

Data sheet

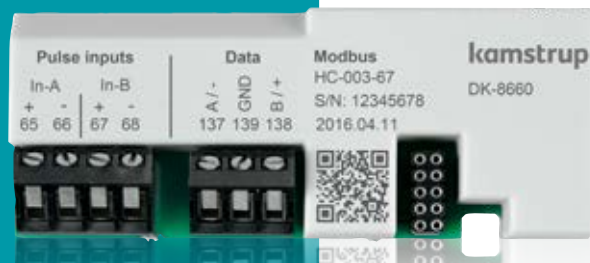
**Modbus RTU
Modbus/KMP TCP/IP**

MULTICAL® 403

MULTICAL® 603

MULTICAL® 803

- Modbus register mapping
- Registers for PQT Controller



Contents

Modbus register mapping	3
Default datagram: xx-yy-300	3
Legacy datagram, xx-yy-301	9
MULTICAL® 803 datagram: xx-yy-302	13
Registers for PQT Controller	20

Modbus register mapping

The following datagrams are available for the Modbus modules:

- HC-003-67: Modbus RTU inputs (In-A, In-B) and
- HC-003-82: Modbus/KMP TCP/IP, inputs (In-A, In-B)

The various Modbus datagrams are described in details below. Any datagrams can be used in any of the MULTICAL® XX3. Thus the same configuration can be used for all meters in your application, irrespective that the application consists of a mix of MULTICAL® 403, 603 and 803. Some registers found in MULTICAL® 803 does not exist in MULTICAL® 403 and 603, and some registers found in MULTICAL® 603 does not exist in MULTICAL® 403. If a meter do not have the requested register, the module will set the register's value as invalid.

Default datagram: xx-yy-300

The following tables show how the MULTICAL® 403, 603 and 803 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	Address (hex)	Description	# Regs	Contents	Data type
1	0000	Flow V1 actual	2	Value	32 bit IEEE Float
3	0002	Flow V2 actual	2	Value	32 bit IEEE Float
5	0004	Actual Power	2	Value	32 bit IEEE Float
7	0006	t1 actual	2	Value	32 bit IEEE Float
9	0008	t2 actual	2	Value	32 bit IEEE Float
11	000A	t3 actual	2	Value	32 bit IEEE Float
13	000C	t4 actual	2	Value	32 bit IEEE Float
15	000E	t1-t2 diff. temp.	2	Value	32 bit IEEE Float
17	0010	P1 actual	2	Value	32 bit IEEE Float
19	0012	P2 actual	2	Value	32 bit IEEE Float
21	0014	Heat energy E1	2	Value	32 bit IEEE Float
23	0016	Heat energy E2	2	Value	32 bit IEEE Float
25	0018	Cooling energy E3	2	Value	32 bit IEEE Float
27	001A	Inlet energy E4	2	Value	32 bit IEEE Float
29	001C	Outlet energy E5	2	Value	32 bit IEEE Float
31	001E	Tap water energy E6	2	Value	32 bit IEEE Float
33	0020	Tap water energy E7	2	Value	32 bit IEEE Float
35	0022	Energy E8	2	Value	32 bit IEEE Float
37	0024	Energy E9	2	Value	32 bit IEEE Float
39	0026	Energy E10	2	Value	32 bit IEEE Float
41	0028	Energy E11	2	Value	32 bit IEEE Float
43	002A	Tariff TA2	2	Value	32 bit IEEE Float
45	002C	Tariff TA3	2	Value	32 bit IEEE Float
47	002E	Tariff TA4	2	Value	32 bit IEEE Float

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
49	0030	Heat energy A1	2	Value	32 bit IEEE Float
51	0032	Heat energy A2	2	Value	32 bit IEEE Float
53	0034	Volume V1	2	Value	32 bit IEEE Float
55	0036	Volume V2	2	Value	32 bit IEEE Float
57	0038	Pulse input A1	2	Value	32 bit IEEE Float
59	003A	Pulse input B1	2	Value	32 bit IEEE Float
61	003C	Pulse input A2	2	Value	32 bit IEEE Float
63	003E	Pulse input B2	2	Value	32 bit IEEE Float
65	0040	COP	2	Value	32 bit IEEE Float
67	0042	t5 limit	2	Value	32 bit IEEE Float
69	0044	Power Input B1	2	Value	32 bit IEEE Float
71	0046	QP average time	2	Value	32 bit IEEE Float
73	0048	Tariff limit TL2	2	Value	32 bit IEEE Float
75	004A	Tariff limit TL3	2	Value	32 bit IEEE Float
77	004C	Tariff limit TL4	2	Value	32 bit IEEE Float
79	004E	Mass M1	2	Value	32 bit IEEE Float
81	0050	Mass M2	2	Value	32 bit IEEE Float
83	0052	Flow V1 actual	1	Unit	16 bit Unsigned Integer
84	0053	Flow V2 actual	1	Unit	16 bit Unsigned Integer
85	0054	Actual Power	1	Unit	16 bit Unsigned Integer
86	0055	t1 actual	1	Unit	16 bit Unsigned Integer
87	0056	t2 actual	1	Unit	16 bit Unsigned Integer
88	0057	t3 actual	1	Unit	16 bit Unsigned Integer
89	0058	t4 actual	1	Unit	16 bit Unsigned Integer
90	0059	t1-t2 diff. temp.	1	Unit	16 bit Unsigned Integer
91	005A	P1 actual	1	Unit	16 bit Unsigned Integer
92	005B	P2 actual	1	Unit	16 bit Unsigned Integer
93	005C	Heat energy E1	1	Unit	16 bit Unsigned Integer
94	005D	Heat energy E2	1	Unit	16 bit Unsigned Integer
95	005E	Cooling energy E3	1	Unit	16 bit Unsigned Integer
96	005F	Inlet energy E4	1	Unit	16 bit Unsigned Integer
97	0060	Outlet energy E5	1	Unit	16 bit Unsigned Integer
98	0061	Tap water energy E6	1	Unit	16 bit Unsigned Integer
99	0062	Tap water energy E7	1	Unit	16 bit Unsigned Integer
100	0063	Energy E8	1	Unit	16 bit Unsigned Integer
101	0064	Energy E9	1	Unit	16 bit Unsigned Integer
102	0065	Energy E10	1	Unit	16 bit Unsigned Integer
103	0066	Energy E11	1	Unit	16 bit Unsigned Integer
104	0067	Tariff TA2	1	Unit	16 bit Unsigned Integer
105	0068	Tariff TA3	1	Unit	16 bit Unsigned Integer
106	0069	Tariff TA4	1	Unit	16 bit Unsigned Integer

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
107	006A	Heat energy A1	1	Unit	16 bit Unsigned Integer
108	006B	Heat energy A2	1	Unit	16 bit Unsigned Integer
109	006C	Volume V1	1	Unit	16 bit Unsigned Integer
110	006D	Volume V2	1	Unit	16 bit Unsigned Integer
111	006E	Pulse input A1	1	Unit	16 bit Unsigned Integer
112	006F	Pulse input B1	1	Unit	16 bit Unsigned Integer
113	0070	Pulse input A2	1	Unit	16 bit Unsigned Integer
114	0071	Pulse input B2	1	Unit	16 bit Unsigned Integer
115	0072	COP	1	Unit	16 bit Unsigned Integer
116	0073	t5 limit	1	Unit	16 bit Unsigned Integer
117	0074	Power Input B1	1	Unit	16 bit Unsigned Integer
118	0075	QP average time	1	Unit	16 bit Unsigned Integer
119	0076	Tariff limit TL2	1	Unit	16 bit Unsigned Integer
120	0077	Tariff limit TL3	1	Unit	16 bit Unsigned Integer
121	0078	Tariff limit TL4	1	Unit	16 bit Unsigned Integer
122	0079	Mass M1	1	Unit	16 bit Unsigned Integer
123	007A	Mass M2	1	Unit	16 bit Unsigned Integer
124	007B	Info code	2	Value	32 bit Unsigned Integer
126	007D	Operating hours	2	Value	32 bit Unsigned Integer
128	007F	Error hour counter	2	Value	32 bit Unsigned Integer
130	0081	Date [yy.mm.dd]	2	Value	32 bit Unsigned Integer
132	0083	Time [hh.mm.ss]	2	Value	32 bit Unsigned Integer
134	0085	Config No. 1	2	Value	32 bit Unsigned Integer
136	0087	Config No. 2	2	Value	32 bit Unsigned Integer
138	0089	Config No. 3	2	Value	32 bit Unsigned Integer
140	008B	Config No. 4	2	Value	32 bit Unsigned Integer
142	008D	Customer No. 2	2	Value	32 bit Unsigned Integer
144	008F	Customer No. 1	2	Value	32 bit Unsigned Integer
146	0091	Serial No.	2	Value	32 bit Unsigned Integer
148	0093	Meter type incl. SW edition	2	Value	32 bit Unsigned Integer
150	0095	Meter Main/Sub type	2	Value	32 bit Unsigned Integer
152	0097	Meter SW revision	2	Value	32 bit Unsigned Integer
154	0099	Flow V1 actual	2	Value	32 bit Signed Integer
156	009B	Flow V2 actual	2	Value	32 bit Signed Integer
158	009D	Actual Power	2	Value	32 bit Signed Integer
160	009F	t1 actual	2	Value	32 bit Signed Integer
162	00A1	t2 actual	2	Value	32 bit Signed Integer
164	00A3	t3 actual	2	Value	32 bit Signed Integer
166	00A5	t4 actual	2	Value	32 bit Signed Integer
168	00A7	t1-t2 diff. temp.	2	Value	32 bit Signed Integer
170	00A9	P1 actual	2	Value	32 bit Signed Integer

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
172	00AB	P2 actual	2	Value	32 bit Signed Integer
174	00AD	Heat energy E1	2	Value	32 bit Signed Integer
176	00AF	Heat energy E2	2	Value	32 bit Signed Integer
178	00B1	Cooling energy E3	2	Value	32 bit Signed Integer
180	00B3	Inlet energy E4	2	Value	32 bit Signed Integer
182	00B5	Outlet energy E5	2	Value	32 bit Signed Integer
184	00B7	Tap water energy E6	2	Value	32 bit Signed Integer
186	00B9	Tap water energy E7	2	Value	32 bit Signed Integer
188	00BB	Energy E8	2	Value	32 bit Signed Integer
190	00BD	Energy E9	2	Value	32 bit Signed Integer
192	00BF	Energy E10	2	Value	32 bit Signed Integer
194	00C1	Energy E11	2	Value	32 bit Signed Integer
196	00C3	Tariff TA2	2	Value	32 bit Signed Integer
198	00C5	Tariff TA3	2	Value	32 bit Signed Integer
200	00C7	Tariff TA4	2	Value	32 bit Signed Integer
202	00C9	Heat energy A1	2	Value	32 bit Signed Integer
204	00CB	Heat energy A2	2	Value	32 bit Signed Integer
206	00CD	Volume V1	2	Value	32 bit Signed Integer
208	00CF	Volume V2	2	Value	32 bit Signed Integer
210	00D1	Pulse input A1	2	Value	32 bit Signed Integer
212	00D3	Pulse input B1	2	Value	32 bit Signed Integer
214	00D5	Pulse input A2	2	Value	32 bit Signed Integer
216	00D7	Pulse input B2	2	Value	32 bit Signed Integer
218	00D9	COP	2	Value	32 bit Signed Integer
220	00DB	t5 limit	2	Value	32 bit Signed Integer
222	00DD	Power Input B1	2	Value	32 bit Signed Integer
224	00DF	QP average time	2	Value	32 bit Signed Integer
226	00E1	Tariff limit TL2	2	Value	32 bit Signed Integer
228	00E3	Tariff limit TL3	2	Value	32 bit Signed Integer
230	00E5	Tariff limit TL4	2	Value	32 bit Signed Integer
232	00E7	Mass M1	2	Value	32 bit Signed Integer
234	00E9	Mass M2	2	Value	32 bit Signed Integer
236	00EB	Flow V1 actual	1	Factor	16 bit Signed Integer
237	00EC	Flow V2 actual	1	Factor	16 bit Signed Integer
238	00ED	Actual Power	1	Factor	16 bit Signed Integer
239	00EE	t1 actual	1	Factor	16 bit Signed Integer
240	00EF	t2 actual	1	Factor	16 bit Signed Integer
241	00F0	t3 actual	1	Factor	16 bit Signed Integer
242	00F1	t4 actual	1	Factor	16 bit Signed Integer
243	00F2	t1-t2 diff. temp.	1	Factor	16 bit Signed Integer
244	00F3	P1 actual	1	Factor	16 bit Signed Integer

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
245	00F4	P2 actual	1	Factor	16 bit Signed Integer
246	00F5	Heat energy E1	1	Factor	16 bit Signed Integer
247	00F6	Heat energy E2	1	Factor	16 bit Signed Integer
248	00F7	Cooling energy E3	1	Factor	16 bit Signed Integer
249	00F8	Inlet energy E4	1	Factor	16 bit Signed Integer
250	00F9	Outlet energy E5	1	Factor	16 bit Signed Integer
251	00FA	Tap water energy E6	1	Factor	16 bit Signed Integer
252	00FB	Tap water energy E7	1	Factor	16 bit Signed Integer
253	00FC	Energy E8	1	Factor	16 bit Signed Integer
254	00FD	Energy E9	1	Factor	16 bit Signed Integer
255	00FE	Energy E10	1	Factor	16 bit Signed Integer
256	00FF	Energy E11	1	Factor	16 bit Signed Integer
257	0100	Tariff TA2	1	Factor	16 bit Signed Integer
258	0101	Tariff TA3	1	Factor	16 bit Signed Integer
259	0102	Tariff TA4	1	Factor	16 bit Signed Integer
260	0103	Heat energy A1	1	Factor	16 bit Signed Integer
261	0104	Heat energy A2	1	Factor	16 bit Signed Integer
262	0105	Volume V1	1	Factor	16 bit Signed Integer
263	0106	Volume V2	1	Factor	16 bit Signed Integer
264	0107	Pulse input A1	1	Factor	16 bit Signed Integer
265	0108	Pulse input B1	1	Factor	16 bit Signed Integer
266	0109	Pulse input A2	1	Factor	16 bit Signed Integer
267	010A	Pulse input B2	1	Factor	16 bit Signed Integer
268	010B	COP	1	Factor	16 bit Signed Integer
269	010C	t5 limit	1	Factor	16 bit Signed Integer
270	010D	Power Input B1	1	Factor	16 bit Signed Integer
271	010E	QP average time	1	Factor	16 bit Signed Integer
272	010F	Tariff limit TL2	1	Factor	16 bit Signed Integer
273	0110	Tariff limit TL3	1	Factor	16 bit Signed Integer
274	0111	Tariff limit TL4	1	Factor	16 bit Signed Integer
275	0112	Mass M1	1	Factor	16 bit Signed Integer
276	0113	Mass M2	1	Factor	16 bit Signed Integer

Table legend for the default datagram

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.
# Regs	Number of modbus registers for the meter value
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
40	0x0028	m ³

Decimal value	Hex value	SI unit of measure
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
52	0x0034	bar
55	0x0037	M ³ x10
58	0x003A	Minutes
85	0x0055	%RH
86	0x0056	%O2
87	0x0057	m/s
88	0x0058	kJ/kg
89	0x0059	pH
90	0x005A	g/kg

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	±1.17×10 ⁻³⁸	±3.4×10 ³⁸	0x4F800000

Legacy datagram, xx-yy-301

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, 603 and 803. 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	Address (hex)	Description	# Regs	Contents	Data type
1	0000	Heat energy E1	2	Value	32 bit IEEE Float
5	0004	Flow V1 actual	2	Value	32 bit IEEE Float
9	0008	Volume V1	2	Value	32 bit IEEE Float
13	000C	Actual Power	2	Value	32 bit IEEE Float
17	0010	t1 actual	2	Value	32 bit IEEE Float
21	0014	t2 actual	2	Value	32 bit IEEE Float
25	0018	Pulse input A1	2	Value	32 bit IEEE Float
29	001C	Pulse input B1	2	Value	32 bit IEEE Float
33	0020	Heat energy E1	1	Units	16 bit Unsigned Integer
35	0022	Flow V1 actual	1	Units	16 bit Unsigned Integer
37	0024	Volume V1	1	Units	16 bit Unsigned Integer
39	0026	Actual Power	1	Units	16 bit Unsigned Integer
41	0028	Heat energy E1	2	Value	32 bit Signed Integer
45	002C	Flow V1 actual	2	Value	32 bit Signed Integer
49	0030	Volume V1	2	Value	32 bit Signed Integer
53	0034	Actual Power	2	Value	32 bit Signed Integer
57	0038	t1 actual	2	Value	32 bit Signed Integer
61	003C	t2 actual	2	Value	32 bit Signed Integer
65	0040	Pulse input A1	2	Value	32 bit Signed Integer
69	0044	Pulse input B1	2	Value	32 bit Signed Integer
73	0048	Heat energy E1	1	Decimals	16 bit Unsigned Integer
75	004A	Flow V1 actual	1	Decimals	16 bit Unsigned Integer
77	004C	Volume V1	1	Decimals	16 bit Unsigned Integer
79	004E	Actual Power	1	Decimals	16 bit Unsigned Integer
81	0050	Pulse input A1	1	Decimals	16 bit Unsigned Integer
83	0052	Pulse input B1	1	Decimals	16 bit Unsigned Integer
85	0054	Modul SW revision	1	Value	16 bit Unsigned Integer
87	0056	Info code	1	Value	16 bit Unsigned Integer
89	0058	ZERO	2	0	32 bit Unsigned Integer
93	005C	Cooling energy E3	2	Value	32 bit IEEE Float
97	0060	Heat energy E1-Month Log	2	Value	32 bit IEEE Float
101	0064	Volume V1 - Month Log	2	Value	32 bit IEEE Float
105	0068	Cooling energy E3	1	Units	16 bit Unsigned Integer
107	006A	ZERO	1	0	16 bit Unsigned Integer

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
109	006C	Cooling energy E3	2	Value	32 bit Signed Integer
113	0070	ZERO	2	0	32 bit Signed Integer
117	0074	ZERO	2	0	32 bit Signed Integer
121	0078	Cooling energy E3	1	Decimals	16 bit Unsigned Integer
123	007A	ZERO	1	0	16 bit Unsigned Integer
125	007C	Power max year	2	Value	32 bit IEEE Float
129	0080	Tarif 2	2	Value	32 bit IEEE Float
133	0084	Tarif 3	2	Value	32 bit IEEE Float
137	0088	Tarif limit 2	2	Value	32 bit IEEE Float
141	008C	Tarif limit 3	2	Value	32 bit IEEE Float
145	0090	ZERO	2	0	32 bit Unsigned Integer
149	0094	Customer No. 1	2	Value	32 bit Unsigned Integer
153	0098	Serial No.	2	Value	32 bit Unsigned Integer
157	009C	ZERO	2	0	32 bit Unsigned Integer
161	00A0	ZERO	2	0	32 bit Unsigned Integer
165	00A4	ZERO	2	0	32 bit Unsigned Integer
169	00A8	Operating hours	2	Value	32 bit Unsigned Integer

The Modbus registers from 257 to 341 are 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	# Regs	Contents	Data type
257	0100	Heat energy E1	2	Value	32 bit IEEE Float
259	0102	Flow V1 actual	2	Value	32 bit IEEE Float
261	0104	Volume V1	2	Value	32 bit IEEE Float
263	0106	Actual Power	2	Value	32 bit IEEE Float
265	0108	t1 actual	2	Value	32 bit IEEE Float
267	010A	t2 actual	2	Value	32 bit IEEE Float
269	010C	Pulse input A1	2	Value	32 bit IEEE Float
271	010E	Pulse input B1	2	Value	32 bit IEEE Float
273	0110	Heat energy E1	1	Units	16 bit Unsigned Integer
274	0111	Flow V1 actual	1	Units	16 bit Unsigned Integer
275	0112	Volume V1	1	Units	16 bit Unsigned Integer
276	0113	Actual Power	1	Units	16 bit Unsigned Integer
277	0114	Heat energy E1	2	Value	32 bit Signed Integer
279	0116	Flow V1 actual	2	Value	32 bit Signed Integer
281	0118	Volume V1	2	Value	32 bit Signed Integer
283	011A	Actual Power	2	Value	32 bit Signed Integer
285	011C	t1 actual	2	Value	32 bit Signed Integer
287	011E	t2 actual	2	Value	32 bit Signed Integer

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
289	0120	Pulse input A1	2	Value	32 bit Signed Integer
291	0122	Pulse input B1	2	Value	32 bit Signed Integer
293	0124	Heat energy E1	1	Decimals	16 bit Unsigned Integer
294	0125	Flow V1 actual	1	Decimals	16 bit Unsigned Integer
295	0126	Volume V1	1	Decimals	16 bit Unsigned Integer
296	0127	Actual Power	1	Decimals	16 bit Unsigned Integer
297	0128	Pulse input A1	1	Decimals	16 bit Unsigned Integer
298	0129	Pulse input B1	1	Decimals	16 bit Unsigned Integer
299	012A	Modul SW revision	1	Value	16 bit Unsigned Integer
300	012B	Info code	1	Value	16 bit Unsigned Integer
301	012C	ZERO	2	0	32 bit Unsigned Integer
303	012E	Cooling energy E3	2	Value	32 bit IEEE Float
305	0130	Heat energy E1 - Month Log	2	Value	32 bit IEEE Float
307	0132	Volume V1 - Month Log	2	Value	32 bit IEEE Float
309	0134	Cooling energy E3	1	Units	16 bit Unsigned Integer
310	0135	ZERO	1	0	16 bit Unsigned Integer
311	0136	Cooling energy E3	2	Value	32 bit Signed Integer
313	0138	ZERO	2	0	32 bit Signed Integer
315	013A	ZERO	2	0	32 bit Signed Integer
317	013C	Cooling energy E3	1	Decimals	16 bit Unsigned Integer
318	013D	ZERO	1	0	16 bit Unsigned Integer
319	013E	Power max year	2	Value	32 bit IEEE Float
321	0140	Tarif 2	2	Value	32 bit IEEE Float
323	0142	Tarif 3	2	Value	32 bit IEEE Float
325	0144	Tarif limit 2	2	Value	32 bit IEEE Float
327	0146	Tarif limit 3	2	Value	32 bit IEEE Float
329	0148	ZERO	2	0	32 bit Unsigned Integer
331	014A	Customer No. 1	2	Value	32 bit Unsigned Integer
333	014C	Serial No.	2	Value	32 bit Unsigned Integer
335	014E	ZERO	2	0	32 bit Unsigned Integer
337	0150	ZERO	2	0	32 bit Unsigned Integer
339	0152	ZERO	2	0	32 bit Unsigned Integer
341	0154	Operating hours	2	Value	32 bit Unsigned Integer

Table legend for the legacy datagram

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.
# Regs	Number of modbus registers for the meter value
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 = $10^{-\text{decimal}} * 32\text{-bit signed value}$.
- 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.

MULTICAL® 803 datagram: xx-yy-302

The following tables show how the MULTICAL® 803 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	Address (hex)	Description	# Regs	Contents	Data type
1	0000	Flow V1 actual	2	Value	32 bit IEEE Float
3	0002	Flow V2 actual	2	Value	32 bit IEEE Float
5	0004	Actual Power	2	Value	32 bit IEEE Float
7	0006	Actual Power 2 [E14/E16]	2	Value	32 bit IEEE Float
9	0008	t1 actual	2	Value	32 bit IEEE Float
11	000A	t2 actual	2	Value	32 bit IEEE Float
13	000C	t3 actual	2	Value	32 bit IEEE Float
15	000E	t4 actual	2	Value	32 bit IEEE Float
17	0010	t1-t2 diff. temp.	2	Value	32 bit IEEE Float
19	0012	P1 actual	2	Value	32 bit IEEE Float
21	0014	P2 actual	2	Value	32 bit IEEE Float
23	0016	Heat energy E1	2	Value	32 bit IEEE Float
25	0018	* Heat energy E1	2	Value	32 bit IEEE Float
27	001A	Heat energy E2	2	Value	32 bit IEEE Float
29	001C	Cooling energy E3	2	Value	32 bit IEEE Float
31	001E	* Heat energy E3	2	Value	32 bit IEEE Float
33	0020	Inlet energy E4	2	Value	32 bit IEEE Float
35	0022	Outlet energy E5	2	Value	32 bit IEEE Float
37	0024	Tap water energy E6	2	Value	32 bit IEEE Float
39	0026	Tap water energy E7	2	Value	32 bit IEEE Float
41	0028	Energy E8	2	Value	32 bit IEEE Float
43	002A	Energy E9	2	Value	32 bit IEEE Float
45	002C	Energy E10	2	Value	32 bit IEEE Float
47	002E	Energy E11	2	Value	32 bit IEEE Float
49	0030	Energy E12	2	Value	32 bit IEEE Float
51	0032	Energy E13	2	Value	32 bit IEEE Float
53	0034	Energy E14	2	Value	32 bit IEEE Float
55	0036	Energy E15	2	Value	32 bit IEEE Float
57	0038	Energy E16	2	Value	32 bit IEEE Float
59	003A	Tariff TA2	2	Value	32 bit IEEE Float
61	003C	Tariff TA3	2	Value	32 bit IEEE Float
63	003E	Tariff TA4	2	Value	32 bit IEEE Float
65	0040	Heat energy A1	2	Value	32 bit IEEE Float
67	0042	Heat energy A2	2	Value	32 bit IEEE Float
69	0044	Volume V1	2	Value	32 bit IEEE Float

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
71	0046	*Volume V1	2	Value	32 bit IEEE Float
73	0048	Volume V2	2	Value	32 bit IEEE Float
75	004A	Pulse input A1	2	Value	32 bit IEEE Float
77	004C	Pulse input B1	2	Value	32 bit IEEE Float
79	004E	Pulse input A2	2	Value	32 bit IEEE Float
81	0050	Pulse input B2	2	Value	32 bit IEEE Float
83	0052	COP	2	Value	32 bit IEEE Float
85	0054	t5 limit	2	Value	32 bit IEEE Float
87	0056	Power Input B1	2	Value	32 bit IEEE Float
89	0058	QP average time	2	Value	32 bit IEEE Float
91	005A	Tariff limit TL2	2	Value	32 bit IEEE Float
93	005C	Tariff limit TL3	2	Value	32 bit IEEE Float
95	005E	Tariff limit TL4	2	Value	32 bit IEEE Float
97	0060	Mass M1	2	Value	32 bit IEEE Float
99	0062	Mass M2	2	Value	32 bit IEEE Float
101	0064	Mass M3	2	Value	32 bit IEEE Float
103	0066	Mass M4	2	Value	32 bit IEEE Float
105	0068	Flow V1 actual	1	Unit	16 bit Unsigned Integer
106	0069	Flow V2 actual	1	Unit	16 bit Unsigned Integer
107	006A	Actual Power	1	Unit	16 bit Unsigned Integer
108	006B	Actual Power 2 (E14/E16)	1	Unit	16 bit Unsigned Integer
109	006C	t1 actual	1	Unit	16 bit Unsigned Integer
110	006D	t2 actual	1	Unit	16 bit Unsigned Integer
111	006E	t3 actual	1	Unit	16 bit Unsigned Integer
112	006F	t4 actual	1	Unit	16 bit Unsigned Integer
113	0070	t1-t2 diff. temp.	1	Unit	16 bit Unsigned Integer
114	0071	P1 actual	1	Unit	16 bit Unsigned Integer
115	0072	P2 actual	1	Unit	16 bit Unsigned Integer
116	0073	Heat energy E1	1	Unit	16 bit Unsigned Integer
117	0074	* Heat energy E1	1	Unit	16 bit Unsigned Integer
118	0075	Heat energy E2	1	Unit	16 bit Unsigned Integer
119	0076	Cooling energy E3	1	Unit	16 bit Unsigned Integer
120	0077	* Heat energy E3	1	Unit	16 bit Unsigned Integer
121	0078	Inlet energy E4	1	Unit	16 bit Unsigned Integer
122	0079	Outlet energy E5	1	Unit	16 bit Unsigned Integer
123	007A	Tap water energy E6	1	Unit	16 bit Unsigned Integer
124	007B	Tap water energy E7	1	Unit	16 bit Unsigned Integer
125	007C	Energy E8	1	Unit	16 bit Unsigned Integer
126	007D	Energy E9	1	Unit	16 bit Unsigned Integer
127	007E	Energy E10	1	Unit	16 bit Unsigned Integer
128	007F	Energy E11	1	Unit	16 bit Unsigned Integer

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
129	0080	Energy E12	1	Unit	16 bit Unsigned Integer
130	0081	Energy E13	1	Unit	16 bit Unsigned Integer
131	0082	Energy E14	1	Unit	16 bit Unsigned Integer
132	0083	Energy E15	1	Unit	16 bit Unsigned Integer
133	0084	Energy E16	1	Unit	16 bit Unsigned Integer
134	0085	Tariff TA2	1	Unit	16 bit Unsigned Integer
135	0086	Tariff TA3	1	Unit	16 bit Unsigned Integer
136	0087	Tariff TA4	1	Unit	16 bit Unsigned Integer
137	0088	Heat energy A1	1	Unit	16 bit Unsigned Integer
138	0089	Heat energy A2	1	Unit	16 bit Unsigned Integer
139	008A	Volume V1	1	Unit	16 bit Unsigned Integer
140	008B	* Volume V1	1	Unit	16 bit Unsigned Integer
141	008C	Volume V2	1	Unit	16 bit Unsigned Integer
142	008D	Pulse input A1	1	Unit	16 bit Unsigned Integer
143	008E	Pulse input B1	1	Unit	16 bit Unsigned Integer
144	008F	Pulse input A2	1	Unit	16 bit Unsigned Integer
145	0090	Pulse input B2	1	Unit	16 bit Unsigned Integer
146	0091	COP	1	Unit	16 bit Unsigned Integer
147	0092	t5 limit	1	Unit	16 bit Unsigned Integer
148	0093	Power Input B1	1	Unit	16 bit Unsigned Integer
149	0094	QP average time	1	Unit	16 bit Unsigned Integer
150	0095	Tariff limit TL2	1	Unit	16 bit Unsigned Integer
151	0096	Tariff limit TL3	1	Unit	16 bit Unsigned Integer
152	0097	Tariff limit TL4	1	Unit	16 bit Unsigned Integer
153	0098	Mass M1	1	Unit	16 bit Unsigned Integer
154	0099	Mass M2	1	Unit	16 bit Unsigned Integer
155	009A	Mass M3	1	Unit	16 bit Unsigned Integer
156	009B	Mass M4	1	Unit	16 bit Unsigned Integer
157	009C	Info code	2	Value	32 bit Unsigned Integer
159	009E	Operating hours	2	Value	32 bit Unsigned Integer
161	00A0	Error hour counter	2	Value	32 bit Unsigned Integer
163	00A2	Date [yy.mm.dd]	2	Value	32 bit Unsigned Integer
165	00A4	Time [hh.mm.ss]	2	Value	32 bit Unsigned Integer
167	00A6	Config No. 1	2	Value	32 bit Unsigned Integer
169	00A8	Config No. 2	2	Value	32 bit Unsigned Integer
171	00AA	Config No. 3	2	Value	32 bit Unsigned Integer
173	00AC	Config No. 4	2	Value	32 bit Unsigned Integer
175	00AE	Customer No. 2	2	Value	32 bit Unsigned Integer
177	00B0	Customer No. 1	2	Value	32 bit Unsigned Integer
179	00B2	Serial No.	2	Value	32 bit Unsigned Integer
181	00B4	Meter type incl. SW edition	2	Value	32 bit Unsigned Integer

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
183	00B6	Meter Main/Sub type	2	Value	32 bit Unsigned Integer
185	00B8	Meter SW revision	2	Value	32 bit Unsigned Integer
187	00BA	Fluid type/Concentration	2	Value	32 bit Unsigned Integer
189	00BC	Flow V1 actual	2	Value	32 bit Signed Integer
191	00BE	Flow V2 actual	2	Value	32 bit Signed Integer
193	00C0	Actual Power	2	Value	32 bit Signed Integer
195	00C2	Actual Power 2 (E14/E16)	2	Value	32 bit Signed Integer
197	00C4	t1 actual	2	Value	32 bit Signed Integer
199	00C6	t2 actual	2	Value	32 bit Signed Integer
201	00C8	t3 actual	2	Value	32 bit Signed Integer
203	00CA	t4 actual	2	Value	32 bit Signed Integer
205	00CC	t1-t2 diff. temp.	2	Value	32 bit Signed Integer
207	00CE	P1 actual	2	Value	32 bit Signed Integer
209	00D0	P2 actual	2	Value	32 bit Signed Integer
211	00D2	Heat energy E1	2	Value	32 bit Signed Integer
213	00D4	* Heat energy E1	2	Value	32 bit Signed Integer
215	00D6	Heat energy E2	2	Value	32 bit Signed Integer
217	00D8	Cooling energy E3	2	Value	32 bit Signed Integer
219	00DA	* Heat energy E3	2	Value	32 bit Signed Integer
221	00DC	Inlet energy E4	2	Value	32 bit Signed Integer
223	00DE	Outlet energy E5	2	Value	32 bit Signed Integer
225	00E0	Tap water energy E6	2	Value	32 bit Signed Integer
227	00E2	Tap water energy E7	2	Value	32 bit Signed Integer
229	00E4	Energy E8	2	Value	32 bit Signed Integer
231	00E6	Energy E9	2	Value	32 bit Signed Integer
233	00E8	Energy E10	2	Value	32 bit Signed Integer
235	00EA	Energy E11	2	Value	32 bit Signed Integer
237	00EC	Energy E12	2	Value	32 bit Signed Integer
239	00EE	Energy E13	2	Value	32 bit Signed Integer
241	00F0	Energy E14	2	Value	32 bit Signed Integer
243	00F2	Energy E15	2	Value	32 bit Signed Integer
245	00F4	Energy E16	2	Value	32 bit Signed Integer
247	00F6	Tariff TA2	2	Value	32 bit Signed Integer
249	00F8	Tariff TA3	2	Value	32 bit Signed Integer
251	00FA	Tariff TA4	2	Value	32 bit Signed Integer
253	00FC	Heat energy A1	2	Value	32 bit Signed Integer
255	00FE	Heat energy A2	2	Value	32 bit Signed Integer
257	0100	Volume V1	2	Value	32 bit Signed Integer
259	0102	* Volume V1	2	Value	32 bit Signed Integer
261	0104	Volume V2	2	Value	32 bit Signed Integer
263	0106	Pulse input A1	2	Value	32 bit Signed Integer

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
265	0108	Pulse input B1	2	Value	32 bit Signed Integer
267	010A	Pulse input A2	2	Value	32 bit Signed Integer
269	010C	Pulse input B2	2	Value	32 bit Signed Integer
271	010E	COP	2	Value	32 bit Signed Integer
273	0110	t5 limit	2	Value	32 bit Signed Integer
275	0112	Power Input B1	2	Value	32 bit Signed Integer
277	0114	QP average time	2	Value	32 bit Signed Integer
279	0116	Tariff limit TL2	2	Value	32 bit Signed Integer
281	0118	Tariff limit TL3	2	Value	32 bit Signed Integer
283	011A	Tariff limit TL4	2	Value	32 bit Signed Integer
285	011C	Mass M1	2	Value	32 bit Signed Integer
287	011E	Mass M2	2	Value	32 bit Signed Integer
289	0120	Mass M3	2	Value	32 bit Signed Integer
291	0122	Mass M4	2	Value	32 bit Signed Integer
293	0124	Flow V1 actual	1	Factor	16 bit Signed Integer
294	0125	Flow V2 actual	1	Factor	16 bit Signed Integer
295	0126	Actual Power	1	Factor	16 bit Signed Integer
296	0127	Actual Power 2 [E14/E16]	1	Factor	16 bit Signed Integer
297	0128	t1 actual	1	Factor	16 bit Signed Integer
298	0129	t2 actual	1	Factor	16 bit Signed Integer
299	012A	t3 actual	1	Factor	16 bit Signed Integer
300	012B	t4 actual	1	Factor	16 bit Signed Integer
301	012C	t1-t2 diff. temp.	1	Factor	16 bit Signed Integer
302	012D	P1 actual	1	Factor	16 bit Signed Integer
303	012E	P2 actual	1	Factor	16 bit Signed Integer
304	012F	Heat energy E1	1	Factor	16 bit Signed Integer
305	0130	* Heat energy E1	1	Factor	16 bit Signed Integer
306	0131	Heat energy E2	1	Factor	16 bit Signed Integer
307	0132	Cooling energy E3	1	Factor	16 bit Signed Integer
308	0133	* Heat energy E3	1	Factor	16 bit Signed Integer
309	0134	Inlet energy E4	1	Factor	16 bit Signed Integer
310	0135	Outlet energy E5	1	Factor	16 bit Signed Integer
311	0136	Tap water energy E6	1	Factor	16 bit Signed Integer
312	0137	Tap water energy E7	1	Factor	16 bit Signed Integer
313	0138	Energy E8	1	Factor	16 bit Signed Integer
314	0139	Energy E9	1	Factor	16 bit Signed Integer
315	013A	Energy E10	1	Factor	16 bit Signed Integer
316	013B	Energy E11	1	Factor	16 bit Signed Integer
317	013C	Energy E12	1	Factor	16 bit Signed Integer
318	013D	Energy E13	1	Factor	16 bit Signed Integer
319	013E	Energy E14	1	Factor	16 bit Signed Integer

Modbus Register	Address (hex)	Description	# Regs	Contents	Data type
320	013F	Energy E15	1	Factor	16 bit Signed Integer
321	0140	Energy E16	1	Factor	16 bit Signed Integer
322	0141	Tariff TA2	1	Factor	16 bit Signed Integer
323	0142	Tariff TA3	1	Factor	16 bit Signed Integer
324	0143	Tariff TA4	1	Factor	16 bit Signed Integer
325	0144	Heat energy A1	1	Factor	16 bit Signed Integer
326	0145	Heat energy A2	1	Factor	16 bit Signed Integer
327	0146	Volume V1	1	Factor	16 bit Signed Integer
328	0147	* Volume V1	1	Factor	16 bit Signed Integer
329	0148	Volume V2	1	Factor	16 bit Signed Integer
330	0149	Pulse input A1	1	Factor	16 bit Signed Integer
331	014A	Pulse input B1	1	Factor	16 bit Signed Integer
332	014B	Pulse input A2	1	Factor	16 bit Signed Integer
333	014C	Pulse input B2	1	Factor	16 bit Signed Integer
334	014D	COP	1	Factor	16 bit Signed Integer
335	014E	t5 limit	1	Factor	16 bit Signed Integer
336	014F	Power Input B1	1	Factor	16 bit Signed Integer
337	0150	QP average time	1	Factor	16 bit Signed Integer
338	0151	Tariff limit TL2	1	Factor	16 bit Signed Integer
339	0152	Tariff limit TL3	1	Factor	16 bit Signed Integer
340	0153	Tariff limit TL4	1	Factor	16 bit Signed Integer
341	0154	Mass M1	1	Factor	16 bit Signed Integer
342	0155	Mass M2	1	Factor	16 bit Signed Integer
343	0156	Mass M3	1	Factor	16 bit Signed Integer
344	0157	Mass M4	1	Factor	16 bit Signed Integer

* High resolution registers.

Table legend for the MULTICAL® 803 datagram

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.
# Regs	Number of modbus registers for the meter value
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
40	0x0028	m ³

Decimal value	Hex value	SI unit of measure
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
52	0x0034	bar
55	0x0037	M ³ x10
58	0x003A	Minutes
85	0x0055	%RH
86	0x0056	%O2
87	0x0057	m/s
88	0x0058	kJ/kg
89	0x0059	pH
90	0x005A	g/kg

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	±1.17×10 ⁻³⁸	±3.4×10 ³⁸	0x4F800000

Registers for PQT Controller

The PQT Controller, module HC-003-43 must be mounted in one module slot in the MULTICAL® 603 or MULTICAL® 803, and the Modbus module, HC-003-67 and -82 in another Module slot. The Modbus module will locate the PQT Controller automatically within 1...2 minutes from powering up the meter. Reading the PQT set points will return invalid values, until the PQT Controller has been detected by the Modbus module.

The following table shows how the set-points in the PQT Controller are addressed. All registers are 32 bit Unsigned integers. All PQT set points can be read simultaneous in one read command using Modbus function code 3 or 4. However writing is only allowed for one PQT set point at a time, using Modbus function code 0x10 – write multiple registers, as it takes two Modbus registers for each PQT set point value.

Modbus register	Address (hex)	Description	No of decimals	No of regs	Contents	Data type
4097	1000	PQT Flow set point [l/h]	0	2	Value	32 bit Unsigned Integer
4099	1002	PQT Power set point [kW]	1	2	Value	32 bit Unsigned Integer
4101	1004	PQT Delta t set point [K]	2	2	Value	32 bit Unsigned Integer
4103	1006	PQT t2 set point [°C]	2	2	Value	32 bit Unsigned Integer

PQT Controller has 4 set point registers. The values are read as 32 bit unsigned integers, meaning that the comma position of each register are included in the value.

Examples:

Reading Flow set point, a value of 10125 corresponds to 10125 [l/h]

Reading Power set point, a value of 76543 corresponds to 7654,3 [kW]

Reading Delta t set point, a value of 5432 corresponds to 54,32 [K]

Reading t2 set point, a value of 1245 corresponds to 12,45 [°C]

Writing a value of 20250 to Flow set point, the PQT Controller will adjust the flow to 20250 [l/h]

Writing a value of 14500 to Power set point, the PQT Controller will adjust the flow until Power is 1450,0 [kW]

Writing a value of 3500 to Delta t set point, the PQT Controller will adjust the flow until Delta t is 35,00 [°K]

Writing a value of 2550 to t2 set point, the PQT Controller will adjust the flow until t2 is 25,50 [°C]

Find more information in the data sheet about the PQT Controller.

Kamstrup A/S

Industrivej 28, Stilling
DK-8660 Skanderborg
T: +45 89 93 10 00
F: +45 89 93 10 01
info@kamstrup.com
kamstrup.com