TOSVERT VF-PS1 series

Metasys® N2 option unit Function Manual

MTS001Z

NOTICE

1. Make sure that this instruction manual is delivered to the end user of Metasys® N2 option unit.
2. Read this manual before installing or operating the Metasys® N2 option unit. Keep it in a safe place for reference.
3. All information contained in this manual are subject to change without notice. Please confirm the latest information on our web site “www.inverter.co.jp”.

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1. Introduction

Thank you for purchasing the Metasys® N2 option unit (MTS001Z) for VF-PS1 series inverter.
Before using Metasys® N2 option unit, carefully read this function manual in order to completely and correctly utilize its excellent performance.

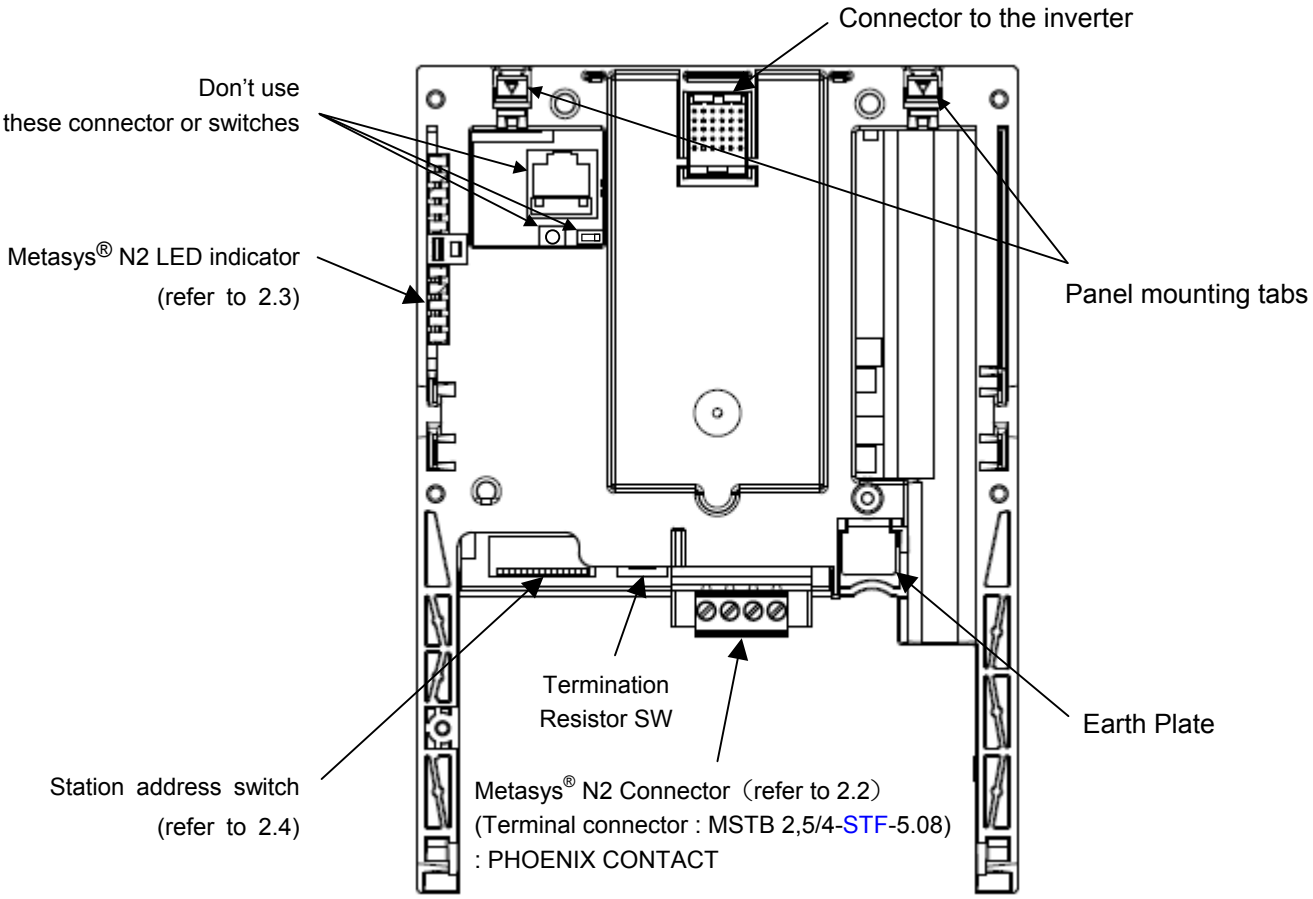
After reading this function manual, please keep it handy for future reference.
For details of its general handling, see an instruction manual attached with the option unit.

- TOSVERT VF-PS1 Instruction Manual E6581386
- TOSVERT VF-PS1 RS485 Communication Manual.....E6581413
- MTS001Z Instruction Manual E6581539

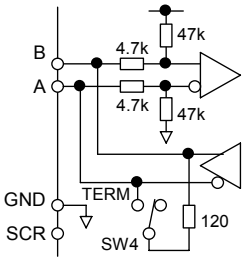
* Metasys® N2 is a registered trademark of Johnson Controls Inc.

2. Names and functions of main parts

2.1. Outline view



2.2. Metasys® N2 Connector

Terminal symbol	Function	Electrical specifications	Internal circuits
B	Metasys® N2 communication signal EIA-485	Communication signal (+)	
A		Communication signal (-)	
GND		Signal common	
SCR		Shield terminal.	

2.3. LED indicator

The option has two LEDs. Those function are below table.

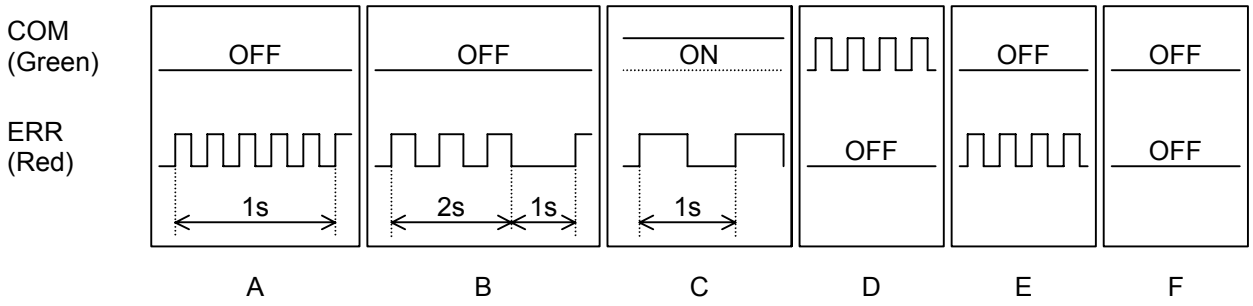
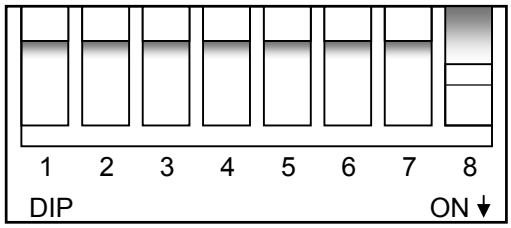


Table 1 LED Behavior

State	LEDs	Comment
A	COM LED: OFF ERR LED: Flashing 5 times in 1 second	Metasys® N2 failure.
B	COM LED: OFF ERR LED: 3 times in 2 sec, Off for 1 sec	Communication loss detected. Confirm the network condition and connection of the cable.
C	COM LED: ON ERR LED: OFF 0.5 sec, ON 0.5 sec	Invalid configuration detected. Note: When inverter occurred in e-23 or e-24, the LED becomes this state.
D	COM LED: Flashing ERR LED: -	Valid message received for this node
E	COM LED: - ERR LED: Flashing	Invalid message received (any node)
F	COM LED: OFF ERR LED: OFF	No communication Confirm the network condition and connection of the cable.

2.4. Setting a station address

The DIP switch on the circuit board of the option is used to set a station address. Each DIP switch is ON when it is flipped to the lower position. By default, it is factory-configured to 1.
The station address must be unique and not match any other device on the network.



SW / ID	1	2	3	4	5	6	7	8
0 *	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
2	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
3	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**
4	OFF	OFF	OFF	OFF	OFF	**ON**	OFF	OFF
5	OFF	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**
6	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**	OFF
7	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**
8	OFF	OFF	OFF	OFF	**ON**	OFF	OFF	OFF
9	OFF	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**
10	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**	OFF
11	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**	**ON**
12	OFF	OFF	OFF	OFF	**ON**	**ON**	OFF	OFF
13	OFF	OFF	OFF	OFF	**ON**	**ON**	OFF	**ON**
14	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**	OFF
15	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**
16	OFF	OFF	OFF	**ON**	OFF	OFF	OFF	OFF
17	OFF	OFF	OFF	**ON**	OFF	OFF	OFF	**ON**
18	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**	OFF
19	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**	**ON**
20	OFF	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF
21	OFF	OFF	OFF	**ON**	OFF	**ON**	OFF	**ON**
22	OFF	OFF	OFF	**ON**	OFF	**ON**	**ON**	OFF
23	OFF	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**
24	OFF	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF
25	OFF	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**
26	OFF	OFF	OFF	**ON**	**ON**	OFF	**ON**	OFF
27	OFF	OFF	OFF	**ON**	**ON**	OFF	**ON**	**ON**
28	OFF	OFF	OFF	**ON**	**ON**	**ON**	OFF	OFF
29	OFF	OFF	OFF	**ON**	**ON**	**ON**	OFF	**ON**
30	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**	OFF
31	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**	**ON**

SW / ID	1	2	3	4	5	6	7	8
32	OFF	OFF	**ON**	OFF	OFF	OFF	OFF	OFF
33	OFF	OFF	**ON**	OFF	OFF	OFF	OFF	**ON**
34	OFF	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF
35	OFF	OFF	**ON**	OFF	OFF	OFF	**ON**	**ON**
36	OFF	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF
37	OFF	OFF	**ON**	OFF	OFF	**ON**	OFF	**ON**
38	OFF	OFF	**ON**	OFF	OFF	**ON**	**ON**	OFF
39	OFF	OFF	**ON**	OFF	OFF	**ON**	**ON**	**ON**
40	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF
41	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF	**ON**
42	OFF	OFF	**ON**	OFF	**ON**	OFF	**ON**	OFF
43	OFF	OFF	**ON**	OFF	**ON**	OFF	**ON**	**ON**
44	OFF	OFF	**ON**	OFF	**ON**	**ON**	OFF	OFF
45	OFF	OFF	**ON**	OFF	**ON**	**ON**	OFF	**ON**
46	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**	OFF
47	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**	**ON**
48	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF
49	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	**ON**
50	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**	OFF
51	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**	**ON**
52	OFF	OFF	**ON**	**ON**	OFF	**ON**	OFF	OFF
53	OFF	OFF	**ON**	**ON**	OFF	**ON**	OFF	**ON**
54	OFF	OFF	**ON**	**ON**	OFF	**ON**	**ON**	OFF
55	OFF	OFF	**ON**	**ON**	OFF	**ON**	**ON**	**ON**
56	OFF	OFF	**ON**	**ON**	**ON**	OFF	OFF	OFF
57	OFF	OFF	**ON**	**ON**	**ON**	OFF	OFF	**ON**
58	OFF	OFF	**ON**	**ON**	**ON**	OFF	**ON**	OFF
59	OFF	OFF	**ON**	**ON**	**ON**	OFF	**ON**	**ON**
60	OFF	OFF	**ON**	**ON**	**ON**	**ON**	OFF	OFF
61	OFF	OFF	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
62	OFF	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
63	OFF	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

* “0” must not be set as station address.

SW / ID	1	2	3	4	5	6	7	8
64	OFF	**ON**	OFF	OFF	OFF	OFF	OFF	OFF
65	OFF	**ON**	OFF	OFF	OFF	OFF	OFF	**ON**
66	OFF	**ON**	OFF	OFF	OFF	OFF	**ON**	OFF
67	OFF	**ON**	OFF	OFF	OFF	OFF	**ON**	**ON**
68	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
69	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	**ON**
70	OFF	**ON**	OFF	OFF	OFF	**ON**	**ON**	OFF
71	OFF	**ON**	OFF	OFF	OFF	**ON**	**ON**	**ON**
72	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF	OFF
73	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**
74	OFF	**ON**	OFF	OFF	**ON**	OFF	**ON**	OFF
75	OFF	**ON**	OFF	OFF	**ON**	OFF	**ON**	**ON**
76	OFF	**ON**	OFF	OFF	**ON**	**ON**	OFF	OFF
77	OFF	**ON**	OFF	OFF	**ON**	**ON**	OFF	**ON**
78	OFF	**ON**	OFF	OFF	**ON**	**ON**	**ON**	OFF
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88	OFF	**ON**	OFF	**ON**	**ON**	OFF	OFF	OFF
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SW / ID	1	2	3	4	5	6	7	8
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101	OFF	**ON**	**ON**	OFF	OFF	**ON**	OFF	**ON**
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113	OFF	**ON**	**ON**	**ON**	OFF	OFF	OFF	**ON**
114	OFF	**ON**	**ON**	**ON**	OFF	OFF	**ON**	OFF
115	OFF	**ON**	**ON**	**ON**	OFF	OFF	**ON**	**ON**
116	OFF	**ON**	**ON**	**ON**	OFF	**ON**	OFF	OFF
117	OFF	**ON**	**ON**	**ON**	OFF	**ON**	OFF	**ON**
118	OFF	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	OFF
119	OFF	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	**ON**
120	OFF	**ON**	**ON**	**ON**	**ON**	OFF	OFF	OFF
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122	OFF	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	OFF
123	OFF	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	**ON**
124	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	OFF
125	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
126	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
127	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

SW / ID	1	2	3	4	5	6	7	8
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129	**ON**	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
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132	**ON**	OFF	OFF	OFF	OFF	**ON**	OFF	OFF
133	**ON**	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**
134	**ON**	OFF	OFF	OFF	OFF	**ON**	**ON**	OFF
135	**ON**	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**
136	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF	OFF
137	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**
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143	**ON**	OFF	OFF	OFF	**ON**	**ON**	**ON**	**ON**
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145	**ON**	OFF	OFF	**ON**	OFF	OFF	OFF	**ON**
146	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**	OFF
147	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**	**ON**
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149	**ON**	OFF	OFF	**ON**	OFF	**ON**	OFF	**ON**
150	**ON**	OFF	OFF	**ON**	OFF	**ON**	**ON**	OFF
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154	**ON**	OFF	OFF	**ON**	**ON**	OFF	**ON**	OFF
155	**ON**	OFF	OFF	**ON**	**ON**	OFF	**ON**	**ON**
156	**ON**	OFF	OFF	**ON**	**ON**	**ON**	OFF	OFF
157	**ON**	OFF	OFF	**ON**	**ON**	**ON**	OFF	**ON**
158	**ON**	OFF	OFF	**ON**	**ON**	**ON**	**ON**	OFF
159	**ON**	OFF	OFF	**ON**	**ON**	**ON**	**ON**	**ON**

SW / ID	1	2	3	4	5	6	7	8
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161	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF	**ON**
162	**ON**	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF
163	**ON**	OFF	**ON**	OFF	OFF	OFF	**ON**	**ON**
164	**ON**	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF
165	**ON**	OFF	**ON**	OFF	OFF	**ON**	OFF	**ON**
166	**ON**	OFF	**ON**	OFF	OFF	**ON**	**ON**	OFF
167	**ON**	OFF	**ON**	OFF	OFF	**ON**	**ON**	**ON**
168	**ON**	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF
169	**ON**	OFF	**ON**	OFF	**ON**	OFF	OFF	**ON**
170	**ON**	OFF	**ON**	OFF	**ON**	OFF	**ON**	OFF
171	**ON**	OFF	**ON**	OFF	**ON**	OFF	**ON**	**ON**
172	**ON**	OFF	**ON**	OFF	**ON**	**ON**	OFF	OFF
173	**ON**	OFF	**ON**	OFF	**ON**	**ON**	OFF	**ON**
174	**ON**	OFF	**ON**	OFF	**ON**	**ON**	**ON**	OFF
175	**ON**	OFF	**ON**	OFF	**ON**	**ON**	**ON**	**ON**
176	**ON**	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF
177	**ON**	OFF	**ON**	**ON**	OFF	OFF	OFF	**ON**
178	**ON**	OFF	**ON**	**ON**	OFF	OFF	**ON**	OFF
179	**ON**	OFF	**ON**	**ON**	OFF	OFF	**ON**	**ON**
180	**ON**	OFF	**ON**	**ON**	OFF	**ON**	OFF	OFF
181	**ON**	OFF	**ON**	**ON**	OFF	**ON**	OFF	**ON**
182	**ON**	OFF	**ON**	**ON**	OFF	**ON**	**ON**	OFF
183	**ON**	OFF	**ON**	**ON**	OFF	**ON**	**ON**	**ON**
184	**ON**	OFF	**ON**	**ON**	**ON**	OFF	OFF	OFF
185	**ON**	OFF	**ON**	**ON**	**ON**	OFF	OFF	**ON**
186	**ON**	OFF	**ON**	**ON**	**ON**	OFF	**ON**	OFF
187	**ON**	OFF	**ON**	**ON**	**ON**	OFF	**ON**	**ON**
188	**ON**	OFF	**ON**	**ON**	**ON**	**ON**	OFF	OFF
189	**ON**	OFF	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
190	**ON**	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
191	**ON**	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

SW / ID	1	2	3	4	5	6	7	8
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193	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	**ON**
194	**ON**	**ON**	OFF	OFF	OFF	OFF	**ON**	OFF
195	**ON**	**ON**	OFF	OFF	OFF	OFF	**ON**	**ON**
196	**ON**	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
197	**ON**	**ON**	OFF	OFF	OFF	**ON**	OFF	**ON**
198	**ON**	**ON**	OFF	OFF	OFF	**ON**	**ON**	OFF
199	**ON**	**ON**	OFF	OFF	OFF	**ON**	**ON**	**ON**
200	**ON**	**ON**	OFF	OFF	**ON**	OFF	OFF	OFF
201	**ON**	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**
202	**ON**	**ON**	OFF	OFF	**ON**	OFF	**ON**	OFF
203	**ON**	**ON**	OFF	OFF	**ON**	OFF	**ON**	**ON**
204	**ON**	**ON**	OFF	OFF	**ON**	**ON**	OFF	OFF
205	**ON**	**ON**	OFF	OFF	**ON**	**ON**	OFF	**ON**
206	**ON**	**ON**	OFF	OFF	**ON**	**ON**	**ON**	OFF
207	**ON**	**ON**	OFF	OFF	**ON**	**ON**	**ON**	**ON**
208	**ON**	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF
209	**ON**	**ON**	OFF	**ON**	OFF	OFF	OFF	**ON**
210	**ON**	**ON**	OFF	**ON**	OFF	OFF	**ON**	OFF
211	**ON**	**ON**	OFF	**ON**	OFF	OFF	**ON**	**ON**
212	**ON**	**ON**	OFF	**ON**	OFF	**ON**	OFF	OFF
213	**ON**	**ON**	OFF	**ON**	OFF	**ON**	OFF	**ON**
214	**ON**	**ON**	OFF	**ON**	OFF	**ON**	**ON**	OFF
215	**ON**	**ON**	OFF	**ON**	OFF	**ON**	**ON**	**ON**
216	**ON**	**ON**	OFF	**ON**	**ON**	OFF	OFF	OFF
217	**ON**	**ON**	OFF	**ON**	**ON**	OFF	OFF	**ON**
218	**ON**	**ON**	OFF	**ON**	**ON**	OFF	**ON**	OFF
219	**ON**	**ON**	OFF	**ON**	**ON**	OFF	**ON**	**ON**
220	**ON**	**ON**	OFF	**ON**	**ON**	**ON**	OFF	OFF
221	**ON**	**ON**	OFF	**ON**	**ON**	**ON**	OFF	**ON**
222	**ON**	**ON**	OFF	**ON**	**ON**	**ON**	**ON**	OFF
223	**ON**	**ON**	OFF	**ON**	**ON**	**ON**	**ON**	**ON**

SW / ID	1	2	3	4	5	6	7	8
224	**ON**	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF
225	**ON**	**ON**	**ON**	OFF	OFF	OFF	OFF	**ON**
226	**ON**	**ON**	**ON**	OFF	OFF	OFF	**ON**	OFF
227	**ON**	**ON**	**ON**	OFF	OFF	OFF	**ON**	**ON**
228	**ON**	**ON**	**ON**	OFF	OFF	**ON**	OFF	OFF
229	**ON**	**ON**	**ON**	OFF	OFF	**ON**	OFF	**ON**
230	**ON**	**ON**	**ON**	OFF	OFF	**ON**	**ON**	OFF
231	**ON**	**ON**	**ON**	OFF	OFF	**ON**	**ON**	**ON**
232	**ON**	**ON**	**ON**	OFF	**ON**	OFF	OFF	OFF
233	**ON**	**ON**	**ON**	OFF	**ON**	OFF	OFF	**ON**
234	**ON**	**ON**	**ON**	OFF	**ON**	OFF	**ON**	OFF
235	**ON**	**ON**	**ON**	OFF	**ON**	OFF	**ON**	**ON**
236	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	OFF	OFF
237	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	OFF	**ON**
238	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	**ON**	OFF
239	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	**ON**	**ON**
240	**ON**	**ON**	**ON**	**ON**	OFF	OFF	OFF	OFF
241	**ON**	**ON**	**ON**	**ON**	OFF	OFF	OFF	**ON**
242	**ON**	**ON**	**ON**	**ON**	OFF	OFF	**ON**	OFF
243	**ON**	**ON**	**ON**	**ON**	OFF	OFF	**ON**	**ON**
244	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	OFF	OFF
245	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	OFF	**ON**
246	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	OFF
247	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	**ON**
248	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	OFF	OFF
249	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	OFF	**ON**
250	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	OFF
251	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	**ON**
252	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	OFF
253	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
254	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
255	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**

3. Parameters

3.1. Communication parameters

Set up the inverter parameters as follows. To update, reset the power of inverter. If these parameters are not set to correct value, this unit can not work normally.

Table 2 LED Behavior

Title	Function	Description	Value
f832	Network Time-Out	0: No action, 1 - 100s * Unit: 0.1 sec (Setting range: 1 - 1000)	0
f851	Operation at communication error by disconnection	0: Inverter stop, communication command, frequency mode open (by cmod, fmod) 1: None (continued operation) 2: Deceleration stop 3: Coast stop 4: Network error (err8 trip)	0
f852	Preset speed operation selection	0: None 1 - 15: Preset speed operation	0
f853	Communication option station address monitor (Read Only)	Station address (setup by switch) monitor	1 - 255
F899	Network option reset setting	0: None 1: Reset option board and inverter	0 **

* f832 must be set up by a hexadecimal number.
ex.) 100 sec = 0x3E8

Note) When the parameters are changed, the power must be cycled (or set f899 to 1) to the VF-PS1 for the changes to take effect.

Note) When cmod or fmod is set to “Communication option input”, VF-PS1 drives without RSCMDMOD (Binary Output Object - 10) or FRCMDMOD (Binary Output Object - 11) at each Objects.

3.2. f832: Communication Loss Action Time Setting

Set the communication loss action time to f832. The network loss action function starts from receiving the properly frame message. The action of the network communication loss is set by f851.

3.3. f851: Communication Loss Action Setting

This parameter sets up the VF-PS1 response to a loss of communications with the Metasys® N2 network.

0: Stop and Communication release
The inverter decelerates the motor to a stop and gives an E alarm (the leftmost LED E flashes). Commands entered through the network are canceled, and the commands set with parameters cmod and fmod become effective.
When communications are restored, the E alarm is turned off.

1: None
The inverter remains in the state where it was when the problem arose, and it gives an E alarm.

2: Deceleration stop
The inverter decelerates the motor to a stop and gives an E alarm. Commands entered through the network are not canceled.

3: Coast stop
The inverter issues a command for a frequency of 0Hz and gives an E alarm. Commands entered through the network are not canceled.

4: Emergency stop
The error message err8 is displayed. Commands entered through the network are not canceled.
When communications are restored, the inverter is not restored to working order and the error message err8 does not disappear until the inverter is reset.

5: Preset speed operation command
Refer to Section 3.4.

3.4. f852: Preset speed operation selection

If the communication loss action (parameter f851) is set to 5 (preset speed command), the VF-PS1 will run at a preset speed as set up by this parameter in the case of a communication loss (with E alarm). Commands entered through the network are not canceled.

For example,
If the inverter is set as described below,
f851 = 5 (preset speed operation command)
f852 = 8 (preset speed operation frequency 8)
f287 (preset speed operation frequency 8) = 10 (10Hz)

Operation is carried out as follows.

Network	**Operation of the VF-PS1**
Normal conditions	Operates according to commands entered through the network.
↓	↓
communications loss	Operates at 10Hz.
↓	↓
Restoration	Operates according to commands entered through the network.

4. Functional profile

MTS001Z supports the following commands and objects.

Table 3 Analog Input Objects Table

Command/ Sub command/ Region			Function	Support	Note
0	0	-	Synch Time Command	✓	
	1	-	Read Memory Command	No support	“N01” response
	4	-	Poll Without Ack Message	✓	
	5	-	Poll With Ack Message	✓	
	8	-	Warm Start	No support	“N01” response
	9	-	Status Update Request	✓	
1	1	-	Read Analog Input Command	✓	
	2	-	Read Binary Input Command	✓	
	3	-	Read Analog Output Command	✓	
	4	-	Read Binary Output Command	✓	
	5	-	Read Internal Parameter Command (Float)	No support	“N01” response
	6	-	Read Internal Parameter Command (Integer)	No support	“N01” response
	7	-	Read Internal Parameter Command (Byte)	No support	“N01” response
2	1	-	Write Analog Input Command	✓	
	2	-	Write Binary Input Command	✓	
	3	-	Write Analog Output Command	✓	
	4	-	Write Binary Output Command	✓	
	5	-	Write Internal Parameter Command (Float)	No support	“N01” response
	6	-	Write Internal Parameter Command (Integer)	No support	“N01” response
	7	-	Write Internal Parameter Command (Byte)	No support	“N01” response
7	2	01	Override Analog Input Command	No support	“N01” response
		02	Override Binary Input Command	No support	“N01” response
		03	Override Analog Output Command	✓	
		04	Override Binary Output Command	✓	
		05	Override Internal Parameter Command (Float)	No support	“N01” response
		06	Override Internal Parameter Command (Integer)	No support	“N01” response
		07	Override Internal Parameter Command (Byte)	No support	“N01” response
7	3	01	Override Analog Input Release Request	No support	“N01” response
		02	Override Binary Input Release Request	No support	“N01” response
		03	Override Analog Output Release Request	✓	
		04	Override Binary Output Release Request	✓	
		05	Override Internal Parameter Release Request	No support	“N01” response
		06	Override Internal Parameter Release Request	No support	“N01” response
		07	Override Internal Parameter Release Request	No support	“N01” response
7	7	01	Write Analog Input Attributes Request	✓	
		02	Write Binary Input Attributes Request	✓	
		03	Write Analog Output Attributes Request	✓	
		04	Write Binary Output Attributes Request	✓	
	8	01	Read Analog Input Attributes Request	✓	
		02	Read Binary Input Attributes Request	✓	
		03	Read Analog Output Attributes Request	✓	
		04	Read Binary Output Attributes Request	✓	
8	0 - 4	-	Upload Request (data base)	No support	“N01” response
9	0 - 4	-	Download Request (data base)	No support	“N01” response
F	-	-	Identify Device Type Command	✓	

4.1. Synch Time Command

MTS001Z responds “A” to Synch Time Command.

A normal response to Synch Time Command.

CHAR1 Start of message..... A
CHAR1 End of message..... (CR)

4.2. Status Update Request

The form and the version information of the MTS001Z connected inverter are returned.

Response example)

CHAR1 Start of message..... A
CHAR16 Model number..... VFPS1-2007PM
CHAR4 Days in service..... 0000*
CHAR4 Device status 0108**
CHAR2 Checksum..... 02
CHAR1 End of message..... (CR)

* Days in service increases 1 in 24 hours at the continuation operation.
** VF-PS1 CPU1 version is shown.

4.3. Analog Input Object

Analog Input Object is used for the output frequency of VF-PS1, and the monitor of analog input terminal. COS (Change Of State) alarm and warning functions are also enabled.

Overriding of analog input is not supported (“A” response).

Table 4 Analog Input Objects Table

Object number	Object name	Contents	Units
0	OUTPUTSPEED	Output speed	min^{-1}
1	OUTPUTFREQ	Output frequency	Hz
2	DCBUSVOLT	DC bus voltage	V
3	OUTPUTVOLT	Motor voltage	V
4	CURRENT	Motor current	A
5	TORQUE	Motor Torque	%
6	POWER	Motor Power	%
7	DRIVETEMP	Drive Thermal State	%
8	KWH	Input Energy counter	kWh
9	RUNTIME	Operating time	h
10	LASTFLT	Error code **	-
11	PREVFLT1	Previous fault 1 **	-
12	PREVFLT2	Previous fault 2 **	-
13	MBOXVALUEREAD	Refer to section 4.9.	-
14	A1ACT	Analog input value 1 (RR/S4)	-
15 *	-	-	-
16	AI2ACT	Analog input value 2 (VIB)	-
17	AI3ACT	Analog input value 3（RX）	%
18	AI4ACT ***	Analog input value 4（AI1）	%
19	AI5ACT ***	Analog input value 5（AI2）	%
20 *	-	-	-
21 *	-	-	-
22	PRCPIDFBCK	PID feedback value	%

* Reserved (The response is “A”).

** Refer to section 5 about the trip code of VF-PS1.

*** These are enabled with ETB004Z (Expansion IO Card option).

4.3.1. Analog Input Attribute

Table 5 Analog Input Attribute Table

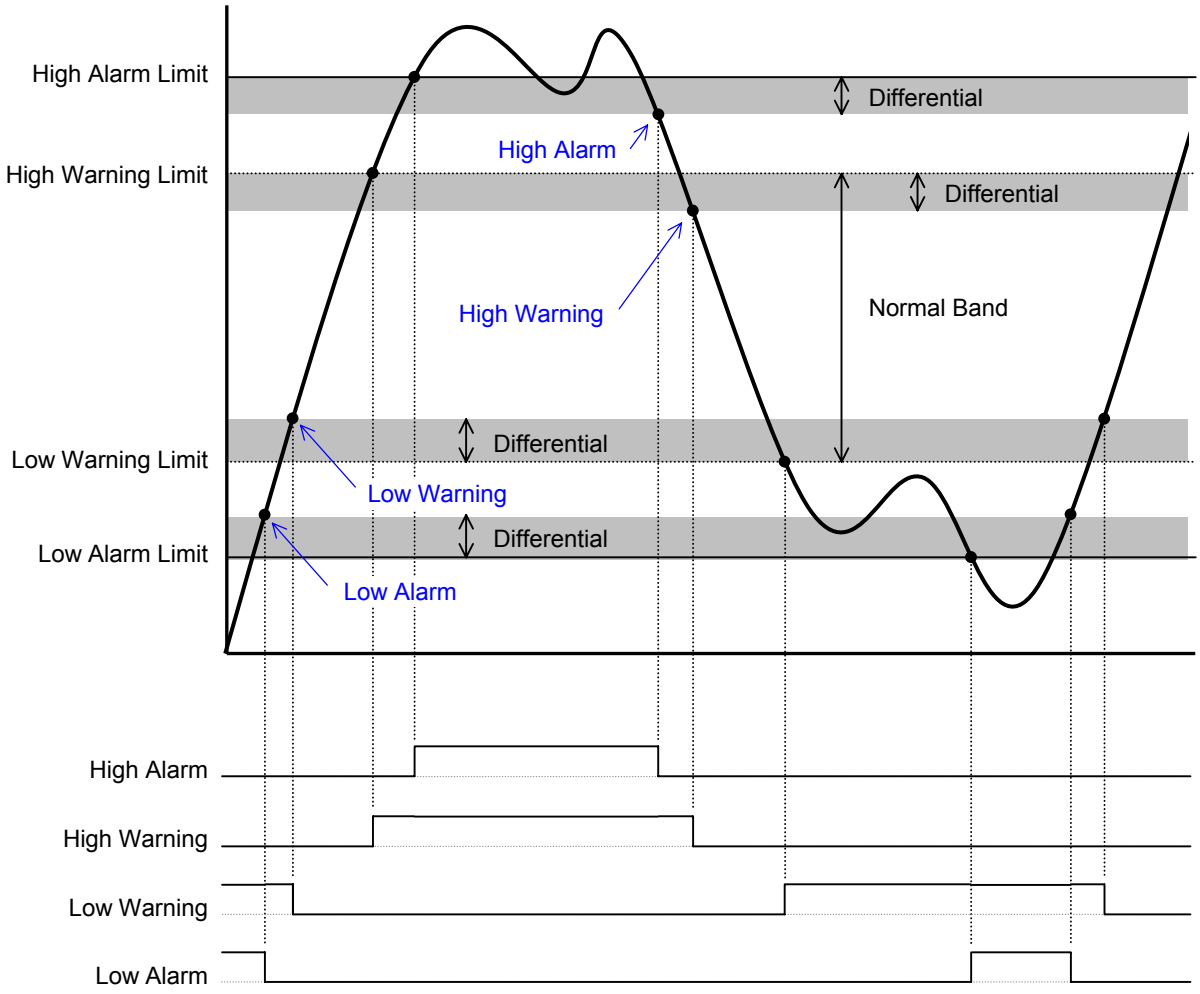
Attribute	Type	Contents
1	Byte	**Object Configuration** Bit 0 = COS_enabled (1) Bit 1 = unused Bit 2 = unused Bit 3 = alarm_enabled (1) Bit 4 = warning_enabled (1) Bit 5 = unused Bit 6 = unused Bit 7 = unused
2	Byte	**Object Status** Bit 0 = reliable (0) / unreliable (1) Bit 1 = override active (1) Bit 2 = out of range - high (1) Bit 3 = out of range - low (1) Bit 4 = COS status Bit 5 = COS status Bit 6 = COS status where Bits 4,5,6 are: 000 = normal 001 = trouble (JCI use only) 010 = not available 011 = low warning 100 = low alarm 101 = high warning 110 = high alarm Bit 7 = unused
3	Float	Analog Input Value
4	Float	Linear Ranging Parameter 1 (JCI use only)
5	Float	Linear Ranging Parameter 2 (JCI use only)
6	Float	Linear Ranging Parameter 3 (JCI use only)
7	Float	Linear Ranging Parameter 4 (JCI use only)
8	Float	Low Alarm Limit
9	Float	Low Warning Limit
10	Float	High Warning Limit
11	Float	High Alarm Limit
12	Float	Differential
13	Integer	Filter Weight (JCI use only)
14	Float	AI_Offset (JCI use only)

* Added shading functions are not supported (The response is “N10”).

4.3.2. Analog Input COS Works

Analog Input points use 3 bits in the object configuration to determine how COS is reported. First, no COS is reported when the COS_enabled bit is zero. If the COS_enabled bit is set then COS will be reported whenever the object status changes.
The alarm_enabled and warning_enabled bit of the object configuration allow the supervisory system to control the types of COS reported . If the alarm_enabled bit is zero, then the COS status of the object status would not have a low alarm or high alarm condition. If the warning_enabled bit is zero, then the COS status of the object status would not have a low warning or high warning condition. If both bits are zero, then the COS status would be normal.

COS works of MTS001Z is following.



* Status priority is given to “alarm” when both “alarm” and “warning” are enabled.

Status	ON	OFF
High Alarm	Analog Input Value > High Alarm limit	Analog Input Value < High Alarm limit - Differential
High Warning	Analog Input Value > High Warning limit	Analog Input Value < High Warning limit - Differential
Low Warning	Analog Input Value < Low Warning limit	Analog Input Value > Low Warning limit + Differential
Low Alarm	Analog Input Value < Low Alarm limit	Analog Input Value > Low Alarm limit + Differential

4.4. Binary Input Object

Binary Input Object is used for the status of VF-PS1, and the monitor of a logic input terminal. COS alarm and warning functions are also enabled.

Overriding of analog inputs is not supported (“A” response).

Table 6 Binary Input Objects Table

Object number	Object name	VF-PS1	Contents
0	RO1ACT	FL (TB)	0 = OFF, 1= ON
1	RO2ACT	RY (TB)	0 = OFF, 1= ON
2	DI1ACT	F (TB)	0 = OFF, 1= ON
3	DI2ACT	R (TB)	0 = OFF, 1= ON
4 *	-	-	-
5	RUNSTOP	-	0 = Stop, 1= Run
6	FWDREV	-	0 = Fwd, 1= Rev
7	FAULT	-	1 = Tripped
8	HANDAUTO	-	1 = Serial communication
9	MAINTREQ	-	1 = Cumulative operation alarming
10	DRIVEREADY	-	0 = Start-up, 1 = Standby
11	ATSETPOINT	-	1 = Achieved
12	RO3ACT	OUT2	0 = OFF, 1= ON
13	RO4ACT **	R2	0 = OFF, 1= ON
14	RO5ACT **	OUT5	0 = OFF, 1= ON
15	RO6ACT **	OUT6	0 = OFF, 1= ON
16	DI4ACT	RES	0 = OFF, 1= ON
17	DI5ACT	S1	0 = OFF, 1= ON
18	DI6ACT	S2	0 = OFF, 1= ON
19	DI7ACT	S3	0 = OFF, 1= ON
20	DI8ACT	RR/S4	0 = OFF, 1= ON
21	DI9ACT **	LI5	0 = OFF, 1= ON
22	DI10ACT **	LI6	0 = OFF, 1= ON
23	DI11ACT **	LI7	0 = OFF, 1= ON
24	DI12ACT **	LI8	0 = OFF, 1= ON

* Reserved (The response is “A”).

** These are enabled with ETB004Z (Expansion IO Card option).

4.4.1. Binary Input Attribute

Table 7 Binary Input Attribute Table

Attribute	Type	Contents
1	Byte	**Object Configuration** Bit 0 = COS_enabled (1) Bit 1 = normal state Bit 2 = unused Bit 3 = alarm_enabled (1) Bit 4 = unused Bit 5 = unused Bit 6 = unused Bit 7 = unused
2	Byte	**Object Status** Bit 0 = reliable (0) / unreliable (1) Bit 1 = override active (1) Bit 2 = unused Bit 3 = unused Bit 4 = normal (0) / alarm (1) Bit 5 = normal (0) / trouble (1) (JCI use only) Bit 6 = current state Bit 7 = unused
3	Integer	Debouncing Value in Msec (1-65535) (JCI use only)
4	Integer32	Accumulator value (JCI use only)

* Added shading functions are not supported (The response is “N10”).

4.5. Binary Input COS Works

First, no COS is reported when the COS_enabled bit is zero. If the COS_enabled bit is set then COS will be reported whenever the object status changes.
The alarm_enabled bit of the object configuration allow the supervisory system to control the types of COS reported. If the alarm_enabled bit is zero, then the current status of the object status would never have the normal/alarm bit set to alarm.
This bit is set to alarm when the normal state of the object configuration does not match the current state of the object status.

4.6. Analog Output Object

Analog Output is used for the speed reference of VF-PS1 etc. COS alarm and warning functions are also enabled.

Overriding of analog outputs will be accepted and acknowledged with the active override flag set. Upon release of the override command, the analog output point will reset the active override flag, retain the override value, and not return to its pre-override value.

Table 8 Analog Output Objects Table

Object number	Object name	Contents	Units
0	INPUTREF	Speed reference from Bus *	%
1	ACCELTIME	Acceleration time	0.1s
2	DECELTIME	Deceleration time	0.1s
3	MBOXPARAM	Refer to section 4.9.	-
4	MBOXVALUEWRITE	Refer to section 4.9.	-
5	AO1COMMAND **	FM	%
6	AO2COMMAND **	AM	%
7	AO3COMMAND ***	MON1	%
8	AO4COMMAND ***	MON2	%

* 100% = vl(Base frequency), fh(Maximum frequency) limits this value.
** 0-2047（100%）
*** 0-2047（100%）, these are enabled with ETB004Z (Expansion IO Card option).

4.6.1. Analog Output Attribute

Table 9 Analog Output Attribute Table

Attribute	Type	Contents
1	Byte	**Object Configuration** Bit 0 = COS_enabled (1) Bit 1 = unused Bit 2 = unused Bit 3 = unused Bit 4 = unused Bit 5 = unused Bit 6 = unused Bit 7 = unused
2	Byte	**Object Status** Bit 0 = reliable (0) / unreliable (1) Bit 1 = override active (1) Bit 2 = saturated high (1) (JCI use only) Bit 3 = saturated low (1) (JCI use only) Bit 4 = unused Bit 5 = unused Bit 6 = unused Bit 7 = unused
3	Float	Current Value
4	Float	Low Linear Ranging Parameter (JCI use only)
5	Float	High Linear Ranging Parameter (JCI use only)

* Added shading functions are not supported (The response is “N10”).

4.6.2. Analog Output COS Works

Analog Output and Binary Output points have simple COS.
If the COS_enabled bit is set then COS will be reported whenever the object status changes.

4.7. Binary Output Object

Binary Output is used for the run/stop of VF-PS1 etc. COS alarm and warning functions are also enabled.

Overriding of analog outputs will be accepted and acknowledged with the active override flag set. Upon release of the override command, the binary output point will reset the active override flag, retain the override value, and not return to its pre-override value.

Table 10 Binary Output Objects Table

Object number	Object name	VF-PS1	Contents
0	RO1CMD	FL (TB) ***	0 = OFF, 1 = ON (f130 = 38)
1	RO2CMD	OUT1 ***	-
2	RUNSTOPCMD	-	0 = Stop, 1= Run
3	FWDREVCMD	-	0 = Fwd, 1= Rev
4	FAULTRESET *	-	1 = Reset
5	MBOXREAD	-	Refer to section 4.9.
6	MBOXWRITE	-	Refer to section 4.9.
7	SP1PRESET	-	Preset speed operation frequencies 1
8	SP2PRESET	-	Preset speed operation frequencies 2
9	SP3PRESET	-	Preset speed operation frequencies 3
10	FRCMDMOD	-	1 = Metasys® N2 Enabled
11	RSCMDMOD	-	1 = Metasys® N2 Enabled
12	RO3CMD	OUT2 ***	-
13	RO4CMD **	R2 ***	-
14	RO5CMD **	OUT5 ***	-
15	RO6CMD **	OUT6 ***	-

* After reset, this value return to 0.

** These are enabled with ETB004Z (Expansion IO Card option).

*** Before using these, as shown in the following table, it is necessary to set up Output terminal selection.

Terminal	Parameter of Output terminal selection	Value
FL	f132	92 (Inversion: 93)
OUT1	f130	94 (Inversion: 95)
OUT2	f131	96 (Inversion: 97)
R2	f138	98 (Inversion: 99)
OUT5	f136	100 (Inversion: 101)
OUT6	f137	102 (Inversion: 102)

4.7.1. Binary Output Attribute

Table 11 Binary Output Attribute Table

Attribute	Type	Contents
1	Byte	Object Configuration Bit 0 = COS_enabled (1) Bit 1 = normal state Bit 2 = unused Bit 3 = unused Bit 4 = unused Bit 5 = unused Bit 6 = unused Bit 7 = unused
2	Byte	Object Status Bit 0 = reliable (0) / unreliable (1) Bit 1 = override active (1) Bit 2 = unused Bit 3 = unused Bit 4 = normal (0) / alarm (1) (JCI use only) Bit 5 = normal (0) / trouble (1) (JCI use only) Bit 6 = current state Bit 7 = unused
3	Integer	Minimum On-time (sec) (0-65535)
4	Integer	Minimum Off-time (sec) (0-65535)
5	Integer	Maximum Cycles/Hour
6	Integer	Interstage on delay(sec)(0-65535) (JCI use only)
7	Integer	Interstage off delay(sec)(0-65535) (JCI use only)

* Added shading functions are not supported (The response is “N10”).

4.7.2. Binary Output COS Works

Binary Output and Binary Output points have simple COS.
If the COS_enabled bit is set then COS will be reported whenever the object status changes.

4.8. Error Message Format

The negative responses have the following format, followed by the error codes and their meaning.

CHAR1 Start of message ..... N
CHAR2 Error code ..... (Refer to Table 12)
CHAR1 End of message ..... (CR)

Table 12 Error Code Table

Error Table	Contents
00	MTS001Z has reset and is waiting for the “Identify Yourself” command.
01	Undefined Command error.
02	Invalid message (include checksum error).
05	Data field error: message size not correct for command type.
10	Invalid Data: The fields contains a value that is out of the expected range. Confirm that the requested point exists or a commanded value is not out of range.

4.9. VF-PS1 Parameter access

Using below Metasys® N2 objects, inverter parameters can be read and written.

Table 13 Error Code Table

Object	Object number	Object name	Note
Analog Output	3	MBOXPARAM	The communication number (hex.) of the access parameter is set.
Analog Input	13	MBOXVALUEREAD	The read value is set.
Analog Output	4	MBOXVALUEWRITE	Set the write value.
Binary Output	5	MBOXREAD	The parameter value specified by MBOXPARAM is read.
Binary Output	6	MBOXWRITE	The value of MBOXVALUEWRITE is written to the parameter specified by MBOXPARAM.

Example 1) Read the deceleration time (dec, Comm. No. 0010)

1. Override "16" as the communication number to MBOXPARAM (Analog Output Object - 3).
   * The communication number uses the value of a decimal number set to "10" by the hexadecimal number. 0x0010 = 16 dec.
2. Override "1" to MBOXREAD (Binary Output Object - 5).
3. The read value set to MBOXVALUE (READ Analog Input Object - 13). Its unit is 0.1s.

Example 2) Write "50.0Hz" to VIB input point 2 (f213, Comm No. 0213)

1. Override "531" as the communication number to MBOXPARAM (Analog Output Object - 3).
   * 0x0213 = 531 dec.
2. Override "5000" to MBOXVALUEWRITE (Analog Output Object - 4).
   * 5000 = 50.00Hz, unit is 0.01Hz
3. Override "1" to MBOXWRITE (Binary Output Object - 6).

Example 3) Read the input voltage (fd04, Comm No. fd04)

1. Override "64772" as the communication number to MBOXPARAM (Analog Output Object - 3).
   * 0xfd04 = 64772 dec.
2. Override "1" to MBOXREAD (Binary Output Object - 5).
3. The read value set to MBOXVALUE (READ Analog Input Object - 13). Its unit is 0.01%.

* When the communication is failed, overrided "1" of MBOXREAD or MBOXWRITE is kept ("A" response). Please check the value of MBOXREAD or MBOXWRITE after the parameter access.
* The writing value using MBOXWRITE writes to EEPROM at VF-PS1 (it is kept after VF-PS1 power off). So, frequent writing decrease the life of EEPROM (10,000 times).

5. VF-PS1 Trip code

Code		Description	Display
Data (Dec.)	Data (Hex.)		
0	00H	No error	nerr
1	01H	Over-current during acceleration	oc1
2	02H	Over-current during deceleration	oc2
3	03H	Over-current during constant speed operation	oc3
4	04H	Over-current in load at startup	oc1
5	05H	U-phase arm overcurrent	ocai
6	06H	V-phase arm overcurrent	oca2
7	07H	W-phase arm overcurrent	oca3
8	08H	Input phase failure	ephi
9	09H	Output phase failure	epho
10	0AH	Overvoltage during acceleration	op1
11	0BH	Overvoltage during deceleration	op2
12	0CH	Overvoltage during constant speed operation	op3
13	0DH	Over-LOAD in inverter	ol1
14	0EH	Over-LOAD in motor	ol2
15	0FH	Dynamic braking resistor overload	olr
16	10H	Overheat	oh
17	11H	Emergency stop	e
18	12H	EEPROM fault	eep1
19	13H	Initial read error	eep2
20	14H	Initial read error	eep3
21	15H	Inverter RAM fault	err2
22	16H	Inverter ROM fault	err3
23	17H	CPU fault	err4
24	18H	Communication time-out error	err5
25	19H	Gate array fault	err6
26	1AH	Output current detector error	err7
27	1BH	Option error	err8
29	1DH	Low current operation status	uc
30	1EH	Undervoltage (main circuit)	up1
32	20H	Over-torque trip	ot
33	21H	Ground fault trip	ef1
34	22H	Ground fault trip	ef2
36	24H	Dynamic braking abnormal element	ocr

(Continued overleaf)

(Continued)

Code		Description	Display
Data (Dec.)	Data (Hex.)		
37	25H	Overcurrent during acceleration (element overheat)	oc1p
38	26H	Overcurrent during deceleration (element overheat)	oc2p
39	27H	Overcurrent during fixed speed operation (element overheat)	oc3p
40	28H	Tuning error	etn
41	29H	Inverter type error	etyp
42	2AH	Analog input terminal overvoltage	e-10
43	2BH	Abnormal brake sequence	e-11
44	2CH	Disconnection of encoder	e-12
45	2DH	Speed error	e-13
46	2EH	External thermal	oh2
47	2FH	Step-out (for PM motors only)	sout
50	32H	Terminal input error	e-18
51	33H	Abnormal CPU2 communication	e-19
52	34H	V/f control error	e-20
53	35H	CPU1 fault	e-21
54	36H	Abnormal logic input voltage	e-22
55	37H	Option 1 error	e-23
56	38H	Option 2 error	e-24
57	39H	Stop position retaining error	e-25
58	3AH	CPU2 fault	e-26
61	3DH	Control circuit option error	e-29
84	54H	f410 tuning error	etn1
85	55H	f412 tuning error	etn2
86	56H	vl, vlv, f405 - 407 Motor constant setting error	etn3

6. Specifications

< Environmental specification >

Item	Specification
Model number	MTS001Z
Service environment	VF-PS1 compliant
Ambient temperature	-10 to +60℃
Storage temperature	-25 to +65℃
Relative humidity	20 to 93% (No condensation and absence of vapor)
Vibration	5.9m/s^2 (0.6G) or less (10 to 55 Hz) (To be complied with JIS C0040.)

<MTS001Z network specification >

Item	Specification
Maximum node	255 nodes (32 nodes per segment)
Communication baud rate	9600bps
Bias resistor and termination	Local bias resistors are mounted. Termination resistor (120 ohm) can be select by SW.
Terminal block	Detachable terminal block 4-pole (5.08mm pitch) Manufacturer: PHOENIX CONTACT Type-Form : MSTB 2,5/4-STF-5.08