

ModbusTCP protocol description POWER IONIZER

Interface description

POWER IONIZER family generators support a ModbusTCP based Ethernet interface. Only the variant based on the TCP/IP protocol is supported. Generally, it should be noted that a register has always 16 bits. Longer data types with 32 bits or strings are split over several consecutive registers.

Supported Modbus Function Codes POWER IONIZER

The following Modbus function codes are supported. Note: Not all Modbus specific feature codes are supported. Only the codes in the table below are to be used for the communication.

Function code	Description
3	Read Holding Registers
6	Write Single Register
16	Write Multiple Register

Setting of network parameters

As standard, the DHCP protocol is activated to set the network parameters (IP address, submask, gateway, etc.). It is possible to change the parameters manually, using the "IPConfig" program from HMS. Similarly, this tool can analyse the entire network for available devices. For further information and download of the program please see <http://www.anybus.de/>.

Overview of the used register "Device information"

The device information (e.g. serial number, device type, etc.) is available in the following register.

Register	Name
0x2000 – 0x200F	Order Code
0x2010 – 0x2016	Serial Number
0x2020	Revision Number Hardware
0x2030 – 0x2033	Revision Number Software

Overview of the used register "Software Reset"

Register	Name
0x2040	Software Reset

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Overview of the used register “Error- and Warning history”

Register	Name
0x2050 – 0x205F	Error history
0x2056 600x206F	Warning history

Overview of the used register “Actual values”

The following table lists all the registers used for the actual values of the charge.

Register	Name
0x0800	System Status
0x0801	Active Error
0x0802	Active Warning
0x0803	Supply Power Capacity
0x0804	Temperature Intern
0x0805	Supply Voltage
0x0806	Supply Current
0x0807	Supply Power
0x0808	Years Operating Hour
0x0809	Days Operating Hour
0x080A	Hours Operating Hour
0x080B	Minutes Operating Hour
0x080C	Discharging Capacity
0x080D	Status Discharge 1
0x080E	Status Discharge 2
0x080F	Temperature Discharging
0x0810	Voltage Discharging
0x0811	AC Current Discharging
0x0812	DC Current Discharging
0x0813	Power Discharging
0x0814	Discharging Mode
0x0815	Power Discharge 1
0x0816	Power Discharge 1
0x0817	Years Discharging Hour
0x0818	Days Discharging Hour
0x0819	Hours Discharging Hour
0x0821A	Minutes Discharging Hour

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Overview of the used register “Acknowledgement of error and warning messages”

The following table lists all the registers used for the acknowledgement of error and warning messages.

Register	Name
0x1320	Clear Error
0x1330	Clear Warning

Overview of the used register “Save and reset parameters”

The following registers are used for saving and resetting the parameters.

Register	Name
0x1340	Save Parameter
0x1350	Load Factory Settings

Overview of the used register “Parameter”

The following table lists all the registers used for the charge parameters.

Register	Name
0x 13C0	HV Release Mode Software
0x14F0	Pollution Detection Mode
0x1520	Keyboard Lock
0x1530	LED Bar Mode
0x1A00	Voltage Setpoint Discharging
0x1A10	Current Setpoint Discharging
0x1A20	Power Setpoint Discharging
0x1A30	Percent Setpoint Discharging
0x1A40	Discharging Mode
0x1A50	Discharging Adjustment
0x1A60	Discharging Frequency
0x1A70	Nominal Power Discharge 1
0x1A80	Nominal Power Discharge 2

Overview of the used register “Release”

The following register is used to control the release:

Register	Name
0x1010	HV Release

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Description of the single register

Register 0x0800 – System Status

Current system status of the generator. The status consists of several parts:

- Bit 0 – high voltage release
0 – high voltage deactivated
1 – high voltage activated
- Bit 1 – Error
0 – no error active
1 – error occurred
- Bit 2 - Warning
0 – no warning occurred
1 – warning occurred
- Bit 4 - Discharge
0 – discharge deactivated (resp. with existing discharge: passive mode)
1 – discharge active
- Bit 5 – Software release
0 – no software release
1 – software release is set
- Bit 6 – pollution calibration Charge
0 – pollution calibration deactivated
1 – pollution calibration active

Register	0x0800
Name	System Status
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0801 – Active Error

Error number of the active error message. For further information see chapter “error messages” in the operating instructions.

Register	0x0801
Name	Active Error
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0802 – Active Warning

Error number of the active warning message. For further information see chapter “warning messages” in the operating instructions.

Register	0x0802
Name	Active Warning
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0803 – Supply Power Capacity

Percentage capacity of the supply power.

Register	0x0803
Name	Supply Power Capacity
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0804 – Ambient Temperature

Internal housing temperature in °C.

Register	0x0804
Name	Ambient Temperature
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0805 – Supply Voltage

Supply voltage in mV.

Register	0x0805
Name	Supply Voltage
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0806 – Supply Current

Supply current in mA.

Register	0x0806
Name	Supply Current
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0807 – Supply Power

Supply power in watts with one decimal place (specification 725 corresponds to 72.5 W).

Register	0x0807
Name	Supply Power
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0808 – Years Operating Hour

Years of the operating hour counter.

Register	0x0808
Name	Years Operating Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0809 – Days Operating Hour

Days of the operating hour counter.

Register	0x0809
Name	Days Operating Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x080A – Hours Operating Hour

Hours of the operating hour counter.

Register	0x080A
Name	Hours Operating Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x080B – Minutes Operating Hour

Minutes of the operating hour counter.

Register	0x080B
Name	Minutes Operating Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x080C –Discharging Capacity

Percentage capacity of the Discharge.

Register	0x080C
Name	Discharging Capacity
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x080D – Status Discharge 1

Display of status for connection Discharge 1. Pollution determination is only possible in connection with bars of the R60 and R60L series at this connection of the discharge. A corresponding setting of the registers 0x14F0 and 0x1A70 is necessary to determine the pollution.

- 0 – no consumer connected
- 1 – consumer connected
- 2 – conductive pollution detected
- 3 – insulated pollution detected

Register	0x080D
Name	Status Discharge 1
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x080E – Status Discharge 2

Display of status for connection Discharge 2. Pollution determination is only possible in connection with bars of the R60 and R60L series at this connection of the discharge. A corresponding setting of the registers 0x14F0 and 0x1A80 is necessary to determine the pollution.

- 0 – no consumer connected
- 1 – consumer connected
- 2 – conductive pollution detected
- 3 – insulated pollution detected

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Register	0x080E
Name	Status Discharge 2
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x080F – Temperature Discharging

Temperature of the discharge in °C.

Register	0x080F
Name	Temperature Discharging
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0810 – Discharging Voltage

Effective discharge voltage in V.

Register	0x0810
Name	Discharging Voltage
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0811 – AC Discharging Current

Effective AC discharge current in µA.

Register	0x0811
Name	AC Discharging Current
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0812 – DC Discharging Current

Signed DC discharge current in μA .

Register	0x0812
Name	DC Discharging Current
Data Type	SIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0813 – Discharging Power

Discharging Power in watt with one decimal place

Register	0x0813
Name	Discharging Power
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0814 – Discharging Mode

Operating state of the Discharge.

The indication of the operating status is divided into two parts. The low-order byte represents the current operating mode. The higher-order byte shows the discharge limiters.

- Operating mode Discharge
 - 0 – passive discharging
 - 1 – active discharging
- Limiter Discharge
 - Bit 8 – voltage limiter
 - 0 – voltage limiter not active
 - 1 – voltage limiter active

Register	0x0814
Name	Discharging Mode
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0815 – Power Discharge 1

Effective power of the discharge, connection 1 in mW.

Register	0x0815
Name	Power Discharge 2
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0816 – Power Discharge 2

Effective power of the discharge, connection 2 in mW.

Register	0x0816
Name	Power Discharge 2
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0817 – Years Discharging Hour

Years of the hour counter Discharge.

Register	0x0817
Name	Years Discharging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0818 – Days Discharging Hour

Days of the hour counter Discharge.

Register	0x0818
Name	Days Discharging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0819 – Hours Discharging Hour

Hours of the hour counter Discharge.

Register	0x0819
Name	Hours Discharging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x081A – Minutes Discharging Hour

Minutes of the hour counter Discharge.

Register	0x081A
Name	Minutes Discharging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x1010 – HV Release

Release of the high voltage.

If the "Fieldbus Ethernet" interface is selected for release (register 0x13C0), the software release of the high voltage is set or deleted during a write access. The high voltage is activated as soon as the hardware release for charging or discharging is active.

- 0x0000 – Delete the software release
- 0x000F – Set the software release

Register	0x1010
Name	HV Release
Data Type	UNSIGNED16
Access Type	Write Only
Default Value	0x0000
Low Limit	0x0000
High Limit	0x000F

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Register 0x1320 – Clear Error

After a successful internal check, the selected error message is deleted.

Register	0x1320
Name	Clear Error
Data Type	UNSIGNED16
Access Type	Write Only
Default Value	0x0000
Low Limit	0x0000
High Limit	0xFFFF

Register 0x1330 – Clear Warning

After a successful internal check, the selected warning message is deleted.

Register	0x1330
Name	Clear Error
Data Type	UNSIGNED16
Access Type	Write Only
Default Value	0x0000
Low Limit	0x0000
High Limit	0xFFFF

Register 0x1340 – Save Parameter

For saving the entire parameter set with the current values, key 0xA5 must be written to register 0x1340.

Register	0x1340
Name	Save Parameter
Data Type	UNSIGNED16
Access Type	Write Only
Default Value	0x0000
Low Limit	0x0000
High Limit	0xFFFF

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Register 0x1350 Load Factory Settings

After a write access with key 0xA5 to register 0x1350, the factory settings for the entire parameter set are loaded.

Register	0x1350
Name	Load Factory Settings
Data Type	UNSIGNED16
Access Type	Write Only
Default Value	0x0000
Low Limit	0x0000
High Limit	0xFFFF

Register 0x13C0 – HV Release Mode Software

The high voltage software release can be set with this parameter via the different options. The individual release options can be activated separately. The output of the high voltage starts after setting the software and the respective hardware release via the interface.

- Bit 0 – Autostart
0 – Autostart deactivated
1 – Autostart activated (Automatic setting of the software release after switching on the supply voltage)
- Bit 1 – HMI
0 – HMI release deactivated
1 – HMI release activated (Release can be switched on / off via touchscreen or keypad)
- Bit 2 – CANopen®
0 – Release via CANopen® deactivated
1 – Release via CANopen® activated (software release can be controlled via fieldbus)
- Bit 3 – Fieldbus Ethernet
0 – Release via Ethernet deactivated
1 – Release via Ethernet activated (software release can be controlled via write access to register 0x1010)

Register	0x13C0
Name	HV Release Mode Software
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	4
Low Limit	0
High Limit	31

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Register 0x14F0 – Pollution Detection Mode

Parameter for setting the pollution monitoring. Pollution monitoring is only possible in connection with bars of the R60 and R60L series.

When pollution monitoring is activated, the current value of the power for output 1 or 2 (register 0x0816 or 0x0817) is compared with the determined value of the nominal power for the output (register 0x1A70 or 0x1A80). The comparison of the values takes place in a known reference point, which is controlled automatically and independently of the set parameters for the discharge voltage.

The pollution calibration can be used to determine the nominal power. Manual setting of the corresponding parameters for registers 0x1AB0 and 0x1AC0 is also possible.

- 0 – Pollution monitoring deactivated
- 1 – Pollution monitoring activated
- 2 – Calibration of the pollution monitoring

Register	0x14F0
Name	Pollution Detection Mode
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	2

Register 0x1520 – Keyboard Lock

Activation or deactivation of the keyboard lock of the keypad. When the keyboard lock is activated, an operation via the integrated keypad at the generator is not possible. Note that this parameter is not saved and the keyboard lock is always deactivated after the generator is restarted.

- 0 – keyboard lock not activated
- 1 – keyboard lock activated

Register	0x1520
Name	Keyboard Lock
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	1

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Register 0x1530 – LED Bar Mode

Setting of the mode for displaying the actual values using the integrated LED bar.

- 0 – display actual value voltage
- 1 – display actual value current

Register	0x1530
Name	LED Bar Mode
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	1

Register 0x1A00 – Voltage Setpoint Discharging

Setting of the voltage setpoint of the discharge in V.

The parameter is only available in the variants PC__/A and PC__/C.

Register	0x1A00
Name	Voltage Setpoint Discharging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	100% Umax Discharging
Low Limit	Umin Discharging
High Limit	Umax Discharging

Register 0x1610 – Current Setpoint Discharging

Setting of the current setpoint of the discharge in μA .

This parameter can only be read.

Register	0x1A10
Name	Current Setpoint Discharging
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x1A20 – Power Setpoint Discharging

Setting of the power setpoint of the discharge in W.

The value for the power is represented with one decimal place (specification 125 corresponds to 12.5 W).

Register	0x1A20
Name	Power Setpoint Dischargingg
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x1A30 – Setpoint Percent Discharging

Percentage setting of the voltage setpoint for the discharge.

Register	0x1A30
Name	Setpoint Percent Discharging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	100
Low Limit	0
High Limit	100

Register 0x1A40 – Discharging Mode

Setting of the discharging mode. The following settings can be selected:

- 0 – passive discharging
- 1 – active discharging

Register	0x1A40
Name	Discharging Mode
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	1

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Register 0x1A50 – Discharging Adjustment

Percentage setting of the parameter adjustment to optimize the discharging result.

Register	0x1A50
Name	Discharging Adjustment
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	100

Register 0x1A60 – Discharging Frequency

Selection of the frequency for the discharge voltage. The setting is made by selecting the respective index for the frequency. The following discharge frequencies can be set:

- 0 – 50Hz
- 1 – 55.7Hz
- 2 – 62.5Hz
- 3 – 71.4Hz
- 4 – 83.3Hz
- 5 – 100Hz
- 6 – 125Hz
- 7 – 166.7Hz
- 8 - 250Hz

Register	0x1A80
Name	Discharging Frequency
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	8

Register 0x1A70 – Nominal Power Discharge 1

Setting of the nominal power for discharging connection 1 in mW. This parameter is used in conjunction with the pollution monitoring (Register 0x14F0).

Register	0x1A70
Name	Nominal Power Discharge 1
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	1000

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Register 0x1A80 – Nominal Power Discharge 2

Setting of the nominal power for discharging connection 2 in mW. This parameter is used in conjunction with the pollution monitoring (Register 0x14F0).

Register	0x1A80
Name	Nominal Power Discharge 2
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	1000

Register 0x2000 – 0x200F – Order Code

The complete article number of the generator is shown as a character string in ASCII format. Each register contains one character.

Register	0x2000
Name	Order Code Character 0
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2001
Name	Order Code Character 1
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2002
Name	Order Code Character 2
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register	0x2003
Name	Order Code Character 3
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2004
Name	Order Code Character 4
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2005
Name	Order Code Character 5
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2006
Name	Order Code Character 6
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2007
Name	Order Code Character 7
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register	0x2008
Name	Order Code Character 8
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2009
Name	Order Code Character 9
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x200A
Name	Order Code Character 10
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x200B
Name	Order Code Character 11
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x200C
Name	Order Code Character 12
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register	0x200D
Name	Order Code Character 13
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x200E
Name	Order Code Character 14
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x200F
Name	Order Code Character 15
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x2010 – 0x2016 – Serial Number

The serial number of the generator is shown as a string in ASCII format. Each register contains one character.

Register	0x2010
Name	Serial Number Character 0
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	
Register	0x2011
Name	Serial Number Character 1
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2012
Name	Serial Number Character 2
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2013
Name	Serial Number Character 3
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2014
Name	Serial Number Character 4
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register	0x2015
Name	Serial Number Character 5
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2016
Name	Serial Number Character 6
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x2020 – Revision Number Hardware

Revision number of the hardware.

Register	0x2020
Name	Revision Number Hardware
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x2030 – 0x2033 – Revision Number Software

The revision number of the software is shown as a string in ASCII format. Each register contains one character.

Register	0x2030
Name	Revision Number Software Character 0
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2031
Name	Revision Number Software Character 1
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2032
Name	Revision Number Software Character 2
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x2033
Name	Revision Number Software Character 3
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x2040 – Software Reset

A software reset of the generator is possible via a write access to the register 0x2040 with the key 0x71A3.

Before the reset, there is an internal check whether the reset is executable. In the case of a diagnostic error (error number greater than 80), the reset via the network is not possible.

Register	0x2040
Name	Software Reset
Data Type	UNSIGNED16
Access Type	Write Only
Default Value	
Low Limit	
High Limit	

Register 0x2050 – 0x205F – Error History

In the individual registers 0x2050 - 0x205F one entry of the error history is stored each. The last error occurred is stored in register 0x2050. In the following registers the previously occurred errors are stored.

Register	0x2050 – 0x205F
Name	Error History
Data Type	UNSIGNED16
Access Type	Write Only
Default Value	
Low Limit	
High Limit	

Register 0x2060 – 0x206F – Warning History

In the individual registers 0x2060 - 0x206F one entry of the warning history is stored each. The last error occurred is stored in register 0x2060. In the following registers the previously occurred warnings are stored.

Register	0x2050 – 0x205F
Name	Error History
Data Type	UNSIGNED16
Access Type	Write Only
Default Value	
Low Limit	
High Limit	