleEventLiveInsertion (2) moduleEventPowerFail (0)
moduleEventChannelStatus	Bits	R	Bit field that reserves one bit for every channel.
moduleDoClear	Integer	R/W	All events of the module will be cleared.
moduleAuxiliaryMeasurementTemperature0	Float	R	The measured module temperature of sensor 1.
moduleAuxiliaryMeasurementTemperature1	Float	R	The measured module temperature of sensor 2.
moduleAuxiliaryMeasurementTemperature2	Float	R	The measured module temperature of sensor 3.
moduleAuxiliaryMeasurementTemperature3	Float	R	The measured module temperature of sensor 4.

Table 3

4.9 Extended precision for net-snmp functions

Some command-line applications require a higher precision of the output of snmpget, snmpwalk and so on.
This functionality was tested with NET-SNMP version 5.8 and is included in the master branch of the net-snmp code since July 2012 (commit 77f4d3517c1b5407dca93b099810231bc89cdbc5), but not backported to older versions.

With this modification it is possible to add a printf-like format string parameter to the snmp command line utilities to define the output format.
The new option is

> -Op PRECISION
>
> Uses the PRECISION string to allow modification of the value output format. This is used with OPAQUE float/double at the moment, but might be usable for other types in the future. Allowed PRECISION strings are compatible to the flag/field with/precision part of the printf(3) function.

Examples:

```
$ snmpget -v2c -Op .12 -m WIENER-CRATE-MIB -c public 192.168.2.25
 outputMeasurementCurrent.1
WIENER-CRATE-MIB::outputMeasurementCurrent.u0 = Opaque: Float: +0.000000000122 A
```

It is also possible to define a default precision in the net-snmp configuration files. Lock at the net-snmp man pages available after installation for details.

5 References

For more information please use the following download links:

This document https://iseg-hv.com/download/?dir=SOFTWARE/SNMPguide/SNMP_Programmers-Guide_en.pdf
CAN EDCP Programmers-Guide http://download.iseg-hv.com/SYSTEMS/MMS/CAN_EDCP_Programmers-Guide.pdf
iseg Hardware Abstraction Layer http://download.iseg-hv.com/SYSTEMS/MMS/isegHardwareAbstractionLayer.pdf
Net-SNMP project page http://net-snmp.sourceforge.net
W-IE-NE-R MPOD manual http://file.wiener-d.com/documentation/MPOD/
W-IE-NE-R extended precision patch https://file.wiener-d.com/software/net-snmp/net-snmp-CompileForExtendedPrecision-2015-03-06.txt

6 Glossary

SHORTCUT	MEANING
0V	Supply ground
V_{nom}	nominal output voltage
V_{out}	output voltage
V_{set}	set value of output voltage
V_{mon}	monitor voltage of output voltage
V_{meas}	digital measured value of output voltage
V_{p-p}	peak to peak ripple voltage
V_{in}	input / supply voltage
V_{type}	type of output voltage (AC, DC)
V_{ref}	internal reference voltage
V_{max}	limit (max.) value of output voltage
V_{limit}	voltage limit
$\Delta V_{out} - [\Delta V_{in}]$	deviation of V_{out} depending on variation of supply voltage
$\Delta V_{out} - [\Delta R_{load}]$	deviation of V_{out} depending on variation of output load
V_{bounds}	voltage bounds, a tolerance tube $V_{set} \pm V_{bounds}$ around V_{set}
I_{nom}	nominal output current
I_{out}	output current
I_{set}	set value of output current
I_{mon}	monitor voltage of output current
I_{meas}	digital measured value of current
I_{trip}	current limit to shut down the output voltage
I_{in}	input / supply current
I_{max}	limit (max.) value of output current
I_{limit}	current limit
I_{bounds}	current bounds, a tolerance tube $I_{set} \pm I_{bounds}$ around I_{set}
P_{nom}	nominal output power
P_{in}	input power
P_{in_nom}	nominal input power
T	temperature
T_{REF}	reference temperature
ON	HV ON
OFF	HV OFF
CH	channel(s)
HV	high voltage

SHORTCUT	MEANING
LV	low voltage
GND	signal ground
INH	Inhibit
POL	Polarity
KILL	KillEnable

Table 4: Glossary

7 Manufacturer contact

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