

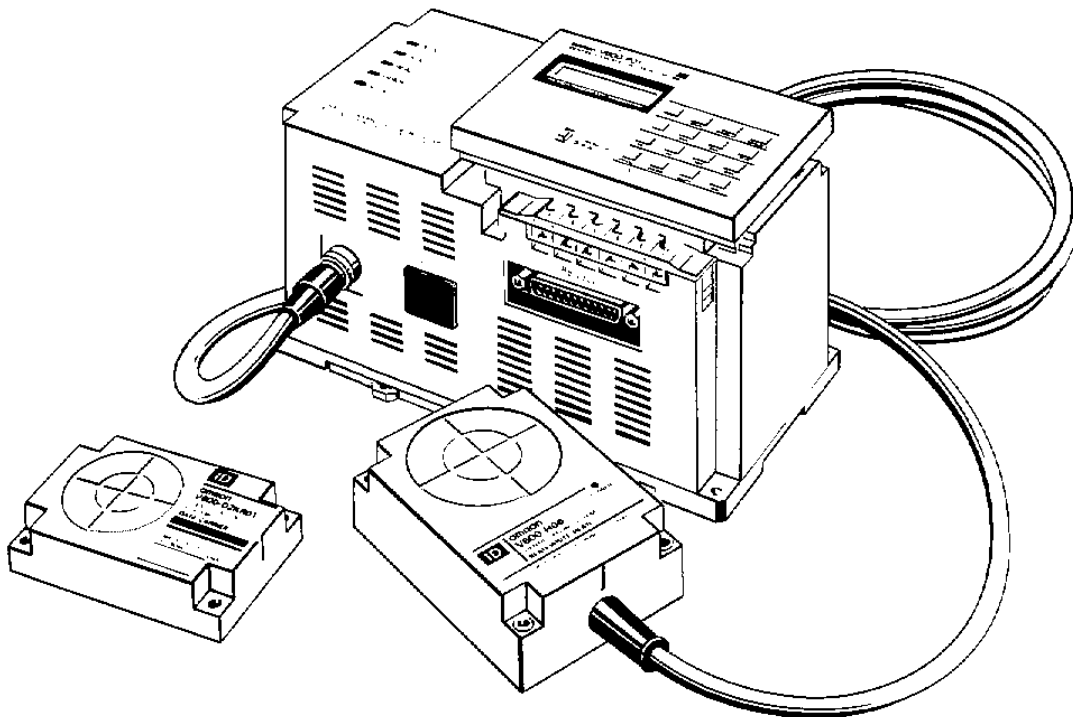
V600 RFID System

V600-CA8A-V□/V600-CA9A-V□

Parallel Interface ID Controller

Operation Manual


Revised August 1998





Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

 **DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **Caution** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PC” means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

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About this Manual:

This manual describes the installation and operation of the V600 RFID System with parallel interface and the ID Controller and includes the sections described below.

Please read this manual carefully and be sure you understand the information provide before attempting to install and operate the V600 RFID System with parallel interface and the ID Controller.

Section 1 provides a general introduction to the V600 RFID System with parallel interface and the ID Controller.

Section 2 provides the V600-CA8A-V□/CA9A-V□ nomenclature and specifications as well as the dimensions of both Units.

Section 3 provides procedures and formats required for communications with the Programmable Controller. Program examples are also provided.

Section 4 provides the commands and procedures required for Monitor Unit operations.

Section 5 provides installation and pre-operation setting procedures.

Section 6 provides diagnosis and maintenance procedures as well as solutions to possible problems and abnormalities.

The **Appendices** contain information relating to standard models and Auto Read/Auto Write operations.



WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

SECTION 1

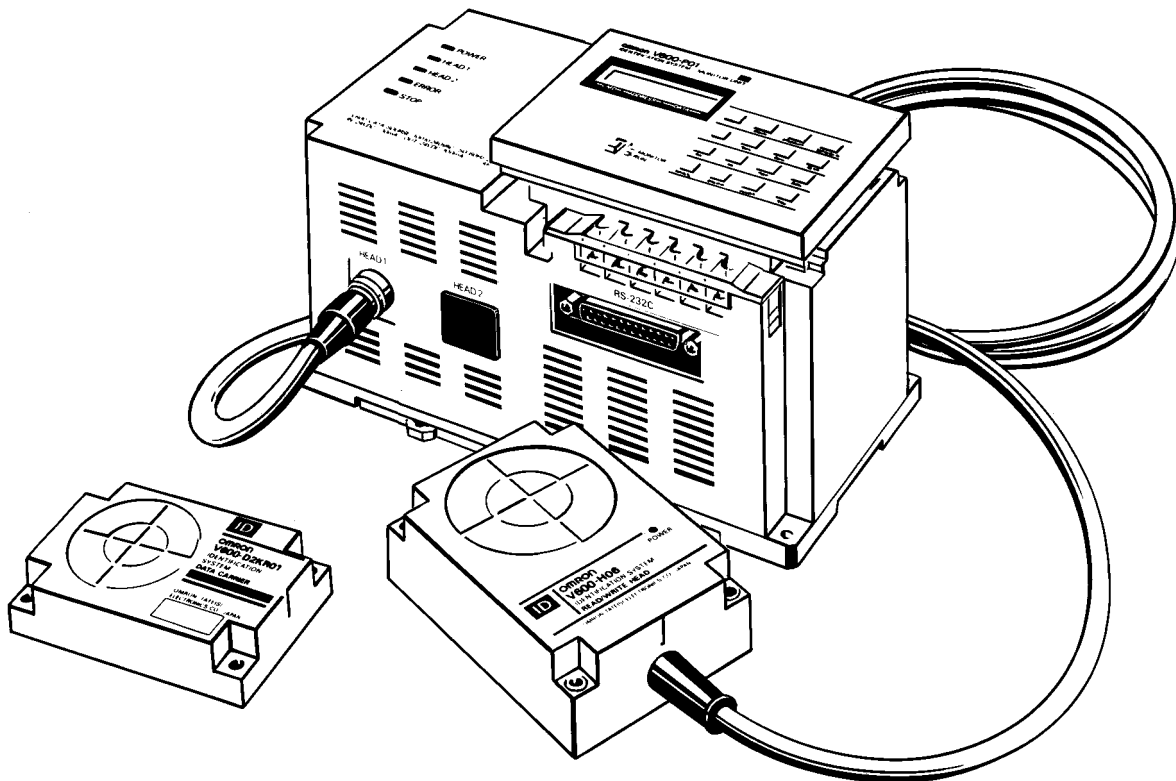
Features and System Configuration

This section provides a general introduction to the V600 RFID System with parallel interface and the ID Controller.

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1-1 Features

The V600 RFID System adopts electromagnetic coupling enabling contactless data communications. It can significantly enhance factory automation (FA) systems incorporating large-scale decentralized control systems and small lot production systems.



Unique Built-in Parallel Interface

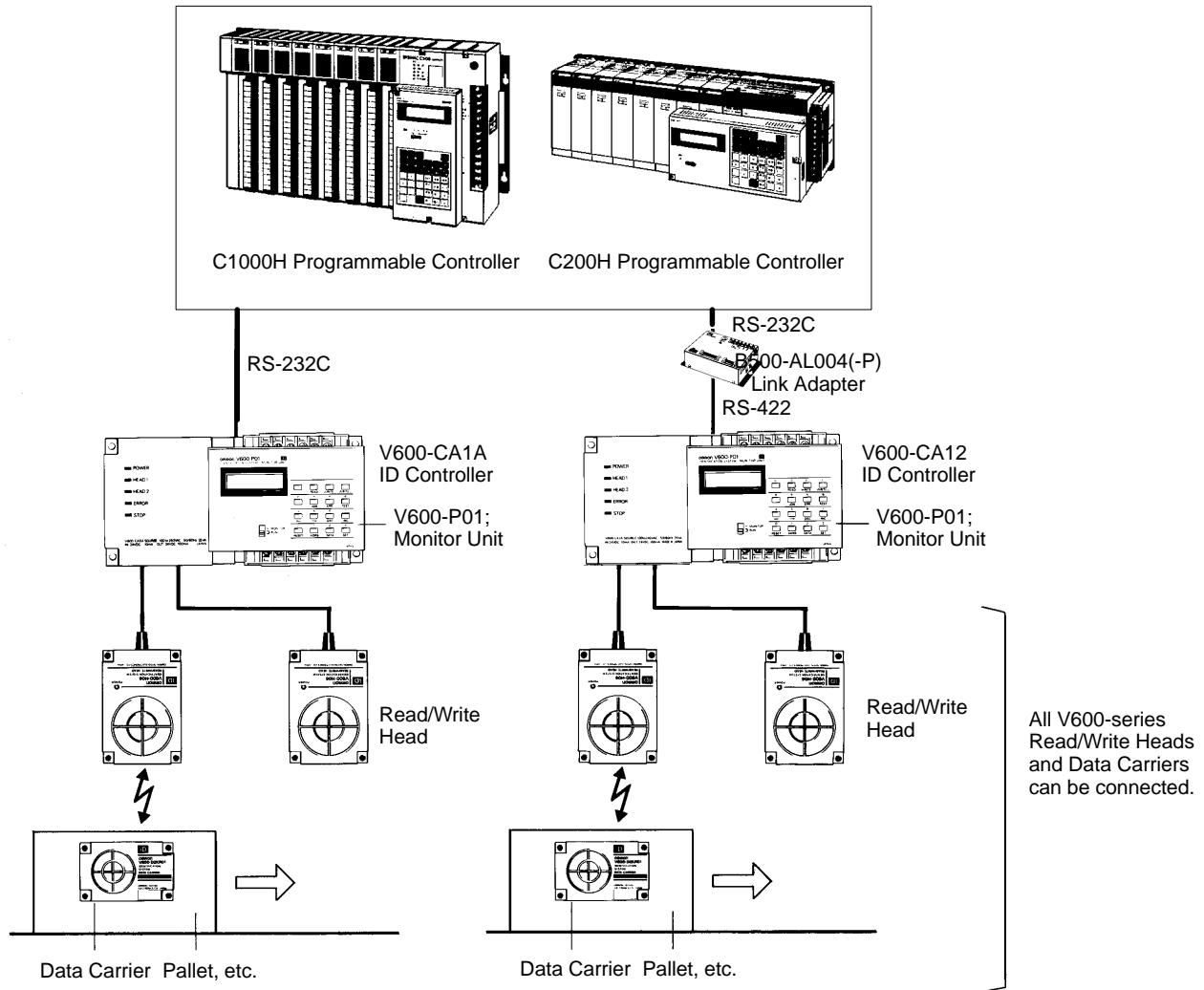
OMRON's original Parallel Interface is built-in, enabling connection to general-purpose Programmable Controllers using the I/O Units of Programmable Controllers (PC). The V600-CA8A-V□ has PNP transistor output and the V600-CA9A-V□ has NPN transistor output.

Easy to Use

- Safety is ensured with powerful check functions such as an innovative error logging function which records the 30 most current operational errors.
- An optional Monitor Unit can be mounted on the ID Controller for the offline monitoring of system operations and reading of error log data and error messages, thus improving system start-up and on-site maintenance.
- Two Read/Write Heads can be connected to one ID Controller providing flexibility for sophisticated production systems.

1-2 System Configuration

The V600-CA8A-V□/9A-V□ ID Controller has OMRON's original parallel interface built-in, enabling communications with general-purpose Programmable Controllers. All communications processing is controlled in the command language of the PC.

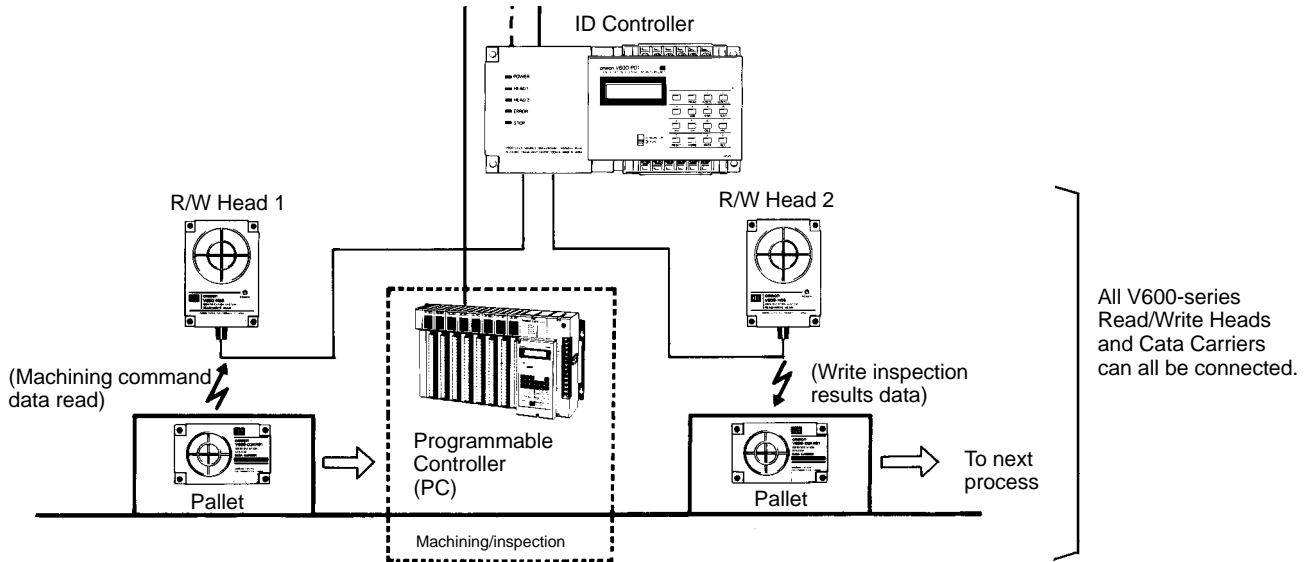


Read/Write Head (R/W Head) The R/W Head enables contactless communications with a Data Carrier (DC) mounted on a stationary or moving pallet or other means of conveyance. The epoxy resin mold makes it highly durable, maintenance free, and ensures stable operation.

Data Carrier (DC) The Data Carrier can record data such as production indicators, and data can be read or written at any time using the Read/Write Head. The DC is molded with epoxy resin to withstand severe operating conditions and is sufficiently compact to be attached anywhere.

Monitor Unit This convenient monitoring tool enables the user to communicate with DCs without connecting to a host computer, as well as allowing readout of error conditions. Refer to *Section 4 Monitor Unit Operation*.

1-3 Operation



- 1, 2, 3...**
1. When a command is sent from the host computer to the ID Controller, R/W Head 1 enters the waiting condition and waits for the arrival of the DC. The command data at this time specifies the memory area from which data is to be read by R/W Head 1.
 2. When the DC arrives within communications range of R/W Head 1, the data (format and machining/inspection command data) in the memory area indicated by the read command is sent to the host computer as the response.
 3. Based on the response data, the host computer transmits the workpiece machining/inspection command to the PC.
 4. Once operations in the machining/inspection process have been completed, a write command is sent to the ID Controller, and this time R/W Head 2 waits for arrival of the DC. This command sets the memory area to which R/W Head 2 is to write data and set the machining/inspection results data.
 5. When the DC arrives in the R/W Head 2 communications range, the machining/inspection results data is written to the memory area specified by the DC.

SECTION 2

Nomenclature and Specifications

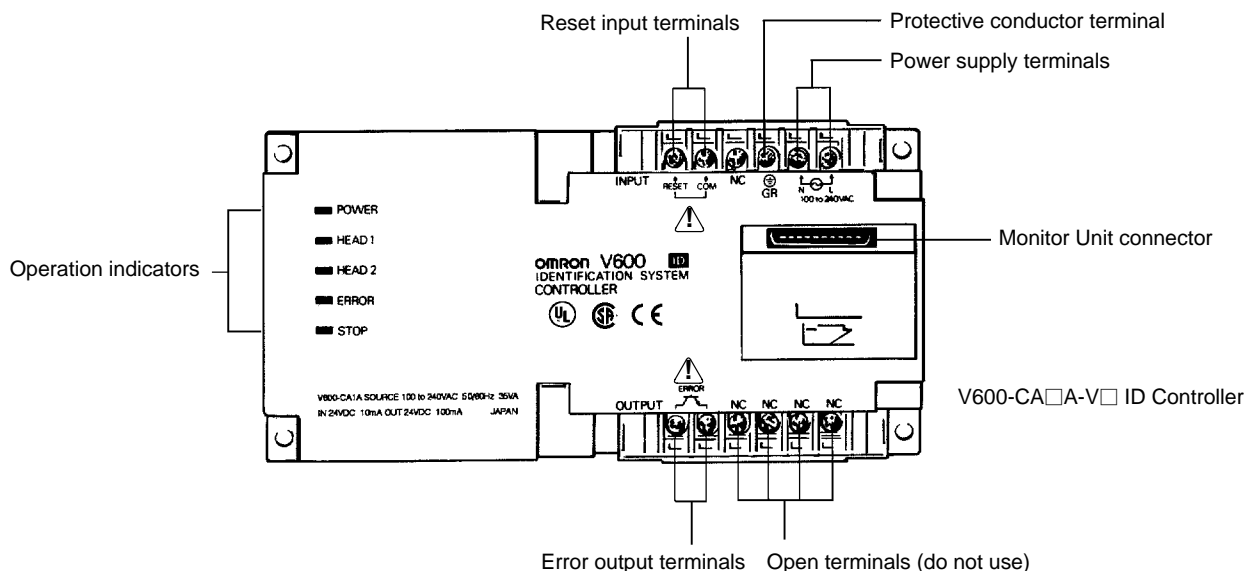
This section provides the V600-CA8A-V□/CA9A-V□ nomenclature and specifications as well as the dimensions of both Units.

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2-1 V600-CA□A-V□ ID Controller

2-1-1 Nomenclature

Front Panel




Note Where there is no reference to the “V600-CA8A-V2 only” or the “V600-CA9A-V2 only” is given, all information in this section is common to both.

Operation Indicators

| Name | Description |
|----------------|--|
| POWER (green) | Lit when power is applied. |
| HEAD 1 (green) | Lit when R/W Head 1 is communicating. |
| HEAD 2 (green) | Lit when R/W Head 2 is communicating. |
| ERROR (red) | Lit when an ID Controller operation stop error (CPU error, memory error) is detected, or when an error in communications with an IBM PC/AT or compatible or with R/W Heads is detected. Error messages can be read from the host computer or Monitor Unit. |
| STOP (red) | Lit when an operation stop error (CPU error, memory error) occurs, or when an external reset input is received. |

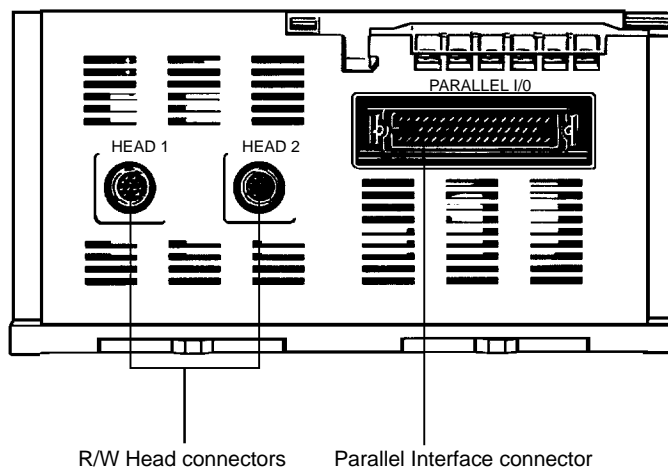
Terminal Connections

| Name | Description |
|--|--|
| 100 to 240 VAC | Connection for the 100 to 240 VAC (50/60 Hz) power supply. |
| GR  | Protective conductor terminal. Connect a dedicated ground cable here and ground at a resistance of less than 100 Ω. |
| RESET/COM | Emergency stop external reset input. Use a 24-VDC power supply. |
| ERROR | External output terminal for error signals when an operation stop error is detected. Connect via a 24-VDC relay or similar device. This signal is not output when there is a communications error. |

Side Panel

R/W Head Connector Up to two R/W Heads can be connected.

Parallel Interface Connector Used for communications with the PC. Use the connector provided as an accessory with the Unit when making the connection. (Refer to page 69 for details on interface connection.)



2-1-2 Specifications

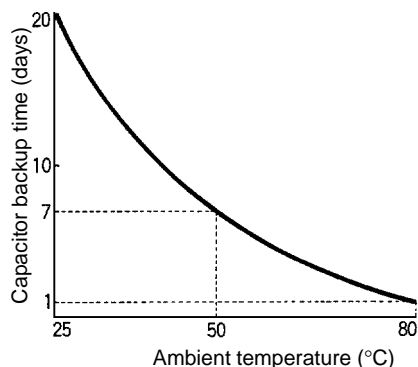
Ratings

| Parameter | | Specifications |
|---|-------------|---|
| Supply voltage | | 100 to 240 VAC, 50/60 Hz |
| Permissible variation range of supply voltage | | 85 to 264 VAC |
| Power consumption | | 35 VA max. |
| Insulation resistance | | 50 M Ω min. at 500 VDC between power supply terminals and case; between input/output terminals and case; between power supply terminals and input/output terminals |
| Dielectric strength | | For all combinations given above: 1,500 VAC 50/60 Hz for 1 minute, leakage current: 10 mA max. |
| Noise resistance | | 1,500 Vp-p, pulse width: 100 ns to 1 μ s, rise time: 1 ns |
| Vibration resistance | Mechanical | 10 to 150 Hz with 0.3-mm double amplitude for 32 minutes in X, Y, and Z directions |
| | Malfunction | 10 to 150 Hz with 0.2-mm double amplitude for 32 minutes in X, Y, and Z directions |
| Shock resistance | | 20G, three times in X, Y, and Z directions |
| Ambient operating temperature | | -10°C to 55°C |
| Ambient operating humidity | | 35% to 85% (without condensation) |
| Atmosphere | | With no corrosive gases |
| Storage temperature | | -25°C to 65°C |
| Protection class | | Class I (with protective conductor terminal) |
| Protection rating | | IEC60529: IP30 (built into panel) |
| Approved standards | | IEC1010-1, EN61010-1, UL3101, CSA1010.1, FCC Part 15 Subpart B |
| Weight | | 960 g |
| Altitude | | 2,000 m max. |
| Overvoltage category | | II |
| Pollution degree | | 2 |

Characteristics

| Parameter | Specifications |
|-------------------------|---|
| Memory backup | Capacitors used for backup, and storage of statistical errors and latest errors are effective for 20 days after Unit power is turned off (at ambient temperature of 25°C). Refer to the plot given below for the relationship between ambient temperature and memory backup time. |
| Self-diagnosis function | Checks CPU errors, memory errors, power cutoff, and communication errors. |

Ambient Temperature vs. Memory Backup Characteristics

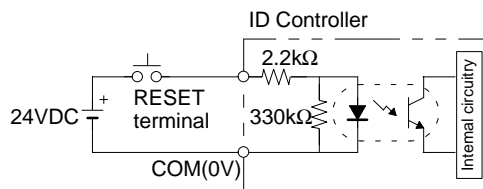


2-1-3 External Input/Output Specifications

Input Specifications (RESET)

| | |
|---------------------|---|
| Input voltage | 24 VDC: +10% (including ripple component), -15% |
| Input impedance | 2.2 k Ω |
| Input current | 10 mA typ. (24 VDC) |
| On voltage | 19 V min. |
| Off voltage | 5 V max. |
| Input response time | 70 ms max. |

Circuit Diagram

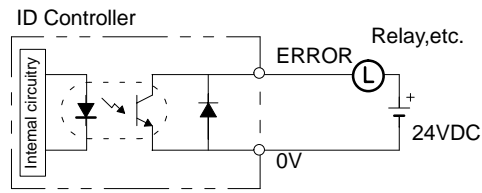


Output Specifications (Error)

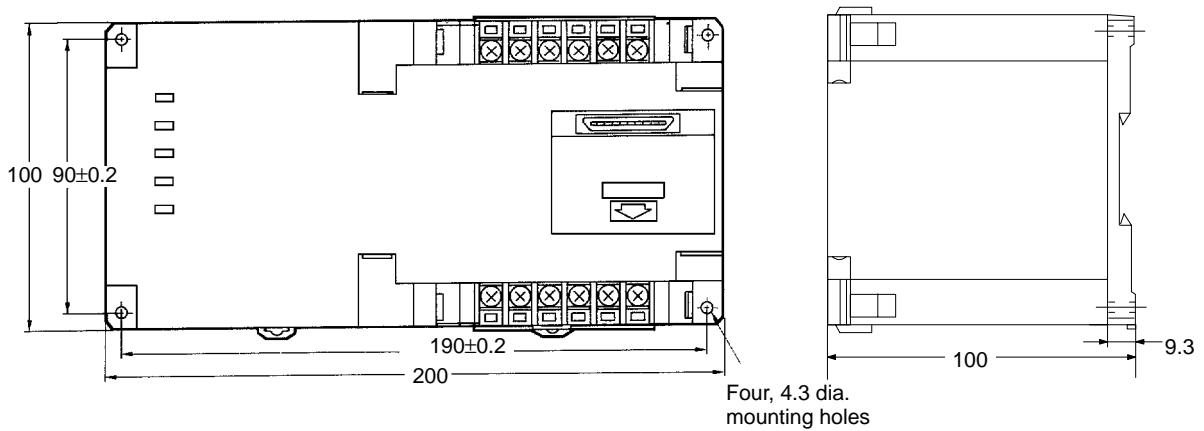
| | |
|----------------------------|--|
| Maximum switching capacity | 24 VDC: +10% (including ripple component) 100 mA, -15% |
| Leak current | 100 μ A max. |
| Residual voltage | 1.5 V Max. |

- Note**
1. When RESET input is ON, the CPU stops operation, and the STOP indicator lights. At this time the ERROR output is reset.
 2. If short-circuited without load, the internal transistor may be damaged.
 3. The ERROR output is ON only when the ID Controller is not operating. Refer to 6-2 Diagnostic Functions for details.

Circuit Diagram

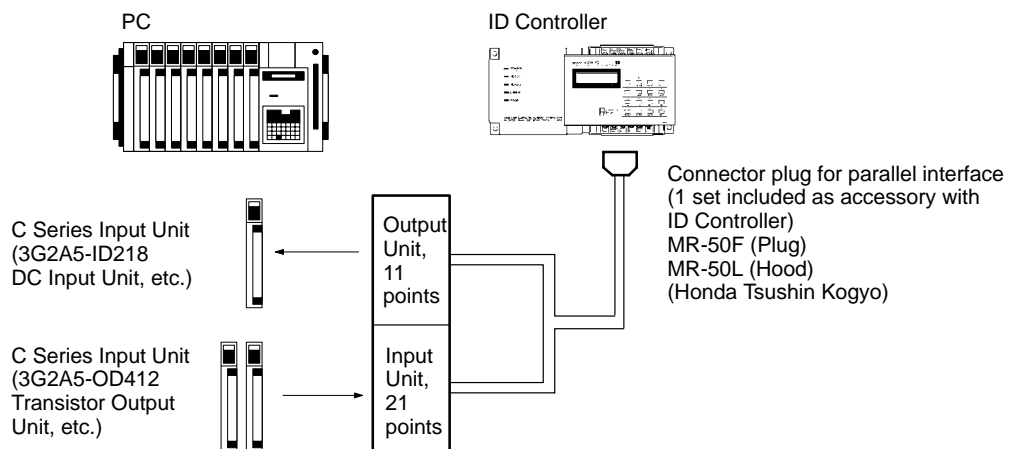


2-1-4 Outer Dimensions



2-1-5 Communications Specifications

OMRON's original parallel interface built into the V600-CA8A-V□/9A-V□ ID Controller enables communications with a general-purpose PC. The parallel interface includes input and output sections, connected separately to the PC Input Unit and Output Unit.



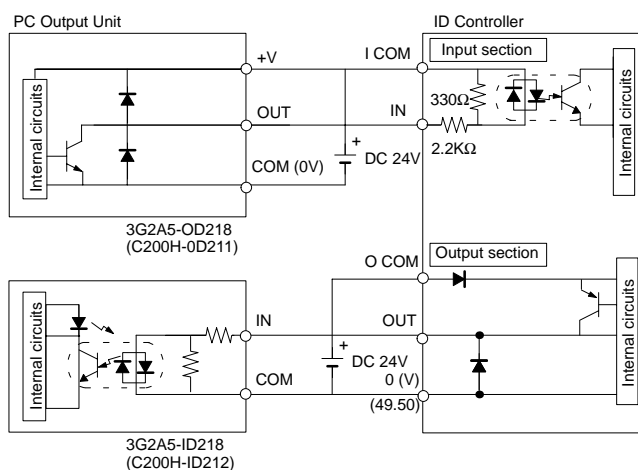
2-1-6 Input/Output Specifications

- Use a bi-directional input unit for the PC.
- The ID Controller input section common terminal (I COM) and output section common terminal (O COM) are not connected internally.

Input Section

| | |
|--|---|
| Input Unit | 24 VDC: +10% (including ripple component), -15% |
| On voltage | 19 V min. |
| Off voltage | 5 V max. |
| Input current | 10 mA typ. (24 VDC) |
| Permissible delay for HS and other inputs | 500 μs max. |

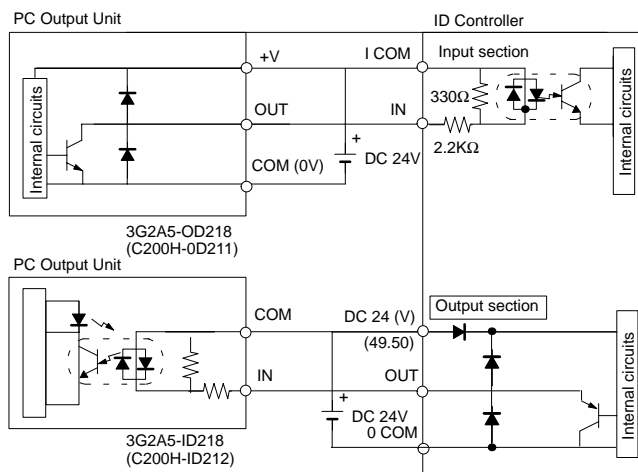
V600-CA8A-V□ (PNP Transistor Output)



Output Section

| | |
|-----------------------------------|---|
| Maximum switching capacity | 24 VDC: +10% (including ripple component) 50 mA, -15% |
| Saturation voltage | 1.5 V max. |
| Leak current | 100 μA max. |
| Output delay time | On delay: 200 μs max. Off delay: 300 μs max. |

V600-CA9A-V□ (NPN Transistor Output)

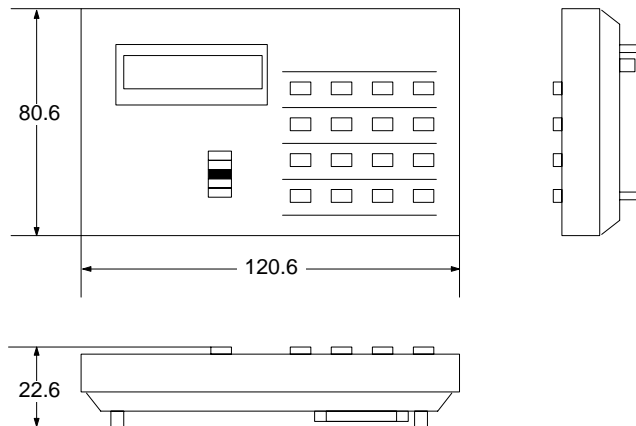


2-2 Monitor Unit

2-2-1 General Specifications

General specifications are the same as those for the ID Controller. Note that the operating ambient temperature must be in the range 0°C to 40°C.

2-2-2 Dimensions



Refer to *Section 4 Monitor Unit Operation* for information on the functions and operating procedures of the Monitor Unit.

Note Remove the Monitor Unit before starting system operation.

SECTION 3

Communications with Programmable Controller

This section provides procedures and formats required for communications with the Programmable Controller. Program examples are also provided.

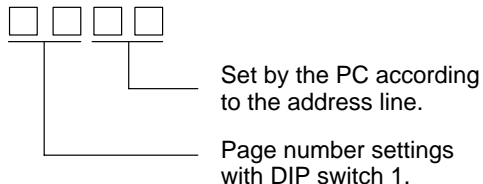
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3-1 Data Carrier Motion and Command Conditions

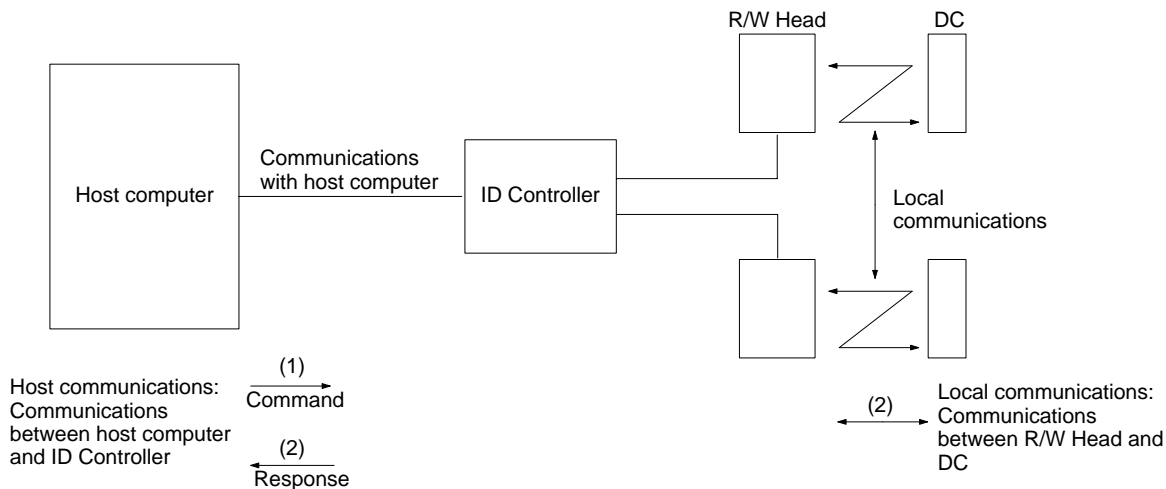
3-1-1 Communications Control Procedure

OMRON's unique host communications control procedure enables the ID Controller to communicate with a general-purpose PC via the PC's I/O Unit.

- The ID Controller has access to the PC via a total of 32 points (i.e., 21 input and 11 output points of the ID Controller are used).
- Eight points are used to write an address. The address space for the host uses 256 bytes (00 to FF). The leftmost two digits are used for page number settings with DIP switches 1.



- Eight points are used for the data line. The ID Controller has access to the PC via one byte.



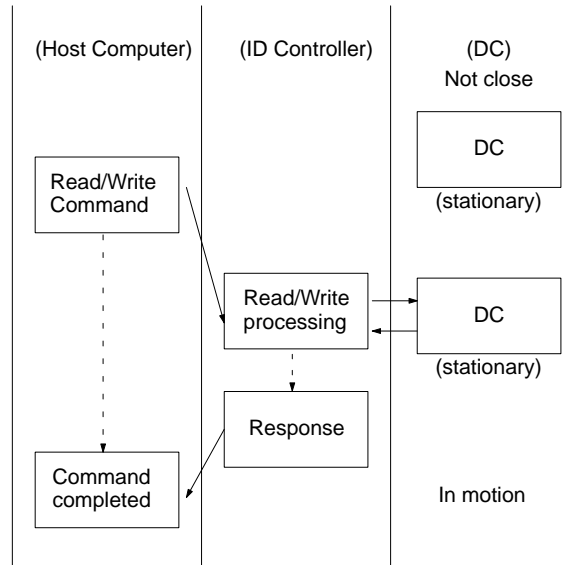
Explanation

- 1, 2, 3...**
1. The PC sends a command to the ID Controller.
 2. The ID Controller interprets the PC command and executes local communications, and writes data to or reads data from the DC memory.
 3. If it is a read command, the data read out is sent to the PC as the response. If it is a write command, a response (00) is sent to the PC.

3-1-2 Read and Write Functions

Command Processing

The read/write functions are used for communications when the DC is stationary. Thus, before using these commands, it is necessary to check that the DC is at a specific position. If the DC is not in a specified position, an error response is returned.

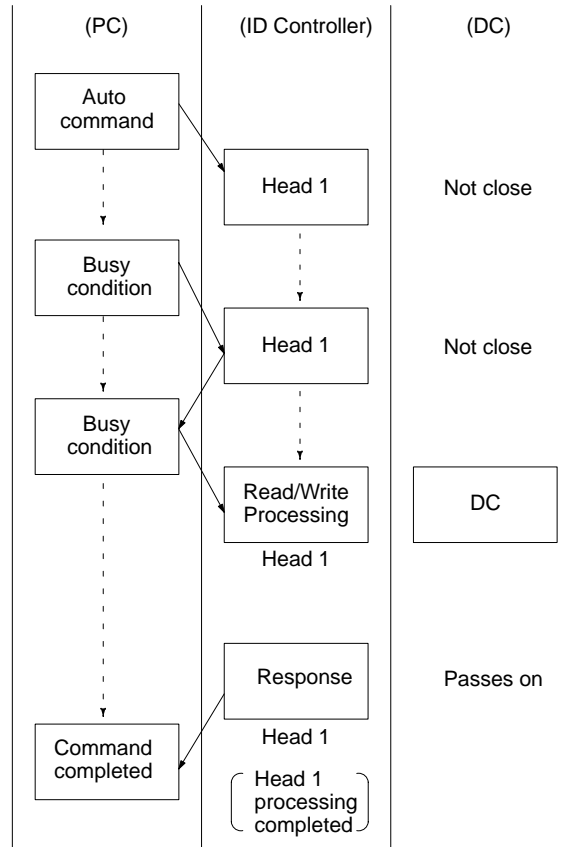


- 1, 2, 3...**
1. Once it is confirmed that the DC has stopped in the specified position, the PC sends the command.
 2. The ID Controller follows the command and performs either writing or reading operations.
 3. After completing processing, the ID Controller returns a processing completed response to the IBM PC/AT or compatible. The IBM PC/AT or compatible accepts the response, and once again starts the line workpiece (with the DC attached) in motion.

3-1-3 Automatic Read/Write Function

Command Processing

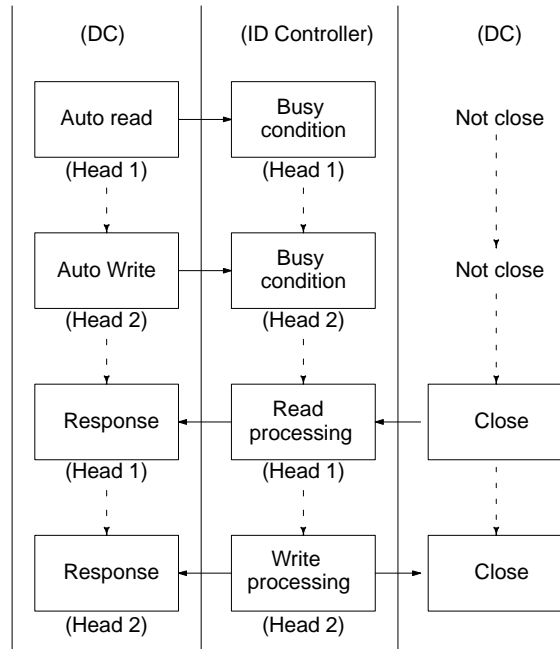
Under the automatic commands, the ID Controller does not return a response until the DC comes close to the specified R/W Head. This means that the communications path to the PC remains in the busy condition until the response is returned, and the IBM PC/AT or compatible cannot send commands specifying the other R/W Head of the same ID Controller.



- 1, 2, 3...**
1. The PC sends the auto command to Head 1.
 2. The ID Controller does not return the response until the DC comes close to the specified R/W Head, and consequently, the IBM PC/AT or compatible stays in the busy condition. If two R/W Heads are connected to the same ID Controller, communications to Head 2 are not possible.
 3. When the DC passes in front of a R/W Head, write or read processing is performed.
 4. Once processing is completed, the ID Controller sends a response to the PC indicating that processing indicated by the auto command has been completed.

3-1-4 Simultaneous Processing of Commands

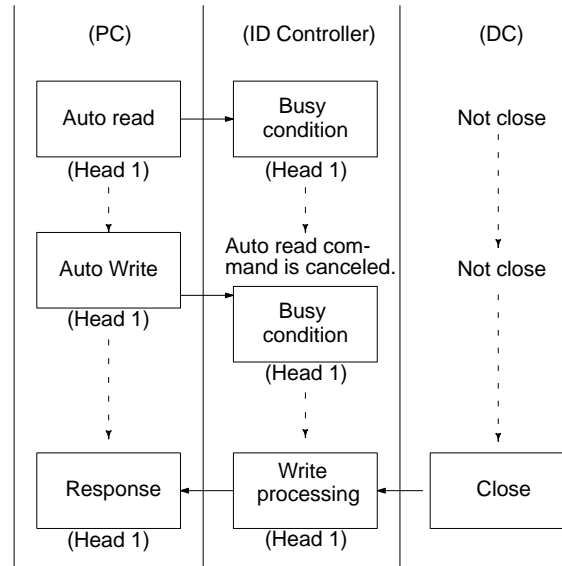
The ID Controller can have two R/W Heads connected to it, and communications can be conducted with them independently.



- 1, 2, 3...**
1. An auto read command is sent to Head 1.
 2. An auto write command is sent to Head 2.
 3. When a DC approaches close to Head 1, read processing is executed, and the read data is sent to the PC as the response.
 4. When a DC approached close to Head 2, write processing is executed, and the normal completion code 00 is sent to the PC as the response.

3-1-5 Command Processing in Busy Condition

The ID Controller accepts commands from the PC and remains in the busy condition from that time until a DC approaches (until it can execute a command). If a new command is sent to the ID Controller for the same Head while the ID Controller is in the busy condition, the new command replaces the old command which becomes invalid.



- 1, 2, 3...**
1. An auto read command is sent to Head 1. At this time there is no DC close by, and so the ID Controller is in the busy condition.
 2. If a new auto read command is sent to the antenna in the busy condition, the first auto read command is canceled.
 3. When a DC approaches close to Head 1, write processing is executed, and the response is sent to the PC.

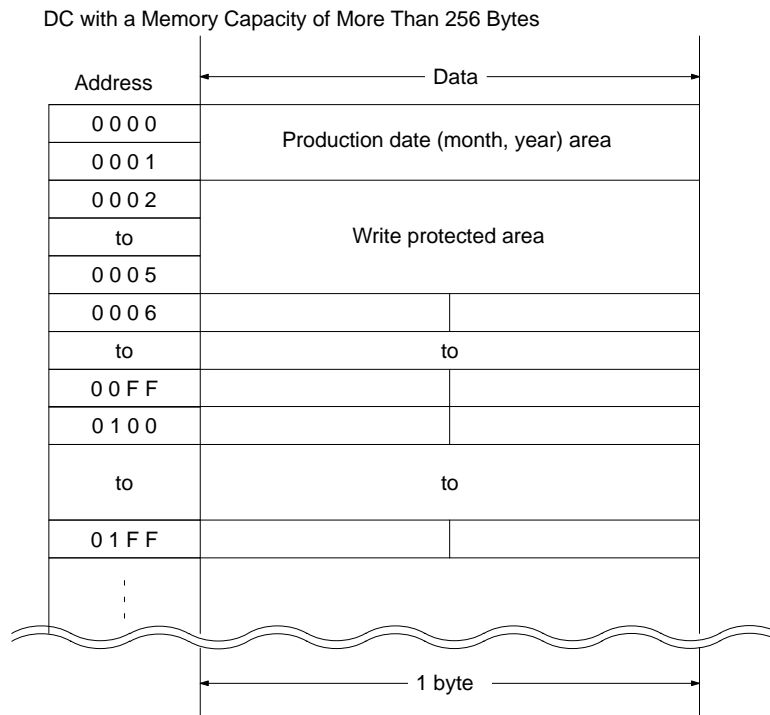
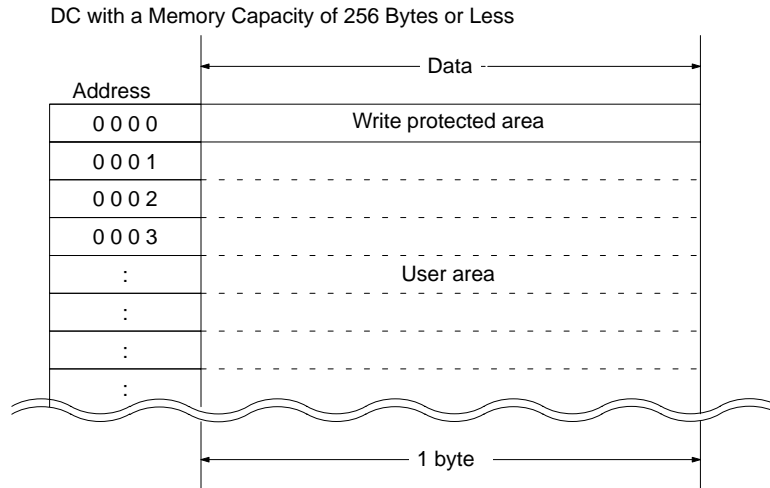
3-2 Data Carrier Memory Map

Access to a maximum of 16k bytes of (0000 to 3FFF) ID Controller (as parallel interface) memory area is possible. The actual accessible memory area of the ID Controller varies with the memory capacity of the DC. The space that the host can have access is a 256-byte page area set with DIP switch 1.

A DC with a memory capacity of more than 256 bytes has a production date (month and year) area and write protected area. On the other hand, a DC with a memory capacity of 256 bytes or less does not have a production date (month and year) area. The processing methods of these areas vary between a DC with a memory capacity of 256 bytes or less and a DC with a memory capacity of more than 256 bytes.

The system areas of DCs vary with the kind of memory (SRAM or EEPROM). For details refer to the manuals for the R/W Head and DC.

3-2-1 Memory Map



3-2-2 Production Date Format

The production date format is valid for a DC with a memory capacity of more than 256 bytes.

For checking the life of the DC battery, the manufacturer registers the production date in the first two bytes of the memory area immediately prior to shipping the DC from the factory. Data can be read from this area, but cannot be written to it. If a write operation to this area is attempted by mistake, an error message, “7D,” will be issued.

Production Date Control Area

| Address | Bit | | | | | | | |
|---------|--------------------|---|---|---|---------------------|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0000 | Month, first digit | | | | Month, second digit | | | |
| 0001 | Year, first digit | | | | Year, second digit | | | |

- Note**
1. The last two digits of the year is used. For example, 92 for 1992.
 2. The month is represented by two digits. For example, 03 for March and 10 for October.

Example

In the case of September 1992, the bits are as follows:

| Address | Bit | | | | | | | |
|---------|-----|---|---|---|---|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0000 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| | 0 | | | | 9 | | | |
| 0001 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| | 9 | | | | 2 | | | |

Note A DC with a memory capacity of 256 bytes or less does not have a production date (month and year) area. The first address of such a DC is a write protect area.

3-2-3 Write Protect Function

The write protect function protects important data stored in the memory of the Data Carrier, such as product number and model, from inadvertent write access. With this function, the data up to a specified memory address can be protected. The setting of page 0 is necessary because the address is set to 0000 or 0002 to 0005.

It is recommended that important data be write-protected as follows:

Setting Write Protect Function

The write protect function is set in address 0000 of the Data Carrier's memory. The most significant bit of address 0000 determines whether or not the write protect function is in effect.

| Address | Bit | | | | | | | |
|---------|------------|------------------------------|---|---|---|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0000 | YES/ NO | Last 2 digits of end address | | | | | | |

Write protect execution bit (most significant bit of address 0000)

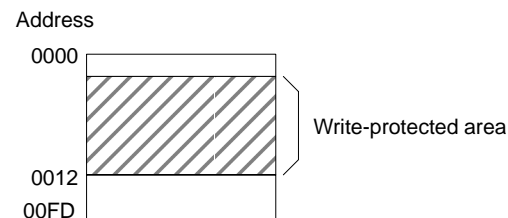
- 1: Write-protected
- 0: Not write-protected

The end address can be set between 00 and 7F. Setting the address to 00 protects all bytes from 0001 through 00FD. Setting the address to a value from 01 to 7F protects all bytes from 0001 through the specified address. It is not possible to specify an end address between 0080 and 00FF.

- Note**
1. Address 0000 cannot be write-protected.
 2. Address 0001 is always the starting address of the write-protect area. Important data that needs to be protected should be input from 0001 on.

Example 1

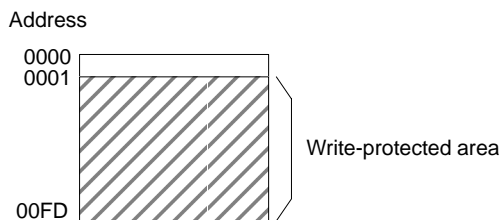
To protect addresses 0001 through 0012:



| Address | Higher digits | | | | Lower digits | | | |
|---------|---------------|---|---|---|--------------|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0000 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| | 9 | | | | 2 | | | |

Example 2

All bytes from 0001 through 00FD will be write-protected when bit 7 is ON and the end address is set to 00.



| Address | Higher digits | | | | Lower digits | | | |
|---------|---------------|---|---|---|--------------|---|---|---|
| 0000 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 8 | | | | 0 | | | |

Canceling Write Protection

To cancel write protection, clear the most significant bit of address 0000 to 0. The write protection will be cancelled and the end address specified in 0000 will be invalid.

Memory Exceeding 256 Bytes

Specify the four bytes in DC addresses 0002 to 0005. The most significant bit (MSB) of address 0002 is used to specify whether a write protect specification is to be made or not.

| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---------|------------------------------|------------------------------|---|---|---|---|---|---|
| Address | | | | | | | | |
| 0002 | Y/N | Start address lower two bits | | | | | | |
| 0003 | Start address upper two bits | | | | | | | |
| 0004 | End address lower two bits | | | | | | | |
| 0005 | End address upper two bits | | | | | | | |

- Note**
1. When the write protect control bit (most significant bit of address 0002) is 1 (Y), write protect is ON and when it is 0 (N), write protect is OFF.
 2. The start address of the available setting area is 0006 to FFFF and the end address is 0006 to FFFF.

The following is an example of the conditions of addresses 0006 to 07FF to be write protected.

| Address | Upper bits | | | | Lower bits | | | |
|---------|------------|---|---|---|------------|---|---|---|
| 0002 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 8 | | | | 0 | | | |
| 0003 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| | 0 | | | | 6 | | | |
| 0004 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| | 0 | | | | 7 | | | |
| 0005 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | F | | | | F | | | |

When the addresses are not write protected, the conditions of the addresses are as follows:

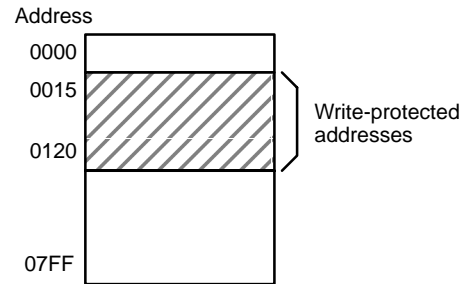
| Address | Upper bits | | | | Lower bits | | | |
|---------|------------|---|---|---|------------|---|---|---|
| | 0002 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | | | | 0 | | | |
| 0003 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | | | | 0 | | | |
| 0004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | | | | 0 | | | |
| 0005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | | | | 0 | | | |

Examples

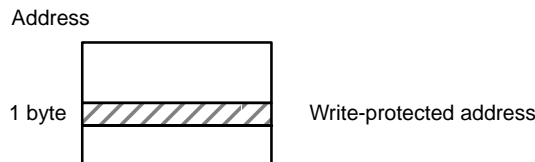
Several examples of write-protect settings are listed below. These examples are for a 2K-byte DC, for an 8K-byte DC simply replace 07FF with 1FFF.

- 1, 2, 3... 1. The following settings would protect addresses 0015 through 0120:

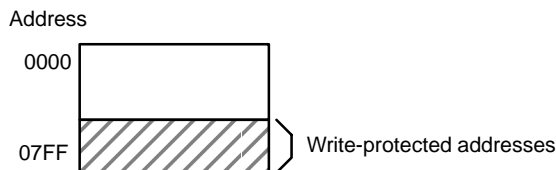
| Address | Bit | | | | | | | |
|---------|-----|---|---|---|---|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0002 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 8 | | | | 0 | | | |
| 0003 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| | 1 | | | | 5 | | | |
| 0004 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 0 | | | | 1 | | | |
| 0005 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | 2 | | | | 0 | | | |



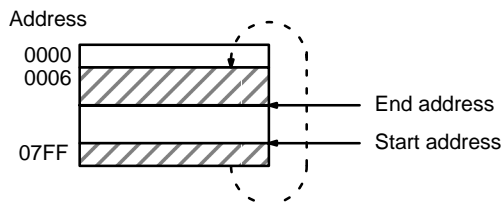
2. To write-protect only 1 byte, set the same address as the start and end addresses (start address = end address).



3. If the end address exceeds the last address of the Data Carrier memory (end address > 07FF), addresses up to the last will be protected:



4. If start address is greater than the end address (start address > end address), the write-protected area will wrap through 0006, so that addresses from 0006 through the end address, and from the start address through 07FF will be write-protected.



3-2-4 SRAM Data Carrier Battery Check

The life of the battery of the DC that incorporates SRAM can be checked with the Parallel Interface Controller.

The record of the number of overwriting operations of the DC that incorporates EEPROM should be managed by the user's program. Unlike the Serial Interface Controller, however, the MDL command cannot be used with the DC.

Data Carrier battery checks are not performed automatically, only when the contents of the production date area (addresses 0000 and 0001) are read. Too much power would be consumed if a battery check was performed automatically every time DC memory was accessed. When a battery check is performed, a small current is passed through the DC's internal circuitry.

To execute a battery low check, set page 0 with DIP switches 1 and read address 00 (the month area of the production date (month, year) area).

Low battery check command:

- 1, 2, 3... 1. Read command
2. Auto read command

| C1 | C0 |
|----|----|
| 0 | 0 |
| 1 | 0 |

7B (hexadecimal) is output as a low battery response to the ID Controller's RD0 to RD7.

| RD7 | RD6 | RD5 | RD4 | RD3 | RD2 | RD1 | RD0 |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 |
| 7 | | | | B | | | |

At that time, the read data of address 00 will not be output. The ID Controller indicates an error by turning OFF the error line "ERR."

Under ordinary operating conditions the DC can be used for about 1 month after a low battery completion code is received. However, it is recommended that the Data Carrier battery be replaced with a new one as soon as possible.

Note The SRAM DC contains a thionyl chloride-type lithium battery. One characteristic of this type of battery is its tendency to develop a higher internal resistance when it is not used. If the battery isn't used for several months, the internal resistance can increase enough to cause a low battery response, even if the battery is good.

Consequently, after several months of disuse it is recommended to transmit data to/from the DC for about 10 minutes to "warm up" the battery and decrease its internal resistance. This operation will have almost no effect on the useful life of the battery.

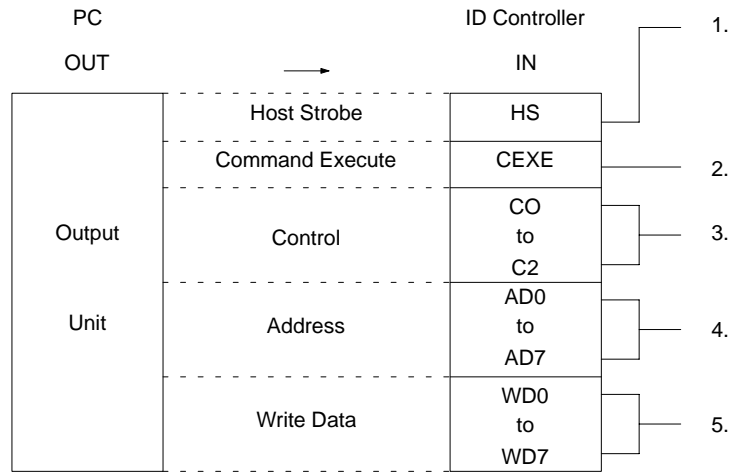
3-2-5 EEPROM Batteryless Data Carrier Check

Unlike the V600-CA1A-V□ or V600-CA2A-V□ Serial Interface ID Controller, the MDL command (which manages the number of overwriting operations) cannot be used with the DC that incorporates EEPROM (batteryless-type DC). To keep a record of the number of overwriting operations on the Parallel Interface ID Controller, the user should use the write or auto write command to increase the number of overwriting operations.

3-3 Communications Methods

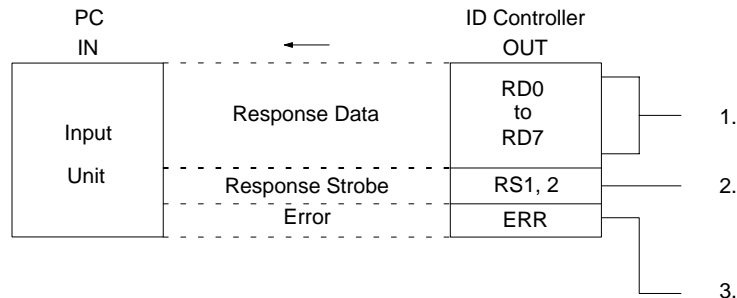
Communications between the PC and the ID Controller are performed using a parallel bus with a total of 32 lines, and one byte of data is transmitted per communication cycle.

Command Reception



- 1, 2, 3...**
1. A clock signal with a fixed on/off cycle is output, indicating the timing for communications to the ID Controller.
 2. The ID Controller is informed of command execution.
 3. Command type and the number of the antenna to be accessed are specified.
 4. Address data is output. The address range is 256 bytes between 00 and FF within the page specified by the DIP switch.
 5. When executing an auto write command, the data to be written to the DC is specified.

Response Transmission



- 1, 2, 3...**
1. Response data (read: read data, write: end code) obtained when command executed is output to the PC.
 2. PC is informed of establishment of response data resulting from execution of the command.
RS1 line: Head 1
RS2 line: Head 2

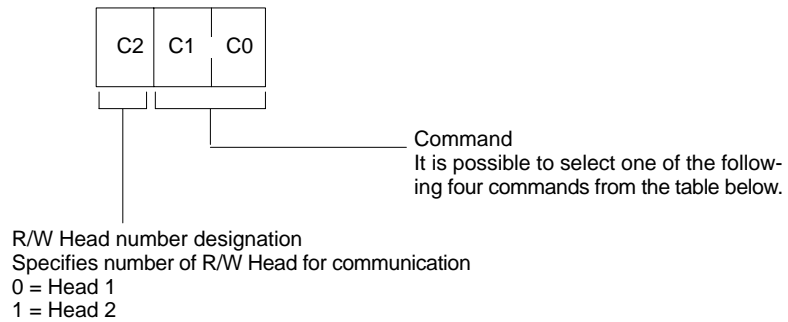
- When a communications error is recognized, communications are turned off.

- Note**
- A page that the ID Controller has access to must be set with DIP switch 1 of the ID Controller. The setting will be effective when the power is turned on. Any setting altered with DIP switch 1 after the power is turned on will not be effective.
 - The status of each output signal of the ID Controller with the power turned on is as follows:
 RD0 to RD7: OFF
 RS1 and RS2: OFF
 ERR: ON (no error)
 ERR turns ON if the version of the ID Controller Software is 5.0 or newer and turns OFF if an older version is used.

3-4 Command/Response Format

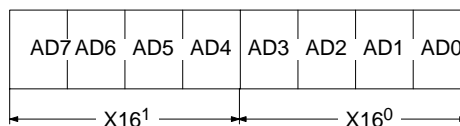
3-4-1 Command Format

Command Lines Specify the processing method and Head number using three lines (C0 to C2).



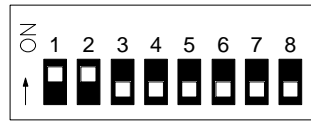
| C1 | C0 | Command | Processing |
|----|----|------------|--|
| 0 | 0 | Read | The data in the specified address is received by a DC. If there is no DC in front of the R/W Head when a command is executed, an error response is returned. |
| 0 | 1 | Write | Data is written to the specified DC address. If there is no DC in front of the R/W Head when a command is executed, an error response is returned. |
| 1 | 0 | Auto read | The ID Controller waits for the approach of a DC and reads its data. |
| 1 | 1 | Auto write | The ID Controller waits for the approach of a DC and writes data to it. |

Address Lines Eight lines (AD0 to AD7) are used to specify the rightmost two digits of the DC's address to be processed. The leftmost two digits are specified by the page number settings with DIP switch 1.



Example:

In this example, the DC's address 0318 is specified for command processing.

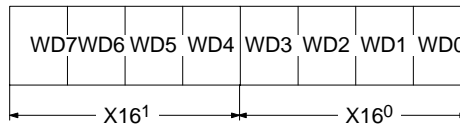


Address Lines:

| | | | | | | | |
|-----|-----|-----|----|----|-----|-----|-----|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| OFF | OFF | OFF | ON | ON | OFF | OFF | OFF |
| 1 | | | | 8 | | | |

Write Data Lines

Eight lines (WD0 to WD7) are used to specify the data to be written in the case of write processing.



Command Execute Line (CEXE)

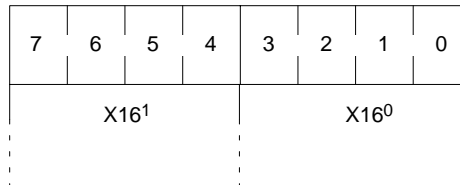
Command execution is given using the CEXE line. The data given on the command lines, on the address lines, and on the write data lines are effective.

Host Strobe Line (HS)

The HS line informs the ID Controller of the communications timing by outputting the clock signal, which turns ON and OFF at a cycle of 10 ms.

3-4-2 Response Format

Eight lines (RD0 to RD7) are used to output response data. The meaning of the signal varies with the kind of command executed and the result of operation termination.



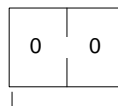
Normal Termination

Read and Auto Read Commands

- 1, 2, 3... 1. The read data from the DC is output as the ID Controller response to the PC.
- 2. The ERR line is not OFF, which informs the PC that local communications have been performed normally.
- 3. Line RS1 or RS2 of the ID Controller is ON, which informs the PC that the DC read operation has been completed.

Write and Auto Write Commands

- 1, 2, 3... 1. The normal termination code (00) is output as the response from lines RD0 to RD7 of the ID Controller.



Normal termination code

2. The ERR line is not OFF, which informs the PC that local communications have been performed normally.
3. Line RS1 or RS2 of the ID Controller is ON, which informs the PC that the DC write operation has been completed.

Abnormal Condition

- 1, 2, 3...
1. The ERR line will be OFF.
 2. The error code, as the response from lines RD0 to RD7, is returned to the PC.

Error Code List

| Error code | Error |
|------------|-------------------------|
| 70 | DC communications error |
| 71 | Disagreement error |
| 72 | DC not present |
| 7A | Address too high |
| 7B | Low battery warning |
| 7C | R/W Head not connected |
| 7D | Write protect error |

Note See 6-3 Error Lists for details on the errors.

- See 3-2-4 SRAM Data Carrier Battery Check for details on the low battery warning.
- The ERR line will be OFF when battery voltage is low, and the ID Controller treats it as an error.

Error Line (ERR)

The ERR line turns ON at the time of normal termination and turns OFF when there is an operation error.

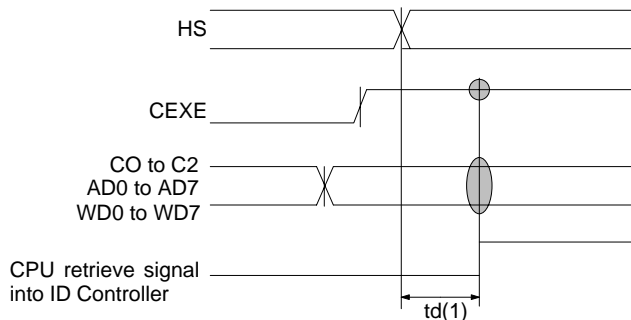
Response Strobe Lines (RS1 and RS2)

Lines RS1 and RS2 inform the PC that response data has been sent by command execution.

3-5 Command and Response Timing

3-5-1 Command Input Timing

By changing the host strobe line (HS) while the command execute line (CEXE) is ON, the ID Controller will execute the process specified by the command (C0 to C2) lines, address (AD0 to AD7) lines, and write data (WD0 to WD7) lines.



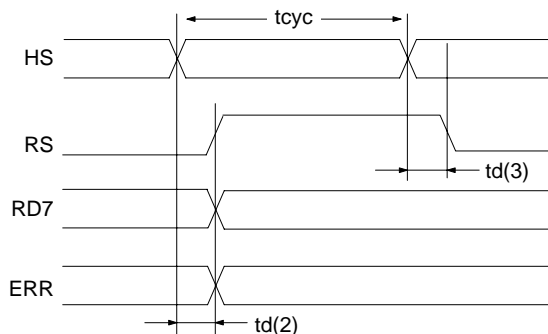
| Type of delay | Min. | Max. |
|--|--------|--------|
| Retrieval delay after the change of the HS line: $td(1)$ | 0.5 ms | 1.5 ms |

Operation

- 1, 2, 3... 1. The input signals (CEXE, C0 to C2, AD0 to AD7, and WD0 to WD7) will be retrieved following an interval of $td(1)$ after the HS line changes so that the input signals can be retrieved after they are fixed. If the Output Unit of the PC has a deviation of 0.5 ms or less in outputting signals, the HS line and input signals (CEXE, C0 to C2, AD0 to AD7, and WD0 to WD7) can be changed simultaneously. If the Output Unit of the PC has a deviation of more than 0.5 ms, the input signal must be retrieved before the HS line signal is input (for example, by retrieving the input signal one scan before the HS line signal is input) so that the input signals will be fixed when the ID Controller retrieves the HS line signal.
2. If the CEXE line signal is kept ON, the command will be executed again at the time of the next HS line change. Therefore, the CEXE line signal must be OFF before the next HS line change. If the Output Unit of the PC has a deviation of 0.5 ms or less when outputting signals, the CEXE line signal can be turned OFF at the moment the HS line changes.

3-5-2 Response Output Timing

When the ID Controller completes processing the command specified by the host unit, the ID Controller outputs response data to the error line (ERR) and response data lines (RD0 to RD7) in synchronization with the change of the host strobe (HS) after an interval of $td(2)$. By turning ON a response strobe line (RS), the ID Controller can send the response data to the host unit. RS1 turns ON for Head 1's command processing and RS2 turns ON for Head 2's command processing, both with which the host unit can retrieve the response data. The response strobe line will be OFF in synchronization with the change of the host strobe line (HS) after an interval of $td(3)$.



| Type of delay | Min. | Max. |
|--|--------|--------|
| Data transmission delay after the change of the HS line: $td(2)$ | 0.5 ms | 1.5 ms |
| RS clear delay after the change of the HS line: $td(3)$ | 0.5 ms | 1.5 ms |

Operation

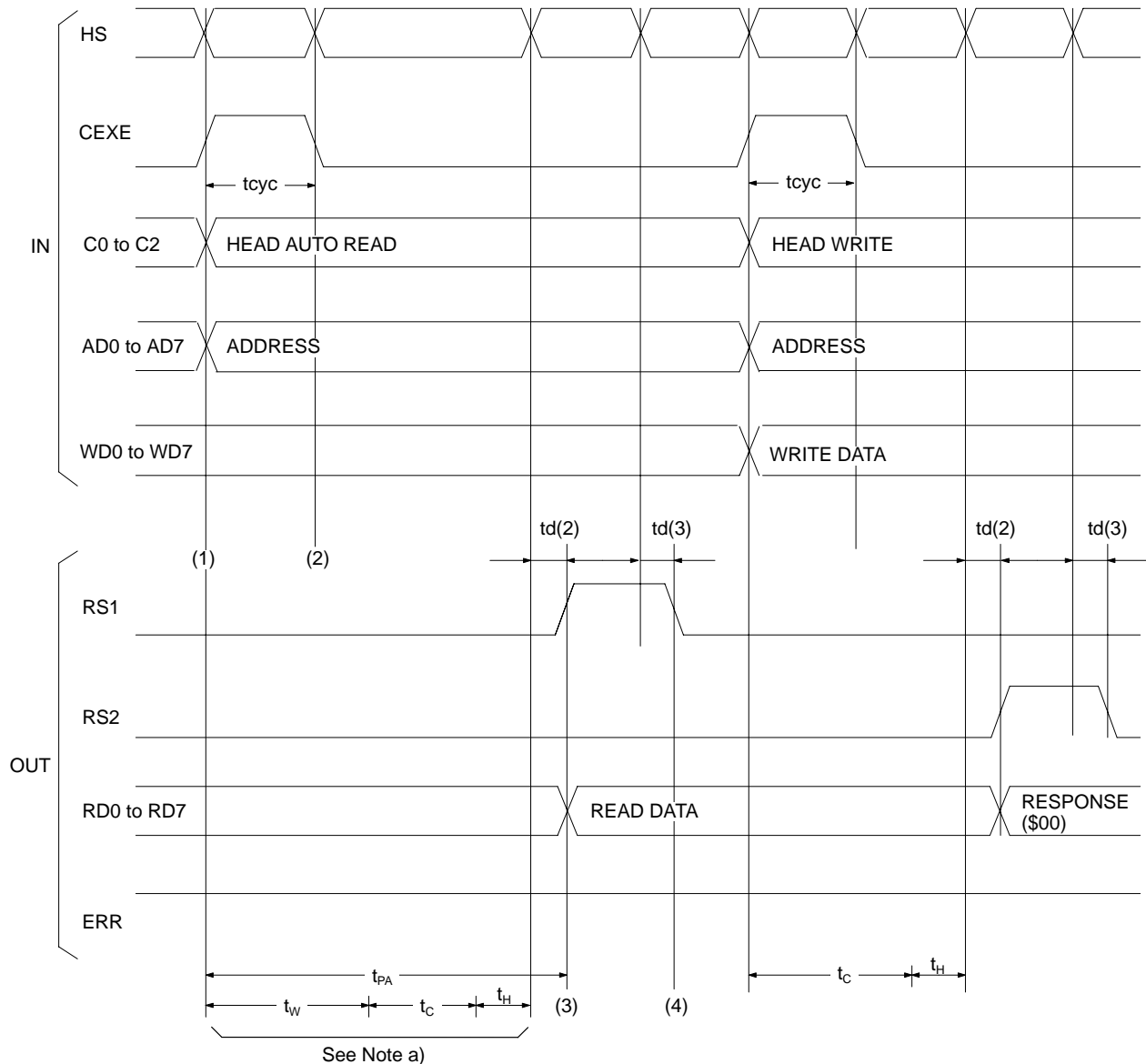
- 1, 2, 3... 1. A response strobe line (RS1 or RS2) and response data (RD0 to RD7 and ERR) will be output following an interval of $td(2)$ after the HS line changes.
2. A response strobe line (RS1 or RS2) will be turned OFF following an interval of $td(3)$ after the next HS line change.
3. The response data (RD0 to RD7 and ERR) will be on hold until the next response strobe line (RS1 or RS2) is output, at which time, the response data will change to the next response.

Note a) When the PC retrieves data, the output delay time of the PC's Output Unit, input delay time of the PC's Input Unit, OUT refresh timing, and IN refresh timing must be all synchronized.

- b) The cycle of the HS change (t_{CYC}) must be 10 ms or more, taking the I/O delay of the PC and the internal processing time of the ID Controller into consideration.

3-5-3 Operation Timing Chart

The following is an example of transmission of an auto read command to Head 1 and a write command to Head 2.



Operation

- 1, 2, 3...**
1. The moment the HS line changes, the command (C0 to C2) lines, address (AD0 to AD7) lines, and command execute (CEXE) lines are output.
 2. The moment the HS line changes, the command execute line (CEXE) is turned OFF. If the CEXE line is not turned OFF, the command will be overwritten.
 3. The ID Controller, in synchronization with the change of the HS line that has completed command processing after an interval of $t_d(2)$, outputs response data to response data lines RD0 to RD7 and turns ON line RS1 to indicate that this is a response for Head 1.

4. In synchronization with the next HS line change, after an interval of $t_d(3)$, line RS1 will be turned OFF.

- Note**
- a) t_{PA} :
 DC wait time (t_W) + command execution time (t_C) + HS line wait time (t_H) + $t_d(2)$
 If an auto command is to be executed, the DC wait time (t_W), which is required for the DC to approach the R/W Head, will be added.
 - b) The t_{CYC} value must be 10 ms minimum.
 - c) The above timing chart is an example using PC's Output Unit that has a deviation of 0.5 ms maximum when outputting signals.

3-6 Communications Time

- The communications time of the ID Controller varies widely with the PC program and PC's scan time. In this section, only the local communications time of the ID Controller, which is required for communications between the R/W Head and DC, is explained.
- The local communications time is referred to for the calculation of auto command movement speeds.
- The local communications time varies with the type of the DC's memory (SRAM or EEPROM).

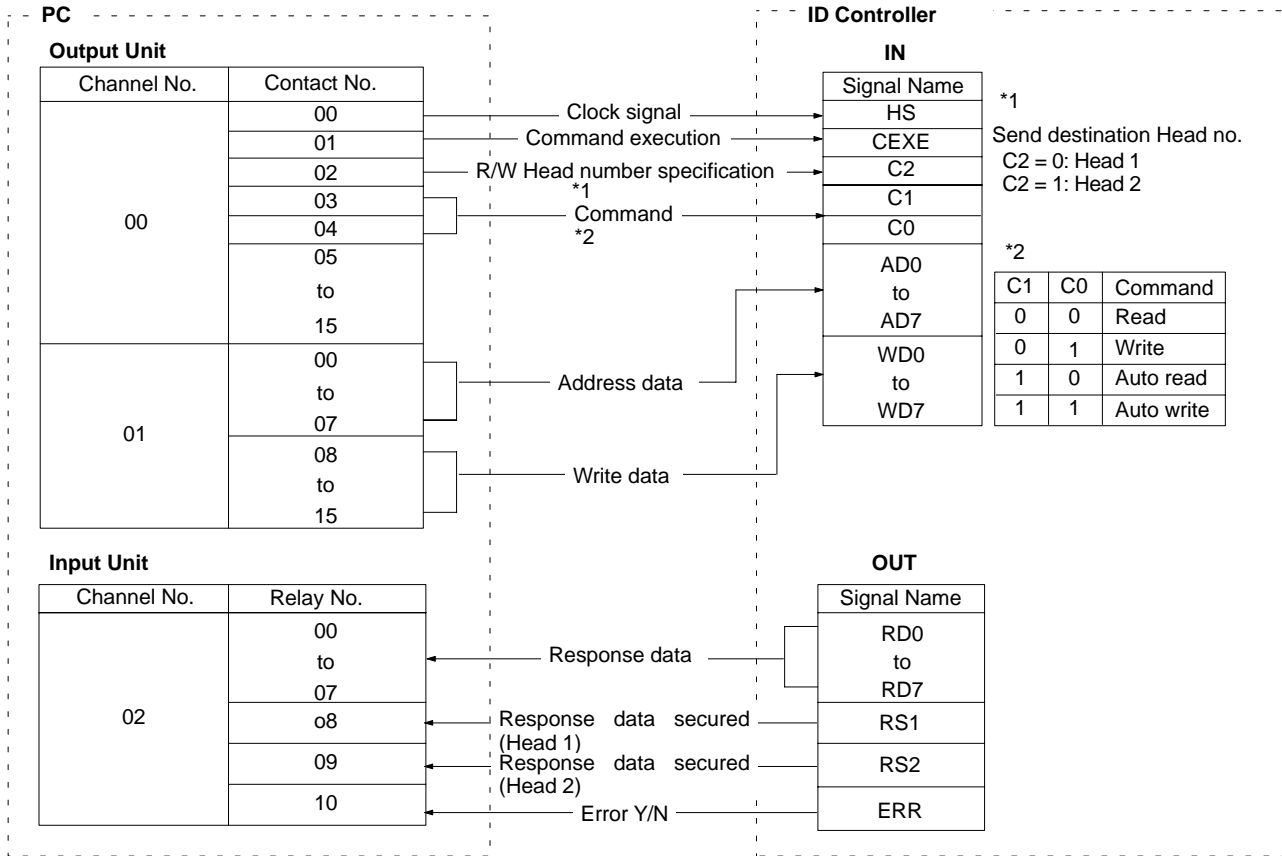
| Memory | DC | Local communications time |
|--------|-------|---------------------------|
| EEPROM | Read | 68 ms |
| | Write | 175 ms |
| SRAM | Read | 57 ms |
| | Write | 100 ms |

Note The ID Controller has access to the PC via a byte. Therefore, the local communications are executed by the byte.

3-7 Program Examples

This section gives examples of SYSMAC C500 auto read and auto write programs.

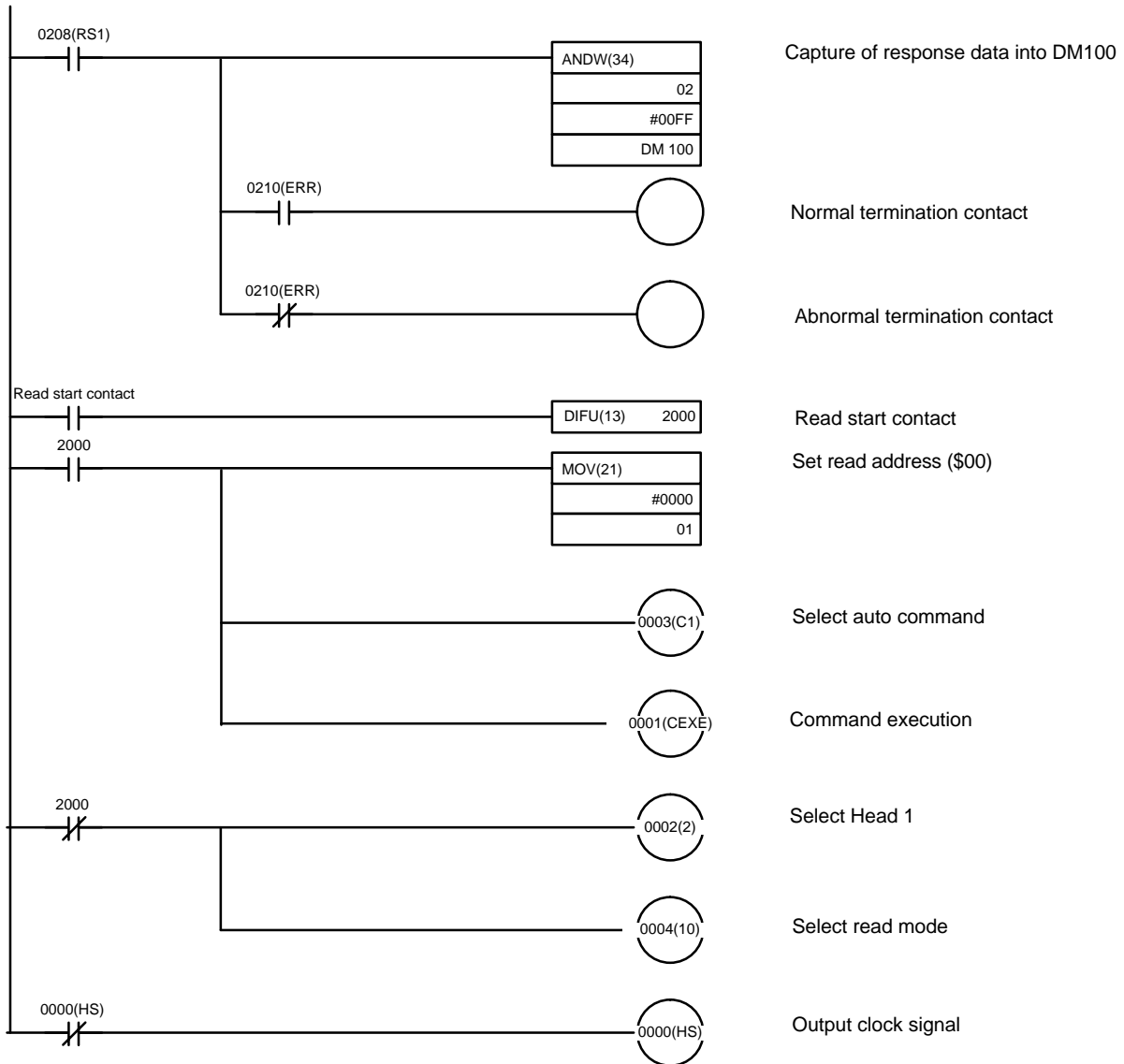
Example of PC and ID Controller Connections



Note See page 69 when connecting PC Input and Output Units.

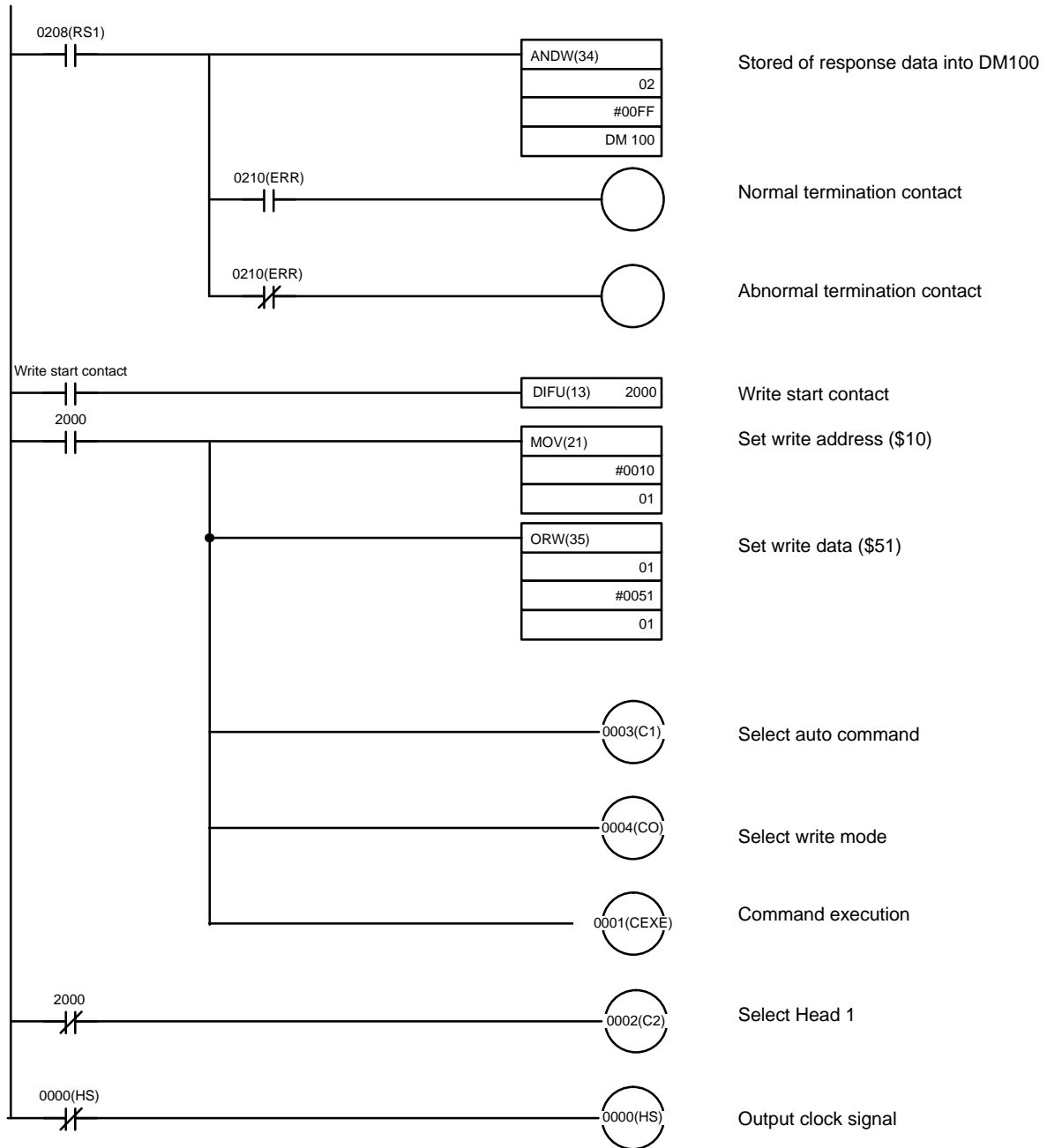
3-7-1 Example of One-byte Auto Read Operation

When read start contact goes on, data is read from DC address 00, and stored in DM 100.



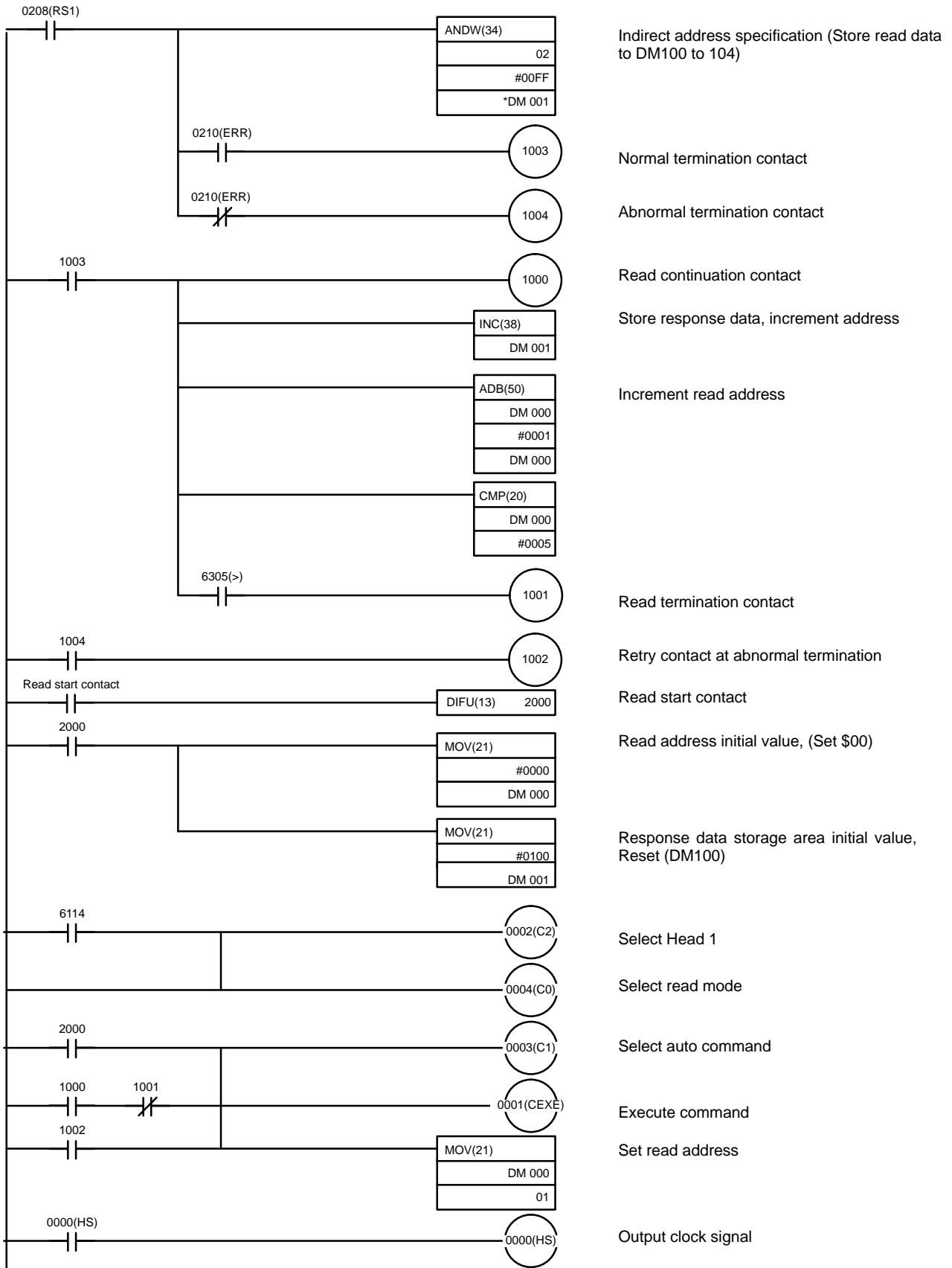
3-7-2 Example of One-byte Auto Write Operation

When write start contact goes on, data \$51 is written to DC address 10.



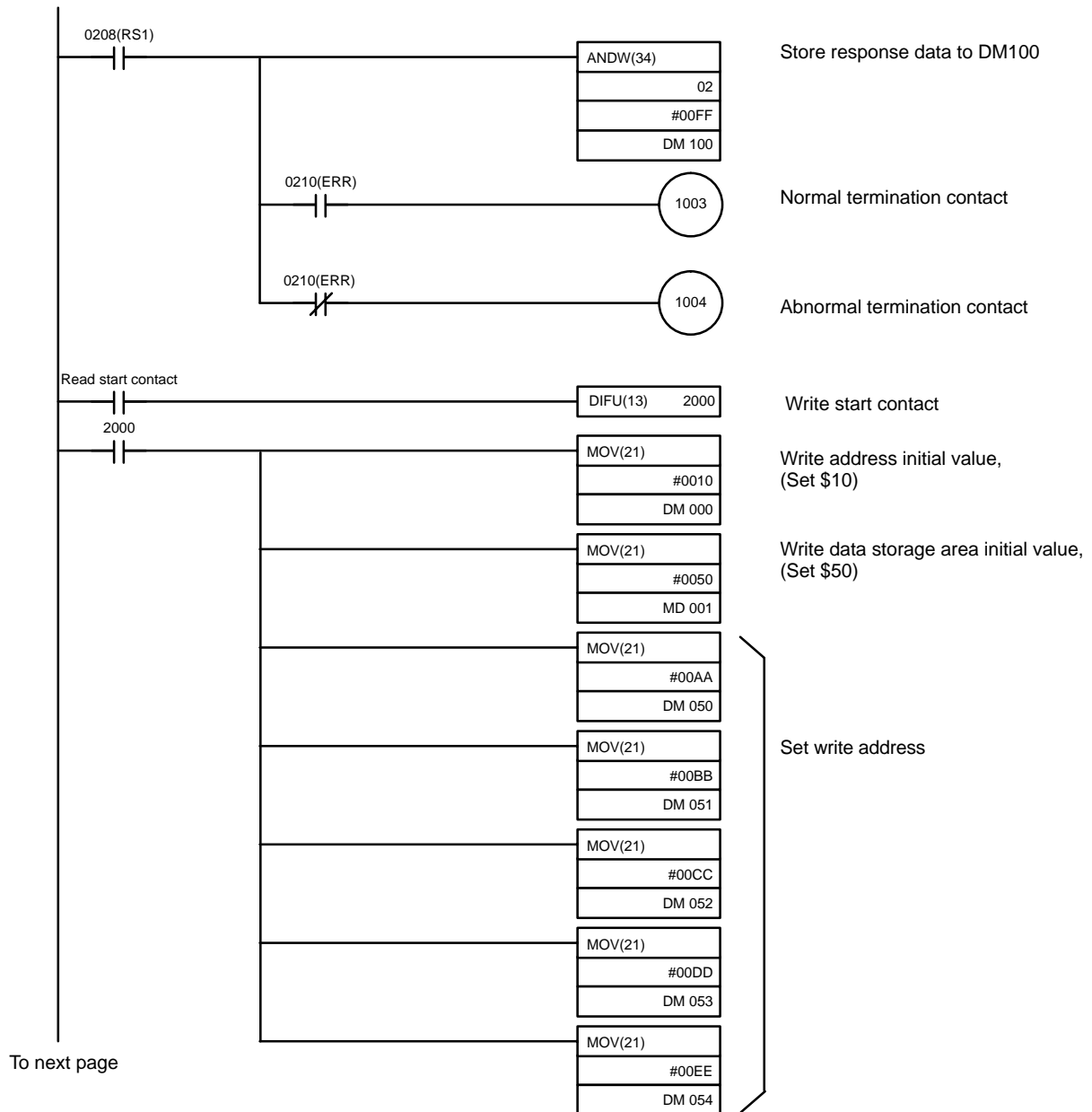
3-7-3 Example of Five-byte Auto Read Command

Five bytes of data is read starting from DC address 00, and stored in DM 100 to DM 104.

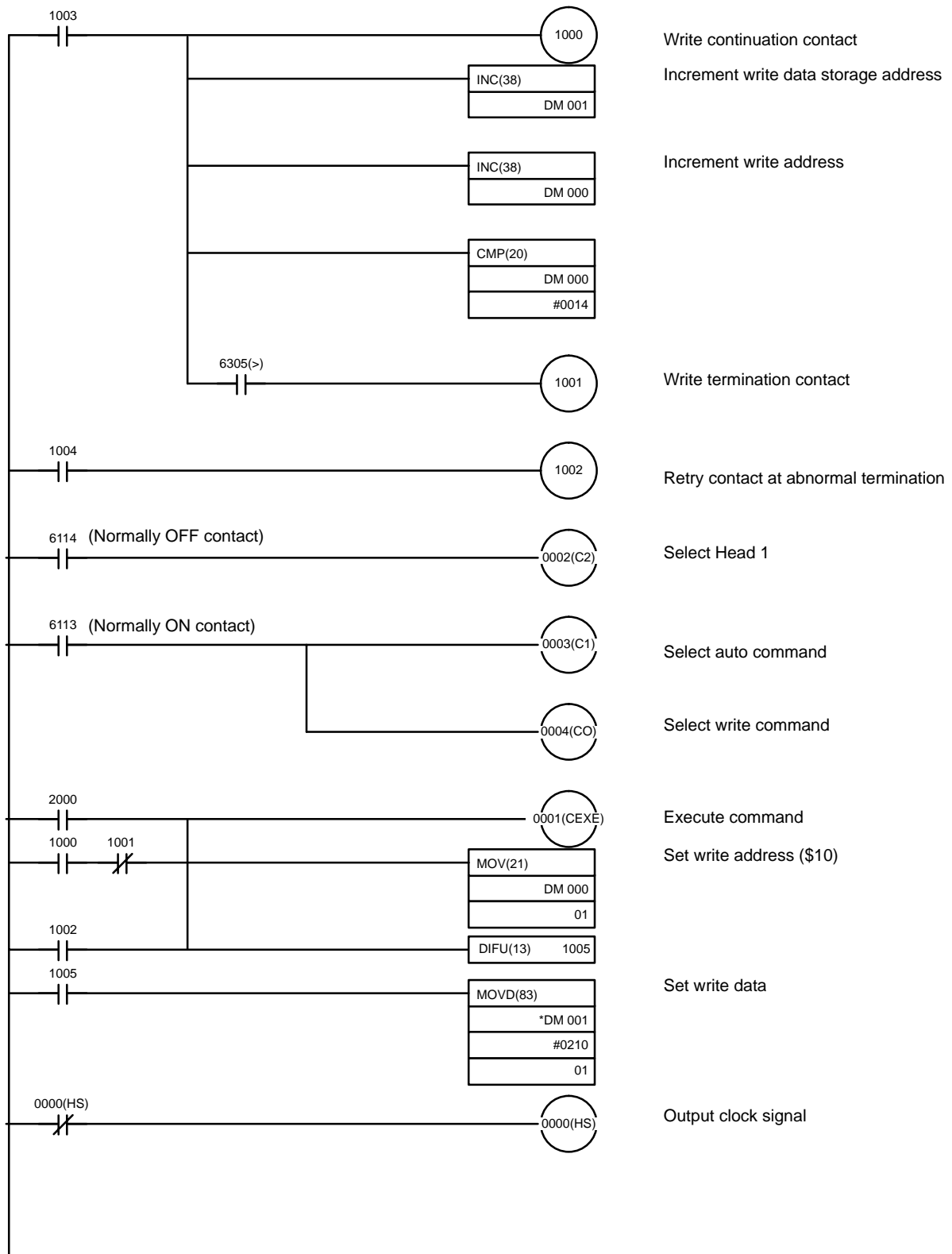


3-7-4 Example of Five-byte Auto Write Command

Five bytes of data from DM050 to 054 is written into DC addresses 10 to 14.



To next page



SECTION 4

Monitor Unit Operation

This section provides the commands and procedures required for Monitor Unit operations.

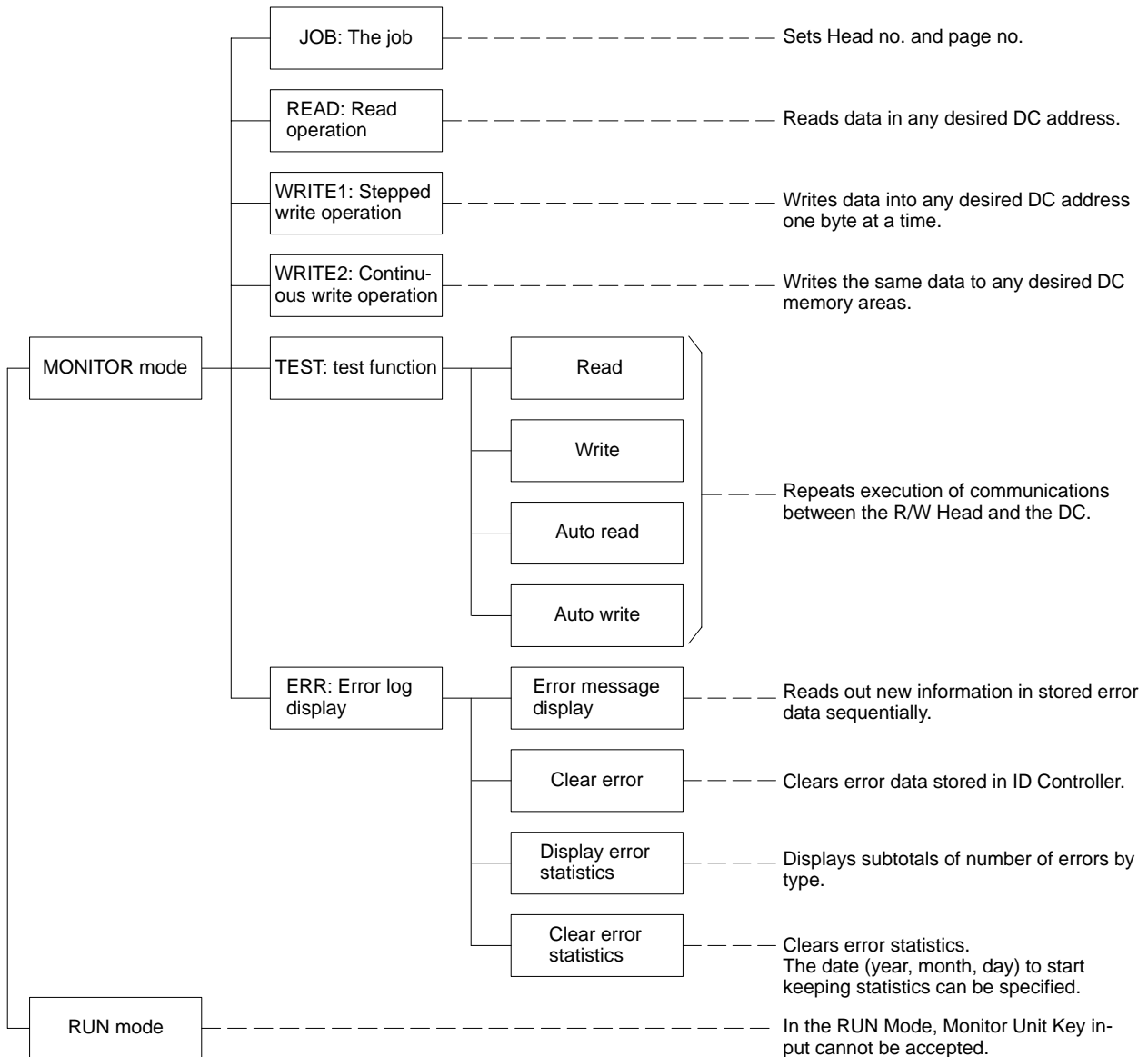
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4-1 Using Monitor Unit (V600-P01)

The Monitor Unit is a monitoring tool mounted on the ID Controller. It can be used during system startup to check communications with the DC, to read or write data to the DC, and to read any error messages.

4-1-1 Monitor Unit Functions

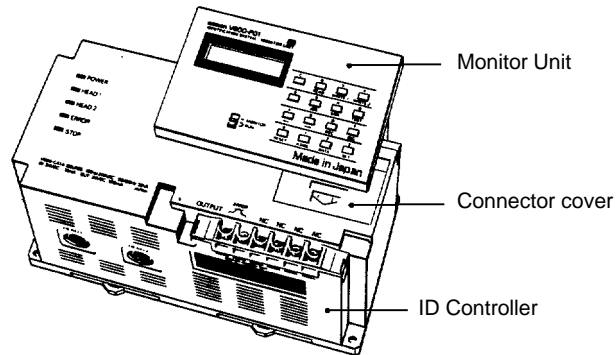
The Monitor Unit has the following functions which are executed in the MONITOR Mode.



Note Remove the Monitor Unit before starting operations.

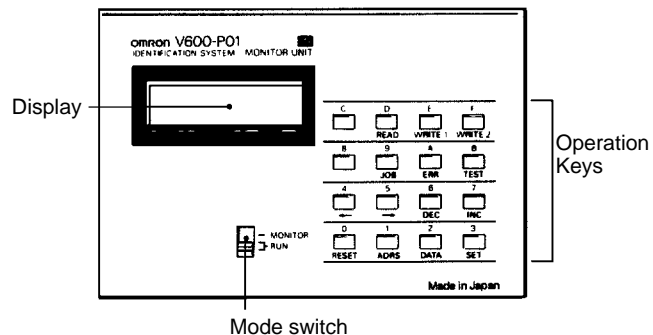
4-1-2 Mounting the Monitor Unit

The Monitor Unit is attached by sliding the ID Controller connector cover in the direction of the arrow on the cover. Press the four tabs on the back of the Monitor Unit down until they lock to make sure that it is mounted properly and securely.



- Note**
1. The Monitor Unit can be mounted while power is applied to the ID Controller. Note, however, that the ID Controller mode when the Monitor Unit is not mounted is the RUN Mode. This means that when the Monitor Unit mode switch is set to MONITOR Mode when the Monitor Unit is mounted on the ID Controller, the ID Controller's mode will change from the RUN Mode to the MONITOR Mode. Special care must be exercised at this point.
 2. If power is applied to the ID Controller with the Monitor Unit attached, information showing that power is being applied is displayed on the Monitor Unit display, but this operation has no effect on operation of the device.
 3. There are three positions on the mode switch, two of which specify the RUN Mode. It does not matter which setting is used.
 4. When the Monitor Unit is removed, the ID Controller reverts to the RUN Mode, regardless of which mode it was set in.

4-1-3 Nomenclature



Display

All data is displayed here in the MONITOR Mode. In the RUN Mode, only "RUN" is displayed.

Mode Switch

This is used to switch the operation mode of the ID Controller.

Operation Keys

These are used to select functions and execute operations and also include numerical keys.

■ Key Designations

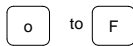
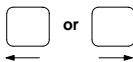
- Function selection



Operation



Numbers

**■ English/Japanese Character Selection**

Note There is a beeper in the ID Controller, which activated when a mistake is made in the Monitor Unit key operations, or when read or write operations cannot be performed (because DC is not present or other reasons).

4-1-4 Preparations for Operations in Monitor Mode

The following information provides the relationships between various settings before the execution of read, write, or test operations in the MONITOR Mode.

| Operation | | Read | WRITE 1, stepped write | WRITE 2, continuous write | Test read | Test, auto read | Test write | Test auto write |
|-------------------|---------------------------|------------------|-------------------------------|-------------------------------|--|--|-------------------------------|-------------------------------|
| Setting | | | | | | | | |
| JOB specification | Head no. (HEAD) | Setting required | Setting required | Setting required | Setting required | Setting required | Setting required | Setting required |
| | Page no. (PAGE) | Setting required | Setting required | Setting required | While significant, setting can be omitted (see note 1) | While significant, setting can be omitted (see note 1) | Setting required | Setting required |
| ADRS, address | Start address (a) | Setting required | Setting required (see note 2) | Setting required (see note 2) | While significant, setting can be omitted (see note 1) | While significant, setting can be omitted (see note 1) | Setting required (see note 2) | Setting required (see note 2) |
| | End address (\bar{a}) | --- | --- | Setting required (see note 2) | While significant, setting can be omitted (see note 1) | While significant, setting can be omitted (see note 1) | Setting required (see note 2) | Setting required (see note 2) |
| DATA (d) | | --- | Setting required | Setting required | --- | --- | Setting required | Setting required |

JOB Specification

The job specification includes the specifications of the R/W Head numbers and page numbers required for all read or write operations.

ADRS (Address) Settings

This requires setting the start address (a) and the end address (\bar{a}). It is extremely important to ensure that the start address does not exceed the end address. If it does, only the start address will be effective.

DATA Setting

For a write operation, one byte of the specified data is written to the DC in the area defined by the start and end addresses.

- Note**
1. Data setting is not required for an operation test with the test read or test auto read command to check the relationship of the position.
 2. If the DC's memory capacity is more than 256 bytes, data cannot be written to address 00 or 01 when page 0 is set with a page number because these addresses are used to register the production month and year of the DC. Nothing can be written to addresses 0002 to 0005 because these addresses are used as a write protected area.
- or
- If the DC's memory capacity is 256 bytes or less, no data can be written to address 00 when page 0 is set with a page number because this address is used as a write protected area.

4-2 Monitor Unit Operation List

4-2-1 Basic Operations

| Operation mode | Description | Basic operation procedure | Page |
|-------------------------|---|--|------|
| Changing operation mode | Switches ID Controller operation mode | <ul style="list-style-type: none"> • MONITOR Mode • RUN Mode | 43 |
| Job specification | Specifies Head and page numbers required for given operations | | 44 |
| Numerical keys | Used for setting address, specifying data, and selecting functions | <ul style="list-style-type: none"> • Address and data specifications o to F → o to F Upper digit Lower digit • Function selection 1 to 4 | --- |
| Address setting | Sets the address from which data is read or to which data is written in the range 00 to FF. | <ul style="list-style-type: none"> • Start address ADRS → o to F → o to F Upper digit Lower digit • End address → / ← → ADRS → o to F → o to F Upper digit Lower digit | 45 |
| Data specification | Specifies the 8-bit data (00 to FF) to be written to the DC. | | 46 |

Note Monitor Unit read and write data is limited to HEX code.

4-2-2 Data Read and Write Operations

| Operation mode | Description | Basic operation procedure | Page |
|---------------------------|---|---------------------------|------|
| Read (READ) | Data from any desired address is read from DC. | | 47 |
| Step write (WRITE1) | One byte of data is written to any desired address in the DC. | | 49 |
| Continuous write (WRITE2) | The same data is written to the desired continuous series of addresses in the DC. | | 50 |

4-2-3 Operation Test at System Startup

| Operation mode | Description | Basic operation procedure | Pages |
|-----------------------|--|---------------------------|----------|
| Select test parameter | Selects operation to test from among read, auto read, write, and auto write. | | 51 to 55 |

4-2-4 Reading Error Data

| Operation mode | Description | Basic operation procedure | Page |
|----------------------------------|---|---------------------------|------|
| Error logging function selection | Selects ID Controller error logging function | | 56 |
| Read error data | Up to 30 errors occurring in the RUN Mode are stored, and new occurrences are displayed in the order of occurrence along with Head numbers and error codes. | | 57 |
| Read error statistics | Subtotals of errors occurring in RUN Mode are displayed by type. | | 58 |
| Clear stored error data | Stored error data is cleared. | | 59 |
| Clear error statistics | Error statistics are cleared, and the data (year, month, day) for starting collection of statistics is specified. | | 60 |

4-3 Basic Operations

4-3-1 Changing Operation Mode

The following describes how to switch the ID Controller operation mode. By pressing the Left or Right Arrow Key when MONITOR is displayed, the English or Japanese display can be selected. The selected display will be on hold until the Left or Right Arrow Key is pressed again.

Relationship between Mode Switch and Display

English characters or Japanese characters can be selected.

Monitor Mode

The Monitor Unit key operations can only be used in the MONITOR Mode. Communications to the host computer stop when the MONITOR Mode is entered.



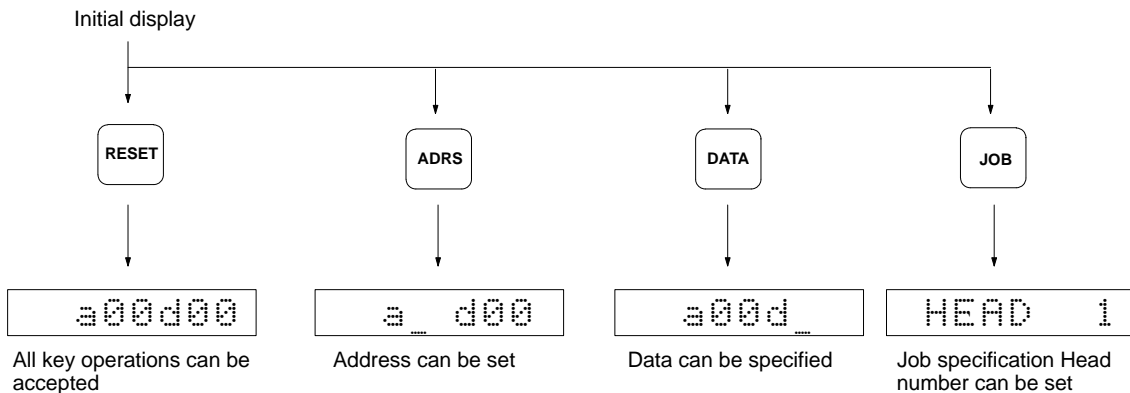
Run Mode

In the RUN Mode, "RUN," is always displayed and key inputs are not accepted. There are two switch positions for the RUN Mode, and operation is the same at both settings.



Key Assignments in Monitor Display

If the mode switch is set to monitor, "MONITOR" is displayed. When this is displayed, only the RESET, DATA, ADRS, and JOB Keys can be accepted.

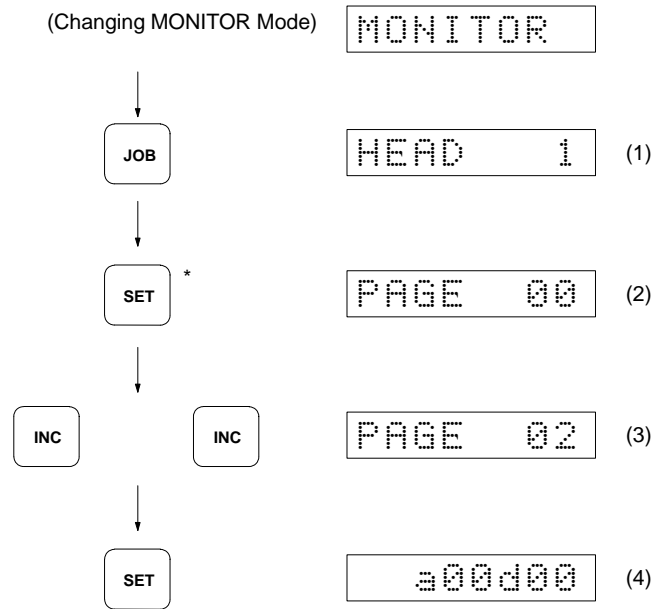


4-3-2 Job Specification (JOB)

This enables setting of the Head number and page number for data reading, writing and testing in the MONITOR Mode.

Operation Procedure

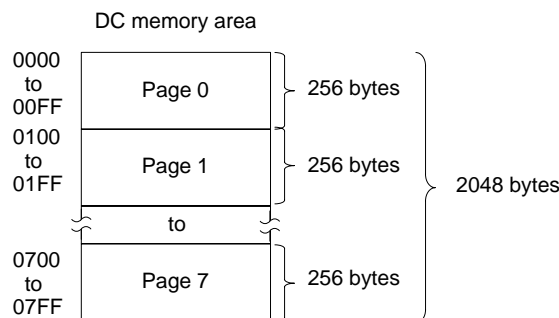
The following is an example specifying R/W Head 1 and Page 2 (DC memory area addresses 0200 to 02FF).



The JOB Key is effective when the MONITOR Mode initial display is shown. Press the RESET Key to move from another operation and create the job specification.

- 1, 2, 3...**
1. When the JOB Key is pressed, "HEAD1" is displayed. If R/W Head 1 is to be set, press the SET Key. If R/W Head 2 is to be set, press the INC/DEC Key once and then press the SET Key.
 2. When the Set Key is pressed, "page0" is displayed.
 3. Press the INC Key twice and specify page 2.
 4. Press the SET Key to set the page number to 2, and then the display changes to address/data.

- Note**
1. The Head number is specified using the INC/DEC Key. The numerical keys are not effective.
 2. A page number is the number of a division in the DC memory area (see page 19).

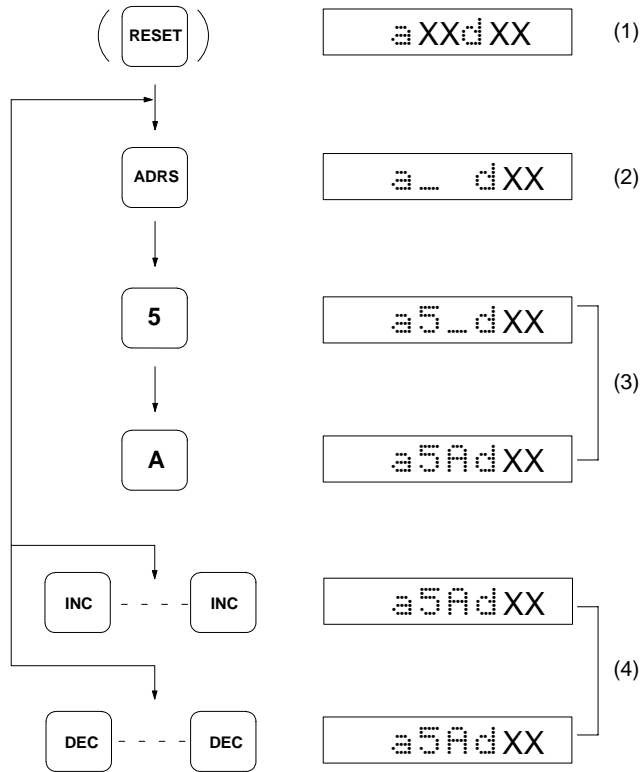


4-3-3 Address Setting (ADRS)

This enables the setting of the start address for data reading, writing, and testing.

Operation Procedure

Start address: 5A in this example



- 1, 2, 3...**
1. The address setting procedure must start from the address/data display.
 2. When the ADRS Key is pressed, the address display section goes blank, and the cursor is shown at the upper digit position.
 3. Specify the address in two digits using the numerical keys.

Note If a mistake is made during key operations, press the ADRS Key again and specify the address correctly using the numerical keys.

4. Subsequent address settings can be made using the INC (increment) Key, or the DEC (decrement) Key.

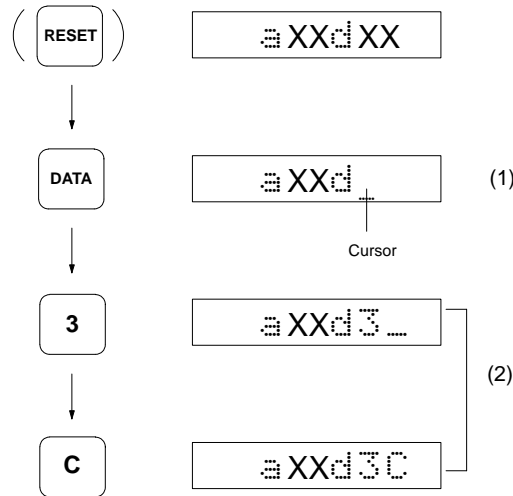
- Note**
1. The XX positions in the display are for the numerical data in the range 00 to FF.
 2. Addresses are displayed in two digits of hexadecimal numbers in the range 00 to FF. Since the page number was set at 2 previously in page 44, address 5A means address 025A in the DC memory area.
 3. To set an address on a different page, first specify the page number using the job specification procedure.

4-3-4 Data Specification (DATA)

When writing data to the DC, specify the data in two hexadecimal digits in the range 00 to FF.

Operation Procedure

The following procedure is an example showing how to specify 3C as the data.

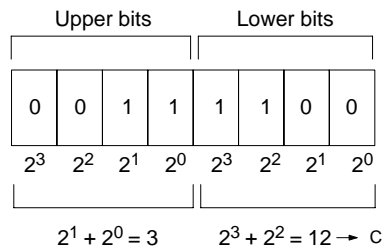


Data specification is performed in the address/data display.

- 1, 2, 3...**
1. When the DATA Key is pressed, the data display section goes blank, and the cursor appears at the upper digit.
 2. Specify the data in the order upper digit, lower digit.

Note If a mistake is made during key operations, press the DATA Key again and specify the address correctly using the numerical keys.

- Note**
1. Data contents: Each address location contains two digits in hexadecimal code comprising eight bits. The upper four bits and lower four bits represent hexadecimal code in the range 0 to F, thus the upper digit is 16^1 and the lower digit is 16^0 . After the procedure above, the address location looks like this.



2. Valid operations on data values: The following four operations can be performed on the data once it has been specified.

- WRITE1: Step write
- WRITE2: Continuous write
- TEST (write): Write test
- TEST (auto write): Auto write test

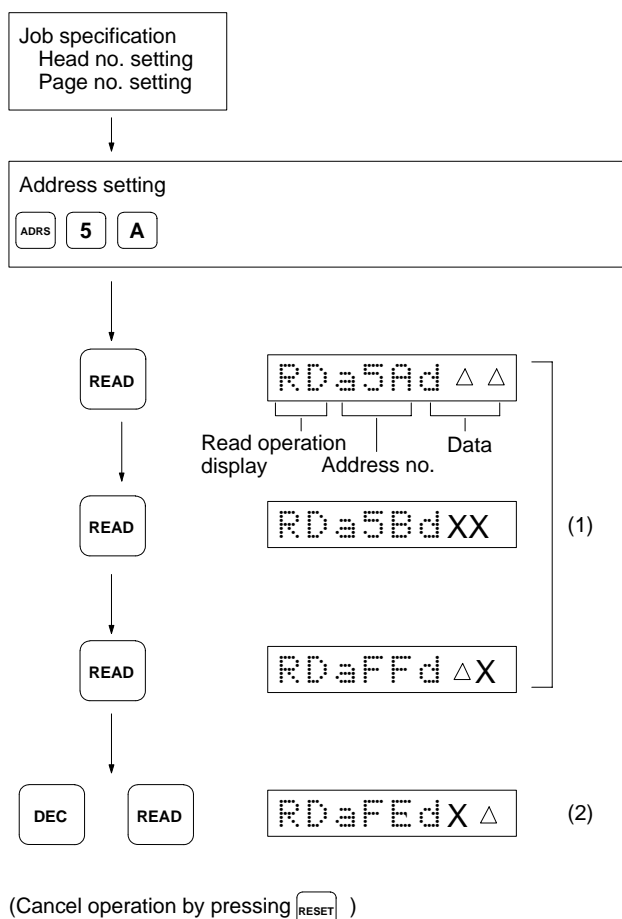
4-4 Data Read and Write Operations

These operations are used to read data from or write data to the DC in the offline condition. Before executing these operations, check that the R/W Head is connected, and check for the presence or absence of the DC.

4-4-1 Read

This is used to read data to the Monitor Unit from the desired DC address.

Operation Procedure



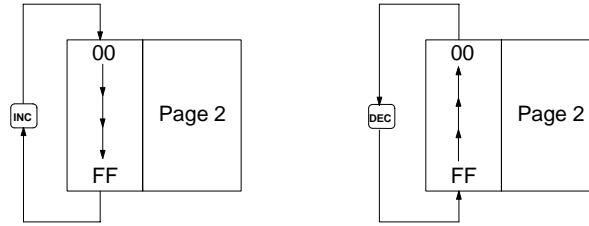
Data read by the read operation contains the job specification Head and page numbers. If the start address is not set, the data in address 00 is read.

- 1, 2, 3...
1. When the READ Key is pressed, "RD" (read operation) appears on the display, and the data in the specified address is shown at the right end of the display. If the READ Key is pressed again, the address is incremented, and the next data can be read.

Note If no R/W Head is connected, if the DC is not in the communications range, or if a communication error occurs, an error code is displayed (see page 78). When this happens, use the horizontal cursor keys to display the error message.

2. Use the INC/DEC Key to increment or decrement the address, and then press the READ Key to read the data. To read data from an address of a different page, start the procedure from the job specification.

Note 1. If the INC/DEC Key is pressed, and the address exceeds the 00 to FF range:

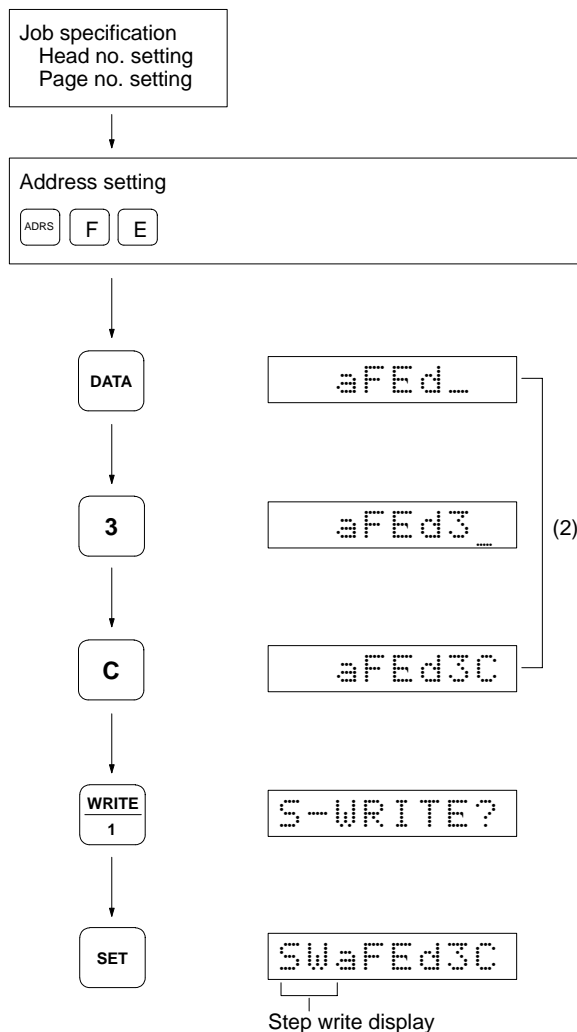


- 2. If the address is FF when the INC Key is pressed, the setting returns to address 00 of the same page.
- 3. If the address is 00 when the DEC Key is pressed, the setting moves to address FF of the same page.

4-4-2 Step Write

This is used to write one byte of data to the desired DC address.

Operation Procedure



(Cancel operation by pressing)

The step write operation writes the job specification Head and page numbers.

1, 2, 3... 1. Specify the address.

Note Page 0 addresses 00 and 01 are reserved for registration of the production data (year, month, day), and data cannot be written in this area. Note also when using this function that addresses 02 to 05 are write protected (see page 20).

2. Press the DATA Key and specify one byte of data (two hexadecimal digits).
3. When the WRITE1 Key is pressed, "S-WRITE?" is shown at the left end of the display.
4. When the SET Key is pressed, data is written to the specified DC address.

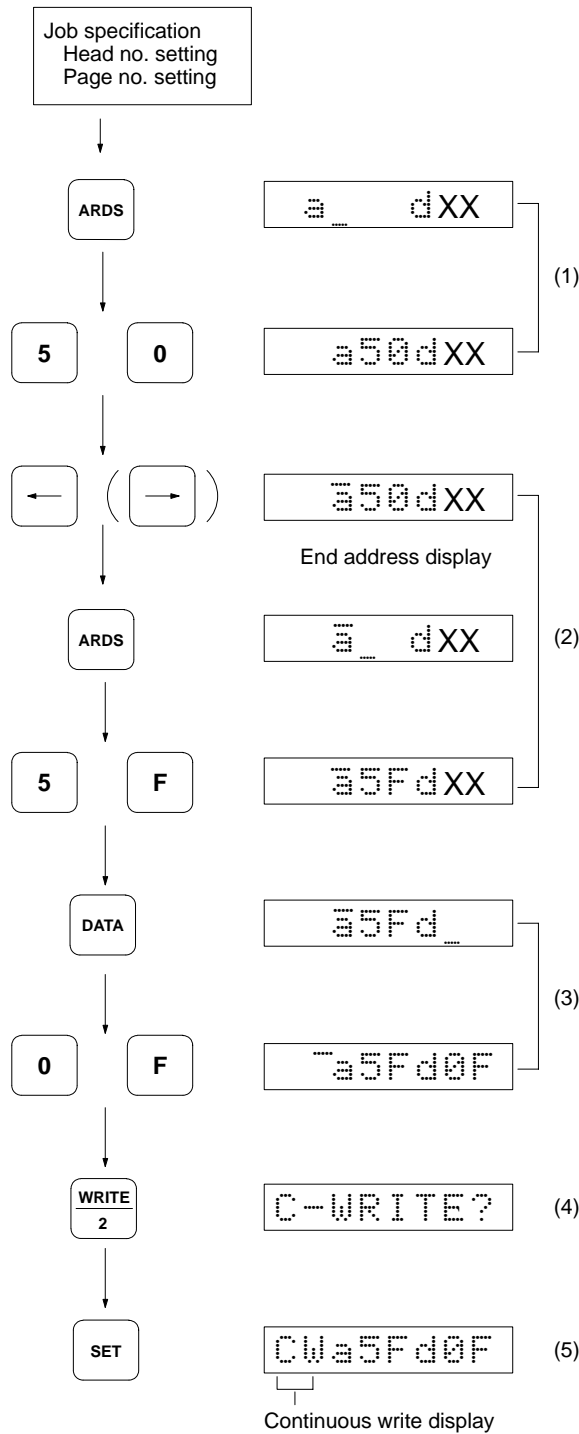
Note If no R/W Head is connected, if the DC is not in the communications range, or if a communication error occurs, an error code is displayed (see page 78). When this happens, use the horizontal cursor keys to display the error message.

4-4-3 Continuous Write (WRITE2)

This is used to write the same one byte of data to a continuous series of DC addresses.

Operation Procedure

The example shows the procedure for writing 0F into locations 50 to 5F.



(Cancel operation by pressing **RESET**)

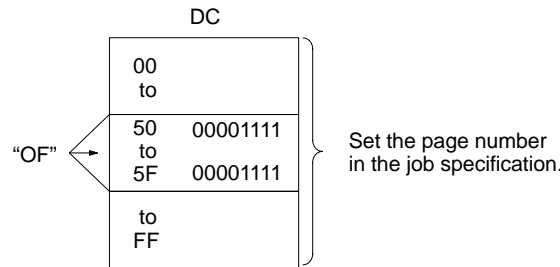
The continuous write operation writes the job specification Head and page numbers.

- 1, 2, 3... 1. Specify the start address.

2. Specify the end address. When either of the horizontal cursor keys is pressed, the display changes to the end address.

- Note**
- a) Ensure that the start address does not exceed the end address.
 - b) In the case of a DC with SRAM, page 0 addresses 00 and 01 are reserved for registration of the production date (year, month, day), and data cannot be written in this area. Note also when using this function that addresses 02 to 05 are write protected (see page 20).

3. Specify the data to be written. The example below shows the procedure for writing 0F to all 16 addresses 50 to 5F.



4. When the WRITE2 Key is pressed, "C-WRITE?" is shown at the left end of the display.
5. When the SET Key is pressed, the same data is written to all the specified DC addresses.

- Note** If no R/W Head is connected, if the DC is not in the communications range, or if a communication error occurs, an error code is displayed (see page 78). When this happens, use the horizontal cursor keys to display the error message.

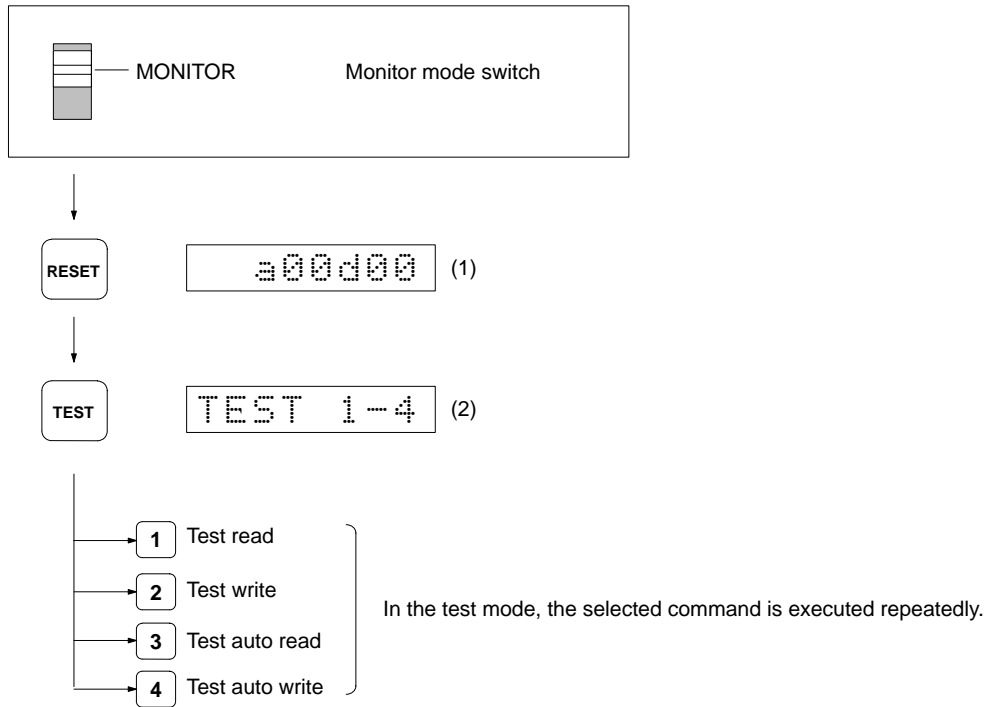
4-5 Operation Test (TEST)

When checking the installation of the R/W Heads and the DC, TEST can be used to initiate communications to establish the type of installation relationship and the relative speeds. Test commands are available for read, write, auto read, and auto write operations.

Preparations for Executing Test Commands

The job specification Head and page numbers are objects of the test commands. If the job specification has already been made, check the respective settings. If the job specification has not been made, the test commands use Head 1 and Page 0. Note that if the start and end addresses have been set, the entire area they define is used by the test commands.

Test Menu Selection

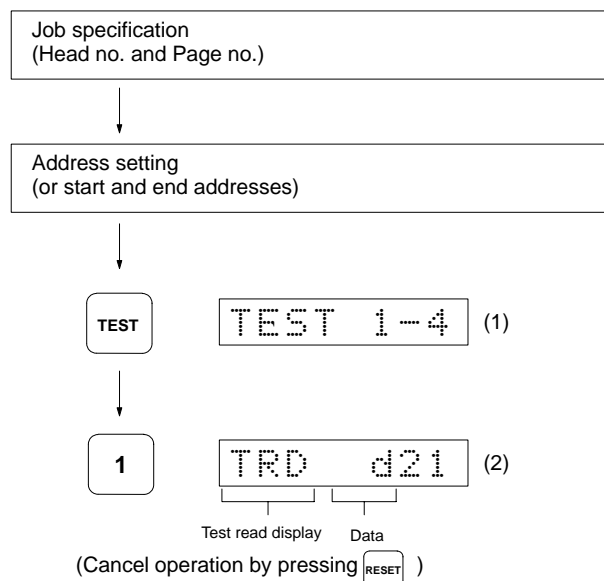


- 1, 2, 3...**
1. The TEST Key is not effective when MONITOR is shown on the display, so press the RESET Key.
 2. When the TEST Key is pressed, the command selection menu appears in the test mode. Use numerical keys 1 to 4 to select the command.

4-5-1 Test Read

Data in the specified DC address (or area defined by start address to end address) is repeatedly read out.

Operation Procedure



- 1, 2, 3...**
1. Press the TEST Key.
 2. When the Key 1 is pressed, test read is initiated, and the data is read out.

If the start address is set, only the data in that location is displayed.
 While the read test is in progress, the data in the display flashes every second, and the ID Controller Head number display indicator also flashes every second.

Note When an error occurs in communications between the DC and a R/W Head, the error code is displayed (see page 78). When this happens, use the horizontal cursor keys to display the error message.

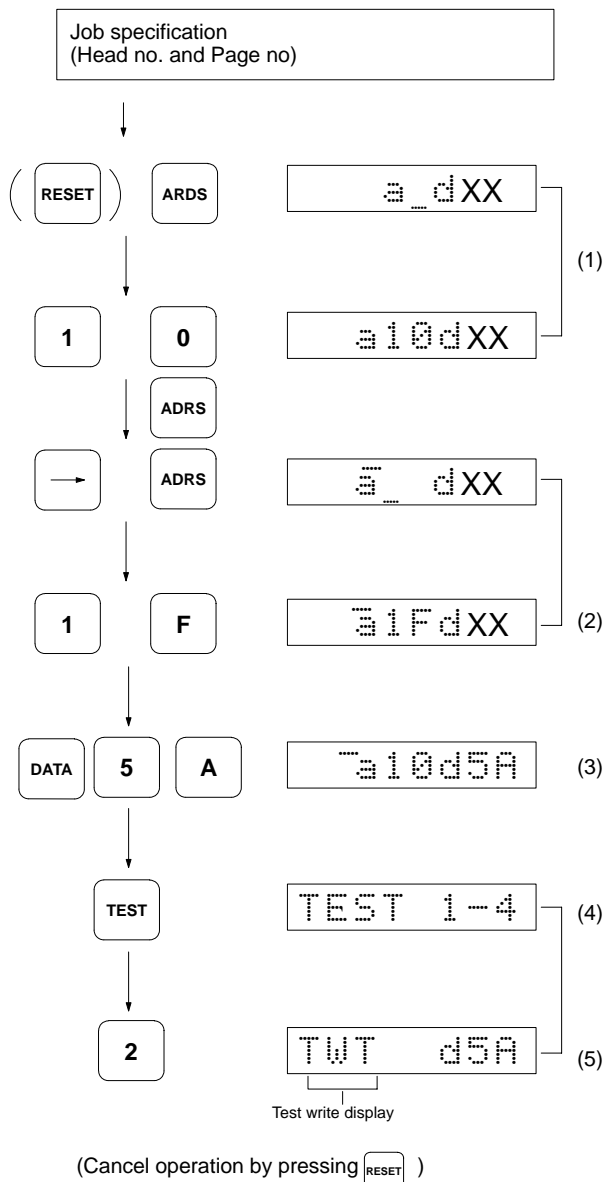
Note If the address setting is incorrect (start address > End address), then only the contents of the start address location are read.

4-5-2 Test Write

One byte of data is written to the specified DC address (or locations from start address to end address) repeatedly.

Operation Procedure

This example shows the procedure for writing 5A into locations 10 to 1F.



- 1, 2, 3... 1. Specify the address(es) to which data is to be written.

Note In the case of a SRAM DC, data cannot be written to addresses 00 and 01 on Page 0. In this example, data is written to address 10.

2. Specify the write end address. If the start address exceeds the end address, then data is written only to the start address location.
3. Specify the data.
4. When the TEST Key is pressed, the test menu is shown on the display.
5. When Key 2 is pressed, the write test is initiated, and if operation is normal, the write data is displayed.

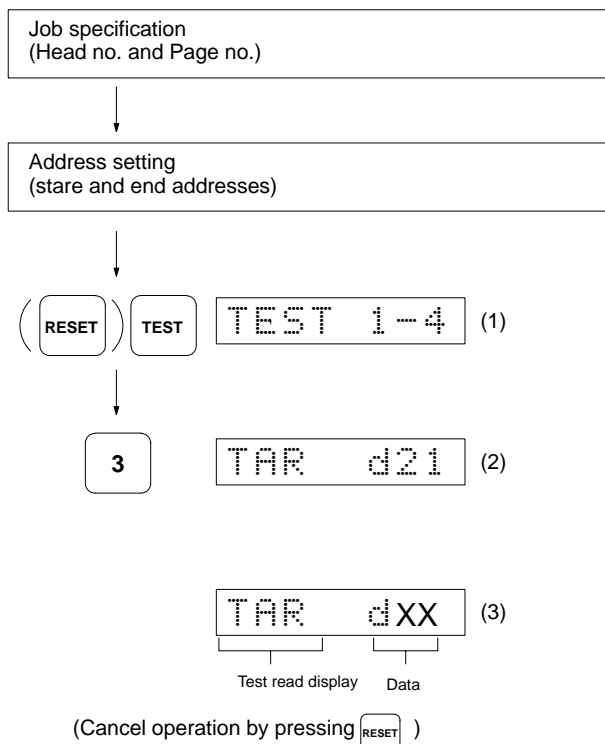
Note If operation is abnormal, and error code is displayed (see page 78). When this happens, use the horizontal cursor keys to display the error message.

4-5-3 Test Auto Read

Data is repeatedly read out from any memory area defined by specified start and end addresses from the DC while it is in motion.

The step number of the received data can be set to any value in the range 1 to FF (256 bytes maximum), enabling a total communications test checking relationships between installation positions, speeds, and other parameters.

Operation Procedure



- 1, 2, 3...**
1. When the TEST Key is pressed, the test menu is shown on the display.
 2. Press Key 3 to select auto read, and TAR is shown on the display. This indicates the DC waiting condition, and the indicator on Head 1 or 2 lights at this time.
 3. The DC approaches the operation range, and once processing is completed, the data in the location of the specified address (start address) is displayed. The Head 1 or 2 indicator now flashes. When an error code is displayed, use the horizontal cursor keys to display the error message.

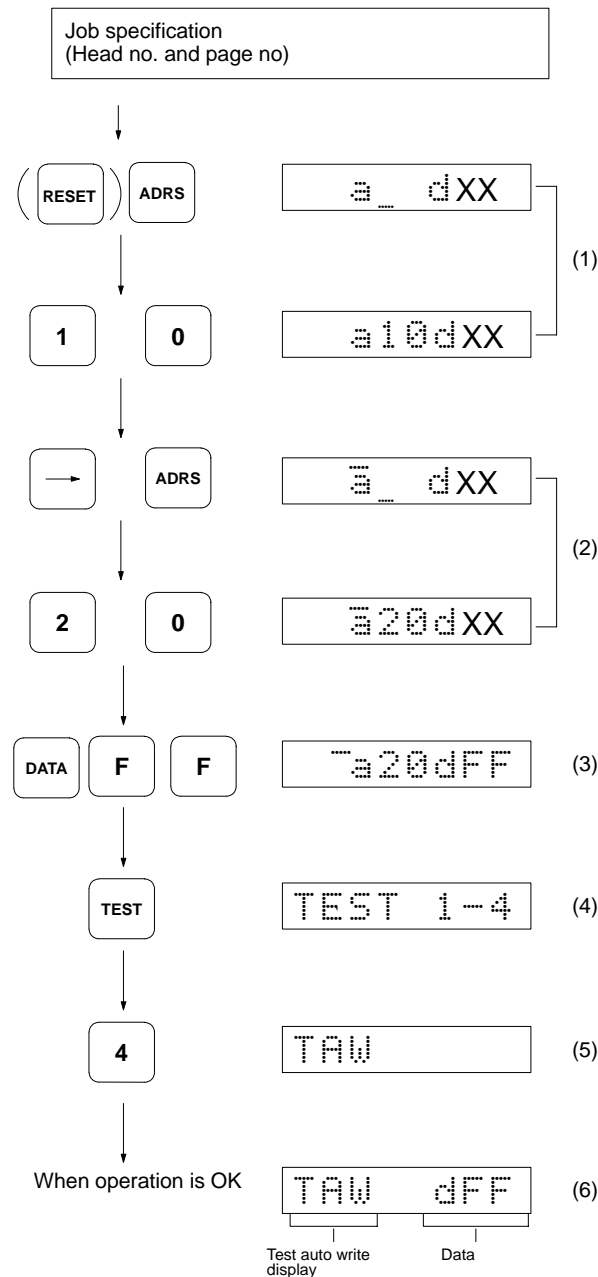
Note Ensure that the start address does not exceed the end address before pressing the TEST Key to read data from several addresses.

4-5-4 Test Auto Write

One byte of data is written repeatedly to any memory area defined by specified start and end addresses from the DC while it is in motion. The step number of the send data can be set to any value in the range 1 to FF (256 bytes maximum), enabling a total communications test checking relationships between installation positions, speeds, and other parameters.

Operation Procedure

This example shows the procedure for writing FF into locations 10 to 20.



(Cancel operation by pressing (RESET))

- 1, 2, 3...**
1. Specify the start address.
 2. Specify the end address.
 3. Specify the data.
 4. When the TEST Key is pressed, the test menu is shown on the display.

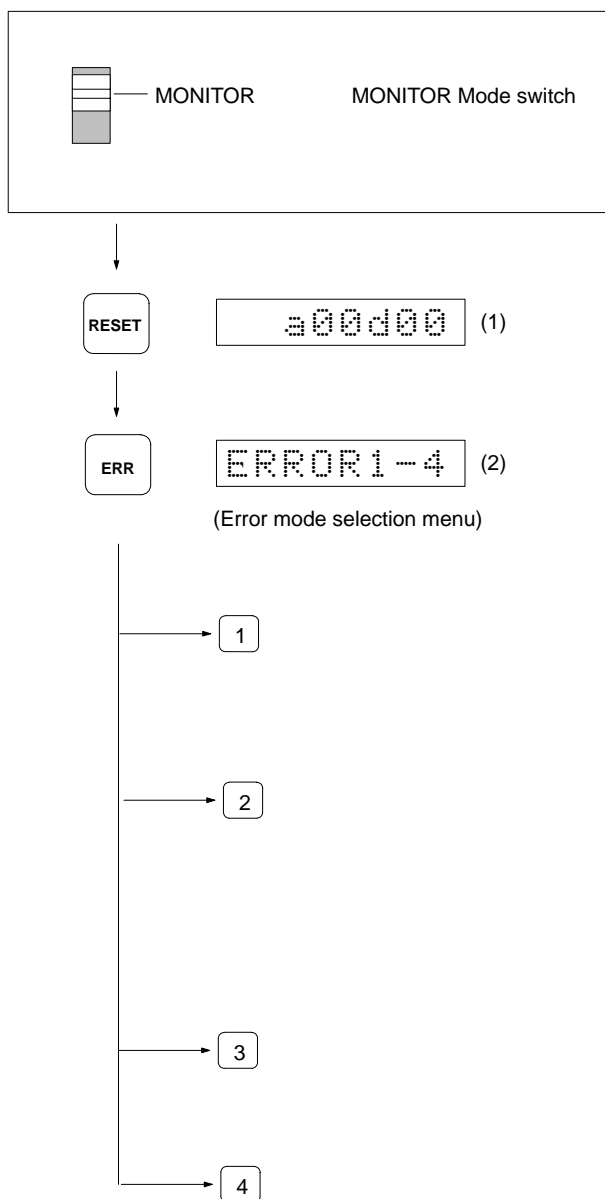
5. Press Key 4 to select auto write, and then TAW is shown on the display. Head 1 indicator lights now.
6. When the DC enters the operation range, the specified data is sent to the memory area defined by the start and end addresses, and Head 1 indicator flashes while processing occurs.

Note When only TAW is shown on the display, and no data is displayed, this indicates the DC waiting condition. When an error code is displayed, use the horizontal cursor keys to display the error message.

4-6 Reading Error Information (ERR)

All communications, system, and other errors occurring in the RUN Mode are stored in the ID Controller RAM. The latest error statistics (30 items maximum) can be read or cleared using the Monitor Unit.

Error Logging Menu Selection

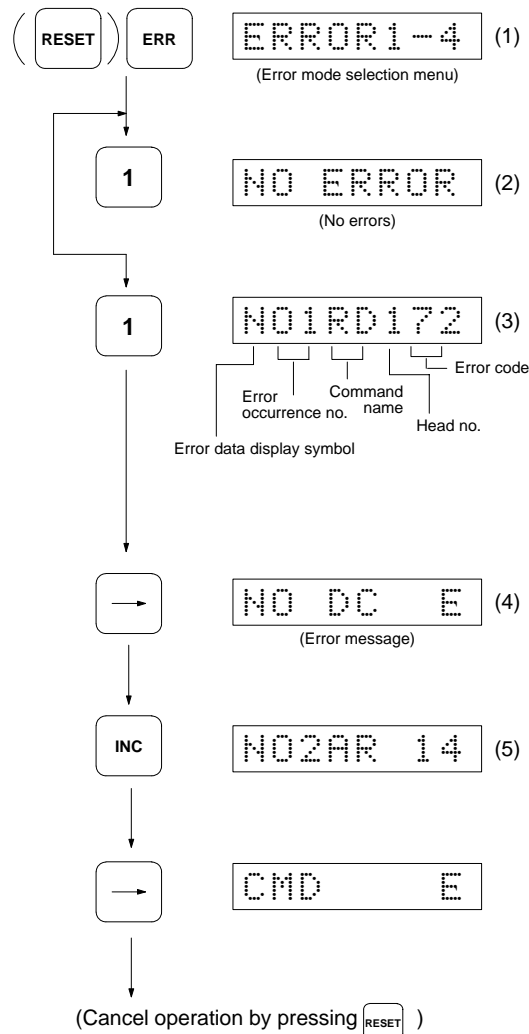


- 1, 2, 3...** 1. The ERR Key is not effective when MONITOR is shown on the display, so press the RESET Key to display the address and data.

- When the ERR Key is pressed, the error mode selection menu appears on the display. Use numerical keys 1 to 4 to select the error mode.

4-6-1 Reading Error Data

The ID Controller has a memory area designated for data storage of errors occurring in the RUN Mode. This memory area can store up to 30 items of error occurrence data, and if this number is exceeded, data is written over the first item and continues on sequentially. The read command can be used to read data from the newest items.



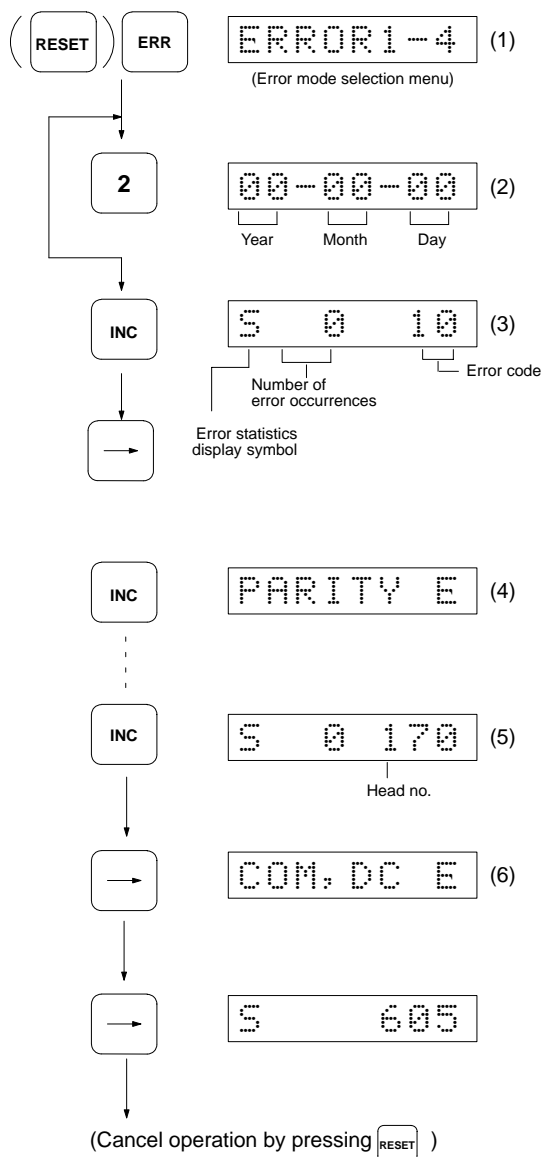
- 1, 2, 3...**
- When the ERR Key is pressed, the error menu is shown on the display.
 - When Key 1 is pressed, error data can be read. If there are no errors, NO ERROR appears on the display. When the RESET Key is pressed, address/data display is restored.
 - If there are errors, they are read out sequentially from the latest error.
 - While the error code is being displayed, use the horizontal cursor keys to display the error messages. When one of the horizontal cursor keys is pressed again, error code display is restored.
 - Press the INC Key to display the errors in order. Press the DEC Key to perform the reverse operation.

Note Error data (up to 30 items) and error statistics are stored in the ID Controller RAM. Data storage is supported by a maintenance-free back-up capacitor, and data is preserved for approximately 20 days (at 25°C) after power to the ID Controller is turned off.

4-6-2 Reading Error Statistics

Each time an error occurs, the ID Controller increments the subtotal for the given type of error. MCBF figures are also calculated simultaneously, and up to 999 data items are stored in the designated memory area. The error statistics read command enables supervision of error occurrence conditions, and therefore makes it possible to perform system operation condition diagnosis on a regular basis.

Operation Procedure



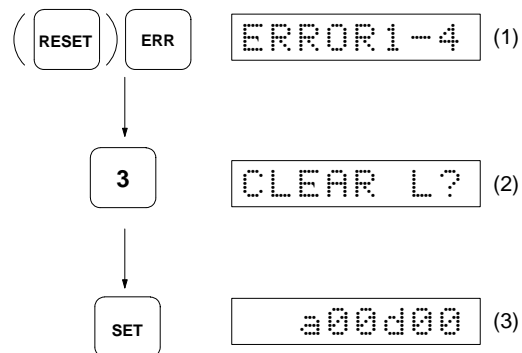
- 1, 2, 3...
1. When the ERR Key is pressed, the error menu is shown on the display.
 2. When Key 2 is pressed, the error statistics can be read. The first time this selection is made, the display is used to specify the data (year, month, day) when statistics collection is about to start.

3. When the INC Key is pressed, the number of error occurrences for the first error code 10 is displayed. The maximum number of occurrences that can be counted for each error code is 999.
4. While the error code is being displayed, use the horizontal cursor keys to display the error messages. When a horizontal cursor key is pressed again, the error code display is restored.
5. Press the INC Key to read the error occurrence conditions sequentially. Press the DEC Key to perform the reverse operation.
6. After displaying occurrence conditions for all errors, press the INC Key to display the MCBF. MCBF is obtained by dividing the total number of host commands by the total number of occurrences of communications errors (see note below).

Note This includes all communications errors with the host computer, R/W Head, DC, and other devices.

4-6-3 Clear Error Data

Error data is cleared from memory.



- 1, 2, 3...**
1. When the ERR Key is pressed, the error menu is shown on the display.
 2. Press the 3 Key.
 3. When the SET Key is pressed, the error data is cleared, and address/data display is restored.

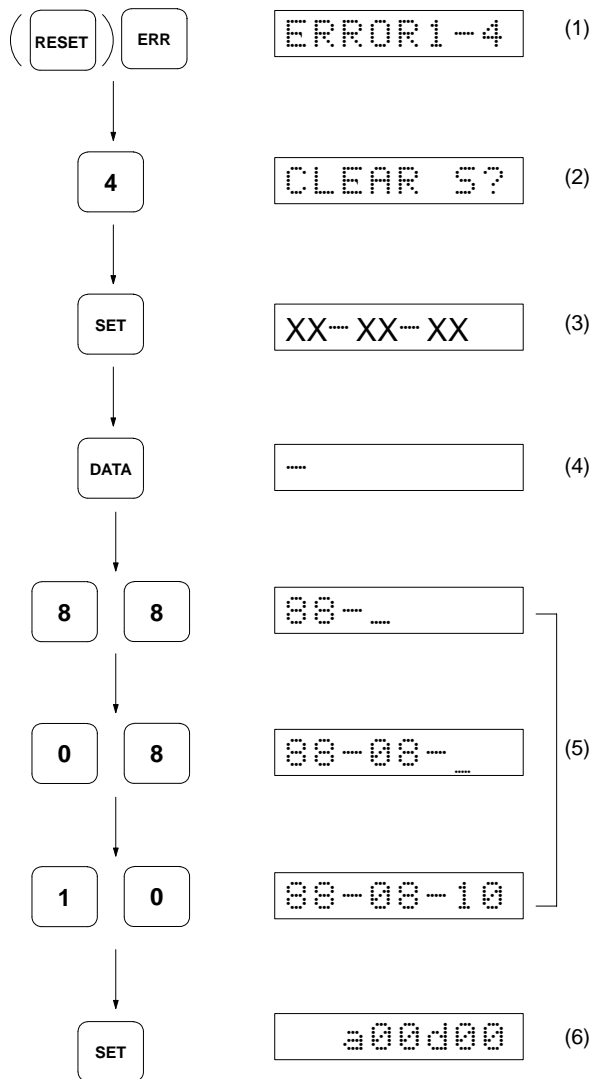
Note To cancel the error data clear command, press the SET Key before pressing the RESET Key.

4-6-4 Clear Error Statistics

This procedure is used to clear error statistics from memory, and to specify the new date (year, month, day) to start collecting statistics.

Here we take August 10, 1988, as an example.

Operation Procedure



- 1, 2, 3...
1. When the ERR Key is pressed, the error menu is shown on the display.
 2. Press the 4 Key.

Note To cancel the error data clear command, press the SET Key before pressing the RESET Key.
 3. When the SET Key is pressed, error statistics data is cleared, and the format for specifying the new data (year, month, day) when statistics collection is to begin is shown on the display.

Note If this data does not need to be changed, press the RESET Key.
 4. When the DATA Key is pressed, the cursor appears at the left end of the display, and the date can now be specified.
 5. Use numerical keys 0 to 9 to specify the date. Keys A to F are effective, but if these are used, the setting value cannot be guaranteed.
 6. When the SET Key is pressed, the date is set, and address/date display is restored.

SECTION 5

Installation and Wiring

This section provides installation and pre-operation setting procedures.

| | | |
|-------|---|----|
| 5-1 | Installation Environment | 62 |
| 5-1-1 | Location | 62 |
| 5-1-2 | Panel Installation Position | 62 |
| 5-2 | ID Controller Installation | 62 |
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5-1 Installation Environment

The V600-CA8A-V□/9A-V□ ID Controller is a high-reliability control system that is resistant to variations in environmental conditions. Nevertheless, it is important to observe the following precautions during installation to increase reliability and ensure that all system functions can be used to the utmost.

5-1-1 Location

Do not install the ID Controller in locations subject to the the following conditions.

- Ambient temperature varies outside the range -10°C to 55°C , or temperature varies rapidly thus causing condensation.
- Relative humidity varies outside the range 35% to 85%.
- Presence of corrosive gases, combustible gases, dust, saline atmosphere, or steel particles.
- Possibility of vibration or direct impacts to ID Controller.
- Exposure to direct sunlight.
- Exposure to water, oil, or chemical sprays.

5-1-2 Panel Installation Position

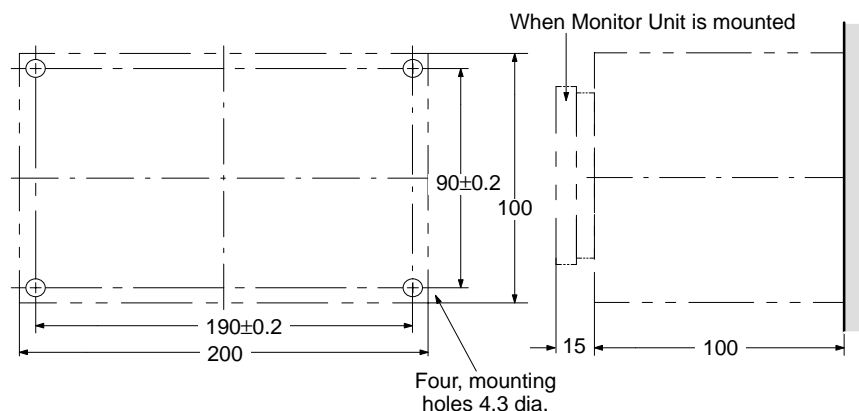
The ID Controller operates under ambient temperatures in the range -10°C to 55°C . It also requires the following conditions.

- Sufficient space for ventilation.
- Avoid installation in the vicinity of equipment such as heaters, transformers, or high-capacity resistors that generate large amounts of heat.
- Install a control fan or cooler in case the ambient temperature rises above 55°C .
- Note that when the Monitor Unit is mounted, the acceptable range for the ambient temperature is only 0°C to 40°C .
- Memory is backed up by built-in capacitors, which will maintain memory for 20 days at a temperature of 25°C , but note that if the ambient temperature increases above this level, the number of days memory is maintained decreases. At 65°C , memory is maintained for only about two days.

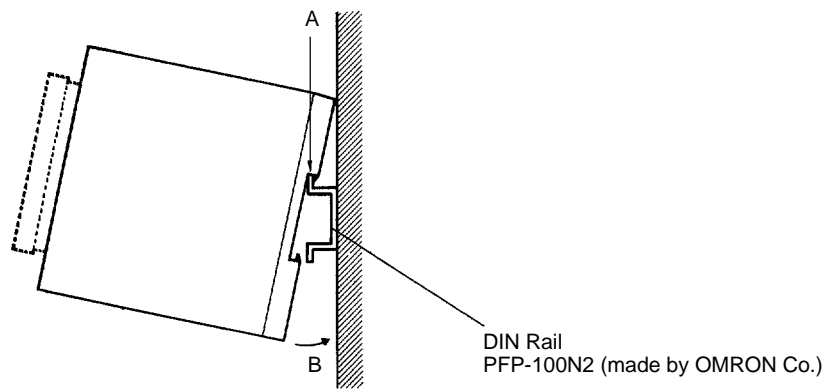
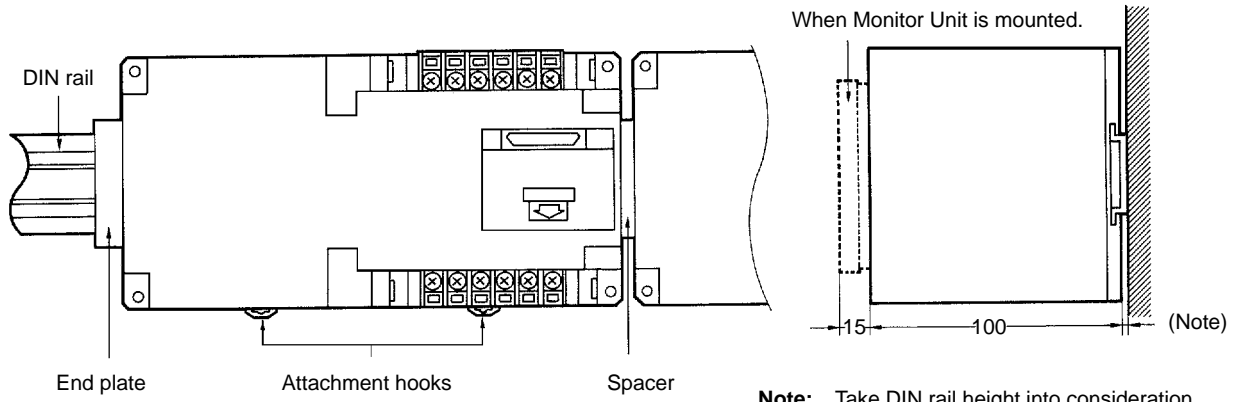
5-2 ID Controller Installation

5-2-1 Direct Attachment to Panel

When installing the ID Controller so that it is directly mounted to the panel, it is extremely important to use flat washers and to secure the ID Controller with M4 screws.



5-2-2 DIN Rail Attachment



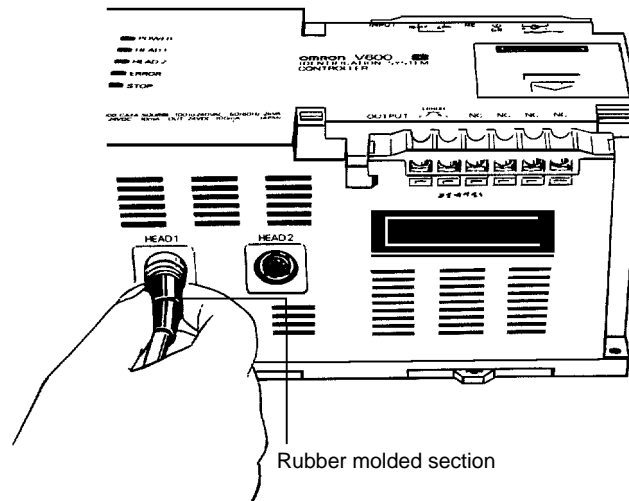
- 1, 2, 3...**
1. When attaching the ID Controller to a DIN rail, first attach at A, then push in direction B to mount the ID Controller.
 2. To remove the ID Controller from the DIN rail, pull the attachment hooks forward.

5-3 Connecting and Disconnecting R/W Head Connector

5-3-1 Connection Procedure

- 1, 2, 3... 1. Hold the rubber molded section of the connector and insert the cable connector by fitting it into the key groove.
2. Now push in the connector until it locks.

Note If the connector ring is pushed in, it will not lock, and therefore it is extremely important to hold the connector by the rubber molded section.

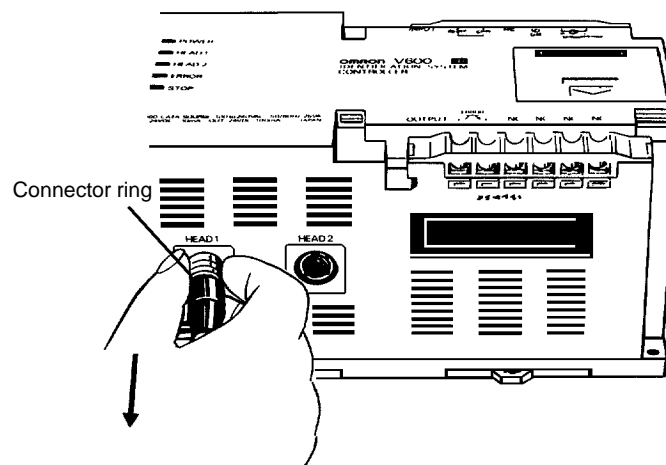


5-3-2 Disconnection Procedure

Hold the connector ring and pull it out.

Note The connector cannot be disconnected by pulling on the rubber molded section.

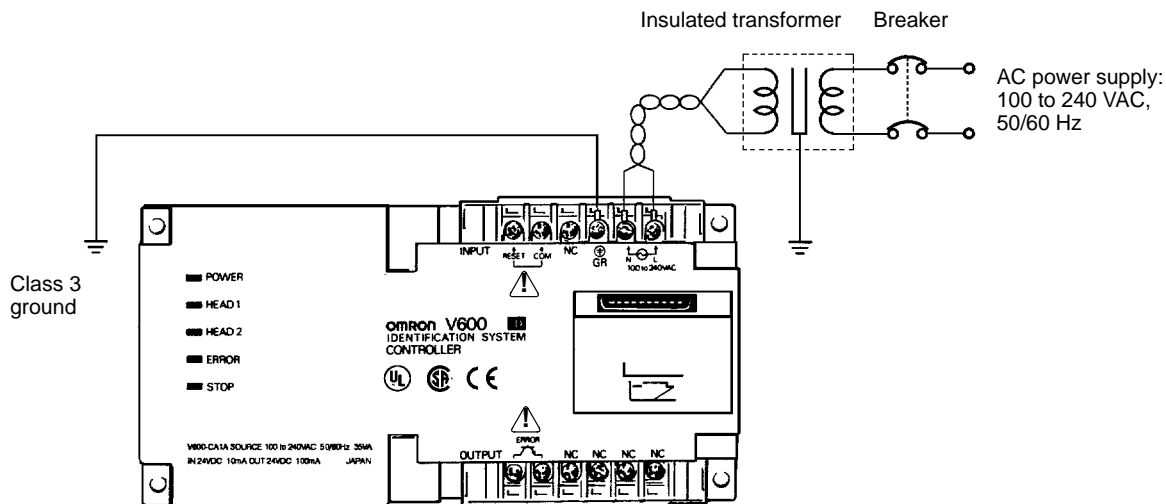
Caution It is extremely important not to pull the cable with too much force, as this could break wiring connections or damage the connector in other ways.



5-4 Wiring Procedures

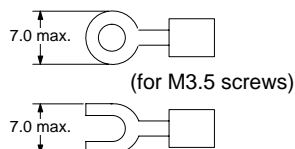
5-4-1 Power Supply and Ground Line Wiring

The ID Controller conforms to IEC1010-1, EN61010-1, UL3101 and CSA1010-1. Therefore, field wiring is readily available.



Note Use a Tokin GT-20601 filter or equivalent approved by TÜV or VDE. Then ground its ground terminal.

- The screws used on the power supply and the protective conductor terminal are M3.5 self-tapping screws. If a crimp-on terminal is to be used, select one from those shown below. Ensure that the binding torque is about 8 kg • cm.

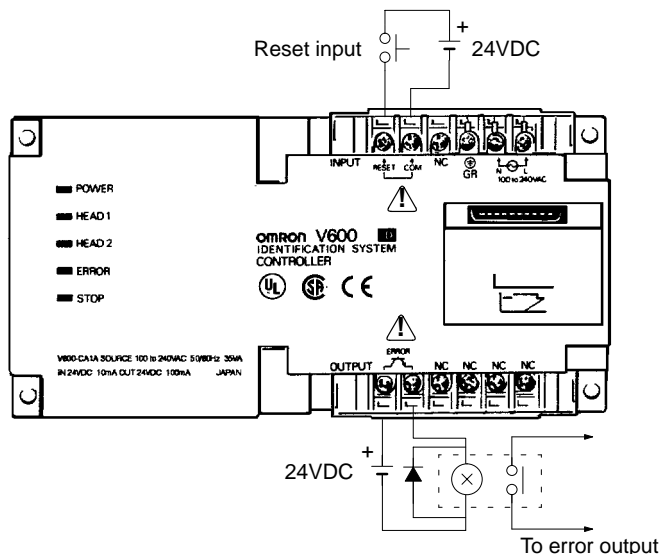


- Ensure that the line voltage is in the range of 100 to 240 VAC. It is also extremely important to ensure that the permissible voltage variation range of 85 to 264 VAC is not exceeded.
- The ID Controller has internal components to deal with noise from the power line, and supplying power via a 1:1 insulated transformer drastically attenuates ground noise.
- The ID Controller power consumption is less than 35 VA using the maximum configuration, but when setting up the power supply, note that there is a surge current of approximately 15 A (at 100 VAC) when power is applied to the system.
- Use a power cable with at least a 2-mm² cross-section with no voltage drop. It is recommended that the power wires be twisted for use.
- To prevent electric shocks and improve noise resistance, independently ground the ID Controller at a resistance of less than 100 Ω.
- Do not use the open terminal (NC terminal).

5-4-2 Input/Output Line Wiring Precautions

Reset Signal Input

- Take sufficient care to ensure that the input voltage does not exceed the maximum applied voltage (26.4 V). Exceeding the permissible voltage level will damage the equipment.
- Lay the input line away from high-voltage equipment or power lines to improve noise resistance of the lines.



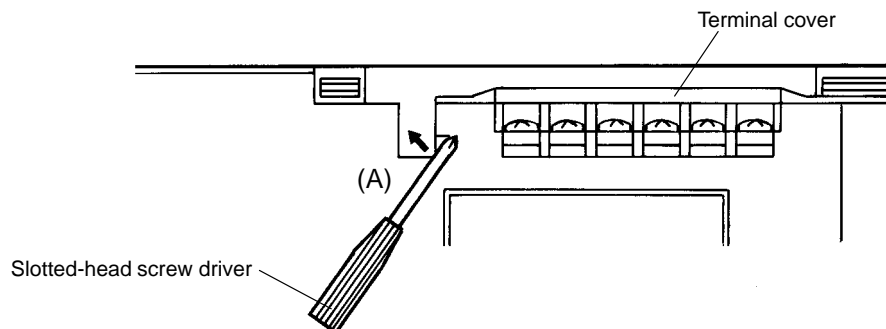
Error Signal Output Wiring

- The output section maximum switching capacity is 100 mA at 24 VDC (+10%, -15%). Applying voltages or loads that exceed the switching capacity will damage the equipment.
- It is recommended that auxiliary relays (100 mA max. at 24 VDC) be used in the output circuit.

Note The reset signal input terminal and error signal output terminal will be supplied from an SELV source in accordance with IEC1010-1 Annex I-I.

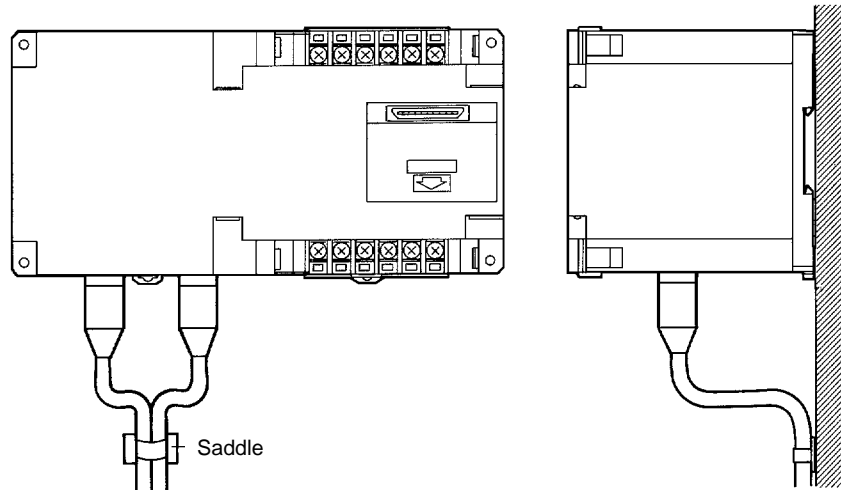
5-4-3 Removing Terminal Cover

The terminal cover must be removed with a slotted-head screwdriver in the direction (A).



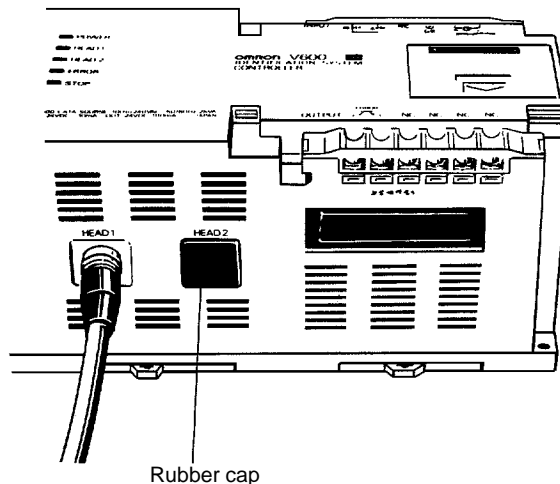
5-4-4 Wiring Processing Precautions

Applying excessive external forces to connectors while they are connected to the system can cause damage to the connectors and internal PCBs, or cause cable wiring disconnections. Thus, it is important to provide at least 10 cm of space under the ID Controller to protect the connectors from external forces originating from the right or left. Also, the cables should be secured using a saddle or similar fixture to ensure that forces applied to the cables are not transmitted to the connectors.



Lay the R/W Head cables away from other power lines.

Up to two R/W Heads can be connected, but if only one R/W Head is connected, it is extremely important to cover the unused connector on the ID Controller with the rubber cap provided.

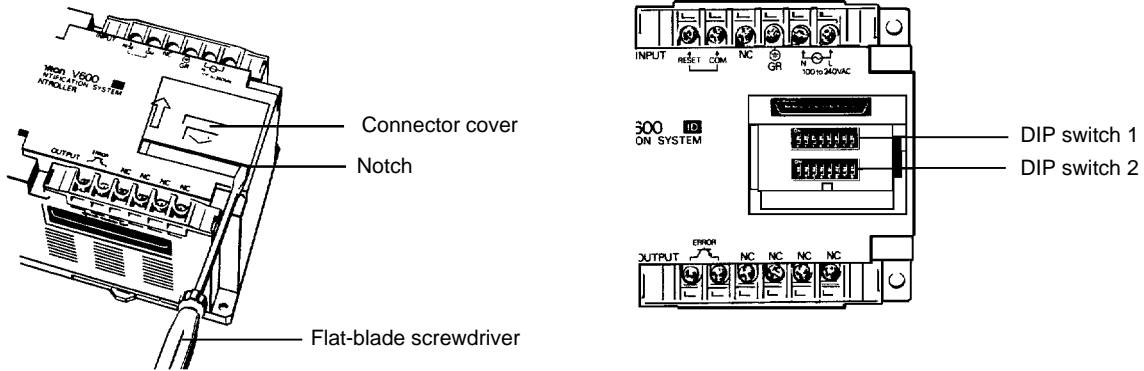


5-5 Page Number Settings

This section describes the procedure for setting the page number in the DC memory area from which data is to be read or to which data is to be written. The host will have access to only the specified page area.

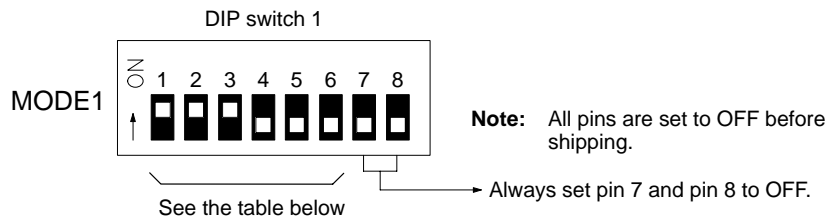
Remove the connector cover and set the DIP switches as shown below. Pages 00 to 3F can be set (accessible to a DC that has a memory capacity of 16k bytes).

Connector Cover Removal



To remove the connector cover, slide the connector cover upwards, and insert a flat-blade screwdriver into the notch at the right end of the cover.

DIP Switch Settings



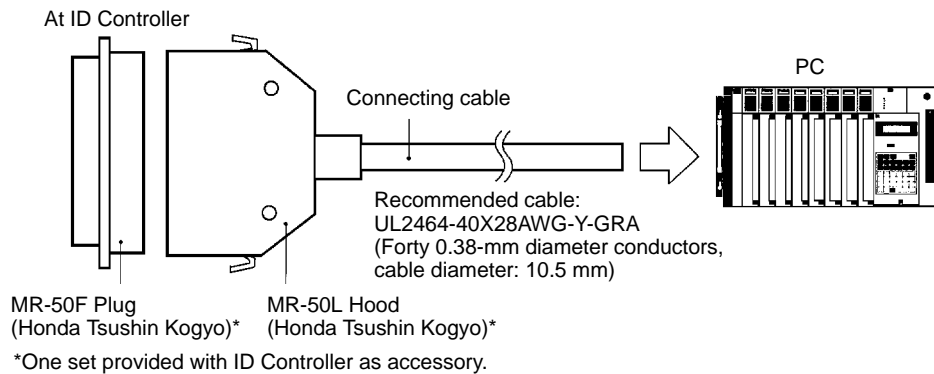
| Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | DC page no. | DC address range |
|-------|-------|-------|-------|-------|-------|-------------|------------------|
| 0 | 0 | 0 | 0 | 0 | 0 | 00 | 0000 to 00FF |
| 1 | 0 | 0 | 0 | 0 | 0 | 01 | 0100 to 01FF |
| 0 | 1 | 0 | 0 | 0 | 0 | 02 | 0200 to 02FF |
| 1 | 1 | 0 | 0 | 0 | 0 | 03 | 0300 to 03FF |
| 0 | 0 | 1 | 0 | 0 | 0 | 04 | 0400 to 04FF |
| . | . | . | . | . | . | . | . |
| . | . | . | . | . | . | . | . |
| . | . | . | . | . | . | . | . |
| 1 | 0 | 1 | 1 | 1 | 1 | 3D | 3D00 to 3DFF |
| 0 | 1 | 1 | 1 | 1 | 1 | 3E | 3E00 to 3EFF |
| 1 | 1 | 1 | 1 | 1 | 1 | 3F | 3F00 to 3FFF |

- DIP switch 2 must be set to OFF. These DIP switches are set to OFF before shipping.
- If a page number exceeding the memory capacity of the DC is set, Address Too High Error "7A" will be returned.

Note Communications between the ID Controller in RUN mode and the DC is directed to the address range for the DC page specified by its DIP switches.

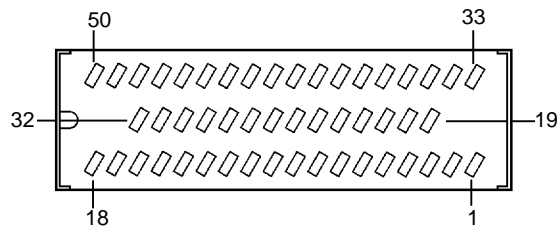
5-6 Connecting Parallel Interface

Use the connector provided as an accessory as the communications connector. The user must provide the connecting cable.



5-6-1 Pin Arrangement

As viewed from the ID Controller side:



V600-CA8A-V□ (PNP Output)

| Pin no. | Signal name | Pin no. | Signal name | Pin no. | Signal name |
|---------|-------------|---------|-------------|---------|-------------|
| 1 | --- | --- | --- | 33 | --- |
| 2 | --- | 19 | --- | 34 | --- |
| 3 | CO | 20 | C1 | 35 | C2 |
| 4 | ICOM1 | 21 | HS | 36 | CEXE |
| 5 | A5 | 22 | A6 | 37 | A7 |
| 6 | A2 | 23 | A3 | 38 | A4 |
| 7 | ICOM2 | 24 | A0 | 39 | A1 |
| 8 | WD5 | 25 | WD6 | 40 | WD7 |
| 9 | WD2 | 26 | WD3 | 41 | WD4 |
| 10 | ICOM3 | 27 | WD0 | 42 | WD1 |
| 11 | --- | 28 | --- | 43 | --- |
| 12 | RD5 | 29 | RD6 | 44 | RD7 |
| 13 | RD2 | 30 | RD3 | 45 | RD4 |
| 14 | OCOM1 | 31 | RD0 | 46 | RD1 |
| 15 | OCOM2 | 32 | ERR | 47 | RS1 |
| 16 | --- | --- | --- | 48 | RS2 |
| 17 | --- | --- | --- | 49 | 0V |
| 18 | --- | --- | --- | 50 | 0V |

V600-CA9A-V□ (NPN Output)

| Pin no. | Signal name | Pin no. | Signal name | Pin no. | Signal name |
|---------|-------------|---------|-------------|---------|-------------|
| 1 | --- | --- | --- | 33 | --- |
| 2 | --- | 19 | --- | 34 | --- |
| 3 | CO | 20 | C1 | 35 | C2 |
| 4 | ICOM1 | 21 | HS | 36 | CEXE |
| 5 | A5 | 22 | A6 | 37 | A7 |
| 6 | A2 | 23 | A3 | 38 | A4 |
| 7 | ICOM2 | 24 | A0 | 39 | A1 |
| 8 | WD5 | 25 | WD6 | 40 | WD7 |
| 9 | WD2 | 26 | WD3 | 41 | WD4 |
| 10 | ICOM3 | 27 | WD0 | 42 | WD1 |
| 11 | --- | 28 | --- | 43 | --- |
| 12 | RD5 | 29 | RD6 | 44 | RD7 |
| 13 | RD2 | 30 | RD3 | 45 | RD4 |
| 14 | OCOM1 | 31 | RD0 | 46 | RD1 |
| 15 | OCOM2 | 32 | ERR | 47 | RS1 |
| 16 | --- | --- | --- | 48 | RS2 |
| 17 | --- | --- | --- | 49 | 24V |
| 18 | --- | --- | --- | 50 | 24V |

Output Section Signal Names and Descriptions

V600-CA8A-V□ (PNP Output)

| Signal name | Abbreviation | Pin no. | Description | |
|---------------------|--------------|---------|---|-----------------|
| COMMON | OCOM1 | 14 | RD0 to RD7 common pins | |
| READ DATA | RD0 | 31 | 16 ⁰ Response data output – Read: Read data – Write: End code – Error: Error code | |
| | RD1 | 46 | | |
| | RD2 | 13 | | |
| | RD3 | 30 | | |
| | RD4 | 45 | | 16 ¹ |
| | RD5 | 12 | | |
| | RD6 | 29 | | |
| | RD7 | 44 | | |
| COMMON | OCOM2 | 15 | RS1, RS2, and ERR common pins | |
| RESPONSE STROBE | RS1 | 47 | Response data output | |
| | RS2 | 48 | | |
| ERROR | ERR | 32 | Communication error output | |
| Power supply common | 0V | 49 | Output power supply pin (0-V side) | |
| | 0V | 50 | | |

- Note**
1. OCOM1 (pin 14) and OCOM2 (pin 15) are connected internally.
 2. Input common pins (ICOM1 to ICOM3) and output common pins (OCOM1 and OCOM2) are not connected.

V600-CA9A-V□ (NPN Output)

| Signal name | Abbreviation | Pin no. | Description | |
|---------------------|--------------|---------|---------------------------------------|---|
| COMMON | OCOM1 | 14 | RD0 to RD7 common pins | |
| READ DATA | RD0 | 31 | 16 ⁰ | Response data output – Read: Read data – Write: End code – Error: Error code |
| | RD1 | 46 | | |
| | RD2 | 13 | | |
| | RD3 | 30 | 16 ¹ | |
| | RD4 | 45 | | |
| | RD5 | 12 | | |
| | RD6 | 29 | | |
| RD7 | 44 | | | |
| COMMON | OCOM2 | 15 | RS1, RS2, and ERR common pins | |
| RESPONSE STROBE | RS1 | 47 | Response data output | |
| | RS2 | 48 | | |
| ERROR | ERR | 32 | Communication error output | |
| Power supply common | 0V | 49 | Output power supply pin (24 VDC side) | |
| | 0V | 50 | | |

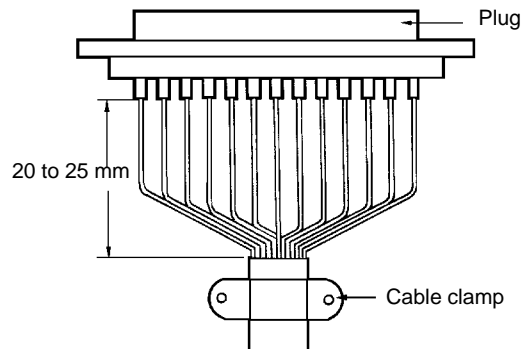
- Note**
1. OCOM1 (pin 14) and OCOM2 (pin 15) are connected internally.
 2. Input common pins (ICOM1 to ICOM3) and output common pins (OCOM1 and OCOM2) are not connected.

Input Section Signal Names and Descriptions**V600-CA8A-V□/CA9A-V□**

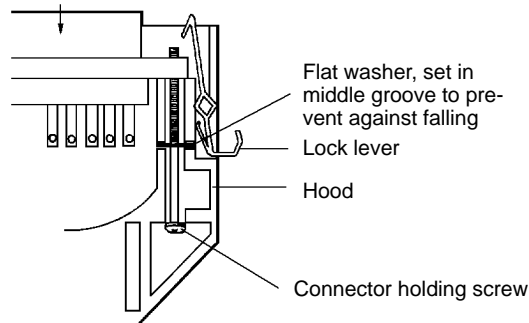
| Signal name | Abbreviation | Pin no. | Description | |
|-----------------|--------------|---------|--------------------------|---|
| COMMON | ICOM1 | 4 | CO, HS, CEXE common pins | |
| CONTROL | C0 | 3 | Command receive input | |
| | C1 | 20 | | |
| | C2 | 35 | | |
| HOST STROBE | HS | 21 | Pulse signal input | |
| COMMAND EXECUTE | CEXE | 36 | EXECUTE COMMAND INPUT | |
| COMMON | ICOM2 | 7 | A0 To A7 common pins | |
| ADDRESS | A0 | 24 | 16 ⁰ | Auto read and auto write destination address inputs |
| | A1 | 39 | | |
| | A2 | 6 | | |
| | A3 | 23 | | |
| | A3 | 38 | 16 ¹ | |
| | A5 | 5 | | |
| | A6 | 22 | | |
| | A7 | 37 | | |
| COMMON | ICOM3 | 10 | WD0 to WD7 common pins | |
| WRITE DATA | WD0 | 27 | 16 ⁰ | Auto write data input |
| | WD1 | 42 | | |
| | WD2 | 9 | | |
| | WD3 | 26 | | |
| | WD4 | 41 | 16 ¹ | |
| | WD5 | 8 | | |
| | WD6 | 25 | | |
| | WD7 | 40 | | |

- Note**
1. ICOM1 (pin 4), ICOM2 (pin 7), and ICOM3 (pin 10) are connected internally.
 2. Do not use pins not listed in the output section and input section signal-pin tables above (pins 1, 2, 11, 16, to 19, 28, 33, 34, and 43).

5-6-2 Connector Assembly

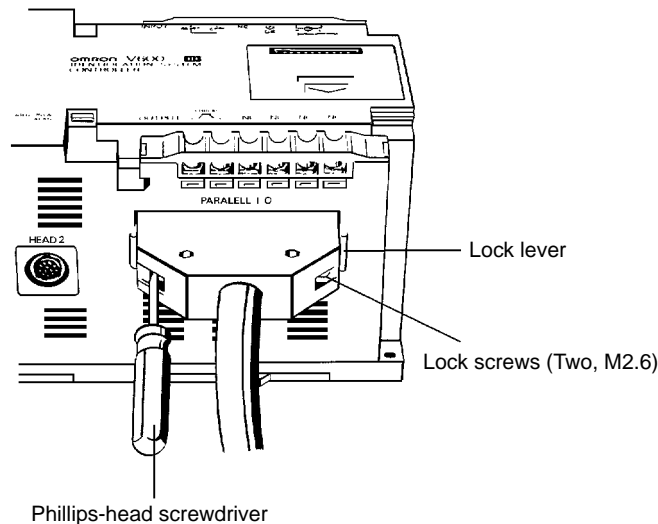


- 1, 2, 3...**
1. Remove 25 to 30 mm of cable sheath and solder each individual conductor to its corresponding pin while adjusting the length as needed.
 2. Attach the plug and cable clamp to the hood.
 3. Screw in the two connector holding screws and set the two connector lock levers, then attach one of the hoods and tighten it with the screw and nut.

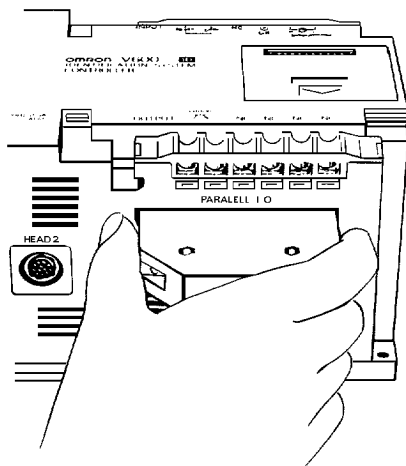


5-6-3 Insertion and Removal of Connector

It is extremely important to hand-hold the connector to attach and insert it properly. After inserting the connector, take a Phillips-head screwdriver and fully tighten the two lock screws.



To remove the connector, completely unscrew the two lock screws, and take out the protruding section of the connector hood by hand and pull it straight out. If it is difficult to remove, hold the ID Controller down with one hand and pull carefully on the connector with the other.



SECTION 6

Diagnosis and Maintenance

This section provides diagnosis and maintenance procedures as well as solutions to possible problems and abnormalities.

| | | |
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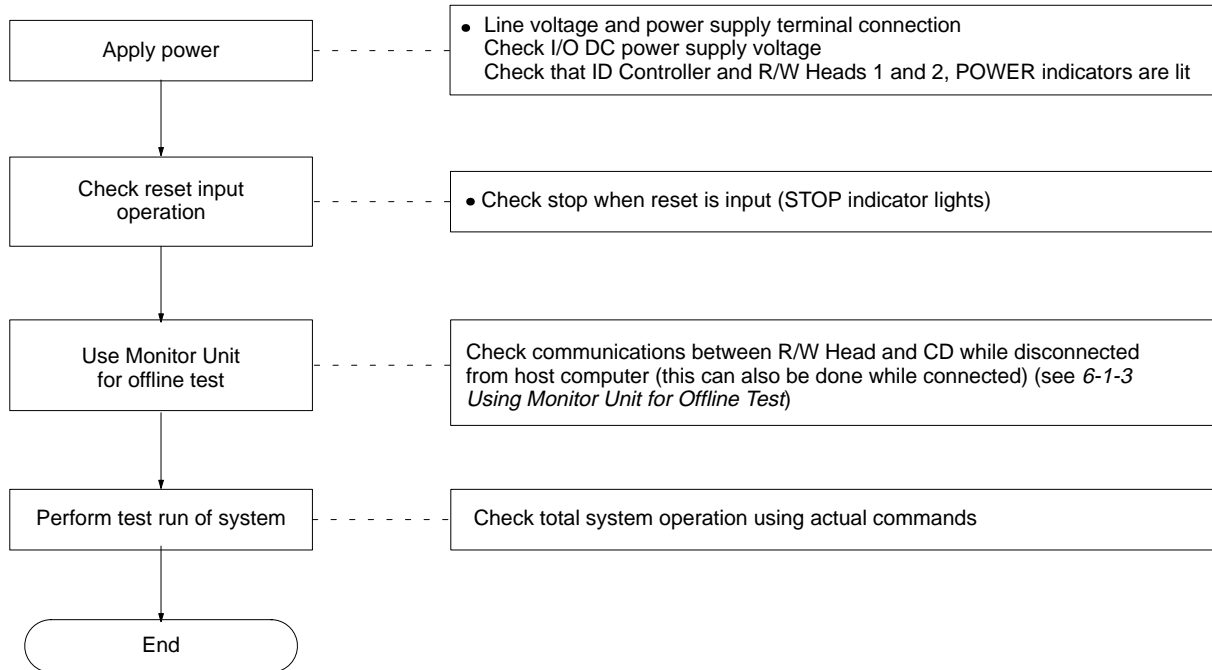
6-1 Test Operation

6-1-1 Checklist

Check the following items before performing the test operation.

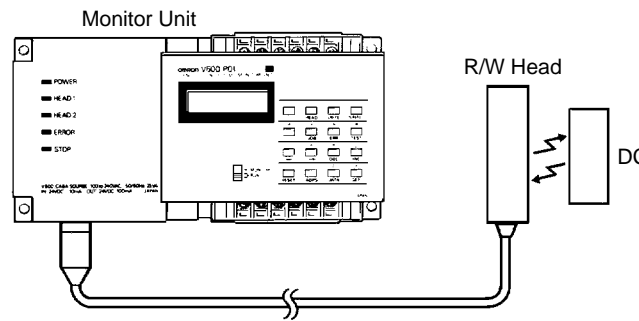
| No. | Check items | Checks | Page |
|-----|---------------------------------------|--|------|
| 1 | Power supply and I/O line connections | Has wiring been done correctly? Are the terminal screws loose? | 65 |
| 2 | DIP switch settings | Have page settings been made correctly? | 68 |
| 3 | R/W Head connection | Are R/W Heads connected correctly? | 64 |
| 4 | DC positioning | Are DCs and R/W Heads correctly positioned? Refer to the <i>V600 FA ID System R/W Heads</i> or <i>SRAM Data Carriers/V600 FA ID System R/W Heads and EEPROM Data Carriers Operation Manuals</i> . | |
| 5 | Connections to PC | Has PC IN/OUT unit wiring and connector connection been done correctly? | 69 |

6-1-2 Test Operation Procedure



6-1-3 Using Monitor Unit for Offline Test

The Monitor Unit can be used to test communications between the R/W Heads and the DCs with the ID Controller disconnected from the host computer. Use this test to check the installation positions and speeds prior to performing test operations (see *Appendix C Offline Test and Auto Read/Auto Write*).



Read, write, auto read, and auto write operations can be performed in the Monitor Unit test mode. See *Section 4 Monitor Unit Operation* and *Appendix B Auto Read/Auto Write* for operation methods.

Monitor Unit Offline Test Table

The following describes the communications test that can be performed only using the Monitor Unit. Refer to *Section 4 Monitor Unit* for details on Monitor Unit operation.

| Parameter | Test method | Criteria | Reference |
|---|---|---|---|
| Check read and write when stationary | When the DC is in R/W Head communications range, use the Monitor Unit to execute test read and test write operations. | <ul style="list-style-type: none"> Has an error occurred? When an error occurs, a beeper sounds, and the error code is displayed on the Monitor Unit. | <ul style="list-style-type: none"> 4-5-1 Test Read 4-5-2 Test Write |
| Check auto read and auto write when in motion | Use the Monitor Unit to perform prior test auto read and test auto write operations (See notes 1 and 2). Next, set the DC in motion and pass it through the R/W Head communications range. | <ul style="list-style-type: none"> Has an error occurred? When an error occurs, the ID Controller error indicator lights for 1 s. | <ul style="list-style-type: none"> 4-5-3 Test Auto Read 4-5-4 Test Auto Write |

- Note**
1. It is important during the job specification procedure to specify the DC page number and the R/W Head number. Also, specify start and end addresses for each system.
 2. The limit for the test read and write operations on the Monitor Unit is 256 bytes.

6-2 Diagnostic Functions

The ID Controller has various diagnostic functions to deal with abnormal situations and to reduce system down time. If an abnormality occurs, the details can be read by mounting the Monitor Unit.

6-2-1 Abnormalities

Abnormalities detectable by the ID Controller are generally classified into operation termination abnormalities and operation continuation abnormalities.

Operation Termination Abnormalities

When abnormalities occur in the ID Controller hardware, CPU operation stops, and the ERROR and STOP indicators light. When this happens, the error output goes on. Also, if the external stop input reset is turned on, the CPU stops, and the STOP indicator lights. When this happens, the error output goes off.

**Operation Continuation
Abnormality**

When an abnormality occurs in communications between the ID Controller and the host computer or a R/W Head, the ERROR indicator lights. Up to 30 files of abnormality data are stored, and if this number is exceeded, old abnormality data is erased from the beginning to make room for the new data. If the Monitor Unit is used, apart from reading the details of these errors, it is also possible to get the subtotals of the number of error occurrences by type.

6-2-2 Indications During Operation and Output Conditions

| Condition | Parameter | Details | Indicators | | | | | Error |
|-----------------------------------|--|---|------------|---------|---------|---------|---------|-------|
| | | | POWER | HEAD1 | HEAD2 | ERROR | STOP | |
| Normal Operation | Waiting for data transmission or reception | --- | Lit | Not lit | Not lit | Not lit | Not lit | OFF |
| | Data transmission or reception in progress | In communication with R/W Head 1 | Lit | Lit | Not lit | Not lit | Not lit | OFF |
| | | In communication with R/W Head 2 | Lit | Not lit | Lit | Not lit | Not lit | OFF |
| Operation termination abnormality | CPU abnormality | System program abnormality | Lit | Not lit | Not lit | Lit | Lit | ON |
| | Memory abnormality | System memory abnormality | Lit | Not lit | Not lit | Lit | Lit | ON |
| Continuation abnormality | Communications abnormality | Abnormality in communications with host computer or PC Abnormality in communications with R/W Head | Lit | Not lit | Not lit | Lit | Not lit | OFF |
| Emergency Stop | Reset processing | Reset input is turned on | Lit | Not lit | Not lit | Not lit | Lit | OFF |

6-3 Error Lists**6-3-1 Communications Errors**

| Error code | Name | Error message | Description |
|------------|-------------------------|---------------|---|
| 70 | DC communications error | COM, DC E | There exists an abnormality in communications between R/W Heads and DCs. <ul style="list-style-type: none"> • Problem with positioning due to DC speed or distance. • Obstacles causing mis-operation. |
| 71 | Disagreement error | VERIFY E | Read or write processing could not be done correctly. |
| 72 | DC not present | NO DC E | DC was not present within communications range when execution of write or Head commands was attempted. |
| 7A | Address too high | ADRS E | An address has been specified which falls outside the DC memory area. |
| 7C | R/W Head not connected | R/W H E | R/W Head is not connected. |
| 7D | Write protect error | PROTECT E | The production date (year, month, day) area or the write protected area has been specified by a write command. |

If a communications error occurs when sending a R/W Head command after receiving a command from the PC, an error code is sent to the PC.

6-3-2 System Errors

| Error code | Name | Error message | Description and cause | |
|---|---|---------------|---|--|
| 90 | Power disconnection during command processing | P OFF CMD | Power is disconnected during command execution. | After applying power once again, execute the command again. |
| 91 | Power disconnection during write processing | P OFF WT | Power was disconnected during execution of a write or auto write operation. | |
| 92 | CPU abnormality | CPU | E | There may an influence of noise due to an abnormality in the ID Controller. Turn off the power and apply it once again. |
| 93 | Memory abnormality | C.NEM | E | |
| Turn reset input on. (If normal operation cannot be restored, use a replacement.) | | | | |

System error (operation termination error) data can be checked on the Monitor Unit, but cannot be checked on the PC.

6-3-3 Warning Code

| Warning code | Name | Description |
|--------------|----------------|--|
| 7B | DC battery low | The voltage of the DC's built-in battery is low. |

- Note**
1. These warnings are not recorded by the ID Controller.
 2. If a DC communications error (with an error code of 70) or disagreement error (with an error code of 71) occurs while writing data, all or part of the data object address data may have been replaced. The data that may have been replaced will not always be the data for the write instruction. If a DC communications error or disagreement error occurs, execute retry processing from the host side until no error occurs. The data in other addresses will not be influenced at all.

6-4 Dealing with Abnormalities

The following three problems are usual causes of problems in the ID Controller.

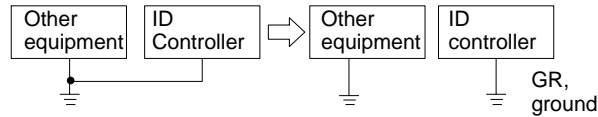
- Noise. Take countermeasures to deal with noise.
- Breakdowns in external equipment, in which case repairs are required.
- ID Controller breakdown, in which case repairs are required.

6-4-1 Noise

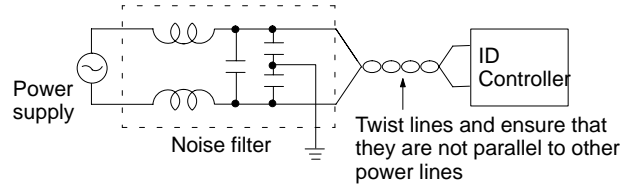
When system mis-operation occurs due to noise, refer to the following table to take appropriate countermeasures to eliminate the influence of noise.

| No. | Problem conditions | Probable cause | Action |
|-----|--|---|---|
| 1 | Occurs with large capacity motor, transformers, or capacitors when power is applied. | Instantaneous voltage drop in power supply system due to large-scale load surge current | There exists an abnormality in communications between R/W Heads and DCs. Check communications speed, distance, and obstacles. |
| | | Common mode noise due to above cause | Supply power via a 1:1 non-grounded insulated transformer. Avoid common grounds with other large-scale loads, and ground the ID Controller independently. |
| 2 | Occurs irregularly | Noise on power lines | Supply power via a 1:1 non-grounded insulated transformer or a noise filter. |
| 3 | Mis-operation such as turning input signal on when it is off | Induced noise in input wiring | Lay input signal grounds away from other power lines. If noise effects are large, insert inside metal line pipes or use shielded cables. |

Improving Ground



Dealing with Power Supply Noise



Note Use a Tokin GT-20601 filter or equivalent approved by TÜV or VDE. Then ground its ground terminal.

6-5 Maintenance and Inspections

Daily and other regular inspections are required to keep the ID Controller functions operating at optimal levels. The ID Controller main sections are configured from IC components, and consequently there are almost no consumable items, but the following problems may occur due to environmental or operating conditions.

- Excessive voltage or excessive current causing element deterioration.
- Use in high ambient temperature locations can cause long term stress leading to the deterioration of elements.
- Deterioration of insulation due to humidity, dust, or deterioration in connector connections.
- Corrosive gas causing bad connector connections or corroding elements.

6-5-1 Inspection Parameters

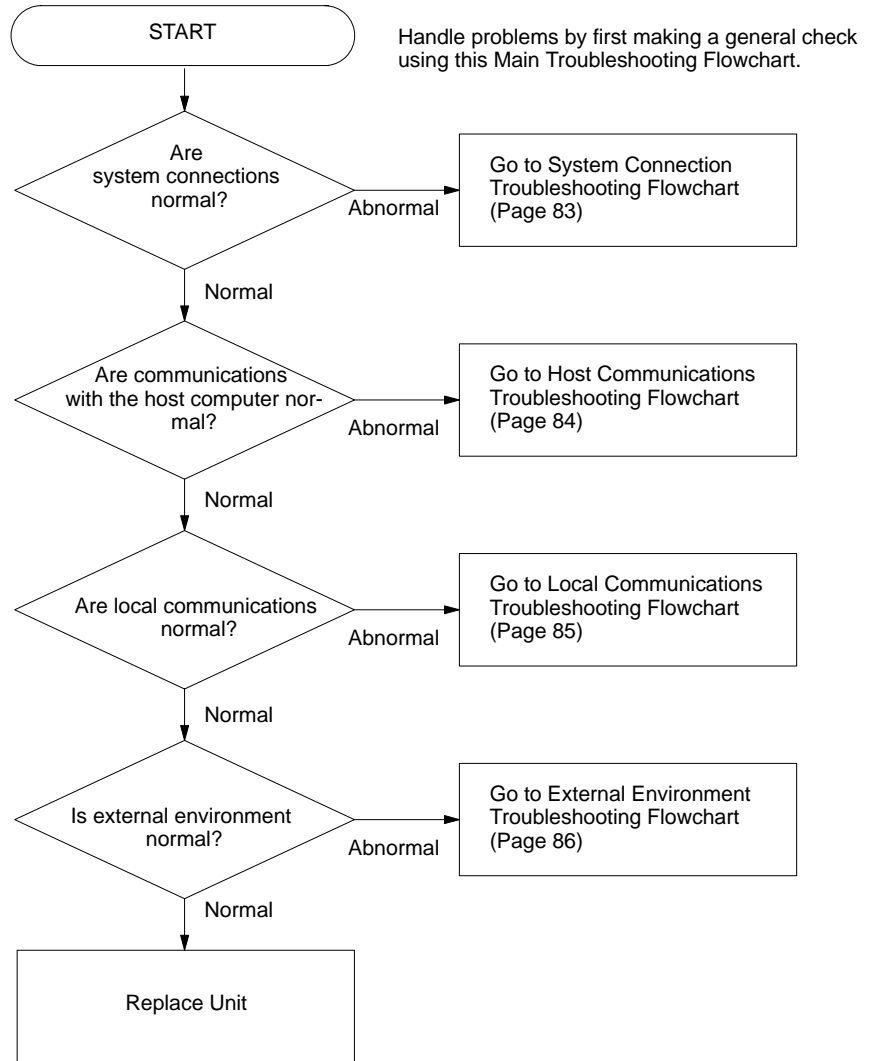
| No. | Inspection parameters | Inspection description | Criteria | Remarks |
|-----|---|---|---|---|
| 1 | Line voltage variation | (i) Determine whether it's within standards by checking power supply terminal strip. | Line voltage should be within specified range. | Tester |
| | | (ii) Is there frequent instantaneous power drops or sudden voltage fluctuations? | Voltage variation should be within specified range. | Power supply analyzer |
| 2 | Ambient environment: (i) Temperature. (ii) Humidity. (iii) Vibration and impacts. (iv) Dust. (v) Corrosive gas | (i) and (ii): Within specifications? (iii) Is there vibration or impact transmitted from machinery? (iv) Is dust or foreign matter is adhered to controller, and has it accumulated? (v) Is the metal casing discolored or corroded? | (i) -10°C to 55°C . (ii) 35% to 85%. (iii) Within specified range. (iv) There should be none. (v) There should be none. | Maximum and minimum thermometer, humidity measuring equipment |
| 3 | Panel condition: (i) Is there adequate air flow? (ii) Is packing damaged on hermetically shielded configuration? | (i) Is the natural air flow/forced air flow/cooling operating well? | There should be good air flow and the temperature within the panel should be within -10°C to 55°C . | --- |
| | | (ii) Is the packing attached to the panel coming off or damaged? | --- | |
| 4 | I/O power supply: (i) Voltage variation. (ii) Ripple. | Are measurements of the terminal strips in each I/O section within specifications? | It should be within the specified range. | Tester, oscilloscope |
| 5 | Installation conditions | (i) Are all devices secured properly? (ii) Are all connectors completely inserted? (iii) Are the screws on the terminal strips loose? (iv) Is the wiring about to break? (v) Is distance between DC and R/W Heads within specified range? | There should be no looseness. Locks and screws should be tight. --- --- --- | --- |
| 6 | DC battery life check | Check DC production date | It should be within the specified range. | --- |
| 7 | Error logging check | Check error data | --- | --- |

Note The DCs have built-in lithium batteries for memory backup. When the batteries are drained or become unusable, please dispose of properly as it is extremely dangerous to burn them. Fires must be avoided.

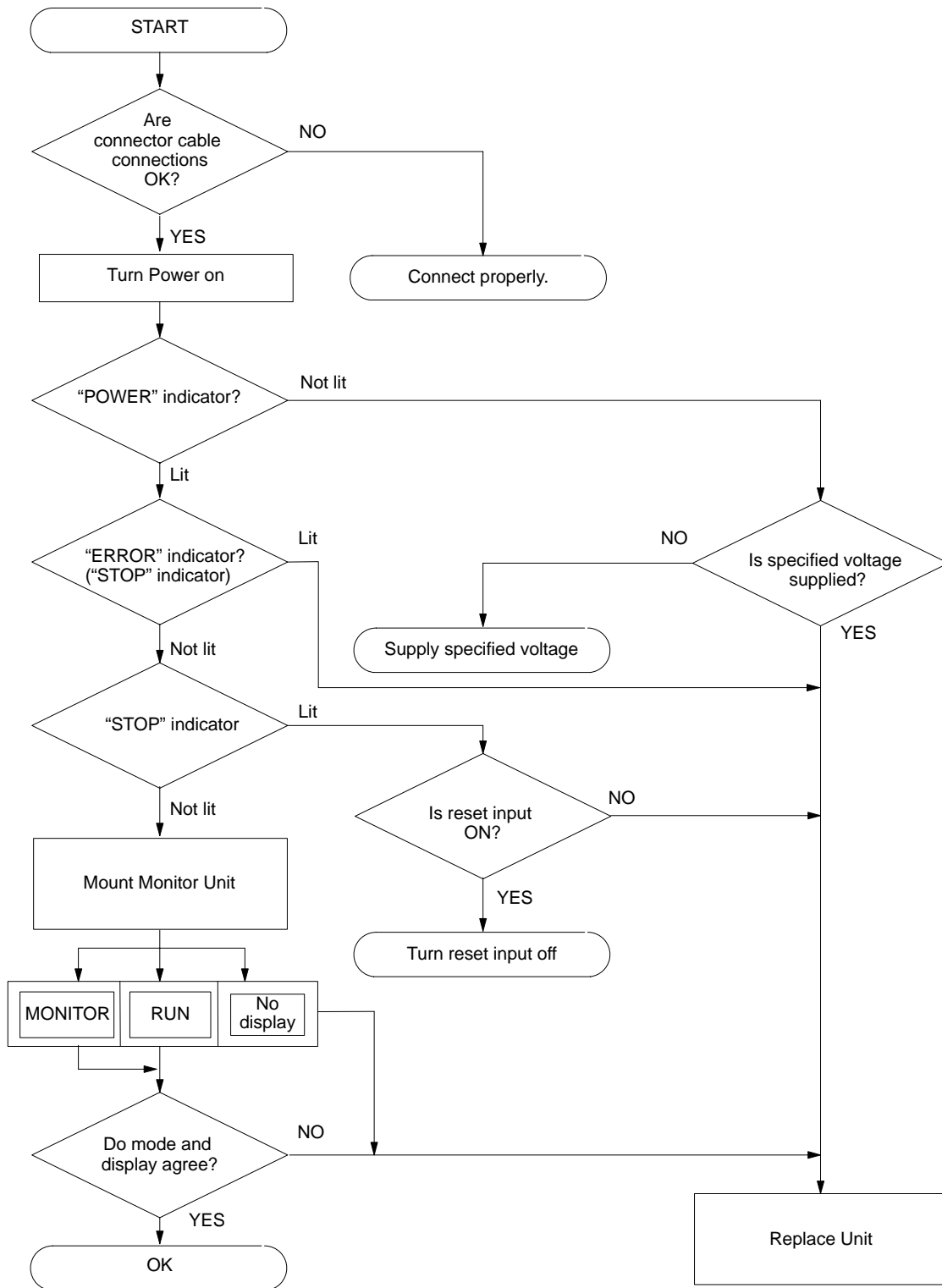
6-6 Troubleshooting

When abnormalities occur, it is important to make the following checks to determine completely the nature of the problem, determine whether there is any possibility of reoccurrence, and to find out if there is any relation to other devices.

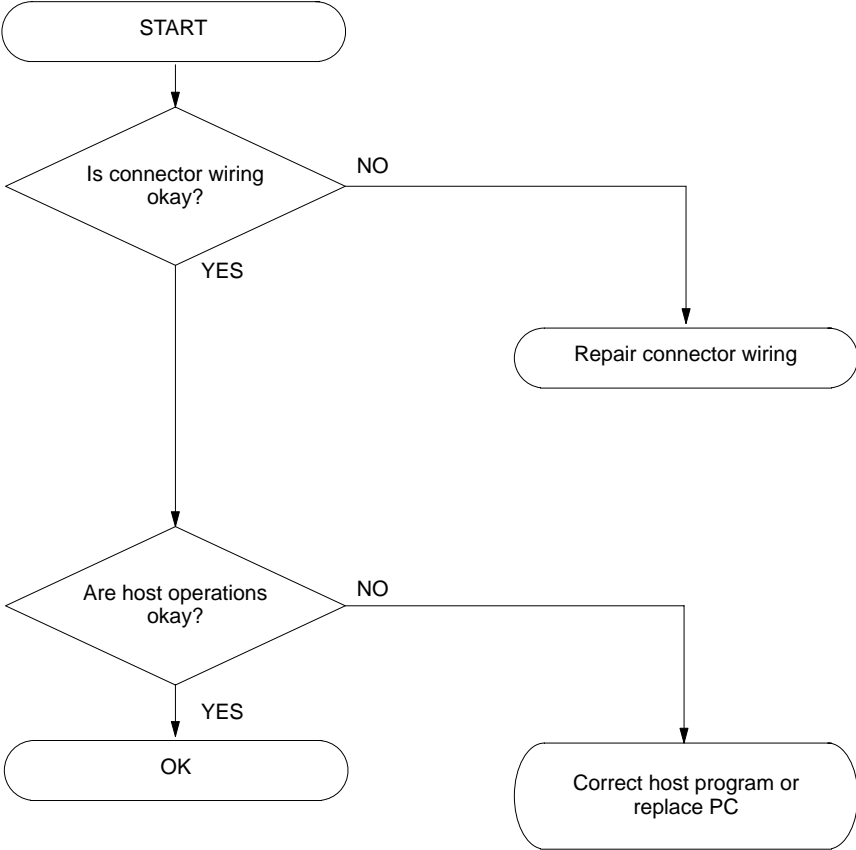
6-6-1 Main Troubleshooting Flowchart



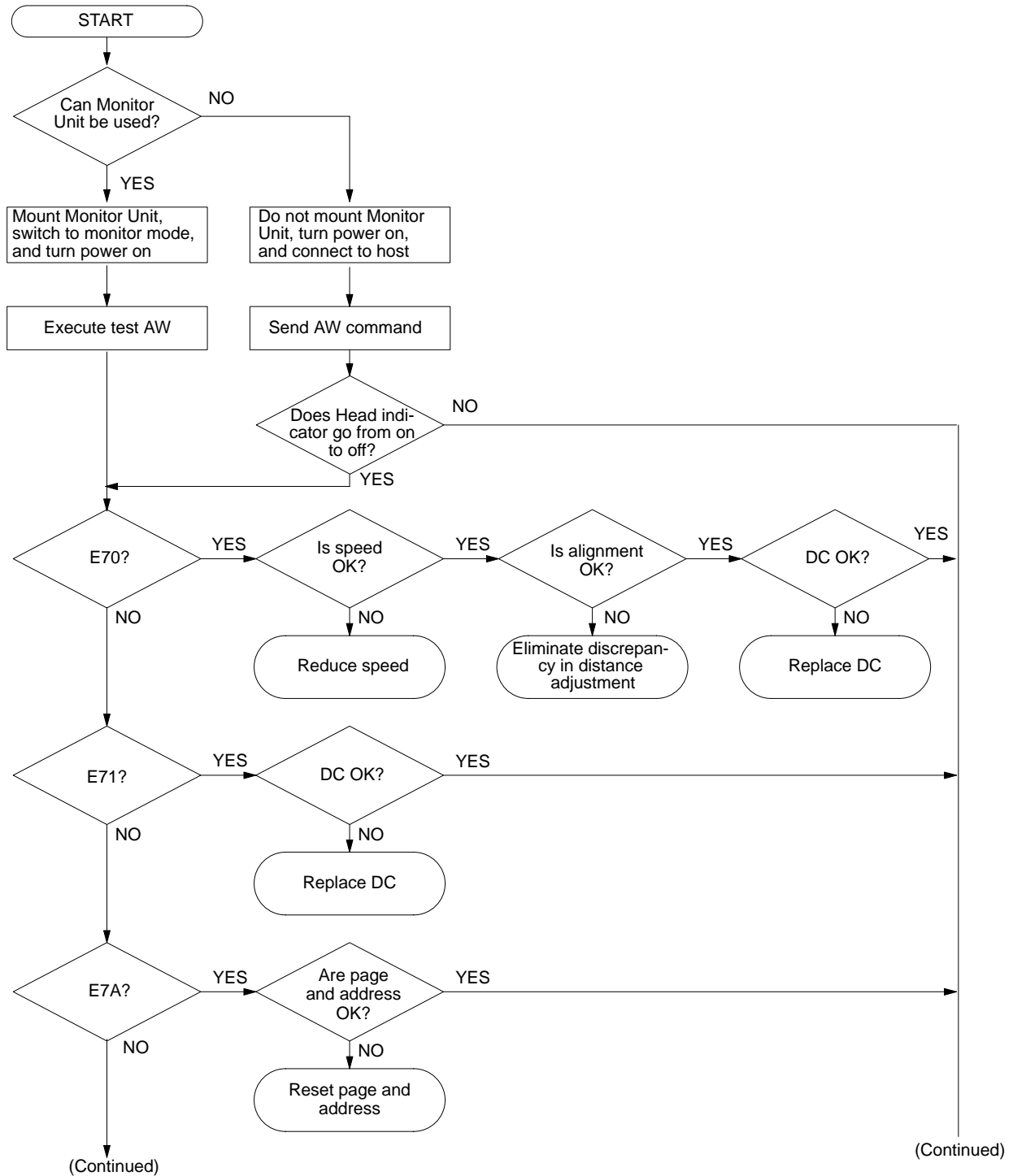
6-6-2 System Connection Troubleshooting Flowchart

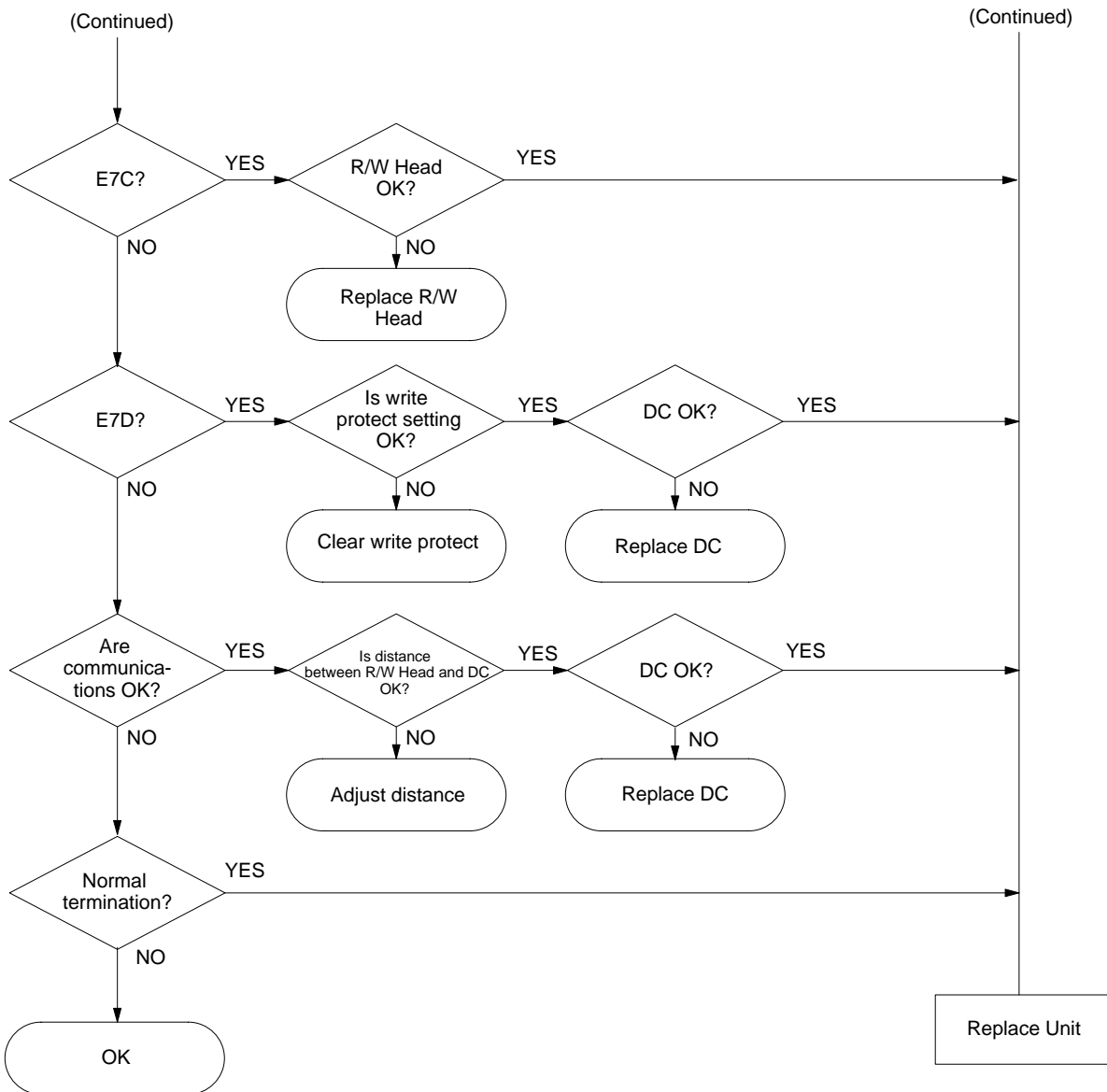


6-6-3 Host Communications Troubleshooting Flowchart

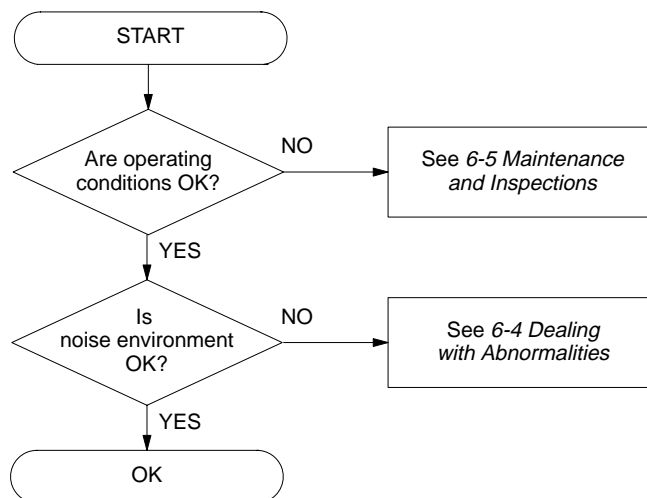


6-6-4 Local Communications Troubleshooting Flowchart





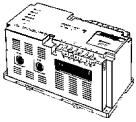
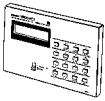
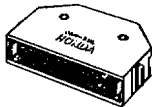
6-6-5 External Environment Troubleshooting Flowchart



Appendix A

Standard Models

ID Controller and System Components

| Product | Specification | Model number | Remarks |
|---|---|-------------------------------|--|
| ID Controller  | Serial interface, 100 to 240 VAC power supply | V600-CA8A-V□ (PNP output) | — |
| | | V600-CA9A-V□ (NPN output) | |
| Monitor Unit  | — | V600-P01 | — |
| Communications connector  | Connector plug | MR-50F Honda Tsushin Kogyo | A connector plug and connector hood are provided with the ID Controller. |
| | Connector hood | MR-50L Honda Tsushin Kogyo | |

Appendix B

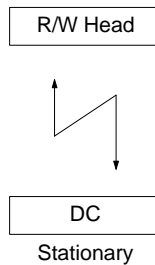
Auto Read/Auto Write

Use of Auto Read and Auto Write Commands

In general, read and write commands are used while DCs are stationary. Auto commands are used while DCs are in motion.

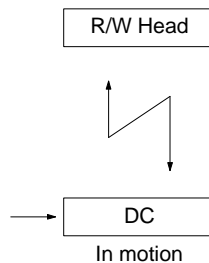
Read and Write Commands

- Communications distance can be greater than when DC is in motion, and so accurate communications can be performed.

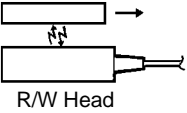
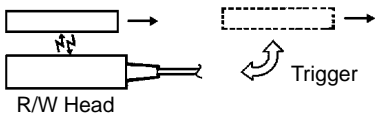


Auto Read and Auto Write Commands

- When the auto commands are used, DC proximity is detected automatically.
- If DC motion is slow and positioning is accurate, communications can be done with few limitations on distance.
- When an auto command is sent while the DC is stationary, the DC Not Present indication is not issued.



Application Example of Command

| Item | Application | Description | Note |
|--------------------------------------|---|--|--|
| <p>Command transmission by timer</p> | <p>Transmits next auto command after response is returned.</p>  | <ul style="list-style-type: none"> - When DC passes through the communications area of R/W Head at fixed intervals. - If a long time elapses before next DC arrives. - Overlapping of the same communication with the same DC can be avoided if wait time during which DC leaves the communication area elapses after the end of communication. | <ul style="list-style-type: none"> - Keep transportation speed constant. - Valid only for systems where communication is not made more than once with same DC. |
| <p>Trigger</p> | <p>Transmits next auto command when a trigger is received after a response is returned.</p>  | <ul style="list-style-type: none"> - For example, auto command is transmitted after end of processing for preceding process is confirmed. - Trigger must be input before the next DC approaches. | <ul style="list-style-type: none"> - Trigger processing is necessary. - Make sure that the trigger is accurately input. |

Appendix C

Conformity to Standards

UL (Underwriters' Laboratories Inc.)

U

Listing Mark

UL3101

File No. E41515

CSA (Canadian Standard Association)

C

Listing Mark

CSA1010.1

File No. LR46463

EC Directives

We hereby declare that the following products are in conformity with the requirements of the EC Directives listed below:

Identification System

V600-CA8A/9A-V2 ID Controllers

V600-H□□-□ Read/Write Heads

V600-D□□□-□ Data Carriers

No. of Directive: 89/336/EEC

Title of Directive: Electromagnetic Compatibility

No. of Directive: 73/23/EEC

Title of Directive: Low Voltage Safety

The above referenced products conform to the following standards:

Electromagnetic Compatibility

EMI (Electromagnetic Interference)

Radiated

EN50081-2: 1994 / EN55011: 1991

EMS (Electromagnetic Susceptibility)

Electrostatic Discharge

EN50082-2: 1995 / EN61000-4-2: 1995

RF Electromagnetic Field

EN50082-2: 1995 / ENV50140: 1994

RF Common Mode

EN50082-2: 1995 / ENV50141: 1994

Electrical Fast Transient Burst

EN50082-2: 1995 / EN61000-4-4: 1995

Power-Frequency Magnetic Field

EN50082-2: 1995 / EN61000-4-8: 1993

Electrical Safety

EN61010-1: 1993

IEC1010-1: 1990 / A1: 1992 / A2: 1995

Technical Data

Intended Environment: Industrial

1. Type designation: V600-CA8A/9A-V2
2. Host interface: Parallel interface
CA8A-V2: PNP, CA9A-V2: NPN
3. Number of Read/Write Heads connectable: 2 channels
4. Rated power supply voltage: 100 to 240 VAC, 50/60 Hz
5. Acceptable power supply voltage: 85 to 264 VAC
6. Power consumption: 35 VA max.
7. Dielectric strength: 1,500 VAC, between live parts and protective grounding conductor
3,700 VAC, between primary and secondary circuits
8. Ambient air temperature: Operating -10° to 55°C
Storage -25° to 65°C
9. IP degree (IEC60529): IP30 (for inner-panel installation)
10. Pollution degree: 2 (controlled environment)
11. Electromagnetic Compatibility (EMC)
 - a) Field Withstandability: 10 V/m
 - b) RF Common Mode: 10 V
 - c) Electrostatic Discharge Withstandability: 4 kV (Contact)
8 kV (Air)
 - d) Fast Transient Withstandability: 2 kV (DC power)
1 kV (Signal line)
 - e) Radiated Emission: Class A, Group 1

Note This Controller is not intended for direct connection to AC power line. In order to reduce conducted emission from the Controller, provide a suitable noise suppressor (Tokin GT-20601 or equivalent) between the AC power line and the Controller.
V600-CA8A/9A-V2 conforms to EN50081-2/EN55011 Class A, Group 1 when used with Tokin GT-20601.

Model Legend

- ID Controllers

V600-CA8A/9A-V2-□
I II III IV

- I – V600: Inductive Identification System
- II – CA8A/9A: Two read/write heads connectable
Parallel interface
(CA8A: PNP, CA9A: NPN)
– AC power supply model
- III – V2: Version 2
- IV – □: Blank – Standard model
Suffix(es) – For marketing purposes

• Read/Write Heads

V600-H □ □ □ - □
 I II III IV V

- I – V600: Inductive Identification System
- II – H: Read/write head
- III – □: Shape – 0 or 1 Square type
 – 5 Cylindrical type
- IV – □: Serial number
- V – □: Blank – Standard model
 Suffix(es) – For marketing purposes

• Data Carriers

V600-D □ □ □ □ - □
 I II III IV V VI

- I – V600: Inductive Identification System
- II – D: Data Carrier
- III – □: Memory Capacity – 2 2K bytes
 – 8 8K bytes
 – 23 256 bytes
- IV – □: Memory type – K SRAM
 – P EEPROM
- V – □: Serial number
- VI – □: Blank – Standard model
 Suffix(es) – For marketing purposes

FCC (Federal Communications Commission)

FCC (Federal Communications Commission)

FCC Part 15 Subpart B

For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement placed in a prominent location in the text of the manual:

Note This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

