5 YEAR WARRANTY

OMEGA®

User's Guide

PLATINUM™ Series

CN32Pt, CN16Pt, CN16DPt, CN8Pt, CN8DPt, CN8EPt

DP32Pt, DP16Pt, DP8Pt, DP8EPt

Serial Communication Protocol

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TABLE OF CONTENTS

1 Introduction

1.1 Purpose

Defining the Platinum Series Serial Communications Protocols.

1.2 Definition of Terms and Acronyms

I2C	2-wire serial interface	**ADC**	Analog to Digital Converter
Base Device	Device connected to slave device	**DAC**	Digital to Analog Converter
Smart Input	Device supporting 1 or more Input sensors	**RS485**	Electrical signals used for serial communications
Smart Output	Device supporting 1 or more Output Elements	**RS232**	Electrical signals used for serial communications
Sensor Element	One of the physical sensing elements on a Smart Output	**CSV**	Comma Separated Values
AC	Alternating Current	**COTS**	Commercially-Off-The-Shelf
DC	Direct Current	**ESD**	Electro Static Discharge
CS	Chip Select	**FW**	Firmware
RS232	Electrical signals used for serial communications	**HW**	Hardware
CSV	Comma Separated Values	**I/O**	Input/output
COTS	Commercially-Off-The-Shelf	**LED**	Light Emitting Diode
ESD	Electro Static Discharge	**Hexadecimal**	Values expressed using base 16 (24)

2 Hardware

2.1 Communications Interfaces

The Platinum Series Protocol is designed to be an updated version of the original iSeries protocol which can be used over serial connections using RS-232, RS-485, USB and serial over Ethernet.

2.1.1 RS-232

Point-to-point connections at baud rates up to 115,200.

Hardware flow control is not supported.

2.1.2 RS-485

Multi-point connections. Up to 200 individual addresses can be assigned.

Single Ending character is supported (e.g., carrier return 0x0D). Multiple Ending character is not supported (e.g. carrier return, line feed 0x0D 0x0A).

2.1.3 USB Virtual Comm

Point-to-point connections the same as RS-232.

2.1.4 Ethernet

The serial protocol is transmitted using TCP/IP on port 2000.
Platinum Echo mode ON is recommended.

3 Protocol Description

3.1 Protocol

The protocol is command/response, based on 4 command classes:

Get (G), Put (P), Read (R) and Write (W):

Get Reads the current value resident in RAM.

Put Writes a parameter to RAM without committing it to non-volatile memory.

Read Retrieves the value of a parameter stored in non-volatile memory.

Write Commits a parameter value to non-volatile memory.

3.2 Command Structure

The overall structure of a command packet is as follows:

- Start of frame (SOF) character – usually '*'
- Command class (GPRW)
- Command ID – a hex number identifying the message.
- Mandatory space if there are parameters following the command ID.
- Parameter List.
- An end of frame (EOF) character – usually a carriage return.

A unit address is optional.

An address is a hex-encoded number in the range 0-199 (00 – C7 hex) between the start of frame and the command class.

Example: to get the current process value, without an address would be:

"*G110 <CR>"

In this case the command class is 'G', the command ID is 110 (hex) and this command takes no parameters.

- If this were addressed to unit 100 (hex value 64), the command would be:

"*64G110 <CR>"

3.3 Response Format

The response format depends on whether a command echo has been selected. If selected, the address (if present), command class and command ID precede the parameters returned.

Example: if an echo is selected, the previous command would return:

"G110+32.0<CR>" (no address)

"64G110+32.0<CR> (if the unit responding had address = 64 (hex).

- If echo is not selected, in both cases, only "+32.0<CR>" would be returned.

For Put (P) and Write (W) type transactions, only the command is echoed if echo is on.

Thus, "*Pxxx yyyyyy<CR>" will echo "Pxxx<CR>".

3.4 Error Messages

In the event of an error in the message format, an error string is returned:

"Command Failed Decode 0"

4 Platinum Series Messages

4.1 Input Configuration

Input Configuration							
ID	**Classes**	**Parameters**					
0x100	RW	STYPE	SI1	SI2			

The parameters are as follows:

STYPE - Sensor Type	
Value	**Type**
0	Thermocouple
1	RTD
2	Process Input
3	Thermistor
4	Remote

The meaning of the two sensor info fields, SI1 and SI2 depends on the sensor type indicated in the STYPE field.

For thermocouple type (STYPE = 0):

SI1 – Sensor Info 1 Thermocouple Type)	
Value	**Type**
0	J
1	K
2	T
3	E
4	N
5	Reserved
6	R
7	S
8	B
9	C
10	Reserved
11	Reserved

For thermocouple, the SI2 field is irrelevant.

Example: to set input type to Type K thermocouple: "*W100 010<CR>"

For RTD Sensor type (STYPE = 1):

SI1 – Sensor Info 1 RTD Configuration	
Value	**Type**
0	2 Wire
1	3 Wire
2	4 Wire

SI2 – Sensor Info 1 RTD ACRV Ohm Types	
Value	**Type**
0	385 Curve, 100 ohms
1	385 Curve, 500 ohms
2	385 Curve, 1000 ohms
3	392 Curve, 100 ohms
4	3916 Curve, 100 ohms

For Process Input (STYPE = 2):

SI1 – Process Range	
Value	**Range**
0	4 – 20 mA
1	0 – 24 mA
2	*NS
3	*NS
2	*NS
5	+/– 10 Vdc
6	+/ – 1.0 Vdc
7	+/ – 0.1 Vdc

*NS – Not currently supported.

SI2 – Sensor Info 2 Process Manual/Live	
0	Live
1	Manual

For Thermistor Type (STYPE = 3):

SE1 – Sensor Info 1 - Thermistor Type	
0	2.25 K
1	5K
2	10K

The Sensor Info 2 Field is irrelevant when STYPE = 3.

For Remote Sensor Type (STYPE = 4).

This is not currently supported and is for future expansion.

4.2 Filter Constant

Filter Constant								
ID	**Classes**	**Parameters**						
0x101	RW	FC						

The parameters are as follows:

FC	
Value	**Effect**
0	No filtering (1 X rate)
1	X 2 filtering
2	X 4 filtering
3	X 8 filtering
4	X 16 filtering
5	X 32 filtering
6	X 64 filtering
7	X 128 filtering

Example: To set input filter to x2 "*W101 1<CR>"

4.3 Current Reading

Current Reading								
ID	**Classes**	**Parameters**						
0x110	G							

This does not take any parameters.

To get current process reading: "*G110<CR>"

4.4 Peak Reading

Peak Reading		
ID	**Classes**	**Parameters**
0x111	G	

This command does not take any parameters.

4.5 Valley Reading

Valley Reading		
ID	**Classes**	**Parameters**
0x112	G	

This command does not take any parameters.

4.6 TC Calibration Type

TC Calibration Type		
ID	**Classes**	**Parameters**
0x120	RW	Mode

The parameters are as follows:

Mode	
Value	**Effect**
0	No Calibration
1	1 Point
2	2 Point
3	Ice Point

4.7 TC Calibration Single Point

TC Calibration Single Point		
ID	**Classes**	**Parameters**
0x121	RW	Value (float)

4.8 TC Calibration Double Point Low

TC Calibration Double Point Low		
ID	**Classes**	**Parameters**
0x122	RW	Value (float)

4.9 TC Calibration Double Point High

TC Calibration Double Point High		
ID	**Classes**	**Parameters**
0x123	GPRW	Value (float)

4.10 Process Reading 1 (Low)

Process Reading 1 (Low)				
ID	**Classes**	**Parameters**		
0x130	RW	PR	ML	Value (float)

PR – Process Range	
Value	**Range**
0	4 – 20 mA
1	0 – 24 mA
2	*NS
3	*NS
4	*NS
5	+/– 10 Vdc
6	+/ – 1.0 Vdc
7	+/ – 0.1 Vdc

ML – Manual/Live	
Value	**Range**
0	Manual Mode
1	Live Mode

*NS – not currently supported.

4.11 Process Range Input 1 (Low)

Process Range Input - Low				
ID	**Classes**	**Parameters**		
0x131	RW	PR	ML	Value (float)

The parameters PR and ML, are the same as defined for command ID = 0x130.

4.12 Process Range Reading 2 (High)

Process Range Reading (High)				
ID	**Classes**	**Parameters**		
0x132	RW	PR	ML	Value (float)

The parameters PR and ML, are the same as defined for command ID = 0x130.

4.13 Process Range Input 2 (High)

Process Range Input - High				
ID	**Classes**	**Parameters**		
0x133	RW	PR	ML	Value (float)

The parameters PR and ML, are the same as defined for command ID = 0x130.

4.14 Tare Mode

Tare Mode									
ID	Classes	Parameters							
0x140	RW	TM							

TM – Tare Mode	
Value	Effect
0	Tare Disabled
1	Tare Enabled
2	Tare Remote Control

4.15 Tare Reset

Tare Reset									
ID	Classes	Parameters							
0x141	GP	EN							

EN – Enable Tare	
Value	Action
0	Disable Tare
1	Enable Tare

4.16 Number of Linearization Points

Number of Linearization Points									
ID	Classes	Parameters							
0x142	RW	N							

N – Number of Linearization Points	
Value	Action
[0..A]	0 to 10 Number of Linearization points

4.17 Linearization Reading

Linearization Reading			
ID	Classes	Parameters	
0x143	RW	P	Value (float)

P –Linearization Point	
Value	Action
[0..A]	Select Linearization Point from 0 to 10
Value	Linearization Reading Value

4.18 Linearization Input

Linearization Input			
ID	**Classes**	**Parameters**	
0x144	RW	P	Value (float)

P –Linearization Point	
Value	**Action**
[0..A]	Select Linearization Point from 0 to 10
Value	Linearization Input Value

4.19 Annunciator Mode

Annunciator Mode									
ID	**Classes**	**Parameters**							
0x145	RW	N.ANN	Mode						

N.ANN - Annunciator Number	
Value	**Select**
[0..6]	Select Annunciator Number from 0 to 6

Mode - Annunciator Mode	
Value	**Action**
0	Disable Annunciator
1	Annunciator activated by Alarm 1
2	Annunciator activated by Alarm 2
3	Annunciator activated by Output 1
4	Annunciator activated by Output 2
5	Annunciator activated by Output 3
6	Annunciator activated by Output 4
7	Annunciator activated by RE.ON bit
8	Annunciator activated by SE.ON bit
9	Annunciator activated during any RAMP cycle
10	Annunciator activated during any SOAK cycle

4.20 Display Rounding

Display Rounding		
ID	**Classes**	**Parameters**
0x146	RW	Value (float)

4.21 Rate Mode

Rate Mode									
ID	**Classes**	**Parameters**							
0x147	RW	EN							

EN – Rate Mode	
Value	**Effect**
0	Disable Rate Mode
1	Disable Rate Mode

4.22 Process Type

Process Type									
ID	**Classes**	**Parameters**							
0x148	RW	PT							

PT – Process Type	
Value	**Type**
0	Single Ended
1	Differential
2	Ratiometric

4.23 Display Configuration

Display Configuration								
ID	**Classes**	**Parameters**						
0x200	RW	DP	UNIT	COLOR	BRT			

The parameters are as follows:

DP - Decimal Point	
Value	**Effect**
0	Display as F.FFF
1	Display as FF.FF

Units	
Value	**Effect**
0	No units applied
1	Values converted to °C
2	Values converted to °F

Color	
Value	**Effect**
1	GREEN
2	RED
3	AMBER

BRT - Brightness	
Value	**Brightness**
0	LOW
1	MEDIUM
2	HIGH

4.24 Excitation Voltage

Excitation Voltage								
ID	**Classes**	**Parameters**						
0x210	RW	EV						

The parameters are as follows:

EV – Excitation Voltage	
Value	**Voltage**
0	0 Volts
1	5 Volts
2	10 Volts
3	12 Volts
4	24 Volts

4.25 Safety Configuration

Safety Configuration							
ID	**Classes**	**Parameters**					
0x220	RW	POR	OR	LBE			

The parameters are as follows:

POR – Power On Run	
Value	**Voltage**
0	Go to standby when powered on
1	Go to run when powered on

OR – Operate Run	
Value	**Voltage**
0	Disabled
1	Enabled

LBE - Loop Break Enabled	
Value	**Enabled/Disabled**
0	Disabled
1	Enabled

4.26 Loop Break Configuration

Loop Break Configuration								
ID	**Classes**	**Parameters**						
0x221	RW	LBE	MINMS	MINLS	SECMS	SECLS		

LBE - Loop Break Enabled	
Value	**Enabled/Disabled**
0	Disabled
1	Enabled

The parameters MINMS, MINLS define the minutes in the loop break time. MINMS is the most significant part of the minutes, MINLS the least significant. Both are in hex format.

For example: to encode 100 minutes, MINMS = 6, MINLS = 4. (64 hex).

The second's portion of the loop break time is similarly defined in SECMS, SECLS.

4.27 Set Point Low Limit

Set Point Low Limit		
ID	**Classes**	**Parameters**
0x222	RW	Value (float)

4.28 Set Point High Limit

Set Point High Limit		
ID	**Classes**	**Parameters**
0x223	RW	Value (float)

4.29 Serial Communication Address

Serial Communications Address							
ID	**Classes**	**Parameters**					
0x300	RW	AMS	ALS				

The parameters are as follows:

AMS and ALS are the most significant and least significant nibble of the serial communications address in hex format. The address must be in the range 0 to 199 (decimal).

For example: if an address of 100 (decimal) is to be used, the hex value of the address would be 0x64 so AMs would be '6' and ALS would be '4'.

4.30 USB Communication Address

USB Communications Address							
ID	**Classes**	**Parameters**					
0x301	RW	AMS	ALS				

The format and parameter usage is the same as for the serial communications address.

4.31 Ethernet Communication Address

Ethernet Communications Address							
ID	**Classes**	**Parameters**					
0x302	RW	AMS	ALS				

The format and parameter usage is the same as for the serial communications address.

4.32 Serial Communication Config

Serial Communications Configuration							
ID	**Classes**	**Parameters**					
0x310	RW	PROT	DM	LFE	ECHO	SEP	

The parameters are as follows:

PROT- Protocol	
Value	**Protocol**
0	Omega Protocol
1	Modbus Protocol

Data Mode – Data Mode	
Value	**Voltage**
0	Command
1	Continuous

LFE – Line Feed Enabled	
Value	**Voltage**
0	Don't insert line feed on responses
1	Insert line feed

ECHO – Response Echo Enabled	
Value	**Voltage**
0	No echo.
1	Echo command in response

SEP - Separation Character (Omega Protocol)	
Value	**Effect**
0	Use <space> character between records
1	Use <CR> between records

The Serial Communications Configuration must be set before the Serial Data Mode (ID = 0x311).

4.33 Serial Data Mode Config

Serial Communications Data Mode Config			
ID	**Classes**	**Parameters**	
0x311	RW	MODE	Interval - seconds (variable length - float)

MODE – (Omega Protocol)	
0	Interactive command mode
1	Continuous mode

Serial Modbus Mode Config

The interval is specified as a floating point number in seconds when the continuous mode is specified.

Example: setting serial to continuous mode with 5 second interval:

"*P311 1 5.0<CR>"

4.34 Serial Modbus Mode

Serial Modbus Mode			
ID	**Classes**	**Parameters**	
0x314	RW	MODE	

MODE - Modbus	
Value	**Mode**
0	RTU
1	ASCII

4.35 Serial Data Format

Serial Data Format							
ID	**Classes**	**Parameters**					
0x312	RW	AS	RE	PE	VE	UE	

AS – Alarm Status Enabled in Continuous Mode	
Value	**Voltage**
0	Don't send alarm status in cont. mode
1	Send alarm status

RE – Readings Enabled in Continuous Mode	
Value	**Voltage**
0	Don't send readings in cont. mode
1	Send readings

PE – Peak Readings Enabled in Continuous Mode	
Value	**Voltage**
0	Don't send peak readings in cont. mode
1	Send peak readings

VE – Valley Readings Enabled in Continuous Mode	
Value	**Voltage**
0	Don't send valley readings in cont. mode
1	Send valley readings

UE – Valley Readings Enabled in Continuous Mode	
Value	**Voltage**
0	Don't append measurement units in cont. mode
1	Append measurement units in cont. mode.

4.36 Serial Communications Parameters

Serial Communications Parameters								
ID	**Classes**	**Parameters**						
0x313	RW	MODE	BR	PAR	DB	SB		

MODE - Serial Mode	
Value	**Mode**
0	RS232
1	RS485

BR - Serial Baud Rate	
Value	**Rate**
0	300 Baud
1	600 Baud
2	1200 Baud
3	2400 Baud
4	4800 Baud
5	9600 Baud
6	19200 Baud
7	38400 Baud
8	57600 Baud
9	115200 Baud

PAR - Parity	
Value	**Parity**
0	None
1	Odd
2	Even

DB - Data Bits	
Value	**Bits**
0	7
1	8

SB - Stop Bits	
Value	**Bits**
0	1
1	2

4.37 USB Communications Configuration

USB Communications Configuration							
ID	**Classes**	**Parameters**					
0x320	RW	PROT	DM	LFE	ECHO	SEP	

This is for use with a virtual com serial port. The usage of the parameters is the same as for the Serial Communications Message.

4.38 USB Data Mode Configuration

USB Communications Data Mode Config			
ID	**Classes**	**Parameters**	
0x321	RW	MODE	Interval - seconds (float)

The usage of the parameters for this command is the same as for the Serial Communications Data Mode (ID = 0x311).

4.39 USB Modbus Mode

USB Modbus Mode		
ID	**Classes**	**Parameters**
0x323	RW	MODE

MODE - Modbus	
0	RTU
1	ASCII

4.40 USB Data Format

Serial Data Format							
ID	**Classes**	**Parameters**					
0x312	RW	AS	RE	PE	VE	UE	

The usage of the parameters for this command is the same as for the Serial Data Format (ID = 0x312).

4.41 Ethernet Communications Configuration

Ethernet Communications Configuration								
ID	**Classes**	**Parameters**						
0x330	RW	PROT	DM	LFE	ECHO	SEP		

The usage of the parameters for this command is the same as for the Serial Communications Configuration (ID = 0x310).

4.42 Ethernet Data Mode Configuration

Ethernet Communications Data Mode Config			
ID	**Classes**	**Parameters**	
0x331	RW	MODE	Interval - seconds (float)

The usage of the parameters for this command is the same as for the Serial Communications Data Mode (ID = 0x311).

4.43 Ethernet Data Format

Ethernet Data Format								
ID	**Classes**	**Parameters**						
0x332	RW	AS	RE	PE	VE	UE		

The usage of the parameters for this command is the same as for the Serial Data Format command (ID = 0x312).

4.44 Ethernet Modbus Mode

Ethernet Modbus Mode			
ID	**Classes**	**Parameters**	
0x333	RW	MODE	

MODE - Modbus	
0	RTU
1	ASCII

4.45 Setpoint 1

Setpoint 1		
ID	**Classes**	**Parameters**
0x400	GPRW	Setpoint Value - variable length (float)

4.46 Remote Setpoint Configuration

Remote Setpoint Configuration									
ID	**Classes**	**Parameters**							
0x401	RW	EN	PR						

EN – Enable Remote Setpoint	
Value	**Action**
0	Enable Remote Setpoint
1	Disable Remote Setpoint

PR - Output Process Range	
Value	**Range**
0	4 - 20 V
1	0 – 24 V
2	0 – 10 V
3	0 – 1 V

4.47 Setpoint 2

Setpoint 2			
ID	**Classes**	**Parameters**	
0x410	RW	TYPE	Setpoint Value - variable length (float)

TYPE - Setpoint Type	
Value	**Action**
0	Setpoint value given as fixed constant
1	Setpoint value is deviation (+/-) Setpoint 1 value

4.48 Remote Process Range Setpoint Min

Remote Process Range Setpoint Minimum			
ID	**Classes**	**Parameters**	
0x420	RW	PR	Setpoint Value (float – variable length)

The parameters are as follows:

PR - Output Process Range	
Value	Range
0	4 - 20 V
1	0 – 24 V
2	0 – 10 V
3	0 – 1 V

4.49 Remote Process Range Setpoint Max

Remote Process Range Setpoint Maximum			
ID	**Classes**	**Parameters**	
0x422	RW	PR	Setpoint Value (float – variable length)

The process range parameter PR is as defined for the Remote Process Range Setpoint Min command (ID = 0x420).

4.50 Remote Process Range Input Max

Remote Process Range Input Maximum			
ID	**Classes**	**Parameters**	
0x423	RW	PR	Setpoint Value (float – variable length)

The process range parameter PR is as defined for the Remote Process Range Setpoint Min command (ID = 0x420).

4.51 Remote Process Range Input Min

Remote Process Range Input Minimum			
ID	**Classes**	**Parameters**	
0x421	RW	PR	Setpoint Value (float – variable length)

The process range parameter PR is as defined for the Remote Process Range Setpoint Min command (ID = 0x420).

4.52 PID Configuration

PID Configuration								
ID	**Classes**	**Parameters**						
0x500	RW	CA	AC					

CA - Control Action	
Value	**Action**
0	Output active if P.V. < Setpoint
1	Output active if P.V. > Setpoint

AC – Adaptive Control	
Value	**Action**
0	Enable Adaptive Control
1	Disable Adaptive Control

4.53 PID Low Clamping Limit

PID Low Clamping Limit									
ID	**Classes**	**Parameters**							
0x501	RW	CLMS	CLLS						

The hex-encoded byte fields CLMS, CLLS form the hex representation of the limit (percent) 0-100

For example: if the limit were to be 35 (decimal) the hex representation would be 23, so CLMS would equal 2 and CLLS 3.

4.54 PID High Clamping Limit

PID High Clamping Limit									
ID	**Classes**	**Parameters**							
0x502	RW	CLMS	CLLS						

The encoding of the high clamping limit is the same as for the low clamping limit.

4.55 PID P Parameter

PID P-Parameter		
ID	**Classes**	**Parameters**
0x503	RW	P-parameter Value (float – variable length)

4.56 PID I Parameter

PID I-Parameter		
ID	**Classes**	**Parameters**
0x504	RW	I-parameter Value (float – variable length)

4.57 PID D Parameter

PID D-Parameter		
ID	**Classes**	**Parameters**
0x505	RW	D-parameter Value (float – variable length)

4.58 Output Mode

Output Mode									
ID	**Classes**	**Parameters**							
0x600	RW	NOUT	MODE						

NOUT – the output number (1-4)

MODE - Output Mode	
Value	**Mode**
0	Output maintained in OFF state
1	Output control by PID control function
2	Output controlled by ON-OFF control function
3	Output retransmits the scaled process variable
4	Output set by ALARM 1 state
5	Output set by ALARM 2 state
6	Output set by Ramp & Soak RE.ON control bit
7	Output set by Ramp & Soak SE.ON control bit

4.59 Output Type

Output Type									
ID	**Classes**	**Parameters**							
0x601	G	NOUT							

NOUT – the output number

This returns the output type for the specified output as a hex encoded string as follows:

Output Types	
Code Returned (hex encoded)	**Type**
000	No output available
001	Single Poll Relay
002	SSR output
004	Double Poll Relay
008	DC Pulse output
010	Analog Output
020	Isolated Analog Output

4.60 Output ON/OFF Configuration

Output On/Off Config				
ID	**Classes**	**Parameters**		
0x610	RW	NOUT	RD	Dead Band Value (float – variable length)

NOUT is the output number (1-4)

RD – Reverse/Direct	
Value	**Action**
0	Reverse
1	Direct

4.61 Output Alarm Configuration

Output Alarm Configuration									
ID	Classes	Parameters							
0x620	RW	NAL	TYP	MODE	COLOR	HHEN	LAT	CNT	PO

NAL is the alarm number (1-2)

TYP- Alarm Type	
0	Alarm not active
1	Alarm triggered if PV > ALM.H
2	Alarm trigger if PV < ALM.L
3	Alarm trigger if PV > ALM.H or PV < ALM.L
4	Alarm trigger if PV > ALM.L and PV < ALM.H

MODE - Alarm Mode	
Value	**Mode**
0	Alarm setpoint is fixed constant
1	Alarm is offset from Setpoint 1
2	Alarm is offset from Setpoint 2

Color	
Value	**Alarm Color**
0	No color
1	GREEN
2	RED
3	AMBER

HHEN – HiHi Mode	
Value	**Action**
0	Enable Hi Hi Mode
1	Disable Hi Hi Mode

LAT- Alarm Latch Control	
Value	**Action**
0	Alarm does not latch
1	Alarm state will be latched, clear by front panel
2	Alarm state will be latched, clear by digital input
3	Alarm state latched, clear by front panel or input

CNT – Contact Polarity	
Value	**Polarity**
0	Contacts OPEN until activated
1	Contacts CLOSED until activated

PO – Power On Enable	
0	Not active on power-on
1	Active on power-on

4.62 Hi Value

Alarm Hi Value			
ID	**Classes**	**Parameters**	
0x621	RW	NAL	Hi Value (float – variable length)

NAL = alarm number (1-2).

4.63 Low Value

Alarm Low Value			
ID	**Classes**	**Parameters**	
0x622	RW	NAL	Low Value (float – variable length)

4.64 On Delay

Alarm On Delay			
ID	**Classes**	**Parameters**	
0x623	RW	NAL	On Delay - seconds (float – variable length)

NAL = alarm number (1 – 2).

4.65 Off Delay

Alarm Off Delay			
ID	**Classes**	**Parameters**	
0x624	RW	NAL	Off Delay - seconds (float – variable length)

NAL – alarm number (1-2).

4.66 HiHi Mode

HiHi Mode								
ID	**Classes**	**Parameters**						
0x625	RW	NAL	ON/OFF					

NAL – alarm number.

ON/OFF	
0	On
1	Off

4.67 HiHi Offset

Alarm HiHi Offset			
ID	**Classes**	**Parameters**	
0x626	RW	NAL	Offset (float – variable length)

4.68 Output Retransmission Reading 1

Output Retransmission Reading 1			
ID	**Classes**	**Parameters**	
0x630	RW	NOUT	Reading Value (float – variable length)

NOUT – output number (1-4).

4.69 Output Retransmission Output 1

Output Retransmission Output 1			
ID	**Classes**	**Parameters**	
0x631	RW	NOUT	Output Value (float – variable length)

NOUT – output number (1-4).

4.70 Output Retransmission Reading 2

Output Retransmission Reading 2			
ID	**Classes**	**Parameters**	
0x632	RW	NOUT	Reading Value (float – variable length)

NOUT = output number (1-4).

4.71 Output Retransmission Output 2

Output Retransmission Output 2			
ID	**Classes**	**Parameters**	
0x633	RW	NOUT	Output Value (float – variable length)

NOUT – output number (1-4).

4.72 Output Cycle Time/Pulse Width

Output Cycle Time/Pulse Width			
ID	**Classes**	**Parameters**	
0x650	RW	NOUT	Cycle Time - seconds (float – variable length)

NOUT – output number.

4.73 Output Range

Output Range								
ID	**Classes**	**Parameters**						
0x660	RW	NOUT	RANGE					

RANGE	
Value	**Range**
0	0 – 10V
1	0 – 5V
2	0-20V
3	4-20V
4	0-24V

4.74 Time Format

Time Format								
ID	**Classes**	**Parameters**						
0x700	RW	FMT						

FMT - Time Format	
0	MM.SS displayed
1	HH.MM displayed
2	S.MMM displayed

4.75 Multi Ramp/Soak Configuration

Ramp/Soak Config								
ID	**Classes**	**Parameters**						
0x720	RW	RS						

RS – Ramp Soak Mode	
0	Ramp/Soak Disabled
1	Ramp/Soak Enabled
2	Ramp/Soak Remote Control

4.76 Multi Ramp/Soak Profile Configuration

Multi Ramp/Soak Profile Config								
ID	**Classes**	**Parameters**						
0x721	RW	PMS	PLS	SC	TE			

PMS, PLS form the profile number in hex form. PMS is the most significant hex digit, PLS the least significant.

For example: segment 31 (0x1f) would be encoded as PMS = '1', PLS = 'F'

SC is the segment count (0 – 15) encoded as a single hex digit.

TE- Tracking Enabled	
0	Disabled
1	Enabled

4.77 Multi Ramp/Soak Segment Event Configuration

Multi Ramp/Soak Event Config								
ID	**Classes**	**Parameters**						
0x730	RW	NSEG	RE	SE				

PMS, PLS identify the profile number as in Multi Ramp/Soak Profile Configuration (ID = 0x721).

NSEG is the segment number encoded as a single hex digit (0-F).

RE – Ramp enabled (1) or disabled (0) for segment.

SE – Soak enabled (1) or disabled (0) for segment.

4.78 Multi Ramp/Soak Profile Segment Ramp Time

Multi Ramp/Soak Segment Ramp Time			
ID	**Classes**	**Parameters**	
0x731	RW	NSEG	Ramp Time Seconds (float, variable length)

NSEG is a single hex digit identifying the segment number.

4.79 Multi Ramp/Soak Profile Segment Soak Process Value

Multi Ramp/Soak Segment Soak Process Value			
ID	**Classes**	**Parameters**	
0x732	RW	NSEG	Soak Value (float, variable length)

NSEG is a single hex digit identifying the segment number.

4.80 Multi Ramp/Soak Profile Segment Soak Time

Multi Ramp/Soak Segment Soak Time			
ID	**Classes**	**Parameters**	
0x733	RW	NSEG	Soak Time - seconds (float, variable length)

PMS, PLS pair identify the profile number as in the Multi-Ramp Profile Config message (ID = 0x721).

NSEG is a single hex digit identifying the segment number.

4.81 INIT Password

INIT Password								
ID	**Classes**	**Parameters**						
0xF00	RW	EN	PWD3	PWD2	PWD1	PWD0		

EN – Enable Init (1) / Disable Init (0)

The parameters PWD0-3 form a hex encoded number. The range of each must be 0-9.

For Example; '1234' would be encoded as PWD3 = 1, PWD2 = 2, PWD1 = 3, PWD0 = 4.

4.82 Program Password

Program Password								
ID	**Classes**	**Parameters**						
0xF01	RW	EN	PWD3	PWD2	PWD1	PWD0		

EN – Enable Programming (1) / Disable Programming (0)

The parameters PWD0-3 form a hex encoded number. The range of each must be 0-9.

4.83 Version Number

Version Number								
ID	**Classes**	**Parameters**						
0xF20	G							

This command returns the current firmware version number as a hex encoded string. The format is:

- Major (2 bytes)
- Minor (2 bytes)
- Fix (2 bytes)
- Build (2 bytes)

Example: If the current version is 01.00.05.00 the command "*GF20<CR>" would return "01000500"

4.84 Version Upgrade

Version Upgrade								
ID	**Classes**	**Parameters**						
0xF21	P	SEL						

This command forces a firmware upgrade, followed by a reboot.

The SEL parameter determines the method to be used.

SEL – Firmware Upgrade Method	
1	EIP Serial Port
2	User Serial Port
3	USB Thumb drive.

Example: to upgrade using the USB Thumb drive the drive would be inserted into the USB port, followed by the serial command "*PF21 3<CR>"

4.85 Bootloader Version

Bootloader Version Number									
ID	**Classes**	**Parameters**							
0xF22	G								

This retrieves the bootloader version number in exactly the same manner as the version number command (ID = 0xF20).

4.86 Run Mode

Run Mode										
ID	**Classes**	**Parameters**								
0xF23	GP	SS								

SS - System State		
0	LOAD	File transfer in progress
1	IDLE	Idle, no control
2	INPUT_ADJUST	Adjusting input value
3	CONTROL_ADJUST	Adjusting output value
4	MODIFY	Modify parameter in OPER mode
5	WAIT	Waiting for RUN condition
6	RUN	System is running
7	STANDBY	Standby mode
8	STOP	Stopped mode
9	PAUSE	Paused mode
10	FAULT	Fault detected
11	SHUTDOWN	Shutdown condition detected
12	AUTOTUNE	Autotune in progress

4.87 Set Factory Defaults

Bootloader Version Number									
ID	**Classes**	**Parameters**							
0xF30	P	EN							

To reset factory defaults, use the command "*PF30 1<CR>"

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OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **61 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the **normal five (5) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

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