

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.

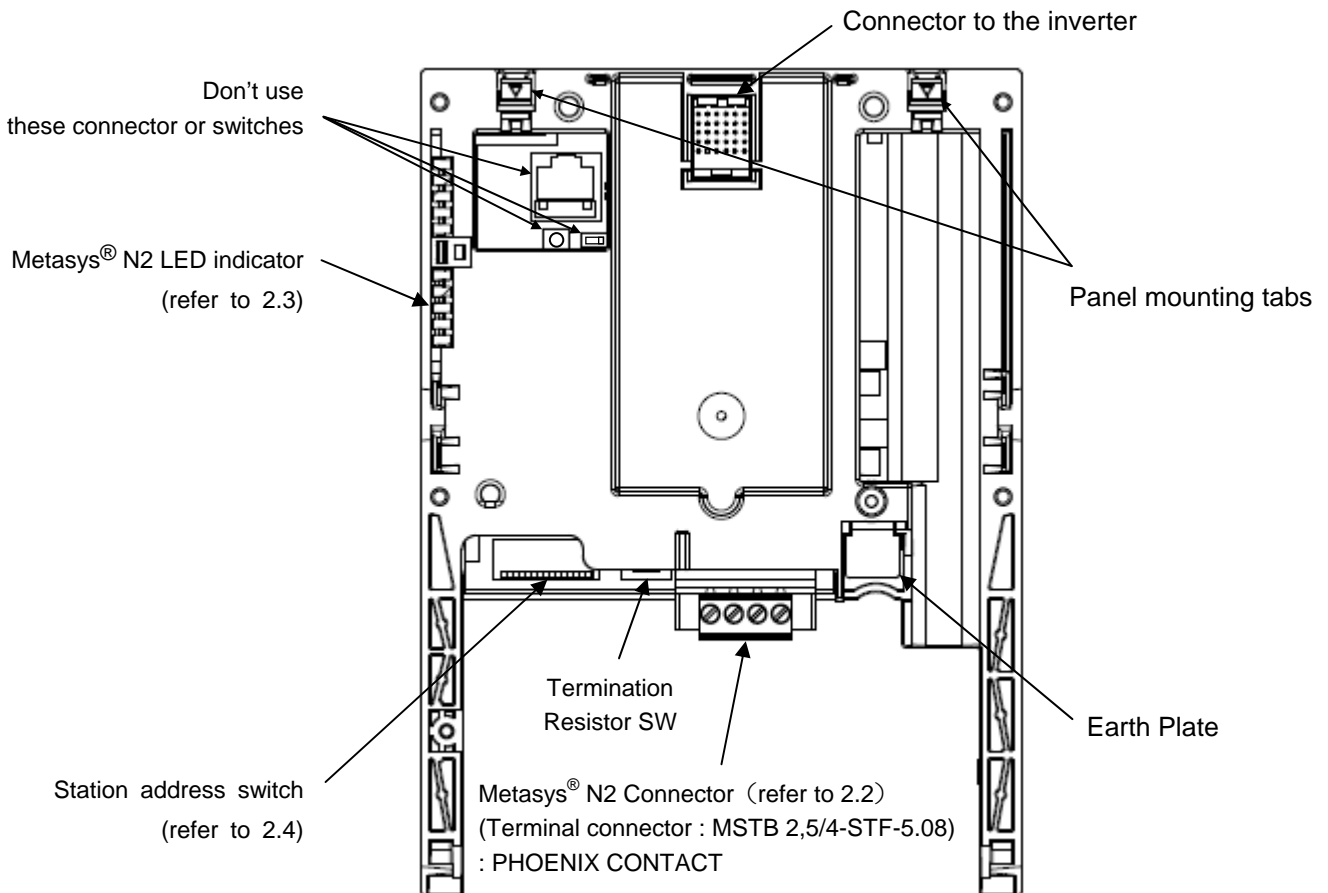
For details of its general handling, see an instruction manual attached with the option unit.

- TOSVERT VF-PS1 Instruction ManualE6581386
- TOSVERT VF-PS1 RS485 Communication Manual.....E6581413
- MTS001Z Instruction ManualE6581539

* 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.

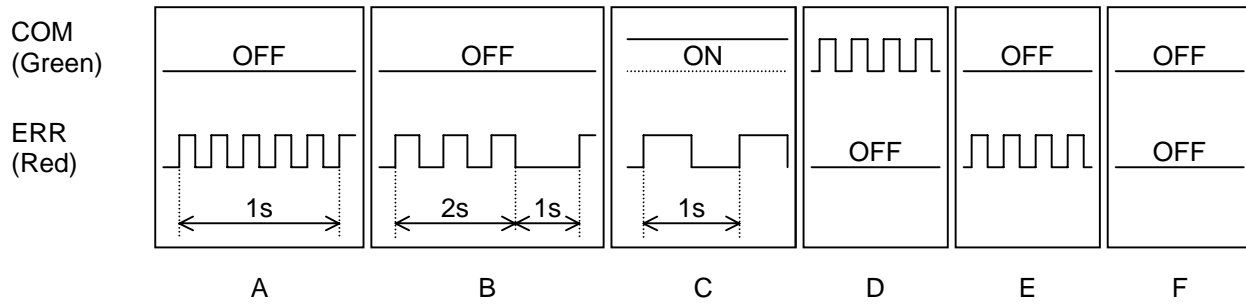


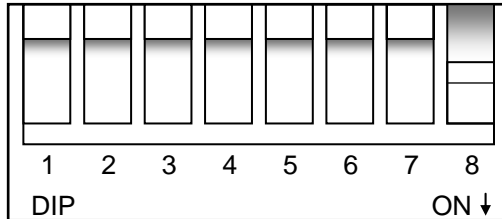
Table 1 LED Behavior

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

* "0" must not be set as station address.

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

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
79	OFF	ON	OFF	OFF	ON	ON	ON	ON
80	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF
81	OFF	ON	OFF	ON	OFF	OFF	OFF	ON
82	OFF	ON	OFF	ON	OFF	OFF	ON	OFF
83	OFF	ON	OFF	ON	OFF	OFF	ON	ON
84	OFF	ON	OFF	ON	OFF	ON	OFF	OFF
85	OFF	ON	OFF	ON	OFF	ON	OFF	ON
86	OFF	ON	OFF	ON	OFF	ON	ON	OFF
87	OFF	ON	OFF	ON	OFF	ON	ON	ON
88	OFF	ON	OFF	ON	ON	OFF	OFF	OFF
89	OFF	ON	OFF	ON	ON	OFF	OFF	ON
90	OFF	ON	OFF	ON	ON	OFF	ON	OFF
91	OFF	ON	OFF	ON	ON	OFF	ON	ON
92	OFF	ON	OFF	ON	ON	ON	OFF	OFF
93	OFF	ON	OFF	ON	ON	ON	OFF	ON
94	OFF	ON	OFF	ON	ON	ON	ON	OFF
95	OFF	ON	OFF	ON	ON	ON	ON	ON

SW ID	1	2	3	4	5	6	7	8
96	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
97	OFF	ON	ON	OFF	OFF	OFF	OFF	ON
98	OFF	ON	ON	OFF	OFF	OFF	ON	OFF
99	OFF	ON	ON	OFF	OFF	OFF	ON	ON
100	OFF	ON	ON	OFF	OFF	ON	OFF	OFF
101	OFF	ON	ON	OFF	OFF	ON	OFF	ON
102	OFF	ON	ON	OFF	OFF	ON	ON	OFF
103	OFF	ON	ON	OFF	OFF	ON	ON	ON
104	OFF	ON	ON	OFF	ON	OFF	OFF	OFF
105	OFF	ON	ON	OFF	ON	OFF	OFF	ON
106	OFF	ON	ON	OFF	ON	OFF	ON	OFF
107	OFF	ON	ON	OFF	ON	OFF	ON	ON
108	OFF	ON	ON	OFF	ON	ON	OFF	OFF
109	OFF	ON	ON	OFF	ON	ON	OFF	ON
110	OFF	ON	ON	OFF	ON	ON	ON	OFF
111	OFF	ON	ON	OFF	ON	ON	ON	ON
112	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
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
121	OFF	ON	ON	ON	ON	OFF	OFF	ON
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
128	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
129	ON	OFF	OFF	OFF	OFF	OFF	OFF	ON
130	ON	OFF	OFF	OFF	OFF	OFF	ON	OFF
131	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
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
138	ON	OFF	OFF	OFF	ON	OFF	ON	OFF
139	ON	OFF	OFF	OFF	ON	OFF	ON	ON
140	ON	OFF	OFF	OFF	ON	ON	OFF	OFF
141	ON	OFF	OFF	OFF	ON	ON	OFF	ON
142	ON	OFF	OFF	OFF	ON	ON	ON	OFF
143	ON	OFF	OFF	OFF	ON	ON	ON	ON
144	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
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
148	ON	OFF	OFF	ON	OFF	ON	OFF	OFF
149	ON	OFF	OFF	ON	OFF	ON	OFF	ON
150	ON	OFF	OFF	ON	OFF	ON	ON	OFF
151	ON	OFF	OFF	ON	OFF	ON	ON	ON
152	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
153	ON	OFF	OFF	ON	ON	OFF	OFF	ON
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
160	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
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
192	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
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
<i>F832</i>	Network Time-Out	0: No action, 1 - 100s * Unit: 0.1 sec (Setting range: 1 - 1000)	0
<i>F851</i>	Operation at communication error by disconnection	0: Inverter stop, communication command, frequency mode open (by <i>CnOd</i> , <i>FnOd</i>) 1: None (continued operation) 2: Deceleration stop 3: Coast stop 4: Network error (<i>ErrB</i> trip)	0
<i>F852</i>	Preset speed operation selection	0: None 1 - 15: Preset speed operation	0
<i>F853</i>	Communication option station address monitor (Read Only)	Station address (setup by switch) monitor	1 - 255
<i>F899</i>	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 *CnOd* or *FnOd* 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 L alarm (the leftmost LED L flashes). Commands entered through the network are canceled, and the commands set with parameters *CNOd* and *FNOd* become effective.

When communications are restored, the L alarm is turned off.

1: None

The inverter remains in the state where it was when the problem arose, and it gives an L alarm.

2: Deceleration stop

The inverter decelerates the motor to a stop and gives an L 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 L alarm.

Commands entered through the network are not canceled.

4: Emergency stop

The error message *E r r B* 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 *E r r B* 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 L 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	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

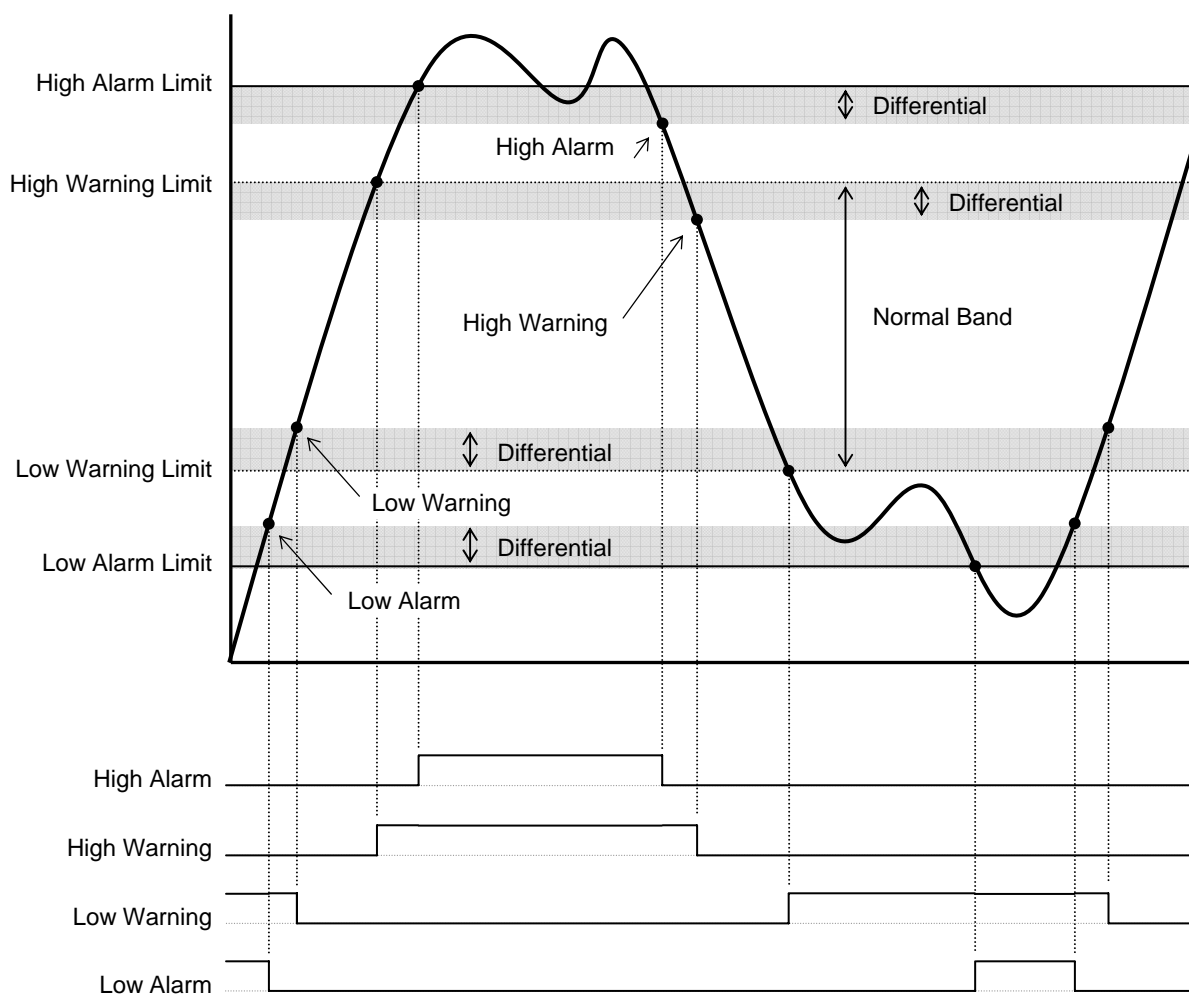
Attribute	Type	Contents
1	Byte	Object Configuration Bit 0 = COS_enabled (1) Bit 1 = unused Bit 2 = unused Bit 3 = alarm_enabled (1) Bit 4 = warning_enabled (1) Bit 5 = unused Bit 6 = unused Bit 7 = unused
2	Byte	Object Status Bit 0 = reliable (0) / unreliable (1) Bit 1 = override active (1) Bit 2 = out 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	%

* $100\% = \frac{f}{f_H}$ (Base frequency), f_H (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 (<i>F 130</i> = 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	<i>F 132</i>	92 (Inversion: 93)
OUT1	<i>F 130</i>	94 (Inversion: 95)
OUT2	<i>F 131</i>	96 (Inversion: 97)
R2	<i>F 138</i>	98 (Inversion: 99)
OUT5	<i>F 136</i>	100 (Inversion: 101)
OUT6	<i>F 137</i>	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 ($dE\zeta$, Comm. No. 0010)

- 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.
- Override "1" to MBOXREAD (Binary Output Object - 5).
- 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 ($F\zeta 1\zeta$, Comm No. 0213)

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

Example 3) Read the input voltage ($F\delta 04$, Comm No. fd04)

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

* When the communication is failed, overridden "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	<i>nErr</i>
1	01H	Over-current during acceleration	<i>OC1</i>
2	02H	Over-current during deceleration	<i>OC2</i>
3	03H	Over-current during constant speed operation	<i>OC3</i>
4	04H	Over-current in load at startup	<i>OC4</i>
5	05H	U-phase arm overcurrent	<i>OCRA1</i>
6	06H	V-phase arm overcurrent	<i>OCRA2</i>
7	07H	W-phase arm overcurrent	<i>OCRA3</i>
8	08H	Input phase failure	<i>EPH1</i>
9	09H	Output phase failure	<i>EPHO</i>
10	0AH	Overvoltage during acceleration	<i>OP1</i>
11	0BH	Overvoltage during deceleration	<i>OP2</i>
12	0CH	Overvoltage during constant speed operation	<i>OP3</i>
13	0DH	Over-LOAD in inverter	<i>OL1</i>
14	0EH	Over-LOAD in motor	<i>OL2</i>
15	0FH	Dynamic braking resistor overload	<i>OLr</i>
16	10H	Overheat	<i>OH</i>
17	11H	Emergency stop	<i>E</i>
18	12H	EEPROM fault	<i>EEP1</i>
19	13H	Initial read error	<i>EEP2</i>
20	14H	Initial read error	<i>EEP3</i>
21	15H	Inverter RAM fault	<i>Err2</i>
22	16H	Inverter ROM fault	<i>Err3</i>
23	17H	CPU fault	<i>Err4</i>
24	18H	Communication time-out error	<i>Err5</i>
25	19H	Gate array fault	<i>Err6</i>
26	1AH	Output current detector error	<i>Err7</i>
27	1BH	Option error	<i>Err8</i>
29	1DH	Low current operation status	<i>UC</i>
30	1EH	Undervoltage (main circuit)	<i>UP1</i>
32	20H	Over-torque trip	<i>Ot</i>
33	21H	Ground fault trip	<i>EF1</i>
34	22H	Ground fault trip	<i>EF2</i>
36	24H	Dynamic braking abnormal element	<i>OCr</i>

(Continued overleaf)

(Continued)

Code		Description	Display
Data (Dec.)	Data (Hex.)		
37	25H	Overcurrent during acceleration (element overheat)	<i>OC 1P</i>
38	26H	Overcurrent during deceleration (element overheat)	<i>OC 2P</i>
39	27H	Overcurrent during fixed speed operation (element overheat)	<i>OC 3P</i>
40	28H	Tuning error	<i>Et n</i>
41	29H	Inverter type error	<i>Et 4P</i>
42	2AH	Analog input terminal overvoltage	<i>E - 10</i>
43	2BH	Abnormal brake sequence	<i>E - 11</i>
44	2CH	Disconnection of encoder	<i>E - 12</i>
45	2DH	Speed error	<i>E - 13</i>
46	2EH	External thermal	<i>OH 2</i>
47	2FH	Step-out (for PM motors only)	<i>SOUL</i>
50	32H	Terminal input error	<i>E - 18</i>
51	33H	Abnormal CPU2 communication	<i>E - 19</i>
52	34H	V/f control error	<i>E - 20</i>
53	35H	CPU1 fault	<i>E - 21</i>
54	36H	Abnormal logic input voltage	<i>E - 22</i>
55	37H	Option 1 error	<i>E - 23</i>
56	38H	Option 2 error	<i>E - 24</i>
57	39H	Stop position retaining error	<i>E - 25</i>
58	3AH	CPU2 fault	<i>E - 26</i>
61	3DH	Control circuit option error	<i>E - 29</i>
84	54H	<i>F 4 10</i> tuning error	<i>Et n 1</i>
85	55H	<i>F 4 12</i> tuning error	<i>Et n 2</i>
86	56H	<i>uL, uLv, F 405 - 407</i> Motor constant setting error	<i>Et n 3</i>

6. Specifications

< Environmental specification >

Item	Specification
Model number	MTS001Z
Service environment	VF-PS1 compliant
Ambient temperature	-10 to +60°C
Storage temperature	-25 to +65°C
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