Nordic Automation Systems

# LoRaWAN®
# ACM
# CM3010

## ELSTER/HONEYWELL


LoRaWAN® Absolute Encoder Communication Module (ACM) enables the acquisition of gas consumption data from Elster/ Honeywell Absolute Encoder AE2 and AE3 gas meters and transmits it wirelessly to the available LoRaWAN® network.

LoRaWAN® ACM is meant to be attached to the existing gas meter.

# OVERVIEW

### Efficient

LoRaWAN® ACM has bidirectional, battery powered, long range transceiver with low power consumption.

### Intelligent

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

# APPLICATIONS

### Gas metering

Frequent reporting provides a detailed usage overview.

# FEATURES

- Long range wireless data transmission
- Absolute Encoder AE2 and AE3 reading
- Pre-installed long-life battery
- Gas metering
- Configurable reporting interval
- Maintenance free - install & forget
- Easy installation
- Average life 10 years*
- Secure communication

* Lifetime depends from the device location and reporting interval.

# SPECIFICATIONS

| | |
|---|---|
| Width: | 47.0 mm |
| Height: | 102.0 mm |
| Length: | 123.0 mm |
| Weight: | 200g |
| Operating temperature: | -20°C ... +65°C |
| Communication range: | up to 15km* |
| Tx power: | up to +20dBm |
| Rx Senitivity: | -140dBm |
| MAC Layer: | LoRaWAN® |
| Physical Layer: | LoRa® |
| Body material: | PC |
| IP Rating: | 54 |
| Communication: | LoRaWAN® |

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

# COMMUNICATION

| | |
|---|---|
| Bit order: | LSB |
| Usage reporting: | Unconfirmed messages |
| Status reporting: | Confirmed messages |

# PORT LIST

| fPort | Usage | Format | Uplink | Unit | Comment |
|---|---|---|---|---|---|
| 16 | Gas usage | uint32_t | yes | liters | Cumulative |
| 24 | Status | | yes | - | Defined below |
| 50 | Configuration | | no | - | Defined below |
| 99 | Boot/Debug | | yes | - | Defined below |

# fPort16 gas usage

| Byte 0 | Byte 1 | Byte 2 | Byte 3 |
|---|---|---|---|
| Liters (uint32) | | | |

## Message sample

Message in base64

```
TikAAA==
```

Message decoded to hex

```
4E290000
```

HEX message flip for MSB

```
0000294E
```

HEX message converted to decimal

```
10574 (liters)
```

# fPort 24 Status Message

| Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 | Byte 6 | Byte 7 |
|---|---|---|---|---|---|---|
| Usage counter (uint32) | | | | Battery Offset (Int8) | Temperature °C (int8) | Sensor RSSI dBm (int8) |

## Message sample

Message in base64

```
EQAAAE4kqgYE
```

Message decoded to hex

```
110000004E24AA0604
```

Usage counter `11000000` HEX message flip for MSB

```
00000011
```

HEX message converted to decimal

```
17 (liters)
```

Battery HEX message

```
4E
```

HEX message converted to decimal

```
78
```

Offset value converted to volts

```
2.974V (see volts conversion map)
```

Temperature HEX message

```
24
```

HEX message converted to decimal

```
36°C
```

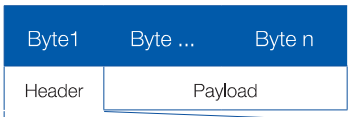
Sensor RSSI HEX message

```
AA
```

HEX message converted to signed decimal

```
-42 dBm
```

# fPort 50 Configuration Message




| Value | Bit # | Parameter | Payload size | Type | Value | Unit | Comment |
|---|---|---|---|---|---|---|---|
| 0: not sent<br>1: sent | 0 | Reporting interval | 32bit | uint | 3600 | seconds | 0 = disabled |
| | 1 | Reporting interval | 32bit | uint | 1000 | liters | 0 = disabled |
| | 2 | Status interval | 32bit | uint | 86400 | seconds | 0 = default |
| | 3 | RFU | | | | | |
| | 4 | RFU | | | | | |
| | 5 | RFU | | | | | |
| | 6 | RFU | | | | | |
| | 7 | RFU | | | | | |

## Message sample

Message goal: Configure reporting interval to 600 sec & reporting interval to 400 liters

Header

Function selection

```
1 : Reporting interval (seconds) - set
1 : Reporting interval (units) - set
0 : Status interval - not set
0 : Counter - not set
0 : Temperature threshold - not set
0 : RFU
0 : RFU
0 : Functions - not set
```

Selection converted to binary

```
00000011
```

Selection converted to HEX

```
03
```

Reporting interval (seconds)

Converting interval `600` to HEX

```
258
```

Flip interval for LSB

```
58020000
```

Reporting interval (units)

Converting interval `400` to HEX

```
190
```

Flip interval for LSB

```
90010000
```

Compile message for sending (HEX)

```
03|58020000|90010000
```

Control value in base64 to control after sending

```
A1gCAACQAQAA
```

# 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 99 Boot/Debug Message

| Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 | Byte 6 | Byte 7 | Byte 8 | Byte 9 | Byte 10 | Byte 11 | Byte 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Header (HEX) | Payload | | | | | | | | | | |
| 0x00 Boot | Serial (HEX) | | | | Firmware (HEX) | | | Elster meter ID (uint32) | | | |
| 0x01 Shutdown | | | | | | | | | | | |

## Message sample

Message in base64

```
ADoAAksAApiXyL8B
```

Message decoded to hex

```
003A00024B000298 97C8BF01
```

Header HEX message

```
00
```

HEX translated to type

```
Boot
```

Serial HEX message

```
3A00024B
```

Flip HEX message for MSB

```
4B02003A
```

Firmware version

Major version in HEX

```
00
```

HEX value converted to decimal

```
0
```

Minor version in HEX

```
02
```

HEX value converted to decimal

```
2
```

Patch version in HEX

```
98
```

HEX value converted to decimal

```
152
```

Elster meter ID HEX message

```
97C8BF01
```

Flip HEX message for MSB

```
01BFC897
```

Convert HEX message to decimal

```
29345943
```

# BATTERY OFFSET CHART

255 - Not measured

254 - 4
253 - 3,95
252 - 3,9
251 - 3,85
250 - 3,8
249 - 3,75
248 - 3,7
247 - 3,65
246 - 3,646
245 - 3,642
244 - 3,638
243 - 3,634
242 - 3,63
241 - 3,626
240 - 3,622
239 - 3,618
238 - 3,614
237 - 3,61
236 - 3,606
235 - 3,602
236 - 3,606
235 - 3,602
234 - 3,598
233 - 3,594
232 - 3,59
231 - 3,586
230 - 3,582
229 - 3,578
228 - 3,574
227 - 3,57
226 - 3,566
225 - 3,562
224 - 3,558
223 - 3,554
222 - 3,55

221 - 3,546
220 - 3,542
219 - 3,538
218 - 3,534
217 - 3,53
216 - 3,526
215 - 3,522
214 - 3,518
213 - 3,514
212 - 3,51
211 - 3,506
210 - 3,502

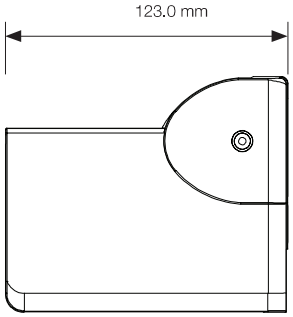
209 - 3,498
208 - 3,494
207 - 3,49
206 - 3,486
205 - 3,482
204 - 3,478
203 - 3,474
202 - 3,47
201 - 3,466
200 - 3,462
199 - 3,458
198 - 3,454
197 - 3,45
196 - 3,446
195 - 3,442
194 - 3,438
193 - 3,434
192 - 3,43
191 - 3,426
190 - 3,422
189 - 3,418
188 - 3,414
187 - 3,41
186 - 3,406
185 - 3,402
184 - 3,398
183 - 3,394
182 - 3,39
181 - 3,386
180 - 3,382
179 - 3,378
178 - 3,374
177 - 3,37
176 - 3,366
175 - 3,362
174 - 3,358
173 - 3,354
172 - 3,35
171 - 3,346
170 - 3,342
169 - 3,338
168 - 3,334
167 - 3,33
166 - 3,326
165 - 3,322
164 - 3,318
163 - 3,314
162 - 3,31
161 - 3,306

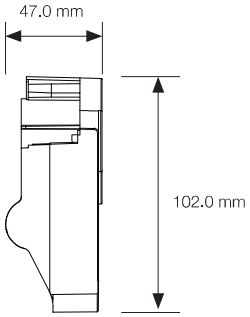
160 - 3,302
159 - 3,298
158 - 3,294
157 - 3,29
156 - 3,286
155 - 3,282
154 - 3,278
153 - 3,274
152 - 3,27
151 - 3,266
150 - 3,262
149 - 3,258
148 - 3,254
147 - 3,25
146 - 3,246
145 - 3,242
144 - 3,238
143 - 3,234
142 - 3,23
141 - 3,226
140 - 3,222
139 - 3,218
138 - 3,214
137 - 3,21
136 - 3,206
135 - 3,202
134 - 3,198
133 - 3,194
132 - 3,19
131 - 3,186
130 - 3,182
129 - 3,178
128 - 3,174
127 - 3,17
126 - 3,166
125 - 3,162
124 - 3,158
123 - 3,154
122 - 3,15
121 - 3,146
120 - 3,142
119 - 3,138
118 - 3,134
117 - 3,13
116 - 3,126
115 - 3,122
114 - 3,118
113 - 3,114
112 - 3,11
111 - 3,106
110 - 3,102
109 - 3,098
108 - 3,094
107 - 3,09
106 - 3,086
105 - 3,082
104 - 3,078
103 - 3,074
102 - 3,07
101 - 3,066
100 - 3,062
99 - 3,058
98 - 3,054
97 - 3,05
96 - 3,046
95 - 3,042
94 - 3,038
93 - 3,034
92 - 3,03
91 - 3,026
90 - 3,022
89 - 3,018
88 - 3,014
87 - 3,01
86 - 3,006
85 - 3,002
84 - 2,998
83 - 2,994
82 - 2,99
81 - 2,986
80 - 2,982
79 - 2,978
78 - 2,974
77 - 2,97
76 - 2,966
75 - 2,962
74 - 2,958
73 - 2,954
72 - 2,95
71 - 2,946
70 - 2,942
69 - 2,938
68 - 2,934
67 - 2,93
66 - 2,926
65 - 2,922
64 - 2,918
63 - 2,914
62 - 2,91
61 - 2,906
60 - 2,902
59 - 2,898
58 - 2,894
57 - 2,89
56 - 2,886
55 - 2,882
54 - 2,878
53 - 2,874
52 - 2,87
51 - 2,866
50 - 2,862
49 - 2,858
48 - 2,854
47 - 2,85
46 - 2,846
45 - 2,842
44 - 2,838
43 - 2,834
42 - 2,83
41 - 2,826
40 - 2,822
39 - 2,818
38 - 2,814
37 - 2,81
36 - 2,806
35 - 2,802
34 - 2,798
33 - 2,794
32 - 2,79
31 - 2,786
30 - 2,782
29 - 2,778
28 - 2,774
27 - 2,77
26 - 2,766
25 - 2,762
24 - 2,758
23 - 2,754
22 - 2,75
21 - 2,746
20 - 2,742
19 - 2,738
18 - 2,734
17 - 2,684
16 - 2,634
15 - 2,584
14 - 2,534
13 - 2,484
12 - 2,434
11 - 2,384
10 - 2,334
9 - 2,284
8 - 2,234
7 - 2,184
6 - 2,134
5 - 2,084
4 - 2,034
3 - 1,984
2 - 1,934
1 - 1,884

0 - N/A

# DIMENSIONS / PACKAGING

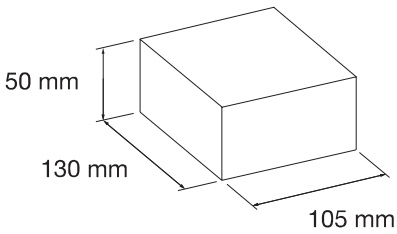
## Dimensions




## Packaging

1 pcs box




# COMPATIBILITY

### Supported protocols

AE02:04.01:01.01 (M-BUS Standard (EN 13757))

AE02:02.01:01.01 (M-BUS OMS)

AE03:05.01:01.01 (“MP” (M-BUS/SCR+ OBIS OMS))

AE03:04.01:01.01 (M-BUS - GWF)

# ORDERING INFORMATION

| Article / SKU | Package qty | Frequency | Region |
|---|---|---|---|
| CM3010A#0001EU | 1 | 868 MHz | EU |
| CM3010B#0001AU | 1 | 922 MHz | AU |
| CM3010C#0001US | 1 | 915 MHz | US |
| CM3010D#0001AS | 1 | 923 MHz | AS |
| CM3010E#0001CN | 1 | 780 MHz | CN |
| CM3010F#0001KR | 1 | 922 MHz | KR |
| CM3010G#0001EU | 1 | 433 MHz | EU |
| CM3010H#0001CN | 1 | 470 MHz | CN |
| CM3010I#0001IN | 1 | 866 MHz | IN |

# CONTACT INFORMATION

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# REVISION HISTORY

1.0 - First version

1.1 - Added ordering details.

1.2 - Communication protocol & battery info added

1.3 - Consumption field size corrected. Compatibility added.