

# **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 MCU SW version 2.0 (2023.21.11024) which includes the Modbus register settings v1.0.3.

### 1. General

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)
- Register Word order: LowWord / HighWord
- Byte order: Big Endian HighByte / LowByte

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:**

- If the AMTRON is configured as Satellite with help of the DIP-Switches on the baseboard, there is the address "50" already preconfigured. With help of the configuration tool, you can additionally use the alternative addresses from 10 to 50.
- To start a charging session, it is necessary to send the master heartbeat (0x55AA / 21930) at least every 10s, set the charging release to 1 and the set a charging current limitation by the energy manager to a value of at least 6A.
- 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.
- Dynamic phase change is only available for 11kW devices which are configured in the appropriate way with the help of the configuration tool.
- If you use the feature of dynamic phase change, please be sure that the EV is capable of doing so. A phase change should also not be used in an intensive way to guarantee the successful charging of the connected EV.

## **2. General Information (0x0000-0x00FF)**

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

- Modbus Version
- Firmware Version
- Serial 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
- Max Current House (DIP)
- Max Current EVSE
- Phase Switching Mode
- Phase Options HW
- Cable Lock
- Master Lost 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. Settings** **(0x0700 - 0x08FF)**

Configure some basic settings.

- Maximal EVSE Current
- Phase Rotation
- Connected Phases
- Phase Usage Solar Charging
- Fallback Current Master Lost
- Solar Charging Active
- Phase Switching Pause

## **7. Input Measurements** **(0x0900 - 0x0AFF)**

Internal values from the EVSE.

- Temperature

## **8. 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

## **9. 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
- Solar Charging Mode
- Requested Phases
- Charging Release Energy Manager
- Lock EVSE
- System Restart

## **10. 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 AMTRON® Compact 2.0s Configuration Tool available on the MENNEKES website <https://www.mennekes.de/emobility/services/software-updates/>

## **11. Statistic (0x1000 – 0x1FFF)**

Information about the charging sessions in total.

- Charged Energy Total
- Charging Sessions Total

## **12. Appendix with all registers and practical examples, e.g. for the use of phase change**

address	R/W	function Code	bytes	type	range	Modbus version	register name	description
0x0000	R	(0x03), (0x04)	2	uint16	0...65536 0xFF FF	v 01.00	Modbus Version	Internal Modbus Register Layout Version (V1.0.0 = 0x100, V1.0.3 = 0x103)
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
0x0100	R	(0x03), (0x04)	2	uint16	0...7	v 01.00	EVSE State	Status of the charging station 0 = not initialized 1 = Idle (A1) 2 = EV connected (B1) 3 = Preconditions valid but not charging yet 4 = Ready to charge (B2) 5 = Charging (C2) 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 Downgrade 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 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 EVSE-EV 0 = Init 10 = A1 (no EV) 11 = B1 (EV connected) 12 = C1 (EV ready to charge) 13 = D1 14 = E (Error) 15 = F (Error) 26 = A2 (EV disconnected) 27 = B2 (EVSE ready to charge) 28 = C2 (charging) 29 = D2
0x0114	R	(0x03), (0x04)	4	float	-	v 01.03	Signaled Current	Signaled Current to the EV
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), (0x10)	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: 0xD050 can be used additionally to interrupt the charging process
0x0304 - 0x0305	R	(0x03), (0x04)	4	float	0...xA	v 01.00	Max Current House (DIP)	Maximal installation current, configured from DIP-Switch with attention to the house installation.
0x0306 - 0x0307	R	(0x03), (0x04)	4	float	0...xA	v 01.00	Max Current EVSE	Maximal current of the EVSE as configured during the installation.
0x030A	R	(0x03), (0x04)	2	uint16	0...2	v 01.00	Phase Switching Mode	phase usage while using the 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
0x030D	R	(0x03), (0x04)	2	uint16	0...1	v 01.02	Cable Lock	permanent cable lock 0 = not enabled or unavailable 1 = enabled
0x030E	R	(0x03), (0x04)	2	uint16	0...32	v 01.02	Master Lost Fallback Current	fallback behaviour if Master (energy manager) is unavailable 0 = fallback disabled (charging continues as before) 1 = pause charging (0A) 6...32 = charging continues with stored value in A
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	Setting of the number of grid phases connected to the EVSE. 0 = L1 2 = L1, L2 and L3

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	duration of the pause during a dynamic phase switch
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
0x0706	R/W	(0x03), (0x04), (0x06), (0x10)	2	uint16	0...6	v 01.03	Maximal EVSE Current	Maximal current of the wallbox: 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
0x070A	R/W	(0x03), (0x04), (0x06), (0x10)	2	uint16	0...2	v 01.03	Phase Rotation	Phase rotation on grid side on the input of the EVSE: 0 - L1 = L1, L2 = L2, L3 = L3 (no rotation) 1 - L1 = L2, L2 = L3, L3 = L1 2 - L1 = L3, L2 = L1, L3 = L2
0x0710	R/W	(0x03), (0x04), (0x06), (0x10)	2	uint16	0...2	v 01.03	Connected Phases	Number of connected phases to the grid: 0: L1 is connected 2: L1, L2, L3 are connected
0x071A	R/W	(0x03), (0x04), (0x06), (0x10)	2	uint16	0...3	v 01.03	Phase Usage Solar Charging	Used Phases in Solar Charging 0 - 1ph for 7.4kW, 3ph for 11/22kW 1 - use always one phase 2 - use always three phases 3 - dynamic phase switch
0x073A	R/W	(0x03), (0x04), (0x06), (0x10)	2	uint16	0...32	v 01.03	Fallback Current Master Lost	Fallback behaviour when the heartbeat of the Master is not available: 0 - Fallback handling disabled, EVSE will not change the last received master values 1 - Fallback handling enabled, EVSE will pause charging on heartbeat timeout 6...32 - Fallbackcurrent 6...32A
0x073C	R/W	(0x03), (0x04), (0x06), (0x10)	2	uint16	0...1	v 01.03	Solar Charging Active	Internal Solar Modes can be indicated with the help of the Solar LEDs. 0 - Solar Modes are not active (DIP7 bank S1 "OFF") 1 - Solar Modes are active (DIP7 bank S1 "ON")  If activated, charging modes can be switched by button or by the modbus register "Solar Charging Mode".
0x078C	R/W	(0x03), (0x04), (0x06), (0x10)	2	uint16	0...1200	v 01.03	Phase Switching Pause	Time between a phase switch from 1 to 3 phase and vice versa (in seconds).
0x0900 - 0x0901	R	(0x03), (0x04)	4	float	-x°C ... x°C	v 01.02	Temperature	Temperature (°C) inside the EVSE
0x0B00 - 0x0B01	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 ...).
0x0B02 - 0x0B03	R	(0x03), (0x04)	4	float	0...xkWh	v 01.00	Charged Energy Session	energy transferred within the current charging session
0x0B04 - 0x0B05	R	(0x03), (0x04)	4	uint32	0...xs	v 01.00	Duration Session	duration of the current charging session
0x0B06	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"
0x0D00	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.
0x0D02	R	(0x03), (0x04)	2	uint16	0...3	v 01.00	Cable Lock	locking status of the cable 0 = cable locking unknown 1 = cable unlocked 2 = cable locked 3 = EVSE with fixed cable
0x0D03	R/W	(0x03), (0x04), (0x06)	2	uint16	0...3	v 01.00	Solar Charging Mode	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.



0x0D04	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 switching pause as set in register 0x0314.
0x0D05	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)
0x0D06	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
0x0D19	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.
0x0E00	R	(0x03), (0x04)	2	uint16	-	v 01.00	Active Error Code	error code in case of an active error 0 = no error active
0x0E01	R	(0x03), (0x04)	2	uint16	0...1	v 01.02	Master Lost Fallback State	Master lost fallback state 0 = not active 1 = active (energy manager unavailable)
0x0E02	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...xkWh	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	<b>Read:</b> READ HOLDING REGISTERS (0x03) or READ INPUT REGISTERS (0x04) <b>Write:</b> WRITE SINGLE REGISTER (0x06) (only if data size = 1 register) or WRITE MULTIPLE REGISTERS (0x10)
bus parameter (default)	Baudrate 57600, 8 Data bits, no parity, 2 stop bits
byte order	Big endian

row	address	register name	R/W	possible value	interpretation
1	<b>Minimum requirements for loading with a EMS</b>				
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	<b>Read out of the wallbox configuration</b>				
6	0x0100	EVSE State	Read	1 = Idle (A1)	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	0x030A	Phase Switching Mode	Read	2 = Solar dynamic 1 or 3 phases	Wallbox tells the EMS, that: 1. wallbox is capable of dynamic phase switching in terms of hardware. 2. the "dynamic phase change" setting is set in the configuration tool.
9	0x0D04	Requested Phases	Write	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 (B1)	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	<b>Situation changes regarding available energy, PV surplus &gt; 230V * 6A for x-minutes</b>				
14	0x0302	Charging Current Energy Manager	Write	6A	EMS writes a valid current to the wallbox.
15	0x0D05	Charging Release Energy Manager	Write	1 = charging is allowed	EMS tells the wallbox to charge.
16	0x0100	EVSE State	Read	4 = Ready to charge (B2)	All criteria in the wallbox are fulfilled, the EV gets a ready for charge.
17	0x0100	EVSE State	Read	5 = Charging (C2)	EV has reacted via CP state C2.
18	<b>Charging active, PV surplus increases, charging current is adjusted</b>				
19	0x0302	Charging Current Energy Manager	Write	7A	EMS writes a valid current to the wallbox.
20	0x0302	Charging Current Energy Manager	Write	10A	EMS writes a valid current to the wallbox. <b>Change charge current only at intervals &gt;5s.</b>
21	0x0302	Charging Current Energy Manager	Write	8A	EMS writes a valid current to the wallbox.
22	0x0302	Charging Current Energy Manager	Write	11A	EMS writes a valid current to the wallbox.
23	0x0302	Charging Current Energy Manager	Write	16A	EMS writes a valid current to the wallbox.
24	<b>Situation requires switching to three phases, e.g. caused by 5kW PV surplus</b>				
25	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. Object 0x030A "Phase Switching Mode" shows that this is possible on this hardware.
26	<b>Wallbox triggers phase change</b>				
27	0x0302	Charging Current Energy Manager	Write	7,2A (5000W/230V/3 Phases)	EMS updates the charging current, as this now applies to 3 phases.
28	0x0100	EVSE State	Read	5 = Charging (C2)	Charging current will go to 0 within the phase change, no explicit status for the phase change necessary.
29	0x0100	EVSE State	Read	4 = Ready to charge (B2)	Phase change sequence takes place, wallbox offers a ready to charge.
30	0x0100	EVSE State	Read	5 = Charging (C2)	EV reacts again with CP-C2 and charging continues.
31	<b>Generation situation changes including a charging pause</b>				
32	0x0302	Charging Current Energy Manager	Write	6A	EMS writes a valid current to the wallbox.
33	0x0D05	Charging Release Energy Manager	Write	0 = charging is not allowed	EMS tells the wallbox to pause charging, the relays are opened.
34	0x0302	Charging Current Energy Manager	Write	6A	EMS continues to write a charging current to the wallbox but the charging still pauses because charging release is not set.
35	0x0D05	Charging Release Energy Manager	Write	1 = charging is allowed	EMS authorises the wallbox to charge. Charging is resumed with 6A with the same number of "Requested Phases". <b>The change between charging pause and charging resumption should be reduced as much as possible.</b> <b>Recommendation: Continue charging at intervals of &gt;5 minutes.</b>