

ModbusTCP protocol description POWER CHARGER

Interface description

POWER CHARGER 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 CHARGER

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

Overview of the used register "Error- and Warning history"

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

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Overview of the used register “Actual values Charging”

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	Charging Power Capacity
0x0805	Charging Voltage Capacity
0x0806	Charging Current Capacity
0x0807	Pollution Charging
0x0808	Temperature Power Stage
0x0809	Temperature Intern
0x080A	Temperature Cascade
0x080B	Supply Voltage
0x080C	Supply Current
0x080D	Supply Power
0x080E	Charging Voltage
0x080F	Charging Current
0x0810	Charging Power
0x0811	Charging Mode
0x0812	Strong Sparks Error Counter
0x0813	Strong Sparks Warning Counter
0x0814	Weak Sparks Error Counter
0x0815	Weak Sparks Warning Counter
0x0816 – 0x0817	Load Resistor Charging
0x0818	Years Operating Hour
0x0819	Days Operating Hour
0x081A	Hours Operating Hour
0x081B	Minutes Operating Hour
0x081C	Years Charging Hour
0x081D	Days Charging Hour
0x081E	Hours Charging Hour
0x081F	Minutes Charging Hour

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Overview of the used register “Actual values Discharging”

The following table lists all the registers used for the actual values of the discharge. These registers are filled with the respective actual values for the variants with integrated discharge. Otherwise, the value of the register is 0.

Register	Name
0x0820	Discharging Capacity
0x0821	Status Discharge 1
0x0822	Status Discharge 2
0x0823	Temperature Discharging
0x0824	Voltage Discharging
0x0825	AC Current Discharging
0x0826	DC Current Discharging
0x0827	Power Discharging
0x0828	Discharge Mode
0x0829	Power Discharge 1
0x082A	Power Discharge 2
0x082B	Years Discharging Hour
0x082C	Days Discharging Hour
0x082D	Hours Discharging Hour
0x082E	Days Discharging Hour
0x082F	Minutes Discharging

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

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Overview of the used register “Parameter Charge”

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

Register	Name
0x 13C0	HV Release Mode Software
0x13D0	Analog Setpoint
0x13E0	Voltage Setpoint Charging
0x13F0	Current Setpoint Charging
0x1400	Power Setpoint Charging
0x1410	Setpoint Percent Charging
0x1420	Voltage Limit Minimum Charging
0x1430	Voltage Limit Maximum Charging
0x1440	Current Limit Minimum Charging
0x1450	Current Limit Maximum Charging
0x1460	Operating Mode
0x1470	Ramp Time
0x1480	Current Width Factor
0x1490	Web Width
0x14A0	Web Width Minimum
0x14B0	Web Width Maximum
0x14C0	Strong Sparks Level
0x14D0	Weak Sparks Level
0x14E0	Sparks Counter Limit
0x14F0	Pollution Detection Charging
0x1500 – 0x1501	Nominal Resistor Charging
0x1510	Limiter Warning
0x1520	Keyboard Lock
0x1530	LED Bar Mode

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Overview of the used register “Parameter Discharge“

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

The following table lists all the registers used for the discharge parameters. These registers are filled with the respective parameters for the variants with integrated discharge. Otherwise, the value of the register is 0.

Register	Name
0x1A00	Voltage Setpoint Discharging
0x1A10	Current Setpoint Discharging
0x1A20	Power Setpoint Discharging
0x1A30	Percent Setpoint Discharging
0x1A40	Discharging Mode
0x1A50	Active Length Discharging Bar 1
0x1A60	Active Length Discharging Bar 2
0x1A70	Discharging Adjustment
0x1A80	Discharging Frequency
0x1A90	Software Release Discharging
0x1AA0	Pollution Detection Discharging
0x1AB0	Nominal Power Discharge 1
0x1AC0	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 3 – charge
0 – charge deactivated
1 – charge active
- 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	

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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	

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	

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Register 0x0804 – Charging Power Capacity

Percentage capacity of the charging power.

Register	0x0804
Name	Charging Power Capacity
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0805 – Charging Voltage Capacity

Percentage capacity of the charging voltage.

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

Register 0x0806 – Charging Current Capacity

Percentage capacity of the charging current.

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

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Register 0x0807 – Pollution Charging

Percentage pollution of the charging bar. For the calculation of the pollution, the pollution detection must be activated via the parameter (register 0x14F0). The pollution calibration must be carried out or a nominal resistance of the charging (register 0x1500 - 0x1501) must be written.

Register	0x0807
Name	Pollution Charging
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0808 – Temperature Power Stage

Temperatur Endstufe Aufladung in °C.

Register	0x0808
Name	Temperature Power Stage
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0809 – Ambient Temperature

Internal housing temperature in °C.

Register	0x0809
Name	Ambient Temperature
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x080A – Temperature Cascade

Temperature of the high voltage cascade Charge in °C.

Register	0x080A
Name	Temperature Cascade
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x080B – Supply Voltage

Supply voltage in mV.

Register	0x080B
Name	Supply Voltage
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x080C – Supply Current

Supply current in mA.

Register	0x080C
Name	Supply Current
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x080D – Supply Power

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

Register	0x080D
Name	Supply Power
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x080E – Charging Voltage

Charging voltage in V.

Register	0x080E
Name	Charging Voltage
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x080F – Charging Current

Charging current in μ A.

Register	0x080F
Name	Charging Current
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0810 – Charging Power

Charging power in watt with one decimal place (specification 725 corresponds to 72.5 W).

Register	0x0810
Name	Charging Power
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0811 – Charging Mode

Operating state of the Charge.

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 charge limiters.

- Operating mode Charge
 - 3 – Operating mode: voltage constant (U-Const)
 - 4 – Operating mode: current constant (I-Const)
 - 5 – Operating mode ESA Film
 - 6 – Operating mode ESA Paper
 - 7 – Operating mode ESA Metallized materials
- Limiter Charge
 - Bit 8 – Voltage limiter
 - 0 – Voltage limiter not active
 - 1 – Voltage limiter active
 - Bit 9 – Current limiter
 - 0 – Current limiter not active
 - 1 – Current limiter active
 - Bit 10 – Power limiter
 - 0 – Power limiter not active
 - 1 – Power limiter active

Register	0x0811
Name	Charging Mode
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0812 – Strong Sparks Error Counter

Error counter of the strong sparks.

Register	0x0812
Name	Strong Sparks Error Counter
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0813 – Strong Sparks Warning Counter

Warning counter of the strong sparks.

Register	0x0813
Name	Strong Sparks Warning Counter
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0814 – Weak Sparks Error Counter

Error counter of the weak sparks.

Register	0x0814
Name	Weak Sparks Error Counter
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0815 – Weak Sparks Warning Counter

Warning counter of the weak sparks.

Register	0x0815
Name	Weak Sparks Warning Counter
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0816 & 0x0817 – Load Resistor Charging

Load resistor of the charging in Ω . The 32-bit value for the load resistor is divided into two 16-bit values of the registers 0x0816 and 0x0817.

Register	0x0816
Name	Load Resistor Low Half Word
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register	0x0817
Name	Load Resistor High Half Word
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0818 – Years Operating Hour

Years of the operating hour counter.

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

Register 0x0819 – Days Operating Hour

Days of the operating hour counter.

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

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Register 0x081A – Hours Operating Hour

Hours of the operating hour counter.

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

Register 0x081B – Minutes Operating Hour

Minutes of the operating hour counter.

Register	0x081B
Name	Minutes Operating Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x081C – Years Charging Hour

Years of the charging hour counter.

Register	0x081C
Name	Years Charging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x081D – Days Charging Hour

Days of the charging hour counter.

Register	0x081D
Name	Days Charging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x081E – Hours Charging Hour

Hours of the charging hour counter.

Register	0x081E
Name	Hours Charging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x081F – Minutes Charging Hour

Minutes of the charging hour counter.

Register	0x081F
Name	Minutes Charging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0820 –Discharging Capacity

Percentage capacity of the Discharge.

Actual value is only available for variants PC__/A.

Register	0x0820
Name	Discharging Capacity
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0821 – Status Discharge 1

Display of status for connection Discharge 1. Actual value is only available for variants PC__/A.

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 0x1AA0 and 0x1AB0 is necessary to determine the pollution.

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

Register	0x0821
Name	Status Discharge 1
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0822 – Pollution Discharge 2

Display of status for connection Discharge 2. Actual value is only available for variants PC__/A.

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 0x1AA0 and 0x1AC0 is necessary to determine the pollution.

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

Register	0x0822
Name	Status Discharge 2
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0823 – Temperature Discharging

Temperature of the discharge in °C. Actual value is only available for variants PC__/A.

Register	0x0823
Name	Temperature Discharging
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0824 – Discharging Voltage

Effective discharge voltage in V.

Actual value is only available for variants PC__/A.

Register	0x0824
Name	Discharging Voltage
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0825 – AC Discharging Current

Effective AC discharge current in μ A.

Actual value is only available for PC__/A and PC__/C versions.

Register	0x0825
Name	AC Discharging Current
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0826 – DC Discharging Current

Signed DC discharge current in μA .

Actual value is only available for variants PC__/A.

Register	0x0826
Name	DC Discharging Current
Data Type	SIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0827 – Discharging Power

Discharging Power in watt with one decimal place (specification 125 corresponds to 12.5 W). Actual value is only available for variants PC__/A.

Register	0x0827
Name	Discharging Power
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x0828 – Discharging Mode

Discharge operating status. Actual value is only available for variants PC__/A.

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

- Discharge mode
 - 0 – passive discharge
 - 1 – active discharge
- Discharge limiter
 - Bit 8 – voltage limiter
 - 0 – voltage limiter not active
 - 1 – voltage limiter active

Register	0x0828
Name	Discharging Mode
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x0829 – Power Discharge 1

Effective power of the discharge, connection 1 in mW.
Actual value is only available for variants PC__/A.

Register	0x0829
Name	Power Discharge 1
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x082A – Power Discharge 2

Effective power of the discharge, connection 2 in mW.
Actual value is only available for variants PC__/A.

Register	0x082A
Name	Power Discharge 2
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x082B – Years Discharging Hour

Years of the hour counter of the discharge.
Actual value is only available for variants PC__/A.

Register	0x082B
Name	Years Discharging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

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Register 0x082C – Days Discharging Hour

Days of the hour counter of the discharge.
Actual value is only available variants PC__/A.

Register	0x082C
Name	Days Discharging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x082D – Hours Discharging Hour

Hours of the hour counter of the discharge.
Hour counter is only available for variants PC__/A.

Register	0x082D
Name	Hours Discharging Hour
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	
Low Limit	
High Limit	

Register 0x082E – Minutes Discharging Hour

Minutes of the hour counter of the discharge.
Hour counter is only available for variants PC__/A.

Register	0x082E
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

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

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 0x5A 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 – Analog setpoint
0 – Release of the analog setpoint deactivated
1 – Release of the analog setpoint activated (Software release can be controlled via the setting of the analog setpoint)
- Bit 2 – HMI
0 – HMI release deactivated
1 – HMI release activated (Release can be switched on / off via touchscreen or keypad)
- Bit 3 – CANopen®
0 – Release via CANopen® deactivated
1 – Release via CANopen® activated (software release can be controlled via fieldbus)
- Bit 4 – 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 0x13D0 – Analog Setpoint

Selection of the analog interface for setting the setpoint of the output voltage (operating mode U-Const) or output current (operating mode I-Const) for the charging.

- 0 – analog interface deactivated + message signal limit inactive
- 1 – current interface (0-20mA) active + message signal limit inactive
- 2 – voltage interface (0-10V) active + message signal limit inactive
- 3 – analog interface deactivated + message signal limit active
- 4 – current interface (0-20mA) active + message signal limit active
- 5 – voltage interface (0-10V) active + message signal limit active

Register	0x13D0
Name	Analog Setpoint
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	5

Register 0x13E0 – Voltage Setpoint Charging

Setting the voltage setpoint of the charging in V. The setpoint is adjustable in the range of the two limits for the minimum (register 0x0x1420) and the maximum (0x1430) of the output voltage.

By default, these limits are set at 5 % for the minimum and 100 % of the maximum output voltage of the charge.

Register	0x13E0
Name	Voltage Setpoint Charging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	5 % U _{max} Charging
Low Limit	Voltage Limit Minimum Charging
High Limit	Voltage Limit Maximum Charging

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Register 0x13F0 – Current Setpoint Charging

Setting the current setpoint of the charging in μA . The setpoint is adjustable in the range of the two limits for the minimum (register 0x0x1440) and the maximum (0x1450) of the output current.

By default, these limits are set at 5 μA for the minimum and 100 % of the maximum output current of the charge.

Register	0x13F0
Name	Current Setpoint Charging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	100% I _{max} Charging
Low Limit	Current Limit Minimum Charging
High Limit	Current Limit Maximum Charging

Register 0x1400 – Power Setpoint Charging

Parameter for the maximum available power of the charge; this parameter is write protected. The setting is made exclusively by internal values for temperatures and currents. The value for the power is displayed with one decimal place (specification 725 corresponds to 72.5W).

For improved performance of the charging power, the generator should be mounted in a cool and well-ventilated place.

Register	0x1400
Name	Power Setpoint Charging
Data Type	UNSIGNED16
Access Type	Read Only
Default Value	100% P _{max} Charging
Low Limit	
High Limit	

Register 0x1410 – Setpoint Percent Charging

Percentage setting of the setpoint for the voltage (operating mode U-Const) or the current (operating mode I-Const) for the charging. In the case of a setting, the new setpoint is always checked with the respective limits of the minimum and maximum and a possible limitation of the setpoint.

Register	0x1410
Name	Setpoint Percent Charging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	
Low Limit	0
High Limit	100

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Register 0x1420 – Voltage Limit Minimum Charging

Minimum for setting the voltage setpoint of the charging in V. If the set voltage setpoint is less than the new minimum, an automatic change takes place to the new minimum.

Register	0x1420
Name	Voltage Limit Minimum Charging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	5 % Umax Charging
Low Limit	5 % Umax Charging
High Limit	Voltage Limit Maximum Charging

Register 0x1430 – Voltage Limit Maximum Charging

Maximum for setting the voltage setpoint of the charging in V. If the set voltage setpoint is greater than the new maximum, an automatic change takes place to the new maximum.

Register	0x1430
Name	Voltage Limit Maximum Charging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	100 % Umar Charging
Low Limit	Voltage Limit Minimum Charging
High Limit	100 % Umax Charging

Register 0x1440 – Current Limit Minimum Charging

Minimum for setting the current setpoint of the charging in μ A. If the set current setpoint is less than the new minimum, an automatic change takes place to the new minimum.

Register	0x1440
Name	Current Limit Minimum Charging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	50
Low Limit	50
High Limit	Current Limit Maximum Charging

ModbusTCP protocol description POWER CHARGER

Register 0x1450 - Current Limit Maximum Charging

Maximum for setting the current setpoint of the charging in μA . If the set current setpoint is greater than the new maximum, an automatic change takes place to the new maximum.

Register	0x1450
Name	Current Limit Maximum Charging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	100% I _{max} Charging
Low Limit	Current Limit Minimum Charging
High Limit	100 % I _{max} Charging

Register 0x1460 – Operating Mode

Setting the operating mode for the charging.

Depending on the selected operating mode, changes in the setpoint via the analog interface or by percentage setting (register 0x1410) will influence the voltage or current setpoint of the charging. The regulation of the charging voltage in the range of the three setpoints - voltage, current and power - remains active. Changing the operating mode has no influence on this behavior.

In case of a change, the parameter set is automatically adjusted depending on the operating mode.

The following operating modes are adjustable:

- 3 – operating mode: voltage constant (U-Const)
- 4 – operating mode: current constant (I-Const)
- 5 – operating mode: ESA Film
- 6 – operating mode: ESA Paper
- 7 – operating mode: ESA Metallized materials

Register	0x1460
Name	Operating Mode
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	3 (PCRT, PCSC) 4 (PCMT) 5 (PCTL)
Low Limit	3 (PCMT, PCRT, PCTL) 5 (PCTL)
High Limit	4 (PCMT, PCRT, PCTL) 7 (PCTL)

ModbusTCP protocol description POWER CHARGER

Register 0x1470 – Ramp Time

Parameter for setting the ramp time of the charging in ms. The parameter value determines the time after which the setpoint for the charging voltage or charging current is reached when setting the release or in case of a change.

Register	0x1470
Name	Ramp Time
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	500
Low Limit	100
High Limit	10000

Register 0x1480 – Current Width Factor

Factor for calculating the current setpoint as a function of the preset web width (register 0x1490). The setting is in $\mu\text{A}/8\text{m}$. After the calculation, the current limits for the charging are verified (registers 0x1440 & 0x1450).

Register	0x1480
Name	Current Width Factor
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	1000
Low Limit	100
High Limit	5000

Register 0x1490 – Web Width

Setting the web width or the active length of the charging electrode in mm. Depending on the width and the conversion factor (register 0x1480), the current setpoint is calculated. The check of the setpoint for its limits (registers 0x1440 & 0x1450) always takes place after the calculation. If no web width is set (default value) no calculation is performed.

The parameter can be set within the limits of the web width (registers 0x14A0 and 0x14B0).

Register	0x1490
Name	Web Width
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	Web Width Minimum
High Limit	Web Width Maximum

ModbusTCP protocol description POWER CHARGER

Register 0x14A0 – Web Width Minimum

Setting the minimum of the web width or the active length of the charging bar in mm. If the set web width is smaller than the new minimum, the web width is automatically corrected and the current setpoint is calculated.

Register	0x14A0
Name	Web Width Minimum
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	Web Width Maximum

Register 0x14B0 – Web Width Maximum

Setting the maximum of the web width or the active length of the charging bar in mm. If the set web width is greater than the new maximum, the web width is automatically corrected and the current setpoint is calculated.

Register	0x14B0
Name	Web Width Maximum
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	5000
Low Limit	Web Width Minimum
High Limit	5000

Register 0x14C0 – Strong Sparks Level

Level for detection of strong sparks in the case of sudden changes of the charging current value. The setting is made in % of the maximum output current. The factor is calculated as follows:

$$f_{strong} = \frac{Value_{strong} * I_{max\ Charging}}{8} \left[\frac{mA}{ms} \right]$$

The error or warning counter (registers 0x0812 and 0x813) is counting up as soon as a current change is detected which is greater than the calculated level. The warning detection level is 80% of the error detection level. If the level for the meters is exceeded (register 0x14E0), the corresponding error or warning message is set. The reasons for an occurrence are different (e.g., defective bar, defective high voltage cable, grounded materials in the area of the bar, etc.).

ModbusTCP protocol description POWER CHARGER

Register	0x14C0
Name	Strong Sparks Level
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	40
Low Limit	25
High Limit	40

Register 0x14D0 – Weak Sparks Level

Level for detection of weak sparks in the case of sudden changes of the charging current value. The setting is made in % of the maximum output current. The factor is calculated as follows:

$$f_{Weak} = \frac{Value_{Weak} * I_{max\ Charging}}{8} \left[\frac{mA}{ms} \right]$$

The error or warning counter (registers 0x08 and 0x815) is counting up as soon as a current change is detected which is greater than the calculated level. The warning detection level is 80% of the error detection level. If the level for the meters is exceeded (register 0x14E0), the corresponding error or warning message is set. The reasons for an occurrence are different (e.g., defective bar, defective high voltage cable, grounded materials in the area of the bar, etc.).

Register	0x14D0
Name	Weak Sparks Level
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	25
Low Limit	10
High Limit	25

Register 0x14E0 – Sparks Counter Limit

Threshold value for the individual spark counters (registers 0x0812 - 0x0815) at which the corresponding error or warning message occurs.

If the value 0 is set, no errors or warnings are set.

Register	0x14E0
Name	Sparks Counter Limit
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	10
Low Limit	0
High Limit	1000

ModbusTCP protocol description POWER CHARGER

Register 0x14F0 – Pollution Detection Charging

Parameter for setting the pollution monitoring of the charging.

Setting options:

- 0 – monitoring deactivated
- 1 – monitoring charging
- 2 – calibration of the pollution monitoring

During operation, the calibration of the monitoring for a reliable detection of the charging bar pollution is necessary,

It starts automatically if the nominal resistance of the charging (registers 0x1500 and 0x1501) contains the default value and the monitoring is activated. It is recommended to clean the charging bar before the calibration. It is also advisable to carry out a separate calibration of the pollution detection for the different applications. The calibration is carried out when the high voltage is switched on and determines values over a period of 20 minutes. If the high voltage is deactivated, the detection waits for the release of the charge.

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

Register 0x1500 & 0x1501- Nominal Resistor Charging

Nominal resistance of the charging. This value serves as reference point for the pollution monitoring. If the load resistance of the charging (registers 0x0817 and 0x0818) decreases, this is an indication of conductive pollution; with insulating pollution, the load resistance increases.

It is advisable to determine the nominal resistance for each condition separately and to save externally because the resistance can vary significantly with the different applications and jobs of the generator. If the job is changed later, this parameter must be written with the appropriate value for an optimum detection of the pollution.

The resistor is distributed as a 32-bit value over the two registers 0x1500 and 0x1501. The indication is in Ω .

ModbusTCP protocol description POWER CHARGER

Register	0x1500 / 0x1501
Name	Nominal Resistor Charging Low Half Word
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0x0000
Low Limit	0x0000
High Limit	0xFFFF

Register 0x1510 – Limiter Warning

Activate or deactivate the warnings generated by each limiter.
The following settings are possible:

- 0 – warnings of the limiter deactivated
- 1 – warnings of the limiter activated

Register	0x1510
Name	Limiter Warning
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	1
Low Limit	0
High Limit	1

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

ModbusTCP protocol description POWER CHARGER

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.

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 μ A.
This parameter can only be read.
The parameter is only available in the variants PC__/A.

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

ModbusTCP protocol description POWER CHARGER

Register 0x1A20 – Power Setpoint Discharging

Setting of the power setpoint of the discharge in W. The parameter is only available in the variants PC__/A.

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 parameter is only available in the variants PC__/A.

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

ModbusTCP protocol description POWER CHARGER

Register 0x1A70 – Discharging Adjustment

Percentage setting of the parameter adjustment to optimize the discharging result.
The parameter is only available in the variants PC__/A.

Register	0x1A70
Name	Discharging Adjustment
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	100

Register 0x1A80 – Discharging Frequency

Parameter for the discharging voltage frequency. Select the corresponding index of the frequency.

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

- 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

ModbusTCP protocol description POWER CHARGER

Register 0x1A90 – Software Release Discharging

Parameter to disable or enable the software release for the discharging function. If the software release is disabled, the release is performed exclusively via the hardware release of the discharge.

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

- 0 – Software release discharging disabled
- 1 – Software release discharging enabled

Register	0x1A90
Name	Software Release Discharging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	1
Low Limit	0
High Limit	1

Register 0x1AA0 – Pollution Detection Discharging

Parameter for setting the pollution monitoring. Pollution monitoring is only possible in connection with bars of the R60 and R60L series. The parameter is only available in the variants PC__/A.

When pollution monitoring is activated, the current value of the power for output 1 or 2 (register 0x0829 or 0x082A) is compared with the determined value of the nominal power for the output (register 0x1AB0 or 0x1AC0). 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 Discharge deactivated
- 1 – Pollution monitoring Discharge activated
- 2 – Calibration Pollution monitoring Discharge

Register	0x1AA0
Name	Pollution Detection Discharging
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	2

ModbusTCP protocol description POWER CHARGER

Register 0x1AB0 – 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 0x1AA0).

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

Register	0x1AB0
Name	Nominal Power Discharge 1
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	1000

Register 0x1AC0 – 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 0x1AA0).

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

Register	0x1AC0
Name	Nominal Power Discharge 2
Data Type	UNSIGNED16
Access Type	Read/Write
Default Value	0
Low Limit	0
High Limit	1000

ModbusTCP protocol description POWER CHARGER

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	

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	

ModbusTCP protocol description POWER CHARGER

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	

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	

ModbusTCP protocol description POWER CHARGER

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	

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	

ModbusTCP protocol description POWER CHARGER

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

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	

ModbusTCP protocol description POWER CHARGER

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

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	

ModbusTCP protocol description POWER CHARGER

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	

ModbusTCP protocol description POWER CHARGER

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	0x2060 – 0x206F
Name	Warning History
Data Type	UNSIGNED16
Access Type	Write Only
Default Value	
Low Limit	
High Limit	