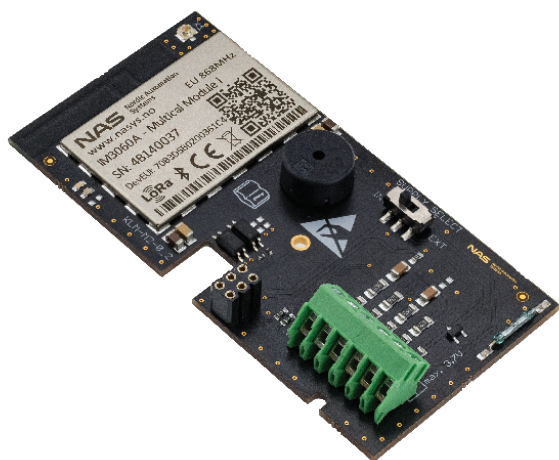


# LoRaWAN™ Multical® MODULE I IM3060

**KAMSTRUP**



LoRaWAN™ Multical® Module enables the acquisition of consumption data from Kamstrup Multical® series meters and transmit it wirelessly to the available LoRaWAN™ network.

LoRaWAN™ Multical® Module is meant to be attached to the existing meter as internal module.

# OVERVIEW

## Efficient

LoRaWAN™ Multical® Module has bidirectional, long range transceiver with low power consumption.

## Intelligent

Real-time consumption data is gathered wirelessly and processed automatically. Data is accessible from your LoRaWAN™ provider.

# APPLICATIONS

## Metering

Frequent reporting provides a detailed usage overview.

# FEATURES

- Long range wireless data transmission
- Kamstrup data input port
- Metering
- Configurable reporting interval
- Maintenance free - install & forget
- Easy installation
- Secure communication
- Internal BT antenna
- U.fl antenna connector
- Additional battery connector
- On board buzzer

# SPECIFICATIONS

Width:	44.3 mm
Height:	11.2 mm
Length:	89.3 mm
Weight:	19 g
Operating temperature:	-40°C ... +60°C
Communication range:	up to 15km*
Tx power:	up to +20dBm
Rx Senitivity:	-140dBm
MAC Layer:	LoRaWAN™
Physical Layer:	LoRa®
IP Rating:	N/A
Communication:	LoRaWAN™
Device Class:	A/C**
Suitable Battery:	3.6V

\* Communication range is dependent on the location of the sensor and nearest base station.

\*\* Can be forced to work as C class devide. Should ONLY be used with Power suply module (24 or 240 VAC).

# COMMUNICATION

Byte order:	LSB
Usage reporting:	Unconfirmed messages
Status reporting:	Confirmed messages

# INPUT SPECIFICATIONS

For pulse input specifiacation look at the Kamstrup Multical® meter data sheet.

# PORT LIST

fPort	Usage	Format	Uplink	Unit	Comment
24	Status		yes	-	Defined below
25	Consumption		yes	-	Defined below
50	Configuration		no	-	Defined below
51	Update mode		no	-	Defined below
60	Command		no	-	Defined below
99	Boot/Debug		yes	-	Defined below

For firmware version  $\geq 0.7.0$

# fPort 24 Status Message

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 8/4	Byte 9	Byte 10	Byte ..	Byte ..	Byte ..	Byte ..	Byte 42	Byte 43	Byte 44	Byte 45	Byte 46
Metering time	Clock**			Battery***	Sensor RSSI	Register ID	Byte 8	Byte 8/4	Register value 1	Register ID	Byte ..	Register value ..	Byte ..	Byte ..	Register ID	Register value 8	Byte 43	Byte 44	Byte 45	Byte 46
0..143* FF - live	uint32 - Unix timestamp in utc			uint8	int8	uint8	uint8	Float IEEE754	Register ID	uint8	Register ID	Float IEEE754	Byte ..	Byte ..	uint8	Float IEEE754	Byte 43	Byte 44	Byte 45	Byte 46

- \* Metering time is offset from the beginning of the day in 10 minute steps. See time step chart for more information. Value FF is used when the fixed time metering is not activated and the metering data is live.
- \*\* Multical® meter clock value (for series 66 it is the Multical® Module I clock if the clock gets adjusted)
- \*\*\* FF no battery info

## Message sample

Message in base64

```
TiXYu1n/hg2a6KZGAusRREQTAOShrG==
```

Message decoded to HEX

```
4E25D8BB59FF860D9AE8A64602EB1144441300E4A146
```

Metering time

```
4E
```

HEX message converted to decimal

```
78
```

Decimal value translated to time

```
13:00:00 (UTC)
```

Device clock 

```
25D8BB59
```

 HEX message flip for MSB

```
59BBD825
```

HEX message converted to decimal (epoch)

```
1505482789 (seconds)
```

Epoch time converted to date

```
September 15, 2017 13:39:49 (UTC)
```

Sensor Battery HEX message

```
FF
```

HEX message converted to battery level

```
No battery info
```

Sensor RSSI HEX message

```
86
```

HEX message converted to signed decimal

```
-122 (dBm)
```

1<sup>st</sup> Register

Register in HEX

```
0D
```

HEX value converted to decimal

```
13
```

Decimal value translated to register

```
Volume register V1
```

Register value in HEX

```
9AE8A646
```

HEX message flip for MSB

```
46A6E89A
```

HEX value converted to Float (IEEE-754)

```
21364.3 (m3)
```

## 2<sup>nd</sup> Register

Register in HEX

02

HEX value converted to decimal

2

Decimal value translated to register

Heat energy

Register value in HEX

EB114444

HEX message flip for MSB

444411EB

HEX value converted to Float (IEEE-754)

784.27997 (kWh)

## 3<sup>rd</sup> Register

Register in HEX

13

HEX value converted to decimal

19

Decimal value translated to register

Operational hour counter

Register value in HEX

00E4A146

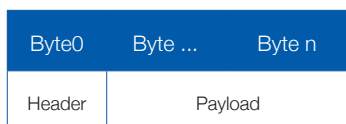
HEX message flip for MSB

46A1E400

HEX value converted to Float (IEEE-754)

20722 (h)

# fPort 25 Usage message



Different headers with their respective payloads are described below

## Meter usage

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte ..	Byte ..	Byte ..	Byte ..	Byte ..	Byte 42	Byte 43	Byte 44	Byte 45	Byte 46
Header	Measuring time	Register ID	Register value 1				Register ID	Register value ..				Register ID	Register value 9			
00	0..143 255 - live	uint8	Float IEEE754				uint8	Float IEEE754				uint8	Float IEEE754			

## Message sample

Message in base64

```
AE4NmuiRgLrEUREEwDkoUY=
```

Message decoded to HEX

```
004E0D9AE8A64602EB1144441300E4A146
```

Header 00 decoded

```
Standard usage message
```

Metering time

```
4E
```

HEX message converted to decimal

```
78
```

Decimal value translated to time

```
13:00:00 (UTC)
```

1<sup>st</sup> Register

Register in HEX

```
0D
```

HEX value converted to decimal

```
13
```

Decimal value translated to register

```
Volume register V1
```



Register value in HEX

9AE8A646

HEX message flip for MSB

46A6E89A

HEX value converted to Float (IEEE-754)

21364.3 (m<sup>3</sup>)

2<sup>nd</sup> Register

Register in HEX

02

HEX value converted to decimal

2

Decimal value translated to register

Heat energy

Register value in HEX

EB114444

HEX message flip for MSB

444411EB

HEX value converted to Float (IEEE-754)

784.27997 (kWh)

3<sup>rd</sup> Register

Register in HEX

13

HEX value converted to decimal

19

Decimal value translated to register

Operational hour counter

Register value in HEX

00E4A146

HEX message flip for MSB

46A1E400

HEX value converted to Float (IEEE-754)

20722 (h)

## Digital inputs

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Header	Measuring time	Kamstrup pulse 1 count				Kamstrup pulse 2 count			
02	0..144 255 - live	uint32				uint32			

Pulse counter is available with Kamstrup Multical® 601, 602

## Message sample

Message in base64

```
Ak6lAAAAAAAAAAAA==
```

Message decoded to HEX

```
024EA50000000000000000
```

Header 02 decoded

```
Pulse usage message
```

Metering time

```
4E
```

HEX message converted to decimal

```
78
```

Decimal value translated to time

```
13:00:00 (UTC)
```

1<sup>st</sup> Pulse interface

Register in HEX

```
A5000000
```

HEX value flipped for MSB

```
000000A5
```

HEX value converted to decimal

```
165 (pulses)
```

2<sup>nd</sup> Pulse interface

Register in HEX

```
00000000
```

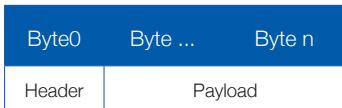
HEX value flipped for MSB

```
00000000
```

HEX value converted to decimal

```
0 (pulses)
```

# fPort 50 Configuration Message



Different headers with their respective payloads are described below

## Reporting

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Header	Usage interval (seconds)				Status interval (seconds)				Options
00	uint32* default - 3600				uint32** default - 86400				

\* Can't be configured shorer than 600. When set to 0 disables usage packets.

\*\* Can't be configured shorer than 600.

\*\*\* Should ONLY be used with Power supply module (24 or 230VAC).

\*\*\*\* Fixed measuring will take the measurements on fixed points in time and then report them with time delay (to avoid network overload). Measurements can be taken in 10 minute steps from 00:00.

\*\*\*\*\* Fixed measuring interval determines how often the measurement is taken and reported. When used, one of the measurements is always at full hour (except 24h interval, then the measurement is taken at 00:00). This will over ride normal reporting intervals.

Bit #	Function	Value
0	RFU	
1	Kamstrup pulses	0 - off (default) 1 - on
2	Device class	0 - A (default) 1 - C ***
3	Fixed measuring****	0 - off (default) 1 - on
4	RFU	
5		
6		
7		

Value	Fixed measuring interval*****
00	Not used
01	10 min
02	20 min
03	30 min
04	1 h
05	24 h
06	RFU
07	RFU

## Message sample

Message goal: Configure usage interval to 10 minutes and status interval to 1 hour.

Header

Select Header HEX code

```
00
```

Usage reporting interval

Convert interval 600 to HEX

```
258
```

Flip HEX value to LSB

```
58020000
```

Status reporting interval

Convert interval 3600 to HEX

```
E10
```

Flip HEX value to LSB

```
100E0000
```

Option selection

```
0 : RFU
0 : Kamstrup pulses - off
0 : Device class - A
0 : Fixed measuring - off
0 : RFU
X : Fixed measuring interval
X :
X :
```

Interval not used mapped to Decimal

```
0
```

Decimal message converted to binary

```
0B000
```

Whole binary message assembled

```
0B00000000
```

Binary value converted to HEX

```
0x00
```

Compile message for sending (HEX)

```
00|58020000|100E0000|00
```

Control value in base64 to control after sending

```
AFgCAAAQDgAAAA==
```

## Usage package registers

Byte 0	Byte 1	Byte ..	Byte 9	Comment
Header	Register ID*	Register ID*	Register ID*	Max 9 registers. Send as few as possible.
01	uint8	uint8	uint8	

\* If disable all registers value is sent then usage message reporting is disabled. If an improper register value is sent the configuration is not saved.

## Message sample

Message goal: Order Volume register V1

Header

Select Header HEX code

01

1<sup>st</sup> Register

Register name

Volume register V1

Register translated to register number

13

Decimal value converted to HEX

0D

Compile message for sending (HEX)

010D

Control value in base64 to control after sending

AQ0=

## Status package registers

Byte 0	Byte 1	Byte ..	Byte 9	Comment
Header	Register ID	Register ID	Register ID	Max 9 registers. Send as few as possible.
02	uint8	uint8	uint8	

\* If disable all registers value is sent then uregister value reporting in status message is disabled. If an improper register value is sent the configuration is not saved.

## Message sample

Message goal: Order Volume register V1

Header

Select Header HEX code

02

1<sup>st</sup> Register

Register name

Volume register V1

Register translated to register number

13

Decimal value converted to HEX

0D

Compile message for sending (HEX)

020D

Control value in base64 to control after sending

Ag0=

## Time settings

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Header	Device clock (Unix timestamp in UTC)*			
03	uint32			

\* Sets Multical® clock. With model 66 the module clock is set instead.

## Message sample

Message goal: Set device clock to 22 August 2017 11:50:00

### Header

Select Header HEX code

03

### Device clock

Choose desired time

22 August 2017 11:50:00 (UTC)

Convert to epoch

1503402600

Covert to hex

599C1A68

Flip HEX value for LSB

681A9C59

Compile message for sending (HEX)

03681A9C59

Control value in base64 to control after sending

A2ganFk=

## Time settings

Byte 0	Byte 1	Byte 2
Header	Device clock offser	
04	int16 (seconds)	

## Message sample

Message goal: Adjust device clock 2min 37 seconds back.

### Header

Select Header HEX code

04

### Device clock offset

Choose desired time

-157 seconds

Covert to hex

FF63

Flip HEX value for LSB

63FF

### Compile message for sending (HEX)

0463FF

### Control value in base64 to control after sending

BGP/



# fPort 51 Update message

Byte 0
Header
FF

Activate update mode for BT update for 2 minutes. if nothing is done the device will reboot, join and resume working

NB! **Only** unconfirmed messages should be used for this message.

## Message sample

Message goal: Set device to update mode

Header

Select Header HEX code

FF

Compile message for sending (HEX)

FF

Control value in base64 to control after sending

/w==

# fPort 60 Command Message

Byte0	Byte ...	Byte n
Header	Payload	

Different headers with their respective payloads are described below

## Request register values

Byte 0	Byte 1	Byte ..	Byte 9
Header	Register ID	Register ID	Register ID
00	uint8	uint8	uint8

Max 9 registers. Answer is sent to fPort25 in usage message format.

## Message sample

Message goal: Order Volume register V1

Header

Select Header HEX code

00

1<sup>st</sup> Register

Register name

Volume register V1

Register translated to register number

13

Decimal value converted to HEX

0D

Compile message for sending (HEX)

000D

Control value in base64 to control after sending

AA0=

## Request digital input values

Byte 0
Header
02

Answer will be sent to fPort 25 according to usage message format

## Message sample

Message goal: Request digital input values

Header

Select Header HEX code

02

Compile message for sending (HEX)

02

Control value in base64 to control after sending

AQ==

## Request historic data

Byte 0	Byte 1
Header	Measuring time
03	uint8 (0..143)*

\* This request can only be used when fixed interval measuring is activated. Only actual measurement points data can be requested (if measurement is set to hourly, then half hourly data can not be requested). Only data within last 24h can be requested. Answer is sent as a usage packet.

## Message sample

Message goal: Request values from 14:00

Header

Select Header HEX code

03

Select time

14:00

Convert time to according time step chart

84

Convert to HEX

54

Compile message for sending (HEX)

0354

Control value in base64 to control after sending

A1Q=

# fPort 99 Boot/Debug Message

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5-7	Byte 8-12	Byte 13-16	Byte 17-23	Byte 24-27	Byte 28	Byte 29-32	
Header (HEX)	Payload											
0x00 Boot	Serial (HEX)				Firmware (HEX)	Kamstrup meter ID	Kamstrup config. (ABC-CCCC)	Kamstrup config. (DDDEEFF-GGMN)	Kamstrup type	Active Device class	Device clock (epoch)	
0x01 Shutdown												
0x10 Error codes	0x00 Ext. power lost											
	0x01 Ext. power restored											

## Message sample

Message in base64

```
AHYAFEsABwhSgx0EAJvw/QHVAAAYGAAAEExEGAQDeZJVa
```

Message decoded to HEX

```
007600144B00070852831D04009BF0FD01D50000181800001311060100DE64955A
```

Header

```
00
```

Value translated to message type

```
Boot
```

Device serial `7600141B` HEX message flip for MSB

```
4B140076
```

Firmware version

Major version in HEX

```
00
```

HEX value converted to decimal

```
0
```

Minor version in HEX

```
07
```

HEX value converted to decimal

```
7
```

Patch version in HEX

```
08
```

HEX value converted to decimal

```
8
```

Kamstrup meter ID

Meter ID **52831D0400** HEX message flip for MSB

**00041D8352**

HEX value converted to decimal

**69043026**

Kamstrup Configuration (A B CCC CCC)

Config. **9BF0FD01** HEX message flip for MSB

**01FDF09B**

HEX value converted to decimal

**3 3 419 419**

Kamstrup Configuration (DDD EE FF GG M N)

Config. **D5000018180000** HEX message converted to decimal values

DDD **D5** HEX value converted to decimal

**213**

EE **00** HEX value converted to decimal

**0**

FF **18** HEX value converted to decimal

**24**

GG **18** HEX value converted to decimal

**24**

M **00** HEX value converted to decimal

**0**

N **00** HEX value converted to decimal

**0**

Kamstrup type

Type **13110601** HEX message converted to decimal values

Software version

Major version in HEX

**13**

HEX value converted to decimal

**19**

Minor version in HEX

**11**

HEX value converted to decimal

**17**

Display version

Major version in HEX

**06**

HEX value converted to decimal

**6**

Minor version in HEX

01

HEX value converted to decimal

1

Device class

00

Class value converted to binary

00000000

Binary converted to classes (LSB)

```
0 : Class C - not active
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
```

Device clock `DE64955A` HEX message flip for MSB

5A9564DE

HEX message converted to decimal (epoch)

1519740126 (seconds)

Epoch time converted to date

27 February 2018 14:02:06 (Kamstrup time)

# REGISTER ID MAPPING TABLE

NAS ID	Register ID		Register name	Multical®											Unit
	Hex	Dec.		66	62	S6	602	601	601+	801	402	403	21	302	
1	03EB	1003	Date (yy.mm.dd)	+	+	+	+	+	+	+	+	+	+	+	-
2	003C	60	Heat energy E1			+	+	+	+	+	+		+	+	kWh
3	005E	94	Heat energy E2			+	+	+	+	+				+	kWh
4	003F	63	Cooling energy E3			+	+	+	+	+	+		+	+	kWh
5	003D	61	Inlet energy E4			+	+	+	+	+				+	kWh
6	003E	62	Outlet energy E5			+	+	+	+	+				+	kWh
7	005F	95	Tap water energy E6			+	+	+	+	+				+	kWh
8	0060	96	Tap water energy E7			+	+	+	+	+				+	kWh
9	0061	97	Energy E8			+	+	+	+	+	+		+	+	-
10	006E	110	Energy E9			+	+	+	+	+	+		+	+	-
11	0040	64	Tariff TA2	+	+	+	+	+	+	+	+			+	-
12	0041	65	Tariff TA3	+	+	+	+	+	+	+	+			+	-
13	0044	68	Volume V1	+	+	+	+	+	+	+	+	+	+	+	m3
14	0045	69	Volume V2	+		+	+	+	+	+				+	m3
15	0054	84	Pulse input A1		+	+	+	+	+	+	+	+		+	-
16	0055	85	Pulse input B1		+	+	+	+	+	+	+	+		+	-
17	0048	72	Mass M1	+		+	+	+	+	+				+	ton
18	0049	73	Mass M2	+		+	+	+	+	+				+	ton
19	03EC	1004	Operating hours	+	+	+	+	+	+	+	+	+	+	+	-
20	0071	113	Info event counter		+	+	+	+	+	+	+	+	+	+	-
21	03EA	1002	Time (hh.mm.ss)	+	+	+	+	+	+	+	+	+	+	+	-
22	0063	99	Info code	+	+	+	+	+	+	+	+	+	+	+	-
23	0056	86	t1 actual (2 decimals)	+		+	+	+	+	+	+		+	+	C
24	0057	87	t2 actual (2 decimals)	+		+	+	+	+	+	+		+	+	C
25	0058	88	t3 actual (2 decimals)	+		+	+	+	+	+				+	C
26	007A	122	t4 actual (2 decimals)			+	+	+	+	+				+	C
27	0059	89	t1-t2 diff. temp (2 decimals)	+		+	+	+	+	+	+		+	+	C
28	005B	91	P1 actual	+		+	+	+	+	+				+	Bar
29	005C	92	P2 actual	+		+	+	+	+	+				+	Bar
30	004A	74	Flow V1 actual	+	+	+	+	+	+	+	+	+	+	+	l/h
31	004B	75	Flow V2 actual	+		+	+	+	+	+				+	l/h
32	0050	80	Power E1 actual	+		+	+	+	+	+	+	+	+	+	kW
33	007B	123	Flow V1 max year date		+	+	+	+	+	+	+	+	+	+	l/h
34	007C	124	Flow V1 max year		+	+	+	+	+	+	+	+	+	+	l/h
35	007D	125	Flow V1 min year date		+	+	+	+	+	+	+	+	+	+	l/h
36	007E	126	Flow V1 min year		+	+	+	+	+	+	+	+	+	+	l/h
37	007F	127	Power max year date			+	+	+	+	+	+	+	+	+	kW
38	0080	128	Power max year			+	+	+	+	+	+	+	+	+	kW
39	0081	129	Power min year date			+	+	+	+	+	+	+	+	+	kW
40	0082	130	Power min year			+	+	+	+	+	+	+	+	+	kW
41	008A	138	Flow V1 max month date		+	+	+	+	+	+	+	+	+	+	l/h
42	008B	139	Flow V1 max month		+	+	+	+	+	+	+	+	+	+	l/h
43	008C	140	Flow V1 min month date		+	+	+	+	+	+	+	+	+	+	l/h
44	008D	141	Flow V1 min month		+	+	+	+	+	+	+	+	+	+	l/h
45	008E	142	Power max month date			+	+	+	+	+	+	+	+	+	kW
46	008F	143	Power max month			+	+	+	+	+	+	+	+	+	kW



NAS ID	Register ID		Register name	Multical®											Unit
	Hex	Dec.		66	62	S6	602	601	601+	801	402	403	21	302	
47	0090	144	Power min month date			+	+	+	+	+	+			+	kW
48	0091	145	Power min month			+	+	+	+	+	+			+	kW
49	0092	146	t1 average year			+	+	+	+	+	+		+	+	C
50	0093	147	t2 average year			+	+	+	+	+	+		+	+	C
51	0095	149	t1 average month			+	+	+	+	+	+		+	+	C
52	0096	150	t2 average month			+	+	+	+	+	+		+	+	C
53	0042	66	Tariff limit TL2	+	+	+	+	+	+	+	+			+	-
54	0043	67	Tariff limit TL3	+	+	+	+	+	+	+	+			+	-
55	0062	98	Target date	+	+	+	+	+	+	+	+		+	+	-
56	0098	152	Program No.	+	+	+	+	+	+	+	+				-
57	0099	153	Config No. 1	+	+	+	+	+	+	+	+	+	+	+	-
58	00A8	168	Config No. 2	+	+	+	+	+	+	+	+		+	+	-
59	03E9	1001	Serial No.	+	+	+	+	+	+	+	+	+	+	+	-
60	0070	112	Customer No. 2	+	+	+	+	+	+	+	+		+	+	-
61	03F2	1010	Customer No. 1	+	+	+	+	+	+	+	+		+	+	-
62	0072	114	Meter No. input A1		+	+	+	+	+	+	+			+	-
63	0068	104	Meter No. input B1		+	+	+	+	+	+	+			+	-
64	03ED	1005	Meter type incl. SW edition		+	+	+	+	+	+	+	+	+	+	-
65	009A	154	SW check sum		+	+	+	+	+	+	+	+	+	+	-
66	009B	155	Energy high res. TEST			+	+	+	+	+	+				-
67	009D	157	Top module ID		+	+	+	+	+	+					-
68	009E	158	Base module 1 ID		+	+	+	+	+	+					-
69	00AF	175	Error hour counter	+	+	+	+		+			+		+	-
70	00EA	234	Pulse value A1/A2	+					+			+		+	-
71	00EB	235	Pulse value B1/B2	+					+			+		+	-
72			E1-E2	+											kWh
73			QSUM1	+											-
74			QSUM2	+											-
75			Pre. counter 1	+											-
76			Pre. counter 2	+											-
77			E cold	+											kWh
78			M3TF	+											-
79			M3TR	+											-
80			Calendar	+											-
81			P power act.	+											kW
82			P power year	+											kW
83	015C	348	Date and time									+		+	
84	01D9	473	Energy E10											+	
85	01DA	474	Energy E11											+	
86	00B2	178	Differential energy dE											+	
87	00B3	179	Control energy cE											+	
88	00B4	180	Differential volume dV											+	
89	00B5	181	Control volume cV											+	
90	016C	364	Heat energy A1									+		+	
91	016D	365	Heat energy A2									+		+	
92	016A	362	Tariff TA4									+		+	
93	016B	363	Tariff limit TL4									+		+	
94	0101	257	Pulse value V1		+	+	+							+	
95	0102	258	Pulse value V2			+	+								

NAS ID	Register ID		Register name	Multical®											Unit
	Hex	Dec.		66	62	S6	602	601	601+	801	402	403	21	302	
96	0103	259	Qp V1		+	+	+								+
97	0104	260	Qp V2			+	+								
98	00E0	224	Pulse input A2												+
99	00E1	225	Pulse input B2												+
100	00E2	226	Meter No. input A2												+
101	00E3	227	Meter No. input B2												+
102	0171	369	Info bits									+			+
103	017F	383	Flow V1 max year time									+			+
104	0180	384	Flow V1 mine year time									+			+
105	0181	385	Power max year time									+			+
106	0182	386	Power min year time									+			+
107	0183	387	Flow V1 max month time									+			+
108	0184	388	Flow V1 min month time									+			+
109	0185	389	Power max month time									+			+
110	0186	390	Power min month time									+			+
111	00F1	241	Flow V1 max day										+		
112	00F2	242	Flow V1 min day										+		
113	0173	371	COP									+			+
114	018D	395	COP average period									+			+
115	0163	355	COP year									+			+
116	016F	367	COP month									+			+
117	017B	379	t1 time average day									+			+
118	017C	380	t2 time average day									+			+
119	01DD	477	t3 time average day												+
120	017D	381	t1 time average hour									+			+
121	017E	382	t2 time average hour									+			+
122	01DE	478	t3 time average hour												+
123	01F9	505	P1 average day												+
124	01FA	506	P2 average day												+
125	01FB	507	P1 average hour												+
126	01FC	508	P2 average hour												+
127	018E	398	t1 actual (1 decimal)									+			+
128	018F	399	t2 actual (1 decimal)									+			+
129	0190	400	t1-t2 diff. temp. (1 decimal)									+			+
130	0174	372	Power input B1									+			+
131	0153	339	Controlled output C1/C2									+			+
132	0154	340	Controller output D1/D2									+			+
133	010D	269	Theta HC									+		+	+
134	0159	345	Temperature offset									+			+
135	0193	403	t2 preset									+			+
136	016E	366	t5 limit									+			+
137	010C	268	QP average time									+		+	+
138	0147	327	Target date 1 year									+			+
139	0148	328	Target date 2 year									+			+
140	0149	329	Target date 1 month									+			+
141	014A	330	Target date 2 month									+			+
142	00E4	228	Config No. 3									+			+
143	0170	368	Config No. 4									+			+

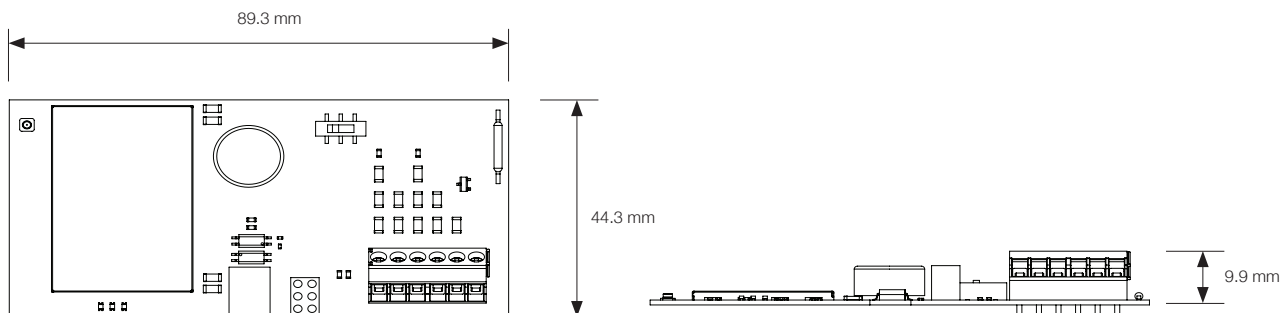
NAS ID	Register ID		Register name	Multical®											Unit	
	Hex	Dec.		66	62	S6	602	601	601+	801	402	403	21	302		603
144	00FE	254	Type No.									+	+	+	+	
145	0117	279	DIN meter ID									+		+	+	
146	015A	346	SW revision									+				+
147	00AB	171	Base module 2 ID							+						
148	00AC	172	External module ID							+						
149	00B8	184	Bus pri. adr. module 1							+	+	+		+	+	
150	00B9	185	M-Bus sec. adr. module 1							+	+	+		+	+	
151	00DA	218	Bus pri. adr. module 2							+						+
152	00DB	219	M-Bus sec. adr. module 2							+						+
153	00DC	220	Bus pri. adr. ext. module							+						
154	00DD	221	M-Bus sec. adr. ext. module							+						
155	00B6	182	M-Bus pri. adr. internal													+
156	00B7	183	M-Bus sec. adr. internal													+
157	00DE	222	Config counter		+	+	+					+		+	+	
158	00BA	186	Time stamp 1 (yy.mm)		+	+	+									
159	00BB	187	Time stamp 1 (dd.hh)		+	+	+									
160	01FE	510	Type approval rev. heat													+
161	01FF	511	Type approval rev. cooling													+
162	0200	512	Type approval rev. national													+
163	014B	331	E1 high res. auto int.									+				+
164	014C	332	E3 high res. auto int.									+				+
165	0151	337	V1 high res. auto int.													+
166	00E5	229	t1 avg. auto int.								+	+		+	+	
167	00E6	230	t2 avg. auto int.								+	+		+	+	
168	0191	401	A1 auto int.													+
169	0192	402	A2 auto int.													+
170	010A	266	E1 high res.									+		+	+	
171	010B	267	E3 high res.									+		+	+	
172	00EF	239	V1 high res.		+	+	+					+	+	+	+	
173	00F3	243	V1 reverse										+			
174	00DF	223	Volume high res. TEST								+		+			
175	0214	532	Optical eye lock									+				+
...																
255			Disable all registers	+	+	+	+	+	+	+	+	+	+	+	+	+

# TIME STEP CHART

0 - 00:00	29 - 04:50	58 - 09:40	87 - 14:30	116 - 19:20
1 - 00:10	30 - 05:00	59 - 09:50	88 - 14:40	117 - 19:30
2 - 00:20	31 - 05:10	60 - 10:00	89 - 14:50	118 - 19:40
3 - 00:30	32 - 05:20	61 - 10:10	90 - 15:00	119 - 19:50
4 - 00:40	33 - 05:30	62 - 10:20	91 - 15:10	120 - 20:00
5 - 00:50	34 - 05:40	63 - 10:30	92 - 15:20	121 - 20:10
6 - 01:00	35 - 05:50	64 - 10:40	93 - 15:30	122 - 20:20
7 - 01:10	36 - 06:00	65 - 10:50	94 - 15:40	123 - 20:30
8 - 01:20	37 - 06:10	66 - 11:00	95 - 15:50	124 - 20:40
9 - 01:30	38 - 06:20	67 - 11:10	96 - 16:00	125 - 20:50
10 - 01:40	39 - 06:30	68 - 11:20	97 - 16:10	126 - 21:00
11 - 01:50	40 - 06:40	69 - 11:30	98 - 16:20	127 - 21:10
12 - 02:00	41 - 06:50	70 - 11:40	99 - 16:30	128 - 21:20
13 - 02:10	42 - 07:00	71 - 11:50	100 - 16:40	129 - 21:30
14 - 02:20	43 - 07:10	72 - 12:00	101 - 16:50	130 - 21:40
15 - 02:30	44 - 07:20	73 - 12:10	102 - 17:00	131 - 21:50
16 - 02:40	45 - 07:30	74 - 12:20	103 - 17:10	132 - 22:00
17 - 02:50	46 - 07:40	75 - 12:30	104 - 17:20	133 - 22:10
18 - 03:00	47 - 07:50	76 - 12:40	105 - 17:30	134 - 22:20
19 - 03:10	48 - 08:00	77 - 12:50	106 - 17:40	135 - 22:30
20 - 03:20	49 - 08:10	78 - 13:00	107 - 17:50	136 - 22:40
21 - 03:30	50 - 08:20	79 - 13:10	108 - 18:00	137 - 22:50
22 - 03:40	51 - 08:30	80 - 13:20	109 - 18:10	138 - 23:00
23 - 03:50	52 - 08:40	81 - 13:30	110 - 18:20	139 - 23:10
24 - 04:00	53 - 08:50	82 - 13:40	111 - 18:30	140 - 23:20
25 - 04:10	54 - 09:00	83 - 13:50	112 - 18:40	141 - 23:30
26 - 04:20	55 - 09:10	84 - 14:00	113 - 18:50	142 - 23:40
27 - 04:30	56 - 09:20	85 - 14:10	114 - 19:00	143 - 23:50
28 - 04:40	57 - 09:30	86 - 14:20	115 - 19:10	

# DIMENSIONS / PACKAGING

## Dimensions



## Packaging

1 pcs ESD bag

# COMPATIBILITY LIST

Multical® 61, Multical® 62, Multical® 66, Multical® 601, Multical® 602, Multical® 801

# ORDERING INFORMATION

Article / SKU	Package qty	Frequency	Region
IM3060A#0001EU	1	868 MHz	EU
IM3060B#0001AU	1	922 MHz	AU
IM3060C#0001US	1	915 MHz	US
IM3060D#0001AS	1	923 MHz	AS
IM3060E#0001CN	1	780 MHz	CN
IM3060F#0001KR	1	922 MHz	KR
IM3060G#0001EU	1	433 MHz	EU
IM3060H#0001CN	1	470 MHz	CN
IM3060I#0001IN	1	866 MHz	IN

# CONTACT INFORMATION

Nordic Automation Systems AS

[www.nasys.no](http://www.nasys.no)

[info@nasys.no](mailto:info@nasys.no)

# REVISION HISTORY

- 1.0 - First version
- 1.1 - Added communication protocol.
- 1.2 - Communication protocol updated.
- 1.3 - Product name
- 1.4 - Class A compatibility
- 1.5 - Major improvements
  - Updated register map
  - Support for fw 0.7.0
    - Device clock in boot message
    - Time settings
    - Time offset
    - All register values in IEEE754 float
    - Battery value position reserved in status message
- 1.6 - Fixed reporting configuration packet
- 1.7 - Corrected compatibility list

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