

AMTRON® 4You 300

AMTRON® Compact 2.0s

AMTRON® Start 2.0s

Modbus RTU Specification

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Release information

The Modbus RTU specification which is described in this document will be available for the AMTRON® 4You 300, AMTRON® Compact 2.0s and AMTRON Start 2.0s with SW-Version 2023.21.11024 and above which includes the Modbus register settings v 01.03.

1. General

- Modbus “A” corresponds to “+”, Modbus “B” corresponds to “-“

MENNEKES Modbus RTU uses the following default communication parameters, which can be changed with the help of the configuration tool (optional):

- Baudrate 57600 bit/s
(*optional 9600, 14400, 19200, 28800, 38400, 56000, 57600 bit/s*)
- 8 Data bits, 2 Stop bits, no parity
(*optional 8 Data bits, 1 Stop bit, even parity, 8 Data bits, 1 Stop bit, odd parity*)
- Byte and Word Order: Big Endian

The following functional codes can be used:

- Read:
 - READ HOLDING REGISTERS (0x03)
 - READ INPUT REGISTERS (0x04)
- Write:
 - WRITE SINGLE REGISTER (0x06) (only if data size = 1 register), e.g. writing 2 bytes into a uint16 type
 - WRITE MULTIPLE REGISTERS (0x10), e.g. writing 4 bytes into a float 32 type

Important notes:

- The AMTRON is configured as Satellite as soon as the DIP-Switches on bank S1, DIP 4 and DIP 5 are set to “ON” and a reboot is performed. The default Modbus address is 50 but can be changed with the help of the configuration tool. Addresses from 10 to 50 can be set.
- To start a charging session, a master heartbeat (0x0D00 = 0x55AA / 21930) has to be received at least every 10s, the charging release has to be set to 1 (0x0D05 = 1) and the charging current limitation by the energy manager is set to a value of at least 6A (0x0302 >= 6.00).
- If “charging current limitation by the energy manager” is set to 0 (0x0302 = 0), this is interpreted as “no limitation” and the “Signaled Current” is set to the maximum value (0x0114 = 16/32A).
- If the wallbox is in error state due to a missing energy manager or after a reboot, the registers 0x0D00, 0x0D05 and 0x0302 need to be written to set the wallbox back in the “Idle” state.
- Dynamic phase switch is only available for 11kW devices (Phase Options HW 0x030C = 2).
- For 1-phase charging set Requested Phases to 1 (0x0D04 = 1), for 3-phase charging to 0.
- The phase switch can be triggered within an ongoing charging session. But for some EVs (known for Fiat 500e) it is necessary to previously set the charging current to 0 (0x0302 = 0) before changing the value in Requested Phases.
- If you use the feature of dynamic phase switch, please be sure that the EV is capable of doing so. A phase switch should also not be used in an intensive way to guarantee the successful charging of the connected EV.
- It is highly recommended to change the charging current at an interval not faster than 5s and also to reduce the charging pauses to a minimum to have a high compatibility with EVs.

2. General Information (0x0000-0x00FF)

Reading out this part will return basic information about the connected wallbox device.

- Modbus Version
- Firmware Version
- Serial Number
- MENNEKES Article Number

3. Status (0x0100 - 0x02FF)

The following registers contain general information about the status of the device.

- EVSE State
- Authorization Status (RFID & Energy Manager)
- Downgrade
- Phase Rotation
- CP State
- Signaled Current

4. Configuration (0x0300 - 0x04FF)

This section describes information about pre-configured settings via DIP switches or via configuration tool. Additionally, it is possible (and necessary) for the external EMS to set charging current parameters for the EVSE.

- Downgrade Current
- Charging Current Energy Manager
- Maximal Current House (DIP)
- Maximal EVSE Current
- Phase Switching Mode
- Phase Options HW
- Cable Lock Setting
- Energy Manager Fallback Current
- Grid Imbalance
- Grid Imbalance Threshold
- Grid Phases Connected
- Authorization
- Solar Supported Charging (Sunshine+) Current
- Phase Switching Pause

5. Output Measurements (AC) **(0x0500 - 0x06FF)**

It is possible to read the RMS current, the voltage and power on all three connected phases separately. The overall power is also available.

- Current L1
- Current L2
- Current L3
- Voltage L1
- Voltage L2
- Voltage L3
- Power L1
- Power L2
- Power L3
- Power Overall

6. Input Measurements **(0x0900 - 0x0AFF)**

Internal values from the EVSE.

- Temperature

7. Charging Session **(0x0B00 - 0x0CFF)**

Information about the current charging session can be read in the following registers.

- Max Current Session
- Charged Energy Session
- Duration Session
- Detected EV Phases

8. Functions **(0x0D00 - 0x0DFF)**

The registers in the functions part allow control of the EVSE. Note that some functions have to be activated on the hardware dip-switches first.

- Heartbeat Energy Manager
- Cable Lock Status
- Solar Charging Mode
- Requested Phases
- Charging Release Energy Manager
- Lock EVSE
- System Restart

9. Diagnostic (0x0E00 – 0x0FFF)

It is also possible to get some diagnostic data from the EVSE.

- Active Error Code
- Master Lost Fallback State
- Switched Phases

In case of error codes please contact the responsible installer or MENNEKES service hotline. Further details can also be seen using the MENNEKES Configuration Tool available on the MENNEKES website <https://www.mennekes.de/emobility/services/software-updates/>

10. Statistic (0x1000 – 0x1FFF)

Information about the charging sessions in total.

- Charged Energy Total
- Charging Sessions Total

11. Appendix with all registers and practical examples

Helpful information for implementing the wallbox into an energy management system including a step-by-step description of using the dynamic phase switch.

address	R/W	function code	bytes	type	range	Modbus version	register name	description
0x0000	R	(0x03), (0x04)	2	uint16	0...65536 0x 00 00...0x FF FF	v 01.00	Modbus Version	Internal Modbus Register Layout Version (v 01.00 = 0x0100, v 01.03 = 0x0103)
0x0001	R	(0x03), (0x04)	16	ascii	-	v 01.00	Firmware Version	Firmware Version
0x0013	R	(0x03), (0x04)	16	ascii	-	v 01.02	Serial Number	Serial Number
0x001B	R	(0x03), (0x04)	16	ascii	-	v 01.03	MENNEKES Article Number	Article number as on the type plate, e.g. 1313201205 for AMTRON 4You 310 11
0x0100	R	(0x03), (0x04)	2	uint16	0...7	v 01.00	EVSE State	Status of the charging station: 0 = not initialized 1 = Idle (no EV connected) 2 = EV connected (no charging current is signalled to EV) 3 = Preconditions valid, but not charging yet 4 = Ready to charge (charging current is signalled to EV) 5 = Charging 6 = Error 7 = Service Mode
0x0101	R	(0x03), (0x04)	2	uint16	0...2	v 01.00	Authorization Status (RFID & Energy Manager)	Authorization Status (RFID & Energy Manager): 0 = not used (IDLE) 1 = authorized (charging released) 2 = not authorized (charging not released)
0x0102	R	(0x03), (0x04)	2	uint16	0...2	v 01.00	Downgrade	Status of the external downgrade signal: 0 = not relevant (no EV connected) 1 = charging current not downgraded 2 = charging current downgraded
0x0103	R	(0x03), (0x04)	2	uint16	0...2	v 01.00	Phase Rotation	Order of the connected phases (relevant for load management): 0 = L1 - L2 - L3 (no rotation) 1 = L2 - L3 - L1 2 = L3 - L1 - L2
0x0108	R	(0x03), (0x04)	2	uint16	0...29	v 01.02	CP State	State of the CP communication between EVSE and EV: 0 = Init 10 = A1 (no EV) 11 = B1 (EV connected, EVSE has not started charging yet or charging is paused by EVSE) 12 = C1 (EV ready to charge) 13 = D1 14 = E (Error) 15 = F (Error) 26 = A2 (EV disconnected, signaled current >=6A offered to EV) 27 = B2 (EVSE ready to charge, signaled current >=6A offered to EV) 28 = C2 (charging, signaled current >=6A offered to EV) 29 = D2
0x0114	R	(0x03), (0x04)	4	float	0...xA	v 01.03	Signaled Current	Signaled Current to the EV on the CP-line.
0x0300 - 0x0301	R	(0x03), (0x04)	4	float	0...xA	v 01.00	Downgrade Current	Charging current limitation while downgrade is active.
0x0302 - 0x0303	R/W	(0x03), (0x04)(0x06), (0x13)	4	float	0...xA	v 01.00	Charging Current Energy Manager	Charging current limitation by Energy Manager: 0 = no limitation, EVSE signals maximal current (16/32A) 0.01...5.99 = invalid, EVSE signals 0A 6...x = valid, EVSE limits at its own upper limit (6...16/32A) Remark: 0x0D05 can be used additionally to interrupt the charging process
0x0304 - 0x0305	R	(0x03), (0x04)	4	float	0...xA	v 01.00	Maximal Current House (DIP)	Maximal installation current, configured from DIP-Switch, with attention to the house installation, configured by DIP-Switches 6-8 at bank S2: 0 - 63A; 1 - 50A; 2 - 40A; 3 - 35A; 4 - 32A; 5 - 25A; 6 - 20A; 7 - 16A
0x0306 - 0x0307	R	(0x03), (0x04)	4	float	0...xA	v 01.00	Maximal EVSE Current	Maximal current of the EVSE as configured during the installation: 0 - 32A in 22kW EVSE, 16A in 11kW EVSE 1 - 25A in 22kW EVSE, 16A in 11kW EVSE 2 - 20A in 22kW EVSE, 16A in 11kW EVSE 3 - 16A 4 - 13A 5 - 10A 6 - 6A
0x030A	R	(0x03), (0x04)	2	uint16	0...2	v 01.00	Phase Switching Mode	Phase usage possibilities while using the internal solar algorithm: 0 = Solar only 1 phase 1 = Solar only 3 phases 2 = Solar dynamic 1 or 3 phases
0x030C	R	(0x03), (0x04)	2	uint16	0...2	v 01.01	Phase Options HW	Phase options regarding the hardware: 0 = HW only 1 phase 1 = HW only 3 phases 2 = HW 1 or 3 phases (phase switch possible)
0x030D	R	(0x03), (0x04)	2	uint16	0...1	v 01.02	Cable Lock Setting	Permanent cable lock: 0 = not enabled or unavailable 1 = enabled
0x030E	R	(0x03), (0x04)	2	uint16	0...32	v 01.02	Energy Manager Fallback Current	Fallback behaviour when the heartbeat of the Energy Manager is not available during a charging session: 0 - Fallback handling disabled, EVSE will continue charging with the last received values from the Energy Manager 1 - Fallback handling enabled, EVSE will pause charging on heartbeat timeout 6...32 - Fallback Current 6...32A
0x030F	R	(0x03), (0x04)	2	uint16	0...1	v 01.02	Grid Imbalance	Grid Imbalance: 0 = disabled 1 = enabled
0x0310	R	(0x03), (0x04)	2	uint16	10...30A	v 01.02	Grid Imbalance Threshold	Grid Imbalance Threshold
0x0311	R	(0x03), (0x04)	2	uint16	0...2	v 01.02	Grid Phases Connected	Number of connected phases to the grid: 0: L1 is connected 2: L1, L2, L3 are connected
0x0312	R	(0x03), (0x04)	2	uint16	0...1	v 01.02	Authorization	Authorization: 0 = disabled 1 = enabled
0x0313	R	(0x03), (0x04)	2	uint16	6...32A	v 01.02	Solar Supported Charging (Sunshine+) Current	Minimal charging current in Solar supported charging (Sunshine+) mode.
0x0314	R	(0x03), (0x04)	2	uint16	0...1200s	v 01.02	Phase Switching Pause	Time between a phase switch from 1 to 3 phase and vice versa (in seconds).
0x0500 - 0x0501	R	(0x03), (0x04)	4	float	0...xA	v 01.00	Current L1	RMS output current of phase L1
0x0502 - 0x0503	R	(0x03), (0x04)	4	float	0...xA	v 01.00	Current L2	RMS output current of phase L2
0x0504 - 0x0505	R	(0x03), (0x04)	4	float	0...xA	v 01.00	Current L3	RMS output current of phase L3

0x0506 - 0x0507	R	(0x03), (0x04)	4	float	0 ... xV	v 01.00	Voltage L1	RMS output voltage of phase L1
0x0508 - 0x0509	R	(0x03), (0x04)	4	float	0 ... xV	v 01.00	Voltage L2	RMS output voltage of phase L2
0x050A - 0x050B	R	(0x03), (0x04)	4	float	0 ... xV	v 01.00	Voltage L3	RMS output voltage of phase L3
0x050C - 0x050D	R	(0x03), (0x04)	4	float	-xW ... 0 ... xW	v 01.00	Power L1	Actual power on phase L1
0x050E - 0x050F	R	(0x03), (0x04)	4	float	-xW ... 0 ... xW	v 01.00	Power L2	Actual power on phase L2
0x0510 - 0x0511	R	(0x03), (0x04)	4	float	-xW ... 0 ... xW	v 01.00	Power L3	Actual power on phase L3
0x0512 - 0x0513	R	(0x03), (0x04)	4	float	-xW ... 0 ... xW	v 01.00	Power Overall	Actual overall power on all phases
0x0900 - 0x0901	R	(0x03), (0x04)	4	float	-x°C ... x°C	v 01.02	Temperature	Temperature (°C) inside the EVSE
0xB00 - 0xB01	R	(0x03), (0x04)	4	float	0...xA	v 01.00	Max Current Session	Max charging current, evaluated out of all sources that could restrict the maximal allowed current and are static during a charging session (e.g. Installation Current Limitation, Charging Cable ...)
0xB02 - 0xB03	R	(0x03), (0x04)	4	float	0...kWh	v 01.00	Charged Energy Session	Energy transferred within the current charging session.
0xB04 - 0xB05	R	(0x03), (0x04)	4	uint32	0...xs	v 01.00	Duration Session	Duration of the current charging session.
0xB06	R	(0x03), (0x04)	2	uint16	0...3	v 01.02	Detected EV Phases	Maximum number of the detected phases of the EV during a charging session: 0 = not init 1 = 1 phase detected 2 = 2 phases detected 3 = 3 phases detected'
0xD00	W	(0x06)	2	uint16	-	v 01.00	Heartbeat Energy Manager	A master heartbeat with the value 0x55AA has to be sent at least every 10s by the Energy Manager to keep the communication valid. If no Energy Manager fallback Current (0x030E) is active, the EVSE will turn into error state when no EV is connected.
0xD02	R	(0x03), (0x04)	2	uint16	0...3	v 01.00	Cable Lock Status	Locking status of the cable: 0 = cable locking unknown 1 = cable unlocked 2 = cable locked 3 = EVSE with fixed cable
0xD03	R/W	(0x03), (0x04), (0x06)	2	uint16	0...3	v 01.00	Solar Charging Mode	Internal Solar Modes can be indicated with the help of the Solar LEDs. Active charge mode: 0 = Solar charging Mode not active 1 = Fast charging (Standard) Mode 2 = Solar charging (Sunshine) Mode 3 = Solar supported charging (Sunshine+) Mode Remark: This triggers only the HMI, the Energy Manager is responsible for the solar algorithms. Solar Mode has to be activated by DIP 7, too. The solar button at the wallbox also triggers a change of the solar mode.
0xD04	R/W	(0x03), (0x04), (0x06)	2	uint16	0...1	v 01.00	Requested Phases	Requested phases when using dynamic phase usage: 0 = regular charging on all available phases 1 = force charging on 1 phase only Remark: EVSE has to support this technically (see register 0x030C). If not, write function will be ignored. The phase switch will be done automatically by the EVSE regarding to CharIN guidelines including the pause as set in register 0x0314.
0xD05	R/W	(0x03), (0x04), (0x06)	2	uint16	0...1	v 01.00	Charging Release Energy Manager	Charging Release Energy Manager: 0 = charging is not allowed (relais are opened) 1 = charging is allowed (relais are closed)
0xD06	R/W	(0x03), (0x04), (0x06)	2	uint16	0...1	v 01.00	Lock EVSE	Lock charging station (prevent charging): 0 = EVSE is not locked 1 = EVSE is locked
0xD19	W	(0x06)	2	uint16	-	v 01.03	System Restart	Trigger a system restart by sending 0xBB once. Only use this function if the system is in IDLE state.
0xE00	R	(0x03), (0x04)	2	uint16	0...65536	v 01.00	Active Error Code	Error code in case of an active error: 0 = no error active 200 = Energy Manager not available (no heartbeat) 2011 = EV overcurrent (EV charged with more current than signaled) 2300...2305 = Over-/Undervoltage on L1, L2 or L3 (if voltage detection active) 2323 = Connected Phases mismatch (if voltage detection active)
0xE01	R	(0x03), (0x04)	2	uint16	0...1	v 01.02	Master Lost Fallback State	Energy Manager fallback state: 0 = not active 1 = active (Energy Manager currently unavailable)
0xE02	R	(0x03), (0x04)	2	uint16	0...1	v 01.02	Switched Phases	Information what phase is used or will be used if the EVSE will close the charging relay: 0 = regular charging on all available phases 1 = only 1 phase charging
0x1000	R	(0x03), (0x04)	4	float	0...kWh	v 01.02	Charged Energy Total	Cumulated charged energy in kWh on the AC-Port of the EVSE of all time. Not useable for billing.
0x1002	R	(0x03), (0x04)	4	uint32	0...x	v 01.02	Charging Sessions Total	Total number of the charging sessions.

function code	Read: READ HOLDING REGISTERS (0x03) or READ INPUT REGISTERS (0x04)
bus parameter (default)	Write: WRITE SINGLE REGISTER (0x06) (only if data size = 1 register) or WRITE MULTIPLE REGISTERS (0x10)
byte/word order	Baudrate 57600, 8 Data bits, no parity, 2 stop bits Big endian

row	address	register name	R/W	possible value	interpretation
1	Minimum requirements for charging with an EMS (also necessary after a reboot or a communication error)				
2	0x0D00	Heartbeat Energy Manager	Write	0x55AA / 21930	EMS signals standby. Interval: < 10s (note package runtime)
3	0x0D05	Charging Release Energy Manager	Write	1 = charging is allowed	EMS signals the wallbox to charge.
4	0x0302	Charging Current Energy Manager	Write	6A	EMS writes a valid current to the EVSE (6...16/32A). Values are automatically limited by the configuration of the wallbox.
5	Read out the general configuration and the status of the wallbox				
6	0x0100	EVSE State	Read	1 = Idle (no EV connected)	Wallbox has booted, no EV connected.
7	0x0D03	Solar Charging Mode	Read	2 = Solar Charging Mode	Wallbox set to solar charging via DIP, with button set to Solar charging mode (Sunshine).
8	0x030C	Phase Options HW	Read	2 = HW 1 or 3 phases (phase switch possible)	Wallbox tells the EMS, that the hardware is capable of dynamic phase switching in terms of hardware.
9	0x0D04	Requested Phases	Read	1 = force charging on 1 phase only	Based on its relevant criteria, the EMS decides that the load should only be started with one phase, e.g: - PV production is too low - state of charge of the PV house battery is too low - outgoing power of the PV house battery restricts more power - other house consumers have a higher priority - other reasons
10	0x0100	EVSE State	Read	2 = EV connected (no charging current is signalled to EV)	EV plugged in, not charging yet.
11	0x0B00	Max Current Session	Read	16A	The wallbox is limited to 16A charging current.
12	0x0100	EVSE State	Read	3 = Preconditions valid, but not charging yet	Self-test OK, other external reason are blocking the charging release (e.g. no charging release by EMS).
13	Situation changes regarding available energy, PV surplus > 230V * 6A for x-minutes				
14	0x0E02	Switched Phases	Read	1 = only 1 phase will be used for charging	Only 1 phase will be used for charging after closing the relais (if supported by hardware).
15	0x0302	Charging Current Energy Manager	Write	6A	EMS writes a valid current to the wallbox.
16	0x0100	EVSE State	Read	4 = Ready to charge (charging current is signalled to EV)	All criteria in the wallbox are fulfilled, the EV gets a ready for charge.
17	0x0114	Signaled Current	Read	6A	Charging current from the Energy Manager is transmitted on the CP-line to signal the current to the EV.
18	0x0108	CP State	Read	28 = C2 (charging, signaled current >=6A offered to EV)	EV has reacted via CP state C2.
19	0x0100	EVSE State	Read	5 = Charging	EVSE changes its state to "Charging".
20	Charging active, PV surplus increases, charging current is adjusted				
21	0x0302	Charging Current Energy Manager	Write	6.78A	EMS writes a valid current to the wallbox.
22	0x0114	Signaled Current	Read	6.78A	Charging current from the Energy Manager is transmitted on the CP-line to signal the current to the EV.
23	0x0302	Charging Current Energy Manager	Write	16A	EMS writes a valid current to the wallbox. Change charge current only at intervals > 5 seconds.
24	0x0114	Signaled Current	Read	16A	Charging current from the Energy Manager is transmitted on the CP-line to signal the current to the EV.
25	Situation requires switching to three phases, e.g. caused by 5000W PV surplus				
26	0x0302	Charging Current Energy Manager	Write	1A = charging is paused	EMS tells the wallbox to pause charging with values from 0.01-5.99A. Beware: 0A would mean unlimited current 16/32A!
27	0x0108	CP State	Read	11 = B1 (EV connected)	Wait until the EV pauses charging as well (3-5s).
28	0x0100	EVSE State	Read	2 = EV connected (no charging current is signalled to EV)	EV plugged in, not charging in preparation for the phase switch.
29	0x0D04	Requested Phases	Write	0 = regular charging on all available phases	Based on its relevant criteria, EMS decides that charging should be continued with three phases.
30	Wallbox triggers phase change				
31	0x0114	Signaled Current	Read	0A	Charging current is set to 0A during phase switch.
32	0x0302	Charging Current Energy Manager	Write	7.2A (5000W/230V/3 Phases)	EMS updates the charging current, as this now applies to 3 phases.
33	0x0108	CP State	Read	11 = B1 (EV connected)	During the phase switch, the CP State lasts in B1 during the optional phase switch pause.
34	0x0E02	Switched Phases	Read	0 = all available phases will be used for charging	All phases will be used for charging after closing the relais.
35	0x0114	Signaled Current	Read	7.2A	Charging current from the Energy Manager is signaled to the EV as soon as the phase switch is completed.
36	0x0108	CP State	Read	27 = B2 (signaled current >=6A offered to EV)	EVSE ready to charge, waiting for the EV to start charging.
37	0x0100	EVSE State	Read	4 = Ready to charge (charging current is signalled to EV)	All criteria in the wallbox are fulfilled, the EV gets a ready for charge.
38	0x0108	CP State	Read	28 = C2 (charging, signaled current >=6A offered to EV)	EV has reacted via CP state C2.
39	0x0100	EVSE State	Read	5 = Charging	If EV reacts again by changing the CP State to C2, charging will be continued.
40	EMS wants to pause charging, e.g. caused by user interaction or PV surplus below 1380W				
41	0x0302	Charging Current Energy Manager	Write	1A = charging is paused	EMS tells the wallbox to pause charging with values from 0.01-5.99A. Beware: 0A would mean unlimited current 16/32A!
42	0x0114	Signaled Current	Read	0A	Charging current is set to 0A during a charging pause.
43	0x0100	EVSE State	Read	2 = EV connected (no charging current is signalled to EV)	EV plugged in, not charging while pausing.
44	0x0302	Charging Current Energy Manager	Write	6A	EMS writes a valid current to the wallbox.
45	0x0114	Signaled Current	Read	6A	Charging current from the Energy Manager is transmitted on the CP-line to signal the current to the EV.
46	0x0100	EVSE State	Read	5 = Charging	Charging will be continued with the same number of "Requested Phases".
The change between charging pause and charging resumption should be reduced as much as possible. Recommendation: Continue charging or trigger a pause or a phase switch at intervals of > 5 minutes. Use hysteresis!					