

F600AT

DeviceNet I/F

OPERATION MANUAL

01SEP2014REV.3.01

UNIPULSE

INTRODUCTION

This material describes the Specifications of DeviceNet (Option) which connects PLC and F600AT. You will be able to control F600AT directly through PLC by using DeviceNet. Thus it enables you to shorten its wiring drastically.

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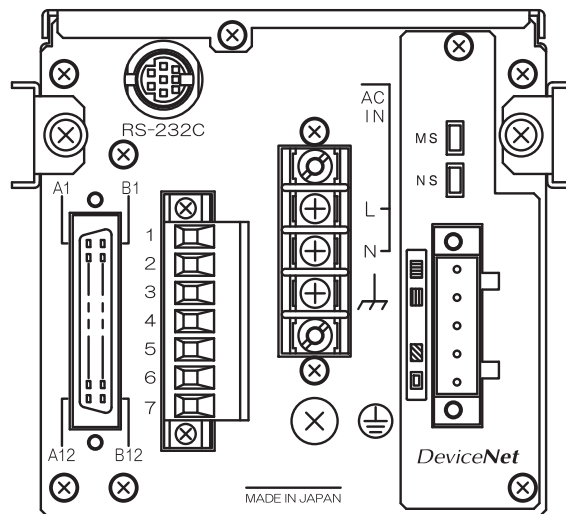
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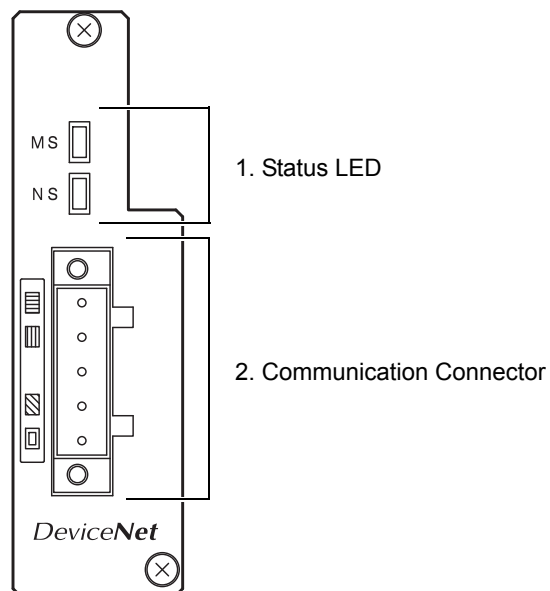
1. APPEARANCE DESCRIPTIONS

1-1. F600AT with DeviceNet I/F



2. NAME OF EACH PART

2-1. DeviceNet I/F



1. Status LED

Indicating the communication status.
(See "5.STATUS LED" on page 3.)

2. Communication Connector

The Connector for connecting DeviceNet.
(See "4.COMMUNICATION CONNECTOR" on page 2.)

3. F600AT SETTING

Operation

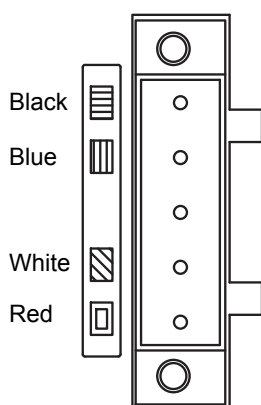
[MODE] → [OPTION]

NODE ADDRESS (Initial value: No.0)	No.0 to 63
SPEED (Initial value: 500kbps)	125kbps, 250kbps, 500kbps
WGT SELECT CODE (Initial value: Extinput)	Network, Extinput
COMM. MODE (Initial value: Read only)	Read only, Write En.

Explanation for setting

NODE ADDRESS	Setting the Node Address.
SPEED	Deciding the communication speed.
WGT SELECT CODE	Selecting the External connector (Extinput) or DeviceNet (Network) to instruct the code for comparison of F600AT.
COMM. MODE	Set values cannot be written in “READ ONLY” mode. (The same as the conventional specification.) Set values can be written in “WRITE EN.” mode.

4. COMMUNICATION CONNECTOR



Prepare the power source of DC24V.

Relation between each signal line and color chip are as follows.

Color	Type of signal
Black	Power cable - side (V-)
Blue	Communication data Low side (CAN L)
—	Shield
White	Communication data High side (CAN H)
Red	Power cable + side (V+)

5. STATUS LED

Communication status is displayed by LED.

MS: Indicating the F600AT status.

MS (Module Status)	LED		Status
	Red	Turns ON	Trouble
	Red	Blinks	Setting Abnormal
	Green	Turns ON	Normal

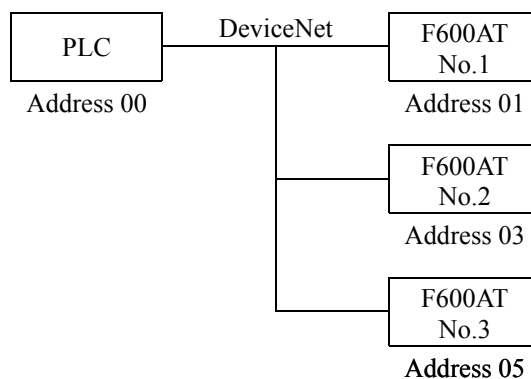
NS: Indicating the Network status.

NS (Network Status)	LED		Status
	Red	Turns ON	Bus OFF, Node Address Overlap
	Red	Blinks	Communication Time-out
	Green	Blinks	Waiting for Connection fixed
	Green	Turns ON	Normal

6. PLC ADDRESS

When F600AT is connected to PLC via DeviceNet, each F600AT occupies Input 2CH (words) and Output “CH (words) respectively.

Example: When you use three F600AT (When not using configurator)



* Address of F600AT DeviceNet I/F should be set without overlapping as shown above when configurator is not used.

7. ADDRESS MAP

7-1. Read Only Mode

7-1-1. DeviceNet PLC ← F600AT (input data)

B15		B14		B13		B12		B11		B10		B9		B8		B7		B6		B5		B4		B3		B2		B1		B0																							
(Lower word)																		Indicated value (x1000)						Indicated value (x100)						Indicated value (x10)						Indicated value (x1)																	
Net/ Gross		4		2		1		Weighing code										HH (END)		HI (SP3)		LO (SP2)		LL (SP1)		Bit for synchro nization		CPU normal		Weight abnormal		Sign		Indicated value (x10000)																			
(Upper word)																																																					

7-1-2. DeviceNet PLC → F600AT (output data)

				B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0			
(Lower word)				Net/ Gross									Print instruc- tion	Display change Gross	Display change Net	TARE OFF	TARE ON	DZ OFF	DZ ON			
(Upper word)					4	2	1	Weighing code														

7-1-3. Explanation of input data

◎ Indicated value (20bit BCD) (*Synchronization is required.)

MSB			LSB
10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit	4bit	10^4 4bit

Indicated values are shown. Its decimal point is ignored.

(Example) when 50.0 → 500
 when 12.000 → 12000

Selection of net or gross is possible at Net/Gross output selection.

◎ Sign (1bit) (*Synchronization is required.)

MSB			LSB
10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit		10^4 4bit

Signal is expressed as below.

0: Plus (+)
 1: Minus (-)

◎ Weight abnormal (1bit) (*Synchronization is required.)

MSB			LSB
10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit		10^4 4bit

When one of +LOAD, -LOAD, NET OVER, GROSS OVER or ZERO ALARM occurred, it became 1.

◎ CPU normal (1bit)

MSB			LSB
10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit		10^4 4bit

0 and 1 are repeated for every sec. [about].

◎ Bit for synchronization (1bit)

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit		10^4 4bit

Bit for synchronization.

◎ Comparison signal (4bit) (*Synchronization required)

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit			10^4 4bit

Compares with LL, LO, HI and HH.

(When DIS. (discharge mode), SP1, SP2, SP3 and End.)

It is equivalent to the output signal of external comparison.

◎ Weighing code (3bit BINARY)

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4 2 1	4bit	4bit	10^4 4bit

The weighing code of the indicator is shown.

There are 8 types of codes: 0 to 7.

◎ Net/Gross output

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
	4bit	4bit	10^4 4bit

“1” when the weight output by the current indicator is net, and “0” when it is gross.

7-1-4. Explanation of output data

◎ DZ ON (1bit)

MSB			LSB			
4bit	4bit	4bit				
4bit	4bit	4bit	4bit			

Digital zero is taken by ON edge.

◎ DZ OFF (1bit)

MSB			LSB			
4bit	4bit	4bit				
4bit	4bit	4bit	4bit			

Digital zero is reset by ON edge.

◎ TARE ON (1bit)

MSB			LSB			
4bit	4bit	4bit				
4bit	4bit	4bit	4bit			

Tare subtraction is performed by ON edge.

◎ TARE OFF (1bit)

MSB			LSB			
4bit	4bit	4bit				
4bit	4bit	4bit	4bit			

Tare subtraction is reset by ON edge.

◎ Display change Net (1bit)

MSB			LSB			
4bit	4bit					4bit
4bit	4bit	4bit		4bit		

The display of the main unit is changed to net by ON edge.

◎ Display change Gross (1bit)

MSB				LSB			
4bit		4bit		1bit	1bit	1bit	4bit
4bit		4bit		4bit		4bit	

The display of the main unit is changed to gross by ON edge.

◎ Print Instruction (1bit)

MSB				LSB			
4bit		4bit		1bit	1bit	1bit	4bit
4bit		4bit		4bit		4bit	

Printing is performed to the UNIPULSE printer connected to SI/F by ON edge.

◎ Net/Gross output selection (1bit)

MSB				LSB			
1bit	1bit	1bit	1bit	4bit		4bit	
4bit		4bit		4bit		4bit	

Net is output when it is ON, and gross is output when it is OFF.

◎ Weighing code (3bit binary)

MSB				LSB			
4bit		4bit		4bit		4bit	
	4	2	1	4bit		4bit	

The code for the indicator to make a comparison is indicated.

The WGT SELECT CODE should be “Network”.

(*Synchronization required) Adopt synchronization of 32 bit for the data synchronization required.
(See "7-3.Synchronization" on page 15.)

7-2. Write Enable Mode

7-2-1. DeviceNet PLC ← F600AT (input data)

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
(Lower word)															
Indicated value (x1000)				Indicated value (x100)				Indicated value (x10)				Indicated value (x1)			
Net/ Gross	4	2	1	HH (END)	HI (SP3)	LO (SP2)	LL (SP1)	Bit for synchro nization	Response	Weight abnormal	Sign	Indicated value (x10000)			
	Weighing code														
(Upper word)															

7-2-2. DeviceNet PLC → F600AT (output data)

B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1		
(Lower word)				Indicated value (x1000)				Indicated value (x100)				Indicated value (x10)				Indicated value (x1)
(Upper word)				Weighing code				Display change	TARE OFF	TARE ON	DZ ON	Setting Value selection 1	Setting Value selection 0	Request	Sign	Indicated value (x10000)
Net/ Gross		4	2	1												

7-2-3. Explanation of input data

◎ Indicated value (20bit BCD) (*Synchronization is required.)

MSB			LSB
10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit	4bit	10^4 4bit

Indicated values are shown. Its decimal point is ignored.

(Example) when 50.0 → 500
 when 12.000 → 12000

◎ Sign (1bit) (*Synchronization is required.)

MSB			LSB
10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit	4bit	10^4 4bit

Signal is expressed as below.

0: Plus (+)
 1: Minus (-)

◎ Weight abnormal (1bit) (*Synchronization is required.)

MSB			LSB
10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit	4bit	10^4 4bit

When one of +LOAD, -LOAD, NET OVER, GROSS OVER or ZERO ALARM occurred, it became 1.

◎ Response (1bit)

MSB			LSB
10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit	4bit	10^4 4bit

It is used for confirmation when transmitting the setting value.

◎ Bit for synchronization (1bit)

MSB				LSB			
10^3 4bit				10^0 4bit			
10^2 4bit				10^4 4bit			

Bit for synchronization.

◎ Comparison signal (4bit) (*Synchronization required)

MSB				LSB			
10^3 4bit				10^0 4bit			
10^2 4bit				10^4 4bit			

Compares with LL, LO, HI and HH.
(When DIS. (discharge mode), SP1, SP2, SP3 and End.)
It is equivalent to the output signal of external comparison.

◎ Weighing code (3bit) (*Synchronization required)

MSB				LSB			
10^3 4bit				10^0 4bit			
10^2 4bit				10^4 4bit			

It is the present weighing code.

◎ Gross/Net (1bit) (*Synchronization required)

MSB				LSB			
10^3 4bit				10^0 4bit			
10^2 4bit				10^4 4bit			

“1” when the weight output by the current indicator is net, and “0” when it is gross.

(*Synchronization required) Adopt synchronization of 32 bit for the data synchronization required.
(See "7-3.Synchronization" on page 15.)

7-2-4. Explanation of output data

◎ Setting value (20bit BCD)

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit	4bit	10^4 4bit

Set the setting value. Decimal point for the value is ignored.

◎ Sign (1bit)

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit		10^4 4bit

Setting the sign of setting value as follows.

- 0: Plus (+)
1: Minus (-)

◎ Request (1bit)

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit		10^4 4bit

Setting value is transmitted to F600AT at the start of Request bit.

◎ Setting value selection 0,1 (2bit)

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit	4bit		10^4 4bit

Selecting the setting of transmission.

“HI-LO Comparison (HI-LO COMP)” mode

Setting value	Setting value selection 1	Setting value selection 0
LL	0	0
LO	0	1
HI	1	0
HH	1	1

“Discharge Over/Under (DIS.-O/U)” mode or “Discharge HI/LO (DIS.-H/L)” mode

Setting value	Setting value selection 1	Setting value selection 0
FINAL	0	0
SP1	0	1
SP2	1	0
CPS	1	1

◎ DZ ON (1bit)

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit			10^4 4bit

Digital zero is taken by ON edge.

◎ TARE ON (1bit)

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit			10^4 4bit

Tare subtraction is performed by ON edge.

◎ TARE OFF (1bit)

MSB

LSB

10^3 4bit	10^2 4bit	10^1 4bit	10^0 4bit
4bit			10^4 4bit

Tare subtraction is reset by ON edge.

◎ Display change (1bit)

MSB				LSB			
10 ³ 4bit				10 ² 4bit			
10 ¹ 4bit				10 ⁰ 4bit			
4bit				10 ⁴ 4bit			

The display of the main unit is changed to net by ON edge, and gross by OFF edge.

◎ Weighing code (3bit binary)

MSB				LSB			
4bit				4bit			
4bit				4bit			
4bit				4bit			

Code No. to be compared is instructed by the indicator.

Select “NETWORK” for the WGT SELECT CODE.

It is also utilized for setting the code of transmitting setting value.

WGT SELECT CODE can be conducted by NETWORK or EXTINPUT.

◎ Gross/Net (1bit)

MSB				LSB			
10 ³ 4bit				10 ² 4bit			
10 ¹ 4bit				10 ⁰ 4bit			
4bit				10 ⁴ 4bit			

The weight to be output by the indicator is changed to net when it is “1”, and gross when it is “0”.

7-2-5. Transmitting setting value

The Setting Value can be sent to F600AT from PLC. It is the function of only Write Enable Mode. The Code to be written in is indicated with the Code No.

(The bit for Upper Word will be from bit 12 to bit 14.)

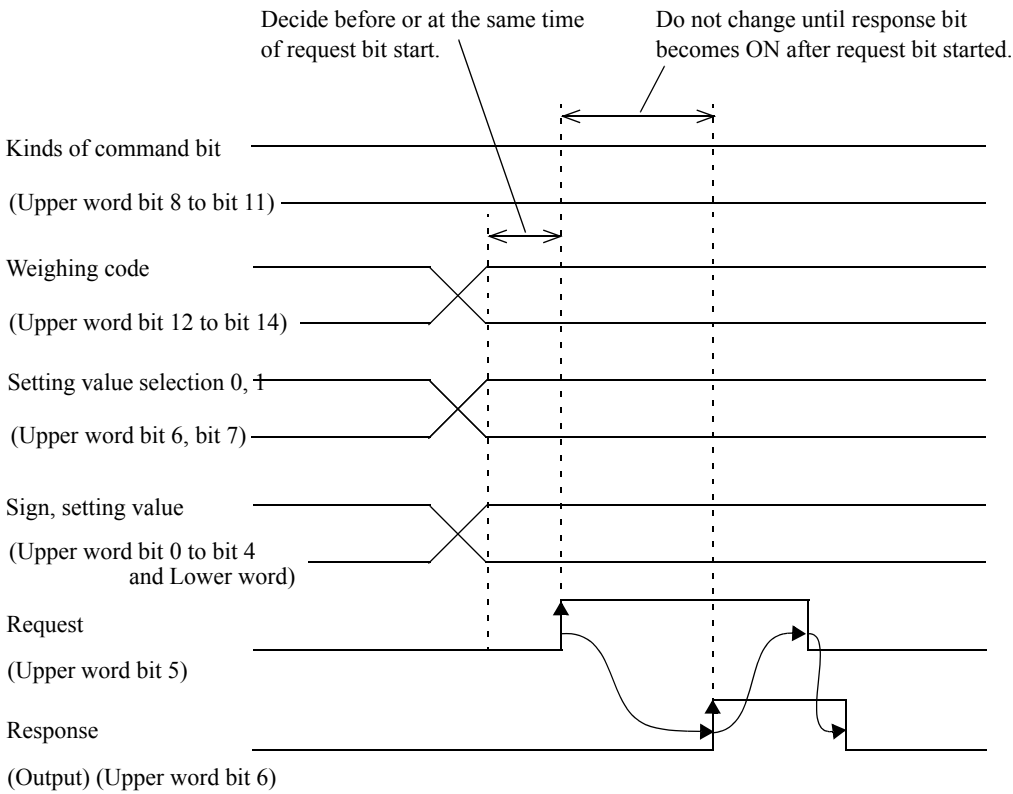
As the transmission will be operated at the start of request bit, decide the Code No., Setting Value, Selection of 0 or 1, Value of Setting and Sign before giving the information of the request bit at start.

Confirm the response bit OFF before turning request bit ON.

When request bit becomes ON response bit also becomes ON. After confirming both of them are ON, turn OFF the request bit. During the operation, do not change any output data of 32 bit.

When request bit becomes OFF, response bit also becomes OFF.

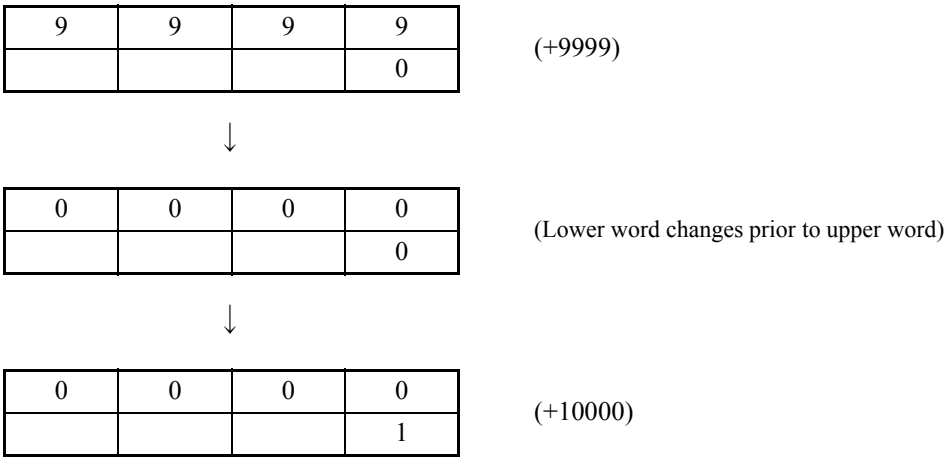
Time chart



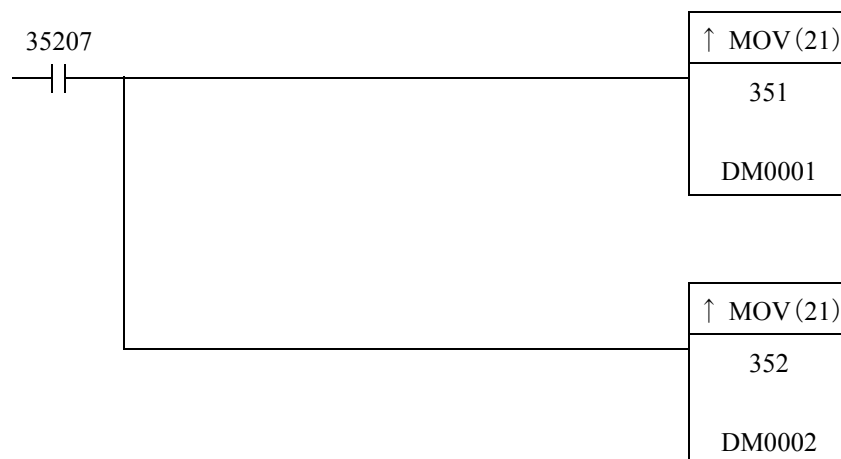
7-3. Synchronization

The synchronization of output data 32 bits is guaranteed for each 1 word unit but the data of upper word and lower word can not be guaranteed its synchronization.

For example when the indicated value changes “from +9999 to 10000”, status of “+0” can be occurred in an instant in PLC. In this case if the date is collected at random, abnormal indicated value can be taken in by chance. (see chart below.)



Preventing these phenomenon, collect the data to adopt the synchronization of 32 bits as follows.

Omron PLC C200HE (example)

Node address is set to 1.

351 is a data of lower word and 352 is a data of upper word.

35207 is a synchronizing bit. Take in the data of 32 bits, 2 words at start of this bit.

When the signals of HH, HI, LO, LL are only used without acquiring the data, there is no need to adopt the synchronization.

8. DEVICE PROFILES AND OBJECT IMPLEMENTATION

8-1. Device Profiles

General data	Corresponding Specification for DeviceNet	Volume 1 Release2.0 Volume 2 Release2.0
	Vender ID	135
	Device type	Generic device type No:0
	Produce code	13
Physical conformance data	Current consumption by net work	About 30mA (at DC24V)
	Connector type	The open pug type
	With or without insulation for physical layer	The use of insulation
	Supported LED	Module Network
	MAC ID setting	Setting by touch panel
	Default MAC ID	00
	Transmission baud rate setting	Setting by touch panel
	Supported baud rate	125kbit/s, 250kbit/s, 500kbit/s
Communication data	Predefined master/slave connection set	Group 2 only server
	Support for dynamic connection (UCMM)	Not available
	Fragmentation of explicit message	Available

8-2. Implementation of Objects

8-2-1. Dentity object (01H)

Object class	Attribute	Not supported
	Service	Not supported

Object instance	Attribute	ID Description	GET	SET	Value
		1 Vendor	○	×	135
		2 Device type	○	×	0
		3 Product code	○	×	13
		4 Revision	○	×	1
		5 Status (bits supported)	○	×	bit 0 only
		6 Serial number	○	×	Each unit
		7 Product name	○	×	F600A □
		8 State	×	×	
		9 Configuration Consistency Value	×	×	
		10 Heartbeat Interval	×	×	
	Service	DeviceNet service	Parameter option		
		05H Reset	Not available		
		0EH Get_Attribute_Single	Not available		

8-2-2. Message router object (02H)

Object class	Attribute	Not supported
	Service	Not supported
Object instance	Attribute	Not supported
	Service	Not supported
Addition of vendor-specific specification		Not available

8-2-3. Devicenet objects (03H)

Objects class	Attribute	ID Description	GET	SET	Value
		1 Revision	○	×	02H
	Service	DeviceNet Service	Parameter option		
		0EH Get_Attribute_Single	Not available		

Object instance	Attribute	ID Description	GET	SET	Value
		1 MAC ID	○	×	
		2 Baud rate	○	×	
		3 BOI	○	×	00H
		4 Bus-off counter	×	×	
		5 Allocation information	○	×	
		6 MAC ID switch changed	×	×	
		7 Baud rate switch changed	×	×	
		8 MAC ID switch value	×	×	
		9 Baud rate switch value	×	×	
	Service	DeviceNet Service	Parameter option		
		0EH Get_Attribute_Single	Not available		
		4BH Allocate Master/ Slave_Connection Set	Not available		
		4CH Release Master/ Slave_Connection Set	Not available		

8-2-4. Assembly object (04H)

Object class	Attribute	Not supported
	Service	Not supported

Object instance 1	Section	Information	Max. number of instances		
	Instance type	Static I/O	1		
	Attribute	Description	GET	SET	Value
		1 Number of Members in List	×	×	
		2 Member List	×	×	
		3 Data	○	×	
	Service	DeviceNet Service	Parameter option		
		0EH Get_Attribute_Single	Not available		

8-2-5. Connection object (05H)

Object class	Attribute	Not supported
	Service	Not supported
	Max. number of active connections	1

Object Instance 1	Section	Information	Max. number of instances		
	Instance type	Explicit Message	1		
	Production trigger	Cyclic			
	Transport type	Server			
	Transport class	3			
	Attribute	ID Description	GET	SET	Value
		1 State	○	×	
		2 Instance type	○	×	00H
		3 Transport class trigger	○	×	83H
		4 Produced connection ID	○	×	
		5 Consumed connection ID	○	×	
		6 Initial comm. characteristics	○	×	21H
		7 Produced connection size	○	×	1100H
		8 Consumed connection size	○	×	1100H
		9 Expected packed rate	○	○	
		12 Watchdog time-out action	○	○	One of 01,03
		13 Produced connection path length	○	×	00
		14 Produced connection path	○	×	
		15 Consumed connection path length	○	×	00
		16 Consumed connection path	○	×	
		17 Production inhibit time	○	×	00
	Service	DeviceNet Service	Parameter Option		
		05H Reset	Not available		
		0EH Get_Attribute_Single	Not available		
		10H Set_Attribute_Single	Not available		

Object Instance 2	Section	Information	Max. number of instances		
	Instance type	Polled I/O	1		
	Production trigger	Cyclic			
	Transport type	Server			
	Transport class	2			
	Attribute	ID Description	GET	SET	Value
	1	State	○	×	
	2	Instance type	○	×	01H
	3	Transport class trigger	○	×	82H
	4	Produced connection ID	○	×	
	5	Consumed connection ID	○	×	
	6	Initial comm. characteristics	○	×	01H
	7	Produced connection size	○	×	0400H
	8	Consumed connection size	○	×	0400H
	9	Expected packed rate	○	○	
	12	Watchdog time-out action	○	×	00
	13	Produced connection path length	○	×	6
	14	Produced connection path	○	×	20_04_24_01_30_03
	15	Consumed connection path length	○	×	6
	16	Consumed connection path	○	×	20_04_24_01_30_03
	17	Production inhibit time	○	×	00
	Service	DeviceNet Service	Parameter Option		
	05H	Reset	Not available		
	0EH	Get_Attribute_Single	Not available		
	10H	Set_Attribute_Single	Not available		

Object instance 3	Section	Information	Max. number of instances		
	Instance type	Bit Strobed I/O	1		
	Production trigger	Cyclic			
	Transport type	Server			
	Transport class	2			
	Attribute	ID contents	GET	SET	Value
	1	State	○	×	
	2	Instance type	○	×	01H
	3	Transport class trigger	○	×	82H
	4	Produced connection ID	○	×	
	5	Consumed connection ID	○	×	
	6	Initial comm. characteristics	○	×	01H
	7	Produced connection size	○	×	0400H
	8	Consumed connection size	○	×	0800H
	9	Expected packed rate	○	○	
	12	Watchdog time-out action	○	×	00
	13	Produced connection path length	○	×	6
	14	Produced connection path	○	×	20_04_24_01_30_03
	15	Consumed connection path length	○	×	6
	16	Consumed connection path	○	×	20_04_24_01_30_03
	17	Production inhibit time	○	×	00
	Service	DeviceNet service	Parameter option		
	05H	Reset	Not available		
	0EH	Get_Attribute_Single	Not available		
	10H	Set_Attribute_Single	Not available		

9. ALARM CODES

The alarm codes appearing at the lower right of the DeviceNet setting screen are as shown in the table below.

Code	Status
0	Normal status
1	Memory error
2	Hardware error
3	Network error
4	Setting error
7	Other error