



DAE Instrument Corp.



SMB350

Multi-Circuit Meter

Modbus Reference

Table of Contents

General Information	3
Register Tables	4
Common Voltage (Phase and Line)	4
Current (Per Phase)	4
Power per Phase (kW)	5
Energy Per Phase (kWh)	7
Reactive Energy Per Phase (kVARh)	8
Power Factor Per Phase	9
Totals and Averages	10
Other Parameter	13
Device Settings	13
CT Ratio	14
Device Information	14
Peak Energy Per Phase (kWh Per Phase)	15
Peak kWh (totals)	16
Start/Stop Peak kWh	16
Commit Value To Storage	17
Examples	18
Read Current	18
Read Power (kW)	19
Read Energy (kWh)	19
Write Energy (kWh)	20
Read Reactive Energy (kVARh)	20
Write Reactive Energy (kVARh)	21
Read Average Current	22
Read Total Power (kW)	22
Read Total Energy (kWh)	23
Read Total Reactive Power (kVAr)	23
Read Total Reactive Energy (kVARh)	24
Read Total Apparent Power (kVA)	24
Read Power Factor	25
Read Frequency	25
Read Peak kWh	30
Read Total Peak kWh	30

Start Peak kWh	31
Stop Peak kWh	31
CCommit CT Ratio	31
Commit kWh/kVAh	31
CRC Computation	32
Definition	32
Usage	32
Notes on Modscan	33
Additional Resources	34

General Information

The SMB350 uses the Modbus/RTU protocol. The communications interface is RS485. There are 2 RS485 ports on the SMB350. RS485-1 is mainly used for connecting with the computer host, as it is both read and write. While RS485-2 is used for connecting with an optional HMI (human machine interface) unit and is read only. The default baud rate is 9600. The data format is 8 bits, no parity, 1 stop bit. The default address of the SMB350 can either be zero, one or the same as the last 2 digits of the serial number, except 00 which resolves to 100. The actual device address can be found through the front panel by entering the settings mode.

The range column in the register tables indicate the range of the data that is returned and are in their raw integer form and must be scaled by multiplying with its unit to get its actual displayable value.

Reading is done through function code 3. Writing is done through function code 16. Control is done through function code 5. All numerical values are in decimal unless otherwise specified or appended with an 'h', in which case the data is in hexadecimal.

The SMB350 uses the address 255 instead of zero as the broadcast address.

The default address is the serial number last 2 digits or 100 when it is 00. The default baud rate is 9600. It is possible that the defaults have been changed from the original factory settings. To find out the address and baud rate, enter the settings mode through the front panel controls. To find out the same information through Modbus, query using the broadcast address 255, but make sure that only the given SMB350 is connected to the host PC, no other devices must be on the same bus network.

When a command is in error, the SMB350 will not respond; the host PC doing the reading will time out. The SMB350 should have a maximum latency of 300 milliseconds, this is the guaranteed time in which the SMB350 should respond, if this time is exceeded, the host PC should issue a time out.

A command is in error in any of these conditions:

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

Register Tables

Common Voltage (Phase and Line)

Register Address	Modscan	Description	Word	Unit	Range	R/W
0	03:0001	Phase A	low	0.1 V	0~9,999	read only
1	03:0002		high			
2	03:0003	Phase B	low			
3	03:0004		high			
4	03:0005	Phase C	low			
5	03:0006		high			
6	03:0007	Line A-B	low			
7	03:0008		high			
8	03:0009	Line B-C	low			
9	03:0010		high			
10	03:0011	Line C-A	low			
11	03:0012		high			

Current (Per Phase)

The Current value has been pre-multiplied by the CT ratio.

Register Address	Modscan	Channel	Phase	Word	Unit	Range	R/W
16	03:0017	1	A	low	0.001 A	0~999,999	read only
17	03:0018			high			
18	03:0019		B	low			
19	03:0020			high			
20	03:0021		C	low			
21	03:0022			high			
22	03:0023	2	A	low	0.001 A	0~999,999	read only
23	03:0024			high			
24	03:0025		B	low			
25	03:0026			high			
26	03:0027		C	low			
27	03:0028			high			
28	03:0029	3	A	low	0.001 A	0~999,999	read only
29	03:0030			high			
30	03:0031		B	low			
31	03:0032			high			
32	03:0033		C	low			
33	03:0034			high			

Register Address	Modscan	Channel	Phase	Word	Unit	Range	R/W
34	03:0035	4	A	low	0.001 A	0~999,999	read only
35	03:0036			high			
36	03:0037		B	low			
37	03:0038			high			
38	03:0039		C	low			
39	03:0040			high			
40	03:0041	5	A	low	0.001 A	0~999,999	read only
41	03:0042			high			
42	03:0043		B	low			
43	03:0044			high			
44	03:0045		C	low			
45	03:0046			high			
46	03:0047	6	A	low	0.001 A	0~999,999	read only
47	03:0048			high			
48	03:0049		B	low			
49	03:0050			high			
50	03:0051		C	low			
51	03:0052			high			
52	03:0053	7	A	low	0.001 A	0~999,999	read only
53	03:0054			high			
54	03:0055		B	low			
55	03:0056			high			
56	03:0057		C	low			
57	03:0058			high			
58	03:0059	8	A	low	0.001 A	0~999,999	read only
59	03:0060			high			
60	03:0061		B	low			
61	03:0062			high			
62	03:0063		C	low			
63	03:0064			high			

Power per Phase (kW)

Address	Modscan	Channel	Phase	Word	Unit	Range	R/W
64	03:0065	1	A	low	0.001 kW	0~999,999	read only
65	03:0066			high			
66	03:0067		B	low			
67	03:0068			high			
68	03:0069		C	low			
69	03:0070			high			

Address	Modscan	Channel	Phase	Word	Unit	Range	R/W
70	03:0071	2	A	low	0.001 kW	0~999,999	read only
71	03:0072			high			
72	03:0073		B	low			
73	03:0074			high			
74	03:0075		C	low			
75	03:0076			high			
76	03:0077	3	A	low	0.001 kW	0~999,999	read only
77	03:0078			high			
78	03:0079		B	low			
79	03:0080			high			
80	03:0081		C	low			
81	03:0082			high			
82	03:0083	4	A	low	0.001 kW	0~999,999	read only
83	03:0084			high			
84	03:0085		B	low			
85	03:0086			high			
86	03:0087		C	low			
87	03:0088			high			
88	03:0089	5	A	low	0.001 kW	0~999,999	read only
89	03:0090			high			
90	03:0091		B	low			
91	03:0092			high			
92	03:0093		C	low			
93	03:0094			high			
94	03:0095	6	A	low	0.001 kW	0~999,999	read only
95	03:0096			high			
96	03:0097		B	low			
97	03:0098			high			
98	03:0099		C	low			
99	03:0100			high			
100	03:0101	7	A	low	0.001 kW	0~999,999	read only
101	03:0102			high			
102	03:0103		B	low			
103	03:0104			high			
104	03:0105		C	low			
105	03:0106			high			
106	03:0107	8	A	low	0.001 kW	0~999,999	read only
107	03:0108			high			
108	03:0109		B	low			
109	03:0110			high			

Address	Modscan	Channel	Phase	Word	Unit	Range	R/W
110	03:0111		C	low			
111	03:0112			high			

Energy Per Phase (kWh)

Address	Modscan	Channel	Phase	Word	Unit	Range	R/W
112	03:0113	1	A	low	0.01 kWh	0~9,999,999	read/write
113	03:0114			high			
114	03:0115		B	low			
115	03:0116			high			
116	03:0117		C	low			
117	03:0118			high			
118	03:0119	2	A	low	0.01 kWh	0~9,999,999	read/write
119	03:0120			high			
120	03:0121		B	low			
121	03:0122			high			
122	03:0123		C	low			
123	03:0124			high			
124	03:0125	3	A	low	0.01 kWh	0~9,999,999	read/write
125	03:0126			high			
126	03:0127		B	low			
127	03:0128			high			
128	03:0129		C	low			
129	03:0130			high			
130	03:0131	4	A	low	0.01 kWh	0~9,999,999	read/write
131	03:0132			high			
132	03:0133		B	low			
133	03:0134			high			
134	03:0135		C	low			
135	03:0136			high			
136	03:0137	5	A	low	0.01 kWh	0~9,999,999	read/write
137	03:0138			high			
138	03:0139		B	low			
139	03:0140			high			
140	03:0141		C	low			
141	03:0142			high			
142	03:0143	6	A	low	0.01 kWh	0~9,999,999	read/write
143	03:0144			high			
144	03:0145		B	low			
145	03:0146			high			

Address	Modscan	Channel	Phase	Word	Unit	Range	R/W
146	03:0147		C	low			
147	03:0148			high			
148	03:0149	7	A	low	0.01 kWh	0~9,999,999	read/write
149	03:0150			high			
150	03:0151		B	low			
151	03:0152			high			
152	03:0153		C	low			
153	03:0154			high			
154	03:0155	8	A	low	0.01 kWh	0~9,999,999	read/write
155	03:0156			high			
156	03:0157		B	low			
157	03:0158			high			
158	03:0159		C	low			
159	03:0160			high			

Reactive Energy Per Phase (kVArh)

Address	Modscan	Channel	Phase	Word	Unit	Range	R/W
160	03:0161	1	A	low	0.01 kVArh	0~9,999,999	read/write
161	03:0162			high			
162	03:0163		B	low			
163	03:0164			high			
164	03:0165		C	low			
165	03:0166			high			
166	03:0167	2	A	low	0.01 kVArh	0~9,999,999	read/write
167	03:0168			high			
168	03:0169		B	low			
169	03:0170			high			
170	03:0171		C	low			
171	03:0172			high			
172	03:0173	3	A	low	0.01 kVArh	0~9,999,999	read/write
173	03:0174			high			
174	03:0175		B	low			
175	03:0176			high			
176	03:0177		C	low			
177	03:0178			high			
178	03:0179	4	A	low	0.01 kVArh	0~9,999,999	read/write
179	03:0180			high			
180	03:0181		B	low			
181	03:0182			high			

Address	Modscan	Channel	Phase	Word	Unit	Range	R/W				
182	03:0183		C	low							
183	03:0184			high							
184	03:0185	5	A	low	0.01 kVArh	0~9,999,999	read/write				
185	03:0186			high							
186	03:0187		B	low							
187	03:0188			high							
188	03:0189		C	low							
189	03:0190			high							
190	03:0191		6	A				low	0.01 kVArh	0~9,999,999	read/write
191	03:0192							high			
192	03:0193	B		low							
193	03:0194			high							
194	03:0195	C		low							
195	03:0196			high							
196	03:0197	7		A	low	0.01 kVArh	0~9,999,999	read/write			
197	03:0198				high						
198	03:0199		B	low							
199	03:0200			high							
200	03:0201		C	low							
201	03:0202			high							
202	03:0203		8	A	low				0.01 kVArh	0~9,999,999	read/write
203	03:0204				high						
204	03:0205	B		low							
205	03:0206			high							
206	03:0207	C		low							
207	03:0208			high							

Power Factor Per Phase

Address	Modscan	Channel	Phase	Word	Unit	Range	R/W
208	03:0209	1	A	low	0.001	0~1000	read only
209	03:0210		B	low			
210	03:0211		C	low			
211	03:0212	2	A	low	0.001	0~1000	read only
212	03:0213		B	low			
213	03:0214		C	low			
214	03:0215	3	A	low	0.001	0~1000	read only
215	03:0216		B	low			
216	03:0217		C	low			
217	03:0218		A	low			

Address	Modscan	Channel	Phase	Word	Unit	Range	R/W
218	03:0219	4	B	low	0.001	0~1000	read only
219	03:0220		C	low			
220	03:0221	5	A	low	0.001	0~1000	read only
221	03:0222		B	low			
222	03:0223		C	low			
223	03:0224	6	A	low	0.001	0~1000	read only
224	03:0225		B	low			
225	03:0226		C	low			
226	03:0227	7	A	low	0.001	0~1000	read only
227	03:0228		B	low			
228	03:0229		C	low			
229	03:0230	8	A	low	0.001	0~1000	read only
230	03:0231		B	low			
231	03:0232		C	low			

Totals and Averages

Address	Modscan	Channel	Description	Word	Unit	Range	R/W
232	03:0233	1	Average Current	low	0.001 A	0~999,999	read only
233	03:0234			high			
234	03:0235		Total Power (kW)	low	0.001 kW	0~999,999	
235	03:0236			high			
236	03:0237		Total Energy (kWh)	low	0.01 kWh	0~9,999,999	
237	03:0238			high			
238	03:0239		Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	
239	03:0240			high			
240	03:0241		Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	
241	03:0242			high			
242	03:0243		Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	
243	03:0244			high			
244	03:0245		Total Power Factor	low	0.001	0~1000	
245	03:0246			high			
246	03:0247	2	Average Current	low	0.001 A	0~999,999	read only
247	03:0248			high			
248	03:0249		Total Power (kW)	low	0.001 kW	0~999,999	
249	03:0250			high			
250	03:0251		Total Energy (kWh)	low	0.01 kWh	0~9,999,999	
251	03:0252			high			
252	03:0253		Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	
253	03:0254			high			

Address	Modscan	Channel	Description	Word	Unit	Range	R/W
254	03:0255		Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	
255	03:0256			high			
256	03:0257		Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	
257	03:0258			high			
258	03:0259		Total Power Factor	low	0.001	0~1000	
259	03:0260			high			
260	03:0261	3	Average Current	low	0.001 A	0~999,999	read only
261	03:0262			high			
262	03:0263		Total Power (kW)	low	0.001 kW	0~999,999	
263	03:0264			high			
264	03:0265		Total Energy (kWh)	low	0.01 kWh	0~9,999,999	
265	03:0266			high			
266	03:0267		Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	
267	03:0268			high			
268	03:0269		Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	
269	03:0270			high			
270	03:0271		Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	
271	03:0272			high			
272	03:0273		Total Power Factor	low	0.001	0~1000	
273	03:0274			high			
274	03:0275	4	Average Current	low	0.001 A	0~999,999	read only
275	03:0276			high			
276	03:0277		Total Power (kW)	low	0.001 kW	0~999,999	
277	03:0278			high			
278	03:0279		Total Energy (kWh)	low	0.01 kWh	0~9,999,999	
279	03:0280			high			
280	03:0281		Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	
281	03:0282			high			
282	03:0283		Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	
283	03:0284			high			
284	03:0285		Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	
285	03:0286			high			
286	03:0287		Total Power Factor	low	0.001	0~1000	
287	03:0288			high			
288	03:0289		Average Current	low	0.001 A	0~999,999	
289	03:0290			high			
290	03:0291		Total Power (kW)	low	0.001 kW	0~999,999	
291	03:0292			high			
292	03:0293		Total Energy (kWh)	low	0.01 kWh	0~9,999,999	
293	03:0294			high			

Address	Modscan	Channel	Description	Word	Unit	Range	R/W																																																																																																																																																																														
294	03:0295	5	Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	read only																																																																																																																																																																														
295	03:0296			high				296	03:0297	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	297	03:0298	high	298	03:0299	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	299	03:0300	high	300	03:0301	Total Power Factor	low	0.001	0~1000	301	03:0302	high	302	03:0303	6	Average Current	low	0.001 A	0~999,999	read only	303	03:0304	high	304	03:0305	Total Power (kW)	low	0.001 kW	0~999,999	305	03:0306	high	306	03:0307	Total Energy (kWh)	low	0.01 kWh	0~9,999,999	307	03:0308	high	308	03:0309	Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	309	03:0310	high	310	03:0311	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	311	03:0312	high	312	03:0313	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	313	03:0314	high	314	03:0315	Total Power Factor	low	0.001	0~1000	315	03:0316	high	316	03:0317	7	Average Current	low	0.001 A	0~999,999	read only	317	03:0318	high	318	03:0319	Total Power (kW)	low	0.001 kW	0~999,999	319	03:0320	high	320	03:0321	Total Energy (kWh)	low	0.01 kWh	0~9,999,999	321	03:0322	high	322	03:0323	Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	323	03:0324	high	324	03:0325	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	325	03:0326	high	326	03:0327	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	327	03:0328	high	328	03:0329	Total Power Factor	low	0.001	0~1000	329	03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999		331	03:0332	high	332	03:0333	Total Power (kW)	low	0.001 kW	0~999,999
296	03:0297		Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999																																																																																																																																																																															
297	03:0298			high				298	03:0299	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	299	03:0300	high	300	03:0301	Total Power Factor	low	0.001	0~1000	301	03:0302	high	302	03:0303	6	Average Current	low	0.001 A	0~999,999	read only	303	03:0304	high		304	03:0305	Total Power (kW)	low		0.001 kW	0~999,999	305	03:0306	high	306	03:0307	Total Energy (kWh)	low	0.01 kWh	0~9,999,999	307	03:0308	high	308	03:0309	Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	309	03:0310	high	310	03:0311	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	311	03:0312	high	312	03:0313	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	313	03:0314	high	314	03:0315	Total Power Factor	low	0.001	0~1000	315	03:0316	high	316	03:0317	7	Average Current	low	0.001 A	0~999,999	read only	317		03:0318	high	318	03:0319		Total Power (kW)	low	0.001 kW	0~999,999	319	03:0320	high	320	03:0321	Total Energy (kWh)	low	0.01 kWh	0~9,999,999	321	03:0322	high	322	03:0323	Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	323	03:0324	high	324	03:0325	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	325	03:0326	high	326	03:0327	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	327	03:0328	high	328	03:0329	Total Power Factor	low	0.001	0~1000	329	03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999			331	03:0332	high		332	03:0333	Total Power (kW)	low	0.001 kW	0~999,999	333	03:0334	high
298	03:0299		Total Apparent Power (kVA)	low	0.001 kVA	0~999,999																																																																																																																																																																															
299	03:0300			high				300	03:0301	Total Power Factor	low	0.001	0~1000	301	03:0302	high	302	03:0303	6	Average Current	low	0.001 A	0~999,999	read only	303	03:0304	high		304	03:0305	Total Power (kW)	low		0.001 kW	0~999,999	305		03:0306	high	306	03:0307		Total Energy (kWh)	low	0.01 kWh	0~9,999,999	307	03:0308	high	308	03:0309	Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	309	03:0310	high	310	03:0311	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	311	03:0312	high	312	03:0313	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	313	03:0314	high	314	03:0315	Total Power Factor	low	0.001	0~1000	315	03:0316	high	316	03:0317	7	Average Current	low	0.001 A	0~999,999	read only	317		03:0318	high	318	03:0319		Total Power (kW)		low	0.001 kW	0~999,999	319		03:0320	high	320	03:0321	Total Energy (kWh)	low	0.01 kWh	0~9,999,999	321	03:0322	high	322	03:0323	Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	323	03:0324	high	324	03:0325	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	325	03:0326	high	326	03:0327	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	327	03:0328	high	328	03:0329	Total Power Factor	low	0.001	0~1000	329	03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999			331	03:0332	high	332		03:0333	Total Power (kW)	low	0.001 kW	0~999,999	333	03:0334	high					
300	03:0301		Total Power Factor	low	0.001	0~1000																																																																																																																																																																															
301	03:0302			high				302	03:0303	6	Average Current	low	0.001 A	0~999,999	read only	303	03:0304	high		304	03:0305	Total Power (kW)	low		0.001 kW	0~999,999	305		03:0306	high	306	03:0307		Total Energy (kWh)	low	0.01 kWh		0~9,999,999	307	03:0308	high		308	03:0309	Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	309	03:0310	high	310	03:0311	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	311	03:0312	high	312	03:0313	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	313	03:0314	high	314	03:0315	Total Power Factor	low	0.001	0~1000	315	03:0316	high	316	03:0317	7	Average Current	low	0.001 A	0~999,999	read only	317		03:0318	high	318	03:0319		Total Power (kW)		low	0.001 kW	0~999,999	319		03:0320		high	320	03:0321	Total Energy (kWh)		low	0.01 kWh	0~9,999,999	321	03:0322	high	322	03:0323	Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	323	03:0324	high	324	03:0325	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	325	03:0326	high	326	03:0327	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	327	03:0328	high	328	03:0329	Total Power Factor	low	0.001	0~1000	329	03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999			331	03:0332	high	332		03:0333	Total Power (kW)	low	0.001 kW	0~999,999	333	03:0334	high										
302	03:0303	6	Average Current	low	0.001 A	0~999,999	read only																																																																																																																																																																														
303	03:0304			high				304	03:0305		Total Power (kW)	low	0.001 kW	0~999,999		305	03:0306	high		306	03:0307	Total Energy (kWh)	low		0.01 kWh	0~9,999,999	307		03:0308	high	308	03:0309		Total Reactive Power (kVAr)	low	0.001 kVAr		0~999,999	309	03:0310	high		310	03:0311	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	311	03:0312	high	312	03:0313	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	313	03:0314	high	314	03:0315	Total Power Factor	low	0.001	0~1000	315	03:0316	high	316	03:0317	7	Average Current	low	0.001 A	0~999,999	read only	317	03:0318	high		318	03:0319	Total Power (kW)	low		0.001 kW		0~999,999	319	03:0320	high		320		03:0321	Total Energy (kWh)	low	0.01 kWh		0~9,999,999		321	03:0322	high	322		03:0323	Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	323	03:0324	high	324	03:0325	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	325	03:0326	high	326	03:0327	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	327	03:0328	high	328	03:0329	Total Power Factor	low	0.001	0~1000	329	03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999		331		03:0332	high	332	03:0333	Total Power (kW)		low	0.001 kW	0~999,999	333	03:0334	high																	
304	03:0305		Total Power (kW)	low	0.001 kW	0~999,999																																																																																																																																																																															
305	03:0306			high				306	03:0307		Total Energy (kWh)	low	0.01 kWh	0~9,999,999		307	03:0308	high		308	03:0309	Total Reactive Power (kVAr)	low		0.001 kVAr	0~999,999	309		03:0310	high	310	03:0311		Total Reactive Energy (kVArh)	low	0.01 kVArh		0~9,999,999	311	03:0312	high		312	03:0313	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	313	03:0314	high	314	03:0315	Total Power Factor	low	0.001	0~1000	315	03:0316	high	316	03:0317	7	Average Current	low	0.001 A	0~999,999	read only	317	03:0318	high		318	03:0319	Total Power (kW)	low		0.001 kW	0~999,999	319		03:0320	high	320	03:0321		Total Energy (kWh)		low	0.01 kWh	0~9,999,999	321		03:0322		high	322	03:0323	Total Reactive Power (kVAr)		low		0.001 kVAr	0~999,999	323	03:0324		high	324	03:0325	Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	325	03:0326	high	326	03:0327	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	327	03:0328	high	328	03:0329	Total Power Factor	low	0.001	0~1000	329	03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999		331		03:0332	high	332	03:0333		Total Power (kW)	low	0.001 kW	0~999,999	333	03:0334	high																								
306	03:0307		Total Energy (kWh)	low	0.01 kWh	0~9,999,999																																																																																																																																																																															
307	03:0308			high				308	03:0309		Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999		309	03:0310	high		310	03:0311	Total Reactive Energy (kVArh)	low		0.01 kVArh	0~9,999,999	311		03:0312	high	312	03:0313		Total Apparent Power (kVA)	low	0.001 kVA		0~999,999	313	03:0314	high		314	03:0315	Total Power Factor	low	0.001	0~1000	315	03:0316	high	316	03:0317	7	Average Current	low	0.001 A	0~999,999	read only	317	03:0318	high		318	03:0319	Total Power (kW)	low		0.001 kW	0~999,999	319		03:0320	high	320	03:0321		Total Energy (kWh)	low	0.01 kWh		0~9,999,999	321	03:0322	high		322		03:0323	Total Reactive Power (kVAr)	low	0.001 kVAr		0~999,999		323	03:0324	high	324		03:0325		Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999		325	03:0326	high	326	03:0327	Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	327	03:0328	high	328	03:0329	Total Power Factor	low	0.001	0~1000	329	03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999		331		03:0332	high	332	03:0333		Total Power (kW)	low	0.001 kW	0~999,999	333	03:0334	high																															
308	03:0309		Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999																																																																																																																																																																															
309	03:0310			high				310	03:0311		Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999		311	03:0312	high		312	03:0313	Total Apparent Power (kVA)	low		0.001 kVA	0~999,999	313		03:0314	high	314	03:0315		Total Power Factor	low	0.001		0~1000	315	03:0316	high		316	03:0317	7	Average Current	low	0.001 A	0~999,999	read only	317	03:0318	high		318	03:0319	Total Power (kW)	low		0.001 kW	0~999,999	319		03:0320	high	320	03:0321		Total Energy (kWh)	low	0.01 kWh		0~9,999,999	321	03:0322	high		322	03:0323	Total Reactive Power (kVAr)		low	0.001 kVAr	0~999,999	323		03:0324		high	324	03:0325	Total Reactive Energy (kVArh)		low		0.01 kVArh	0~9,999,999	325	03:0326		high		326	03:0327	Total Apparent Power (kVA)	low		0.001 kVA	0~999,999	327	03:0328	high	328	03:0329	Total Power Factor	low	0.001	0~1000	329	03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999		331		03:0332	high	332	03:0333		Total Power (kW)	low	0.001 kW	0~999,999	333	03:0334	high																																						
310	03:0311		Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999																																																																																																																																																																															
311	03:0312			high				312	03:0313		Total Apparent Power (kVA)	low	0.001 kVA	0~999,999		313	03:0314	high		314	03:0315	Total Power Factor	low		0.001	0~1000	315		03:0316	high	316	03:0317		7	Average Current	low	0.001 A	0~999,999	read only	317	03:0318	high	318	03:0319		Total Power (kW)	low	0.001 kW	0~999,999		319	03:0320	high		320	03:0321	Total Energy (kWh)	low		0.01 kWh	0~9,999,999	321		03:0322	high	322	03:0323		Total Reactive Power (kVAr)	low	0.001 kVAr		0~999,999	323	03:0324	high		324	03:0325	Total Reactive Energy (kVArh)		low	0.01 kVArh	0~9,999,999	325		03:0326		high	326	03:0327	Total Apparent Power (kVA)		low		0.001 kVA	0~999,999	327	03:0328		high	328	03:0329	Total Power Factor	low	0.001	0~1000	329	03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999		331	03:0332	high	332	03:0333		Total Power (kW)	low	0.001 kW	0~999,999		333	03:0334	high																																																	
312	03:0313		Total Apparent Power (kVA)	low	0.001 kVA	0~999,999																																																																																																																																																																															
313	03:0314			high				314	03:0315		Total Power Factor	low	0.001	0~1000		315	03:0316	high		316	03:0317	7	Average Current		low	0.001 A	0~999,999	read only	317	03:0318	high	318	03:0319		Total Power (kW)	low	0.001 kW	0~999,999		319	03:0320	high	320	03:0321		Total Energy (kWh)	low	0.01 kWh	0~9,999,999		321	03:0322	high		322	03:0323	Total Reactive Power (kVAr)	low		0.001 kVAr	0~999,999	323		03:0324	high	324	03:0325		Total Reactive Energy (kVArh)	low	0.01 kVArh		0~9,999,999	325	03:0326	high		326	03:0327	Total Apparent Power (kVA)		low	0.001 kVA	0~999,999	327		03:0328		high	328	03:0329	Total Power Factor		low	0.001	0~1000	329	03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999		331	03:0332	high	332	03:0333		Total Power (kW)	low	0.001 kW	0~999,999		333	03:0334	high																																																												
314	03:0315		Total Power Factor	low	0.001	0~1000																																																																																																																																																																															
315	03:0316			high				316	03:0317		7	Average Current	low	0.001 A		0~999,999	read only	317	03:0318	high	318		03:0319	Total Power (kW)	low	0.001 kW	0~999,999		319	03:0320	high	320	03:0321		Total Energy (kWh)	low	0.01 kWh	0~9,999,999		321	03:0322	high	322	03:0323		Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999		323	03:0324	high		324	03:0325	Total Reactive Energy (kVArh)	low		0.01 kVArh	0~9,999,999	325		03:0326	high	326	03:0327		Total Apparent Power (kVA)	low	0.001 kVA		0~999,999	327	03:0328	high		328	03:0329	Total Power Factor		low	0.001	0~1000	329		03:0330	high	330	03:0331		Average Current	low	0.001 A	0~999,999		331	03:0332	high	332	03:0333		Total Power (kW)	low	0.001 kW	0~999,999		333	03:0334	high																																																																							
316	03:0317		7	Average Current	low	0.001 A		0~999,999	read only																																																																																																																																																																												
317	03:0318				high					318		03:0319	Total Power (kW)	low	0.001 kW	0~999,999		319	03:0320	high	320		03:0321	Total Energy (kWh)	low	0.01 kWh	0~9,999,999		321	03:0322	high	322	03:0323		Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999		323	03:0324	high	324	03:0325		Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999		325	03:0326	high		326	03:0327	Total Apparent Power (kVA)	low		0.001 kVA	0~999,999	327		03:0328	high	328	03:0329		Total Power Factor	low	0.001		0~1000	329	03:0330	high		330	03:0331		Average Current	low	0.001 A	0~999,999		331	03:0332	high	332	03:0333		Total Power (kW)	low	0.001 kW	0~999,999		333	03:0334	high																																																																																		
318	03:0319	Total Power (kW)		low	0.001 kW	0~999,999																																																																																																																																																																															
319	03:0320			high			320	03:0321		Total Energy (kWh)		low	0.01 kWh	0~9,999,999	321	03:0322		high	322	03:0323	Total Reactive Power (kVAr)		low	0.001 kVAr	0~999,999	323	03:0324		high	324	03:0325	Total Reactive Energy (kVArh)	low		0.01 kVArh	0~9,999,999	325	03:0326		high	326	03:0327	Total Apparent Power (kVA)	low		0.001 kVA	0~999,999	327	03:0328		high	328	03:0329		Total Power Factor	low	0.001	0~1000		329	03:0330	high		330	03:0331		Average Current		low	0.001 A	0~999,999		331	03:0332	high	332	03:0333	Total Power (kW)	low		0.001 kW	0~999,999	333	03:0334		high																																																																																															
320	03:0321	Total Energy (kWh)		low	0.01 kWh	0~9,999,999																																																																																																																																																																															
321	03:0322			high			322	03:0323		Total Reactive Power (kVAr)		low	0.001 kVAr	0~999,999	323	03:0324		high	324	03:0325	Total Reactive Energy (kVArh)		low	0.01 kVArh	0~9,999,999	325	03:0326		high	326	03:0327	Total Apparent Power (kVA)	low		0.001 kVA	0~999,999	327	03:0328		high	328	03:0329	Total Power Factor	low		0.001	0~1000	329	03:0330		high	330	03:0331			Average Current	low	0.001 A		0~999,999		331	03:0332	high	332		03:0333	Total Power (kW)	low	0.001 kW	0~999,999		333	03:0334	high																																																																																																										
322	03:0323	Total Reactive Power (kVAr)		low	0.001 kVAr	0~999,999																																																																																																																																																																															
323	03:0324			high			324	03:0325		Total Reactive Energy (kVArh)		low	0.01 kVArh	0~9,999,999	325	03:0326		high	326	03:0327	Total Apparent Power (kVA)		low	0.001 kVA	0~999,999	327	03:0328		high	328	03:0329	Total Power Factor	low		0.001	0~1000	329	03:0330		high	330	03:0331		Average Current		low	0.001 A	0~999,999			331	03:0332	high	332		03:0333	Total Power (kW)	low	0.001 kW	0~999,999		333	03:0334	high																																																																																																																					
324	03:0325	Total Reactive Energy (kVArh)		low	0.01 kVArh	0~9,999,999																																																																																																																																																																															
325	03:0326			high			326	03:0327		Total Apparent Power (kVA)		low	0.001 kVA	0~999,999	327	03:0328		high	328	03:0329	Total Power Factor		low	0.001	0~1000	329	03:0330		high	330	03:0331		Average Current		low	0.001 A	0~999,999			331	03:0332	high		332	03:0333	Total Power (kW)	low	0.001 kW		0~999,999	333	03:0334	high																																																																																																																																
326	03:0327	Total Apparent Power (kVA)		low	0.001 kVA	0~999,999																																																																																																																																																																															
327	03:0328			high			328	03:0329		Total Power Factor		low	0.001	0~1000	329	03:0330		high	330	03:0331			Average Current	low	0.001 A	0~999,999			331	03:0332	high		332	03:0333	Total Power (kW)	low	0.001 kW		0~999,999	333	03:0334	high																																																																																																																																											
328	03:0329	Total Power Factor		low	0.001	0~1000																																																																																																																																																																															
329	03:0330			high			330	03:0331				Average Current	low	0.001 A	0~999,999			331	03:0332	high		332	03:0333	Total Power (kW)	low	0.001 kW		0~999,999	333	03:0334	high																																																																																																																																																						
330	03:0331			Average Current	low	0.001 A	0~999,999																																																																																																																																																																														
331	03:0332				high						332	03:0333	Total Power (kW)	low	0.001 kW		0~999,999	333	03:0334	high																																																																																																																																																																	
332	03:0333		Total Power (kW)	low	0.001 kW	0~999,999																																																																																																																																																																															
333	03:0334			high																																																																																																																																																																																	

Address	Modscan	Channel	Description	Word	Unit	Range	R/W
334	03:0335	8	Total Energy (kWh)	low	0.01 kWh	0~9,999,999	read only
335	03:0336			high			
336	03:0337		Total Reactive Power (kVAr)	low	0.001 kVAr	0~999,999	
337	03:0338			high			
338	03:0339		Total Reactive Energy (kVArh)	low	0.01 kVArh	0~9,999,999	
339	03:0340			high			
340	03:0341		Total Apparent Power (kVA)	low	0.001 kVA	0~999,999	
341	03:0342			high			
342	03:0343		Total Power Factor	low	0.001	0~1000	
343	03:0344			high			

Other Parameter

Address	Modscan	Description	Size	Unit	Range	R/W
503	03:0504	Frequency	1 word	0.1 Hertz	450 to 650	read only

Device Settings

Address	Modscan	Description	Range	Default	R/W
505	03:0506	Device Address	1~254	serial number last 2 digits or 00 => 100	read/write
506	03:0507	RS485 baud rate	0~3	0 (9600)	read/write

The default baud rate is 9600. The default device address is the same as the last 2 digits of the serial number (except when serial 00 which resolves to address 100). If the address has been changed and not known, isolate the SMB350 from the rest of the RS485 network and connect one to one with a host computer. Then use broadcast address 255 to read the device address.

The baud rate is encoded as follows:

- 0 = 9600
- 1 = 4800
- 2 = 2400
- 3 = 1200

CT Ratio

The CT ratio is only used for either the CT5D3 or CT5S, for all other types of dedicated CTs, the CT ratio does not need to be changed and should retain its factory default. The CT ratio is useful when using a secondary standard 5A output CT to the CT5D3 or CT5S. For example, if the secondary CT is 400:5A, set the CT ratio to 80 (400 ÷ 5). Note that CT ratio is available only in version U10 or higher. For more information on how to connect a second CT, please refer to the SMB350 user's manual or SMB350 installation guide.

After writing all the CT ratios, remember to issue the [Commit CT Ratio](#) command to have them stored into long term memory.

Address	Modscan	Channel	Phase	Words	Range	Default	Unit	R/W
1120	03:1121	1	A	1	1~250	1	1	read/write
1121	03:1122		B					
1122	03:1123		C					
1123	03:1124	2	A	1	1~250	1	1	read/write
1124	03:1125		B					
1125	03:1126		C					
1126	03:1127	3	A	1	1~250	1	1	read/write
1127	03:1128		B					
1128	03:1129		C					
1129	03:1130	4	A	1	1~250	1	1	read/write
1130	03:1131		B					
1131	03:1132		C					
1132	03:1133	5	A	1	1~250	1	1	read/write
1133	03:1134		B					
1134	03:1135		C					
1135	03:1136	6	A	1	1~250	1	1	read/write
1136	03:1137		B					
1137	03:1138		C					
1138	03:1139	7	A	1	1~250	1	1	read/write
1139	03:1140		B					
1140	03:1141		C					
1141	03:1142	8	A	1	1~250	1	1	read/write
1142	03:1143		B					
1143	03:1144		C					

Device Information

Address	Description	Words	R/W
64000	ASCII string of Model Identifier + firmware version	32	read only

Peak Energy Per Phase (kWh Per Phase)

This Peak kWh (totals) register table only applies to version U14 and above.

Address	Modscan	Channel	Phase	Words	Range	Default	Unit	R/W
1280	03:1281	1	A	2	0~9,999,999	0	0.01 kWh	read only
1281	03:1282		B					
1282	03:1283		C					
1283	03:1284							
1284	03:1285							
1285	03:1286							
1286	03:1287	2	A	2	0~9,999,999	0	0.01 kWh	read only
1287	03:1288		B					
1288	03:1289		C					
1289	03:1290							
1290	03:1291							
1291	03:1292							
1292	03:1293	3	A	2	0~9,999,999	0	0.01 kWh	read only
1293	03:1294		B					
1294	03:1295		C					
1295	03:1296							
1296	03:1297							
1297	03:1298							
1298	03:1299	4	A	2	0~9,999,999	0	0.01 kWh	read only
1299	03:1300		B					
1300	03:1301		C					
1301	03:1302							
1302	03:1303							
1303	03:1304							
1304	03:1305	5	A	2	0~9,999,999	0	0.01 kWh	read only
1305	03:1306		B					
1306	03:1307		C					
1307	03:1308							
1308	03:1309							
1309	03:1310							
1310	03:1311	6	A	2	0~9,999,999	0	0.01 kWh	read only
1311	03:1312		B					
1312	03:1313		C					
1313	03:1314							
1314	03:1315							
1315	03:1316							
1316	03:1317		A					
1317	03:1318							

Address	Modscan	Channel	Phase	Words	Range	Default	Unit	R/W
1318	03:1319	7	B	2	0~9,999,999	0	0.01 kWh	read only
1319	03:1320							
1320	03:1321							
1321	03:1322		C					
1322	03:1323	8	A	2	0~9,999,999	0	0.01 kWh	read only
1323	03:1324							
1324	03:1325							
1325	03:1326		B					
1326	03:1327							
1327	03:1328		C					

Peak kWh (totals)

This Peak kWh (totals) register table only applies to version U14 and above.

Address	Modscan	Channel	Phase	Words	Range	Default	Unit	R/W
1328	03:1329	1	total	2	0~9,999,999	0	0.01 kWh	read only
1329	03:1330							
1330	03:1331	2						
1331	03:1332							
1332	03:1333	3						
1333	03:1334							
1334	03:1335	4						
1335	03:1336							
1336	03:1337	5						
1337	03:1338							
1338	03:1339	6						
1339	03:1340							
1340	03:1341	7						
1341	03:1342							
1342	03:1343	8						
1343	03:1344							

Start/Stop Peak kWh

Starts and stops the peak kWh accumulation. Uses function code 5. This applies to version U14 and above.

Address	Description	Force Data
1	Start/Stop Peak kWh from Accumulating	0 = Stop 255 = Start

Commit Value To Storage

Certain parameter values that are writable are not immediately committed to long term memory when changed through Modbus, they will eventually be stored in long term memory after 3 minutes automatically. But if a reset or power cycle occurs in the interim, then the new value will not be stored and the old value will be retrieved from storage after the reset or power cycle. A special command can be issued to immediately commit the new value to long term memory without having to wait for the 3 minute delay.

Use function code 5 to issue the command to commit. This register table is applicable only to version U14 or higher.

Address	Description	Force Data
174	Commit kWh/kVArh	255 = Commit
175	Commit CT Ratio	255 = Commit

When writing to the kWh and kVArh, the new values are stored automatically to long term memory after 3 minutes. If in the interim, a reset or power cycle is encountered, the new value will be overwritten by the old value. If it is desired that the new value be stored in long term storage immediately, then the **Commit kWh/kVArh** command can be issued without having to wait for the 3 minute delay.

The **Commit CT Ratio** should be issued after changing all the CT Ratios so that all the new values are written all at once. This command is mandatory to make the new CT ratios permanent.

Examples

Read Common Voltage

Query

- ◆ Read Common Voltage for Phase C
- ◆ Register Address = 4
- ◆ $XH = 4 \text{ div } 256 = 0$
- ◆ $XL = 4 \text{ mod } 256 = 4$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
30	3	0	4	0	2	135	165

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
30	3	4	9	3	0	0	231	110

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Phase Voltage} = (0 * 16,777,216 + 0 * 65,536 + 9 * 256 + 3) * 0.1 \text{ V} = 230.7 \text{ V}$

Read Current

Query

- ◆ Read Current for Channel 5 Phase B
- ◆ Register Address = 42
- ◆ $XH = 42 \text{ div } 256 = 0$
- ◆ $XL = 42 \text{ mod } 256 = 42$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
23	3	0	42	0	2	231	53

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
23	3	4	6	71	0	1	252	175

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Current} = (0 * 16,777,216 + 1 * 65,536 + 6 * 256 + 71) * 0.001 \text{ A} = 67.143 \text{ A}$

* Note that the Current has been pre-multiplied by the CT ratio.

Read Power (kW)

Query

- ◆ Read Power for Channel 3 Phase A
- ◆ Register Address = 76
- ◆ $XH = 76 \text{ div } 256 = 0$
- ◆ $XL = 76 \text{ mod } 256 = 76$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
71	3	0	76	0	2	11	122

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
71	3	4	3	41	0	12	12	126

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Power (kW)} = (0 * 16,777,216 + 12 * 65,536 + 3 * 256 + 41) * 0.001 \text{ kW} = 787.241 \text{ kW}$

Read Energy (kWh)

Query

- ◆ Read Energy for Channel 2 Phase C
- ◆ Register Address = 122
- ◆ $XH = 122 \text{ div } 256 = 0$
- ◆ $XL = 122 \text{ mod } 256 = 122$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
26	3	0	122	0	2	230	57

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
26	3	4	219	62	0	81	203	230

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Energy} = (0 * 16,777,216 + 81 * 65,536 + 219 * 256 + 62) * 0.01 \text{ kWh} = 53,645.42 \text{ kWh}$

Write Energy (kWh)

Query

- ✦ Write Energy for Channel 2 Phase C
- ✦ Register Address = 122
- ✦ $XH = 122 \text{ div } 256 = 0$
- ✦ $XL = 122 \text{ mod } 256 = 122$
- ✦ Energy = 53645.42 kWh
- ✦ $Y3 = (53645.42 \text{ kWh} / 0.01 \text{ kWh}) \text{ div } 16,777,216 = 0$
- ✦ $Y4 = ((53645.42 \text{ kWh} / 0.01 \text{ kWh}) \text{ mod } 16,777,216) \text{ div } 65,536 = 81$
- ✦ $Y1 = ((53645.42 \text{ kWh} / 0.01 \text{ kWh}) \text{ mod } 65,536) \text{ div } 256 = 219$
- ✦ $Y2 = (53645.42 \text{ kWh} / 0.01 \text{ kWh}) \text{ mod } 256 = 62$

SMB50 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data				CRC	
		high	low	high	low		Word 1		Word 2		low	high
							high (Y1)	low (Y2)	high (Y3)	low (Y4)		
26	16	0	122	0	2	4	219	62	0	81	159	196

Reply

SMB350 Address	Function Code	Register Address		Number of Registers		CRC	
		high	low	high	low	low	high
26	16	0	122	0	2	99	250

Tip

- ❖ After writing, the command [Commit kWh/kVArh](#) can be optionally issued if it is desired to have the new value be stored immediately instead of having to wait 3 minutes for it to be stored automatically.

Read Reactive Energy (kVArh)

Query

- ✦ Read Reactive Energy for Channel 8 Phase C
- ✦ Register Address = 206
- ✦ $XH = 206 \text{ div } 256 = 0$
- ✦ $XL = 206 \text{ mod } 256 = 206$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
11	3	0	206	0	2	165	94

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
11	3	4	37	35	0	14	43	49

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Reactive Energy} = (0 * 16,777,216 + 14 * 65,536 + 37 * 256 + 35) * 0.01 \text{ kVArh} = 9270.11 \text{ kVArh}$

Write Reactive Energy (kVArh)

Query

- ✦ Write Reactive Energy for Channel 8 Phase C
- ✦ Register Address = 206
- ✦ $XH = 206 \text{ div } 256 = 0$
- ✦ $XL = 206 \text{ mod } 256 = 206$
- ✦ Reactive Energy = 9270.11 kVArh
- ✦ $Y3 = (9270.11 \text{ kWh} / 0.01 \text{ kVArh}) \text{ div } 16,777,216 = 0$
- ✦ $Y4 = ((9270.11 \text{ kWh} / 0.01 \text{ kVArh}) \text{ mod } 16,777,216) \text{ div } 65,536 = 14$
- ✦ $Y1 = ((9270.11 \text{ kWh} / 0.01 \text{ kVArh}) \text{ mod } 65,536) \text{ div } 256 = 37$
- ✦ $Y2 = (9270.11 \text{ kWh} / 0.01 \text{ kVArh}) \text{ mod } 256 = 35$

SMB50 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data				CRC	
		high	low	high	low		Word 1		Word 2		low	high
							high (Y1)	low (Y2)	high (Y3)	low (Y4)		
11	16	0	206	0	2	4	37	35	0	14	36	169

Reply

SMB350 Address	Function Code	Register Address		Number of Registers		CRC	
		high	low	high	low	low	high
11	16	0	206	0	2	32	157

Note

- ❖ After writing, the command [Commit kWh/kVArh](#) can be optionally issued if it is desired to have the new value be stored immediately instead of having to wait 3 minutes for it to be stored automatically.

Read Power Factor

Query

- ✦ Read Power Factor for Channel 1 Phase A
- ✦ Register Address = 208
- ✦ $XH = 208 \text{ div } 256 = 0$
- ✦ $XL = 208 \text{ mod } 256 = 208$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
1	3	0	208	0	1	133	243

Reply

SMB350 Address	Function Code	Byte Count	Read Data		CRC	
			high (Y1)	low (Y2)	low	high
1	3	2	3	49	121	96

- ❖ $\text{Data} = (Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Power Factor} = (3 * 256 + 49) * 0.001 = 0.817$

Read Average Current

Query

- ◆ Read Average Current for Channel 3
- ◆ Register Address = 260
- ◆ $XH = 260 \text{ div } 256 = 1$
- ◆ $XL = 260 \text{ mod } 256 = 4$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
200	3	1	4	0	2	149	175

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
200	3	4	114	42	0	4	152	76

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Current} = (0 * 16,777,216 + 4 * 65,536 + 114 * 256 + 42) * 0.001 \text{ A} = 291.37 \text{ A}$
- * Note that the Current has been pre-multiplied by the CT ratio.

Read Total Power (kW)

Query

- ◆ Read Total Power for Channel 4
- ◆ Register Address = 276
- ◆ $XH = 276 \text{ div } 256 = 1$
- ◆ $XL = 276 \text{ mod } 256 = 20$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
100	3	1	20	0	2	140	6

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
100	3	4	2	19	0	3	127	73

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Total Power} = (0 * 16,777,216 + 3 * 65,536 + 2 * 256 + 19) * 0.001 \text{ kW} = 197.139 \text{ kW}$

Read Total Energy (kWh)

Query

- ◆ Read Total Energy for Channel 5
- ◆ Register Address = 292
- ◆ $XH = 292 \text{ div } 256 = 1$
- ◆ $XL = 292 \text{ mod } 256 = 36$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
50	3	1	36	0	2	128	63

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
50	3	4	249	53	0	120	217	128

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Total Energy} = (0 * 16,777,216 + 120 * 65536 + 249 * 256 + 53) * 0.01 \text{ kWh} = 79281.17 \text{ kWh}$

Read Total Reactive Power (kVAr)

Query

- ◆ Read Total Reactive Power for Channel 6
- ◆ Register Address = 308
- ◆ $XH = 308 \text{ div } 256 = 1$
- ◆ $XL = 308 \text{ mod } 256 = 52$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
7	3	1	52	0	2	132	95

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
7	3	4	123	223	0	12	181	40

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Total Reactive Power} = (0 * 16,777,216 + 12 * 65536 + 123 * 256 + 223) * 0.001 \text{ kVAr} = 818.143 \text{ kVAr}$

Read Total Reactive Energy (kVArh)

Query

- ◆ Read Total Reactive Energy for Channel 1
- ◆ Register Address = 240
- ◆ $XH = 240 \text{ div } 256 = 0$
- ◆ $XL = 240 \text{ mod } 256 = 240$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
1	3	0	240	0	2	196	56

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
1	3	4	249	53	0	120	218	131

❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$

❖ $\text{Total Energy} = (0 * 16,777,216 + 120 * 65536 + 249 * 256 + 53) * 0.01 \text{ kVArh} = 79281.17 \text{ kVArh}$

Read Total Apparent Power (kVA)

Query

- ◆ Read Total Apparent Power for Channel 1
- ◆ Register Address = 242
- ◆ $XH = 242 \text{ div } 256 = 0$
- ◆ $XL = 242 \text{ mod } 256 = 242$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
177	3	0	242	0	2	127	200

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
177	3	4	67	126	0	3	126	101

❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$

❖ $\text{Total Apparent Power} = (0 * 16,777,216 + 3 * 65536 + 67 * 256 + 126) * 0.001 \text{ kVA} = 213.886 \text{ kVA}$

Read Power Factor

Query

- ◆ Read Power Factor for Channel 7
- ◆ Register Address = 342
- ◆ $XH = 342 \text{ div } 256 = 1$
- ◆ $XL = 342 \text{ mod } 256 = 86$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
254	3	1	86	0	2	49	232

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
254	3	4	2	224	0	0	245	114

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Total Power Factor} = (0 * 16,777,216 + 0 * 65,536 + 2 * 256 + 224) * 0.001 = 0.736$

Read Frequency

Query

- ◆ Register Address = 503
- ◆ $XH = 503 \text{ div } 256 = 1$
- ◆ $XL = 503 \text{ mod } 256 = 247$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
1	3	1	247	0	1	52	4

Reply

SMB350 Address	Function Code	Byte Count	Read Word		CRC	
			high (Y1)	low (Y2)	low	high
1	3	2	2	88	184	222

- ❖ $\text{Total Power Factor} = (2 * 256 + 88) * 0.1 \text{ Hz} = 60.0 \text{ Hz}$

Read Device Address

Query

- ❖ Register Address = 505
- ❖ XH = $505 \div 256 = 1$
- ❖ XL = $505 \bmod 256 = 249$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
128	3	1	249	0	1	75	214

Reply

SMB350 Address	Function Code	Byte Count	Read Data		CRC	
			high (Y1)	low (Y2)	low	high
128	3	2	0	210	4	7

- ❖ Data = $(Y1 * 256 + Y2) * \text{Unit}$
- ❖ Device Address = $(0 * 256 + 210) = 210$

Write Device Address

This command overwrites the SMB350 Modbus slave address. Once you issue this command, the original address is replaced. The next time that you issue commands to the same SMB350, you must use the new address, it will no longer respond to the old address, unless of course the new address is the same as the old.

Note that the slave address can also be changed through the front panel. This command can be used with the broadcast address 255, if the original address of the SMB350 is unknown. But the SMB350 must be in a one to one connection with the host PC, no other devices must be on the same bus network; otherwise the other slave devices will also respond to the broadcasted command the replies from the various devices will collide.

Query

- ◆ Register Address = 505
- ◆ XH = $505 \div 256 = 1$
- ◆ XL = $505 \bmod 256 = 249$
- ◆ New Device Address = 210
- ◆ Y1 = $0 \div 256 = 0$
- ◆ Y2 = $210 \bmod 256 = 210$

SMB350 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data		CRC	
		high (XH)	low (XL)	high	low		high (Y1)	low (Y2)	low	high
128	16	1	249	0	1	2	0	210	78	242

Reply

SMB350 Address	Function Code	Register Address		Number of Registers		CRC	
		high	low	high	low	low	high
128	16	1	249	0	1	206	21

Read Baud Rate

Query

- ◆ Register Address = 506
- ◆ $XH = 506 \div 256 = 1$
- ◆ $XL = 506 \bmod 256 = 250$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
100	3	1	250	0	1	172	50

Reply

SMB350 Address	Function Code	Byte Count	Read Data		CRC	
			high (Y1)	low (Y2)	low	high
100	3	2	0	2	117	141

- ❖ $Data = (Y1 * 256 + Y2) * Unit$
- ❖ $Index = (0 * 256 + 2) = 2$
- ❖ Baud Rate = {0 => 9600, 1 => 4800, 2 => 2400, 3 => 1200} [Index]
- ❖ Baud Rate = {0 => 9600, 1 => 4800, 2 => 2400, 3 => 1200} [2] = 2400 bauds

Write Baud Rate

This command overwrites the existing baud rate setting of the SMB350. When issuing this command, the original baud rate setting is replaced. The next time that you issue commands to the same SMB350, make sure to use the new baud rate, it will no longer respond to the old baud rate, unless of course the new baud rate is the same the old.

Query

- ◆ Register Address = 506
- ◆ $XH = 506 \div 256 = 1$
- ◆ $XL = 506 \bmod 256 = 250$
- ◆ New Baud Rate = 2400
- ◆ $Index = \{0 \Rightarrow 9600, 1 \Rightarrow 4800, 2 \Rightarrow 2400, 3 \Rightarrow 1200\}.index [2400] = 2$
- ◆ $Y1 = 1 \div 256 = 0$
- ◆ $Y2 = 1 \bmod 256 = 1$

SMB350 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data		CRC	
		high (XH)	low (XL)	high	low		high (Y1)	low (Y2)	low	high
100	16	1	250	0	1	2	0	2	180	89

Reply

SMB350 Address	Function Code	Register Address		Number of Registers		CRC	
		high	low	high	low	low	high
100	16	1	250	0	1	41	241

Read CT Ratio

Query

- ◆ Read CT Ratio for Channel 6 Phase C
- ◆ Register Address = 1137
- ◆ $XH = 1137 \div 256 = 4$
- ◆ $XL = 1137 \bmod 256 = 113$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
12	3	4	113	0	1	212	60

Reply

SMB350 Address	Function Code	Byte Count	Read Data		CRC	
			high (Y1)	low (Y2)	low	high
12	3	2	0	20	149	138

- ❖ $\text{Data} = (Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{CT Ratio} = (0 * 256 + 20) = 20$

Write CT Ratio

Query

- ◆ Write CT Ratio for Channel 3 Phase B
- ◆ Register Address = 1127
- ◆ $XH = 1127 \div 256 = 4$
- ◆ $XL = 1127 \bmod 256 = 103$
- ◆ New CT ratio = 40
- ◆ $Y1 = 40 \div 256 = 0$
- ◆ $Y2 = 40 \bmod 256 = 40$

SMB350 Address	Function Code	Register Address		Number of Registers		Byte Count	Write Data		CRC	
		high (XH)	low (XL)	high	low		high (Y1)	low (Y2)	low	high
210	16	4	103	0	1	2	0	40	98	172

Reply

SMB350 Address	Function Code	Register Address		Number of Registers		CRC	
		high	low	high	low	low	high
210	16	4	103	0	1	162	133

Very Important!

- ❖ After writing all the CT ratios, the command [Commit CT Ratio](#) should be issued to make the new values permanent.

Read Peak kWh

Query

- ◆ Read Peak kWh for Channel 4 Phase A
- ◆ Register Address = 1298
- ◆ $XH = 1298 \text{ div } 256 = 5$
- ◆ $XL = 1298 \text{ mod } 256 = 18$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
1	3	5	18	0	2	100	194

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
1	3	4	41	104	0	11	50	116

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Phase A Peak kWh} = (0 * 16,777,216 + 11 * 65536 + 41 * 256 + 104) * 0.01 \text{ kWh} = 7314.96 \text{ kWh}$

Read Total Peak kWh

Query

- ◆ Read Total Peak kWh for Channel 6
- ◆ Register Address = 1338
- ◆ $XH = 1338 \text{ div } 256 = 5$
- ◆ $XL = 1338 \text{ mod } 256 = 58$

SMB350 Address	Function Code	Register Address		Number of Words		CRC	
		high (XH)	low (XL)	high	low	low	high
11	3	5	58	0	2	228	96

Reply

SMB350 Address	Function Code	Byte Count	Read Word 1		Read Word 2		CRC	
			high (Y1)	low (Y2)	high (Y3)	low (Y4)	low	high
11	3	4	231	175	0	100	87	77

- ❖ $\text{Data} = (Y3 * 16,777,216 + Y4 * 65,536 + Y1 * 256 + Y2) * \text{Unit}$
- ❖ $\text{Total Peak kWh} = (0 * 16,777,216 + 100 * 65536 + 231 * 256 + 175) * 0.01 \text{ kWh} = 66129.11 \text{ kWh}$

Start Peak kWh

Query and Reply

- ◆ Register Address = 1
- ◆ $XH = 1 \text{ div } 256 = 0$
- ◆ $XL = 1 \text{ mod } 256 = 1$

SMB350 Address	Function Code	Register Address		Force Control		CRC	
		high (XH)	low (XL)	high	low	low	high
7	5	0	1	255	0	221	156

Stop Peak kWh

Query and Reply

- ◆ Register Address = 1
- ◆ $XH = 1 \text{ div } 256 = 0$
- ◆ $XL = 1 \text{ mod } 256 = 1$

SMB350 Address	Function Code	Register Address		Force Control		CRC	
		high (XH)	low (XL)	high	low	low	high
7	5	0	1	0	0	156	108

Commit CT Ratio

After writing all the CT ratios, this command must be issued so that they are stored into long term memory. Otherwise, the CT ratios will revert back to their previous values after a reset or power cycle.

Query and Reply

- ◆ Register Address = 175
- ◆ $XH = 175 \text{ div } 256 = 0$
- ◆ $XL = 175 \text{ mod } 256 = 175$

SMB350 Address	Function Code	Register Address		Force Control		CRC	
		high (XH)	low (XL)	high	low	low	high
17	5	0	175	255	0	190	139

Commit kWh/kVArh

After writing all the kWh and kVArh values, this command must be issued if they are to be stored immediately into long term memory. If this command is not issued, the values will still be automatically committed after 3 minutes.

Query and Reply

- ◆ Register Address = 174
- ◆ $XH = 174 \text{ div } 256 = 0$
- ◆ $XL = 174 \text{ mod } 256 = 174$

SMB350 Address	Function Code	Register Address		Force Control		CRC	
		high (XH)	low (XL)	high	low	low	high
17	5	0	174	255	0	239	75

CRC Computation

The SMB350 conforms to the Modbus/RTU protocol and thus uses CRC16 for its error checking. The computed CRC is appended to the end of the message with the LSB first and then the MSB. Below is the pseudo code for computing the CRC as used by the standard Modbus/RTU. The pseudo code is written in the Ruby language and can be directly used as such.

Definition

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

Usage

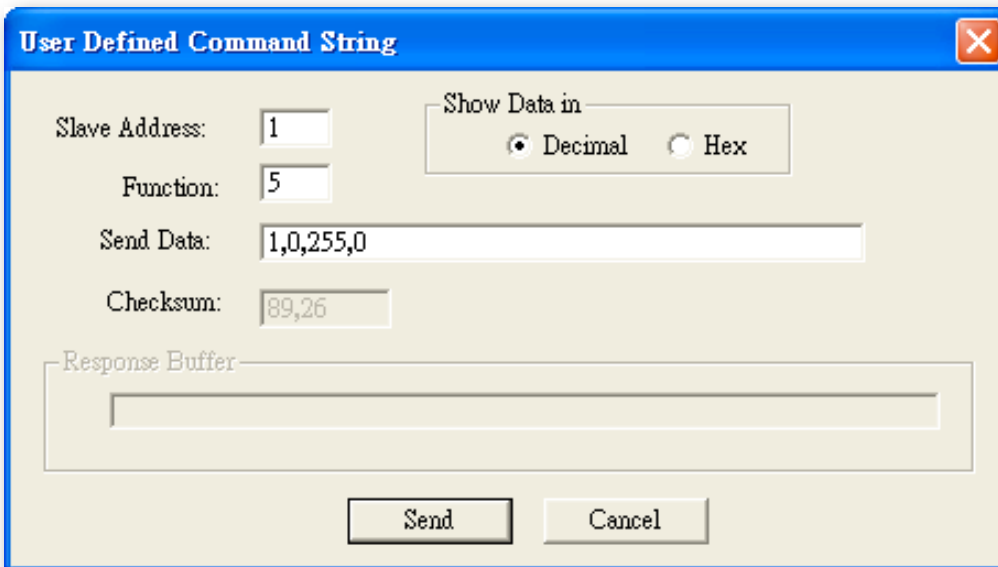
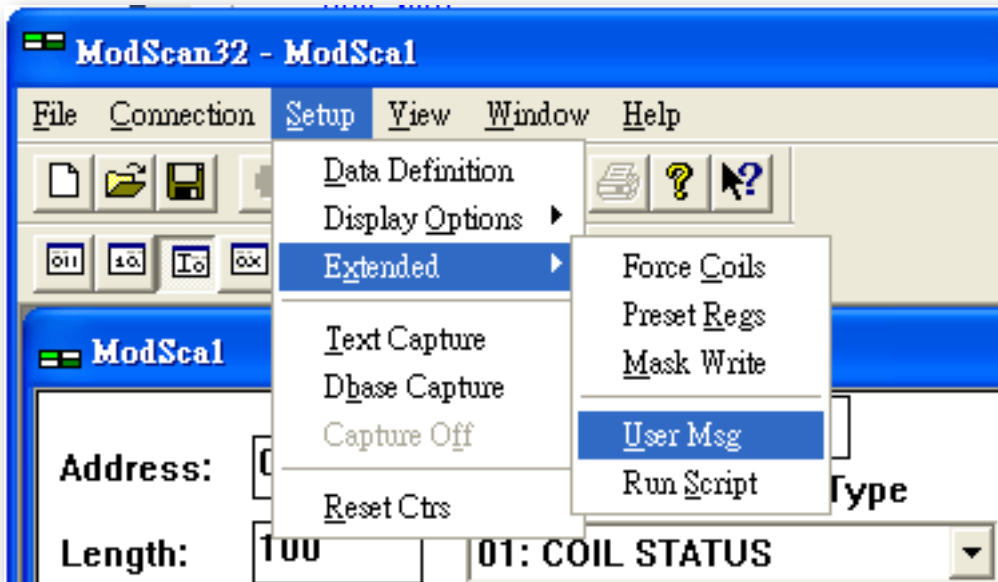
```
>> crc = get_crc(1,3,0,141,0,5)
=> [21, 226]          <---- [CRC low byte, CRC high byte]
```

Notes on Modscan

This is not a manual of Modscan, but only a short note describing its manual commands capability.

Most users are familiar with Modscan's ability to read and continuously poll a designated device using Modbus commands 1 to 4. But in addition, Modscan also has the ability to issue other commands as well.

For the SMB350, function code 5 and 16 needs to be issued as well. To issue them, first make sure that the connection has already been established and running then go to the menu and run the dialog box "User Defined Command String" from [Setup->Extended->User Msg] as shown in the screen captures below:



From this dialog box, one can issue function code 5 to issue the control command to start or stop the peak kWh from accumulating and function code 16 to write to some of the writeable registers.

Additional Resources

Although every effort has been taken to ensure that this document is free from errors, some may still remain. If found please send an email to: info@daeinstrument.com, in the subject line write "Errata" and please indicate the name of this document "SMB350 Modbus Reference", revision number, page number and indicate the error with its correction. Thank you.

We have made sure that this document is as clear and useful to you as possible, but any suggestions on improving this document to serve you even better would be welcome. Send comments and suggestions to: info@daeinstrument.com, in the subject line, write "Comments" and please indicate the name of this document "SMB350 Modbus Reference". Questions are also welcome.

This document only covers the Modbus protocol registers as used by the SMB350, for interfacing and other information please refer to the SMB350 user's manual.