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Totalflow

PG&E

Protocol

for

FCU 6400(5333) w/

ModScan Interface

PRODUCT LINE TOTALFLOW®	LEVEL 3	ABB TOTALFLOW PRODUCTS							
DESIGN JUESCHKE	DATE 00/11/10	APPLICATION INFORMATION FOR TOTALFLOW PG&E PROTOCOL FOR 6400 (5333) W/MODSCAN MODBUS							
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I. Purpose

This paper describes the PG&E communications protocol for Totalflow FCU's.

II. Modbus Description

The Modbus protocol is described in the document entitled "Gould Modbus Protocol Reference Guide" published January, 1985 by Gould Inc., Programmable Control Division, Andover, Massachusetts.

Modbus uses the master, slave communications concept. Slave devices speak only when spoken to by the master. Each slave is identified by an unsigned, one byte number ranging from 1 to 247 (inclusive). A slave must send a single response to a master's request for data.

Modbus messages may be one of two formats:

Modbus RTU message frame format:

Packet	CRC
N x 8 bits	16-bits

Packet: The packet field consists of the Modbus packet being sent or received. Packet format varies with the function being performed and the register group being accessed.

CRC: The error check field consists an 16 bit cyclic redundancy check calculated over the length of the packet field.

Modbus ASCII message frame format:

BOF	Packet	LRC	EOF	Ready
:	2 x Number of bytes in Modbus packet	8-bits	CR	LF

BOF: A colon (:) character is used to indicate beginning of frame.

Packet: The packet field consists of hexadecimal ASCII characters representing the Modbus packet being sent or received. The number of characters is twice the number of bytes in the Modbus packet because each packet byte is converted into two hexadecimal ASCII characters ('0'-'9','A'-'F').

LRC: The error check field consists an 8 bit longitudinal redundancy check calculated over the length of the packet field before it is converted to hexadecimal ASCII.

EOF/Ready: A carriage return and line feed are used to delineate end of frame.

Note: Total message frame length can not exceed 256 bytes.

III. Totalflow Modbus Implementation

Totalflow Modbus supports RTU or ASCII mode. Support has also been added for long integer, floating point, and archive record registers. Totalflow Modbus supports the following subset of the Gould Modbus defined functions:

Code	Function	Description
01*	Read Boolean	Reads group of boolean registers
03	Read Registers	Reads group of 16/32 bit registers
05*	Set Single Boolean	Set or clear a boolean register
06*	Set Single Register	Set a 16/32 bit register to specified value
16	Set Multiple Register	Set multiple 16/32 bit registers
128-143	Exception Response	Used in FCU response packets to indicate errors in processing function codes 1-16.

* Available for use, but not implemented in Poll Group or Block PG&E protocols.

Packet formats:

Read Query

Address	Function	Register	Quantity
8-bits	8-bits	16-bits	16-bits

Read Response

Address	Function	Byte Count	Data
8-bits	8-bits	8-bits	N x 8 bits

Set Query

Address	Function	Register	Data
8-bits	8-bits	16-bits	N x 8 bits

Set Response

Address	Function	Register	Data
8-bits	8-bits	16-bits	N x 8 bits

Set Multiple Query

Address	Function	Register	Quantity	Byte Count	Data
8-bits	8-bits	16-bits	16-bits	8-bits	N x 8 bits

Set Multiple Response

Address	Function	Register	Quantity
8-bits	8-bits	16-bits	16-bits

Exception Response

Address	Function	Code
8-bits	8-bits	8-bits

Address: The address field contains the slave address of the FCU intended to receive the packet. Each FCU must be assigned a unique address in the range of 1 to 247.

Function: The function code field contains a code which tells the FCU what to do or what data to send. The high order bit in this field may be set by the FCU in the response packet to indicate an error response.

Totalflow FCU PG&E Modbus Protocol

- Register:** The register field contains the register number of the FCU data item to fetch or set. For read functions, this is the starting register number.
- Code:** The code field contains an error value for the exception response. Currently there are three values used; 1 indicates that the function code is unsupported, 2 indicates the register number requested is invalid, 3 indicates that too many data values were requested and that the maximum packet size was exceeded. The maximum packet size for ASCII is 122 bytes and for RTU the maximum packet size is 250.
- Quantity:** The quantity field contains the number of consecutive registers to fetch or set. This field is not present in all packets (only read and set multiple queries).
- Byte Count:** The byte count field contains the number of bytes of data being transferred. This field is not present in all packets (only read response and set multiple query).
- Data:** The data field contains the actual data values being transferred. This field is not present in all packets. The size and format of the data values depend on the register group being accessed. The byte order of data items is high to low (MSB first, LSB last).

IV. Register Group Configuration

Registers are grouped by data type. The grouping is fixed, but the base (or starting) register number of each group is configurable. The PG&E protocol introduces the concepts of Block and Poll Group transactions. Default register group assignments:

Default Base	Type	Description
100	INTEGER	Register Configuration for Poll Groups
500	INTEGER	Overall Configuration for PG&E
1001	BOOLEAN	1 Bit Boolean Group
3001	INTEGER	16 Bit Integer Group
5001	LONG INTEGER	32 Bit Long Integer Group
7001	FLOATING POINT	32 Bit IEEE Floating Point Group
8400	PGEHEAD	Signifies Header File Start for Block Operations
10001	RECORD	Daily Flow Archive Record Group
11001	RECORD	Log Period Flow Archive Record Group
12001	RECORD	Event Log Archive Record Group
15001	TLP	TLP Type PG&E Register Group
20001	PGEGROUP	Partition Table Containing Point Type Definitions
30001	PGESTRING	Partition Table Containing Point Type Strings
0 (Disabled)	FLOATING POINT	Configurable Read-only Floating Point Group

Group configuration registers are read using function code 03 and set using function code 16. It is also possible to set a register in the 1001 – 7001 groups using function code 06. To disable a register group, set the base register to zero (0).

V. Configurable Register Group

Registers 110-357 can be used to configure a custom floating point register group as follows:

- Define the register group by writing the fixed register numbers of the data items to be included in this register group into registers 111-357. Any of the Boolean, Integer, Long Integer, or Floating Point registers may be specified. The data from boolean, integer, and long integer registers will be converted to floating point before they are inserted into the response packet.
- Enable the register group by writing a base register number into register 110. This will be the starting register number of the custom register group.

An example follows this register group table.

Register	Access	Description
100	Read/Write	Configuration Group Base Register Number
101	Read/Write	Boolean Register Group Base Register Number
102	Read/Write	Integer Register Group Base Register Number
103	Read/Write	Long Register Group Base Register Number
104	Read/Write	Floating Point Register Group Base Register Number
105	Read/Write	Daily Flow Archive Register Group Base Register Number
106	Read/Write	Log Period Archive Register Group Base Register Number
107	Read/Write	Event Log Archive Register Group Base Register Number
110	Read/Write	Poll Group Base Register Number -- 8000
111	Read/Write	Configurable Register 1
112	Read/Write	Configurable Register 2
113	Read/Write	Configurable Register 3
114	Read/Write	Configurable Register 4
115	Read/Write	Configurable Register 5
116	Read/Write	Configurable Register 6
117	Read/Write	Configurable Register 7
118	Read/Write	Configurable Register 8
119	Read/Write	Configurable Register 9
120	Read/Write	Configurable Register 10
121	Read/Write	Configurable Register 11
122	Read/Write	Configurable Register 12
123	Read/Write	Configurable Register 13
124	Read/Write	Configurable Register 14
125	Read/Write	Configurable Register 15
126	Read/Write	Configurable Register 16
127	Read/Write	Configurable Register 17
128	Read/Write	Configurable Register 18
129	Read/Write	Configurable Register 19
130	Read/Write	Configurable Register 20
131	Read/Write	Configurable Register 21
132	Read/Write	Configurable Register 22
133	Read/Write	Configurable Register 23
134	Read/Write	Configurable Register 24
135	Read/Write	Configurable Register 25
136	Read/Write	Configurable Register 26
137	Read/Write	Configurable Register 27
138	Read/Write	Configurable Register 28
139	Read/Write	Configurable Register 29
140	Read/Write	Configurable Register 30
141	Read/Write	Configurable Register 31

Configurable Registers (cont.)

Register	Access	Description
142	Read/Write	Configurable Register 32
143	Read/Write	Configurable Register 33
144	Read/Write	Configurable Register 34
145	Read/Write	Configurable Register 35
146	Read/Write	Configurable Register 36
147	Read/Write	Configurable Register 37
148	Read/Write	Configurable Register 38
149	Read/Write	Configurable Register 39
150	Read/Write	Configurable Register 40
151	Read/Write	Configurable Register 41
152	Read/Write	Configurable Register 42
153	Read/Write	Configurable Register 43
154	Read/Write	Configurable Register 44
155	Read/Write	Configurable Register 45
156	Read/Write	Configurable Register 46
157	Read/Write	Configurable Register 47
158	Read/Write	Configurable Register 48
159	Read/Write	Configurable Register 49
160	Read/Write	Configurable Register 50
161	Read/Write	Configurable Register 51
162	Read/Write	Configurable Register 52
163	Read/Write	Configurable Register 53
164	Read/Write	Configurable Register 54
165	Read/Write	Configurable Register 55
166	Read/Write	Configurable Register 56
167	Read/Write	Configurable Register 57
168	Read/Write	Configurable Register 58
169	Read/Write	Configurable Register 59
170	Read/Write	Configurable Register 60
171	Read/Write	Configurable Register 61
172	Read/Write	Configurable Register 62
173	Read/Write	Configurable Register 63
174	Read/Write	Configurable Register 64
175	Read/Write	Configurable Register 65
176	Read/Write	Configurable Register 66
177	Read/Write	Configurable Register 67
178	Read/Write	Configurable Register 68
179	Read/Write	Configurable Register 69
180	Read/Write	Configurable Register 70
181	Read/Write	Configurable Register 71
182	Read/Write	Configurable Register 72
183	Read/Write	Configurable Register 73
184	Read/Write	Configurable Register 74
185	Read/Write	Configurable Register 75
186	Read/Write	Configurable Register 76
187	Read/Write	Configurable Register 77
188	Read/Write	Configurable Register 78
189	Read/Write	Configurable Register 79
190	Read/Write	Configurable Register 80
191	Read/Write	Configurable Register 81
192	Read/Write	Configurable Register 82

Configurable Registers (cont.)

Register	Access	Description
193	Read/Write	Configurable Register 83
194	Read/Write	Configurable Register 84
195	Read/Write	Configurable Register 85
196	Read/Write	Configurable Register 86
197	Read/Write	Configurable Register 87
198	Read/Write	Configurable Register 88
199	Read/Write	Configurable Register 89
200	Read/Write	Configurable Register 90
201	Read/Write	Configurable Register 91
202	Read/Write	Configurable Register 92
203	Read/Write	Configurable Register 93
204	Read/Write	Configurable Register 94
205	Read/Write	Configurable Register 95
206	Read/Write	Configurable Register 96
207	Read/Write	Configurable Register 97
208	Read/Write	Configurable Register 98
209	Read/Write	Configurable Register 99
210	Read/Write	Configurable Register 100
211	Read/Write	Configurable Register 101
212	Read/Write	Configurable Register 102
213	Read/Write	Configurable Register 103
214	Read/Write	Configurable Register 104
215	Read/Write	Configurable Register 105
216	Read/Write	Configurable Register 106
217	Read/Write	Configurable Register 107
218	Read/Write	Configurable Register 108
219	Read/Write	Configurable Register 109
220	Read/Write	Configurable Register 110
221	Read/Write	Configurable Register 111
222	Read/Write	Configurable Register 112
223	Read/Write	Configurable Register 113
224	Read/Write	Configurable Register 114
225	Read/Write	Configurable Register 115
226	Read/Write	Configurable Register 116
227	Read/Write	Configurable Register 117
228	Read/Write	Configurable Register 118
229	Read/Write	Configurable Register 119
230	Read/Write	Configurable Register 120
231	Read/Write	Configurable Register 121
232	Read/Write	Configurable Register 122
233	Read/Write	Configurable Register 123
234	Read/Write	Configurable Register 124
235	Read/Write	Configurable Register 125
236	Read/Write	Configurable Register 126
237	Read/Write	Configurable Register 127
238	Read/Write	Configurable Register 128
239	Read/Write	Configurable Register 129
240	Read/Write	Configurable Register 130
241	Read/Write	Configurable Register 131
242	Read/Write	Configurable Register 132
243	Read/Write	Configurable Register 133
244	Read/Write	Configurable Register 134

Configurable Registers (cont.)

Register	Access	Description
245	Read/Write	Configurable Register 135
246	Read/Write	Configurable Register 136
247	Read/Write	Configurable Register 137
248	Read/Write	Configurable Register 138
249	Read/Write	Configurable Register 139
250	Read/Write	Configurable Register 140
251	Read/Write	Configurable Register 141
252	Read/Write	Configurable Register 142
253	Read/Write	Configurable Register 143
254	Read/Write	Configurable Register 144
255	Read/Write	Configurable Register 145
256	Read/Write	Configurable Register 146
257	Read/Write	Configurable Register 147
258	Read/Write	Configurable Register 148
259	Read/Write	Configurable Register 149
260	Read/Write	Configurable Register 150
261	Read/Write	Configurable Register 151
262	Read/Write	Configurable Register 152
263	Read/Write	Configurable Register 153
264	Read/Write	Configurable Register 154
265	Read/Write	Configurable Register 155
266	Read/Write	Configurable Register 156
267	Read/Write	Configurable Register 157
268	Read/Write	Configurable Register 158
269	Read/Write	Configurable Register 159
270	Read/Write	Configurable Register 160
271	Read/Write	Configurable Register 161
271	Read/Write	Configurable Register 162
272	Read/Write	Configurable Register 163
273	Read/Write	Configurable Register 164
274	Read/Write	Configurable Register 165
275	Read/Write	Configurable Register 166
276	Read/Write	Configurable Register 167
277	Read/Write	Configurable Register 168
278	Read/Write	Configurable Register 169
279	Read/Write	Configurable Register 170
280	Read/Write	Configurable Register 171
281	Read/Write	Configurable Register 172
282	Read/Write	Configurable Register 173
283	Read/Write	Configurable Register 174
284	Read/Write	Configurable Register 175
285	Read/Write	Configurable Register 176
286	Read/Write	Configurable Register 177
287	Read/Write	Configurable Register 178
288	Read/Write	Configurable Register 179
289	Read/Write	Configurable Register 180
290	Read/Write	Configurable Register 181
291	Read/Write	Configurable Register 182
292	Read/Write	Configurable Register 183
293	Read/Write	Configurable Register 184
294	Read/Write	Configurable Register 185

Configurable Registers (cont.)

Register	Access	Description
295	Read/Write	Configurable Register 186
296	Read/Write	Configurable Register 187
297	Read/Write	Configurable Register 188
298	Read/Write	Configurable Register 189
299	Read/Write	Configurable Register 190
300	Read/Write	Configurable Register 191
301	Read/Write	Configurable Register 192
302	Read/Write	Configurable Register 193
303	Read/Write	Configurable Register 194
304	Read/Write	Configurable Register 195
305	Read/Write	Configurable Register 196
306	Read/Write	Configurable Register 197
307	Read/Write	Configurable Register 198
308	Read/Write	Configurable Register 199
309	Read/Write	Configurable Register 200
310	Read/Write	Configurable Register 201
311	Read/Write	Configurable Register 202
312	Read/Write	Configurable Register 203
313	Read/Write	Configurable Register 204
314	Read/Write	Configurable Register 205
315	Read/Write	Configurable Register 206
316	Read/Write	Configurable Register 207
317	Read/Write	Configurable Register 208
318	Read/Write	Configurable Register 209
319	Read/Write	Configurable Register 210
320	Read/Write	Configurable Register 211
321	Read/Write	Configurable Register 212
322	Read/Write	Configurable Register 213
323	Read/Write	Configurable Register 214
324	Read/Write	Configurable Register 215
325	Read/Write	Configurable Register 216
326	Read/Write	Configurable Register 217
327	Read/Write	Configurable Register 218
328	Read/Write	Configurable Register 219
329	Read/Write	Configurable Register 220
330	Read/Write	Configurable Register 221
331	Read/Write	Configurable Register 222
332	Read/Write	Configurable Register 223
333	Read/Write	Configurable Register 224
334	Read/Write	Configurable Register 225
335	Read/Write	Configurable Register 226
336	Read/Write	Configurable Register 227
337	Read/Write	Configurable Register 228
338	Read/Write	Configurable Register 229
339	Read/Write	Configurable Register 230
340	Read/Write	Configurable Register 231
341	Read/Write	Configurable Register 232
342	Read/Write	Configurable Register 233
343	Read/Write	Configurable Register 234
344	Read/Write	Configurable Register 235

Configurable Registers (cont.)

Register	Access	Description
345	Read/Write	Configurable Register 236
346	Read/Write	Configurable Register 237
347	Read/Write	Configurable Register 238
348	Read/Write	Configurable Register 239
349	Read/Write	Configurable Register 240
350	Read/Write	Configurable Register 241
351	Read/Write	Configurable Register 242
352	Read/Write	Configurable Register 243
353	Read/Write	Configurable Register 244
354	Read/Write	Configurable Register 245
355	Read/Write	Configurable Register 246
356	Read/Write	Configurable Register 247
357	Read/Write	Configurable Register 248

Example Custom Group Definition:

```

110 = 8001      (Starting register number of group)
111 = 0        (Null)
112 = 0        (Null)
113 = 7003     (Current SP)
114 = 7004     (Current DP)
115 = 7005     (Current TF)
116 = 7006     (Current Flow Rate)
117 = 7009     (Today's Accumulated Volume)
118 = 7022     (Previous Day's Volume)
119 = 7001     (Current Battery Voltage)
120 = 7002     (Current Charger Voltage)
    
```

Using the above group definition, a poll of registers 8001-8010 will return:

```

8001 = zero (0.0)
8002 = zero (0.0)
8003 = Current SP
8004 = Current DP
8005 = Current TF
8006 = Current Flow Rate
8007 = Today's Accumulated Volume
8008 = Previous Day's Volume
8009 = Current Battery Voltage
8010 = Current Charger Voltage
    
```

As shown in the example above, null (0) register entries are allowed. The response packet will be padded with zero (0.0) values for each null register polled. Attempts to write to null register entries will be ignored.

VI. Boolean Register Group

Boolean registers are read using function code 01 or set using function code 05. The base register number for this register group defaults to 1001 when the unit is cold started. It can be changed by setting register 101 to the desired starting register number of the group.

Register	Access	Description	Meter Type
1001	Read/Write	Use Sqrt /linear SP/DP avgs (1 = Sqrt)	Gas Orifice
1002	Read/Write	Use F(pb) (1985 Equation)	G.O. / Turbine
1003	Read/Write	Use F(tb) (1985 Equation)	G.O. / Turbine
1004	Read/Write	Use F(tf) (1985 Equation)	Gas Orifice
1005	Read/Write	Use F(g)(1985 Equation)	Gas Orifice
1006	Read/Write	Use F(a)(1985 Equation)	Gas Orifice
1007	Read/Write	Use F@ (1985 Equation)	Gas Orifice
1008	Read/Write	Use Y (1985 Equation)	Gas Orifice
1009	Read/Write	Use F(w) (1985 Equation)	Gas Orifice
1010	Read/Write	Use F(pv) (1985 Equation)	Gas Orifice
1011	Read/Write	Use F(aux) (1985 Equation)	G.O. / Turbine
1012	Read/Write	Use F(b)(1985 Equation)	Gas Orifice
1013	Read/Write	Tap location (1985 Equation) (1 = Upstream)	Gas Orifice
1014	Read/Write	Orifice Type (0 = SS, 1 = Monel) (1985 Eq only)	Gas Orifice
1015	Read/Write	Use Y (1992 Equation)	Gas Orifice
1016	Read/Write	Use F(pv) (1992 Equation)	Gas Orifice
1017	Read/Write	Use F(w) (1992 Equation)	Gas Orifice
1018	Read/Write	Use F(aux) (1992 Equation)	Gas Orifice
1019	Read/Write	Tap location (1992 Equation)(1 = Upstream, 0 = Down)	Gas Orifice
1020	Read/Write	Use calc Cd / fixed Cd (1 = calc Cd) (1992 Equation)	Gas Orifice
1021	Read/Write	Tap Type Support (1 = supported) (1985 Equation)	Gas Orifice
1022	Read/Write	Tap type (1 = pipe, 0 = flange) (1985 Equation)	Gas Orifice
1023	Read/Write	RTD installed	G.O. / Turbine
1024	Read/Write	Temperature in calcs (1 = Measured, 0 = Fixed)	G.O. / Turbine
1025	Write Only	Reset volume	Gas Orifice
1026	Write Only	Reset Log Period	Gas Orifice
1027	Read/Write	Trip contact on Low Charger alarm	G.O. / Turbine
1028	Read/Write	Trip contact on DP low alarm	Gas Orifice
1029	Read/Write	Trip contact on DP high alarm	Gas Orifice
1030	Read/Write	Trip contact on SP low alarm	G.O. / Turbine
1031	Read/Write	Trip contact on SP high alarm	G.O. / Turbine
1032	Read/Write	Trip contact on Remote Sense	G.O. / Turbine
1033	Read/Write	Trip contact on volume setpoint	G.O. / Turbine
1034	Read/Write	Aux Contact Auto Reset (1 = yes)	G.O. / Turbine
1035	Read/Write	Auxiliary Contact State DO1 (0='ON' 1='OFF') Stays on for default time	Gas Orifice
1036	Read/Write	Hold Current Analog Inputs	Gas Orifice
1037	Read Only	Attached to stream (AIU support)	G.O. / Turbine
1038	Read Only	First analysis received (AIU support)	G.O. / Turbine
1039	Read/Write	Use Fixed Analysis on error (AIU support)	G.O. / Turbine
1040	Read/Write	Use Fixed Water Vapor Content	Gas Orifice
1041	Write Only	Wakeup FCU from low voltage induced sleep	Gas Orifice
1042	Read/Write	Use Fixed Test Mode SP, DP/PI, and RTD values.	Gas Orifice
1043	Read/Write	Use Measured SP	Turbine
1044	Read/Write	Use S (Fpv ²)	Turbine

Boolean Registers (cont.)

Register	Access	Description	Meter Type
1045	Read/Write	Trip contact on ACF low alarm	Turbine
1046	Read/Write	Trip contact on ACF high alarm	Turbine
1047	Read Only	Remote Sense Digital Input State(DI 1)	G.O. / Turbine
1048	Read Only	Digital Input 2	G.O. / Turbine
1049	Read/Write	Digital Output 2 (0='ON', 1='OFF') stays on for default time	G.O. / Turbine
1050	Read/Write	Trip DO 1 on TF Low Limit	G.O./ Turbine
1051	Read/Write	Trip DO 1 on TF High Limit	G.O./ Turbine
1052	Read/Write	Trip DO 1 on Flow Rate Low Limit	G.O./ Turbine
1053	Read/Write	Trip DO 1 on Flow Rate High Limit	G.O./ Turbine
1054	Read/Write	Trip DO 2 on Low Charger	G.O./ Turbine
1055	Read/Write	Trip DO 2 on DP(ACF) Low Limit	G.O./ Turbine
1056	Read/Write	Trip DO 2 on DP(ACF) High Limit	G.O./ Turbine
1057	Read/Write	Trip DO 2 on SP Low Limit	G.O./ Turbine
1058	Read/Write	Trip DO 2 on SP High Limit	G.O./ Turbine
1059	Read/Write	Trip DO 2 on Remote Sense	G.O./ Turbine
1060	Read/Write	Trip DO 2 on Volume Setpoint	G.O./ Turbine
1061	Read/Write	Auto Reset DO 2	G.O./ Turbine
1062	Read/Write	Trip DO 2 on TF Low Limit	G.O./ Turbine
1063	Read/Write	Trip DO 2 on TF High Limit	G.O./ Turbine
1064	Read/Write	Trip DO 2 on Flow Rate Low Limit	G.O./ Turbine
1065	Read/Write	Trip DO 2 on Flow Rate High Limit	G.O./ Turbine
1066	Read/Write	Configure gravity for live analysis	G.O./ Turbine
1067	Read/Write	Fixed gravity value on error	G.O./ Turbine
1068	Read/Write	Configure heating value for live analysis	G.O./ Turbine
1069	Read/Write	Fixed heating value on error	G.O./ Turbine
1070	Read/Write	Configure CO2 for live analysis	G.O./ Turbine
1071	Read/Write	Fixed CO2 value on error	G.O./ Turbine
1072	Read/Write	Configure N2 for live analysis	G.O./ Turbine
1073	Read/Write	Fixed N2 value on error	G.O./ Turbine
1074	Read/Write	Configure Methane for live analysis	G.O./ Turbine
1075	Read/Write	Fixed Methane value on error	G.O./ Turbine
1076	Read/Write	Configure H2S for live analysis	G.O./ Turbine
1077	Read/Write	Fixed H2S on error	G.O./ Turbine
1078	Read/Write	Configure H2O for live analysis	G.O./ Turbine
1079	Read/Write	Fixed H2O on error	G.O./ Turbine
1080	Read/Write	Configure Helium for live analysis	G.O./ Turbine
1081	Read/Write	Fixed Helium value on error	G.O./ Turbine
1082	Read/Write	Configure C2 for live analysis	G.O./ Turbine
1083	Read/Write	Fixed C2 value on error	G.O./ Turbine
1084	Read/Write	Configure C3 for live analysis	G.O./ Turbine
1085	Read/Write	Fixed C3 value on error	G.O./ Turbine
1086	Read/Write	Configure IC4 for live analysis	G.O./ Turbine

Boolean Registers (cont.)

Register	Access	Description	Meter Type
1087	Read/Write	Fixed IC4 value on error	G.O./ Turbine
1088	Read/Write	Configure NC4 for live analysis	G.O./ Turbine
1089	Read/Write	Fixed NC4 value on error	G.O./ Turbine
1090	Read/Write	Configure IC5 for live analysis	G.O./ Turbine
1091	Read/Write	Fixed IC5 value on error	G.O./ Turbine
1092	Read/Write	Configure NC5 for live analysis	G.O./ Turbine
1093	Read/Write	Fixed NC5 value on error	G.O./ Turbine
1094	Read/Write	Configure NC6 for live analysis	G.O./ Turbine
1095	Read/Write	Fixed NC6 value on error	G.O./ Turbine
1096	Read/Write	Configure NC72 for live analysis	G.O./ Turbine
1097	Read/Write	Fixed NC7 value on error	G.O./ Turbine
1098	Read/Write	Configure NC8 for live analysis	G.O./ Turbine
1099	Read/Write	Fixed NC8 value on error	G.O./ Turbine
1100	Read/Write	Configure NC9 for live analysis	G.O./ Turbine
1101	Read/Write	Fixed NC9 on error	G.O./ Turbine
1102	Read/Write	Configure NC10 for live analysis	G.O./ Turbine
1103	Read/Write	Fixed NC10 on error	G.O./ Turbine
1104	Read/Write	Configure Oxygen for live analysis	G.O./ Turbine
1105	Read/Write	Fixed Oxygen value on error	G.O./ Turbine
1106	Read/Write	Configure CO for live analysis	G.O./ Turbine
1107	Read/Write	Fixed CO value on error	G.O./ Turbine
1108	Read/Write	Configure H2 for live analysis	G.O./ Turbine
1109	Read/Write	Fixed H2 value on error	G.O./ Turbine
1110	Read/Write	Configure Argon for live analysis	G.O./ Turbine
1111	Read/Write	Fixed Argon value on error	G.O./ Turbine
1112	Read	User Bool	G.O./ Turbine
1113-1162	Read	User Bool's	G.O./ Turbine
1163	Write	Reset PG&E Block Table to Factory Defaults	G.O./ Turbine
1164	Write	Reset PG&E Poll Group Config to Factory Defaults	G.O./ Turbine

VII. Short Integer Register Group

Short integer registers are read using function code 03 and set using function code 06 or 16. The base register number for this register group defaults to 3001 when the unit is cold started. It can be changed by setting register 102 to the desired starting register number of the group.

Register	Access	Description	Meter Type
3001	Read Only	Primary element (1 = Turbine, 0 = Gas Orifice)	G.O. / Turbine
3002	Read Only	Primary element mask	G.O. / Turbine
3003	Read/Write	FCU volume calc. method (1 = 1985 eq., 2 = 1992 eq.)	G.O. / Turbine
3004	Read Only	FCU volume calc method mask	G.O. / Turbine
3005	Read Only	FCU calculation units	G.O. / Turbine
3006	Read Only	FCU calculation units mask	G.O. / Turbine
3007	Read/Write	Supercomp method (0 = NX19 Fixed, 1 = NX19 Auto, 2 = NX19 GCN, 3 = NX19 GCNM, 11 = AGA-8 Gross, 12 = AGA-8 Detail)	G.O. / Turbine
3008	Read Only	Supercomp method mask	G.O. / Turbine
3009	Read/Write	Contract Hour	G.O. / Turbine
3010	Read/Write	Volume calculation period in seconds (60, 120, 600, 1200, & 3600)	G.O. / Turbine
3011	Read/Write	Modbus Slave Address	G.O. / Turbine
3012	Read/Write	Remote Comm Baud (0=1200,1=2400,2=4800,3=9600)	G.O. / Turbine
3013	Read/Write	Remote Comm Data Bits (7 or 8)	G.O. / Turbine
3014	Read/Write	Remote Comm Parity (0 = None, 1 = Odd, 2 = Even)	G.O. / Turbine
3015	Read/Write	Remote Comm Stop Bits (1 or 2)	G.O. / Turbine
3016	Read/Write	Radio power up delay(milliseconds)	G.O. / Turbine
3017	Read/Write	Xmitter key delay(milliseconds)	G.O. / Turbine
3018	Read/Write	Xmitter unkey delay (milliseconds)	G.O. / Turbine
3019	Read/Write	Remote Comm Protocol (0 = Totalflow, 1 = Modbus)	G.O. / Turbine
3020	Read/Write	Remote Comm Link Establish Time (Totalflow Protocol)	G.O. / Turbine
3021	Read/Write	Maximum Number of Events	G.O. / Turbine
3022	Read/Write	Sequence Number of Last Event Logged	G.O. / Turbine
3023	Read/Write	Sequence Number of Last Event Read	G.O. / Turbine
3024	Read/Write	Sequence Number of Last Event Acknowledged	G.O. / Turbine
3025	Read/Write	Number of unacknowledged events	G.O. / Turbine
3026	Read/Write	Maximum Number of Log Period Records	G.O. / Turbine
3027	Read Only	Sequence Number of current Log Period Record	G.O. / Turbine
3028	Read/Write	Maximum Number of Day Period Records	G.O. / Turbine
3029	Read Only	Sequence Number of current Day Period Record	G.O. / Turbine
3030	Read Only	Sequence number of 1st Log Period Rec in current day	G.O. / Turbine
3031	Read/Write	Vol Period Counter	G.O. / Turbine
3032	Read/Write	FCU ID	G.O. / Turbine
3033	Read/Write	FCU ID (cont.)	G.O. / Turbine
3034	Read/Write	FCU ID (cont.)	G.O. / Turbine
3035	Read/Write	FCU ID (cont.)	G.O. / Turbine
3036	Read/Write	FCU ID (cont.)	G.O. / Turbine
3037	Read/Write	FCU Location	G.O. / Turbine
3038	Read/Write	FCU Location (cont.)	G.O. / Turbine
3039	Read/Write	FCU Location (cont.)	G.O. / Turbine
3040	Read/Write	FCU Location (cont.)	G.O. / Turbine
3041	Read/Write	FCU Location (cont.)	G.O. / Turbine
3042	Read/Write	FCU Location (cont.)	G.O. / Turbine
3043	Read/Write	FCU Location (cont.)	G.O. / Turbine
3044	Read/Write	FCU Location (cont.)	G.O. / Turbine
3045	Read/Write	FCU Location (cont.)	G.O. / Turbine

Short Integer Group (cont.)

Register	Access	Description	Meter Type
3046	Read/Write	FCU Location (cont.)	G.O. / Turbine
3047	Read/Write	FCU Location (cont.)	G.O. / Turbine
3048	Read/Write	FCU Location (cont.)	G.O. / Turbine
3049	Read/Write	Software Part Number	G.O. / Turbine
3050	Read/Write	Software Part Number (cont.)	G.O. / Turbine
3051	Read/Write	Software Part Number (cont.)	G.O. / Turbine
3052	Read/Write	Software Part Number (cont.)	G.O. / Turbine
3053	Read/Write	Software Part Number (cont.)	G.O. / Turbine
3054	Read/Write	Software Part Number (cont.)	G.O. / Turbine
3055	Read/Write	Software Part Name	G.O. / Turbine
3056	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3057	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3058	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3059	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3060	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3061	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3062	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3063	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3064	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3065	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3066	Read/Write	Software Part Name (cont.)	G.O. / Turbine
3067	Read/Write	Software Revision	G.O. / Turbine
3068	Read/Write	Software Revision (cont.)	G.O. / Turbine
3069	Read Only	Flow Window Period In Seconds (1, 2, 5, 10, 15, 20, 30, & 60) (60 - 3600 in 60 sec. intervals)	Turbine
3070	Read/Write	Modbus Group Address	G.O. / Turbine
3071	Read/Write	Current Group Select	G.O. / Turbine
3072	Read/Write	Remote Port Listen Interval Timeout (Seconds)	G.O. / Turbine
3073	Read/Write	Local Port Listen Interval Timeout (Seconds)	G.O. / Turbine
3074	Read/Write	Aux Port Listen Interval Timeout (Seconds)	G.O. / Turbine
3075	Read/Write	Current Analog Input Number (0-6)	G.O. / Turbine
3076	Read/Write	Number of Components in Live Analysis	G.O. / Turbine
3077	Read/Write	Live Analysis Update Period (seconds)	G.O. / Turbine
3078-3079	Read/Write	User Integers	G.O. / Turbine
3080	Read/Write	Remote Port Comm Schedule	G.O. / Turbine
3081	Read/Write	Remote Port Comm Hour	G.O. / Turbine
3082	Read/Write	Remote Port Comm Min	G.O. / Turbine
3083	Read/Write	Remote Port Comm Duration	G.O. / Turbine
3084	Read/Write	Remote Port Comm Schedule Status	G.O. / Turbine
3085	Read/Write	Remote Port Comm Interval	G.O. / Turbine
3086	Read/Write	Remote Port Comm Off Hour	G.O. / Turbine
3087	Read/Write	Remote Port Comm Exception Retry	G.O. / Turbine
3088	Read/Write	AUX Port Comm Schedule	G.O. / Turbine
3089	Read/Write	AUX Port Comm Hour	G.O. / Turbine
3090	Read/Write	AUX Port Comm Min	G.O. / Turbine
3091	Read/Write	AUX Port Comm Duration	G.O. / Turbine
3092	Read/Write	AUX Port Comm Schedule Status	G.O. / Turbine
3093	Read/Write	AUX Port Comm Interval	G.O. / Turbine
3094	Read/Write	AUX Port Comm Off Hour	G.O. / Turbine
3095	Read/Write	AUX Port Comm Exception Retry	G.O. / Turbine
3096-3117	Read/Write	User Integers	G.O. / Turbine
3118	Read Only	PG&E NULL Character Register	G.O. / Turbine

Short Integer Group (cont.)

Register	Access	Description	Meter Type
3119	Read Only	PG&E NULL ASCII Register	G.O. / Turbine
3120	Read Only	PG&E NULL Integer Register	G.O. / Turbine
3121	Read Only	PG&E NULL Binary Register	G.O. / Turbine
3122	Read/Write	PG&E DO 1 (0=Default of 15 sec, any other value is time to stay on)	G.O. / Turbine
3123	Read/Write	PG&E DO 2 (0=Default of 15 sec, any other value is time to stay on)	G.O. / Turbine
3124	Read/Write	Month	G.O. / Turbine
3125	Read/Write	Day	G.O. / Turbine
3126	Read/Write	Year	G.O. / Turbine
3127	Read/Write	Hour	G.O. / Turbine
3128	Read/Write	Minutes	G.O. / Turbine
3129	Read/Write	Seconds	G.O. / Turbine
3130	Read Only	Day of Week	G.O. / Turbine
3131	Read/Write	PG&E Date/Time 6 byte Register	G.O. / Turbine
3132	Read Only	DI 1 Status for Block Protocol	G.O. / Turbine
3133	Read Only	DI 2 Status for Block Protocol	G.O. / Turbine
3134	Read Only	DO 1 Status for Block Protocol	G.O. / Turbine
3135	Read Only	DO 2 Status for Block Protocol	G.O. / Turbine
3136	Read Only	Host Type ('R' = RTU, 'A'=ASCII) (Port Specific)	G.O. / Turbine
3137	Read/Write	AUX Port Baudrate	G.O. / Turbine
3138	Read/Write	AUX Port Data Bits	G.O. / Turbine
3139	Read/Write	AUX Port Parity	G.O. / Turbine
3140	Read/Write	AUX Port Stop Bits	G.O. / Turbine
3141	Read/Write	AUX Port Radio Power Up Delay (milliseconds)	G.O. / Turbine
3142	Read/Write	AUX Port Xmitter Key Delay	G.O. / Turbine
3143	Read/Write	AUX Port Xmitter Un-Key Delay	G.O. / Turbine
3144	Read/Write	AUX Port Comm Protocol	G.O. / Turbine
3145	Read/Write	AUX Port Comm Link Establish Time	G.O. / Turbine
3146	Read/Write	Reset Factory Calibration	G.O. / Turbine
3147	Read/Write	Auto Fb Enable	G.O. / Turbine

VIII. Long Integer Register Group

Long integer registers are read using function code 03 and set using function code 06 or 16. The base register number for this register group defaults to 5001 when the unit is cold started. It can be changed by setting register 103 to the desired starting register number of the group.

Register	Access	Description	Meter Type
5001	Read/Write	Date / Time (Julian - # seconds since 00:00:00 1/1/70)	G.O. / Turbine
5002	Read/Write	Volume Log period	G.O. / Turbine
5003	Read Only	Log Period Counter	G.O. / Turbine
5004	Read Only	Log Period Start Date/Time	G.O. / Turbine
5005	Read Only	Day Period Start Date/Time	G.O. / Turbine
5006	Read Only	AIU Date/Time	G.O. / Turbine
5007	Read Only	AIU Stream ID	G.O. / Turbine
5008	Read/Write	Modbus Security Seed	G.O. / Turbine
5009	Read Only	Extended Feature Flags	G.O. / Turbine
5010	Read Only	Cold Start Date	G.O. / Turbine
5011	Read Only	Total RAM size	G.O. / Turbine
5012	Read Only	Total Banked RAM size	G.O. / Turbine
5013	Read Only	Total Free Banked RAM	G.O. / Turbine
5014	Read Only	Last calc Period Int. Range	G.O. / Turbine
5015	Read Only	Last calc Period Int. Counts	G.O. / Turbine
5016	Read Only	Last calc Period Alarms	G.O. / Turbine
5017	Read/Write	PI 1 Accumulated Counts	G.O. / Turbine
5018	Read/Write	PI 2 Accumulated Counts	G.O. / Turbine
5019	Read Only	PI 1 Current Counts (1 second reading)	G.O. / Turbine
5020	Read Only	PI 2 Current Counts (1 second reading)	G.O. / Turbine
5021-5028	Read Only	Null Registers	G.O. / Turbine
5027	Read Only	Extended Feature Flags 2	G.O. / Turbine
5028	Read Only	PG&E NULL Long Integer Register	G.O. / Turbine
5029	Read Only	Poll Group Alarm Status Register 1	G.O. / Turbine
5030	Read Only	Poll Group Alarm Status Register 2	G.O. / Turbine
5031	Read Only	Poll Group DI Status	G.O. / Turbine
5032	Read/Write	Poll Group DO Status and Set Register	G.O. / Turbine

IX. Floating Point Register Group

Floating point registers are read using function code 03 and set using function code 06 or 16. The base register number for this register group defaults to 7001 when the unit is cold started. It can be changed by setting register 104 to the desired starting register number of the group.

Register	Access	Description	Meter Type
7001	Read Only	Current battery voltage	G.O. / Turbine
7002	Read Only	Current charger voltage	G.O. / Turbine
7003	Read Only	Current SP	G.O. / Turbine
7004	Read Only	Current DP	Gas Orifice
7005	Read Only	Current Temp	G.O. / Turbine
7006	Read Only	Current flow rate (MCF/Hour)	G.O. / Turbine
7007	Read Only	Current energy rate (MMBTU/Hour)	G.O. / Turbine
7008	Read Only	Accumulated volume (MCF)	G.O. / Turbine
7009	Read Only	Accumulated Volume since start of contract day (MCF)	G.O. / Turbine
7010	Read Only	Previous Hour diff. pressure	Gas Orifice
7011	Read Only	Previous Hour abs. pressure	G.O. / Turbine
7012	Read Only	Previous Hour flowing temp	G.O. / Turbine
7013	Read Only	Previous Hour extension	Gas Orifice
7014	Read Only	Previous Hour volume (MCF)	G.O. / Turbine
7015	Read Only	Previous Hour energy (MMBTU)	G.O. / Turbine
7016	Read Only	Previous Hour Flow Time (MMMM.SS)	G.O. / Turbine
7017	Read Only	Previous Hour Time (MMMM.SS)	G.O. / Turbine
7018	Read Only	Previous Day diff. pressure	Gas Orifice
7019	Read Only	Previous Day abs. pressure	G.O. / Turbine
7020	Read Only	Previous Day flowing temp	G.O. / Turbine
7021	Read Only	Previous Day Extension	Gas Orifice
7022	Read Only	Previous Day volume (MCF)	G.O. / Turbine
7023	Read Only	Previous Day energy (MMBTU)	G.O. / Turbine
7024	Read Only	Previous Day Flow Time (MMMM.SS)	G.O. / Turbine
7025	Read Only	Previous Day Time (MMMM.SS)	G.O. / Turbine
7026	Read/Write	Fixed Analysis BTU	G.O. / Turbine
7027	Read/Write	Fixed Analysis Gravity	G.O. / Turbine
7028	Read/Write	Fixed Analysis CO2	G.O. / Turbine
7029	Read/Write	Fixed Analysis N2	G.O. / Turbine
7030	Read/Write	Fixed Analysis Methane	G.O. / Turbine
7031	Read/Write	Fixed Analysis Ethane	G.O. / Turbine
7032	Read/Write	Fixed Analysis Propane	G.O. / Turbine
7033	Read/Write	Fixed Analysis IButane	G.O. / Turbine
7034	Read/Write	Fixed Analysis NButane	G.O. / Turbine
7035	Read/Write	Fixed Analysis IPentane	G.O. / Turbine
7036	Read/Write	Fixed Analysis NPentane	G.O. / Turbine
7037	Read/Write	Fixed Analysis NHexane	G.O. / Turbine
7038	Read/Write	Fixed Analysis NHeptane	G.O. / Turbine
7039	Read/Write	Fixed Analysis NOctane	G.O. / Turbine
7040	Read/Write	Fixed Analysis NNonane	G.O. / Turbine
7041	Read/Write	Fixed Analysis H2S	G.O. / Turbine
7042	Read/Write	Fixed Analysis Hydrogen	G.O. / Turbine
7043	Read/Write	Fixed Analysis Helium	G.O. / Turbine
7044	Read/Write	Fixed Analysis Oxygen	G.O. / Turbine
7045	Read/Write	Fixed Analysis Carbon Monoxide	G.O. / Turbine
7046	Read/Write	Fixed Analysis Argon	G.O. / Turbine
7047	Read/Write	Fixed Analysis NDecane	G.O. / Turbine

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Floating Point (cont.)

Register	Access	Description	Meter Type
7048	Read/Write	Fixed Analysis H2O	G.O. / Turbine
7049	Read/Write	Fixed temperature	G.O. / Turbine
7050	Read/Write	Temperature bias	G.O. / Turbine
7051	Read/Write	Temperature base	G.O. / Turbine
7052	Read/Write	Pressure base	G.O. / Turbine
7053	Read/Write	Ratio of specific heats	G.O. / Turbine
7054	Read/Write	Viscosity	G.O. / Turbine
7055	Read/Write	Fixed F(b) (1985 Equation)	Gas Orifice
7056	Read/Write	Fixed Cd (1992 Equation)	Gas Orifice
7057	Read/Write	Fixed F(aux)	G.O. / Turbine
7058	Read/Write	Fixed F(t) for NX19	G.O. / Turbine
7059	Read/Write	Fixed F(p) for NX19	G.O. / Turbine
7060	Read/Write	Zba – Z of air at base (1992 Equation)	Gas Orifice
7061	Read/Write	Orifice diameter	Gas Orifice
7062	Read/Write	Orifice plate coef. Of expansion (1992 Equation)	Gas Orifice
7063	Read/Write	Pipe diameter	Gas Orifice
7064	Read/Write	Pipe coef. Of expansion (1992 Equation)	Gas Orifice
7065	Read/Write	Fixed barometric pressure	G.O. / Turbine
7066	Read/Write	Fixed Water Vapor Content (LBS/MMSCF)	Gas Orifice
7067	Read/Write	Water Content Bias (LBS/MMSCF)	Gas Orifice
7068	Read Only	Last Calc Period diff. Pressure	Gas Orifice
7069	Read Only	Last Calc Period abs. Pressure	G.O. / Turbine
7070	Read Only	Last Calc Period flowing temp	G.O. / Turbine
7071	Read Only	Last Calc Period volume (MCF)	G.O. / Turbine
7072	Read Only	Last Calc Period Extension	Gas Orifice
7073	Read Only	Last Calc Period C'	G.O. / Turbine
7074	Read Only	Last Calc Period Y	Gas Orifice
7075	Read Only	Last Calc Period F(pv)	Gas Orifice
7076	Read Only	Last Calc Period F(w)	Gas Orifice
7077	Read Only	Last Calc Period F(aux)	Gas Orifice
7078	Read Only	Last Calc Period Qv	Gas Orifice
7079	Read Only	Last Calc Period F(b)	Gas Orifice
7080	Read Only	Last Calc Period F®	Gas Orifice
7081	Read Only	Last Calc Period F(pb)	G.O. / Turbine
7082	Read Only	Last Calc Period F(tb)	G.O. / Turbine
7083	Read Only	Last Calc Period F(tf)	Gas Orifice
7084	Read Only	Last Calc Period F(g)	Gas Orifice
7085	Read Only	Last Calc Period F(a)	Gas Orifice
7086	Read Only	Last Calc Period Fip	Gas Orifice
7087	Read Only	Last Calc Period Ev	Gas Orifice
7088	Read Only	Last Calc Period Orif Diameter	Gas Orifice
7089	Read Only	Last Calc Period Pipe Diameter	Gas Orifice
7090	Read Only	Last Calc Period Rhob	Gas Orifice
7091	Read Only	Last Calc Period qm	Gas Orifice
7092	Read Only	Last Calc Period Cd	Gas Orifice
7093	Read Only	Last Calc Analysis BTU	G.O. / Turbine
7094	Read Only	Last Calc Analysis Gravity	G.O. / Turbine
7095	Read Only	Last Calc Analysis CO2	G.O. / Turbine
7096	Read Only	Last Calc Analysis N2	G.O. / Turbine
7097	Read Only	Last Calc Analysis Methane	G.O. / Turbine
7098	Read Only	Last Calc Analysis Ethane	G.O. / Turbine
7099	Read Only	Last Calc Analysis Propane	G.O. / Turbine

Floating Point (cont.)

Register	Access	Description	Meter Type
7100	Read Only	Last Calc Analysis Ibutane	G.O. / Turbine
7101	Read Only	Last Calc Analysis Nbutane	G.O. / Turbine
7102	Read Only	Last Calc Analysis Ipentane	G.O. / Turbine
7103	Read Only	Last Calc Analysis Npentane	G.O. / Turbine
7104	Read Only	Last Calc Analysis Nhexane	G.O. / Turbine
7105	Read Only	Last Calc Analysis Nheptane	G.O. / Turbine
7106	Read Only	Last Calc Analysis Noctane	G.O. / Turbine
7107	Read Only	Last Calc Analysis Nnonane	G.O. / Turbine
7108	Read Only	Last Calc Analysis H2S	G.O. / Turbine
7109	Read Only	Last Calc Analysis Hydrogen	G.O. / Turbine
7110	Read Only	Last Calc Analysis Helium	G.O. / Turbine
7111	Read Only	Last Calc Analysis Oxygen	G.O. / Turbine
7112	Read Only	Last Calc Analysis Carbon Monoxide	G.O. / Turbine
7113	Read Only	Last Calc Analysis Argon	G.O. / Turbine
7114	Read Only	Last Calc Analysis Ndecane	G.O. / Turbine
7115	Read Only	Last Calc Analysis H2O	G.O. / Turbine
7116	Read/Write	DP Zero cutoff	Gas Orifice
7117	Read/Write	DP low limit	Gas Orifice
7118	Read/Write	DP hi limit	Gas Orifice
7119	Read/Write	SP lo limit	G.O. / Turbine
7120	Read/Write	SP hi limit	G.O. / Turbine
7121	Read/Write	Tf low limit	G.O. / Turbine
7122	Read/Write	Tf high limit	G.O. / Turbine
7123	Read/Write	Flow Rate low limit	G.O. / Turbine
7124	Read/Write	Flow Rate high limit	G.O. / Turbine
7125	Read/Write	Volume Set Point for contact	G.O. / Turbine
7126	Read Only	Accumulated Volume Rollover Setpoint	G.O. / Turbine
7127	Read/Write	Places User Site Code in Event Log	G.O. / Turbine
7128	Read Only	SP low calibration	G.O. / Turbine
7129	Read Only	SP mid calibration	G.O. / Turbine
7130	Read Only	SP high calibration	G.O. / Turbine
7131	Read Only	DP lo calibration	Gas Orifice
7132	Read Only	DP mid calibration	Gas Orifice
7133	Read Only	DP high calibration	Gas Orifice
7134	Read Only	Current Unfiltered Temp	G.O. / Turbine
7135	Read Only	Current Unfiltered SP	G.O. / Turbine
7136	Read Only	Current Unfiltered DP	Gas Orifice
7137	Read Only	Current Pulse Count * Meter Factor	G.O. / Turbine
7138	Read Only	Test Mode Fixed RTD Input Value	G.O. / Turbine
7139	Read Only	Test Mode Fixed SP Input Value	G.O. / Turbine
7140	Read Only	Test Mode Fixed DP/PI Input Value	G.O. / Turbine
7141	Read Only	Previous Vol Period Pulse Count	Turbine
7142	Read Only	Current Uncorrected Flow Rate	Turbine
7143	Read Only	Uncorrected Accumulated Volume	Turbine
7144	Read Only	Yesterday's Uncorrected Volume	Turbine
7145	Read Only	Last Calc Period Uncorrected Volume	Turbine
7146	Read Only	Last Calc Period S (Fpv ²)	Turbine
7147	Read Only	Fixed SP	Turbine
7148	Read Only	ACF high limit	Turbine
7149	Read Only	ACF low limit	Turbine
7150	Read Only	Meter Factor	Turbine
7151	Read Only	Accumulated Energy	GO. / Turbine

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Floating Point (cont.)

Register	Access	Description	Meter Type
7152	Read Only	Contract Day Accumulated Energy	G.O. / Turbine
7153	Read Only	Prev Contract Day Accum Energy	G.O. / Turbine
7154	Read Only	Prev Contract Day Accum Volume	G.O. / Turbine
7155	Read Only	AI 1 scaled value	G.O. / Turbine
7156	Read Only	AI 2 scaled value	G.O. / Turbine
7157	Read Only	AI 1 ratio value	G.O. / Turbine
7158	Read Only	AI 2 ratio value	G.O. / Turbine
7159	Read/Write	PI 1 K factor	G.O. / Turbine
7160	Read/Write	PI 2 K factor	G.O. / Turbine
7161	Read Only	PI 1 Accum Contract Day Value	G.O. / Turbine
7162	Read Only	PI 2 Accum Contract Day Value	G.O. / Turbine
7163	Read Only	PI 1 Prev Contract Day Value	G.O. / Turbine
7164	Read Only	PI 2 Prev Contract Day Value	G.O. / Turbine
7165	Read Only	Current PI 1 Value	G.O. / Turbine
7166	Read Only	Current PI 2 Value	G.O. / Turbine
7167	Read/Write	Calibrate selected analog input	G.O. / Turbine
7168	Read/Write	Selected analog input mid hi cal units	G.O. / Turbine
7169	Read/Write	Selected analog input mid lo cal units	G.O. / Turbine
7170	Read/Write	Selected analog input high cal units	G.O. / Turbine
7171	Read/Write	Selected analog input mid cal units	G.O. / Turbine
7172	Read/Write	Selected analog input low cal units	G.O. / Turbine
7173	Read/Write	DO2 Volume Setpoint	G.O. / Turbine
7174	Read/Write	Live Analysis Gravity	G.O. / Turbine
7175	Read/Write	Live Analysis BTU	G.O. / Turbine
7176	Read/Write	Live Analysis CO2	G.O. / Turbine
7177	Read/Write	Live Analysis N2	G.O. / Turbine
7178	Read/Write	Live Analysis Methane	G.O. / Turbine
7179	Read/Write	Live Analysis H2S	G.O. / Turbine
7180	Read/Write	Live Analysis H2O	G.O. / Turbine
7181	Read/Write	Live Analysis Helium	G.O. / Turbine
7182	Read/Write	Live Analysis Ethane	G.O. / Turbine
7183	Read/Write	Live Analysis Propane	G.O. / Turbine
7184	Read/Write	Live Analysis Ibutane	G.O. / Turbine
7185	Read/Write	Live Analysis Nbutane	G.O. / Turbine
7186	Read/Write	Live Analysis Ipentane	G.O. / Turbine
7187	Read/Write	Live Analysis Npentane	G.O. / Turbine
7188	Read/Write	Live Analysis Nhexane	G.O. / Turbine
7189	Read/Write	Live Analysis Nheptane	G.O. / Turbine
7190	Read/Write	Live Analysis Noctane	G.O. / Turbine
7191	Read/Write	Live Analysis NNonane	G.O. / Turbine
7192	Read/Write	Live Analysis NDecane	G.O. / Turbine
7193	Read/Write	Live Analysis Oxygen	G.O. / Turbine
7194	Read/Write	Live Analysis Carbon Monoxide	G.O. / Turbine
7195	Read/Write	Live Analysis Hydrogen	G.O. / Turbine
7196	Read/Write	Live Analysis Argon	G.O. / Turbine
7197	Read/Write	Custom group scale factor	G.O. / Turbine
7198	Read/Write	Current flow rate in MCF/Day	G.O. / Turbine
7199-7205	Read/Write	User Float's	G.O. / Turbine
7206	Read	AIU Air Component	G.O. / Turbine
7207	Read	AIU C6plus Component	G.O. / Turbine
7208	Read	AIU C7plus Component	G.O. / Turbine
7209	Read	AIU C8plus Component	G.O. / Turbine

Floating Point (cont.)

Register	Access	Description	Meter Type
7210	Read	AIU sgf Component	G.O. / Turbine
7211	Read	AIU cpcv Component	G.O. / Turbine
7212	Read	AIU Viscosity Component	G.O. / Turbine
7213	Read	AIU Density Component	G.O. / Turbine
7214	Read	AIU ft Component	G.O. / Turbine
7215	Read	AIU fp Component	G.O. / Turbine
7216	Read	AIU H2O Content Component	G.O. / Turbine
7217	Read	AIU H2O Bias Component	G.O. / Turbine
7218-7268	Read/Write	User Float's	G.O. / Turbine
7269	Read	PG&E NULL Float Register	G.O. / Turbine
7270	Read	AI #1 Calibration Low Value	G.O. / Turbine
7271	Read	AI #1 Calibration Mid Low Value	G.O. / Turbine
7272	Read	AI #1 Calibration Mid Value	G.O. / Turbine
7273	Read	AI #1 Calibration Mid High Value	G.O. / Turbine
7274	Read	AI #1 Calibration High Value	G.O. / Turbine
7275	Read	AI #2 Calibration Low Value	G.O. / Turbine
7276	Read	AI #2 Calibration Mid Low Value	G.O. / Turbine
7277	Read	AI #2 Calibration Mid Value	G.O. / Turbine
7278	Read	AI #2 Calibration Mid High Value	G.O. / Turbine
7279	Read	AI #2 Calibration High Value	G.O. / Turbine
7280	Read	Current Flow MMCF/Day	G.O. / Turbine
7281	Read	Current Energy MMBTU/Day	G.O. / Turbine

X. TLP Register Group

The TLP registers are 3 byte data entities. These registers are read using function code 03 and set using function code 06 or 16. The base register number for this register group defaults to 15001 when the unit is cold started.

Register	Access	Description	Meter Type
15001	Read/Write	Primary Input Point	G.O. / Turbine
15002	Read/Write	Primary Output Point	G.O. / Turbine
15003	Read/Write	Primary Switch Variable	G.O. / Turbine
15004	Read/Write	Override Input Point	G.O. / Turbine
15005	Read/Write	Override Output point	G.O. / Turbine
15006	Read/Write	Override Switch Variable	G.O. / Turbine
15007	Read/Write	Low DP (stacked)	G.O. / Turbine
15008	Read/Write	DP Number (stacked)	G.O. / Turbine
15009	Read/Write	Static Press Number (stacked)	G.O. / Turbine
15010	Read/Write	Temp Number (stacked)	G.O. / Turbine
15011	Read/Write	NULL TLP Register	G.O. / Turbine

XI. Log Period Flow Record Register Group

Totalflow Log Period flow records are read using Modbus function code 03. The byte order of the record is reversed in the response packet (MSB of last field first, LSB of first field last.) The base register number for the Log Period Flow Record register group defaults to 11001 when the unit is cold started. It can be changed by setting register 106 to the desired starting register number of the group. Register 11001 accesses the most recent log period record, register 11970 accesses the least recent log period record.

Gas Orifice Log Period Flow Record Format

Field	Size	Type	Description
Date/time	4	ULONG	Log Date/Time (# seconds since 00:00:00 1/1/70)
Sequence #	2	UINT	Log Period record sequence number
Average DP	4	FLOAT	Average differential pressure during flow
Average SP	4	FLOAT	Average static pressure during flow
Average TF	4	FLOAT	Average temperature
Extension	4	FLOAT	Accumulated Extension / 3600
Volume	4	FLOAT	Total volume for the day (MCF)
Energy	4	FLOAT	Total energy for the day
Flowtime	4	ULONG	Total flow seconds for the day
Period time	4	ULONG	Total seconds actually used in this log period
Alarms	3	24BITS	Period alarm summary (See alarm bit mapping)
Verification Code	1	UCHAR	8 Bit Proprietary Checksum

Turbine Log Period Flow Record Format

Field	Size	Type	Description
Date/time	4	ULONG	Log Date/Time (# seconds since 00:00:00 1/1/70)
Sequence #	2	UINT	Log Period record sequence number
Pulse Count	4	FLOAT	Total pulse count for the period
Average SP	4	FLOAT	Average static pressure during flow
Average TF	4	FLOAT	Average temperature
Uncorrected Volume	4	FLOAT	Total uncorrected volume for the day (MACF)
Volume	4	FLOAT	Total volume for the day (MCF)
Energy	4	FLOAT	Total energy for the day
Flowtime	4	ULONG	Total flow seconds for the day
Period time	4	ULONG	Total seconds actually used in this log period
Alarms	3	24BITS	Period alarm summary (See alarm bit mapping)
Verification Code	1	UCHAR	8 Bit Proprietary Checksum

XII. Daily Flow Record Register Group

Totalflow Daily flow records are read using Modbus function code 03. The byte order of the record is reversed in the response packet (MSB of last field first, LSB of first field last.) The base register number for the Daily Flow Record register group defaults to 10001 when the unit is cold started. It can be changed by setting register 105 to the desired starting register number of the group. Register 10001 accesses the most recent daily record, register 10050 accesses the least recent daily record.

Gas Orifice Daily Flow Record Format

Field	Size	Type	Description
Date/time	4	ULONG	Day Date/Time (# seconds since 00:00:00 1/1/70)
Sequence #	2	UINT	Daily record sequence number
Event Sequence #	2	UINT	Event sequence counter at start of day
Starting Log Seq#	2	UINT	1st Log Period record assigned to this day
Ending Log Seq#	2	UINT	Last Log Period record assigned to this day
Contract Hour	1	UCHAR	Start of gas day per contract
Extension	4	FLOAT	Accumulated Extension / 3600
Volume	4	FLOAT	Total volume for the day (MCF)
Energy	4	FLOAT	Total energy for the day
Flowtime	4	ULONG	Total flow seconds for the day
Backflow	4	ULONG	Total backflow seconds for the day
Period time	4	ULONG	Total seconds actually used in this log period
Alarms	3	24BITS	Daily alarm summary (See alarm bit mapping)
Average SP	4	FLOAT	Average static pressure during flow
Min SP	4	FLOAT	Minimum SP value observed during this period
Max SP	4	FLOAT	Maximum SP value observed during this period
% time SP high	4	FLOAT	SP percent of day above hi limit
% time SP low	4	FLOAT	SP percent of day below lo limit
Average DP	4	FLOAT	Average differential pressure during flow
Min DP	4	FLOAT	Minimum DP value observed during this period
Max DP	4	FLOAT	Maximum DP value observed during this period
% time DP high	4	FLOAT	DP percent of day above hi limit
% time DP low	4	FLOAT	DP percent of day below lo limit
Average TF	4	FLOAT	Average temperature
Min TF	4	FLOAT	Minimum Temp value observed during this period
Max TF	4	FLOAT	MaximumTemp value observed during this period
% time TF high	4	FLOAT	Tf percent of day above hi limit
% time TF low	4	FLOAT	Tf percent of day below low limit
Verification Code	1	UCHAR	8 Bit Proprietary Checksum

Turbine Daily Flow Record Format

Field	Size	Type	Description
Date/time	4	ULONG	Day Date/Time (# seconds since 00:00:00 1/1/70)
Sequence #	2	UINT	Daily record sequence number
Event Sequence #	2	UINT	Event sequence counter at start of day
Starting Log Seq#	2	UINT	1st Log Period record assigned to this day
Ending Log Seq#	2	UINT	Last Log Period record assigned to this day
Contract Hour	1	UCHAR	Start of gas day per contract
Uncorrected Volume	4	FLOAT	Total uncorrected volume for the day (MACF)
Volume	4	FLOAT	Total volume for the day (MCF)
Energy	4	FLOAT	Total energy for the day
Flowtime	4	ULONG	Total flow seconds for the day
Backflow	4	ULONG	Total backflow seconds for the day
Period time	4	ULONG	Total seconds actually used in this log period
Alarms	3	24BITS	Daily alarm summary (See alarm bit mapping)
Average SP	4	FLOAT	Average static pressure during flow
Min SP	4	FLOAT	Minimum SP value observed during this period
Max SP	4	FLOAT	Maximum SP value observed during this period
% time SP high	4	FLOAT	SP percent of day above hi limit
% time SP low	4	FLOAT	SP percent of day below lo limit
Pulse Count	4	FLOAT	Total pulse count for the day
Min Pulse Count	4	FLOAT	Minimum pulse count observed during this period
Max Pulse Count	4	FLOAT	Maximum pulse count observed during this period
% time ACF high	4	FLOAT	ACF percent of day above hi limit
% time ACF low	4	FLOAT	ACF percent of day below lo limit
Average TF	4	FLOAT	Average temperature
Min TF	4	FLOAT	Minimum Temp value observed during this period
Max TF	4	FLOAT	MaximumTemp value observed during this period
% time TF high	4	FLOAT	Tf percent of day above hi limit
% time TF low	4	FLOAT	Tf percent of day below low limit
Verification Code	1	UCHAR	8 Bit Proprietary Checksum

XIII. Alarm bit mapping for Totalflow Daily and Log Period records

Bit	Description
0	AGA Calculation error
1	Methane gravity method f(pv) used
2	Alternate analysis used
3	Low lithium battery
4	Low charger
5	DP measurement error
6	SP measurement error
7	Temperature measurement error
8	Auxiliary contact #1 tripped
9	Remote sense #1 detected
10	Back flow detected
11	Zero flow detected
12	DP below low limit
13	DP over high limit
14	SP below low limit
15	SP over high limit
16	Auxiliary contact #2 tripped
17	Remote sense #2 detected
18	Tf below low limit
19	Tf above high limit

XIV. Event Log Record Register Group

Totalflow Event records are read using Modbus function code 03. The base register number for this register group defaults to 12001 when the unit is cold started. It can be changed by setting register 107 to the desired starting register number of the group. Register 12001 accesses the most recent event log record, register 12200 accesses the least recent event log record. The byte order of the record is reversed in the response packet (MSB of last field first, LSB of first field last.)

Field	Size	Type	Description
Date/time	4	ULONG	# of seconds since 00:00:00 1/1/70
Event flags	1	BITS	Event flags (such as day skip)
Event Sequence #	2	UINT	Sequence # of event
Event Code	2	UINT	Describes event type (Table 5.13)
Old Value	4	Depends on Code	Value changed from...
New Value	4	Depends on Code	Value changed to...
Verification Code	1	UCHAR	8 Bit Proprietary Checksum

Totalflow Event data types

Type	Old Value Format	New Value Format
1	Unsigned Integer	Unsigned Integer
2	Unsigned Char	Unsigned Char
3	BOOL	BOOL
4	IEEE Floating Point	N/A (Rollover)
5	IEEE Floating Point	IEEE Floating Point
8	Unsigned Long Integer	Unsigned Long Integer
9	2 Character String	2 Character String

Totalflow Event Codes

Event Code	Data Type	Description
1	8	New date and time
5	1	Contract day starting hour
8	8	AIU Stream ID
9	3	Use fixed analysis on error?
10	2	Reset volume
11	2	Wakeup from sleep
12	2	Go to sleep
13	2	Watchdog timeout
14	2	Accumulated volume rollover
15	2	Security code changed
16	3	Attached to AIU stream?
19	3	Is SP present?
20	3	RTD installed
21	3	Use fixed temperature
24	3	SS/Monel orifice plate
25	3	Use Fb
26	3	Use Fr
27	3	Use Y
28	3	Use Ftb
29	3	Use Fpb

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Event Codes (cont.)

30	3	Use Ftf
31	3	Use Fg
32	3	Use Fpv
33	3	Use Fa
34	3	Use contact on charger low
35	3	Contact on dp lo
36	3	Contact on dp hi
37	3	Contact on SP lo
38	3	Contact on SP hi
39	3	Contact on remote sense
40	3	Auto re-open
41	3	Contact on vol set point
42	3	Use Fw
43	3	Use Faux
44	3	Use Fpm (TURBINE_REV)
45	3	Use Ftm (TURBINE_REV)
46	3	Use s (TURBINE_REV)
47	3	Use Faux (TURBINE_REV)
49	5	fixed SP value (TURBINE_REV)
50	4	well log code (Site Code)
51	4	Accumulated volume reset
52	3	RTD installed (TURBINE)
53	3	Use rtd (TURBINE)
54	3	Auto start TEG (TURBINE)
55	3	Check security code(TURBINE)
56	3	Use fixed SP (TURBINE)
57	4	Accum ACF before reset (TRB)
58	4	Initial volume reset value(TRB)
59	2	Accum ACF rollover date (TRB)
60	5	Fb
61	5	Orifice diameter
62	5	Pipe diameter
63	5	Specific gravity
64	5	DP low limit
65	5	DP hi limit
66	5	SP low limit
67	5	SP hi limit
68	5	CO2 mole percent
69	5	N2 mole percent
70	5	SP low calibration
71	5	SP mid calibration
72	5	SP hi calibration
73	5	DP low calibration
74	5	DP mid calibration
75	5	DP hi calibration
76	5	DP zero cutoff
77	5	Temperature base
78	5	Pressure base
79	5	Fixed temperature

Event Codes (cont.)

80	5	Temperature bias
81	5	Viscosity
82	5	Ratio of specific heats
83	5	Ft – gravity adjusted temp
84	5	Fp – gravity adjusted press
85	5	BTU/SCF
86	5	SP pressure marker
87	5	DP pressure marker
88	3	Contact on charger low (TRB)
89	3	Contact on acf low (TRB)
90	3	Contact on acf hi (TRB)
91	3	Contact on SP low (TRB)
92	3	Contact on SP hi (TRB)
93	3	Contact on remote sense (TRB)
94	3	Contact auto re-open (TRB)
95	3	Contact on vol set point (TRB)
96	5	ACF Low Limit (TURBINE)
97	5	ACF Hi Limit (TURBINE)
98	5	Flow period (TURBINE)
99	5	Faux (TURBINE)
100	5	Faux
101	5	K (TURBINE)
102	5	Initial analysis OK?
103	5	VCF K0
104	5	VCF K1
105	5	VCF K2
106	1	Liquid type
107	1	Calculation units type
108	1	Z method
111	1	AGA calculation type
112	5	Fixed cd
115	5	Zba
116	9	Software revision change
117	1	Volume calculation period
118	8	Volume log period
119	5	H2S content
120	5	H2O content
121	5	Helium content
122	5	Methane content
123	5	Ethane content
124	5	Propane content
125	5	N-Butane content
126	5	I-Butane content
127	5	N-Bentane content
128	5	I-Pentane content
129	5	N-Hexane content

Event Codes (cont.)

130	5	N-Heptane content
131	5	N-Octane content
132	5	N-Nonane content
133	5	N-Decane content
134	5	Oxygen content
135	5	Carbon Monoxide content
136	5	Orifice coefficient of expansion
137	5	Pipe coefficient of expansion
138	5	barometric pressure
142	1	Characteristic type
143	3	Calculated or Fixed Cd in vol calc
144	5	Fixed Argon mole percent
145	5	Fixed hydrogen mole percent
146	4	Accumulated volume rollover
147	4	Event log full (CANADIAN EVENT)
148	4	Event log collected (CANADIAN)
149	1	Password mode, operator change
150	3	Password mode, password enable
151	2	Password mode, password table
152	2	A/D converter could not be read
153	5	SP mid low calibration event
154	5	SP mid hi calibration event
155	5	DP mid low calibration event
156	5	DP mid hi calibration event
157	3	Use Faux
158	3	static pressure tap up/downstream
159	3	Use Y expansion factor
160	3	Use Fpv factor
161	3	Use Fw water vapor factor
162	5	Reset Log Period
164	3	Use Linear/Sqrt Averaging
165	3	Hold last read analog values (SP, DP, TF)
166	1	Maximum number of events log records
167	1	Maximum number of day period records
168	1	Maximum number of log period records
169	1	Size of local port communications buffer
170	1	Size of remote port communications buffer
171	8	Partition memory free space
172	3	Use fixed water content in wet gas calcs
173	5	Water content (LBS/MMSCF)
174	5	Water content bias

XV. Radio Power Duty Cycling and Group Operation.

Duty cycling the power to the radio can significantly decrease the solar panel and battery requirements of a remote installation. Totalflow Modbus uses group addressing to control radio duty cycling. Using Modbus group addresses also removes the standard Modbus limit of 247 slave addresses per communications channel.

Totalflow Modbus group addressing and radio duty cycling work as follows:

Writing a group number into the Modbus group address register (3070) invokes Modbus group addressing. The FCU will listen for its standard Modbus slave address (0-247) only when the Modbus group address register (3070) matches the current group select register (3071) set by a previous broadcast.

The duty cycle is specified by setting the link establishment register (3020) to the desired cycle time (seconds). The FCU will power the radio once each duty cycle and listen for broadcasts. A duty cycle time of zero (0) means that the radio is always powered (used for group addressing without duty cycling).

When the remote unit is duty cycling the radio, the host must broadcast function code 6 (single register write command) to the current group select register (3071) continuously for the duty cycle interval. This forces remote units with matching Modbus group address registers (3070) to keep it's radio powered up and listen for subsequent commands (addressed to the standard slave address) until the group address register (3070) no longer matches the current group select register (3071).

The group returns to duty cycling when the host broadcasts a different group select. The current group select register is also reset (to 0) upon expiration of the maximum listen time specified in the listen timeout register (3072).

For example, the following ASCII mode broadcast command would set the current group select register to 1. As mentioned above, this command must be repeated for the configured duty cycle.

Broadcast :

BOF	Address	Function	Register	Data	LRC	EO F	Ready
:	00	06	0B FF	00 01	??	CR	LF

The remote device does not respond to the broadcast. It powers the radio and listens for Modbus commands directed to it's standard Modbus slave address. When the host is finished polling this group, it switches to the next group by broadcasting a new group select address. If the host does not intend to switch to a new group, it should disable the current group by broadcasting a group select of zero (0).

XVI. PG&E Poll Group Protocol

The Poll Group Protocol uses an expanded set of TotalFlow's custom register group whose base is at 8000. Each Poll Group consists of 62 registers, each of which is four (4) bytes in length. The first four registers of each Poll Group are in packed binary format, while all other registers are floating point values. The first register of each group accesses Modbus register 5029 and sets each bit according to the alarm status of the first 29 registers requested. The second register of each group accesses Modbus register 5030 and sets the bits with alarm values for the remaining 28 registers. An alarm status can only be set if the corresponding register was read on the current request. Any registers which are not read will have the alarm bit defaulted to zero(0) representing no alarm. The following table shows the definition of these two registers.

Register	Bit Description
5029	Bit 0 = Not Used (always 0)
	Bit 1 = Not Used (always 0)
	Bit 2 = Alarm Status of First Floating Point Value (register 4)
	◆
	◆
	◆
5030	Bit 31 = Alarm Status of Register 33
	Bit 0 = Alarm Status of Register 34
	◆
	◆
	◆
	Bit 27 = Alarm Status of Last Floating point Value (register 58)
	Bits 28 – 31 = Not Used (always 0)

Example: If the first floating point register requested was associated with the current flow rate and its' value was greater than that set as the high limit the following would be seen:

00000000 00000000 00000000 00000100

The third packed binary register contains information on the status of the discrete inputs. This register (5031) is updated when any Poll Group request is made or when any Block operation is performed by reading the physical state of the pin associated with each discrete input. The discrete input register is Read Only. The fourth packed binary register is mapped through register 5032 and allows the user to view the status of the discrete outputs on a 'Read' operation, or to set specific discrete outputs on a 'Write' operation. Again, the status of the discrete outputs is obtained by physically examining the state of the pin associated with each discrete output. When a 'Write' is performed through this register the discrete outputs remain 'On' for a default of 15 seconds. The following table and example will illustrate the use of the discrete inputs and outputs.

Register	Bit Description
5031	Bit 32 = Status of DI 1
	Bit 31 = Status of DI 2
	Bit 30 = Status of VCI DI 1
	Bit 29 = Status of VCI DI 2
	Bit 28 = Status of VCI DI 3
	Bit 27 = Status of VCI DI 4
	Bits 26 – 0 Not used (always 0)
5032	Bit 32 = Status/Set DO 1
	Bit 31 = Status/Set DO 2
	Bit 30 = Status/Set VCI DO 1
	Bit 29 = Status/Set VCI DO 2
	Bit 28 = Status/Set VCI DO 3
	Bit 27 = Status/Set VCI DO 4
	Bits 26 – 0 Not Used (always 0)

Totalflow FCU PG&E Modbus Protocol

Example: Following a 'Read', the following is displayed on the screen:

8002	Discrete Input Status	10000000	00000000	00000000	00000000
8003	Discrete Output Status	11000000	00000000	00000000	00000000

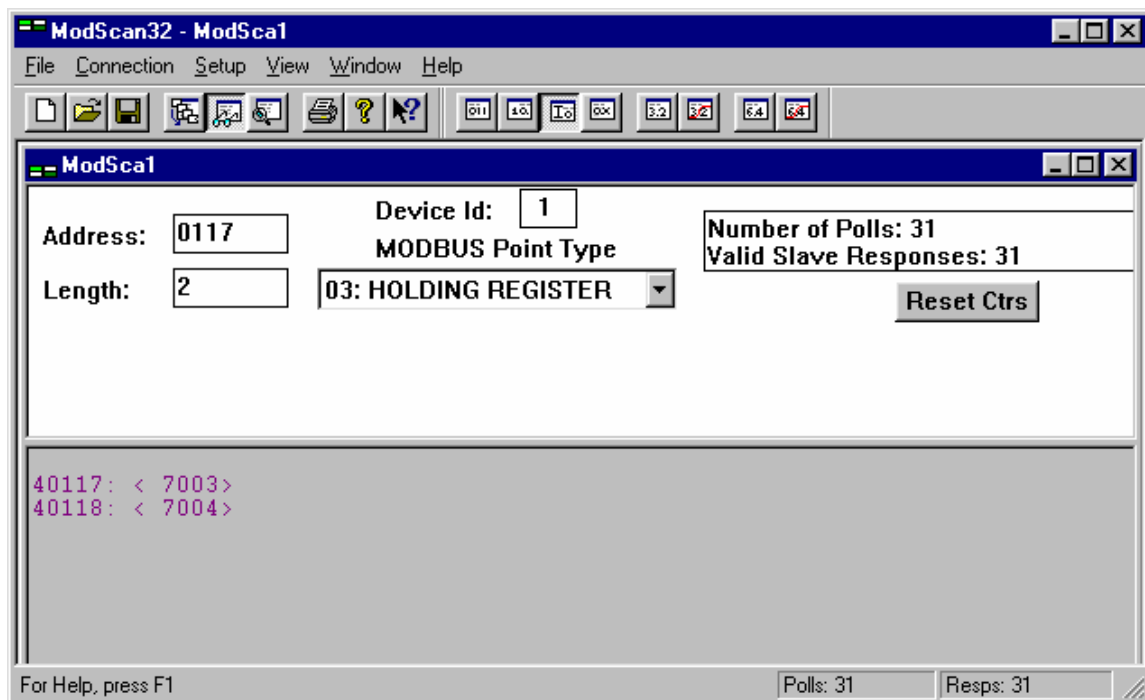
Correlating what is shown on the screen with the above table this says that DI 1 is active and that DO 1 and DO 2 are currently 'On'.

Customization:

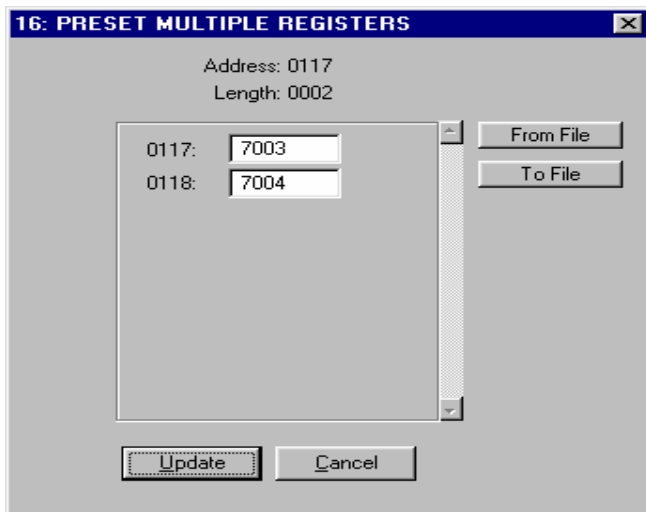
The Poll Groups are an extended set of TotalFlow custom Modbus registers. They are mapped into the 100 series registers where register 110 sets the base for the custom registers. In this case, the base is set to 8000 and there are 248 user configurable registers which begin with register 111. Each user configurable register points to a TotalFlow standard register containing the data associated with that variable. The maps for TotalFlow standard registers are contained in above sections such as XIII. Floating Point Register Group. The factory default mapping for the Poll Groups is located in the next section XVI. Poll Group Tables. It is possible for the user to reconfigure these registers based on their particular needs, and the methods to accomplish this will be discussed in this section.

ModScan 32 is a commercially available interface which offers many benefits to the user. One of these benefits is the ability to set multiple registers through a graphical interface and see the results of the action at the same time. This package is available at www.win-tech.com for under \$100.

To illustrate how the user can modify the layout of the Poll Groups, consider that it is desired to change Poll Group 1 so that user configurable registers 7 and 8 switch positions in the table. Referring to the table for Poll Group 1 in the next section this equates to swapping the positions of Current static pressure (8006) and Current Differential pressure (8007). These equate to custom registers 117 and 118, respectively. A read of these registers with ModScan will show that they point to standard registers 7003 and 7004 as the following screen shows.



To perform the swap of these registers, select Setup| Extended|Preset Regs and the following screen will appear.



At this point, enter 7004 for the value of 117 and 7003 as the value for 118, Update, and the Poll Group table in the flow computer has been modified. This process can be repeated for any other modifications required to the Poll Groups.

XVII. Poll Group Tables

Poll groups will act like custom registers and so will be mapped into the 8000 area. There are 4 distinct poll groups and will be arranged as follows.

8000-8061 Poll Group 1
 8062-8123 Poll Group 2
 8124-8185 Poll Group 3
 8186-8247 Poll Group 4

Poll Group 1

ModScan Address	Poll Register	Std Register	Read/Write	Description	Units	Meter Type
115	8004	7004/7269	Read Only	Current Differential Pressure / NULL	Inches H2O	G.O./P.I.
116	8005	7003	Read Only	Current static pressure	psia	
117	8006	7005	Read Only	Current temperature	degrees F	
118	8007	7280	Read Only	Current flow rate	MMCF/Day	
119	8008	7009	Read Only	Current contract day volume	MCF	
120	8009	7154	Read Only	Yesterday's contract day accumulated volume	MCF	
121	8010	7269	Read Only	NULL		
122	8011	7269	Read Only	NULL		
123	8012	7269	Read Only	NULL		
124	8013	7001	Read Only	Current battery volts	volts	
125	8014	7002	Read Only	Current charger volts	volts	
126	8015	7155	Read Only	External AI 1 value		
127	8016	7156	Read Only	External AI 2 value		
128	8017	7061/7269	Read/Write	orifice size at reference temperature / NULL	Inches	G.O./P.I.
129	8018	7063/7269	Read/Write	pipe size at reference temperature / NULL	Inches	G.O./P.I.
130	8019	7281	Read Only	Current energy rate	MMBTU/Day	
131	8020	7153	Read Only	Yesterday's contract day accumulated energy	MMBTU	
132	8021	7008	Read Only	Current accumulated volume (Totals to 99999 until rolls over)	MCF	
133	8022	7026	Read/Write	Energy content	BTU/SCF	
134	8023	7027	Read/Write	real specific gravity		
135	8024	7028	Read/Write	CO2	mole percent	
136	8025	7029	Read/Write	N2	mole percent	
137	8026	7030	Read/Write	Methane	mole percent	
138	8027	7269	Read Only	NULL		
139	8028	7269	Read Only	NULL		
140	8029	7269	Read Only	NULL		
141	8030	7269	Read Only	NULL		
142	8031	7269	Read Only	NULL		
143	8032	7269	Read Only	NULL		
144	8033	7269	Read Only	NULL		
145	8034	7269	Read Only	NULL		
146	8035	7269	Read Only	NULL		
147	8036	7269	Read Only	NULL		

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Poll Group 1 (cont.)

148	8037	7269	Read Only	NULL		G.O./P.I.
149	8038	7269	Read Only	NULL		G.O./P.I.
150	8039	7269	Read Only	NULL		
151	8040	7269	Read Only	NULL		
152	8041	7269	Read Only	NULL		
153	8042	7269	Read Only	NULL		
154	8043	7269	Read Only	NULL		
155	8044	7269	Read Only	NULL		
156	8045	7269	Read Only	NULL		
157	8046	7269	Read Only	NULL		
158	8047	7269	Read Only	NULL		
159	8048	7269	Read Only	NULL		
160	8049	7269	Read Only	NULL		
161	8050	7269	Read Only	NULL		
162	8051	7269	Read Only	NULL		
163	8052	7010/7269	Read Only	last log period differential / NULL	inches H2O	G.O./P.I.
164	8053	7011	Read Only	last log period static	psia	
165	8054	7012	Read Only	last log period temperature	Degrees F	
166	8055	7013/7269	Read Only	last log period extension / NULL		G.O./P.I.
167	8056	7014	Read Only	last log period volume	MCF	
168	8057	7015	Read Only	last log period energy	MBTU	
169	8058	7016	Read Only	last log period flow time	seconds	
170	8059	7017	Read Only	last log period time	seconds	
171	8060	7018/7269	Read Only	last day period differential / NULL	inches H2O	G.O./P.I.
172	8061	7019	Read Only	last day period static	psia	

Poll Group 2

ModScan Address	Poll Register	Std Register	Read/Write	Description	Units	Meter Type
177	8066	7020	Read Only	last day period temperature	degrees F	
178	8067	7021/7269	Read Only	last day period extension / NULL		G.O./P.I.
179	8068	7022	Read Only	last day period volume	MCF	
180	8069	7023	Read Only	last day period energy	MBTU	
181	8070	7024	Read Only	last log period flow time	seconds	
182	8071	7025	Read Only	Last log period time	seconds	
183	8072	7128	Read Only	SP low cal point	psia	
184	8073	7129	Read Only	SP mid cal point	psia	
185	8074	7130	Read Only	SP high cal point	psia	
186	8075	7131/7269	Read Only	DP low cal point / NULL	inches H2O	G.O./P.I.
187	8076	7132/7269	Read Only	DP mid cal point / NULL	inches H2O	G.O./P.I.
188	8077	7133/7269	Read Only	DP high cal point / NULL	inches H2O	G.O./P.I.
189	8078	7135	Read Only	current unfiltered SP	psia	
190	8079	7136/7269	Read Only	current unfiltered DP / NULL	inches H2O	G.O./P.I.
191	8080	7134	Read Only	current unfiltered temp	degrees F	
192	8081	7050	Read/Write	temperature bias	degrees F	
193	8082	7049	Read/Write	Fixed temp	Degrees F	
194	8083	7055	Read/Write	Fb (AGA 3 1985)		
195	8084	7051	Read/Write	base temperature	degrees F	
196	8085	7052	Read/Write	base pressure	psia	
197	8086	7065	Read/Write	barometric pressure	psia	
198	8087	7057	Read/Write	Faux		

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Poll Group 2 (cont.)

199	8088	7053/7269	Read/Write	ratio of specific heats / NULL		G.O./P.I.
200	8089	7054/7269	Read/Write	Viscosity / NULL	centipoise	G.O./P.I.
201	8090	7058	Read/Write	ft for Fpv		
202	8091	7059	Read/Write	fp for Fpv		
203	8092	7066	Read/Write	Water content	lbs/MMCF	
204	8093	7067	Read/Write	water content bias	lbs/MMCF	
205	8094	7056/7269	Read/Write	Fixed Cd / NULL		G.O./P.I.
206	8095	7060/7269	Read/Write	Z base of air / NULL		G.O./P.I.
207	8096	7062/7269	Read/Write	Orifice coefficient of expansion/NULL		G.O./P.I.
208	8097	7064/7269	Read/Write	Pipe coefficient of expansion / NULL		G.O./P.I.
209	8098	7270	Read/Write	AI #1 calibration low value		
210	8099	7271	Read/Write	AI #1 calibration mid low value		
211	8100	7272	Read/Write	AI #1 calibration mid value		
212	8101	7273	Read/Write	AI #1 calibration mid high value		
213	8102	7274	Read/Write	AI #1 calibration high value		
214	8103	7275	Read/Write	AI #2 calibration low value		
215	8104	7276	Read/Write	AI #2 calibration mid low value		
216	8105	7277	Read/Write	AI #2 calibration mid value		
217	8106	7278	Read/Write	AI #2 calibration mid high value		
218	8107	7279	Read/Write	AI #2 calibration high value		
219	8108	7068/7269	Read Only	Last volume calculation DP value / NULL	Inches H2O	G.O./P.I.
220	8109	7069	Read Only	Last volume calculation SP	Psia	
221	8110	7070	Read Only	Last volume calculation Tf	Temperature	
222	8111	7071	Read Only	Last volume calculation volume	MCF	
223	8112	7072/7269	Read Only	Last volume calculation extension / NULL		G.O./P.I.
224	8113	7073	Read Only	Last volume calculation Cprime or integral multiplier		
225	8114	7074/7269	Read Only	Last volume calculation Y expansion factor / NULL		G.O./P.I.
226	8115	7075	Read Only	Last volume calculation Fpv		
227	8116	7076	Read Only	Last volume calculation Fw – water vapor factor		
228	8117	7077	Read Only	Last volume calculation Faux – auxiliary factor		
229	8118	7078	Read Only	Last volume calculation flow rate	SCF/hour	
230	8119	7079/7269	Read Only	Last volume calculation Fb, AGA-3 1985 / NULL		G.O./P.I.
231	8120	7080/7269	Read Only	Last volume calculation Fr – Reynolds number factor, AGA-3, 1985 / NULL		G.O./P.I.
232	8121	7081/7269	Read Only	Last volume calculation Fpb, pressure base factor, AGA-3, 1985 / NULL		G.O./P.I.
233	8122	7082/7269	Read Only	Last volume calculation Ftb, temperature base factor, AGA-3, 1985 / NULL		G.O./P.I.
234	8123	7083/7269	Read Only	Last volume calculation Ftf, flow temperature factor, AGA-3, 1985 / NULL		G.O./P.I.

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Poll Group 3

ModScan Address	Poll Register	Std Register	Read/Write	Description	Units	Meter Type
239	8128	7084/7269	Read Only	Last volume calculation Fg, gravity factor, AGA-3, 1985 / NULL		G.O./P.I.
240	8129	7085/7269	Read Only	Last volume calculation Fa, orifice thermal expansion factor, AGA-3, 1985 / NULL		G.O./P.I.
241	8130	7086/7269	Read Only	Last volume calculation Fip, pressure dependent part of AGA-3, 1992 / NULL		G.O./P.I.
242	8131	7087/7269	Read Only	Last volume calculation Ev, velocity of approach, AGA-3, 1992 / NULL		G.O./P.I.
243	8132	7088/7269	Read Only	Last volume calculation Orifice diameter corrected to flow temperature, AGA-3, 1992 / NULL	Inches	G.O./P.I.
244	8133	7089/7269	Read Only	Last volume calculation Pipe diameter corrected to flow temperature, AGA-3, 1992 / NULL	Inches	G.O./P.I.
245	8134	7090/7269	Read Only	Last volume calculation density at base conditions, AGA-3, 1992 / NULL	Lbs mass/cf	G.O./P.I.
246	8135	7091/7269	Read Only	Last volume calculation mass flow rate / NULL	Lbs mass/hour	G.O./P.I.
247	8136	7092/7269	Read Only	Last volume calculation Coefficient of discharge (Cd), AGA-3, 1992 / NULL		G.O./P.I.
248	8137	7093	Read Only	Last volume calculation heating value	BTU/SCF	
249	8138	7094	Read Only	Last volume calculation real specific gravity		
250	8139	7095	Read Only	Last volume calculation CO2 content	Mole percent	
251	8140	7096	Read Only	Last volume calculation nitrogen content	Mole percent	
252	8141	7097	Read Only	Last volume calculation methane content	Mole percent	
253	8142	7098	Read Only	Last volume calculation ethane content	Mole percent	
254	8143	7099	Read Only	Last volume calculation propane content	Mole percent	
255	8144	7100	Read Only	Last volume calculation iso-butane content	Mole percent	
256	8145	7101	Read Only	Last volume calculation normal butane content	Mole percent	
257	8146	7102	Read Only	Last volume calculation iso-pentane content	Mole percent	
258	8147	7103	Read Only	Last volume calculation normal pentane content	Mole percent	
259	8148	7104	Read Only	Last volume calculation normal hexane content	Mole percent	
260	8149	7105	Read Only	Last volume calculation normal heptane content	Mole percent	
261	8150	7106	Read Only	Last volume calculation normal octane content	Mole percent	
262	8151	7107	Read Only	Last volume calculation normal nonane content	Mole percent	
263	8152	7108	Read Only	Last volume calculation hydrogen sulfide content	Mole percent	
264	8153	7109	Read Only	Last volume calculation hydrogen content	Mole percent	

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Poll Group 3 (cont.)

265	8154	7110	Read Only	Last volume calculation helium content	Mole percent	
266	8155	7111	Read Only	Last volume calculation oxygen content	Mole percent	
267	8156	7112	Read Only	Last volume calculation carbon monoxide content	Mole percent	
268	8157	7113	Read Only	Last volume calculation argon content	Mole percent	
269	8158	7114	Read Only	Last volume calculation normal decane	Mole percent	
270	8159	7115	Read Only	Last volume calculation water content	Mole percent	
271	8160	7116/7269	Read/Write	DP zero cutoff / NULL	Inches H2O	G.O./P.I.
272	8161	7117/7269	Read/Write	DP low limit / NULL	Inches H2O	G.O./P.I.
273	8162	7118/7269	Read/Write	DP high limit / NULL	Inches H2O	G.O./P.I.
274	8163	7119	Read/Write	SP low limit	Psia	
275	8164	7120	Read/Write	SP high limit	Psia	
276	8165	7121	Read/Write	Temperature low limit	Degrees F	
277	8166	7122	Read/Write	Temperature high limit	Degrees F	
278	8167	7123	Read/Write	Flow rate low limit	Scf/hour	
279	8168	7124	Read/Write	Flow rate high limit	Scf/hour	
280	8169	7125	Read/Write	Contact output volume setpoint	Mcf	
281	8170	7151	Read Only	Accumulated Energy	MMBTU	
282	8171	7152	Read Only	Current contract day accumulated energy	MMBTU	
283	8172	7161	Read Only	Current contract day PI 1 value	Accumulated PI 1 counts * k for current contract day	
284	8173	7162	Read Only	Current contract day PI 2 value	Accumulated PI 2 counts * k for current contract day	
285	8174	7163	Read Only	Previous contract day PI 1 value	Previous contract day PI 1 counts * k	
286	8175	7164	Read Only	Previous contract day PI 2 value	Previous contract day PI 2 counts * k	
287	8176	7165	Read Only	Current PI 1 value	PI 1 counts * k	
288	8177	7166	Read Only	Current PI 2 value	PI 2 counts * k	
289	8178	7159	Read/Write	PI 1 k value		
290	8179	7160	Read/Write	PI 2 k value		
291	8180	7140/7269	Read/Write	DP test input value / NULL	Inches H2O	G.O./P.I.
292	8181	7139	Read/Write	SP test input value	Psia	
293	8182	7138	Read/Write	Rtd test input value	Degrees F	
294	8183	7174	Read/Write	Live real specific gravity input		
295	8184	7175	Read/Write	Live heating value input	BTU/scf	
296	8185	7176	Read/Write	Live CO2 content	Mole percent	

Poll Group 4

ModScan Address	Poll Register	Std Register	Read/Write	Description	Units	Meter Type
301	8190	7177	Read/Write	Live N2 content	Mole percent	
302	8191	7178	Read/Write	Live methane content	Mole percent	
303	8192	7182	Read/Write	Live ethane content	Mole percent	
304	8193	7183	Read/Write	Live propane content	Mole percent	
305	8194	7184	Read/Write	Live iso-butane content	Mole percent	
306	8195	7185	Read/Write	Live normal butane content	Mole percent	
307	8196	7186	Read/Write	Live iso-pentane content	Mole percent	
308	8197	7187	Read/Write	Live normal pentane content	Mole percent	
309	8198	7188	Read/Write	Live normal hexane content	Mole percent	
310	8199	7189	Read/Write	Live normal heptane content	Mole percent	
311	8200	7190	Read/Write	Live normal octane content	Mole percent	
312	8201	7191	Read/Write	Live normal nonane content	Mole percent	
313	8202	7192	Read/Write	Live normal decane content	Mole percent	
314	8203	7193	Read/Write	Live oxygen content	Mole percent	
315	8204	7194	Read/Write	Live carbon monoxide content	Mole percent	
316	8205	7195	Read/Write	Live hydrogen content	Mole percent	
317	8206	7196	Read/Write	Live argon content	Mole percent	
318	8207	7179	Read/Write	Live hydrogen sulfide content	Mole percent	
319	8208	7180	Read/Write	Live H2O content	Mole percent	
320	8209	7181	Read/Write	Live helium content	Mole percent	
321	8210	7219/xxxx	Read/Write	User float 1 / PI #1 Flow Window	None/Sec	G.O./P.I.
322	8211	7220/xxxx	Read/Write	User float 2 / Current Uncorrected Flow Rate		G.O./P.I.
323	8212	7221/xxxx	Read/Write	User float 3 / Uncorrected Accumulated Volume		G.O./P.I.
324	8213	7222/xxxx	Read/Write	User float 4 / Yesterday's Uncorrected Volume		G.O./P.I.
325	8214	7223/xxxx	Read/Write	User float 5 / Last Calc Period Uncorrected Volume		G.O./P.I.
326	8215	7224/xxxx	Read/Write	User float 6 / Last Calc Period (Fpv ²)	S	G.O./P.I.
327	8216	7225/xxxx	Read/Write	User float 7 / PI #1 ACF Low Limit		G.O./P.I.
328	8217	7226/xxxx	Read/Write	User float 8 / PI #1 ACF High Limit		G.O./P.I.
329	8218	7227/xxxx	Read/Write	User float 9 / Current Uncorrected Flow		G.O./P.I.
330	8219	7228	Read/Write	User float 10		
331	8220	7229	Read/Write	User float 11		
332	8221	7230	Read/Write	User float 12		
333	8222	7231	Read/Write	User float 13		
334	8223	7232	Read/Write	User float 14		
335	8224	7233	Read/Write	User float 15		
336	8225	7234	Read/Write	User float 16		
337	8226	7235	Read/Write	User float 17		
338	8227	7236	Read/Write	User float 18		
339	8228	7237	Read/Write	User float 19		
340	8229	7238	Read/Write	User float 20		
341	8230	7239	Read/Write	User float 21		
342	8231	7240	Read/Write	User float 22		
343	8232	7241	Read/Write	User float 23		
344	8233	7242	Read/Write	User float 24		
345	8234	7243	Read/Write	User float 25		
346	8235	7244	Read/Write	User float 26		
347	8236	7245	Read/Write	User float 27		

Poll Group 4 (cont.)

348	8237	7246	Read/Write	User float 28		
349	8238	7247	Read/Write	User float 29		
350	8239	7248	Read/Write	User float 30		
351	8240	7249	Read/Write	User float 31		
352	8241	7250	Read/Write	User float 32		
353	8242	7251	Read/Write	User float 33		
354	8243	7252	Read/Write	User float 34		
355	8244	7253	Read/Write	User float 35		
356	8245	7254	Read/Write	User float 36		
357	8246	7255	Read/Write	User float 37		
358	8247	7256	Read/Write	User float 38		

XVIII. Discrete Outputs -- General

There are two on-board discrete outputs(DO's) available on the 6400 series flow computer.

DO 1 and DO 2 are the on-board DO's, and in the PG&E protocol are accessed through registers 3122 and 3123 respectively. *IMPORTANT:* For these DO's to operate correctly for this protocol two variables must be set through the local interface – DO1=64 and DO2=64. (These are the default values on startup) When selecting additional tasks for the DO's it is important that the value 64 is factored into the final value. If these variables are not set and a command is sent to turn on the DO, it will not time out and will remain 'On' indefinitely. A restriction for the on-board DO's is that they can not be selected as the Push-to-Talk DO.

The operation of all the DO's is dependent upon the method in which they are accessed. If accessed through a Poll Group write by entering a '1' in the desired bit position for the chosen DO, the selected DO(s) will remain on for a default of 15 seconds. To determine which bit position corresponds to which DO, see the examples in the section titled "PG&E Poll Group Protocol". When a DO is selected for a Block operation write, the value of the "Time On" parameter will determine how long the DO stays activated. If a "Time On" value of zero is entered in this field, the DO will turn on for a default of 15 seconds. If accessing a DO through its individual register number (i.e. 3122) for a write operation, a value of zero will turn on the DO for a default of 15 seconds. Otherwise, the value entered is the time for the DO to remain on.

XIX. New Local Commands

Several new commands have been added to the local interface which allow for accessing some of the new parameters in the PG&E protocol. The following table outlines these commands and also lists the register associated with that variable if it is possible to also set the value remotely.

<i>Command</i>	<i>Purpose</i>	<i>Register</i>
RSPT	1 = Reset Point Type Table to Factory Defaults	1163
RSPG	1 = Reset Poll Group Table to Factory Defaults	1164
MNTH	Set Month (i.e. 1 = January, 2 = February, etc.)	3124
DAY	Set Day of Month	3125
YEAR	Set Year (two digits, 1999 = 99)	3126
HOUR	Set Hour	3127
MIN	Set Minutes	3128
SEC	Set Seconds	3129
PDO1	Turn On On-Board DO 1 (value = time on, value = 0 'on' 15 sec)	3122
PDO2	Turn On On-Board DO 2	3123
RFC	1 = Reset Factory Calibration	3146
AFB	0 = Manual Entry 1 = FCU calculate Fb factor for 1985 Eqn.	3147

XX. PG&E Block Protocol

Point Type Definition:

There are 12 basic point types which are required for the PG&E project. These are basically structures of Modbus data which may be read or written to in blocks. They consist of a varying number of parameters, and different data types exist within each block. PG&E requested that these should be configurable. The decided upon instances of these point types is as follows:

<i>Point Type</i>	<i>Parameter</i>	<i># in Design Process</i>
1	Discrete Inputs	6
2	Discrete Outputs	6
3	Analog Inputs	2
4	Analog Outputs	4
5	Pulse Inputs	2
6	PID Parameters	3
7	AGA Flow Parameters	1
10	AGA Flow Values	1
12	Clock	1
14	Communication Port	3
15	System Variables	1
34	User Config	1

Several methods to implement a table to house these types were discussed in the design phase of the project. The method decided upon was to have 60 parameters for each Point Type entry which would be user configurable. 60 was chosen because the largest Point Type, AGA Flow Parameters, had 54 entries. This would allow some flexibility for configuring it and lots of flexibility in configuring the other Point Types. By having a fixed number of entries, accessing the table in partition RAM was simplified.

Outline:

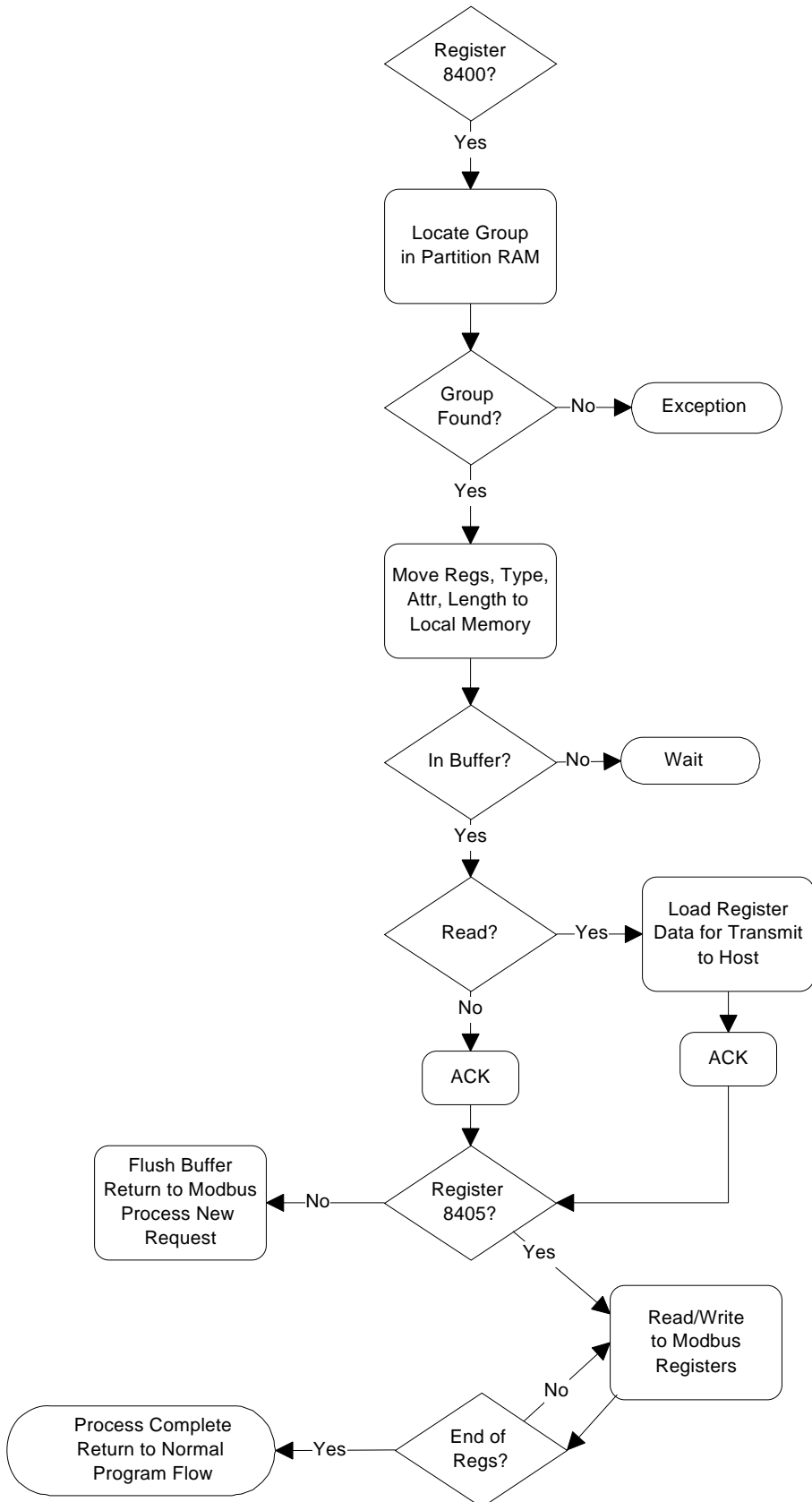
Modbus will operate as usual until it is found that the host wants to do a write to register 8400. This will signal the system that a block operation is going to take place. A routine will be called to go locate the information needed in partition RAM based on what the host has written to registers 8400 – 8404. If the proper point type is not found, return an exception response. If it is found, move this data into a storage buffer. The data will consist of the register number, data type, attributes, and the length as specified in the documentation provided by PG&E.

If the operation is to be a write, this Point Type information is restored out in the PGEDATA area in partition RAM and the FCU will ACK the host. The host response should be an access to register 8405 for a write operation. If it is not, the block operation will be canceled and the new request will be processed. Otherwise, the data to be changed is received from the host and the FCU will use the information that was stored in PGEDATA RAM to place the data into the proper registers.

If the operation is to be a read, the FCU processes the header file information and load the register data before sending an ACK to the host. This process takes a little while, so this fact should be kept in mind when setting up communication parameters such as timeout.

On the following page is a flowchart which gives a visual idea of this process.

Design Flowchart



ASCII Character Type:

Point Type parameters which are of this type are modifiable through the Block operation of the host. In FCU memory, each string is allotted a size of 30, however, the host may restrict this to a different size. The host does its' own boundary checking, and the FCU will not allow more than 30 characters for data whose type is AC.

Customization:

The arrangement of the entries in each Point Type may be changed by the user. Referring to the tables in section XXI. Point Type Tables, there are four parts, or sub-parms, to each Point Type parameter which are used in the operating code – Type, Length, Attributes, and RAM. RAM is the physical location of each sub-parm. The sub-parms reside in the partition RAM area of the flow computer and are accessed through two-byte registers which begin at 20,001. Each Point Type table lists these registers for the first two parameters and provides some help at determining the others by references at every fifth parameter. When connecting with ModScan to modify these tables, the protocol should be Standard RTU.

To customize a Point Type, the sub-parms must be accessed through register writes. This may be accomplished through the use of ModScan32 (available for less than \$100 at www.win-tech.com). With this application the user can view the register contents as they are being modified and the results of the change are also visible at the same time. This allows for a more convenient and less error prone method of entry. For an example of customizing the Point Types this way, consider that the user wishes to change the format of Point Type 2, Discrete Output Parameters, for DO 1 on a 6700 flow computer so that the “Time On” parameter switches positions with the “Status” parameter. The pertinent information for these two parameters is looked up in the corresponding Point Type table and is found to be the following:

Time On

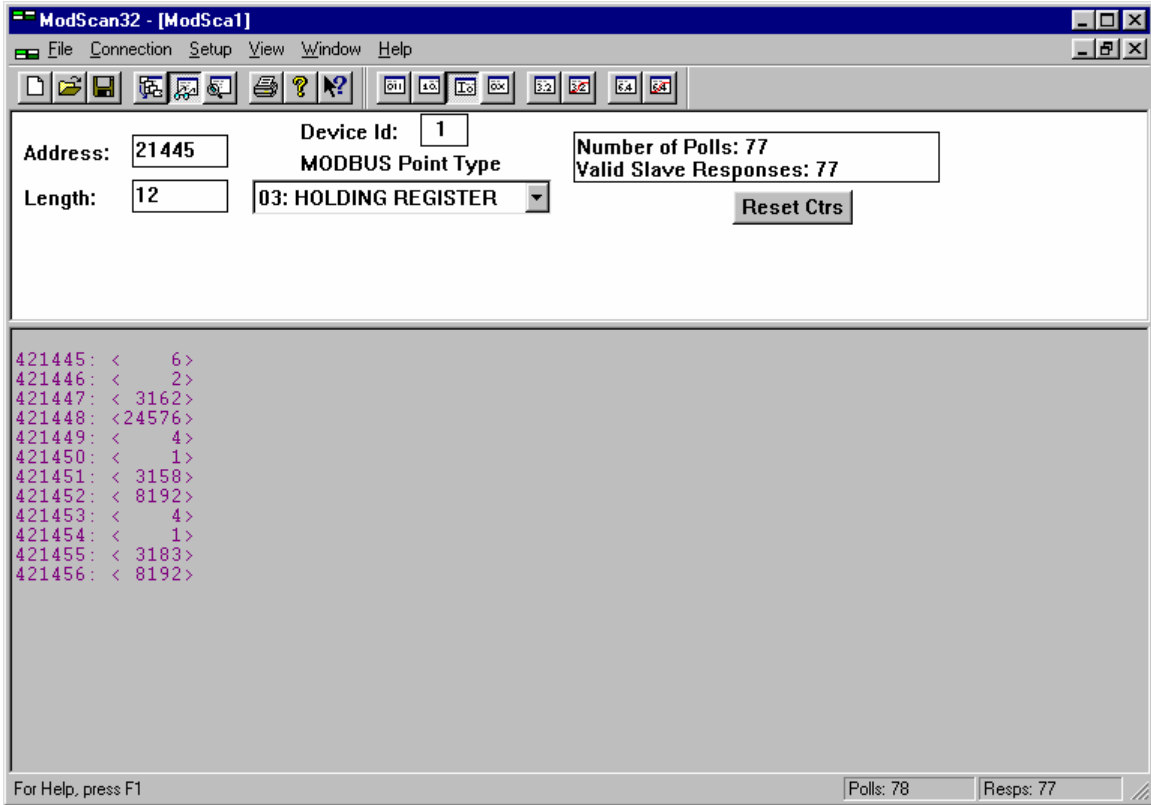
Variable	Location	Data
Type	21445	UI
Length	21446	2
Register	21447	3188
Attribute	21448	Read Write

Status

Variable	Location	Data
Type	21453	UC
Length	21454	1
Register	21455	3134
Attribute	21456	Read

Given this information it is now possible to reverse the positions of these parameters. By selecting to read holding registers beginning at 21445 for a total of 12 registers these two parameters would then be in the scope of that read and their current values would be displayed as shown below.

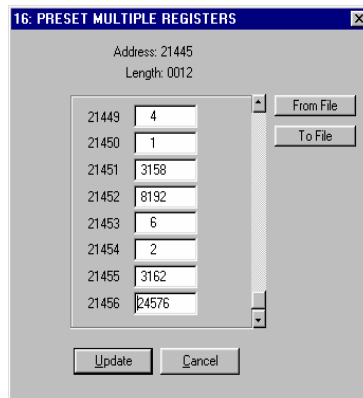
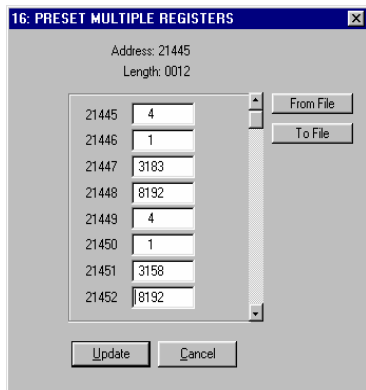
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Note: The registers in slots 5 – 8 would be the sub-params associated with parameter #2, "Spare".

Before entering any data values, a few conversions must be performed at this point. By referencing the "Data Type" table convert the "Type" variables above to their equivalent decimal representation (UI = 6, and UC = 4). These are the values which will be written into the appropriate register later. Also, referring to the "Attributes" table convert the attributes to their equivalence (Read|Write = 24576, and Read = 8192).

Now, by selecting to preset registers off of the Setup| Extended|Preset Regs menu, the actual data entry to swap the desired parameters can take place. The screens below show this option with the data in the proper format ready to be sent to the FCU to make the swap of the two parameters.



Important:

It should be noted that when performing this operation of swapping two unlike types that the results were unsuccessful with the Host_Sim program because the host was still expecting the original data type. This is a limitation on the host side. Swaps were accepted by the host if the data type of the register being moved was the same as was there previously. For example swapping the Point Tag ID parameter and the Units parameter. Both are of the same type and size so the swap was successful. This shows that the flow computer can perform the customization of the Point Type tables, but it is also up to the host to be configurable for these changes to be truly global in their application. Even though the Units parameter was moved into parameter slot 0, the host still labeled this parameter as Point Tag ID.

For parameters which are not required to return meaningful values, such as "Spare" parameters, a set of NULL registers has been created which will return a 0 (zero) of the proper format for their data type. These can be referenced in the "NULL Register" table.

Important:

Remember that each sub-parm occupies two bytes and the Modbus protocol only allows the transfer of a maximum of 256 bytes for each transaction.

XXI. Point Type Table Definitions

Data Types

<i>Data Type</i>	<i>Value</i>	<i>Definition</i>
BN	0	Binary
AC	1	ASCII Character
CH	2	Single ASCII Character
SC	3	Signed Character
UC	4	Unsigned Character
PGE_SI	5	Signed Integer
UI	6	Unsigned Integer
SL	7	Signed Long Integer
UL	8	Unsigned Long Integer
FL	9	Floating Point (IEEE)
TLP	10	Type, Point Number, and Parameter Number
TM	11	Six Byte Time Variable

Attributes

<i>Attribute</i>	<i>Value</i>
Read Only	8192
Read and Write	24576

NULL Registers

<i>Register</i>	<i>Description</i>
3118	NULL Character Register
3119	NULL ASCII Register
3120	NULL Integer Register
3121	NULL Binary Register
5028	NULL Long Integer Register
7269	NULL Floating Point Register

Point Type 1, Discrete Input #1 Parameters

Type	Length	Register	Attributes	Description	Parm	RAM Type Length Reg Attr	Meter Type
AC	10	30001	READ WRITE	Tag id	0	20001 0002 0003 0004	
UC	1	3118	READ	Not Used	1	20005 0006 0007 0008	
UC	1	3132	READ	Status (0=off 1=on)	2		
UC	1	3118	READ	Not Used	3		
UC	1	3118	READ	Not Used	4		0020
UL	4	5028	READ	Not Used	5		
UL	4	5028	READ	Not Used	6		
UL	4	5028	READ	Not Used	7		
UI	2	3120	READ	Not Used	8		
UI	2	3120	READ	Not Used	9		0040
UI	2	3120	READ	Not Used	10		
AC	10	30661	READ WRITE	Units	11		
UI	2	3120	READ	Not Used	12		
FL	4	7269	READ	Not Used	13		
FL	4	7269	READ	Not Used	14		0060
FL	4	7269	READ	Not Used	15		
FL	4	7269	READ	Not Used	16		
FL	4	7269	READ	Not Used	17		
FL	4	7269	READ	Not Used	18		
FL	4	7269	READ	Not Used	19		0080
FL	4	7269	READ	Not Used	20		
FL	4	7269	READ	Not Used	21		
UI	2	3120	READ	Not Used	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24		0100
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29		0120
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34		0140
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39		0160
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44		0180
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49		0200
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		

Discrete Input #1 (cont.)

FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54		0220
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59		0240

Point Type 1, Discrete Input #2 Parameters

Type	Length	Register	Attributes	Description	Parm	RAM				Meter Type
						Type	Length	Reg	Attr	
AC	10	30016	READ WRITE	Tag id	0	20241	0242	0243	0244	
UC	1	3118	READ	Not Used	1	20245	0246	0247	0248	
UC	1	3133	READ	Status (0=off 1=on)	2					
UC	1	3118	READ	Not Used	3					
UC	1	3118	READ	Not Used	4				0260	
UL	4	5028	READ	Not Used	5					
UL	4	5028	READ	Not Used	6					
UL	4	5028	READ	Not Used	7					
UI	2	3120	READ	Not Used	8					
UI	2	3120	READ	Not Used	9				0280	
UI	2	3120	READ	Not Used	10					
AC	10	30676	READ WRITE	Units	11					
UI	2	3120	READ	Not Used	12					
FL	4	7269	READ	Not Used	13					
FL	4	7269	READ	Not Used	14				0300	
FL	4	7269	READ	Not Used	15					
FL	4	7269	READ	Not Used	16					
FL	4	7269	READ	Not Used	17					
FL	4	7269	READ	Not Used	18					
FL	4	7269	READ	Not Used	19				0320	
FL	4	7269	READ	Not Used	20					
FL	4	7269	READ	Not Used	21					
UI	2	3120	READ	Not Used	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24				0340	
FL	4	7269	READ	Spare	25					
FL	4	7269	READ	Spare	26					
FL	4	7269	READ	Spare	27					
FL	4	7269	READ	Spare	28					
FL	4	7269	READ	Spare	29				0360	
FL	4	7269	READ	Spare	30					
FL	4	7269	READ	Spare	31					
FL	4	7269	READ	Spare	32					
FL	4	7269	READ	Spare	33					
FL	4	7269	READ	Spare	34				0380	
FL	4	7269	READ	Spare	35					
FL	4	7269	READ	Spare	36					
FL	4	7269	READ	Spare	37					

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Discrete Input # 2 (cont.)

FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	0400	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	0420	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	0440	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	0460	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	0480	

Point Type 1, Discrete Input #3 Parameters (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM				Meter Type
						Type	Length	Reg	Attr	
AC	10	30031	READ WRITE	Tag id	0	20481	0482	0483	0484	
UC	1	3118	READ	Not Used	1	20485	0486	0487	0488	
UC	1	3118	READ	Not Used	2					
UC	1	3118	READ	Not Used	3					
UC	1	3118	READ	Not Used	4				0500	
UL	4	5028	READ	Not Used	5					
UL	4	5028	READ	Not Used	6					
UL	4	5028	READ	Not Used	7					
UI	2	3120	READ	Not Used	8					
UI	2	3120	READ	Not Used	9				0520	
UI	2	3120	READ	Not Used	10					
AC	10	30691	READ WRITE	Units	11					
UI	2	3120	READ	Not Used	12					
FL	4	7269	READ	Not Used	13					
FL	4	7269	READ	Not Used	14				0540	
FL	4	7269	READ	Not Used	15					
FL	4	7269	READ	Not Used	16					
FL	4	7269	READ	Not Used	17					
FL	4	7269	READ	Not Used	18					
FL	4	7269	READ	Not Used	19				0560	
FL	4	7269	READ	Not Used	20					
FL	4	7269	READ	Not Used	21					
UI	2	3120	READ	Not Used	22					
FL	4	7269	READ	Spare	23					

Discrete Input #3 (cont.)

FL	4	7269	READ	Spare	24	0580	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	0600	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	0620	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	0640	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	0660	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	0680	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	0700	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	0720	

Point Type 1, Discrete Input #4 Parameters (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM				Meter Type
						Type	Length	Reg	Attr	
AC	10	30046	READ WRITE	Tag id	0	20721	0722	0723	0724	
UC	1	3118	READ	Not Used	1	20725	0726	0727	0728	
UC	1	3118	READ	Not Used	2					
UC	1	3118	READ	Not Used	3					
UC	1	3118	READ	Not Used	4				0740	
UL	4	5028	READ	Not Used	5					
UL	4	5028	READ	Not Used	6					
UL	4	5028	READ	Not Used	7					
UI	2	3120	READ	Not Used	8					
UI	2	3120	READ	Not Used	9				0760	

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Discrete Input #4 (cont.)

UI	2	3120	READ	Not Used	10		
AC	10	30706	READ WRITE	Units	11		
UI	2	3120	READ	Not Used	12		
FL	4	7269	READ	Not Used	13		
FL	4	7269	READ	Not Used	14	0780	
FL	4	7269	READ	Not Used	15		
FL	4	7269	READ	Not Used	16		
FL	4	7269	READ	Not Used	17		
FL	4	7269	READ	Not Used	18		
FL	4	7269	READ	Not Used	19	0800	
FL	4	7269	READ	Not Used	20		
FL	4	7269	READ	Not Used	21		
UI	2	3120	READ	Not Used	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	0820	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	0840	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	0860	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	0880	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	0900	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	0920	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	0940	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	0960	

Point Type 1, Discrete Input #5 Parameters (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM				Meter Type
						Type	Length	Reg	Attr	
AC	10	30061	READ WRITE	Tag id	0	20961	0962	0963	0964	
UC	1	3118	READ	Not Used	1	20965	0966	0967	0968	
UC	1	3118	READ	Not Used	2					
UC	1	3118	READ	Not Used	3					
UC	1	3118	READ	Not Used	4				0980	
UL	4	5028	READ	Not Used	5					
UL	4	5028	READ	Not Used	6					
UL	4	5028	READ	Not Used	7					
UI	2	3120	READ	Not Used	8					
UI	2	3120	READ	Not Used	9				1000	
UI	2	3120	READ	Not Used	10					
AC	10	30721	READ WRITE	Units	11					
UI	2	3120	READ	Not Used	12					
FL	4	7269	READ	Not Used	13					
FL	4	7269	READ	Not Used	14				1020	
FL	4	7269	READ	Not Used	15					
FL	4	7269	READ	Not Used	16					
FL	4	7269	READ	Not Used	17					
FL	4	7269	READ	Not Used	18					
FL	4	7269	READ	Not Used	19				1040	
FL	4	7269	READ	Not Used	20					
FL	4	7269	READ	Not Used	21					
UI	2	3120	READ	Not Used	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24				1060	
FL	4	7269	READ	Spare	25					
FL	4	7269	READ	Spare	26					
FL	4	7269	READ	Spare	27					
FL	4	7269	READ	Spare	28					
FL	4	7269	READ	Spare	29				1080	
FL	4	7269	READ	Spare	30					
FL	4	7269	READ	Spare	31					
FL	4	7269	READ	Spare	32					
FL	4	7269	READ	Spare	33					
FL	4	7269	READ	Spare	34				1100	
FL	4	7269	READ	Spare	35					
FL	4	7269	READ	Spare	36					
FL	4	7269	READ	Spare	37					
FL	4	7269	READ	Spare	38					
FL	4	7269	READ	Spare	39				1120	
FL	4	7269	READ	Spare	40					
FL	4	7269	READ	Spare	41					
FL	4	7269	READ	Spare	42					
FL	4	7269	READ	Spare	43					
FL	4	7269	READ	Spare	44				1140	
FL	4	7269	READ	Spare	45					
FL	4	7269	READ	Spare	46					
FL	4	7269	READ	Spare	47					
FL	4	7269	READ	Spare	48					
FL	4	7269	READ	Spare	49				1160	
FL	4	7269	READ	Spare	50					
FL	4	7269	READ	Spare	51					
FL	4	7269	READ	Spare	52					

Discrete Input #5 (cont.)

FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54		1180
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59		1200

Point Type 1, Discrete Input #6 Parameters (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM Type Length Reg Attr	Meter Type
AC	10	30076	READ WRITE	Tag id	0	21201 1202 1203 1204	
UC	1	3118	READ	Not Used	1	21205 1206 1207 1208	
UC	1	3118	READ	Not Used	2		
UC	1	3118	READ	Not Used	3		
UC	1	3118	READ	Not Used	4		1220
UL	4	5028	READ	Not Used	5		
UL	4	5028	READ	Not Used	6		
UL	4	5028	READ	Not Used	7		
UI	2	3120	READ	Not Used	8		
UI	2	3120	READ	Not Used	9		1240
UI	2	3120	READ	Not Used	10		
AC	10	30736	READ WRITE	Units	11		
UI	2	3120	READ	Not Used	12		
FL	4	7269	READ	Not Used	13		
FL	4	7269	READ	Not Used	14		1260
FL	4	7269	READ	Not Used	15		
FL	4	7269	READ	Not Used	16		
FL	4	7269	READ	Not Used	17		
FL	4	7269	READ	Not Used	18		
FL	4	7269	READ	Not Used	19		1280
FL	4	7269	READ	Not Used	20		
FL	4	7269	READ	Not Used	21		
UI	2	3120	READ	Not Used	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24		1300
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29		1320
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34		1340
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		

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Discrete Input #6 (cont.)

FL	4	7269	READ	Spare	39	1360	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	1380	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	1400	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	1420	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	1440	

Point Type 2, Discrete Output #1

Type	Length	Register	Attributes	Description	Parm	RAM Type Length Reg Attr	Meter Type
AC	10	30091	READ WRITE	Tag ID	0	21441 1442 1443 1444	
UI	2	3122	READ WRITE	Time On	1	21445 1446 1447 1448	
UC	1	3118	READ	Spare	2		
UC	1	3134	READ	Status (0=off 1=on)	3		
UC	1	3118	READ	Not Used	4	1460	
UC	1	3118	READ	Not Used	5		
UL	4	5028	READ	Not Used	6		
AC	10	30751	READ WRITE	Units	7		
UI	2	3120	READ	Not Used	8		
UI	2	3120	READ	Not Used	9	1480	
UI	2	3120	READ	Not Used	10		
FL	4	7269	READ	Not Used	11		
FL	4	7269	READ	Not Used	12		
FL	4	7269	READ	Not Used	13		
FL	4	7269	READ	Spare	14	1500	
FL	4	7269	READ	Spare	15		
FL	4	7269	READ	Spare	16		
FL	4	7269	READ	Spare	17		
FL	4	7269	READ	Spare	18		
FL	4	7269	READ	Spare	19	1520	
FL	4	7269	READ	Spare	20		
FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	1540	
FL	4	7269	READ	Spare	25		

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Discrete Output #1 (cont.)

FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	1560	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	1580	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	1600	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	1620	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	1640	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	1660	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	1680	

Point Type 2, Discrete Output #2

Type	Length	Register	Attributes	Description	Parm	RAM Type Length Reg Attr	Meter Type
AC	10	30106	READ WRITE	Tag ID	0	21681 1682 1683 1684	
UI	2	3123	READ WRITE	Time On	1	21685 1686 1687 1688	
UC	1	3118	READ	Spare	2		
UC	1	3135	READ	Status (0=off 1=on)	3		
UC	1	3118	READ	Not Used	4	1700	
UC	1	3118	READ	Not Used	5		
UL	4	5028	READ	Not Used	6		
AC	10	30766	READ WRITE	Units	7		

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Discrete Output #2 (cont.)

UI	2	3120	READ	Not Used	8		
UI	2	3120	READ	Not Used	9	1720	
UI	2	3120	READ	Not Used	10		
FL	4	7269	READ	Not Used	11		
FL	4	7269	READ	Not Used	12		
FL	4	7269	READ	Not Used	13		
FL	4	7269	READ	Spare	14	1740	
FL	4	7269	READ	Spare	15		
FL	4	7269	READ	Spare	16		
FL	4	7269	READ	Spare	17		
FL	4	7269	READ	Spare	18		
FL	4	7269	READ	Spare	19	1760	
FL	4	7269	READ	Spare	20		
FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	1780	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	1800	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	1820	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	1840	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	1860	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	1880	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	1900	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	1920	

Point Type 2, Discrete Output #3 (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM				Meter Type
						Type	Length	Reg	Attr	
AC	10	30121	READ WRITE	Tag ID	0	21921	1922	1923	1924	
UI	2	3120	READ	Not Used	1	21925	1926	1927	1928	
UC	1	3118	READ	Spare	2					
UC	1	3118	READ	Not Used	3					
UC	1	3118	READ	Not Used	4					1940
UC	1	3118	READ	Not Used	5					
UL	4	5028	READ	Not Used	6					
AC	10	30781	READ WRITE	Units	7					
UI	2	3120	READ	Not Used	8					
UI	2	3120	READ	Not Used	9					1960
UI	2	3120	READ	Not Used	10					
FL	4	7269	READ	Not Used	11					
FL	4	7269	READ	Not Used	12					
FL	4	7269	READ	Not Used	13					
FL	4	7269	READ	Spare	14					1980
FL	4	7269	READ	Spare	15					
FL	4	7269	READ	Spare	16					
FL	4	7269	READ	Spare	17					
FL	4	7269	READ	Spare	18					
FL	4	7269	READ	Spare	19					2000
FL	4	7269	READ	Spare	20					
FL	4	7269	READ	Spare	21					
FL	4	7269	READ	Spare	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24					2020
FL	4	7269	READ	Spare	25					
FL	4	7269	READ	Spare	26					
FL	4	7269	READ	Spare	27					
FL	4	7269	READ	Spare	28					
FL	4	7269	READ	Spare	29					2040
FL	4	7269	READ	Spare	30					
FL	4	7269	READ	Spare	31					
FL	4	7269	READ	Spare	32					
FL	4	7269	READ	Spare	33					
FL	4	7269	READ	Spare	34					2060
FL	4	7269	READ	Spare	35					
FL	4	7269	READ	Spare	36					
FL	4	7269	READ	Spare	37					
FL	4	7269	READ	Spare	38					
FL	4	7269	READ	Spare	39					2080
FL	4	7269	READ	Spare	40					
FL	4	7269	READ	Spare	41					
FL	4	7269	READ	Spare	42					
FL	4	7269	READ	Spare	43					
FL	4	7269	READ	Spare	44					2100
FL	4	7269	READ	Spare	45					
FL	4	7269	READ	Spare	46					
FL	4	7269	READ	Spare	47					
FL	4	7269	READ	Spare	48					
FL	4	7269	READ	Spare	49					2120
FL	4	7269	READ	Spare	50					
FL	4	7269	READ	Spare	51					
FL	4	7269	READ	Spare	52					

Discrete Output #3 (cont.)

FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	2140	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	2160	

Point Type 2, Discrete Output #4 (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
AC	10	30136	READ WRITE	Tag ID	0	22161	2162	2163	2164	
UI	2	3120	READ	Not Used	1	22165	2166	2167	2168	
UC	1	3118	READ	Spare	2					
UC	1	3118	READ	Not Used	3					
UC	1	3118	READ	Not Used	4				2180	
UC	1	3118	READ	Not Used	5					
UL	4	5028	READ	Not Used	6					
AC	10	30796	READ WRITE	Units	7					
UI	2	3120	READ	Not Used	8					
UI	2	3120	READ	Not Used	9				2200	
UI	2	3120	READ	Not Used	10					
FL	4	7269	READ	Not Used	11					
FL	4	7269	READ	Not Used	12					
FL	4	7269	READ	Not Used	13					
FL	4	7269	READ	Spare	14				2220	
FL	4	7269	READ	Spare	15					
FL	4	7269	READ	Spare	16					
FL	4	7269	READ	Spare	17					
FL	4	7269	READ	Spare	18					
FL	4	7269	READ	Spare	19				2240	
FL	4	7269	READ	Spare	20					
FL	4	7269	READ	Spare	21					
FL	4	7269	READ	Spare	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24				2260	
FL	4	7269	READ	Spare	25					
FL	4	7269	READ	Spare	26					
FL	4	7269	READ	Spare	27					
FL	4	7269	READ	Spare	28					
FL	4	7269	READ	Spare	29				2280	
FL	4	7269	READ	Spare	30					
FL	4	7269	READ	Spare	31					
FL	4	7269	READ	Spare	32					
FL	4	7269	READ	Spare	33					
FL	4	7269	READ	Spare	34				2300	
FL	4	7269	READ	Spare	35					
FL	4	7269	READ	Spare	36					
FL	4	7269	READ	Spare	37					

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Discrete Output #4 (cont.)

FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	2320	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	2340	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	2360	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	2380	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	2400	

Point Type 2, Discrete Output #5 (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM Type Length Reg Attr	Meter Type
AC	10	30151	READ WRITE	Tag ID	0	22401 2402 2403 2404	
UI	2	3120	READ	Not Used	1	22405 2406 2407 2408	
UC	1	3118	READ	Spare	2		
UC	1	3118	READ	Not Used	3		
UC	1	3118	READ	Not Used	4	2420	
UC	1	3118	READ	Not Used	5		
UL	4	5028	READ	Not Used	6		
AC	10	30811	READ WRITE	Units	7		
UI	2	3120	READ	Not Used	8		
UI	2	3120	READ	Not Used	9	2440	
UI	2	3120	READ	Not Used	10		
FL	4	7269	READ	Not Used	11		
FL	4	7269	READ	Not Used	12		
FL	4	7269	READ	Not Used	13		
FL	4	7269	READ	Spare	14	2460	
FL	4	7269	READ	Spare	15		
FL	4	7269	READ	Spare	16		
FL	4	7269	READ	Spare	17		
FL	4	7269	READ	Spare	18		
FL	4	7269	READ	Spare	19	2480	
FL	4	7269	READ	Spare	20		
FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	2500	

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Discrete Output #5 (cont.)

FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	2520	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	2540	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	2560	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	2580	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	2600	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	2620	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	2640	

Point Type 2, Discrete Output #6 (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM Type Length Reg Attr	Meter Type
AC	10	30166	READ WRITE	Tag ID	0	22641 2642 2643 2644	
UI	2	3120	READ	Not Used	1	22645 2646 2647 2648	
UC	1	3118	READ	Spare	2		
UC	1	3118	READ	Not Used	3		
UC	1	3118	READ	Not Used	4		2660
UC	1	3118	READ	Not Used	5		
UL	4	5028	READ	Not Used	6		
AC	10	30826	READ WRITE	Units	7		
UI	2	3120	READ	Not Used	8		

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Discrete Output #6 (cont.)

UI	2	3120	READ	Not Used	9	2680	
UI	2	3120	READ	Not Used	10		
FL	4	7269	READ	Not Used	11		
FL	4	7269	READ	Not Used	12		
FL	4	7269	READ	Not Used	13		
FL	4	7269	READ	Spare	14	2700	
FL	4	7269	READ	Spare	15		
FL	4	7269	READ	Spare	16		
FL	4	7269	READ	Spare	17		
FL	4	7269	READ	Spare	18		
FL	4	7269	READ	Spare	19	2720	
FL	4	7269	READ	Spare	20		
FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	2740	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	2760	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	2780	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	2800	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	2820	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	2840	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	2860	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	2880	

Point Type 3, Analog Input #1

Type	Length	Register	Attributes	Description	Parm	RAM				Meter Type
						Type	Length	Reg	Attr	
AC	10	30181	READ WRITE	Tag ID	0	22881	2882	2883	2884	
AC	10	30841	READ WRITE	Units	1	22885	2886	2887	2888	
UI	2	3120	READ	Not Used	2					
UI	2	3120	READ	Not Used	3					
UI	2	3120	READ	Not Used	4				2900	
UI	2	3120	READ	Not Used	5					
FL	4	7155	READ	Current AI Value	6					
FL	4	7157	READ	Current AI Volts	7					
FL	4	7269	READ	Not Used	8					
FL	4	7269	READ	Not Used	9				2920	
FL	4	7269	READ	Not Used	10					
FL	4	7269	READ	Not Used	11					
FL	4	7269	READ	Not Used	12					
FL	4	7269	READ	Not Used	13					
FL	4	7269	READ	Not Used	14				2940	
UC	1	3118	READ	Not Used	15					
UC	1	3118	READ	Not Used	16					
UI	2	3120	READ	Not Used	17					
UI	2	3120	READ	Not Used	18					
FL	4	7269	READ	Spare	19				2960	
FL	4	7269	READ	Spare	20					
FL	4	7269	READ	Spare	21					
FL	4	7269	READ	Spare	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24				2980	
FL	4	7269	READ	Spare	25					
FL	4	7269	READ	Spare	26					
FL	4	7269	READ	Spare	27					
FL	4	7269	READ	Spare	28					
FL	4	7269	READ	Spare	29				3000	
FL	4	7269	READ	Spare	30					
FL	4	7269	READ	Spare	31					
FL	4	7269	READ	Spare	32					
FL	4	7269	READ	Spare	33					
FL	4	7269	READ	Spare	34				3020	
FL	4	7269	READ	Spare	35					
FL	4	7269	READ	Spare	36					
FL	4	7269	READ	Spare	37					
FL	4	7269	READ	Spare	38					
FL	4	7269	READ	Spare	39				3040	
FL	4	7269	READ	Spare	40					
FL	4	7269	READ	Spare	41					
FL	4	7269	READ	Spare	42					
FL	4	7269	READ	Spare	43					
FL	4	7269	READ	Spare	44				3060	
FL	4	7269	READ	Spare	45					
FL	4	7269	READ	Spare	46					
FL	4	7269	READ	Spare	47					
FL	4	7269	READ	Spare	48					
FL	4	7269	READ	Spare	49				3080	
FL	4	7269	READ	Spare	50					
FL	4	7269	READ	Spare	51					

Analog Input #1 (cont.)

FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	3100	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	3120	

Point Type 3, Analog Input #2

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
AC	10	30196	READ WRITE	Tag ID	0	23121	3122	3123	3124	
AC	10	30856	READ WRITE	Units	1	23125	3126	3127	3128	
UI	2	3120	READ	Not Used	2					
UI	2	3120	READ	Not Used	3					
UI	2	3120	READ	Not Used	4				3140	
UI	2	3120	READ	Not Used	5					
FL	4	7156	READ	Current AI Value EU	6					
FL	4	7158	READ	Current AI Volts	7					
FL	4	7269	READ	Not Used	8					
FL	4	7269	READ	Not Used	9				3160	
FL	4	7269	READ	Not Used	10					
FL	4	7269	READ	Not Used	11					
FL	4	7269	READ	Not Used	12					
FL	4	7269	READ	Not Used	13					
FL	4	7269	READ	Not Used	14				3180	
UC	1	3118	READ	Not Used	15					
UC	1	3118	READ	Not Used	16					
UI	2	3120	READ	Not Used	17					
UI	2	3120	READ	Not Used	18					
FL	4	7269	READ	Spare	19				3200	
FL	4	7269	READ	Spare	20					
FL	4	7269	READ	Spare	21					
FL	4	7269	READ	Spare	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24				3220	
FL	4	7269	READ	Spare	25					
FL	4	7269	READ	Spare	26					
FL	4	7269	READ	Spare	27					
FL	4	7269	READ	Spare	28					
FL	4	7269	READ	Spare	29				3240	
FL	4	7269	READ	Spare	30					
FL	4	7269	READ	Spare	31					
FL	4	7269	READ	Spare	32					
FL	4	7269	READ	Spare	33					
FL	4	7269	READ	Spare	34				3260	
FL	4	7269	READ	Spare	35					
FL	4	7269	READ	Spare	36					
FL	4	7269	READ	Spare	37					
FL	4	7269	READ	Spare	38					

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Analog Input #2 (cont.)

FL	4	7269	READ	Spare	39		3280	
FL	4	7269	READ	Spare	40			
FL	4	7269	READ	Spare	41			
FL	4	7269	READ	Spare	42			
FL	4	7269	READ	Spare	43			
FL	4	7269	READ	Spare	44		3300	
FL	4	7269	READ	Spare	45			
FL	4	7269	READ	Spare	46			
FL	4	7269	READ	Spare	47			
FL	4	7269	READ	Spare	48			
FL	4	7269	READ	Spare	49		3320	
FL	4	7269	READ	Spare	50			
FL	4	7269	READ	Spare	51			
FL	4	7269	READ	Spare	52			
FL	4	7269	READ	Spare	53			
FL	4	7269	READ	Spare	54		3340	
FL	4	7269	READ	Spare	55			
FL	4	7269	READ	Spare	56			
FL	4	7269	READ	Spare	57			
FL	4	7269	READ	Spare	58			
FL	4	7269	READ	Spare	59		3360	

Point Type 4, Analog Output #1 (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
AC	10	30211	READ WRITE	Tag ID	0	23361	3362	3363	3364	
AC	10	30871	READ WRITE	Units	1	23365	3366	3367	3368	
UI	2	3120	READ	Not Used	2					
UI	2	3120	READ	Not Used	3					
FL	4	7269	READ	Not Used	4				3380	
FL	4	7269	READ	Not Used	5					
FL	4	7269	READ	Not Used	6					
UC	1	3118	READ	Not Used	7					
UC	1	3118	READ	Not Used	8					
UI	2	3120	READ	Not Used	9				3400	
FL	4	7269	READ	Spare	10					
FL	4	7269	READ	Spare	11					
FL	4	7269	READ	Spare	12					
FL	4	7269	READ	Spare	13					
FL	4	7269	READ	Spare	14				3420	
FL	4	7269	READ	Spare	15					
FL	4	7269	READ	Spare	16					
FL	4	7269	READ	Spare	17					
FL	4	7269	READ	Spare	18					
FL	4	7269	READ	Spare	19				3440	
FL	4	7269	READ	Spare	20					
FL	4	7269	READ	Spare	21					
FL	4	7269	READ	Spare	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24				3460	

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Analog Output #1 (cont.)

FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	3480	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	3500	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	3520	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	3540	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	3560	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	3580	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	3600	

Point Type 4, Analog Output #2 (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
AC	10	30226	READ WRITE	Tag ID	0	23601	3602	3603	3604	
AC	10	30886	READ WRITE	Units	1	23605	3606	3607	3608	
UI	2	3120	READ	Not Used	2					
UI	2	3120	READ	Not Used	3					
FL	4	7269	READ	Not Used	4				3620	
FL	4	7269	READ	Not Used	5					
FL	4	7269	READ	Not Used	6					
UC	1	3118	READ	Not Used	7					
UC	1	3118	READ	Not Used	8					
UI	2	3120	READ	Not Used	9				3640	

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Analog Output #2 (cont.)

FL	4	7269	READ	Spare	10		
FL	4	7269	READ	Spare	11		
FL	4	7269	READ	Spare	12		
FL	4	7269	READ	Spare	13		
FL	4	7269	READ	Spare	14	3660	
FL	4	7269	READ	Spare	15		
FL	4	7269	READ	Spare	16		
FL	4	7269	READ	Spare	17		
FL	4	7269	READ	Spare	18		
FL	4	7269	READ	Spare	19	3680	
FL	4	7269	READ	Spare	20		
FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	3700	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	3720	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	3740	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	3760	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	3780	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	3800	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	3820	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	3840	

Point Type 4, Analog Output #3 (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
AC	10	30241	READ WRITE	Tag ID	0	23841	3842	3843	3844	
AC	10	30901	READ WRITE	Units	1	23845	3846	3847	3848	
UI	2	3120	READ	Not Used	2					
UI	2	3120	READ	Not Used	3					
FL	4	7269	READ	Not Used	4				3860	
FL	4	7269	READ	Not Used	5					
FL	4	7269	READ	Not Used	6					
UC	1	3118	READ	Not Used	7					
UC	1	3118	READ	Not Used	8					
UI	2	3120	READ	Not Used	9				3880	
FL	4	7269	READ	Spare	10					
FL	4	7269	READ	Spare	11					
FL	4	7269	READ	Spare	12					
FL	4	7269	READ	Spare	13					
FL	4	7269	READ	Spare	14				3900	
FL	4	7269	READ	Spare	15					
FL	4	7269	READ	Spare	16					
FL	4	7269	READ	Spare	17					
FL	4	7269	READ	Spare	18					
FL	4	7269	READ	Spare	19				3920	
FL	4	7269	READ	Spare	20					
FL	4	7269	READ	Spare	21					
FL	4	7269	READ	Spare	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24				3940	
FL	4	7269	READ	Spare	25					
FL	4	7269	READ	Spare	26					
FL	4	7269	READ	Spare	27					
FL	4	7269	READ	Spare	28					
FL	4	7269	READ	Spare	29				3960	
FL	4	7269	READ	Spare	30					
FL	4	7269	READ	Spare	31					
FL	4	7269	READ	Spare	32					
FL	4	7269	READ	Spare	33					
FL	4	7269	READ	Spare	34				3980	
FL	4	7269	READ	Spare	35					
FL	4	7269	READ	Spare	36					
FL	4	7269	READ	Spare	37					
FL	4	7269	READ	Spare	38					
FL	4	7269	READ	Spare	39				4000	
FL	4	7269	READ	Spare	40					
FL	4	7269	READ	Spare	41					
FL	4	7269	READ	Spare	42					
FL	4	7269	READ	Spare	43					
FL	4	7269	READ	Spare	44				4020	
FL	4	7269	READ	Spare	45					
FL	4	7269	READ	Spare	46					
FL	4	7269	READ	Spare	47					
FL	4	7269	READ	Spare	48					
FL	4	7269	READ	Spare	49				4040	
FL	4	7269	READ	Spare	50					
FL	4	7269	READ	Spare	51					

Analog Output #3 (cont.)

FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	4060	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	4080	

Point Type 4, Analog Output #4 (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
AC	10	30256	READ WRITE	Tag ID	0	24081	4082	4083	4084	
AC	10	30916	READ WRITE	Units	1	24085	4086	4087	4088	
UI	2	3120	READ	Not Used	2					
UI	2	3120	READ	Not Used	3					
FL	4	7269	READ	Not Used	4				4100	
FL	4	7269	READ	Not Used	5					
FL	4	7269	READ	Not Used	6					
UC	1	3118	READ	Not Used	7					
UC	1	3118	READ	Not Used	8					
UI	2	3120	READ	Not Used	9				4120	
FL	4	7269	READ	Spare	10					
FL	4	7269	READ	Spare	11					
FL	4	7269	READ	Spare	12					
FL	4	7269	READ	Spare	13					
FL	4	7269	READ	Spare	14				4140	
FL	4	7269	READ	Spare	15					
FL	4	7269	READ	Spare	16					
FL	4	7269	READ	Spare	17					
FL	4	7269	READ	Spare	18					
FL	4	7269	READ	Spare	19				4160	
FL	4	7269	READ	Spare	20					
FL	4	7269	READ	Spare	21					
FL	4	7269	READ	Spare	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24				4180	
FL	4	7269	READ	Spare	25					
FL	4	7269	READ	Spare	26					
FL	4	7269	READ	Spare	27					
FL	4	7269	READ	Spare	28					
FL	4	7269	READ	Spare	29				4200	
FL	4	7269	READ	Spare	30					
FL	4	7269	READ	Spare	31					
FL	4	7269	READ	Spare	32					
FL	4	7269	READ	Spare	33					
FL	4	7269	READ	Spare	34				4220	
FL	4	7269	READ	Spare	35					
FL	4	7269	READ	Spare	36					

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Analog Output #4 (cont.)

FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	4240	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	4260	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	4280	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	4300	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	4320	

Point Type 5, Pulse Input #1

Type	Length	Register	Attributes	Description	Parm	RAM				Meter Type
						Type	Length	Reg	Attr	
AC	10	30271	READ WRITE	Tag ID	0	24321	4322	4323	4324	
AC	10	30931	READ WRITE	Units	1	24325	4326	4327	4328	
UC	1	3118	READ	Not Used	2					
UC	1	3069/3118	READ	Flow Window / NULL	3					G.O./P.I.
UC	1	3118	READ	Not Used	4				4340	
UI	2	3120	READ	Not Used	5					
FL	4	7159	READ WRITE	Conversion(k Factor)	6					
FL	4	7269/xxxx	READ WRITE	NULL / Flow Window	7					G.O./P.I.
FL	4	7269	READ	Not Used	8					
FL	4	7269	READ	Not Used	9				4360	
FL	4	7269	READ	Not Used	10					
FL	4	7269	READ	Not Used	11					
FL	4	7269	READ	Not Used	12					
FL	4	7137	READ	Current Count * Meter Factor	13					
UC	1	3118	READ	Not Used	14				4380	
UC	1	3118	READ	Not Used	15					
UL	4	5017	READ WRITE	Accumulated Value	16					
FL	4	7269	READ	Not Used	17					
FL	4	7161	READ	Today's Total	18					
FL	4	7163	READ	Yesterday's Total	19				4400	
FL	4	7269	READ	Spare	20					

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Pulse Input #1 (cont.)

FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	4420	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	4440	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	4460	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	4480	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	4500	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	4520	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	4540	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	4560	

Point Type 5, Pulse Input #2

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
AC	10	30286	READ WRITE	Tag ID	0	24561	4562	4563	4564	
AC	10	30946	READ WRITE	Units	1	24565	4566	4567	4568	
UC	1	3118	READ	Not Used	2					
UC	1	3069/3118	READ	Flow Window / NULL	3					G.O./P.I.
UC	1	3118	READ	Not Used	4				4580	
UI	2	3120	READ	Not Used	5					
FL	4	7160	READ WRITE	Conversion(k Factor)	6					
FL	4	7269/xxxx	READ WRITE	NULL / Flow Window	7					G.O./P.I.
FL	4	7269	READ	Not Used	8					
FL	4	7269	READ	Not Used	9				4600	
FL	4	7269	READ	Not Used	10					
FL	4	7269	READ	Not Used	11					
FL	4	7269	READ	Not Used	12					
FL	4	7137	READ	Current Count * Meter Factor	13					
UC	1	3118	READ	Not Used	14				4620	
UC	1	3118	READ	Not Used	15					
UL	4	5018	READ WRITE	Accumulated Value	16					
FL	4	7269	READ	Not Used	17					
FL	4	7162	READ	Today's Total	18					
FL	4	7164	READ	Yesterday's Total	19				4640	
FL	4	7269	READ	Spare	20					
FL	4	7269	READ	Spare	21					
FL	4	7269	READ	Spare	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24				4660	
FL	4	7269	READ	Spare	25					
FL	4	7269	READ	Spare	26					
FL	4	7269	READ	Spare	27					
FL	4	7269	READ	Spare	28					
FL	4	7269	READ	Spare	29				4680	
FL	4	7269	READ	Spare	30					
FL	4	7269	READ	Spare	31					
FL	4	7269	READ	Spare	32					
FL	4	7269	READ	Spare	33					
FL	4	7269	READ	Spare	34				4700	
FL	4	7269	READ	Spare	35					
FL	4	7269	READ	Spare	36					
FL	4	7269	READ	Spare	37					
FL	4	7269	READ	Spare	38					
FL	4	7269	READ	Spare	39				4720	
FL	4	7269	READ	Spare	40					
FL	4	7269	READ	Spare	41					
FL	4	7269	READ	Spare	42					
FL	4	7269	READ	Spare	43					
FL	4	7269	READ	Spare	44				4740	
FL	4	7269	READ	Spare	45					
FL	4	7269	READ	Spare	46					
FL	4	7269	READ	Spare	47					
FL	4	7269	READ	Spare	48					
FL	4	7269	READ	Spare	49				4760	
FL	4	7269	READ	Spare	50					

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Pulse Input #2 (cont.)

FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	4780	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	4800	

Point Type 6, DP Primary Control PID (G.O.) Uncorrected Volume PID (P.I.) (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM				Meter Type
						Type	Length	Reg	Attr	
AC	10	30301	READ WRITE	Tag Id	0	24801	4802	4803	4804	
UC	1	3118	READ	Not Used	1	24805	4806	4807	4808	
UC	1	3118	READ	Not Used	2					
UI	2	3120	READ	Not Used	3					
TLP	3	15005	READ	Not Used	4				4820	
TLP	3	15005	READ	Not Used	5					
FL	4	7269	READ	Not Used	6					
TLP	3	15005	READ	Not Used	7					
CH	1	3119	READ	Not Used	8					
TLP	3	15005	READ	Not Used	9				4840	
TLP	3	15005	READ	Not Used	10					
FL	4	7269	READ	Not Used	11					
TLP	3	15005	READ	Not Used	12					
CH	1	3119	READ	Not Used	13					
FL	4	7269	READ	Not Used	14				4860	
FL	4	7269	READ	Not Used	15					
UI	2	3120	READ	Not Used	16					
FL	4	7269	READ	Not Used	17					
FL	4	7269	READ	Not Used	18					
FL	4	7269	READ	Not Used	19				4880	
FL	4	7269	READ	Not Used	20					
FL	4	7269	READ	Not Used	21					
FL	4	7269	READ	Not Used	22					
FL	4	7269	READ	Not Used	23					
FL	4	7269	READ	Not Used	24				4900	
UI	2	3120	READ	Not Used	25					
FL	4	7269	READ	Not Used	26					
FL	4	7269	READ	Not Used	27					
UI	2	3120	READ	Not Used	28					
FL	4	7269	READ	Not Used	29				4920	
FL	4	7269	READ	Not Used	30					

DP Primary Control / Uncorrected Volume(cont.)

FL	4	7269	READ	Not Used	31		
FL	4	7269	READ	Not Used	32		
FL	4	7269	READ	Not Used	33		
FL	4	7269	READ	Not Used	34	4940	
FL	4	7269	READ	Not Used	35		
FL	4	7269	READ	Not Used	36		
FL	4	7269	READ	Not Used	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	4960	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	4980	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	5000	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	5020	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	5040	

Note: For pulse input meters any reference to DP or 'Primary' should be replaced with Actual Cubic Feet (ACF)

Point Type 6, SP Primary Control PID (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM				Meter Type
						Type	Length	Reg	Attr	
AC	10	30316	READ WRITE	Tag ID	0	25041	5042	5043	5044	
UC	1	3118	READ	Not Used	1	25045	5046	5047	5048	
UC	1	3118	READ	Not Used	2					
UI	2	3120	READ	Not Used	3					
TLP	3	15005	READ	Not Used	4				5060	
TLP	3	15005	READ	Not Used	5					
FL	4	7269	READ	Not Used	6					
TLP	3	15005	READ	Not Used	7					
CH	1	3119	READ	Not Used	8					
TLP	3	15005	READ	Not Used	9				5080	
TLP	3	15005	READ	Not Used	10					
FL	4	7269	READ	Not Used	11					

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SP Primary Control (cont.)

TLP	3	15005	READ	Not Used	12		
CH	1	3119	READ	Not Used	13		
FL	4	7269	READ	Not Used	14	5100	
FL	4	7269	READ	Not Used	15		
UI	2	3120	READ	Not Used	16		
FL	4	7269	READ	Not Used	17		
FL	4	7269	READ	Not Used	18		
FL	4	7269	READ	Not Used	19	5120	
FL	4	7269	READ	Not Used	20		
FL	4	7269	READ	Not Used	21		
FL	4	7269	READ	Not Used	22		
FL	4	7269	READ	Not Used	23		
FL	4	7269	READ	Not Used	24	5140	
UI	2	3120	READ	Not Used	25		
FL	4	7269	READ	Not Used	26		
FL	4	7269	READ	Not Used	27		
UI	2	3120	READ	Not Used	28		
FL	4	7269	READ	Not Used	29	5160	
FL	4	7269	READ	Not Used	30		
FL	4	7269	READ	Not Used	31		
FL	4	7269	READ	Not Used	32		
FL	4	7269	READ	Not Used	33		
FL	4	7269	READ	Not Used	34	5180	
FL	4	7269	READ	Not Used	35		
FL	4	7269	READ	Not Used	36		
FL	4	7269	READ	Not Used	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	5200	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	5220	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	5240	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	5260	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	5280	

Note: For pulse input meters any reference to DP should be replaced with Actual Cubic Feet (ACF)

Point Type 6, Flow Rate Primary Control PID (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
AC	10	30331	READ WRITE	Tag ID	0	25281	5282	5283	5284	
UC	1	3118	READ	Not Used	1	25285	5286	5287	5288	
UC	1	3118	READ	Not Used	2					
UI	2	3120	READ	Not Used	3					
TLP	3	15005	READ	Not Used	4				5300	
TLP	3	15005	READ	Not Used	5					
FL	4	7269	READ	Not Used	6					
TLP	3	15005	READ	Not Used	7					
CH	1	3119	READ	Not Used	8					
TLP	3	15005	READ	Not Used	9				5320	
TLP	3	15005	READ	Not Used	10					
FL	4	7269	READ	Not Used	11					
TLP	3	15005	READ	Not Used	12					
CH	1	3119	READ	Not Used	13					
FL	4	7269	READ	Not Used	14				5340	
FL	4	7269	READ	Not Used	15					
UI	2	3120	READ	Not Used	16					
FL	4	7269	READ	Not Used	17					
FL	4	7269	READ	Not Used	18					
FL	4	7269	READ	Not Used	19				5360	
FL	4	7269	READ	Not Used	20					
FL	4	7269	READ	Not Used	21					
FL	4	7269	READ	Not Used	22					
FL	4	7269	READ	Not Used	23					
FL	4	7269	READ	Not Used	24				5380	
UI	2	3120	READ	Not Used	25					
FL	4	7269	READ	Not Used	26					
FL	4	7269	READ	Not Used	27					
UI	2	3120	READ	Not Used	28					
FL	4	7269	READ	Not Used	29				5400	
FL	4	7269	READ	Not Used	30					
FL	4	7269	READ	Not Used	31					
FL	4	7269	READ	Not Used	32					
FL	4	7269	READ	Not Used	33					
FL	4	7269	READ	Not Used	34				5420	
FL	4	7269	READ	Not Used	35					
FL	4	7269	READ	Not Used	36					
FL	4	7269	READ	Not Used	37					
FL	4	7269	READ	Spare	38					
FL	4	7269	READ	Spare	39				5440	
FL	4	7269	READ	Spare	40					
FL	4	7269	READ	Spare	41					
FL	4	7269	READ	Spare	42					
FL	4	7269	READ	Spare	43					
FL	4	7269	READ	Spare	44				5460	
FL	4	7269	READ	Spare	45					

Flow Rate Primary Control (cont.)

FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	5480	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	5500	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	5520	

Note: For pulse input meters any reference to DP should be replaced with Actual Cubic Feet (ACF)

Point Type 7, AGA Flow Parameters

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
AC	10	30346	READ WRITE	Tag ID	0	25521	5522	5523	5524	
FL	4	7269	READ	Not Used	1	25525	5526	5527	5528	
FL	4	7269	READ	Not Used	2					
BN	1	3003	READ WRITE	Calculation Method	3					
BN	1	3121	READ	Not Used	4				5540	
FL	4	7027	READ WRITE	Specific Gravity	5					
FL	4	7026	READ WRITE	Heating Value	6					
FL	4	7269	READ	Not Used	7					
UI	2	3120	READ	Not Used	8					
FL	4	7063/7269	READ WRITE	Pipe Diameter / NULL	9				5560	G.O./P.I.
FL	4	7061/7269	READ WRITE	Orifice Diameter /NULL	10					G.O./P.I.
FL	4	7269	READ	Not Used	11					
UC	1	1014/3118	READ WRITE	Orifice Material / NULL	12					G.O./P.I.
AC	30	30361	READ WRITE	Description	13					
UC	1	3118	READ	Not Used	14				5580	
FL	4	7123	READ WRITE	Low Alarm EU	15					
FL	4	7124	READ WRITE	High Alarm EU	16					
FL	4	7054	READ WRITE	Viscosity	17					
FL	4	7053	READ WRITE	Specific Heat Ratio	18					
FL	4	7052	READ WRITE	Contract Pressure	19				5600	
FL	4	7051	READ WRITE	Contract Temperature	20					
FL	4	7116/7269	READ WRITE	DP Low Cutoff / NULL	21					G.O./P.I.
FL	4	7269	READ WRITE	Not Used	22					
FL	4	7029	READ WRITE	N2 Nitrogen	23					
FL	4	7028	READ WRITE	CO2 Carbon Dioxide	24				5620	
FL	4	7041	READ WRITE	H2S Hydrogen Sulfide	25					
FL	4	7048	READ WRITE	H2O Water	26					
FL	4	7043	READ WRITE	He Helium	27					
FL	4	7030	READ WRITE	CH4 Methane	28					
FL	4	7031	READ WRITE	C2H6 Ethane	29				5640	
FL	4	7032	READ WRITE	C3H8 Propane	30					

AGA Flow Parameters (cont.)

FL	4	7034	READ WRITE	C4H10 n-Butane	31				
FL	4	7033	READ WRITE	C4H10 i-Butane	32				
FL	4	7036	READ WRITE	C5H12 n-Pentane	33				
FL	4	7035	READ WRITE	C5H12 i-Pentane	34			5660	
FL	4	7037	READ WRITE	C6H14 n-Hexane	35				
FL	4	7038	READ WRITE	C7H16 n-Heptane	36				
FL	4	7039	READ WRITE	C8H18 n-Octane	37				
FL	4	7040	READ WRITE	C9H20 n-Nonane	38				
FL	4	7047	READ WRITE	C10H22 n-Decane	39			5680	
FL	4	7044	READ WRITE	O2 Oxygen	40				
FL	4	7045	READ WRITE	CO Carbon Monoxide	41				
FL	4	7042	READ WRITE	H2 Hydrogen	42				
UC	1	3118	READ	Not Used	43				
UC	1	3118	READ	Not Used	44			5700	
TLP	3	15005	READ	Not Used	45				
TLP	3	15005	READ	Not Used	46				
TLP	3	15005	READ	Not Used	47				
TLP	3	15005	READ	Not Used	48				
FL	4	7117/7269	READ WRITE	Low DP Setpoint / NULL	49			5720	G.O./P.I.
FL	4	7118/7269	READ WRITE	High DP Setpoint / NULL	50				G.O./P.I.
FL	4	7004/7269	READ	DP / NULL	51				G.O./P.I.
FL	4	7003	READ	SP	52				
FL	4	7005	READ	Tf	53				
FL	4	7269	READ	Spare	54			5740	
FL	4	7269	READ	Spare	55				
FL	4	7269	READ	Spare	56				
FL	4	7269	READ	Spare	57				
FL	4	7269	READ	Spare	58				
FL	4	7269	READ	Spare	59			5760	

Point Type 10, AGA Flow Value Parameters

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
FL	4	7004/7269	READ	DP / NULL	0	25761	5762	5763	5764	G.O./P.I.
FL	4	7003	READ	SP	1	25765	5766	5767	5768	
FL	4	7005	READ	Tf	2					
FL	4	7006	READ	Instantaneous Flow	3					
FL	4	7007	READ	Instantaneous Energy	4				5780	
FL	4	7009	READ	Flow Today	5					
FL	4	7152	READ	Energy Today	6					
FL	4	7022	READ	Flow Yesterday	7					
FL	4	7023	READ	Energy Yesterday	8					
FL	4	7072	READ	Pressure Extension	9				5800	
FL	4	7073	READ	C Prime	10					
FL	4	7269	READ	Not Used	11					
FL	4	7074	READ	Expansion Factor	12					
FL	4	7080	READ	Fr	13					

AGA Flow Value Parameters (cont.)

FL	4	7083	READ	Ftf	14	5820	
FL	4	7075	READ	Fpv	15		
FL	4	7084	READ	Fgr	16		
FL	4	7079	READ	Fb	17		
FL	4	7081	READ	Fpb	18		
FL	4	7082	READ	Ftb	19	5840	
FL	4	7085	READ	Fa	20		
FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	5860	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	5880	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	5900	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	5920	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	5940	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	5960	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	5980	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	6000	

Point Type 12, Clock Parameters

Type	Length	Register	Attributes	Description	Parm	RAM				Meter Type
						Type	Length	Reg	Attr	
UC	1	3129	READ WRITE	seconds	0	26001	6002	6003	6004	
UC	1	3128	READ WRITE	minutes	1	26005	6006	6007	6008	
UC	1	3127	READ WRITE	hours	2					
UC	1	3125	READ WRITE	day	3					
UC	1	3124	READ WRITE	month	4				6020	
UC	1	3126	READ WRITE	year	5					
UC	1	3118	READ WRITE	Not Used	6					
UC	1	3130	READ WRITE	day of week	7					
TM	6	3131	READ WRITE	Time info	8					
FL	4	7269	READ	Spare	9				6040	
FL	4	7269	READ	Spare	10					
FL	4	7269	READ	Spare	11					
FL	4	7269	READ	Spare	12					
FL	4	7269	READ	Spare	13					
FL	4	7269	READ	Spare	14				6060	
FL	4	7269	READ	Spare	15					
FL	4	7269	READ	Spare	16					
FL	4	7269	READ	Spare	17					
FL	4	7269	READ	Spare	18					
FL	4	7269	READ	Spare	19				6080	
FL	4	7269	READ	Spare	20					
FL	4	7269	READ	Spare	21					
FL	4	7269	READ	Spare	22					
FL	4	7269	READ	Spare	23					
FL	4	7269	READ	Spare	24				6100	
FL	4	7269	READ	Spare	25					
FL	4	7269	READ	Spare	26					
FL	4	7269	READ	Spare	27					
FL	4	7269	READ	Spare	28					
FL	4	7269	READ	Spare	29				6120	
FL	4	7269	READ	Spare	30					
FL	4	7269	READ	Spare	31					
FL	4	7269	READ	Spare	32					
FL	4	7269	READ	Spare	33					
FL	4	7269	READ	Spare	34				6140	
FL	4	7269	READ	Spare	35					
FL	4	7269	READ	Spare	36					
FL	4	7269	READ	Spare	37					
FL	4	7269	READ	Spare	38					
FL	4	7269	READ	Spare	39				6160	
FL	4	7269	READ	Spare	40					
FL	4	7269	READ	Spare	41					
FL	4	7269	READ	Spare	42					
FL	4	7269	READ	Spare	43					
FL	4	7269	READ	Spare	44				6180	
FL	4	7269	READ	Spare	45					
FL	4	7269	READ	Spare	46					
FL	4	7269	READ	Spare	47					
FL	4	7269	READ	Spare	48					
FL	4	7269	READ	Spare	49				6200	
FL	4	7269	READ	Spare	50					

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Clock Parameters (cont.)

FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	6220	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	6240	

Point Type 14, Remote Port

Type	Length	Register	Attributes	Description	Parm	RAM Type Length Reg Attr	Meter Type
AC	10	30376	READ WRITE	Tag id	0	26241 6242 6243 6244	
UI	2	3012	READ WRITE	Baud	1	26245 6246 6247 6248	
UC	1	3015	READ WRITE	Stop Bits	2		
UC	1	3013	READ WRITE	Data Bits	3		
UC	1	3014	READ WRITE	Parity	4	6260	
BN	1	3121	READ	Not Used	5		
BN	1	3121	READ	Not Used	6		
UC	1	3017	READ WRITE	Key on Delay	7		
UC	1	3018	READ WRITE	Turnaround Delay	8		
UC	1	3019	READ WRITE	Protocol	9	6280	
UI	2	3072	READ WRITE	Timeout (RTO)	10		
UI	2	3120	READ	Not Used	11		
UI	2	3120	READ	Not Used	12		
UI	2	3120	READ	Not Used	13		
UI	2	3120	READ	Not Used	14	6300	
FL	4	7269	READ	Spare	15		
FL	4	7269	READ	Spare	16		
FL	4	7269	READ	Spare	17		
FL	4	7269	READ	Spare	18		
FL	4	7269	READ	Spare	19	6320	
FL	4	7269	READ	Spare	20		
FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	6340	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	6360	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		

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Remote Port (cont.)

FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	6380	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	6400	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	6420	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	6440	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	6460	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	6480	

Point Type 14, AUX Port

Type	Length	Register	Attributes	Description	Parm	RAM Type	Length	Reg	Attr	Meter Type
AC	10	30391	READ WRITE	Tag id	0	26481	6482	6483	6484	
UI	2	3137	READ WRITE	Baud	1	26485	6486	6487	6488	
UC	1	3140	READ WRITE	Stop Bits	2					
UC	1	3138	READ WRITE	Data Bits	3					
UC	1	3139	READ WRITE	Parity	4				6500	
BN	1	3121	READ	Not Used	5					
BN	1	3121	READ	Not Used	6					
UC	1	3142	READ WRITE	Key on Delay	7					
UC	1	3143	READ WRITE	Turnaround Delay	8					
UC	1	3144	READ WRITE	Protocol	9				6520	
UI	2	3074	READ WRITE	Timeout (ATO)	10					
UI	2	3120	READ	Not Used	11					
UI	2	3120	READ	Not Used	12					
UI	2	3120	READ	Not Used	13					
UI	2	3120	READ	Not Used	14				6540	

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AUX Port (cont.)

FL	4	7269	READ	Spare	15		
FL	4	7269	READ	Spare	16		
FL	4	7269	READ	Spare	17		
FL	4	7269	READ	Spare	18		
FL	4	7269	READ	Spare	19	6560	
FL	4	7269	READ	Spare	20		
FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	6580	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	6600	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	6620	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	6640	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	6660	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	6680	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	6700	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	6720	

Point Type 14, AUXB Port (6700 only)

Type	Length	Register	Attributes	Description	Parm	RAM Type Length Reg Attr	Meter Type
AC	10	30406	READ WRITE	Tag id	0	26721 6722 6723 6724	
UI	2	3120	READ	Not Used	1	26725 6726 6727 6728	
UC	1	3118	READ	Not Used	2		
UC	1	3118	READ	Not Used	3		
UC	1	3118	READ	Not Used	4		6740
BN	1	3121	READ	Not Used	5		
BN	1	3121	READ	Not Used	6		
UC	1	3118	READ	Not Used	7		
UC	1	3118	READ	Not Used	8		
UC	1	3118	READ	Not Used	9		6760
UI	2	3120	READ	Not Used	10		
UI	2	3120	READ	Not Used	11		
UI	2	3120	READ	Not Used	12		
UI	2	3120	READ	Not Used	13		
UI	2	3120	READ	Not Used	14		6780
FL	4	7269	READ	Spare	15		
FL	4	7269	READ	Spare	16		
FL	4	7269	READ	Spare	17		
FL	4	7269	READ	Spare	18		
FL	4	7269	READ	Spare	19		6800
FL	4	7269	READ	Spare	20		
FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24		6820
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29		6840
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34		6860
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39		6880
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44		6900
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		

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AUXB Port (cont.)

FL	4	7269	READ	Spare	49	6920	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	6940	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	6960	

Point Type 15, System Variables

Type	Length	Register	Attributes	Description	Parm	RAM Type Length Reg Attr	Meter Type
UC	1	3011	READ WRITE	Address	0	26961 6962 6963 6964	
UC	1	3070	READ WRITE	Group	1	26965 6966 6967 6968	
AC	20	30421	READ WRITE	Station Name	2		
UC	1	3118	READ	Not Used	3		
UC	1	3118	READ	Not Used	4	6980	
UC	1	3118	READ	Not Used	5		
UC	1	3118	READ	Not Used	6		
UC	1	3118	READ	Not Used	7		
UC	1	3118	READ	Not Used	8		
UC	1	3118	READ	Not Used	9	7000	
UC	1	3009	READ WRITE	Contract Hour	10		
AC	20	30436	READ WRITE	Part Number	11		
AC	20	30451	READ WRITE	ID	12		
AC	20	30466	READ WRITE	Time Created	13		
AC	12	30481	READ WRITE	Serial Number	14	7020	
AC	20	30496	READ WRITE	Customer Name	15		
UC	1	3118	READ	Not Used	16		
UC	1	3118	READ	Not Used	17		
UC	1	3118	READ	Not Used	18		
UC	1	3118	READ	Not Used	19	7040	
UC	1	3118	READ	Not Used	20		
UC	1	3118	READ	Not Used	21		
FL	4	7269	READ	Not Used	22		
UC	1	3118	READ	Not Used	23		
FL	4	7269	READ	Spare	24	7060	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	7080	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		

System Variables (cont.)

FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	7100	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	7120	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	7140	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	7160	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	7180	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	7200	

Point Type 34, Modbus User Configuration

Type	Length	Register	Attributes	Description	Parm	RAM Type Length Reg Attr	Meter Type
CH	1	3136	READ	Host Type ASCII/RTU	0	27201 7202 7203 7204	
UC	1	3118	READ	Not Used	1	27205 7206 7207 7208	
UC	1	3118	READ	Not Used	2		
UC	1	3118	READ	Not Used	3		
UC	1	3118	READ	Not Used	4		7220
UC	1	3118	READ	Not Used	5		
UC	1	3118	READ	Not Used	6		
UI	2	3120	READ	Not Used	7		
UI	2	3120	READ	Not Used	8		
UI	2	3120	READ	Not Used	9		7240
UI	2	3120	READ	Not Used	10		
FL	4	7269	READ	Spare	11		
FL	4	7269	READ	Spare	12		
FL	4	7269	READ	Spare	13		
FL	4	7269	READ	Spare	14		7260
FL	4	7269	READ	Spare	15		

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User Configuration (cont.)

FL	4	7269	READ	Spare	16		
FL	4	7269	READ	Spare	17		
FL	4	7269	READ	Spare	18		
FL	4	7269	READ	Spare	19	7280	
FL	4	7269	READ	Spare	20		
FL	4	7269	READ	Spare	21		
FL	4	7269	READ	Spare	22		
FL	4	7269	READ	Spare	23		
FL	4	7269	READ	Spare	24	7300	
FL	4	7269	READ	Spare	25		
FL	4	7269	READ	Spare	26		
FL	4	7269	READ	Spare	27		
FL	4	7269	READ	Spare	28		
FL	4	7269	READ	Spare	29	7320	
FL	4	7269	READ	Spare	30		
FL	4	7269	READ	Spare	31		
FL	4	7269	READ	Spare	32		
FL	4	7269	READ	Spare	33		
FL	4	7269	READ	Spare	34	7340	
FL	4	7269	READ	Spare	35		
FL	4	7269	READ	Spare	36		
FL	4	7269	READ	Spare	37		
FL	4	7269	READ	Spare	38		
FL	4	7269	READ	Spare	39	7360	
FL	4	7269	READ	Spare	40		
FL	4	7269	READ	Spare	41		
FL	4	7269	READ	Spare	42		
FL	4	7269	READ	Spare	43		
FL	4	7269	READ	Spare	44	7380	
FL	4	7269	READ	Spare	45		
FL	4	7269	READ	Spare	46		
FL	4	7269	READ	Spare	47		
FL	4	7269	READ	Spare	48		
FL	4	7269	READ	Spare	49	7400	
FL	4	7269	READ	Spare	50		
FL	4	7269	READ	Spare	51		
FL	4	7269	READ	Spare	52		
FL	4	7269	READ	Spare	53		
FL	4	7269	READ	Spare	54	7420	
FL	4	7269	READ	Spare	55		
FL	4	7269	READ	Spare	56		
FL	4	7269	READ	Spare	57		
FL	4	7269	READ	Spare	58		
FL	4	7269	READ	Spare	59	7440	

XXII. Baud Rates

Supported baud rates range from 300 to 38,400. These may be set through local terminal mode using the appropriate command, or they may be set through Point Type 14 parameter 1 ' Baud Rate'. The following table shows the correlation between the input value and the corresponding baud rate.

<i>Baud Rate</i>	<i>Input Value</i>
300	10
600	11
1200	0
2400	1
4800	2
9600	3
19200	4
38400	5

Important:

When operating at 300 and 600 baud, the character timeout value becomes critical to proper communications between the flow computer and host. At 300 baud this value should be at least 500 and may be set locally or through the communications Point Type. For example to run the Remote Port at 300 baud, "RTO = 500" entered locally will allow this port to have reliable communications. When running at 600 baud, a character timeout value greater than 250 is acceptable. Values less than those recommended will result in the flow computer answering a poll only when the poll happens to align properly with the internal timing routine of the FCU. (At 600 baud and RTO=100 successful communications occur at about 70%.)

XXIII. Analog Inputs

There are two analog inputs available for use and are located at J13. While these inputs may be calibrated through a procedure using local commands, the preferred method is accomplished using PCCU32 with a local connection since it is much simpler and less time consuming. Calibration and setup procedures are discussed through online help within PCCU32. Once setup is complete the settings will be displayed through Point Type 3. Following is a description of some of the relevant parameters for this Point Type:

Units – character string entered by the user to describe what type of units were chosen for the 'Calibration Range' in PCCU32

Current AI Value – value associated with the Units parameter

Current AI Volts – the actual voltage being input to that analog

Further information on calibrating the analog inputs is provided in the section titled Basic Configuration.

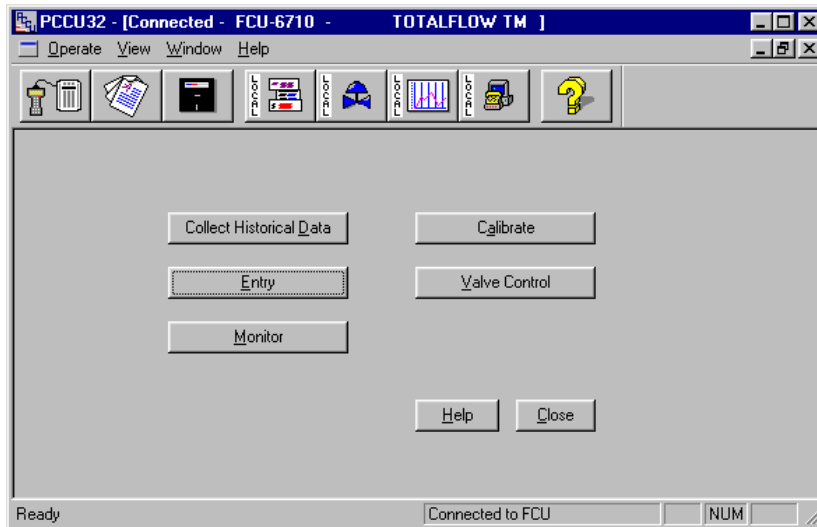
XXIV. Basic Configuration

This section will present a method for configuring the flow computer for use using PCCU32 version 3.10.1. It is necessary to calibrate the analog inputs and outputs before they can be used. These topics and other valve control setup issues will be discussed here.

After bringing the program up, select *Operate* | *System Setup* to check that the *Query All Commands* checkbox has been enabled. Now it is time to connect to the FCU via the local port using PCCU32. This may be accomplished by



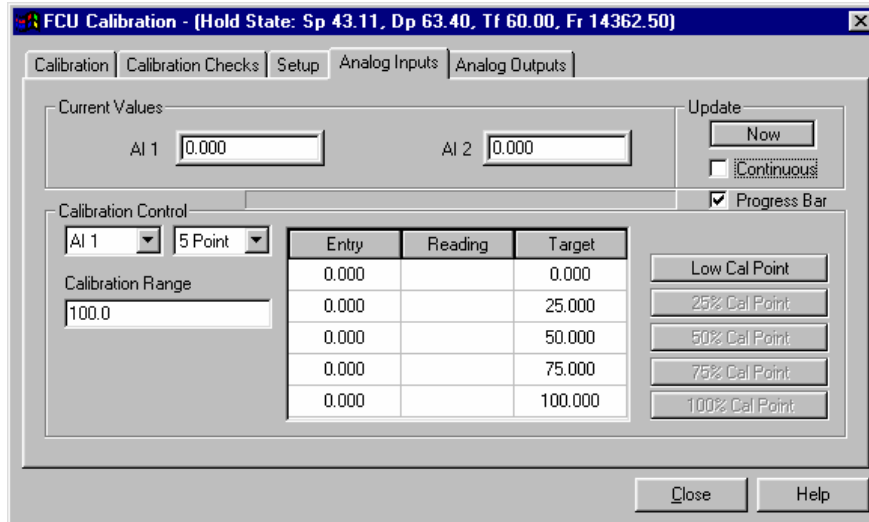
clicking the 'Connected to Totalflow' icon or by selecting *Operate* | *Connect to Totalflow*, at which point the program will attempt to connect with the flow computer. The program will check the security code, version, and query all commands. Once connected the following screen will appear:



From this screen it is possible to completely configure the flow computer for use.

Analog Input Calibration:

Click on the Calibrate button and when the calibrate screen appears, select the Analog Inputs tab to view the following screen:



The Current Values section will display the current values continuously by checking the Continuous box or on demand by clicking the Now button. It is recommended that the Continuous box not be checked during a calibration. The Progress Bar if checked, will show any communication between the PCCU and the flow computer.

- Step 1** Connect an accurate power source capable of 1 - 5 volts to the AI terminals to be calibrated.
6700 Models: AI 1 (+) J13 Pin 1 AI 1 (-) J13 Pin 2
AI 2 (+) J13 Pin 3 AI 2 (-) J13 Pin 4
- Step 2** Under Calibration Control, select the AI to be calibrated from the drop down dialog box.
- Step 3** Under Calibration Control, select whether to do a 3 Point or 5 Point calibration. Note that if 3 Point is selected, there will be 3 Target values and 3 Cal Point buttons. If 5 Point is selected, there will be 5 Target values and 5 Cal Point buttons.
- Step 4** Click inside the Calibration Range window and enter a range. The range can be any thing and represent any units (percent, volts, .etc.) the user wants. Target values will be updated to reflect the new Calibration Range.
- Step 5** Click on the Low Cal Point button and apply the voltage for the low calibration point and verify the Current Reading on the Enter Low Calibration Value screen is stable.
- Step 6** Enter the Target value for the Low Cal Point and click the OK button.
- Step 7** Click on the 100% Cal Point button and apply the voltage representing the full range and verify the Current Reading is stable.
- Step 8** Enter the Target value for the 100% Cal Point and click the OK button.
- Step 9** Click on the next highest Cal Point button and apply a voltage representing it's range and verify the Current Reading is stable.
- Step 10** Enter the Target value for that Cal Point and click the OK button.
- Step 11** Repeat Steps 9 - 10 for any remaining Cal Points. After the last point is entered, the PCCU will automatically calibrate the AI.

General Setup:

To configure the rest of the flow computer for operation go to the *Entry* tab on the Connected to Totalflow page. This will present a wide variety of options for configuring communications ports, selecting factors to use in calculations and various other selections.

