FUJI ELECTRIC

MICREX-SX *series*

SPH/SPS

USER'S MANUAL

GENERAL PURPOSE COMMUNICATION PACKAGE FOR FACTORY AUTOMATION MACHINE

FEH240

Preface

This User's Manual explains the specifications and the operation of each expansion FB in this package.
Read this manual carefully to ensure correct operation.
When using modules or peripheral devices, be sure to read the corresponding user's manuals listed below.

Title	Manual No.	Contents
User's Manual Instruction, MICREX-SX series SPH	FEH200	Explains the memory, language and system definitions of the MICREX-SX series.
User's Manual Hardware, MICREX-SX series SPH	FEH201	Explains the system configuration, the specifications and operations of modules in the MICREX-SX series.
User's Manual D300win <Introduction>, MICREX-SX series	FEH250	Explains the basic operations of D300win, the programming and monitoring for MICREX-SX series.
User's Manual D300win <Reference>, MICREX-SX series	FEH251	Explains the menu and icon of D300win and all of the operations of D300win.
User's Manual D300win V2 <Reference>, MICREX-SX series	FEH254	Explains the menu and icon of D300win and all of the operations of D300win V2.

Notes

1. This manual may not be reproduced in whole or part in any form without prior written approval by the manufacturer.
2. The contents of this manual (including specifications) are subject to change without prior notice.
3. If you find any ambiguous or incorrect descriptions in this manual, please write them down (along with the manual No. shown on the cover) and contact FUJI.

Safety Precautions

Before mounting, wiring, operation, maintenance and inspection of the device, be sure to read the operating instructions carefully to ensure proper operation. The operation instructions should be furnished to the maintenance supervisions of final users.

Warning : Incorrect handling of the device may result in death or serious injury.

Caution : Incorrect handling of the device may result in minor injury or physical damage.

Even some items indicated by “Caution” may also result in a serious accident.
Both safety instruction categories provide important information. Be sure to strictly observe these instructions.

Caution

◊ Do not bring the magnetic object close to the floppy disk, otherwise, failure might be caused.
◊ Insert the memory cassette, floppy disk and engage the loader connector in a correct orientation, otherwise, failure or erratic operation might be caused.
◊ Sufficiently make sure of safety before program change, forced output, starting, stopping or anything else during a run. The wrong operation might break or cause machine problems.
◊ Do not turn off the loader during a run (accessing to the hard disk or the floppy disk, communicating to the PLC), otherwise, missing of *data, failure or erratic operation of products, damage or trouble of machines might be caused.
◊ Use this package in the operating environment of software described in the user's manual, otherwise, failure or erratic operation might be caused.
◊ Perform the version-up operation by the explanation of the user's manual, otherwise, failure or erratic operation might be caused.
◊ Engage the communication cable connector firmly and lock it, otherwise, erratic operation be might caused.
◊ Do not touch the disk's surface of the floppy disk, otherwise, failure or erratic operation might be caused.
◊ Perform the periodic inspection for the floppy disk drive and the hard disk drive. If the data are made by the fault disk, failure or erratic operation of the system might be caused.
◊ When disengaging the communication cable or the power cable, do not pull the cord, otherwise, failure, erratic operation or damage might be caused.

Precautions for using the General Purpose Communication Package of Factory Automation Machine

To use the expansion FB included in the General Purpose Communication Package of Factory Automation Machine, it is necessary to register “_c_com.pwt” in the common library.
“_c_com.pwt” is included in the standard expansion FB that is supplied with D300win.
When you use the expansion FB for 1.0.0.1 or newer version of General Purpose Communication Package of Factory Automation Machine, be sure to use the “_c_com” that is included in 1.1.1.0 or newer version of standard expansion FB package (supplied with 1.2.0.0 or newer version of D300win system).

Revision

*Manual No. is shown on the cover.

Printed on	*Manual No.	Revision contents
Jan. 2001	FEH240	First edition

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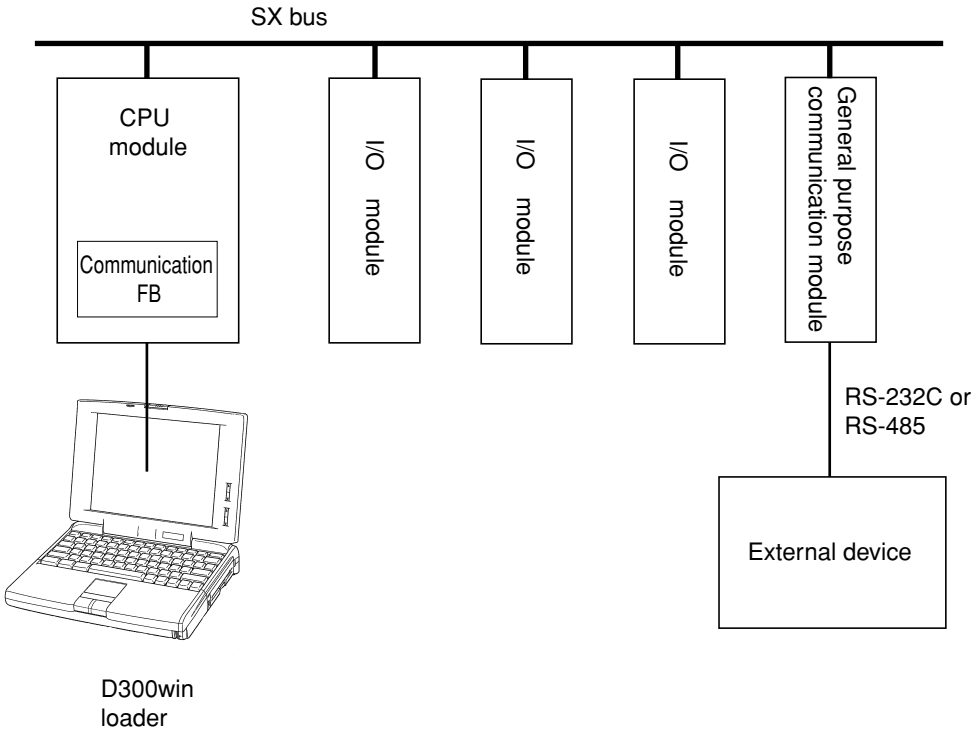
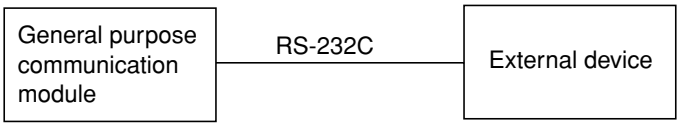
Section 1 General

General purpose communication package for Factory Automation machine NP4N-COMF is a collection package of the temperature controllers or the bar code readers, etc.

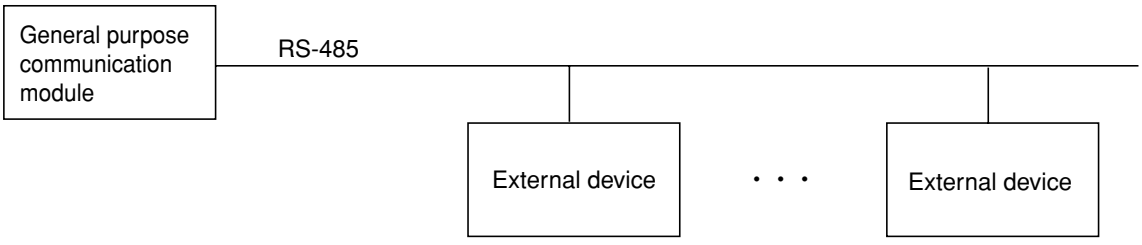


<Connecting a general purpose communication module with the external device>
There are two connecting methods to connect a general purpose communication module with the external device. As connecting method depends on each FB, refer to the operating instructions of the external device for details.

- **1:1 Connection using RS-232C**



- **1:N Connection using RS-485**

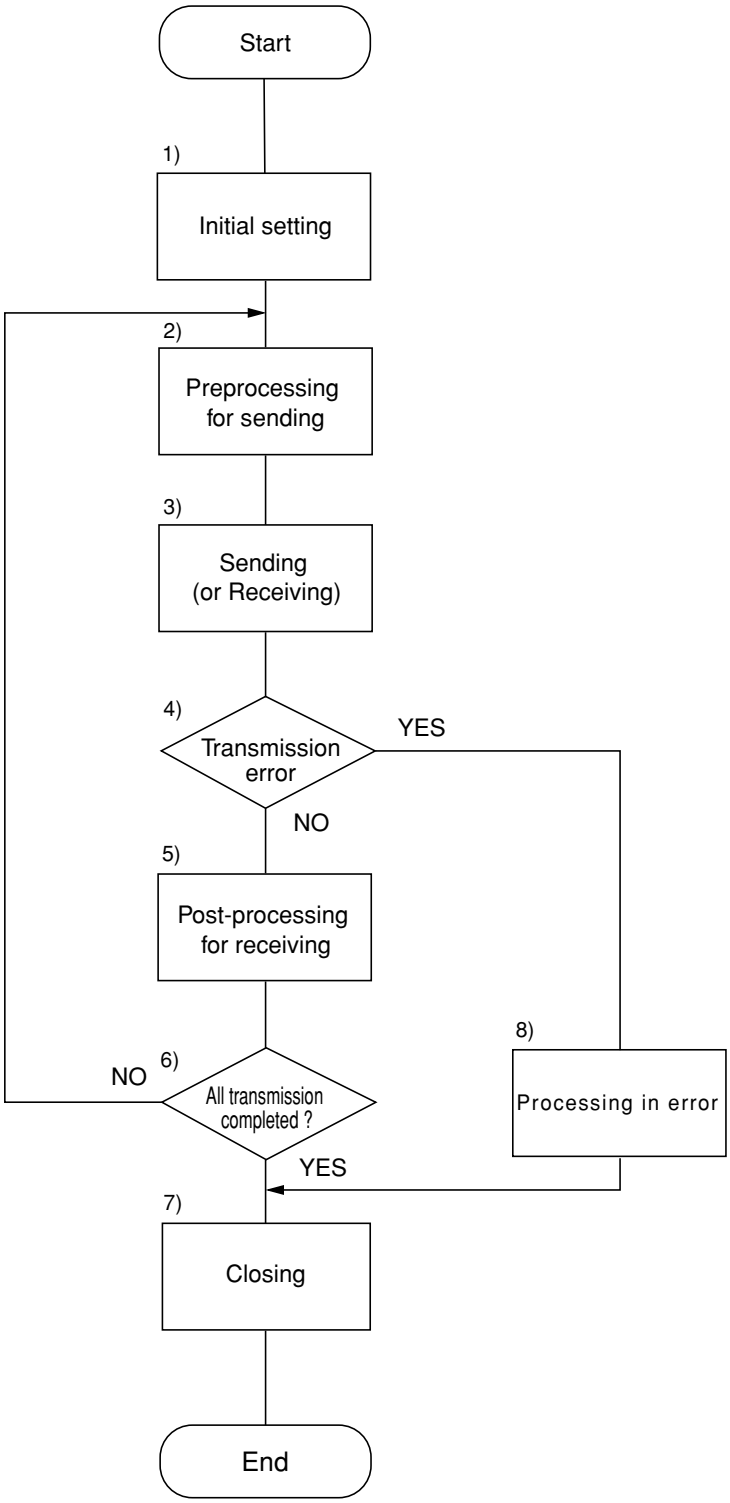


1-2 FBs in the General Purpose Communication Package for Factory Automation Machine

Procedure	FB name	Device
Temperature controller	_CrkREX	RIKA KOGYOU CO., LTD. REX-F, REX-D, FAREX-SR series
	_ComAX	OMRON Corporation. Digital temperature controller E5AX, E5XJ series
	_ComCK	OMRON Corporation. Digital temperature controller E5CK series
	_CymSDC	Yamatake Corporation. Digitronic temperature controller SDC40A/40G series
ID system	_ComV6	OMRON Corporation. V600 series
	_CshDS	SHARP MANUFACTURING SYSTEM CORPORATION. Microwave ID plate system DS series
	_CymWAM	Yamatake Corporation. Code distinguish ID system WAM120 series
	_CizFP	IDEC IZUMI CORPORATION. Data carrier system FP1A series
Bar code reader	_CtkTCD	THOKEN Co., Ltd. TCD8200/8500, TLMS-3200RV series
	_CndBCC	NIPPON ELECTRIC INDUSTRY CO., LTD. BCC2600 series, BL500, BL700
	_CkyBL	KEYENCE CORPORATION. BL180 series
	_CizDS	IZUMI DATA LOGIC CO., LTD. Bar code reader DS series
SECS	_C_SECS	SECS procedure semiconductor manufacturing system (for SECS-I only)
FUNUC	_CDNC2	FUNUC Corporation. CNC system.
Serial printer	_Cprint	Serial interface printer sold on the market.

1-3 General Usage of this Package

General purpose communication package for Factory Automation machine is a collection package of FBs (Function Block). Describing the FB in the application program enables the usage of functions which FB offers.
As the usage depends on each FB, refer to the explanation of each FB and the operating instructions of the external device.



1) It is need to initialize the general purpose communication module before the transmission. For initializing, required parameters (transmission speed, data bit length, etc) should be set and open request should be set for FB. FB turns the communication ready flag ON when the transmission is ready.
2) For sending, send data should be stored in the send data area.
3) Sending or receiving is performed between the general purpose communication module and the external device. For some FBs, other process is needed. The end flag turns ON when sending or receiving has completed.
4) Transmission error is checked.
5) For receiving, user must handle the receive data for the application program.
6) The above process is repeated until all transmissions have been completed.
7) Post-processing is performed after all transmissions.
8) The countermeasure should be performed according to the status information in the case of transmission error.

Section 2 Installation

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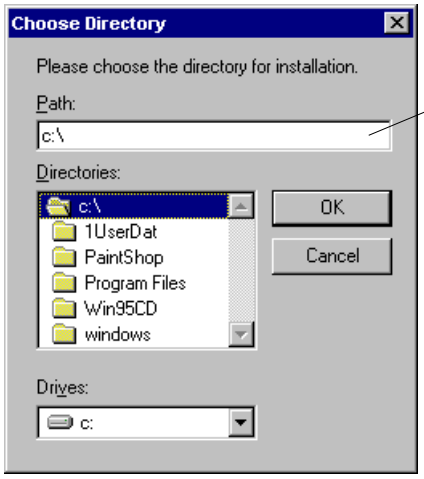
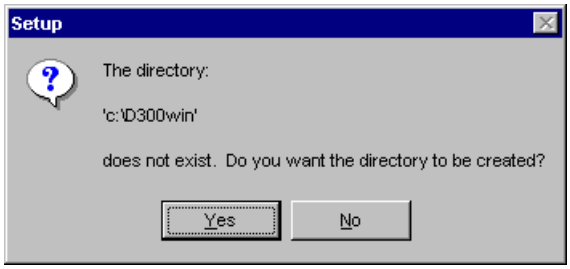
Section 2 Installation
2-1 Installation Procedure

1) Disable any virus detection software and screen saver.
2) Select [Control panel] from the [Settings] submenu under the Windows95 [Start] menu.
3) Left-double-click the [Add/Remove Programs] icon in the {Control panel} dialog box.
4) Left-click the [Install] button.
5) Insert the No. 1 system disc, which contains the installation program, into the floppy disc drive.
6) Left-clicc the [Next >] button.
7) Make sure that "A:¥SETUP.EXE" is displayed in the {Command line for installation program : } text box.
   If not, left-click the [Browse] button, select the drive No. for the floppy disc drive, and select file name [Setup.exe].
   Left-click the [Finish] button.
8) {Install Shield Wizard Preparing} working box appears on the screen.
   Left-click the [Next >] button.
9) Then the {Welcome} dialog box appears on the screen.
   Left-click the [Next >] button.
10) When you want to change the default directory for installation (C:¥D300win), left-click the [Reference] button, designate the desired directory for installation in the [Select directory] dialog box, and left-click the [OK] button.



Note: Designate the directory name with up to 8 alphanumeric characters.

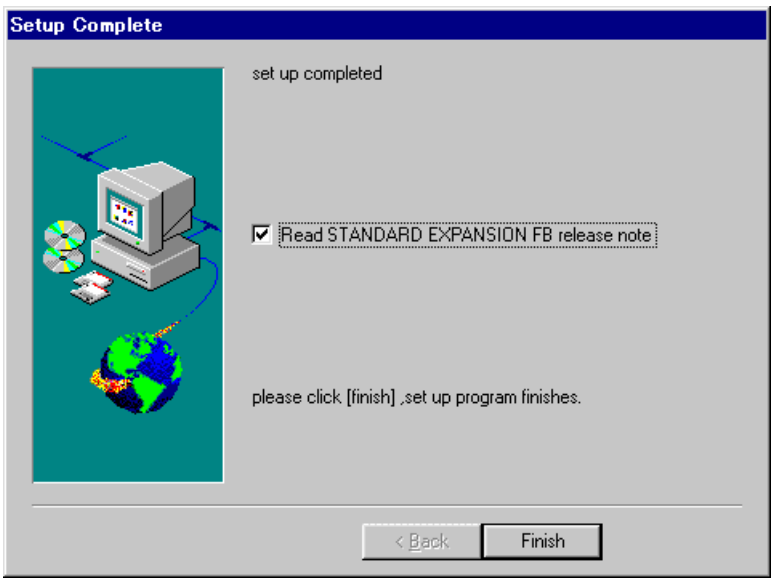
If the dssignated installation directory for does not exist,the following message box will appear on the screen
After confirming the message, left-click the [OK] button.



Left-click the [Next >] button, and start file copying.

11) When the installation of the first system disc is completed , the {Insert the next disc} dialog box as shown below appears on the screen.
Insert the second disc, and left-click the [OK] button. Install the third and following discs in the same manner.

12) When setup ends, following screeen appears.

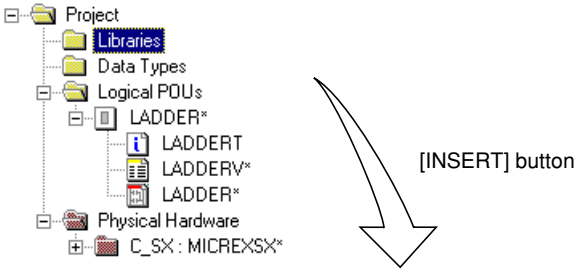


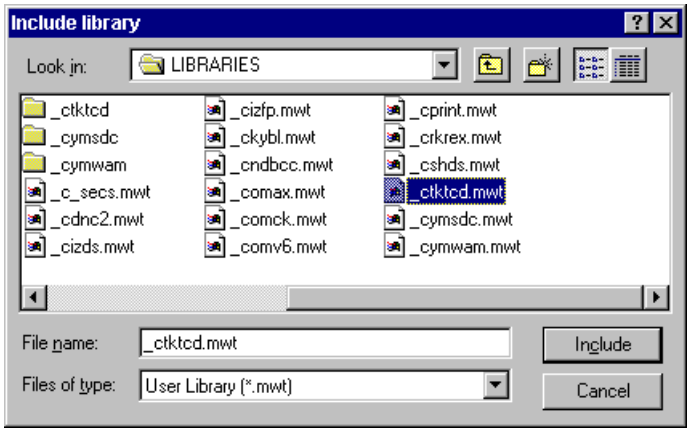
2-2 Registrtion / Deletion in Library

2-2-1 Registrtion in library

Individual communication FBs included in the standard expansion FB package can be used when registered in a library under a created project.

1) Left-click the [Libraries], a subtree in the “Project” tree, and then on the [INSERT] button.
Then the {Include library} dialog box will appear on the screen.

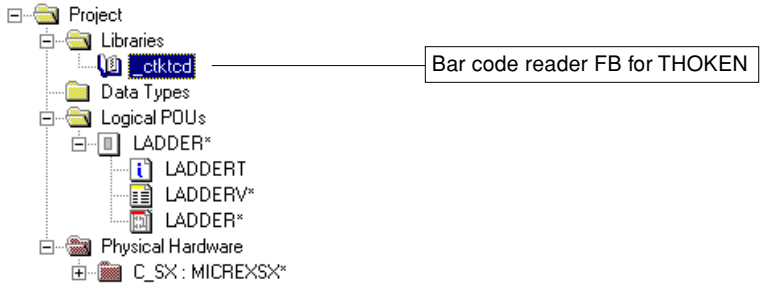




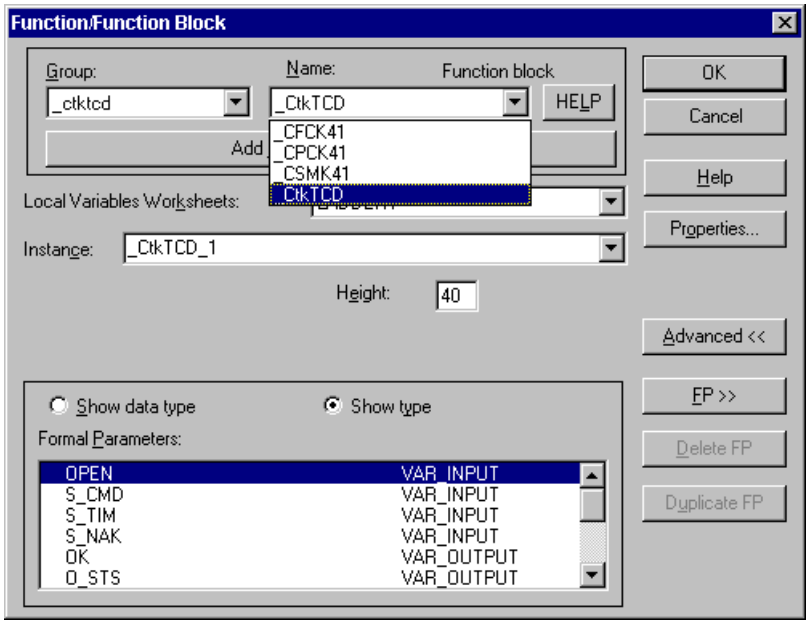
2) Select an FB (file name) which you want to register in the library, and left-click the [Include] button.

Procedure	Device	FB name
Temperature controller	RIKA KOGYOU CO., LTD. REX-F, REX-D, FAREX-SR series	_crkrex.mwt
	OMRON Corporation. Digital temperature controller E5AX, E5XJ series	_comax.mwt
	OMRON Corporation. Digital temperature controller E5CK series	_comck.mwt
	Yamatake Corporation. Digitronic temperature controller SDC40A/40G series	_cymsdc.mwt
ID system	OMRON Corporation. V600 series	_comv6.mwt
	SHARP MANUFACTURING SYSTEM CORPORATION. Microwave ID plate system DS series	_cshds.mwt
	Yamatake Corporation. Code distinguish ID system WAM120 series	_cymwam.mwt
	IDEC IZUMI CORPORATION. Data carrier system FP1A series	_cizfp.mwt
Bar code reader	THOKEN Co., Ltd. TCD8200/8500, TLMS-3200RV series	_ctktcd.mwt
	NIPPON ELECTRIC INDUSTRY CO., LTD. BCC2600 series, BL500, BL700	_cndbcc.mwt
	KEYENCE CORPORATION. BL180 series	_ckybl.mwt
	IZUMI DATA LOGIC CO., LTD. Bar code reader DS series	_cizds.mwt
SECS	SECS procedure semiconductor manufacturing system (for SECS-I only)	_c_secs.mwt
FUNUC	FUNUC Corporation. CNC system.	_cdnc2.mwt
Serial printer	Serial interface printer sold on the market.	_cprint.mwt

3) The FB is registered in the library, as shown in the figure below.



4) When registered in library, FBs can be selected in the [Function/Function Block] dialog box.



2-2-2 Deletion from library

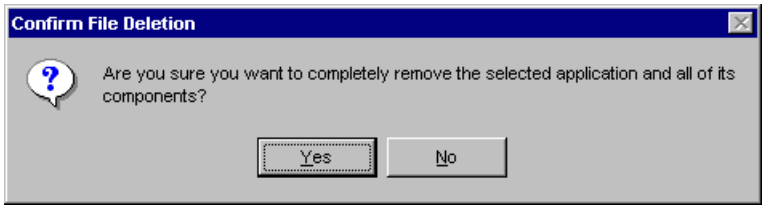
1) Select the FB to be deleted in the [Libraries] subtree, and left-click the [DELETE] button. The following window appears.

2) Left-click the [OK] button. Selected FB will be deleted.

2-3 Uninstallation Procedure

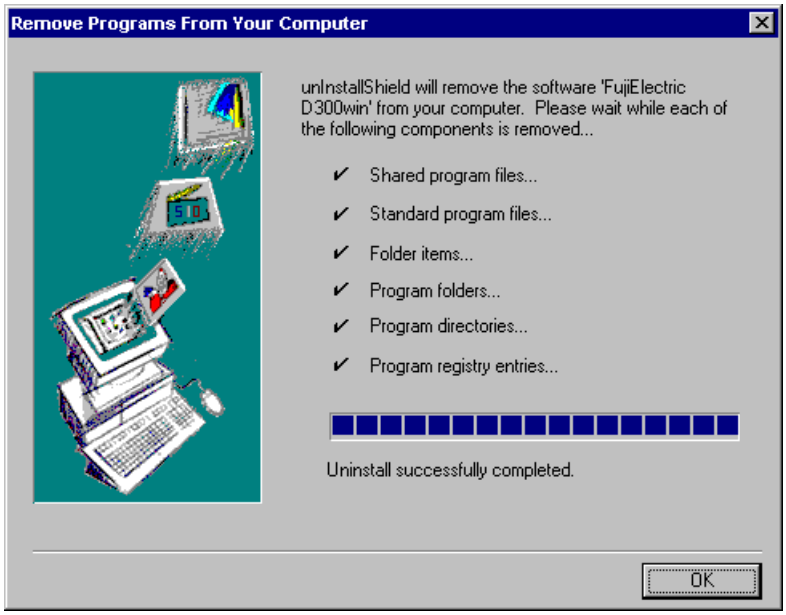
This procedure is used to delete the related files with the expansion FB from the hard disk.

1) Select the [Control panel] from [Setting] submenu under the Windows 95 [Start] menu. Double-click the [Add/delete application] icon in the [Control panel] dialog box with the left button. Select the “General purpose communication package for Factory Automation machine” in the tree, and left-click the [Add/delete].
The [Confirming of the file deletion] message box appears.



Left-click the [Yes] button.

2) Deletion is performed.
During the deletion, the following window appears. Check marks are displayed for the deleted items.



3) Left-click the [OK] button to close the {Remove Programs From Your Computer} dialog box.

Key-point:

The files created/stored by user cannot be deleted by the “uninstall program” operation.

2-4-1 About the file in the package

(1) Library project
When this package is installed, the project of each FB is stored in the directory “D300win/Lib”. This project is created by deleting the variable work sheet and program work sheet after compilation, then describing the version No. and using method in a text work sheet, and then setting write protection. Users can reference its contents from the library of the project tree. It is also possible to reference the contents with the “Display project” function. However, because the work sheet has already been deleted, program and variable definition data cannot be referenced. Only the text work sheet and data type declaration can be referenced. Because it is write protected, users cannot open the library project as a project.

(2) Sample project
When this package is installed, a compressed project is stored in the directory “D300win/Zipped”. This is a zip file which is not write protected, and has been compressed without including the library. The library is made into a project which references D300win/LIBRARIES and therefore needs to be modified when the folder is changed during installation of the package. A project name is created by adding “Z” following the FB name, such as in crkrexz.zwt.

<Sample project file list>

Procedure	Device	FB name
Temperature controller	RIKA KOGYOU CO., LTD. REX-F, REX-D, FAREX-SR series	crkrexz.zwt
	OMRON Corporation. Digital temperature controller E5AX, E5XJ series	comaxz.zwt
	OMRON Corporation. Digital temperature controller E5CK series	comckz.zwt
	Yamatake Corporation. Digitronic temperature controller SDC40A/40G series	cymsdcz.zwt
ID system	OMRON Corporation. V600 series	comv6z.zwt
	SHARP MANUFACTURING SYSTEM CORPORATION. Microwave ID plate system DS series	cshdsz.zwt
	Yamatake Corporation. Code distinguish ID system WAM120 series	cymwamz.zwt
	IDEC IZUMI CORPORATION. Data carrier system FP1A series	cizfpz.zwt
Bar code reader	THOKEN Co., Ltd. TCD8200/8500, TLMS-3200RV series	ctktcdz.zwt
	NIPPON ELECTRIC INDUSTRY CO., LTD. BCC2600 series, BL500, BL700	cndbccz.zwt
	KEYENCE CORPORATION. BL180 series	ckyblz.zwt
	IZUMI DATA LOGIC CO., LTD. Bar code reader DS series	cizdsz.zwt
SECS	SECS procedure semiconductor manufacturing system (for SECS-I only)	c_secsz.zwt
FUNUC DNC2	FUNUC Corporation. CNC system.	cdnc2z.zwt
Serial printer	Serial interface printer sold on the market.	cprintz.zwt

2-4-2 Common library
Common library is necessary for the standard general purpose communication package and the general purpose communication package for Factory Automation machine.
This common library named “_c_com” is included in the standard general purpose communication package. To use each FB in this package, users are registered to register the project for these FBs as well as common library “_c_com.”
Since “_c_com” is included in the standard general purpose communication package, users of the general purpose communication package for Factory Automation machine are registered to install both packages.

Section 3 Temperature Controller FB

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Section 3 Temperature Controller FB

3-1 RIKA KOGYOU _CrkREX

3-1-1 General

_CrkREX is a FB which performs the start-stop synchronous data transmission between the CPU module and the REX-F, REX-D, FAREX-SR series of RIKA KOUGYOU CO., LTD. For the transmission parameters to control RIKA KOGYOU temperature controllers, refer to those manuals.

<Function of _CrkREX>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

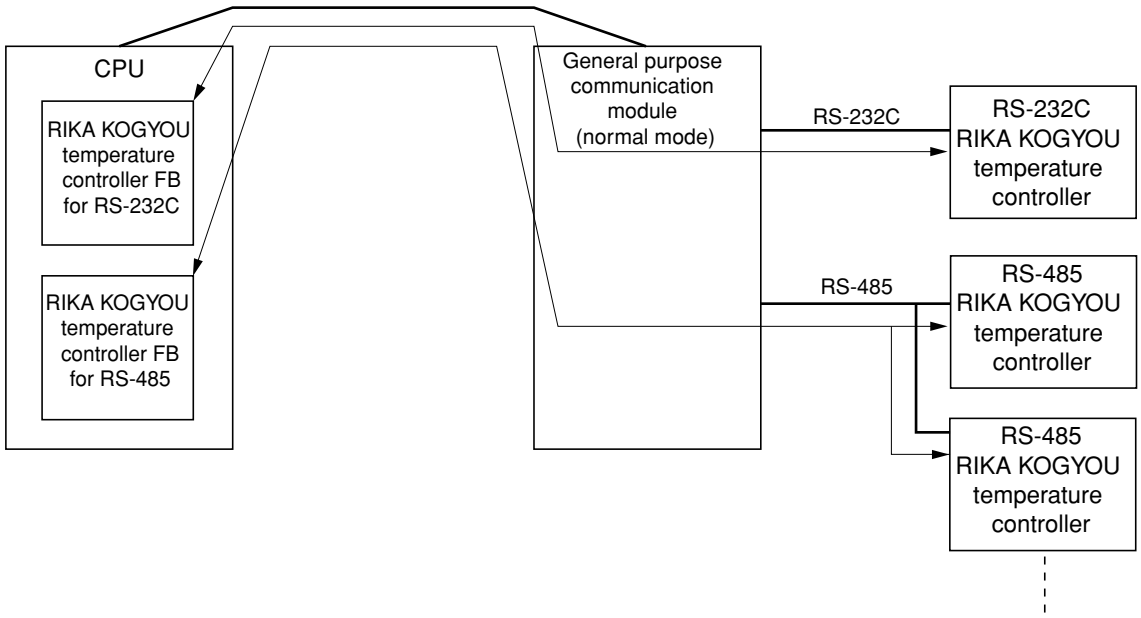
Send the data from an application program in the CPU module to OMRON temperature controller via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The temperature controller can be connected with the RS-232C port by 1:1 or with the RS-485 port by 1:N.
For REX-D, REX-SR are connectable only to the RS-485 port.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

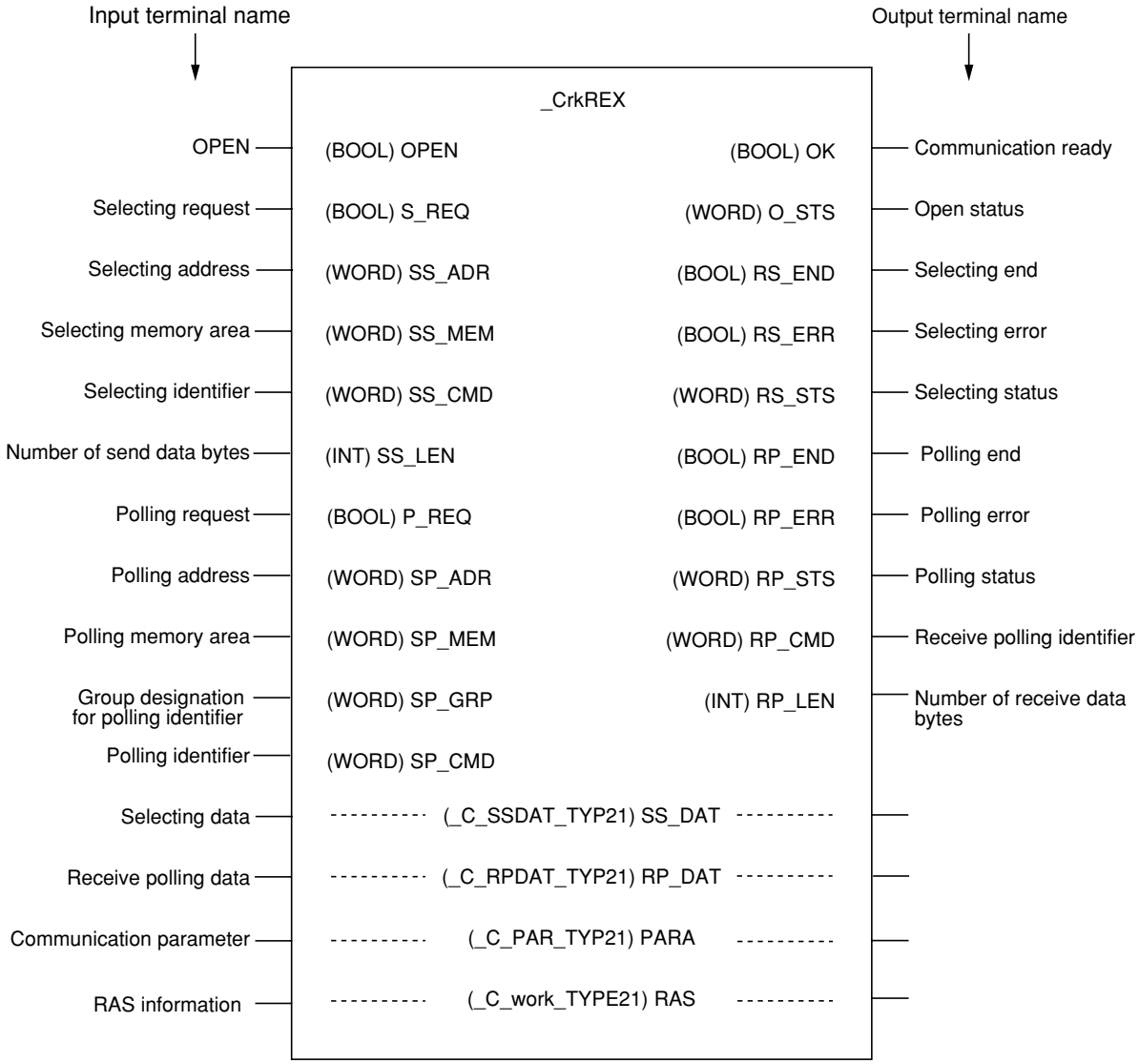
<Memory capacity>

Program area = approx. 2.2K steps
Data memory capacity = Instance memory for user FB: approx. 0.3K words
Standard memory or Retain memory: approx. 0.8K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of temperature controller FB main body as well as that of the sub-FB which is called from the temperature controller FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

3-1-2 Specifications for _CrkREX

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Description
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Selecting request	S_REQ	BOOL	IN	Starts to send data by the selecting procedure. When sending is completed, this needs to be turned OFF by the application program.
Selecting address	SS_ADR	WORD	IN	Specifies the device address.
Selecting memory area	SS_MEM	WORD	IN	Specifies the memory area.
Selecting identifier	SS_CMD	WORD	IN	Specifies the identifier.
Number of send data bytes	SS_LEN	INT	IN	Specifies the number of send data bytes.
Selecting data	SS_DAT	_C_SSDAT _TYP21	IN_ OUT	Stores the send data. WORD type array data with element No. 0 to 31.
Polling request	P_REQ	BOOL	IN	Starts to receive data by the polling procedure. When receiving is completed, this needs to be turned OFF by the application program.
Polling address	SP_ADR	WORD	IN	Specifies the device address.
Polling memory area	SP_MEM	WORD	IN	Specifies the memory area.
Group designation for polling identifier	SP_GRP	WORD	IN	Specifies the identifier group.
Polling identifier	SP_CMD	WORD	IN	Specifies the identifier group.
Communication parameter	PARA	_C_PAR _TYP21	IN_ OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39 .
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Selecting end	RS_END	BOOL	OUT	Turns ON when selecting ends.
Selecting error	RS_ERR	BOOL	OUT	Selecting result code
Selecting status	RS_STS	WORD	OUT	Turns ON if a selecting error has occurred.
Polling end	RP_END	BOOL	OUT	Turns ON when polling ends.
Polling error	RP_ERR	BOOL	OUT	Turns ON if a polling error has occurred.
Polling status	RP_STS	WORD	OUT	Polling result code
Receive polling identifier	RP_CMD	WORD	OUT	Polling identifier when data have received.
Number of receive data bytes	RP_LEN	INT	OUT	Stores the number of receive data bytes.
Receive polling data	RP_DAT	_C_RPDAT _TYP21	IN_ OUT	Stores the receive data by polling. WORD type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE21	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 3-1-6 for details.

3-1-3 Initialization

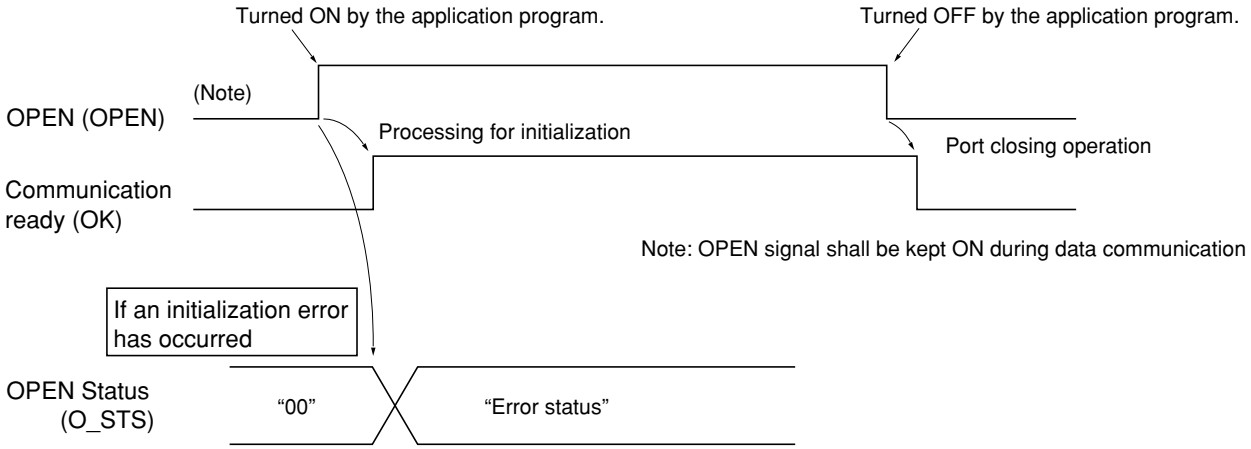
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper value for each “communication parameter” item so as to match the communication specifications of the RIKA KOGYOU temperature controller.
The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 11	Reserved ⋮ Reserved	Not used
12	RS-485 mode	Selects 4-wire or 2-wire for RS-485. 0: 4-wire 1: 2-wire
13	Reserved	Not used
14	Reserved	
15	Reserved	
16	Response monitoring timer	The timer for monitoring during the period from when the CPU module sends a send request to a device until communication ends. Normally set to 100 (=1 second) (in 0.01-second steps).
17	Retry count	In case of communication error, this designates how many times to retry communication.
18 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).



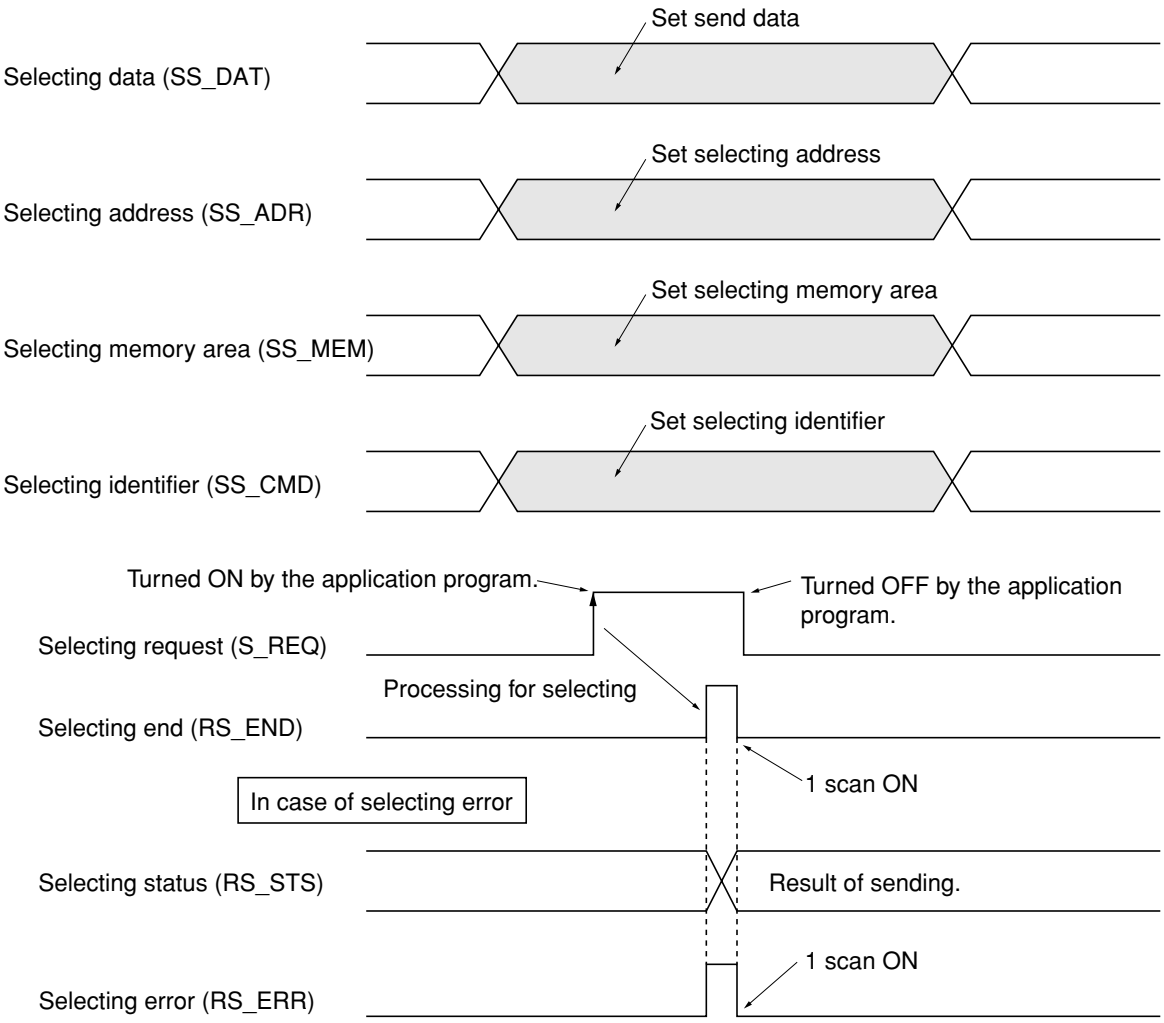
(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Transmison speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'08'	RS-485 mode setting error	Error detected on general purpose communication module
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Response monitoring timer value setting error	
'41'	Retry count setting error	
'42'	Reserved	
'43'	Reserved	
'44'	Reserved	
'45'	Reserved	
'46'	Reserved	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error.	
'82'	Message port No. setting error.	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because selfdiagnosis is being executed.	Error detected on general purpose communication module

3-1-4 Selecting

(1) Selecting procedure

Selecting is a function which the CPU module sends data by selecting one from any temperature controllers.
For details, refer to the manual of each temperature controller.



Selecting data, selecting address, selecting memory area and selecting identifier are set and selecting request is turned ON by the application program. FB detects the rising edge to execute the processing for selecting.
When selecting has ended, the selecting end flag is turned ON (1 scan). If a selecting error has occurred, the selecting end and the selecting error are turned ON (1 scan), and the corresponding error code is output to the selecting status ("00") when ended normally).

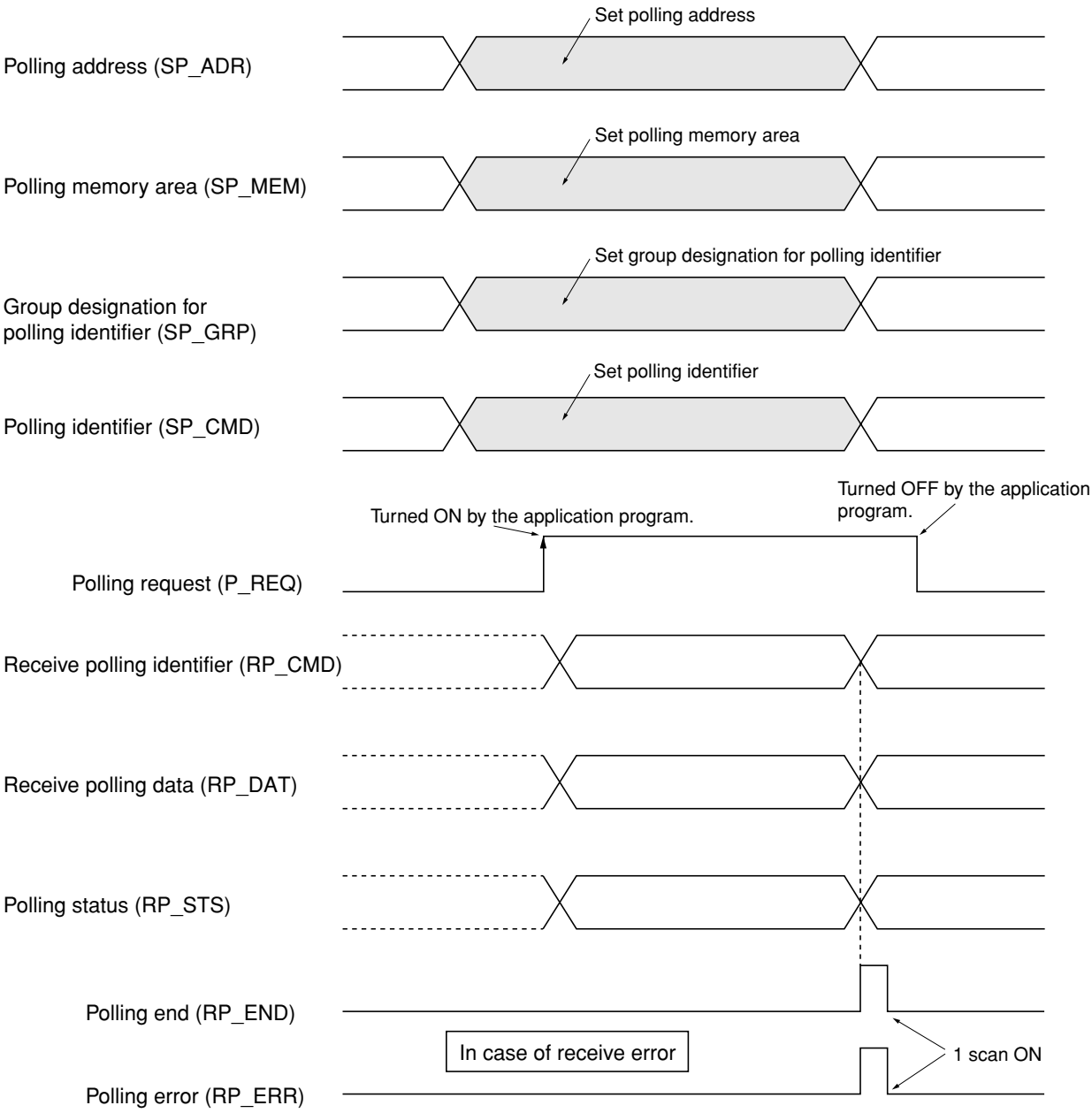
(2) Selecting status list

No.	Result of selecting	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error	
'42'	BCC error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer has overflowed.	Error detected on general purpose communication module
'C2'	Send buffer has overflowed.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

3-1-5 Polling

(1) Polling procedure

Polling is a function which the CPU module receives data by selecting one from any temperature controllers.
For details, refer to the manual of each temperature controller.



Polling address, polling memory area, group designation for polling identifier and polling identifier are set and polling request is turned ON by the application program.
FB detects the rising edge to execute the processing for polling. When sending and receiving have ended, polling identifier and receive polling data are stored and the polling end flag is turned ON (1 scan). If a polling error has occurred, the polling end flag and the polling error are turned ON (1 scan).

(2) Polling status list

No.	Result of polling	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Reserve buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error	
'42'	BCC error	
'90'	General purpose communication module disconnected	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer has overflowed.	Error detected on general purpose communication module
'C2'	Send buffer has overflowed.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

3-1-6 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE21).
To use RAS information in an application, variables are declared in the following manner:

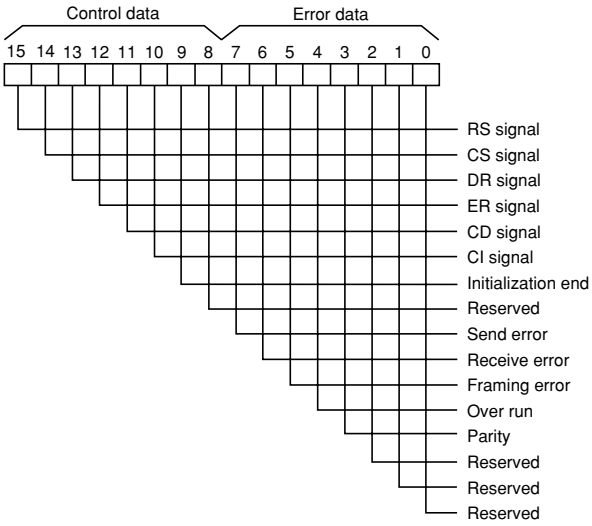
<Sample variable declaration>

```
VAR
  RAS:_C_work_TYPE21;
END_VAR
```

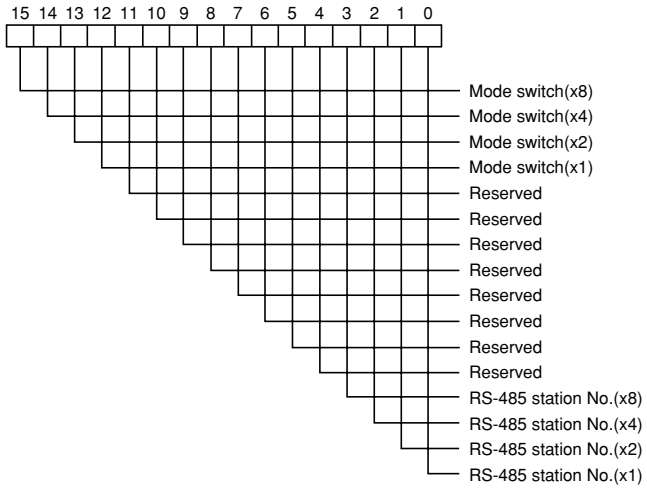
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



3-2-1 General

_ComAX is a FB which performs the start-stop synchronous data transmission between the CPU module and the E5AX, E5xJ series of OMRON Corporation. For the transmission parameters to control OMRON temperature controllers, refer to those manuals.

<Function of _ComAX>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

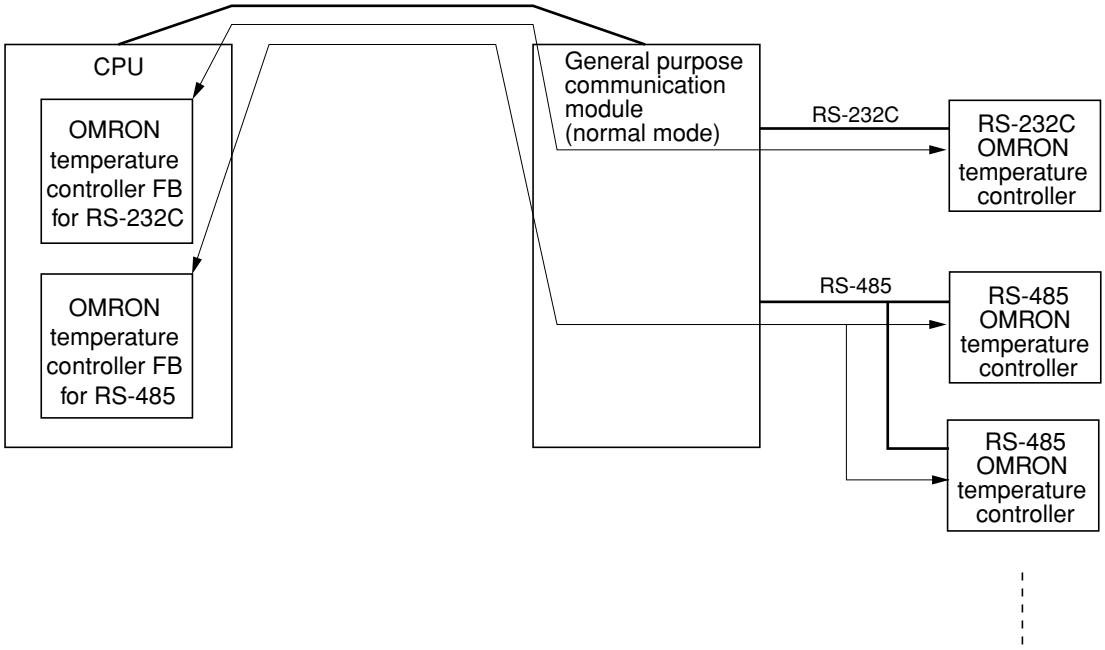
Send the data from an application program in the CPU module to OMRON temperature controller via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The temperature controller can be connected with the RS-232C port by 1:1 or with the RS-485 port by 1:N.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

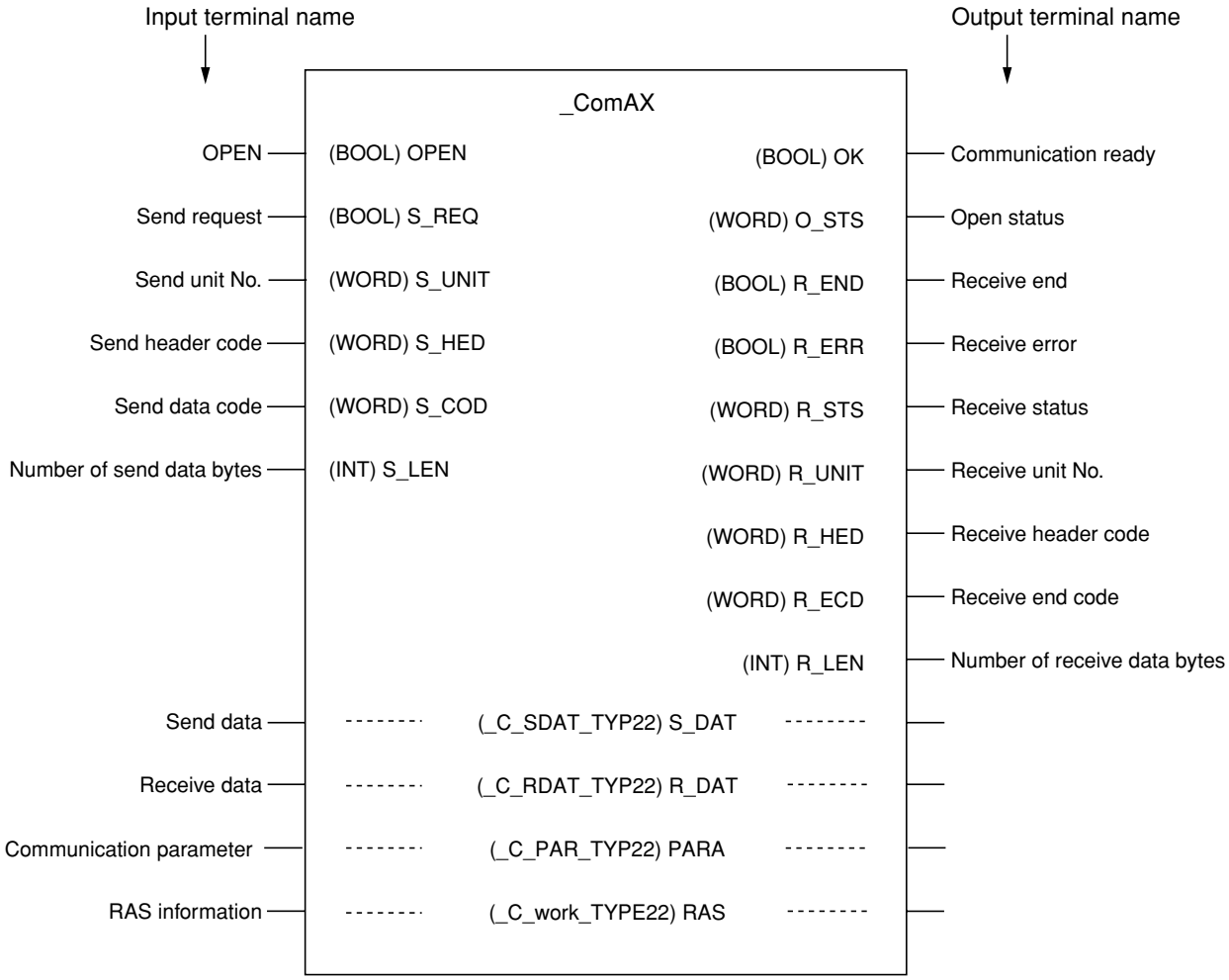
<Memory capacity>

Program area = approx. 2.0K steps
Data memory capacity = Instance memory for user FB: approx. 0.3K words
Standard memory or Retain memory: approx. 0.8K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of temperature controller FB main body as well as that of the sub-FB which is called from the temperature controller FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission. memory capacity necessary for data transmission.

3-2-2 Specification for _ComAX

(1) FB Format



*The send header code (S_COD) is input by the following data.
· For E5A·····Channel No.
· For E5xJ·····Data code

Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Send unit No.	S_UNIT	WORD	IN	Unit No. assigned to the temperature controller
Send header code	S_HED	WORD	IN	Code for the function
Send data code	S_COD	WORD	IN	For E5AX: Channel No., For E5xJ: Header code
Number of send data bytes	S_LEN	INT	IN	Specifies the number of send data bytes.
Send data	S_DAT	_C_SDAT _TYP22	IN_OUT	Stores the send data. WORD type array data with element No. 0 to 31.
Communication parameter	PARA	_C_PAR _TYP22	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Receive end	R_END	BOOL	OUT	Turns ON when receive ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Receive unit No.	R_UNIT	WORD	OUT	Unit No. of a responded temperature controller
Receive header code	R_HED	WORD	OUT	Stores the receive header code.
Receive end code	R_ECD	WORD	OUT	Stores the end code.
Number of receive data bytes	R_LEN	INT	OUT	Stores the number of receive data bytes.
Receive data	R_DAT	_C_RDAT _TYP22	IN_OUT	Stores the receive data. WORD type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE22	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 3-2-5 for details.

3-2-3 Initialization

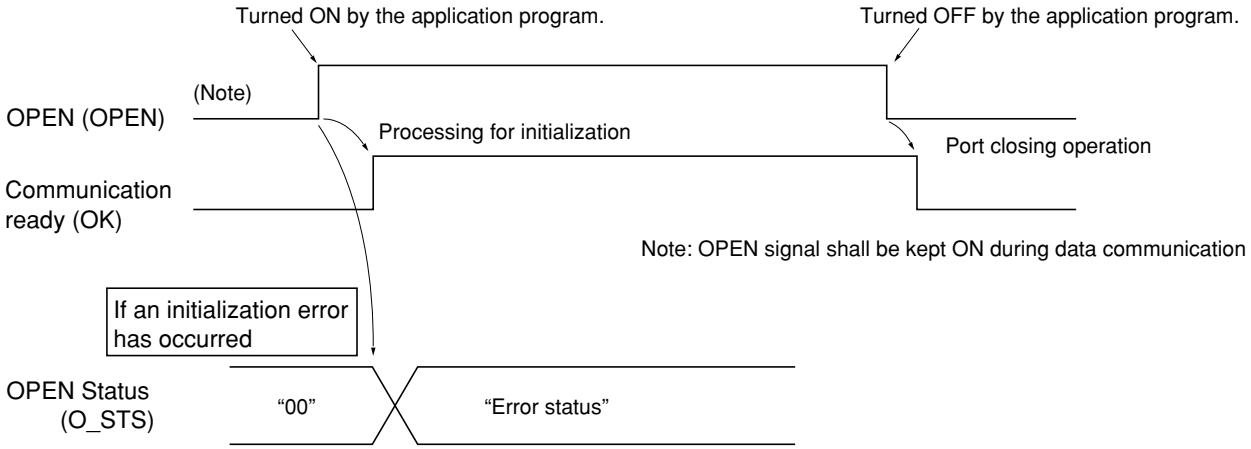
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each “communication parameter” item so as to match the communication specifications of the OMRON-(1) temperature controller. The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 11	Reserved ⋮ Reserved	Not used
12	RS-485 mode	Selects 4-wire or 2-wire for RS-485. 0: 4-wire 1: 2-wire
13	Reserved	Not used
14	Reserved	
15	Reserved	
16	Response monitoring timer	The timer for monitoring during the period from when the CPU module sends a send request to a device until communication ends. Normally set to 100 (=1 second) (in 0.01-second steps).
17	Retry count	In case of communication error, this designates how many times to retry communication.
18 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

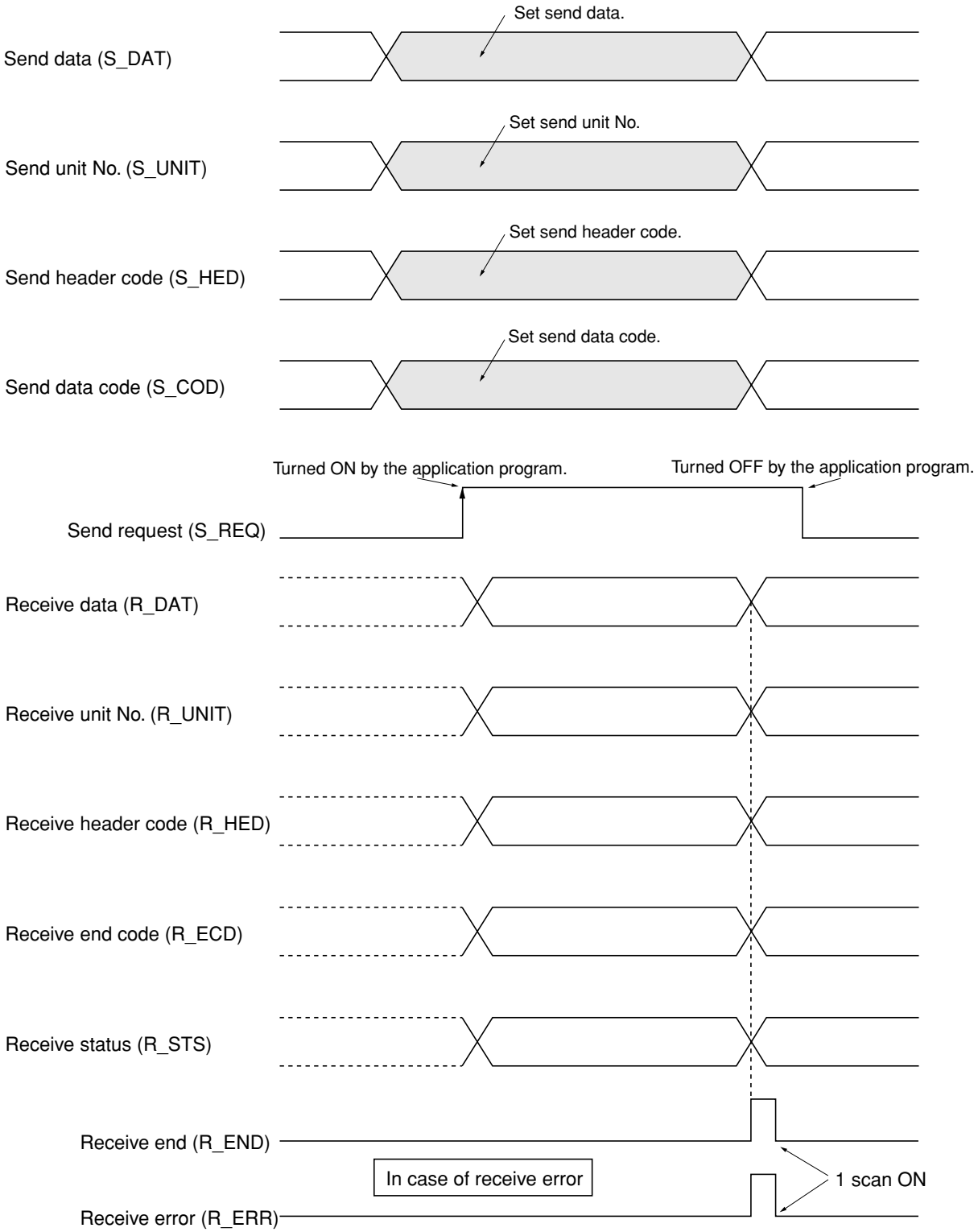


(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Transmission speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'08'	RS-485 mode setting error	Error detected on general purpose communication module
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Response monitoring timer value setting error	
'41'	Retry count setting error	
'42'	Reserved	
'43'	Reserved	
'44'	Reserved	
'45'	Reserved	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error	
'82'	Message port No. setting error	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

3-2-4 Data sending/receiving

(1) Data sending/receiving procedure



Send data, send unit No., send header code and send data code are set and then send request is turned ON by the application program. FB detects the rising edge to execute the processing for sending. The system automatically enters receiving waiting mode the moment sending is completed, executing the processing for receiving.
When the processing for sending and receiving has completed, receive data, receive unit No., receive header code and receive end code are stored, and receive end flag is turned ON (1 scan). In case of transmission error, both end flag and receive error are turned ON (1 scan).

(2) Sending/receiving status list

No.	Result of sending /receiving	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error	
'42'	BCC rror	
'90'	General purpose communication module disconnected	Not detected
'91'	SX bus send error	
'92'	SX bus Reserve error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed .	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer has overflowed.	Error detected on general purpose communication module
'C2'	Send buffer has overflowed.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

3-2-5 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE22).
To use RAS information in an application, variables are declared in the following manner:

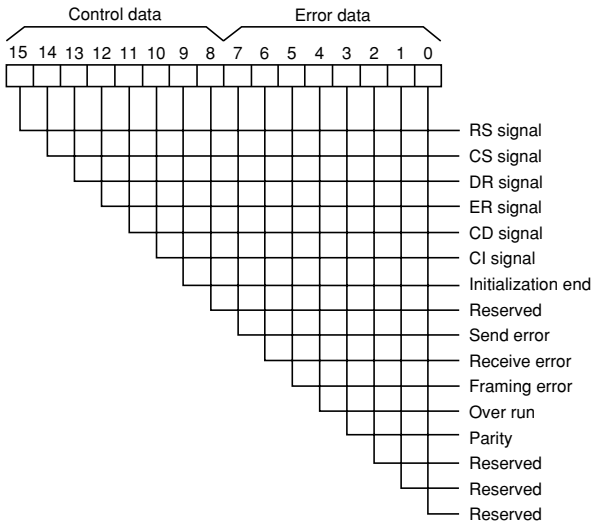
<Sample variable declaration>

```
VAR
  RAS:_C_work_TYPE22;
END_VAR
```

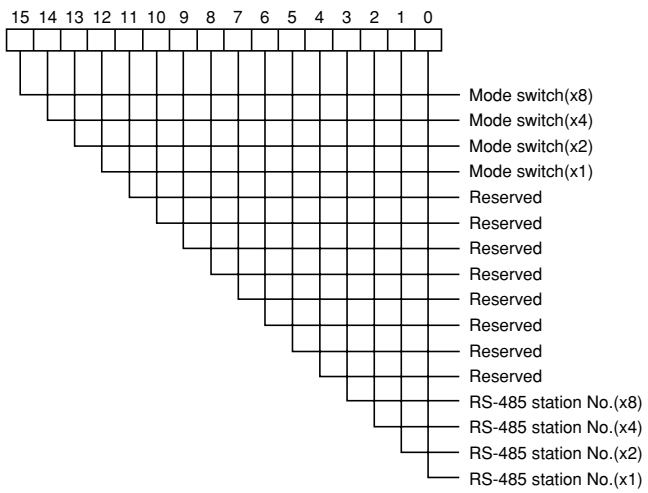
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



3-3-1 General

_ComCKis a FB which performs the start-stop synchronous data transmission between the CPU module and the E5CK series of OMRON Corporation. For the transmission parameters to control OMRON temperature controllers, refer to those manuals.

<Function of _ComCK>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

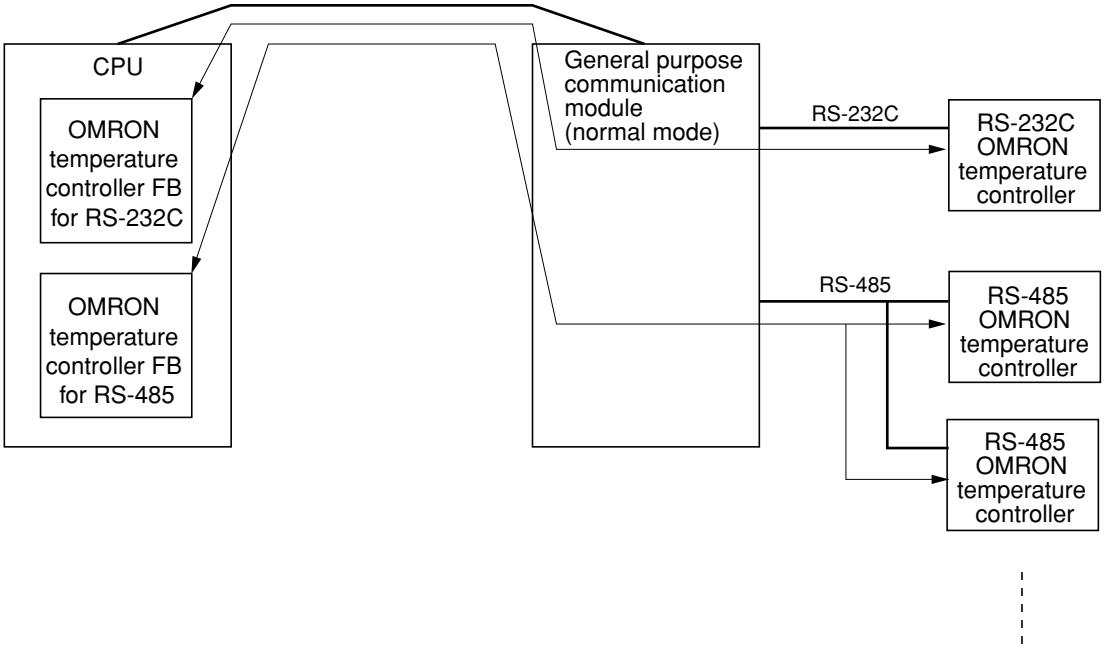
Send the data from an application program in the CPU module to OMRON temperature controller via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The temperature controller can be connected with the RS-232C port by 1:1 or with the RS-485 port by 1:N.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

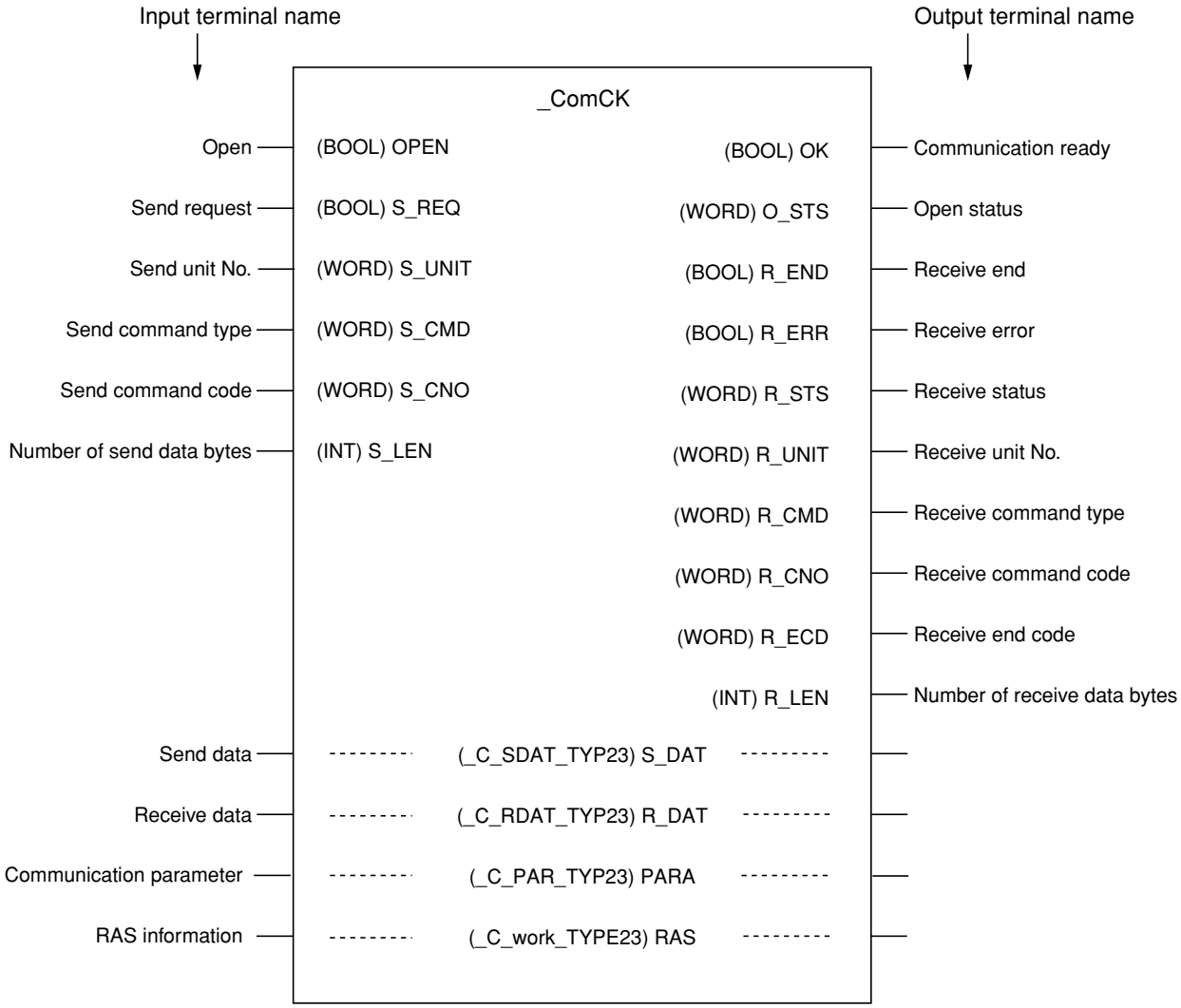
<Memory capacity>

Program area = approx. 2.0K steps
Data memory capacity = Instance memory for user FB: approx. 0.3K words
Standard memory or Retain memory: approx. 0.8K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of temperature controller FB main body as well as that of the sub-FB which is called from the temperature controller FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

3-3-2 Specifications for _ComCK

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Send unit No.	S_UNIT	WORD	IN	Unit No. assigned to the temperature controller
Send command type	S_CMD	WORD	IN	Designates the type of command
Send command code	S_CNO	WORD	IN	For read/write command: Parameter No. For special command: Command No.
Number of send data bytes	S_LEN	INT	IN	Specifies the number of send data bytes.
Send data	S_DAT	_C_SDAT _TYP23	IN_OUT	Stores the send data. WORD type array data with element No. 0 to 31.
Communication parameter	PARA	_C_PAR _TYP23	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Receive end	R_END	BOOL	OUT	Turns ON when receive ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Receive unit No.	R_UNIT	WORD	OUT	Unit No. of a responded temperature controller
Receive command type	R_CMD	WORD	OUT	The type of receive command
Receive command code	R_CNO	WORD	OUT	Stores the command code when receiving.
Receive end code	R_ECD	WORD	OUT	Stores the end code.
Number of receive data bytes	R_LEN	INT	OUT	Stores the number of receive data bytes.
Receive data	R_DAT	_C_RDT _TYP23	IN_OUT	Stores the receive data. WORD type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE23	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 3-3-5 for details.

3-3-3 Initialization

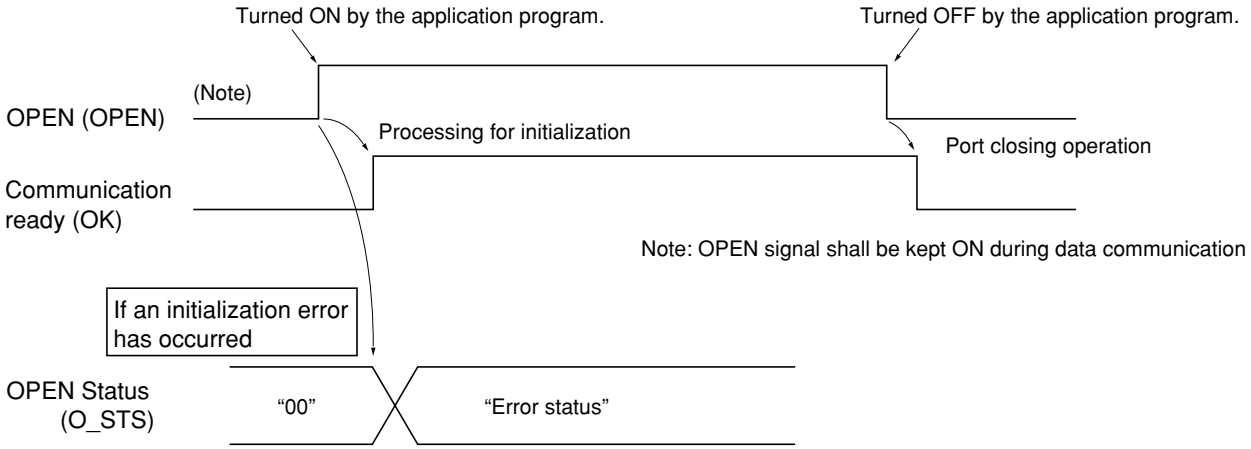
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each “communication parameter” item so as to match the communication specifications of the OMRON-(2) temperature controller. The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 11	Reserved ⋮ Reserved	Not used
12	RS-485 mode	Selects 4-wire or 2-wire for RS-485. 0: 4-wire 1: 2-wire
13	Reserved	Not used
14	Reserved	
15	Reserved	
16	Response monitoring timer	The timer for monitoring during the period from when the CPU module sends a send request to a device until communication ends. Normally set to 100 (=1 second) (in 0.01-second steps).
17	Retry count	In case of communication error, this designates how many times to retry communication.
18 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

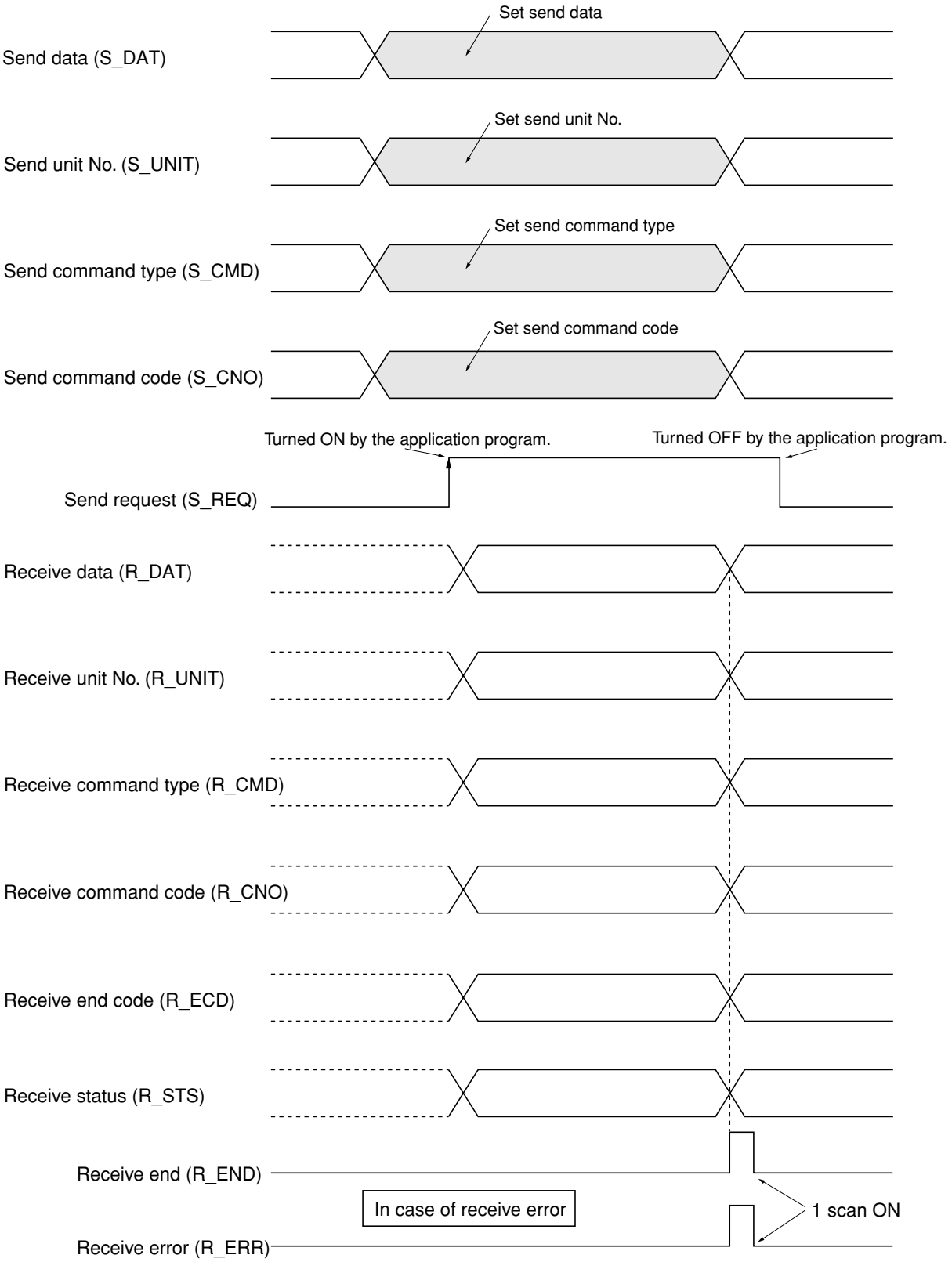


(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Transmissin speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit length error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Response monitoring timer value setting error	
'41'	Retry count setting error	
'42'	Reserved	
'43'	Reserved	
'44'	Reserved	
'45'	Reserved	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error	
'82'	Message port No. setting error	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization.
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because selfdiagnosis is being executed.	Error detected on general purpose communication module

3-3-4 Data sending/receiving

(1) Data sending/receiving procedure



Send data, send unit No., send command type and send command code are set and then send request is turned ON by the application program. FB detects the rising edge to execute the processing for sending. The system automatically enters receiving waiting mode the moment sending is completed, executing the processing for receiving.
When the processing for sending and receiving has completed, receive data, receive unit No., receive command type, receive command code and receive end code are stored, and receive end flag is turned ON (1 scan).
In case of transmission error, both end flag and receive error are turned ON (1 scan).

(2) Sending/receiving status list

No.	Result of sending/receiving	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error	
'42'	BCC error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer has overflowed.	Error detected on general purpose communication module
'C2'	Send buffer has overflowed.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

3-3-5 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE23).
To use RAS information in an application, variables are declared in the following manner:

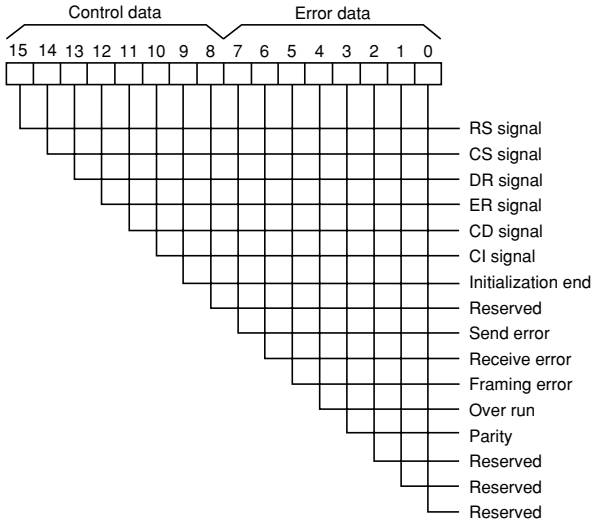
<Sample variable declaration>

```
VAR
  RAS:_C_work_TYPE23;
END_VAR
```

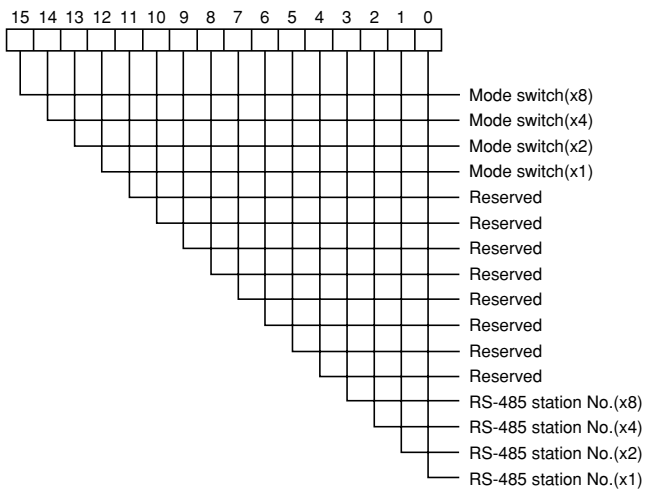
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



3-4-1 General

_CymSDC is a FB which performs the start-stop synchronous data transmission between the CPU module and the SDC40A/40G series of Yamatake Corporation. For the transmission parameters to control Yamatake temperature controllers, refer to those manuals.

<Function of _CymSDC>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

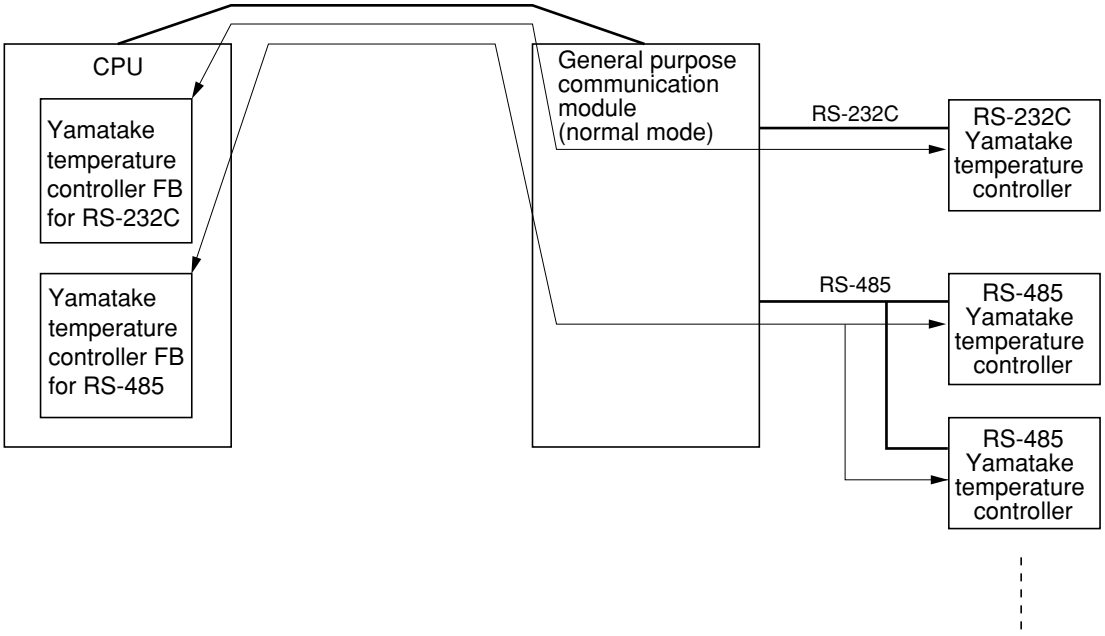
Send the data from an application program in the CPU module to Yamatake temperature controller via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The temperature controller can be connected with the RS-232C port by 1:1 or with the RS-485 port by 1:N.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

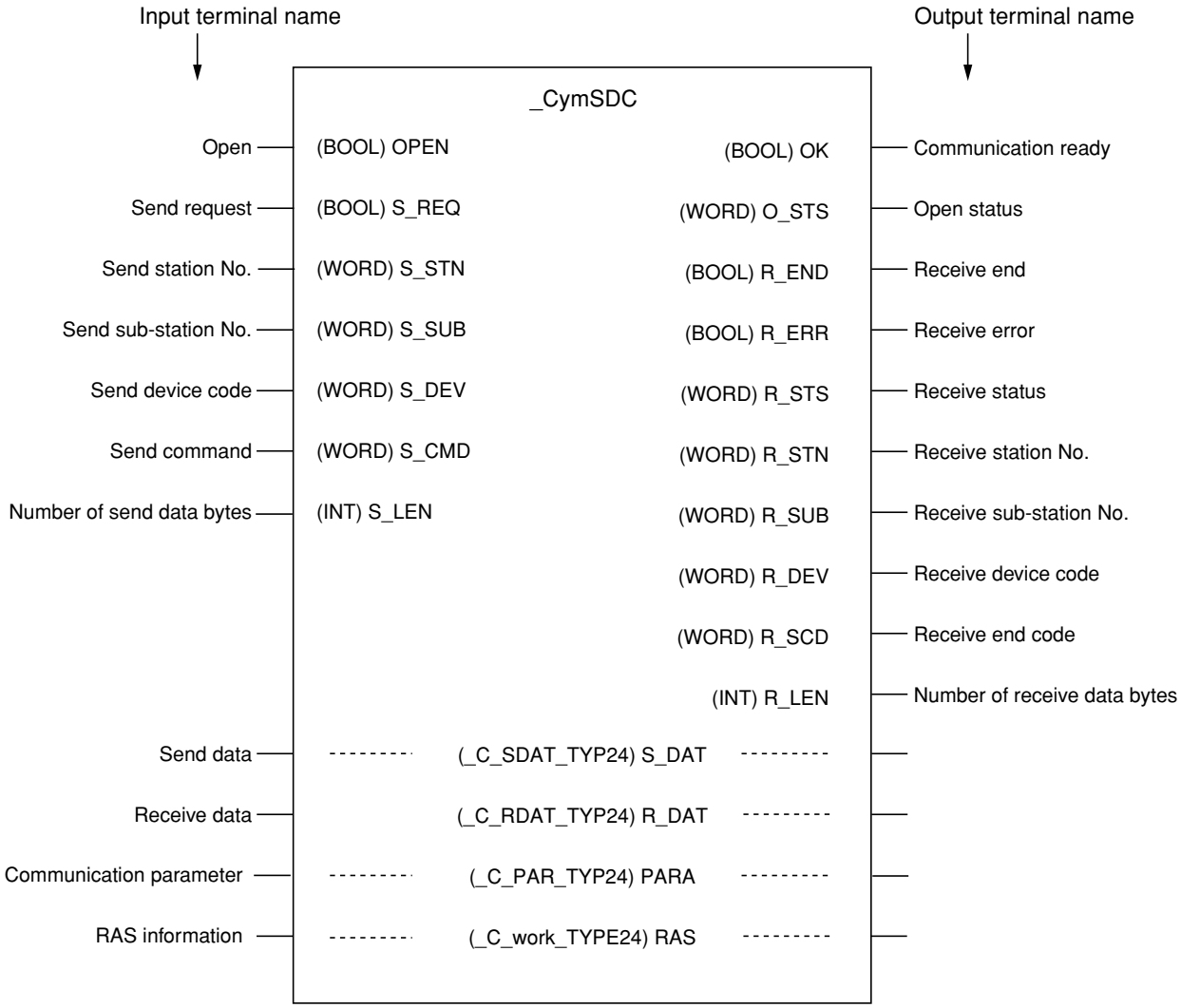
<Memory capacity>

Program area = approx. 2.0K steps
Data memory capacity = Instance memory for user FB: approx. 0.3K words
Standard memory or Retain memory: approx. 0.8K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of temperature controller FB main body as well as that of the sub-FB which is called from the temperature controller FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

3-4-2 Specifications for _CymSDC

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Send station No.	S_STN	WORD	IN	Unit No. assigned to the temperature controller
Send sub-station No.	S_SUB	WORD	IN	Stores the fixed value "00" (WORD#16#3030).
Send device code	S_DEV	WORD	IN	Stores the fixed value "X" (WORD#16#0058).
Send command	S_CMD	WORD	IN	Designates the type of send command
Number of send data bytes	S_LEN	INT	IN	Specifies the number of send data bytes.
Send data	S_DAT	_C_SDAT _TYP24	IN_OUT	Stores the send data. WORD type array data with element No. 0 to 31.
Communication parameter	PARA	_C_PAR _TYP24	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization.
Receive end	R_END	BOOL	OUT	Turns ON when receive ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Receive station No.	R_STN	WORD	OUT	Unit No. of a responded temperature controller
Receive sub-station No.	R_SUB	WORD	OUT	Usually "00" (WORD#16#3030) is returned.
Receive device code	R_DEV	WORD	OUT	Usually "X" (WORD#16#0058) is returned.
Receive end code	R_SCD	WORD	OUT	Stores the end code.
Number of receive data bytes	R_LEN	INT	OUT	Stores the number of receive data bytes.
Receive data	R_DAT	_C_RDAT _TYP24	IN_OUT	Stores the receive data. WORD type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE24	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 3-4-5 for details.

3-4-3 Initialization

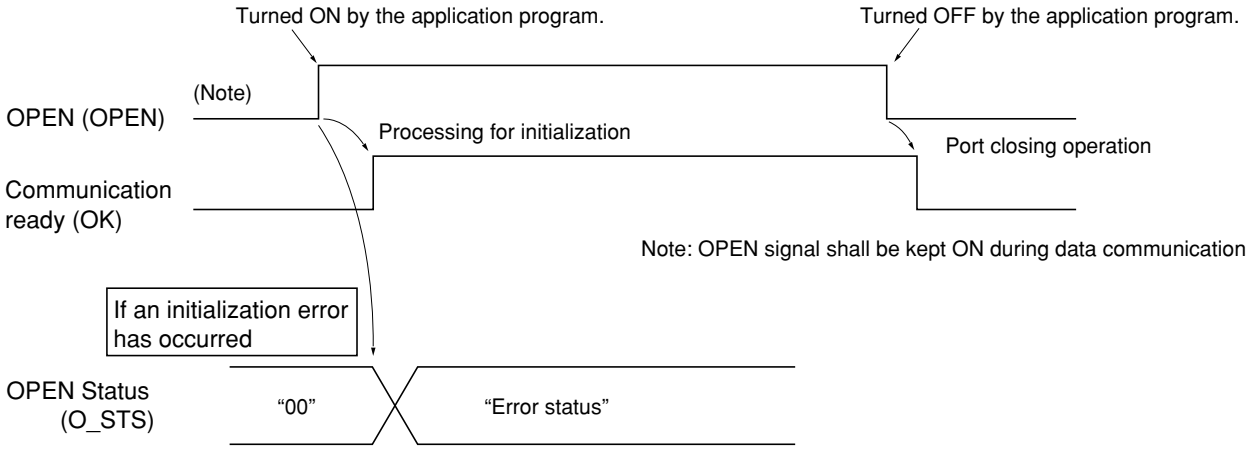
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each "communication parameter" item so as to match the communication specifications of the Yamatake temperature controller. The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 11	Reserved ⋮ Reserved	Not used
12	RS-485 mode	Selects 4-wire or 2-wire for RS-485. 0: 4-wire 1: 2-wire
13 ⋮ 15	Reserved ⋮ Reserved	Not used
16	BCC designation	
17	Response monitoring timer	The timer for monitoring during the period from when the CPU module sends a send request to a device until communication ends. Normally set to 100 (=1 second) (in 0.01-second steps).
18	Retry count	In case of communication error, this designates how many times to retry communication.
19 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

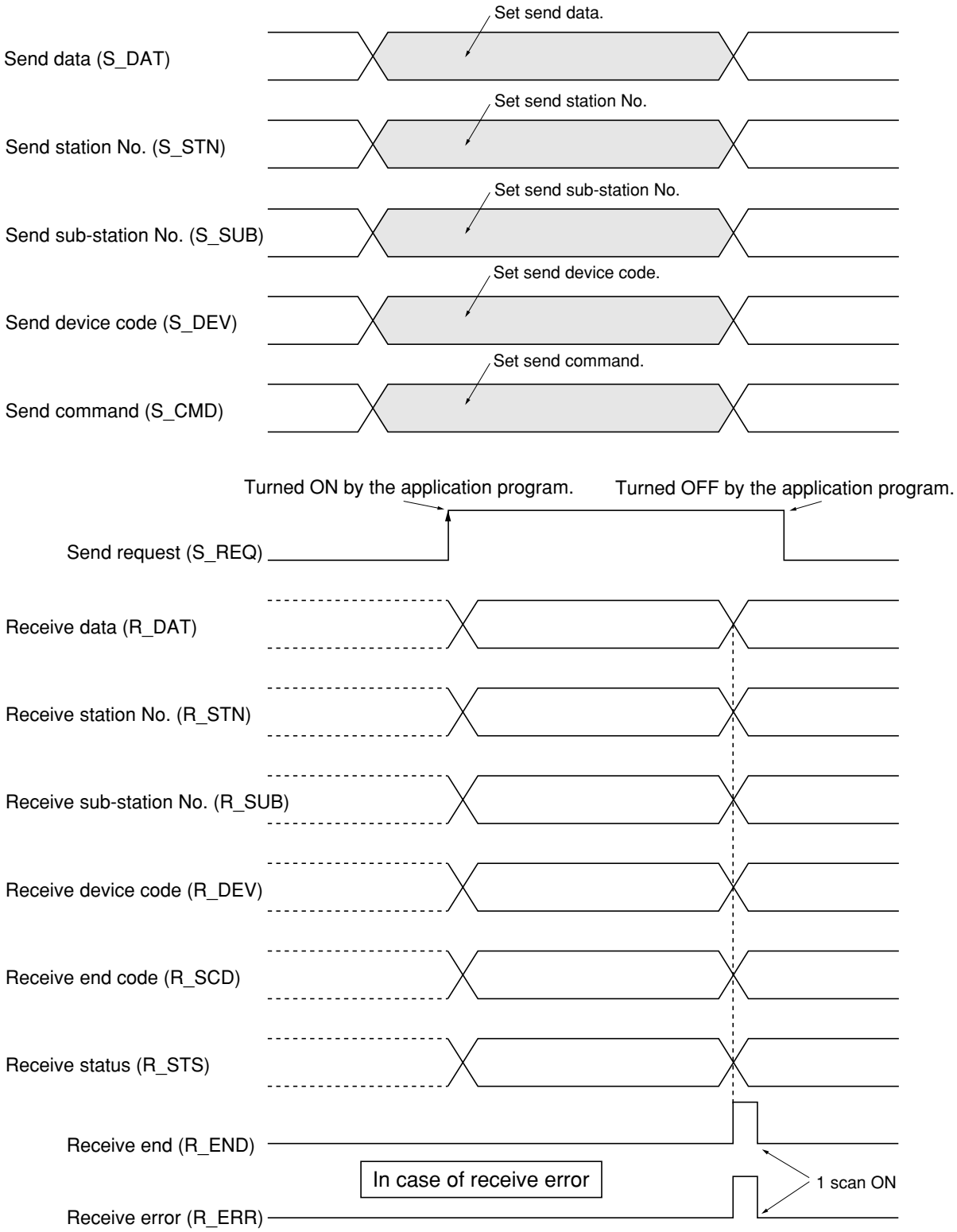


(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Transmission speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'08'	RS-485 mode setting error	Error detected on general purpose communication module
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Response monitoring timer value setting error	
'41'	Retry count setting error	
'42'	Reserved	
'43'	Reserved	
'44'	BCC designation error	
'45'	Reserved	
'46'	Reserved	
'47'	Reserved	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error	
'82'	Message port No. setting error	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

3-4-4 Data sending/receiving

(1) Data sending/receiving procedure



Send data, send station No., send sub-station No., send device code and send command are set and then send request is turned ON by the application program. FB detects the rising edge to execute the processing for sending. The system automatically enters receiving waiting mode the moment sending is completed, executing the processing for receiving. When the processing for sending and receiving has completed, receive data, receive station No., receive sub-station No., receive device code and receive end code are stored, and receive end flag is turned ON (1 scan).
In case of transmission error, both end flag and receive error are turned ON (1 scan).

(2) Sending/receiving status list

No.	Result of sending/receiving	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error	
'42'	BCC error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer has overflowed.	Error detected on general purpose communication module
'C2'	Send buffer has overflowed.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

3-4-5 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE24).
To use RAS information in an application, variables are declared in the following manner:

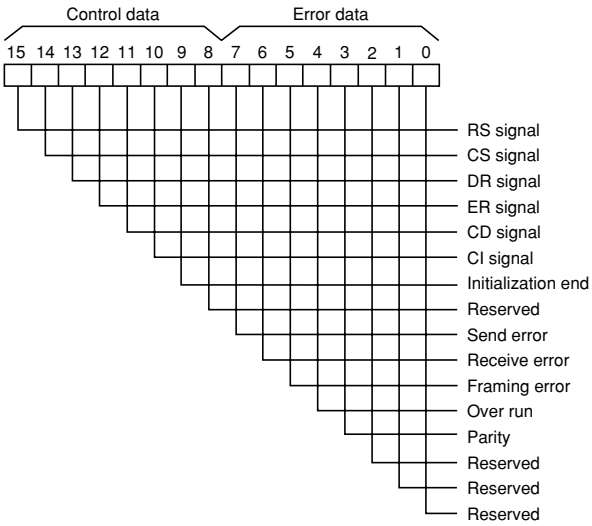
<Sample variable declaration>

```
VAR
  RAS:_C_work_TYP24;
END_VAR
```

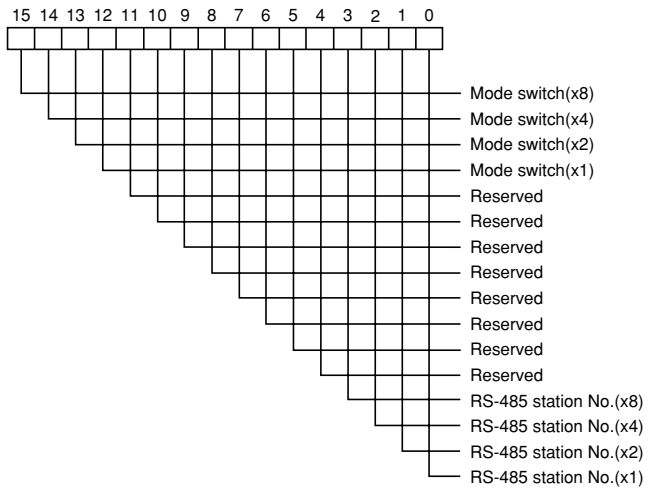
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



Section 4 ID System FB

Page

Section 4 ID System FB
4-1 OMRON _ComV6

4-1-1 General

_ComV6 is a FB which performs the start-stop synchronous data transmission between the CPU module and the ID system V600 series of OMRON Corporation. For the transmission parameters to control ID system V600, refer to those manuals.

<Function of _ComV6>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

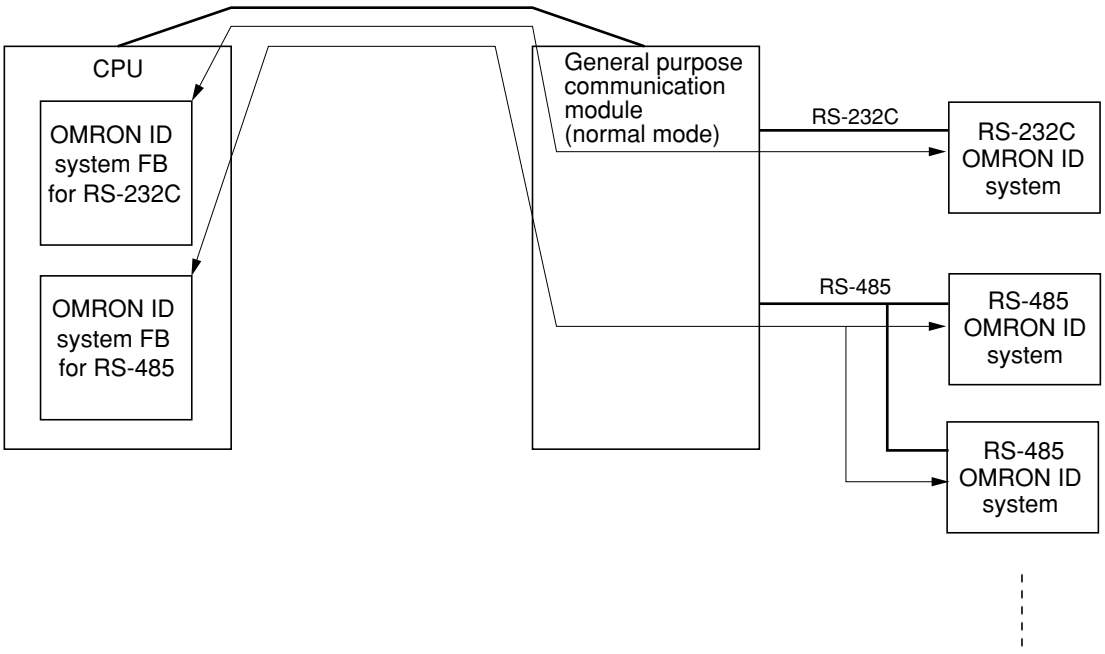
Send the data from an application program in the CPU module to OMRON ID system via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The ID system can be connected with the RS-232C port by 1:1.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

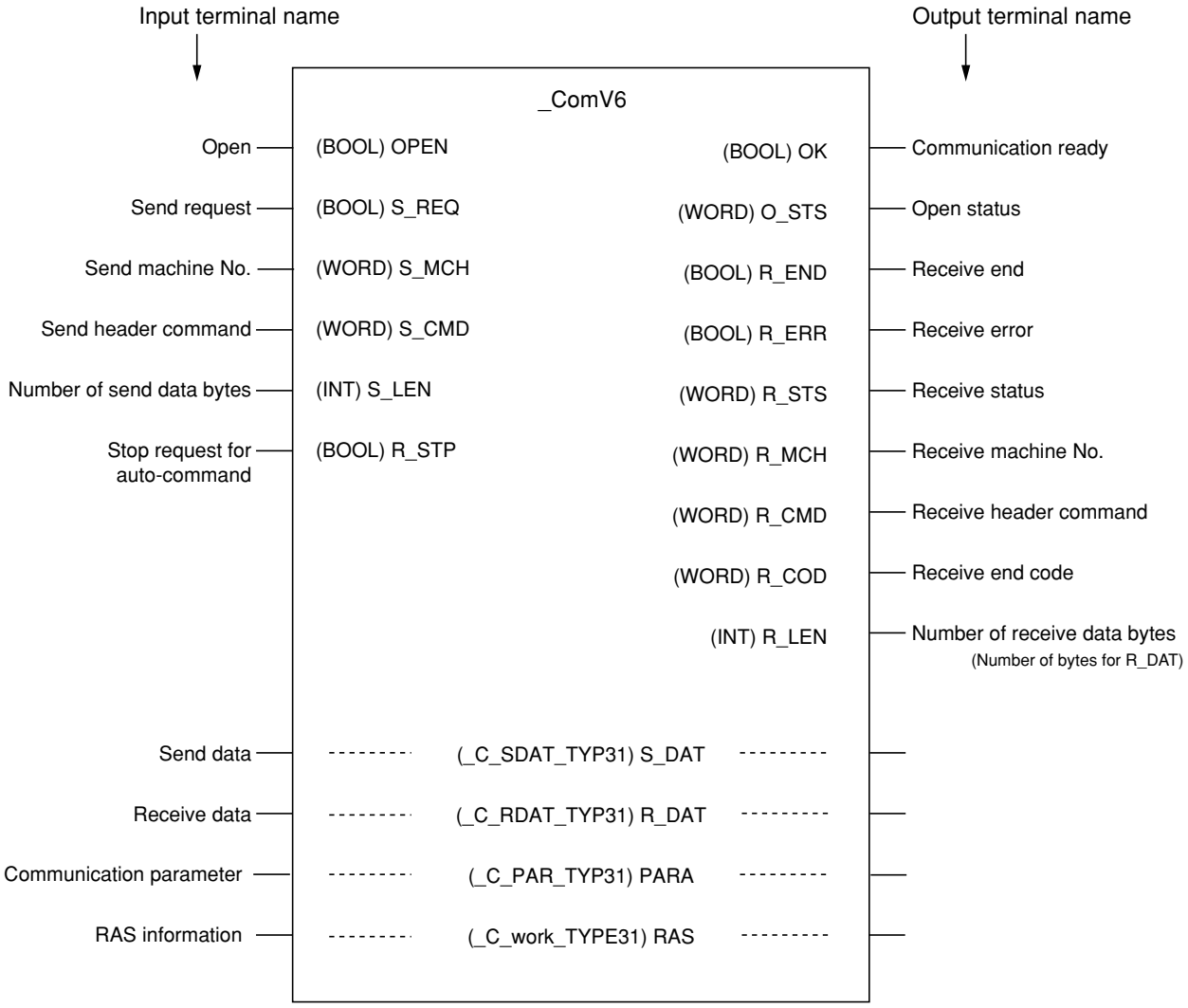
<Memory capacity>

Program area = approx. 2.1K steps
Data memory capacity = Instance memory for user FB: approx. 0.3K words
Standard memory or Retain memory: approx. 0.8K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of ID system FB main body as well as that of the sub-FB which is called from the ID system FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

4-1-2 Specifications for _ComV6

(1) FB Format



* Send machine No. (S_MCH) and receive machine No. (R_MCH) are available for 1:N connecting. It is ignored for 1:1 connecting.

Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Send machine No.	S_MCH	WORD	IN	Machine No. assigned to V600
Send header command	S_CMD	WORD	IN	Command for V600. For details, refer to V600 user's manual.
Number of send data bytes	S_LEN	INT	IN	Specifies the number of send data bytes.
Send data	S_DAT	_C_SDAT _TYP31	IN_OUT	Stores send data. WORD type array data with element No. 0 to 39.
Stop request for auto-command	R_STP	BOOL	IN	Stops executing of auto-command.
Communication parameter	PARA	_C_PAR _TYP31	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Receive end	R_END	BOOL	OUT	Turns ON when receive ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Receive unit No.	R_MCH	WORD	OUT	Machine No. assigned to V600.
Receive header command.	R_CMD	WORD	OUT	Command specified on sending is stored, except at error occurrence.
Receive end code	R_COD	WORD	OUT	Stores the end code.
Number of receive data bytes	R_LEN	INT	OUT	Stores the number of receive data bytes.
Receive data	R_DAT	_C_RDAT _TYP31	IN_OUT	Stores the receive data. WORD type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE31	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 3-2-5 for details.

4-1-3 Initialization

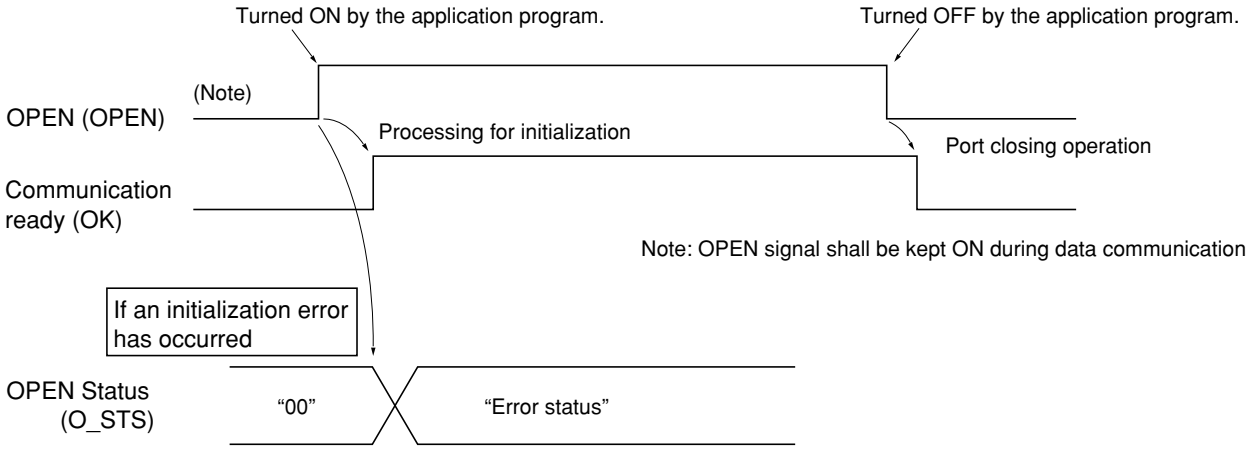
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each “communication parameter” item so as to match the communication specifications of the ID system V600 temperature controller. The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 15	Reserved ⋮ Reserved	Not used
16	Response monitoring timer	The timer for monitoring during the period from when the CPU module sends a send request to a device until communication ends. Normally set to 100 (=1 second) (in 0.01-second steps).
17	Retry count	In case of communication error, this designates how many times to retry communication.
18	Transmission mode	Designates the transmission mode. 0: (1:1) mode, 1: (1:N) mode
19 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

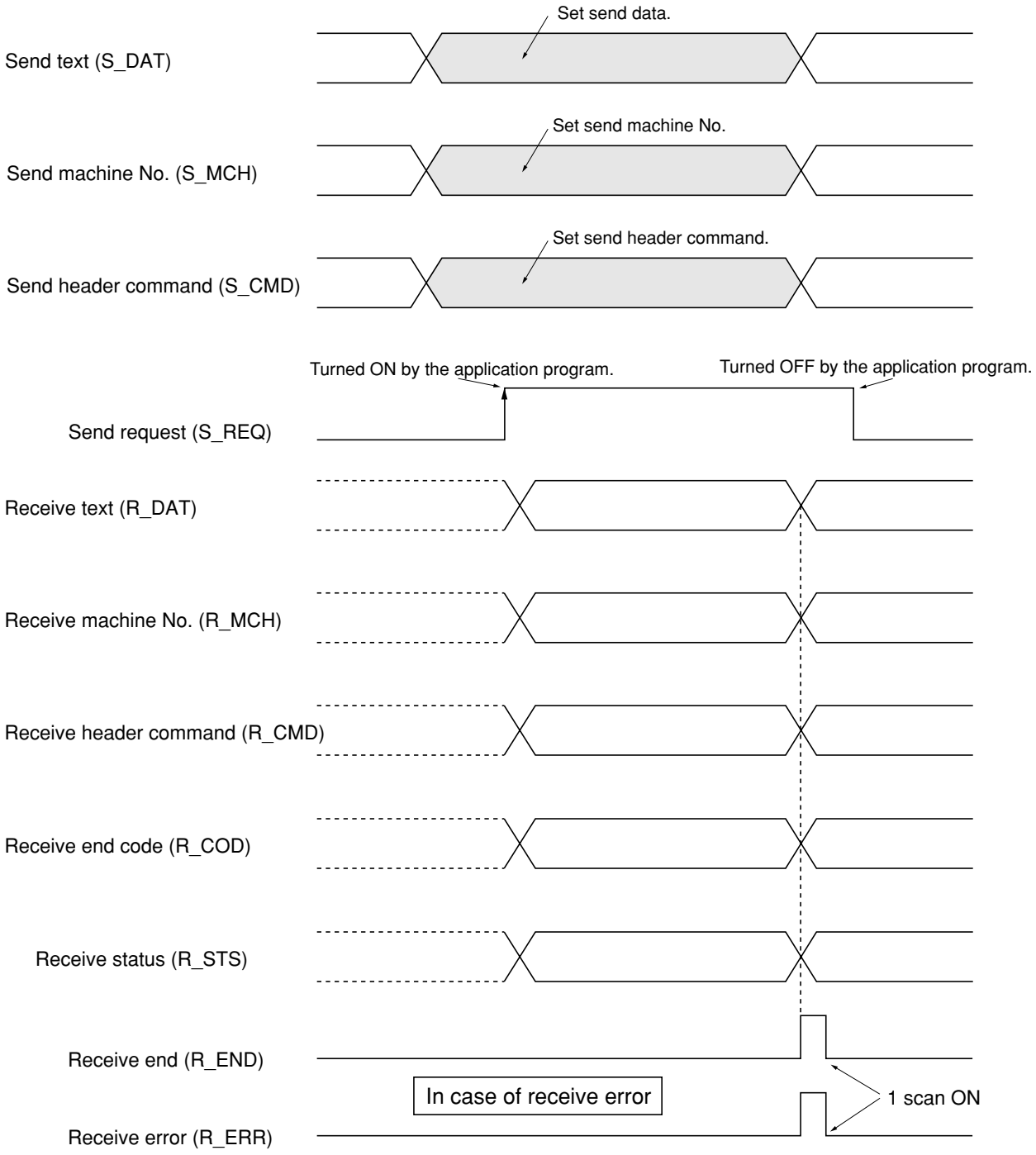


(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Transmission speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Response monitoring timer value setting error	
'41'	Retry count setting error	
'42'	Reserved	
'43'	Reserved	
'44'	Reserved	
'45'	Reserved	
'46'	Reserved	
'47'	Reserved	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error	
'82'	Message port No. setting error	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

4-1-4 Data sending/receiving

(1) Data sending/receiving procedure



Send data, send machine No. and send header command are set and then send request is turned ON by the application program. FB detects the rising edge to execute the processing for sending. The system automatically enters receiving waiting mode the moment sending is completed, executing the processing for receiving.
When the processing for sending and receiving has completed, receive data, receive machine No., receive header command and receive end code are stored, and receive end flag is turned ON (1 scan).
In case of transmission error, both end flag and receive error are turned ON (1 scan).

(2) Sending/receiving status list

No.	Result of sending/receiving	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Data send time-out	
'41'	Protocol response error	
'42'	BCC error	
'90'	eneral purpose communication module disconnected	Not detected
'91'	SX bus send error	
'92'	SX bus Receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being exscuted.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

4-1-5 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE31).
To use RAS information in an application, variables are declared in the following manner:

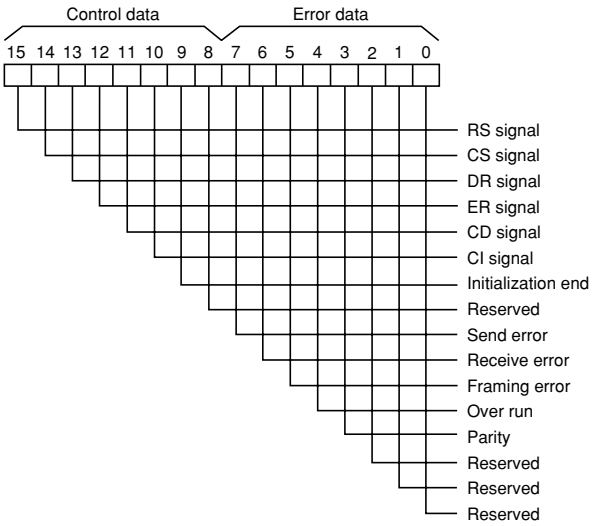
<Sample variable declaration>

```
VAR
  RAS：_C_work_TYPE31；
END_VAR
```

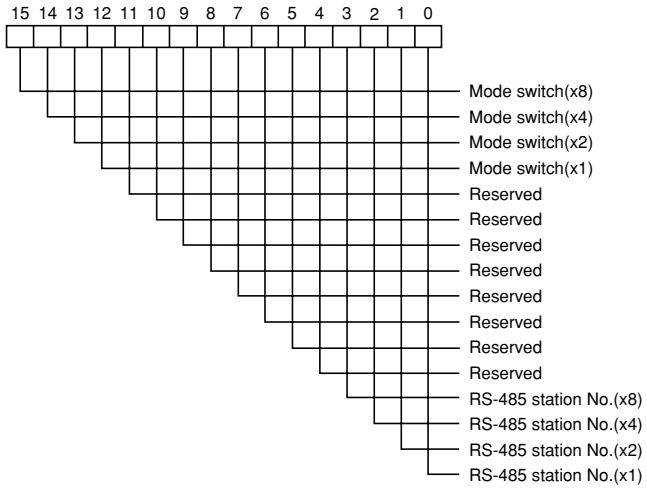
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



4-2-1 General

_CshDS is a FB which performs the start-stop synchronous data transmission between the CPU module and the DS-XXX series of SHARP CORPORATION. For the transmission parameters to control SHARP ID system, refer to those manuals.

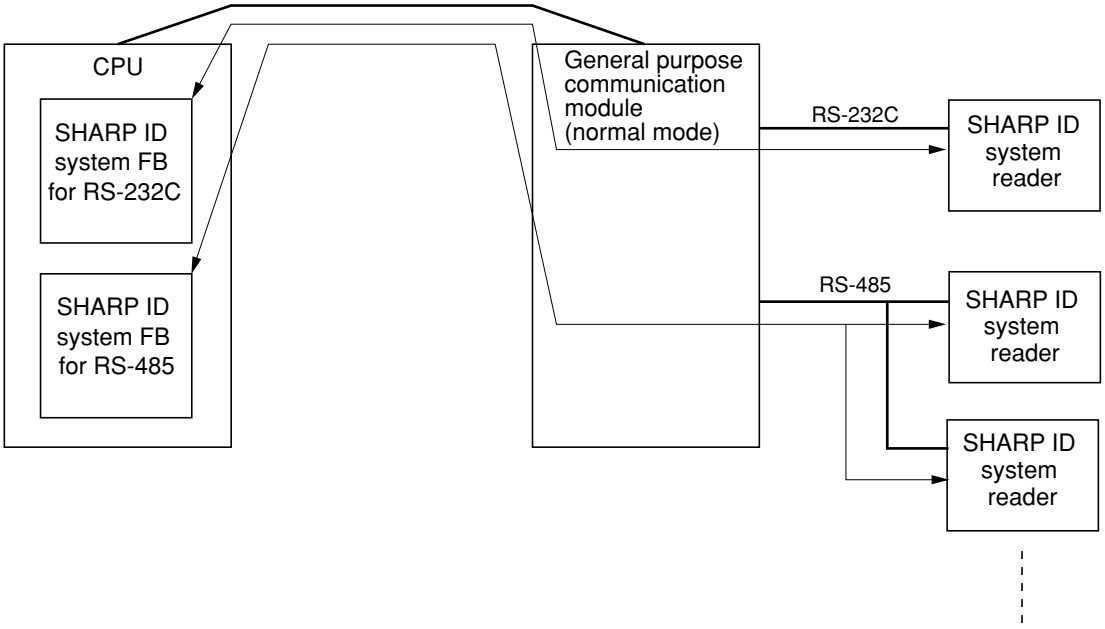
<Function of _CshDS>

1) Initialization of communication ports
Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function
Send the data from an application program in the CPU module to SHARP ID system via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function
Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>
The ID system can be connected with the RS-232C port by 1:1 or with the RS-485 port by 1:N.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

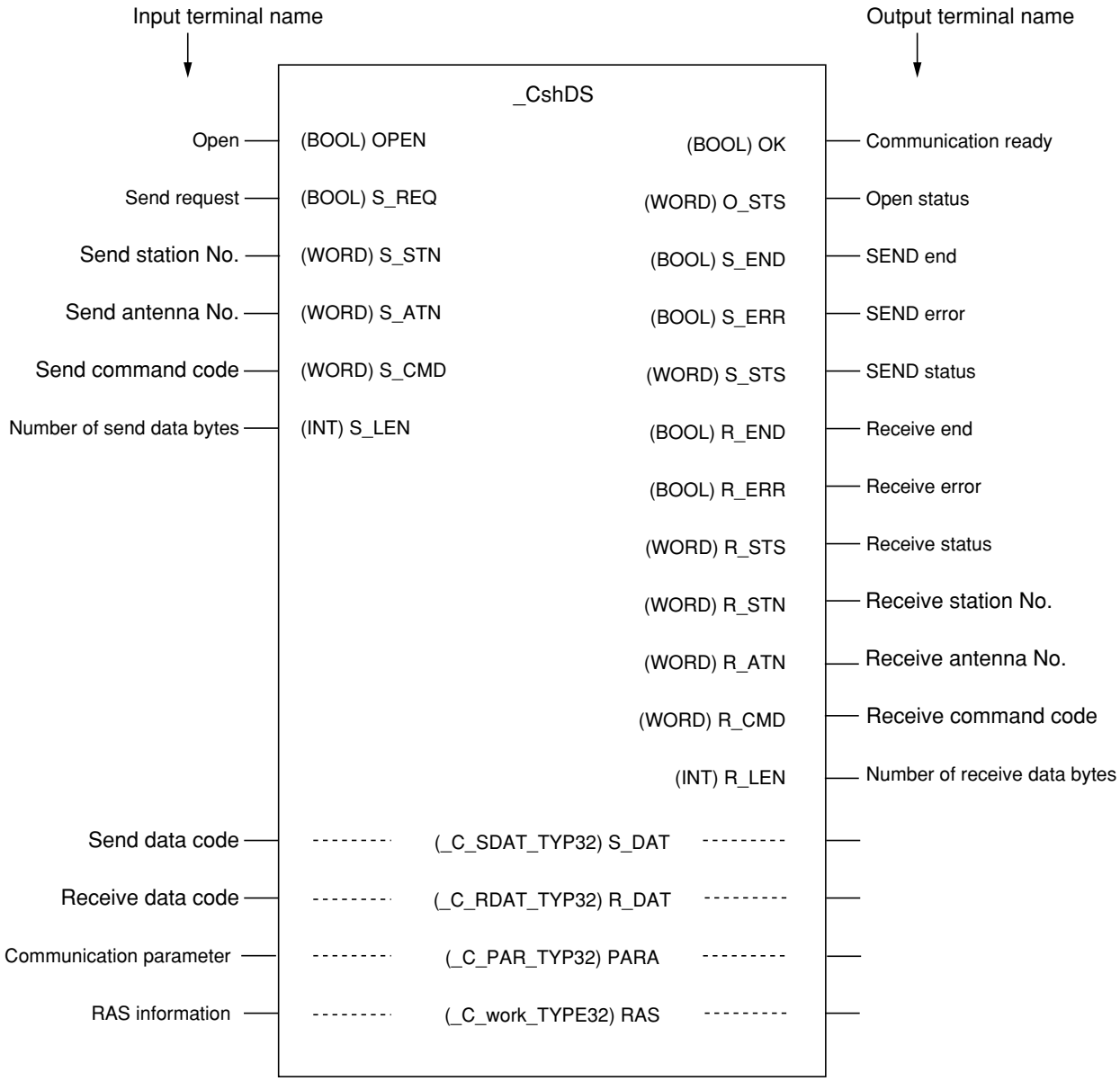
<Memory capacity>

Program area	= approx. 1.9K steps		
Data memory capacity	= Instance memory for user FB:	approx. 0.3K words	
	Standard memory or Retain memory:	approx. 0.8K words	
	Instance memory for system FB:	approx. 0.1K words	

Note1: The above memory area includes the capacity of ID system FB main body as well as that of the sub-FB which is called from the ID system FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

4-2-2 Specifications for _CshDS

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Send station No.	S_STN	WORD	IN	Station No. assigned to the ID controller
Send antenna No.	S_ATN	WORD	IN	Stores the antenna No.
Send command code	S_CMD	WORD	IN	Sets the send command code
Number of send data bytes.	S_LEN	INT	IN	Specifies the number of send data bytes.
Send data code	S_DAT	_C_SDAT _TYP32	IN_OUT	Stores send data. WORD type array data with element No. 0 to 31.
Communication parameter	PARA	_C_PAR _TYP32	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Send end	S_END	BOOL	OUT	Turns ON when receive ends.
Send error	S_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Send status	S_STS	WORD	OUT	Receive result code.
Receive end	R_END	BOOL	OUT	Turns ON when send ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a send error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Receive station No.	R_STN	WORD	OUT	Stores the receive station No.
Receive antenna No.	R_ATN	WORD	OUT	Stores the receive station No.
Receive command code	R_CMD	WORD	OUT	Stores the command code when received.
Number of receive data bytes.	R_LEN	INT	OUT	Stores the number of receive data bytes.
Receive data code	R_DAT	_C_RDAT _TYP32	IN_OUT	Stores the receive data. WORD type array data with element No. 0 to 31.
RAS Information	RAS	_C_work _TYPE32	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 4-2-6 for details.

4-2-3 Initialization

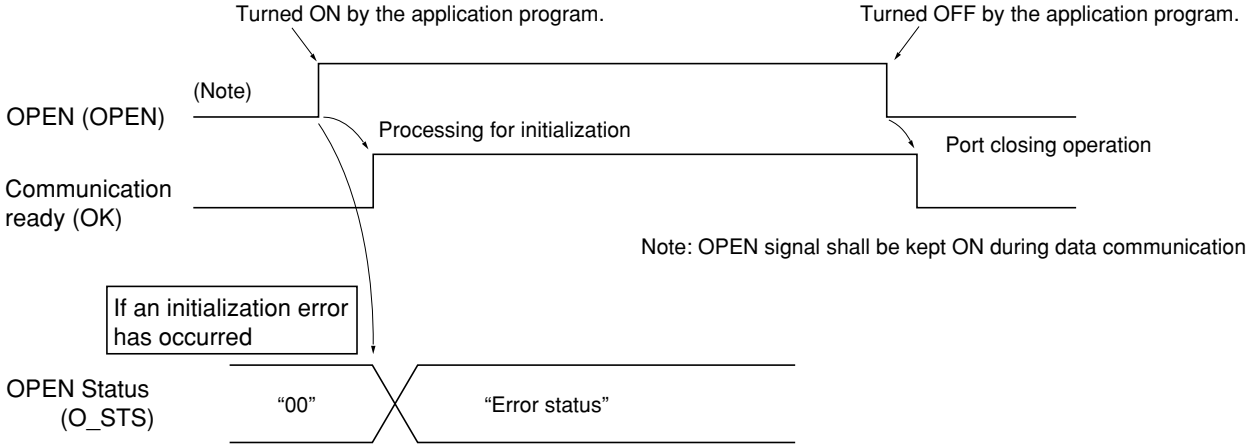
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each "communication parameter" item so as to match the communication specifications of the SHARP ID system.
The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit	Designates the data bit length. 0: 7 bits (when ASCII code is used) 1: 8 bits (when EBCDIC code is used)
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 11	Reserved ⋮ Reserved	Not used
12	RS-485 mode	Selects 4-wire or 2-wire for RS-485. 0: 4-wire 1: 2-wire
13 ⋮ 15	Reserved ⋮ Reserved	Not used
16	Response monitoring timer	The timer for monitoring during the period from when the CPU module sends a send request to a device until communication ends. Normally set to 100 (=1 second) (in 0.01-second steps).
17 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

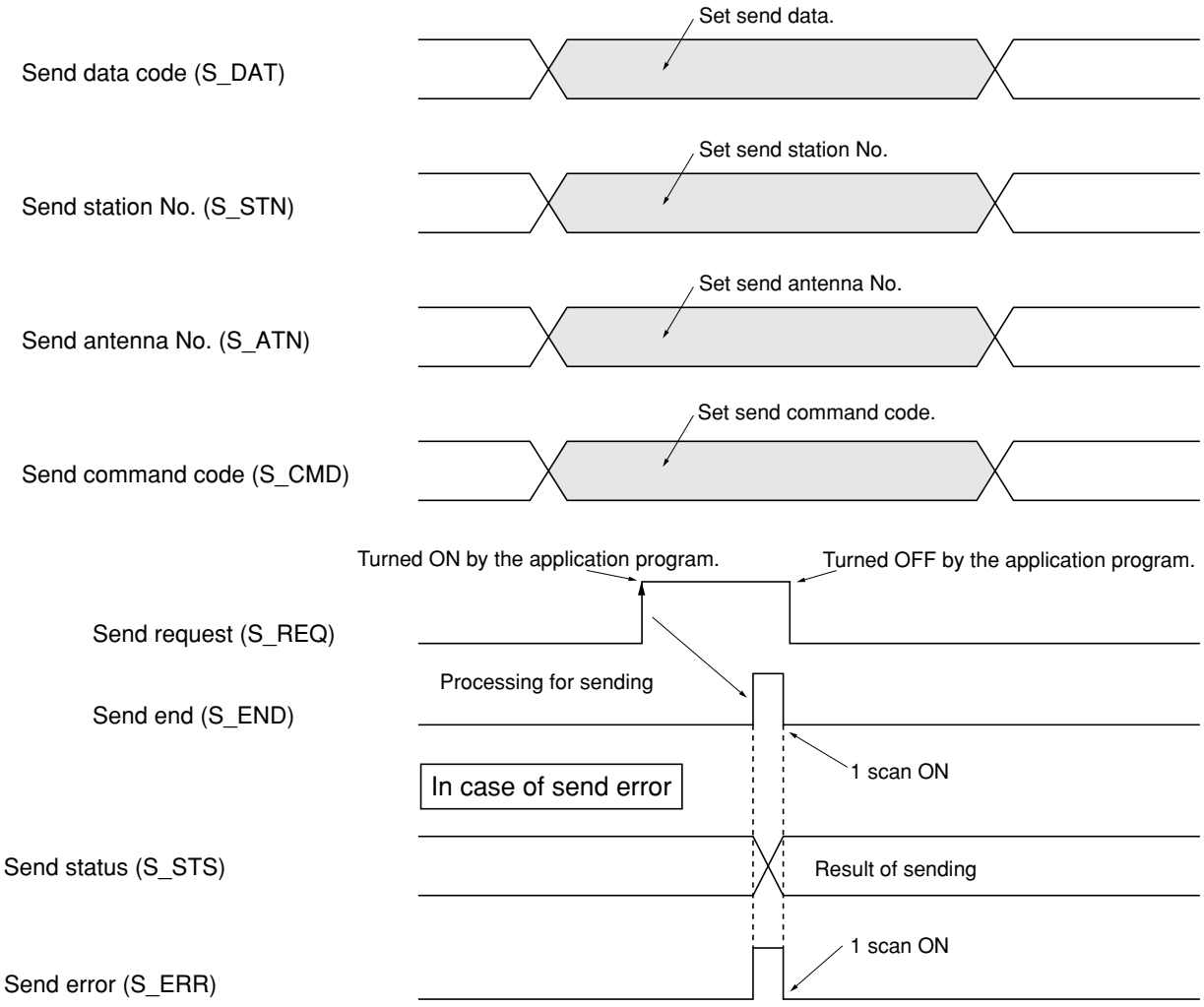


(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Transmission speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'08'	RS-485 mode setting error	
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Response monitoring timer value setting error	
'41'	Reserved	
'42'	Reserved	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error	
'82'	Message port No. setting error	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

4-2-4 Data sending

(1) Data sending procedure



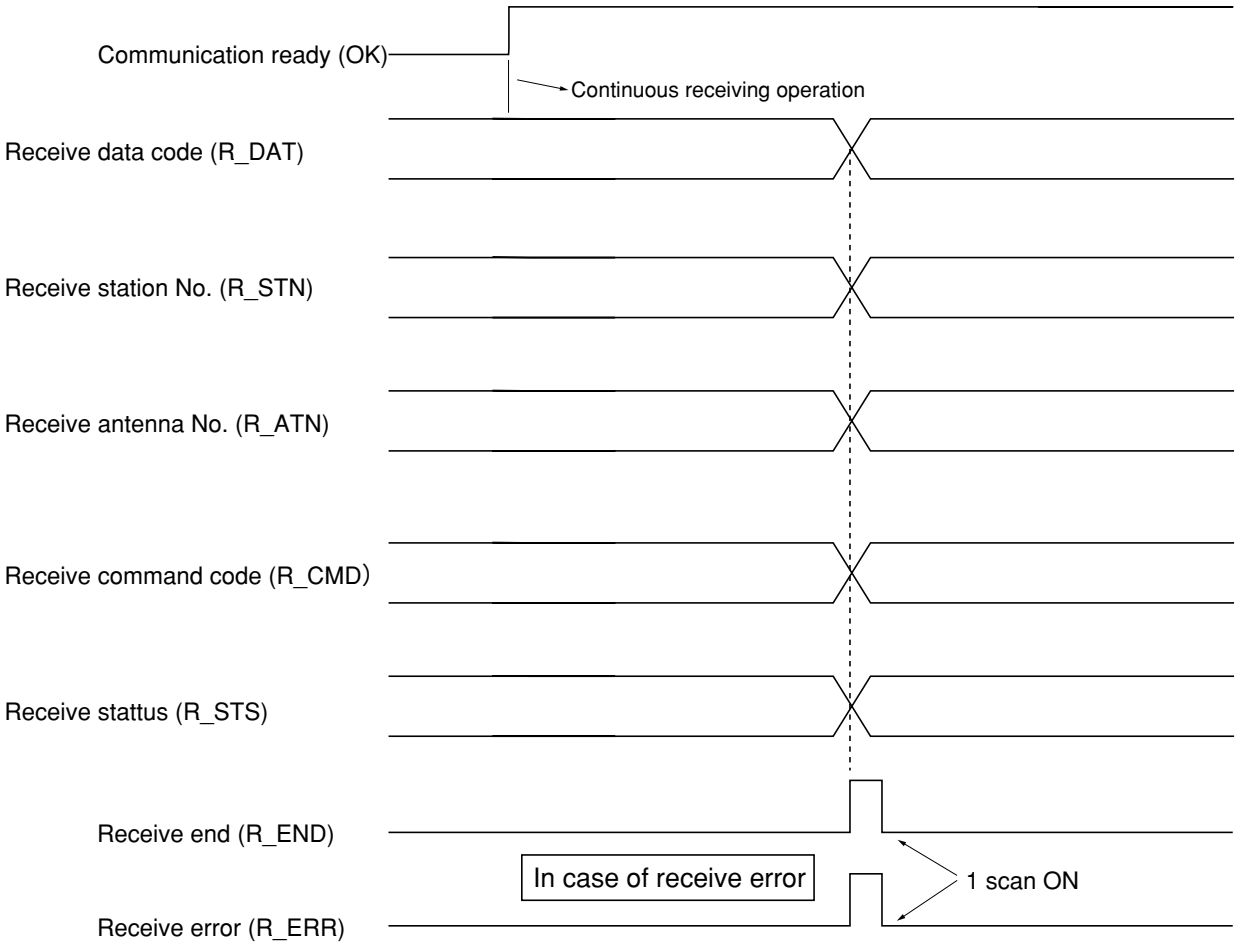
Send data, send station No., send antenna No. and send command code are set and then send request is turned ON by the application program. FB detects the rising edge to execute the processing for sending.
When the processing for sending and receiving has completed, receive end flag is turned ON (1 scan).
In case of transmission error, both end flag and receive error are turned ON (1 scan), and the error code is output in the send status (“00” when ended normally).

(2) Sending status list

No.	Result of sending	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Received	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Data send time-out	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Nunber of send data over.	Error detected on general purpose communication module

4-2-5 Data receiving

(1) Data receiving procedure



While the communication ready flag is turned ON, whether the data to be received exists or not is checked continuously and, when it exists, the operation for receiving is executed. When a delimiter between data frames is detected, the receive data, the receive station No., the receive antenna No. and the receive command code are stored and the receive end flag is turned ON (1 scan). The receiving result is stored in the receive status. If a receive error has occurred, the receive end and the receive error are turned ON (1 scan).

(2) Receiving status list

No.	Result of receiving	Remarks
'00'	Ended normally	
'01'	Reserved	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error	
'42'	BCC error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being excecuted.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

4-2-6 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE32).
To use RAS information in an application, variables are declared in the following manner:

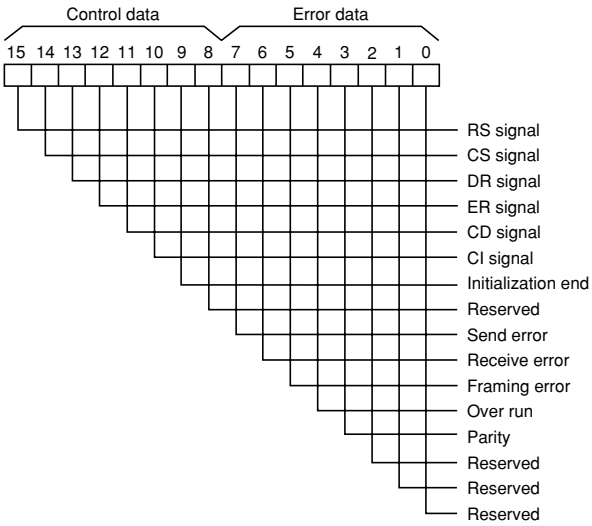
<Sample variable declaration>

```
VAR
  RAS : _C_work_TYPE32 ;
END_VAR
```

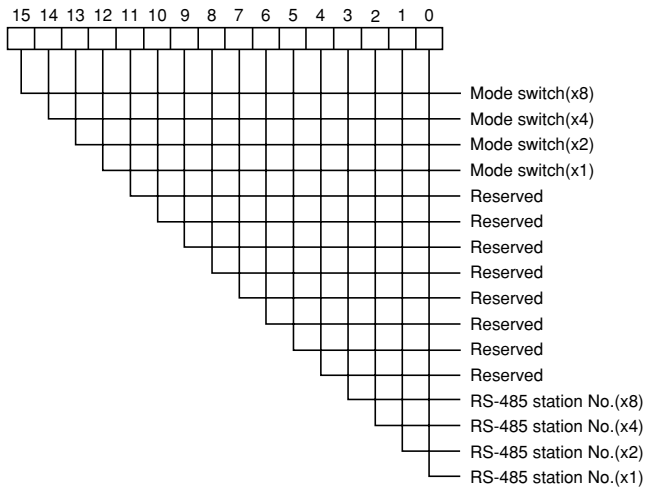
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



4-3-1 General

_CymWAM is a FB which performs the start-stop synchronous data transmission between the CPU module and the WAM100 series of Yamatake Corporation. For the transmission parameters to control ID system WAM100, refer to those manuals.

<Function of _CymWAM>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

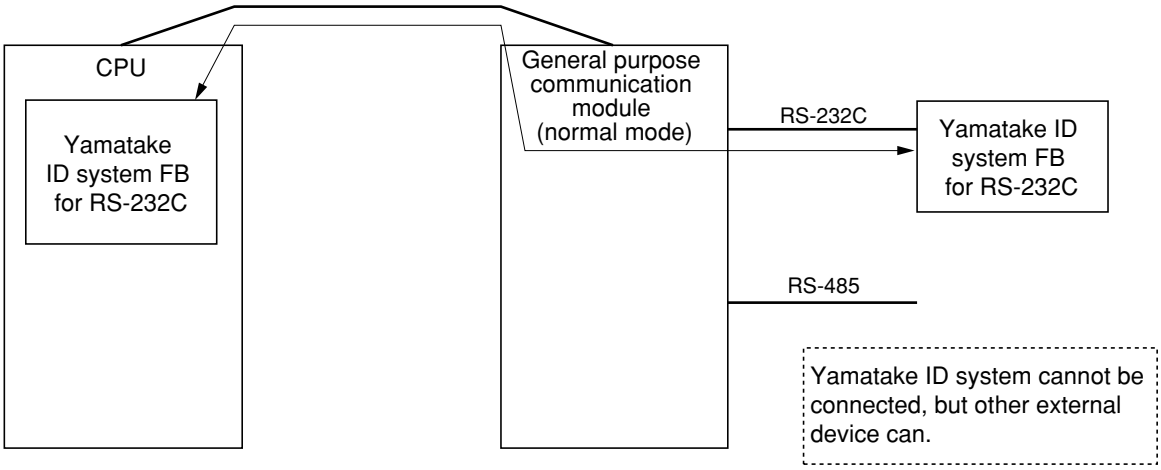
Send the data from an application program in the CPU module to Yamatake ID system via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The ID system can be connected with the RS-232C port by 1:1.
Yamatake ID system cannot be connected to the RS-485 port.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

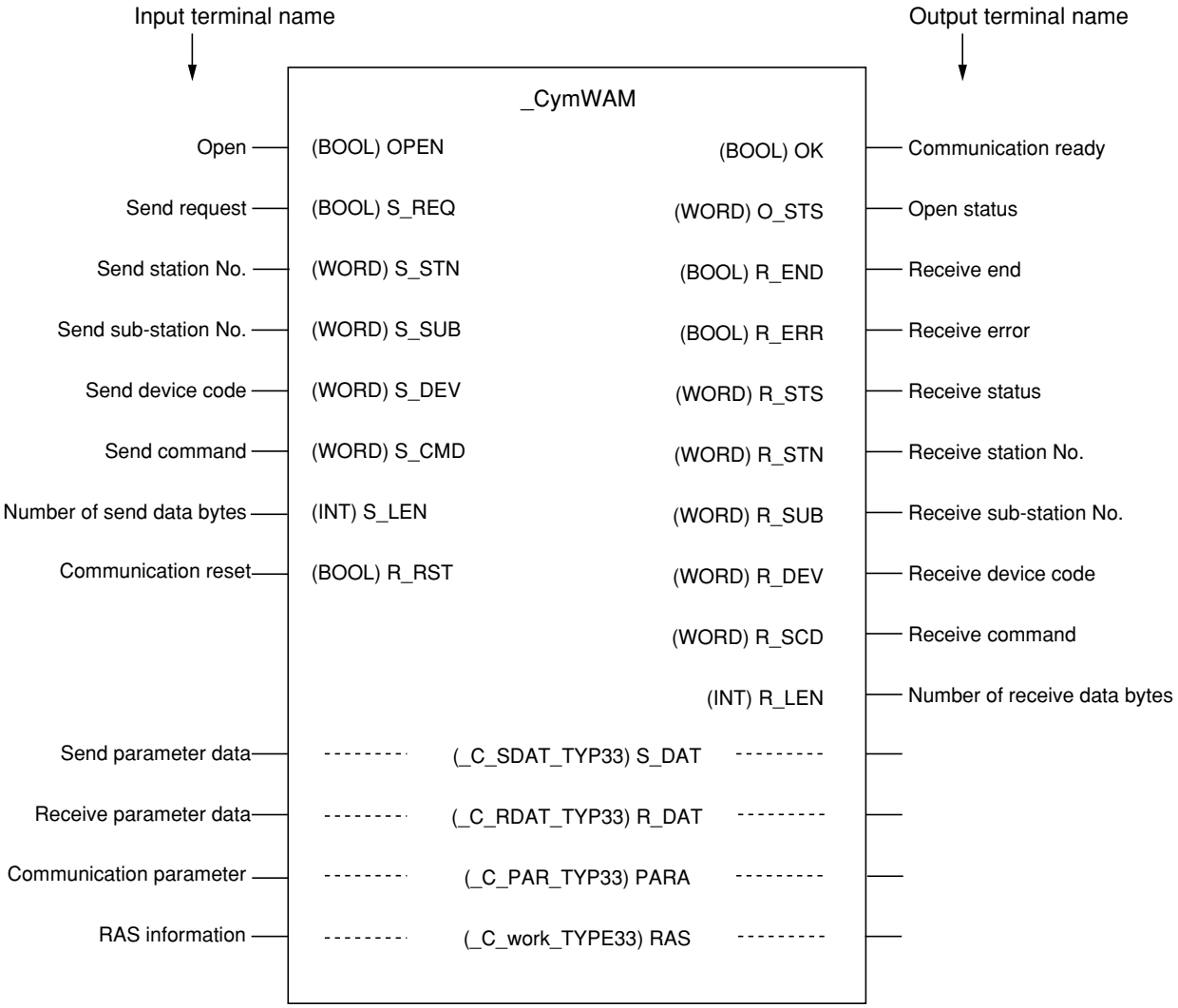
<Memory capacity>

Program area = approx. 2.3K steps
Data memory capacity = Instance memory for user FB: approx. 0.3K words
Standard memory or Retain memory: approx. 0.8K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of ID system FB main body as well as that of the sub-FB which is called from the ID system FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

4-3-2 Specifications for _CymWAM

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Send station No.	S_STN	WORD	IN	Stores the station No. set on the WAM100 side.
Send sub-station No.	S_SUB	WORD	IN	Stores fixed value "F0" (WORD#16#3046).
Send machine code	S_DEV	WORD	IN	Stores fixed value "T" (WORD#16#0054).
Send command	S_CMD	WORD	IN	Sets the send command code
Number of send data bytes	S_LEN	INT	IN	Specifies the number of send data bytes.
Send parameter data	S_PARA	_C_SDAT _TYP33	IN_OUT	Stores the send parameters. WORD type array data with element No. 0 to 31.
Communication cancel request	R_RST	BOOL	IN	Turns ON when cancel communicate.
Communication parameter	PARA	_C_PAR _TYP33	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Send end	R_END	BOOL	OUT	Turns ON when receive ends.
Send error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Send stattus	R_STS	WORD	OUT	Receive result code.
Receive station No.	R_STN	WORD	OUT	Stores the receive station No.
Receive sub-station No.	R_SUB	WORD	OUT	Usually "F0" (WORD#16#3046) is returned.
Receive machine code	R_DEV	WORD	OUT	Usually "T" (WORD#16#0054) is returned.
Receive command	R_SCD	WORD	OUT	Stores the receive command.
Number of receive data bytes	R_LEN	INT	OUT	Stores the number of receive data bytes.
Receive parameter data	R_PARA	_C_RDAT _TYP33	IN_OUT	Stores the receive parameter data WORD type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE33	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 4-3-5 for details.

4-3-3 Initialization

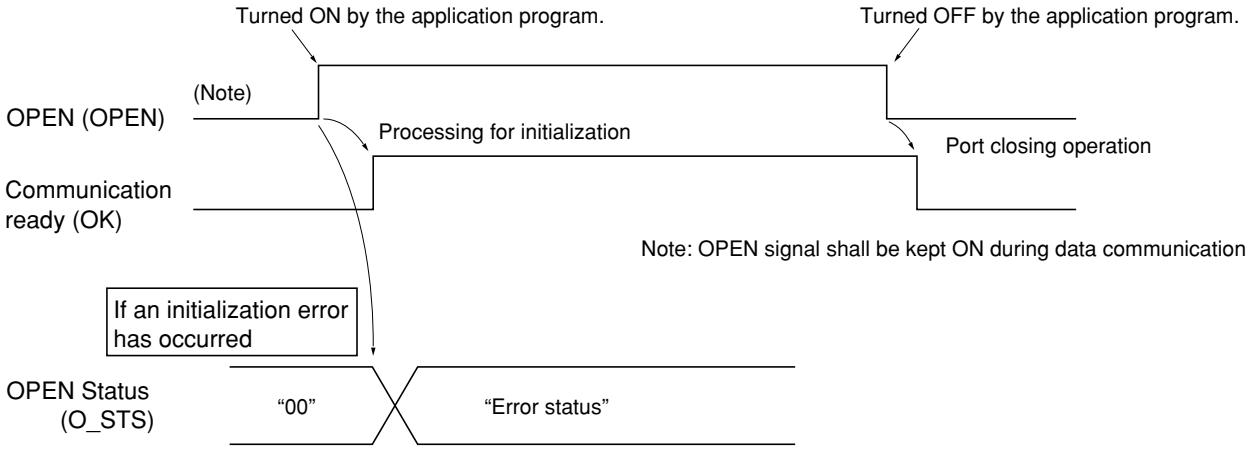
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each "communication parameter" item so as to match the communication specifications of the ID system WAM100.
The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None, 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit, 2: 2 bits
8 ⋮ 15	Reserved ⋮ Reserved	Not used
16	BCC designation	Sets whether or not to add horizontal parity for checking text data transmission error. 0: No 1: Yes
17	Retry count	In case of communication error, this designates how many times to retry communication.
18	Data type	Designates the data types. 0:character, 1:HEX, 2:binary
19	Response monitoring timer	The timer for monitoring during the period from when the CPU module sends a send request to a device until communication ends. Normally set to 100 (=1 second) (in 0.01-second steps).
20 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

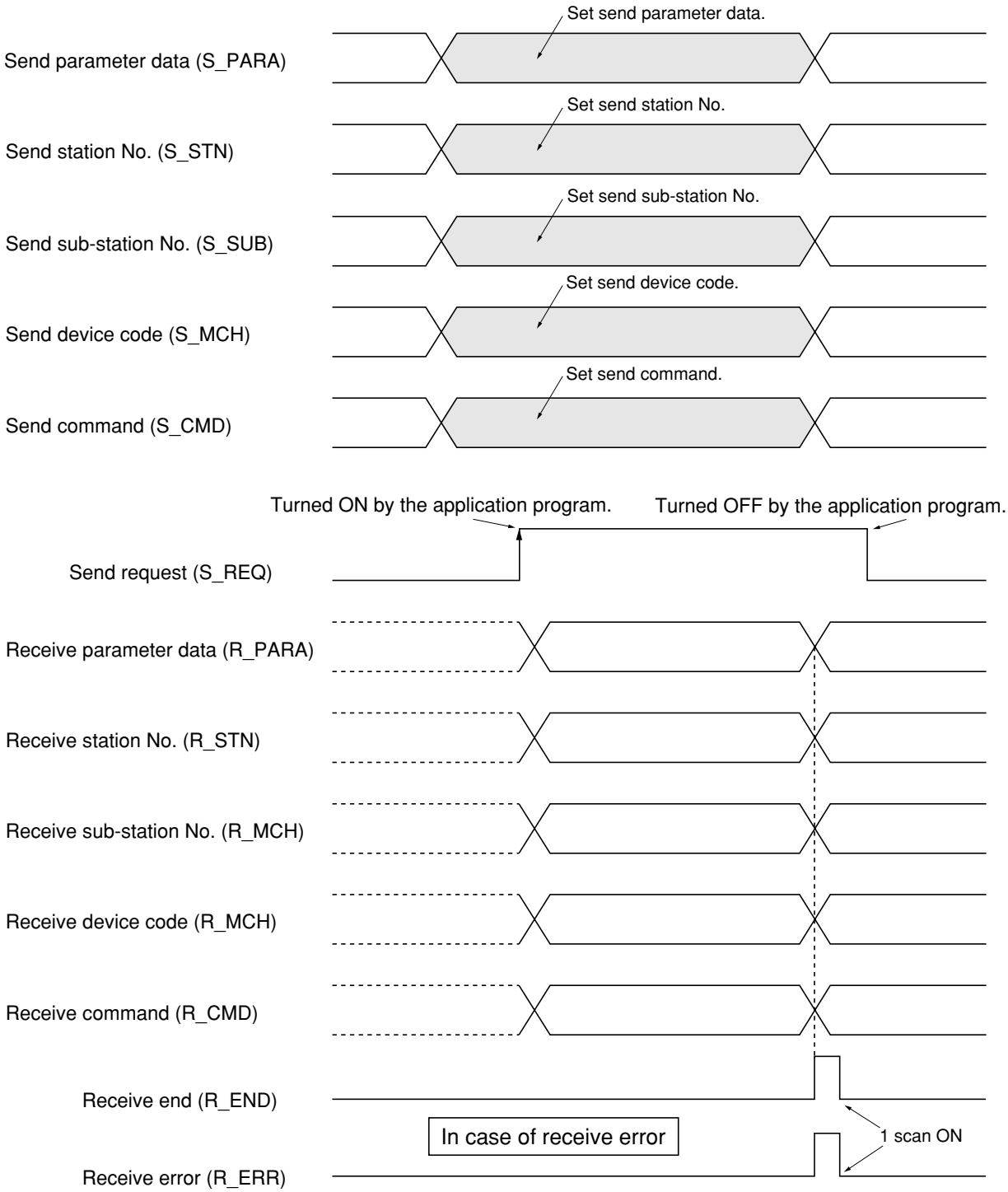


(3) Open status list

No.	Result of initiallization	Remarks
'00'	Ended normally	
'01'	Transmission speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Data type setting error	
'41'	Retry count setting error	
'42'	Response monitoring timer value setting error	
'43'	Reserved	
'44'	BCC setting error	
'45'	Reserved	
'46'	Reserved	
'47'	Reserved	
'48'	Data type setting error	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error.	
'82'	Message port No. setting error.	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

4-3-4 Data sending/receiving

(1) Data sending/receiving procedure



Send parameter, send station No., send sub-station No., send device code and send command are set and then send request is turned ON by the application program. FB detects the rising edge to execute the processing for sending.
The system automatically enters receiving waiting mode the moment sending is completed, executing the processing for receiving.
When the processing for sending and receiving has completed, receive parameter, receive station No., receive sub-station No., receive device code and receive command are stored, and receive end flag is turned ON (1 scan).
In case of transmission error, both end flag and receive error are turned ON (1 scan).
To stop sending/receiving, turn ON the communication reset.

(2) Sending/receiving status list

No.	Result of sending/ receiving	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error	
'42'	BCC error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error.	
'92'	SX bus receive error.	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

4-3-5 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE33).
To use RAS information in an application, variables are declared in the following manner:

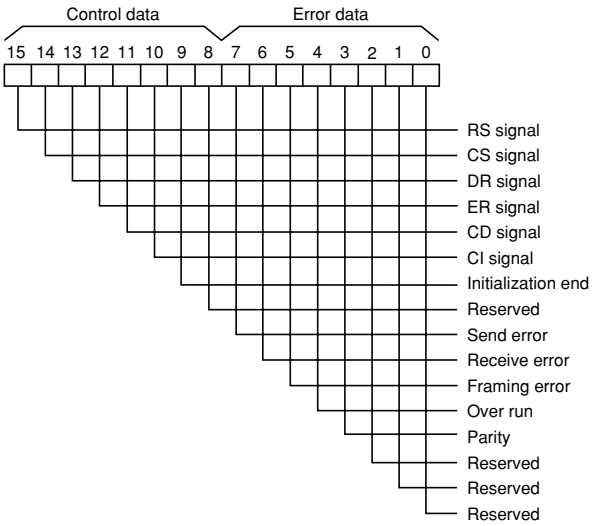
<Sample variable declaration>

```
VAR
  RAS : _C_work_TYPE33 ;
END_VAR
```

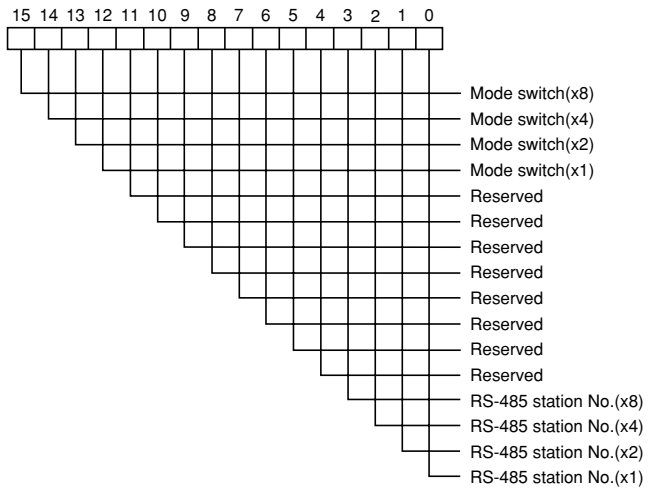
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



4-4-1 General

_CizFP is a FB which performs the start-stop synchronous data transmission between the CPU module and the FP1A series of IDEC IZUMI CORPORATION. For the transmission parameters to control IZUMI ID system, refer to those manuals.

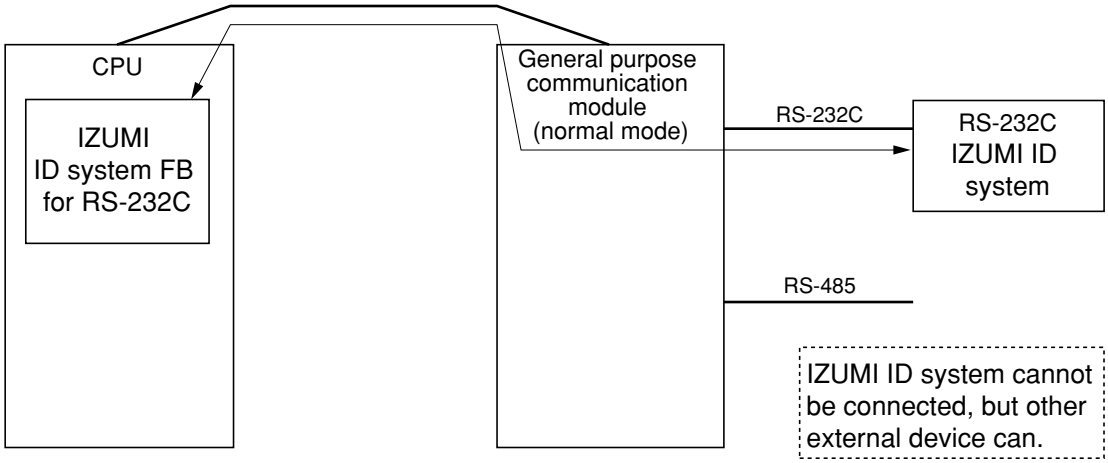
<Function of _CizFP>

1) Initialization of communication ports
Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function
Send the data from an application program in the CPU module to IZUMI ID system via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function
Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>
The ID system can be connected with the RS-232C port by 1:1.
IZUMI ID system cannot be connected to the RS-485 port.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for one ID system.

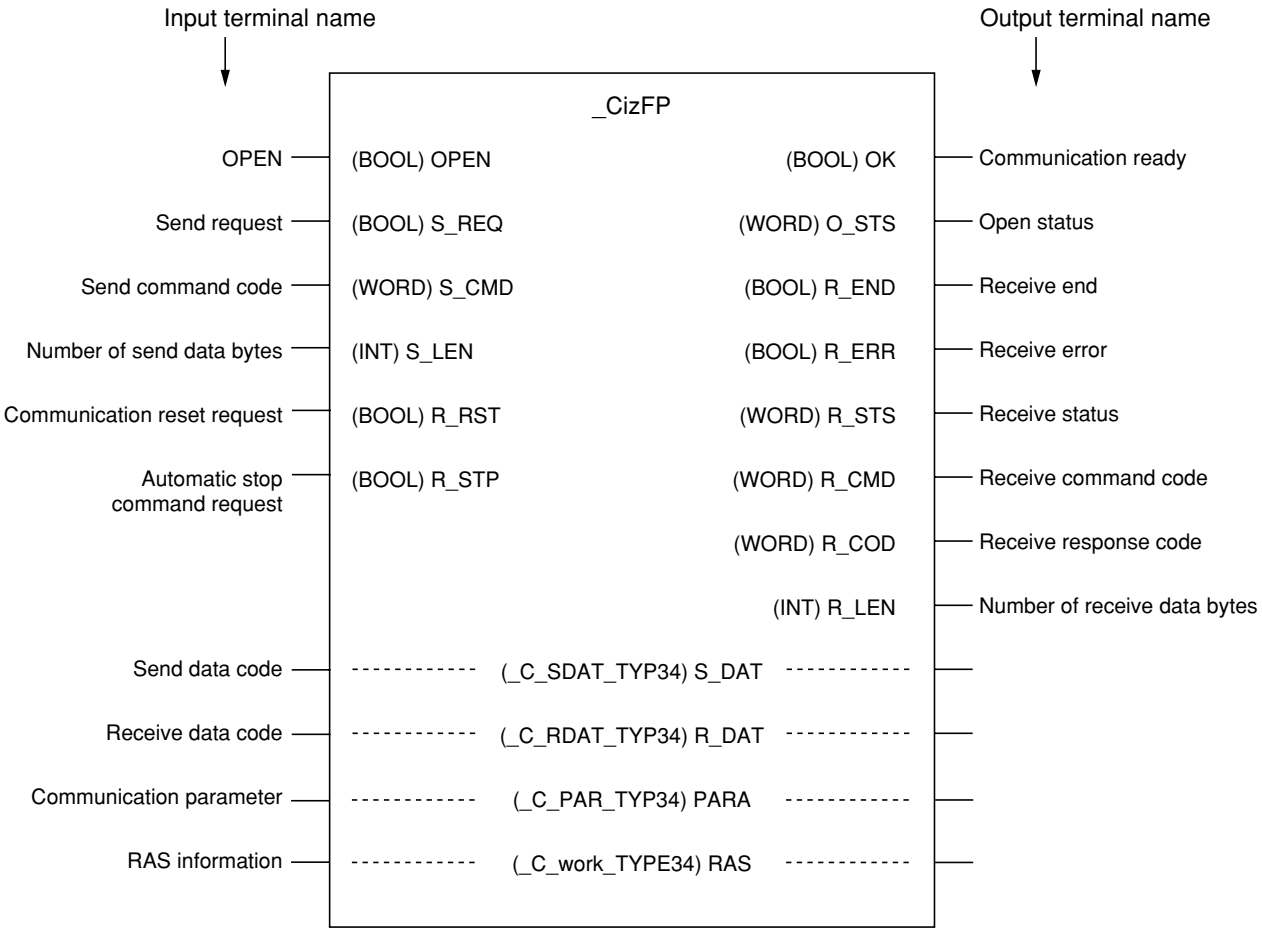
<Memory capacity>

Program area	= approx. 2.1K steps		
Data memory capacity	= Instance memory for user FB:	approx. 0.3K words	
	Standard memory or Retain memory:	approx. 0.8K words	
	Instance memory for system FB:	approx. 0.1K words	

Note1: The above memory area includes the capacity of ID system FB main body as well as that of the sub-FB which is called from the ID system FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

4-4-2 Specifications for _CizFP

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Send command code	S_CMD	WORD	IN	Stores the command that corresponds to the purpose.
Number of send data bytes	S_LEN	INT	IN	Specifies the number of send data bytes.
Send data code	S_DAT	_C_SDAT _TYP34	IN_OUT	Stores the data code. WORD type array data with element No. 0 to 31.
Communication reset request	R_RST	BOOL	IN	Send the reset command to the general purpose communication module.
Automatic stop command request	R_STP	BOOL	IN	Send the automatic stop command to the general purpose communication module.
Communication parameter	PARA	_C_PAR _TYP34	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Receive end	R_END	BOOL	OUT	Turns ON when receive ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Receive command code	R_CMD	WORD	OUT	Stores the receive command code.
Receive response code	R_COD	WORD	OUT	Stores the receive response code.
Number of receive data bytes	R_LEN	INT	OUT	Stores the number of receive data bytes.
Receive data code	R_DAT	_C_RDAT _TYP34	IN_OUT	Stores the receive data. INT type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE34	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 4-4-5 for details.

4-4-3 Initialization

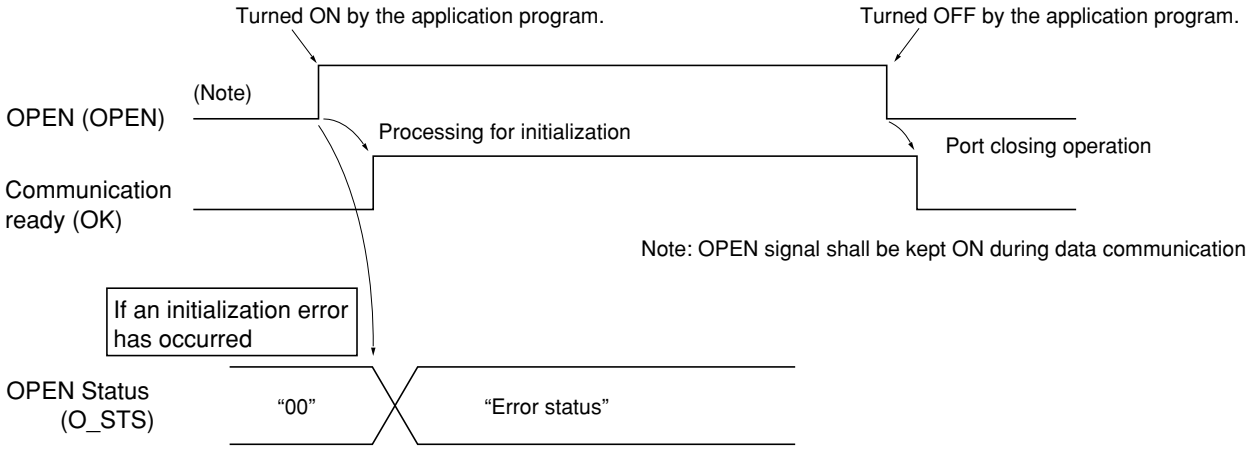
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each “communication parameter” item so as to match the communication specifications of the IZUMI ID system.
The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 15	Reserved ⋮ Reserved	Not used
16	BCC Designation	Sets whether or not to add horizontal parity for checking text data transmission error. 0: No 1: Yes
17	Retry count	In case of communication error, this designates how many times to retry communication.
18 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

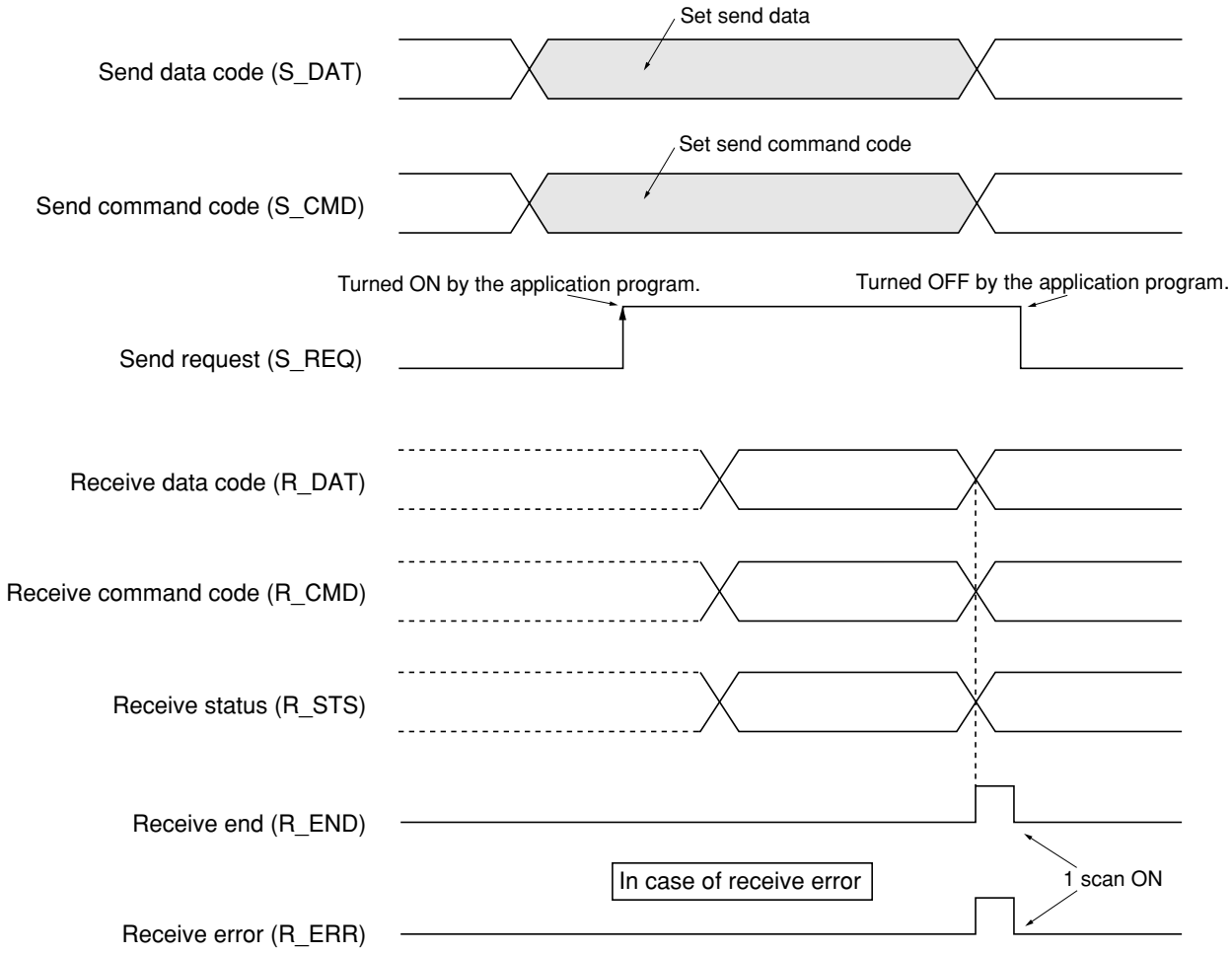


(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Transmission speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Retry count setting error	
'41'	Response monitoring timer value setting error	
'42'	Reserved	
'43'	Reserved	
'44'	BCC setting error	
'45'	Reserved	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error.	
'82'	Message port No. setting error.	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing not ready because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing not ready because in loader mode.	Error detected on general purpose communication module
'A6'	Processing not ready because selfdiagnosis is being executed.	Error detected on general purpose communication module

4-4-4 Data sending/receiving

(1)Data sending/receiving procedure



Send data code and send command code are set and then send request is turned ON by the application program.
FB detects the rising edge to execute the processing for sending.
The system automatically enters receiving waiting mode the moment sending is completed, executing the processing for receiving.
When the processing for sending and receiving has completed, receive data code and receive command code are stored, and receive end flag is turned ON (1 scan). In case of transmission error, both end flag and receive error are turned ON (1 scan).
When the communication reset is turned ON, the reset command is sent to the general purpose communication module.
When the general purpose communication module is reset, the receive end flag is turned ON and “00” is set in the receive status.
When the automatic stop is turned ON, the automatic stop command is sent to the general communication module.

(2) Sending/receiving status list

No.	Result of sending/receiving	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error.	
'42'	BCC error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error.	
'92'	SX bus receive error.	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being excecuted.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

4-4-5 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE34).
To use RAS information in an application, variables are declared in the following manner:

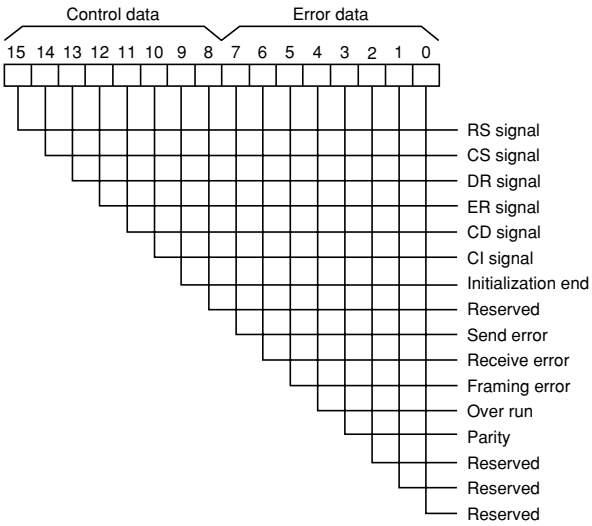
<Sample variable declaration>

```
VAR
  RAS : _C_work_TYPE34 ;
END_VAR
```

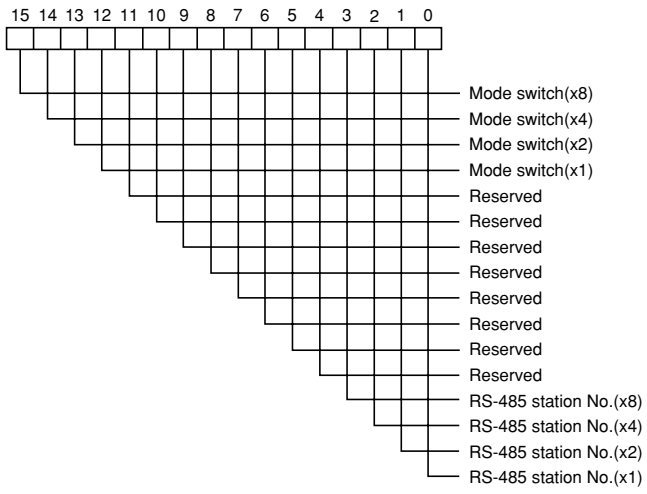
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



Section 5 Bar Code Reader FB

Page

Section 5 Bar Code Reader FB
5-1 THOKEN _CtkTCD

5-1-1 General

_CtkTCD is a FB which performs the start-stop synchronous data transmission between the CPU module and the TCD8200/8500, TLM-3200RV series of THOKEN Co., Ltd.
For the transmission parameters to control THOKEN bar code reader, refer to those manuals.

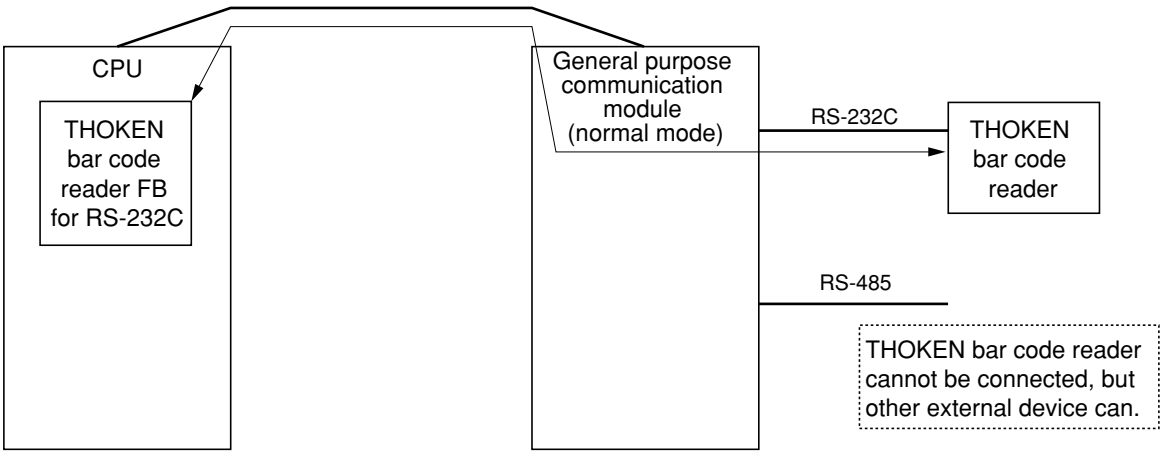
<Function of _CtkTCD>

1) Initialization of communication ports
Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function
Send the data from an application program in the CPU module to THOKEN bar code reader via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function
Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>
The bar code reader can be connected with the RS-232C port by 1:1.
THOKEN bar code reader cannot be connected to the RS-485 port.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

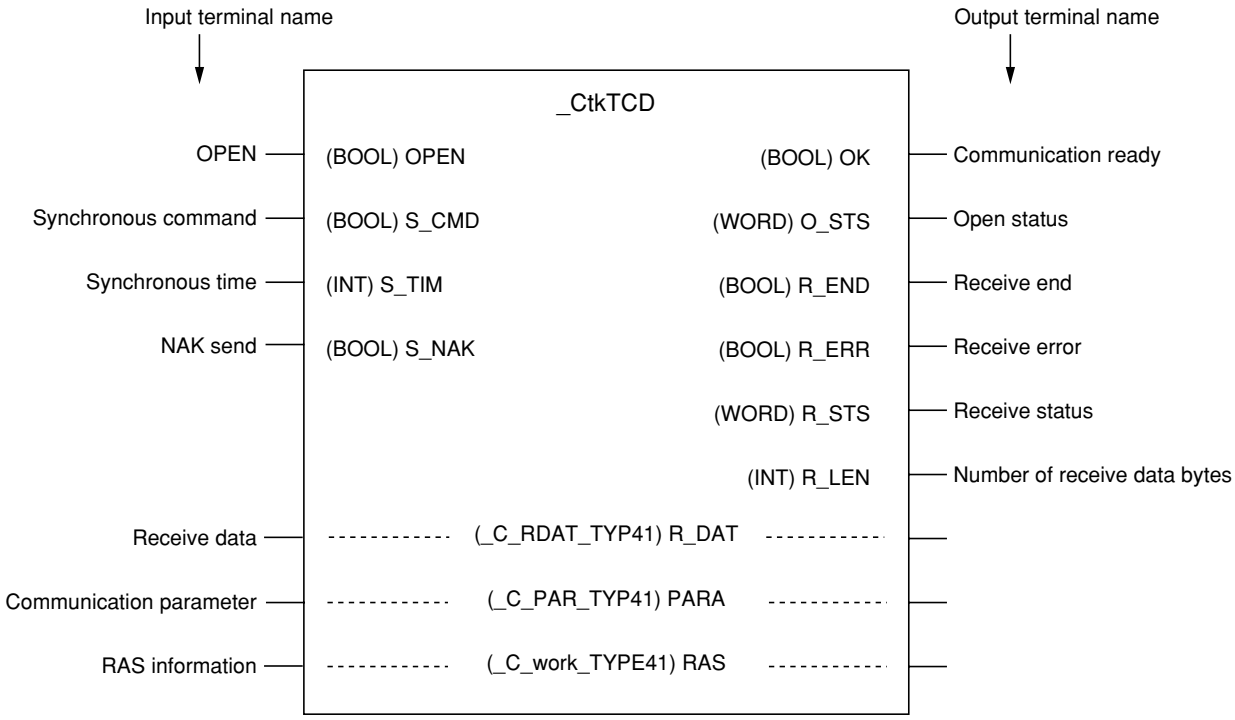
<Memory capacity>

Program area	= approx. 1.7K steps		
Data memory capacity	= Instance memory for user FB:		approx. 0.3K words
	Standard memory or Retain memory:		approx. 0.8K words
	Instance memory for system FB:		approx. 0.1K words

Note1: The above memory area includes the capacity of bar code reader FB main body as well as that of the sub-FB which is called from the bar code reader FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

5-1-2 Specifications for _CtkTCD

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

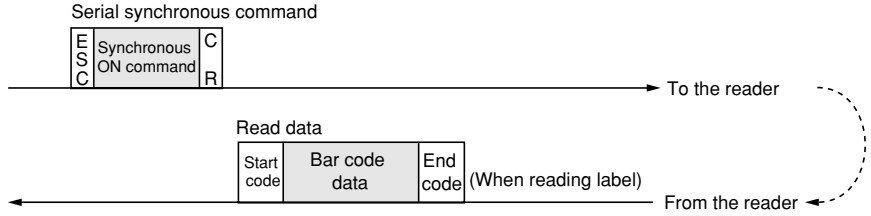
<Terminal list>

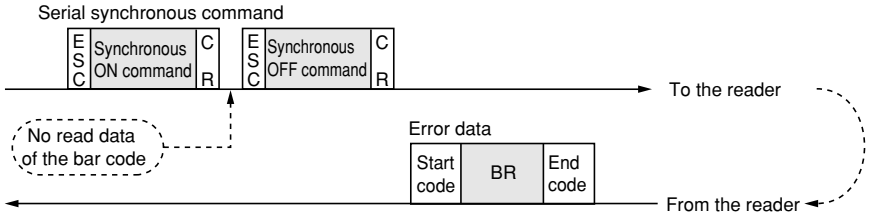
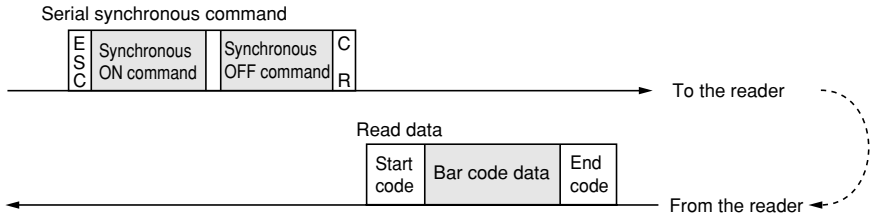
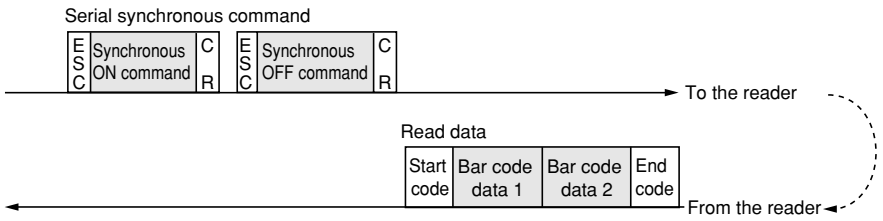
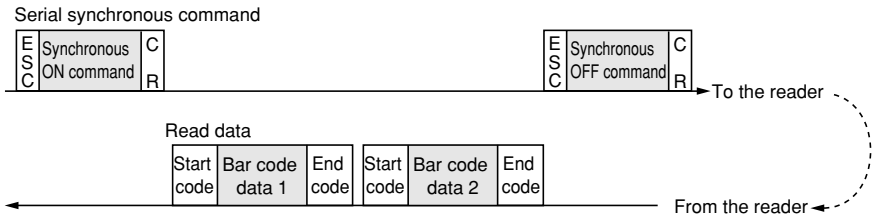
Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Synchronous command	S_CMD	BOOL	IN	Starts to read a bar code. When receiving is completed, this needs to be turned OFF by the application program.
Synchronous time	S_TIM	INT	IN	Stores the bar code reading time within the period of 1 to 9 seconds. (Synchronous mode 2)
NAK send	S_NAK	BOOL	IN	Send the NAK code by turning ON. After NAK code is sent, it is necessary to turn OFF S_NAK by the application program.
Communication parameter	PARA	_C_PAR _TYP41	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Receive end	R_END	BOOL	OUT	Turns ON when receive ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Receive data	R_DAT	_C_RDAT _TYP41	IN_OUT	Stores the receive data. WORD type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE41	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 5-1-6 for details.

5-1-3 Initialization

(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each "communication parameter" item so as to match the communication specifications of the THOKEN bar code reader. The parameter file contains the INT type array data with element No. 0 to 39.

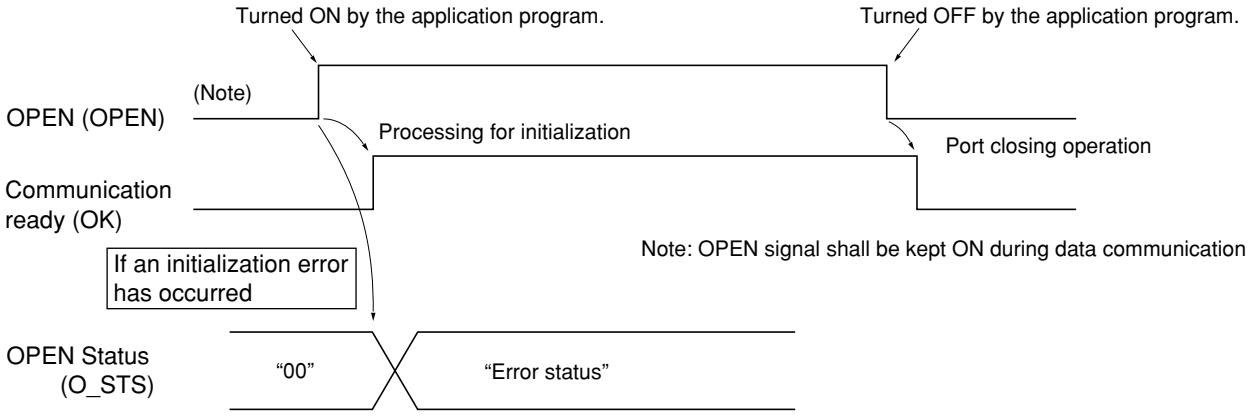
No.	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200,1:2400,2:4800,3:9600,4:19200 bps
5	Data bit	Designates the data bit length. 0:7bit 1:8bit
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0:1 bit, 2:2 bit
8 ⋮ 15	Reserved ⋮ Reserved	Not used.
16	Synchronous mode	This mode indicates the bar code reading method. 0: Synchronous mode 1 to 3, 1: Synchronous mode 4 (1) Synchronous mode 1 This is a general synchronous mode. When the first label is read after the synchronous ON command has been sent, the bar code data is received and reading ends. (Synchronous signal is turned OFF.) If the bar code data were not received when the synchronous OFF command has been set, error data are received. 1) When operating normally 

No.	Item	Description
		2) When operating abnormally When the bar code data have not been received within the synchronous input ON time, error data are received. From the synchronous mode 1 to 4, common operation is performed at the error occurrence. 
		(2) Synchronous mode 2 When the bar code cannot be read within a certain period (1 to 9 seconds), NG signal is output and reading ends. In this mode, the synchronous OFF signal is ignored. When the bar code data have not been received within the synchronous ON time, error data are received. 
16	Synchronous mode	(3) Synchronous mode 3 Bar code data which have been read, when the synchronous input was ON, are combined. The bar code reader sends the read data when the synchronous input has been turned OFF. When the bar code data have not been received within the synchronous ON time, error data are received. 
		(4) Synchronous mode 4 While the synchronous input is ON, bar code data are read. In this mode, whenever the bar code are read, data are received. When the bar code data have not been received within the synchronous ON time, error data are received. 

No.	Item	Description
17	Start/End code (Receive)	Designates the start code and the end code of the receive code. 0:STX~ETX, 1:STX~ETX+CR, 2:None~CR+LF, 3:None~CR, 4:ESC~CR
18	Model specification	Designates the model. 0:TCD8200 / TCD8500 / TLMS-3200RV, 1:TLMS-3500RV
19 ⋮ 39	Reserved ⋮ Reserved	Not used.

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

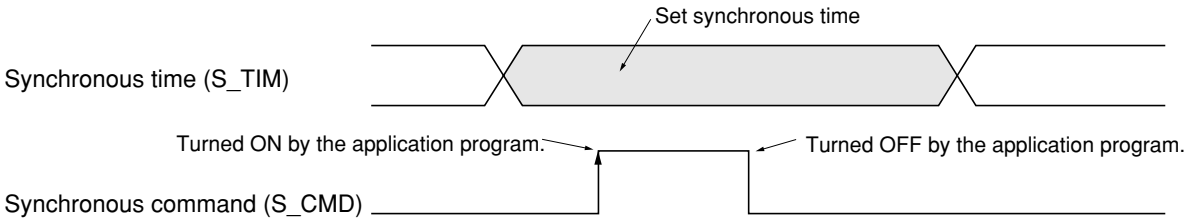


(3) Open status list

No.	Result of initiallization	Remarks
'00'	Ended normally	
'01'	Transmission speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Synchronous mode setting error	
'41'	Model setting error	
'42'	Start code setting error	
'43'	End code setting error	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error.	Reserved
'82'	Message port No. setting error.	Reserved
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

5-1-4 Data sending

(1) Data sending procedure



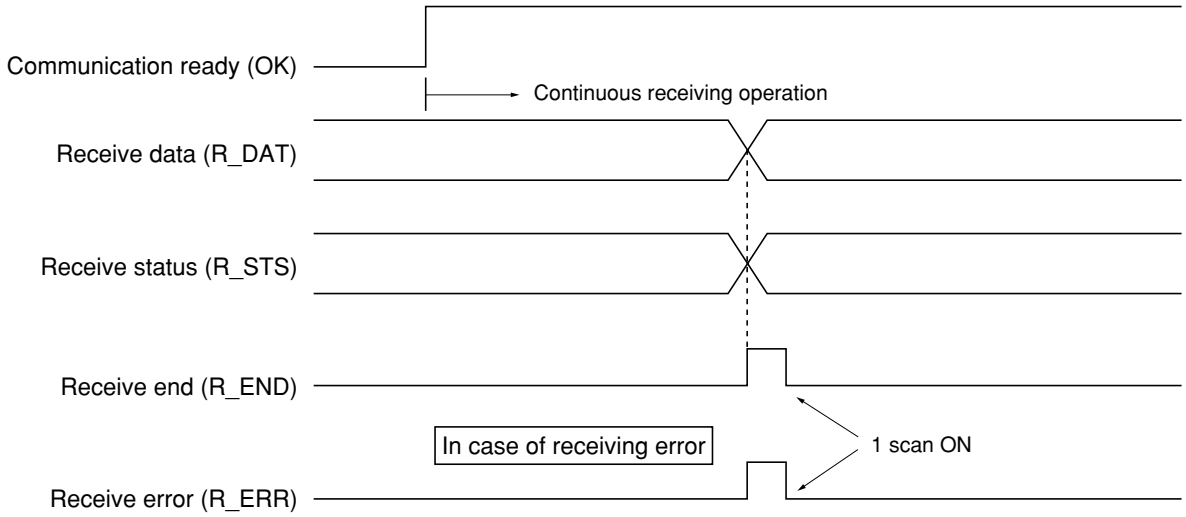
Synchronous time is set and then synchronous command is turned ON by the application program. FB detects the rising edge to execute the processing for sending.

(2) Sending status list

No.	Result of sending	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Received	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Data send time-out	
'41'	Protocol response error.	
'42'	Reserved	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

5-1-5 Data receiving

(1) Data receiving procedure



While the communication ready flag is turned ON, whether the data to be received exists or not is checked continuously and, when it exists, the operation for receiving is executed. When a delimiter between data frames is detected, the receive data are stored and the receive end flag is turned ON (1 scan). The receiving result is stored in the receive status. If a receive error has occurred, the receive end and the receive error are turned ON (1 scan).

(2) Receiving status list

No.	Result of receiving	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Received	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Data transmission time-out	
'41'	Protocol response error.	
'42'	Reserved	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Nunber of send data over.	Error detected on general purpose communication module

5-1-6 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE41).
To use RAS information in an application, variables are declared in the following manner:

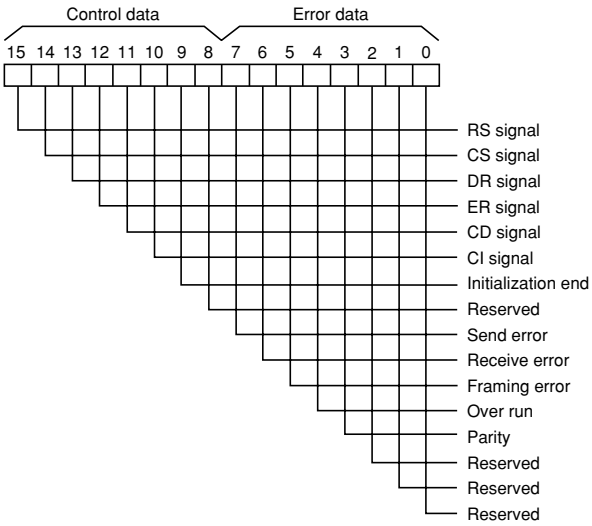
<Sample variable declaration>

```
VAR
  RAS : _C_work_TYPE41 ;
END_VAR
```

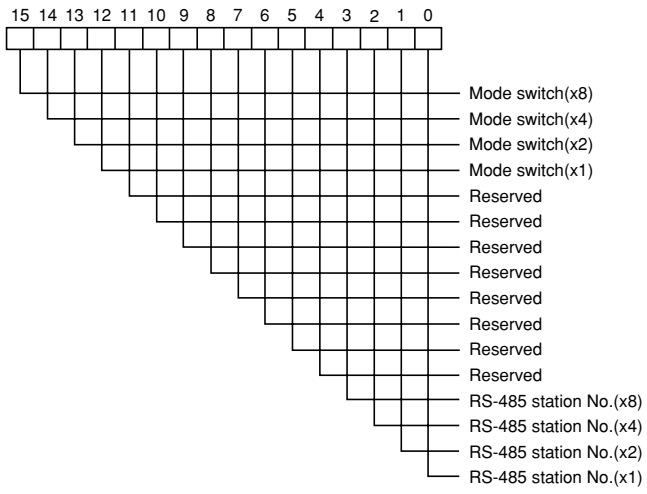
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



5-2 NIPPON ELECTRIC INDUSTRY _CndBCC

5-2-1 General

_CndBCC is a FB which performs the start-stop synchronous data transmission between the CPU module and the BCC2600 series of NIPPON ELECTRIC INDUSTRY CO., LTD. For the transmission parameters to control NIPPON ELECTRIC INDUSTRY bar code reader, refer to those manuals.

<Function of _CndBCC>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

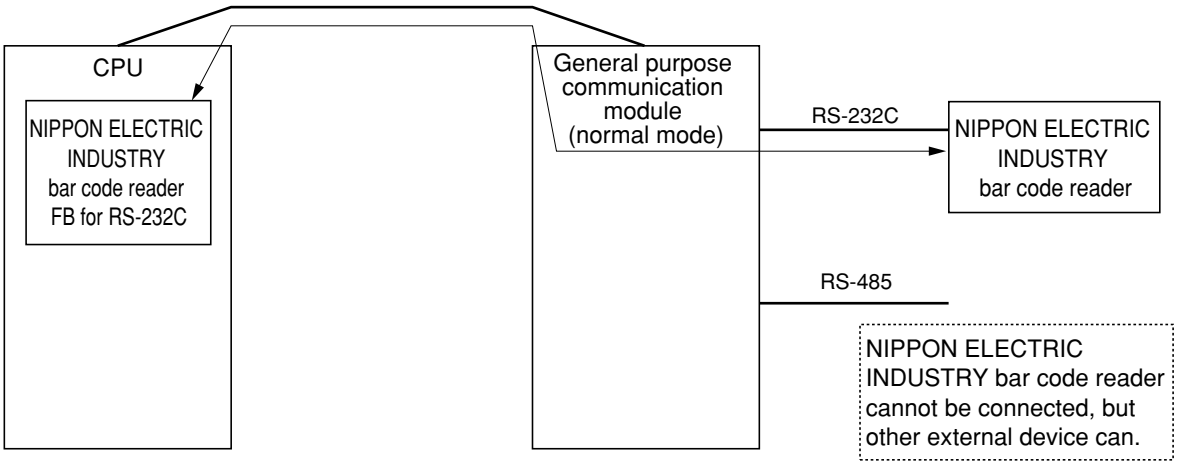
Send the data from an application program in the CPU module to NIPPON ELECTRIC INDUSTRY bar code reader via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The bar code reader can be connected with the RS-232C port by 1:1.
NIPPON ELECTRIC INDUSTRY bar code reader cannot be connected to the RS-485 port.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

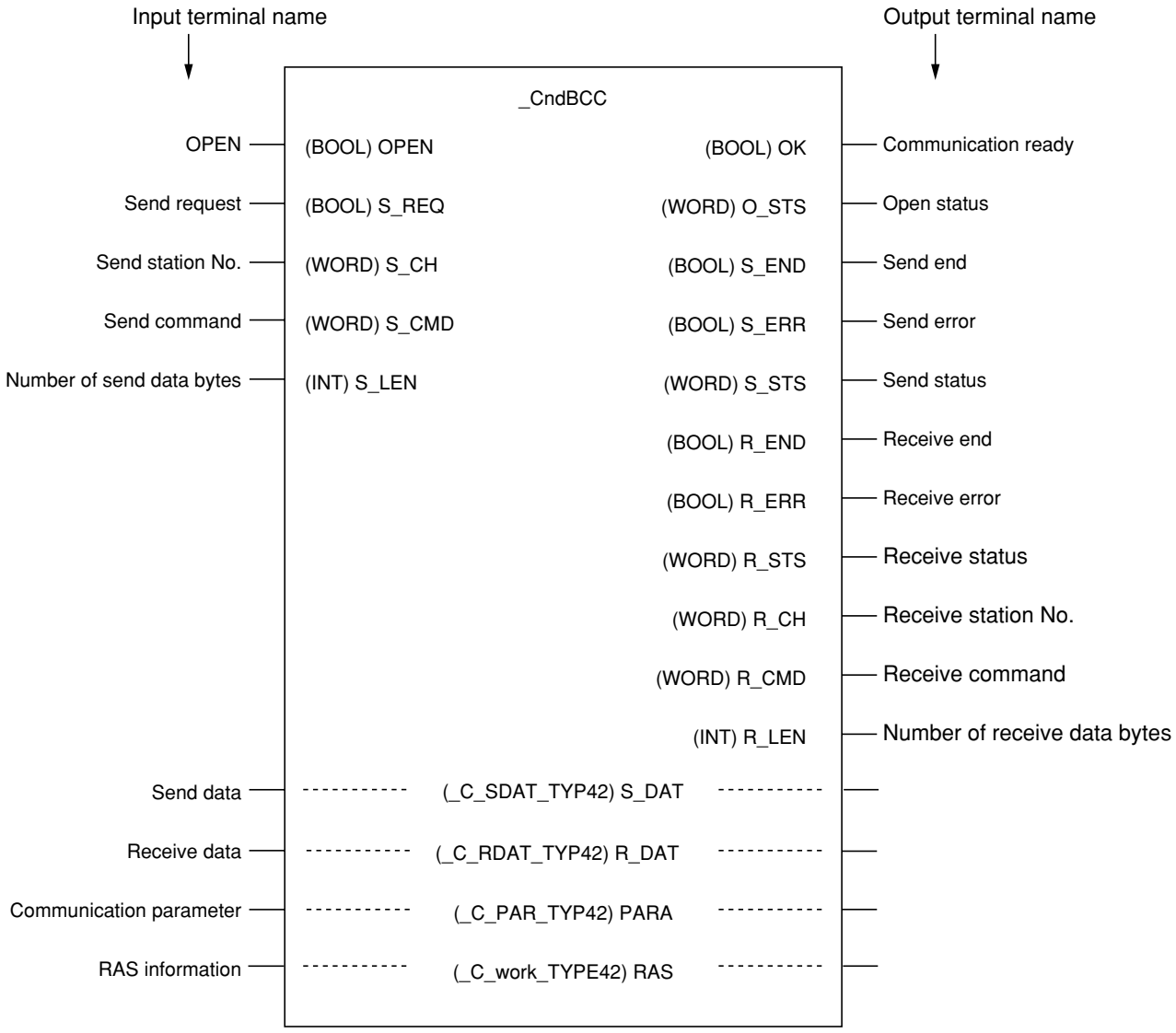
<Memory capacity>

Program area = approx. 1.8K steps
Data memory capacity = Instance memory for user FB: approx. 0.3K words
Standard memory or Retain memory: approx. 0.8K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of bar code reader FB main body as well as that of the sub-FB which is called from the bar code reader FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

5-2-2 Specifications for _CndBCC

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. The system automatically enters receiving waiting mode the moment sending is completed, executing the processing for receiving. When sending is completed, this needs to be turned OFF by the application program.
Send station No.	S_CH	WORD	IN	Station No. assigned to the bar code reader.
Send command	S_CMD	WORD	IN	Stores the send command.
Number of send data bytes	S_LEN	INT	IN	Stores the number of send data bytes.
Send data	S_DAT	_C_SDAT _TYP42	IN_OUT	Stores the send data. WORD type array data with element No. 0 to 31.
Communication parameter	PARA	_C_PAR _TYP42	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization.
Send end	S_END	BOOL	OUT	Turns ON when send ends..
Send error	S_ERR	BOOL	OUT	Turns ON if a send error has occurred.
Send status	S_STS	WORD	OUT	Send result code.
Receive end	R_END	BOOL	OUT	Turns ON when receive ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Receive station No.	R_CH	WORD	OUT	Station No. of a responded bar code reader.
Receive command	R_CMD	WORD	OUT	Stores the receive command code.
Number of receive data bytes	R_LEN	INT	OUT	Stores the number of receive data bytes.
Receive data	R_DAT	_C_RDAT _TYP42	IN_OUT	Stores the receive data. WORD type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE42	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 5-2-6 for details.

5-2-3 Initialization

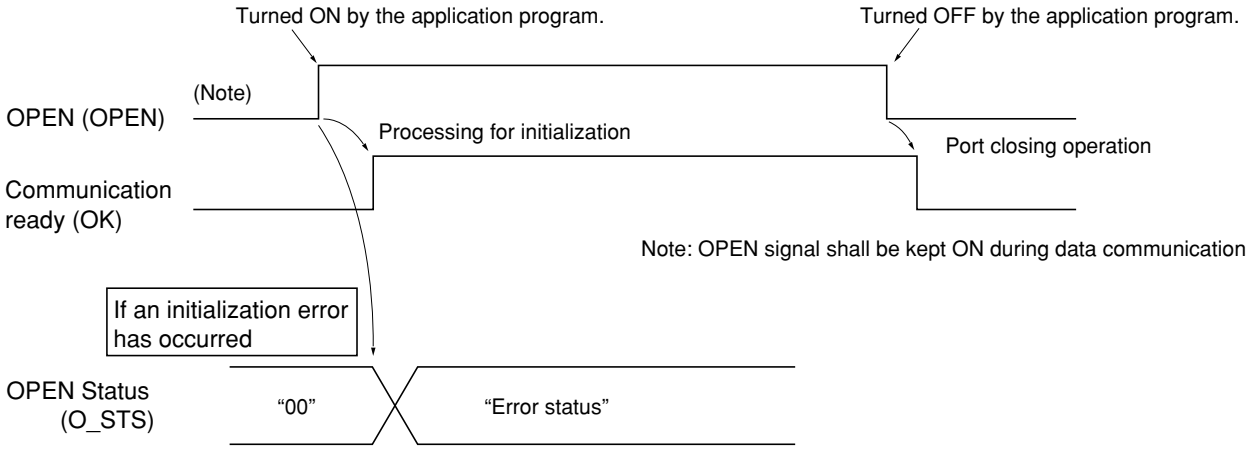
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each “communication parameter” item so as to match the communication specifications of the NIPPON ELECTRIC INDUSTRY bar code reader. The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 15	Reserved ⋮ Reserved	Not used
16	Response monitoring timer for ACK/NAK	Monitor timer for the receive. Normally set to 100 (=1 second) (in 0.01-second steps).
17	Start code setting	Designates the start of data code. 0:None 1:STX
18	End code setting	Designates the end of data code. 0:ETX 1:CR
19 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

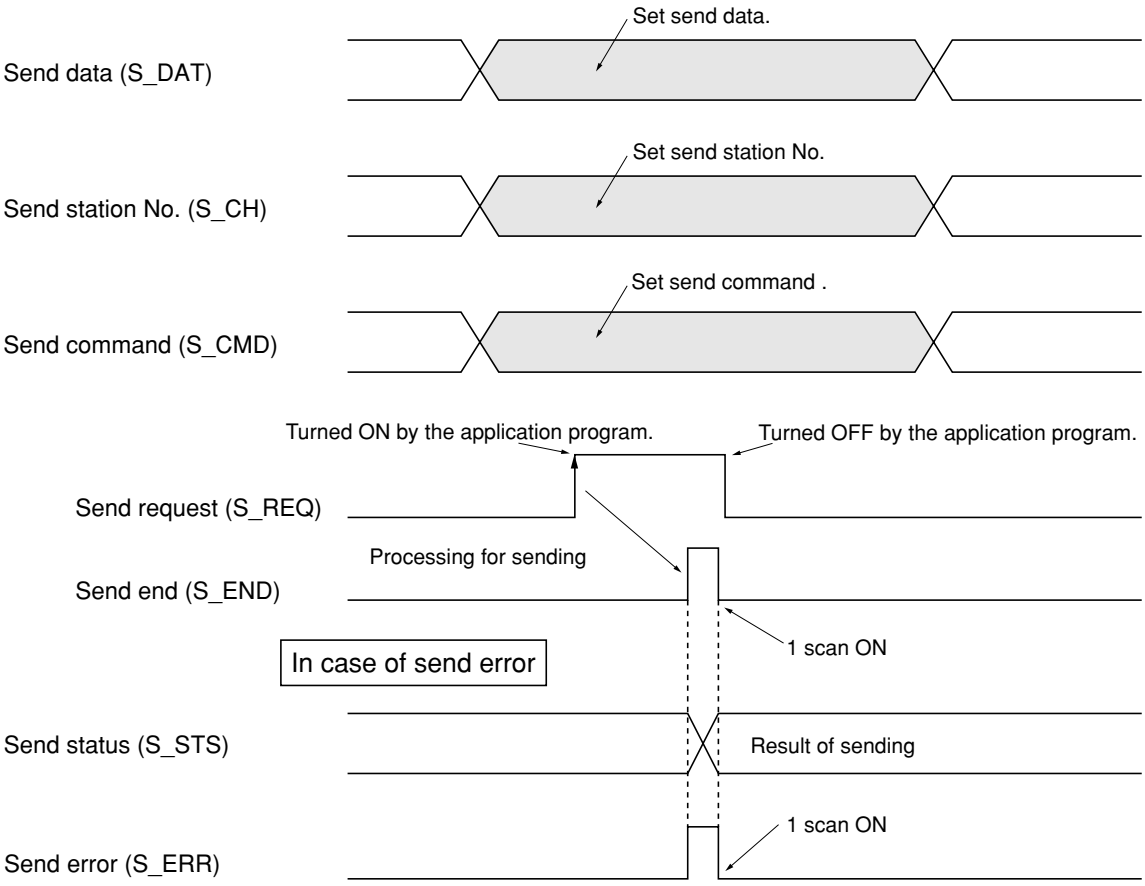


(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Transmission speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Response monitoring timer value setting error	
'41'	Reserved	
'42'	Start code setting error	
'43'	End code setting error	
'44'	Reserved	
'45'	Reserved	
'80'	General purpose communication module station No. setting error	
'81'	Port No. setting error.	
'82'	Message port No. setting error.	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

5-2-4 Data sending

(1) Data sending procedure



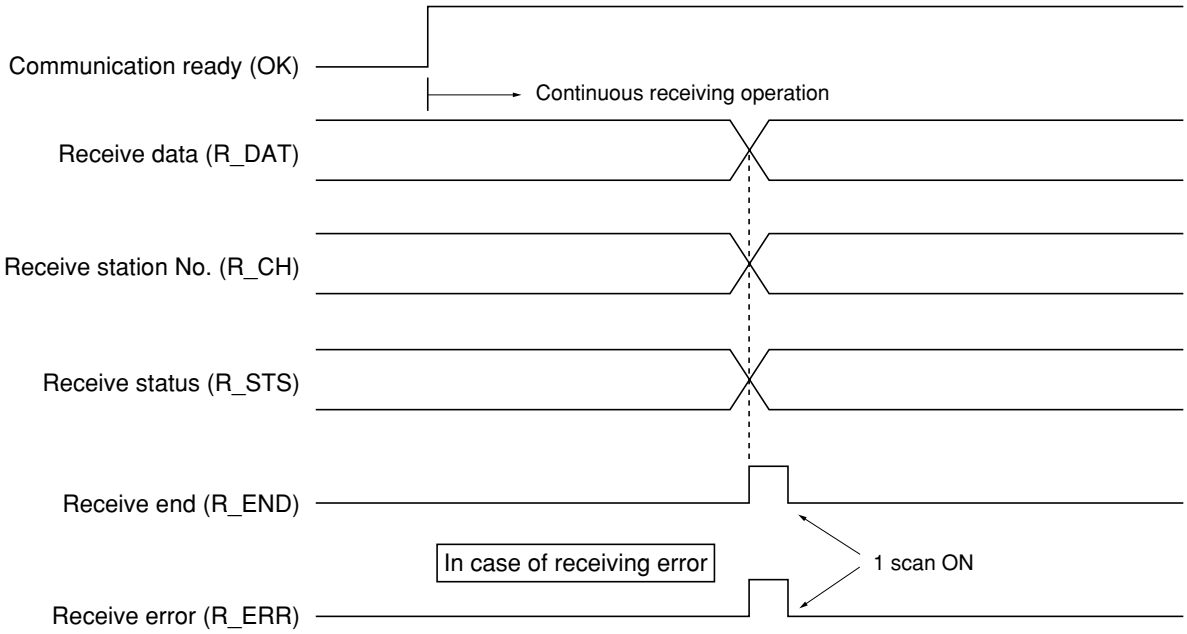
Send data, send station No. and send command are set and then send request is turned ON by the application program. FB detects the rising edge to execute the processing for sending.
When sending has ended, the send end flag is turned ON (1 scan). If a send error has occurred, the send end and the send error are turned ON (1 scan), and the corresponding error code is output to the send status (“00” when ended normally).

(2) Sending status list

No.	Result of sending	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error.	
'42'	Reserved	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Nunber of send data over.	Error detected on general purpose communication module

5-2-5 Data receiving

(1) Data receiving procedure



While the communication ready flag is turned ON, whether the data to be received exists or not is checked continuously and, when it exists, the operation for receiving is executed. When a delimiter between data frames is detected, the receive data and the receive station No. are stored and the receive end flag is turned ON (1 scan). The receiving result is stored in the receive status. If a receive error has occurred, the receive end and the receive error are turned ON (1 scan).

(2) Receiving status list

No.	Result of receiving	Remarks
'00'	Ended normally	
'01'	Reserved	
'02'	Send buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error.	
'42'	Reserved	
'90'	General purpose communication module disconnected.	Not detected
'91'	Reserved	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Nunber of send data over.	Error detected on general purpose communication module

5-2-6 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE42).
To use RAS information in an application, variables are declared in the following manner:

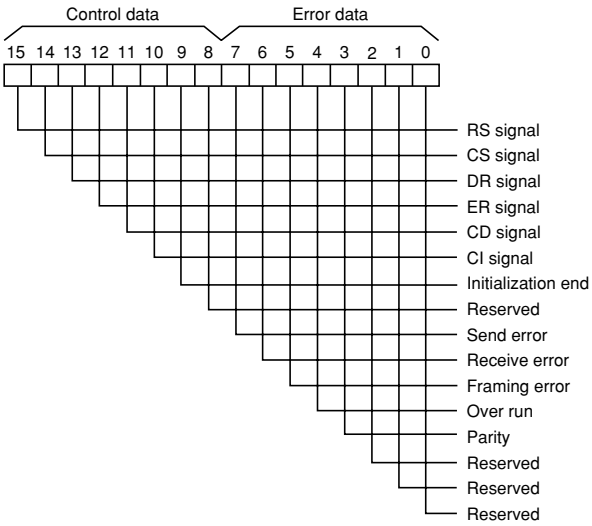
<Sample variable declaration>

```
VAR
  RAS : _C_work_TYPE42 ;
END_VAR
```

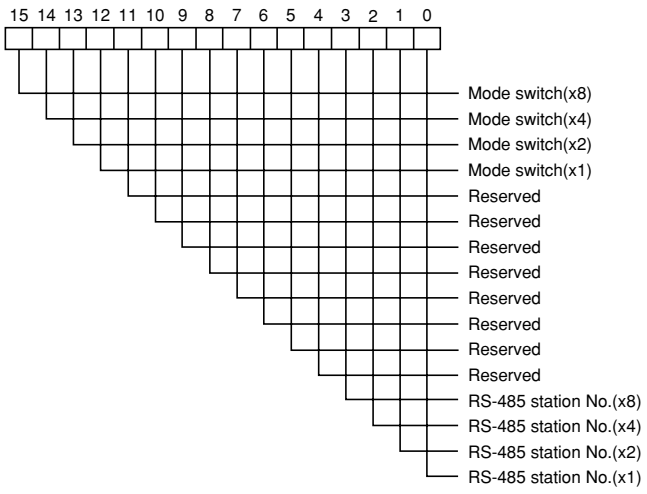
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



5-3-1 General

_CkyBL is a FB which performs the start-stop synchronous data transmission between the CPU module and the BL-180 series of KEYENCE CORPORATION. For the transmission parameters to control KEYENCE bar code reader, refer to those manuals.

<Function of _CkyBL>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

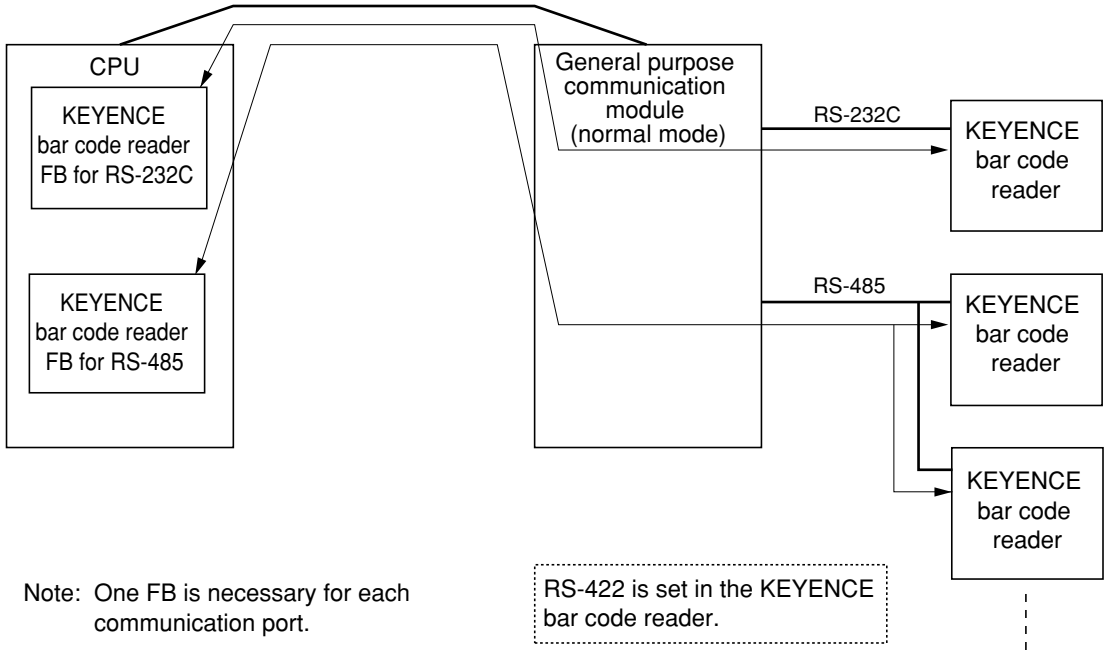
Send the data from an application program in the CPU module to KEYENCE bar code reader via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The bar code reader can be connected with the RS-232C port by 1:1 or with the RS-485 port by 1:N.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

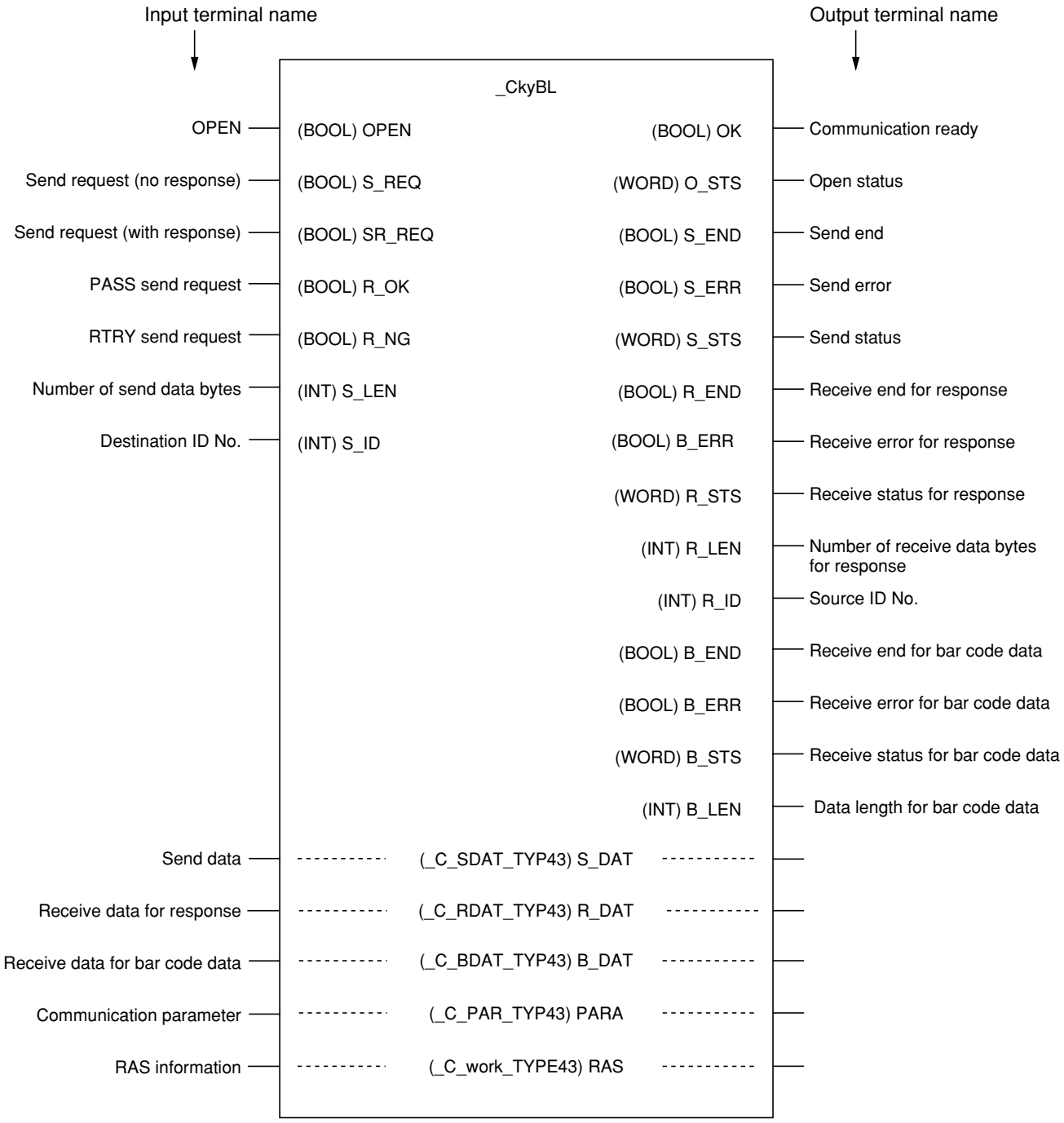
<Memory capacity>

Program area = approx. 3.0K steps
Data memory capacity = Instance memory for user FB: approx. 0.3K words
Standard memory or Retain memory: approx. 0.9K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of bar code reader FB main body as well as that of the sub-FB which is called from the bar code reader FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

5-3-2 Specifications for _CkyBL

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request (no response)	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Send request (with response)	SR_REQ	BOOL	IN	Starts to send data. The system automatically enters receiving waiting mode for response the moment sending is completed, executing the processing for receiving. When sending is completed, this needs to be turned OFF by the application program.
Send data	S_DAT	_C_SDAT _TYP43	IN_OUT	Stores the send data. WORD type array data with element No. 0 to 31.
Communication parameter	PARA	_C_PAR _TYP43	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
PASS send request	R_OK	BOOL	IN	Starts the PASS send. When sending is completed, this needs to be turned OFF by the application program.
RTRY send request	R_NG	BOOL	IN	Starts the RTRY send. When sending is completed, this needs to be turned OFF by the application program.
Number of send data bytes	S_LEN	INT	IN	Stores the number of send data bytes.
Destination ID No.	S_ID	INT	IN	Stores the destination ID No. when 1:N connecting.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Send end	S_END	BOOL	OUT	Turns ON when send ends.
Send error	S_ERR	BOOL	OUT	Turns ON if a send error has occurred.
Send status	S_STS	WORD	OUT	Send result code
Receive end for response	R_END	BOOL	OUT	Turns ON when response ends.
Receive error for response	R_ERR	BOOL	OUT	Turns ON if a response error has occurred.
Receive status for response	R_STS	WORD	OUT	Response result code
Number of receive data bytes for response	R_LEN	INT	OUT	Stores the number of receive data bytes for response.
Source ID No.	R_ID	INT	OUT	Stores the source ID No. when 1:N connecting.
Receive data for response	R_DAT	_C_RDAT _TYP43	IN_OUT	Stores the receive data for response. WORD type array data with element No. 0 to 31.
Receive end for bar code data	B_END	BOOL	OUT	Turns ON when receive ends for bar code data.
Receive error for bar code data	B_ERR	BOOL	OUT	Turns ON if a receive error has occurred for bar code data.
Receive status for bar code data	B_STS	WORD	OUT	Receive result code for bar code data.
Data length for bar code data	B_LEN	INT	OUT	Stores the number of receive data bytes for bar code data.
Receive data for bar code data	B_DAT	_C_BDAT _TYP43	IN_OUT	Stores the receive data for bar code data. WORD type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE43	IN_OUT	Stores the operating status of this FB.Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 5-3-6 for details.

5-3-3 Initialization

(1) Set values of initialization parameters

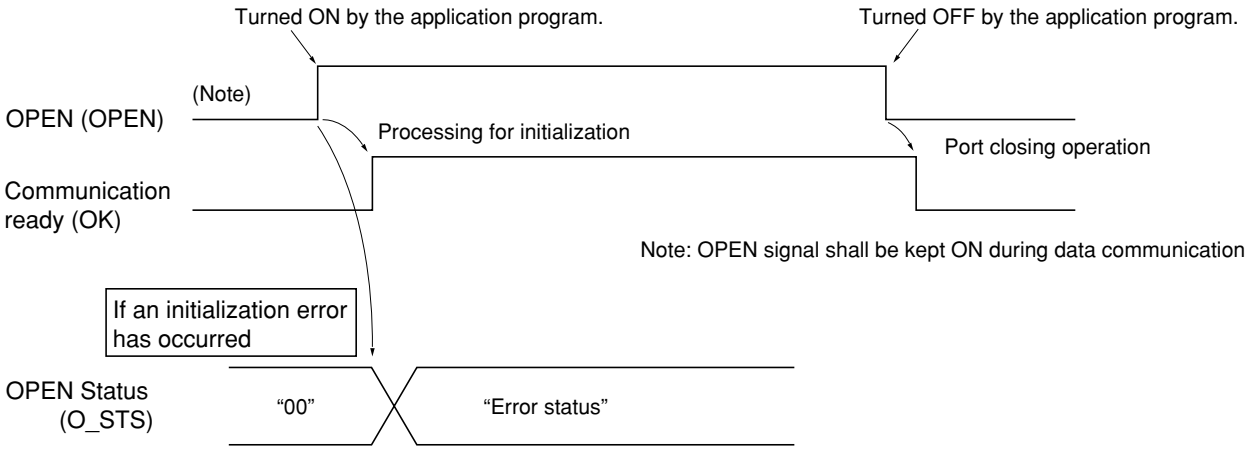
In order to initialize communication ports which are to be used, it is necessary to set proper values for each "communication parameter" item so as to match the communication specifications of the KEYENCE bar code reader. The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Communication speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit.	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit.	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 11	Reserved ⋮ Reserved	Not used.
12	RS-485 mode	Selects 4-wire or 2-wire for RS-485. 0: 4-wire 1: 2-wire
13 ⋮ 15	Reserved ⋮ Reserved	Not used.
16	Response monitoring timer	The timer for monitoring during the period from when the CPU module sends a send request to a device until communication ends. Normally set to 100 (=1 second) (in 0.01-second steps).
17	Transmission procedure	Designates the transmission procedure. 0: Non-procedural Reads directly the data which the bar code reader has read. 1: PASS/RTRY procedure Sends "PASS", when the module has received normally the data which the bar code read. Sends "RTRY", when error has occurred. 2: ACK/NAK procedure Sends "ACK, when the module has received normally the data which the bar code read. Sends "NAK", when error has occurred.
18	Frequency of retry	Designates the number of start code bytes.
19	Number of start code bytes	Designates the number of end code bytes (0 to 5). 0 can be omitted.
20	Start code 1	Designates start code.
21	Start code 2	
22	Start code 3	
23	Start code 4	
24	Start code 5	
25	Number of end code bytes	Designates end code (1 to 5). It is not possible to omit.

Element	Item	Description
26	End code 1	Designates end code.
27	End code 2	
28	End code 3	
29	End code 4	
30	End code 5	
31 ⋮ 33	Reserved ⋮ Reserved	Not used.

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).



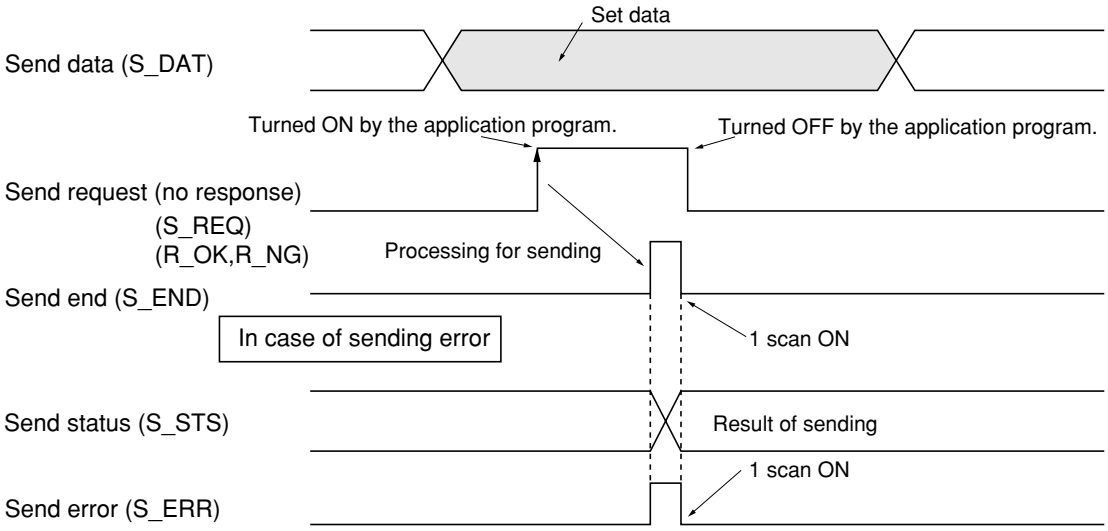
(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Transmission speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'08'	RS-485 mode designation error.	
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Response monitoring timer value setting error	
'41'	Procedure setting error	
'42'	Start code setting error	
'43'	End code setting error	
'44'	Reserved	
'45'	Reserved	
'46'	Reserved	
'80'	General purpose communication module station No. setting error	
'81'	Port No. setting error.	
'82'	Message port No. setting error.	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because selfdiagnosis is being executed.	Error detected on general purpose communication module

5-3-4 Data sending

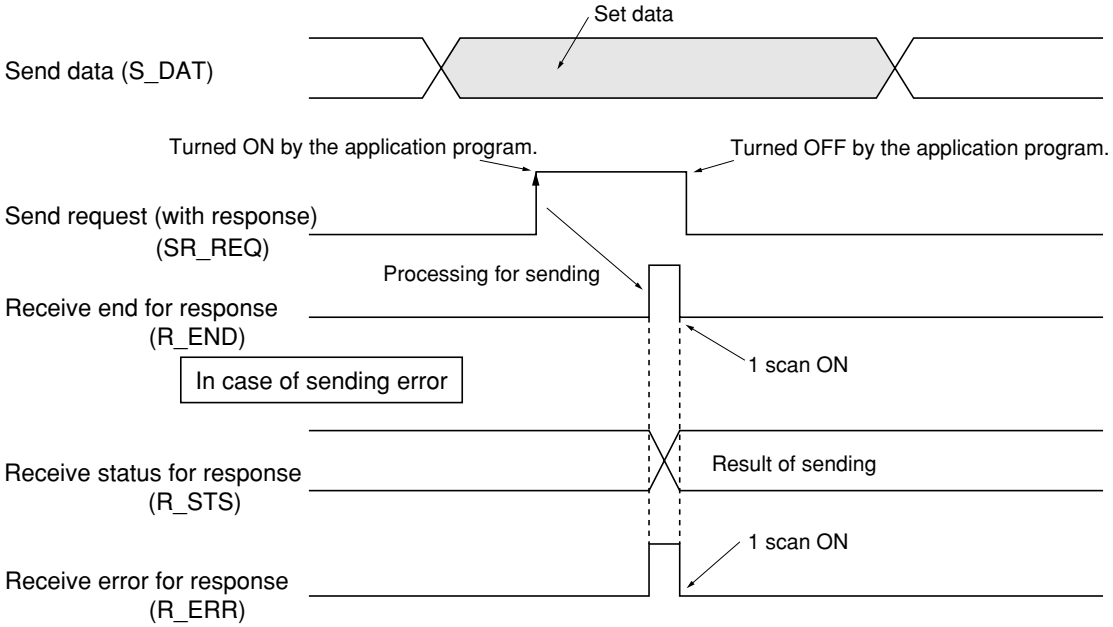
(1) Data sending procedure

1) No response procedure



Send data are set and then send request (no response) is turned ON by the application program. FB detects the rising edge to execute the processing for sending.
When sending has ended, the send end flag is turned ON (1 scan). If a send error has occurred, the send end and the send error are turned ON (1 scan), and the corresponding error code is output to the send status (“00” when ended normally).

2) With-response procedure



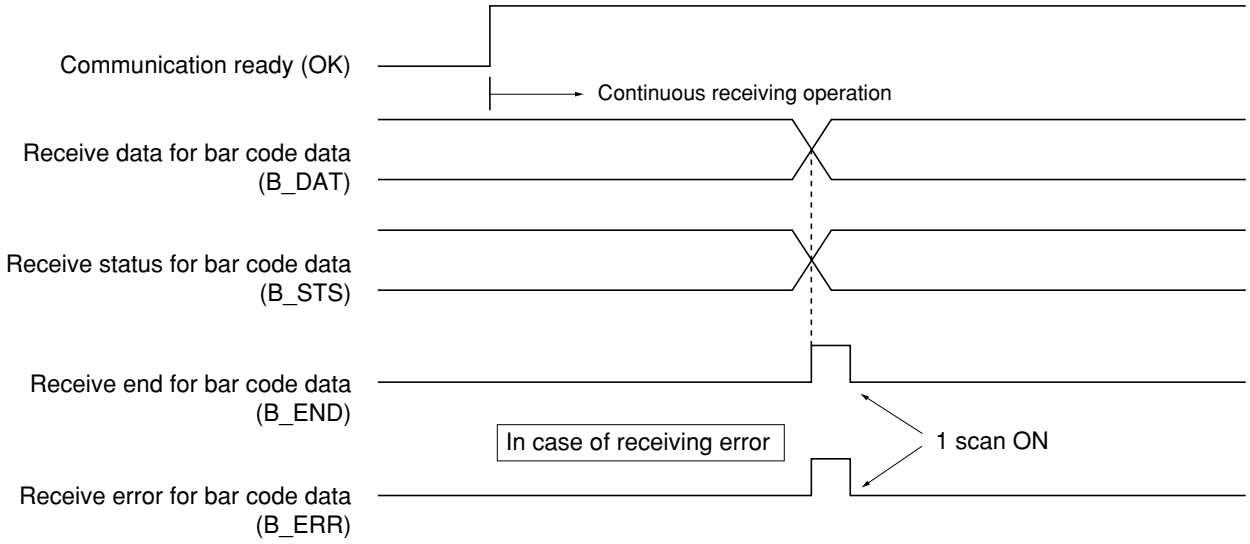
Send data are set and then send request (with response) is turned ON by the application program. FB detects the rising edge to execute the processing for sending.
The system automatically enters receiving waiting mode for response the moment sending is completed, executing the processing for receiving.
When a delimiter between data frames is detected, receive end flag for response is turned ON (1 scan).
If a receive error has occurred, receive end for response and receive error for response are turned ON (1 scan), and the corresponding error code is output to the error status (“00” when ended normally).

(2) Sending status list

No.	Result of sending	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Received	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Data transmission time-out	
'41'	Reserved	
'42'	Reserved	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Nunber of send data over.	Error detected on general purpose communication module

5-3-5 Data receiving

(1) Data receiving procedure



While the communication ready flag is turned ON, whether the bar code data to be received exists or not is checked continuously and, when it exists, the operation for receiving is executed. When a delimiter between data frames is detected, the receive data for bar code data are stored and the receive end flag is turned ON (1 scan). The receiving result is stored in the receive status. If a receive error has occurred, the receive end for bar code data and the receive error for bar code data are turned ON (1 scan).

(2) Receiving status list

No.	Result of receiving	Remarks
'00'	Ended normally	
'01'	Reserved	
'02'	Send buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Data transmission time-out	
'41'	Protocol response error	
'42'	BCC error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Nunber of send data over.	Error detected on general purpose communication module

5-3-6 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE43).
To use RAS information in an application, variables are declared in the following manner:

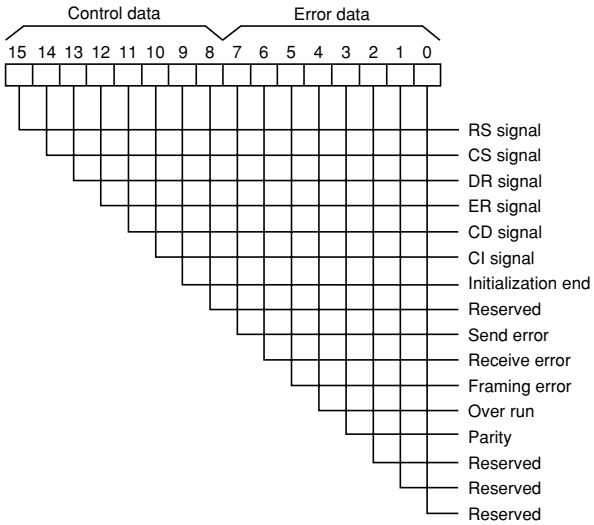
<Sample variable declaration>

```
VAR
  RAS：_C_work_TYPE43；
END_VAR
```

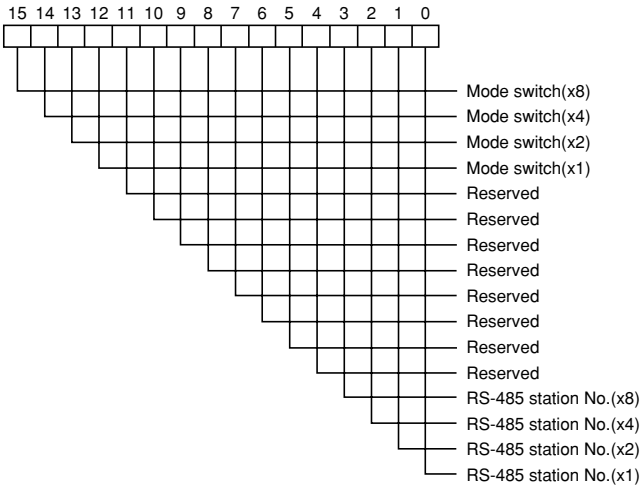
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



5-4 IZUMI DATA LOGIC _CizDS

5-4-1 General

_CizDS is a FB which performs the start-stop synchronous data transmission between the CPU module and the DS series of IZUMI DATA LOGIC CO., LTD. For the transmission parameters to control IZUMI DATA LOGIC bar code reader, refer to those manuals.

<Function of _CizDS>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

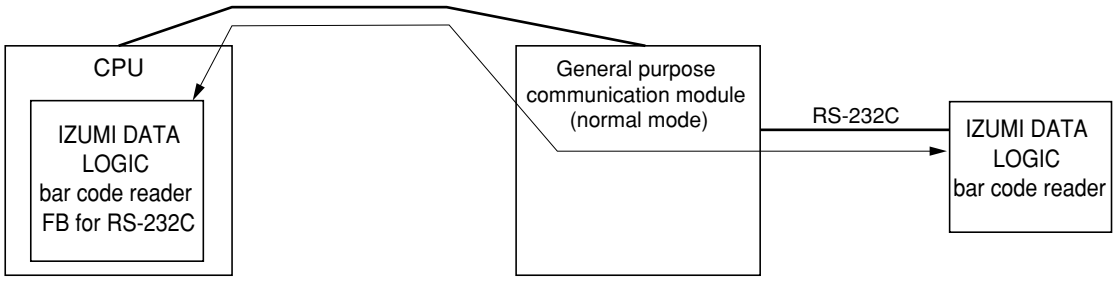
Send the data from an application program in the CPU module to IZUMI DATA LOGIC bar code reader via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The bar code reader can be connected with the RS-232C port by 1:1 or with the RS-485 port by 1:N.
IZUMI DATA LOGIC bar code reader cannot be connected to the RS-485 port.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

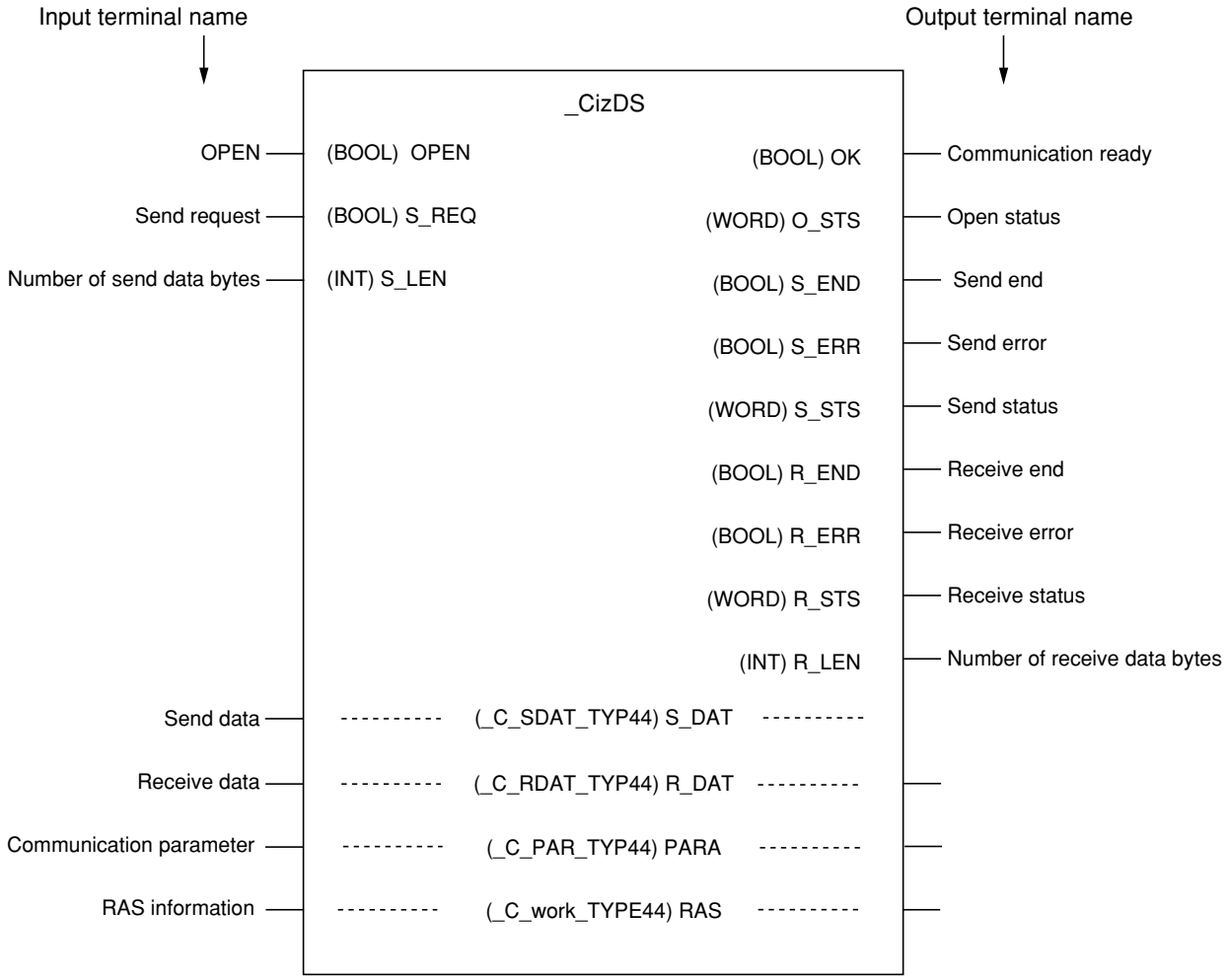
<Memory capacity>

Program area = approx. 1.7K steps
Data memory capacity = Instance memory for user FB: approx. 0.3K words
Standard memory or Retain memory: approx. 0.8K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of bar code reader FB main body as well as that of the sub-FB which is called from the bar code reader FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

5-4-2 Specifications for _CizDS

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Number of send data bytes	S_LEN	INT	IN	Stores the number of send data bytes.
Send data	S_DAT	_C_SDAT _TYP44	IN_OUT	Stores the send data. WORD type array data with element No. 0 to 31.
Communication parameter	PARA	_C_PAR _TYP44	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization.
Send end	S_END	BOOL	OUT	Turns ON when send ends
Send error	S_ERR	BOOL	OUT	Turns ON if a send error has occurred.
Send status	S_STS	WORD	OUT	Send result code.
Receive end	R_END	BOOL	OUT	Turns ON when receive ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Number of receive data bytes	R_LEN	INT	OUT	Stores the number of receive data bytes.
Receive data	R_DAT	_C_RDAT _TYP44	IN_OUT	Stores the receive data. WORD type array data with element No. 0 to 31.
RAS information	RAS	_C_work _TYPE44	IN_OUT	Stores the operating status of this FB. Structure data which uses 732 words of Standard memory or Retain memory. Refer to term 5-4-6 for details.

5-4-3 Initialization

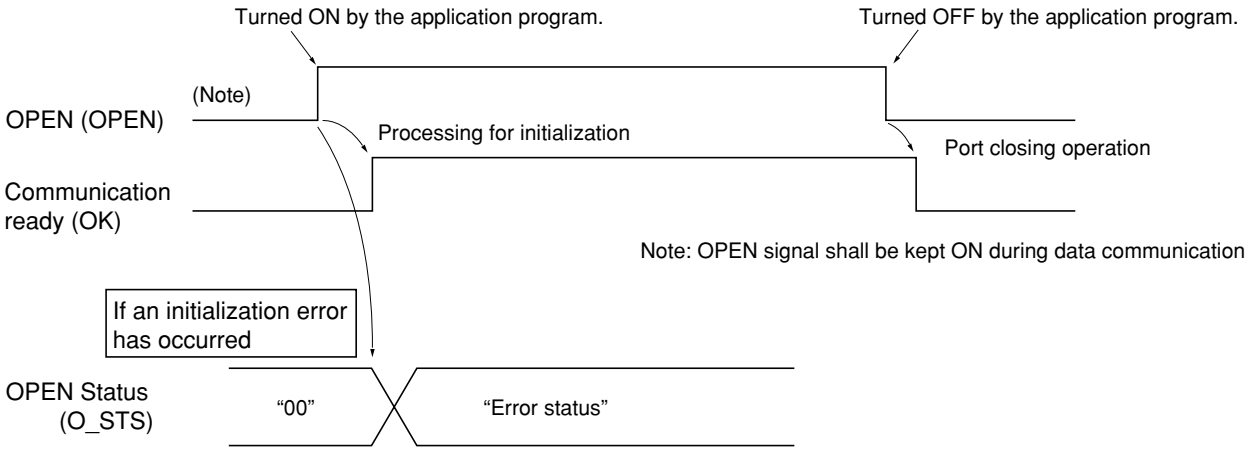
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each “communication parameter” item so as to match the communication specifications of the IZUMI DATA LOGIC bar code reader. The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Communication speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit.	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit.	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 15	Reserved ⋮ Reserved	Not used
16	Send monitoring timer	The timer for monitoring during the period from when the CPU module sends a send request to a device until communication ends. Normally set to 100 (=1 second) (in 0.01-second steps)
17	Number of start code bytes	Designates the number of start code bytes.
18	Start code 1	Designates start code.
19	Start code 2	
20	Start code 3	
21	Start code 4	
22	Number of end code bytes	Designates the number of end code bytes.
23	End code 1	Designates end code.
24	End code 2	
25	End code 3	
26	End code 4	
27 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).



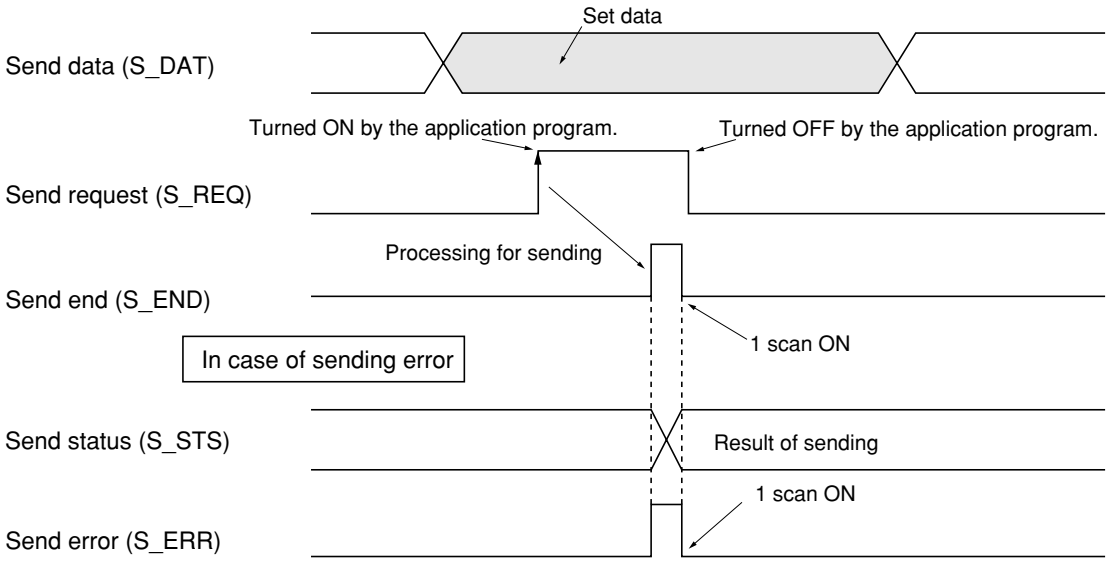
(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Transmission speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Reserved	
'42'	Start code setting error	
'43'	End code setting error	
'44'	Reserved	
'45'	Reserved	
'46'	Reserved	
'47'	Reserved	
'80'	General purpose communication module station No. setting error	
'81'	Port No. setting error.	
'82'	Message port No. setting error.	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

5-4-4 Data sending

(1) Data sending procedure

1) No response procedure



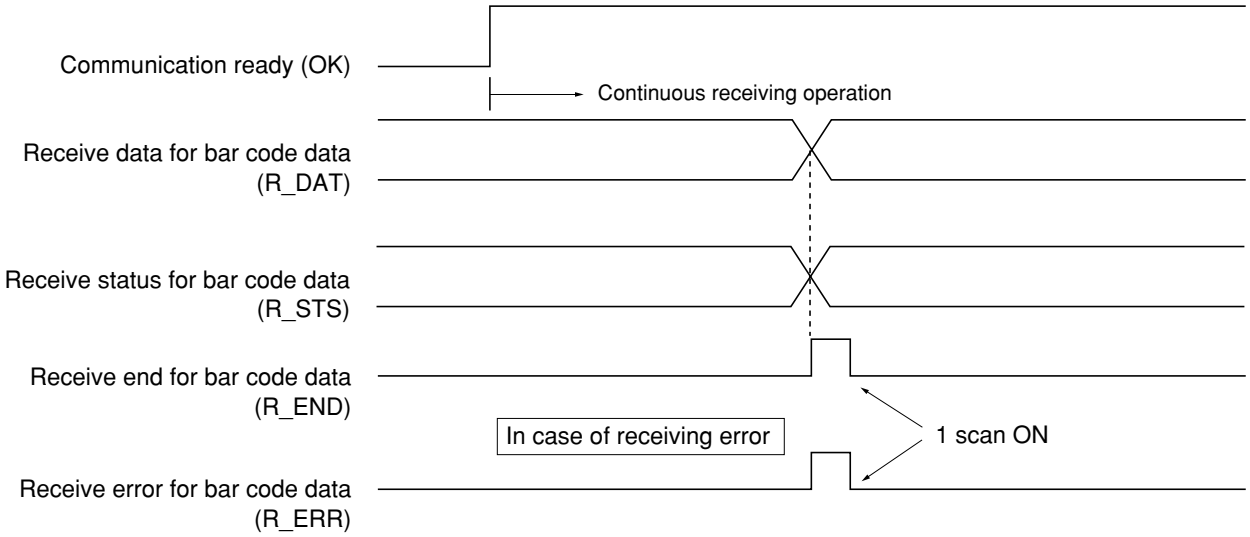
Send data are set and then send request is turned ON by the application program. FB detects the rising edge to execute the processing for sending. When sending has ended, the send end flag is turned ON (1 scan). If a send error has occurred, the send end and the send error are turned ON (1 scan), and the corresponding error code is output to the send status (“00” when ended normally).

(2) Sending status list

No.	Result of sending	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Received	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Data transmission time-out	
'41'	Reserved	
'42'	Reserved	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SXbus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Nunber of send data over.	Error detected on general purpose communication module

5-4-5 Data receiving

(1) Data receiving procedure



While the communication ready flag is turned ON, whether the data to be received exists or not is checked continuously and, when it exists, the operation for receiving is executed. When a delimiter between data frames is detected, the receive data are stored and the receive end flag is turned ON (1 scan). The receiving result is stored in the receive status.
If a receive error has occurred, the receive end and the receive error are turned ON (1 scan).

(2) Receiving status list

No.	Result of receiving	Remarks
'00'	Ended normally	
'01'	Reserved	
'02'	Send buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Data transmission time-out	
'41'	Protocol response error	
'42'	BCC error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus SEND error	
'92'	SX bus RECEIVE error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Nunber of send data over.	Error detected on general purpose communication module

5-4-6 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE44).
To use RAS information in an application, variables are declared in the following manner:

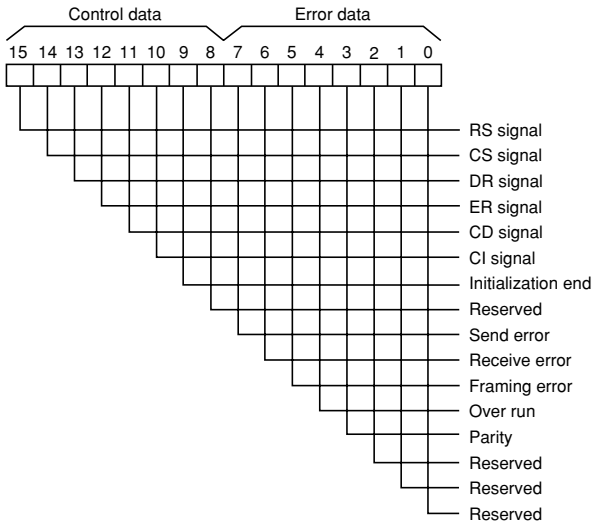
<Sample variable declaration>

```
VAR
  RAS : _C_work_TYPE44 ;
END_VAR
```

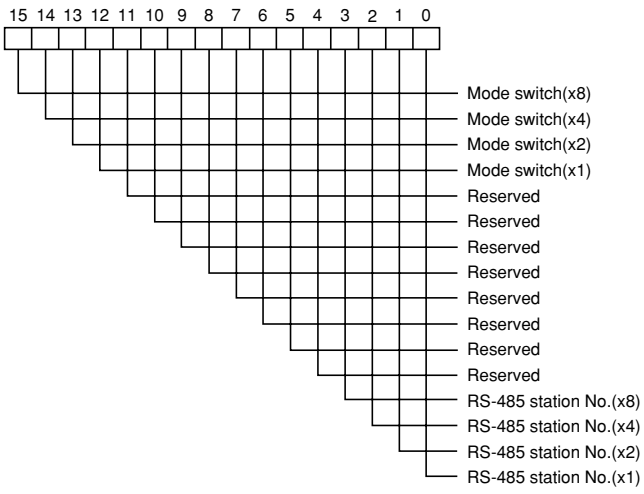
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



Section 6 SECS FB

Page

Section 6 SECS FB
6-1 _C_SECS

6-1-1 General

_C_SECS is a FB which performs the start-stop synchronous data transmission between the CPU module and the SECS I procedure semiconductor manufacturing system. For the transmission parameters to control SECS procedure semiconductor manufacturing system, refer to those manuals.

<Function of _C_SECS>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

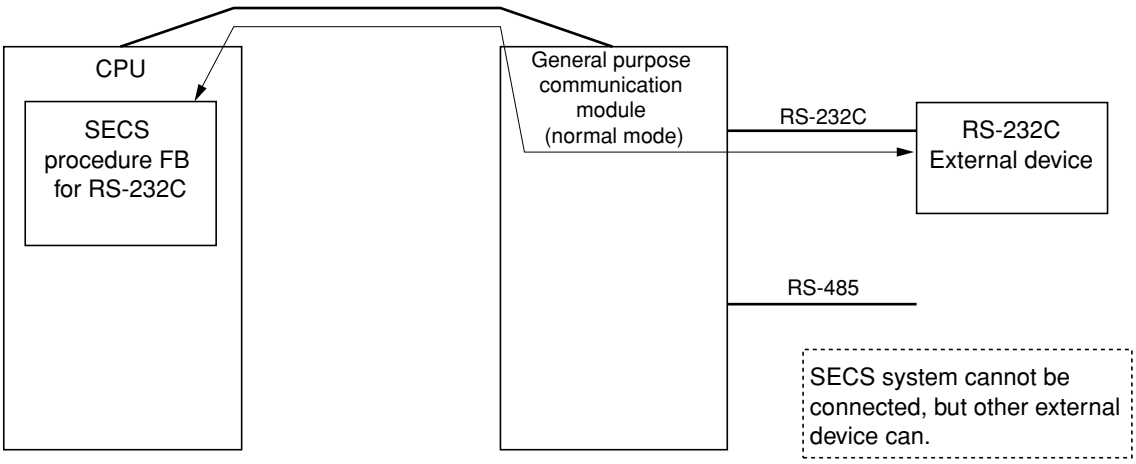
Send the data from an application program in the CPU module to SECS procedure semiconductor manufacturing system via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The SECS system can be connected with the RS-232C port by 1:1.
SECS system cannot be connected to the RS-485 port .
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note1: One FB is necessary for each communication port.
Note2: To return EQT within 0.2 seconds after ENQ reception, operate FB at an interval of 0.2 seconds or less.

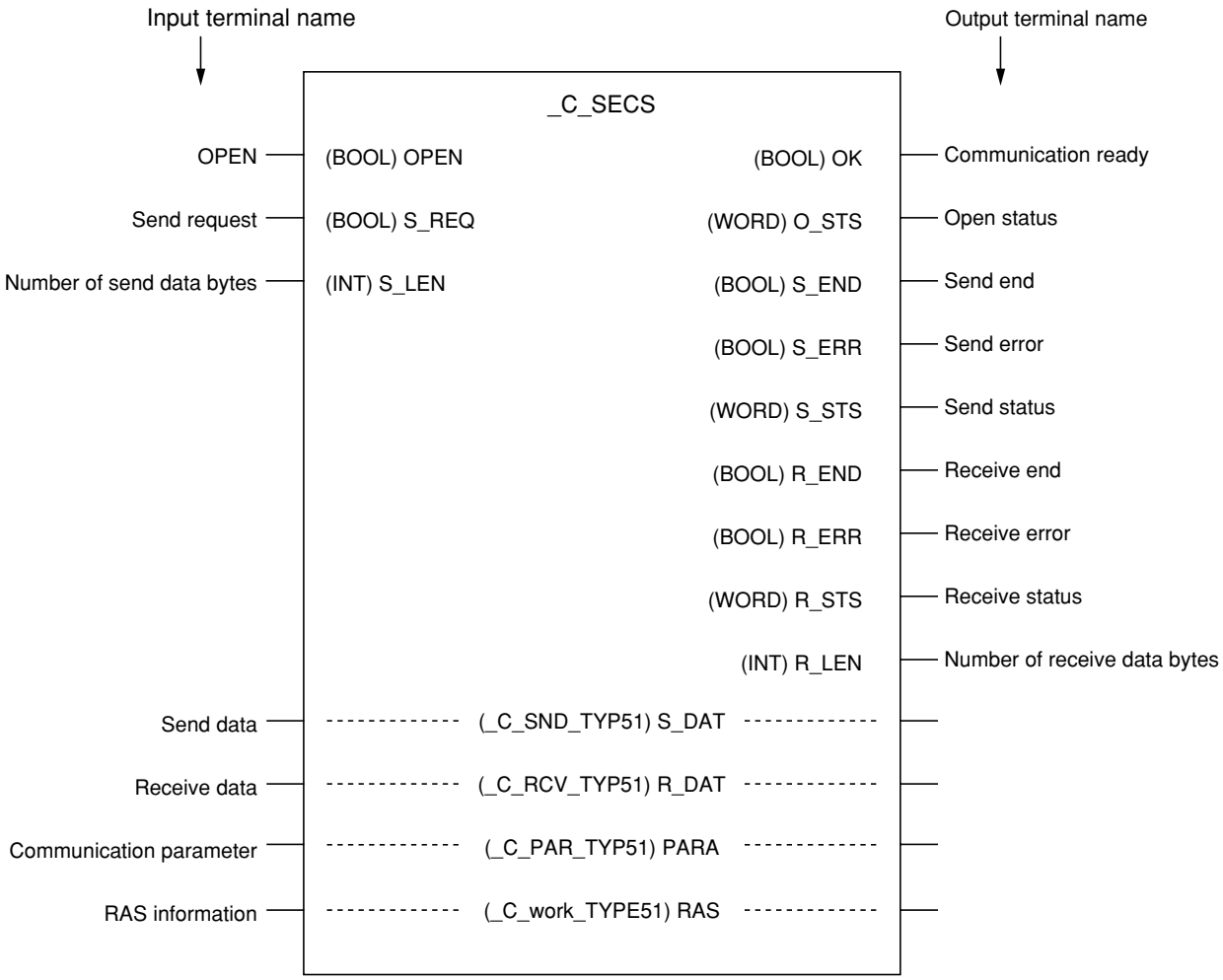
<Memory capacity>

Program area = approx. 2.0K steps
Data memory capacity = Instance memory for user FB: approx. 0.3K words
Standard memory or Retain memory: approx. 1.4K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of SECS procedure FB main body as well as that of the sub-FB which is called from the SECS procedure FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

6-1-2 Specifications for _C_SECS

(1) FB Format



* Send data (S_DAT) includes the header (10 bytes).

Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Number of send data bytes	S_LEN	INT	IN	Stores the number of send data bytes.
Send data	S_DAT	_C_SND _TYP51	IN_OUT	Stores the send data. WORD type array data with element No. 0 to 126.
Communication parameter	PARA	_C_PAR _TYP51	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Send end	S_END	BOOL	OUT	Turns ON when send ends
Send error	S_ERR	BOOL	OUT	Turns ON if a send error has occurred.
Send status	S_STS	WORD	OUT	Send result code
Receive end	R_END	BOOL	OUT	Turns ON when receive ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Number of receive data bytes	R_LEN	INT	OUT	Stores the number of receive data bytes.
Receive data	R_DAT	_C_RCV _TYP51	IN_OUT	Stores the receive data. WORD type array data with element No. 0 to 126.
RAS information	RAS	_C_work _TYPE51	IN_OUT	Stores the operating status of this FB. Structure data which uses 1086 words of Standard memory or Retain memory. Refer to term 6-1-6 for details.

6-1-3 Initialization

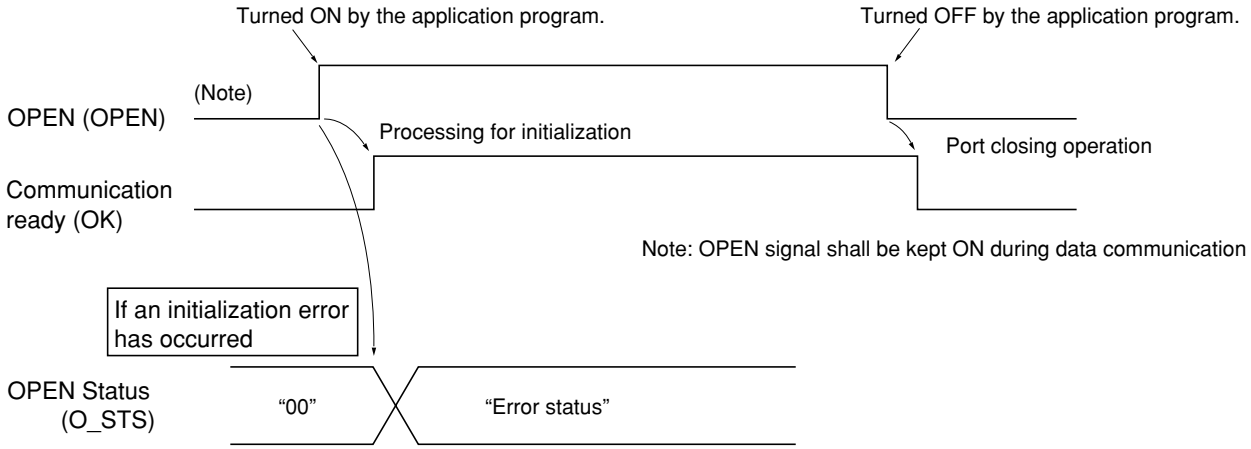
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each "communication parameter" item so as to match the communication specifications of the SECS procedure.
The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Communication speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit.	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit.	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 15	Reserved ⋮ Reserved	Not used
16	Master/Slave	Designates a master module or a slave module. 0: Master 1: Slave
17	Retry count	In case of communication error, this designates how many times to retry communication.
18	Character monitoring timer	The timer for monitoring during the period between data bytes. Set value x 100 (=1 second) (in 0.01-second steps).
19	Protocol monitoring timer	The timer for monitoring during the response period. Set value x 100 (=1 second) (in 0.01-second steps).
20 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

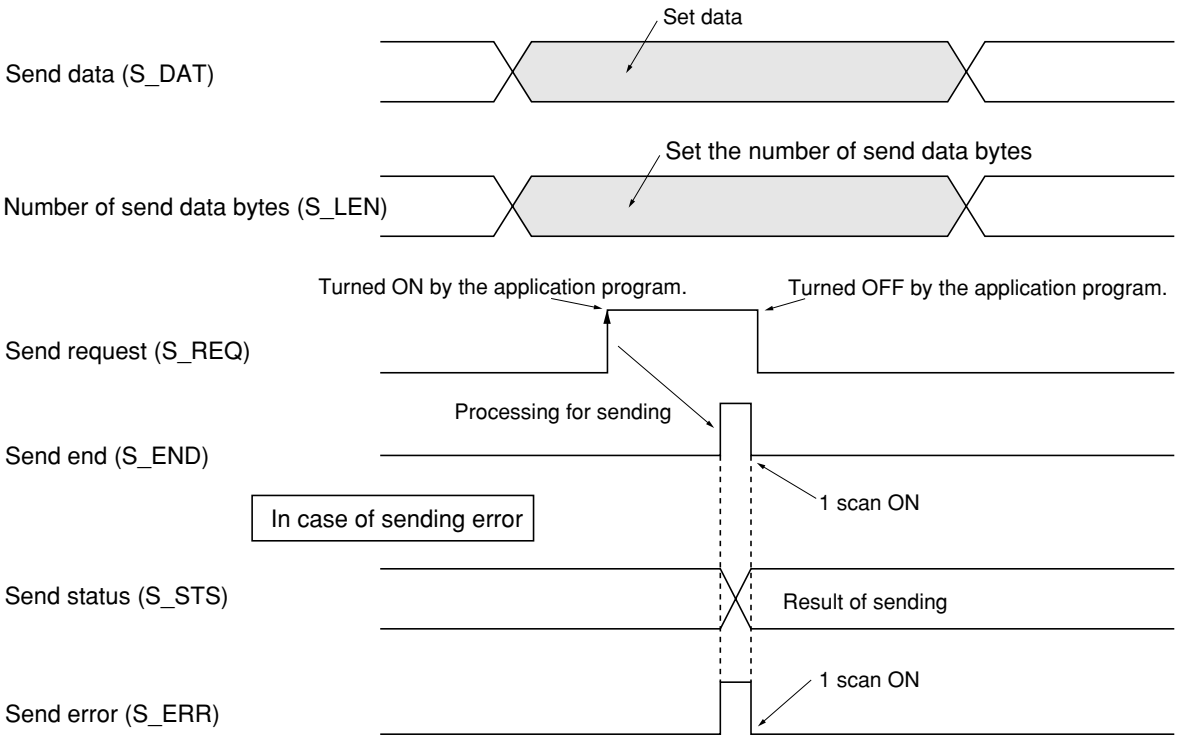


(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Communication speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Master/Slave setting error	
'41'	Retry count setting error	
'42'	Character monitoring timer (T1) setting error	
'43'	Protocol monitoring timer (T2) setting error	
'44'	Reserved	
'45'	Reserved	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error.	
'82'	Message port No. setting error.	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

6-1-4 Data sending

(1) Data sending procedure



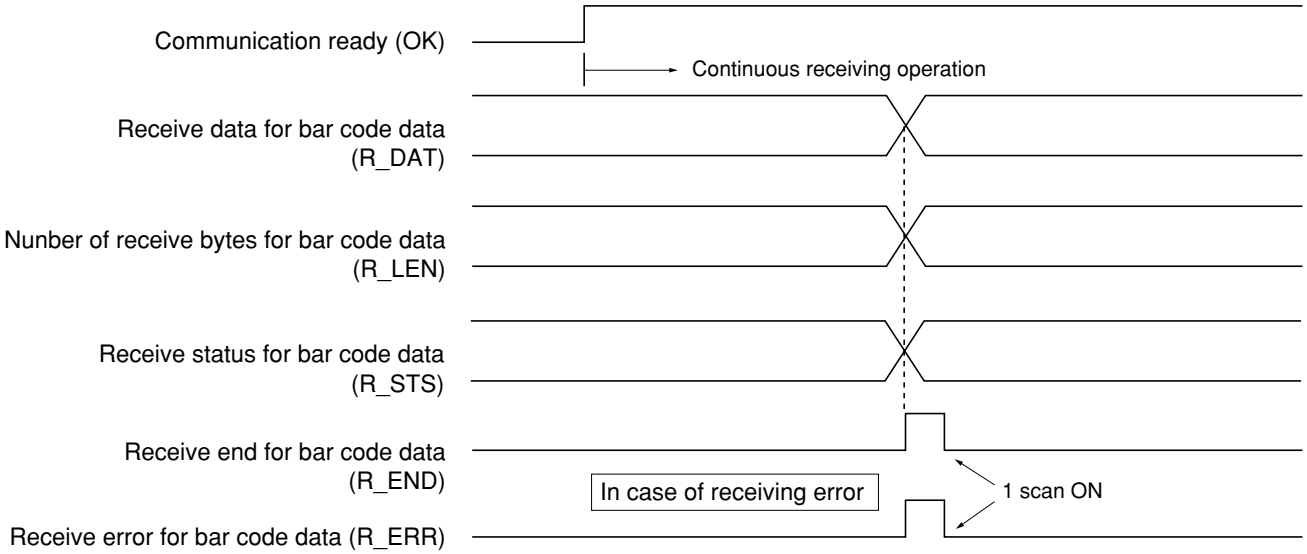
Send data and the number of send data bytes are set and then send request is turned ON by the application program.
FB detects the rising edge to execute the processing for sending.
When sending has ended, the send end flag is turned ON (1 scan). If a send error has occurred, the send end and the send error are turned ON (1 scan), and the corresponding error code is output to the send status (“00” when ended normally).

(2) Sending status list

No.	Result of sending	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Data send time-out	
'41'	Protocol response error	
'42'	BCC error	
'43'	Number of send data bytes setting error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

6-1-5 Data receiving

(1) Data receiving procedure



While the communication ready flag is turned ON, whether the data to be received exists or not is checked continuously and, when it exists, the operation for receiving is executed. When a delimiter between data frames is detected, the receive data and the number of receive data bytes are stored and the receive end flag is turned ON (1 scan). The receiving result is stored in the receive status. If a receive error has occurred, the receive end and the receive error are turned ON (1scan).

(2) Receiving status list

No.	Result of receiving	Remarks
'00'	Ended normally	
'01'	Reserved	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Reserved	
'41'	Protocol response error	
'42'	BCC error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receiv error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

6-1-6 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE51).
To use RAS information in an application, variables are declared in the following manner:

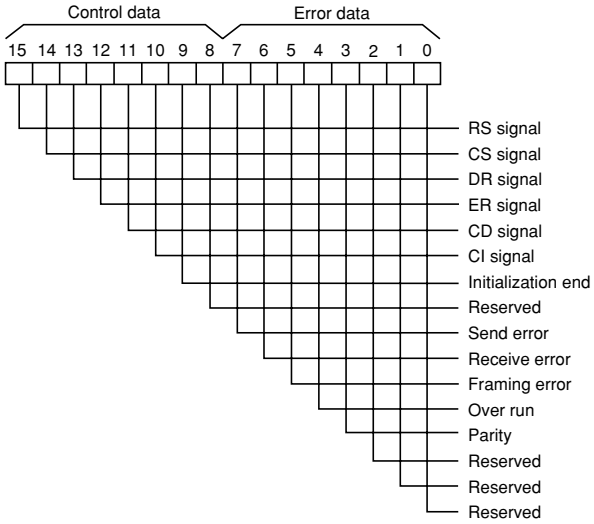
<Sample variable declaration>

```
VAR
  RAS : _C_work_TYPE51 ;
END_VAR
```

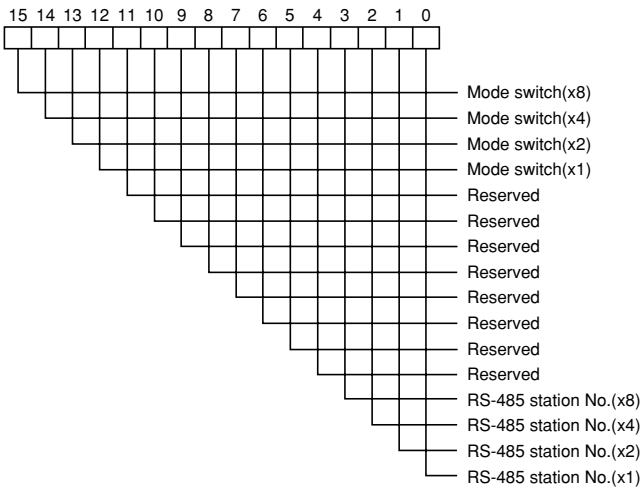
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



Section 7 FANUC DNC2 FB

Page

Section 7 FANUC DNC2 FB
7-1 FANUC _CDNC2

7-1-1 General

_CDNC2 is a FB which performs the start-stop synchronous data transmission between the CPU module and the CNC (Computer Numerical Control) of FANUC LTD.

<Function of _CDNC2>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

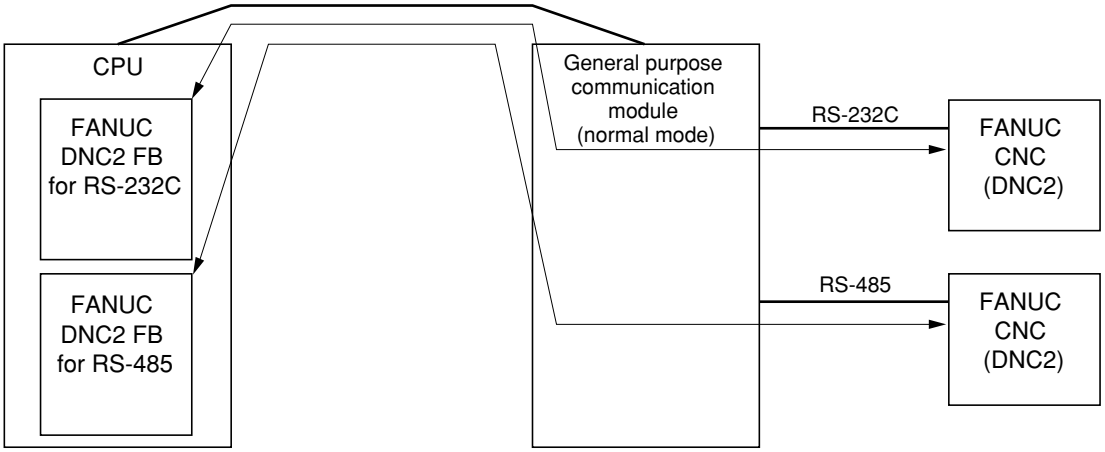
Send the data from an application program in the CPU module to FANUC LTD CNC via the general purpose communication module, outputs the data received via the general purpose communication module to an application program.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The CNC can be connected with the RS-232C or RS-485 port by 1:1.
CNC cannot be connected to the RS-485 port by 1:N.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for each communication port.

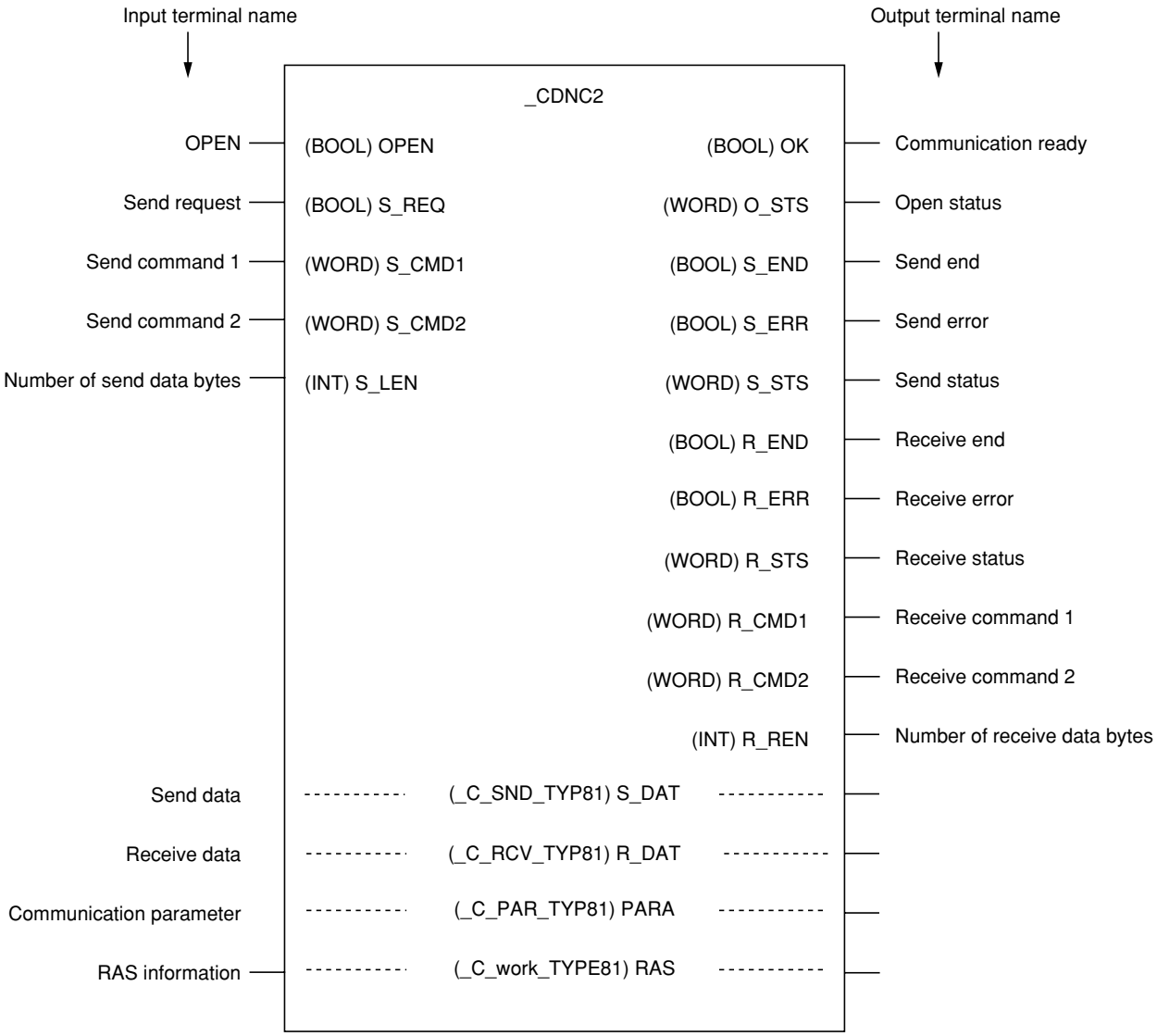
<Memory capacity>

Program area	= approx. 4.5K steps		
Data memory capacity	= Instance memory for user FB:		approx. 1.0K words
	Standard memory or Retain memory:		approx. 1.1K words
	Instance memory for system FB:		approx. 0.1K words

Note1: The above memory area includes the capacity of _CDNC2 FB main body as well as that of the sub-FB which is called from the _CDNC2 FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

7-1-2 Specifications for _CDNC2

(1) FB format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Send command 1	S_CMD1	WORD	IN	Stores the initial term of send command.
Send command 2	S_CMD2	WORD	IN	Stores the second term of send command.
Number of send data bytes	S_LEN	INT	IN	Stores the number of receive data bytes. (additional information)
Send data	S_DAT	_C_SND _TYP81	IN_OUT	Stores the send data. (additional information) WORD type array data with element No. 0 to 260.
Communication parameter	PARA	_C_PAR _TYP81	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Send end	S_END	BOOL	OUT	Turns ON when send ends
Send error	S_ERR	BOOL	OUT	Turns ON if a send error has occurred.
Send status	S_STS	WORD	OUT	Send result code
Receive end	R_END	BOOL	OUT	Turns ON when receive ends.
Receive error	R_ERR	BOOL	OUT	Turns ON if a receive error has occurred.
Receive status	R_STS	WORD	OUT	Receive result code.
Receive command 1	R_CMD1	WORD	OUT	Stores the initial term of receive command.
Receive command 2	R_CMD2	WORD	OUT	Stores the second term of receive command.
Number of receive data bytes	R_LEN	INT	OUT	Stores the number of receive data bytes. (additional information)
Receive data	R_DAT	_C_RCV _TYP81	IN_OUT	Stores the receive data. (additional information) WORD type array data with element No. 0 to 260.
RAS information	RAS	_C_work _TYPE81	IN_OUT	Stores the operating status of this FB. Structure data which uses 1104 words of Standard memory or Retain memory. Refer to term 7-1-6 for details.

7-1-3 Initialization

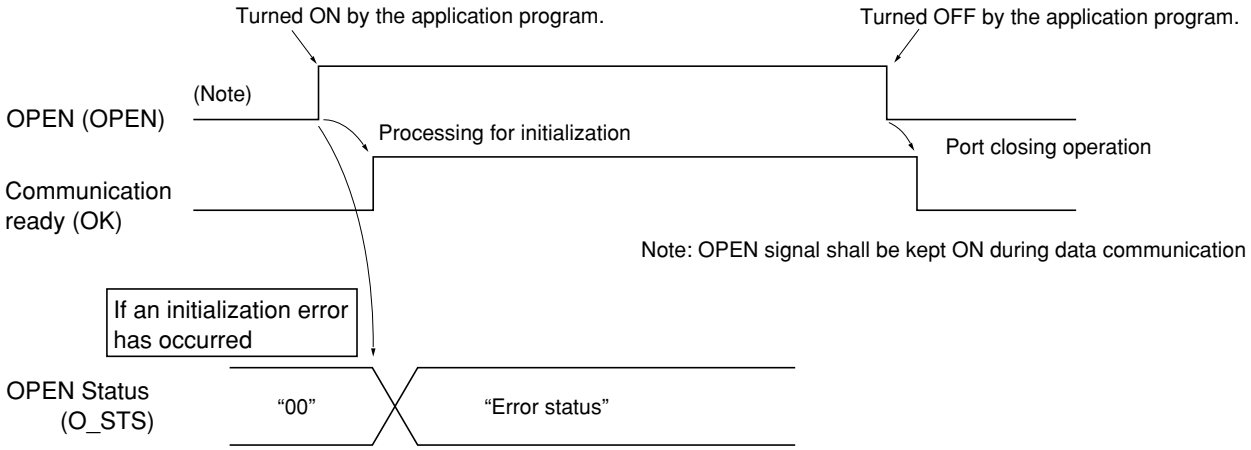
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each “communication parameter” item so as to match the communication specifications of the FANUC CNC. The parameter file contains the INT type array data with element No. 0 to 39.

Element	Item	Description
0	General purpose communication module station No.	Sets the station number of the general purpose communication module on the SX bus.
1	Port No.	Designates an interface port on the general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.	Designates a port No. for sending/receiving message to/from a general purpose communication module. The "M_open" FB is used in this FB. This set value is input to "M_open" as the "SPORT_No." Avoid designating a port No. which is used as "SPORT_No." of "M_open" in the other program.
3	Reserved	
4	Transmission speed	Designates the transmission speed. 0:1200, 1:2400, 2:4800, 3:9600, 4:19200 bps
5	Data bit	Designates the data bit length. 0: 7 bits 1: 8 bits
6	Parity bit	This is a bit which is added to data for the purpose of error detection. 0: None 1: Odd 2: Even
7	Stop bit	This bit indicates the end of data. 0: 1 bit 2: 2 bits
8 ⋮ 11	Reserved ⋮ Reserved	Not used
12	RS-485 mode	Selects 4-wire or 2-wire for RS-485. 0: 4-wire 1: 2-wire
13 ⋮ 15	Reserved ⋮ Reserved	Not used
16	Response monitoring timer	The timer for monitoring during the period from when the CPU module sends a send request to a device until communication ends. Set a value which is 100 (1 second) or more and 100 times the program activation interval or more (in 0.01 increments).
17	Retry count	In case of communication error, this designates how many times to retry communication.
18 ⋮ 39	Reserved ⋮ Reserved	Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

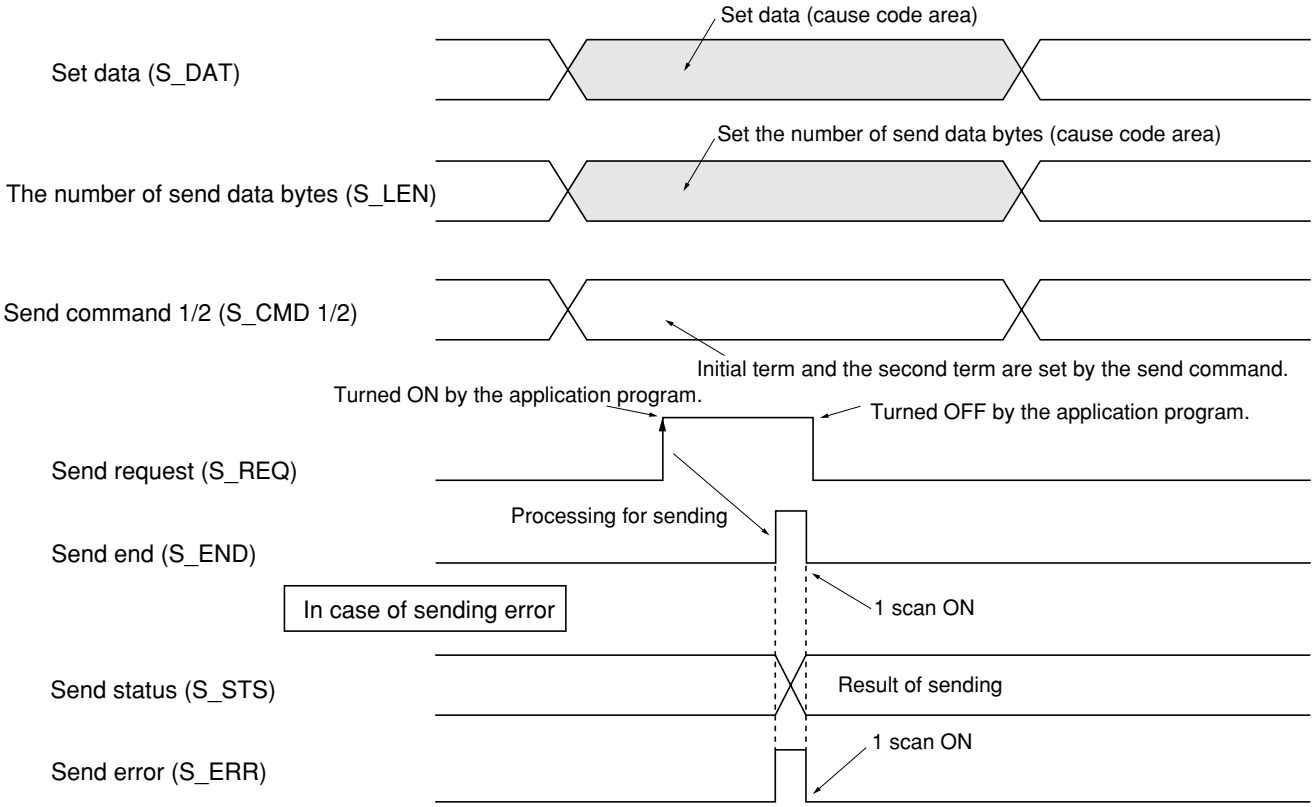


(3) Open status list

No.	Result of initialization	Remarks
'00'	Ended normally	
'01'	Communication speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	Reserved	
'06'	Reserved	
'07'	Reserved	
'08'	Reserved	
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'40'	Response monitoring timer setting error	
'41'	Retry count setting error	
'42'	Reserved	
'43'	Reserved	
'44'	Reserved	
'45'	Reserved	
'46'	Reserved	
'47'	Reserved	
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error.	
'82'	Message port No. setting error.	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

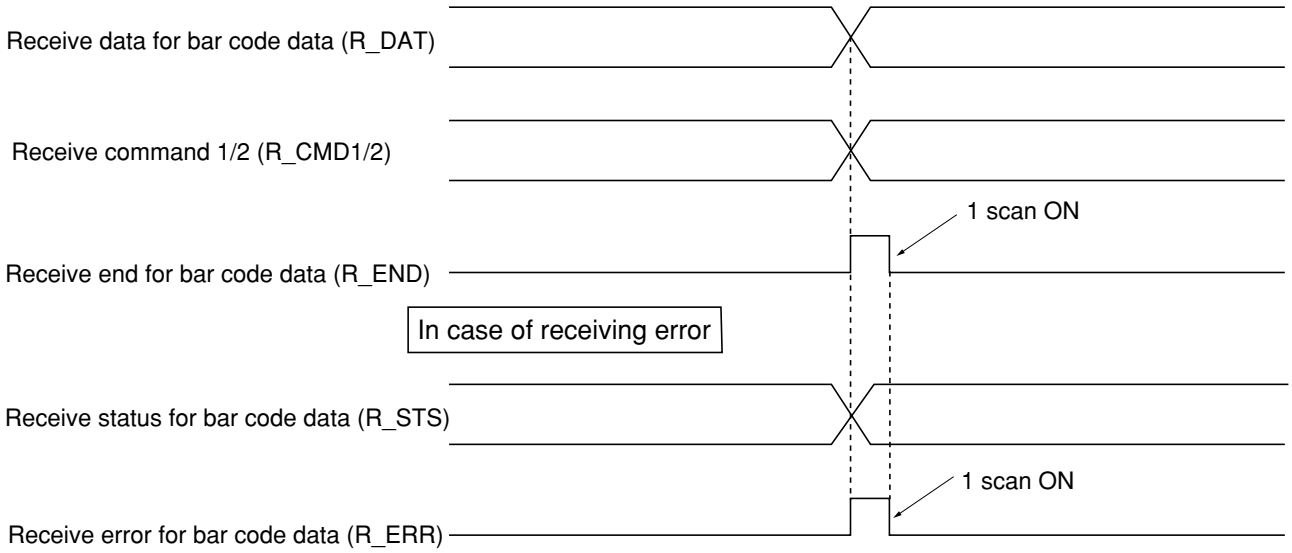
7-1-4 Data sending

(1) Data sending procedure



Send data and send command 1/2 are set and then send request is turned ON by the application program. FB detects the rising edge to execute the processing for sending.
When sending has ended, the send end flag is turned ON (1 scan). If a send error has occurred, the send end and the send error are turned ON (1 scan), and the corresponding error code is output to the send status (“00” when ended normally).

(2) Data receiving procedure



While the communication ready flag is turned ON, whether the bar code data to be received exists or not is checked continuously and, when it exists, the operation for receiving is executed. When a delimiter between data frames is detected, the receive data are stored and the receive end flag is turned ON (1 scan). The receiving result is stored in the receive status. If a receive error has occurred, the receive end for bar code data and the receive error for bar code data are turned ON (1 scan).

(3) Receiving status list

No.	Result of receiving	Remarks
'00'	Ended normally	
'01'	Send buffer has overflowed.	
'02'	Receive buffer has overflowed.	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'40'	Data transmission time-out	
'41'	Protocol response error	
'42'	BCC error	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Error detected on general purpose communication module
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module
'C0'	Hardware error detected during receiving	Error detected on general purpose communication module
'C1'	Receive buffer overflow.	Error detected on general purpose communication module
'C2'	Send buffer overflow.	Error detected on general purpose communication module
'C3'	Send data size over	Error detected on general purpose communication module

7-1-5 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE81).
To use RAS information in an application, variables are declared in the following manner:

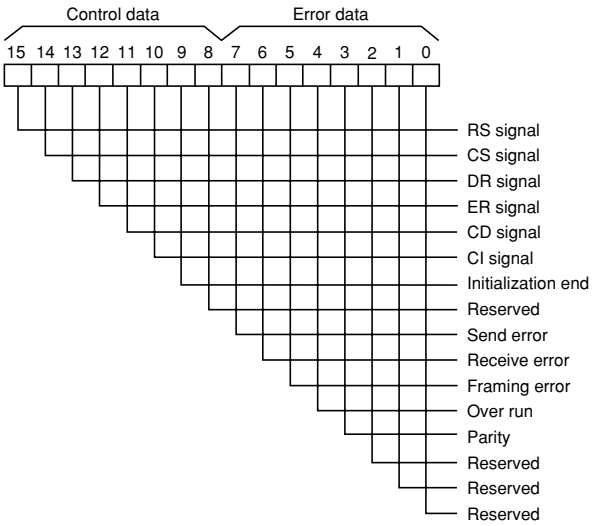
<Sample variable declaration>

```
VAR
  RAS : _C_work_TYPE81 ;
END_VAR
```

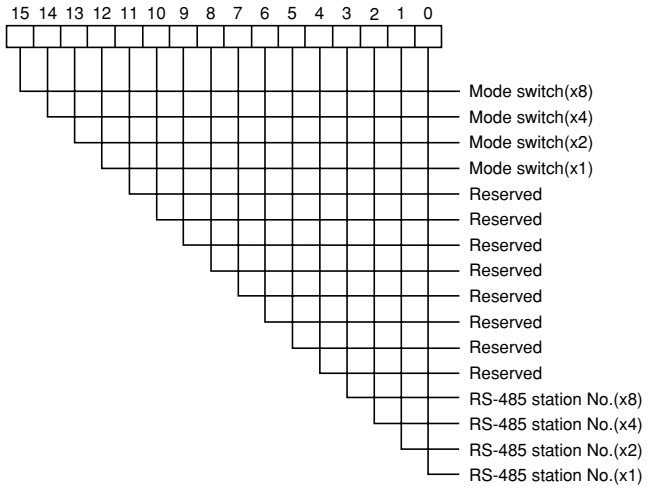
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



Section 8 Serial Printer Controller FB

Page

Section 8 Serial Printer Controller FB

8-1 _Cprint

8-1-1 General

_Cprint is a FB which performs the start-stop synchronous data transmission between the CPU module and the serial interface printer sold on the market.

<Function of _Cprint>

1) Initialization of communication ports

Initializes communication ports (the setting of the transmission speed, data bit length, parity bits, etc.).

2) Data sending/receiving function

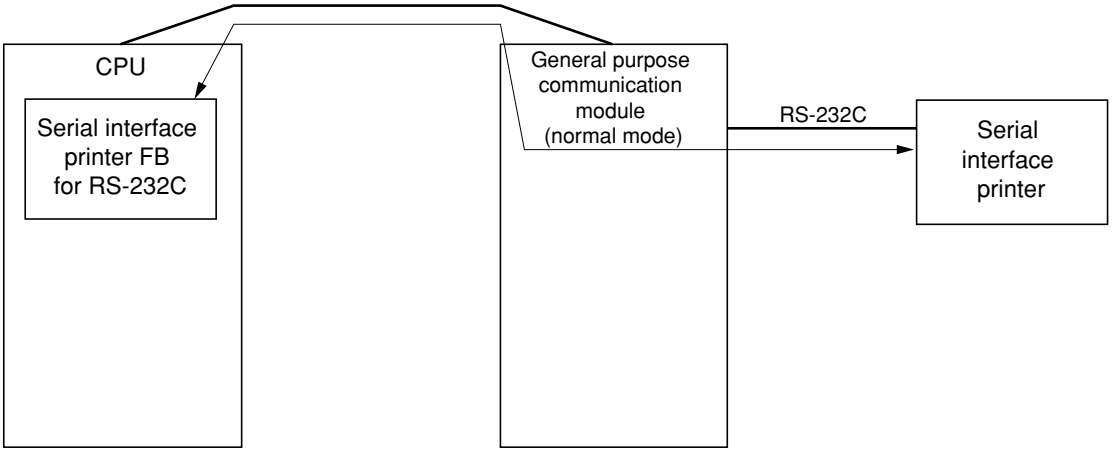
Send the data from an application program in the CPU module to the serial interface printer sold on the market via the general purpose communication module.

3) Transmission condition monitoring function

Monitors data transmission condition and, if abnormal, outputs error information.

<System configuration>

The serial interface printer can be connected with the RS-232C port by 1:1.
Connected composition of communication module and serial interface printer is the following.
This FB cannot be used for the general purpose communication module in RS-232C/RS-485 conversion mode.



Note: One FB is necessary for one printer.

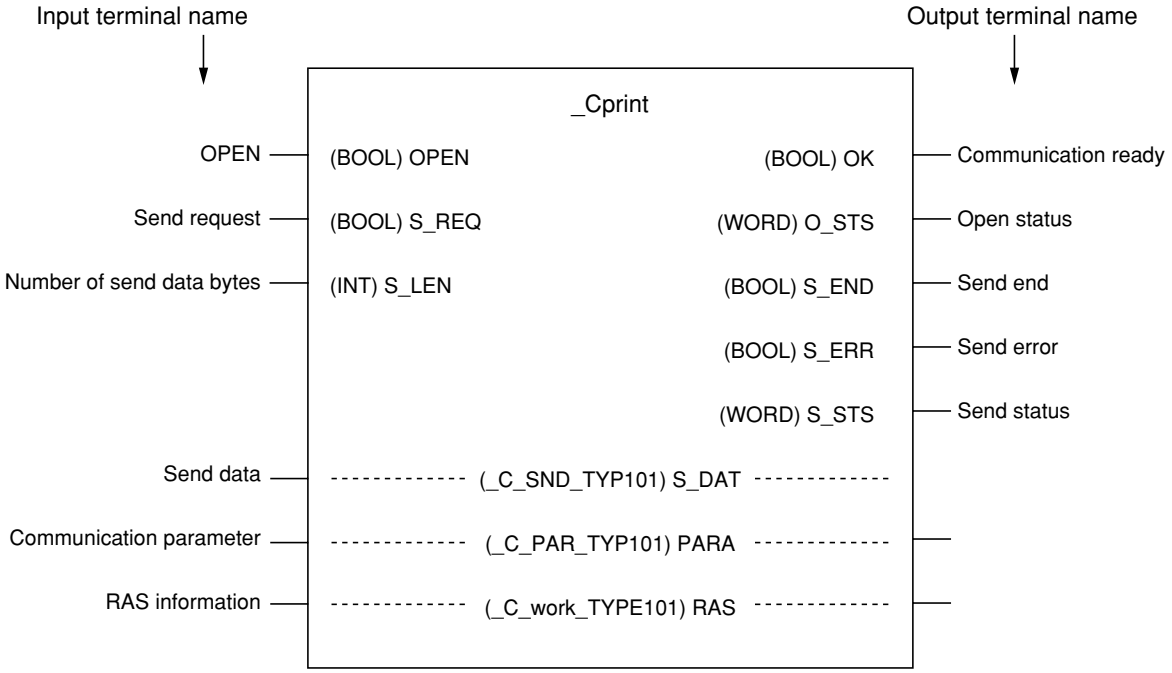
<Memory capacity>

Program area = approx. 1.5K steps
Data memory capacity = Instance memory for user FB: approx. 1.0K words
Standard memory or Retain memory: approx. 4.0K words
Instance memory for system FB: approx. 0.1K words

Note1: The above memory area includes the capacity of serial interface printer FB main body as well as that of the sub-FB which is called from the serial interface printer FB.
Note2: “Standard memory” or “Retain memory” includes the memory capacity necessary for data transmission.

8-1-2 Specifications for _Cprint

(1) FB Format



Note: Connect only the variables necessary for control to the FB terminal. However, be sure to connect a variable to the IN-OUT terminal even if it is not in use.

(2) Explanation of each FB terminal

<Terminal list>

Terminal name	Variable name	Data type	I/O	Explanation
OPEN	OPEN	BOOL	IN	ON: Sends "communication parameters" to the general purpose communication module to initialize communication. When communication becomes possible, "communication ready" turns ON. OFF: Performs the processing for ending communication. "Communication ready" turns OFF.
Send request	S_REQ	BOOL	IN	Starts to send data. When sending is completed, this needs to be turned OFF by the application program.
Number of send data bytes	S_LEN	INT	IN	Stores the number of send data bytes and print data bytes.
Send data	S_DAT	_C_SND _TYP101	IN_OUT	Stores the send data and print data. WORD type array data with element No. 0 to 255.
Communication parameter	PARA	_C_PAR _TYP101	IN_OUT	Stores the initialization parameters. INT type array data with element No. 0 to 39.
Communication ready	OK	BOOL	OUT	Turns ON when initialization has ended normally to indicate that the system is ready for sending/receiving data.
Open status	O_STS	WORD	OUT	2-digit hexadecimal code to indicate the result of initialization
Send end	S_END	BOOL	OUT	Turns ON for 1 scanning when transmission is completed.
Send error	S_ERR	BOOL	OUT	Turns ON for 1 scanning if a transmission error occurs.
Send status	S_STS	WORD	OUT	Send result code.
RAS information	RAS	_C_work _TYPE101	IN_OUT	Stores the operating status of this FB. Structure data which uses 1340 words of Standard memory or Retain memory. Refer to term 8-1-5 for details.

8-1-3 Initialization

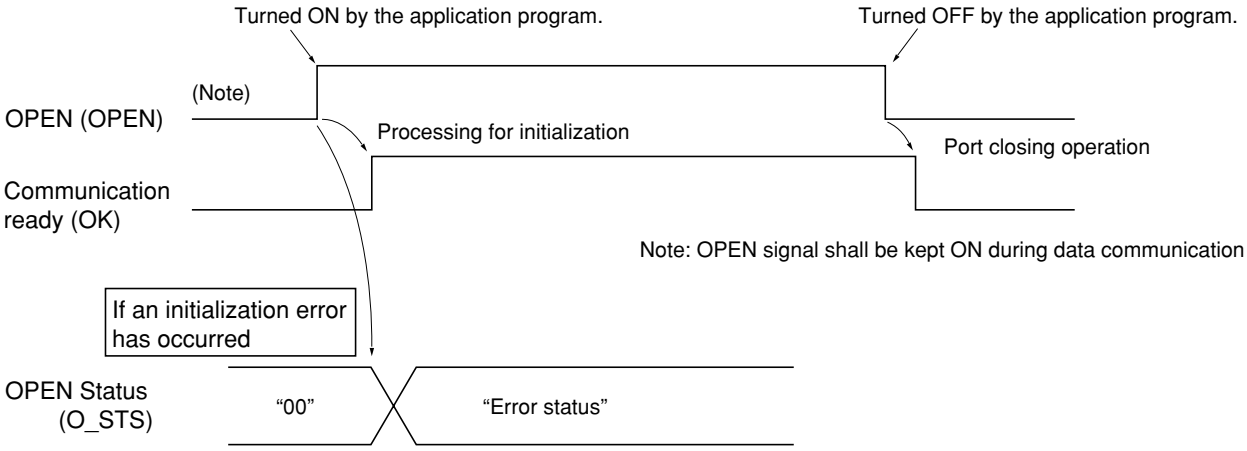
(1) Set values of initialization parameters

In order to initialize communication ports which are to be used, it is necessary to set proper values for each "communication parameter" item so as to match the communication specifications of the serial interface printer. The parameter file contains the INT type array data with element No. 0 to 39.

No.	Item		Description
0	General purpose communication module station No.		Sets the station number of the general purpose communication module on the SX bus.
1	Port No.		Designates an interface port on general purpose communication module. 0: RS-232C port 1: RS-485 port
2	Message port No.		Designates a port No. for sending/receiving messages to/from a general purpose communication module (1 to 127). Note: Avoid designating a port No. which is already used for sending/receiving messages to/from other module.
3	Reserved		Not used.
4	Transmission speed		Designates the transmission speed. 0: 1200, 1: 2400, 2: 4800, 3: 9600, 4: 19200, 5: 38400, 6: 57600 bps
5	Data bit		Designates the data bit length. When "7" is selected, 7 bits make up one data; when "8," 8 bits make up one data. 0: 7 bits 1: 8 bits
6	Parity bit		This is a bit which is added to data for the purpose of error detection. Designate the proper one to match the setting of the device at the other end. 0: None, 1: Odd, 2: Even
7	Stop bit		This bit indicates the end of data. Designate the proper one to match the setting of the device at the other end. 0: 1 bit, 2: 2 bits
8	DCE designation		When signal line control is not performed, there is no difference in functions between DCE and DTE modes. The RS-232C of the general purpose communication module is of DTE specification, however, it can be used as a DCE specification interface when signal lines are converted as follows: No. 4 pin (RS) to CS No. 5 pin (CS) to RS No. 6 pin (DR) to ER No. 20 pin (ER) to DR 0: DTE, 1: DCE, 2: Modem DTE
9	ER/DR signal control		0: Off, 1: On
10	Signal flow control	DTE mode	0: Off RS: always ON; Sending: unconditional 1: On RS: ON while sending; Sending: when CTS is ON
		DCE mode	0: Off CS: always ON; Sending: unconditional 1: On CS: ON when RTS is ON; Sending: when DRT is ON
11	XON/XOFF control		Because communication between sender and receiver is performed asynchronously, flow control may be necessary. The receiver sends an XOFF signal to indicate that it cannot receive data for a while and then sends an XON signal to cancel the XOFF condition. To use XON/OFF control, the device at the other end must also have this function. 0: NO, 1: YES
12 ⋮ 39	Reserved ⋮ Reserved		Not used

(2) Initialization procedure

When the OPEN terminal of FB is turned ON, communication parameters are transferred to the general purpose communication module, which executes initialization. If initialization is impossible due to communication parameter setting error or hardware error, FB outputs the corresponding error code to O_STS (OPEN status).

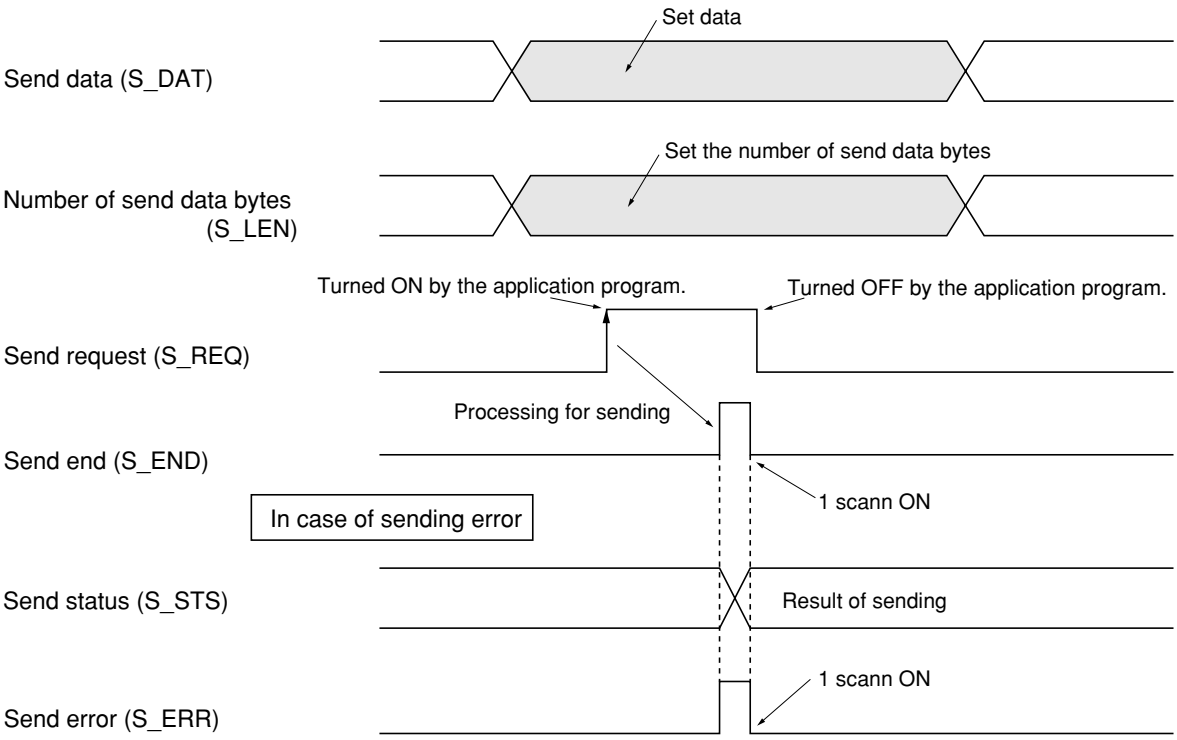


(3) Open status list

No.	Result of initiallization	Remarks
'00'	Ended normally	
'01'	Communication speed error	Error detected on general purpose communication module
'02'	Data bit length error	Error detected on general purpose communication module
'03'	Parity bit error	Error detected on general purpose communication module
'04'	Stop bit error	Error detected on general purpose communication module
'05'	DCE designation error	Error detected on general purpose communication module
'06'	Signal flow control setting error	Error detected on general purpose communication module
'07'	XON/XOFF control setting error	Error detected on general purpose communication module
'3F'	Parameter changeover error	Parameter modification after OPEN detected
'48'	Send timer value setting error	Do not set the value of the minus.
'80'	General purpose communication module station No. setting error.	
'81'	Port No. setting error.	
'82'	Message port No. setting error.	
'93'	Open error	SX bus error
'94'	Open error	Failed the general purpose communication module initialization
'A3'	Processing impossible because in conversion mode.	Error detected on general purpose communication module
'A5'	Processing impossible because in loader mode.	Error detected on general purpose communication module
'A6'	Processing impossible because self-diagnosis is being executed.	Error detected on general purpose communication module

8-1-4 Data sending

(1) Data sending procedure



Send data and send data length are set and then send request is turned ON by the application program. FB detects the rising edge to execute the processing for sending. When sending has ended, the send end flag is turned ON (1 scan).
If a send error has occurred, the send end and the send error are turned ON (1 scan), and the corresponding error code is output to the send status (“00” when ended normally).

(2) Sending status list

No.	Result of sending	Remarks
'00'	Normally ended	
'01'	Reserved	
'02'	Reserved	
'03'	Reserved	
'04'	Reserved	
'05'	Reserved	
'06'	Reserved	
'90'	General purpose communication module disconnected.	Not detected
'91'	SX bus send error	
'92'	SX bus receive error	Not detected
'A0'	Object port error	Specified port No. is neither 0 nor 1.
'A3'	Processing impossible because in code conversion mode.	
'A5'	Processing impossible because in loader mode.	
'A6'	Processing impossible because self-diagnosis is being executed.	Error detection on general purpose communication module
'C0'	Reserved	
'C1'	Reserved	
'C2'	Send buffer has overflowed.	Error detection on general purpose communication module
'C3'	Send data size over	Error detection on general purpose communication module

8-1-5 RAS information

The RAS information is stored in the member name “RAS” (array data of the INT data type) of structure data type (_C_work_TYPE101).
To use RAS information in an application, variables are declared in the following manner:

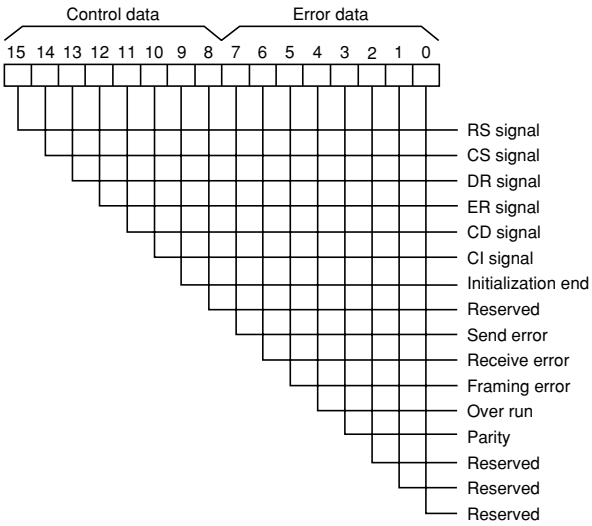
<Sample variable declaration>

```
VAR
  RAS : _C_work_TYPE101 ;
END_VAR
```

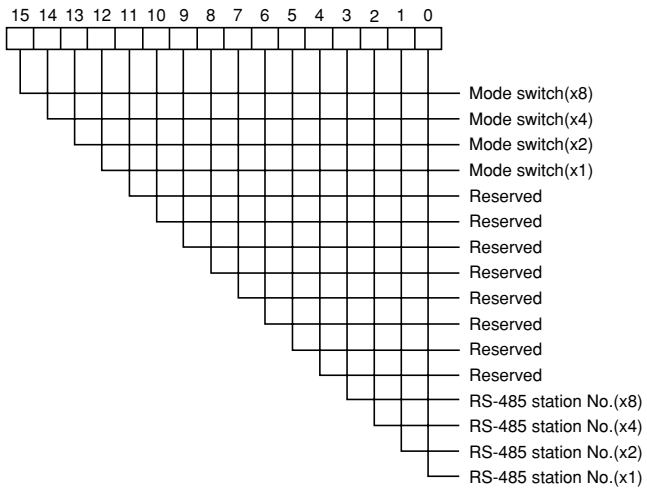
• RAS information area

RAS.RAS[0]	Port status
RAS.RAS[1]	General purpose communication module status
RAS.RAS[2]	Send request count
RAS.RAS[3]	Send end count
RAS.RAS[4]	Receive count
RAS.RAS[5]	Frame detection count
RAS.RAS[6]	M_OPEN status
RAS.RAS[7]	M_SEND status
RAS.RAS[8]	M_RECEIVE status
RAS.RAS[9]	M_SEND error count
RAS.RAS[10]	M_RECEIVE error count
RAS.RAS[11]	Reserved
RAS.RAS[12]	Reserved
RAS.RAS[13]	Reserved
RAS.RAS[14]	Reserved
RAS.RAS[15]	Reserved
RAS.RAS[16]	Reserved
RAS.RAS[17]	Reserved
RAS.RAS[18]	Reserved
RAS.RAS[19]	Reserved

• Port status



• Status of general purpose communication module



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