

DELTA

MODBUS Definition

General Information	
Default SSID	Delta-[Serial Number] (Example: Delta-O5817900001W0)
Default Password	DELTASOL
IP address	192.168.50.1
Port	5001/502
Topology	Point to point
Baud Rate	19200 bps
Parity	None
Data Bits	8
Stop Bits	1
Addresses Mode	PLC Addresses Mode (Base 1)

Version 1.02

Version History			
Date	Version	Changes	Editor
Jul-25-2022	V01.00	First draft.	Charles
Aug-31-2022	V01.01	Update PCS status	Richard
May-08-2024	V01.02	Add reactive power	Charles

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1. Message Format

Address	Function Code	Data	Error Check
1 byte	1 bytes	<=252 byte	2 bytes

1.1 Address

PCS ID=1~255 (Default : 1)(255 is for broadcast only)

1.2 Function Code

0x03: Read Holding Register (16-bit word , R/W)

0x04: Read Input Register (16-bit word , R)

0x05: Write Single Coil

0x06: Write Single Register

0x10: Write Multiple Registers

1.3 Data

1.4 Error Check

CRC

2. MODBUS Message Format

2.1 Read Holding Registers (0x03)

INQUIRY : Computer→ PCS

Address	Function Code	Data				Error Check	
1~255	0x03	Starting Address HI	Starting Address LO	No of Registers HI	No of Registers LO	Error Check LO	Error Check HI

RESPONSE : PCS → Computer

Address	Function Code	Data						Error Check	
1~255	0x03	Byte Count	Data HI	Data LO	Data HI	Data LO		Error Check LO	Error Check HI

ERROR: PCS→ Computer

Address	Function Code	Data				Error Check	
1~255	0x83	0x01 or 0x02 or 0x03 or 0x04				Error Check LO	Error Check HI

PS. starting Address : 0x0000 to 0xFFFF

No of Registers : 1 to 125 (0x7D)

2.2 Read Input Registers (0x04)

INQUIRY : Computer→ PCS

Address	Function Code	Data				Error Check	
1~255	0x04	Starting Address HI	Starting Address LO	No of Registers HI	No of Registers LO	Error Check LO	Error Check HI

RESPONSE : PCS→ Computer

Address	Function Code	Data						Error Check	
1~255	0x04	Byte Count	Data HI	Data LO	Data HI	Data LO		Error Check LO	Error Check HI

ERROR: PCS→ Computer

Address	Function Code	Data				Error Check	
1~255	0x84	0x01 or 0x02 or 0x03 or 0x04				Error Check LO	Error Check HI

PS. starting Address : 0x0000 to 0xFFFF

No of Registers : 1 to 125 (0x7D)

2.3 Write Single Coil (0x05)

INQUIRY : Computer→ PCS

Address	Function Code	Data				Error Check	
1~255	0x05	Coil Address HI	Coil Address LO	Write Data HI	Write Data LO	Error Check LO	Error Check HI

RESPONSE : PCS → Computer

Address	Function Code	Data				Error Check	
1~255	0x05	Coil Address HI	Coil Address LO	Write Data HI	Write Data LO	Error Check LO	Error Check HI

ERROR: PCS → Computer

Address	Function Code	Data				Error Check	
1~255	0x85	0x01 or 0x02 or 0x03 or 0x04				Error Check LO	Error Check HI

PS. Coil Address : 0x0000 to 0xFFFF

Write Data : 0x0000 or 0xFF00

2.4 Write Single Register (0x06)

INQUIRY : Computer → PCS

Address	Function Code	Data				Error Check	
1~255	0x06	Register Address HI	Register Address LO	Write Data HI	Write Data LO	Error Check LO	Error Check HI

RESPONSE : PCS→ computer

Address	Function Code	Data				Error Check	
1~255	0x06	Register Address HI	Register Address LO	Write Data HI	Write Data LO	Error Check LO	Error Check HI

ERROR: PCS→ computer

Address	Function Code	Data				Error Check	
1~255	0x86	0x01 or 0x02 or 0x03 or 0x04				Error Check LO	Error Check HI

PS. Register Address : 0x0000 to 0xFFFF

Write Data : 0x0000 or 0xFFFF

3. Memory Map ~ Read Only (Input Registers)

<SYSTEM INFORMATION>

Old Address (Hex)	Old Address (Dec)	Description	
408	1032	<i>Inverter ID</i>	<i>RS485 ID</i>
409	1033	<i>RTC Year</i>	
40A	1034	<i>RTC Month</i>	
40B	1035	<i>RTC Day</i>	
40C	1036	<i>RTC Hour</i>	
40D	1037	<i>RTC Minute</i>	
40E	1038	<i>RTC Second</i>	
410	1040	<i>FW1 Revision</i>	<i>ex : 0x0A0B => V10.11</i>
411	1041	<i>FW1 Date</i>	<i>ex : 0x082D => Y08W45</i>
412	1042	<i>FW2 Revision</i>	<i>ex : 0x0A0B => V10.11</i>
413	1043	<i>FW2 Date</i>	<i>ex : 0x082D => Y08W45</i>
418	1048	<i>PCS Status</i>	<i>REFER TO APPENDIX C</i>
419	1049	<i>Reconnected Time</i>	<i>unit : second</i>

< Energy / Run Time >

Old Address (Hex)	Old Address (Dec)	Description	
430	1072	Today Energy	1072:Low Word, 1073: High Word ※
431	1073		
432	1074	Today Runtime	1074:Low Word, 1075: High Word unit : 1 second
433	1075		
434	1076	Life Energy	1076:Low Word, 1077: High Word ※
435	1077		
436	1078	Life Runtime	1078:Low Word, 1079: High Word unit : 1 second
437	1079		

※: Follow Scale factor

<EVENT LIST>

Address (Hex)	Address (Dec)	Description	
440	1088	Event Index (HR:801)	This shall be assigned via Holding Registers (801) first when reading the events.
441	1089	Event (index*10+0)	
442	1090	Event (index*10+1)	The event index is the page index.
443	1091	Event (index*10+2)	For current design in PV inverter the maximum event is 30, so the index is from 0 to 2.
444	1092	Event (index*10+3)	
445	1093	Event (index*10+4)	If the index is equal to 0, the event with index from 0 to 9 will be reported. If the index is equal to 1, the event with index from 10 to 19 will be reported, and so on.
446	1094	Event (index*10+5)	
447	1095	Event (index*10+6)	
448	1096	Event (index*10+7)	
449	1097	Event (index*10+8)	
44A	1098	Event (index*10+9)	

<EVENT TIME>

Address (Hex)	Address (Dec)	Description	
4A0	1184	<i>Event time (index+0)</i>	This shall be assigned via Holding Registers (801) first when reading the events.
4A1	1185		
4A2	1186	<i>Event time (index+1)</i>	The event index is the page index. For current design in PV inverter the maximum event is 30, so the index is from 0 to 2. If the index is equal to 0, the event with index from 0 to 9 will be reported. If the index is equal to 1, the event with index from 10 to 19 will be reported, and so on.
4A3	1187		
4A4	1188	<i>Event time (index+2)</i>	
4A5	1189		
4A6	1190	<i>Event time (index+3)</i>	
4A7	1191		
4A8	1192	<i>Event time (index+4)</i>	
4A9	1193		
4AA	1194	<i>Event time (index+5)</i>	The unit is “seconds”, and the starting point is 1970/01/01-00:00. For example, if the event time is 86460, this indicate that this event was happened at 1970/ 01/02-00:01.
4AB	1195		
4AC	1196	<i>Event time (index+6)</i>	
4AD	1197		
4AE	1198	<i>Event time (index+7)</i>	
4AF	1199		
4B0	1200	<i>Event time (index+8)</i>	
4B1	1201		
4B2	1202	<i>Event time (index+9)</i>	
4B3	1203		

<GENERAL INVERTER INFORMATION>

Address (Hex)	Address (Dec)	Description
C001	49153	AC voltage ✖
C002	49154	AC current ✖
C003	49155	AC wattage ✖
C004	49156	AC frequency
B001	45057	Input1 DC voltage ✖
B002	45058	Input1 DC current ✖
B003	45059	Input1 DC wattage ✖
B004	45060	Input2 DC voltage ✖
B005	45061	Input2 DC current ✖
B006	45062	Input2 DC wattage ✖

✖: Follow Scale factor

<SERIAL NUMBER >

Address (Hex)	Address (Dec)	Description
A00F	40975	Serial number 0,1
A010	40976	Serial number 2,3
A011	40977	Serial number 4,5
A012	40978	Serial number 6,7
A013	40979	Serial number 8,9
A014	40980	Serial number 10,11
A015	40981	Serial number 12,13

<TEMPERATURE INFORMATION>

Old Address (Hex)	Old Address (Dec)	New Address (Hex)	New Address (Dec)	Command	Unit	Description
438	1080	D00B	53259	Interior Temperature	1°C	
439	1081	D00C	53260	Boost Module 1 Temperature	1°C	
43A	1082	D00D	53261	Boost Module 2 Temperature	1°C	
43B	1083	D00E	53262	Inverter Module Temperature	1°C	
480	1152	D049	53321	Max Interior Temperature	1°C	
481	1153	D04A	53322	Max Boost Module 1 Temperature	1°C	
482	1154	D04B	53323	Max Boost Module 2 Temperature	1°C	
483	1155	D04B	53323	Max Inverter Module Temperature	1°C	

<DAILY ENERGY LOG>

Address (Hex)	Address (Dec)	Purpose	Description
800	2048	Day-0 (Today)	2048: Low word, 2049: High Word ※
801	2049		
802	2050	Day-1 (Yesterday)	※
803	2051		
804	2052	Day-2	※
805	2053		
806	2054	Day-3	※
807	2055		
808	2056	Day-4	※
809	2057		
80A	2058	Day-5	※
80B	2059		
80C	2060	Day-6	※
80D	2061		
80E	2062	Day-7	※
80F	2063		
810	2064	Day-8	※
811	2065		
812	2066	Day-9	※
813	2067		
814	2068	Day-10	※
815	2069		
816	2070	Day-11	※
817	2071		
818	2072	Day-12	※

819	2073		
81A	2074	Day-13	※
81B	2075		
81C	2076	Day-14	※
81D	2077		
81E	2078	Day-15	※
81F	2079		
820	2080	Day-16	※
821	2081		
822	2082	Day-17	※
823	2083		
824	2084	Day-18	※
825	2085		
826	2086	Day-19	※
827	2087		
828	2088	Day-20	※
829	2089		
82A	2090	Day-21	※
82B	2091		
82C	2092	Day-22	※
82D	2093		
82E	2094	Day-23	※
82F	2095		
830	2096	Day-24	※
831	2097		
832	2098	Day-25	※
833	2099		
834	2100	Day-26	※
835	2101		
836	2102	Day-27	※
837	2103		
838	2104	Day-28	※
839	2105		
83A	2106	Day-29	※
83B	2107		
83C	2108	Day-30	※
83D	2109		
83E	2110	Day-31	※
83F	2111		

※: Follow Scale factor.

<MONTH ENERGY LOG>

Address (Hex)	Address (Dec)	Purpose	Description
840	2112	Month--0 (Current Month)	2112: Low word,2113:High Word ※
841	2113		
842	2114	Month--1 (Last Month)	※
843	2115		
844	2116	Month--2	※
845	2117		

846	2118	Month--3	※
847	2119		
848	2120	Month--4	※
849	2121		
84A	2122	Month--5	※
84B	2123		
84C	2124	Month--6	※
84D	2125		
84E	2126	Month--7	※
84F	2127		
850	2128	Month--8	※
851	2129		
852	2130	Month--9	※
853	2131		
854	2132	Month--10	※
855	2133		
856	2134	Month--11	※
857	2135		
858	2136	Month--12	※
859	2137		
85A	2138	Month--13	※
85B	2139		
85C	2140	Month--14	※
85D	2141		
85E	2142	Month--15	※
85F	2143		
860	2144	Month--16	※
861	2145		
862	2146	Month--17	※
863	2147		
864	2148	Month--18	※
865	2149		
866	2150	Month--19	※
867	2151		
868	2152	Month--20	※
869	2153		
86A	2154	Month--21	※
86B	2155		
86C	2156	Month--22	※
86D	2157		
86E	2158	Month--23	※
86F	2159		

※: Follow Scale factor.

<QUARTER ENERGY LOG >

Address (Hex)	Address (Dec)	Purpose	Description
870	2160	Quarter 0(00:00~00:15)	※
871	2161	Quarter 1(00:15~00:30)	※
872	2162	Quarter 2(00:30~00:45)	※
873	2163	Quarter 3	※

874	2164	Quarter 4	※
875	2165	Quarter 5	※
876	2166	Quarter 6	※
877	2167	Quarter 7	※
878	2168	Quarter 8	※
879	2169	Quarter 9	※
87A	2170	Quarter 10	※
87B	2171	Quarter 11	※
87C	2172	Quarter 12	※
87D	2173	Quarter 13	※
87E	2174	Quarter 14	※
87F	2175	Quarter 15	※
880	2176	Quarter 16	※
881	2177	Quarter 17	※
882	2178	Quarter 18	※
883	2179	Quarter 19	※
884	2180	Quarter 20	※
885	2181	Quarter 21	※
886	2182	Quarter 22	※
887	2183	Quarter 23	※
888	2184	Quarter 24	※
889	2185	Quarter 25	※
88A	2186	Quarter 26	※
88B	2187	Quarter 27	※
88C	2188	Quarter 28	※
88D	2189	Quarter 29	※
88E	2190	Quarter 30	※
88F	2191	Quarter 31	※
890	2192	Quarter 32	※
891	2193	Quarter 33	※
892	2194	Quarter 34	※
893	2195	Quarter 35	※
894	2196	Quarter 36	※
895	2197	Quarter 37	※
896	2198	Quarter 38	※
897	2199	Quarter 39	※
898	2200	Quarter 40	※
899	2201	Quarter 41	※
89A	2202	Quarter 42	※
89B	2203	Quarter 43	※
89C	2204	Quarter 44	※
89D	2205	Quarter 45	※
89E	2206	Quarter 46	※
89F	2207	Quarter 47	※
8A0	2208	Quarter 48	※
8A1	2209	Quarter 49	※
8A2	2210	Quarter 50	※
8A3	2211	Quarter 51	※
8A4	2212	Quarter 52	※
8A5	2213	Quarter 53	※

8A6	2214	Quarter 54	※
8A7	2215	Quarter 55	※
8A8	2216	Quarter 56	※
8A9	2217	Quarter 57	※
8AA	2218	Quarter 58	※
8AB	2219	Quarter 59	※
8AC	2220	Quarter 60	※
8AD	2221	Quarter 61	※
8AE	2222	Quarter 62	※
8AF	2223	Quarter 63	※
8B0	2224	Quarter 64	※
8B1	2225	Quarter 65	※
8B2	2226	Quarter 66	※
8B3	2227	Quarter 67	※
8B4	2228	Quarter 68	※
8B5	2229	Quarter 69	※
8B6	2230	Quarter 70	※
8B7	2231	Quarter 71	※
8B8	2232	Quarter 72	※
8B9	2233	Quarter 73	※
8BA	2234	Quarter 74	※
8BB	2235	Quarter 75	※
8BC	2236	Quarter 76	※
8BD	2237	Quarter 77	※
8BE	2238	Quarter 78	※
8BF	2239	Quarter 79	※
8C0	2240	Quarter 80	※
8C1	2241	Quarter 81	※
8C2	2242	Quarter 82	※
8C3	2243	Quarter 83	※
8C4	2244	Quarter 84	※
8C5	2245	Quarter 85	※
8C6	2246	Quarter 86	※
8C7	2247	Quarter 87	※
8C8	2248	Quarter 88	※
8C9	2249	Quarter 89	※
8CA	2250	Quarter 90	※
8CB	2251	Quarter 91	※
8CC	2252	Quarter 92	※
8CD	2253	Quarter 93(23:15~23:30)	※
8CE	2254	Quarter 94(23:30~23:45)	※
8CF	2255	Quarter 95(23:45~24:00)	※

※: Follow Scale factor.

<CURRENT EVENT LIST>

Old Address (Hex)	Old Address (Dec)	Purpose	Description
C00	3072	Current event - Error0	<i>Error 15 ~ Error 00</i>
C01	3073	Current event - Error1	<i>Error 31 ~ Error 16</i>
C02	3074	Current event - Error2	<i>Error 47 ~ Error 32</i>
C03	3075	Current event - Error3	
C04	3076	Current event - Error4	...
C05	3077	Current event - Error5	
C06	3078	Current event - Error6	
C07	3079	Current event - Error7	
C08	3080	Current event - Error8	
C09	3081	Current event - Error9	
C0A	3082	Current event - Error10	
C0B	3083	Current event - Error11	
C0C	3084	Current event - Error12	
C0D	3085	Current event - Error13	
C0E	3086	Current event - Error14	
C0F	3087	Current event - Error15	
C10	3088	Current event - Warning0	<i>Warning 15 ~ Warning 00</i>
C11	3089	Current event - Warning1	<i>Warning 31 ~ Warning 16</i>
C12	3090	Current event - Warning2	<i>Warning 47 ~ Warning 32</i>
C13	3091	Current event - Warning3	
C14	3092	Current event - Warning4	...
C15	3093	Current event - Warning5	
C16	3094	Current event- Warning6	
C17	3095	Current event- Warning7	
C18	3096	Current event - Warning8	
C19	3097	Current event - Warning9	
C1A	3098	Current event - Warning10	
C1B	3099	Current event - Warning11	
C1C	3100	Current event - Warning12	
C1D	3101	Current event - Warning13	
C1E	3102	Current event - Warning14	
C1F	3103	Current event - Warning15	
C20	3104	Current event - Fault0	<i>Fault 15 ~ Fault 00</i>
C21	3105	Current event - Fault1	<i>Fault 31 ~ Fault 16</i>
C22	3106	Current event - Fault2	<i>Fault 47 ~ Fault 32</i>
C23	3107	Current event - Fault3	
C24	3108	Current event - Fault4	...
C25	3109	Current event - Fault5	
C26	3110	Current event - Fault6	
C27	3111	Current event - Fault7	
C28	3112	Current event - Fault8	
C29	3113	Current event - Fault9	
C2A	3114	Current event - Fault10	
C2B	3115	Current event - Fault11	
C2C	3116	Current event - Fault12	
C2D	3117	Current event - Fault13	
C2E	3118	Current event - Fault14	
C2F	3119	Current event - Fault15	
See below for example			

※Example: If address 3072 replies with *0100011000010001*

0 1 0 0 0 1 1 0 0 0 0 1 0 0 0 1

E15, E14, E13, E12, E11, E10, E9, E8, E7, E6, E5, E4, E3, E2, E1, E0

We can get the information that Error 14, Error 10, Error 9, Error 4 and Error 0 are now occurring.

For description of every error code, refer to APPENDIX D.

<SCALE FACTOR>

Address (Hex)	Address (Dec)	Purpose	Description
A023	40995	Scale Factor:	See below for more detail.

<Important!>

If received "Illegal Data Address" while accessing this address.

Use default scale of Monitoring software. Otherwise, refer to the following instruction.

bit0: All default (0: Disable; 1: Enable)

bit1 ~ bit2: Idc (0: default ; 1: 0.01A ; 2: 0.1A ; 3: 1.0A)

bit3 ~ bit5: W & Quarter(W → Wh) (0: reserved ; 1: 0.1W ; 2: 1W ; 3: 10W ; 4: 100W ; 5: 1000W)

bit6 ~ bit9: Wh (0: default ; 1: 1mWh ; 2: 10mWh ; 3: 100mWh ; 4: 1Wh ; 5: 10Wh ; 6: 100Wh ; 7: 1000Wh)

bit10 ~ bit11: lac (0: default ; 1: 0.01A ; 2: 0.1A ; 3: 1.0A)

bit12 ~ bit13: V (0: default ; 1: 0.01V ; 2: 0.1V ; 3: 1.0V)

bit14~15 : reserved

PS.

1. bit6 ~ bit9, unless unit of Quarter Energy

2. bit3 ~ bit5 also use in unit of Quarter Energy (W → Wh) Quarter default: 1Wh

3. when read Idc, W, Wh, lac, V => 0 or bit0 = 1 :

single phase default : 0.01A / 1W / 1Wh / 0.01A / 0.1V

triple phase default : 0.01A / 1W / 10Wh / 0.01A / 0.1V

Example1:

When a triple phase inverter received: 0000000110010011

As bit 0 = 1, this inverter use all default scale(Do not care the other bits):

0.01A / 1W / 10Wh / 0.01A / 0.1V

Example2:

When a triple phase inverter received: 0000000110011100

We could separate it into several part: 00 00 00 0110 011 10 0

As bit 0 = 0 -> don't use default scale.

Bit 1~2 = 2 -> 0.1A for Idc

Bit 3~5 = 3 -> 10W for W

Bit 6~9 = 6 -> 100Wh for Wh

Bit10~11 = 0 -> use default scale, 0.01A for lac

Bit 12~13 = 0 -> use default scale, 0.1V for V

4. Memory Map ~ Writable (Holding Register)

<EVENT INDEX>

Address (Hex)	Address (Dec)	Purpose	Description
321	801	Event Index	Default = 0xFFFF (IR:1088)

<GRID SETTING - VOLTAGE>

Old Address (Hex)	Old Address (Dec)	New Address (Hex)	New Address (Dec)	Command	Unit	Description
8310	33552	BC00	48128	Uac High off	0.1v	
8311	33553	BC01	48129	Uac High off time	0.01s	
8312	33554	BC02	48130	Uac High on	0.1v	
8316	33558	BC03	48131	Uac High off slow	0.1v	
8317	33559	BC04	48132	Uac High off slow time	0.01s	
8318	33560	BC05	48133	Uac High on slow	0.1v	
8313	33555	BC06	48134	Uac Low off	0.1v	
8314	33556	BC07	48135	Uac Low off time	0.01s	
8315	33557	BC08	48136	Uac Low on	0.1v	
8319	33561	BC09	48137	Uac Low off slow	0.1v	
831A	33562	BC0A	48138	Uac Low off slow time	0.01s	
831B	33563	BC0B	48139	Uac Low on slow	0.1v	

<GRID SETTING - FREQUENCY>

Old Address (Hex)	Old Address (Dec)	New Address (Hex)	New Address (Dec)	Command	Unit	Description
8320	33568	BC0C	48140	Fac High off	0.01Hz	
8321	33569	BC0D	48141	Fac High off time	0.01s	
8322	33570	BC0E	48142	Fac High on	0.01Hz	
834A	33610	BC0F	48143	Fac High off slow	0.01Hz	
834B	33611	BC10	48144	Fac High off slow time	0.01s	
834C	33612	BC11	48145	Fac High on slow	0.01Hz	
8323	33571	BC12	48146	Fac Low off	0.01Hz	
8324	33572	BC13	48147	Fac Low off time	0.01s	
8325	33573	BC14	48148	Fac Low on	0.01Hz	
834D	33613	BC15	48149	Fac Low off slow	0.01Hz	
834E	33614	BC16	48150	Fac Low off slow time	0.01s	
834F	33615	BC17	48151	Fac Low on slow	0.01Hz	

<POWER LIMIT>

Old Address (Hex)	Old Address (Dec)	New Address (Hex)	New Address (Dec)	Command	Unit	Description
31F	798	BD80	48512	Power Management Mode	N/A	Word map 0x0000 :Disable(Default) 0x0001 :Rated
31F	799	BD81	48513	Power Management Percent	1%	Range: 0~100

<REACTIVE POWER CONTROL >

Old Address (Hex)	Old Address (Dec)	New Address (Hex)	New Address (Dec)	Command	Unit	Description
N/A	N/A	BE80	48768	Control Low Selection 0	N/A	<i>Refer below</i>
Byte map of bit 0 ~ 7 0x00 : Disable (Default) 0x01 : Constant $\cos(\varphi)$ 0x02 : $\cos(\varphi)$ of P Control 0x03 : Constant Q 0x04 : Q of U Control (Curve A) 0x09 : $\cos\phi$ Of U						
N/A	N/A	BE8F	48783	Delay time	0.01s	

<Q(U)>

Old Address (Hex)	Old Address (Dec)	New Address (Hex)	New Address (Dec)	Command	Unit	Description
N/A	N/A	BE88	48776	Qi Limit	1%	Range: -60~60
N/A	N/A	BE89	48777	Qs Limit	1%	Range: -60~60
N/A	N/A	BE8A	48778	V2i	0.1V	Range: 1840~2645
N/A	N/A	BE8B	48779	V2s	0.1V	Range: 1840~2645
N/A	N/A	BE8C	48780	V1i	0.1V	Range: 1840~2645
N/A	N/A	BE8D	48781	V1s	0.1V	Range: 1840~2645
N/A	N/A	BE8E	48782	Hysteresis	0.1V	
N/A	N/A	BE94	48788	Lock-in Power	1%	
N/A	N/A	BE95	48789	Lock-out Power	1%	

<cosphi(U)>

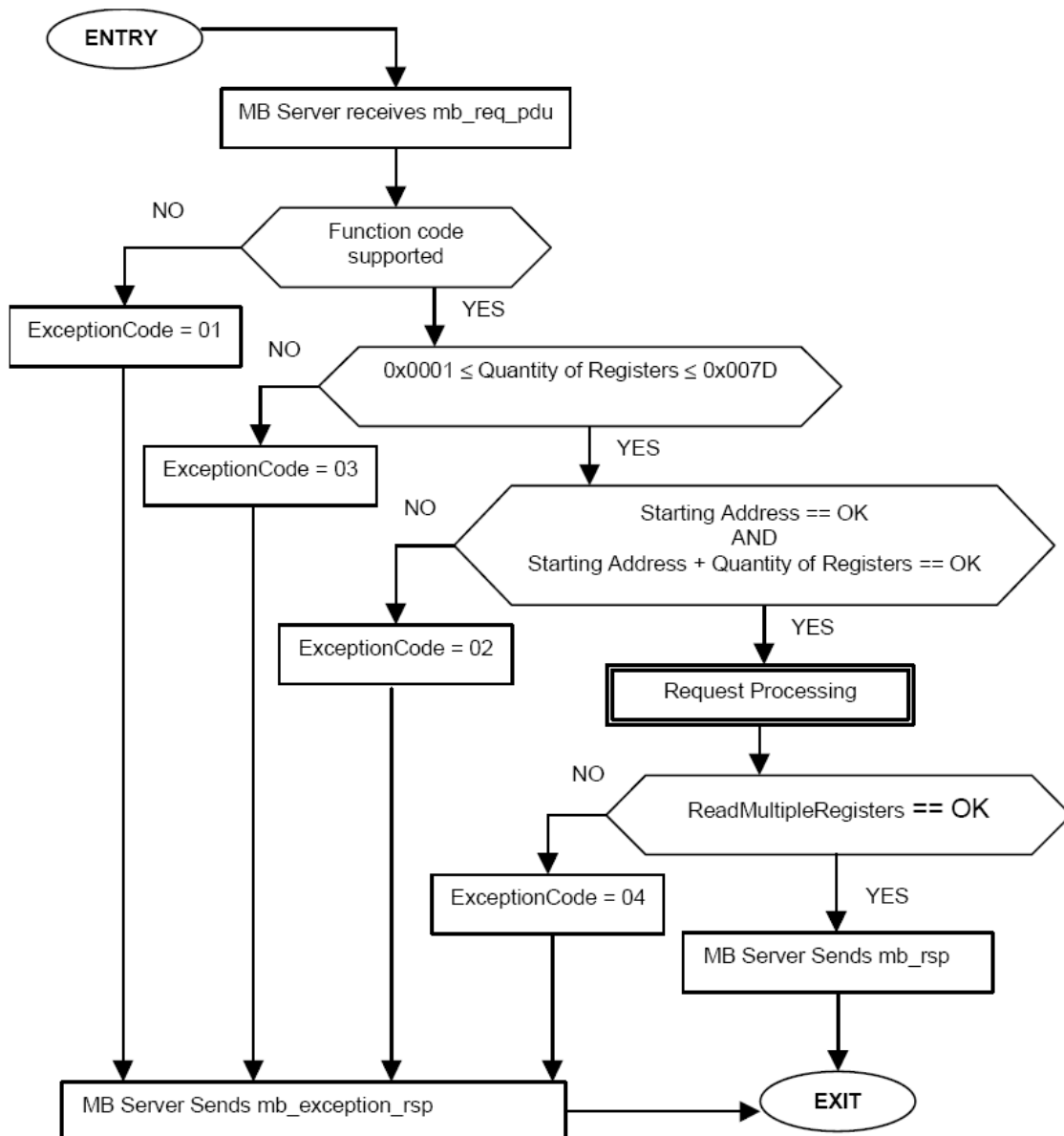
Old Address (Hex)	Old Address (Dec)	New Address (Hex)	New Address (Dec)	Command	Unit	Description
N/A	N/A	BEB1	48817	Upper Limit	0.001	Range: 1.000 ~ cap 0.800
N/A	N/A	BEB2	48818	Lower Limit	0.001	Range: 1.000 ~ Ind 0.800
N/A	N/A	BEB3	48819	Vmin	0.1V	Range: 1840~2300
N/A	N/A	BEB4	48820	Vmax	0.1V	Range: 2200~2645
N/A	N/A	BEB5	48821	V1	0.1V	Range: 1840~2300
N/A	N/A	BEB6	48822	V2	0.1V	Range: 2200~2645
N/A	N/A	BEB7	48823	Lock-in Power	1%	
N/A	N/A	BEB8	48824	Lock-out Power	1%	

APPENDIX A : MODBUS Exception Responses

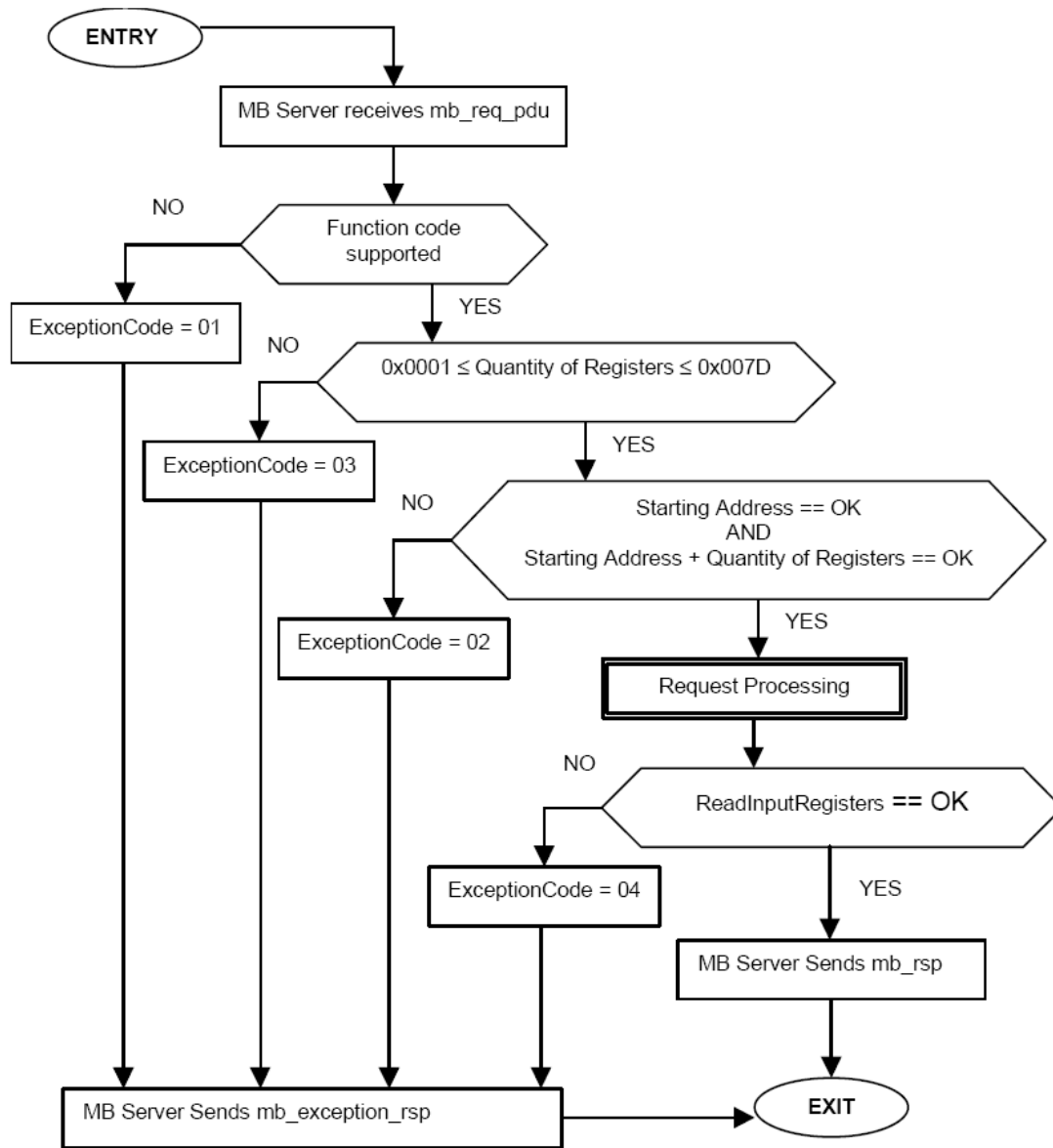
MODBUS Exception Codes		
Code	Name	Meaning
01	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the server (or slave).
02	ILLEGAL DATA ADDRESS	The data address received in the query is not an allowable address for the server (or slave).
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for server (or slave).
04	SLAVE DEVICE FAILURE	An unrecoverable error occurred while the server (or slave) was attempting to perform the requested action.

APPENDIX B : Communications Transmission Process

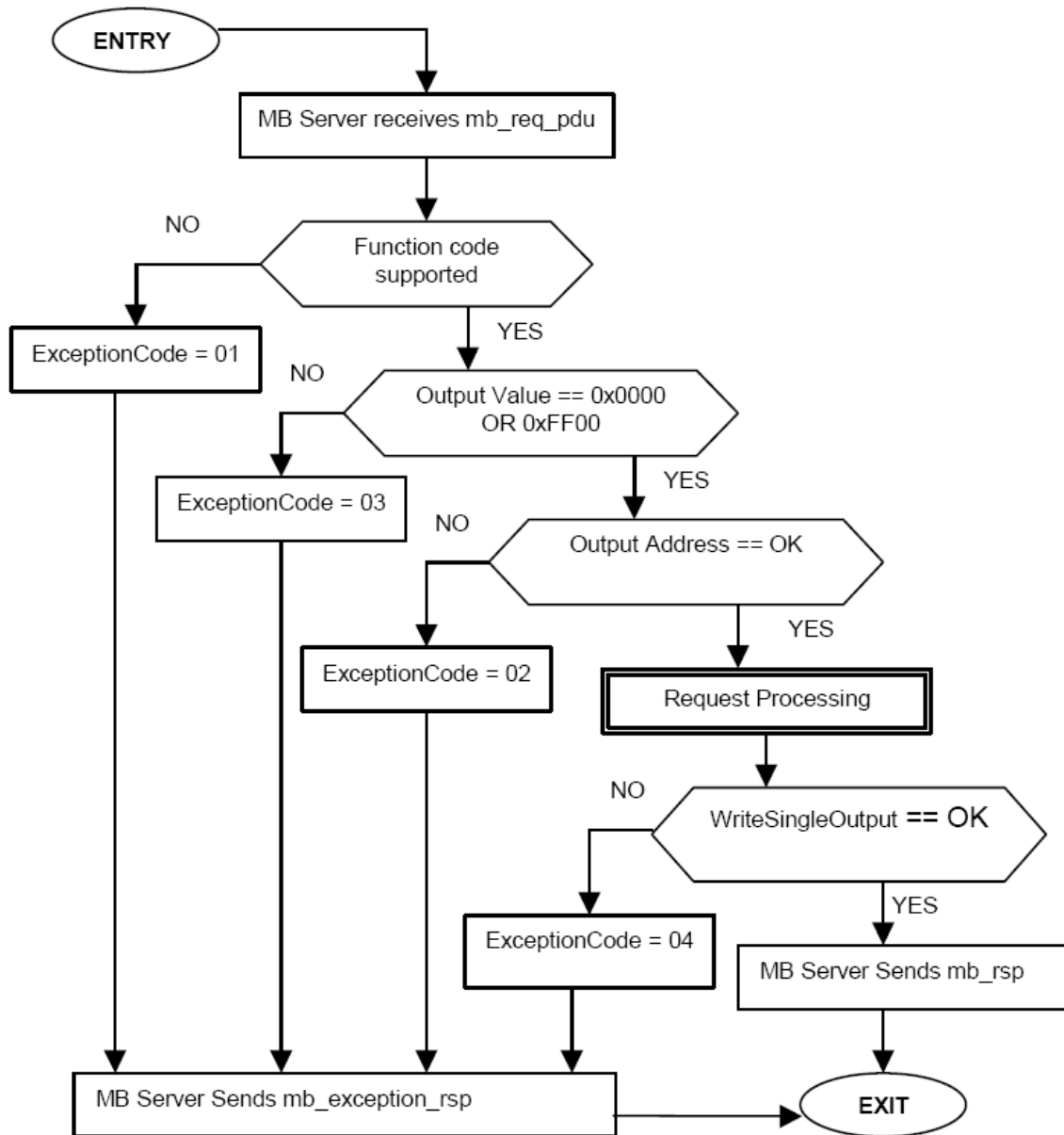
i. Function 0x03 Read Holding Registers



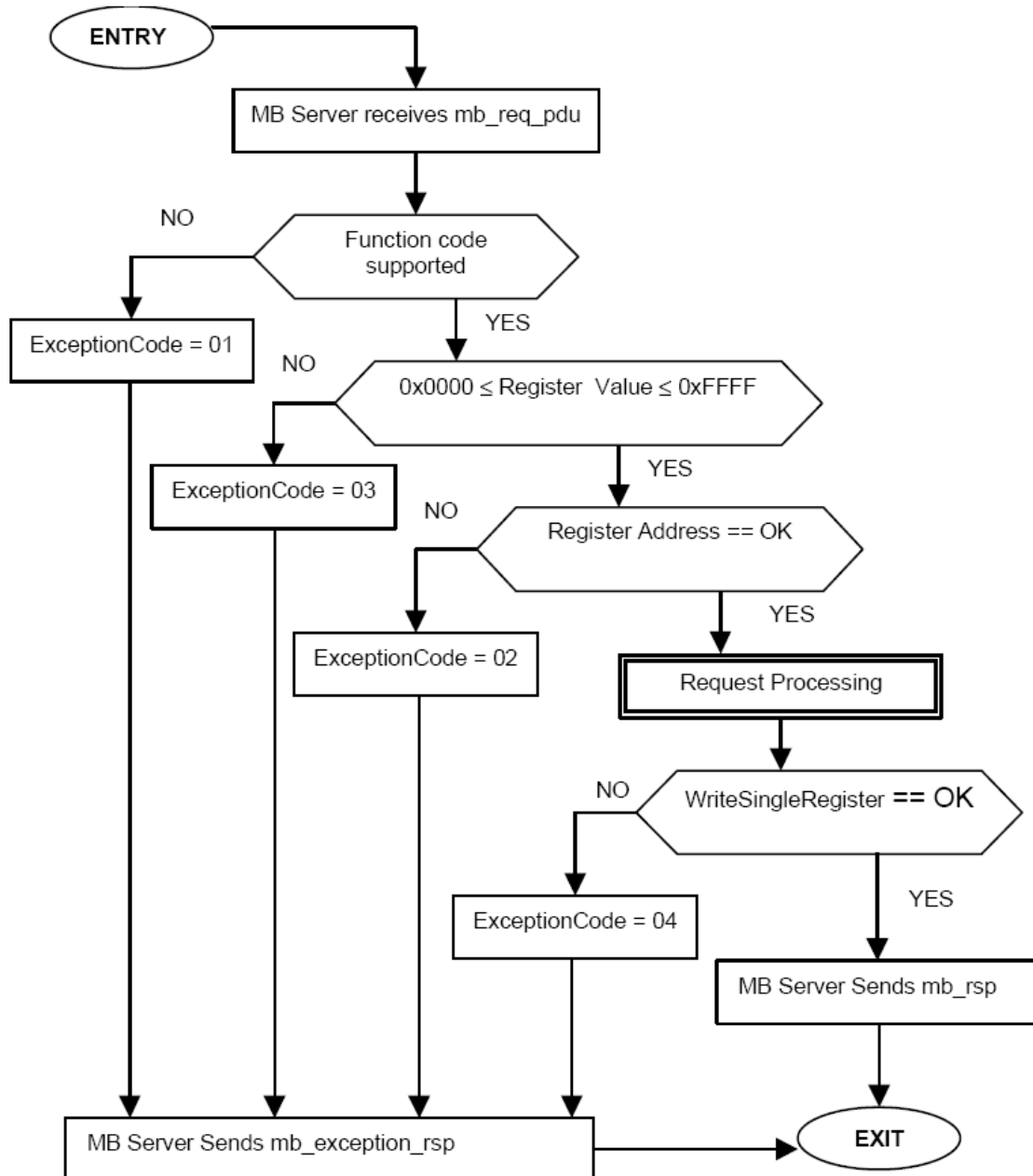
ii. Function 0x04 Read Input Registers



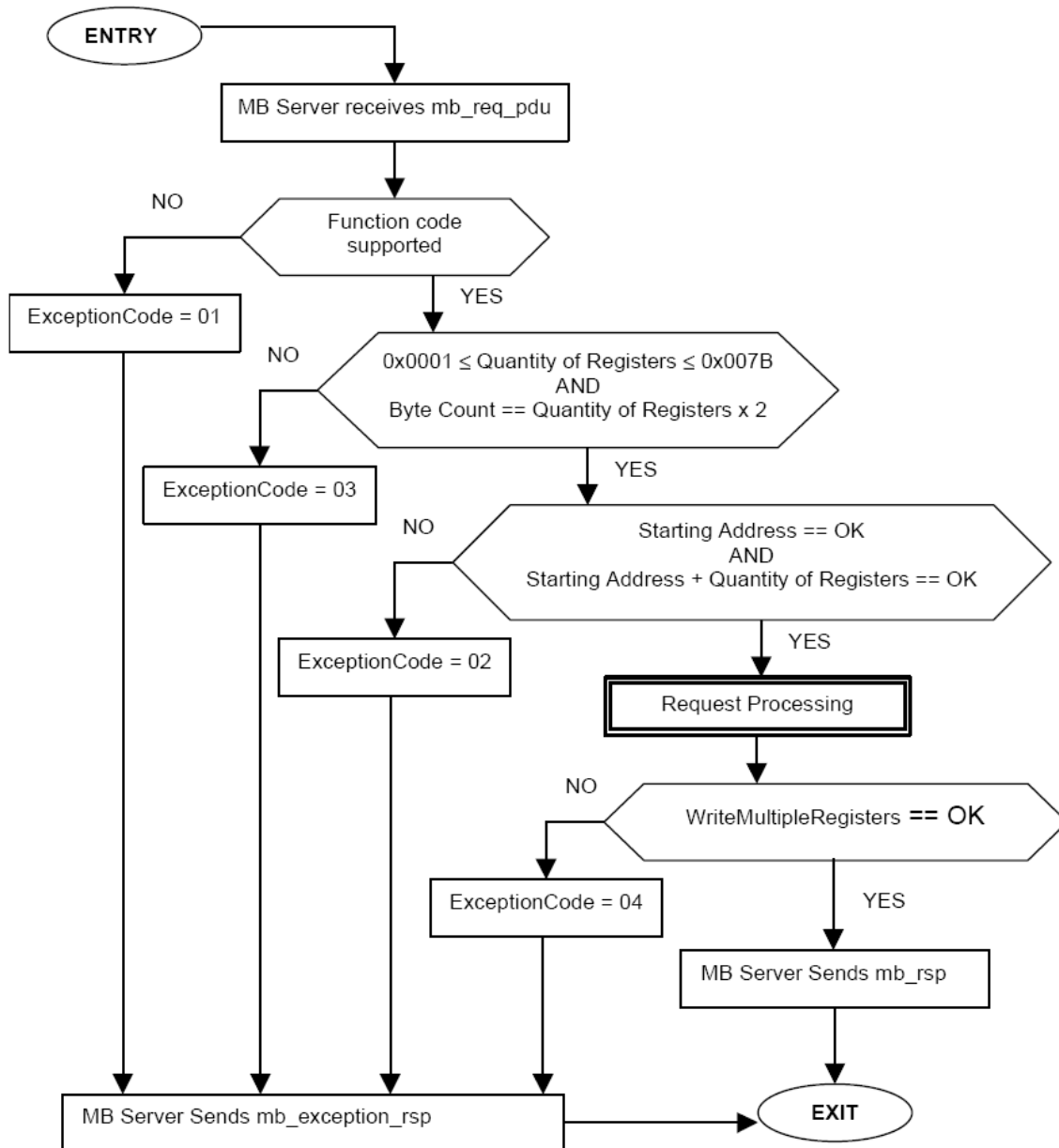
iii. **Function 0x05 Write Single Coil**



iv. Function 0x06 Write Single Register



v. Function 0x10 Write Multiple registers



APPENDIX C : PCS STATUS

PCS Status	Condition
0	STATUS_CHECK_DC
1	STATUS_RECL_COUNTDOWN
2	STATUS_ON
3	STATUS_NO_DC
4	STATUS_ALARM
6	STATUS_STAND_ALONE
7	STATUS_OFF
8	STATUS_CHECK_PV_POWER

APPENDIX D : EVENT CODE TABLE

1) Fault Event

Item	Value	Description
GF01	0x0001	DC Injection
GF05	0x0005	NTC Over temperature
GF06	0x0006	Inside NTC Circuit Fail
GF07	0x0007	NTC Under temperature
GF09	0x0009	Heat Sink Ntc2 Circuit Fail
GF15	0x000F	ADC Vgrid/Vst/Iout Bias Fail
GF16	0x0010	ADC Vin/Vbus Fail
GF17	0x0011	ADC Iin/Iboost Bias Fail
GF19	0x0013	ADC Iout_dc Bias Fail
GF20	0x0014	Efficiency Abnormal
GF23	0x0017	Internal Communication Fault (Display)
GF24	0x0018	Residual Current Over Rating
GF27	0x001B	RCMU Circuit Fail
GF28	0x001C	Relay Short
GF29	0x001D	Relay Open
GF35	0x0023	Bus voltage over rating
GF37	0x0025	Output Current Over Rating
GF42	0x002A	CT Current Sensor Fail
GF56	0x0038	Hardware Incompatibility
GF60	0x003C	PV1 Current Over Rating
GF61	0x003D	PV2 Current Over Rating

2) Error Event

Item	Value	Description
GE01	0x0081	Over Frequency Range
GE02	0x0082	Under Frequency Range
GE09	0x0089	No Grid
GE10	0x008A	Under Voltage Range
GE11	0x008B	Over Voltage Range
GE13	0x008D	Slow Over Voltage Range
GE26	0x009A	Slow Over Frequency Range
GE27	0x009B	Slow Under Frequency Range
GE28	0x009C	Slow Under Voltage Range
GE30	0x009E	PV input voltage too high
GE34	0x00A2	Insulation

※: *GExx: Grid-Tie Mode Event*

SExx: Stand-Alone Mode Event