

WALLBOX basicEVO | basicEVO PRO



INSTRUCTION MANUAL



walther-werke.de/service



English 11





















XI

! 🛕 🐻

Contents

1.	Introduction	12
2.	Installation of the bus system	12
2.1	General requirements	12
2.2	Bus system in line wiring	12
2.3	Bus system with central wiring in distributor	12
3.	Local and external load management	12
3.1	Prerequisites	13
3.2	Bus topology	13
3.3	Check-list for local load management	13
3.4	Check-list for external load management	13
4.	Configuration of the Wallboxes	13
4.1	Configuration of maximum (switch S1) and minimum	
	(switch S3) charging current (per Wallbox)	14
4.2	Switch S2	14
4.3	Switch S4	14
4.4	Switch S5	15
4.5	Switch S6	15
5.	Bus protocol (external load management)	15
5.1	Modbus connection	15
5.2	Functions supported by the Modbus protocol	16
6.	Checking load management	16
Tabl	e Modbus Register – Wallbox basicEVO PRO	17

1. Introduction

The Wallbox basicEVO PRO is used to charge plug-in hybrid or electric vehicles. Several basicEVO PRO Wallbox units can be operated in an integrated network. This enables the power distribution to be monitored for up to 16 Wallboxes. In the interest of simplicity, the 'Wallbox basicEVO PRO' will be shortened to 'Wallbox' below. The integrated network can be implemented in the form of local or external load management.

Fig. V shows an integrated network comprising five Wallboxes as an example. In an integrated network of five Wallboxes, the energy supply provides up to 32 A of current. The Wallboxes are pre-set with I_{max} 16 A and I_{min} 6 A. The total charging current (32 A) is distributed equally. If a vehicle has ended its charging process but remains connected to the Wallbox, this vehicle will continue to be provided with 6 A of continuous current (for the auxiliary heater, for example), in some cases alternately with other vehicles which have already been charged.

2. Installation of the bus system

Installation of the bus system is described below. The wiring is implemented as line wiring (see 2.2) or as central wiring (see 2.3).

2.1 General requirements

Fig. VIII: Illustration of line wiring and Fig. XI: Central wiring

- 1. Shield connection for the bus lines
- 2. Power supply connection
- 3. Conductors of the charging cable
- 4. Connection terminals for bus conductors
- 5. Bus insulation

The following requirements must be met for any type of wiring:

- Always use a screened bus line (e.g. CAT6a) for the cabling.
- Do not exceed the total permissible fieldbus length of 500 m.
- Prepare the bus cable and the Wallbox for installation (Figs. VI and VII).
- Ensure that there is sufficient distance between the conductors, the power supply (2), the charging cable (3) and the bus lines (5).
- Securely connect the bus lines to the designated screen connections.
- Cut off unused individual conductors at the end of the insulation.

2.2 Bus system in line wiring

With line wiring (Figs. VIII, IX and X), the bus line is routed directly from a Wallbox or external

load management system to the next Wallbox. Please note:

- Two conductors per bus line are used.
- Connect the bus using two separate bus lines each
 between the Wallboxes (Line in and Line out).
- Connect only one bus line each to the first (Line out) and last (Line in) devices.

Figs. IX and X are explained below

Item	Designation
1	First Wallbox or external load manage-
'	ment on the bus
2	Second Wallbox on the bus
3	Wallbox X on the bus
4	Last Wallbox on the bus

2.3 Bus system with central wiring in distributor

Central wiring (Figs. XI, XII and XIII) differs as follows:

- Four conductors per bus line are used.
- Only two conductors each are needed on the first and last devices.
- Connect the screens of the individual bus lines in the central distributor.

Figs. XII and XIII are explained below

ltem	Designation		
1	First Wallbox or external load manage-		
	ment on the bus		
2	Second Wallbox on the bus		
3	Wallbox X on the bus		
4	Last Wallbox on the bus		
5	Central distributor		

3. Local and external load management

In local load management mode, several Wallboxes are networked via an RS485 bus. These Wallboxes share the available total current equally. An external control system is not necessary in this case. Activating this mode does not require making any communication settings. Please observe the information on configuring and installing the Wallboxes. In external load/energy management mode, the Wallboxes are networked with an external control

Wallboxes are networked with an external control system (e.g. HEMS – Home Energy Management System) via an RS485 bus.

The external control system (leader) manages the system and communicates with all connected Wallboxes (followers). The external control system controls the energy distribution. This approach enables solar energy to be fed in when an electric vehicle is being charged, for example.

Please observe the points below for trouble-free installation and commissioning.

3.1 Prerequisites

- At least two Wallboxes with local load management.
- At least one Wallbox and an external control system with external load management.
- Maximum of 16 Wallboxes
- · One hybrid/electric vehicle per Wallbox.
- Energy supply at least 6 A per Wallbox (in case of overloading, ongoing charging processes will be completed first).

To avoid single-phase load peaks, connect the devices with an alternating phase sequence.

- First Wallbox: L1, L2, L3.
- · Second Wallbox: L2, L3, L1.
- Third Wallbox: L3. L1. L2.
- · Fourth Wallbox: L1, L2, L3 again, etc.

3.2 Bus topology

Prerequisites:

- Bus system: RS485 fieldbus
- Protocol: Modbus RTU
- The leader distributes the total current in the system.
- A charging current (default: 6 A) is configured for each Wallbox. Set the required charging current.
- The follower Wallboxes revert to standby state
 when not in use.
- Communication between the follower Wallbox and leader Wallbox is required in order to start the charging process.

Local load management:

- One Wallbox as the leader and at least one or up to 15 Wallboxes as followers.
- The physical position of the Wallbox (leader) is freely selectable.

External load management:

 External control system (e.g. HEMS) which is configured as the leader and at least one or up to 16 Wallboxes as followers.

3.3 Check-list for local load management

- Wire the power supply and the bus system so as to avoid single-phase load peaks.
- · Select the leader Wallbox.

- Set the number of follower Wallboxes in the leader Wallbox.
- Set the maximum system current in the leader Wallbox.
- Set the maximum and minimum individual charging currents in each Wallbox.
- Set the bus ID in each follower Wallbox.
- Activate the bus terminating resistor in the first and last Wallboxes.
- Configure the optional blocking function in the leader Wallbox.

3.4 Check-list for external load management

- Wire the power supply and the bus system so as to avoid single-phase load peaks.
- Configure the external control system (following the manufacturer's instructions).
- · Set each Wallbox as a follower Wallbox.
- Set the bus ID in each Wallbox.
- Set the maximum and minimum individual charging currents in each Wallbox.
- Activate the bus terminating resistor in the external control system and the last Wallbox.

4. Configuration of the Wallboxes

The individual Wallboxes must be pre-configured using rotary switches and micro switches to operate the integrated network of Wallboxes (Fig. XIV). All rotary switches and micro switches are initially set to OFF. The configuration differs in some cases, depending on the local or external load management mode.

Mode-independent switch functions:

S1: rotary switch S1 is used to set the maximum charging current of 6 A to 16 A per Wallbox S3: configuration of minimum charging current S6: bus terminating resistor On/Off

Switch functions in local load management mode:

S2: setting of maximum system current (only in leader Wallbox)

S4: in leader Wallbox: setting of the number of followers

S4: In follower Wallbox: setting of the respective bus ID S5: setting of leader or follower, front illumination and blocking

Switch functions in external load management mode:

S2: configuration of bus ID 16S4: configuration of bus IDs 1 to 15S5: setting of leader or follower, front illumination

4.1 Configuration of maximum (switch S1) and minimum (switch S3) charging current (per Wallbox)

Rotary switch ${\rm S1}$ – setting of the maximum charging current from 6 A to 16 A

Rotary switch ${\bf S3}$ – setting of the minimum charging current from 6 A to 16 A

0	6 A (default setting, as-delivered state)
1	8 A
2	10 A
3	12 A
4	14 A
5 9	16 A

4.2 Switch S2

Local load management: configuration of maximum system current in the **leader Wallbox**

	coh	ca/a	co/7	co//
	52/1	52/2	52/5	52/4
10 A	OFF	OFF	OFF	OFF
16 A	OFF	OFF	OFF	ON
20 A	OFF	OFF	ON	OFF
25 A	OFF	OFF	ON	ON
32 A	OFF	ON	OFF	OFF
35 A	OFF	ON	OFF	ON
40 A	OFF	ON	ON	OFF
50 A	OFF	ON	ON	ON
63 A	ON	OFF	OFF	OFF
80 A	ON	OFF	OFF	ON
100 A	ON	OFF	ON	OFF
125 A	ON	OFF	ON	ON
160 A	ON	ON	OFF	OFF
200 A	ON	ON	OFF	ON
224 A	ON	ON	ON	OFF
250 A	ON	ON	ON	ON

External load management: micro switch S4 is without function in the Wallbox configured for bus ID 16.

Bus ID	S2/1	S2/2	S2/3	S2/4
0	OFF	OFF	OFF	ON

4.3 Switch S4

Local load management: configuration of the number of follower Wallboxes in the leader Wallbox

Follower Wallboxes	S4/1	S4/2	S4/3	S4/4
No follower	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON

Follower Wallboxes	S4/1	S4/2	S4/3	S4/4
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF
11	ON	OFF	ON	ON
12	OFF	ON	OFF	OFF
13	ON	ON	OFF	ON
14	ON	ON	ON	OFF
15	ON	ON	ON	ON

Configuration of the bus ID of the individual follower Wallboxes:

- Never assign double bus IDs.
- The bus ID of the first follower Wallbox must begin with a 1.

Bus ID	S4/1	S4/2	S4/3	S4/4
Only leader	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF
11	ON	OFF	ON	ON
12	OFF	ON	OFF	OFF
13	ON	ON	OFF	ON
14	ON	ON	ON	OFF
15	ON	ON	ON	ON

External load management: configuration of bus IDs of follower Wallboxes 1 to 15

Set the bus IDs of follower Wallboxes 1-15 using switch S4.

Please note:

· Never assign double bus IDs.

Bus ID	S4/1	S4/2	S4/3	S4/4
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF

Bus ID	S4/1	S4/2	S4/3	S4/4
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON
10	ON	OFF	ON	OFF
11	ON	OFF	ON	ON
12	OFF	ON	OFF	OFF
13	ON	ON	OFF	ON
14	ON	ON	ON	OFF
15	ON	ON	ON	ON

4.4 Switch S5

- Switches S5/1, S5/2 and S5/3 are not needed on any of the follower Wallboxes. Set these switches to OFF.
- Switch S5/2 is not required on the leader Wallbox. Set the switch to OFF.

Configuration as leader and follower via switch S5/4

S5/4	
ON	Leader
OFF	Follower

Configuration of blocking function (in leader Wallbox) via switch S5/3

- The Wallbox has an input via which it can be blocked by an external switching element (key-operated switch or similar device; see assembly instructions).
- Use switch S5/3 to specify whether this blocking is to affect only the leader Wallbox or all Wallboxes.

S5/3	
	Only the leader Wallbox
	is blocked.
	All Wallboxes are
	blocked.

4.5 Switch S6

The first and last devices on the RS485 bus must be connected with a terminating resistor.

Terminating resistor for last Wallbox

Use micro switch S6/2 to connect the built-in terminating resistor on the last follower Wallbox. Switches S6/1, S6/3 and S6/4 are not used. Set these switches to OFF position.

S6/2	
OFF	Bus termination inactive
ON	Bus termination active

Local load management

Leader Follower1 Follower2 Follower3 Follower4

Terminating resistor for leader Wallbox

Use micro switch S6/2 to connect the built-in terminating resistor on the leader Wallbox. Switches S6/1, S6/3 and S6/4 are not used. Set these switches to OFF position.

External load management

Leader Follower1 Follower2 Follower3 Follower4 Follower5

HEMS terminating resistor

When using an external control unit, terminate the bus line with a 120 ohm resistor. Observe the specifications from the manufacturer of the external control system here.

5. Bus protocol (external load management)

The Modbus RTU protocol is used for communication between the external control system and the Wallboxes. Each Wallbox is ready to receive a Modbus command only after more than 10 seconds have elapsed since Power On. If the corresponding Wallbox is in standby mode, it cannot be addressed via Modbus.

5.1 Modbus connection

The Wallbox is connected to an external control system using a two-wire RS485 bus (half-duplex). Bus parameters used:

- Baud 19200 bit/sec,
- 8 data bits,
- 1 stop bit,
- 1 parity bit (even),

Least significant bit sent first (LSB first).

Only unicast mode is supported as the addressing mode.

Broadcast mode is not supported.

5.2 Functions supported by the Modbus protocol

The Wallboxes support exclusively the following functions:

- 03 (0x03) Read Holding Register
- · 04 (0x04) Read Input Register
- · 06 (0x06) Write Holding Register
- · 16 (0x10) Write Multiple Register

The byte sequence is High byte before Low byte (Motorola format).

The CRC checksum sequence is Low byte before High byte (Intel format).

6. Checking load management

Put the load management system into operation after properly installing and configuring it.

When checking the load management system, ensure that no vehicle is connected to any Wallbox.

- Establish the power supply for the Wallboxes in local load management mode, beginning with the leader Wallbox.
- Establish the power supply for all devices in external load management mode, beginning with the external control electronics.
- The front illumination of each Wallbox lights up for 5 minutes and then goes out.
- Load management is now ready for operation.

Diagnosis of communication errors in the load management system via the front illumination. The front illumination flashes in the event of a fault.

Six brief white flashes. Pause, three long blue flashes. Pause.

This flashing sequence indicates a communication error between the leader Wallbox or the external control system and the corresponding follower Wallbox. Check whether the bus installation was performed correctly. Once the fault has been remedied and a self-test has been performed, the front illumination lights up white and the charging process can be requested. Please contact the Hotline if the fault persists.

Table Modbus Register – Wallbox basicEVO PRO

Status 22 February 2022

Bus.Adv	DAM	ModBus	e-Euroction	Tune	Description	Dance		Valuae / avamplae	Dofault Value	Available at
4	α	04 - readir	nputRegister	uintl6	Modbus Register-Layouts Version	0.65536		0×100 -> V1.0.0		V 1.0.0
'n	٣	04 - readlr	nputRegister	uintl6	Charging State *	L		2=A1, 3=A2, 4=B1,5=B2, 6=C1, 7=C2, 8=derating, 9=E, 10=F, 11=ERR		V1.0.0
9	۲	04 - readli	nputRegister	uint16	L1 - Current RMS *	0350		1 = 0.1 Arms		V 1.0.0
7	α	04 - readir	nputRegister	uint16	L2 - Current RMS **	0350		1 = 0.1 Arms		V 1.0.0
8	α	04 - readir	nputRegister	uint16	L3 - Current RMS **	0350		1 = 0.1 Arms		V 1.0.0
6	۲	04 - readir	nputRegister	int16	PCB-Temperatur in 0.1 °C	-200°C/201	0°C	325 = +32.5 °C / -145 = -14.5 °C		V 1.0.0
10	α	04 - readir	nputRegister	uint16	Voltage L] - Nrms in Volt **	065536		238 = 238 Vrms		V1.0.0
u	α	04 - readIn	nputRegister	uint16	Voltage L2 - N rms in Volt **	065536		8 = 8 Vrms		V 1.0.0
12	α	04 - readin	putRegister	uint16	Voltage L3 - Nrms in Volt **	065536		258 = 258 Vrms		V 1.0.0
13	α	04 - readin	nputRegister	uint16	extern lock state	ψo		0 = locked / 1 = unlocked		V 1.0.0
14	α	04 - readin	nputRegister	uint16	Power (L1+L2+L3) in VA **	0.65536		1000> 1kVA		V1.0.4
15	α	04 - readin	nputRegister	uint16	Energy since PowerOn [High byte] **	0.65536		1>2 ¹⁶ VAh		VI.0.4
16	α	04 - readin	nputRegister	uint16	Energy since PowerOn [Low byte] **	065536		1000> 1000VAh		VI.0.4
17	α	04 - readin	nputRegister	uint16	Energy since PowerOn [High byte] **	065536		1> 2 ¹⁶ VAh		V1.0.7
18	α	04 - readin	nputRegister	uint16	Energy since Installation [Low byte] **	065536		1000 1000VAh		VI.0.7
100	α	04 - readin	nputRegister	uint16	Hardware configuration maximal currer	nt 016		10 = 10A		V1.0.0
LOL	α	04 - readin	nputRegister	uint16	Hardware configuration minimal currer	t 016		7 = 7A		V1.0.0
102	æ	04 - readIn	nputRegister	char[2]	Logistic - String [0,1]	ASCCI				M.0.4
:	α	04 - readIn	nputRegister	char[2]	Logistic - String []	ASCCI		reserved manufacturer		VI.0.4
133	α	04 - readIn	nputRegister	char[2]	Logistic - String [62,63]	ASCCI				VI.0.4
200	α	04 - readin	nputRegister	uint16	Hardware-Variant					V1.0.3
203	α	04 - readin	nputRegister	uint16	Application Software svn-revNo			reserved manulacturer		V1.0.5
300	α	04 - readin	nputRegister	uint16						V1.0.4
:	α	04 - readIn	nputRegister	uint16	Support Diagnostic Data			reserved manufacturer		V1.0.4
318	α	04 - readin	nputRegister	uint16						V1.0.4
500	٣	04 - readin	nputRegister	int16						V1.0.4
:	:			:	640 Bytes Error Memory	:		reserved manufacturer	:	V1.0.4
618	۵	04 - readin	nputRegister	int16						V1.0.4
257	R/W	03 - readHol 06 - writeHok	dingRegister *** dingRegister ***	uint16	ModBus-Master WatchDog Timeout in n	rs 065536		10000 = 10 sec. 0 = Off	15000	V1.0.1
	~	06 - writeHo	oldingRegister ***		Standby Function Control	4		0-> enable StandBy Funktion	:	V10.4 - V1.07
2957	R/W	03 - readHok 06 - writeHolo	dingRegister *** dingRegister ***	uintie	(Power Saving if no car plugged)	05.0000		4-> clsable standby Funktion X -> reserved development	U = enable	V1.0.8
259	R/W	06 - writeHol	lding Register	uint16	Remote lock (only if extern lock unlocked)	1-0		0 = locked / 1= unlocked	1 = unlocked	V1.0.4
261	R/W	03 - readHolc 06 - writeHold	dingRegister *** dingRegister ***	uint16	Maximal current command	[0; 60 to]6	0	100 = 10A	0	V 10.7
262	R/W	03 - readHold 06 - writeHold	dingRegister *** dingRegister ***	uint16	FailSafe Current configuration (in case loss of Modbus communication)	[0;60 to 16	0	0 = error state 60 = 6 A	0	V1.0.7
*Notice Cha	rging States				**Notice Internal Values	***Notice Holding Register				
		Car	Wallbox		These values are for internal purposes and should	In to and including wareion 1	7 after Dovier On or			
State Al State A2	2 V	vehicle plugged	Wallbox allows chargi	2	not be used for accurate billing.	Standby default values are va	id.			
State B1	- Vehicle plug.	nged without charging request	Wallbox doesn't allow cha	arg ing		values are retained and only i	n Register 261 default values			
State CI			Wallbox doesn't allow chargi	raina		are valid after Power On or Stu Diese check Modhus register	indby. avoirt vareion hvi Danistar 4			
State C2	Vehicle plu	ugged with charging request	Wallbox allows chargi	6 Gu		Integer control when a second	ayout veraion by respired to			

Contact WALTHER-WERKE Ferdinand Walther GmbH Ramsener Straße 6 D-67304 Eisenberg Germany Fon + (49) 6351 / 475 – 0 Fax + (49) 6351 / 475 – 227

www.walther-werke.de

40.020.0553/