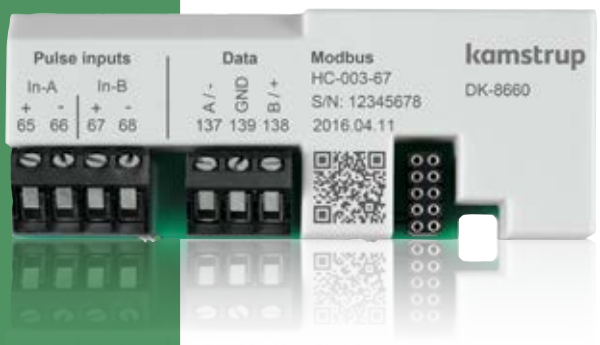
kamstrup

Data sheet

Modbus Module

Communication module for MULTICAL® 403

- Modbus RTU communication
- Communication speed up to 115200 bits/s
- Programmable data, communication speed and parity settings
- Two pulse inputs for additional water and electricity meters
- RS-485 galvanic isolated from meter
- Complies with Modbus implementation guide V1.02



Contents

Introduction

A new high performance and flexible Modbus module has been introduced with the MULTICAL® 403 energy meter family. The Modbus communication module enables the MULTICAL® 403 to be integrated into a building automation system or to participate in industrial applications. The Modbus RTU is based on an RS-485 communication bus.

Applications

The Modbus module is designed with focus on high flexibility to fulfill a wide pallet of applications. The Modbus module supports rapid exchange of meter data, e.g. flow, energy and temperatures to facilitate 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.

Installation

The module is easily mounted in the module slot of the meter. A configuration might be necessary if a specific slave address is required. Configuration of the Modbus slave address, bus speed and selection of dataset can be done with METERTOOL HCW through the optical read-out head on MULTICAL® or through the 10 pole connector on the module.

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

Cable connections

Wire size
Max cable size 1.5 mm²

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

Modbus connection
Terminal 137: RS-485 A/-
Terminal 138: RS-485 B/+
Terminal 139: RS-485 GND

Modbus connection
Screw terminals for the Modbus RS-485 signals A/-, B/+ twisted pair and GND.

Pulse inputs
Screw terminals for connection of the two pulse inputs. The pulse inputs are used for collecting and accumulating pulses remotely, e.g. from water meters and electricity meters. The pulse inputs are physically placed on the Modbus module, however the accumulation and data logging of values are made by the MULTICAL® calculator.

Communication from module

Protocol
According to the Modbus over Serial Line, Specification and Implementation Guide V1.02

Modbus addressing
The module may be addressed as a Modbus slave unit in the range from 1-247.

Communication speed
The module supports baud rates from 300 to 115200 baud. The parity and stop bits are to be selected as one of the following: no parity 1 stop, no parity 2 stop, even parity 1 stop or odd parity 1 stop.

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
- 0x08 Diagnostics with exception code:
  - 0x01 – Illegal function
  - Subcode 0x01 Restart with exception code:
    - 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
- 0x41 and 0x42 Reserved as Kamstrup Specific Function code

Modbus datagrams

The Modbus module supports the most common registers used for heating and cooling applications. The legacy datagram is partly compatible with MULTICAL® 602.

Default datagram	Legacy datagram
Flow 1	Flow 1
Actual power	Actual Power
Temp. 1 Inlet	Volume V1
Temp. 2 Outlet	Heat energy E1
Differential temp.	Cooling energy E3
Heat energy E1	Temp. 1 Inlet
Cooling energy E3	Temp. 2 Outlet
Energy E8 (T1*m^3)	Pulse Input A
Energy E9 (T2*m^3)	Pulse Input B
Tariff 2	Max power
Tariff 3	Info Code
Tariff 4	Module Program version
Heat with discount A1	Meter Number (low)
Heat with surcharge A2	Serial Number
Volume V1	Hour counter
Pulse input A	
Pulse input B	
Coefficient of performance CP	
T5 Limit	
VB Power	
QP Avg Time	
Tariff Limit 2	
Tariff Limit 3	
Tariff Limit 4	
Info Code	
HourCounter	
ErrorHourCounter	
Date	
Clock	
Config No1	
Config No2	
Config No3	
Config No 4	
Meter Number (high)	
Meter Number (low)	
Serial Number	
Meter Type	
Meter Main/Sub Type	
Software-number and revision	

Default datagram, Modbus register mapping

The following tables show how the MULTICAL® 403 memory data are mapped into Modbus registers. Most values can be read at two different addresses, either as IEEE Float or as 32-bit signed integers. All registers used for units and factors are 16-bit values, all others are 32-bit Float or integer values.

Modbus register	Memory address (hex)	Description	Contents	Data type
1	0000	Flow 1	Value	32 bit IEEE Float
3	0002	*	Value	32 bit IEEE Float
5	0004	Actual power	Value	32 bit IEEE Float
7	0006	Temp. 1 Inlet	Value	32 bit IEEE Float
9	0008	Temp. 2 Outlet	Value	32 bit IEEE Float
11	000A	*	Value	32 bit IEEE Float
13	000C	*	Value	32 bit IEEE Float
15	000E	Differential temp.	Value	32 bit IEEE Float
17	0010	*	Value	32 bit IEEE Float
19	0012	*	Value	32 bit IEEE Float
21	0014	Heat energy E1	Value	32 bit IEEE Float
23	0016	*	Value	32 bit IEEE Float
25	0018	Cooling energy E3	Value	32 bit IEEE Float
27	001A	*	Value	32 bit IEEE Float
29	001C	*	Value	32 bit IEEE Float
31	001E	*	Value	32 bit IEEE Float
33	0020	*	Value	32 bit IEEE Float
35	0022	Energy E8 (T1*m^3)	Value	32 bit IEEE Float
37	0024	Energy E9 (T2*m^3)	Value	32 bit IEEE Float
39	0026	*	Value	32 bit IEEE Float
41	0028	*	Value	32 bit IEEE Float
43	002A	Tariff 2	Value	32 bit IEEE Float
45	002C	Tariff 3	Value	32 bit IEEE Float
47	002E	Tariff 4	Value	32 bit IEEE Float
49	0030	Heat with discount A1	Value	32 bit IEEE Float
51	0032	Heat with surcharge A2	Value	32 bit IEEE Float
53	0034	Volume V1	Value	32 bit IEEE Float
55	0036	*	Value	32 bit IEEE Float
57	0038	Pulse input A	Value	32 bit IEEE Float
59	003A	Pulse input B	Value	32 bit IEEE Float
61	003C	*	Value	32 bit IEEE Float
63	003E	*	Value	32 bit IEEE Float
65	0040	Coefficient of performance CP	Value	32 bit IEEE Float
67	0042	T5 Limit	Value	32 bit IEEE Float
69	0044	VB Power	Value	32 bit IEEE Float
71	0046	QP Avg Time	Value	32 bit IEEE Float

Default datagram, Modbus register mapping

Modbus register	Memory address (hex)	Description	Contents	Data type
73	0048	Tariff Limit 2	Value	32 bit IEEE Float
75	004A	Tariff Limit 3	Value	32 bit IEEE Float
77	004C	Tariff Limit 4	Value	32 bit IEEE Float
79	004E	*	Value	32 bit IEEE Float
81	0050	*	Value	32 bit IEEE Float
83	0052	Actual flow 1	Unit	16 bit Unsigned Integer
84	0053	*	Unit	16 bit Unsigned Integer
85	0054	Actual power 1	Unit	16 bit Unsigned Integer
86	0055	Temp. 1 Inlet	Unit	16 bit Unsigned Integer
87	0056	Temp. 2 Outlet	Unit	16 bit Unsigned Integer
88	0057	*	Unit	16 bit Unsigned Integer
89	0058	*	Unit	16 bit Unsigned Integer
90	0059	Differential temp.	Unit	16 bit Unsigned Integer
91	005A	*	Unit	16 bit Unsigned Integer
92	005B	*	Unit	16 bit Unsigned Integer
93	005C	Heat energy E1	Unit	16 bit Unsigned Integer
94	005D	*	Unit	16 bit Unsigned Integer
95	005E	Cooling energy E3	Unit	16 bit Unsigned Integer
96	005F	*	Unit	16 bit Unsigned Integer
97	0060	*	Unit	16 bit Unsigned Integer
98	0061	*	Unit	16 bit Unsigned Integer
99	0062	*	Unit	16 bit Unsigned Integer
100	0063	Energy E8 (T1*m^3)	Unit	16 bit Unsigned Integer
101	0064	Energy E9 (T2*m^3)	Unit	16 bit Unsigned Integer
102	0065	*	Unit	16 bit Unsigned Integer
103	0066	*	Unit	16 bit Unsigned Integer
104	0067	Tariff 2	Unit	16 bit Unsigned Integer
105	0068	Tariff 3	Unit	16 bit Unsigned Integer
106	0069	Tariff 4	Unit	16 bit Unsigned Integer
107	006A	Heat with discount A1	Unit	16 bit Unsigned Integer
108	006B	Heat with surcharge A2	Unit	16 bit Unsigned Integer
109	006C	Volume V1	Unit	16 bit Unsigned Integer
110	006D	*	Unit	16 bit Unsigned Integer
111	006E	Pulse input A	Unit	16 bit Unsigned Integer
112	006F	Pulse input B	Unit	16 bit Unsigned Integer
113	0070	*	Unit	16 bit Unsigned Integer
114	0071	*	Unit	16 bit Unsigned Integer
115	0072	Coefficient of performance CP	Unit	16 bit Unsigned Integer
116	0073	T5 Limit	Unit	16 bit Unsigned Integer

Default datagram, Modbus register mapping

Modbus register	Memory address (hex)	Description	Contents	Data type
117	0074	VB Power	Unit	16 bit Unsigned Integer
118	0075	QP Avg Time	Unit	16 bit Unsigned Integer
119	0076	Tariff Limit 2	Unit	16 bit Unsigned Integer
120	0077	Tariff Limit 3	Unit	16 bit Unsigned Integer
121	0078	Tariff Limit 4	Unit	16 bit Unsigned Integer
122	0079	*	Unit	16 bit Unsigned Integer
123	007A	*	Unit	16 bit Unsigned Integer
124	007B	Info Code	Value	32 bit Unsigned Integer
126	007D	HourCounter	Value	32 bit Unsigned Integer
128	007F	ErrorHourCounter	Value	32 bit Unsigned Integer
130	0081	Date	Value	32 bit Unsigned Integer
132	0083	Clock	Value	32 bit Unsigned Integer
134	0085	Config No1	Value	32 bit Unsigned Integer
136	0087	Config No2	Value	32 bit Unsigned Integer
138	0089	Config No3	Value	32 bit Unsigned Integer
140	008B	Config No 4	Value	32 bit Unsigned Integer
142	008D	Meter Number (high)	Value	32 bit Unsigned Integer
144	008F	Meter Number (low)	Value	32 bit Unsigned Integer
146	0091	Serial Number	Value	32 bit Unsigned Integer
148	0093	Meter Type	Value	32 bit Unsigned Integer
150	0095	Meter Main/Sub Type	Value	32 bit Unsigned Integer
152	0097	Software-number and revision	Value	32 bit Unsigned Integer
154	0099	Actual flow 1	Value	32 bit Signed Integer
156	009B	*	Value	32 bit Signed Integer
158	009D	Actual power	Value	32 bit Signed Integer
160	009F	Temp. 1 Inlet	Value	32 bit Signed Integer
162	00A1	Temp. 2 Outlet	Value	32 bit Signed Integer
164	00A3	*	Value	32 bit Signed Integer
166	00A5	*	Value	32 bit Signed Integer
168	00A7	Differential temp.	Value	32 bit Signed Integer
170	00A9	*	Value	32 bit Signed Integer
172	00AB	*	Value	32 bit Signed Integer
174	00AD	Heat energy E1	Value	32 bit Signed Integer
176	00AF	*	Value	32 bit Signed Integer
178	00B1	Cooling energy E3	Value	32 bit Signed Integer
180	00B3	*	Value	32 bit Signed Integer
182	00B5	*	Value	32 bit Signed Integer
184	00B7	*	Value	32 bit Signed Integer

Default datagram, Modbus register mapping

Modbus register	Memory address (hex)	Description	Contents	Data type
186	00B9	*	Value	32 bit Signed Integer
188	00BB	Energy E8 (T1*m³)	Value	32 bit Signed Integer
190	00BD	Energy E9 (T2*m³)	Value	32 bit Signed Integer
192	00BF	*	Value	32 bit Signed Integer
194	00C1	*	Value	32 bit Signed Integer
196	00C3	Tariff 2	Value	32 bit Signed Integer
198	00C5	Tariff 3	Value	32 bit Signed Integer
200	00C7	Tariff 4	Value	32 bit Signed Integer
202	00C9	Heat with discount A1	Value	32 bit Signed Integer
204	00CB	Heat with surcharge A2	Value	32 bit Signed Integer
206	00CD	Volume V1	Value	32 bit Signed Integer
208	00CF	*	Value	32 bit Signed Integer
210	00D1	Pulse input A	Value	32 bit Signed Integer
212	00D3	Pulse input B	Value	32 bit Signed Integer
214	00D5	*	Value	32 bit Signed Integer
216	00D7	*	Value	32 bit Signed Integer
218	00D9	Coefficient of performance CP	Value	32 bit Signed Integer
220	00DB	T5 Limit	Value	32 bit Signed Integer
222	00DD	VB Power	Value	32 bit Signed Integer
224	00DF	QP Avg Time	Value	32 bit Signed Integer
226	00E1	Tariff Limit 2	Value	32 bit Signed Integer
228	00E3	Tariff Limit 3	Value	32 bit Signed Integer
230	00E5	Tariff Limit 4	Value	32 bit Signed Integer
232	00E7	*	Value	32 bit Signed Integer
234	00E9	*	Value	32 bit Signed Integer
236	00EB	Flow 1	Factor	16 bit Signed Integer
237	00EC	*	Factor	16 bit Signed Integer
238	00ED	Actual power	Factor	16 bit Signed Integer
239	00EE	Temp. 1 Inlet	Factor	16 bit Signed Integer
240	00EF	Temp. 2 Outlet	Factor	16 bit Signed Integer
241	00F0	*	Factor	16 bit Signed Integer
242	00F1	*	Factor	16 bit Signed Integer
243	00F2	Differential temp.	Factor	16 bit Signed Integer
244	00F3	*	Factor	16 bit Signed Integer
245	00F4	*	Factor	16 bit Signed Integer
246	00F5	Heat energy E1	Factor	16 bit Signed Integer
247	00F6	*	Factor	16 bit Signed Integer

Default datagram, Modbus register mapping

Modbus register	Memory address (hex)	Description	Contents	Data type
248	00F7	Cooling energy E3	Factor	16 bit Signed Integer
249	00F8	*	Factor	16 bit Signed Integer
250	00F9	*	Factor	16 bit Signed Integer
251	00FA	*	Factor	16 bit Signed Integer
252	00FB	*	Factor	16 bit Signed Integer
253	00FC	Energy E8 (T1*m^3)	Factor	16 bit Signed Integer
254	00FD	Energy E9 (T2*m^3)	Factor	16 bit Signed Integer
255	00FE	*	Factor	16 bit Signed Integer
256	00FF	*	Factor	16 bit Signed Integer
257	0100	Tariff 2	Factor	16 bit Signed Integer
258	0101	Tariff 3	Factor	16 bit Signed Integer
259	0102	Tariff 4	Factor	16 bit Signed Integer
260	0103	Heat with discount A1	Factor	16 bit Signed Integer
261	0104	Heat with surcharge A2	Factor	16 bit Signed Integer
262	0105	Volume V1	Factor	16 bit Signed Integer
263	0106	*	Factor	16 bit Signed Integer
264	0107	Pulse input A	Factor	16 bit Signed Integer
265	0108	Pulse input B	Factor	16 bit Signed Integer
266	0109	*	Factor	16 bit Signed Integer
267	010A	*	Factor	16 bit Signed Integer
268	010B	Coefficient of performance CP	Factor	16 bit Signed Integer
269	010C	T5 Limit	Factor	16 bit Signed Integer
270	010D	VB Power	Factor	16 bit Signed Integer
271	010E	QP Avg Time	Factor	16 bit Signed Integer
272	010F	Tariff Limit 2	Factor	16 bit Signed Integer
273	0110	Tariff Limit 3	Factor	16 bit Signed Integer
274	0111	Tariff Limit 4	Factor	16 bit Signed Integer
275	0112	*	Factor	16 bit Signed Integer
276	0113	*	Factor	16 bit Signed Integer

* Reserved for future use

Default datagram, Modbus register mapping

For the default datagram table

Modbus register — The Modbus register count starts at number 1, and corresponds to the memory address 0. Each register is 16 bits. A 32-bit value requires two Modbus registers.

Memory address (Hex) — The memory address is the location of the register in the module's memory.

Description — The name of the register variable.

Contents

– Value — The address holds the value of the variable.

– Factor — The address holds a multiplication factor (10^x) to scale the 32-bit signed values. The final result = 10^{factor} * 32-bit signed value.

– Unit — The address holds the variable's SI units. The value of units must be translated according to this table:

Decimal value	Hex value	SI unit of measure
0	0x0000	No unit
1	0x0001	Wh
2	0x0002	kWh
3	0x0003	MWh
4	0x0004	GWh
5	0x0005	j
6	0x0006	kj
7	0x0007	Mj
8	0x0008	Gj
21	0x0015	W
22	0x0016	kW
23	0X0017	MW
24	0x0018	GW
37	0x0025	°C
38	0x0026	Kelvin
39	0x0027	l
34	0x0028	m^3
41	0x0029	l/h
42	0x002A	M^3/h
43	0x002B	M^3 *C
44	0x002C	ton
47	0x002F	Time: hh:mm:ss
48	0x0030	Date: yy:mm:dd
49	0x0031	Date: yyyy:mm:dd
55	0x0037	M^3x10
58	0x003A	Minutes

Data type

The data type indicates how data are stored in the Modbus register, and is important information in order to make a correct reading of the value. If a register does not exist in the attached meter, the corresponding Modbus register will contain an invalid value.

Numerical format	Minimum value	Maximum value	Invalid value
16-bit signed integer	0	65535	0x0000
32-bit integer	0	4294967295	0xFFFFFFFF
32-bit signed integer	-2147483648	2147483647	0x7FFFFFFF
32-bit IEEE float	$\pm 1.17 \times 10^{-38}$	$\pm 3.4 \times 10^{38}$	0x4F800000

Legacy datagram, Modbus register mapping

The legacy datagram not only differs in data content, but also in how data must be interpreted. The datagram is reduced and contains fixed zero-values to fill gaps for those MULTICAL® 602 registers which are not available in MULTICAL® 403. The legacy datagram duplicates the same data in two different memory areas. The Modbus register range from address 1 to 169 is byte-addressed. The address is incremented by the number of bytes in the data (2 for 16 bits and 4 for 32 bits).

Modbus register	Memory address (hex)	Description	Contents	Data type
1	0000	Heat energy E1	Value	32 bit IEEE Float
5	0004	Flow 1	Value	32 bit IEEE Float
9	0008	Volume V1	Value	32 bit IEEE Float
13	000C	Actual power	Value	32 bit IEEE Float
17	0010	Temp. 1 Inlet	Value	32 bit IEEE Float
21	0014	Temp. 2 Outlet	Value	32 bit IEEE Float
25	0018	Pulse input A	Value	32 bit IEEE Float
29	001C	Pulse input B	Value	32 bit IEEE Float
33	0020	Heat energy E1	Units	16 bit Unsigned Integer
35	0022	Flow 1	Units	16 bit Unsigned Integer
37	0024	Volume V1	Units	16 bit Unsigned Integer
39	0026	Actual power	Units	16 bit Unsigned Integer
41	0028	Heat energy E1	Value	32 bit Signed Integer
45	002C	Flow 1	Value	32 bit Signed Integer
49	0030	Volume V1	Value	32 bit Signed Integer
53	0034	Actual power	Value	32 bit Signed Integer
57	0038	Temp. 1 Inlet	Value	32 bit Signed Integer
61	003C	Temp. 2 Outlet	Value	32 bit Signed Integer
65	0040	Pulse input A	Value	32 bit Signed Integer
69	0044	Pulse input B	Value	32 bit Signed Integer
73	0048	Heat energy E1	Decimals	16 bit Unsigned Integer
75	004A	Flow 1	Decimals	16 bit Unsigned Integer
77	004C	Volume V1	Decimals	16 bit Unsigned Integer
79	004E	Actual power	Decimals	16 bit Unsigned Integer
81	0050	Pulse input A	Decimals	16 bit Unsigned Integer
83	0052	Pulse input B	Decimals	16 bit Unsigned Integer
85	0054	Version	Value	16 bit Unsigned Integer
87	0056	Info Code	Value	16 bit Unsigned Integer
89	0058	ZERO	0	32 bit Unsigned Integer
93	005C	Cooling energy E3	Value	32 bit IEEE Float
97	0060	ZERO	0	32 bit IEEE Float
101	0064	ZERO	0	32 bit IEEE Float
105	0068	Cooling energy E3	Units	16 bit Unsigned Integer
107	006A	ZERO	0	16 bit Unsigned Integer

Legacy datagram, Modbus register mapping

Modbus register	Memory address (hex)	Description	Contents	Data type
109	006C	Cooling energy E3	Value	32 bit Signed Integer
113	0070	ZERO	0	32 bit Signed Integer
117	0074	ZERO	0	32 bit Signed Integer
121	0078	Cooling energy E3	Decimals	16 bit Unsigned Integer
123	007A	ZERO	0	16 bit Unsigned Integer
125	007C	Max power	Value	32 bit IEEE Float
129	0080	ZERO	0	32 bit IEEE Float
133	0084	ZERO	0	32 bit IEEE Float
137	0088	ZERO	0	32 bit Unsigned Integer
141	008C	ZERO	0	32 bit Unsigned Integer
145	0090	ZERO	0	32 bit Unsigned Integer
149	0094	Meter Number (low)	Value	32 bit Unsigned Integer
153	0098	Serial Number	Value	32 bit Unsigned Integer
157	009C	ZERO	0	32 bit Unsigned Integer
161	00A0	ZERO	0	32 bit Unsigned Integer
165	00A4	ZERO	0	32 bit Unsigned Integer
169	00A8	Hour counter	Value	32 bit Unsigned Integer

The Modbus register range from address 257 to 341 is word-addressed. The address is incremented by the number of words in the data (1 for 16 bits and 2 for 32 bits).

Modbus register	Address (hex)	Description	Contents	Data type
257	0100	Heat energy E1	Value	32 bit IEEE Float
259	0102	Flow 1	Value	32 bit IEEE Float
261	0104	Volume V1	Value	32 bit IEEE Float
263	0106	Actual power	Value	32 bit IEEE Float
265	0108	Temp. 1 Inlet	Value	32 bit IEEE Float
267	010A	Temp. 2 Outlet	Value	32 bit IEEE Float
269	010C	Pulse input A	Value	32 bit IEEE Float
271	010E	Pulse input B	Value	32 bit IEEE Float
273	0110	Heat energy E1	Units	16 bit Unsigned Integer
274	0111	Flow 1	Units	16 bit Unsigned Integer
275	0112	Volume V1	Units	16 bit Unsigned Integer
276	0113	Actual power	Units	16 bit Unsigned Integer
277	0114	Heat energy E1	Value	32 bit Signed Integer
279	0116	Flow 1	Value	32 bit Signed Integer
281	0118	Volume V1	Value	32 bit Signed Integer

Legacy datagram, Modbus register mapping

Modbus register	Address (hex)	Description	Contents	Data type
283	011A	Actual power	Value	32 bit Signed Integer
285	011C	Temp. 1 Inlet	Value	32 bit Signed Integer
287	011E	Temp. 2 Outlet	Value	32 bit Signed Integer
289	0120	Pulse input A	Value	32 bit Signed Integer
291	0122	Pulse input B	Value	32 bit Signed Integer
293	0124	Heat energy E1	Decimals	16 bit Unsigned Integer
294	0125	Flow 1	Decimals	16 bit Unsigned Integer
295	0126	Volume V1	Decimals	16 bit Unsigned Integer
296	0127	Actual power	Decimals	16 bit Unsigned Integer
297	0128	Pulse input A	Decimals	16 bit Unsigned Integer
298	0129	Pulse input B	Decimals	16 bit Unsigned Integer
299	012A	Version	Program version	16 bit Unsigned Integer
300	012B	Info Code	Info code	16 bit Unsigned Integer
301	012C	ZERO	0	32 bit Unsigned Integer
303	012E	Cooling energy E3	Value	32 bit IEEE Float
305	0130	ZERO	0	32 bit IEEE Float
307	0132	ZERO	0	32 bit IEEE Float
309	0134	Cooling energy E3	Units	16 bit Unsigned Integer
310	0135	ZERO	0	16 bit Unsigned Integer
311	0136	Cooling energy E3	Value	32 bit Signed Integer
313	0138	ZERO	0	32 bit Signed Integer
315	013A	ZERO	0	32 bit Signed Integer
317	013C	Cooling energy E3	Decimals	16 bit Unsigned Integer
318	013D	ZERO	0	16 bit Unsigned Integer
319	013E	Max power	Value	32 bit IEEE Float
321	0140	ZERO	0	32 bit IEEE Float
323	0142	ZERO	0	32 bit IEEE Float
325	0144	ZERO	0	32 bit Unsigned Integer
327	0146	ZERO	0	32 bit Unsigned Integer
329	0148	ZERO	0	32 bit Unsigned Integer
331	014A	Meter Number (low)	Value	32 bit Unsigned Integer
333	014C	Serial Number	Value	32 bit Unsigned Integer
335	014E	ZERO	0	32 bit Unsigned Integer
337	0150	ZERO	0	32 bit Unsigned Integer
339	0152	ZERO	0	32 bit Unsigned Integer
341	0154	Hour counter	Value	32 bit Unsigned Integer

Legacy datagram, Modbus register mapping

For the legacy datagram table

Modbus register
The Modbus register count starts at number 1 and corresponds to the memory address 0. Each register is 16 bits. A 32-bit value requires two Modbus registers.

Memory address (hex)
The memory address is the location of the register in the module's memory.

Description
The name of the register variable.

Contents

– Value
The address holds the value of the variable.

– Decimals
The address holds a multiplication factor (10^{-x}) to scale the 32-bit signed values.
The final result = $10^{-decimal}$ * 32-bit signed value.

– Unit
The address holds the variable's SI units.
The value of units must be translated according to this table:

Decimal value	Hex value	SI Unit of measure
1	0x0001	kW
2	0x0002	MW
17	0x0011	kWh
18	0x0012	MWh
33	0x0021	l
34	0x0022	m^3
35	0x0023	m^3 x 10
49	0x0031	l/h
50	0x0032	m^3 /h
65	0x0041	ton
	0xFxxx	Undefined *

* An undefined value may occur if a register in the meter has an SI unit not found in this table.

Technical specifications

Physical	
Usage	Only suitable for installation in MULTICAL® 403
Communication	
Protocol	Modbus RTU
Address range	1 - 247
Baud rates	300 bits/s 2400 bits/s 9600 bits/s 19200 bits/s 38400 bits/s 57600 bits/s 76800 bits/s 115200 bits/s
Parity, stop	No parity 1 stop No parity 2 stop Odd parity 1 stop Even parity 1 stop
Default setting	19200, 8 data bits, even parity 1 stop bit
Bus-specific	
Type	2-wire RS-485 with ground
Galvanic isolation	According to PTB-A50.1
Bus termination	External 120 Ω resistor between A/- and B/+
Supply	
Power supply	MULTICAL® 403 with 230 VAC supply MULTICAL® 403 with 24 VAC supply
Environment	
Operational temperature	5 °C – 55 °C
Humidity	25 – 85 % RH non-condensing
Programming	
Configuration and firmware update	Via optical read-out head or via the multi-pole connector on the module using METERTOOL HCW

Markings/approvals

CE and EN 1434 in conjunction with the type approval of MULTICAL® 403.
Modbus over Serial Line, Specification and Implementation Guide V1.02.

Ordering

Description	Order No.
Modbus module with pulse inputs for MULTICAL® 403	HC-003-67
USB configuration cable for H/C modules	6699-035
Optical read-out head w/USB	6699-099
Optical read-out head w/RS-232 D-SUB 9F	6699-102
METERTOOL HCW	www.kamstrup.com

Configuration

Product type of module	**XX**	**Y**	**Y**	**ZZZ**
Modbus RTU module + 2 pulse inputs (In-A, In-B)	67	4	3	100
Communication speed				
300 baud		1		
2400 baud		2		
9600 baud		3		
19200 baud		4		
38400 baud		5		
57600 baud		6		
76800 baud		7		
115200 baud		8		
Parity/Stop bits				
No parity 1 stop bit			1	
No parity 2 stop bits			2	
Even parity 1 stop bit			3	
Odd parity 1 stop bit			4	
Data content configuration				
Default datagram				100
Legacy datagram				101
Reserved				ZZZ

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