

Data sheet

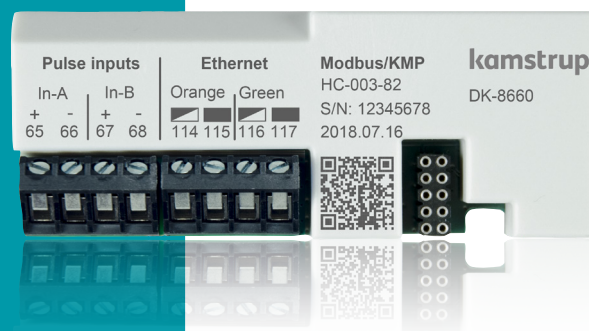
Modbus/KMP TCP/IP inputs (In-A, In-B)

MULTICAL® 403

MULTICAL® 603

MULTICAL® 803

- Ethernet 10/100 base t
- Modbus TCP or KMP communication
- IP assigned via DHCP or fixed IP
- Modbus TCP complies with "Modbus Messaging on TCP/IP Implementation Guide V1.0b"



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Introduction

A high performance and flexible Modbus module for the MULTICAL® 403, MULTICAL® 603 and MULTICAL® 803 energy meters. The module supports two communication protocols, the Modbus TCP protocol and the KMP [Kamstrup Meter Protocol]. Modbus TCP enables MULTICAL® to be integrated into a building automation system or to be part of industrial applications. The KMP enables remote reading of actual data, logged values and configuration parameters.

Applications

The Modbus/KMP TCP/IP module is designed with focus on high flexibility to fulfill any applications for monitoring, control and data analysis. The Modbus TCP protocol facilitates various formatting of meter data to cope with various reading equipment. The fast exchange of meter data makes the Modbus TCP module particularly suitable for monitoring and control tasks.

Analysis

The MULTICAL® energy meter supports high quantities of data, and all relevant data for analysis can be read out.

Alarms

The MULTICAL® info codes for general alarm, flow error, temperature error, water leakage, very high flow, air in the system, and wrong flow direction are available to the Modbus system.

Control and regulation

Data can be read out in intervals of few seconds at very high speed whereby the data can be used for control and regulation purposes.

Remote control of PQT Controller

Remote control of PQT controller is possible, as PQT Controllers limit settings can be read and written via Modbus commands. Thus the flow can be controlled by the building control system simply by setting one or more of the limit-settings in the PQT controller. All 82-01-30x configurations contains the Modbus registers for the PQT functionality.

Installation

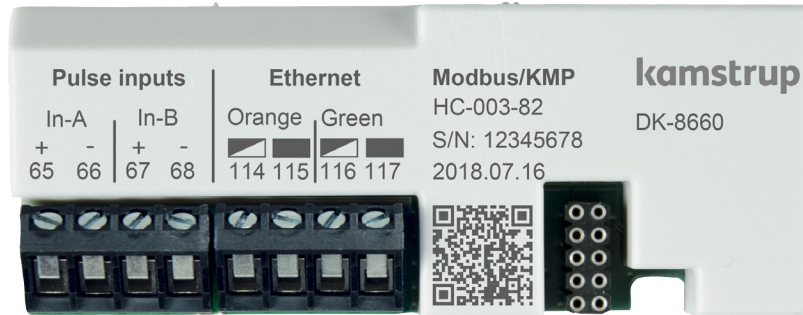
The module is easily mounted into one of the module slots of the meter. A configuration might be necessary if a specific IP address is required. Selection of the module protocol and TCP/IP properties can be done with METERTOOL HCW through the optical eye on MULTICAL® or through the 10-pole connector on the module.

The module is power-supplied from the meter's internal 230 VAC High-Power supply or 24 VAC High-Power supply.

Cable connections

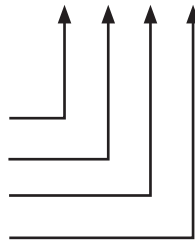
Terminals

Max cable size 1.5 mm²



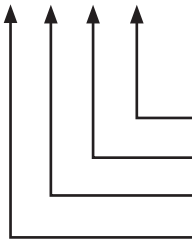
Pulse inputs

- Terminal 65: Pulse In-A (+)
- Terminal 66: Pulse In-A (-)
- Terminal 67: Pulse In-B (+)
- Terminal 68: Pulse In-B (-)



Ethernet

- Terminal 117: Green
- Terminal 116: Green/White
- Terminal 115: Orange
- Terminal 114: Orange/White

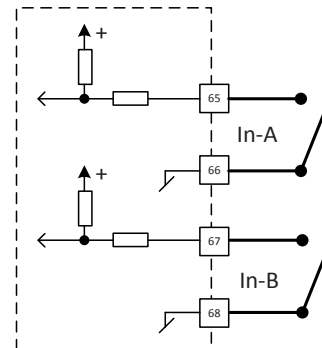


Pulse inputs

The module is equipped with two pulse inputs, In-A and In-B, to collect and accumulate pulses, e.g. from water and electricity meters.

The pulse inputs are physically placed on the module. However, the accumulation and logging of values are performed by the MULTICAL® calculator.

When installing a module with pulse inputs in slot 2 of MULTICAL® 603 and MULTICAL® 803, the pulse inputs will be registered in the meter as In-A2 and In-B2.



Ethernet

Tip: Use a standard patch cable cut in half, then you are able to feed the cable end without RJ45 plug through the holes in the meter and connect the wires to the module. The RJ45 connector then goes into an ethernet switch.

The color coding on the module are according TIA/EIA-568, T568B termination.

The module supports auto MDI/MDI-X, meaning it will automatically detect the type of network cable (straight-through or crossover) being used and configure itself to establish the correct connection. Therefore, as long as the color coding on the module is followed, it does not matter whether the attached cable is straight-through or crossover, or whether it follows the T568A or T568B standard.

Communication from module

Protocol

Modbus TCP is a standard for exchange of messages between equipment. KMP is short for Kamstrup Meter Protokol. The KMP is developed by Kamstrup, and tools and documentation can be requested by relevant utilities and companies.

Network options

The module supports both DHCP and Static IP assignment. When set for Static IP assignment, the following parameters must be entered: IP address, Subnet mask and Default gateway.

Hostname

The module's IP address can be found by pinging its hostname. The hostname is "kammet" followed by the serial number of the meter. To find the IP address of the meter with serial number 80002051, you must send a ping request to "kammet80002051".

Port addresses

By default, Modbus TCP connections use port 502. The KMP TCP connection uses port 1025 by default.

Connections

Modbus TCP allows up to 4 simultaneous connections. KMP allows only 1 connection at a time.

Supported Modbus function codes

The module supports a subset of Modbus function codes for reading and writing. Generally, function codes and addresses are written in hexadecimal format shown by the prefix 0x.

Supported function codes and their possible exception codes:

- 0x03 Read Holding Registers with exception codes:
 - 0x02 – Illegal data address
 - 0x03 – Illegal data value
- 0x04 Read Input Registers with exception codes:
 - 0x02 – Illegal data address
 - 0x03 – Illegal data value
- 0x10 Write Multiple registers with exception code:
 - 0x02 – data address
 - 0x03 – Illegal data value
- 0x2B Encapsulated interface transport with exception code:
 - 0x01 – Illegal function
- Subcode 0x0E Read Device Identification with exception code:
 - 0x03 – Illegal data value

Modbus datagrams

The Modbus module supports the most common registers used for heating and cooling applications.

The following module configurations are available:

- xx-yy-300: Default datagram for MULTICAL® 403, MULTICAL® 603 and MULTICAL® 803.
- xx-yy-301: Legacy datagram makes the meter partly compatible with MULTICAL® 602.
- xx-yy-302: MULTICAL® 803 datagram contains additional registers found only in the MULTICAL® 803.

All datagrams are able to handle reading and writing of the PQT control-registers.

| Default datagram | Legacy datagram | MULTICAL® 803 |
|---------------------|----------------------------|--------------------------|
| Flow V1 actual | Heat energy E1 | Flow V1 actual |
| Flow V2 actual | Flow V1 actual | * Volume V1 |
| Actual Power | Volume V1 | Flow V2 actual |
| t1 actual | Actual Power | Actual Power |
| t2 actual | t1 actual | Actual Power 2 (E14/E16) |
| t3 actual | t2 actual | t1 actual |
| t4 actual | Pulse input A1 | t2 actual |
| t1-t2 diff. temp. | Pulse input B1 | t3 actual |
| P1 actual | Heat energy E1 | t4 actual |
| P2 actual | Flow V1 actual | t1-t2 diff. temp. |
| Heat energy E1 | Volume V1 | P1 actual |
| Heat energy E2 | Actual Power | P2 actual |
| Cooling energy E3 | Heat energy E1 | Heat energy E1 |
| Inlet energy E4 | Flow V1 actual | * Heat energy E1 |
| Outlet energy E5 | Volume V1 | Heat energy E2 |
| Tap water energy E6 | Actual Power | Cooling energy E3 |
| Tap water energy E7 | t1 actual | * Heat energy E3 |
| Energy E8 | t2 actual | Inlet energy E4 |
| Energy E9 | Pulse input A1 | Outlet energy E5 |
| Energy E10 | Pulse input B1 | Tap water energy E6 |
| Energy E11 | Heat energy E1 | Tap water energy E7 |
| Tariff TA2 | Flow V1 actual | Energy E8 |
| Tariff TA3 | Volume V1 | Energy E9 |
| Tariff TA4 | Actual Power | Energy E10 |
| Heat energy A1 | Pulse input A1 | Energy E11 |
| Heat energy A2 | Pulse input B1 | Energy E12 |
| Volume V1 | Modul SW revision | Energy E13 |
| Volume V2 | Info code | Energy E14 |
| Pulse input A1 | ZERO | Energy E15 |
| Pulse input B1 | Cooling energy E3 | Energy E16 |
| Pulse input A2 | Heat energy E1 - Month Log | Tariff TA2 |
| Pulse input B2 | Volume V1 - Month Log | Tariff TA3 |
| COP | Cooling energy E3 | Tariff TA4 |
| t5 limit | ZERO | Heat energy A1 |
| Power Input B1 | Cooling energy E3 | Heat energy A2 |
| QP average time | ZERO | Volume V1 |
| Tariff limit TL2 | ZERO | Volume V2 |

Technical data

Physical

For installation in MULTICAL® 403, MULTICAL® 603 and MULTICAL® 803.

Mechanical data

Dimensions (L x W x D) 90 x 35 x 14 mm

Weight < 45 g

MULTICAL® Supply

→ High Power SMPS

Communication

Protocol IPV4, Modbus TCP/IP

IPV4, Kamstrup KMP

Data rate 10/100 Mbit/s

IP address assignment DHCP or Static IP

Modbus TCP Port 502

Modbus Connections 4

KMP TCP Port 1025

KMP Connections 1

Data refresh rate

Data from the meter to the module are refreshed each time the meter completes an integration. Integration mode is defined by the meters L-code.

Bus Specific

Type Ethernet IPV4

Galvanic isolation > 2kV

Pulse inputs

Input type Contact input

Open voltage 3.6 V

Current ≤ 5 µA

Max cable length 10 m

Environment

Operational temperature 5 °C – 55 °C

Humidity 25 – 85 % RH non-condensing

Markings/approvals

CE, MID together with the type approval of MULTICAL® 403, MULTICAL® 603 and MULTICAL® 803.

Compatibility

Messaging on TCP/IP Implementation Guide V1.0b

Additional documentation

5512-2580

[58101758](#)

Modbus RTU conformance certificate, issued by MBS GmbH

Data sheet Modbus register mapping, detailed description.

Programming

Configuration/Firmware

Via the optical readout head or the multipole connector on the module using METERTOOL HCW

Ordering

Description

Modbus/KMP TCP/IP, inputs (In-A, In-B)
 USB configuration cable for H/C modules
 Optical read-out head w/USB
 METERTOOL HCW

Order No.

HC-003-82
 6699-035
 6699-099
www.kamstrup.com

Configuration

| Product type of module | XX | Y | Y | ZZZ |
|--|----|---|---|-----|
| Modbus/KMP TCP/IP, inputs (In-A, In-B) | 82 | 0 | 1 | 300 |
| Protocol selection | | | | |
| Modbus TCP | | 0 | 1 | |
| Kamstrup KMP | | 0 | 2 | |
| Datagram | | | | |
| Default datagram | | | | 300 |
| Legacy datagram | | | | 301 |
| MULTICAL® 803 datagram | | | | 302 |
| KMP Default | | | | 400 |
| Reserved | | | | ZZZ |

Additional configurations

| | |
|---------------|--|
| IP assignment | Selection of static or dynamic (DHCP) IP addressing |
| IP address | The static IP address |
| Subnet | Subnet mask, typically set to 255.255.255.0 |
| Gateway | IP address, typically the one assigned to the router |
| MAC address | The unique network identifier |

Displayed information

Module information can be read by selecting "TECH-loop" on the MULTICAL® display.

- Module in module slot 1: select menu 2-101 in "TECH-loop"
- Module in module slot 2: select menu 2-201 in "TECH-loop"
- Module in module slot 3: select menu 2-301 in "TECH-loop"
- Module in module slot 4: select menu 2-401 in "TECH-loop"

| Menu | Menu index | Information | Display example |
|---------|------------|-------------------------------|-----------------|
| 2-x01 | 31 | Module type and configuration | |
| 2-x01-1 | 32 | Module firmware and revision | |
| 2-x01-2 | 33 | Module serial number | |
| 2-x01-3 | 47 | Link information * | |
| 2-x01-4 | 49 | Module status ** | |

* Link information has 4 bits of information.

| Bit number | Value when bit set | Meaning | Value when bit not set | Meaning |
|------------|--------------------|---------------------------|------------------------|------------------------------|
| 3 | 8 | 100 Mbit | 0 | 10 Mbit |
| 2 | 4 | Full duplex | 0 | Half duplex |
| 1 | 2 | Auto-Negotiation complete | 0 | Auto-Negotiation in progress |
| 0 | 1 | Link | 0 | No link |

A value of 15 means: 100 Mbit, Full Duplex, Auto-Negotiation Completed and Link

** Module status has 3 bits of information:

| Bit number | Value when bit set | Meaning | Value when bit not set | Meaning |
|------------|--------------------|------------------|------------------------|---------|
| 2 | 4 | No link | 0 | Link |
| 1 | 2 | Internal error | 0 | OK |
| 0 | 1 | No configuration | 0 | OK |

If the module status shows other values than 0 or 4, the module must be sent in for repair.

Modbus register mapping

The various Modbus datagrams are described in details in the data sheet about Modbus registers, [58101758](#).

Modbus/KMP TCP/IP, inputs (In-A, In-B)

MULTICAL® 403

MULTICAL® 603

MULTICAL® 803

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