

## 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

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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

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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

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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

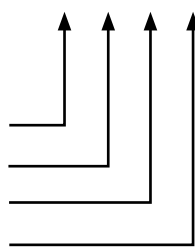
### Terminals

Max cable size 1.5 mm<sup>2</sup>



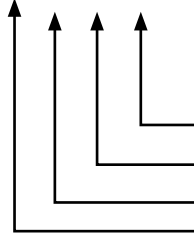
#### Pulse inputs

- 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

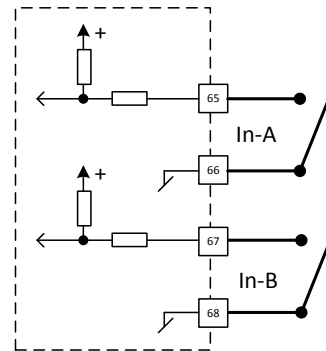


### Pulse inputs

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.

Colours on various brands of cable may deviate..

## Communication from module

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### 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

Default datagram
Tariff limit TL3
Tariff limit TL4
Mass M1
Mass M2
Info code
Operating hours
Error hour counter
Date (yy.mm.dd)
Time (hh.mm.ss)
Config No. 1
Config No. 2
Config No. 3
Config No. 4
Customer No. 2
Customer No. 1
Serial No.
Meter type incl. SW edition
Meter Main/Sub type
Meter SW revision

Legacy datagram
Cooling energy E3
ZERO
Power max year
Tarif 2
Tarif 3
Tarif limit 2
Tarif limit 3
ZERO
Customer No. 1
Serial No.
ZERO
ZERO
ZERO
Operating hours

MULTICAL® 803
Pulse input A1
Pulse input B1
Pulse input A2
Pulse input B2
COP
t5 limit
Power Input B1
QP average time
Tariff limit TL2
Tariff limit TL3
Tariff limit TL4
Mass M1
Mass M2
Mass M3
Mass M4
Info code
Operating hours
Error hour counter
Date (yy.mm.dd)
Time (hh.mm.ss)
Config No. 1
Config No. 2
Config No. 3
Config No. 4
Customer No. 2
Customer No. 1
Serial No.
Meter type incl. SW edition
Meter Main/Sub type
Meter SW revision
Fluid type/Concentration

\* High resolution registers

For detailed description of the datagrams, see data sheet [58101758](#).

## Technical data

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### 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

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### 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](http://www.kamstrup.com)

## Configuration

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### Product type of module

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

## Additional configurations

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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

## 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-x01-4	47	Link information *	
2-x01-5	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

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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