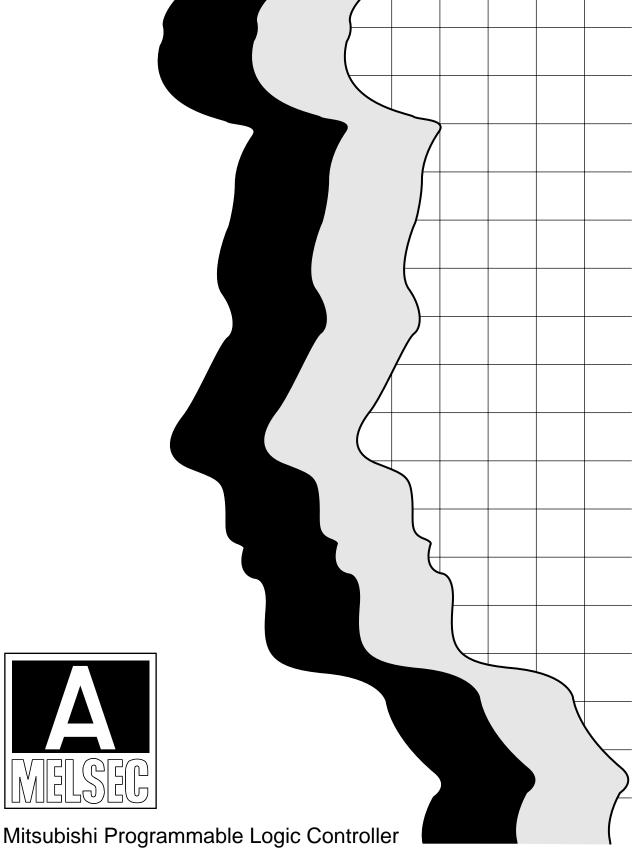
MITSUBISHI

Pt100 input module type A64RD3C/4C User's Manual



REVISIONS

*The manual number is given on the bottom left of the back cover.

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INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers. Please read this manual carefully so that the equipment is used to its optimum. A copy of this manual should be forwarded to the end User.

1. INTRODUCTION

This manual explains the specifications and methods for manipulating and programming the A64RD3C/4C (hereafter called the A64RDC) platinum temperature-measuring resistor Pt100 temperature input module. This module, is used for the following three combinations:

- (1) Combined with the A2CCPU
- (2) Combined with the AnACPU (using dedicated instructions) and the AJ71PT32-S3
- (3) Combined with the ACPU and the AJ71PT32-S3

The A64RDC converts temperature data from a platinum temperature-measuring resistor JPt100 or Pt100 (hereafter called the Pt100) to either 16 or 32 bits of signed binary data. 16 bits of signed binary data are expressed to the first decimal place. 32 bits of signed binary data are expressed to the third decimal place. Fig. 1.1 shows the temperature measuring process.

The A64RD3C module uses three wires to connect with a Pt100.

The A64RD4C module uses four wires to connect with a Pt100.

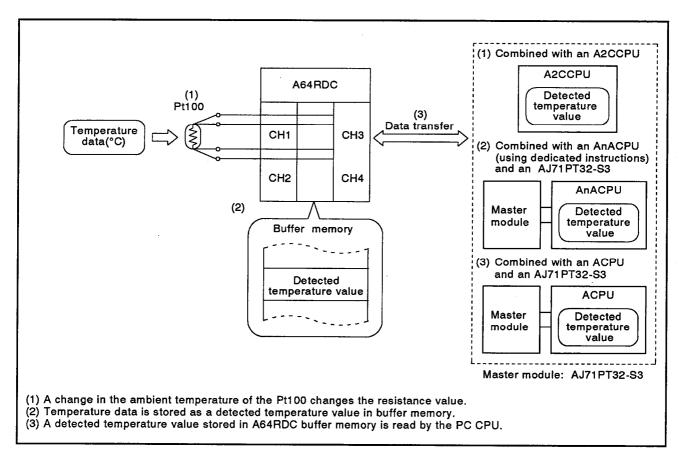
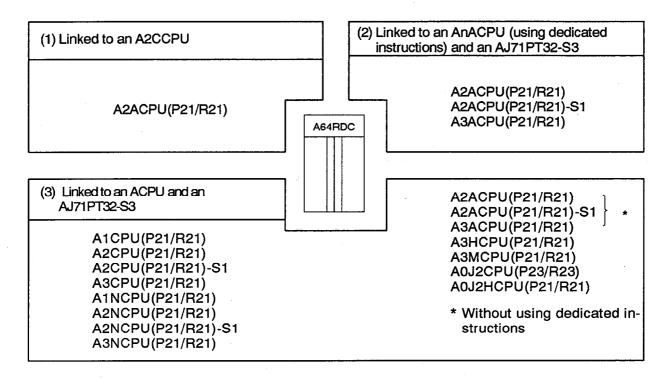


Fig. 1.1 Temperature Measuring Process

The following chart shows CPU modules which can be used with the A64RDC. They are classified by linkage.



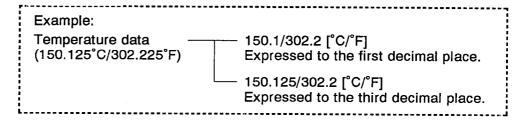
Refer to the following manuals when using the A64RDC.

Manual Title	
ACPU Programming Manual (Fundamentals)	IB(NA)66249
ACPU Programming Manual (Common Instructions)	IB(NA)66250
A2A(S1)/A3ACPU Programming Manual (Dedicated Instructions)	IB(NA)66251
User's Manual for each CPU module	
AJ71PT32-S3 MELSECNET/MINI-S3 Master Module User's Manual	IB(NA)66217
SW0GP-MINIP Operating Manual	IB(NA)66226

1.1 Features

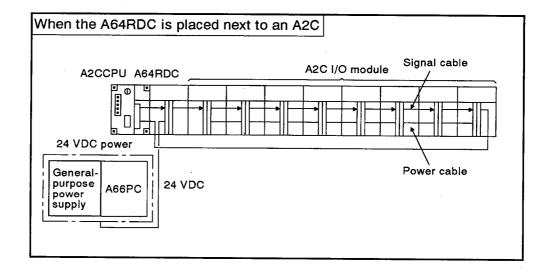
The A64RDC has the following features:

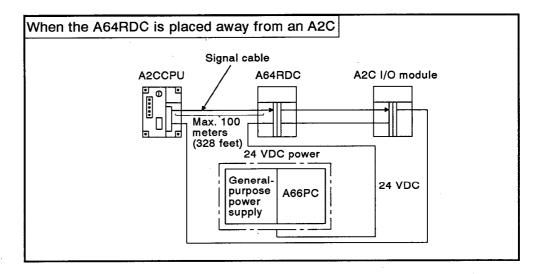
- The A64RDC can read temperature data by connecting either an old or new JIS (DIN) platinum temperature-measuring resistor directly to the A64RDC.
- (2) Input temperature data can be expressed to the first or third decimal place.



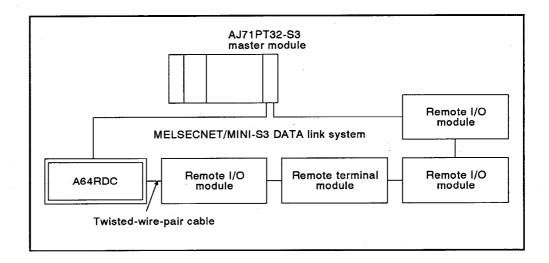
- (3) One module can be connected to four Pt100s.
- (4) Three conversion processing methods (sampling processing, time-average processing, and count average processing) can be selected.
- (5) Disconnection of the Pt100 or cable can be detected.
 - A64RD3C Detected by each channel
 - A64RD4C Detected commonly with all channels.
- (6) Each channel can set conversion enable/disable.
- (7) The A64RDC can be connected to an A2CCPU with special flat cables, twisted-wire-pair cables, and shielded PVC cables.

The A64RDC can either be placed next to or away from the A2CCPU. However, the maximum wiring distance between the A2CCPU and the A64RDC is 100 m (328 feet).

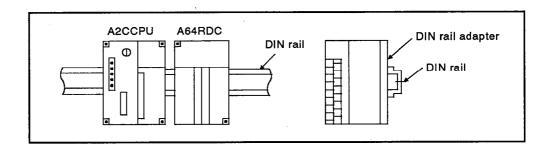




(8) The A64RDC can be used as a remote terminal module in the MELSEC-NET/MINI-S3 data link system.

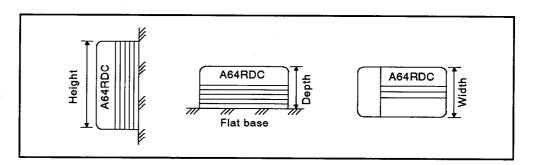


(9) The A64RDC can be mounted to a DIN rail by using a DIN rail adapter.



(10) The A64RDC has compact outside dimensions: 170 mm (height) \times 100 mm (width) \times 80 mm (depth).

The A64RDC can be installed in three different positions on the module body.



2. SPECIFICATIONS

This section describes the general specifications and performance specifications of the A64RDC.

2.1 General Specifications

Table 2.1 gives the general specifications of the A64RDC.

Table 2.1 General Specifications

ltem		Specifications					
Operating ambient temperature	0 to 55°C						
Storage ambient temperature	–20 to 75°C	−20 to 75°C					
Operating ambient humidity	10 to 90%RH, n	on-condensing					
Storage ambient humidity	10 to 90%RH, n	10 to 90%RH, non-condensing					
	Conforms to **JIS C 0911	Frequency	Acceleration	Amplitude	Sweep Count		
Vibration resistance		10 to 55Hz	<u> </u>	0.075mm (0.003 in)	10 times		
		55 to 150Hz	1 g	_	- *(1 octave/minute)		
Shock resistance	Conforms to **J	IS C 0912 (10g x 3	times in 3 direction	ons)			
Dielectric withstand voltage	500 VAC for 1 m	ninute across DC e	xternal terminals a	and ground			
Insulation resistance	5 M Ω or larger by 500 VDC insulation resistance tester across AC external terminals and ground						
Operating ambience	Free of corrosive	e gases. Dust sho	uld be minimal.				
Cooling method	Self-cooling	Self-cooling					

REMARK

One octave marked * indicates a change from the initial frequency to double or half frequency. For example, any of the changes from 10 Hz to 20 Hz, from 20 Hz to 40 Hz, from 40 Hz to 20 Hz, and 20 Hz to 10 Hz are referred to as one octave.

^{**}JIS: Japanese Industrial Standard

2.2 Performance Specifications

The following table gives the performance specifications of the A64RDC.

Table 2.2 Performance Specifications

Item	A64RD3C	A64RD4C		
Type of measuring system	3-wire type	4-wire type		
Connectable temperature-	Pt100 (conforms to JIS* C1604-1989 and DIN 48760-1980)			
measuring resistor	JPt100 (conforms to JIS C1604-1981)			
	Pt100 : -180°C (-292°F) to 600°C (111	2°F) (27.08 Ω to 313.59 Ω)		
Temperature input range	JPt100 : -180°C (-292°F) to 600°C (111	2°F) (25.8 Ω to 317.28 Ω)		
	16-bit signed binary -1800 to 6000 (value to the first	decimal place × 10)		
Detected temperature value	32-bit signed binary -180000 to 600000 (value to the	third decimal place × 1000)		
Resolution	0.025°C			
Overali accuracy	±1% (accuracy to the full scale)			
Conversion speed	40 msec/channel			
Number of temperature input channels	4 channels/module			
Insulation method	Between channels : No insulation Between an input terminal and PC CPU power : Photocoupler insulation			
Number of occupied stations (points)	4 (32)			
Terminal block	47-point terminal block			
Cable between A64RDC and Pt100	See Section 2.2.1.			
Applicable crimp contact	V1.25-3 V1.25-YS3A V2-S3 V2-YS3A			
24 VDC internal current consumption (A)	0.2			
Weight kg (lb)	0.81 (1.77)			
Outside dimensions mm (in)	170(6.69)(H) × 100(3.94)(W) × 80(3.15)(D)			

^{*} Japanese Industrial Standard

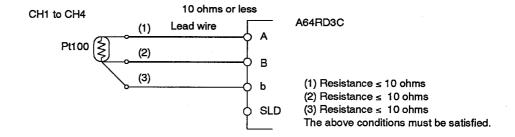
2.2.1 Connection specifications of platinum temperature-measuring resistors

This section gives the specifications of connection between an A64RD3C/4C and a platinum temperature-measuring resistor.

(1) A64RD3C

When a Pt100 is connected to an A64RD3C, the resistance of each lead wire must be 10 ohms or less.

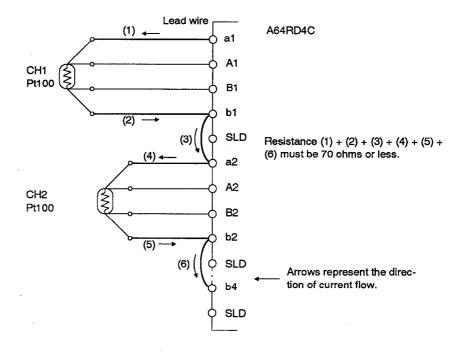
This applies to all channels of 1 through 4.



(2) A64RD4C

Total of the resistance of lead wires through which currents flow (depending on channel setting) must be 70 ohms or less.

(Example) When Pt100s are connected to channels 1 and 2:



2.3 Functions

This section explains the various functions of the A64RDC.

2.3.1 Functions list

The following table shows the functions of the A64RDC.

Table 2.3 List of Functions

ltem	Description	Reference Section
Conversion enable/disable set- ting of each channel	Temperature detection enabled/disabled is set.	2.3.2
Sampling/average processing setting	The detected temperature is processed according to the set processing method. The result is stored in buffer memory. The following three processings are available. • Sampling • Time averaging • Count averaging	2.3.3
Representation of detected temperature values	Values to the first and third decimal places are given. • Value to the first decimal place (16-bit signed binary) Example: 53.8(°C) → 538 • Value to the third decimal place (32-bit signed binary) Example: 216.025(°C) → 216025	2.3.4
Disconnection detection	 Disconnection of a Pt100 or cable is detected. A64RD3C Disconnection at each channel is detected and the disconnection-detected flag (X19 to X1A) that corresponds to that channel goes ON. A64RD4C Disconnection at any channel is detected and the Σ disconnection detected flag (X19) goes ON. 	2.3.5
Setting of platinum temperature- measuring resistor	The type of a platinum temperature-measuring resistor to be used is set. The following two kinds of platinum temperature-measuring resistors are used: • Pt100 new JIS (DIN) type (JIS C1604-1989, DIN 43760-1980) • JPt100 old JIS type (JIS C1604-1981)	2.3.6

2.3.2 Conversion-enabled/disabled setting with each channel

Buffer address 1 is used to designate sampling or averaging.

(1) Temperature detection enable/disable is set for each channel.

• Conversion-enabled : Outside temperature is received, and

disconnection detection is done.

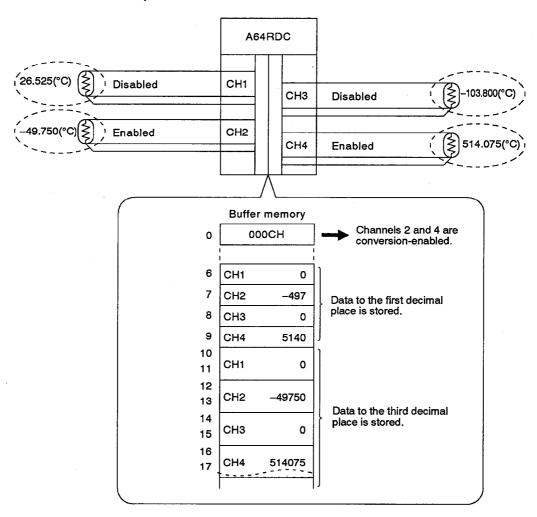
· Conversion-disabled : Outside temperature is not received, and

disconnection detection is not done.

(2) All channels are set to conversion-disabled by default.

Set channels to conversion-enabled at address 0.

Example: If channels 2 and 4 are set to conversion-enabled:



(3) Set unused channels to conversion-disabled to shorten the sampling time

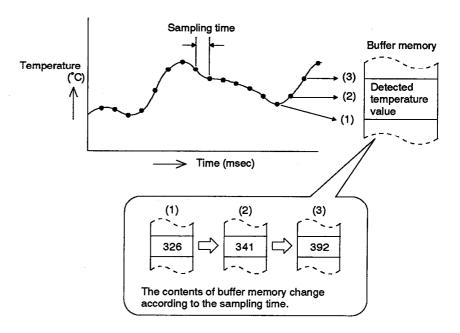
Example:

- (1) When all channels are set to conversion-enabled: 4 x 40 msec/channel = 160 msec
- (2) When channels 1 and 3 are set to conversion-enabled: 2 x 40 msec/channel = 80 msec

2.3.3 Sampling and averaging processings

Buffer address 1 is used to designate sampling or averaging.

(1) Sampling Data input through a channel which is specified for sampling



is converted according to the sampling time set with the PC CPU. The detected temperature values are stored in buffer memory.

REMARK

The sampling time varies according to the number of channels.

Example:

When channels 1, 2, and 4 are used

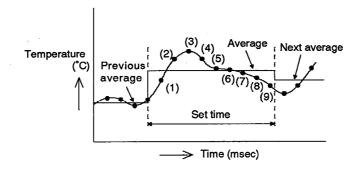
Sampling time = 3 channels x 40

= 120 msec

(2) Time averaging processing

Data conversion in the channel which is specified for time averaging is done in the time set with the PC CPU for averaging processing.

The average of the converted values (except the maximum and minimum values) is stored in buffer memory.



		Maximum value						Minimum value
185	210	220	215	205	200	195	180	170
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Data						,	,	

Average =
$$\frac{185 + 210 + 215 + 205 + 200 + 195 + 180}{7} = \frac{198}{1}$$
 Stored in buffer.

When an average is being calculated, the previous average is stored in buffer memory.

REMARK

The number of sampling times varies with the number of channels and the setting time.

The setting time is in 10 msec units. Values less than 10 msec are rounded down.

Example

When channels 1, 2, and 4 are used, and the setting time is 1100 msec.

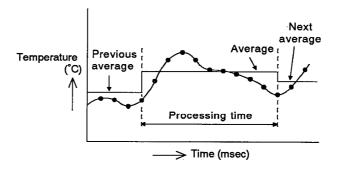
The number of sampling times =
$$\frac{1100 \text{ msec}}{3 \text{ channels} \times 40}$$

= 9.17

The number of sampling times is rounded down to 9.

(3) Count averaging processing times

Data conversion in the channel which is specified for count averaging is done the number of times (count) set with the PC CPU for averaging processing.



When an average value is being calculated, the previous average is stored in buffer memory.

REMARK

The sampling time (in which sampling is done set number of times) varies with the number of channels used.

The number of sampling times = (set number of times) \times (number of channels) \times (40 msec/channel)

Example:

When channels 1, 2, and 4 are used, and the setting number of times are 10, 20, and 30 times.

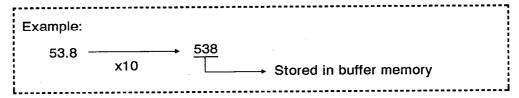
Channel	Setting Number of Setting Times	Sampling Time
CH1	10	10 times x 3 channels x 40 msec/channel = 1200 (msec)
CH2	20	20 times x 3 channels x 40 msec/channel = 2400 (msec)
CH4	30	30 times x 3 channels x 40 msec/channel = 3600 (msec)

2.3.4 Representation of detected temperature values

The temperature that the A64RDC can detect ranges from -180°C to +600°C. Detected temperature values are represented to the first and third decimal places.

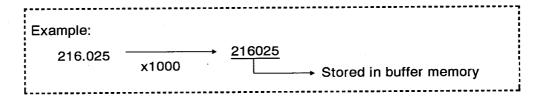
(1) Values to the first decimal place are multiplied by 10 and represented in 16-bit signed binary values.

The detected temperature values range from -1800 to + 6000.



(2) Values to the third decimal place are multiplied by 1000, and represented in 32-bit signed binary values.

These detected temperature values range from -180000 to + 600000.



2.3.5 Disconnection detection

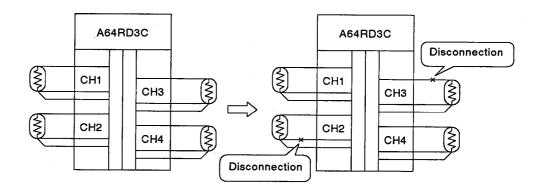
Disconnection of a Pt100 or cable is detected.

(1) A64RD3C (3-wire type)

Disconnection at each channel is detected and the disconnection-detected signal (X19 to X1A) that corresponds to that channel is turned ON.

However, this only applies to in channels specified for conversionenabled.

Example: When channels 1, 2, and 4 are conversion-enabled:



Channel	Conversion- enabled/disabled	Flag	State
CH1	Enabled	X19	OFF
CH2	Enabled	X1A	ON
СНЗ	Disabled	X1B	OFF
CH4	Enabled	X1C	OFF

Since channel 2 is conversion-enabled, the X1A signal is turned on if a disconnection is detected.

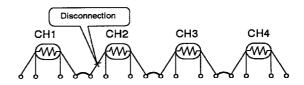
Since channel 3 is conversion-disabled, the X1B signal remains ON if no disconnection is detected.

(2) A64RD4C (4-wire type)

Disconnection at any channel is detected and the Σ disconnection-detected flag (X19) is turned ON.

If at least one channel is specified for conversion-enabled, disconnections will be detected.

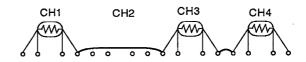
1) All channels are used



	CH1	CH2	СНЗ	CH4	Disconnection- detected Flag
	0	x	0	0	ON
Conversion- enabled/disabled	×	0	0	×	ON
chabled/disabled	×	×	×	x	OFF*

o....Enabled, x....Disabled

- * Since all channels used are conversion disabled, if no disconnections are detected, the disconnection detection flags remain OFF.
- 2) Only channels 1, 2, and 4 are used



		CH1	CH2	СНЗ	CH4	Disconnection- detected Flag
	Conversion-	0	0	×	x	ON*
е	enabled/disabled	0	×	0	х	OFF

o....Enabled, x....Disabled

* Setting channel 3 (which is not used) to conversion-disabled will be regarded by the CPU as a disconnection, thus turning ON the disconnection-detected flag.

IMPORTANT

Be sure to set the channel which is not connected to the Pt100 to conversion-disabled. If it is set to conversion-enabled, the disconnection-detected flag will go ON.

2.3.6 Specifying platinum temperature-measuring resistors

Two types of platinum temperature-measuring resistor - the JPt100 (old JIS type: JIS C1604-1981) and the Pt100 (new JIS and DIN type: JIS C1604-1989, DIN 43760-1980) - can be used with by A64RDC.

The type of platinum temperature-measuring resistor that is designated in buffer address 36 is valid for <u>all channels.</u> (Setting done with each Pt100 is valid when the power to the PC is turned ON or reset.)

CAUTION

Two different types of platinum temperature-measuring resistors cannot be used simultaneously with one A64RDC module. If two types are used, correct temperature detection cannot be obtained in the channel which is connected to a different platinum temperature-measuring resistor than the one specified.

REMARK

See Appendix 1 for the standard resistance of platinum temperature-measuring resistors.

2.4 Cable Specifications

The following cables can be used with an A64RDC.

(1) 5-core flat cable cut wires

These cables, used when an A64RDC is installed next to an A2CCPU or A2CCPU I/O module, can transmit data while supplying 24 VDC. Cable specifications are given below.

Model A2C-005 Module intervals 0 to 34 mm (1.34 in.) Conductor resistance 0.2Ω Insulation resistance (20°C) 15 MΩkm or larger Dielectric withstand voltage V-min 200 VAC 95 mm (3.74 in.) SDA SG SG Configuration SDB RDB +24V

Table 2.4 5-core Flat Cable Specifications

(2) Shielded PVC cables

There are 2 types of cables - a 3-core cable for data send signals and a 5-core cable for data send signals and for supplying 24 VDC. Cable specifications are given below.

MI x 3 CHRV-SV-SB MI x 5CHRV-SV-SB Model Cable type Shielded twisted-wire-pair cable Five-core-composite Number of cores Three-core composite A: SDA, SDB/B: SG/C: 24 DCV Application Module intervals 100 m (3937 in.) maximum A. B: 38 Ω/km or less Conductor resistance C: 10 Ω/km or less (20°C) Insulation resistance 10 M Ωkm or larger (20°C) Dielectric withstand 200 VAC voltage V-min Yellow В Yellow White Cross section White Red Black

Table 2.5 Shielded PVC Cable Specifications

(3) Twisted-wire-pair cable

Table 2.6 Twisted-Wire-Pair Cable Specifications

ltem ·	Specifications
Cable type	Shielded twisted-wire-pair cable
Logarithm	2P or larger
Conductor resistance (20°C)	88.0 Ω/km or less
Electrostatic capacity (1 kHz)	Average 60 nF/km or less
Characteristic impedance (100 kHz)	110±10Ω

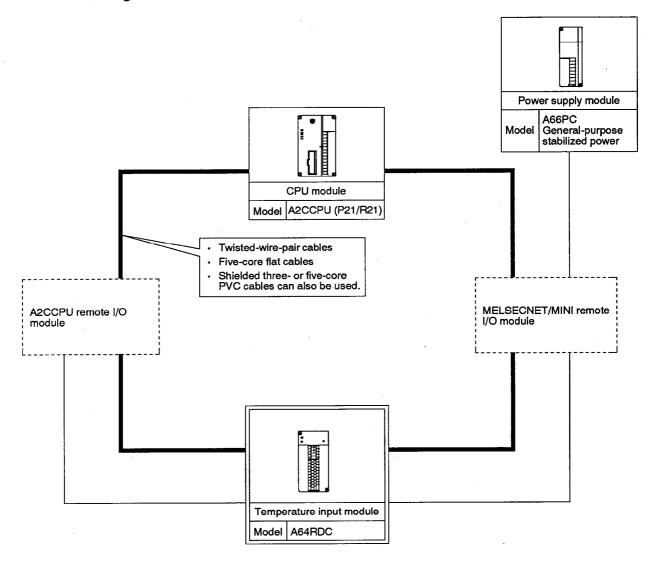
3. LINKING TO THE A2CCPU

The following sections describe the procedures for linking an A64RDC to an A2CCPUP21 or A2CCPUR21 (hereafter called the A2CCPU).

3.1 System Configuration

The following diagram shows when the A64RDC is used as a remote module of the A2CCPU.

3.1.1 Overall configuration



3.1.2 Applicable system modules

The A64RDC can be used as a remote terminal module of an A2CCPU.

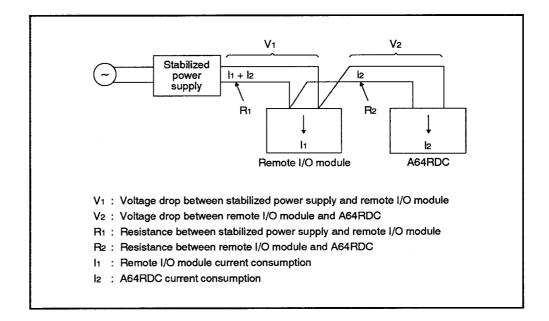
- (1) A maximum of 14 remote terminal modules (such as an A64RDC) can be connected to the A2CCPU module. The following modules are used as remote terminal modules.
 - · A64RDC (temperature input module)
 - A68ADC (analog/digital converter module)
 - AD61C (high-speed counter module)
 - A64DAVC (digital/analog voltage converter module)
 - A64DAIC (digital/analog current converter module)
 - AJ35PTF-R2 (RS-232C interface module)
- (2) Remote modules connected to the A2CCPU can occupy up to 64 stations.

3.1.3 Precautions when constructing the system

(1) Flat cables, twisted-wire-pair cables and shielded three- or five-core PVC cables are used for connections between the A2CCPU and the A64RDC.

The maximum connecting distance between stations varies with the cable diameter when twisted-wire-pair cables are used.

- (2) The A64RDC requires an external power supply of 24 VDC. Use an A66PC power supply module or a general-purpose stabilized power supply (24 VDC).
- (3) When supplying power from one power supply to multiple A64RDCs or to remote I/O modules, select the proper cables and wiring route, taking voltage drop into consideration.



Calculation of voltage drop

 $V_1 = R_1 \times (I_1 + I_2)$

 $V_2 = R_2 \times I_2$

Remote I/O module receiving port voltage

(Remote I/O module receiving port voltage) = (Stabilized power supply voltage) - V1

(A64RDC receiving port voltage)

= (Stabilized power supply voltage) - V1 - V2

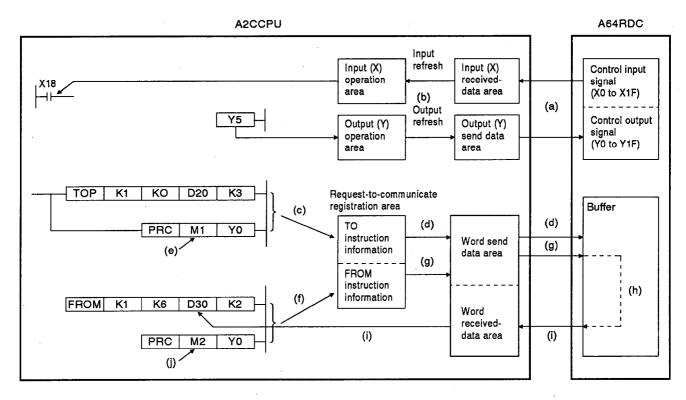
Connection is possible if the receiving port voltage of A64RDC is within the range 15.6 V through 31.2 V.

3.2 Data Communications Processing

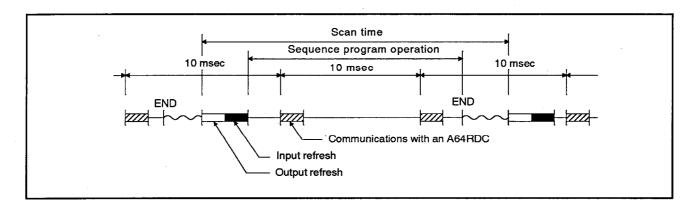
This section discusses data communications processing and the processing time between an A64RDC and an A2CCPU

3.2.1 Communications processing

The letters in parentheses in the figure below correspond to the paragraphs in this section.



- (1) Communications processing of control I/O signals is described below.
 - (a) During sequence program execution, communication of I/O signals between the A2CCPU and the A64RDC is executed by suspending the sequence program execution every 10 msec. During communications, input signal data is stored in the input (X) received-data area, and data stored in the output send data area is output to the A64RDC.
 - (b) After the END instruction of the sequence program is executed, data in the output (Y) operation area where the operation result is stored is refreshed to the output (Y) send data area. Then, data stored in the input (X) received-data area is refreshed to the input (X) operation area.



(2) Writing data to the A64RDC buffer

- (c) The TO instruction information is written to the request-to-communicate registration area by the execution of the TO instruction, and registration of the TO instruction information is completed by execution of the PRC instruction.
- (d) The PC CPU starts processing instructions of the next and following steps when the TO instruction information has been registered.

(The instruction processing will not wait for a transmission-completed response.)

The TO instruction information stored in the request-to-communicate registration area is transmitted in several steps to the A64RDC. This is done via the word data send area to the A64RDC after execution of the END instruction.

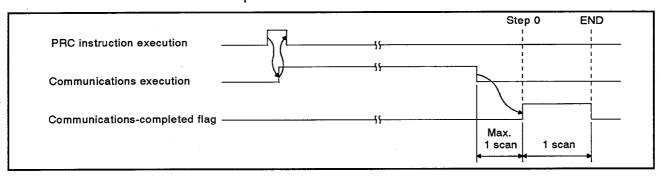
(e) The communications-completed flag (M1) designated by the PRC instruction is turned ON for one scan from step 0 of the scan immediately after the response of send-completed transmitted from the A64RDC is received by the A2CCPU. Upon completion of the send, the TO instruction information stored in the request-to-communicate registration area is cleared.

- (3) Reading data from the A64RDC buffer
 - (f) The FROM instruction information is written to the request-to-communicate registration area by the execution of the TO instruction, and registration of the FROM instruction information is completed by execution of the PRC instruction.
 - (g) The PC CPU starts processing instructions of the next and following steps when the FROM instruction information has been registered.

(The instruction processing will not wait for a transmission-completed response.)

The FROM instruction information stored in the communications request registration area is transmitted in several steps to the A64RDC. This is done via the word data send area to the A64RDC after execution of the END instruction.

- (h) Upon receiving the FROM instruction information, the A64RDC transmits data stored in a designated buffer address back to the A2CCPU according to the information it receives.
- (i) The data is transmitted at the rate of one word per communication from the A64RDC and stored in the storage devices specified by the FROM instruction.
- (j) The communications-completed flag (M2) designated by the PRC instruction is turned ON for one scan from step 0 of the scan immediately after the storage of read data in designated devices is completed.



3.2.2 Processing time

This section describes the processing time required to read data from and write data to the buffer area of an A64RDC.

Processing time required to write data

Max. processing time = 2 scan time + 10 msec x (number of write data words + 7) + 40 msec *1

(2) Processing time required to read data

Max. processing time = 2 scan time + 10 msec x (number of read data words + 8) + 40 msec *1

*1: Internal processing time of the A64RDC

3.3 I/O Signals Handled with an A2CCPU

Functions of the control I/O signals handled between an A64RDC and the A2CCPU are described in this section. Devices X refer to the input signals from the A64RDC to the A2CCPU. Devices Y refer to the output signals from the A2CCPU to the A64RDC.

Table 3.1 List of A64RD3C I/O Signals

Signal Direction : A64RD3C → A2CCPU		Signal Direction : A2CCPU → A64RD3C		
Device No.	Description	Device No.	Description	
X(n+0) to X(n+3)	Unusable	Y(n+0) to Y(n+3)	Unusable	
X(n+4)	FROM/TO instruction error detection flag	Y(n+4)	Error-detection reset	
X(n+5)	Reset switch ON-detected flag	Y(n+5)	Reset switch ON-detected flag reset	
X(n+6)	Unusable	Y(n+6)	Unusable	
X(n+7)	Communications-completed response wait flag	Y(n+7)	Communications reset	
X(n+8) to X(n+17)	Unusable	Y(n+8) to Y(n+1F)	Unusable	
X(n+18)	READY flag			
X(n+19)	CH1 : Disconnection detection flag			
X(n+1A)	CH2: Disconnection detection flag			
X(n+1B)	CH3: Disconnection detection flag			
X(n+1C)	CH4: Disconnection detection flag			
X(n+1 D) to X(n+1 F)	Unusable			

Table 3.2 List of A64RD4C Signals

Signal Direction : A64RD4C → A2CCPU		Signal Direction : A2CCPU → A64RD4C		
Device No. Description		Device No.	Description	
X(n+0) to X(n+3)	Unusable	Y(n+0) to Y(n+3)	Unusable	
X(n+4)	FROM/TO instruction error detection flag	Y(n+4)	Error-detection reset	
X(n+5)	Reset switch ON-detected flag	Y(n+5)	Reset switch ON-detected flag reset	
X(n+6)	Unusable	Y(n+6)	Unusable	
X(n+7)	Communications-completed response wait flag	Y(n+7)	Communications reset	
X(n+8) to X(n+17)	Unusable	Y(n+8)	Unusable	
X(n+18)	READY flag			
X(n+19)	∑ Disconnection detection flag	to Y(n+1F)		
X(n+1A) to X(n+1F)	Unusable			

IMPORTANT

The A64RDC could malfunction if any of the unusable I/O signals is utilized (turned ON or OFF) in the sequence program.

by the sequence program.

(1) FROM/TO instruction error detection X(n+4) and error-detection reset Y(n+4)

Turns ON (latched) when instruction data which cannot be read or written from the A2CCPU to the A64RDC is written. (The RUN LED of the A64RDC flashes.)

When the X(n+4) signal goes ON, its error code (see Table 7.1 in Section 7.1) is stored in the error code storage area (special registers D9180 to D9193 of the A2CCPU) of the corresponding remote terminal number.

To restart communications, turn ON the error-detection reset Y(n+4) with the sequence program or, after resetting the A2CCPU, write "0" to address 18 of the A64RDC to reset the A64RDC. Then, the RUN LED goes ON.

When the error-detection reset Y(n+4) goes ON, the error code in the error code storage area (D9180 to D9193) and the corresponding FROM/TO instruction information stored in the request-to-communicate registration area are cleared.

FROM/TO instruction error ON detection X(n+4)

Error-detection reset ON OFF

Y(n+4)

To be turned ON and OFF

(2) Reset switch ON-detected flag X(n+5) and reset switch ON-detected flag reset Y(n+5)

Turns ON (latched) when the reset switch of the A64RDC is set to reset.

When both the reset switch ON-detected flag and the reset switch ON-detected flag reset are ON, the FROM/TO instruction information, stored in the request-to-communicate registration area, with respect to the corresponding remote terminal module, is cleared.

To restart communications, turn ON the reset switch ON-detected flag reset Y(n+5) with the sequence program, or reset the A2CCPU.

Reset switch on the front of ON the A64RDC OFF ON Reset switch ON-detected flag The request-to-communicate X(n+5)OFF registration area is cleared when both ON of these signals are turned ON. Reset switch ON-detected flag OFF reset signal Y(n+5) To be turned ON and OFF by the sequence program.

POINT

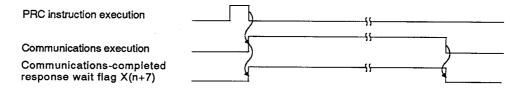
If the A64RDC is reset by moving the reset switch, it returns to the initial state. Execute initial setting again.

Since X(n+5) goes ON after the power is turned ON, be sure to turn ON Y(n+5) and OFF X(n+5) at the initial stage. Then, execute programs for the A64RDC.

(3) Communications-completed response signal wait flag X(n+7)

This goes ON when communications with the A64RDC is started by execution of the PRC instruction, and goes OFF when the communications-completed response signal from the A64RDC is received.

It also goes OFF when the communications error reset signal Y(n+4) goes ON.



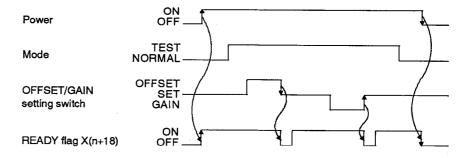
(4) Communications reset Y(n+7)

If the communications-completed response signal for the data transmitted by execution of the PRC instruction is not returned, the communications reset Y(n+7) and the communications error-detection reset Y(n+4) are turned ON simultaneously by the sequence program.

(Communications is reset to the initial state. The set data is not cleared.)

(5) READY flag X(n+18)

This signal goes ON in any NORMAL mode(*1) (except the TEST mode(*2)) after turning ON the power or resetting the PC CPU.



(6) Disconnection Detection (A64RD3C: X(n+19) to X(n+1C), A64RD4C: X(n+19))

Goes ON if a disconnection is detected.

Goes OFF if no disconnection is detected.

REMARK

- (1)*1 ... Normal mode is established when test mode terminals on an A64RDC are not connected.
- (2)*2 ... Test mode is established when test mode terminals on an A64RDC are connected (shorted). Error compensation can be done.
- (3) See Section 2.3.5 for disconnection detection.

3.4 Assignment of the A64RDC Buffer

The assignment of the A64RDC buffer (without battery backup) is shown below.

Address (decimal)	Contents (16 bits)	
0	Conversion-enabled/disabled specifica	tion
1	Averaging specification	
2	CH1 Averaging time/count	
3	CH2 Averaging time/count	
4	CH3 Averaging time/count	
5	CH4 Averaging time/count	
6	CH1 Detected temperature value	
7	CH2 Detected temperature value	
8	CH3 Detected temperature value	
9	CH4 Detected temperature value	
10	CH1 Detected temperature value	(L)
11	(32 bits)	(H)
12	CH2 Detected temperature value	(L)
13	 (32 bits)	(H)
14	CH3 Detected temperature value	(L)
15	(32 bits)	(H)
16	CH4 Detected temperature value	(L)
17	(32 bits)	(H) ~
18	Write data error code	
19	Conversion-completed flag	-
20	Type specification of a platinum temperature-measuring resistor	

CAUTION

Addresses 6 to 17 and 19 of the buffer are exclusively used for reading from the PC CPU. Therefore, if the A64RDC writes data to these areas, any data stored in these areas will be overwritten and destroyed. In this case, the A64RDC detects an error, stores the error code in address 18, and the RUN LED flashes.

3.4.1 Conversion-enabled/disabled specifications (address 0)

Address 0 is used to designate whether temperature detection is executed or not.

- (1) When the power is turned ON, all channels are set to conversion-disabled (0000H(0)).
- (2) To reduce sampling time, these specifications can be changed by the sequence program.

CH4 CH3 CH2 CH1	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
	_	_	_	_	_	_	-	_	_	_	_	_	CH4	СНЗ	CH2	CH1

Ignored

Channel specifications

1 : Conversion-enabled

0 : Conversion-disabled

Example:

To specify channels 1, 3, and 4 for conversion

When writing 000DH (13) to specify channels for conversion-enabled/disabled, the sampling time is 40 msec \times 3 = 120 msec.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	
0	0	0	0	0	0	0	0	o	0	0	0	1	1	0	1	→000DH (13)
												CHA	CÜ3	CHS	CH1	

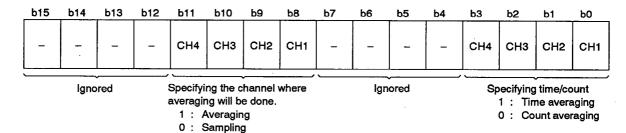
REMARK

See Section 2.3.2 for the designation of conversion enable/disable.

3.4.2 Averaging processing specifications (address 1)

Address 1 is used to designate execution of sampling or averaging.

- (1) When the power is turned ON and the READY signal of the A64RDC is ON, all channels are set for sampling.
- (2) Use buffer address 1 to select sampling or averaging.



POINT

When averaging is not specified, sampling is set without regard to the time/count specification.

REMARK

See Section 2.3.3 for sampling and averaging.

3.4.3 Averaging time/count (addresses 2 to 5)

Addresses 2 to 5 are used to set the length of time or the number of times of averaging.

When the power is turned ON, the averaging time and averaging count are set to 0.

(2) The setting ranges are as indicated below:

Averaging in terms of time

: 160 to 32000 msec

Averaging in terms of count : 1 to 800 times

CAUTION

If a value outside the above range has been written, a setting error occurs and the buffer is overwritten.

However, the A64RDC performs conversion processing at the averaging time or count previously set.

REMARK

See Section 2.3.3 for the length of time and the number of times of averaging.

Detected temperature value (addresses 6 to 17) 3.4.4

Addresses 6 to 17 are used to store detected temperature values which are handled in 16-bit or 32-bit data.

(1) 16-bit data (addresses 6 to 9)

A detected temperature value is multiplied by 10 and represented in the range from -1800 to 6000 of 16-bit signed binary numbers.

If a detected temperature value is negative, it is represented in a complement of 2.

Example 1:

If a detected temperature value is 123.025°C (253.445°F), 1230 is stored.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	1	0	0	1	1	0	0	1	1	1	0

Example 2:

If a detected temperature value is -123.025°C (-189.445°F), -1230 is stored.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
1	1	1	1	1	0	1	1	0	0	1	1	0	0	1	0

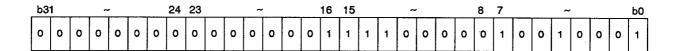
(2) 32-bit data (addresses 10 to 17)

A detected temperature value is multiplied by 1000 and represented in the range from -180000 to 600000 of 32-bit signed binary numbers.

If a detected temperature value is negative, it is represented in a complement of 2.

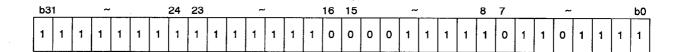
Example 1:

If a detected temperature value is 123.025°C (235.445°F), 123025 is stored.



Example 2:

If a detected temperature value is -123.025°C (-189.445°F), -123025 is stored.



REMARK

See Section 2.3.4 for detected temperature value.

3.4.5 Write data error code (address 18)

- (1) When data is read from the PC CPU, the A64RDC makes a data range check for the number of channels, averaging count, and averaging time. It also performs a single read/write area access check. If any value is outside the range, the A64RDC stores the error code in 16-bit binary. Section 7.1 gives error code details.
- (2) If there is more than one error code, the first data error code detected by the A64RDC is stored. The others are not stored.
- (3) To reset an error code, write 0 from the PC CPU.
- (4) If an error is reset without correcting the error, the data error code is set to 0 and the RUN LED of A64RDC stops flashing.

POINT

The error code can be reset by turning ON the error-detection reset (Yn+4).

3.4.6 Conversion-completed flag (address 19)

Address 19 is used to confirm that a conversion-enabled channel can detect temperature correctly

- (1) The conversion-completed flag processing after power ON is only performed once when the channel specification for conversion-enabled/disabled (address 0) is changed.
 - Conversion-enabled/disabled specification change from 0 to 1:
 After setting conversion-enabled and storing a detected temperature value in the buffer, the conversion-completed flag of its corresponding channel is set to 1.
 - Conversion-enabled/disabled specification change from 1 to 0:
 The conversion-completed flag of its corresponding channel is set to 0.
- (2) A conversion-completed flag is provided to each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	o	o	0	0	0	0	0	CH4	СНЗ	CH2	CH1

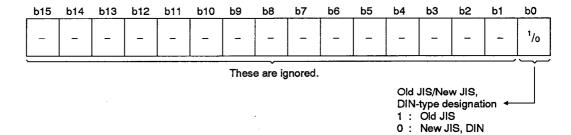
Channel specifications

- 1 : Conversion completed
- 0 : Conversion not completed
- (3) The conversion-completed flag can be used for the interlock when reading the detected temperature value of the channel where averaging processing is executed.

3.4.7 Type specification of a platinum temperature-measuring resistor (address 20)

This area is used to set the type of a platinum temperature-measuring resistor.

- (1) When the power supply is turned ON, the type is set to "0", indicating the new JIS, DIN type.
- (2) All channels correspond to a specified type.



REMARK

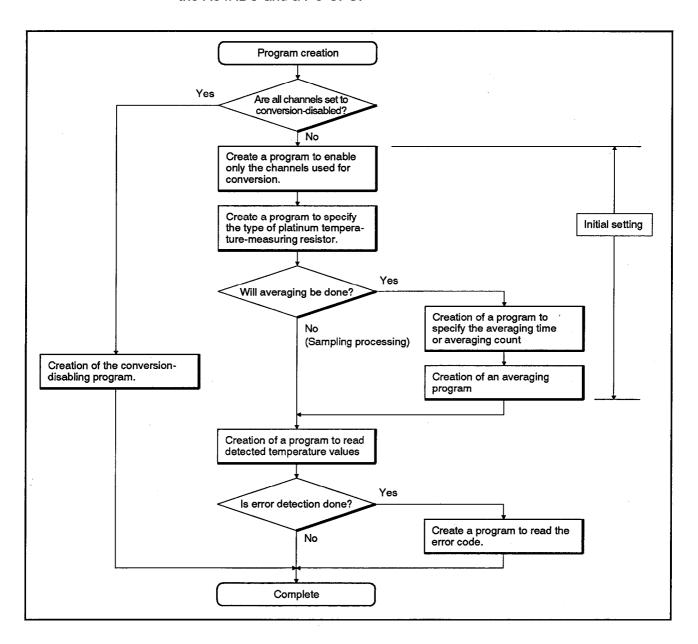
See Section 2.3.6 for platinum temperature-measuring resistor.

3.5 Programming

This section explains how to create a program when an A64RDC is used as the remote terminal module of an A2CCPU.

3.5.1 Programming procedure

The following shows the programming procedure for data read/write between the A64RDC and a PC CPU.



CAUTION

Only use the above-mentioned procedure to perform the initial settings. If average processing is specified before setting averaging time or count, a write data error occurs. To avoid this, batch writing of the initial setting data is recommended.

3.5.2 Initial setting of an A2CCPU

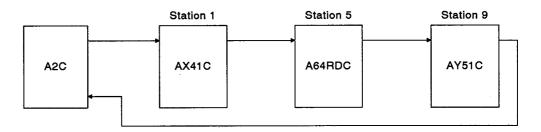
The A2CCPU allows connection of up to 14 remote terminals (such as A64RDC modules). In order to use those remote terminals, it is necessary to set the remote terminal information in the A2CCPU in the initial setting.

The setting procedure varies with the system disk such as SW4GP-GPPAEE and the previous type used for booting. Table 3.3 shows the setting procedures including the setting descriptions and the differences between types of system disks.

Table 3.3 Initial Setting Descriptions and Procedures

	C-11:		Pr	ocedures
ltem	Range			Previous Type System FD
Total number of stations	1 to 64	Set the total number of stations including the remote I/O modules and remote terminal modules.	Parameter setting	D9036
Head station number	1 to 61	Set the station number (head station number) set with the station number setting switch of each remote terminal module. A64RDC Set station number No. 1 AD61C Set station number No. 5 No. 1 remote terminal module = 1 No. 2 remote terminal module = 5	Parameter setting	D9021 No. 1 remote terminal module No. 2 remote terminal module No. 3 remote terminal module No. 14 remote terminal module
Protocol	0 to 1	Set the protocol used for data communications with the remote terminal modules 0: MINI standard protocol 1: No protocol Must be set at "0".	Parameter setting	D9035
Mode	0 to 2	Set the processings after the line error return and when a line error occurs. 0: Automatic online return enable 1: Automatic online return disable 2: Transmission stop at online error	Parameter setting	D9173

The following sample program shows how to write the initial setting data when the system is booted with a previous type system disk.



Total number of stations: AX41C: 4 stations

A64RDC: 4 stations 4 + 4 + 4 = 12 stations

AY41C : 4 stations

Head station number : Remote terminal module is only an A64RDC.

No. 1 remote terminal: Station 5

Protocol : MINI standard protocol = 0 (default = 0)

Mode : Automatic online return enable = 0 (default = 0)

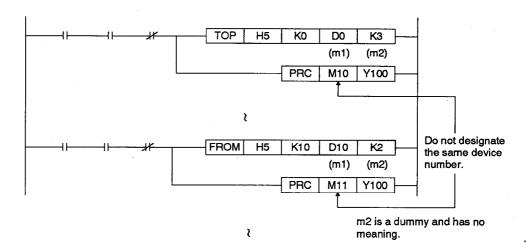
```
ON for one scan after RUN M9038 MOV K12 D9036 MOV K5 D9021
```

CAUTION

- (1) If the initial setting data has not been set, an SP. UNIT. ERR. (error No. 46) occurs and the CPU stops operating.
- (2) If the initial setting is done with both parameters and the sequence program while booting the system with a SW4GP-GPPAEE system disk, the parameter setting is valid and the sequence program setting is ignored.

3.5.3 Precautions when programming

(1) It is necessary to provide the PRC instruction to the step immediately following the FROM/TO instruction. Be careful not to designate the same devices for "m1" of the PRC instruction and for "m1" of the PRC instruction provided to another step.



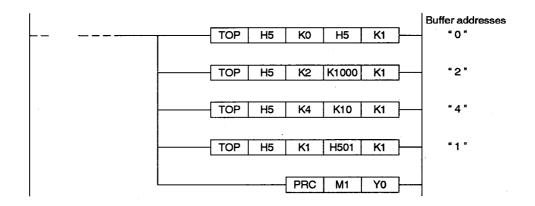
(2) The request-to-communicate registration areas can store up to 32 FROM/TO instructions. If the 33rd FROM/TO instruction is given, it is ignored (without processing) and an "OPERATION ERROR" will occur.

Provide an interlock with the M9081 and D9081 so that the FROM/TO instruction will not be executed when the request-to-communicate registration areas are full.

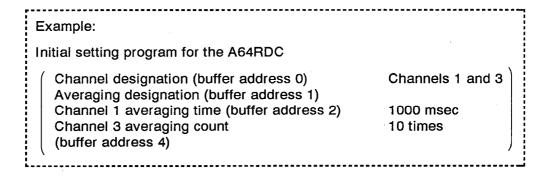
M9081 and D9081 are described below.

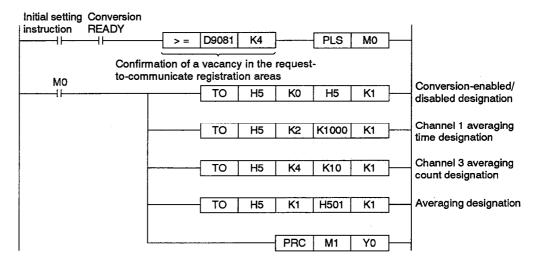
No.	Descriptions	Details				
M9081	OFF: A request-to-communicate registration area has a vacancy.	There are 32 request-to-communicate registration areas for remote				
M9081	ON: The request-to-communicate registration areas are full.	terminals. Goes ON when all these areas are full.				
D9081	The number of vacant areas in the request-to-communicate registration area for remote terminals.	The number of vacant areas in the request-to-communicate registration storage area.				

When data is written to two or more addresses in the buffer of an A64RDC, one FROM/TO instruction can execute data write if the addresses are continuous. If the addresses are not continuous, it is necessary to execute the FROM/TO instruction at two or more points (see below). In this case, more than one FROM/TO piece of instruction information is stored in the request-to-communicate registration areas.



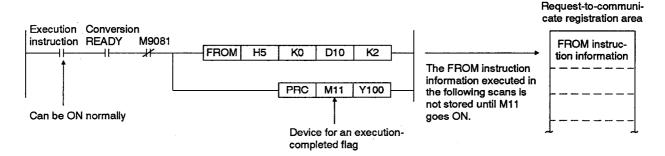
If an attempt is made to store FROM/TO instruction information which is larger than the number of vacancies in the request-to-communicate registration areas, that attempt will be ignored. To prevent this, it is necessary to provide a condition to allow confirmation that the vacancy in the request-to-communicate registration areas is larger than the FROM/TO instruction information. The programming example shown below describes the case when the FROM/TO instruction is executed after confirming such a vacancy in the request-to-communicate registration areas.





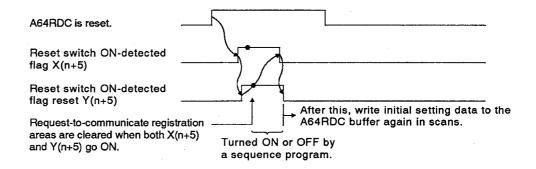
(3) If the execution instruction of the FROM instruction is set to normally ON, the next FROM instruction information is not stored in the requestto-communicate registration areas until the processing of the FROM instruction being executed is completed and the execution-completed flag designated by the PRC instruction goes ON.

It is not necessary to provide an interlock to allow execution of the FROM instruction after the execution-completed flag is turned ON.

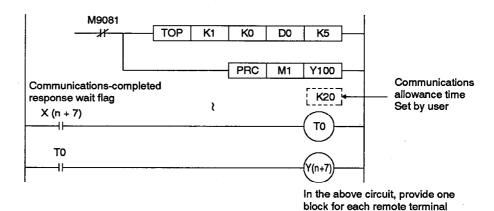


(4) When the reset switch on the front of an A64RDC is moved to reset, the A64RDC returns to the initial state and performs conversion with defaults.

Monitor the reset switch ON-detected flag X(n+5) with a sequence program and, when the flag goes ON, write initial setting data again to the A64RDC (when A/D conversion is executed with other than defaults).



(5) If a communications-completed response signal to the send executed to the A64RDC is not transmitted back, the CPU module is set in the state waiting for the communications-completed signal infinitely unless the CPU module is reset. To prevent this, provide a monitoring timer to allow retransmission of the same data at preset time intervals.



module.

X(n+7), Y(n+7), and Y(n+4) are control I/O signals for the A64RDC (see Section 3.3).

(6) When averaging is to be designated for the A64RDC, the data of the conversion-enabled/disabled designation, averaging designation, averaging time, and averaging count can be written to the buffer without restriction when they are written with one TO instruction. If they are written with several TO instructions, follow the order shown below.

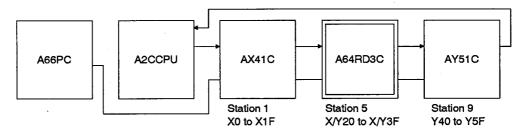
Conversion-enabled/disabled designation → Averaging time or count →

Averaging designation

Must be written last.

3.5.4 Sample program

The following is a programming example when the detected temperature values of channels 1 and 2 of the A64RDC are read in the QUIT system whose configuration is shown below.



(1) Channels to be used

· CH1: Time averaging (1000 msec)

• CH2: Sampling

(2) I/O numbers

A64RDC I/O numbers I/O numbers on CPU side X(n+0) to X(n+1F) X20 to X3F Y20 to Y3F

(3) CPU initial setting

Total number of stations : 12 stations

Head station number : Remote terminal module : Station 5

Protocol : MINI standard protocol

Mode : Automatic online return enable

(4) Program contents

 Write data error code and error reset: X0

 Starts storing detected temperature values to register D : X1

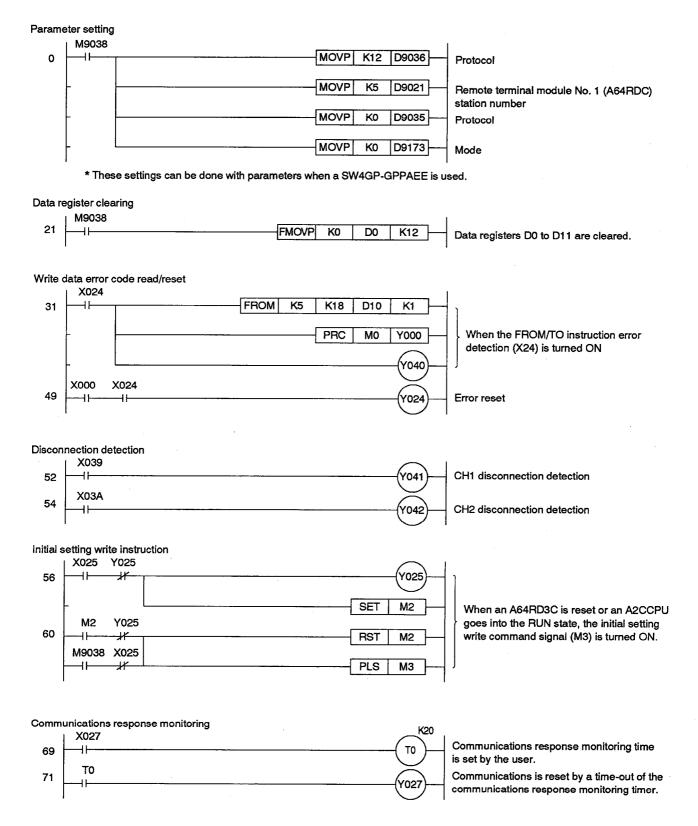
 Stops storing detected temperature values to register D : X2

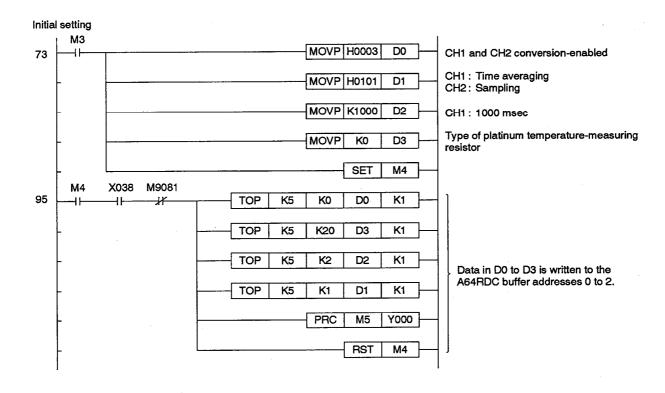
 Outputs error occurrence externally : Y40

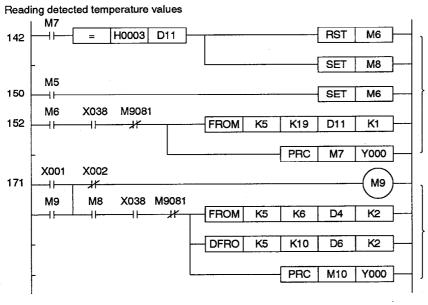
 Outputs disconnection detection externally Channel 1: Y41 Channel 2: Y42

Storage register memory map

	Address	Address Buffer Area Contents	
D0 →	0	Conversion- enabled/ disabled specification	
D1>	1	Averaging specification	
D2 →	2	CH1 Average time/count	
)
	6	CH1 Detected temperature value 16 bits	→ D4
	7	CH2 Detected temperature value 16 bits	→ D5
			j
	10	CH1 Detected temperature	D6 to
	11	value 32 bits	→ D7
	12	CH2 Detected temperature	D8 to
	13	value 32 bits	D9
			}
	18	Write data error code	→ D10
	19	Conversion-completed flag	→ D11
D3 →	20	Platinum temperature- measuring resistor type specification	
'			•





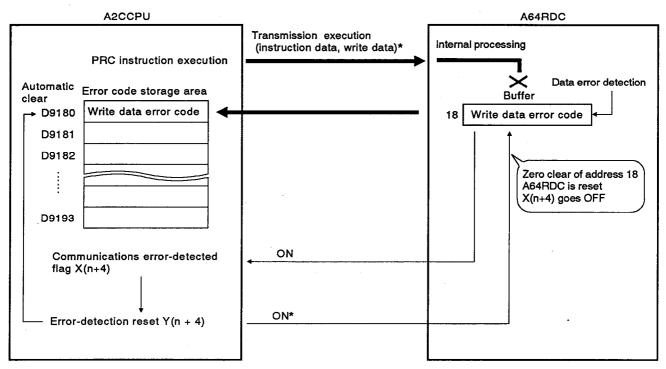


Conversion-completed flag is read from buffer address 19 When conversion for CH1 and CH2 is completed, the reading of the conversion-completed flag is stopped. Also, the detected temperature value storage signal is turned ON.

When X1 is turned ON, detected temperature values are stored. When X2 is turned ON, the storage of detected temperature values is stopped.

3.6 Error Detection

The following figure shows how an error is detected when an A2CCPU and an A64RDC are used together.



^{*} Processing marked by an asterisk is executed by the sequence program.

4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

This section gives the linking procedures when dedicated instructions to the MELSECNET/MINI-S3 (master station is AJ71PT32-S3) of the AnACPU are used and the communication of control I/O signals with the A68ADC is set for automatic refresh.

Use the SW4GP-GPPAEE system disk for automatic refresh setting.

IMPORTANT

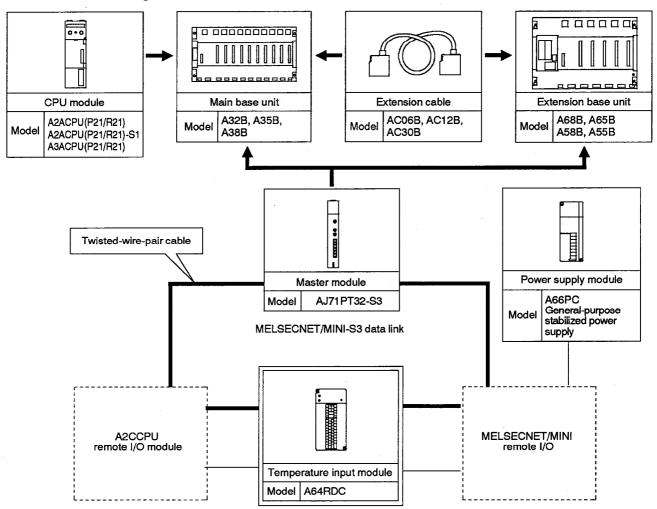
If dedicated instructions are used, the communication of control I/O signals with the A64RDC must be set for automatic refresh.

Section 5 gives details on how to link an AnACPU to an AJ71PT32-S3.

4.1 System Configuration

The following diagram shows when the A64RDC is used as a remote terminal module of the MELSECNET/MINI-S3 with the AJ71PT32-S3 master module linked to the A2ACPU, A2ACPU-S1 or A3ACPU.

4.1.1 Overall configuration



4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3 MELSEC-A

4.1.2 Applicable system modules

The A64RDC can be used as a remote terminal module of the MELSEC-NET/MINI-S3 link with the AJ71PT32-S3 as its master module.

- (1) A maximum of 14 remote terminal modules such as the A64RDC can be connected to an AJ71PT32-S3 module. The following types of modules are used as remote terminal modules.
 - · A64RDC (temperature input module)
 - · A68ADC (analog/digital converter module)
 - · AD61C (high speed counter module)
 - A64DAVC (digital/analog voltage converter module)
 - · A64DAIC (digital/analog current converter module)
 - AJ35PTF-R2 (RS-232C interface module)
 - AJ35PT-OPB-M1-S3 (mounting type operation box)
 - AJ35T-OPB-P1-S3 (portable type operation box)
- (2) Remote modules connected to the AJ71PT32-S3 can occupy up to 64 stations.
- (3) The AJ71PT32-S3 can be connected to an independent CPU system or to the master station or a local station of the MELSECNET data link system. It cannot be connected to a remote I/O station.

The number of modules connected to one CPU module is not limited.

REMARK

For details of the MELSECNET/MINI-S3 link system, refer to AJ71PT32-S3 MELSECNET/MINI-S3 Master Module User's Manual.

4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3 MELSEC-A

4.1.3 Precautions when constructing the system

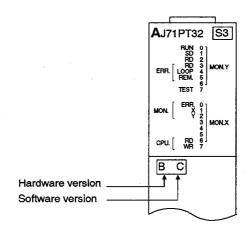
(1) Twisted-wire-pair cables are used for connection between the AJ71PT32-S3 (master module) and the A64RDC.

The maximum communicating distance between stations varies with cable size when twisted-wire-pair cables are used.

- 0.2 mm² to smaller than 0.5 mm²50 m 0.5 mm² or larger......100 m
- (2) The A64RDC requires external supply of 24 VDC power for internal power supply. Use the A66PC power supply module or a general-purpose stabilized power supply (24 VDC). If one power supply is connected to two or more A64RDC or remote I/O modules, select proper cables and wiring route considering voltage drop due to cables.

Refer to Section 3.1.3 (3) for calculation of voltage drop.

(3) The AJ71PT32-S3 (master module) of which software version is B or later can be connected to the A64RDC. The modules of which software version is A or not specified on the front side cannot be used.



IMPORTANT

Use the AJ71PT32-S3 (master module) in the EXTENSION mode (48 occupied points). Be sure to mount the initial data ROM storing the total number of remote stations and remote terminal data (set station numbers of remote terminal modules and corresponding remote terminal numbers) to the master module.

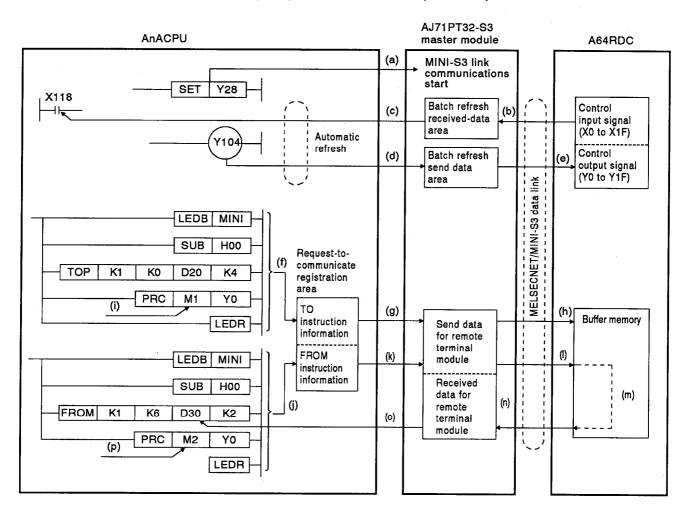
MELSEC-A

4.2 Data Communications Processing

The following describes the procedure and the processing time of the data communications between the A64RDC and AnACPU (with dedicated instructions).

4.2.1 Communications procedure

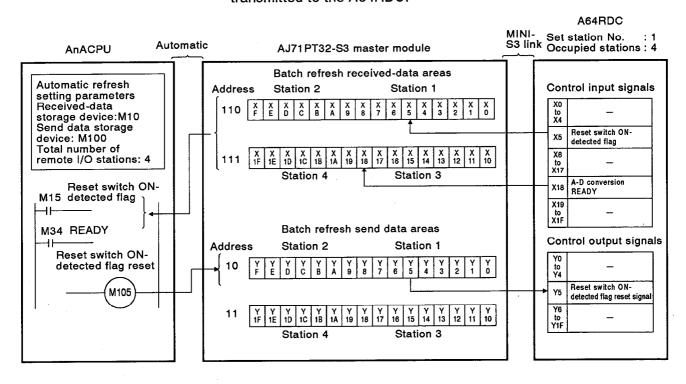
The following diagram shows each step of the operation.



4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

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- (1) Communications procedures of control I/O signals
 - (a) Turning ON the MINI-S3 communications start signal of the master module from the PC CPU starts the MINI-S3 data link.
 - (b) Control input signals from the A64RDC are stored automatically in the batch refresh received-data area in the master module
 - (c) Control input signals stored in the batch refresh received-data area are refreshed to the received-data storage devices as set with parameters.
 - (d) The send data storage device ON/OFF information set by automatic refresh setting is automatically refreshed to the batch refresh send data area.
 - (e) Control output signals stored in the batch refresh send data area are transmitted to the A64RDC.



4. LINKING TO THE AnACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

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- (2) Writing data to the buffer of an A64RDC
 - (f) By executing instructions from LEDB MINI to TO (MINI-S3 dedicated instructions) with the sequence program, data of the master module and A64RDC is stored in the request-to-communicate registration areas.
 - (g) By executing the PRC instruction, send data is written to the remote terminal module send data areas in the master module according to the TO instruction information stored in the request-to-communicate registration area (T0).
 - (h) After writing the send data to the send data area for the remote terminal module, the data is stored to the buffer area of the A64RDC via the MINI-S3 link.
 - (i) When a send-completed signal is received from the A64RDC, the bit device set with the PRC instruction is turned ON for one scan.
 - When communications is completed, the TO instruction information stored in the request-to-communicate registration area is cleared.
- (3) Reading data from the A64RDC buffer
 - (j) By executing the sequence program, data of the master module and A64RDC is stored in the request-to-communicate registration areas.
 - (k) By executing the PRC instruction, the FROM instruction information stored in the request-to-communicate registration area is written to the remote terminal module send data areas in the master module.
 - (I) When the data write is completed, the data is stored in the A64RDC through the MINI-S3 link.
 - (m) When the A64RDC receives the FROM instruction information, it transmits the data stored in the buffer back to the master module using the address data of the information.
 - (n) Data received from the A64ADC is stored in the received- data areas of remote terminal module.
 - (o) Data stored in the remote terminal module received-data areas is stored in the word devices designated by the FROM instruction of the sequence program.
 - (p) After storing the data received from the A64RDC buffer in the designated word devices, the AnACPU turns ON the bit device designated by the PRC instruction for one scan. When the communications is completed, the FROM instruction information stored in the request-to-communicate registration area is cleared.

4. LINKING TO THE Anacpu (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

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4.2.2 Processing time

This section describes the processing time to write and read data to and from the buffer of an A64RDC.

(1) Processing time required to write data

Max. processing time = 2 scan time + t msec x (number of write data words + 7) + 40 msec

(2) Processing time required to read data

Max. processing time = 2 scan time + t msec x (number of read data words + 10) + 40 msec

"t" indicates I/O refresh time. This value varies according to the number of used remote modules and their type.

The I/O refresh time can be found as shown in the following table:

Mode	Operation Mode Setting	I/O Refresh Time (msec)
	Automatic return (0)	t = 0.66 + (0.044 x R) + (0.25 x B) + (0.95 x T)
Extension	No automatic return (1)	t = 0.54 + (0.058 x R) + (0.25 x B) + (0.95 x T)
(48 points)	Communications stop when an error is detected (2)	t = 0.54 + (0.051 x R) + (0.25 x B) + (0.95 x T)

R: Total number of remote stations

B: Number of AJ35PTF-128DTs

T: Number of remote terminal modules

4. LINKING TO THE AnACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

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4.3 I/O Signals Handled with the PC CPU

4.3.1 I/O signals of an A64RDC

This section describes the functions of the control I/O signals transmitted between the A64RDC and an AnACPU. Devices X refer to the input signals from the A64RDC to the AnACPU. Devices Y refer to the output signals from the AnACPU to the A64RDC.

Table 4.1 List of A64RD31 I/O Signals

Signal Dir	rection : A64RD3C → AnACPU	Signal Dir	ection : AnACPU → A64RD3C		
Device No.	Description	Device No.	Description		
X0 to X4	Unusable	Y0 to Y4	Unusable		
X5	Reset switch ON-detected flag	Y5	Reset switch ON-detected flag reset signal		
X6 to X17	Unusable				
X18	READY flag				
X19	CH1 : Disconnection detection flag	Y6			
X1A	CH2 : Disconnection detection flag	to	Unusable		
X1B	CH3 : Disconnection detection flag	Y1F			
X1C	CH4 : Disconnection detection flag				
X1D to X1F	Unusable				

4. LINKING TO THE AnACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

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Table 4.2 A64RD4C I/O List

Signal Dir	ection : A64RD4C → AnACPU	Signal Dire	ection : AnACPU → A64RD4C			
Device No.	Description	Device No.	Description			
X0 to X4	Unusable	Y0 to Y4	Unusable			
X5	Reset switch ON-detected flag	Y5	Reset switch ON-detected flag reset signal			
X6 to X17	Unusable					
X18	READY flag	Y6	Unusable			
X19	∑ Disconnection detection flag	to Y1F	Unusable			
X1A to X1F	Unusable					

IMPORTANT

If any unusable I/O signals are utilized in the sequence program, the functions of the A64RDC cannot be guaranteed.

4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

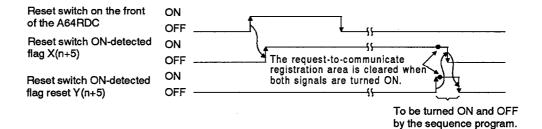
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(1) Reset switch ON-detected flag X(n+5) and reset switch ON-detected flag reset Y(n+5) signals.

Turns ON (latched) when the A64RDC is reset by using the reset switch.

When both the reset switch ON-detected flag X(n+5) and the reset switch ON-detected flag reset signal Y(n+5) are turned ON, the FROM/TO instruction information of the corresponding remote terminal module, stored in the request-to-communicate registration area, is cleared.

Turn ON the reset switch ON-detected flag reset signal Y(n+5) with the sequence program.



POINT

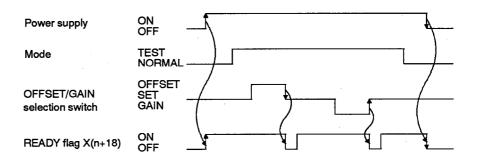
- (1) If the A64RDC is reset by using the reset switch, it returns to the initial state. Restart the operation with the initial setting.
- (2) Since the reset switch ON-detected flag X(n+5) also goes ON after the power is turned ON, be sure to turn the reset switch ON-detected flag reset signal Y(n+5) ON and the X(n+5) OFF at the initial state. Then, execute the program for the A64RDC.

4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

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(2) READY flag X(n+18)

This signal goes ON in any NORMAL mode (*1) (except the TEST mode (*2)) after turning ON the power or resetting the PC CPU.



(3) Disconnection detection (A64RD3C: X(n+19) to X(n+1c), A64RD4C: X(n+19))

Goes ON when a disconnection is detected.

Goes OFF when no disconnection is detected.

REMARK

- (1)*1 Normal mode is established when test mode terminals on an A64RDC are not connected.
- (2)*2 Test mode is established when test mode terminals on an A64RDC are connected (shorted). Error compensation can be done.
- (3) See Section 2.3.5 for disconnection detection.

4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

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4.3.2 I/O signals of an AJ71PT32-S3

The following table shows the functions of the control I/O signals.

Table 4.2 List of Input Signals

Device No.	Signal	name	Device No.	Signal r	name				
X(n+0)	Send-completed signal	For remote terminal	X(n+18)	Send-completed signal	For remote terminal				
X(n+1)	Request-to-read signal	module No. 1	X(n+19)	Request-to-read signal	module No. 13				
X(n+2)	Send-completed signal	For remote terminal	X(n+1A)	Send-completed signal	For remote terminal				
X(n+3)	Request-to-read signal	module No. 2	X(n+1B)	Request-to-read signal	module No. 14				
X(n+4)	Send-completed signal	For remote terminal	X(n+1C)		<u> </u>				
X(n+5)	Request-to-read signal	module No. 3	X(n+1D)]					
X(n+6)	Send-completed signal	For remote terminal	X(n+1E)	- Unusable					
X(n+7)	Request-to-read signal	module No. 4	X(n+1F)						
X(n+8)	Send-completed signal	For remote terminal	X(n+20)	Hardware fault					
X(n+9)	Request-to-read signal	module No. 5	X(n+21)	MINI-S3 link communication	ons				
X(n+A)	Send-completed signal	For remote terminal	X(n+22)	Unusable					
X(n+B)	Request-to-read signal	module No. 6	X(n+23)	Received-data clear comp	letion				
X(n+C)	Send-completed signal	For remote terminal	X(n+24)	Remote terminal module error detection					
X(n+D)	Request-to-read signal	module No. 7	X(n+25)	TEST mode					
X(n+E)	Send-completed signal	For remote terminal	X(n+26)	MINI-S3 link error detection	1				
X(n+F)	Request-to-read signal	module No. 8	X(n+27)	MINI-S3 link communication	ns error				
X(n+10)	Send-completed signal	For remote terminal	X(n+28)	ROM error					
X(n+11)	Request-to-read signal	module No. 9	X(n+29)						
X(n+12)	Send-completed signal	For remote terminal	X(n+2A)						
X(n+13)	Request-to-read signal	module No. 10	X(n+2B)						
X(n+14)	Send-completed signal	For remote terminal	X(n+2C)	Unusable					
X(n+15)	Request-to-read signal	module No. 11	X(n+2D)						
X(n+16)		For remote terminal	X(n+2E)						
X(n+17)	Request-to-read signal		X(n+2F)						

4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

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Table 4.3 List of Output Signals

Device No.	Signal N	ame	Device No.	Signal N	lame						
Y(n+0)	Request-to-send signal	For remote terminal	Y(n+18)	Request-to-send signal	For remote terminal						
Y(n+1)	Read-completed signal	module No. 1	Y(n+19)	Read-completed signal	module No. 13						
Y(n+2)	Request-to-send signal	For remote terminal	Y(n+1A)	Request-to-send signal	For remote terminal						
Y(n+3)	Read-completed signal	module No. 2	Y(n+1B)	Read-completed signal	module No. 14						
Y(n+4)	Request-to-send signal	For remote terminal	Y(n+1C)								
Y(n+5)	Read-completed signal	module No. 3	Y(n+1D)								
Y(n+6)	Request-to-send signal	For remote terminal	Y(n+1E)								
Y(n+7)	Read-completed signal	module No. 4	Y(n+1F)	Unusable							
Y(n+8)	Request-to-send signal	For remote terminal	Y(n+20)								
Y(n+9)	Read-completed signal	module No. 5	Y(n+21)								
Y(n+A)	Request-to-send signal	For remote terminal	Y(n+22)								
Y(n+B)	Read-completed signal	module No. 6	Y(n+23)	Request to clear received data							
Y(n+C)	Request-to-send signal	For remote terminal	Y(n+24)	Remote terminal module f	ault detection reset						
Y(n+D)	Read-completed signal	module No. 7	Y(n+25)								
Y(n+E)	Request-to-send signal	For remote terminal	Y(n+26)	Unusable							
Y(n+F)	Read-completed signal	module No. 8	Y(n+27)								
Y(n+10)	Request-to-send signal	For remote terminal	Y(n+28)	MINI-S3 link communication	ons start						
Y(n+11)	Read-completed signal	module No. 9	Y(n+29)	Unusable							
Y(n+12)	Request-to-send signal	For remote terminal	Y(n+2A)	FROM/TO instruction resp	oonse specification						
Y(n+13)	Read-completed signal	module No. 10	Y(n+2B)	Faulty station data clear s	pecification						
Y(n+14)	Request-to-send signal	For remote terminal	Y(n+2C)	Unusable							
Y(n+15)	Read-completed signal	module No. 11	Y(n+2D)	Error reset							
Y(n+16)	Request-to-send signal	For remote terminal	Y(n+2E)	Unusable							
Y(n+17)	Read-completed signal	module No. 12	Y(n+2F)	Unusable							

n: Head I/O number of an AJPT32-S3.

Example:

If the I/O address of the AJ71PT32-S3 is between X/Y20 and X/Y4F:

X(n+0) to X(n+2F) = X20 to X4F

Y(n+0) to Y(n+2F) = X20 to X4F

REMARK

The AJ71PT32-S3 MELSECNET/MINI-S3 Master User's Manual gives details about the functions and purposes of control I/O signals.

4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3 MELSEC-A

4.4 Assignment of an A64RDC Buffer

The assignment of an A64RDC buffer (without battery backup) is shown below.

Address (decimal)	Contents (16 bits)] 	_
0	Conversion-enabled/disabled specific	cation		
1	Averaging processing specification			
2	CH1 Averaging time/count		. .	
3	CH2 Averaging time/count			Read/write area for use with a PC CPU
4	CH3 Averaging time/count			
5	CH4 Averaging time/count			
6	CH1 Detected temperature value			.
7	CH2 Detected temperature value			•
8	CH3 Detected temperature value			
9	CH4 Detected temperature value			
10	CH1 Detected temperature value	(L)		
11	(32 bits)	(H)		•
12	CH2 Detected temperature value	(L)		Read-only area for use with a PC CPU
13	(32 bits)	(H)	į	
14	CH3 Detected temperature value	(L)		
15	(32 bits)	(H)		
16	CH4 Detected temperature value	(L)		
17	(32 bits)	(H)		
18	Write data error code			Read/write area for use with a PC CPU
19	Conversion-completed flag			Read-only area for use with a PC CPU
20	Type specification of a platinum temperature-measuring resistor			Read/write area for use with a PC CPU

CAUTION

Addresses 6 to 17 and 19 of the buffer are areas used exclusively for reading from the PC CPU. Therefore, if the A64RDC writes data to these areas, any data stored in these areas will be overwritten and destroyed. In this case, the A64RDC detects an error, stores the error code in address 18, and the RUN LED flashes.

4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3 MELSEC-A

4.4.1 Conversion-enabled/disabled specifications (address 0)

Address 0 is used to designate whether temperature detection is executed or not.

- (1) When the power is turned ON, all channels are set to conversion-disabled (0000H(0)).
- (2) To reduce sampling time, these specifications can be changed by the sequence program.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
															:
1 _		_	_	l _	_	l _	_	_	_	_	_	CH4	СНЗ	CH2	CH1
									j						
L	J			L		1		1		L				<u> </u>	

Ignored

Channel specifications

1 : Conversion-enabled

CH4 CH3 CH2 CH1

0 : Conversion-disabled

Example:

To specify channels 1, 3, and 4 for conversion

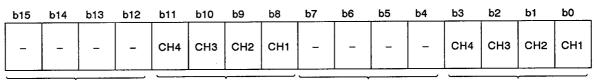
When writing 000DH (13) to specify channels for conversion-enabled/disabled, the sampling time is 40 msec \times 3 = 120 msec.

b	15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	ь0	,
	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	→000DH (13)

4.4.2 Averaging specifications (address 1)

Address 1 is used to designate execution of sampling or averaging.

- (1) When the power is turned ON and the READY signal of the A64RDC is ON, all channels are set for sampling.
- (2) Use buffer address 1 to select sampling or averaging.



Ignored

Specifying the channel where averaging processing will be done.

Ignored

Specifying time/count
1: Time averaging

1 : Averaging

0 : Sampling

0 : Count averaging

POINT

When averaging is not specified, sampling is set without regard to the time/count specification.

REMARK

See Section 2.3.3 for sampling and averaging.

4. LINKING TO THE AnACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3

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4.4.3 Averaging time/count (addresses 2 to 5)

Addresses 2 to 5 are used to set the length of time or the number of times of averaging.

(1) When the power is turned ON, the averaging time and averaging count are set to 0.

(2) The setting ranges are as indicated below:

Averaging in terms of time

: 160 to 32000 msec

Averaging in terms of count : 1 to 800 times

CAUTION

If a value outside the above range has been written, a setting error occurs and the buffer is overwritten.

However, the A64RDC performs conversion processing at the averaging time or count previously set.

Detected temperature value (addresses 6 to 17) 4.4.4

Addresses 6 to 17 are used to store detected temperature values which are handled in 16-bit or 32-bit data.

16-bit data (addresses 6 to 9) (1)

> A detected temperature value is multiplied by 10 and represented in the range from -1800 to 6000 of 16-bit signed binary numbers.

> If a detected temperature value is negative, it is represented in a complement of 2.

Example 1:

If a detected temperature value is 123.025°C (253.445°F), 1230 is stored.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	ь0
0	0	o	0	0	1	0	0	1	1	0	0	1	1	1	0

Example 2:

If a detected temperature value is -123.025°C (-189.445°F), -1230 is stored.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
1	1	1	1	1	0	1	1	0	0	1	1	0	0	1	0

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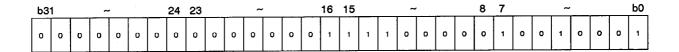
(2) 32-bit data (addresses 10 to 17)

A detected temperature value is multiplied by 1000 and represented in the range from -180000 to 600000 of 32-bit signed binary numbers.

If a detected temperature value is negative, it is represented in a complement of 2.

Example 1:

If a detected temperature value is 123.025°C (235.445°F), 123025 is stored.



Example 2:

If a detected temperature value is -123.025°C (-189.445°F), -123025 is stored.

b3	1		~				24				~	•			16	15			_~				8	7			~				b0	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	0	'	1	0	1	1	1	1	

4.4.5 Write data error code (address 18)

- (1) When data is read from the PC CPU, the A64RDC makes a data range check for the number of channels, averaging count, and averaging time. It also performs a single read/write area access check. If any value is outside the range, the A64RDC stores the error code in 16-bit binary. Section 7.1 gives error code details.
- (2) If there is more than one error code, the first data error code detected by the A64RDC is stored. The others are not stored.
- (3) To reset an error code, write 0 from the PC CPU.
- (4) If an error is reset without correcting the error, the data error code is set to 0 and the RUN LED of A64RDC stops flashing.

POINT

The error code can be reset by turning ON the error-detection reset (Yn+4).

4. LINKING TO THE ANACPU (WITH DEDICATED INSTRUCTIONS) AND THE AJ71PT32-S3 MELSEC-A

4.4.6 Conversion-completed flag (address 19)

Address 19 is used to confirm that a conversion-enabled channel can detect temperature correctly.

- (1) The conversion-completed flag processing after power ON is only performed once when the channel specification for conversion-enabled/disabled (address 0) is changed.
 - Conversion-enabled/disabled specification change from 0 to 1:
 After setting conversion-enabled and storing a detected temperature value in the buffer, the conversion-completed flag of its corresponding channel is set to 1.
 - Conversion-enabled/disabled specification change from 1 to 0:
 The conversion-completed flag of its corresponding channel is set to 0.
- (2) A conversion-completed flag is provided to each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b 3	b2	b1	b0
0	0	0	o	o	o	0	0	0	0	0	0	CH4	СНЗ	CH2	CH1

Channel specifications

1 : Conversion completed

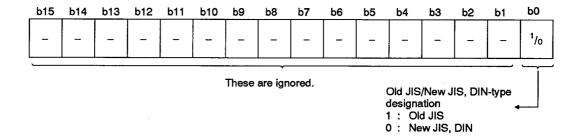
0 : Conversion not completed

(3) The conversion-completed flag can be used for the interlock when reading the detected temperature value of the channel where averaging processing is executed.

4.4.7 Type specification of a platinum temperature-measuring resistor (address 20)

This area is used to set the type of a platinum temperature-measuring resistor.

- (1) When the power supply is turned ON, the type is set to "0", indicating the new JIS, DIN type.
- (2) All channels correspond to a specified type.



REMARK

See Section 2.3.6 for platinum temperature-measuring resistor.

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4.5 Contents and Configuration of an AJ71PT32-S3 Buffer

The AJ71PT32-S3 is provided with a buffer (without battery backup) for data communications with a PC CPU.

Use a FROM/TO instruction to read and write data from and to the buffer.

(1) Assignment of the buffer

Addres (Decima	=		Content	Read/write by PC CPU				
0	(Unused)		<u>-</u>					
1	Retry count	ry count Sets the number of retries when a communications error has occurred.						
	(Unused)							
4	Line error check	Checks the location	on of the line error.	Read/write enabled				
	(Unused)	_`-	_	enabled				
10 to 41	Batch refresh send data	Writes data to be	output to the batch refresh-type remote I/O module.					
	(Unused)			_				
70 to 77	Remote module card information	Stores the type ide	entification of each remote module being connected.	Read only				
	(Unused)		_	_				
90 to 93	Accumulated faulty station detection	Stores faulty remo	te station numbers. (Detected state is retained until	Read/write enabled				
	(Unused)			_				
100 to 103	Faulty station detection	Stores faulty remo	te station numbers. (The latest state is retained.)					
	(Unused)		-]				
107	Communications error code	Stores the cause of going ON.	of the MINI-S3 link communications error signal					
108	Error detection code	Stores the accumulated detection goes ON	ulated number of times the MINI-S3 link error N.					
	(Unused)		<u> </u>					
110 to 141	Batch refresh received data	Stores the input d	ata from the batch refresh-type remote I/O modules.	Read only				
	(Unused)			l lead only				
160	Line error retry counter		r of retries when communications with all remote ad due to a line error.					
161 to 192	Retry counter	Stores the number	r of retries executed to faulty stations.					
	(Unused)		-					
195	Remote terminal module faulty station	Stores the station error.	number when a remote terminal module causes an					
196 to 209	Remote terminal module error code	Stores the cause of X(n+24) going ON	of the remote terminal module error-detected signal					
	(Unused)		_	_				
250 to 282	Partial refresh station set data	Writes the station number of a partial refresh-type of remote I/O module and the data digit designation (number of times the partial refresh processing is done).						
_	(Unused)		-					

Address (Decimal	-	Content	Read/write by PC CPU
300 to 363	Partial refresh send data	Writes data to be output to the partial refresh-type remote I/O module.	-
	(Unused)	<u> </u>	
598	Partial refresh accumulated input error detection	Stores the input faulty station number of the partial refresh-type remote I/O module input data. (The detection state is retained until reset.)	Read/write enabled
599	Partial refresh input error detection	Stores the input faulty station number of the partial refresh-type remote I/O module input data. (The latest communications status is stored.)	
600 to 663	Partial refresh received data	Stores input data from the partial refresh-type remote I/O module.	Read only
858	Received-data clear designation	Sets the AJ35PTF-R2 station that clears received data by the received data request-to-clear signal Y(n+23).	
859	Received-data clear range designation	Designates the receive buffer that clears received data by the received data request-to-clear signal Y(n+23).	Read/write enabled
860 to 929	NO-PROTOCOL mode parameter	Sets the parameters when an AJ35PTF-R2 is used in the NO-PROTOCOL mode.	
930 to 1099	(Unused) (*1) Channel 0 Channel 1		-
1100 dat rem 2099 moo dat 100	Send/received-data areas for remote terminal module No. 9 Ind/received-data areas for remote terminal module No. 9 Ind/received-data areas for remote terminal module No. 9 Ind/received-data areas for remote terminal module No. 10 Ind/received-data areas for remote terminal module No. 10 Ind/received-data areas for remote terminal module No. 11 Ind/received-data areas for remote terminal module No. 11 Ind/received-data areas for remote terminal module No. 12 Ind/received-data areas for remote terminal module No. 12 Ind/received-data areas for remote terminal module No. 13 Ind/received-data areas for remote terminal module No. 14	Areas (a) to which send data to remote terminal modules is written, or (b) to store data received from remote terminal modules.	Read/write enabled

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CAUTION

- (1) Channels specified with *1 are used for executing read/write at addresses 1100 to 8099. They are automatically switched according to the remote terminal module station number designated by the MELSEC-NET/MINI-S3 dedicated instructions (hereafter referred to as the MINI-S3 dedicated instructions).
- (2) The buffer is completely cleared (0 is stored.) at power ON, or when the PC CPU is reset. However, the retry count (address 1) and the NO-PROTOCOL mode parameters (addresses 860 to 929) are set by defaults.
- (3) Do not write data from a PC CPU to read-only areas.
- (4) Unused areas are utilized by the system of the master module.
- (5) Data in the buffer (including unused areas) can be read continuously. For example, data on accumulated faulty stations detection (addresses 90 to 93) and faulty station detection (addresses 100 to 103) can be read by a single FROM instruction.

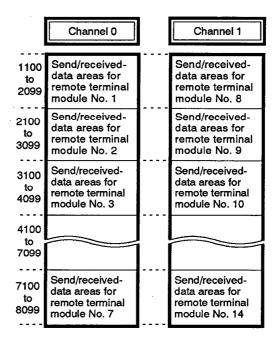
REMARK

The AJ71PT32-S3 MELSECNET/MINI-S3 Master Module User's Manual gives details on the contents of each address and the data configuration of the buffer.

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- (2) Remote terminal communications areas (addresses 1100 to 8099)
 - Areas for data communications with remote terminal modules.
 - The communications areas are assigned to two channels. Channel 0 is assigned to remote terminal modules Nos. 1 to 7. Channel 1 is assigned to remote terminal modules Nos. 8 to 14.

Channels are automatically selected according to the remote terminal module station number settings as designated by the MINI-S3 dedicated instructions.

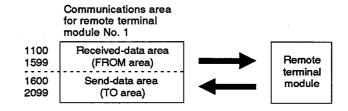


The remote terminal module number refers to the number assigned to each remote terminal module set in the initial data ROM of the master module.

Data read/write is executed for areas which correspond to the module numbers assigned to each remote terminal module.

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 Each communications area consists of a send-data area and a received-data area. The storage capacity of each data area at power ON is 500 words.



The send-data area is used for setting data to be transmitted to remote terminal modules.

The received-data area is used for storing data received from remote terminal modules.

 The capacity of the send-data and received-data areas can be changed by the initial data setting of the master module. (Note that the total capacity of the two areas cannot exceed 1000 words.)

Example:

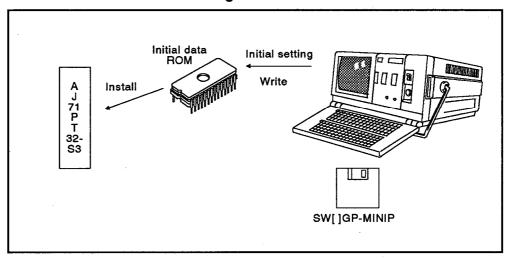
Received-data area: 200 words, send-data area: 800 words

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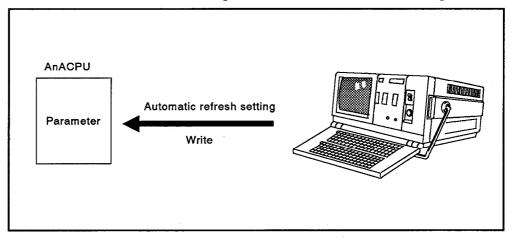
4.6 Initial Setting

The contents of the initial setting when an A64RDC is used as a remote terminal module employing the MINI-S3 dedicated instructions for an AnACPU are shown below.

Initial Setting of an AJ71PT32-S3



A64RDC Control I/O Signals Automatic Refresh Setting



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4.6.1 Initial setting of an AJ71PT32-S3

Use the SW[]GP-MINIP system disk to set the initial data and to store it in the initial data ROM.

· Total number of remote stations:

Set the total number of occupied stations of each module connected to the AJ71PT32-S3.

Example:

AX41C (remote I/O module)

: 4 stations

A64RDC (remote terminal module): 4 stations

ns | Total : 12 stations

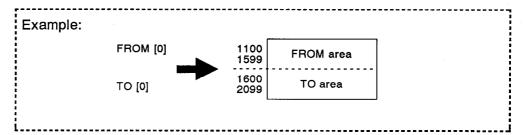
AY51C (remote I/O module)

: 4 stations

- Remote terminal data setting
 - (1) Number of remote terminal modules
 - (2) Head station number of each remote terminal module
 - (3) Attribute (protocol)

"MINI standard protocol" is used.

(4) Determines how the FROM and TO areas will share the 1000 words allocated to FROM and TO addresses.



^{*} The default value of each area is set to 500 words.

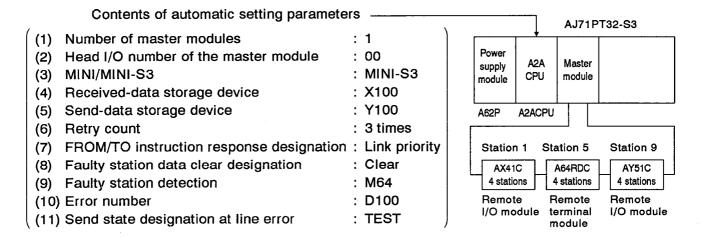
Install the initial data ROM into the "socket for initial data ROM" of the AJ71PT32-S3.

Set the mode switchover pin to "48 (EXTENSION mode)".

The SW[]GP-MINIP Operating Manual gives details about setting procedures.

4.6.2 A64RDC control I/O signals automatic refresh setting

An example of automatic refresh setting is given blow.



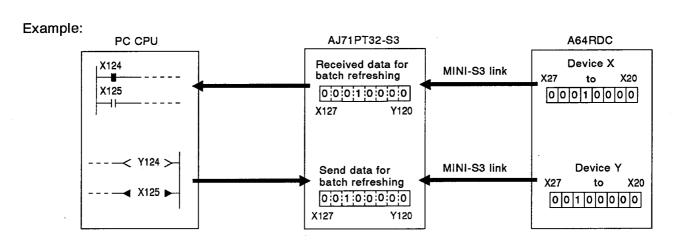
	AX41C	A64RDC	AY51C
Address on the remote terminal module side	X00 to X1F	X20 to X3F Y20 to Y3F	Y40 to Y5F
Address on the PC CPU side	X100 to X11F	X120 to X13F Y120 to Y13F	Y140 to Y15F

An AnACPU can communicate with a remote module by using the "address on the PC CPU side".

Each control I/O signal to and from the A64RDC corresponds to a device number set by the send/received-data storage device set by the automatic refresh.

Thus, an AnACPU can control an A64RDC.

The A2A(S1)/A3A CPU User's Manual (Control Functions) gives setting details.

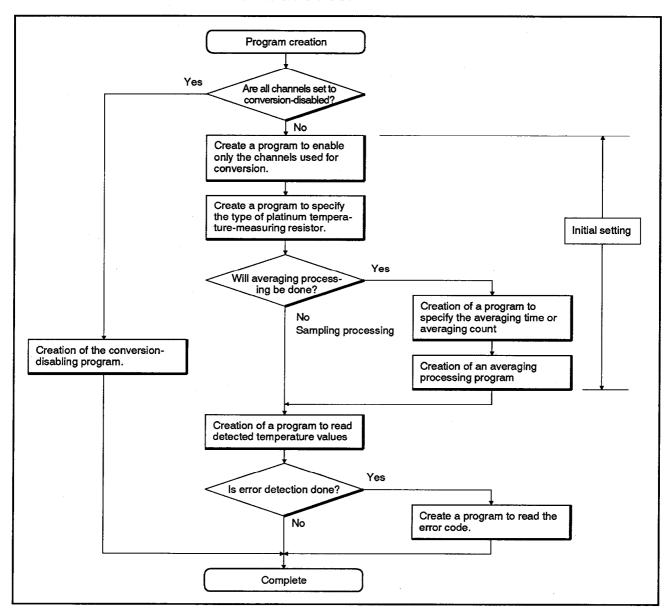


4.7 Programming

This section explains how to program data communications (using an AnACPU's MINI-S3 dedicated instructions) when an A64RDC is linked to a MINI-S3.

4.7.1 Programming procedure

The following shows the programming procedure for data write/read between the A64RDC and a PC PCU.



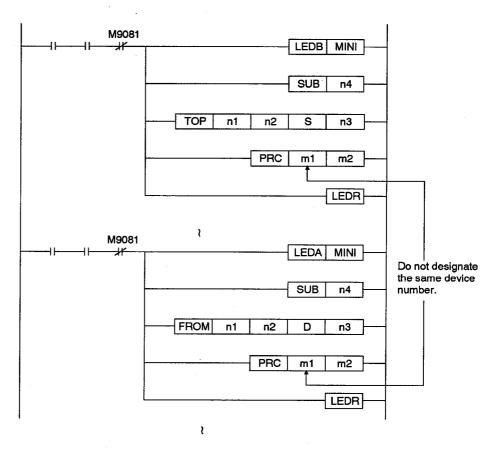
CAUTION

Only use the above-mentioned procedure to perform the initial settings.

If averaging processing is specified before setting averaging time or count, a write data error occurs. To avoid this, batch writing of the initial setting data is recommended.

4.7.2 Precautions when programming

(1) It is necessary to provide the PRC instruction to the step immediately following the FROM/TO instruction. Do not use the same "m1" device for different steps.



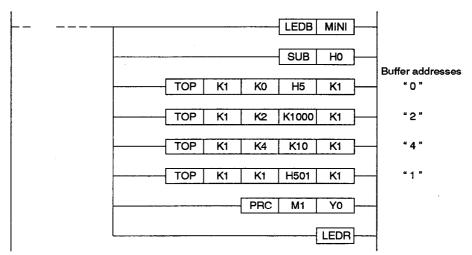
(2) The request-to-communicate registration areas can store a maximum of 32 FROM/TO instructions. If the 33rd FROM/TO instruction is executed, an operation error occurs.

Provide an interlock with the M9081 and D9081 so that the FROM/TO instruction cannot be executed when the request-to-communicate registration areas are full.

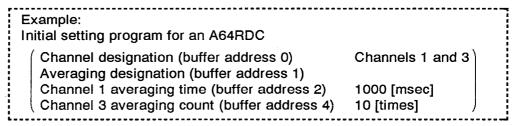
M9081 and D9081 are explained below.

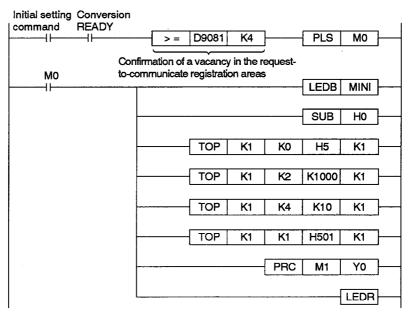
Number	Contents	Details						
M9081	OFF: The request-to-communicate registration area has a vacancy. ON: The request-to-communicate registration areas are full.	There are 32 request-to-communicate registration areas for remote terminals. Goes ON when all areas are full.						
D9081	The number of vacant areas in the request-to-communicate registration area for remote terminals.	The number of vacant areas in the request-to-communicate registration area is stored.						

When data is written to two or more addresses in the buffer of an A64RDC, a single TO instruction can execute data write if the addresses are sequential. If the addresses are not continuous, it is necessary to execute the TO instruction at two or more points as shown below. In this case, two or more TO instructions are stored in the request-to-communicate registration areas.



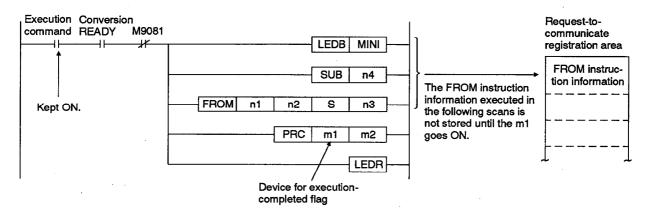
If an attempt is made to store TO instruction information which is larger than the number of vacant areas in request-to-communicate registration areas, an error occurs and the CPU stops operating. To prevent this, confirmation that the vacancy in the request-to-communicate registration areas is larger than the TO instruction information must be provided. The programming example below shows what happens when the TO instruction is executed after a vacancy in the request-to-communicate registration areas is confirmed.





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(3) Though the execution command of the FROM instruction is set to ON, the next FROM instruction information is not stored in the request-to-communicate registration areas until the processing of the FROM instruction being executed is completed and the execution-completed flag designated by the PRC instruction goes ON. Thus, it is not necessary to provide an interlock that allows the FROM instruction to be executed only after the execution-completed flag goes ON.

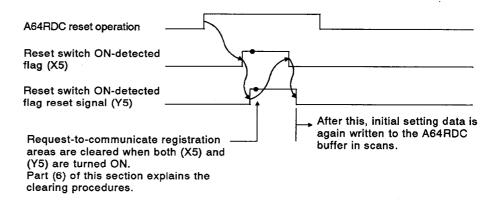


(4) For communications with the remote terminal modules linked to an AJ71PT32-S3, always turn the AJ71PT32-S3 communications start signal Y(n+28) ON before executing each instruction. If the communications start signal is not turned ON, communications processing cannot be done.

Even though the MINI-S3 instruction is executed when the communications start signal is OFF, no error will occur. However, the bit devices designated with m1 of [PRC][m1][m2] will not go ON.

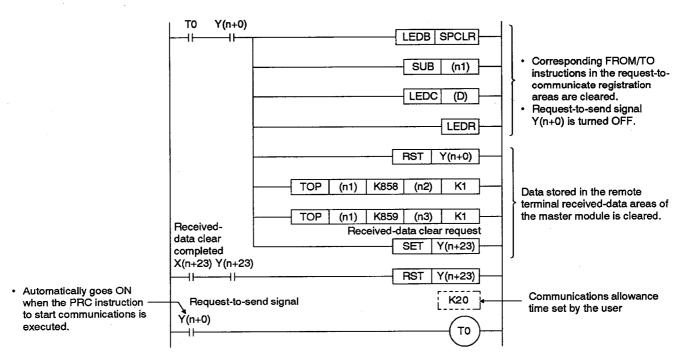
(5) When the reset switch on the front of an A64RDC is moved to reset, the A64RDC returns to the initial state and performs conversion with defaults.

Set the sequence program to continuously monitor the reset switch ON-detected flag (X5) and, when the flag is turned ON, to clear the request-to-communicate registration areas and to write initial setting data to the A64RDC again (when executed with other than defaults).



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(6) If a communications-completed response signal to the send executed to the A64RDC is not transmitted back, the CPU goes into infinite-wait status unless the CPU module is reset. To prevent this, provide a monitoring timer to allow retransmission of the same data at preset intervals.



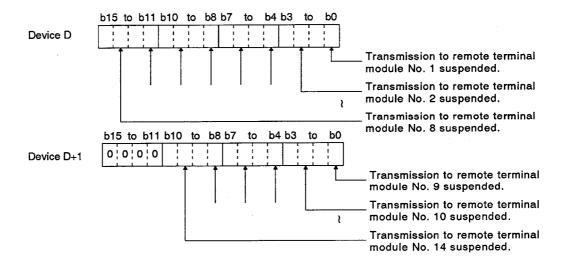
X(n+23), Y(n+0), and Y(n+23) are the control I/O signals for an AJ71PT32-S3 (see Section 4.3.2 for details).

The contents of (n1), (n2), (n3), and (D) designated by each instruction are given below.

(n1): Higher two digits of the head I/O number assigned to an AJ35PT32-S3

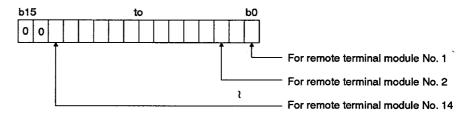
Example: "12H" when assigned to X/Y120 to 13F.

(D): Data when the bit that corresponds to the processing to be suspended is set for "1".



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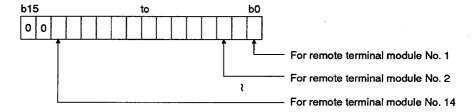
n2 : Receive buffer cleared/not cleared setting for each remote terminal number



- 0: Not cleared
- 1: Cleared

Setting contents are written to address 858 in the AJ71PT32-S3 buffer.

n3 : Clear execution range setting for each remote terminal number



- Only the remote terminal received-data areas of the master module are cleared.
- 1: The remote terminal received-data areas of the master module and the A64RDC receive buffer are cleared.

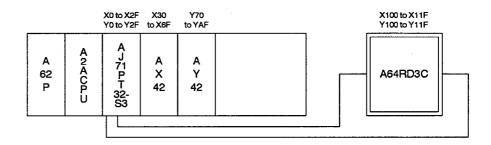
Setting contents are written to address 859 in the AJ71PT32-S3 buffer.

(7) When automatic refresh is being set, MINI-S3 link error detection X(n+24) of control I/O signals assigned to an AJ71PT32-S3 turns ON for one scan after error detection.

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4.7.3 Sample program

This example shows how the detected temperature values of channels 1 and 2 of an A64RDC are read in the following system configuration.



(1) Channels used

• CH1 : Sampling

CH2 : Count averaging : 10

(2) AJ71PT32-S3 initial setting

(a) Total number of remote stations: 4

(b) Remote terminal data

(a) Number of master modules

· Number of remote terminals : 1

· Head station number of the remote terminal module: Station 1

: 1

Protocol : MINI standard

• FROM address : 0
• TO address : 500

(3) Contents of the automatic refresh setting of an AnACPU

(b) Head I/O number : 00H

(c) MINI/MINI-S3 : MINI-S3

(d) Received-data storage device : X100

(e) Send-data storage device : Y100

(f) Retry count : 3

(g) FROM/TO instruction setting : Link priority

(h) Faulty station data clear setting : Clear(i) Faulty station detection : M64

(j) Error No. : D1000

(k) Transmission state setting at line error: TEST

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(4) Programming description

Resets remote terminal error codes and fault detection signals

: X30

· Starts the storing of detected temperature values to register D: X31

Stops the storing of detected temperature values to register D: X32

External output of error occurrence

: Y70

· External output of detected disconnection

Channel 1

: Y71

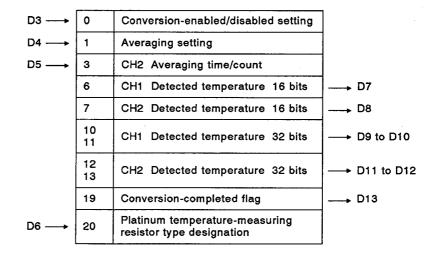
Channel 2

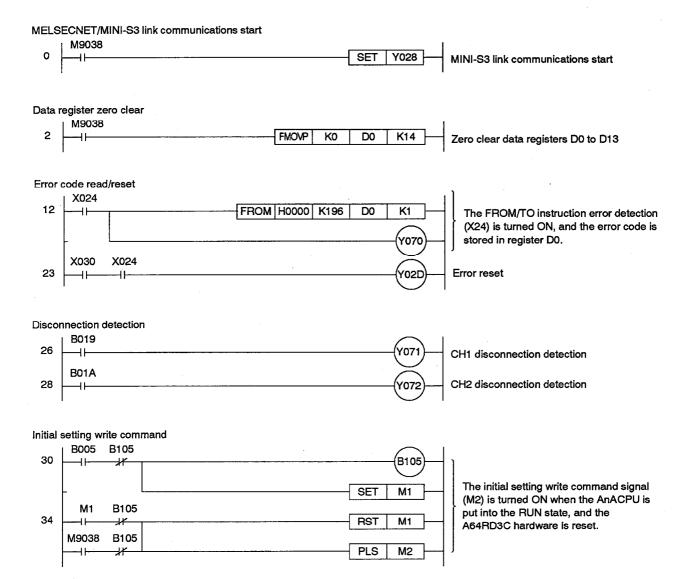
: Y72

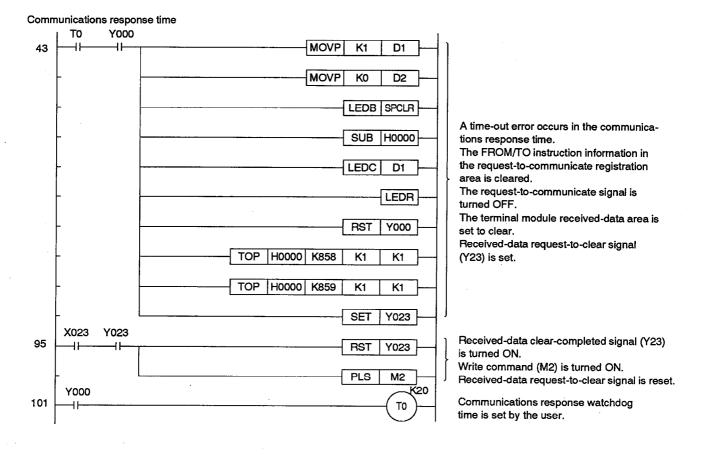
- · Storage register map
- (a) Fault code read (from a master module)

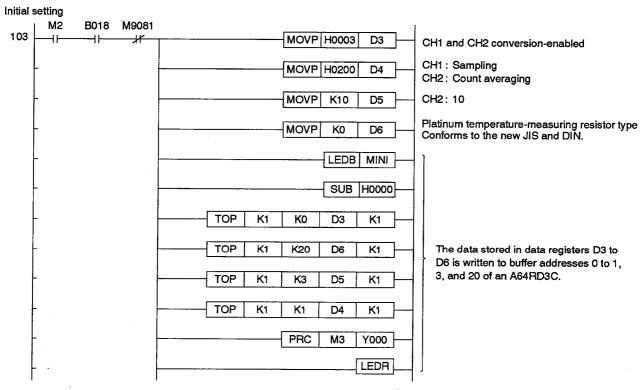
D0 Remote terminal 1 Fault code (address 196)

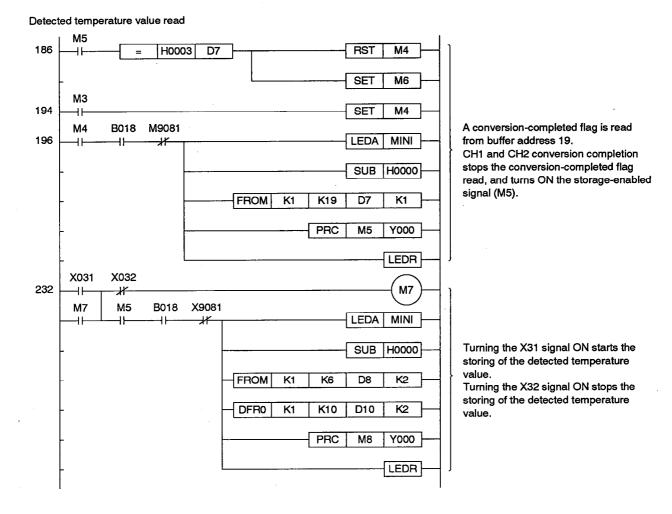
- (b) Remote terminal used for interrupting transmission from D1 to D2 (see Section 4.7.2 (6)).
- (c) Read and write from and to an A64RDC.





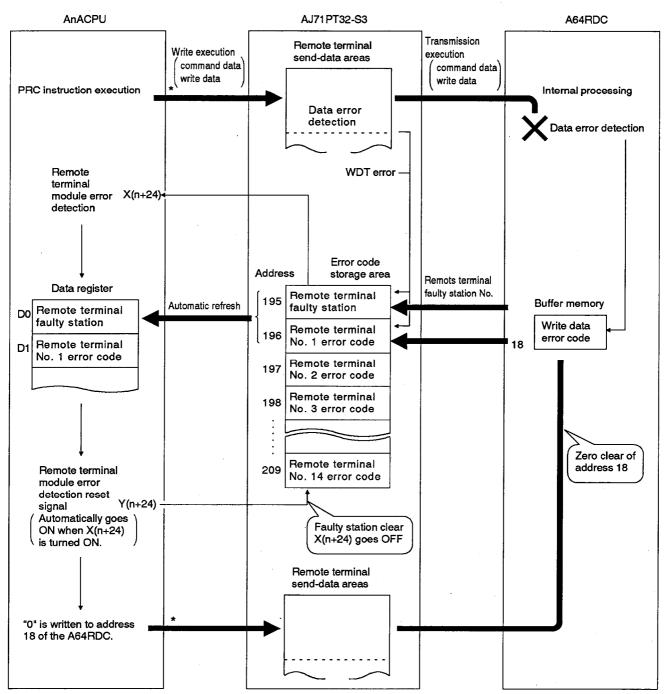






4.8 Error Detection

The following diagram shows the detection procedure if an error occurs when an AnACPU, AJ71PT32-S3, and A64RDC are used together.



^{*} All processing marked by an asterisk is executed by the sequence program.

5. LINKING TO AN ACPU AND AN AJ71PT32-S3

This section gives the linking procedures when an ACPU and AJ71PT32-S3 are used together and linked with an A64RDC on the MINI-S3 link.

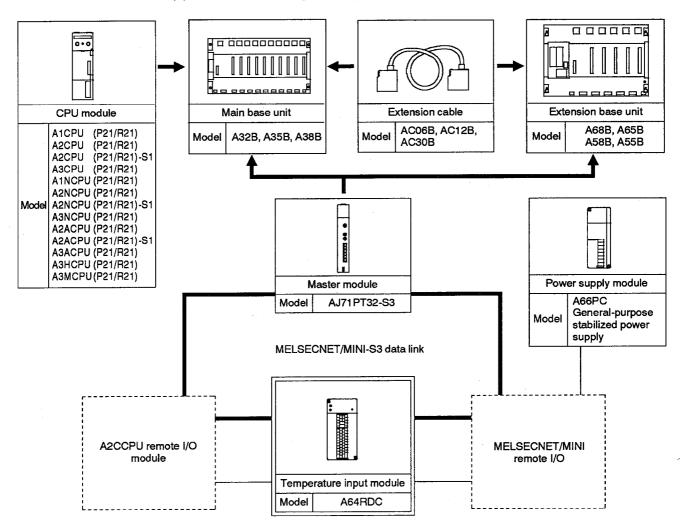
The linking procedures when the MINI-S3 dedicated instructions are not used for the programs for the AnACPU in a system configuration which employs the combination of an AnACPU with the AJ71PT32-S3 are explained in this section.

5.1 System Configuration

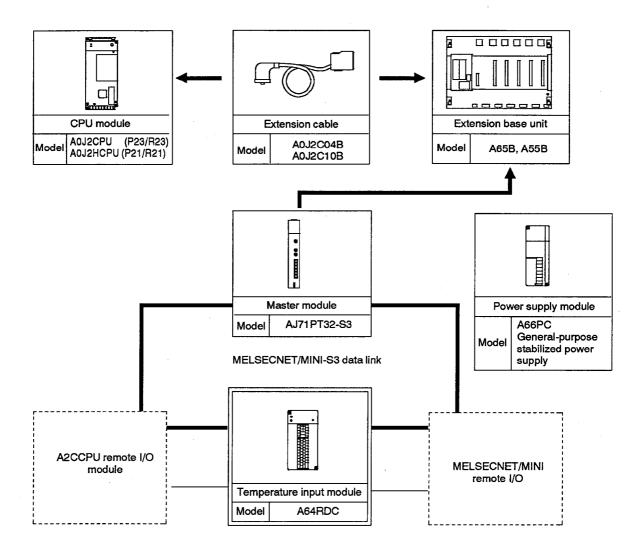
The following diagram shows the system configuration when an A64RDC is used as a remote terminal module of the MELSECNET/MINI-S3 data link and an AJ71PT32-S3 master module is linked to a building block-type CPU or a compact-type CPU.

5.1.1 Overall configuration

(1) When a building block-type CPU is used:



(2) When a compact-type CPU is used:



5.1.2 Applicable system modules

An A64RDC can be used as a remote terminal module of the MELSEC-NET/MINI-S3 data link with an AJ71PT32-S3 as its master module.

(1) A maximum of 14 remote terminal modules (such as an A64RDC) can be connected to an AJ71PT32-S3 module. The following models can be used as remote terminal modules:

A64RDC (temperature input module)

A68ADC (analog/digital converter module)

AD61C (high-speed counter module)

A64DAVC (digital/analog voltage converter module)

A64DAIC (digital/analog current converter module)

AJ35PTF-R2 (RS-232C interface module)

AJ35PT-OPB-M1-S3 (mounting-type operation box)

AJ35T-OPB-P1-S3 (portable-type operation box)

- (2) Remote I/O modules connected to an AJ71PT32-S3 can occupy up to 64 stations.
- (3) The AJ71PT32-S3 can be connected to an independent CPU system or a master station or local station in the MELSECNET data link system. It cannot be connected to a remote I/O station.

An unlimited number of modules can be connected to one CPU.

REMARK

The AJ71PT32-S3 MELSECNET/MINI-S3 Master Module User's Manual gives details about the MELSECNET/MINI-S3 link system.

5.1.3 Precautions when constructing the system

(1) Use twisted-wire-pair cables to connect an AJ71PT32-S3 (master module) and an A64RDC.

When twisted-wire-pair cables are used, the maximum connecting distance between stations varies with the size of the cables used.

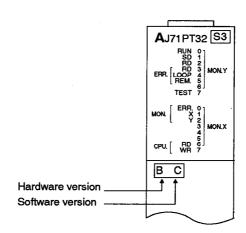
0.2 mm² to smaller than 0.5 mm² : 50 m

0.5 mm² and larger : 100 m

(2) The A64RDC requires an external power supply of 24 VDC. Use the A66PC power supply module or a general-purpose stabilized power supply (24 VDC). If one power supply is connected to two or more A64RDC modules or remote I/O modules, selecting the proper cables and wiring route, taking the voltage drop due to cables into consideration.

Section 3.1.3 (3) explains how to calculate voltage drops.

(3) An AJ71PT32-S3 (master module) having a software version of B or later can be connected to the A64RDC. Any module whose software version is A or unspecified on the front of the module cannot be used.



(4) In an AJ71PT32-S3 system, do not use the final slot of the seventh extension stage to attach the A3CPU (P21/R21).

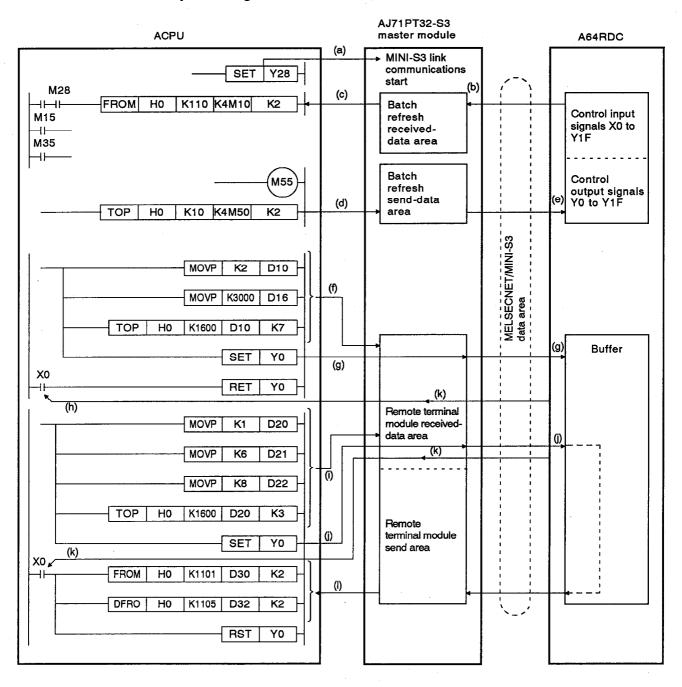
IMPORTANT

Use the AJ71PT32-S3 (master module) in the EXTENSION mode (48 occupied points). Be sure to mount the initial data ROM storing the total number of remote stations and remote terminal data (set station numbers of remote terminal modules and corresponding remote terminal numbers) to the master module.

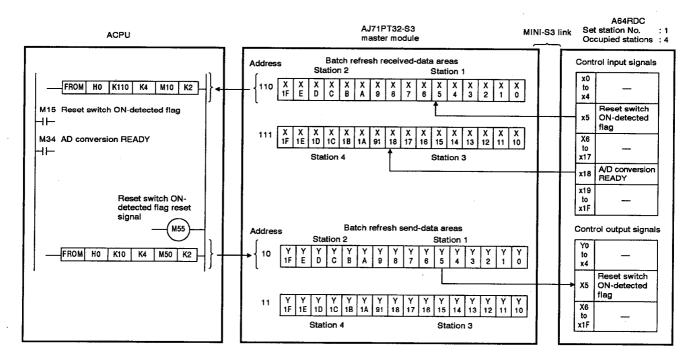
5.2 Data Communications Processing

The following describes the procedure and the processing time of data communications between an A64RDC and an ACPU.

5.2.1 Communications processing



- (1) Communications processing of control I/O signals
 - (a) Turning ON the MINI-S3 communications start signal of the master module from the PC CPU starts the MINI-S3 data link.
 - (b) Control input signals from the A64RDC are automatically stored in the batch refresh received-data area of the master module.
 - (c) Control input signals stored in the batch refresh received-data area are read to designated devices by the FROM instruction.
 - (d) Device output signals are stored in the batch refresh send-data area so that the devices designated by the TO instruction correspond to the control output signals of an A64RDC.
 - (e) Control output signals stored in the batch refresh send-data area are transmitted to the A64RDC.



- (2) Writing data to the A64RDC buffer
 - (f) Command data and write data (such as the write execution command to the A64RDC) are stored in the remote terminal send-data area by the TO instruction.
 - (g) By execution of the SET Y0 instruction, instruction data and write data stored in the remote terminal send-data area are transmitted to the A64RDC.
 - (h) When data is written to the A64RDC buffer and internal processing is completed, a communications-completed signal is transmitted back to the master module.

When the master module has received the communications-completed signal, the send-completed signal (X0) goes ON.

- (3) Reading data from the A64RDC buffer
 - (i) Command data (such as the read execution command from the A64RDC) is stored in the remote terminal send-data area by the TO instruction.
 - (j) By execution of the SET Y0 instruction, read command data stored in the remote terminal send-data area is transmitted to the A64RDC.
 - (k) When the A64RDC has received the command data and after internal processing is completed, the read data is transmitted to the remote terminal received-data area of the master module and a communications-completed signal is transmitted back. When the master module has received the communications-completed signal, the send-completed signal (X0) goes ON.
 - (I) After confirming that the send-completed signal is ON, read data stored in the remote terminal received-data area of the master module is read by the FROM instruction.

5.2.2 Processing time

This section describes the processing time to write and read data to and from the buffer area of an A64RDC.

(1) Processing time required to write data

Max. processing time = 2 scan time + t msec x (number of write data words + 7) + 40 msec

(2) Processing time required to read data

Max. processing time = 2 scan time + t msec x (number of read data words + 10) + 40 msec

"t" indicates I/O refresh time. This value varies according to the number of used remote modules and their type.

The I/O refresh time can be found as shown in the following table:

Mode	Operation Mode Setting	I/O Refresh Time (msec)
	Automatic return (0)	t = 0.66 + (0.044 x R) + (0.25 x B) + (0.95 x T)
Extension	No automatic return (1)	t = 0.54 + (0.058 x R) + (0.25 x B) + (0.95 x T)
(48 points)	Communications stop when an error is detected (2)	t = 0.54 + (0.058 x R) + (0.25 x B) + (0.95 x T)

R: Total number of remote stations

B: Number of AJ35PTF-128DTs

T: Number of remote terminal modules

5.3 I/O Signals Handled with the PC CPU

5.3.1 I/O signals of an A64RDC

This section describes the functions of the control I/O signals transmitted between the A64RDC and an AnACPU. Devices X refer to the input signals from the A64RDC to the AnACPU. Devices Y refer to the output signals from the AnACPU to the A64RDC.

Table 5.1 List of A64RD3C I/O Signals

Signal D	irection : A64RD3C → ACPU	Signal D	irection : ACPU → A64RD3C			
Device No.	Description	Device No.	Description			
X0 to X4	Unusable	Y0 to Y4	Unusable			
X5	Reset switch ON-detected flag	Y5	Reset switch ON-detected flag reset signal			
X6 to X17	Unusable					
X18	READY flag					
X19	CH1 : Disconnection detection flag	Y6				
X1A	CH2: Disconnection detection flag	to	Reset switch ON-detected flag reset signal			
X1B	CH3 : Disconnection detection flag	Y1F				
X1C	CH4: Disconnection detection flag					
X1D to X1F	Unusable					

Table 5.2 A64RD4C I/O Signals

Signal Dir	ection : A64RD4C → A2CCPU	Signal Direction : A2CCPU → A64RD4C						
Device No.	Description	Device No.	Description					
X0 to X4	Unusable	Y0 to Y4	Unusable					
X5	Reset switch ON-detected flag	Y5	Reset switch ON-detected flag reset signal					
X6 to X17	Unusable		Unusable					
X18	READY flag	Y6 to						
X19	∑ Disconnection detection flag	Y1F						
X1D to X1F	Unusable		·					

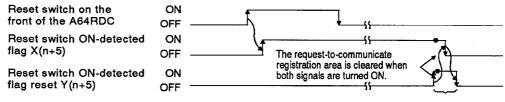
IMPORTANT

If any unusable I/O signals are utilized in the sequence program, the functions of the A64RDC cannot be guaranteed.

(1) Reset the switch ON-detected flag X(n+5) and the reset switch ON-detected flag reset signal Y(n+5)

Turns ON (latched) when the reset switch of the A64RDC is moved to reset.

Turn ON the reset switch ON-detected flag reset signal Y(n+5) with the sequence program.

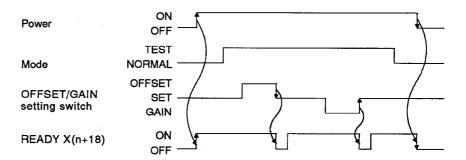


Turned ON and OFF by the sequence program.

CAUTION

- (1) If the A64RDC is reset with the reset switch, it returns to the initial state. Start the operation from the initial setting.
- (2) Since X(n+5) also goes ON after the power is turned ON, be sure to turn Y(n+5) ON and X(n+5) OFF at the initial stage. Then, execute programs for the A64RDC.
- (2) READY flag X(n+18)

After turning ON the power or resetting the PC CPU, this signal goes ON in any NORMAL mode (*1) (except the TEST mode (*2)).



(3) Disconnection detection flag (A64RD3C: X(n+19) to X(n+1c), A64RD4C: X(n+19) goes ON when a disconnection is detected.

It remains OFF if no disconnection is detected.

REMARK

- *1.... Normal mode is established when test mode terminals on an A64RDC are not connected.
- (2) *2Test mode is established when test mode terminals on an A64RDC are connected (shorted). Error compensation can be done.
- (3) See Section 2.3.5 for disconnection detection.

5.3.2 I/O signals of an AJ71PT32-S3

Table 5.2 List of Input Signals

Device No.	Signal 1	lame	Device No.	Signal Name				
X(n+0)	Send-completed signal	For remote terminal	X(n+18)	Send-completed signal For remote termi				
X(n+1)	Request-to-read signal	module No. 1	X(n+19)	Request-to-read signal	module No. 13			
X(n+2)	Send-completed signal	For remote terminal	X(n+1A)	Send-completed signal	For remote terminal			
X(n+3)	Request-to-read signal	module No. 2	X(n+1B)	Request-to-read signal	module No. 14			
X(n+4)	Send-completed signal	For remote terminal	X(n+1C)					
X(n+5)	Request-to-read signal	module No. 3	X(n+1D)	Unusable				
X(n+6)	Send-completed signal	For remote terminal	X(n+1E)	Unusable				
X(n+7)	Request-to-read signal	module No. 4	X(n+1F)					
X(n+8)	Send-completed signal	For remote terminal	X(n+20)	Hardware fault				
X(n+9)	Request-to-read signal	module No. 5	X(n+21)	MINI-S3 link communications				
X(n+A)	Send-completed signal	For remote terminal	X(n+22)	Unusable				
X(n+B)	Request-to-read signal	module No. 6	X(n+23)	Received-data clear comp	oletion			
X(n+C)	Send-completed signal	For remote terminal	X(n+24)	Remote terminal module error detection				
X(n+D)	Request-to-read signal	module No. 7	X(n+25)	TEST mode				
X(n+E)	Send-completed signal	For remote terminal	X(n+26)	MINI-S3 link error detection				
X(n+F)	Request-to-read signal	module No. 8	X(n+27)	MINI-S3 link communications error				
X(n+10)	Send-completed signal	For remote terminal	X(n+28)	ROM error				
X(n+11)	Request-to-read signal	module No. 9	X(n+29)					
X(n+12)	Send-completed signal	For remote terminal	X(n+2A)					
X(n+13)	Request-to-read signal	module No. 10	X(n+2B)					
X(n+14)	Send-completed signal	For remote terminal	X(n+2C)	Unusable				
X(n+15)	Request-to-read signal	module No. 11	X(n+2D)					
X(n+16)	Send-completed signal	For remote terminal	X(n+2E)					
X(n+17)	Request-to-read signal	module No. 12	X(n+2F)					

Table 5.3 List of Output Signals

Device No.	Signal I	Name	Device No.	Signal Name					
Y(n+0)	Request-to-send signal	For remote terminal	Y(n+18)	Request-to-send signal For remote term					
Y(n+1)	Read-completed signal	module No. 1	Y(n+19)	Read-completed signal module No. 13					
Y(n+2)	Request-to-send signal	For remote terminal	Y(n+1A)	Request-to-send signal	For remote terminal				
Y(n+3)	Request-to-read signal	module No. 2	Y(n+1B)	Read-completed signal	module No. 14				
Y(n+4)	Request-to-send signal	For remote terminal	Y(n+1C)						
Y(n+5)	Read-completed signal	module No. 3	Y(n+1D)						
Y(n+6)	Request-to-send signal	For remote terminal	Y(n+1E)	-					
Y(n+7)	Read-completed signal	module No. 4	Y(n+1F)	Unusable					
Y(n+8)	Request-to-send signal	For remote terminal	Y(n+20)						
Y(n+9)	Read-completed signal	module No. 5	Y(n+21)						
Y(n+A)	Request-to-send signal	For remote terminal	Y(n+22)						
Y(n+B)	Read-completed signal	module No. 6	Y(n+23)	Request to clear received data					
Y(n+C)	Request-to-send signal	For remote terminal	Y(n+24) Remote terminal module fault detection		ault detection reset				
Y(n+D)	Read-completed signal	module No. 7	Y(n+25)	Unusable					
Y(n+E)	Request-to-send signal	For remote terminal	Y(n+26)						
Y(n+F)	Read-completed signal	module No. 8							
Y(n+10)	Request-to-send signal	For remote terminal	Y(n+28)	MINI-S3 link communications start					
Y(n+11)	Read-completed signal	module No. 9	Y(n+29)	Unusable					
Y(n+12)	Request-to-send signal	For remote terminal	Y(n+2A)	FROM/TO instruction resp	onse specification				
Y(n+13)	Read-completed signal	module No. 10	Y(n+2B)	Faulty station data clear specification					
Y(n+14)	Request-to-send signal	For remote terminal	Y(n+2C)	Unusable					
Y(n+15)	Read-completed signal	module No. 11	Y(n+2D)	Error reset					
Y(n+16)	Request-to-send signal	For remote terminal	Y(n+2E)						
Y(n+17)	Read-completed signal	module No. 12	Y(n+2F)	Unusable					

"n" specified value of the head I/O number of an AJ71PT32-S3.

Example:

If the I/O address of the AJ71PT32-S3 is between X/Y20 and X/Y4F:

X(n+0) to X(n+2F) = X20 to X4F

Y(n+0) to Y(n+2F) = X20 to X4F

REMARK

The AJ71PT32-S3 MELSECNET/MINI-S3 Master User's Manual gives details about the functions and purposes of control I/O signals.

5.4 Assignment of the Buffer

The assignment of an A64RDC buffer (without battery backup) is shown below.

Address (decimal)	Contents (16 bits)	
0	Conversion-enabled/disabled specifica	tion
1	Averaging processing specification	n
2	CH1 Averaging time/count	
3	CH2 Averaging time/count	
4	CH3 Averaging time/count	
5	CH4 Averaging time/count	
6	CH1 Detected temperature value	
7	CH2 Detected temperature value	
8	CH3 Detected temperature value	
9	CH4 Detected temperature value	
10	CH1 Detected temperature value	(L)
11	_ (32 bits)	(H)
12	CH2 Detected temperature value	(L)
13	– (32 bits)	(H)
14	CH3 Detected temperature value	(L)
15	– (32 bits)	(H)
16	CH4 Detected temperature value	(L)
17	– (32 bits)	(H)
18	Write data error code	
19	Conversion-completed flag	
20	Type specification of a platinum temperature-measuring resistor	

CAUTION

Addresses 6 to 17 and 19 of the buffer are areas exclusively used for reading from the PC CPU. Because the A64RDC overwrites digital data in these areas always destroying the data in the buffer. In this case, the A64RDC detects an error, stores the error code in address 18 and flickers the RUN LED.

5.4.1 Conversion-enabled/disabled specifications (address 0)

Address 0 is used to designate whether temperature detection is executed or not.

- (1) When the power is turned ON, the channel specification is set at "0000H" for conversion-disabled for all channels.
- (2) Conversion-enabled/disabled can be changed by the sequence program to reduce sampling time.

CH4 CH3 CH2 CH	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	ь3	b2	b1	b0
	_	_	_	_	_	_		_	_	_	_	_	CH4	СНЗ	CH2	CH1

Ignored

Channel specifications

1 : Conversion-enabled

0 : Conversion-disabled

Example:

To specify channels 1, 3, and 4 for conversion

By writing 000DH (13) to specify channels for conversion-enabled/disabled, the sampling time is obtained as 40 msec \times 3 = 120 msec.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	
0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	→000DH (13)
												CH4	СНЗ	CH2	CH1	

5.4.2 Averaging processing specifications (address 1)

Address 1 is used to designate execution of sampling or averaging.

- (1) When the power is turned ON and the READY signal of the A64RDC is ON, all channels are set for sampling processing.
- (2) Use buffer memory address 1 for selection of sampling processing or averaging processing.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b 5	b4	b3	b2	b1	b0
_	-		_	CH4	СНЗ	CH2	CH1	_	- -	-	_	CH4	СНЗ	CH2	CH1
	 -					····			~		<u> </u>		·		

Ignored

Specifying the channel where averaging processing will be done.

Ignored

Specifying time/count
1: Time averaging

1 : Averaging processing

0 : Count averaging

0 : Sampling processing

POINT

When averaging processing is not specified, sampling processing is set without regard to the time/count specification.

REMARK

See Section 2.3.3 for sampling and averaging.

5.4.3 Averaging time/count (addresses 2 to 5)

Addresses 2 to 5 are used to set the length of time or the number of times of averaging.

(1) When the power is turned ON, the averaging time and averaging count are set to 0.

(2) The setting ranges are as indicated below:

Averaging processing in terms of time : 160 to 32000 msec

Averaging processing in terms of count : 1 to 800 times

CAUTION

If a value outside the above range has been written, a setting error occurs and the buffer memory is rewritten.

However, the A64RDC performs conversion processing at the averaging time or count previously set.

5.4.4 Detected temperature value (addresses 6 to 17)

Addresses 6 to 17 are used to store detected temperature values which are handled in 16-bit or 32-bit data.

(1) 16-bit data (addresses 6 to 9)

A detected temperature value is multiplied by 10 and represented in the range from -1800 to 6000 of 16-bit signed binary numbers.

If a detected temperature value is negative, it is represented in 2's complement.

Example 1:

If a detected temperature value is 123.025°C (253.445°F), 1230 is stored.

b15	b14	b13	b12	b11	b10	b9	b8	ь7	b6	b5	b4	b3	b2	b1	ь0
0	0	0	0	0	1	0	0	1	1	0	0	1	1	1	0

Example 2:

If a detected temperature value is -123.025°C (-189.445°F), -1230 is stored.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0	
1	1	1	1	1	o	1	1	0	0	1	1	0	o	1	0	

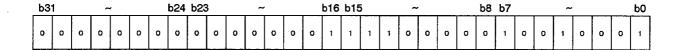
(2) 32-bit data (addresses 10 to 17)

A detected temperature value is multiplied by 1000 and represented in the range from -180000 to 600000 of 32-bit signed binary numbers.

If a detected temperature value is negative, it is represented in a complement of 2.

Example 1:

If a detected temperature value is 123.025°C (235.445°F), 123025 is stored.



Example 2:

If a detected temperature value is -123.025°C (-189.445°F), -123025 is stored.

p3.	31 ~				b24 b23						~				b16 b15					~				b8 b7			~			b0		
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	0	1	1	0	1	1	1	1	

REMARK

See Section 2.3.4 for detected temperature val

5.4.5 Write data error code (address 18)

- (1) When data is read from the PC CPU, the A64RDC makes a data range check for the number of channels, averaging count, and averaging time. It also performs a single read/write area access check. If any value is outside the range, the A64RDC stores the error code in 16-bit binary. Section 7.1 gives error code details.
- (2) If there is more than one error code, the first data error code detected by the A64RDC is stored. The others are not stored.
- (3) To reset an error code, write 0 from the PC CPU.
- (4) If an error is reset without correcting the error, the data error code is set to 0 and the RUN LED of A64RDC stops flashing.

POINT

The error code can be reset by turning ON the error-detected reset signal (Yn+4).

5.4.6 Conversion-completed flag (address 19)

Address 19 is used to confirm that a conversion-enabled channel can detect temperature correctly.

- (1) The conversion-completed flag processing after power ON is only performed once when the channel specification for conversion-enabled/disabled (address 0) is changed.
 - Conversion-enabled/disabled specification change from 0 to 1:
 After setting conversion enabled and storing a detected temperature value in buffer memory, the conversion-completed flag of its corresponding channel is set to 1.
 - Conversion-enabled/disabled specification change from 1 to 0:
 The conversion-completed flag of its corresponding channel is set to 0.
- (2) A conversion-completed flag is provided to each channel.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	o	0	0	0	0	0	O	0	0	. 0	0	CH4	СНЗ	CH2	CH1

Channel specifications

1 : Conversion completed

0 : Conversion not completed

(3) The conversion-completed flag can be used for the interlock when reading the detected temperature value of the channel where averaging processing is executed.

5.4.7 Type specification of a platinum temperature-measuring resistor (address 20)

This area is used to set the type of a platinum temperature-measuring resistor.

- (1) When the power supply is turned ON, the type is set to "0", indicating the new JIS (DIN) type.
- (2) All channels correspond to a specified type.

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	ь0
_	-	_	_	-	-	_	- .	_	-	_	_	_	_	-	¹ /o

These are ignored.

Old JIS/New JIS, DIN-type designation

1 : Old JIS

0: New JIS, DIN

REMARK

See Section 2.3.6 for platinum temperature-measuring resistor.

5.5 Contents and Configuration of an AJ71PT32-S3 Buffer

The AJ71PT32-S3 is provided with a buffer (without battery backup) for data communications with a PC CPU.

Use a FROM/TO instruction to read and write data from and to the buffer.

(1) Assignment of the buffer

Address (Decima		Content	Read/write by PC CPU
0	(Unused)	- :	
1	Retry count	Sets the number of retries when a communications error has occurred.	1
	(Unused)		1
4	Line error check	Checks the location of the line error.	Read/write enabled
	(Unused)	_	enabled
10 to 41	Batch refresh send data	Writes data to be output to the batch refresh-type remote I/O module.	
	(Unused)	-	_
70 to 77	Remote module card information	Stores the type identification of each remote module being connected.	Read only
	(Unused)	_	
90 to 93	Accumulated faulty station detection	Stores faulty remote station numbers. (Detected state is retained until reset.)	Read/write enabled
	(Unused)	. -	
100 to 103	Faulty station detection	Stores faulty remote station numbers. (The latest is retained.)	
	(Unused)	-	1
107	Communications error code	Stores the cause of the MINI-S3 link communications error signal going ON.	
108	Error detection code	Stores the accumulated number of times the MINI-S3 link error detection goes ON.	
	(Unused)		
110 to 141	Batch refresh received data	Stores the input data from the batch refresh-type remote I/O modules.	- Read only
	(Unused)	-] Ticac citing
160	Line error retry counter	Stores the number of retries when communications with all remote modules is disabled due to a line error.	
161 to 192	Retry counter	Stores the number of retries executed to faulty stations.	
	(Unused)		
195	Remote terminal module faulty station	Stores the station number when a remote terminal module causes an error.	
196 to 209	Remote terminal module error code	Stores the cause of the remote terminal module error-detected signal X(n+24) going ON.	
	(Unused)	_	_
250 to 282	Partial refresh station set data	Writes the station number of a partial refresh-type of remote I/O module and the data digit designation (number of times the partial refresh processing is done).	Read/write enabled
	(Unused)	_	

Addre: (Decim				Content	Read/write by PC CPU
300 to 363	Partial refresh send data			Writes data to be output to the partial refresh-type remote I/O module.	
	(Unused)			_	Read/write
598	Partial refresh accumulated input error detection			Stores the input faulty station number of the partial refresh-type remote I/O module input data. (The detection state is retained until reset.)	enabled
599	Partial refres	h input error		Stores the input faulty station number of the partial refresh-type remote I/O module input data. (The latest communications status is stored.)	
600 to 663	Partial refres	sh received data		Stores input data from the partial refresh-type remote I/O module.	Read only
858	Received-da nation	ita clear desig-		Sets the AJ35PTF-R2 station that clears received data by the received data request-to-clear signal Y(n+23).	
859	Received-da designation	ta clear range		Designates the receive buffer that clears received data by the received data request-to-clear signal Y(n+23).	Read/write enabled
860 to 929	NO-PROTOCOL mode			Sets the parameters when an AJ35PTF-R2 is used in the NO-PROTOCOL mode.	
930 to 1099	(Ur	nused)			
	(*1)	(*1)			
<u>[</u>	Channel 0 (n+2C) goes OFF.	Channel Y(n+2C) goes			
1100 to 2099	Send/received- data areas for remote terminal module No. 1	Send/receive data areas fo remote termi module No. 8	r nal		
2100 to 3099	Send/received- data areas for remote terminal module No. 2	Send/receive data areas fo remote termin module No. 9	r " al		
3100 to 4099	Send/received- data areas for remote terminal module No. 3	Send/receive data areas for remote termin module No. 1	r nai		
4100 to 5099	Send/received- data areas for remote terminal module No. 4	Send/receive data areas for remote termi module No. 1	r nal	Areas (a) to which send data to remote terminal modules is written, or (b) to store data received from remote terminal modules.	Read/write enabled
5100 to 6099	Send/received- data areas for remote terminal module No. 5	Send/receive data areas for remote termin module No. 1	r nal		
6100 to 7099	Send/received- data areas for remote terminal module No. 6	Send/receive data areas for remote termin module No. 1	r nai		
7100 to 8099	Send/received- data areas for remote terminal module No. 7	Send/receive data areas for remote termin module No. 1	al		

CAUTION

- (1) Channels specified with *1 are used for executing read/write at addresses 1100 to 8099. They are automatically switched according to the remote terminal module station number designated by the MELSEC-NET/MINI-S3 dedicated instructions (hereafter referred to as the MINI-S3 dedicated instructions).
- (2) The buffer is completely cleared (0 is stored.) at power ON, or when the PC CPU is reset. However, the retry count (address 1) and the NO-PROTOCOL mode parameters (addresses 860 to 929) are set by defaults.
- (3) Do not write data from a PC CPU to read-only areas.
- (4) Unused areas are utilized by the system of the master module.
- (5) Data in the buffer (including unused areas) can be read continuously. For example, data on accumulated faulty stations detection (addresses 90 to 93) and faulty station detection (addresses 100 to 103) can be read by a single FROM instruction.

REMARK

The AJ71PT32-S3 MELSECNET/MINI-S3 Master Module User's Manual gives details on the contents of each address and the data configuration of the buffer.

- (2) Remote terminal communications areas (addresses 1100 to 8099)
 - · Areas for data communications with remote terminal modules.
 - The communications areas are assigned to two channels. Channel 0 is assigned to remote terminal modules Nos. 1 to 7. Channel 1 is assigned to remote terminal modules Nos. 8 to 14.

Channels are automatically selected according to the remote terminal module station number settings as designated by the MINI-S3 dedicated instructions.

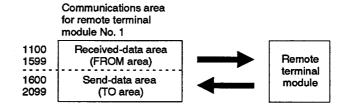
When a data read/write operation is done using a FROM/TO instruction, the channel should be switched to the corresponding remote terminal module. The channel can be switched using the channel switching signal Y(n+2c).

	Channel 0		Channel 1
1100 to 2099	Send/received- data areas for remote terminal module No. 1		Send/received- data_areas for remote terminal module No. 8
2100 to 3099	remote terminal		Send/received- data areas for remote terminal module No. 9
3100 to 4099	Send/received- data areas for remote terminal module No. 3		Send/received- data areas for remote terminal module No. 10
4100 to 7099			
7100 to 8099	Send/received- data areas for remote terminal module No. 7		Send/received- data areas for remote terminal module No. 14
	Y(n+2C) goes OFF.		Y(n+2C) goes ON.

The remote terminal module number refers to the number assigned to each remote terminal module set in the initial data ROM of the master module.

Data read/write is executed for areas which correspond to the module numbers assigned to each remote terminal module.

 Each communications area consists of a send-data area and a received-data area. The storage capacity of each data area at power ON is 500 words.



The send-data area is used for setting data to be transmitted to remote terminal modules.

The received-data area is used for storing data received from remote terminal modules.

 The capacity of the send-data and received-data areas can be changed by the initial data setting of the master module. (Note that the total capacity of the two areas cannot exceed 1000 words.)

Example:

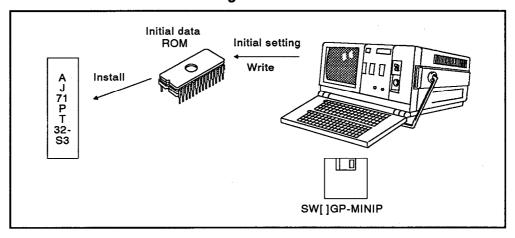
Received-data area: 200 words, send-data area: 800 words

5.6 Initial Setting

This section explains the initial setting when an A64RDC is used as a remote terminal module.

5.6.1 Initial setting of an AJ71PT32-S3

Initial Setting of an AJ71PT32-S3



Use the SW[]GP-MINIP system disk to set the initial data and to store it in the initial data ROM.

· Total number of remote stations:

Set the total number of occupied stations of each module connected to the AJ71PT32-S3.

Example:

AX41C (remote I/O module) : 4 stations

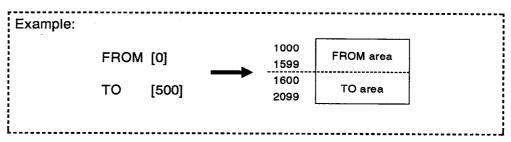
A64RDC (remote terminal module) : 4 stations

AY51C (remote I/O module) : 4 stations

- · Remote terminal data setting
 - (1) Number of remote terminal modules
 - (2) Head station number of each remote terminal module
 - (3) Attribute (protocol)

"MINI standard protocol" is used.

(4) Determines how the FROM and TO areas will share the 1000 words allocated to FROM and TO addresses.



^{*} The default value of each area is set to 500 words.

Install the initial data ROM into the "socket for initial data ROM" of the AJ71PT32-S3.

Set the mode switchover pin to "48 (EXTENSION mode)".

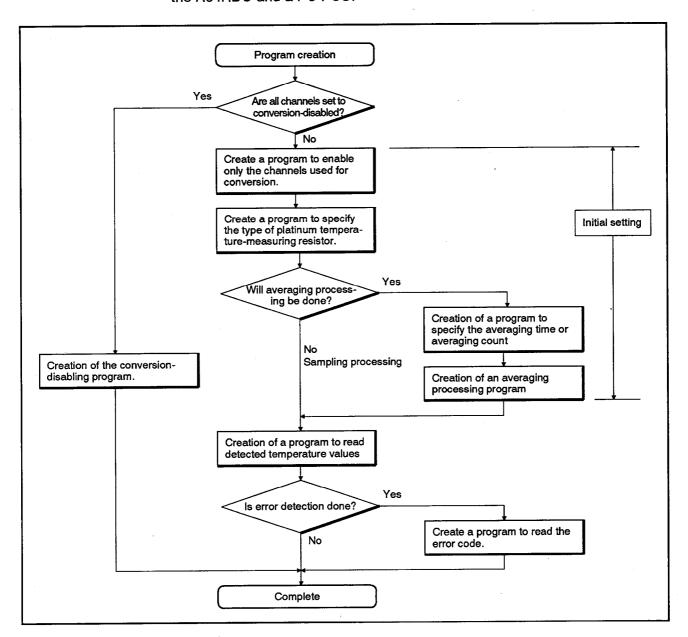
The SW[]GP-MINIP Operating Manual gives details about setting procedures.

5.7 Programming

This section describes how to program the data communications between an ACPU and an A64RDC connected to the MINI-S3 link.

5.7.1 Programming procedure

The following shows the programming procedure for data write/read between the A64RDC and a PC PCU.



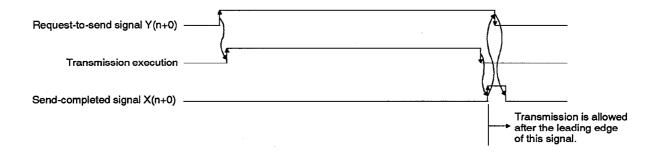
CAUTION

Only use the above-mentioned procedure to perform the initial settings.

If averaging processing is specified before setting averaging time or count, a write data error occurs. To avoid this, batch writing of the initial setting data is recommended.

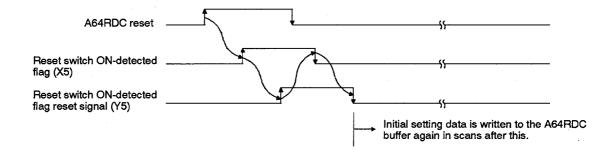
5.7.2 Precautions when programming

- (1) For communications with remote terminal modules linked to the AJ71PT32-S3, always turn ON the AJ71PT32-S3 communications start signal Y(n+28) before executing any instruction. If the communications start signal is not turned ON, communications processing cannot be done.
- (2) Transmission to a remote terminal module cannot be done if the request-to-send signal previously assigned to the same module remains ON. Use the send-completed signal to confirm that the previous transmission is completed. Then, reset the request-to-send signal before executing transmission to the same remote terminal module.

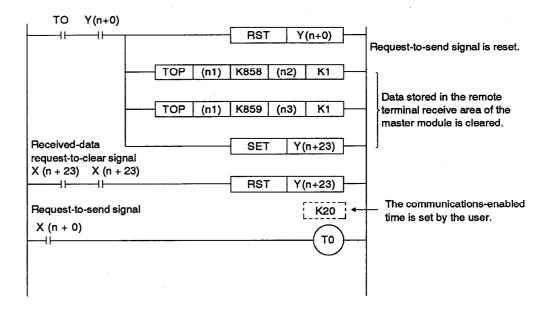


(3) When the reset switch on the front of the A64RDC is moved for resetting, the A64RDC returns to the initial state. Processing is executed with defaults until new set data (such as conversion-enabled/disabled designation and averaging designation) is written to the buffer.

The reset switch ON-detection signal from the A64RDC should always be read from the batch refresh received-data areas of the master module using the FROM instruction. Initial set data should be transmitted to the A64RDC when the detection signal is turned ON.



(4) If a communications-completed response signal to the send executed to the A64RDC is not transmitted back, the CPU goes into infinite-wait status unless the CPU module is reset. To prevent this, provide a monitoring timer to allow retransmission of the same data at preset intervals.



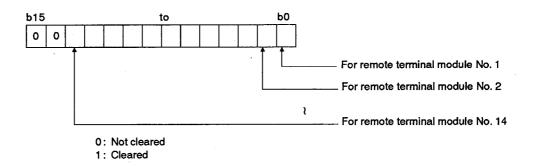
X(n+23), Y(n+0) and Y(n+23) are control I/O signals for the AJ71PT32-S3 (see Section 5.3.2 for details).

The contents of (n1), (n2), and (n3) designated by each instruction are as described below.

(n1): Higher two digits of the head I/O number assigned to an AJ35PT32-S3.

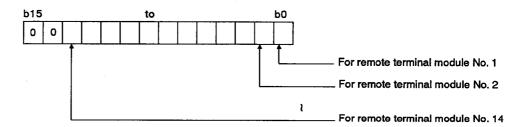
Example) "12H" when assigned to X/Y120 to 13F.

(n2): Receive buffer cleared/not cleared setting for each remote terminal number.



The setting contents are written to address 858 in the buffer of the AJ71PT32-S3.

n3: The range to be cleared is specified for each remote terminal number.

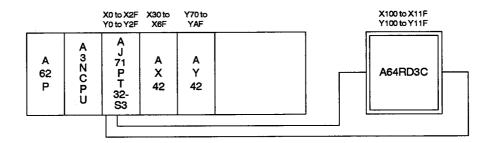


- 0: Only the remote terminal received-data areas of the master module are cleared.
- 1: The remote terminal received-data areas of the master module and the A64RDC receive buffer are cleared.

The setting contents are written to address 859 in the buffer of the AJ71PT32-S3

5.7.3 Sample program

This example shows how the detected temperature values of channels 1 and 2 of an A64RDC are read in the following system configuration.



(1) Channels used

• CH1 : Count averaging : 20 times

• CH2 : Time averaging : 5000 msec

(2) AJ71PT32-S3 initial setting

(a) Total number of remote stations : 4

(b) Remote terminal data

• Number of remote terminals : 1

· Head station number of the remote terminal module: Station 1

Protocol : MINI standard

• FROM address : 0

• TO address : 500

(3) Programming description

Resetting remote terminal error codes and fault detection signals
 X30

• Starts the storing of detected temperature values to register D: X31

Stops the storing of detected temperature values to register D: X32

External output of error occurrence : Y70

· External output of detected disconnection

Channel 1 : Y71

Channel 2 : Y72

Storage register map

(a) For reading error codes (master module)

D0 Remote terminal module No. 1 Error code (address 196)

(b) For writing the initial setting data

D1 Write command code

D2 Head buffer address for writing

D3 Number of write data words

D4 Conversion enable/disable setting

D5 Averaging setting

D6 CH1 Averaging time and count

D7 CH2 Averaging time and count

(c) For reading a conversion-completed flag

D8 Read command code

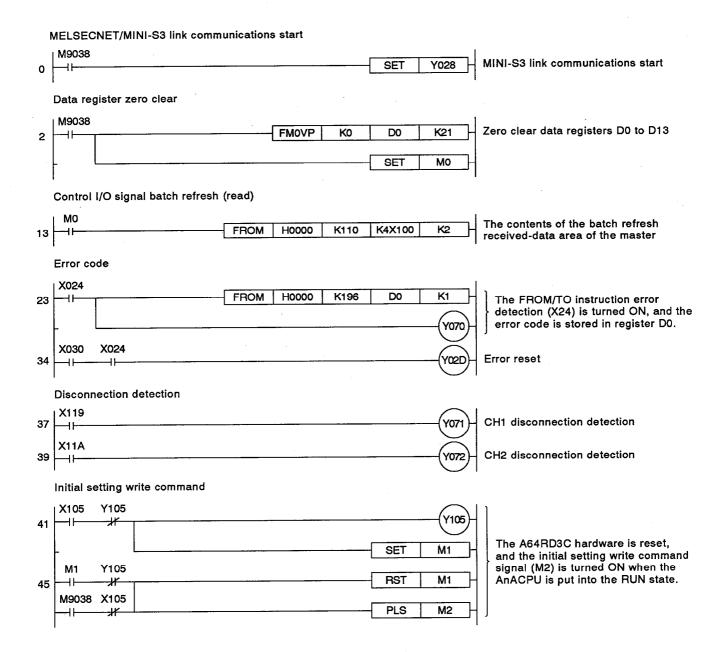
D9 Head buffer address for reading

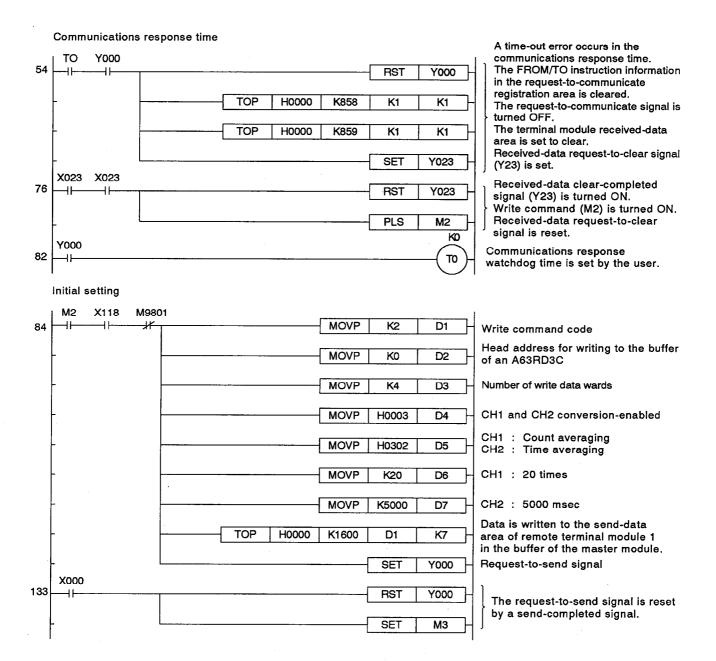
D10 Number of read data words

D11 Conversion-completed flag

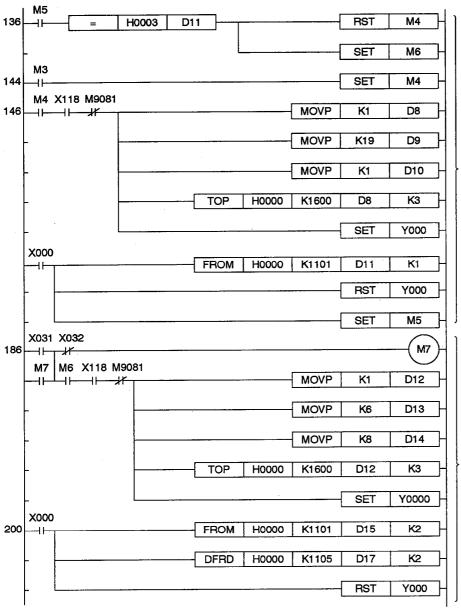
(d) For reading detected temperature value

D12 Read command code D13 Head buffer address for reading D14 Number of read data words CH1 Detected temperature value D15 16 bits CH2 Detected temperature value D16 16 bits D17 CH1 Detected temperature value to D18 32 bits D19 CH2 Detected temperature value to D20 32 bits





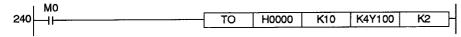




A conversion-completed flag is read from buffer address 19. CH1 and CH2 conversion completion stops the conversion-completed flag read, and turns ON the storageenabled signal (M6).

Turning the X31 signal ON starts the storing of the detected temperature value. Turning the X32 signal ON stops the storing of the detected temperature value.

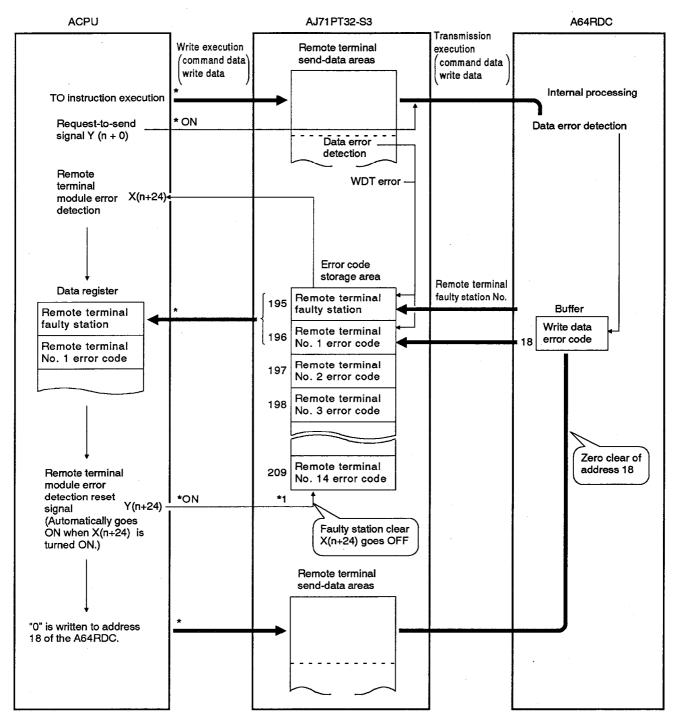
Control I/O signals refresh in batch (write)



The state of the output device is written to the batch refresh send-data area of the master module.

5.8 Error Detection

The following figure shows the detection procedure if an error occurs when an ACPU, AJ71PT32-S3, and A64RDC are used together.



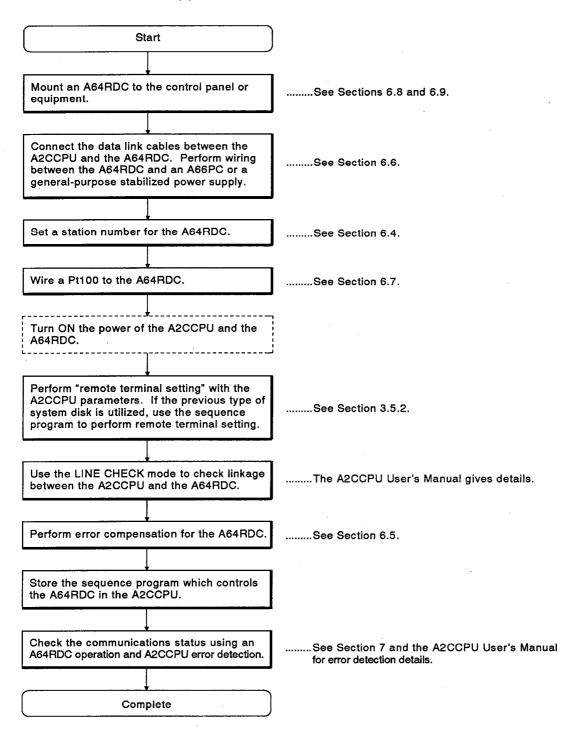
^{*} All processing marked by an asterisk is executed by the sequence program.

6. INSTALLATION AND PRE-OPERATION SETTING PROCEDURES

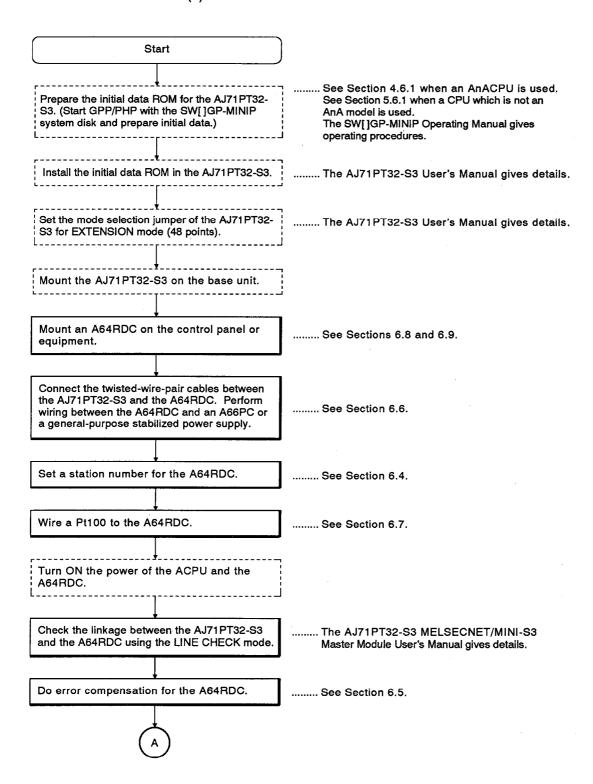
6.1 Pre-Operation Setting Procedures

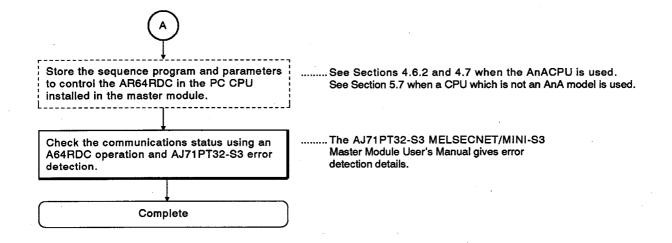
This section explains the pre-operation settings and operating procedures of an A64RDC for different types of system configurations.

(1) When an A2CCPU is used:



(2) When an AJ71PT32-S3 is used:





6.2 Handling Instructions

- (1) Protect the A64RDC and its terminal block from impacts.
- (2) Do not touch the printed circuit board or remove it from its case.
- (3) When wiring, make every effort to keep wire cut-offs out of the module. Make sure to remove any that do enter the module.
- (4) Tighten the terminal screws as specified below.

Screw	Tightening Torque Range kg-cm
I/O terminal block terminal screw (M3.5 screw)	8.5 to 11.5
I/O terminal block mounting screw (M4 screw)	8 to 14

6.3 Parts Identification

The names and descriptions of the parts of the A64RD3C and A64RD4C are given in Table 6.1 on the following page.

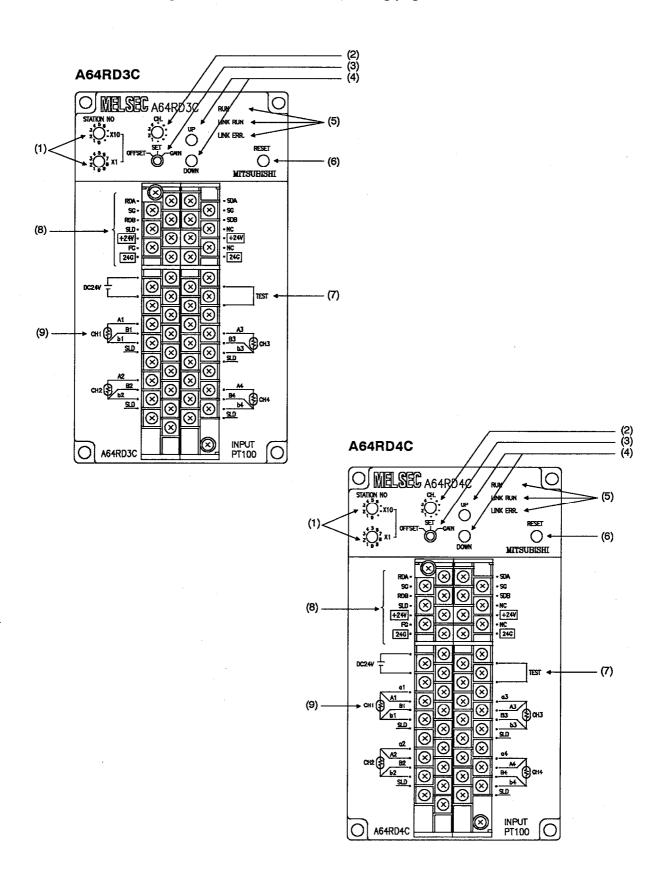


Table 6.1 Names and Description of Parts

No.	Name			Description				
. 1	Station number setting switch			Used to set the station number of an A64RDC in a range from 1 to (64 - [the number of occupied stations of this module] + 1). See Section 6.4.				
2	Channel selection switch	Used to select processing".)	the channel fo	r offset/gain adjustment. (Positions 0 and 5 to 9 select "no				
3	OFFSET/GAIN setting switch	Sets the offset/gain values in the TEST mode. (1) OFFSET position: OFFSET value adjustment mode (2) GAIN position: GAIN value adjustment mode (3) SET position: OFFSET/GAIN value memory mode (When the SET position is selected, the latest value is stored in the internal memory of the A64RDC as an offset/gain value.)						
4	UP/DOWN switch			of the designated channel. ed or decreased by using the UP/DOWN switch.				
			NORMAL mode	ON: Normal operation Flashing: Read/write data error (flashes every sec OFF: Either 24 VDC is OFF or a WDT error.	ond)			
5	Operation status indicator LED	RUNLED	TEST mode	Flashing: Flashes every 0.5 second when the OFF GAIN switch is set to the OFFSET or GAIN position Flashes every 0.1 second when the OFFSET/GAIN value is set outside the setting range by the UP/D switch.	on. N			
		LINK RUN	JN ON Normal communications					
		LED	OFF	Communications data error				
		LINK ERR LED	ON	Communications data error				
		LED	OFF	Normal communications				
6	Reset switch	By turning this	e buffer and o switch ON, the	perations processing of the A64RDC. control input signal (X5) of the A64RDC goes ON. ntrol I/O signals depends on the station setting.)				
7	TEST mode terminal	Error compensa	ation. Shorted	when setting OFFSET/GAIN.				
8	Terminal block for twisted-wire-pair cables and power supply cables	From the previous station From the previous SG SG SG RDB SDB SLD NC +24V +24V FG NC 24G 24G						
9	Pt100 connection terminal.	A Pt100 is conn	ected to this t	erminal.				

6.4 Station Setting

By setting the station number of an A64RDC, the addresses of the batch refresh communications areas (where control I/O signal information is stored) and the range of use of the remote terminal communications data areas (where command data and read/write data are stored) are designated. Take the following points into consideration when performing station setting.

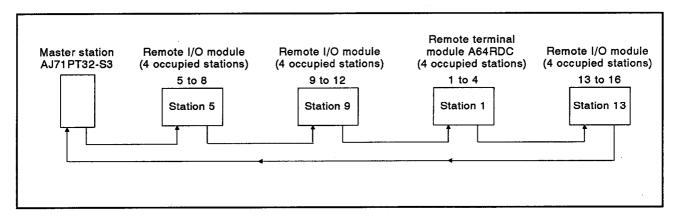
PRECAUTION

Do not change the station setting during communications in the MINI-S3 link. If it is changed, an I/O error may occur.

- (1) The range of station setting is 1 to (64 [number of occupied stations of this module] + 1).
- (2) The range of communications with remote I/O modules and remote terminal modules is determined by the total number of remote stations (initial data ROM).

For example, if the total number of remote stations is 10, communications is executed with the remote I/O modules and remote terminal modules whose station numbers are between 1 and 10.

(3) Station numbers can be set without regard to the order in which the modules are connected.

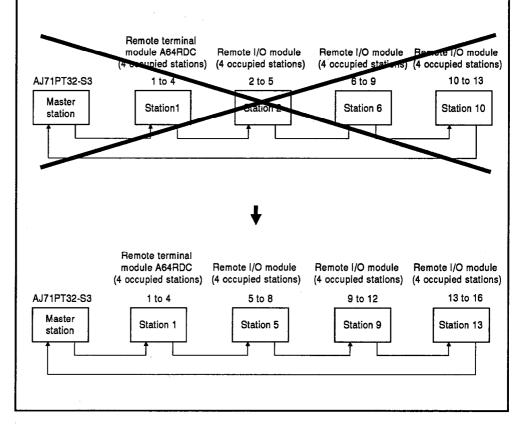


(4) When setting station numbers, make sure there are no unused stations (i.e., station numbers which do not correspond to a remote terminal module or remote I/O module) within the total number of remote stations.

If there is an unused station within the total number of remote stations (set with the initial data ROM), that station will be identified as a communications error station.

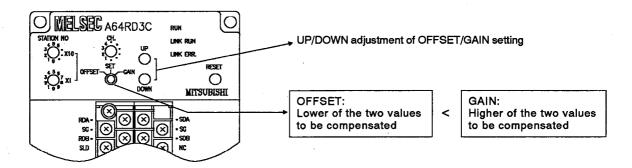
PRECAUTION

- (1) Do not set two or more stations for the same station number in the same loop. If two or more stations are set for the same station number, these stations may not operate properly. Make sure all stations are assigned different station numbers.
- (2) If remote terminal or I/O modules which have two or more occupied stations are used, set the station numbers skipping the numbers used for occupied stations. For example, if an A64RDC which has four occupied stations is set for station 1 (as shown below) do not set other remote I/O modules for stations 2, 3, and 4.

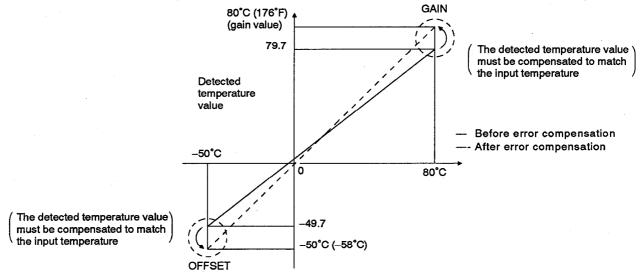


6.5 Error Compensation

Error compensation is required (a) when starting up a system, or (b) when a correct detected temperature value cannot be obtained.



The following explains the characteristics of the detected temperature value when compared with the input temperature.



* Error compensation can be done using a standard resistor instead of direct temperature input to the Pt100.

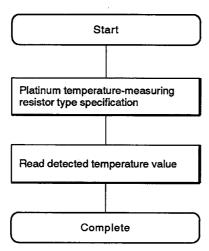
Resistance value of a standard resistor = Standard resistance value of Pt100 for the input temperature that is used for an offset/gain compensation (see Appendix 2).

POINT

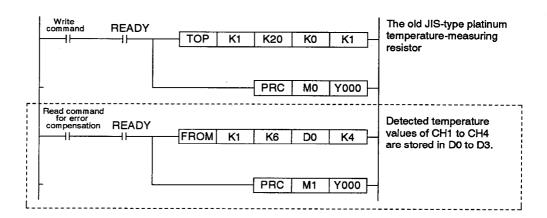
- (1) Perform error compensation at the highest and lowest temperatures of the available range. This yields a high-precision offset/gain value.
- (2) To set an offset/gain value, read the detected temperature value with a sequence program. Use X18 to provide an interlock.
- (3) The offset/gain value must be within the temperature input range.
- (4) The offset/gain value is stored in the A68RD. Even if the power supply is turned OFF, this data is not cleared.

6.5.1 Initial setting

To enable error compensation, perform the initial setting and write a program.

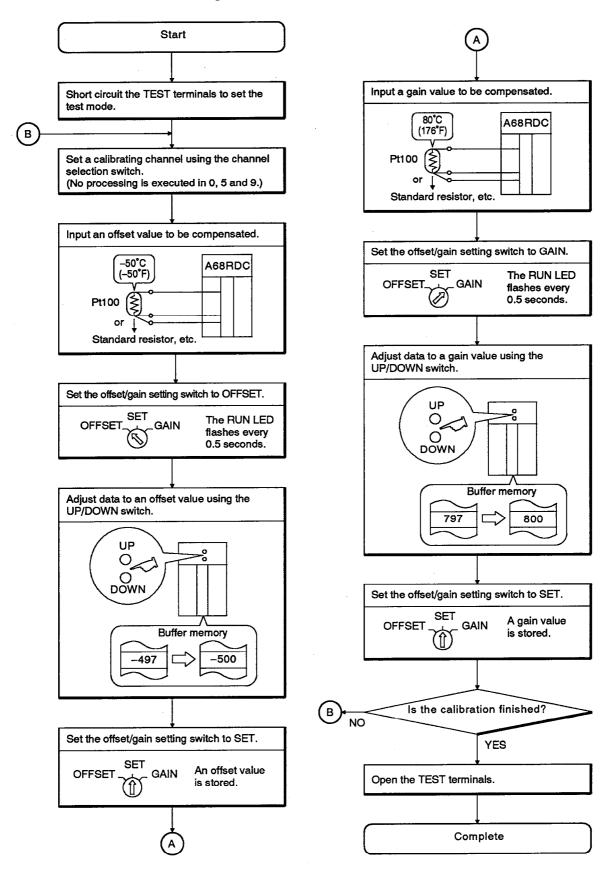


Example: When an old JIS-type platinum temperature-measuring resistor is used (link with A2CCPU).



6.5.2 Error compensation procedure

The following describes the error compensation procedure.



6.6 Wiring of Data Link Cables

The following explains the method of wiring using twisted-wire-pair cables which connect an A64RDC to A2CCPU or to an AJ71PT32-S3.

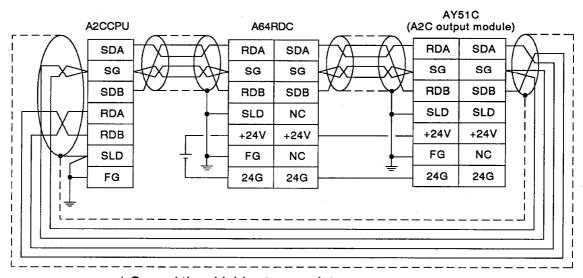
6.6.1 Handling instructions for twisted-wire-pair cables

Handle the cables with special care.

- (1) Do not press down on the cable with rigid or sharp-edged objects.
- (2) Do not twist the cable excessively.
- (3) Do not stretch the cable too much (beyond the allowable tension).
- (4) Do not step on the cable.
- (5) Do not put anything on the cable.
- (6) Do not damage the cable insulation.

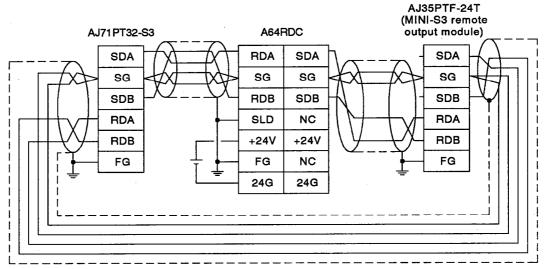
6.6.2 Connection of twisted-wire-pair cables

(1) Connecting an A2CCPU and an A64RDC



* Ground the shields at one point.

(2) Connecting an AJ71PT32-S3 and an A64RDC



^{*} Ground the shields at one point.

The following table shows the names of modules and corresponding terminal screws used to connect twisted-wire-pair cables. Also use appropriate crimp contacts.

Module	Terminal Screw	Tightening Torque Range kg.cm (lb-in)
A2CCPU A64RDC A2CI/O module	M3.5	8.5 (7.36) to 11.5 (9.96)
MELSECNET/MINI-S3 remote I/O module (batch refresh type)	M4	8 (6.93) to 14 (12.1)

PRECAUTIONS

Twisted-wire-pair cables must be connected so that they may not be influenced by noise or surge induction.

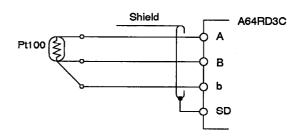
- (1) Do not lay the cables close to or bind them together with main circuit wires. (allow 100 mm or more clearance)
- (2) When connecting to the remote module terminal block, allow maximum clearance between twisted-wire-pair cables and module power supply lines and I/O signal wires.
- (3) Do not use a part of twisted-wire-pair cables (such as one pair among 3 pairs) for power supply.

6.7 Connecting a Platinum Temperature-Measuring Resistor

6.7.1 Connecting an A64RD3C

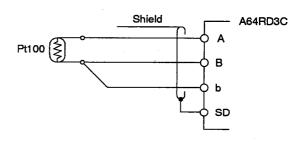
Using a 3-wire Pt100 yields the highest precision.

3-wire type

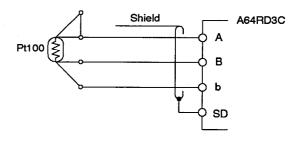


A 2-wire or 4-wire Pt100 can be used with the A64RD3C.

2-wire type



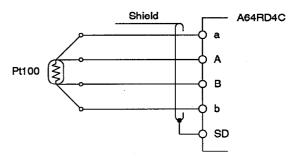
4-wire type



6.7.2 Connecting an A64RD4C

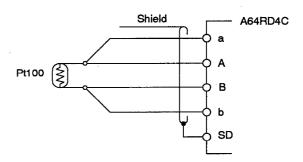
Using a 4-wire Pt100 yields the highest precision.

4-wire type

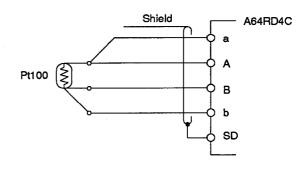


A 2-wire or 4-wire Pt100 can be used with the A64RD4C.

2-wire type



3-wire type



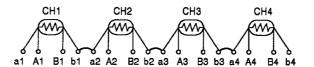
Precautions when connecting an A64RD4C to a Pt100

When an A64RD4C is used, connections to channels as well as to Pt100s are required.

The following shows connection examples.

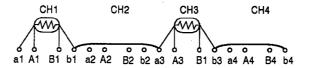
· When all channels are used.

Connect all channels (b1 to a2, b2 to a3, and b3 to a4) when all channels are used.



• When channels 1 and 3 are used.

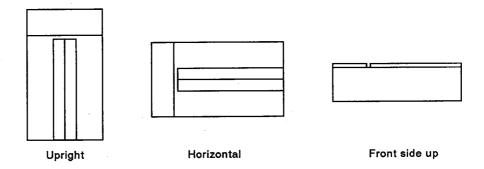
Connect b1 to a3, skipping CH2, and connect b3 to b4 to complete the connection between a1 and b4.



6.8 Mounting Directions

(1) While the A64RDC can be mounted in any direction, the front side must not face downward.

(2) Examples:



6.9 Mounting to a DIN Rail

This section explains how to mount and dismount an A64RDC to and from a DIN rail, as well as the specifications and handling of the DIN rail adapter.

6.9.1 DIN rail adapter

Specifications

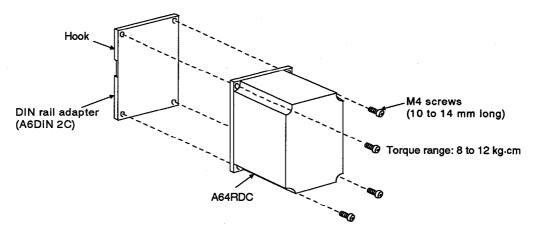
The following shows the specifications of the DIN rail adapter.

ltem	A6DIN2C
Applicable modules	A64RDC A2CCPU and special-function modules
External dimensions mm(inch)	174(6.85) × 106(4.17) × 10(0.4) (mm)
Weight	0.1 kg

(2) Handling instructions

- Since the DIN rail adapter is made of plastic, do not drop it or handle it carelessly.
- Use M4 screws which are 10 to 14 mm long to attach the DIN rail adapter to a module. The torque range is 8 to 12 kg•cm.

6.9.2 Attaching a DIN rail adapter to a module



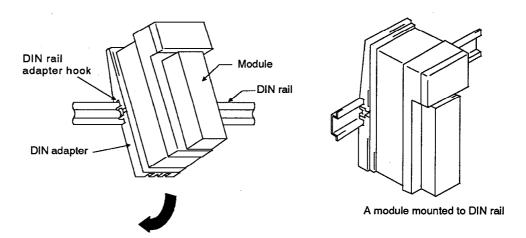
6.9.3 Mounting to a DIN rail

The following explains how to mount and dismount a module to and from a DIN rail.

(1) Mounting procedure

After attaching the DIN rail adapter to the module, mount the module to the DIN rail as shown below.

• Carefully lower the adapter onto the rail, so that the hook on the adapter engages the rail.



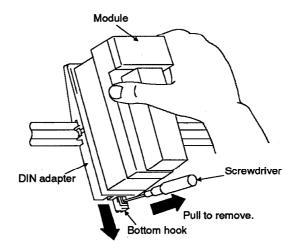
- Push the module onto the rail and secure it in position.
- If two adapters (with modules attached) are mounted to the rail side by side with no clearance between them, there will be a 4 mm clearance between the modules.

6. INSTALLATION AND PRE-OPERATION SETTING PROCEDURES MELSEC-A

(2) Dismounting procedure

Remove the module from the DIN rail as follows:

- Pull down the bottom hook of the adapter using a screwdriver.
- Pull the module away from the rail while pulling down the bottom hook with the screwdriver.



7. TROUBLESHOOTING

7.1 List of Error Codes

(1) Error codes used with an A64RDC

If an error occurs when data is written to an A64RDC (when the RUN LED flashes), any of the error codes shown in the following table will be stored in the buffer at address 18.

If an A2CCPU is used, the same error code is also stored in special registers D9180 (remote terminal module No.1) to D9193 (remote terminal module No.14). If an AJ71PT32-S3 is used, the same error code is also stored in the buffer at addresses 196 (remote terminal module No.1) to 209 (remote terminal module No.14).

Table 7.1 List of A64RDC Error Codes

Error Code	Cause	Corrective Action		
100 (64н)	(Read error) Designated head address is outside the buffer area. Designated range of read words includes addresses outside the buffer area.	Specify a correct buffer area.		
101 (65н)	 (Write error) Designated head address is outside the buffer area. Designated range of write words includes addresses outside the buffer area. Write was attempted to readonly areas. 	 Specify a correct buffer area. Correct the read-only area specification. 		
102 (66н)	Command code other than read (01H) or write (02H) is received.			
103 (67н)	Read/write word length "0" is received.	Apply noise-prevention measures. Try retransmission.		
104 (68н)	Data is received when a FROM instruction is used.			
105 (69н)	The number of words set by the write command data differs from that of the received data.			
1[]0	The averaging time is set outside the 160 to 32000 msec range. [] indicates the channel where the error occurred.	Reset the averaging time inside the 160 to 32000 msec range.		
1[]5	Averaging count is set outside the range of 1 to 800 times. [] indicates the channel where the error occurred.	Reset the averaging count inside the range of 1 to 800 times.		

- (a) If errors occur over a period of time, only the first error code will be stored.
- (b) Error code resetting is done by writing "0" to address 18 of the buffer. (Figures other than 0 are ignored.)

(2) Error codes used with an AJ71PT32-S3

When an AJ71PT32-S3 is used, the error codes for errors which occur during communications with remote terminal modules are stored in the buffer at addresses 196 to 209, in addition to the error codes for errors detected by the A64RDC (see Table 7.1).

Table 7.2 List of AJ71PT32-S3 Error Codes

Error Code	Error Name	Cause	Corrective Action
1	Set data error	Data written to the remote terminal send-data areas includes errors.	Correct the data.
6	WDT error	Remote terminal module malfunction.	Reset faulty remote terminal module. Turn the power OFF and then ON. If the above procedures do not restore the system, the system hardware is faulty. Consult your nearest Mitsubishi representative.
8	Send-data area setting error	Remote terminal send-data area set range is smaller than the number of words used by remote terminal modules.	Correct the initial setting data so that the set range is larger than the number of words used by remote terminal modules.
9	Communications between the master module		Noise or remote
11 (Вн)	error	and remote terminal modules is faulty.	failure.
10 (Ан)	Received-data area setting error	Remote terminal received-data area set range is smaller than the number of words used by remote terminal modules.	Correct the initial setting data so that the set range is larger than the number of words used by remote terminal modules.

7.2 When the RUN LED Flashes or Goes OFF

(1) When the RUN LED flashes:

Check Point	Corrective Action
Data which disables write or read is written to an A64RDC.	Refer to the tables in Section 7.1 for the cause, and correct the sequence program.

(2) When the RUN LED goes OFF:

Check Point	Corrective Action
24 VDC power supply is turned ON.	Make sure the power supply is ON.
Is the voltage applied to the A64RDC within the allowable range?	Adjust the voltage within the range of 15.6 V to 31.2 V.
When a MINI-S3 link is connected: Is the MINI-S3 link communications start Y(n+28) turned ON?	Add a loop to turn ON the MINI-S3 link communications start Y(n+28) in the sequence program.
If the MINI-S3 link is connected, error code "6" may be stored in the master module buffer at addresses 196 to 209.	Reset the A64RDC and the PC CPU, and start them. If error code "6" is stored, the system hardware may be faulty. Consult your nearest Mitsubishi representative.
If the MINI-S3 link is connected, error codes "9" and "10" may be stored in the master module buffer at addresses 196 to 209.	Reset the A64RDC and the PC CPU, and start them. If error codes "9" and "10" are stored, the system hardware may be faulty. Consult your nearest Mitsubishi representative
Data link cables are normal.	Check the cables (see Section 6.6).
The TEST terminals are open.	After error compensation, open the test terminals.

7.3 When the LINK RUN LED is Turned OFF and the LINK ERR. LED is Turned ON

Check Point	Corrective Action
The RUN LED is flashing.	See Section 7.2 (1).
The RUN LED turned OFF.	See Section 7.2 (2).

7.4 If Digital Output Values Cannot be Read

Check	Corrective Action	
The RUN LED is flashing or	See Section 7.2.	
The ERROR LED of the CP turned ON.	The User's Manual for the respective CPU module gives error content details.	
The RUN LED of the CPU returned OFF.	nodule is flashing or	The User's Manual for the respective CPU module gives error content details.
When an A2CCPU is used:	The RD/SD LED of the CPU module is flashing (NORMAL).	The A2CCPU User's Manual gives error content details.
	The MINI-S3 link communications start signal Y(n+28) is turned ON.	Set the sequence program to turn ON the MINI-S3 link communica- tions start signal.
When an AJ71PT32-S3 is used:	The RUN LED of the master module is turned OFF.	The AJ71PT32-S3 User's Manual gives error content details.
	The RD/SD LED of the master module is flashing (NORMAL).	The AJ71PT32-S3 User's Manual gives error content details.
The Pt100 is broken or disc	Visually check the Pt100 and disconnection-detected signals to confirm the faulty parts.	

7.5 When Detected Temperature Values are not Normal

Check Point	Corrective Action
Is the conversion-enabled/disabled correctly specified?	Inspect the A64RDC buffer allocation and correct the conversion-enabled/ disabled specification.
Are the cables linking the Pt100 to the A64RDC correctly connected?	Inspect the connections visually.

7.6 When the READY Signal is not Turned ON

Check Item	Corrective Action
Is there an error in the PC CPU?	Correct it according to the appropriate. User's Manual for the CPU module.
Are the TEST terminals open?	Open the TEST terminals after making an error compensation.

7.7 When the Disconnection-detected Signal Goes ON

Check Point	Corrective Action
Is the conversion-enabled/disabled correctly specified?	Inspect the A64RDC buffer allocation and correct the conversion-enabled/disabled specification.
Are the cables linking the Pt100 to the A64RDC correctly connected?	Inspect the connections visually.

APPENDIX 1. Standard Resistance Value of Platinum Temperature-measuring Resistores

1.1 Pt100

JIS C1604 - 1989, DIN 43760 - 1980

Unit : Ω

-100	-0	Temperature °C	Temperature °C	0	100	200	300	400	500	600
60.25	100.00	-0	0	100.00	138.50	175.84	212.02	247.04	280.90	313.59
56.19	96.09	-10	10	103.90	142.29	179.51	215.57	250.48	284.22	
52.11	92.16	-20	20	107.79	146.06	183.17	219.12	253.90	287.53	
48.00	88.22	-30	30	111.67	149.82	186.82	222.65	257.32	290.83	
43.87	84.27	-40	40	115.54	153.58	190.45	226.17	260.72	294.11	
39.71	80.31	-50	50	119.40	157.31	194.07	229.67	264.11	297.39	
35.53	76.33	-60	60	123.24	161.04	197.69	233.17	267.49	300.65	
31.32	72.33	-70	70	127.07	164.76	201.29	236.65	270.86	303.91	
27.08	68.33	-80	80	130.89	168.46	204.88	240.13	274.22	307.15	
	64.30	-90	90	134.70	172.16	208.45	243.59	277.56	310.38	

1.2 JPt100

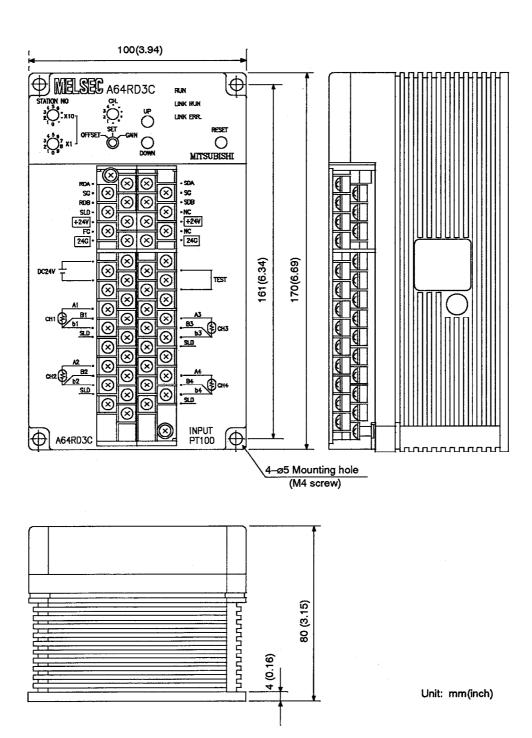
JIS C1604 - 1981

Unit : Ω

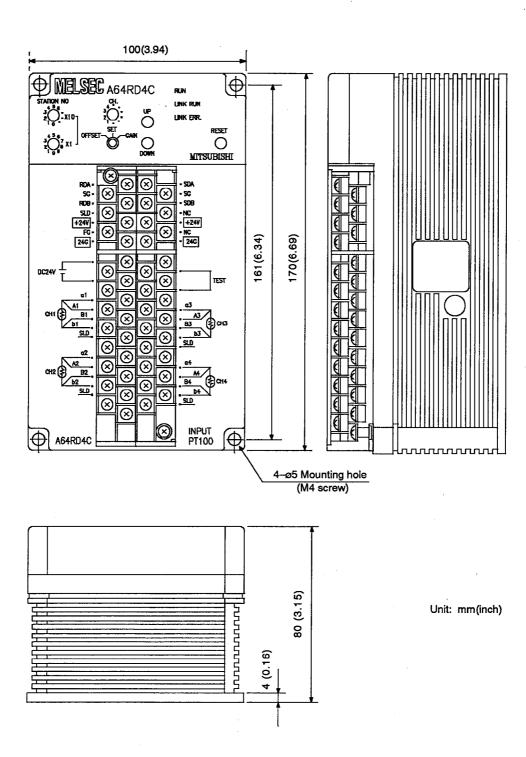
-100	-0	Temperature °C	Temperature °C	0	100	200	300	400	500	600
59.57	100.00	-0	0	100.00	139.16	177.13	213.30	249.56	284.02	317.28
55.44	96.02	-10	10	103.97	143.01	180.86	217.54	253.06	287.40	
51.29	92.02	-20	20	107.93	146.85	184.58	221.15	256.55	290.77	
47.11	88.01	-30	30	111.88	150.67	188.29	224.74	260.02	294.12	
42.91	83.99	-40	40	115.81	154.49	191.99	228.32	263.49	297.47	
38.68	79.96	-50	50	119.73	158.29	195.67	231.89	266.94	300.80	
34.42	75.91	-60	60	123.64	162.08	199.35	235.45	270.38	304.12	
30.12	71.85	-70	70	127.54	165.86	203.01	238.99	273.80	307.43	
25.80	67.77	-80	80	131.42	169.63	206.66	242.53	277.22	310.72	
	63.68	-90	90	135.30	173.38	210.30	246.05	280.63	314.01	

APPENDIX 2. Outside Dimensions

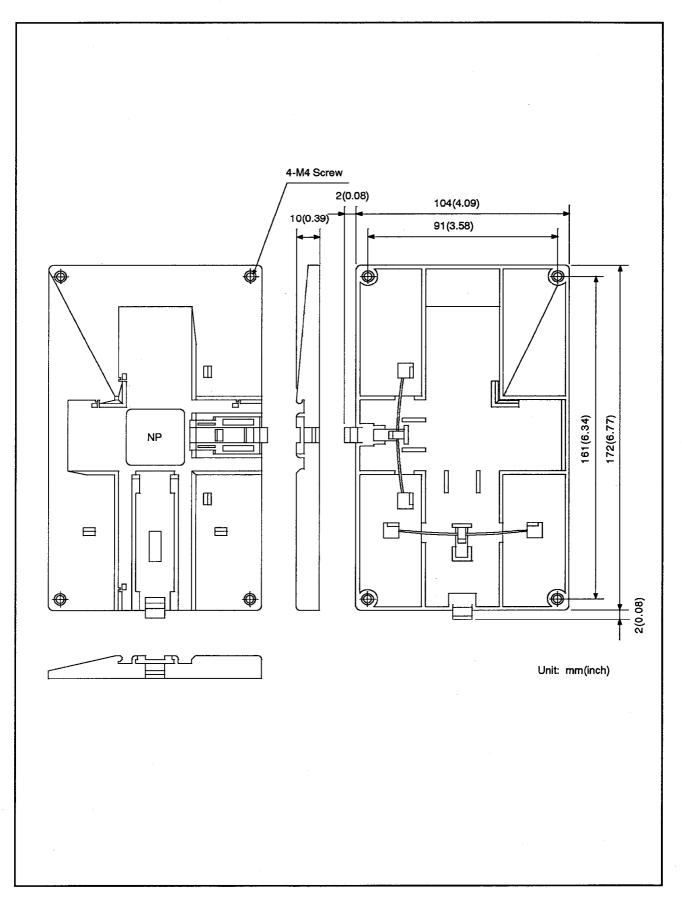
2.1 A64RD3C



2.2 A64RD4C



APPENDIX 3. Din Rail Adapter Outside Dimensions



IMPORTANT

The components on the printed circuit boards will be damaged by static electricity, so avoid handling them directly. If it is necessary to handle them, take the following precautions.

- (1) Before handling the printed circuit boards, touch a grounded metal object.
- (2) Do not touch the conductive areas of the printed circuit board and its electrical parts with any tools, etc. which are not grounded.

Pt100 input module type A64RD3C/4C

User's Manual

MODEL	A64RD3C/4C-USER-E		
MODEL CODE	13J671		
IB(NA)66312-A(9109)MEE			

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