



DAE Instrument Corp.

Polaris Energy Meter

Modbus Reference

Revision 2.0e

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General Information

The Polaris communicates using the Modbus/RTU protocol over the RS485 interface. The default baud rate is 9600 and can be changed through Modbus. The data format is 8 bits, no parity, 1 stop bit. The device address can be from 1~254 and can be seen during the startup process after a power on reset. The power up sequence shows the following information:

| # | Display Shows | Example | Description | Range |
|---|---------------|-----------|--------------------------------------|--|
| 1 | A1 - xxx | A1 - 0 | Device Address | 1~254 |
| 2 | B1 - xx | B1 - 96 | Baud rate | 12 => 1200 24 => 2400 48 => 4800 96 => 9600 |
| 3 | A2 - xxx | A2 - 0 | Card reader address | 0~254 |
| 4 | B2 - 12 | B2 - 12 | Card reader baud rate, fixed at 1200 | 12 => 1200 |
| 5 | A3 - xxx | A3 - 0 | group address | 0 -> no grouping 1~255 -> groups |
| 6 | r - - xxx | r - - r13 | Firmware revision number | varies |

All numerical data in this manual is in integer form.

All numerical values are in decimal unless otherwise specified or appended with an 'h', in which case the data is in hexadecimal.

When a command is in error, the Polaris will not respond and simply allow the host PC doing the reading to time out. The Polaris should have a maximum latency of 300 milliseconds, this is the guaranteed time in which the Polaris should respond, if this time is exceeded, the host PC should issue a time out.

A command is in error in any of these conditions:

1. The function code is not supported.
2. The data is malformed or out of range.
3. The CRC is wrong.

“div” refers to the integer division operator.

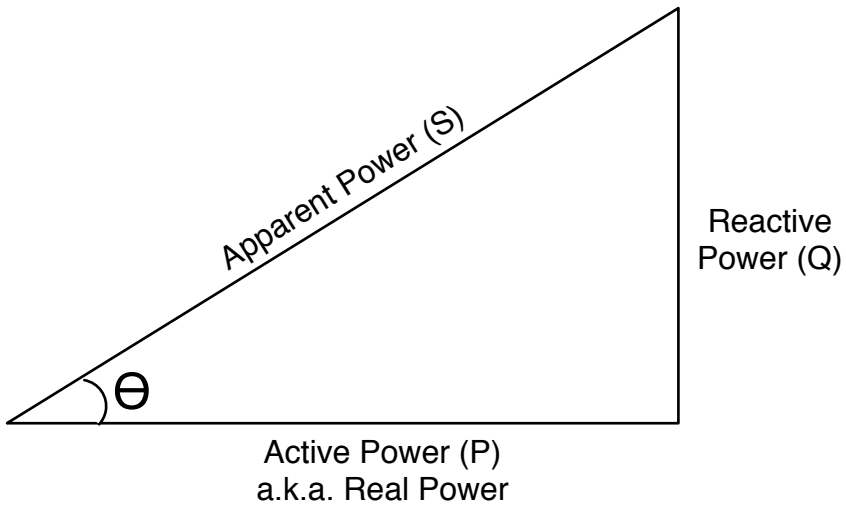
“mod” refers to the modulus operator.

Register Table

Use function code 3 to read, and function code 16 to write.

| Register Address | Size | Description | Read/Write | Range | Unit |
|------------------|---------|---------------------------------------|------------|--|-------------------|
| 5 | 1 word | Address (high: group, low: device) | Read/Write | group: 0~254 device: 1~254 | 1 |
| 6 | 2 words | Water Meter Pulse Count | Read/Write | 0~9,999,999 | 1 pulse |
| 7 | | | | | |
| 127 | 1 word | baud rate | Read/Write | 0 => 9600 1 => 4800 2 => 2400 3 => 1200 | index => bauds |
| 256 | 2 words | Phase A Voltage (VA) | Read Only | 0~9,999 | 0.1 V |
| 257 | | | | | |
| 258 | 2 words | Phase B Voltage (VB) | Read Only | 0~9,999 | 0.1 V |
| 259 | | | | | |
| 260 | 2 words | Phase C Voltage (VC) | Read Only | 0~9,999 | 0.1 V |
| 260 | | | | | |
| 262 | 2 words | Line AB Voltage (VAB) | Read Only | 0~9,999 | 0.1 V |
| 263 | | | | | |
| 264 | 2 words | Line BC Voltage (VBC) | Read Only | 0~9,999 | 0.1 V |
| 265 | | | | | |
| 266 | 2 words | Line CA Voltage (VCA) | Read Only | 0~9,999 | 0.1 V |
| 267 | | | | | |
| 272 | 2 words | Phase A Current (IA) | Read Only | 0~2,999,999 | 0.001 A |
| 273 | | | | | |
| 274 | 2 words | Phase B Current (IB) | Read Only | 0~2,999,999 | 0.001 A |
| 275 | | | | | |
| 276 | 2 words | Phase C Current (IC) | Read Only | 0~2,999,999 | 0.001 A |
| 277 | | | | | |
| 278 | 2 words | Phase A Active Power (PA) | Read Only | 0~2,999,999 | 0.001 kW |
| 279 | | | | | |
| 280 | 2 words | Phase B Active Power (PB) | Read Only | 0~2,999,999 | 0.001 kW |
| 281 | | | | | |
| 282 | 2 words | Phase C Active Power (PC) | Read Only | 0~2,999,999 | 0.001 kW |
| 283 | | | | | |
| 284 | 2 words | Phase A Active Energy (EPA) | Read/Write | 0~9,999,999 | 0.01 kWh |
| 285 | | | | | |
| 286 | 2 words | Phase B Active Energy (EPB) | Read/Write | 0~9,999,999 | 0.01 kWh |
| 287 | | | | | |
| 288 | 2 words | Phase C Active Energy (EPC) | Read/Write | 0~9,999,999 | 0.01 kWh |
| 289 | | | | | |

| Register Address | Size | Description | Read/Write | Range | Unit |
|------------------|----------|--|------------|--------------|------------|
| 290 | 2 words | Total Active Energy (EP) | Read Only | | |
| 291 | | | | | |
| 292 | 2 words | Phase A Reactive Energy (EQA) | Read/Write | 0~9,999,999 | 0.01 kVArh |
| 293 | | | | | |
| 294 | 2 words | Phase B Reactive Energy (EQB) | Read/Write | | |
| 295 | | | | | |
| 296 | 2 words | Phase C Reactive Energy (EQC) | Read/Write | | |
| 297 | | | | | |
| 298 | 2 words | Total Reactive Energy (EQ) | Read Only | | |
| 299 | | | | | |
| 300 | 1 word | Phase A Power Factor | Read Only | 0~1000 | 0.001 |
| 301 | 1 word | Phase B Power Factor | Read Only | | |
| 302 | 1 word | Phase C Power Factor | Read Only | | |
| 303 | 2 words | Average Current | Read Only | 0~2,999,999 | 0.001 A |
| 304 | | | | | |
| 305 | 2 words | Total Active Power (P) | Read Only | 0~2,999,999 | 0.001 kW |
| 306 | | | | | |
| 307 | 2 words | Total Active Energy (EP) | Read Only | 0~9,999,999 | 0.01 kWh |
| 308 | | | | | |
| 309 | 2 words | Total Reactive Power (Q) | Read Only | 0~2,999,999 | 0.001 kVAr |
| 310 | | | | | |
| 311 | 2 words | Total Reactive Energy (EQ) | Read Only | 0~9,999,999 | 0.01 kVArh |
| 312 | | | | | |
| 313 | 2 words | Total Apparent Power (S) | Read Only | 0~2,999,999 | 0.001 kVA |
| 314 | | | | | |
| 315 | 2 words | Total Power Factor (PF) | Read Only | 0~1,000 | 0.001 |
| 316 | | | | | |
| 317 | 2 words | Peak Demand | Read/Write | 0~9,999,999 | 0.01 kWh |
| 318 | | | | | |
| 319 | 2 words | 15 Minute Rolling Demand | Read/Write | 0~9,999,999 | 0.01 kWh |
| 320 | | | | | |
| 502 | 1 word | CT Ratio | Read/Write | 1~400 | 1 |
| 64000 | 32 words | Device Information (Model Name and Firmware Version) | Read Only | ASCII string | |



$$PF = \cos \theta = \frac{P}{S}$$

Command & Data Formats

Read Device Address

This command reads the Polaris device address. Note that in order to read this data, you would need to know the address already, so it makes no sense to use this command in this manner, but there is one situation wherein it would make sense to use this command and that is through using the broadcast command.

The broadcast command will compel the Polaris to reply regardless of its existing device address. But one caveat needs to be observed when this command is used in this manner through broadcasting. There should be a one to one connection between the host PC and the Polaris, there should not be any other device on the same bus network; otherwise the other slave devices will also respond to the same broadcasted command and the replies from the various devices will collide and all the host PC will get gibberish.

Format

Input

- Polaris Address = 1~255 (255 is broadcast address)

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~255 | 3 | 0 | 5 | 0 | 1 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Data | | CRC | |
|-----------------|---------------|------------|-----------|--------|-----|------|
| | | | high | low | low | high |
| 1~255 | 3 | 2 | GRPADD | DEVADD | ZL | ZH |

Output

- DEVADD = device address = 1~254
- GRPADD = group address = 1~254 or 0 (no group), reserved for future use

Example

Input

- Polaris Address = 255 (broadcast)

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 255 | 3 | 0 | 5 | 0 | 1 | 129 | 213 |

Reply

| Polaris Address | Function Code | Byte Count | Read Data | | CRC | |
|-----------------|---------------|------------|-----------|--------|-----|------|
| | | | GRPADD | DEVADD | low | high |
| 255 | 3 | 2 | 0 | 46 | 17 | 140 |

Output

- Device Address (DEVADD) = 46

Write Device Address

Format

Input

- Existing Polaris Address = 1~254
- Polaris New Device Address (NDA) = 1~254

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Data | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|------------|-----|-----|------|
| | | high | low | high | low | | high | low | low | high |
| 1~254 | 16 | 0 | 5 | 0 | 1 | 2 | 0 | NDA | ZL | ZH |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 16 | 0 | 5 | 0 | 1 | ZL | ZH |

Example

Input

- Existing Polaris Address = 1
- Polaris New Device Address (NDA) = 58
- Group Address = 0 (unused, set to zero for future compatibility)

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Data | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|------------|-----|-----|------|
| | | high | low | high | low | | high | NDA | low | high |
| 1 | 16 | 0 | 5 | 0 | 1 | 2 | 0 | 58 | 38 | 22 |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 16 | 0 | 5 | 0 | 1 | 17 | 200 |

Read Water Meter Pulse Count

Format

Input

- Polaris Address = 1~254

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | 6 | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|-----|-------------|-----|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | PC1 | PC2 | PC3 | PC4 | ZL | ZH |

Output

- Pulse Count = (PC3 x 16,777,216 + PC4 x 65,536 + PC1 x 256 + PC2) x 1 pulse

Example

Input

- Polaris Address = 1

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 3 | 0 | 6 | 0 | 2 | 36 | 10 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|-----|-------------|-----|-----|------|
| | | | PC1 | PC2 | PC3 | PC4 | low | high |
| 1 | 3 | 4 | 214 | 135 | 0 | 18 | 242 | 95 |

Output

- Pulse Count = (0 x 16,777,216 + 18 x 65,536 + 214 x 256 + 135) x 1 pulse = 1,234,567 pulses

Write Water Meter Pulse Count

Writing to this register only writes to the pulse count accumulator in the Polaris, it doesn't actually write out to the water meter itself. The water meter that is connected to the Polaris can only have its pulses read. The main purpose of this command is to synchronize the pulse count accumulator value on the Polaris with the pulse counts of the water meter.

Note that this is not the value shown on the water meter, the pulse count is a raw value and does not have the same unit as that displayed on the water meter register. The displayed unit needs to be scaled to the pulse count before being written to this register.

Format

Input

- Polaris Address = 1~254
- Pulse Counts (PC) = 1,234,567
 - PC1 = (PC mod 65,536) div 256
 - PC2 = PC mod 256 = 135
 - PC3 = PC div 16,777,216
 - PC4 = (PC mod 16,777,216) div 65,536

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Word 1 | | Write Word 2 | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|--------------|-----|--------------|-----|-----|------|
| | | high | low | high | low | | high | low | high | low | low | high |
| 1~254 | 16 | 0 | 6 | 0 | 2 | 4 | PC1 | PC2 | PC3 | PC4 | ZL | ZH |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 16 | 0 | 6 | 0 | 2 | ZL | ZH |

Output

- none

Example

Input

- Polaris Address = 1
- Pulse Counts = 1,234,567
 - PC1 = (1,234,567 mod 65,536) div 256 = 214
 - PC2 = 1,234,567 mod 256 = 135
 - PC3 = 1,234,567 div 16,777,216 = 0
 - PC4 = (1,234,567 mod 16,777,216) div 65,536 = 18

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Word 1 | | Write Word 2 | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|--------------|-----|--------------|-----|-----|------|
| | | high | low | high | low | | PC1 | PC2 | PC3 | PC4 | low | high |
| 1 | 16 | 0 | 6 | 0 | 2 | 4 | 214 | 135 | 0 | 18 | 123 | 233 |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 16 | 0 | 6 | 0 | 2 | 161 | 201 |

Read Baud Rate

This command reads the baud rate setting of the Polaris. Obviously, to read this value, you should already know the correct baud rate in order to communicate in the first place.

Format

Input

- Polaris Address = 1~254

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | 127 | 0 | 1 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Data | | CRC | |
|-----------------|---------------|------------|-----------|-----|-----|------|
| | | | high | low | low | high |
| 1~254 | 3 | 2 | 0 | BR | ZL | ZH |

Output

- Baud Rate = BR {0 => 9600, 1 => 4800, 2 => 2400, 3 => 1200}

Example

Input

- Polaris Address = 1

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 3 | 0 | 127 | 0 | 1 | 181 | 210 |

Reply

| Polaris Address | Function Code | Byte Count | Read Data | | CRC | |
|-----------------|---------------|------------|-----------|----|-----|------|
| | | | high | BR | low | high |
| 1 | 3 | 2 | 0 | 2 | 57 | 133 |

Output

- Baud Rate = BR {2 => 2400} = 2400 bauds

Write Baud Rate

This command overwrites the existing baud rate setting of the Polaris. When issuing this command, the original baud rate setting is lost. Therefore, the next time that you issue commands to the same Polaris, make sure to use the new baud rate, it will no longer respond to the old baud rate, unless of course the new baud rate is the same as the old.

Format

Input

- Polaris Address = 1~254
- Baud Rate = 9600 / 4800 / 2400 / 1200
- BR = Baud Rate {9600 => 0, 4800 => 1, 2400 => 2, 1200 => 3}

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Data | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|------------|-----|-----|------|
| | | high | low | high | low | | high | low | low | high |
| 1~254 | 16 | 0 | 127 | 0 | 1 | 2 | 0 | BR | ZL | ZH |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 16 | 0 | 127 | 0 | 1 | ZL | ZH |

Output

- none

Example

Input

- Polaris Address = 1
- Baud Rate = 4800
- BR = Baud Rate {4800 => 1} = 1

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Data | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|------------|----|-----|------|
| | | high | low | high | low | | high | BR | low | high |
| 1 | 16 | 0 | 127 | 0 | 1 | 2 | 0 | 1 | 108 | 95 |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 16 | 0 | 127 | 0 | 1 | 48 | 17 |

Read Phase Voltage

Format

Input

- Polaris Address = 1~254
- Voltage Phase Select = A/B/C

| Phase Voltage Select | PVS |
|----------------------|-----|
| A | 256 |
| B | 258 |
| C | 260 |

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | PVS | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | VOL1 | VOL2 | VOL3 | VOL4 | ZL | ZH |

Output

- Phase Voltage = (VOL3 x 16,777,216 + VOL4 x 65,536 + VOL1 x 256 + VOL2) x 0.1 V

Example

Input

- Polaris Address = 1
- Voltage Phase B -> PVS = 258

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | PVS | high | low | low | high |
| 1 | 3 | 0 | 258 | 0 | 2 | 100 | 91 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | VOL1 | VOL2 | VOL3 | VOL4 | low | high |
| 1 | 3 | 4 | 4 | 152 | 0 | 0 | 122 | 236 |

Output

- Phase B Voltage = (0 x 16,777,216 + 0 x 65,536 + 4 x 256 + 152) x 0.1 V = 117.6 V

Read Line Voltage

Format

Input

- Polaris Address = 1~254
- Voltage Line Select = AB/BC/CA

| Line Voltage Select | LVS |
|---------------------|-----|
| AB | 262 |
| BC | 264 |
| CA | 266 |

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | LVS | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | VOL1 | VOL2 | VOL3 | VOL4 | ZL | ZH |

Output

- Line Voltage = $(VOL3 \times 16,777,216 + VOL4 \times 65,536 + VOL1 \times 256 + VOL2) \times 0.1 \text{ V}$

Example

Input

- Polaris Address = 1
- Voltage Line CA -> VLS = 266

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | LVS | high | low | low | high |
| 1 | 3 | 0 | 266 | 0 | 2 | 229 | 153 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | VOL1 | VOL2 | VOL3 | VOL4 | low | high |
| 1 | 3 | 4 | 11 | 121 | 0 | 0 | 41 | 206 |

Output

- Line CA Voltage = $(0 \times 16,777,216 + 0 \times 65,536 + 11 \times 256 + 121) \times 0.1 \text{ V} = 293.7\text{V}$

Read Current

Format

Input

- Polaris Address = 1~254
- Current Select = A/B/C

| Current Select | CS |
|----------------|-----|
| A | 272 |
| B | 274 |
| C | 276 |

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | CS | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | CUR1 | CUR2 | CUR3 | CUR4 | ZL | ZH |

Output

- Current = (CUR3 x 16,777,216 + CUR4 x 65,536 + CUR1 x 256 + CUR2) x 0.001 A

Example

Input

- Polaris Address = 1
- Current B -> CS = 274

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|----------|-----------------|-----|-----|------|
| | | high | low (CS) | high | low | low | high |
| 1 | 3 | 0 | 274 | 0 | 2 | 101 | 158 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | CUR1 | CUR2 | CUR3 | CUR4 | low | high |
| 1 | 3 | 4 | 178 | 224 | 0 | 0 | 220 | 189 |

Output

- Current B = (0 x 16,777,216 + 0 x 65,536 + 178 x 256 + 224) x 0.001 A = 45.792 A

Read Active Power

Format

Input

- Polaris Address = 1~254
- Active Power Select = A/B/C/Total

| Active Power Select | APS |
|---------------------|-----|
| A | 278 |
| B | 280 |
| C | 282 |
| Total | 305 |

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | APS | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | POW1 | POW2 | POW3 | POW4 | ZL | ZH |

Output

- Active Power = (POW3 x 16,777,216 + POW4 x 65,536 + POW1 x 256 + POW2) x 0.001 kW

Example

Input

- Polaris Address = 1
- Active Power Total -> APS = 305

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | APS | high | low | low | high |
| 1 | 3 | 0 | 305 | 0 | 2 | 148 | 84 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | POW1 | POW2 | POW3 | POW4 | low | high |
| 1 | 3 | 4 | 63 | 123 | 0 | 4 | 135 | 253 |

Output

- Total Active Power = (0 x 16,777,216 + 4 x 65,536 + 63 x 256 + 123) x 0.001 kW = 278.395 kW

Read Active Energy

Format

Input

- Polaris Address = 1~254
- Active Energy Select = A/B/C/Total

| Active Energy Select | AES |
|----------------------|------------|
| A | 284 |
| B | 286 |
| C | 288 |
| Total | 290 or 307 |

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | AES | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | ENG1 | ENG2 | ENG3 | ENG4 | ZL | ZH |

Output

- Active Energy = (ENG3 x 16,777,216 + ENG4 x 65,536 + ENG1 x 256 + ENG2) x 0.01 kWh

Example

Input

- Polaris Address = 1
- Total Active Energy -> AES = 290

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | AES | high | low | low | high |
| 1 | 3 | 0 | 290 | 0 | 2 | 101 | 145 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | ENG1 | ENG2 | ENG3 | ENG4 | low | high |
| 1 | 3 | 4 | 120 | 216 | 0 | 107 | 35 | 71 |

Output

- Total Active Energy = (0 x 16,777,216 + 107 x 65,536 + 120 x 256 + 216) x 0.01 kWh = 70,432.88 kWh

Write Active Energy

Only the per phase active energy can be written to, the total active energy cannot be written to directly. To clear the total to zero, each per phase active energy register must be cleared to zero. Writing any other value to the per phase active energy will also affect the total, as the total will always reflect the total of all three per phase active energy. The value will be modulo 100,000 if the total exceeds 99,999.99.

Format

Input

- Polaris Address = 1~254
- Active Energy (EP) = 0.00~99,999.99 kWh
 - EP3 = (EP / 0.01 kWh) div 16,777,216
 - EP4 = ((EP / 0.01 kWh) mod 16,777,216) div 65,536
 - EP1 = ((EP / 0.01 kWh) mod 65,536) div 256
 - EP2 = (EP / 0.01 kWh) mod 256
- Active Energy Select = A/B/C

| Active Energy Select | AES |
|----------------------|-----|
| A | 284 |
| B | 286 |
| C | 288 |

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Word 1 | | Write Word 2 | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|--------------|------|--------------|------|-----|------|
| | | high | low | high | low | | high | low | high | low | low | high |
| 1~254 | 16 | 0 | AES | 0 | 2 | 4 | ENG1 | ENG2 | ENG3 | ENG4 | ZL | ZH |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 16 | 0 | AES | 0 | 2 | ZL | ZH |

Output

- none

Example

Input

- Polaris Address = 1
- Active Energy = 37196.23 kWh
 - ENG3 = (37196.23 kWh / 0.01 kWh) div 16,777,216 = 0
 - ENG4 = ((37196.23 kWh / 0.01 kWh) mod 16,777,216) div 65,536 = 56
 - ENG1 = ((37196.23 kWh / 0.01 kWh) mod 65,536) div 256 = 193
 - ENG2 = (37196.23 kWh / 0.01 kWh) mod 256 = 199
- Active Energy C => AES = 288

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Word 1 | | Write Word 2 | | CRC | |
|-----------------|---------------|------------------|-----------|---------------------|-----|------------|--------------|------|--------------|------|-----|------|
| | | high | low (AES) | high | low | | ENG1 | ENG2 | ENG3 | ENG4 | low | high |
| 1 | 16 | 0 | 288 | 0 | 2 | 4 | 193 | 199 | 0 | 56 | 108 | 164 |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 16 | 0 | 288 | 0 | 2 | 65 | 146 |

Output

- none

Read Reactive Energy

Format

Input

- Polaris Address = 1~254
- Reactive Energy Select = A/B/C/Total

| Reactive Energy Select | RES |
|------------------------|------------|
| A | 292 |
| B | 294 |
| C | 296 |
| Total | 298 or 311 |

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | RES | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | ENG1 | ENG2 | ENG3 | ENG4 | ZL | ZH |

Output

- Reactive Energy = (ENG3 x 16,777,216 + ENG4 x 65,536 + ENG1 x 256 + ENG2) x 0.01 kVArh

Example

Input

- Polaris Address = 1
- Phase B Reactive Energy -> RES = 294

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----------|-----------------|-----|-----|------|
| | | high | low (AES) | high | low | low | high |
| 1 | 3 | 0 | 294 | 0 | 2 | 36 | 80 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | ENG1 | ENG2 | ENG3 | ENG4 | low | high |
| 1 | 3 | 4 | 120 | 216 | 0 | 107 | 35 | 71 |

Output

- Phase B Reactive Energy = (0 x 16,777,216 + 107 x 65,536 + 120 x 256 + 216) x 0.01 kVArh = 70,432.88 kVArh

Write Reactive Energy

Only the per phase reactive energy can be written to, the total reactive energy cannot be written to directly. To clear the total to zero, each per phase reactive energy register must be cleared to zero. Writing any other value to the per phase reactive energy will also affect the total, as the total will always reflect the total of all three per phase reactive energy. The value will be modulo 100,000 if the total exceeds 99,999.99.

Format

Input

- Polaris Address = 1~254
- Reactive Energy (EQ) = 0.00~99,999.99 kVArh
 - $ENG3 = (ENG / 0.01 \text{ kWh}) \text{ div } 16,777,216$
 - $ENG4 = ((ENG / 0.01 \text{ kWh}) \text{ mod } 16,777,216) \text{ div } 65,536$
 - $ENG1 = ((ENG / 0.01 \text{ kWh}) \text{ mod } 65,536) \text{ div } 256$
 - $ENG2 = (ENG / 0.01 \text{ kWh}) \text{ mod } 256$
- Reactive Energy Select = A/B/C

| Reactive Energy Select | RES |
|------------------------|-----|
| A | 292 |
| B | 294 |
| C | 296 |

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Word 1 | | Write Word 2 | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|--------------|------|--------------|------|-----|------|
| | | high | low | high | low | | high | low | high | low | low | high |
| 1~254 | 16 | 0 | RES | 0 | 2 | 4 | ENG1 | ENG2 | ENG3 | ENG4 | ZL | ZH |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 16 | 0 | RES | 0 | 2 | ZL | ZH |

Example

Input

- Polaris Address = 1
- Reactive Energy = 37196.23 kVArh
 - $ENG3 = (37196.23 \text{ kWh} / 0.01 \text{ kWh}) \text{ div } 16,777,216 = 0$
 - $ENG4 = ((37196.23 \text{ kWh} / 0.01 \text{ kWh}) \text{ mod } 16,777,216) \text{ div } 65,536 = 56$
 - $ENG1 = ((37196.23 \text{ kWh} / 0.01 \text{ kWh}) \text{ mod } 65,536) \text{ div } 256 = 193$
 - $ENG2 = (37196.23 \text{ kWh} / 0.01 \text{ kWh}) \text{ mod } 256 = 199$
- Reactive Energy B => AES = 294

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Word 1 | | Write Word 2 | | CRC | |
|-----------------|---------------|------------------|-----------|---------------------|-----|------------|--------------|------|--------------|------|-----|------|
| | | high | low (AES) | high | low | | ENG1 | ENG2 | ENG3 | ENG4 | low | high |
| 1 | 16 | 0 | 294 | 0 | 2 | 4 | 193 | 199 | 0 | 56 | 236 | 142 |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 16 | 0 | 294 | 0 | 2 | 161 | 147 |

Read Power Factor Per Phase

This command only reads the power factor per phase, a separate command is provided to read the total power factor. Note that they do not share the same command because the register for each per phase power factor only occupies one word, whereas the total power factor occupies two words.

Format

Input

- Polaris Address = 1~254
- Power Factor Select = A/B/C

| Power Factor Select | PFS |
|---------------------|-----|
| A | 300 |
| B | 301 |
| C | 302 |

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | PFS | 0 | 1 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | CRC | |
|-----------------|---------------|------------|-------------|-----|-----|------|
| | | | high | low | low | high |
| 1~254 | 3 | 2 | PF1 | PF2 | ZL | ZH |

Output

- Power Factor = (PF1 x 256 + PF2) x 0.001

Example

Input

- Polaris Address = 1
- Power Factor A -> PFS = 300

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | PFS | high | low | low | high |
| 1 | 3 | 0 | 300 | 0 | 1 | 68 | 83 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | CRC | |
|-----------------|---------------|------------|-------------|-----|-----|------|
| | | | PF1 | PF2 | low | high |
| 1 | 3 | 2 | 3 | 102 | 56 | 158 |

Output

- Power Factor A = (3 x 256 + 102) x 0.001 = 0.870

Read Total Reactive Power

Format

Input

- Polaris Address = 1~254

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | 309 | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | POW1 | POW2 | POW3 | POW4 | ZL | ZH |

Output

- Total Reactive Power = (POW3 x 16,777,216 + POW4 x 65,536 + POW1 x 256 + POW2) x 0.001 kVAr

Example

Input

- Polaris Address = 1

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 3 | 0 | 309 | 0 | 2 | 213 | 149 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | POW1 | POW2 | POW3 | POW4 | low | high |
| 1 | 3 | 4 | 63 | 123 | 0 | 4 | 135 | 253 |

Output

- Total Reactive Power = (0 x 16,777,216 + 4 x 65,536 + 63 x 256 + 123) x 0.001 kVAr = 278.395 kVAr

Read Total Apparent Power

Format

Input

- Polaris Address = 1~254

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | 313 | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | POW1 | POW2 | POW3 | POW4 | ZL | ZH |

Output

- Total Apparent Power = (POW3 x 16,777,216 + POW4 x 65,536 + POW1 x 256 + POW2) x 0.001 kVA

Example

Input

- Polaris Address = 1

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 3 | 0 | 313 | 0 | 2 | 21 | 150 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | POW1 | POW2 | POW3 | POW4 | low | high |
| 1 | 3 | 4 | 63 | 123 | 0 | 4 | 135 | 253 |

Output

- Total Apparent Power = (0 x 16,777,216 + 4 x 65,536 + 63 x 256 + 123) x 0.001 kVA = 278.395 kVA

Read Total Power Factor

Format

Input

- Polaris Address = 1~254

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 0 | 315 | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|-----|-------------|-----|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | PF1 | PF2 | PF3 | PF4 | ZL | ZH |

Output

- Total Power Factor = (PF3 x 16,777,216 + PF4 x 65,536 + PF1 x 256 + PF2) x 0.001

Example

Input

- Polaris Address = 1

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 3 | 0 | 315 | 0 | 2 | 180 | 86 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|-----|-------------|-----|-----|------|
| | | | PF1 | PF2 | PF3 | PF4 | low | high |
| 1 | 3 | 4 | 3 | 190 | 0 | 0 | 154 | 83 |

Output

- Total Power Factor = (0 x 16,777,216 + 0 x 65,536 + 3 x 256 + 190) x 0.001 = 0.958

Read Demand

Applies to both the 15 minute rolling demand and peak demand.

Format

Input

- Polaris Address = 1~254

| Demand Type | Register Address | DT1 | DT2 |
|--------------------------|------------------|-----|-----|
| Peak demand | 317 | 1 | 61 |
| 15 minute rolling demand | 319 | 1 | 63 |

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | DT1 | DT2 | 0 | 2 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | high | low | high | low | low | high |
| 1~254 | 3 | 4 | DEM1 | DEM2 | DEM3 | DEM4 | ZL | ZH |

Output

- Demand = (DEM3 x 16,777,216 + DEM4 x 65,536 + DEM1 x 256 + DEM2) x 0.01 kWh

Example

Input

- Polaris Address = 1
- Demand Type = Peak Demand
 - DT1 = 1
 - DT2 = 61

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | DT1 | DT2 | high | low | low | high |
| 1 | 3 | 1 | 61 | 0 | 2 | 84 | 59 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | Read Word 2 | | CRC | |
|-----------------|---------------|------------|-------------|------|-------------|------|-----|------|
| | | | DEM1 | DEM2 | DEM3 | DEM4 | low | high |
| 1 | 3 | 4 | 120 | 216 | 0 | 107 | 35 | 71 |

Output

- Demand = (0 x 16,777,216 + 107 x 65,536 + 120 x 256 + 216) x 0.01 kWh = 70,432.88 kWh

Write Demand

Applies to both 15 minute rolling demand and peak demand. This command is most often used to reset the peak demand by zeroing its value.

Format

Input

- Polaris Address = 1~254
- Demand Type

| Demand Type | Register Address | DT1 | DT2 |
|--------------------------|------------------|-----|-----|
| Peak demand | 317 | 1 | 61 |
| 15 minute rolling demand | 319 | 1 | 63 |

- Demand Value (DEM)
 - $DEM3 = (DEM / 0.01 \text{ kWh}) \text{ div } 16,777,216$
 - $DEM4 = ((DEM / 0.01 \text{ kWh}) \text{ mod } 16,777,216) \text{ div } 65,536$
 - $DEM1 = ((DEM / 0.01 \text{ kWh}) \text{ mod } 65,536) \text{ div } 256$
 - $DEM2 = (DEM / 0.01 \text{ kWh}) \text{ mod } 256$

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Word 1 | | Write Word 2 | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|--------------|------|--------------|------|-----|------|
| | | high | low | high | low | | high | low | high | low | low | high |
| 1~254 | 16 | DT1 | DT2 | 0 | 2 | 4 | DEM1 | DEM2 | DEM3 | DEM4 | ZL | ZH |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 16 | DT1 | DT2 | 0 | 2 | ZL | ZH |

Example

Input

- Polaris Address = 1
- Demand Type = Peak Demand
 - DT1 = 1
 - DT2 = 61
- Demand Value (DEM) = 37196.23 kWh
 - $DEM3 = (37196.23 \text{ kWh} / 0.01 \text{ kWh}) \text{ div } 16,777,216 = 0$
 - $DEM4 = ((37196.23 \text{ kWh} / 0.01 \text{ kWh}) \text{ mod } 16,777,216) \text{ div } 65,536 = 56$
 - $DEM1 = ((37196.23 \text{ kWh} / 0.01 \text{ kWh}) \text{ mod } 65,536) \text{ div } 256 = 193$
 - $DEM2 = (37196.23 \text{ kWh} / 0.01 \text{ kWh}) \text{ mod } 256 = 199$

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Word 1 | | Write Word 2 | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|--------------|------|--------------|------|-----|------|
| | | DT1 | DT2 | high | low | | DEM1 | DEM2 | DEM3 | DEM4 | low | high |
| 1 | 16 | 1 | 61 | 0 | 2 | 4 | 193 | 199 | 0 | 56 | 177 | 97 |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | DT1 | DT2 | high | low | low | high |
| 1 | 16 | 1 | 61 | 0 | 2 | 209 | 248 |

Read CT Ratio

Format

Input

- Polaris Address = 1~254

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 3 | 1 | 246 | 0 | 1 | ZL | ZH |

Reply

| Polaris Address | Function Code | Byte Count | Read Word 1 | | CRC | |
|-----------------|---------------|------------|-------------|-----|-----|------|
| | | | high | low | low | high |
| 1~254 | 3 | 2 | CT1 | CT2 | ZL | ZH |

Output

- CT Ratio = (CT1 x 256 + CT2) x 1

Example

Input

- Polaris Address = 1

Query

| Polaris Address | Function Code | Register Address | | Number of Words | | CRC | |
|-----------------|---------------|------------------|-----|-----------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 3 | 1 | 246 | 0 | 1 | 101 | 196 |

Reply

| Polaris Address | Function Code | Byte Count | Read Word | | CRC | |
|-----------------|---------------|------------|-----------|-----|-----|------|
| | | | CT1 | CT2 | low | high |
| 1 | 3 | 2 | 1 | 44 | 184 | 9 |

Output

- CT Ratio = (1 x 256 + 44) x 1 = 300

Write CT Ratio

Format

Input

- Polaris Address = 1~254

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Data | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|------------|-------|-----|------|
| | | high | low | high | low | | CT1 | CT2 | low | high |
| 1~254 | 16 | 1 | 246 | 0 | 1 | 2 | 0 | 1~400 | ZL | ZH |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1~254 | 16 | 1 | 246 | 0 | 1 | ZL | ZH |

Output

- none

Example

Input

- Polaris Address = 1
- CT Ratio = 300
 - $CT1 = 300 \div 256 = 1$
 - $CT2 = 300 \bmod 256 = 44$

Query

| Polaris Address | Function Code | Register Address | | Number of Registers | | Byte Count | Write Data | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|------------|------------|-----|-----|------|
| | | high | low | high | low | | CT1 | CT2 | low | high |
| 1 | 16 | 1 | 246 | 0 | 1 | 2 | 1 | 44 | 162 | 75 |

Reply

| Polaris Address | Function Code | Register Address | | Number of Registers | | CRC | |
|-----------------|---------------|------------------|-----|---------------------|-----|-----|------|
| | | high | low | high | low | low | high |
| 1 | 16 | 1 | 246 | 0 | 1 | 224 | 7 |

Output

- none

CRC Computation

The Polaris conforms to the Modbus/RTU protocol and thus uses CRC16 for its error checking. The computed CRC is appended to the end of the message with the LSB first and then the MSB. Below is the pseudo code for computing the CRC as used by the standard Modbus/RTU. The pseudo code is written in the Ruby language and can be directly used as such.

Definition

```
def get_crc (*byte_array)
  sum = 0xFFFF
  byte_array.each do |byte|
    sum ^= byte
    8.times do
      carry = (1 == sum & 1)
      sum = 0x7FFF & (sum >> 1)
      sum ^= 0xA001 if carry
    end
  end
  return [sum & 0xFF, sum >> 8]
end
```

Usage

```
>> crc = get_crc(1,3,0,141,0,5)
=> [21, 226]          <---- [CRC low byte, CRC high byte]
```

Additional Resources

Although every effort has been taken to ensure that this document is free from errors, some may still remain. If found please send an email to: info@daeinstrument.com, in the subject line write “Errata” and please indicate the name of this document “Polaris Modbus Reference”, revision number, page number and indicate the error with its correction. Thank you.

We have made sure that this document is as clear and useful to you as possible, but any suggestions on improving this document to serve you even better would be welcome. Send comments and suggestions to: info@daeinstrument.com, in the subject line, write “Comments” and please indicate the name of this document “Polaris Modbus Reference”. Questions are also welcome.

This document only covers the Modbus protocol registers as used by the Polaris, for hardware interfacing and other information please refer to the Polaris user’s manual.