



Toshiba V Series User Manual

Sequence controllers

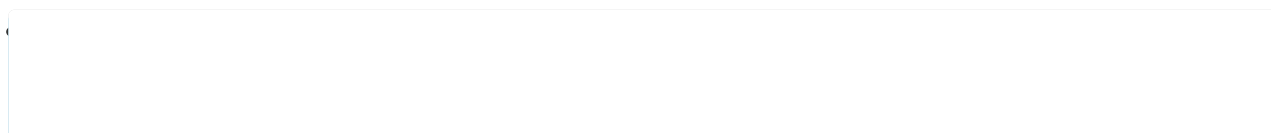
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18

19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68

69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118

119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168

169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
Table Of Contents
205



•

[Table of Contents](#)

-

Troubleshooting

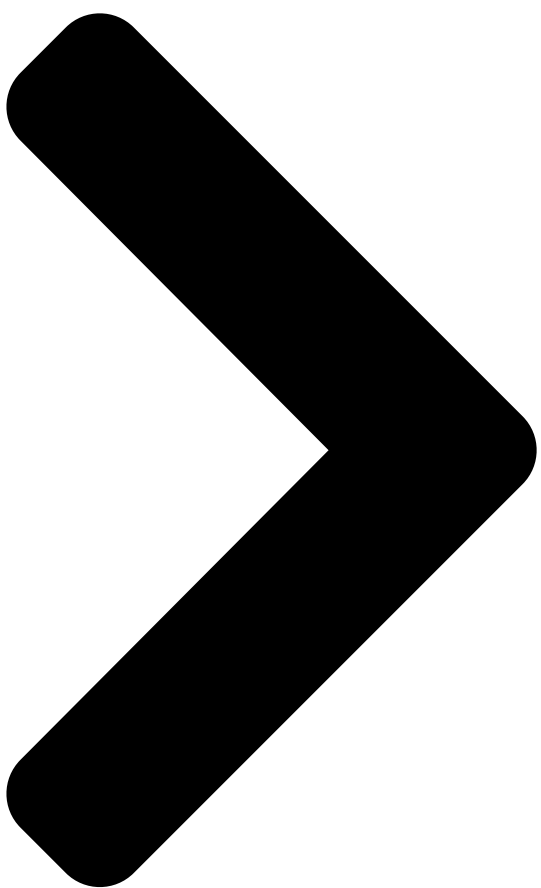
•

Bookmarks

--

[Download this manual](#)

Quick Links



6F8C0836

odel 2000

Sequence Controller S2 User's Manual - Basic Hardware -

TOSHIBA

Integrated Controller



[Table of Contents](#)

[Next Page](#)

1
2
3
4
5

Related Manuals for Toshiba V Series

[Controller Toshiba V Series Manual](#)

Integrated, devicenet module (264 pages)

[Controller Toshiba V Series User Manual](#)

Integrated controller ethernet module, en311 (258 pages)

[Controller Toshiba V Series User Manual](#)

Integrated controller (230 pages)

[Controller Toshiba V Series Manual](#)

(177 pages)

[Controller Toshiba V Series User Manual](#)

Integrated controller, loop controller (158 pages)

[Controller Toshiba V Series User Manual](#)

Admap-5m an712 module (150 pages)

[Controller Toshiba V Series User Manual](#)

Integrated controller (130 pages)

[Control Unit Toshiba V Series Operation Manual](#)

Integrated controller, ethernet module / ds connection module (126 pages)

[Control Unit Toshiba V Series Operation Manual](#)

Integrated controller, ethernet module (122 pages)

[Controller Toshiba V Series Operation Manual](#)

Integrated controller, control network fl-net opcn-2, module (96 pages)

[Control Unit Toshiba V Series User Manual](#)

Analog module (96 pages)

[Controller Toshiba 2000 User Manual](#)

V series integrated controller (76 pages)

[Network Hardware Toshiba V Series User Manual](#)

(60 pages)

[Controller Toshiba V Series User Manual](#)

(50 pages)

[Controller Toshiba V Series Manual](#)

Integrated controller (46 pages)

[Media Player Toshiba V Series Brochure](#)

Toshiba digital camera data specification (2 pages)

Summary of Contents for Toshiba V Series

[Page 1](#) 6F8C0836 odel 2000 Sequence Controller S2 User's Manual - Basic Hardware - ...

[Page 2](#) Important Information No patent liability is assumed by TOSHIBA Corporation with respect to use of information, illustrations, circuits, equipment or examples of application in this publication. TOSHIBA Corporation reserves the right to make changes and improvements to this publication and/or related products at any time without notice.

[Page 3](#) Safety Precautions This manual contains important information for the operator to operate this product safely and correctly and avoid bodily injury and property damage. Grasp the meanings of the following marks and their descriptions before reading this manual. Hazard

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

[Page 4](#) 1. Checking the Warning Labels on the Main Unit Make sure warning markings are attached on the model 2000. If any of them are missing or the wording is illegible, contact Toshiba's Service Department. [Warning Mark on the model 2000] This is the warning mark for dangerous location.

[Page 5](#) 2. Precautions on Installation WARNING Mandatory Be sure to ground the model 2000. The protective ground terminal of the model 2000 must be connected to an external protective earth. Operation without grounding may cause accidental fire or shock. CAUTION Mandatory Avoid the following locations when Install the model 2000 a place where...

[Page 6](#) 3. Precautions on Wiring WARNING Mandatory Mandatory Be sure to use crimp-style terminal with Be sure to turn off power before wiring. insulating sheath or insulating tape to Otherwise, it can cause electric shock or cover the conductive parts when wiring malfunction of the model 2000.

[Page 7](#) 4. Precautions for Operation WARNING Mandatory Mandatory Be sure to keep the terminal block covers Configure emergency stop interlocking closed during power ON. Do not touch the circuit outside the model 2000. Otherwise, terminals. Otherwise, it can cause failure and malfunction of the model 2000 electrical shock or injury.

[Page 8](#) Also unauthorized repairing power according to the following sequence. will cause fire or serious accidents. Do not Turn on the power of model 2000 attempt to repair. Contact Toshiba for Turn on the power for the I/O module repairing. - >...

[Page 9](#) 5. Safety Precautions on Maintenance and inspection WARNING Mandatory Forbidden Turn off power when removing any units, Do not disassemble or modify the model modules, terminal blocks or wired cables after 2000 and related equipment in hardware installing. nor software. Otherwise, exposed conductive parts of wire Otherwise it can cause failure, malfunction, or on the rear of terminal blocks can cause...

[Page 10](#) Mandatory Use soft cloth to clean the model 2000. Use water-dipped and squeezed cloth to clean it if dirty. Leaving the model 2000 dirty can cause mistaken or malfunction. 6. Safety Precautions on Replacing Components WARNING Mandatory Mandatory Turn off power of the model 2000 before Replace the fuse or battery with a new one replacing the power fuse or warning fuse.

[Page 11](#) User's manual. is occurred in the equipment. Otherwise, it can cause malfunction, machine damage or fire due to overheat. Contact Toshiba for repairing. Operation under such situation can cause fire or electrical shock. 6F8C0836...

[Page 12](#) CAUTION Forbidden Forbidden Do not forcibly bend or pull or distort the Do not touch any components, terminals, power cord and other cables. Otherwise, connectors, or printed circuit boards in the they can be cut off or cause overheat. module. Otherwise, it can cause the IC or LSI or the like to be broken by static electricity, resulting in failure or malfunction.

[Page 13](#) 8. Safety Precautions on Disposal WARNING Forbidden Do not throw lithium batteries into fire. Otherwise, they can explode. CAUTION Mandatory Observe local regulations for disposal of the lithium batteries or the model 2000. 6F8C0836...

[Page 14](#) • Toshiba is not liable for any incidental loss caused by the use or non-use of this product, such as loss of business profits, suspension of business, or loss or change of data on memory. •...

[Page 15](#) Preface This manual describes the specification, overview, installation, operation, maintenance and inspection of the hardware of Toshiba's Integrated Controller V-series model 2000 sequence controller S2 (hereinafter called "S2" or when no distinction is needed "model 2000" or the "equipment"). The Integrated Controller V-series offers two types of modules, the station module which integrates multiple functions characteristic to V-series controllers, and the standalone module which provides a single function and is programmable.

[Page 16](#) Ask a qualified person. This manual has been written for users who are familiar with Programmable Controllers and industrial control equipment. Contact Toshiba if you have any questions about this manual. model 2000 Sequence Controller S2 User's Manual -Basic Hardware-...

[Page 17](#) Documentation System The following documents are provided for the S2 system: S2 User's Manual - Basic Hardware (6F8C0836) (this document) Describes the specifications, operation, maintenance and inspection of the hardware (basic hardware, basic I/O, etc.) of S2. S2 User's Manual - Functions (6F8C0837) Describes the S2 functions and usage as well as the information required for users to create programs of their own.

[Page 18](#) TOSLINE-S20 User's Manual (6F8C0840) Describes the system and device configurations of TOSLINE-S20 in a data link system using S2, and the function, performance and operation of TOSLINE-S20. TOSLINE-F10 User's Manual (6F8C0844) Describes the system configuration, and the specifications, wiring and operation of remote I/O data link system TOSLINE-F10.

[Page 19](#) CONTENTS 1 System Configuration1 1.1 S2 Configuration (Station Module: Single Configuration) 3 1.1.1 Basic configuration .

[Page 20](#) CONTENTS 3 Precautions for I/O Modules ..119 3.1 Precautions for DC Input Modules119 3.2 Precautions for AC Input Modules123 3.3 Precautions for DC Output Modules .

[Page 21](#) CONTENTS 6 Troubleshooting163 6.1 Troubleshooting procedure163 6.2 Checking the power supply .

[Page 23](#) Chapter 1 System Configuration Integrated Controller V-series model 2000 sequence controller S2 has two types of modules. Station Module A multiple number of high function CPUs, characteristic to the integrated controller, are mounted in the station module to implement an optimum system through real time inter- module data access.

[Page 24](#) Chapter 1 System Configuration To use the station module, a base (BU648E, BU643D) for the basic station module unit is required. See 1.1, 1.2 and 1.4 and subsequent sections for the system configuration. Standalone module This is a type that can build an optimum system as a programmable, single function controller.

[Page 25](#) 1.1 S2 Configuration (Station Module: Single Configuration) 1.1 S2 Configuration (Station Module: Single Configuration) 1.1.1 Basic configuration The single system is configured only with the basic unit, or with the basic unit plus expansion unit(s) depending on the parallel I/O module (hereinafter called the I/O module or G2 I/O module) of model 2000.

[Page 26](#) Chapter 1 System Configuration 1.1.2 System configuration S2 is designed to be used in various ways through a combination of network modules mounted as high function units and I/O modules. other Operator model model Engineeri control interface ng Tool 3000 2000 Equip.

[Page 27](#) 1.1 S2 Configuration (Station Module: Single Configuration) • General configuration • Station Module • G2 I/O module Base Control module Digital input/output module Main base BU648E Sequence controller S2PU72A 12-24Vdc input DI633 BU643D S2PU82 DI632D Expansion base BU668 Loop controller L2PU11 (Status change detection) CD633 BU666...

[Page 28](#) Chapter 1 System Configuration 1.1.3 Unit configuration Some examples of minimum and maximum configurations of the single system station module are shown in this paragraph. The main base is used as the basic unit. The controller module should always be mounted on S0, the leftmost slot of the slots provided for station modules.

[Page 29](#) 1.1 S2 Configuration (Station Module: Single Configuration) Table 1-6 Modules mounted on the expansion base (O: Yes, X : No) Type Module type BU668 I/O module – – – BU666 I/O module – – – – – BU664 I/O module (1) Minimum Configuration •...

[Page 30](#) Chapter 1 System Configuration Supplementary 1. Sn (n=0 to 8) on upper side is called slot number. m (m=0 to 7) on lower side is called I/O module address. 2. Do not use the following combinations. S0 S1 S2 S3 S4 S5 S6 S7 S8 S0 S1 S2 S3 S4 S5 S6 S7 S8 1 2 3 1 2 3...

[Page 31](#) 1.1 S2 Configuration (Station Module: Single Configuration) Caution S0 is not available for BU668. Mount a space module (SP600) on the slot. Space slots should also be mounted on vacant slots in other configurations to avoid risks of electrical shock. Supplementary 1.

[Page 32](#) Chapter 1 System Configuration 1.2 S2 Configuration (Station Module: Duplex Configuration) In the duplex configuration of model 2000, the core part (basic unit) is configured as the active-standby system (duplex system) while G2 I/O is for the single configuration. In the active-standby system, the standby controller group having identical configuration with the active controller group takes over the operation in case that a failure occurs in the active group.

[Page 33](#) 1.2 S2 Configuration (Station Module: Duplex Configuration) 1.2.2 System Configuration S2 is designed to be used in various ways through a combination of network modules mounted as high function units and I/O modules. Other model model Engineering Operator control Tool interface 3000 2000 Equip.

[Page 34](#) Chapter 1 System Configuration • General configuration • Station Module • G2 I/O module Base Control module Digital input/output module Main base BU648E Sequence controller S2PU72A 12-24Vdc input DI633 BU643D S2PU82 DI632D Expansion base BU668 Loop controller L2PU11 (Status change detection) CD633 BU666 L2PU12 24Vdc input...

[Page 35](#) 1.2 S2 Configuration (Station Module: Duplex Configuration) 1.2.3 Unit Configuration The main base is used as the basic unit. The controller module for duplex system should always be mounted on S0, the leftmost slot of the slots provided for station modules. Other required station modules including the duplexing interface (IF619) can be mounted from the subsequent slots (S1 to S4).

[Page 36](#) Chapter 1 System Configuration Table 1-10 Modules mounted on the expansion base (O: Yes, X : No) Type Module type Expansion interface IF658 for duplex system BU668 I/O module Expansion interface – – – IF658 for duplex system BU666 –...

[Page 37](#) 1.2 S2 Configuration (Station Module: Duplex Configuration) (1) An example of minimum configuration S0 S1 S2 S3 S0 S1 S2 S3 Basic unit Basic unit (Primary) (Secondary) No. I/O points (using 64-point I/O module) S1 S2 S3 Expansion unit 192 points/BU664 6F8C0836...

[Page 38](#) Chapter 1 System Configuration (2) Maximum configuration example S0 S1 S2 S3 S4 S5 S6 S7 S8 S0 S1 S2 S3 S4 S5 S6 S7 S8 Basic unit Basic unit (Secondary) (Primary) No. I/O points (using 64-point I/O module) S2 S3 S5 S6 S7 S8 Expansion unit points/...

[Page 39](#) 1.3 S2 Configuration (Standalone Module) 1.3 S2 Configuration (Standalone Module) 1.3.1 Basic Configuration The standalone module is configured only with the basic unit or with the basic unit plus expansion unit(s) depending on the parallel I/O module (hereinafter called the I/O module or G2 I/O module) of model 2000.

[Page 40](#) Chapter 1 System Configuration 1.3.2 System Configuration S2 is designed to be used in various ways through a combination of network modules mounted as I/O modules. Connection using Ethernet and TC-net, etc. is not available. other Operator model model control interface 3000 2000...

[Page 41](#) 1.3 S2 Configuration (Standalone Module) • General configuration • Standalone module • G2 I/O module Base Controller module Digital I/O module Main/expansion base BU668 Sequence controller S2PU22A 12-24V DC input DI633 BU666 S2PU32A DI632D BU664 CD633 (Status change detection) 24V DC input DI634 Power supply module DI635...

[Page 42](#) Chapter 1 System Configuration 1.3.3 Unit Configuration Examples of the minimum and maximum configurations are shown below. The main/expansion base can be used as the basic or expansion unit for the standalone module. Select an appropriate base from the bases listed in the table below according to the required number of slots.

[Page 43](#) 1.3 S2 Configuration (Standalone Module) (1) Minimum Configuration • Examples of BU668 • Examples of BU666 S0 S1 S2 S3 S4 S5 S6 S7 S8 S0 S1 S2 S3 S4 S5 1 2 3 1 2 3 • Examples of BU664 S0 S1 S2 S3 1 2 3 Caution...

[Page 44](#) Chapter 1 System Configuration (2) Maximum Configuration Number of I/O points

(using 64-point I/O module) S0 S1 S2 S3 S4 S5 S6 S7 S8 Basic unit 512 points/BU648E S0 S1 S2 S3 S4 S5 S6 S7 S8 Expansion unit 1,024 points/BU668 S0 S1 S2 S3 S4 S5 S6 S7 S8 Expansion unit 1,536 points/BU668...

[Page 45](#) 1.4 S2 CPU Module 1.4 S2 CPU Module 1.4.1 Overview The S2 CPU module is a sequence controller that performs data input and output with the parallel I/O module of model 2000 while executing IEC61131 compliant programs at a high speed. Two types of CPU modules are provided;...

[Page 46](#) Chapter 1 System Configuration 1.4.2 Status display LEDs The operation status of the S2 CPU module is indicated by these LEDs. Table 1-15 Status display LEDs Name Display States Remark RUN (Green) Operating state (RUN Mode) Blink HOLD Mode Stopped state (HALT Mode) or Error Mode FLT (Red) CPU abnormal or I/O abnormal Normal...

[Page 47](#) 1.4 S2 CPU Module 1.4.3 Operation Mode Switch The toggle switch located on the front panel of the S2 CPU module can be used for starting and stopping the system. HALT Stop user program execution (HALT mode) Start user program execution (RUN mode) Table 1-16 S2 operation mode Operation Manual change of...

[Page 48](#) Chapter 1 System Configuration 1.4.4 Setting Switches of Operation Mode The DIP switch located inside the battery cover of the S2 CPU module can be used for various S2 settings (only DSW-1 is set to ON at the factory). ROM/RAM Switch : The setting is read when power is turned on or RUN is selected.

[Page 49](#) 1.4 S2 CPU Module 1.4.5 Tool port of RS232C This port connects a cable for the engineering tool. The connector at the CPU module is a 9-pin D-SUB male connector. Communication function specifications Table 1-19 RS232C communication function specifications Item Specifications Interface Conforms to RS232C...

[Page 50](#) Chapter 1 System Configuration 1.4.6 RS485 LINK Port The following communication function is supported with the LINK port: Computer link function Data is transferred between a host computer (including the console) and S2 in a special protocol through the computer link function. Up to 32 units of S2/S3 can be connected to the host computer.

[Page 51](#) 1.4 S2 CPU Module Communication function specifications Use the engineering tool for setting. Table 1-20 Communication function specifications for computer link Item Specifications Interface Conforms to RS-485 (4-wire system) Transmission mode Half-duplex Synchronizing Asynchronous Transmission speed 300, 600, 1200, 2400, 4800, 9600, 19200 bps Flame format Start bit 1 bit (fixed)

[Page 52](#) Chapter 1 System Configuration 1.4.7 Computer link operation In the computer link, S2 always waits for a request from the host computer. When the host computer sends a command, each S2 checks that the station number contained in the command coincides with the station number of its own. The S2 having the coincided station number processes the request and sends a response back to the host computer.

[Page 53](#) 1.4 S2 CPU Module Computer link protocol S2 communicates with the host computer via the computer link using the message format and commands shown below. For the transmission format, see "model 2000 Sequence Controller S2 User's Manual - Functions (6F8C0837)". Message format Max.255bytes DATA...

[Page 54](#) Chapter 1 System Configuration List of computer link commands The commands listed in the table below can be used in the computer link function. Table 1-22 Computer link commands list Request Response Function name Description Remarks command command – Computer Link Error Format error was detected in the Response Response...

[Page 55](#) 1.5 Units 1.5 Units The basic unit of model 2000 is composed of a power supply module, CPU, and I/O modules. The I/O module can be expanded with the expansion base as required. When expansion bases are added, an expansion interface is mounted on each expansion base, and modules are connected with expansion cables.

[Page 56](#) Chapter 1 System Configuration BU668 BU666 BU664 Caution Mount the space module (SP600) on the vacant slot to prevent debris from entering in the unit. Mount the unit cover (SP601) on the leftmost slot when the expansion interface is not used. model 2000

[Page 57](#) 1.5 Units 1.5.2 Expansion interface Expansion interface IF661 is used for the expansion of the base or in duplex configuration. Remove the unit cover and mounted the expansion interface at the most left side of the unit. (1) Setting the unit address Under the front expansion interface cover, two connectors are provided at the upper and lower locations for connecting the expansion cables, and a rotary switch in between for setting the unit address.

[Page 58](#) Chapter 1 System Configuration (2) Expansion cable The basic and expansion units are connected with the expansion cable. The upper and lower connectors on expansion interface IF661 are for input from the upper layer unit and output to the lower layer unit, respectively. Four types of cables are provided as shown in the table below.

[Page 59](#) 1.5 Units 1.5.3 Duplexing interface Duplexed model 2000 requires: (1) Interface module for duplexing (2) Expansion duplexing interface (3) Tracking cable for duplexing (4) Expansion cable See 1.2 S2 Configuration (Station Module: Duplex Configuration). (1) Interface module for duplexing Interface module for duplexing (IF619) is used for transferring tracking data between the primary and secondary basic units in a duplex configuration.

[Page 60](#) Chapter 1 System Configuration • Online/standby display Indicates whether the unit is online or standby. Table 1-27 LED Status for Online/Standby Online/standby status Duplexing interface (IF619) Online Online (Normal) ONL: ON STDY: OFF Equalizing ONL: Blinking STDY: ON Standby Standby (Normal) ONL: OFF STDY: ON Equalizing...

[Page 61](#) 1.5 Units (2) Expansion duplexing interface The expansion duplexing interface (IF658) is mounted on the first layer expansion unit, and connects the expansion units in the second and subsequent layers to the primary and secondary basic units in duplex configuration. Mount IF658 on the slot having I/O module address "0"...

[Page 62](#) Chapter 1 System Configuration (3) Tracking cable for duplexing There are type types of tracking cables for the duplexing interface: TS: Tracking status cable (model: CX7**) TD: Tracking data cable (model: CY7**) Connect these cables to the special connectors in IF619 mounted on the primary and secondary basic units.

[Page 63](#) 1.6 Power Supply Module 1.6 Power Supply Module The power supply module is mounted on a slot second from the left (right side of the expansion interface/unit cover) in all bases. Select an appropriate power supply module according to the configuration. In selecting the unit and module configurations, the capacity of the power supply module and the current consumption of the modules mounted on the unit should be taken into account.

[Page 64](#) Chapter 1 System Configuration Caution Operate the model 2000 and the related modules which closing the terminal covers. Keep hands away from terminals while power on, to avoid the risk of electrical shock. This power supply module is dedicated power supply for the model 2000. Do not use it by itself for other purposes.

[Page 65](#) 1.6 Power Supply Module 1.6.2 Operation Signal Output (RUN Contact) of Power Supply Module In model 2000, the operation signal output (RUN contact) of the power supply module operates as described below. Use the RUN contact by fully referring to this operation in configuring your system.

[Page 66](#) Chapter 1 System Configuration 1.6.3 Power Capacity The total current consumption should be within the maximum output rating. As for output power, satisfy the expression shown below by referring to the current consumption of modules in Table 1-36. Maximum power consumption $\geq 5\text{Vdc} \times \text{Total 5V current} + 3.3\text{Vdc} \times \dots$

[Page 67](#) 1.6 Power Supply Module Table 1-36 Current consumption / Weight Table Internal current External current Weight consumption (Max.) Name Type consumption (Approx.) (Max.)
5Vdc 3.3Vdc Ethernet 10BASE5 EN611 1100mA 200mA DC12V-500mA 350g □ 10BASE2 EN631 1500mA 200mA 350g □ □ 100BASE-TX, EN651A 1000mA...

[Page 68](#) Chapter 1 System Configuration Table 1-36 Current consumption / Weight Table Internal current External current Weight consumption (Max.) Name Type consumption (Approx.) (Max.)
5Vdc 3.3Vdc □ □ 8ch analog input AD638S 600mA 350g (12bit, independent points) (-10 - +10V) □ 8ch analog input (±100mV) TC618 300mA...

[Page 69](#) 1.7 I/O Modules 1.7 I/O Modules Various types of I/O modules are provided for model 2000 as shown in the table below for a wide variety of applications. I/O modules can be mounted on any slots of the base in any order (see 4.7 for recommended arrangements).

[Page 70](#) Chapter 1 System Configuration Table 1-37 I/O module list Type Description
Specification AD624L Analog input 4-channel (not isolated between channels), (8bit)
1-5V/4-20mA, 8bit resolution AD634L 4-channel (not isolated between channels), 0-10V, 8bit
resolution AD624 Analog input 4-channel (not isolated between channels), (12bit) 1-5V/4-20mA,
12bit resolution AD674...

[Page 71](#) 1.8 Network modules 1.8 Network modules A data link system available for inter-PC
transmission, remote I/O transmission and other applications can be built by combining six
network modules provided for S2. • TOSLINE-F10 Assigned to inter-PC and remote I/O
communications as a lower field transmission device of model 2000.

[Page 72](#) Chapter 1 System Configuration • DeviceNet Assigned to inter-PC and remote I/O
communications as a lower field transmission device of model 2000. Performs inter-controller
and remote I/O communication as a lower field transmission device. Table 1-40 DN611A
specification Type DN611A Module type G2 I/O module Transmission cable...

[Page 73](#) 1.8 Network modules • I/O module Table 1-42 FL611/FL612 specifications Type
FL611/FL612 Module type G2 I/O module Transmission medium 10BASE5 10BASE-T Topology
Transmission speed 10Mbps Max transmission distance 2.5km/system 500m/system
500m/segment 100m/segment No. of stations 254 stations/system Transmission capacity
8192words + 8192 bit Response speed 50ms or less/32-station at 2,048 words Communication
Function...

[Page 74](#) Chapter 1 System Configuration • Ethernet A monitoring and control network
connecting controllers. A multi-vendor system can be built using this network. Up to four
modules including station and network modules for model 2000 can be mounted on any station
module slots. Table 1-44 EN611/EN631/EN651A specifications Type EN611...

[Page 75](#) Chapter 2 General Specifications 2.1 General Specifications Table 2-1 model 2000
general Specifications Item Specification Environmental Ambient operating 0 to 55 conditions
temperature Storage temperature -25 to 70 Relative humidity 10 to 95%RH, no condensation
Dust density 10mg/m or less, no conductive dusts Corrosion immunity No corrosive gas is
present.

[Page 76](#) Chapter 2 General Specifications Power Supply Specifications Table 2-2 Power supply
module specifications Specification Item PS691 PS693 PS694 PS632 PS652 Basic Nominal
Voltage 100-120Vac 100-240Vac 24Vdc 100-110Vdc Function 200-240Vac Max power 160VA
(60W) 120VA (50W) 150VA (60W) 50W or less consumption or less or less...

[Page 77](#) 2.1 General Specifications Functional Specifications Table 2-3 shows the S2
functional specifications. Table 2-3 S2CPU functional Specifications Item PU82 PU72D PU72A
PU32A PU22A Module type Station (controller) Standalone Control method Stored program,
cyclic scan Single Duplex Processor Administrator's processor General-purpose processor
Sequence processor Exclusive LSI Execution...

[Page 78](#) Chapter 2 General Specifications Table 2-3 S2CPU functional Specifications Item
PU82 PU72D PU72A PU32A PU22A 0.04 μ s 0.08 μ s Execution Contact speed 0.08 μ s 0.16 μ s
Coil 0.04 μ s 0.08 μ s Integer Transfer 0.04 μ s 0.08 μ s...

[Page 79](#) 2.2 External dimensions 2.2 External dimensions BU648E, BU668 BU666 309.5
BU643D, BU664 238.5 6F8C0836...

[Page 80](#) Chapter 2 General Specifications Dimension of connector type I/O module Dimension
of terminal block type I/O module Connector for external wiring Cable model 2000 Sequence
Controller S2 User's Manual -Basic Hardware-...

[Page 81](#) 2.3 I/O Module Specification 2.3 I/O Module Specification DI633 Item DI633 No. of
input point 16 points Input Voltage Range 12-24V +10% dc/ac(50/60Hz) -15% Input current
(typ.) Approx. 8mA (at 24Vdc) Minimum ON Voltage 9.6V or more Maximum OFF Voltage 3.6V or

less Delay time ON Delay (OFF to ON)

[Page 82](#) Chapter 2 General Specifications DI632D Item DI632D No. of input point 8 points Input Voltage Range 12-24V +10% dc/ac(50/60Hz) -15% Input current (typ.) Approx. 8mA (at 24Vdc) Minimum ON Voltage 9.6V or more Maximum OFF Voltage 4.3V or less Delay time ON Delay (OFF to ON) 10ms or less (dc)/ 20ms or less (ac) OFF Delay (ON to OFF)

[Page 83](#) 2.3 I/O Module Specification DI653 Item DI653 No. of input point 16 points Input Voltage Range 100-110Vdc +10% -15% Input current (typ.) Approx. 2.3mA (at 100Vdc) Minimum ON Voltage Maximum OFF Voltage Delay time ON Delay (OFF to ON) 10ms or less OFF Delay (ON to OFF) 10ms or less External connections...

[Page 84](#) Chapter 2 General Specifications DI634&635&635H Item DI633 DI635 DI635H No. of input point 32 points 64 points Input Voltage Range 24Vdc Input current (typ.) Approx. 4mA (at 24Vdc) Minimum ON Voltage 16V or more Maximum OFF Voltage 5V or less Delay time ON Delay (OFF to ON) 10ms or less...

[Page 85](#) 2.3 I/O Module Specification Connector Connections (A)(B) (B)(A) 20 20 19 19 18 18 17 17 16 16 15 15 14 14 13 13 12 12 11 11 10 10 10 10 11 11 12 12 13 13 14 14 15 15 16 16 17 17...

[Page 86](#) Chapter 2 General Specifications IN653&IN663 Item IN653 IN663 No. of input point 16 points 16 points Input Voltage Range 100-120Vac +10% 200-240Vac +10% (Sine wave) (50/60Hz) -15% (50/60Hz) -15% Input current (typ.) Approx. 7mA Approx. 6mA (at 100Vac-50Hz) (at 200Vac-50Hz) Minimum ON Voltage 80Vac or more 160Vac or more...

[Page 87](#) 2.3 I/O Module Specification 6F8C0836...

[Page 88](#) Chapter 2 General Specifications RO663 Item RO663 No. of input point 16 points Load Voltage 24Vdc, +20%(Max.) /240Vac, +10%(Max.) Maximum Load 2A/point (resistive load), 1A/point (inductive load), 8A/8 points common Minimum Load 50mW (5Vdc or more) Delay time ON Delay 10ms or less OFF Delay 15ms or less...

[Page 89](#) 2.3 I/O Module Specification Supplementary 1. See the life curves in the description of RO662S for the life of relay in open and close operation. 2. 2. Overload protection fuses are not contained in this module. Mount fuses suitable for the current capacity on each common and between the common power supplies.

[Page 90](#) Chapter 2 General Specifications RO662S Item RO662S No. of input point 8 points (each point isolated) Load Voltage 110Vdc, +10%(Max.) /240Vac, +10%(Max.) Maximum Load 2A/point (resistive load) and 1A/point (inductive load) at 240Vac/24Vdc 0.5A/point (resistive load) and 0.1A/point (inductive load) at 110Vdc Minimum Load 50mW (5Vdc or more) Delay time...

[Page 91](#) 2.3 I/O Module Specification Caution RO662S output specifications Output specification (load power supply voltage) depends on the color of letters for "RELAY OUT" written on the front panel of RO662S. Follow the table below. RO662S Association between output and rated voltage Output specification RELAY OUT color...

[Page 92](#) Chapter 2 General Specifications DO633 Item DO633 No. of input point 16 points Load Voltage 5-24Vdc +10% Maximum Load 1A/point (external power supply : 7Vdc or more) 0.3A/point (external power supply : 7Vdc or less) 1.2A/4points (4-element transistor array) 1.5 A or less Output ON resistance Delay time ON Delay...

[Page 93](#) 2.3 I/O Module Specification 6F8C0836...

[Page 94](#) Chapter 2 General Specifications DO634&DO635 Item DO634 DO635 No. of input point 32points 64points Load Voltage 5-24Vdc +10% Maximum Load 0.1A/point (DC9.6 - 26.4Vdc) 0.05A/point (DC4.5 - 9.5Vdc) 0.8A/common Saturation voltage when ON 0.4V or less Leakage current when OFF 0.1mA or less (at 24Vdc) Delay time ON Delay...

[Page 95](#) 2.3 I/O Module Specification Connector Connections (A)(B) (B)(A) P24H1 P24L1 20 20 19 19 18 18 17 17 16 16 15 15 14 14 13 13 12 12 P24L0 P24H0 11 11 10 10 P24H0 P24L0 10

10 11 11 12 12 13 13 14 14...

[Page 96](#) Chapter 2 General Specifications DO633P Item DO633P No. of input point 16 points Load Voltage 12-24Vdc +10% Maximum Load 1A/point 1.2A/4points (4-element transistor array) 1.5 Ω or less Output ON resistance Delay time ON Delay 1ms or less OFF Delay 1ms or less Leakage current when OFF 0.1mA or less...

[Page 97](#) 2.3 I/O Module Specification AC663 Item AC663 No. of input point 12 points Load Voltage 100- +10% (50/60Hz sine wave) 240Vac -15% Maximum Load 0.5A/point 0.6A/2points (2-element SSR) Saturation voltage when ON 1.5V or less (at 0.3A load) Leakage current when OFF 1.2mA or less (at 100Vac), 3mA or less (at 240Vac) External connections 18-point terminal block...

[Page 98](#) Chapter 2 General Specifications CD633 Item CD633 Category DC input with interrupt generation Input type Current sinking/sourcing Number of input points 16 points, 1-word input[not update in the batch I/O processing] Rated input voltage 12 to 24 Vdc Range input voltage 10.2 to 26.4 Vdc Rated input current 7mA (at 24 Vdc)

[Page 99](#) 2.3 I/O Module Specification Terminal Connections : DC power supply : Input switch (solid-state device only) Data format (1) Basic registers Change detection status and Input data Description %IWn Rising edge detection status XWn+1 %IWn+1 Falling edge detection status XWn+2 %IWn+2 Input data XWn+3...

[Page 100](#) Chapter 2 General Specifications (2) Mode selection registers These registers are accessed by the special module data write instruction (WRITE instruction in S2T, MWRITE instruction in S2) Address Description Rising edge detection select register Falling edge detection select register Change detection enable register [Rising edge detection select register bit assignment] UE: When '1', the interrupt is generated at the time of corresponding input is changed OFF...

[Page 101](#) 2.3 I/O Module Specification 6F8C0836...

[Page 102](#) Chapter 2 General Specifications AD624L&AD634L Item AD624L AD634L No. of input channel 4 channels (N side common) 4 channels (N side common) Input Range 1 - 5Vdc or 4 - 20mA*1 0 - +10Vdc 500k Ω or more (1-5V) 500k Ω or more Input Impedance 250 Ω ...

[Page 103](#) 2.3 I/O Module Specification A/D Conversion Digital Value Digital Value 10(V) 20(mA) Analog value Analog value (a)4-20mA range :D=15.625 \times A-62.5 (b)1-5V range :D=62.5 \times A-62.5 D: Digital value (c)0-10V range :D=25 \times A A: Analog value Data Format F E D C B A 9 8 7 6 5 4 3 2 1 0 * D D D D D D D D D: Data bit (8bits) 0-250 (H00 - HFA)

[Page 104](#) Chapter 2 General Specifications AD624&AD674 Item AD624 AD674 No. of input channel 4 channels (N side common) 4 channels (N side common) Input Range 1 - 5Vdc or 4 - 20mA*1 -10Vdc - +10Vdc 1M Ω or more (1-5V) 1M Ω or more Input Impedance 250 Ω ...

[Page 105](#) 2.3 I/O Module Specification A/D Conversion Digital Value Digital Value 4000 4000 3000 3000 2000 2000 1000 1000 20(mA) 10(V) -1000 Analog Value Analog Value -2000 (a) 4-20mA range : D=250 \times A-1000 (b) 1-5V range : D=1000 \times A-1000 D = Digital value (c) \pm ...

[Page 106](#) Chapter 2 General Specifications AD668 Item Specification Module type AD668 No. of input channel 8channels (N side common) Input type Voltage input Current input Input range Bipolar -5 to +5V -10 to +10V Unipolar 0 to +5V 0 to 20mA 0 to +10V 1 to +5V 4 to 20mA...

[Page 107](#) 2.3 I/O Module Specification A/D Conversion (a) Bipolar mode \pm 10V (b) Bipolar mode \pm 5V \square \square Digital Value Digital Value +10V H7D00 32000 Upper limit H3FFF H3FFF H3E80 16383 16383 16000 Analog Value Analog Value -10.24V -5.12V +5.1196V +10.2396V -10.24V -5.12V +5.1196V +10.2396V...

[Page 108](#) Chapter 2 General Specifications AD628S&AD638S Item AD628S AD638S No. of input channel 8 channels Input Range 0-5V or 0-20mA (*1) \pm 10V 500K Ω or more (0-5V) 100K Ω or More Input Impedance 250 Ω (0-20m) A/D Conversion Data 0-4000 -2000-+2000 min.0 max.4095 min.-2048 max.2047 Allowance Input Voltage/Amp...

[Page 109](#) 2.3 I/O Module Specification Data Format (Input 8 words) (1) AD628S D11 D10 D9

Analog value Digital value Hexadecimal 0-5V 0-20mA Integer value Upper limit 5.11875V
20.475mA 0FFFH 4095 Full scale 5.000V 20.000mA 0FA0H 4000 Zero (lower limit) 0000H
Resolution 1.25mV/bit 5μA /bit (2) AD638S...

[Page 110](#) Chapter 2 General Specifications TC618 Item Specification Module type TC618 No.
of input channel 8 channels 7 channels 7 channels 7 channels Input type Voltage input Input
range mV input K thermo-couple J thermo-couple E thermo-couple -100 to +100mV -200 to
+1200 °C -200 to +800 °C -200 to +600 °C...

[Page 111](#) 2.3 I/O Module Specification A/D Conversion (a) ±100mV (b) K thermo-couple
Digital Value Digital Value On burn out +100mV +1200 H7D00 Upper limit 32000 H6B08 24000
H3FFF H3FFF 16383 16383 Analog Value Input temperature HF060 -10.24mV -5.12mV
+50.1196mV +10.2396mV -4000 Lower limit HC000 HC000...

[Page 112](#) Chapter 2 General Specifications RT614 Item Specification Remarks No. of input
channel 4 channels Input type Resistance Temperature Detector input Input specification Pt100
Comforms to JIS C 1604 Wire connection 3-wire system -50 °C to +270 °C Input temperature
range Linear calibration range Digital conversion 800 to 4000 counts...

[Page 113](#) 2.3 I/O Module Specification A/D Conversion 4095 4000 3200 2400 Effective data
range Linear calibration effective range 1600 -130 A=Resistance °C □ Temperature D=10
A+1300 □ - 50 ≤ A +270 □ Data format (Input 4 words) □ □ □ D15 D14 D13 D12 D11 Analog
input value, channel 1 Analog input value, channel 2 XWn+1...

[Page 114](#) Chapter 2 General Specifications DA622L Item DA622L No. of output channel 2
channels (N side common) Output Range 1-5V, 4-20mA (paired output) 5V full-scale terminal :
5K Ω or more Load Impedance 20mA full-scale terminal : 600 Ω or more Resolution 1-5V,
4-20mA: 0-250 Overall Accuracy...

[Page 115](#) 2.3 I/O Module Specification D/A Conversion Analog Value (mA) Analog Value (V)
50 100 150 200 250 50 100 150 200 250 Digital Value Digital Value (a) 4-20mA range :
A=0.064×D+4 A = Analog Value (b) 1-5V range : A=0.016×D+1 D = Digital Value (c) 0-10V
range : A=0.04×D Data Format...

[Page 116](#) Chapter 2 General Specifications DA622&DA672 Item DA622 DA672 No. of output
channel 2 channels (N side common) 2 channels (N side common) Output Range 1-5V, 4-20mA
(paired output) -10 - +10V 1-5V:5K Ω or more 5K Ω or more Load Impedance 4-20mA:600 Ω...

[Page 117](#) 2.3 I/O Module Specification D/A Conversion Analog Value (mA) Analog Value (V)
-2000 2000 4000 2000 4000 Digital Value Digital Value (a) 4-20mA range : A=0.004×D+4 A =
Analog Value (b) 1-5V range : A=0.001×D+1 (c) ±10V range : A=0.005×D D = Digital Value
Data Format (Output occupies 2 words) •...

[Page 118](#) Chapter 2 General Specifications DA664 Item Specification Module type DA664 No.
of input channel 4 channels Output type Voltage output Current output Output range Bipolar -5
to +5V -10 to +10V Unipolar 0 to +10V 0 to 20mA 0 to +10V 1 to +5V 4 to 20mA 1k Ω...

[Page 119](#) 2.3 I/O Module Specification D/A Conversion (a) Bipolar mode (b) Bipolar
mode(±5V) H7D00 Analog Value Analog Value H3E80 32000 16000 +10.2396V +10.2396V
+10V Upper limit +5.1196V +5.1196V Digital Value Digital Value H8000 HC000 H8000 HC000
H3FFF H7FFF H3FFF H7FFF -32768 -16384 -32768 -16384...

[Page 120](#) Chapter 2 General Specifications DA624S Item Specification Output type Current
output Output specification 0-20mA (max. 20.48mA) 0-550 Ω Output load resistance No. of
input channel 4 channels (independent, channels are isolated) Resolution 16 bits ±0.2%/FS (25
°C) Overall accuracy ±0.5%/FS (0 to 55 °C)...

[Page 121](#) 2.3 I/O Module Specification Terminal Connections P: Analog signal (+) N: Analog
signal (-) G: Shield connection terminal LG: 24VDC input filter ground terminal FG: Shield
processing ground terminal (Common to 1G, 2G, 3G and 4G) □ 24Vdc D/A Conversion Analog
output current Upper limit +20.48mA...

[Page 122](#) Chapter 2 General Specifications CF611 Item CF611 Function Communicate with
the devices via serial interface Common memory 160 words × 2 Transmission mode Full-duplex

Synchronization Asynchronous (Start-stop method) Transmission Speed 300, 600, 1200, 2400, 4800, 9600, 19200bps Transmission code ASCII Interface Conforms to RS232C 1 channel Frame Format...

[Page 123](#) 2.3 I/O Module Specification 6F8C0836...

[Page 124](#) Chapter 2 General Specifications PI632&PI672 Item PI632 PI672 No. of pulse input channel 2 channels 2 channels I/O allocation type iX+Y 4W area and 19W memory Input Voltage Range (A,B,M) 5V±5% /12V±5% /24V±5% Conforms to EIA RS-422-A (selectable) Input Voltage Range (G,EXT) 12V±5% /24V±5% Input Input Voltage...

[Page 125](#) 2.3 I/O Module Specification Circuit Configuration PI632 • • • AP/BP/MP/GP phase A, B A5/B5/M5/G5 • • • • A12/B12/M12/G12 1.6k DIP Switch W1 - W8 • • + EXT • • • • - EXT P24 (24Vdc) Hardware 1S1, 1S2, Comparison 2S1, 2S2...

[Page 126](#) Chapter 2 General Specifications • PI672 • • A+/B+/M+ phaseA,B,M • • A-/B-/M- • • • phase G • • • • • + EXT • • • • - EXT P24(24Vdc) Hardware 1S1,1S2 Comparison 2S1,2S2 Output N24(0V) Supplementary 1.

[Page 127](#) 2.3 I/O Module Specification 6F8C0836...

[Page 128](#) Chapter 2 General Specifications MC612 Item MC612 Number of control axis 2axes (2 independent axis or 2 axes linear interpolation) Input command unit pulse, inch, mm, etc Command value range -9,999,999 to +9,999,999 Command data capacity 30points / each axis Maximum speed 200kpps Acceleration / deceleration method...

[Page 129](#) 2.3 I/O Module Specification NC : Not used pin. Do not wiring any external wire. : The pins of Y-axis are not used pin. The X/Y-axis arrangement of connector pins are same without A1 or B1. Supplementary Module side connector : FCN-361P040-AU-2 (MAKER : FUJITSU) Cable side connector : soldering type (standard attached)

[Page 130](#) Chapter 2 General Specifications MC614 Item MC614 No. of control axes 4 axes (X, Y, Z, U), independent/interpolation operation Position control range -134,217,727 to +134,217,726 pulses Command value range -134,217,727 to +134,217,726 pulses/count Interpolation 2-axis linear interpolation, 2-axis arc interpolation Combination of interpolation axes: X + Y and Z + U Max.

[Page 131](#) 2.3 I/O Module Specification Item MC614 Pulse output Mode CW/CCW (positive/negative direction pulse) PLS/DIR (pulse/direction) Output Differential output (equivalent to RS422) - Max. specification 30mA ON/OFF delay 200ns or less Other output Signal name Deviation counter clear pulse output Servo ON output Output method Open collector 5 - 24Vdc - max.50mA...

[Page 132](#) Chapter 2 General Specifications Connector Pin Arrangement External I/O signal connector (CN1) pin arrangement Signal Signal Description Description name name ORGy Y axis Zero LS ORGx X axis Zero LS EL+y Y axis CW overtravel LS EL+x X axis CW overtravel LS EL-y Y axis CCW overtravel LS EL-x...

[Page 133](#) 2.3 I/O Module Specification Supplementary 1. Cable connector is not supplied with MC614. Customers are asked to provide the connector. Connector number Connector name External I/O signal connector Driver I/F signal connector No. of connector pins 30 pins 50 pins Module connector HIF3BA-30PA-2.54DS HIF3BA-50PA-2.54DS...

[Page 134](#) Chapter 2 General Specifications Input Circuits 1) Pulse input (phase Z) Connect the input pin to EXGND if it is not used. CN2-8, 20, 32, 44 CN2-7, 19, 31, 43 CN2-9, 21, 33, 45 EXGND 2) Manual pulser input (phases A, B) Connect the input pin to EXGND if it is not used.

[Page 135](#) 2.3 I/O Module Specification Output circuits 1) Pulse output circuits (CW/PLS, CCW/DIR) PLS+, DIR+ CN2-2, 4, 14, 16, 26, 28, 38, 40 PLS-, DIR CN2-1, 3, 13, 15, 25, 27, 37, 39 EXGND CN2-5, 17, 29, 41 2) Deviation counter clear output, servo ON output circuits ERC, SVON CN2-6, 10, 18, 22, 30, 34, 42, 46...

[Page 136](#) Chapter 2 General Specifications UN611&UN612 Item Specification Model UN611 (TOSLINE-F10 Master Station) UN612 (TOSLINE-F10 Remote Station) Transmission mode High-

speed setting Long-distance setting Transmission cable Shielded twisted-pair cable Topology
Transmission standard EIA Standard RS-485 Transmission speed 750kbps 250kbps 1.2mm Φ
1.2mm Φ Transmission Cable 0.75mm...

[Page 137](#) 2.3 I/O Module Specification SN621/622 TOSLINE-S20 Item SN621 SN622 Topology
No. of stations Max. 64 stations Optical fiber cable GI50/125 μ m Transmission cable Coaxial
cable 5C2V Silica glass Transmission cable Across system: Max. 1km Across system: Max. 10km
length Between stations: Max.

[Page 138](#) Chapter 2 General Specifications DN611A Item DN611A Topology No. of stations 64
stations/network (one master and 63 slaves) Transmission cable DeviceNet THICK cable
DeviceNet THIN cable Transmission cable length 125kbps 250kbps 500kbps 500m 250m 100m
Transmission speed 125/250/500kbps Access method CSMA/NBA method Communication
service Polling command/response (synchronous/asynchronous)

[Page 139](#) 2.3 I/O Module Specification FL611/FL612 Item FL611/FL612 Transmission medium
10BASE5 10BASE-T Topology No. of stations 254 stations/system Transmission cable AUI cable
for Ethernet UTP cable for Ethernet Transmission cable 2.5km/system 500m/system length
500m/segment 100m/segment Transmission speed 10Mbps Access method FA link protocol
Communication service Cyclic transmission/message transmission Transmission capacity 8192
word + 8192 bits...

[Page 141](#) Chapter 3 Precautions for I/O Modules 3.1 Precautions for DC Input Modules (1)
Read conditions for the ON/OFF changes of the input signals are : Input ON time \geq ON delay
time (OFF \rightarrow ON)+Input reading cycle Input OFF time \geq OFF delay time (ON \rightarrow OFF)+Input
reading time The "input reading cycle"...

[Page 142](#) Chapter 3 Precautions for I/O Modules (3) The examples of connection with
transistor output devices such as proximity switches are shown as follows. • NPN open collector
type (+common) • PNP open collector type (-common) (4) If a switch with an LED display is
used, the current (leakage current) through the LED may cause the erroneous input (always
ON).

[Page 143](#) 3.1 Precautions for DC Input Modules Also, when the bleeder resistor is selected in
the above manner, the contact current at the switch ON state should be checked. Ω 3.0[k \times
Contact current 24[V] [mA] Ω \times 3.0[k (5) If the two-wire proximity switch and other solid-state
switches are used, be sure that there is no possibility of mis-inputting because of the leakage
current, as in procedure (4).

[Page 144](#) Chapter 3 Precautions for I/O Modules (8) If dynamic scan input is configured using
a DC input module and a DC output module, in addition to the response-delay of output and
input, consider the difference of timing caused by the S2 scan. Moreover, diodes must be
installed to prevent erroneous input caused by detour circuit.

[Page 145](#) 3.2 Precautions for AC Input Modules 3.2 Precautions for AC Input Modules (1) The
conditions to read the ON/OFF state of the input signals are as follows. Input ON time \geq ON
delay time (OFF \rightarrow ON)+Input reading cycle Input OFF time \geq OFF delay time (ON \rightarrow
OFFN)+Input reading time The "input reading cycle"...

[Page 146](#) Chapter 3 Precautions for I/O Modules (3) If external lines for AC input become
longer with using a multi-core cable, induced current may flow to a open wire from charges
wires due to the electrostatic capacity of the cable, causing an erroneous ON input. In this case,
install a bleeder resistor between the input terminals to lower the input impedance.

[Page 147](#) 3.2 Precautions for AC Input Modules (6) Use the specified voltage and sine waves
of the specified frequency for input of the AC input module. If the fundamental wave of the AC
input voltage contains distorted waveforms or frequency hunting, input may be erroneous (e.g.,
ON is read as OFF). Major causes of erroneous inputs: •...

[Page 148](#) Chapter 3 Precautions for I/O Modules 3.3 Precautions for DC Output Modules (1)
The DC output module needs an external power supply to drive output transistors. For each
common, connect the load power to the appropriate terminal.(For details, see 2.3 I/O Module
Specification) If the wrong polarity of the power supply to the terminal is connected, the module
will be damaged.

[Page 149](#) 3.3 Precautions for DC Output Modules (4) Pay attention to the following cases caused by the diode mentioned in (3). <Case 1> When connecting to the external equipment in which DC power supply is provided from internal, if the voltage of P1 is higher than one of P2 or if P2 turns to OFF when P1 is ON, the external equipment may turn to ON in spite of the output status.

[Page 150](#) Chapter 3 Precautions for I/O Modules (5) If a capacitive load is connected, rush current will flow when output is charged to At that time, necessary measures must be taken to protect the output transistor from being destroyed by the rush current. To limit the rush current there are two effective measures.

[Page 151](#) 3.4 Precautions for AC Output Modules 3.4 Precautions for AC Output Modules (1) Over-Current Protection Coordination One 2A fuse per 4 output points is mounted in the triac output module. Although, taking account of protecting elements by the fuse blowing even in load short circuits, when the fuse blows the semiconductors are subjected to considerable damage.

[Page 152](#) Chapter 3 Precautions for I/O Modules 3.5 Precautions for Relay Output Modules (1) The relay output module (RO663, RO662S) needs external 24Vdc power for driving relays. (For details, see 2.3 I/O Module Specification.) (2) Because the relay output module does not have a built-in fuse to protect from overcurrent, install a fuse appropriate to the load current on the external wire.

[Page 153](#) 3.6 Precautions for Analog Input Modules 3.6 Precautions for Analog Input Modules (1) Use a shielded twisted-pair cable for the analog input signal line, and wire over the minimum distance. Wire the grounding of the cable shield on the analog input side (the model 2000 side).

[Page 154](#) Chapter 3 Precautions for I/O Modules 3.7 Precautions for Analog Output Modules (1) Use a shielded twisted-pair cable for the analog output signal line, and wire over the minimum distance. Wire the grounding of the cable shield on the load side. (a) in the drawing below is the basic.

[Page 155](#) Chapter 4 Installation and Wiring 4.1 Operating environment Do not install the model 2000 in the following locations : (1) Where the ambient temperature drops below 0 ° C (32 ° F) or exceeds 55 ° C (131 ° F) (2) Where the relative humidity drops below 10% or exceeds 95% (3) Where there is condensation due to sudden temperature changes (4) Where there are vibrations that exceed the tolerance of the model 2000...

[Page 156](#) Chapter 4 Installation and Wiring 4.2 Installing bases Installation precautions : (1) Because the model 2000 is not of dust-proof construction, install it in a dust-proof control panel. (2) Do not install the bases directly above equipment which generates a large amount of heat, such as a heater, transformer, or large capacity resistor.

[Page 157](#) 4.2 Installing bases Table 4-1 Base unit installation dimension Type a [mm] b [mm] c [mm] Weight [g] BU648E 402.5 BU668 402.5 BU666 295.5 BU664 224.5 BU643D 224.5 Note1: BU648E/668/666/664 : *1 unnecessary Note2: BU634D : *2 unnecessary Table 4-2 Base unit shape and installation hole Type A [mm] B [mm]...

[Page 158](#) Chapter 4 Installation and Wiring 4.3 Mounting the Modules There are three types of module, 1-slot width module such as the S2 CPU and direct I/ Os, 2-slot width module and narrow width module such as the expansion interface. Basically each module is similar structure and similar handling except some special modules.

[Page 159](#) 4.3 Mounting the Modules (5) Push the module slowly and vertically, supporting the top/bottom by hands until it clicks into the base. (6) Mount the module securely, using the attached module mounting screw of M4 size. (Screws torque: approx. 1.47N•m=15kgf•cm) (7) Remove the cover of modules or open the cover of terminal blocks.

[Page 160](#) Chapter 4 Installation and Wiring Procedure for removing (1) Turn off power of the model 2000 and external power supplied to I/O modules. (2) Remove the cover of modules. (3) Remove the screw at the top of the module (4) Loosen the screw at the top of module.

[Page 161](#) 4.3 Mounting the Modules Supplementary 1. After installing the modules, secure the bases so that it can be mounted vertically, including when in transport. 2. A cover is

mounted on the connector of the base for shipment. Remove this connector cover when mounting modules.

[Page 162](#) Chapter 4 Installation and Wiring 4.3.2 Installing/removing of the module cover Expansion interface (1) Push the mark on the top of module cover. (2) Remove the cover, hanging the bottom as supporting point. Note: Hang the bottom hook of the cover at first and lock the top when installing. Power supply module (1) Push the mark on the bottom of module cover.

[Page 163](#) 4.4 Connecting expansion units 4.4 Connecting expansion units Up to three expansion units can be connected to the model 2000 basic unit. The expansion interface modules are mounted in both the basic unit and the expansion units and connect each other with expansion cables. This procedure is shown as follows.

[Page 164](#) Chapter 4 Installation and Wiring 4.5 Grounding It is advisable, for the grounding of electronic devices to carry out dedicated grounding which is isolated from that of power systems, and to carry out single-point grounding between 2 or more electronic devices. The model 2000 is designed to apply to EMC which takes the actual application into account, and it has a satisfactory noise-immunity without carrying out grounding of the device itself.

[Page 165](#) 4.5 Grounding 4.5.2 Grounding methods (1) Grounding of control panel If the model 2000 panel and power panel are coupled, Power panel model 2000 grounding current from the high-frequency equipment or power panel may flow through the model 2000 panel. Ground current change...

[Page 166](#) Chapter 4 Installation and Wiring (2) Grounding between units Basic unit Expansion unit Expansion unit Ground bar in the panel Dedicated ground • Connect the FG terminal of the power supply module to the unit mounting screw, and to the ground bar in the panel by 2mm or larger wire in shortest possible distance.

[Page 167](#) 4.6 Wiring of the power supply 4.6 Wiring of the power supply (1) Power conditions [Example] Rated voltage :85 to 264Vac, 50/60Hz(PS693) Power consumption :120VA or less (PS693) Retentive power interruption :10ms or less Use a constant voltage transformer if power supply is unstable. (2) Install an electrostatic shielded transformer or a noise filter if the power contains noise.

[Page 168](#) Chapter 4 Installation and Wiring Wiring of the power supply module PS693 (100-240Vac) PS691 (100/200Vac) 24V output □ □ 24 Vdc (Sum of the internal 3.3V/5V output and 24V □ □ output should be under RUN contact 35V. Do not connect the output output to other power RUN contact...

[Page 169](#) 4.6 Wiring of the power supply Caution 1. Turn off power before wiring to minimize the risk of electrical shock. 2. Exposed conductive parts of wire can cause electrical shock. Use crimp-style terminals with insulating sheath or insulating tape to cover the conductive parts. Also close the terminal covers securely on the terminal blocks when wiring has been completed.

[Page 170](#) Chapter 4 Installation and Wiring 4.7 I/O wiring Pay attention to the following points when mounting and wiring the I/O modules. Basic unit Low-power High-power systemI/O systemI/O 70mm or more Expansion unit Low-power High-power 200mm or more systemI/O systemI/O Low-power High-power Power line signal duct...

[Page 171](#) 4.7 I/O wiring (6) Do not blind the I/O signal cables and high-voltage or power cables. Separate them as far as possible. If separation is difficult, use shielded cables for the I/O signals and ground the shield at the leading -in point of the control panel. (7) Pay attention to Chapter 3 Precautions for I/O Modules.

[Page 172](#) Chapter 4 Installation and Wiring 4.8 Wiring of the computer link Cable connection examples show as below. • Below figure shows an example of cable connection using the RS-232C/RS-485 converter (ADP-6237B). • Use shielded twisted-pair cable for data communication suited to RS-485 standard. The cable shield should be connected to single -point ground.

[Page 173](#) 4.8 Wiring of the computer link One to N configuration RS-232C/RS485 (Relaying shielded twisted-pair converter terminal cable block) (ADP-6237B) TERM Termination cable length : max.1km resistors (Total) 1/2W - 220Ω Termination resistors 1/2W - 220Ω • On the CPU,

removable terminal block is provided for cable connection. •...

Page 174 Chapter 4 Installation and Wiring 4.9 Installing Battery A built-in battery is mounted in S2PU72D/72A/32A/22A at the factory, but not in S2PU82. It is supplied as an accessory when the equipment is shipped. Mount the battery just before using S2PU82 according to 5.4.1 Battery replacement procedure. Caution DO NOT operate the equipment without mounting the battery.

Page 175 4.10 Power up/down sequence 4.10 Power up/down sequence For operating S2 safely, configure an external circuit to execute the power up/down sequence described below. (Power up sequence) (2) Turn on the external power for I/O modules (1) Turn on the model 2000's and loads power (1) Turn on power of the model 2000 at first.

Page 176 Chapter 4 Installation and Wiring 4.11 Safety circuit Relay contacts open when power supply stops or power line is broken in the normal relay sequence. This is one of the fundamental characteristics of the relay. Based on this concept, S2 is made failsafe in such a way that all outputs are turned off in the event of emergency stop, power failure, and error shutdown.

Page 177 2. Turn off power immediately if the model 2000 or related equipment is emitting smoke or odor. Operation under such situation can cause fire or electrical shock. Also unauthorized repairing will cause fire or serious accidents. Do not attempt to repair. Contact Toshiba for repairing.

Page 178 Chapter 5 Maintenance and Checking 5.2 Periodical checking items Check the following at regular intervals (every six months), or when operating environments has changed. Table 5-2 Periodical checking items Item Content of checking Criteria Power supply Measure the voltage of the power (at the Within the input specification of terminal of the module) the module...

Page 179 5.3 Maintenance parts 5.3 Maintenance parts To recover from failure quickly, it is recommended to keep the following spare parts: Table 5-3 Maintenance parts Part Quantity Remarks I/O modules One of each For the relay contact output, the contact life must be type used taken into account.

Page 180 Chapter 5 Maintenance and Checking 5.4 Battery Replacement S2 CPU holds program memory, data memory and calendar data using the battery contained in the battery module (GBT611*AS) in RAM operation mode, and holds data memory and calendar data in the same way in ROM operation mode. The lithium battery used in S2 has little self-discharge and is resistant to a wide range of temperatures.

Page 181 5.4 Battery Replacement (4) Insert the battery module in the battery pocket along the guide. (5) Write the installed date on the sheet. (6) Hook the part on the right end of the battery cover on the module and hold the left end to mount the cover.

Page 182 Chapter 5 Maintenance and Checking Approximate battery backup time (S2PU82) Backup time required for S2PU82 user program memory, data memory and calendar memory is shown below. Operating rate - Backup period (year) at 25°C Mean value Guaranteed performance Operating rate Table 5-5 Operating rate of S2PU82 with battery - Backup period (year) Operating rate 0.0%...

Page 183 5.4 Battery Replacement Prohibited DO not connect in reverse, charge, disassemble, heat up, throw in the fire, and short circuit the battery. Doing so will cause the battery to explode or ignite. Caution Replace the battery according to the criteria for battery replacement. Consumed battery may cause data and programs stored on S2 to be erased, resulting in malfunction thereby damages to the equipment and accidents.

Page 184 Chapter 5 Maintenance and Checking 5.5 Fuse Replacement The following modules have built-in protection fuses. Table 5-6 Type of fuse spare Type of module Fuse type No. of fuses Fuse rating DC output(DO633,DO633P) EX10*SFA50 250Vac-5A AC output(AC663) EX10*SFC20 250Vac-2A These output modules are equipped with the above fuses to prevent burn-out of internal circuits due to accidental short circuit.

Page 185 2. See the checklist for troubleshooting in this section for the abnormal operation of model 2000. If the system fails, contact a Toshiba branch (store) or our agent for the request

of return and repair. Toshiba will not guarantee normal operation and safety of the system if it is not repaired by Toshiba or a designated service center.

[Page 186](#) 2. If the fuse is blown, find out and get rid of the cause. If the fuse is replaced without eliminating the cause, damages to modules may get serious. If the cause of blown fuse cannot be determined, consult Toshiba without replacing the fuse. 3. Blown fuse may be caused by failed internal circuits of the power supply module.

[Page 187](#) 6.3 Checking the CPU 6.3 Checking the CPU When the "POWER" LED of the power supply module light, but the "RUN" LED of the S2 CPU module does not, check the following: If the LED continues to blink after power Does FLT LED blink? is up again, the CPU module is defective.

[Page 188](#) Chapter 6 Troubleshooting 6.4 Checking user program Check the program based on the following points if it is running but the operation does not work as intended. (1) Output is not carried on the same coil or register or variable of two or more locations during one scanning;...

[Page 189](#) 6.5 Checking input 6.5 Checking input If the program is running, but the input signal is not read normally, check the following points: For LED error, check input voltage during Does LED on input module ON/OFF, loose screws of input terminal turn ON/OFF by turning ON/ block, displaced input connector, and bad OFF external equipment?

[Page 190](#) If the cause of blown fuse cannot be determined, consult Toshiba without replacing the fuse. 2. For registering modules and I/O symbols with the engineering tool, see "Engineering Tool 3 Basics"...

[Page 191](#) 6.7 Troubles due to external factors 6.7 Troubles due to external factors When a problem with the model 2000 system occurs as one of the following phenomena, external factors should be suspected. (1) If an abnormality occurs synchronously with the operation of I/O equipment: The noise caused at ON/OFF of the output equipment may be the source of the abnormality.

[Page 192](#) Chapter 6 Troubleshooting 6.8 RAS Function If S2 detects an error in self-diagnosis, it enters the corresponding error message in the error log table, and if this error makes the continuation of operation impossible, turns off all outputs and stops operation (error down). The error log table stores the latest 32 error messages and the time of occurrence that can be displayed by the engineering tool.

[Page 193](#) 6.8 RAS Function 6.8.2 Entry of event log/error log Time of power ON and OFF and mode changes are entered in the event log. If S2 detects an error in self-diagnosis, contents of the error and the time of occurrence are entered in the error log.

[Page 194](#) Chapter 6 Troubleshooting 6.8.3 I/O module error detection I/O modules contain information of module errors such as blown built-in fuse that are excluded from I/O access errors. The I/O module error detection function reads the module's error state and sets it on SW[50] to SW[53]. To enable this function, specify "YES"...

[Page 195](#) Replace the CPU module and check peripheral LSIs were after error entry restart the system. initialized normally. Or contact a Toshiba agent. LP check Checks that LP (line Starts in ERROR mode Replace the CPU module and processor) was after error entry restart the system.

[Page 196](#) I/O access. normal, attention and installation of the I/O module. continues operation. If If connection is normal, the I/O bus is not contact a Toshiba agent. normal, degeneration or error down. Batch I/O parity Checks I/O parity Retries after error...

[Page 197](#) 6.8 RAS Function Table 6-5 Self-check during scan Operation when error is Check item Self-check Operator action detected No response Checks response Retries after error Check cable connection and from I/O during from I/O during batch entry. If the I/O bus is installation of I/O module.

[Page 198](#) Error down after error Replace the CPU module check peripheral LSIs entry and restart the system. operate normally. Or contact a Toshiba agent. LP check Checks that LP (line

Error down after error Replace the CPU module processor) operates entry and restart the system.

[Page 199](#) 6.8 RAS Function (5) Self-check of duplex configuration Table 6-7 Self-check of duplex configuration Operation when error is detected Check item Self-check Operator action Online Standby controller controller Tracking Standby controller Single Error down Check connection of the receive error detected a tracking operation expansion interface module,...

[Page 200](#) Chapter 6 Troubleshooting Table 6-7 Self-check of duplex configuration Operation when error is detected Check item Self-check Operator action Online Standby controller controller Duplex Has detected error Single Error down Check the expansion interface module error down of the operation module, and restart the expansion interface mode...

[Page 201](#) Group 3 TEL.: +81-3-3457-4894 1-1, Shibaura 1-chome, Minato-ku, Tokyo 105-8001, Japan Electrical Apparatus & Measurement Division Microelectronics & System Components Department - System Components Support Group TEL.: +81-42-333-2192 1, Toshiba-cho, Fuchu-shi, Tokyo 183-8511, Japan TOSHIBA Corporation 2000-2006 All Right Reserved.

[Page 204](#) 6F8C0836 equence Controller 2 User's Manual - Basic Hardware - 0836.2.0611...

This manual is also suitable for:

2000