KeContact

P30
Charging Station
Modbus TCP Programmers Guide V 1.05

Original manual

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1 Introduction

This programmers guide provides the information required to use the Modbus TCP interface for sending or reading parameters to certain registers of P30 charging station. The Modbus TCP interface can be used for example by energy managers to calculate the actual current and react correspondingly to reduce or increase the charging current. The Modbus TCP interface can also be used to control/limit the power consumption of connected electric vehicles.

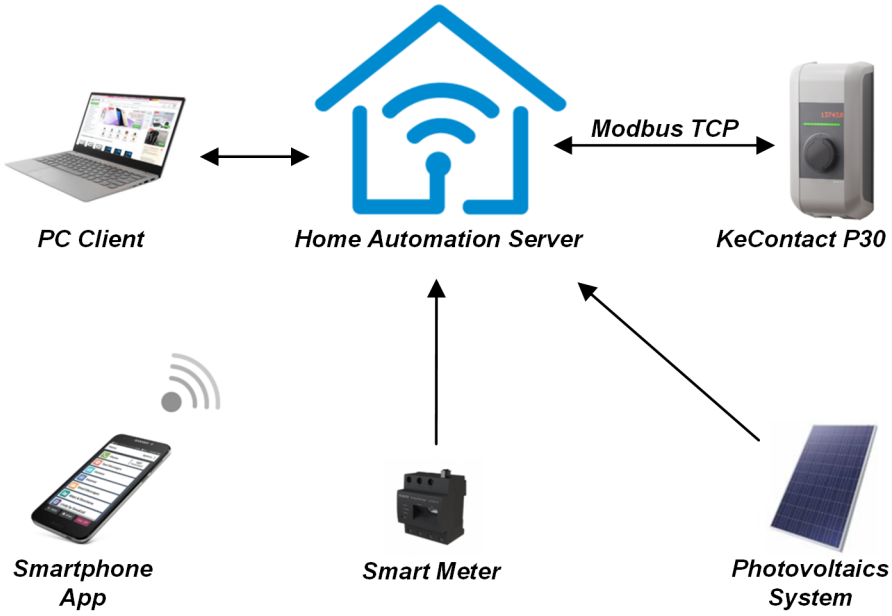

Fig. 1-1: Schematic overview (example)

1.1 Safety instructions

This document is an extension to the supplied manuals of P30.

You must comply with all instructions and safety instructions in the supplied manuals!

1.1.1 Representation of safety instructions

At various points in this manual, you will see notes and precautionary warnings regarding possible hazards. The symbols used have the following meaning:

DANGER!

indicates an imminently hazardous situation, which will result in death or serious bodily injury if the corresponding precautions are not taken.

WARNING!

indicates a potentially hazardous situation, which can result in death or serious bodily injury if the corresponding precautions are not taken.

CAUTION!

means that if the corresponding safety measures are not taken, a potentially hazardous situation can occur that may result in slight bodily injury.

Caution

means that damage to property can occur if the corresponding safety measures are not taken.

ESD

This symbol reminds you of the possible consequences of touching electrostatically sensitive components.

Information

Identifies practical tips and useful information. No information that warns about potentially dangerous or harmful functions is contained.

1.2 Verification of validity

The user must ensure that this document is valid for his present product.

1.3 Target group

This document contains information for persons who have technical knowledge and programming skills in the field concerned and are qualified to carry out the necessary operations.

1.4 Requirements

The following requirements have to be met in order to use the Modbus TCP functionality:

- **KeContact P30 c-series** with firmware version **3.10.16** or higher, or **KeContact P30 x-series** with software version **1.11** or higher
- A PC or smartphone for writing/reading registers via the Modbus TCP interface.
  This also requires a suitable client software or app.
- To enable the Modbus TCP interface the DIP switch DSW1.3 on the charging station must be set to "ON". For details to DIP switches see "Installation Manual".
- The charging station has to be connected (via LAN cable) to the same network as the application.
- The Modbus TCP interface must not be used together with the UDP interface and vice versa.

Information

The latest manuals, firmware and software can be downloaded here: www.keba.com/emobility-downloads

1.5 Legal disclaimer

Specifications are subject to change due to further technical developments. Details presented may be subject to correction.

This program guide applies exclusively to KeContact P30 c-series and to KeContact P30 x-series.

It is possible that the present program guide still has printing defects or printing errors. However, the information in this program guide will be checked regularly and corrections will be made in the next edition.

Liability claims against KEBA relating to material or immaterial damage caused by the use or non-use of the information contained in the program guide or by the use of incorrect or incomplete information are excluded. KEBA shall only be liable for intent and gross negligence as well as for injury to life, body or health as well as for violation of essential contractual obligations.

KEBA expressly reserves the right to change, supplement, adapt or delete parts of the program guide without prior notice or to discontinue the entire program guide temporarily or permanently.

Each integrator is responsible for updating and maintaining the applicable system. There are no legal claims and/or liability claims for failure of systems due to non-updated Modbus TCP commands.

1.6 Documentation for further reading

Detailed protocol description of the Modbus TCP standards is not given here. Further informations can be found online (e.g. http://www.modbus.org, http://www.feldbusse.de/ModbusTCP/modbustcp_protokoll.shtml).

Manuals and additional information are available on our website: www.keba.com/emobility-downloads

2 Overview

Modbus TCP is a standardized communication protocol that enables data exchange between a master (usually a computer) and several slaves (charging stations). It is part of the IEC 61158 standard. The Modbus protocol enables control of the connected slaves and transmission of measurement data from the slave to the master. The data are sent via TCP/IP.

When communicating via Modbus TCP with a KeContact Product, the following applies:

- Each participant must have a unique address, address 0 is reserved for the broadcast. Each participant can send messages via the bus. Communication is usually initiated by the master and the addressed slave replies. Modbus TCP is intended for transmission via Ethernet, for which TCP port 502 is reserved. The Unit ID must be set to 255.
- Supported function codes are FC3 (Read) and FC6 (Write).
- Starting register address count is 0. Depending on the used implementation, +1 might have to be added to adress the right register.
- It is not possible to read several registers at once. The maximum reading length is 2 words, as the return values for a single register are UINT32.
- The recommended timing invervals for reading registers is >0.5 sec. For data, which does not change on a frequent basis, higher intervalls are recommended. The recommended timing intervall for writing registers is >5 sec, to avoid stressing of the charging station.

Frame

When sending a Modbus TCP frame, the frame is split into 6 different sections:

The TCP message starts with a transaction identifier. This is followed by the protocol identifier (0000) and the number of the following bytes. The address and the function field are followed by the data, which varies in size depending on the length of the message. The registers must be sent in decimal format (e.g. charging state - register 1000).

The following attributes are available:

- ro ... read only
- wo ... write only

Name	Length	Description
Transaction ID	2 bytes	For synch between messages of server and client
Protocol ID	2 bytes	0 for Modbus TCP
Length field	2 bytes	Number of remaining bytes in this frame
Unit ID	1 byte	Slave address (must be 255)
Function code	1 byte	FC3 (Read), FC6 (Write)
Data	[n] bytes	Data as response or commands

3 Readable Data

This chapter describes all readable registers that are supported by KeContact P30.

3.1 1000 - Charging state

This register contains the state of the charging station.

Index	Name	Type	Attr.
1000	State	UINT32	ro

Supported values:

- 0: Start-up of the charging station
- 1: The charging station is not ready for charging. The charging station is not connected to an electric vehicle, it is locked by the authorization function or another mechanism.
- 2: The charging station is ready for charging and waits for a reaction from the electric vehicle.
- 3: A charging process is active.
- 4: An error has occurred.
- 5: The charging process is temporarily interrupted because the temperature is too high or the wallbox is in suspended mode.

3.2 1004 - Cable state

This register contains the state of the charging cable.

Index	Name	Type	Attr.
1004	Cable State	UINT32	ro

Supported values:

- 0: No cable is plugged.
- 1: Cable is connected to the charging station (not to the electric vehicle).
- 3: Cable is connected to the charging station and locked (not to the electric vehicle).
- 5: Cable is connected to the charging station and the electric vehicle (not locked).
- 7: Cable is connected to the charging station and the electric vehicle and locked (charging).

3.3 1006 - Error code

This register contains the error code of the charging station.

Index	Name	Type	Attr.
1006	EVSE Error Code	UINT32	ro

Supported values:

- 0: No error
- >1: Specific error code. The represented value is in decimal and has to be converted to hex in order to read the error code. E.g. 262144 converted to hex = 40000, that stands for error group 4.

3.4 1008 - Charging current phase 1

This register contains the measured current value on phase 1 in milliamperes.

Unit: mA

Index	Name	Type	Attr.
1008	Current L1	UINT32	ro

Example:

Value 645: The charging current on phase 1 is 645 mA = 0.645 A.

3.5 1010 - Charging current phase 2

This register contains the measured current value on phase 2 in milliamperes.

Unit: mA

Index	Name	Type	Attr.
1010	Current L2	UINT32	ro

Example:

Value 1011: The charging current on phase 2 is 1011 mA = 1.011 A

3.6 1012 - Charging current phase 3

This register contains the measured current value on phase 3 in milliamperes.

Unit: mA

Index	Name	Type	Attr.
1012	Current L3	UINT32	ro

Example:

Value 645: The charging current on phase 3 is 645 mA = 0.645 A.

3.7 1014 - Serial number

This register contains the serial number of the charging station.

Index	Name	Type	Attr.
1014	Serial	UINT32	ro

Example:

Value 18416854: The serial number of the charging station is 18416854.

3.8 1016 - Product type and features

This register contains the type and the most important features of the charging station.

Index	Name	Type	Attr.
1016	Product	UINT32	ro

Supported Values

Type and features	Product type	Cable / Socket	Supported current	Device series	Energy meter	Authorization
e.g. value:	3	0	4	0	1	1
KC-P30	3					
Socket		0				
Cable		1				
13 A			1			
16 A			2			
20 A			3			
32 A			4			
c-series				1		
x-series				0		

Type and features	Product type	Cable / Socket	Supported current	Device series	Energy meter	Authorization
Standard energy meter, not calibrated					1	
Calibratable energy meter, MID[1)]					2	
Calibratable measuring instrument for electrical energy with national certification					3	
No RFID						0
With RFID						1

[1)] MID (Measuring Instruments Directive): Measuring Instruments Directive

Example:

Value 304111:
The charging station has the following type and features:

- KC-P30
- 32 A
- c-series
- standard energy meter, not calibrated
- with RFID

3.9 1018 - Firmware version

Note: In P30 Modbus TCP version 1.11, this register's number is 1013.

This register contains the firmware version of the charging station. The represented value is in decimal and has to be converted to hex in order to read the firmware version.

Index	Name	Type	Attr.
1018	Firmware	UINT32	ro

Example:

Value 50990336 converted to hex = 30A0D00, which means firmware version 3.10.14 (0A=10, 0D=14).

3.10 1020 - Active power

This register contains the active power in milliwatts.

Unit: mW

Index	Name	Type	Attr.
1020	Active Power	UINT32	ro

Example:

Value 98661: The active power of the charging station is 98661 mW = 98.661 W.

3.11 1036 - Total energy

This register contains the total energy consumption (persistent, device related) in watt-hours.

Unit: Wh

Index	Name	Type	Attr.
1036	Energy Meter	UINT32	ro

Example:

Value 38101: The total energy consumption of the charging station is: 38101 Wh = 38.101 kWh.

3.12 1040 - Voltage phase 1

This register contains the measured voltage value on phase 1 in volts.

Unit: V

Index	Name	Type	Attr.
1040	U1	UINT32	ro

Example:

Value 230: The measured voltage value on phase 1 is 230 V.

3.13 1042 - Voltage phase 2

This register contains the measured voltage value on phase 2 in volts.

Unit: V

Index	Name	Type	Attr.
1042	U2	UINT32	ro

Example:

Value 230: The measured voltage value on phase 2 is 230 V.

3.14 1044 - Voltage phase 3

This register contains the measured voltage value on phase 3 in volts.

Unit: V

Index	Name	Type	Attr.
1044	U3	UINT32	ro

Example:

Value 230: The measured voltage value on phase 3 is 230 V.

3.15 1046 - Power factor

This register contains the current power factor (cos phi) in 0.1 %.

Index	Name	Type	Attr.
1046	PF	UINT32	ro

Example:

Value 928: The measured power factor (cos phi) is 92.8%.

3.16 1100 - Max charging current

This register contains the maximum charging current of the charging station.

Unit: mA

Index	Name	Type	Attr.
1100	Max Current	UINT32	ro

Example:

Value 10000: The maximum charging current of the charging station is 10000 mA = 10 A.

3.17 1110 - Max supported current

Information

Socket variants show value 6000 mA as long as no cable is plugged into the charging station.

This register contains the maximum current value that can be supported by the hardware of the charging station. This value represents the minimum of the DIP switch settings, cable coding and temperature monitoring function.

Unit: mA

Index	Name	Type	Attr.
1110	Curr HW	UINT32	ro

Example:

Value 10000: The maximum current value supported by the charging station is 10000 mA = 10 A.

3.18 1500 - RFID card

This register contains the first 4 bytes of the serial number (UID) of the used RFID card. This register can be read if the charging session was authorized with an RFID card. The represented value is in decimal and has to be converted to hex in order to read the UID.

Index	Name	Type	Attr.
1500	RFID tag	UINT32	ro

Example:

Value 3570234960 converted to hex = D4CD7650 for the serial number (first 4 bytes) of the used RFID card.

3.19 1502 - Charged energy

This register contains the transferred energy of the current charging session.

Unit: Wh

Index	Name	Type	Attr.
1502	E pres	UINT32	ro

Example:

Value 16: The transferred energy of the current charging session is 16 Wh.

3.20 1550 - Phase switching source

This register contains specified communication channel used via contact x2. This is saved permanent.

Index	Name	Type	Attr.
1550	Phase switching source	UINT32	ro

3.21 1552 - Phase switching state

This register contains the phase switching state (1 or 3 phases).

Index	Name	Type	Attr.
1552	Phase switching state	UINT32	ro

3.22 Failsafe

Following registers can be used to read the active failsafe settings. This might not be the persistet setting, because in the meantime the failsafe could have been changed without persisting it.

3.22.1 1600 - Failsafe Current Setting

This register contains the active failsafe current set by the last failsafe command.

Unit: mA

Index	Name	Type	Attr.
1600	Failsafe Current Setting	UINT32	ro

Example:

Value 6000: The failsafe current is set to 6000 mA.

3.22.2 1602 - Failsafe Timeout Setting

This register contains the active failsafe timeout set by the last command.

Unit: s

Index	Name	Type	Attr.
1602	Failsafe Timeout Setting	UINT32	ro

Example:

Value 11: The failsafe timeout is set to 11 s.

4 Writeable Data

This chapter lists all writeable registers that are supported by KeContact P30.

4.1 5004 - Set charging current

In this register, the charging current can be set in order to control the charging current. This command directly changes the value permanently and is valid as long as the device will be rebooted. If the charging current of the charging station needs to be lowered permanently, a reconfiguration of the DIP switch settings is recommended (for more information see "Installation Manual").

Unit: mA

Index	Name	Type	Attr.
5004	Curr User	UINT16	wo

Supported values:

- 6000 − 63000

Example:

Value 8000: The charging current is set to 8000 mA = 8 A.

4.2 5010 - Set energy

In this register, the energy transmission (in 10 watt-hours) for the current or the next charging session can be set. Once this value is reached, the charging session is terminated.

Unit: 10 Wh

Index	Name	Type	Attr.
5010	Setenergy	UINT16	wo

Example:

Value 1: The charging session is terminated after an energy transmission of 10 Wh = 0.01 kWh.

4.3 5012 - Unlock plug

In this register, the plug of the charging station can be unlocked. This is only possible, if the charging station is in suspended state. An ongoing session can be stopped with register 5014 (disable charging station).

Information

The charging process must be stopped beforehand!

Index	Name	Type	Attr.
5012	Unlock	UINT16	wo

Supported values:

- 0: unlock plug

4.4 5014 - Enable/Disable charging station

In this register, the charging station can be enabled or disabled. An active charging process will be stopped.

Index	Name	Type	Attr.
5014	Enable user	UINT16	wo

Supported values:

- 0: Disable charging station (Suspended mode)
- 1: Enable charging station (Charging)

4.5 5050 - Set phase switch toggle

In this register, the communication channel of contact x2 is specified.

Index	Name	Type	Attr.
5050	Set phase switch toggle	UINT16	wo

Supported values:

- 0: No phase toggle source is available
- 1: Toggle via OCPP
- 2: Direct toggle command via RESTAPI
- 3: Toggle via Modbus
- 4: Toggle via UDP

4.6 5052 - Trigger phase switch

In this register, the phase switch can be triggered via contact x2.

Index	Name	Type	Attr.
5052	Trigger phase switch	UINT16	wo

Supported values:

- 0: 1 phase (default state)
- 1: 3 phases

4.7 Failsafe

Following registers can be used to define a fallback strategy in case the communication between the Smart Home System and the wallbox is failing.

Failsafe activation

When setting the failsafe current alone the failsafe feature will not be activated. Only by sending a Failsafe Timeout the failsafe charging will be activated. In case Failsafe needs to be persisted, command "1" has to be sent to the PDC.

Failsafe deactivation

To deactivate Failsafe again, Failsafe Timeout "0" has to be sent. In case a persisted failsafe was used and Failsafe has to be deactivated, Failsafe Timeout with "0" and Failsafe Pesist "1" have to be sent.

4.7.1 5016 - Failsafe Current

In this register, charging can be deactivated in case the connection between the PDC and the Smart Home System is down. An active charging process will be stopped.

Index	Name	Type	Attr.
5016	Failsafe Current	UINT16	wo

Supported values:

- 0: Deactivates charging
- 6000 - 32000: Sets Failsafe current [mA]

4.7.2 5018 - Failsafe Timeout

In this register, Failsafe can be deactivated when no modbus TCP command was sent in between.

Index	Name	Type	Attr.
5016	Failsafe Current	UINT16	wo

Supported values:

- 0: Deactivates charging (charging will continue with the highest possible value)
- 5 - 600: Sets Failsafe Timeout [s]

4.7.3 5020 - Failsafe Persist

In this register, the Failsafe settings can be persisted.

Index	Name	Type	Attr.
5016	Failsafe Persist	UINT16	wo

Supported values:

- 1: current Failsafe settings will be persisted

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