# Series PM172 Powermeters

# PML-DTE Communications Protocol

# Reference Guide

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BG0403 Rev. A1

Every effort has been made to ensure that the material herein is complete and accurate. However, the manufacturer is not responsible for any mistakes in printing or faulty instructions contained in this book. Notification of any errors or misprints will be received with appreciation.

For further information regarding a particular installation, operation or maintenance of equipment, contact the manufacturer or your local representative or distributor.

This document is applicable to the devices PM172P/E with firmware versions 15.71.XX.

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# 1 General

This document specifies a subset of the 3710 ACM PML-DTE serial communications protocol implemented in the PM172. The document is based on the protocol documents “3710 ACM, Serial Communications Protocol, Version 2.1” and “3710 ACM, Detroit Edison Serial Communications Protocol, 28-Mar-91”.

Additional information concerning communications operation, configuring the communications parameters, and communications connections is found in "Series PM172 Powermeters, Installation and Operation Manual".

### IMPORTANT

In 3-wire connection schemes, the unbalanced (neutral) current and phase readings for power factor, active power, and reactive power will be zeros, because they have no meaning. Only the total three-phase power values will be shown.

# 2 Protocol Implementation

For detailed information about the 3710 ACM protocol, refer to the protocol document "3710 ACM, Serial Communications Protocol, Version 2.1"

The PM172 implements a subset of the 3710 ACM protocol commands indicated in Table 2-1.

**Table 2-1**

| Message Type | Command Description |
|---|---|
| 0x03 | Read Long Real-Time Packet |
| 0x04 | Read Short Real-Time Packet |
| 0x07 | Set Time |
| 0x0A | Read Setup |
| 0x0C | Read Status |
| 0x0D | Read Time |
| 0x16 | Clear kWh (clears all energies) |
| 0x1A | Control Relays |
| 0x1E | Read DTE 12-bit Real-Time Packet |
| 0x1F | Read DTE 12-bit Demand and Accumulator Packet |

### Broadcast Packets

The broadcast packets are supported for the 0x07 "Set time" request only.

### Response Time

The PM172 response time to the master requests is indicated in Table 2-2.

**Table 2-2**

| Baud Rate, bps | Response Time, ms | | |
|---|---|---|---|
| | Min | Max | Typical |
| **9600** | **13** | **15** | **13** |
| **19200** | **11** | **12** | **11** |
| **57600** | **9** | **10** | **9** |
| **115200** | **9** | **10** | **9** |

### DTE 12-bit Scaled Data

In the DTE 12-bit data packets 0x1E and 0x1F, analog data is scaled to the range of -2047 to 2047 for bi-directional parameters (such as active and reactive powers and power factor), and to the range of 0 to 2047 for single-ended positive parameters (voltage, current, frequency, etc.). To get a true reading, a reverse conversion should be done using the following formula:

$$Y = ((X - 12\_LO) \times (HI - LO))/(12\_HI - 12\_LO) + LO$$

where:

- Y - True reading in engineering units
- X - Raw input data in the range of 12_LO – 12_HI
- LO, HI - Data low and high scales in either secondary, or primary engineering units (see Section 4 for data scales)
- 12_LO - 12-bit low conversion scale: 12_LO = -2047 for a point with a negative LO scale, 12_LO = 0 for a point with a zero or positive LO scale
- 12_HI - 12-bit high conversion scale: 12_HI = 2047

# 3 Command Description

## 3.1 Read Data Packets

| Offset | Description | Range[2] | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| **Long Real-Time Data** | | | | | | |
| | **Request Packet** | | | | | |
| +0 | Master to Slave | 0x14 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x03 | | UINT8 | | |
| +3 | Packet Length | 0x04 | | UINT8 | | |
| +4-5 | Master Address | | | UINT16 | | |
| +6-7 | Slave Address | | | UINT16 | | |
| +8 | LRC | | | UINT8 | | |
| | **Response Packet** | | | | | |
| +0 | Slave to Master | 0x27 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x03 | | UINT8 | | |
| +3 | Packet Length | 0xB8 | | UINT8 | | |
| +4-5 | Slave Address | | | UINT16 | | |
| +6-7 | Master Address | | | UINT16 | | |
| +8-9 | Device Type | 0x0E7E | | UINT16 | | |
| +10-11 | Software Revision Code | 0x2310 | | UINT16 | | |
| +12 | Feature Code | 0x04 | | UINT8 | | |
| +13 | Input Mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT8 | | |
| +14 | Year (minus 1900) | 100-255 | | UINT8 | | |
| +15 | Month | 1-12 | | UINT8 | | |
| +16 | Day | 1-31 | | UINT8 | | |
| +17 | Hour | 0-23 | | UINT8 | | |
| +18 | Minute | 0-59 | | UINT8 | | |
| +19 | Second | 0-59 | | UINT8 | | |
| +20-23 | V1/V12 | 0-Vmax | V | UINT32 | | [1] |
| +24-27 | V2/V23 | 0-Vmax | V | UINT32 | | [1] |
| +28-31 | V3/V31 | 0-Vmax | V | UINT32 | | [1] |
| +32-35 | Average voltage | 0-Vmax | V | UINT32 | | [1] |
| +36-39 | V12 | 0-Vmax | V | UINT32 | | |
| +40-43 | V23 | 0-Vmax | V | UINT32 | | |
| +44-47 | V31 | 0-Vmax | V | UINT32 | | |
| +48-51 | I1 | 0-Imax | A | UINT32 | | |
| +52-55 | I2 | 0-Imax | A | UINT32 | | |
| +56-59 | I3 | 0-Imax | A | UINT32 | | |
| +60-63 | Average current | 0-Imax | A | UINT32 | | |

| Offset | Description | Range[2] | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| +64-67 | kVA total | 0 to Pmax | kVA | UINT32 | | |
| +72-75 | kW L1 | -Pmax to Pmax | kW | INT32 | | |
| +76-79 | kW L2 | -Pmax to Pmax | kW | INT32 | | |
| +68-79 | kW L3 | -Pmax to Pmax | kW | INT32 | | |
| +80-83 | kW total | -Pmax to Pmax | kW | INT32 | | |
| +84-87 | Reserved | 0 | | | | |
| +88-91 | kvar total | -Pmax to Pmax | kvar | INT32 | | |
| +92-95 | Present kW demand | 0 to Pmax | kW | UINT32 | | |
| +96-97 | Total power factor | -100-100 | ×0.01 | INT16 | | |
| +98-99 | Frequency | 0-4000 | ×0.1 | UINT16 | | |
| +100-103 | kWh total | $0\text{-}10^9\text{-}1$ | kWh | UINT32 | | |
| +104-107 | kWh export | $0\text{-}10^9\text{-}1$ | kWh | UINT32 | | |
| +108-111 | kvarh total | $0\text{-}10^9\text{-}1$ | kvarh | UINT32 | | |
| +112-115 | Alarm status bytes | 0 | | UINT32 | | Unused |
| +116-119 | V aux | 0 | | UINT32 | | Unused |
| +120-123 | Present Amp demand | 0 | | UINT32 | | Unused |
| +124-127 | kVA L1 | 0 to Pmax | kVA | INT32 | | |
| +128-131 | kVA L2 | 0 to Pmax | kVA | INT32 | | |
| +132-135 | kVA L3 | 0 to Pmax | kVA | INT32 | | |
| +136-139 | kvar L1 | -Pmax to Pmax | kvar | INT32 | | |
| +140-143 | kvar L2 | -Pmax to Pmax | kvar | INT32 | | |
| +144-147 | kvar L3 | -Pmax to Pmax | kvar | INT32 | | |
| +148 | Relay #1 status byte | F1 | | UINT8 | | |
| +149 | Relay #2 status byte | F1 | | UINT8 | | |
| +150 | Reserved | 0 | | UINT8 | | |
| +151 | Status input status byte | F2 | | UINT8 | | |
| +152 | Setpoint #1 status byte | F3 | | UINT8 | | |
| +153 | Setpoint #2 status byte | F3 | | UINT8 | | |
| +154 | Setpoint #3 status byte | F3 | | UINT8 | | |
| +155 | Setpoint #4 status byte | F3 | | UINT8 | | |
| +156 | Setpoint #5 status byte | F3 | | UINT8 | | |
| +157 | Setpoint #6 status byte | F3 | | UINT8 | | |
| +158 | Setpoint #7 status byte | F3 | | UINT8 | | |
| +159 | Setpoint #8 status byte | F3 | | UINT8 | | |
| +160 | Setpoint #9 status byte | F3 | | UINT8 | | |
| +161 | Setpoint #10 status byte | F3 | | UINT8 | | |
| +162 | Setpoint #11 status byte | F3 | | UINT8 | | |
| +163 | Setpoint #12 status byte | F3 | | UINT8 | | |
| +164 | Setpoint #13 status byte | F3 | | UINT8 | | |
| +165 | Setpoint #14 status byte | F3 | | UINT8 | | |
| +166 | Setpoint #15 status byte | F3 | | UINT8 | | |
| +167 | Setpoint #16 status byte | F3 | | UINT8 | | |
| +168 | Reserved | 0 | | UINT8 | | |

| Offset | Description | Range[2] | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| +169 | Reserved | 0 | | UINT8 | | |
| +170-171 | Reserved | 0 | | UINT16 | | |
| +172-173 | Reserved | 0 | | UINT16 | | |
| +174-175 | Reserved | 0 | | UINT16 | | |
| +176-177 | Reserved | 0 | | UINT16 | | |
| +178-179 | I neutral | 0-Imax | A | UINT16 | | |
| +180-183 | kvarh export (reverse) | $0\text{-}10^9\text{-}1$ | kvarh | UINT32 | | |
| +184-187 | kVAh | $0\text{-}10^9\text{-}1$ | kVAh | UINT32 | | |
| +188 | LRC | | | UINT8 | | |
| **Short Real-Time Data** | | | | | | |
| | **Request Packet** | | | | | |
| +0 | Master to Slave | 0x14 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x04 | | UINT8 | | |
| +3 | Packet Length | 0x04 | | UINT8 | | |
| +4-5 | Master Address | | | UINT16 | | |
| +6-7 | Slave Address | | | UINT16 | | |
| +8 | LRC | | | UINT8 | | |
| | **Response Packet** | | | | | |
| +0 | Slave to Master | 0x27 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x04 | | UINT8 | | |
| +3 | Packet Length | 0xB8 | | UINT8 | | |
| +4-5 | Slave Address | 0x3C | | UINT16 | | |
| +6-7 | Master Address | | | UINT16 | | |
| +8-9 | Device Type | 0x0E7E | | UINT16 | | |
| +10-11 | Software Revision Code | 0x2310 | | UINT16 | | |
| +12 | Feature Code | 0x04 | | UINT8 | | |
| +13 | Input Mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT8 | | |
| +14 | Year (minus 1900) | 100-255 | | UINT8 | | |
| +15 | Month | 1-12 | | UINT8 | | |
| +16 | Day | 1-31 | | UINT8 | | |
| +17 | Hour | 0-23 | | UINT8 | | |
| +18 | Minute | 0-59 | | UINT8 | | |
| +19 | Second | 0-59 | | UINT8 | | |
| +20-23 | Average voltage | 0-Vmax | V | UINT32 | | [1] |
| +24-23 | Average current | 0-Imax | A | UINT32 | | |
| +28-31 | kVA total | 0 to Pmax | kVA | UINT32 | | |
| +32-35 | kW total | -Pmax to Pmax | kW | INT32 | | |
| +36-39 | kvar total | -Pmax to Pmax | kvar | INT32 | | |
| +40-43 | Present kW demand | 0 to Pmax | kW | UINT32 | | |
| +44-45 | Reserved | 0 | | UINT16 | | |
| +46-47 | Total power factor | -100-100 | ×0.01 | INT16 | | |

| Offset | Description | Range[2] | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| +48-51 | Alarm status bytes | 0 | | UINT32 | | Unused |
| +52-55 | V aux | 0 | | UINT32 | | Unused |
| +56-59 | Present Amp demand | 0 | | UINT32 | | Unused |
| +60-61 | I neutral | 0-Imax | A | UINT16 | | |
| +62-63 | Reserved | 0 | | UINT16 | | |
| +64 | LRC | | | UINT8 | | |
| **DTE 12-bit Real-Time Data Packet** | | | | | | |
| | **Request Packet** | | | | | |
| +0 | Master to Slave | 0x14 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x1E | | UINT8 | | |
| +3 | Packet Length | 0x04 | | UINT8 | | |
| +4-5 | Master Address | | | UINT16 | | |
| +6-7 | Slave Address | | | UINT16 | | |
| +8 | LRC | | | UINT8 | | |
| | **Response Packet** | | | | | |
| +0 | Slave to Master | 0x27 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x1E | | UINT8 | | |
| +3 | Packet Length | 0x36 | | UINT8 | | |
| +4-5 | Slave Address | | | UINT16 | | |
| +6-7 | Master Address | | | UINT16 | | |
| +8-9 | Device Type | 0x0E7E | | UINT16 | | |
| +10-11 | Software Revision Code | 0x2310 | | UINT16 | | |
| +12 | Feature Code | 0x04 | | UINT8 | | |
| +13 | Input Mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT8 | | |
| +14 | Year (minus 1900) | 100-255 | | UINT8 | | |
| +15 | Month | 1-12 | | UINT8 | | |
| +16 | Day | 1-31 | | UINT8 | | |
| +17 | Hour | 0-23 | | UINT8 | | |
| +18 | Minute | 0-59 | | UINT8 | | |
| +19 | Second | 0-59 | | UINT8 | | |
| +20-21 | V1/V12 | 0-Vmax | V | UINT16 | | [1] |
| +22-23 | I1 | 0-Imax | A | UINT16 | | |
| +24-25 | kW L1/total for Delta | -Pmax to Pmax | kW | INT16 | | |
| +26-27 | kvar L1/total for Delta | -Pmax to Pmax | kvar | INT16 | | |
| +28-29 | Power factor L1/total for Delta | -100-100 | ×0.01 | INT16 | | |
| +30-31 | V2/V23 | 0-Vmax | V | UINT16 | | [1] |
| +32-33 | I2 | 0-Imax | A | UINT16 | | |
| +34-35 | kW L2/-FS for Delta | -Pmax to Pmax | kW | INT16 | | |
| +36-37 | kvar L2/-FS for Delta | -Pmax to Pmax | kvar | INT16 | | |
| +38-39 | Power factor L2/total for Delta | -100-100 | ×0.01 | INT16 | | |
| +40-41 | V3/V31 | 0-Vmax | V | UINT16 | | [1] |

| Offset | Description | Range[2] | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| +42-43 | I3 | 0-Imax | A | UINT16 | | |
| +44-45 | kW L3/-FS for Delta | -Pmax to Pmax | kW | INT16 | | |
| +46-47 | kvar L3/-FS for Delta | -Pmax to Pmax | kvar | INT16 | | |
| +48-49 | Power factor L3/total for Delta | -100-100 | ×0.01 | INT16 | | |
| +50-51 | I neutral | 0-Imax | A | UINT16 | | |
| +52-53 | V aux | 0 | | UINT16 | | Unused |
| +54 | Setpoints #1-8 status (bitmap) | 0=inactive, 1=active | | UINT8 | | |
| +55 | Setpoints #9-16 status (bitmap) | 0=inactive, 1=active | | UINT8 | | |
| +56 | Relay/Status inputs status (bitmap) | F4 | | UINT8 | | |
| +57 | Unused | | | UINT8 | | |
| +58 | LRC | | | UINT8 | | |
| **DTE 12-bit Demand and Accumulator Data Packet** | | | | | | |
| | **Request Packet** | | | | | |
| +0 | Master to Slave | 0x14 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x1F | | UINT8 | | |
| +3 | Packet Length | 0x04 | | UINT8 | | |
| +4-5 | Master Address | | | UINT16 | | |
| +6-7 | Slave Address | | | UINT16 | | |
| +8 | LRC | | | UINT8 | | |
| | **Response Packet** | | | | | |
| +0 | Slave to Master | 0x27 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x1F | | UINT8 | | |
| +3 | Packet Length | 0x30 | | UINT8 | | |
| +4-5 | Slave Address | | | UINT16 | | |
| +6-7 | Master Address | | | UINT16 | | |
| +8-9 | Device Type | 0x0E7E | | UINT16 | | |
| +10-11 | Software Revision Code | 0x2310 | | UINT16 | | |
| +12 | Feature Code | 0x04 | | UINT8 | | |
| +13 | Input Mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT8 | | |
| +14 | Year (minus 1900) | 100-255 | | UINT8 | | |
| +15 | Month | 1-12 | | UINT8 | | |
| +16 | Day | 1-31 | | UINT8 | | |
| +17 | Hour | 0-23 | | UINT8 | | |
| +18 | Minute | 0-59 | | UINT8 | | |
| +19 | Second | 0-59 | | UINT8 | | |
| +20-21 | V1/V12 demand | 0-Vmax | V | UINT16 | | [1] |
| +22-23 | I1 demand | 0-Imax | A | UINT16 | | |
| +24-25 | kW demand total | -Pmax to Pmax | kW | INT16 | | |
| +26-27 | kvar demand total | -Pmax to Pmax | kvar | INT16 | | |
| +28-29 | V2/V23 demand | 0-Vmax | V | UINT16 | | [1] |
| +30-31 | I2 demand | 0-Imax | A | UINT16 | | |

| Offset | Description | Range[2] | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| +32-33 | 0 for Wye/-FS for Delta | -Pmax to Pmax | kW | INT16 | | Unused |
| +34-35 | 0 for Wye/-FS for Delta | -Pmax to Pmax | kvar | INT16 | | Unused |
| +36-37 | V3/V31 demand | 0-Vmax | V | UINT16 | | [1] |
| +38-39 | I3 demand | 0-Imax | A | UINT16 | | |
| +40-41 | 0 for Wye/-FS for Delta | -Pmax to Pmax | kW | INT16 | | Unused |
| +42-43 | 0 for Wye/-FS for Delta | -Pmax to Pmax | kvar | INT16 | | Unused |
| +44-45 | kWh import (forward) | 0-65535 | kWh | UINT16 | | |
| +46-47 | kvarh import (forward) | 0-65535 | kvarh | UINT16 | | |
| +48-49 | kWh export (reverse) | 0-65535 | kWh | UINT16 | | |
| +50-51 | kvarh export (reverse) | 0-65535 | kvarh | UINT16 | | |
| +52 | LRC | | | UINT8 | | |

**NOTES:**

Energy and Power demand readings are only available in the meters with suffix E.

[1] Voltage Readings:

When the 4LN3, 3LN3 or 3BLN3 wiring mode is selected, the voltages will be line-to-neutral; for any other wiring mode, they will be line-to-line voltages.

[2] All analog readings are 1-second average values. The volts, amps and power readings in long and short real-time data packets 0x03 and 0x04 are given in primary units. In the DTE 12-bit data packets, volts and amps readings can be converted to either secondary, or primary units. For volts, amps and power scales refer to Section 4 ”Data Scales”.

## 3.2 Device Control and Status

| Offset | Description | Range | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| **Read Status Information** | | | | | | |
| | **Request Packet** | | | | | |
| +0 | Master to Slave | 0x14 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x0C | | UINT8 | | |
| +3 | Packet Length | 0x04 | | UINT8 | | |
| +4-5 | Master Address | | | UINT16 | | |
| +6-7 | Slave Address | | | UINT16 | | |
| +8 | LRC | | | UINT8 | | |
| | **Response Packet** | | | | | |
| +0 | Slave to Master | 0x27 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x0C | | UINT8 | | |
| +3 | Packet Length | 0x24 | | UINT8 | | |
| +4-5 | Slave Address | | | UINT16 | | |
| +6-7 | Master Address | | | UINT16 | | |
| +8-9 | Device Type | 0x0E7E | | UINT16 | | |
| +10-11 | Software Revision Code | 0x2310 | | UINT16 | | |

| Offset | Description | Range | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| +12 | Feature Code | 0x04 | | UINT8 | | |
| +13 | Input Mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT8 | | |
| +14-15 | Reserved | 0 | | UINT16 | | |
| +16 | Relay #1 status byte | F1 | | UINT8 | | |
| +17 | Relay #1 status byte | F1 | | UINT8 | | |
| +18 | Reserved | 0 | | UINT8 | | |
| +19 | Status input status byte | F2 | | UINT8 | | |
| +20 | Setpoint #1 status byte | F3 | | UINT8 | | |
| +21 | Setpoint #2 status byte | F3 | | UINT8 | | |
| +22 | Setpoint #3 status byte | F3 | | UINT8 | | |
| +23 | Setpoint #4 status byte | F3 | | UINT8 | | |
| +24 | Setpoint #5 status byte | F3 | | UINT8 | | |
| +25 | Setpoint #6 status byte | F3 | | UINT8 | | |
| +26 | Setpoint #7 status byte | F3 | | UINT8 | | |
| +27 | Setpoint #8 status byte | F3 | | UINT8 | | |
| +28 | Setpoint #9 status byte | F3 | | UINT8 | | |
| +29 | Setpoint #10 status byte | F3 | | UINT8 | | |
| +30 | Setpoint #11 status byte | F3 | | UINT8 | | |
| +31 | Setpoint #12 status byte | F3 | | UINT8 | | |
| +32 | Setpoint #13 status byte | F3 | | UINT8 | | |
| +33 | Setpoint #14 status byte | F3 | | UINT8 | | |
| +34 | Setpoint #15 status byte | F3 | | UINT8 | | |
| +35 | Setpoint #16 status byte | F3 | | UINT8 | | |
| +36 | Reserved | 0 | | UINT8 | | |
| +37 | Reserved | 0 | | UINT8 | | |
| +38-39 | Reserved | 0 | | UINT16 | | |
| +40 | LRC | | | UINT8 | | |
| **Device Setup Information** | | | | | | |
| | **Request Packet** | | | | | |
| +0 | Master to Slave | 0x14 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x0A | | UINT8 | | |
| +3 | Packet Length | 0x04 | | UINT8 | | |
| +4-5 | Master Address | | | UINT16 | | |
| +6-7 | Slave Address | | | UINT16 | | |
| +8 | LRC | | | UINT8 | | |
| | **Response Packet** | | | | | |
| +0 | Slave to Master | 0x27 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x0A | | UINT8 | | |
| +3 | Packet Length | 0x46 | | UINT8 | | |
| +4-5 | Slave Address | | | UINT16 | | |
| +6-7 | Master Address | | | UINT16 | | |

| Offset | Description | Range | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| +8-9 | Device Type | 0x0E7E | | UINT16 | | |
| +10-11 | Software Revision Code | 0x2310 | | UINT16 | | |
| +12 | Feature Code | 0x04 | | UINT8 | | |
| +13 | Input Mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT8 | | |
| +14-15 | Reserved | 0 | | UINT16 | | |
| +16-19 | Voltage scale (PT primary voltage) | 120-1,150,000 | V | UINT32 | | Relative to 120V secondary |
| +20-21 | Reserved | | | UINT16 | | |
| +22-23 | Current scale (CT primary current) | 5-10,000 | A | UINT16 | | Relative to 5A secondary |
| +24-25 | Baud rate | 1-9 | | UINT16 | | |
| +26-27 | Voltage mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT16 | | |
| +28-29 | Present password | 0 | | UINT16 | | |
| +30-31 | Phase sequence | 0=ABC | | UINT16 | | |
| +32-35 | Unused | 0 | | UINT32 | | |
| +36-37 | Demand period | 1, 2, 5, 10, 15, 20,30, 60 | min | UINT16 | | |
| +38-39 | Number of demand periods | 1-15 | | UINT16 | | |
| +40 | Unused | 0 | | UINT8 | | |
| +41 | Unused | 0 | | UINT8 | | |
| +42-43 | Standard frequency | 25, 50, 60 ,400 | Hz | UINT16 | | |
| +44-47 | Unused | 0 | | UINT32 | | |
| +48-49 | Serial communications mode | 0=RS-232, 1=RS-485 | | UINT16 | | |
| +50-51 | Reserved | 0 | | UINT16 | | |
| +52-53 | Unused | 0 | | UINT16 | | |
| +54-55 | Reserved | 0 | | UINT16 | | |
| +56-59 | Unused | 0 | | UINT32 | | |
| +60-61 | Neutral current scale (CT primary current) | 5-10,000 | A | UINT16 | | Relative to 5A secondary |
| +62-63 | Unused | | | UINT16 | | |
| +64-65 | Unused | | | UINT16 | | |
| +66-67 | Unused | | | UINT16 | | |
| +68-69 | Unused | | | UINT16 | | |
| +70-71 | Unused | | | UINT16 | | |
| +72-73 | Unused | | | UINT16 | | |
| +74 | LRC | | | UINT8 | | |
| **Read Time** | | | | | | |
| | **Request Packet** | | | | | |
| +0 | Master to Slave | 0x14 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x0D | | UINT8 | | |
| +3 | Packet Length | 0x04 | | UINT8 | | |
| +4-5 | Master Address | | | UINT16 | | |
| +6-7 | Slave Address | | | UINT16 | | |
| +8 | LRC | | | UINT8 | | |
| | **Response Packet** | | | | | |
| +0 | Slave to Master | 0x27 | | UINT8 | | |

| Offset | Description | Range | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x0D | | UINT8 | | |
| +3 | Packet Length | 0x10 | | UINT8 | | |
| +4-5 | Slave Address | | | UINT16 | | |
| +6-7 | Master Address | | | UINT16 | | |
| +8-9 | Device Type | 0x0E7E | | UINT16 | | |
| +10-11 | Software Revision Code | 0x2310 | | UINT16 | | |
| +12 | Feature Code | 0x04 | | UINT8 | | |
| +13 | Input Mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT8 | | |
| +14 | Year (minus 1900) | 100-255 | | UINT8 | | |
| +15 | Month | 1-12 | | UINT8 | | |
| +16 | Day | 1-31 | | UINT8 | | |
| +17 | Hour | 0-23 | | UINT8 | | |
| +18 | Minute | 0-59 | | UINT8 | | |
| +19 | Second | 0-59 | | UINT8 | | |
| +20 | LRC | | | UINT8 | | |
| **Set Time** | | | | | | |
| | **Request Packet** | | | | | |
| +0 | Master to Slave | 0x14 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x07 | | UINT8 | | |
| +3 | Packet Length | 0x10 | | UINT8 | | |
| +4-5 | Master Address | | | UINT16 | | |
| +6-7 | Slave Address | | | UINT16 | | |
| +8-9 | Reserved | | | UINT16 | | |
| +10 | Year (minus 1900) | 100-255 | | UINT8 | | |
| +11 | Month | 1-12 | | UINT8 | | |
| +12 | Day | 1-31 | | UINT8 | | |
| +13 | Hour | 0-23 | | UINT8 | | |
| +14 | Minute | 0-59 | | UINT8 | | |
| +15 | Second | 0-59 | | UINT8 | | |
| +16-19 | Number of seconds since 0:00 Jan 1, 1970 | | | UINT32 | | |
| +20 | LRC | | | UINT8 | | |
| | **Response Packet** | | | | | |
| +0 | Slave to Master | 0x27 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x07 | | UINT8 | | |
| +3 | Packet Length | 0x0C | | UINT8 | | |
| +4-5 | Slave Address | | | UINT16 | | |
| +6-7 | Master Address | | | UINT16 | | |
| +8-9 | Device Type | 0x0E7E | | UINT16 | | |
| +10-11 | Software Revision Code | 0x2310 | | UINT16 | | |
| +12 | Feature Code | 0x04 | | UINT8 | | |

| Offset | Description | Range | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| +13 | Input Mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT8 | | |
| +14-15 | Acknowledgement | 0=NAK, 1=ACK | | UINT16 | | |
| +16 | LRC | | | UINT8 | | |
| **Clear Energies** | | | | | | |
| | **Request Packet** | | | | | |
| +0 | Master to Slave | 0x14 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x16 | | UINT8 | | |
| +3 | Packet Length | 0x04 | | UINT8 | | |
| +4-5 | Master Address | | | UINT16 | | |
| +6-7 | Slave Address | | | UINT16 | | |
| +8 | LRC | | | UINT8 | | |
| | **Response Packet** | | | | | |
| +0 | Slave to Master | 0x27 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x16 | | UINT8 | | |
| +3 | Packet Length | 0x0C | | UINT8 | | |
| +4-5 | Slave Address | | | UINT16 | | |
| +6-7 | Master Address | | | UINT16 | | |
| +8-9 | Device Type | 0x0E7E | | UINT16 | | |
| +10-11 | Software Revision Code | 0x2310 | | UINT16 | | |
| +12 | Feature Code | 0x04 | | UINT8 | | |
| +13 | Input Mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT8 | | |
| +14-15 | Acknowledgement | 0=NAK, 1=ACK | | UINT16 | | |
| +16 | LRC | | | UINT8 | | |
| **Control Relays** | | | | | | |
| | **Request Packet** | | | | | |
| +0 | Master to Slave | 0x14 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x1A | | UINT8 | | |
| +3 | Packet Length | 0x08 | | UINT8 | | |
| +4-5 | Master Address | | | UINT16 | | |
| +6-7 | Slave Address | | | UINT16 | | |
| +8-9 | Relay number | 1=RO1, 2=RO2 | | UINT16 | | |
| +10-11 | Relay command | 0=normal, 1=operate, 2=release | | UINT16 | | |
| +12 | LRC | | | UINT8 | | |
| | **Response Packet** | | | | | |
| +0 | Slave to Master | 0x27 | | UINT8 | | |
| +1 | Device Family | 0xFD | | UINT8 | | |
| +2 | Message Type | 0x1A | | UINT8 | | |
| +3 | Packet Length | 0x0C | | UINT8 | | |
| +4-5 | Slave Address | | | UINT16 | | |
| +6-7 | Master Address | | | UINT16 | | |

| Offset | Description | Range | Units | Type | R/W | Notes |
|---|---|---|---|---|---|---|
| +8-9 | Device Type | 0x0E7E | | UINT16 | | |
| +10-11 | Software Revision Code | 0x2310 | | UINT16 | | |
| +12 | Feature Code | 0x04 | | UINT8 | | |
| +13 | Input Mode | 0=4-wire Wye, 1=Delta, 4=3-wire Wye | | UINT8 | | |
| +14-15 | Acknowledgement | 0=NAK, 1=ACK | | UINT16 | | |
| +16 | LRC | | | UINT8 | | |

# 4 Data Scales

| Code | Condition | Value/Range | Notes |
|---|---|---|---|
| **Data Scales** | | | |
| Vmax | | In secondary units: 204.7 V<br>In primary units: 204.7 × PT Ratio, V | |
| Imax | | In secondary units: 8.191 A<br>In primary units: 8.191 × CT ratio, A | 1 |
| Pmax | All wirings | In secondary units: 1,023 W<br>In primary units: 1,023 × PT Ratio × CT Ratio, W | 1 |

1 CT Ratio = CT Primary current/CT Secondary current, assuming CT Secondary current = 5A

# 5 Data Formats

| Format Code | Value | Description | Notes |
|---|---|---|---|
| **Relay Status** | | | |
| F1 | Bit 0 – Relay status | 0=released, 1=operated | |
| | Bit 1 – Remote latch | 0=normal, 1=forced | |
| | Bits 2-7 | Unused | |
| **Status Inputs Status** | | | |
| F2 | Bit 0 – Status Input #1 | 0=normal, 1=active | |
| | Bit 1 – Status Input #2 | 0=normal, 1=active | |
| | Bits 2-7 | Unused | |
| **Setpoint Status** | | | |
| F3 | Bits 0-6 | Unused | |
| | Bit 7 = 0<br>Bit 7 = 1 | Normal<br>Active | |
| **DTE Relay/Status Inputs Status** | | | |
| F4 | Bits 0-1 | Unused | |
| | Bit 2 – Relay #1 | 0=inactive, 1=active | |
| | Bit 3 – Relay #2 | 0=inactive, 1=active | |
| | Bit 4 | Unused | |
| | Bit 5 – Status input #1 | 0=inactive, 1=active | |
| | Bit 6 – Status input #2 | 0=inactive, 1=active | |
| | Bit 7 | Unused | |