User's Manual

YS100 SERIES

RS-485 Communication Functions (/A31)
DCS-LCS Communication Functions (/A32)

IM 1B7C8-03E

YOKOGAWA

Yokogawa Electric Corporation

IM 1B7C8-03E
8th Edition

Introduction

This User's Manual is for communication options as shown below of the YS100 series instruments.

Option code /A31: RS-485 communication
Option code /A32: DCS-LCS communication

• Intended Readers

This manual is intended for personnel who have enough on-the-job experience as maintenance technician in charge, party of construction execution instrumentation and control engineers, start up engineers and party of plant operation and monitoring.

• Before Reading This Manual

The YS100 Series instruments allows additions of either the RS-485 Communication Function to communicate with a supervisory computer (such as a personal computer), or the DCS-LCS Communication Functions to communicate with YOKOGAWA's Distributed Control System (CENTUM-XL, μXL).

This User's Manual describes these two communication functions.

The models which can have the communication functions are as follows:

RS-485 communication (/A31) : YS150, YS170, YS131, YS135, YS136
DCS-LCS communication (/A32): YS150, YS170, YS135, YS136

Start-Up Process and Document Map

Figure 0.1 shows the flow chart of process of the YS100 Series instruments.

Table 0.1, "YS100 Series Document Map," lists the documents for the YS100 series and highlights the position of this document. Refer to this map when handling this product.

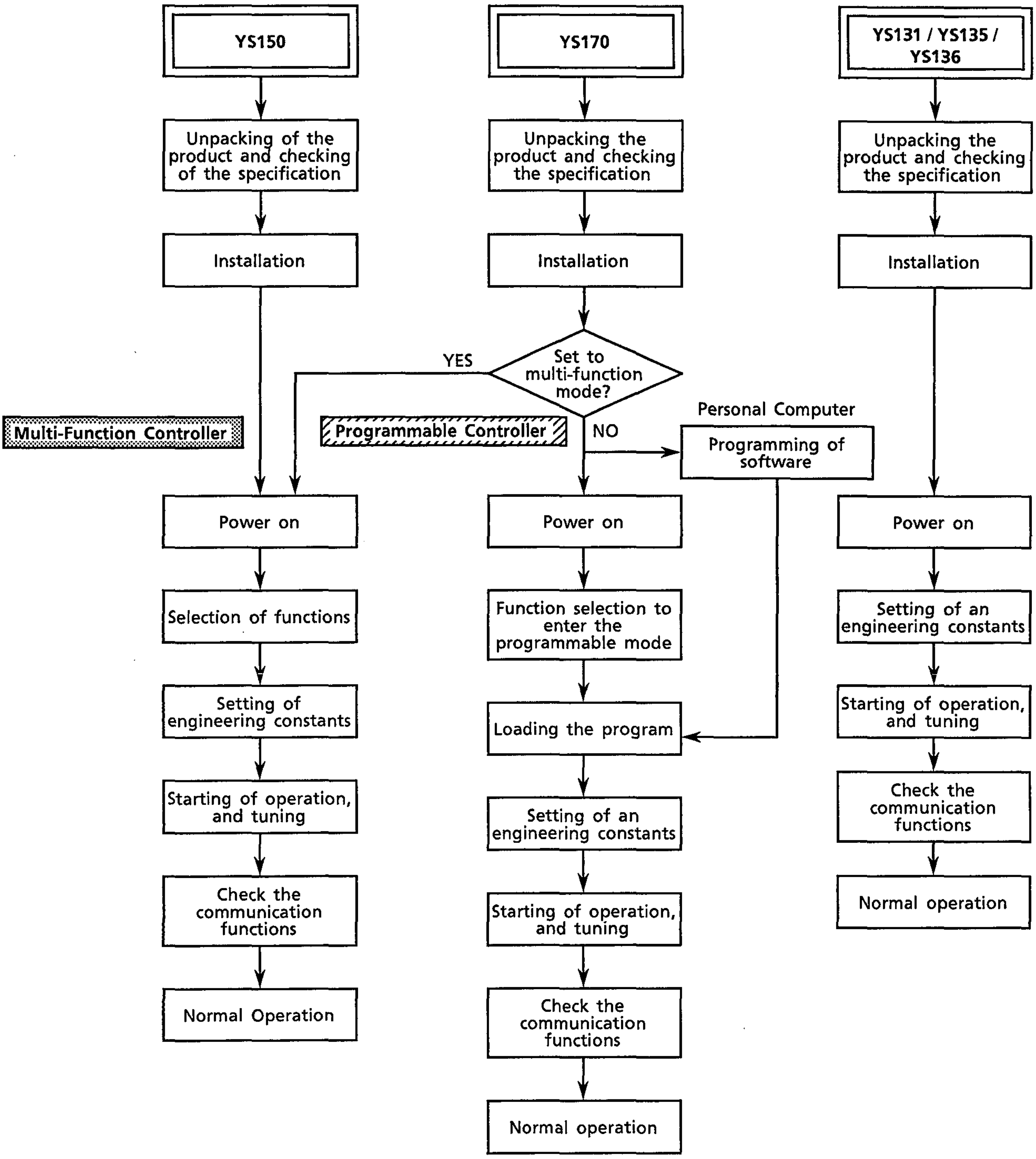

Figure 0.1 Flow Chart of Start-Up Process

Document Map

Table 0.1 lists the documents (Technical Information and User's Manual) to be read at each step of starting up process. Refer to the appropriate documents when using the YS110 Standby Manual Station.

Table 0.1 YS100 Document Map

Document Class	Document No.	Title	Usage (◎: Essential, ○ : For Reference)				
			Programming for YS170	Engineering for function selections and parameter settings	Tuning	Normal Operation	Installation and Maintenance
Technical Information	TI 1B7A1-01E	YS100 SERIES Information	○	○		○	
	TI 1B7C0-01E Note 2	Intelligent Self-tuning Controllers			◎		◎
	TI 1B7C1-01E	YS100, YS170 Single-loop Controller Control Functions	◎	◎	◎	◎	
	TI 1B7C2-03E Note 3	YS170 Programmable Functions	◎		○		
	TI 1B7C8-03E Note 1	Communication Functions (RS-485, DCS-LCS)		◎		◎	
	TI 1B7C8-04E Note 5	YS-net Peer-to-peer Communication Functions		◎			
	TI 1B7C8-05E Note 5	YS-net Personal Computer Communication Functions		◎		◎	
User's Manual	IM 1B7C1-01E	YS150 Single-loop Multi-function Controller YS170 Single-loop Programmable Controller	○	◎	◎	◎	◎
	IM 1B7C8-06E	YSS20 Programming Package	◎				
	IM 1B7C8-03E Note 1	RS-485 Communication Functions (/A31) DCS-LCS Communication Functions (/A32)		◎		◎	◎
	IM 1B7D2-01E	YS131 Indicator with Alarm		◎	◎	◎	◎
	IM 1B7D3-01E	YS135 Auto/Manual Station for SV Setting		◎	◎	◎	◎
	IM 1B7D4-01E	YS136 Auto/Manual Station for MV Setting		◎	◎	◎	◎
	IM 1B7D5-01E Note 4	YS110 Standby Manual Station				◎	

Note 1: Only when used with supervisory communication functions
Note 2: Only when using self- tuning functions
Note 3: Only for YS170 programmable controllers
Note 4: The YS110 can be a standby station only for the YS150, YS170, or YS136
Note 5: Only when using YS net communication functions

Notices

● Regarding This Manual

1. This Manual should be passed on to the end user.
2. Read this manual carefully and fully understand how to operate this product before you start operation.
3. Yokogawa makes no warranty of any kind with regard to this material, but not limited to, implied warranties of merchantability for particular purpose.
4.
5. The contents of this manual are subject to change without prior notice.
6. If any question arises or errors are found, or if there is any information missing from this manual, please inform Yokogawa's documentation department responsible for this manual or the nearest Yokogawa sales office, or use the form in the back of this manual to inform us accordingly.

● Regarding Protection, Safety, and Prohibition Against Unauthorized Modification

1. For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions on safety described in this manual when handling the product. In addition, if you handle the product in contradiction to these instructions, our company does not guarantee safety.
2. The following safety symbol marks are used on the product concerned and in this Manual:
   Les symboles suivants touchat à la sécurité sont utilités sur le produit concerné et dans ce manuel.

⚠ **CAUTION:**

This marking on the product indicates that the operator must refer to an explanation in the instruction manual in order to avoid injury or death of personnel or damage to the instrument. The manual describes that the operator should exercise special care to avoid electric shock or other dangers that may result in injury or the loss of life.

ATTENTION:

Ce symbole marqué sur le produit indique que l'opérateur doit se reporter au manuel d'instruction pour éviter tout accident corporel ou tout dégât matériel.

Le manuel d'instruction indique que l'opérateur doit faire particulièrement attention pour éviter tout choc électrique ou autre accident pouvant entrainer un accident ou la mort.

Protective ground terminal :

In order to provide protection against electrical shock in case of a fault. This symbol indicates that the terminal must be connected to ground prior to operation of equipment.

Borne de connexion à la terre de protection :

Ce symbole indique que la borne doit être reliée à la terre de protechon avant toute utilisation du matériel, dans le but de se protéger d'une électrocution en cas de défaillance.

Function ground terminal :

In order to provide protection against noise.
This symbol indicates that the terminal must be connected to ground prior to operation of equipment.

Borne de connexion à la terre contre le bruit :

Ce symbole indique que la borne doit être reliée à la terre sans bruit avant toute utilisation du materiel, dans le but de se protéger du bruit.

Indicates the power switch is " **ON** ".

Ce symbole indique que le commutateur de mise sous tension est en position de " **Marche** ".

Indicates the power switch is " **Stand - by** ".

Ce symbole indique que le commutateur de mise soustension est en position de " **Veille** ".

Indicates the power switch is on " **OFF** ".

Ce symbole indique que le commutateur de mise soustension est en position de " **Arret** ".

Indicates the direct current.
Indique le courant continu.

Indicates the alternating current.
Indique le courant alternatif.

CAUTION A CAUTION sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

Le symbole CAUTION annonce un risque Il désigne une procédure, une marche à suivre ou autre qui, n'étant pas correctement observée, peut entainer un dommage ou une destruction partielle ou totale du produit.

The symbolic conventions below are used only in the manual.
Les conventions suivantes sont utilisées uniquement dans le manuel d'instruction.

IMPORTANT:

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

IMPORTANT:

Indique que manipuler le matériel ou le logiciel de cette maniére peut l'endommager ou provoquer l'arrêt du système.

NOTE:

Draws attention to onformation essential for understanding the operation and features.

NOTE:

Attire l'attention sur une information essentielle pour la comprehension des opérations à effectuer ou des caractéristiques.

3. If protection / safety circuits are to be used for the product or the system controlled by it, they should be installed outside of the product.
4. When you replace parts or consumables of the product, use those spcified by our company.
5. Do not modify the product.

• Regarding Force Majeure

1. Yokogawa Electric Corporation does not make any warranties regarding the product except those mentioned in the WARRANTY that is provided separately.
2. Yokogawa Electric Corporation assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.

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   You must purchase another copy of the software for use with each additional computer.
3. Copying this software for purposes other than backup is strictly prohibited.
4. Store the streamer, tape, or floppy disk (original medium) in a secure place.
5. Reverse engineering such as the disassembly of software is strictly prohibited.
6. No portion of the software supplied by Yokogawa may be transferred, exchanged, or sublicersed or leased for use by any third party without the prior permission of Yokogawa.

Documentation Conventions

Throughout this manual, the following conventions of notation clarify the input device (keyboard, touch panel, or mouse) used.

- [Enter] represents Enter key (↵) on the keyboard.
- This manual uses the following conventional symbols.

TIP:

Gives information that complements the present topic.

See Also:

Gives the reference locations for further information on the topic.

: Indicates operation with a mouse.
: Indicates input operation from the keyboard.
: Indicates the display on a panel.

• Figures of Display Screen

- The figures that appear in this manual of display screen may sometimes be emphasized or simplified, or may fail to show the entire image for reasons of convenience in explaining them.
- These figures may sometimes differ from the real images on a screen in terms of the location at which they are displayed or the size of the characters (whether they are uppercase or lowercase letters, and so on). However, this occurs only when the difference does not interfere with due understanding of the relevant function or operation and monitoring.

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Revision Record

1. OUTLINE

The YS100 series instruments (hereinafter referred to as YS100) can add either the RS-485 Communication Functions or the DCS-LCS Communication Functions as option specifications. (note)

The RS-485 Communication Functions allows centralized YS100 monitoring from the supervisory computer. Using simple messages, such as "DG" : Data Get (meaning to acquire data), from the supervisory computer, data acquisition and setting of YS100 can be carried out.

The DCS-LCS Communication Functions allows monitoring, and operation of the YS100 without programming, from the Operator Station of YOKOGAWA's Distributed Control System, CENTUM-XL, μXL (hereinafter referred to as DCS) via the LCS loop Communication Card (hereinafter referred to as the LCS card).

(note) : Only the RS-485 Communication Functions can be selected for the YS131 Indicator with Alarm.

1.1 Standard Specifications

RS-485 Communication Functions

The YS100 communicates with a computer as a slave. Data acquisition and data setting commands are sent from the supervisory computer, and the YS100 returns the corresponding result.

The computer enables the following:

- Monitoring / setting of YS100 operation status.
- Process data acquisition / setting.

(1) **Communication Commands**

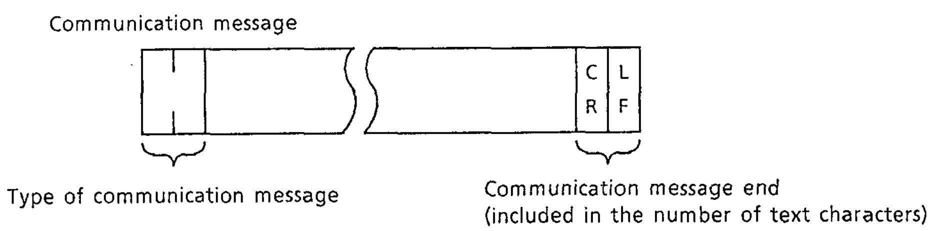
Data acquisition and data setting commands, and YS100 status - communication commands.

(2) **Data Acquisition / Setting Objectives**

Data from YS100 instruments (communicable data in the instruments such as setpoints, process variables, manipulated variables, PID parameters, output limit values, loop status, etc.)

Refer to 4.4 Communication Data List.

(3) **Communication Message Format**



(4) **Communication Specification**

Communication interface:
RS-485 five signals (SD (A), SD (B), RD (A), RD (B), SG

Communication Procedure:
No protocol (command-response message format)

Synchronization:
Asynchronous operation

Transmission Speed (Baud Rate):
1200, 2400, 4800, or 9600 bps

Communication System:
Half - duplex

Connection Method:
1 : n multi - drop method

Communication Code:
ASCII 8 bit code

Text Structure:
Single block

Maximum Number of Characters in a Block:
220 bytes (including CR and LF)

Stop Bit: 1 or 2 bits

Error Detection:
Vertical Parity (even or odd or none)

Bit - Transmission Sequence:
Least significant bit first

Communication Character Timer:
0.1 second

Distance between YS100 and Computer:
1200 m or less

DCS-LCS Communication Functions

The DCS-LCS Communication Functions enables monitoring and operation of the YS100 from the operator station just like the DCS internal units.

With the DCS, without generating programs, YS100 Monitoring Functions can be assigned with the builders which use the standard FIF (Fill - In - Forms) method.

1.2 Models and Suffix Codes

Models	Suffix Codes	Option Codes	Remarks
YS1□□			YS100 series instrument
			Suffix code
Optional specification		/□	Optional specification (Section 1.3)

1.3 Optional Specifications

	Option Code	Description
Communication	/A31 /A32	RS-485 communication DCS-LCS communication (Note)

(Note) Cannot be added to the YS131 indicator with alarm.

1.4 Flow Chart for Starting Communication Functions

Following figure shows the flowchart to start the communications functions of a YS100 series instrument. Refer to the appropriate chapters for operations.

Flow Chart for Starting up the RS-485 Communication Functions

Set the terminating resistor jumper on the communication card (See chapter 2.2.3)

↓

Connect external communication wire. Be sure to set the terminating resistor (See chapter 2.2)

↓

Set the communication specification on configuration panel (See chapter 3)

↓

Communication possible

Flow Chart for Starting up the DCS-LCS Communications Functions

Connect external communication wire (See chapter 2.3)

↓

Set the communication specifications on configuration panel (See chapter 3)

↓

Communication possible

2. INSTALLATION

2.1 Terminal Assignment

The terminals can be checked by removing the terminal cover at the back of the unit (see Figure 2.1). The terminal numbers are marked on the seals attached to the left and right sides of the case, and also marked on the terminal cover.

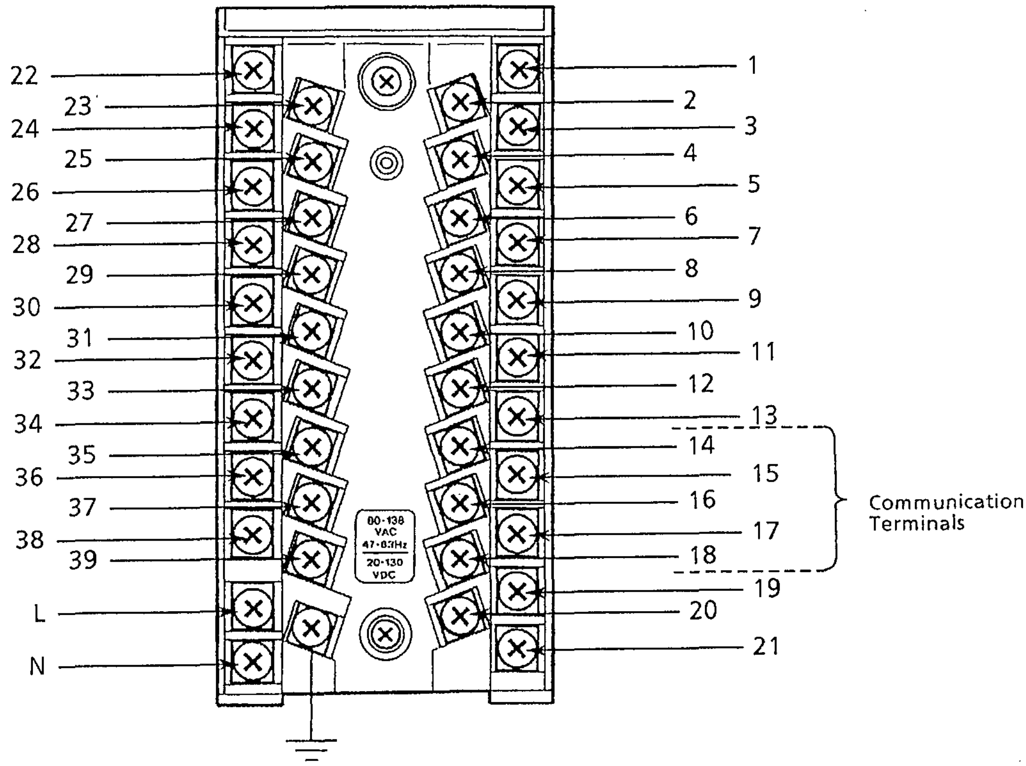


Figure 2.1 Terminal Assignment

Table 2.1 shows the terminals for communication Interface.

Table 2.1 Terminals for Communication

Terminal Mark	RS-485 Communication Terminals		DCS Communication Terminals
14	SG	Signal ground	
15	SD (A)	Transmitted data A	
16	SD (B)	Transmitted data B	
17	RD (A)	Received data A	LCS+
18	RD (B)	Received data B	LCS−
⏚	FG (GND)	Shield	

Definition of terminal names A and B:

As specified in EIA, if the terminal voltages are assumed to be V_A and V_B,

$V_A < V_B$ when the signal is "mark', and thus the terminal condition is OFF or 1.

$V_A > V_B$ when the signal is "space', and thus the terminal condition is ON or 0.

2.2 RS-485 Communication Wiring to a Supervisory Computer

Figure 2.2 illustrates connection of YS100 series instruments to the supervisory computer.

Up to 16 YS100 series instruments can be connected, using a multidrop line, to a single RS-485 port. For a supervisory computer without the RS - 485 interface , use an RS-485 ↔ RS-232C converter to enable connection..

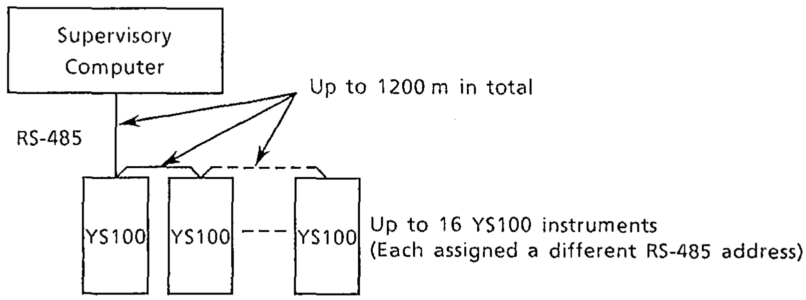


Figure 2.2 Communication System Configuration (RS-485)

2.2.1 Four-wire Communication Cable

YS100 series instruments are connected to a supervisory computer by four-wire cable.

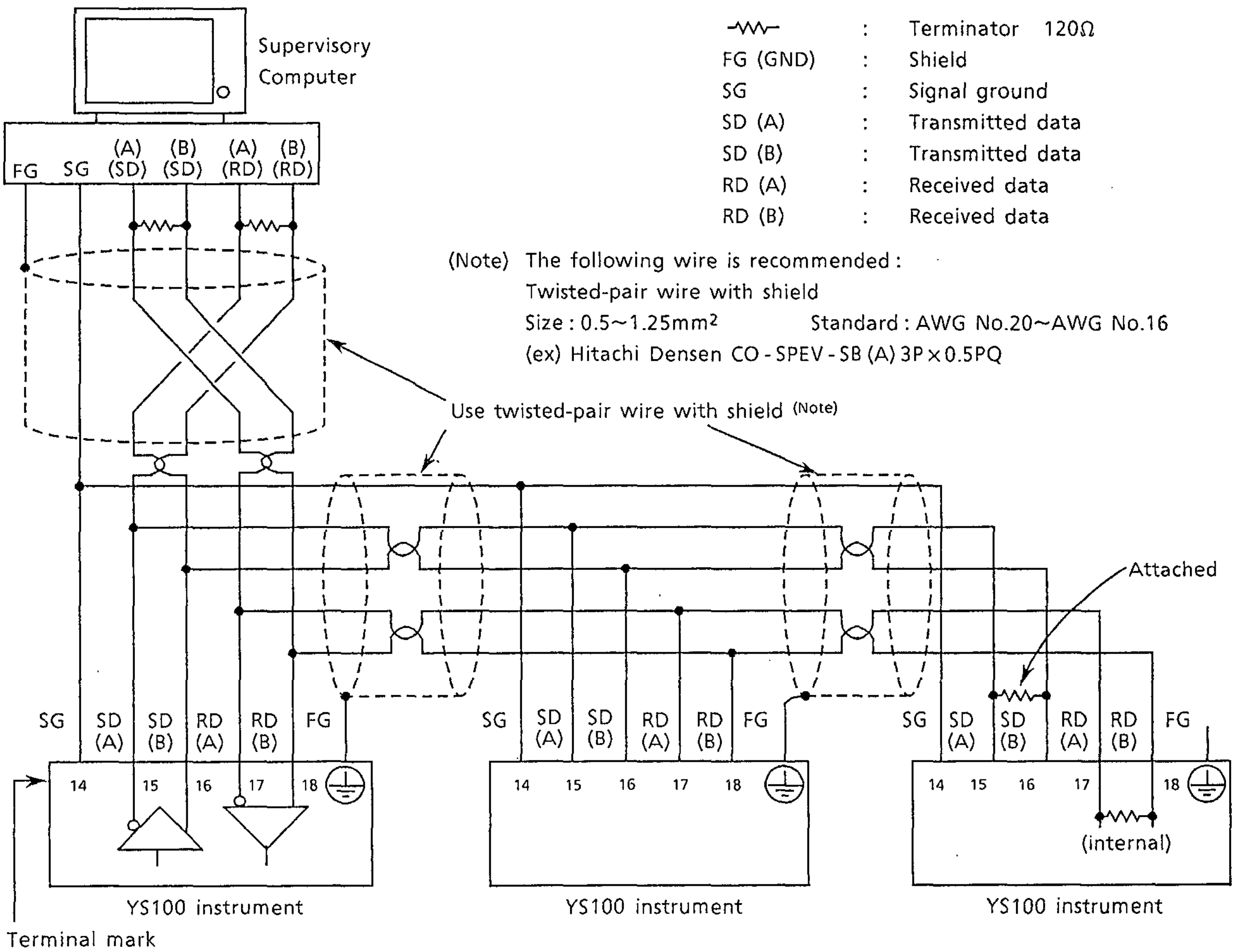


Figure 2.3 Using Four-wire Communication Cable

2.2.2 Two-wire Communication Cable

YS100 series instruments can be connected by two-wire cable with send / receive lines connected together, if the personal computer program operates RTS to switch between send and receive.

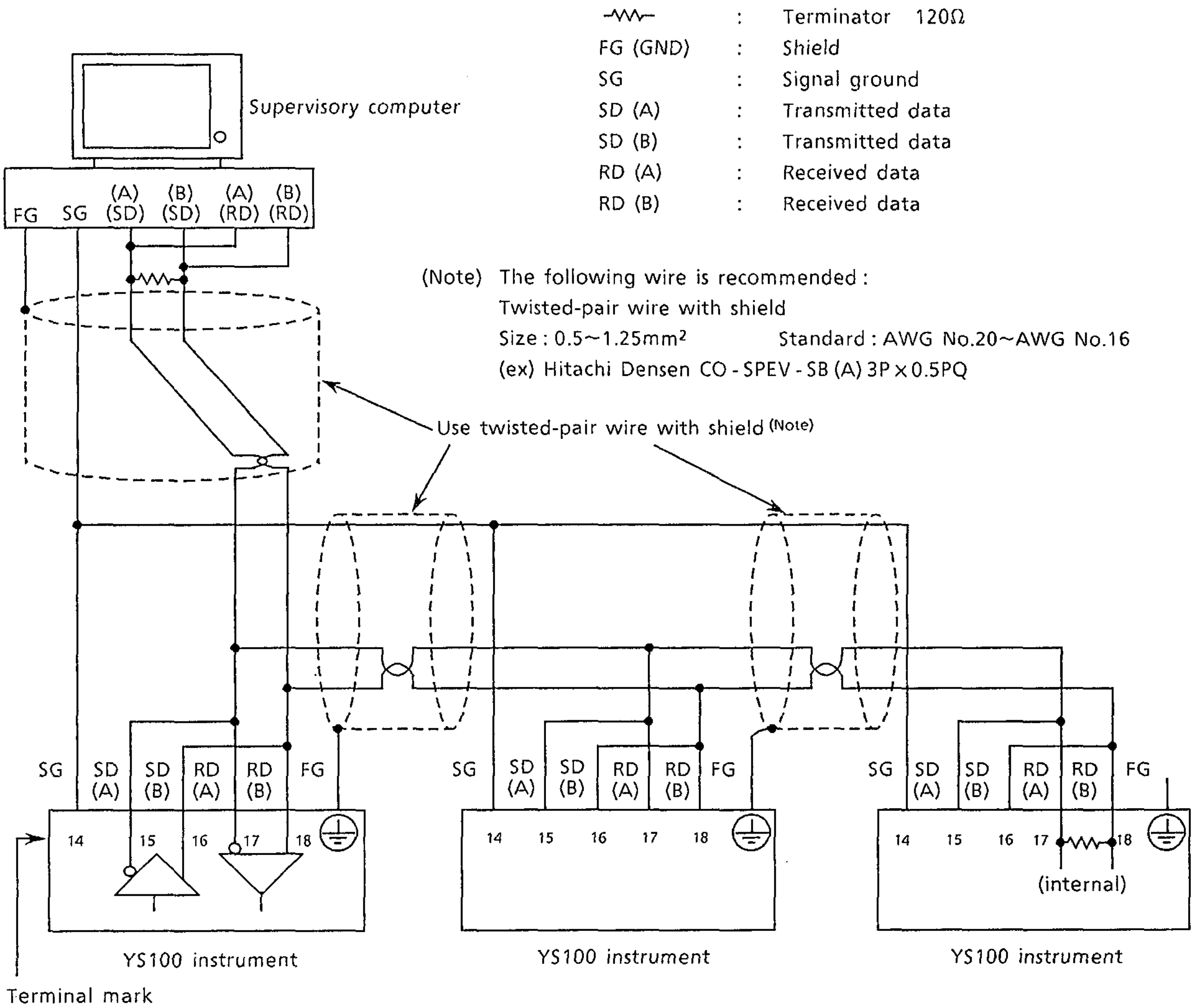


Figure 2.4 Using Two-wire Communication Cable

2.2.3 Setting Terminating Resistance

Terminating resistors must be connected at both ends of RS-485 cable (twisted-pair).

Use the terminating resistor on JP1 jumper of RS-485 communication board as terminator of receiving side for two-wire and four-wire cabling, (between RD (A) and RD (B)).

Install JP1 jumper on RS-485 communication board to ON (J2) side to terminate, and install the jumper to OFF (J1) side to not terminate.

Attach a terminating resistor (120Ω±1%, 1/2W, 100ppm/°C) to the sending side (between SD (A) and SD (B)) at the instrument panel, in the four-wire case.

Refer to computer instruction manual for terminating registor for computer side.

NOTE

Follow the instructions given in chapter 11 (maintenance) of the instruction manual pertaining to the YS100 series instrument for how to mount and demount the communication card.

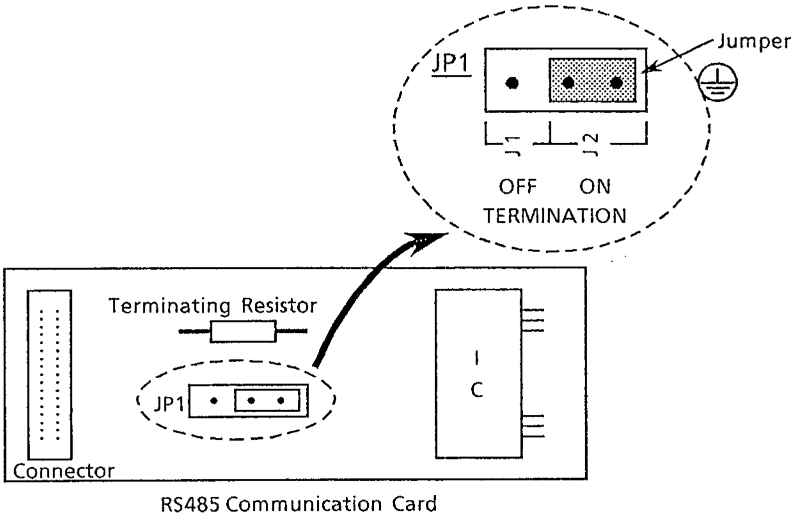


Figure 2.5 Setting Terminating Resistor on Communication Card

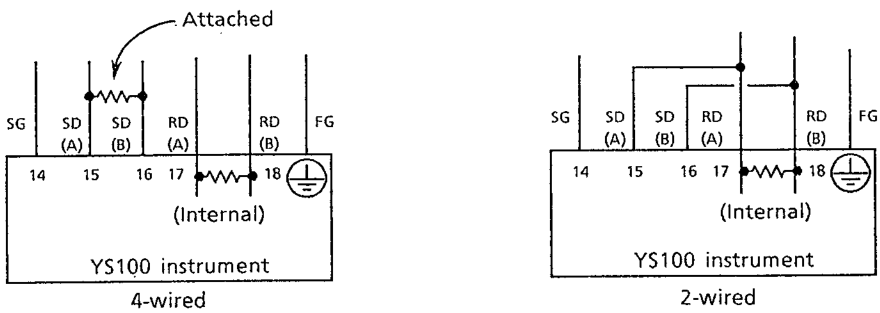
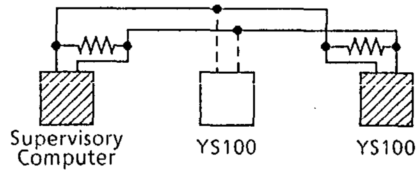


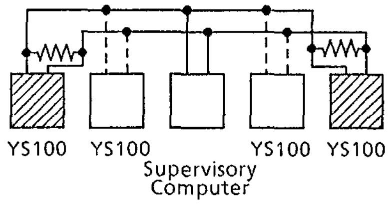
Figure 2.6 Attaching Terminating Resistor

(1) **Two-wire Send / Receive**

Set the terminating resistors at each terminal of the hatched apparatus in the figures to the right. The same applies to the case when YS100 connected with dotted lines are removed.

For YS100 series instruments shown connected with dotted lines, make sure that the internal terminating registor is OFF.

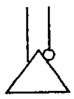


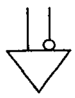


(2) **Four-wire Send / Receive**

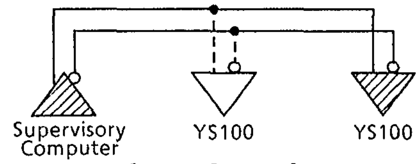
Set the terminating resistors at each terminal of the hatched apparatus in the figures to the right. The same applies to the case when YS100 connected with dotted lines are removed.

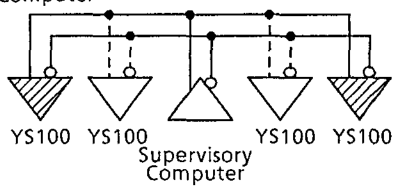
For YS100 series instruments shown connected with dotted lines, make sure that the internal terminating registor is OFF.


..... Sending side

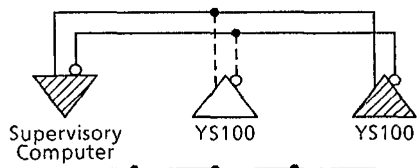

..... Receiving side

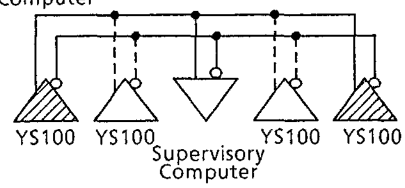
- YS100 Receive Line





- YS100 Send Line





2.3 Communication Wiring to DCS (CENTUM-XL or μXL)

Communication between YS100 series instruments and DCS is performed via the LCS loop communication card.

An example of a configuration where the YS100 is connected to a μXL MFCU field control unit is shown in Figure 2.7. Since up to 8 YS100 instruments can be connected to an LCS card and up to 3 LCS cards can be installed in a μXL Field control unit, the total number of YS100 instruments is up to 24.

A CENTUM-XL configuration example is shown in Figure 2.8.

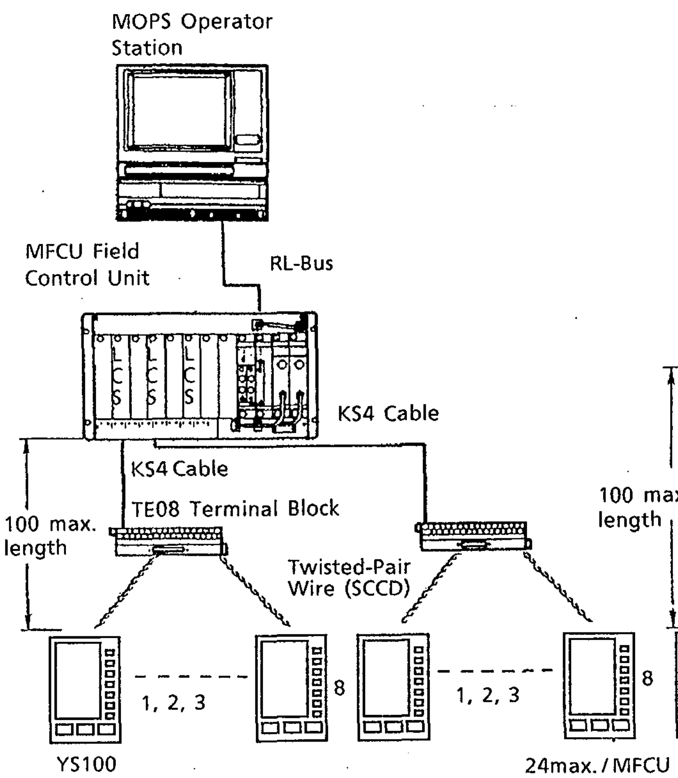


Figure 2.7 Connecting YS100 to µXL

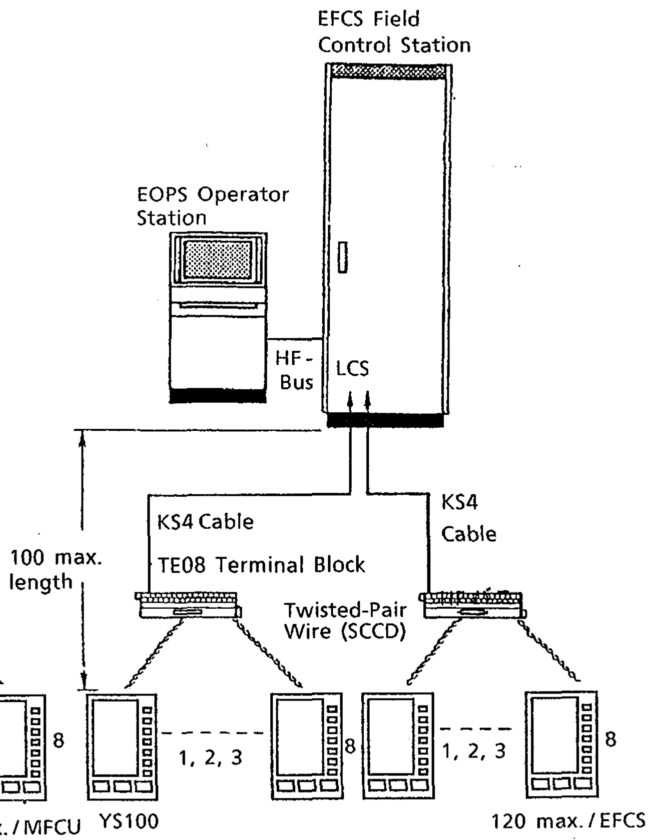


Figure 2.8 Connecting YS100 to CENTUM-XL

2.3.1 Wiring between YS100 Series Instrument and TE08 Terminal Block

Wiring between YS100 series instruments and TE08 block is shown in Figure 2.9. For DCS wiring, refer to the installation manual of μXL or CENTUM-XL.

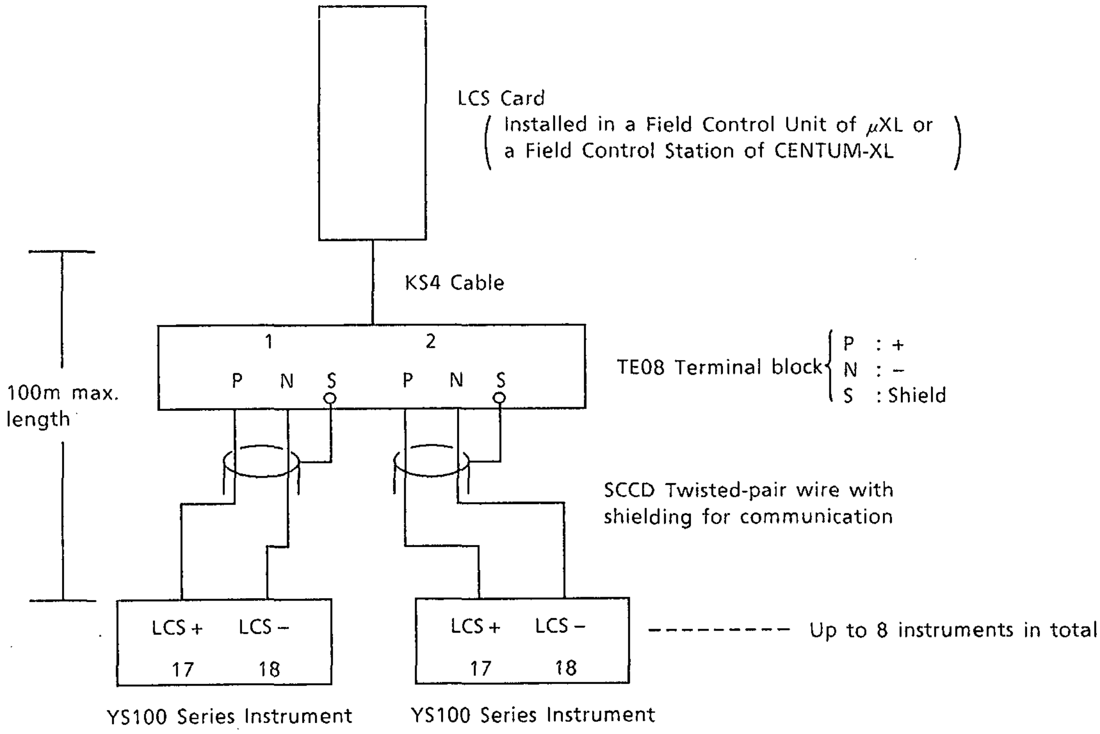


Figure 2.9 YS100 Series and Terminal Block Wiring

3. COMMUNICATION FUNCTION SETTING

3.1 Communication Parameter Setting

Communication function of YS100 can be set from the front panel. (Except for turning the terminating resistors ON / OFF).

They are set from configuration panel 1 (Name : CONFIG 1) in engineering panel group.

Table 3.1 shows communication parameters on configuration panel 1.

For data selection and data setting, refer to chapter 9 or 10 (engineering operation) of the instruction manual pertaining to the YS100 series instrument.

Table 3.1 Communication Parameters on Function Setting Panel 1

Line No.	Display	Description	Default	Selection
1	SET	Setting enable / inhibit	INHB	INHB, ENBL
5	COMM	Display communication functions (Setting unnecessary, Automatic display)	-	- (No communication) LCS (DCS-LCS Communication) 485 (RS-485 Communication) (Note)
6	COMWR	Enable / inhibit data writing by communication	ENBL	ENBL (enable), INHB (inhibit)
7				
8	ADRS	(RS-485) Address (Instrument No.)	1	1 to 16
9	STBIT	(RS-485) Stop bit	1	1, 2
10	PAR	(RS-485) Parity	NO	NO (No parity), ODD, EVEN
11	BPS	(RS-485) Baud rate (Bit / Sec)	1200	1200, 2400, 4800, 9600

(Note) The YS131 indicatior with alarm does not support DCS-LCS communication.

【 Function Setting Guide 】

COMM : Displays [485] (when RS-485 communication card is attached) or [LCS] (when DCS-LCS communication card is attached) automatically.

COMWR : Set [ENBL] if data writing from computer or DCS is permitted, set [INHB] if it is inhibited.

The following parameters must be set only when RS - 485 communication is used.

ADRS : Set any of numbers 1 to 16. Numbers don't have to be allocated in sequence. The same number should not allocated more than once. Address can be set regardless of the position on the communication cable.

STBIT : Numbers of stop bit for transmitted messages. Normally set to 1 bit. For computers, transmitted message usually have one stop bit.

PAR : Parity check. Set the same as computer side. Normally [NO] is set.

BPS : Baud rate. Set the same as computer side.

3.2 Computer Mode Setting

With the YS100 series, apart from the normal mode when centralized YS100 monitoring is carried out from the supervisory computer or DCS, there are two other computer modes.

The SPC mode sends a setpoint from the supervisory system. The DDC mode outputs a control and computation result from the supervisory system as a manipulated signal.
Table 3.2 indicates the computer modes possessed by the YS100 series instruments.

Table 3.2 Computer Modes of YS100 Series Instruments

Models	SPC Mode	DDC mode
YS150 Controller	○	○
YS170 Controller	○	○
YS131 Indicator with Alarm	×	×
YS135 Auto/Manual Station (for SV Setting)	×	○
YS136 Auto/Manual Station (for MV Setting)	×	○

The items that need to be set when using the computer modes are shown below.

As Model YS131 does not possess either computer mode, the item below is not relevant to Model YS131.

3.2.1 C Mode Setting

The "c Mode" is when the LED of the $\boxed{C}$ key of the operation mode keys on the front of the YS100 lights.

There are two states for the "C Mode", the "CAS Mode" and the "CMP Mode".

"CAS mode" means cascade mode, in which an external cascade input signal (1 to 5V) is used as a setpoint for the YS150 and YS170, as a setpoint output value for the YS135, and as a manipulated output value for the YS136. User can monitor the process variable, setpoint, manipulated variable etc. from the supervisory computer.

"CMP mode" means computer mode, in which user can set the setpoint, manipulated variable, or setpoint output value from a supervisory computer as the SPC or DDC mode.

When using it in the computer mode, the C Mode specifying parameter CMOD1 or CMOD2 (CMOD1 only for Models YS135, YS136) on the configuration panel 2 must be set to CMP.

3.2.2 Back-up Mode setting

During operation in the computer mode, if the YS100 receives a Fail signal from the supervisory computer or DCS, or if signal reception is interrupted, the supervisory system is seen to be in the FAIL state. The YS100 then continues operation, but cut off from the supervisory system. This operation status is the back - up mode, and can be divided into the automatic operation back - up mode and the manual operation back - up mode. When using Models YS150 and YS170 in the computer mode, set the back - up mode specifying parameters BMOD1 or BMOD2 on the configuration panel 2 to either of the modes below.

Back - up Mode setting (BMOD1 or BMOD2)

BUM ; M Mode (manual operation, hold output)

BUA ; A Mode (automatic operation)

Models YS135, YS136 do not need to be set, and are always in the M Mode (manual operation, hold output).

When it goes into the back - up state during operation in the "CMP Mode", it is displayed on the YS100 loop panel.

If the supervisory system becomes abnormal during operation in the AUTO mode or MAN mode, the system will not go into the back - up mode.

3.3 Operation Mode Transitions

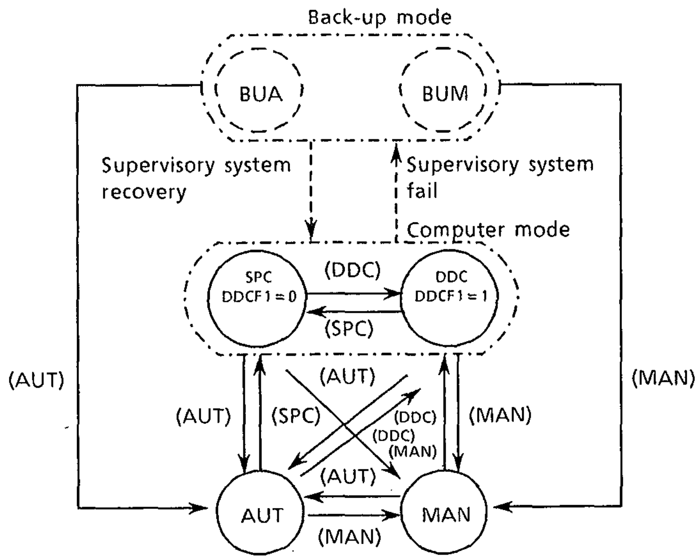
The operation mode transitions under computer mode operation of YS100 instruments is shown below.

3.3.1 YS150/YS170 Operation Mode Transition during RS-485 Communications

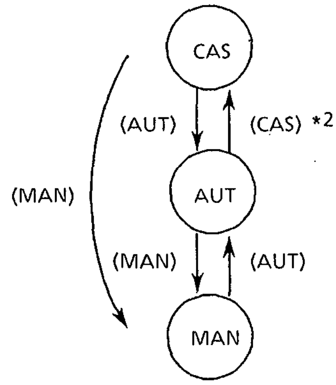
Operation mode transitions are illustrated below with reference to the BSC1, CSC, and SSC control modules for exploration's sake.
With the YS170 BSC2, substitute 2 for the suffix number in each data type (example : DDCF2).

(1) Supervisory Computer side : Display and Operation for Operation Modes

- The primary loop (LS1), or the secondary loop (LS2) when BSC2 is used in program mode

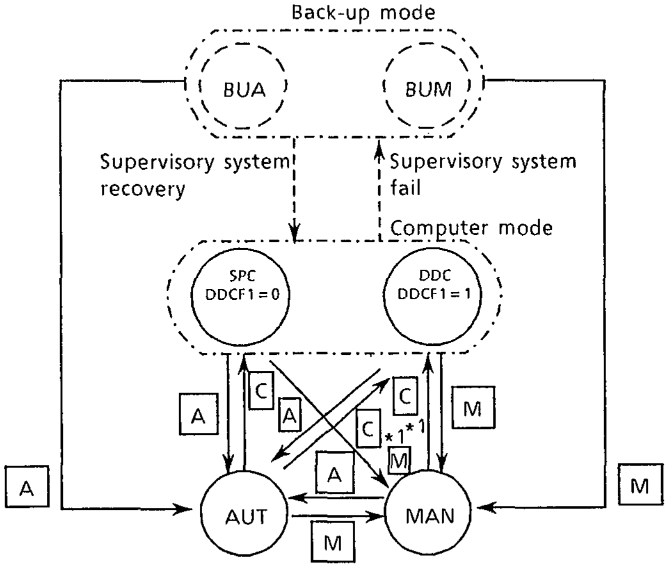


- The secondary loop (LS2) for cascade or selector control



(2) YS150 / YS170 side : Display and Operation for Operation Modes

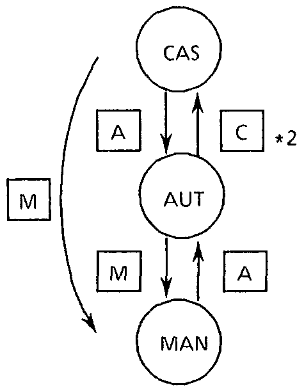
- The primary loop (LS1), or the secondary loop (LS2) when BSC2 is used in program mode



*1 : When DDC status is ON (DDCF1 = 1) and mode is MAN or AUT, press C key on the front panel of YS150 / YS170 to transfer to DDC.

*2 : For selector control, CMOD2 should be set to CAS.

- The secondary loop (LS2), for cascade or selector control



: Operational transition

: Abnormal condition transition and recovery

( ) : Transition in supervisory system

: Operation in YS100

: Operation mode

: Operation mode in abnormal condition

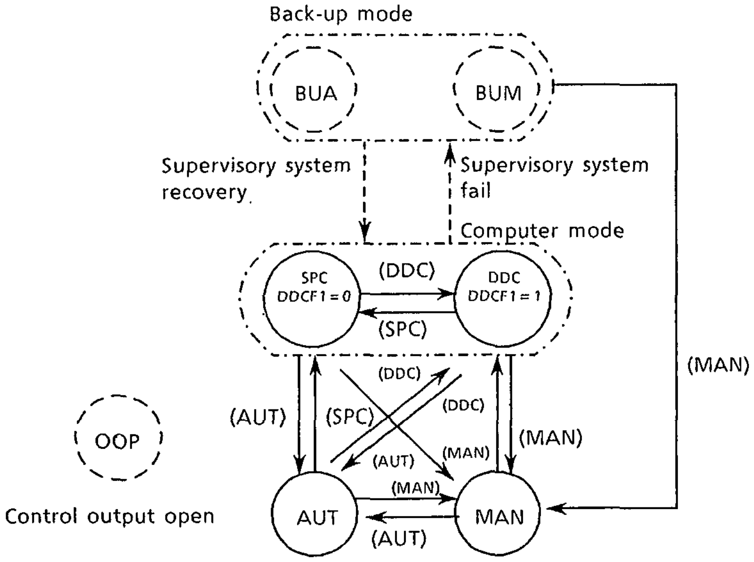
: Group of operation modes

3.3.2 YS150 / YS170 Operation Mode Transition during DCS Communications

Operation mode transitions are illustrated below with reference to the BSC1, CSC, and SSC control modules for explaration's sake.

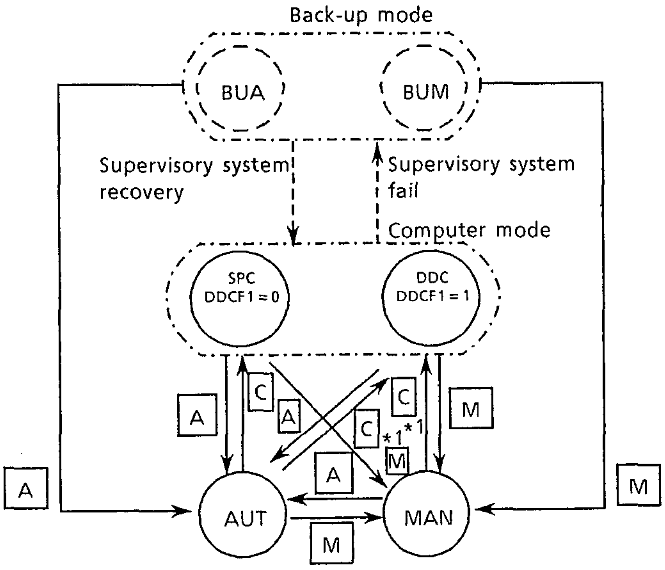
With the YS170 BSC2, substitute 2 for the suffix number in each data type (example : DDCF2).

(1) DCS side: Display and Operation for Operation Modes

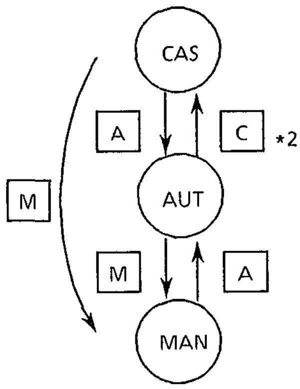


(2) YS150 / YS170 side: Display and Operation for Operation Modes

- The primary loop (LS1), or the secondary loop (LS2) when BSC2 is used in program mode.



- The secondary loop (LS2), for cascade or selector control.



*1 : When DDC status is ON (DDCF1 = 1) and mode is MAN or AUT, press C key on the front panel of YS150 / YS170 to transfer to DDC.

*2 : For selector control, CMOD2 should be set to CAS.

: Operational transition

: Abnormal condition transition and recovery

( ) : Transition in supervisory system

: Operation in YS100

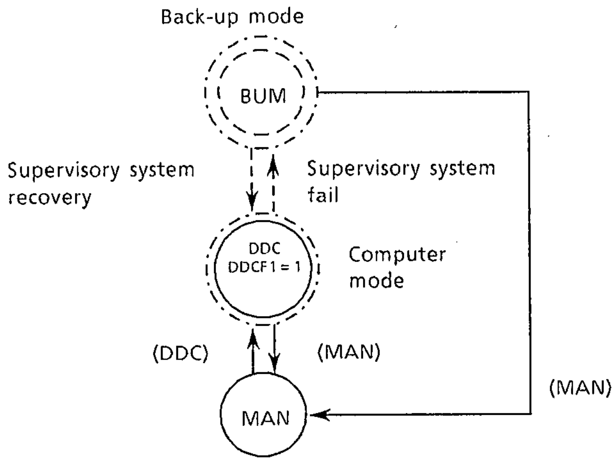
: Operation mode

: Operation mode in abnormal condition

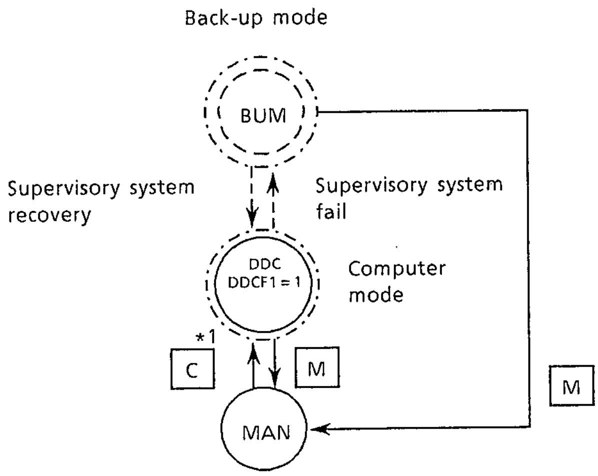
: Group of operation modes

3.3.3 YS135 / YS136 Operation Mode Transition during RS - 485 or DCS-LCS Communications

(1) Supervisory Computer and DCS side: Display and Operation for Operation Modes



(2) YS135 / YS136 side: Display and Operation for Operation Modes



← : Operational transition

←-- : Abnormal condition transition and recovery

( ) : Transition in supervisory system

□ : Operation in YS100

○ : Operation mode

: Operation mode in abnormal condition

: Group of operation modes

*1 : When DDC status is ON (DDCF1 = 1) and mode is MAN, press C key on the front panel of YS135 / YS136 to transfer to DDC.

4. RS-485 COMMUNICATION MESSAGES

[**Explanation of Terminology**]

The terms used in communication messages described in chapters on and after 4 are as follows :

- YS100 instruments : Means YS150, YS170, YS131, YS135 and YS136 instruments which have RS-485 communication function.
- Computer : Means host which communicates with YS100 instruments. May be a personal computer, workstation, minicomputer or other controller.
- ⎵ : Means space.
- [CR] : Means carriage return.
- [LF] : Means line feed.
- " " : Means a message delimiter. Not included in communication message.

4.1 Communication Message Format

4.1.1 Communication Message Format

There are two types of communication message : One is a transmitted message from the computer requesting data from a YS100 instrument, and the other is the response by a YS100 instrument to the transmitted message.

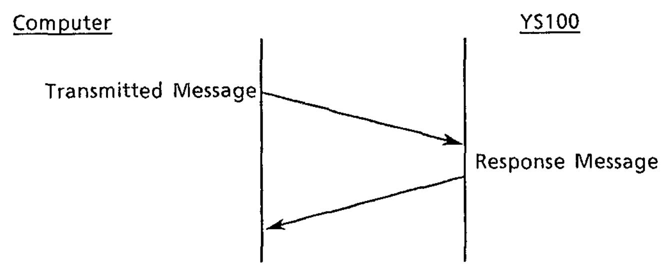


Figure 4.1 Communication Messages

The format of each message is as follows:

- Transmitted message
  <Command>␣<Address>␣<No. of Data>␣<Parameter>␣<Data> [CR] [LF]
- Response message
  <Command>␣<Address>␣<No. of Data>␣<Data> [CR] [LF]

<Command> : Two characters showing command type. Example: "DG"

<Address><No. of Data>
: Parameters showing instrument number (address) and the number of data following the command. Not all commands include <No. of Data>

<Parameter><Data> : This is message text. Some commands do not have <Data> part. Example: SV1␣50.0

4.1.2 General Rules for Communication Messages

(1) Communication messages should be written in capital letters.
(2) Message length should be within 220 characters including [CR] and [LF].
(3) At least one space is necessary between <Items> which follow:
<Command>, <Address>, <No. of Data>, <Parameter> and <Data>.
(4) Message text ends with [CR][LF].

4.2 Transmission Control Protocol

This section describes transmission control protocol based on Figure 4.2.

① A computer sends a message ($TEXT_1$ C_RL_F) to all the YS100.

② Each YS100 compares the address contained in the transmitted message $TEXT_1$ with its own address.

③ If they agree, the YS100 transmits a response ($TEXT_2$ C_RL_F) to the computer.

④ If they do not agree, nothing happens. The YS100 waits to receive messages addressed to it.

⑤ The computer receives a response from the YS100 whose address agrees with the address in the messages TEXT and the communication is completed.

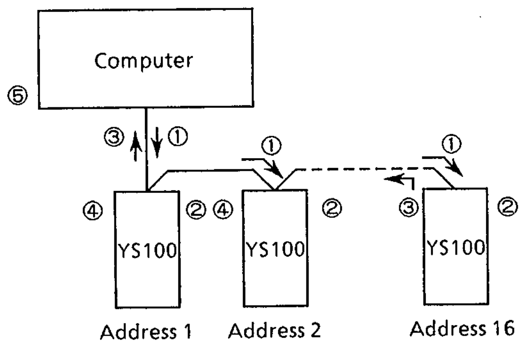
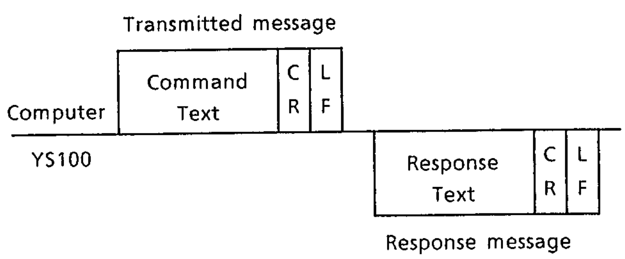
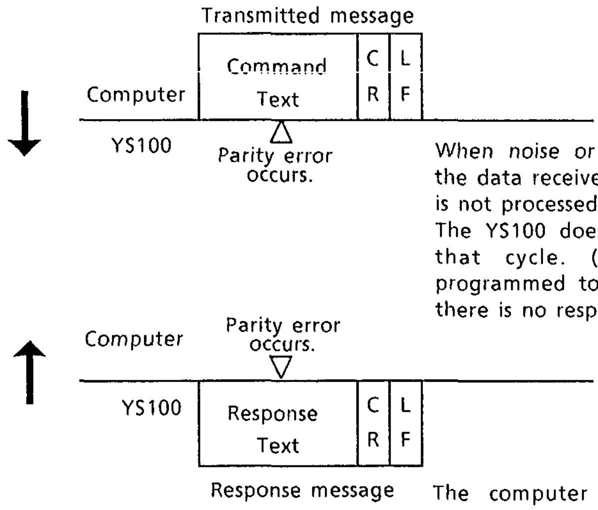


Figure 4.2 Transmission Control Protocol

- Normal Transmission



- Transmission on Error Occurrence



When noise or the like causes an error in the data received by a YS100, that command is not processed by the YS100.
The YS100 does not transmit a response in that cycle. (The computer must be programmed to resend commands to which there is no response.)

The computer must be programmed to request that data be resent if noise or the like causes an error in data transmitted by a YS100 instrument.

(Notice) The inter-character interval for command text should be within 0.1 second. If the inter-character interval exceeds 0.1 second, a communication error occurs and YS100 does not send any response message.
The computer should use a watchdog timer to detect "no response", and recover communications or signal an error.

4.3 Data Communication

4.3.1 Data Read Command (DG)

This command is used for reading the data from YS100 instruments. Communication messages are as follows:

- Computer → YS100 instrument (Transmitted Message)
  `"DG␣n␣m␣PARAM1␣PARAM2␣····␣PARAMm[CR][LF]"`
- YS100 instrument → Computer (Response Message)
  `"DG␣n␣m␣DATA1␣DATA2␣····␣DATAm[CR][LF]"`

n	:	YS100 instrument address ("01" to "16")
m	:	Number of data to be read ("01" to "16") When YS170 is used with 50 msec control period, number of data in one communication message should not exceed four. Otherwise control computation may be delayed for one period.
PARAMm, DATAm	:	PARAMm is parameter to be read. Corresponding data is DATAm. Refer to chapter 4.4 for parameter names and data format.

[Example]

Communication message that reads PV1, SV1, and MV1 from YS100 of address 2.

- Computer → YS100 instrument (Transmitted Message)
  `"DG␣02␣03␣PV1␣SV1␣MV1[CR][LF]"`
- YS100 instrument → Computer (Response Message)
  `"DG␣02␣03␣50.0␣30.0␣65.5[CR][LF]"`

4.3.2 Data Write Command (DP)

This command is used for setting YS100 instrument parameters. Communication messages are as follows:

- Computer → YS100 instrument (Transmitted Message)
  "DP␣n␣m␣PARAM1␣DATA1␣PARAM2␣DATA2␣····␣PARAMm␣DATAm[CR][LF]"
- YS100 instrument → Computer (Response Message)
  "DP␣n␣m␣DATA1␣DATA2␣····␣DATAm[CR][LF]"

n	:	YS100 instrument address ("01" to "16")
m	:	Number of data to be written ("01" to "16") When YS170 is used with 50msec control period, number of data in one communication message should not exceed four.
PARAMm, DATAm	:	PARAMm is parameter to be written. Corresponding data is DATAm. Refer to chapter 4.4 as for parameter name and data form.

[Example]

Communication message example for setting high-limit-alarm-set-point 1 (98.0%) and low-limit-alarm-set-point 1 (5.0%) for input and deviation-alarm-set-point 1 (65.0%) in YS100 instrument with address 2.

- Computer → YS100 instrument (Transmitted Message)
  "DP␣02␣03␣PH1␣98.0␣PL1␣5.0␣DL1␣65.0[CR][LF]"
- YS100 instrument → Computer (Response Message)
  "DP␣02␣03␣98.0␣5.0␣65.0[CR][LF]"

4.3.3 Computer Watchdog Timer Setting Command in DDC and SPC Modes (WDT)

Computer should send this command at fixed intervals to YS100 instruments which are in DDC or SPC mode. If it is not received from the computer within the watchdog timer setting time, YS100 decides that the computer has failed and transfers to back up mode.

- Computer → YS100 instrument (Transmitted Message)
  "DC␣n␣WDT␣xxxx[CR][LF]"
- YS100 instrument → Computer (Response Message)
  "DC␣n␣WDT␣xxxx[CR][LF]"

n	:	YS100 instrument Address ("01" to "16")
xxxx	:	Computer watchdog timer is set with 4 digits. (0000 to 9999 sec.) Setting 0000 sec. disables computer watchdog function.

4.4 Communication Data Lists

4.4.1 YS150 and YS170 Communication Data List

This section lists the types and ranges of data supported by the YS150 and YS170 that can be used in the data read command (DG) and data write command (DP).

Table 4.3 YS150 and YS170 Communication Data List(1/3)

Type (PARAM)	Name	Write enabled	Unit	Range for Displaying (DATA)	Remarks	Mode	
						Multi-func.	Pro-gram
PV1, PV2	Process variable	–	%	−6.3 to 106.3		○	○
SV1, SV2	Setpoint	OK	%	−6.3 to 106.3	When operation mode is MAN or AUTO mode, setting is Enabled.	○	○
CSV1, CSV2	Cascade setpoint	–	%	−6.3 to 106.3		○	○
DV1, DV2	Deviation	–	%	−106.3 to 106.3		○	○
MV1, MV2	Manipulated variable	OK	%	−6.3 to 106.3	When operation mode is MAN mode, setting is enabled. MV2 is valid for only 2-Loop control. In cascade or selector mode, MV1 is the same as MV2.	○	○
PRCA	Process alarm	–	–	$X_1X_2X_3X_4X_5X_6X_7X_8$ Xn=0 (Normal) Xn=1 (Fail)	X_1=High limit alarm 1 X_2=Low limit alarm 1 X_3=Deviation alarm 1 X_4=Velocity alarm1 X_5=High limit alarm 2 X_6=Low limit alarm 2 X_7=Deviation alarm 2 X_8=Velocity alarm 2 Example : When high limit alarm 1 occurs. 10000000	○	○
SYSA	System alarm	–	–	$X_1X_2X_3X_4X_5X_6X_7X_8$ Xn=0 (Normal) Xn=1 (Fail)	X_1=Input over range X_2=Output current open X_3=Invalid data X_4=Invalid data X_5=Computed over flow X_6=Erased RAM memory X_7=Invalid data X_8=Invalid data Example : When current output is open. 01000000	○	○
LS1	Action mode 1	OK	–	MAN, AUT, CAS, SPC, DDC, BUM, BUA	Can't set to BUM or BUA modes	○	○
LS2	Action mode 2	OK	–	Refer to Supple. 1		○	○
SLS1, SLS2	Sub action mode	–	–	$X_1X_2X_3X_4X_5X_6X_7X_8$ Xn=0 (OFF) Xn=1 (ON)	X_1=Output tracking switch X_2=Preset output switch $X_3=X_4=X_5=X_6=X_7=X_8$=invalid data Example : When output tracking switch is ON 10000000	○	○
X01 to X05	Analog input register	–	%	−25.0 to 125.0	In Multi-function mode, X01 to X04 are valid.	○	○
Y01 to Y06	Analog output register	–	%	−25.0 to 125.0	In Multi-function mode, Y01 to Y03 are valid.	○	○
DI01 to DI06	Status input register	–	–	0, 1 (0=OFF, 1=ON)	In Multi-function mode, only DI1 is valid.	○	○
DO01 to DO16	Status output register	–	–	0, 1 (0=OFF, 1=ON)	In Multi-function mode, DO1 to DO5 are valid.	○	○
P01 to P30	Computation parameter register	OK	%	−800.0 to 800.0		–	○
T01 to T30	Temporary storage register	–	%	−800.0 to 800.0		–	○
K01 to K30	Constant register	–	%	−800.0 to 800.0		–	○

Table 4.3 YS150 and YS170 Communication Data List (2/3)

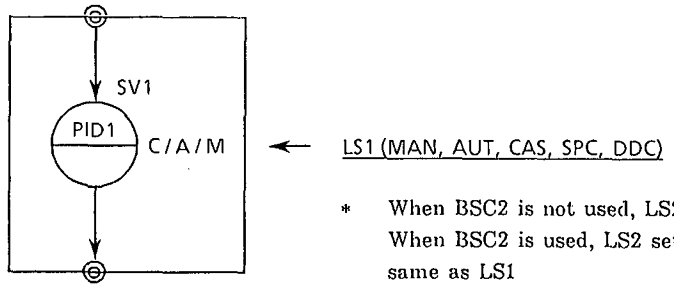
Type (PARAM)	Name	Write enabled	Unit	Range for Displaying (DATA)	Remarks	Mode: Multi-func.	Mode: Pro-gram
PB1, PB2	Proportional band	OK	%	2.0 to 999.9		○	○
TI1, TI2	Integral time	OK	sec.	1 to 9999		○	○
TD1, TD2	Derivative time	OK	sec.	0 to 9999	Action range is 2 to 9999 sec.(0&1 : OFF)	○	○
SFA1, SFA2	Adjustable set point filter constant A	OK	–	0.000 to 1.000		○	○
SFB1, SFB2	Adjustable set point filter constant B	OK	–	0.000 to 1.000		○	○
AG1, AG2	Adjustable gain	–	–	–8.000 to 8.000		–	○
GG1, GG2	Nonlinear control gain	OK	–	0.000 to 1.000		○	○
GW1, GW2	Nonlinear control dead band width	OK	%	0.0 to 100.0		○	○
STM1, STM2	Sample control period	OK	sec.	0 to 9999		–	○
SWD1, SWD2	Sample control time	OK	sec.	0 to 9999		–	○
BD1, BD2	Batch deviation setpoint	OK	%	0.0 to 100.0		–	○
BB1, BB2	Batch bias width	OK	%	0.0 to 100.0		–	○
BL1, BL2	Batch lockup width	OK	%	0.0 to 100.0		–	○
MR1, MR2	Manual reset	OK	%	–6.3 to 106.3		○	○
RB1, RB2	Reset bias	OK	%	0.0 to 106.3		○	○
DM1, DM2	Input compensation	–	%	–100.0 to 100.0		–	○
FF1, FF2	Output compensation	–	%	–100.0 to 200.0		○	○
TRK1, TRK2	Tracking output	–	%	–6.3 to 106.3		○	○
PMV1, PMV2	Preset output	OK	%	–6.3 to 106.3		○	○
EXT	Selector external signal	–	%	–6.3 to 106.3		–	○
SSW	Selector specification switch	–	–	-8.000 to 8.000	Refer to Supple. 2	○	○
PH1, PH2	High limit alarm setpoint	OK	%	–6.3 to 106.3		○	○
PL1, PL2	Low limit alarm setpoint	OK	%	–6.3 to 106.3		○	○
DL1, DL2	Deviation limit alarm setpoint	OK	%	0.0 to 106.3		○	○
VL1, VL2	Velocity limit alarm setpoint	OK	%	0.0 to 106.3		○	○
VT1, VT2	Velocity limit alarm time duration setpoint	OK	sec.	1 to 9999		○	○
MH1, MH2	Manipulated variable high limit setpoint	OK	%	–6.3 to 106.3		○	○
ML1, ML2	Manipulated variable low limit setpoint	OK	%	–6.3 to 106.3		○	○
STC	STC mode	OK	–	0, 1, 2, 3	0=OFF, 1=CALC, 2=ON, 3=ATSTUP	○	○
OD	On demand command	OK	–	0, 1	0=OFF, 1=ON	○	○
IP1, IP2	Process type	OK	–	0, 1	0=STATIC, 1=DYNAM	○	○
TR1, TR2	Process responce time	OK	sec.	4 to 9999		○	○
NB1, NB2	Noise width	OK	%	0.0 to 20.0		○	○
OS1, OS2	Desired response pattern type	OK	–	0, 1, 2, 3	0=ZERO, 1=MIN, 2=MED, 3=MAX	○	○
MI1, MI2	Output signal width	OK	%	0.0 to 20.0		○	○
PMX1, PMX2	Proportional band high limit value	OK	%	2.0 to 999.9		○	○
PMN1, PMN2	Proportional band low limit value	OK	%	2.0 to 999.9		○	○
IMX1, IMX2	Integral time high limit value	OK	sec.	1 to 9999		○	○
IMN1, IMN2	Integral time low limit value	OK	sec.	1 to 9999		○	○
DMX1, DMX2	Derivative time high limit value	OK	sec.	0 to 9999		○	○
PA1, PA2	Proportional band calculated value	–	%	2.0 to 999.9		○	○
IA1, IA2	Integral time calculated value	–	sec.	1 to 9999		○	○
DA1, DA2	Derivative time calculated value	–	sec.	0 to 9999		○	○
CR1, CR2	Estimation accuracy error	–	%	0.00 to 99.99		○	○
RT1, RT2	Signal ratio	–	–	0.000 to 9.999		○	○
LM1, LM2	Equivalent dead time	–	sec.	0 to 9999		○	○
TM1, TM2	Equivalent time constant	–	sec.	0 to 9999		○	○
GM1, GM2	Equivalent process gain	–	–	0.000 to 9.999		○	○
STCA	STC alarm	–	–	$X_1X_2X_3X_4X_5X_6X_7X_8X_9$ $X_{10}X_{11}X_{12}X_{13}X_{14}X_{15}X_{16}$ Xn=0 (Normal) Xn=1 (Fail)	$X_1=X_2=X_3=X_4=X_5=X_6$=Invalid data X_7=SYSALM, X_8=PVOVR, X_9=MVLMT X_{10}=OPERR, X_{11}=IDERR, X_{12}=PWRDWN, X_{13}=PBLMT, X_{14}=TILMT, X_{15}=TDLMT, X16=RTALM Example : When SYSALM occurs, 0000001000000000	○	○

Table 4.3 YS150 and YS170 Communication Data List (3/3)

Type (PARAM)	Name	Write enabled	Unit	Range for Displaying (DATA)	Remarks	Mode Multi-func.	Mode Pro-gram
FXO1n, FXO2n	10-segment line-segment function output	OK	%	0.0 to 100.0	n=01 to 11	○	○
GXI1n, GXI2n	Arbitrary line-segment function input	OK	%	−25.0 to 125.0	n=01 to 11	–	○
GXO1n, GXO2n	Arbitrary line-segment function output	OK	%	−25.0 to 125.0	n=01 to 11	–	○
PGT1n	Program function time set	OK	sec.	0 to 9999	n=01 to 10	–	○
PGO1n	Program function output set	OK	%	−25.0 to 125.0	n=01 to 10	–	○
PPID1	Preset PID switch register	–	–	Refer to Supple. 3		–	○
PPBm	Preset PID proportional band	OK	%	2.0 to 999.9	m=01 to 08	–	○
PTIm	Preset PID integral time	OK	sec.	1 to 9999	m=01 to 08	–	○
PTDm	Preset PID derivative time	OK	sec.	0 to 9999	m=01 to 08, Action range is 2 to 9999 sec. (0&1:OFF)	–	○
PLC1, PLC2	PV low cut square root point	OK	%	0.0 to 100.0		○	–
PLG1, PLG2	PV first-order lag time constant	OK	sec.	0.0 to 800.0		○	–
CLC1, CLC2	SV low cut square root point	OK	%	0.0 to 100.0		○	–
CLG1, CLG2	SV first-order lag time constant	OK	sec.	0.0 to 800.0		○	–
CGN1, CGN2	SV computational gain	OK	–	−8.000 to 8.000		○	–
CBI1, CBI2	SV computational input bias	OK	%	−106.3 to 106.3		○	–
CBO1, CBO2	SV computational output bias	OK	%	−800.0 to 800.0		○	–
FLG	Output compensation first-order lag time constant	OK	sec.	0.0 to 800.0		○	–
FGN	Computation gain	OK	–	−8.000 to 8.000		○	–
FBI	Computation input bias	OK	%	−106.3 to 106.3		○	–
FBO	Computation output bias	OK	%	−800.0 to 800.0		○	–
TLG	Tracking first order lag time constant	OK	sec.	0.0 to 800.0		○	–
PSR1, PSR2	PV square root switch	–	–	0, 1	0=OFF, 1=ON	○	–
PFX1, PFX2	PV line-segment function switch	–	–	0, 1	0=OFF, 1=ON	○	–
CSR1, CSR2	SV square root switch	–	–	0, 1	0=OFF, 1=ON	○	–
CSW1, CSW2	SV line-segment function switch	–	–	0, 1	0=OFF, 1=ON	○	–
FSW	Output compensation computation switch	–	–	0, 1	0=OFF, 1=ON	○	–
FON	Output compensation switch	–	–	0, 1	0=OFF, 1=ON	○	–
SCH1, SCH2	Range high limit	–	–	−9999 to 9999		○	○
SCL1, SCL2	Range low limit	–	–	−9999 to 9999		○	○
SCDP1, SCDP2	Position of decimal point	–	–	1, 2, 3, 4		○	○
CNT1, CNT2	Control module set information	–	–	Refer to Supple. 4		○	○
SYS1, SYS2	System set information 1 or 2	–	–	Refer to Supple. 5, 6		○	○
ID	Instrument identify	–	–	YS150, YS170		○	○

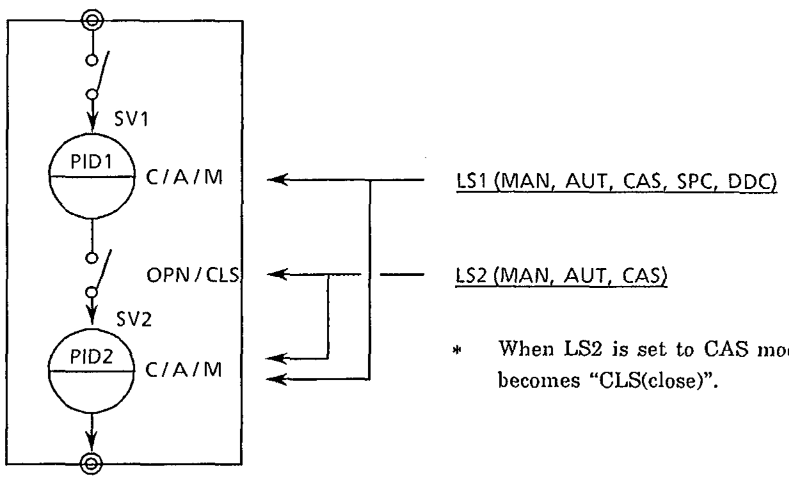
Supplement 1 LS1 or LS2 setting Range for Each Control Module

- For single loop control
  (Single mode or when BSC 1 is used in program mode)



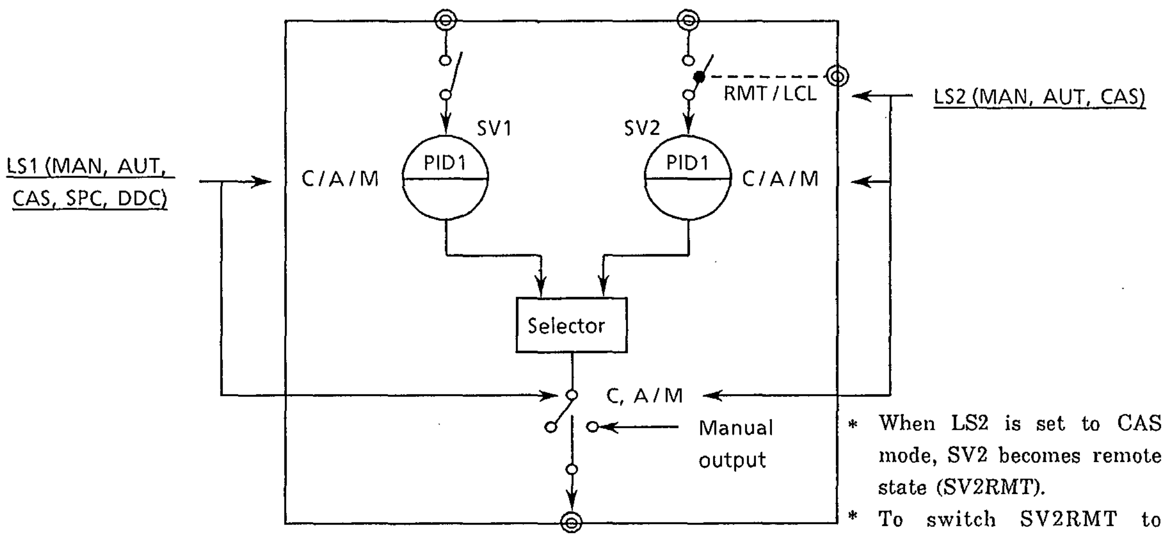
* When BSC2 is not used, LS2 is invalid.
When BSC2 is used, LS2 setting range is the same as LS1

- For cascade control
  (Cascade mode or when CSC is used in program mode.)



* When LS2 is set to CAS mode, internal cascade state becomes "CLS(close)".

- For selector control
  (Selector mode or when SSC is used in program mode)



* When LS2 is set to CAS mode, SV2 becomes remote state (SV2RMT).

* To switch SV2RMT to SV2LCL, CMOD2 must be set to CAS mode.

Supplement 2 SSW value

Data : - 8. 000 to 8. 000

SSW value	Selector action
SSW < 0.500	Autoselector
0.500 <= SSW < 1.500	No. 1 Loop
1.500 <= SSW < 2.500	No. 2 Loop
2.500 <= SSW < 3.500	External signal
3.500 <= SSW	Slave

Supplement 3 Switch Register for Preset PID (PPID1)

Data : - 800. 0 to 800. 0

Set Value to Register	Preset PID
PPID < 0.0	Maintain Present value
0.0 <= PPID < 10.0	PID Set 1 (PPB1, PTI1, PTD1)
10.0 <= PPID < 20.0	PID Set 2 (PPB2, PTI2, PTD2)
20.0 <= PPID < 30.0	PID Set 3 (PPB3, PTI3, PTD3)
30.0 <= PPID < 40.0	PID Set 4 (PPB4, PTI4, PTD4)
40.0 <= PPID < 50.0	PID Set 5 (PPB5, PTI5, PTD5)
50.0 <= PPID < 60.0	PID Set 6 (PPB6, PTI6, PTD6)
60.0 <= PPID < 70.0	PID Set 7 (PPB7, PTI7, PTD7)
70.0 <= PPID	PID Set 8 (PPB8, PTI8, PTD8)

Supplement 4 Control Module Setting Information (CNT1, CNT2)

Data Type : Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8

Item	Data	0	1	2	3
Y1	Control Type	Standard PID	Sample PI	Batch PID	Proportional (PD)
Y2	Control Computation	PV Proportional Type	PV Derivative Type	Adjustable Filter Type	– – –
Y3	Control Action Direction	Reverse	Direct	– – –	– – –
Y4	Open Valve Direction	C–O	O–C	– – –	– – –
Y5	C Mode	C Mode off	Cascade	Computer	– – –
Y6	Backup Mode	Manual Mode	Auto Mode	– – –	– – –
Y7	Engineering Unit	Alphanumeric max 6 digits			
Y8	Tag Number	Alphanumeric max 12 digits			

Note) [– – –] is invalid data.

Supplement 5 System Setting Information 1 (SYS1)

Data Type : Y1, Y2, Y3

Item	Data	0	1	2	3
Y1	Control Mode	Programmable	Multi- Function Type Single- Loop	Multi- Function Type Cascade	Multi- Function Type Selector
Y2	Recovery from Power Failure	TIM1	AUT	TIM2	– – –
Y3	Settable by Communications	Enabled	Inhibited	– – –	– – –

Note) [– – –] is invalid data.

Supplement 6 System Setting Information 2 (SYS2)

Data Type: Y1, Y2, Y3, Y4, Y5, Y6

Item	Data	0	1	2	3	4	5	6	7
Y1	PF key Definition	None	STC ON/OFF	---	---	---	---	---	---
Y2	DI1 Function Definition	None	A/M Toggle	C/A Toggle	Preset MV	Tracking Toggle	STC Toggle	Internal CAS Toggle	Selector 2ndry Loop C/A Toggle
Y3	DI1 Set Active Definition	ON for Open	ON for Close	---	---	---	---	---	---
Y4	Alarm Output Contact Status Definition	Open	Close	---	---	---	---	---	---
Y5	SV Tracking Definition	None	SV	PV	---	---	---	---	---
Y6	Selector Definition	Low Selector	High Selector	---	---	---	---	---	---

Note) [---] is invalid data.

4.4.2 YS131, YS135 and YS136 Communication Data List

This section lists the types and ranges of data supported by the YS131, YS135, and YS136 that can be used in the data read command (DG) and data write command (DP).

Table 4.4 YS131, YS135, and YS136 Communication Data List (1/2)

Type (PARAM)	Name	Write enabled	Unit	Range for Displaying (DATA)	Remarks	Applicable Models		
						YS131	YS135	YS136
PV1	Process variable (1)	–	%	–6.3~106.3		○	○	○
PV2	Process variable 2	–	%	–6.3~106.3		○	–	–
SV1	Setpoint	OK	%	–6.3~106.3	Can be set when in the MAN, BUM, or DDC operation mode.	–	○ (Note 1)	–
CIN1	Cascade setting input value	–	%	–6.3~106.3		–	○	○
MV1	Manipulated output	OK	%	–6.3~106.3	Can be set when in the MAN, BUM, or DDC operation mode.	–	–	○ (Note 2)
PRCA	Process alarm	–	–	$X_1X_2X_3X_4X_5X_6X_7X_8$ Xn=0 (Normal) Xn=1 (Fail)	X_1=High limit alarm PH1 X_2=Low limit alarm PL1 X_3=High limit alarm PH2 X_4=Low limit alarm PL2 X_5=High-high limit alarm HH1 X_6=Low-low limit alarm LL1 X_7=High-high limit alarm HH2 X_8=Low-low limit alarm LL2 Note: X_3 to X_8 are only for YS131 Example: 10000000 on occurrence of a high-limit alarm	○	○	○
SYSA	System alarm	–	–	$X_1X_2X_3X_4X_5X_6X_7X_8$ Xn=0 (Normal) Xn=1 (Fail)	X_1=Input over range X_2=Current output open (only for the YS136) X_3=Invalid data X_4=Invalid data X_5=Invalid data X_6=Lost RAM contents X_7=Invalid data X_8=Invalid data Example: 01000000 on occurrence of a current output open.	○	○	○
LS1	Operation mode	OK	–	MAN, CAS, DDC, BUM	Operation mode BUM cannot be set.	–	○	○
X01	Analog input register 1	–	%	–25.0~125.0	Process input (1)	○	○	○
X02	Analog input register 2	–	%	–25.0~125.0	YS131 : Process input 2, YS135 :Cascade setting input, YS136 :Cascade input	○	○	○
Y01	Analog output register 1	–	%	–20.0~106.3	Manipulated output 1	–	– (Note 3)	○
Y02	Analog output register 2	–	%	–6.3~106.3	YS135 : Cascade setpoint output YS136 : Manipulated output 2	–	○	○
DI01	Status input 1	–	–	0, 1 (0=OFF, 1=ON)	Operation mode switching input	–	○	○
DO01	Status output 1	–	–	0, 1 (0=OFF, 1=ON)	YS131 : Alarm output 1 YS135, YS136 : Process valiable 1 high limit alarm output	○	○	○
DO2	Status output 2	–	–	0, 1 (0=OFF, 1=ON)	YS131 : Alarm output 2 YS135, YS136 : Process valiable 1 low limit alarm output	○	○	○
DO3	Status output 3	–	–	0, 1 (0=OFF, 1=ON)	Alarm output 3	○	– (Note 3)	– (Note 3)
DO4	Status output 4	–	–	0, 1 (0=OFF, 1=ON)	YS131 : Alarm output 4 YS135, YS136: C/M status output	○	○	○
DO5	Status output 5	–	–	0, 1 (0=OFF, 1=ON)	Alarm output 5	○	– (Note 3)	– (Note 3)
DO6	Status output 6	–	–	0, 1 (0=OFF, 1=ON)	Alarm output 6	○	– (Note 3)	– (Note 3)
PH1	Process variable (1) high-limit alarm setpoint	OK	%	–6.3~106.3		○	○	○
PL1	Process variable (1) low-limit alarm setpoint	OK	%	–6.3~106.3		○	○	○
HH1	Process variable 1 high-high limit alarm setpoint	OK	%	–6.3~106.3		○	–	–
LL1	Process variable 1 low-low limit alarm setpoint	OK	%	–6.3~106.3		○	–	–
PH2	Process variable 2 high limit alarm setpoint	OK	%	–6.3~106.3		○	– (Note 4)	– (Note 4)
PL2	Process variable 2 low limit alarm setpoint	OK	%	–6.3~106.3		○	– (Note 4)	– (Note 4)
HH2	Process variable 2 high-high limit alarm setpoint	OK	%	–6.3~106.3		○	–	–
LL2	Process variable 2 low-low limit alarm setpoint	OK	%	–6.3~106.3		○	–	–
MH1	Manipulated output high-limit setpoint	OK	%	–6.3~106.3		–	–	○
ML1	Manipulated output low-limit setpoint	OK	%	–6.3~106.3		–	–	○
PLC1	Process input (1) square root extraction low cutoff level	OK	%	0.0~100.0		○	○	○
PLC2	Process input 2 square root extraction low cutoff level	OK	%	0.0~100.0		○	– (Note 4)	– (Note 4)
PSR1	Process input (1) square root extraction calculation switch	–	–	0, 1 (0=OFF, 1=ON)		○	○	○
PSR2	Process input 2 square root extraction calculation switch	–	–	0, 1 (0=OFF, 1=ON)		○	– (Note 3)	– (Note 3)

Note 1 : SV1 can be written when in the MAN, BUM, or DDC operation mode.
Note 2 : MV1 can be written when in the MAN, BUM, or DDC operation mode.
Note 3 : Invalid data can be read. Do not access as an error code will not be displayed.
Note 4 : Invalid data can be read / written. Do not access as an error code will not be displayed.

Table 4.4 YS131, YS135, and YS136 Communication Data List (2/2)

Type (PARAM)	Name	Write enabled	Unit	Range for Displaying (DATA)	Remarks	Applicable Models		
						YS131	YS135	YS136
PLG1, PLG2	First order lag time constant for process input	OK	sec.	0.0~800.0		O	–	–
HYS1, HYS2	Alarm hysterisis	OK	%	0.0~10.0		O	–	–
ASW1 to ASW6	Alarm output connection	–	–	$X_1X_2X_3X_4X_5X_6X_7X_8$ Xn=0 (OFF) Xn=1 (ON)	X_1=High limit alarm PH1 X_2=Low limit alarm PL1 X_3=High limit alarm PH2 X_4=Low limit alarm PL2 X_5=High-high limit alarm HH1 X_6=Low-low limit alarm LL1 X_7=High-high limit alarm HH2 X_8=Low-low limit alarm LL2	O	–	–
ANOR1 to ANOR6	Alarm AND/OR designation	–	–	0, 1	0 (OR), 1 (AND)	O	–	–
AOUT1 to AOUT6	Alarm output contact status	–	–	0, 1	0 (NC), 1 (NO)	O	–	–
SCH1	100% value of scale (1)	–	–	–9999~9999		O	O	O
SCH2	100% value of scale 2	–	–	–9999~9999		O	– (Note 3)	– (Note 3)
SCL1	0% value of scale (1)	–	–	–9999~9999		O	O	O
SCL2	0% value of scale 2	–	–	–9999~9999		O	– (Note 3)	– (Note 3)
SCDP1	Position of decimal point (1)	–	–	1, 2, 3, 4		O	O	O
SCDP2	Position of decimal point 2	–	–	1, 2, 3, 4		O	– (Note 3)	– (Note 3)
CNT1	Computation module setting information 1	–	–	Refer to supple.1,3 and 4		O	O	O
CNT2	Computation module setting information 2	–	–	Refer to supple. 2		O	–	–
SYS1	System setting information 1	–	–	Refer to supple. 5		O	O	O
SYS2	System setting information 2	–	–	Refer to supple. 6		– (Note 3)	O	O
ID	Instrument model name	–	–	YS131, YS135, YS136		O	O	O

Note 3 : Invalid data can be read. Do not access as an error code will not be displayed.

Supplement 1 Computation Module Setting Information 1 (CNT1) for YS131

Data Type : Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8

Item \ Data		0	1	2
Y1	Invalid item	(Always 0)	– – –	– – –
Y2	Invalid item	(Always 0)	– – –	– – –
Y3	Invalid item	(Always 0)	– – –	– – –
Y4	Invalid item	(Always 0)	– – –	– – –
Y5	Invalid item	(Always 0)	– – –	– – –
Y6	Invalid item	(Always 0)	– – –	– – –
Y7	Engineering unit 1	6 digits of alphanumeric characters		
Y8	Tag number 1	12 digits of alphanumeric characters		

Note) "– – –" is invalid data.

Supplement 2 Computation Module Setting Information 2 (CNT 2) for YS131

Data Type : Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8

Item \ Data		0	1	2
Y1	Invalid item	(Always 0)	– – –	– – –
Y2	Invalid item	(Always 0)	– – –	– – –
Y3	Invalid item	(Always 0)	– – –	– – –
Y4	Invalid item	(Always 0)	– – –	– – –
Y5	Input definition of process input 2	Not using process input 2	Using process input 2	– – –
Y6	Invalid item	(Always 0)	– – –	– – –
Y7	Engineering unit 2	6 digits of alphanumeric characters		
Y8	Tag number 2	12 digits of alphanumeric characters		

Note) "– – –" is invalid data.

Supplement 3 Computation Module Setting Information 1(CNT1) for YS135

Data Type : Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8

Item \ Data		0	1	2
Y1	Invalid item	(Always 0)	– – –	– – –
Y2	Invalid item	(Always 0)	– – –	– – –
Y3	Invalid item	(Always 0)	– – –	– – –
Y4	Invalid item	(Always 0)	– – –	– – –
Y5	C mode definition	C mode off	Cascade	Computer
Y6	Backup mode definition	Fixed to manual mode	– – –	– – –
Y7	Engineering unit	6 digits of alphanumeric characters		
Y8	Tag number	12 digits of alphanumeric characters		

Note) "– – –" is invalid data.

Supplement 4 Computation Module Setting Information 1 (CNT1) for YS136

Data Type : Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8

Item \ Data		0	1	2
Y1	Invalid item	(Always 0)	– – –	– – –
Y2	Invalid item	(Always 0)	– – –	– – –
Y3	Invalid item	(Always 0)	– – –	– – –
Y4	Valve opening direction	C-0	0-C	– – –
Y5	C mode definition	C mode off	Cascade	Computer
Y6	Backup mode definition	Fixed to manual mode	– – –	– – –
Y7	Engineering unit	6 digits of alphanumeric characters		
Y8	Tag number	12 digits of alphanumeric characters		

Note) "– – –" is invalid data.

Supplement 5 System Setting Information 1 (SYS1) for YS131, YS135 and YS136

Data Type : Y1, Y2, Y3

Item \ Data		0	1	2	3
Y1	Operation mode	– – –	Auto/Manual station for MV Setting	Auto/manual station for SV Setting	Indicator with Alarm
Y2	Recovery from power failure	T1M1	AUT	T1M2	– – –
Y3	Settable by communications	Enable	Inhibit	– – –	– – –

Note) "– – –" is invalid data.

Supplement 6 System Setting Information 2 (SYS2) for YS135 and YS136

Data Type : Y1, Y2, Y3, Y4, Y5, Y6

Item \ Data		0	1
Y1	Invalid item	(Always 0)	– – –
Y2	Operation mode selection input function definition	off	C/M transfer
Y3	Operation mode selection input contact definition	Open for ON	Close for OFF
Y4	Alarm output contact status definition	NC	NO
Y5	Invalid item	(Always 0)	– – –
Y6	Invalid item	(Always 0)	– – –

Note) "– – –" is invalid data.

5. RS-485 COMMUNICATION-RELATED ERROR HANDLING

5.1 Communication Errors

The following communication errors can occur in YS100 and computer communications.

Table 5.1

Causes	Phenomenal	Section No. for References
Computer and YS100 communication parameters (start bit, parity, baud rate etc.) differ	YS100 does not return a response message.	5.1.1
No instrument with that address	YS100 does not return a response message.	5.1.2
Communication cable or communication card failure, contact failure, termination wrong.	YS100 does not return a response or receive error occurs in computer.	5.1.1 5.1.3 2.2
Syntax error in a command or parameter	YS100 returns an error code.	5.2
Send a message requiring too long a response	YS100 returns an error code.	5.1.4
Storing data into a parameter which is write-inhibited	YS100 returns existing data.	5.1.5
Storing data which is outside the range of parameter	YS100 stores data equal to range high or low limits as appropriate.	5.1.6

5.1.1 Communication Error in a Transmitted Message

When a YS100 instrument detects a communication error in a transmitted message from the computer:

- YS100 action : YS100 doesn't respond.
- Measures : The computer starts a no-response timer after sending a message.
  If YS100 doesn't respond and the timer times up, the computer retries to send the message. The no-response timer is set to 5 sec. (No. of retries may be set by user.)
- Types of communication error :
  Framing error, parity error, overrun error, character interval time out, received frame too long.

5.1.2 Controller Address Designation Error

The address in a transmitted message from the computer differs from the address of the YS100 which receives the message.

- YS100 action : YS100 doesn't respond.
- Measures : The computer starts a no-response timer after sending a message.
  If YS100 doesn't respond and the timer times up, the computer retries to send the message. The no-response timer is set to 5 sec. (No. of retries may be set by user.)

5.1.3 Communication Error in a Response Message

The computer detects a communication error in a response message from a YS100 instrument.

- YS100 action : YS100 instrument cannot detect an error in its own response.
- Measures : The computer should resend the message. Then, the YS100 instrument retries the message.

5.1.4 Response Message from YS100 is too Long

The response message from a YS100 exceeds 220 bytes (220 ASCII characters including CR and LF).

- YS100 action : YS100 returns the error code "@100[CR] [LF]".
- Measures : The computer program should be changed so that the YS100 response message is within 220 bytes.

5.1.5 Write-inhibited Parameter Error

The computer tries to store data into a parameter which is write-inhibited.

- YS100 action : YS100 doesn't store data in the parameter, and the existing data is unchanged.
- Measures : The computer should compare the setting data with the response data.
- Note : Write-inhibited parameters mean read only parameters or parameters that are write-inhibited due to the current operation mode, e.g. SV and MV.

5.1.6 Setting Data Over-Range Error

The computer tries to store data which is outside the range.

- YS100 action : YS100 stores data equal to range high or low limits as appropriate.
- Measures : The computer should compare the setting data with the response data.

5.2 Syntax Errors

This section describes the error handling of YS100 instruments, and examples of syntax errors.

5.2.1 Syntax Errors

- YS100 action : YS100 returns the error code "@xxx[CR] [LF]".
- Measures : User should check the computer communication program.
- Note : When a YS100 detects an error in a data put (DP) command, the whole of the DP command is ignored.

5.2.2 Syntax Error Codes

Table 5.2 Syntax Errors and Error Codes

Syntax Error	Error Code
Invalid command (but controller address is valid.)	@011
Invalid number of parameters (Not numeric, or over 3 digits long)	@031
The number of parameters is smaller than 01 or larger than 16.	@032
The designated number of parameters differs from the actual number.	@033
Invalid parameter name	@041
Invalid setting value	@051
Response length is over 220 bytes	@100

[Examples of Syntax Errors]

The following examples show invalid transmitted messages and response messages. Communication messages are enclosed in double quotation marks.

1) "DD␣05␣01␣PH1[CR] [LF]" (There is no command DD.)
   "@011[CR] [LF]"
2) "DP␣08␣02␣PB1␣200.0␣TI1␣55␣TD1␣0[CR] [LF]"
   (The number of parameters is incorrect)
   "@033[CR] [LF]"
3) "DG␣01␣1␣PS1[CR] [LF]" (There is no parameter PS.)
   "@041[CR] [LF]"
4) "DG␣02␣2␣P3␣X1[CR] [LF]"
   (P and X parameters need to be followed by 2-digit values.)
   "@041[CR] [LF]"
5) "DP␣04␣1␣SV1␣ACG[CR] [LF]" (Setting data is not numeric.)
   "@051[CR] [LF]"

5.2.3 Cases Where Data is Treated as Normal

1) More than two spaces exist between parameter name and data

"DP␣03␣02␣SV1␣␣␣␣␣␣55.1␣SV2␣␣␣20.0[CR][LF]"

"DP␣03␣02␣55.1␣20.0[CR][LF]"

However, spaces preceding a message or between data and [CR] [LF] are treated as an error.

a) "DP␣03␣02␣SV1␣55.1␣[CR][LF]"

"@033[CR][LF]"

b) "␣DP␣03␣02␣SV1␣55.1[CR][LF]"

(No response)

2) Decimal point of setting data is invalid

"DP␣04␣01␣PB1␣133.3333[CR][LF]"

"DP␣04␣01␣133.3[CR][LF]"

(Digits below decimal point are truncated to one for PB.)

"DP␣01␣01␣TD1␣555.6666[CR][LF]"

"DP␣01␣01␣555[CR][LF]"

(Digits below decimal point are truncated for TD.)

3) '0's preceding the address or the number of parameters are abbreviated.

"DG␣1␣1␣SV1[CR][LF]"

"DG␣01␣01␣100.0[CR][LF]"

6. RS-485 SAMPLE COMMUNICATIONS PROGRAM

6.1 Sample IBM-PC Program

The following example is an IBM-PC BASIC program to get PV1, SV1, and MV1 data from a YS100 instrument whose address is 01.

Program	Comment
110 OPEN␣"COM1:4800, N, 8, 1, LF, CS4000"␣AS␣#1	Open RS-232C port 1 of the IBM-PC, and set its communication parameters.
120 A$="DG␣01␣3␣PV1␣SV1␣MV1"	Put the command string into A$.
130 PRINT␣#1,A$	Send the command to YS100.
140 PRINT␣"SEND␣DATA_TYPE=";A$	Display the command.
150 IF␣LOC(1)=␣0␣THEN␣GOTO␣150	Watch the response. If there is no response, repeat this statement again. (No response handling may be added by the user.)
160 LINE␣INPUT␣#1,B$	Put the response into B$.
170 PRINT␣"RECEIVED␣DATA=";B$	Display the response.
180 CLOSE␣#1:END	Close the RS-232C port and quit.

The following messages are shown when this program is run.

```
SEND␣DATA_TYPE=DG␣01␣3␣PV1␣SV1␣MV1
RECEIVED␣DATA=DG␣01␣03␣35.0␣40.0␣72.3
```

7. DCS-LCS Communication

The YS100 series instruments which possess the DCS-LCS Communication function, can be connected to the DCS Field Control Unit.

The YS100 can be registered as DCS instruments within the DCS Field Control Unit, and can be handled in the same way as other DCS instruments. This allows operation and monitoring of the YS100 from the DCS operator station.

Please refer to DCS materials for information on the DCS instruments.

The corresponding model names in the Field Control Unit for the YS100 series instruments when connected to the DCS are shown in Table 7.1.

Model YS131 Indicator with Alarm, does not possess communication functions with the DCS.

Table 7.1 Corresponding Model Names in the DCS for YS100 Instruments.

YS100 Instruments	DCS Instruments Model Names (Note)
YS150 Controller	SLPC
YS170 Controller	SLPC
YS135 Auto/Manual Station(For SV Setting)	SMST-111
YS136 Auto/Manual Station (For MV Setting)	SMST-121

Note: No YS100 instruments correspond to the DCS instruments model "SLCD".

Figure 7.1 shows an example of an Operator Station Tuning Panel when Model YS170 is connected to μXL. Display and setting of PID, etc. can be carried out from the μXL operator station.

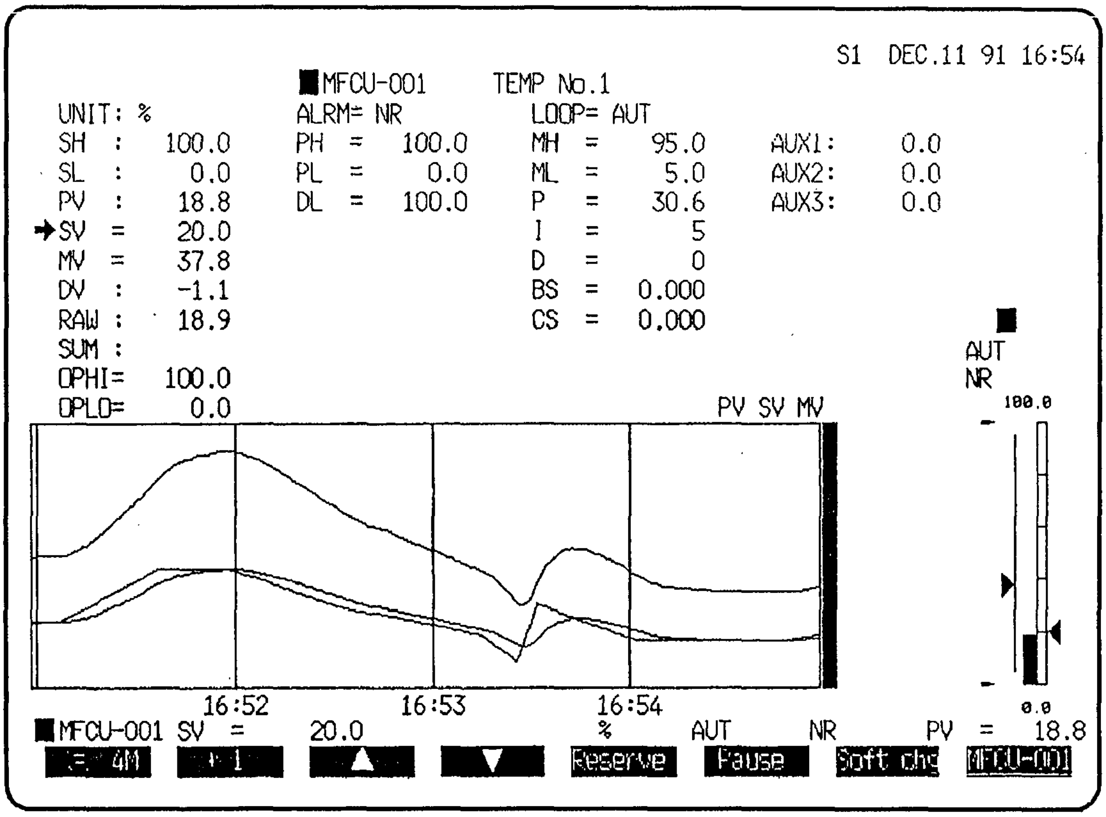


Figure. 7.1 YS100 Tuning panel

7.1 List of YS100 Data Types in DCS Instruments

The data types as DCS instruments and what it corresponds to when YS100 Instruments are connected to DCS are explained. Some instrument data types do not have corresponding YS100 data, and others may need to be independently set.

SUM (totalizer valve), ALARM (alarm status), etc. are data types which only DCS instruments own. PH (high limit alarm setpoint), PL (low limit alarm setpoint), DL (deviation alarm setpoint) are independently owned by DCS and YS100 series instruments.

1) YS150 Cotroller

Table 7.1.1 shows the data types when Model YS150 is connected, and what they correspond to.

2) YS170 Controller

Table 7.1.1 shows the data types when Model YS170 is connected, and when they correspond to.

3) YS135 Auto / Manual Set Station (For SV Setting)

Table 7.1.2 shows the data types when Model YS135 is connected, and what they correspond to.

4) YS136 Auto / Manual Set Station (For MV Setting)

Table 7.1.3 shows the data types when Model YS136 is connected, and what they correspond to.

Table 7.1.1 List of DCS Instrument Data Types and its Corresponding YS150, YS170 Controller Parameters.

Data types with no corresponding parameters in the table below are information owned only by CENTUM - XL, μXL.

CENTUM-XL, μXL Instrument Data Types (Model SLPC)						YS150, YS170 Parameters							
						YS150, YS170 Multi - Function Controller			YS170 Programable Controller				Setting Enable / Disable
Data Type	Name	Setting Enable / Disable	Display (Note 1) Enable / Disable	Unit	Range	Single - Loop Mode	Cascade Mode	Selector Mode	BSC1 only	CSC	SSC	BSC1 + BSC2	
ALRM	Alarm status (with substatus)	○	○	-									
LOOP	Mode (Loop status)	○	○	-		LS1 (Note 2)	LS1 (Note 2)	LS1 (Note 2)	LS1 (Note 2)	LS1 (Note 2)	LS1 (Note 2)	LS1 (Note 2)	○
PV	Process variable	×	○	Engineering unit	SL~SH	PV1 (PV) (Note 3)	PV1 (Note 3)	PV1 (Note 3)	PV1 (PV) (Note 3)	PV1 (Note 3)	PV1 (Note 3)	PV1 (Note 3)	×
SV	Set point	○	○	Engineering unit	SL~SH	SV1 (SV) (Note 3)	SV1 (Note 3)	SV1 (Note 3)	SV1 (SV) (Note 3)	SV1 (Note 3)	SV1 (Note 3)	SV1 (Note 3)	○
MV	Manipulated variable	○	○	%	0.0~100.0	MV1 (MV)	MV1 (MV) (Note 4)	MV1 (MV)	MV1 (MV)	MV1 (MV) (Note 4)	MV1 (MV)	MV1	○
DV	Deviation value	×	○	Engineering unit	-(SH-SL) ~(SH-SL)								
RAW	Raw data	×	○	%	0.0~100.0								
SUM	Totalizer value	○	○	Engineering unit	0~99999999								
OPHI	Output high limit index	○	○	%	0.0~100.0								
OPLO	Output low limit index	○	○	%	0.0~100.0								
PH (Note5)	High limit alarm set point	○	○	Engineering unit	SL~SH								
PL (Note5)	Low limit alarm set point	○	○	Engineering unit	SL~SH								
DL (Note5)	Deviation alarm set point	○	○	Engineering unit	- (SH-SL) ~(SH-SL)								
MH	Manipulated variable high limit set point	○	○	%	0.0~100.0	MH1	MH2	MH1	MH1	MH2	MH1	MH1	○
ML	Manipulated variable low limit set point	○	○	%	0.0~100.0	ML1	ML2	ML1	ML1	ML2	ML1	ML1	○
P	Proportional band	○	○	%	6.3~999.9	PB1	PB1	PB1	PB1	PB1	PB1	PB1	○
I	Integral time	○	○	Second	1~9999	TI1	TI1	TI1	TI1	TI1	TI11	TI11	○
D	Derivative time	○	○	Second	0~9999	TD1	TD1	TD1	TD1	TD1	TD1	TD1	○
BS	Computation parameter 1	○	○	-	-8.000~8.000				P1	P1	P1	P1	○
CS	Computation parameter 2	○	○	-	-8.000~8.000				P2	P2	P2	P2	○
AUX1	Auxiliary input 1	×	○	%	0.0~100.0				Y4	Y4	Y4	Y4	×
AUX2	Auxiliary input 2	×	○	%	0.0~100.0				Y5	Y5	Y5	Y5	×
AUX3	Auxiliary input 3	×	○	%	0.0~100.0				Y6	Y6	Y6	Y6	×
AS	Alarm status	○	×	-									
LS	Loop status	○	×	-									
SH	Scale high limit value	×	○	Engineering unit	-32768~32767								
SL	Scale low limit value	×	○	Engineering unit	-32768~32767								
SU	Totalizer high - order digits	○	×	-	0~9999								
SM	Totalizer low - order digits	○	×	Engineering unit	0~9999								

Note 1 : Exist/not of display on CENTUM - XL, μXL Operation Panel (tuning panel).

Note 2 : Displays operation mode of Models YS150, YS170.

Note 3 : Engineering units set in Models YS150, YS170 scale SCH1, SCL1, SCDP1.

Note 4 : This MV is the output value of the secondary loop.

Note 5 : Parameters with the same name exist in Models YS150, YS170, but set them independently (set the same value).

Table 7.1.2 List of DCS Instrument Data Types and its Corresponding YS135 Auto/Manual station (for SV Setting) Parameters

Data types with no corresponding parameters in the table below are information owned only by CENTUM-XL, μXL.

CENTUM-XL, μXL Instrument Data Types (Model SMST-111)						YS135 Parameters	
Data Type	Name	Setting Enable/Disable	Display (Note 1) Enable/Disable	Unit	Range	Parameters	Setting Enable/DisAble
ALRM	Alarm status (with substatus)	○	○	–			
LOOP	Mode (Loop status)	○	○	–		LS1 (Note 2)	○
PV	Process variable	×	○	Engineering unit	SL to SH	PV1 (Note 3)	×
SV	Set point	○	○	Engineering unit	SL to SH	SV1 (Note 3)	○
RAW	Raw data	×	○	%	00 to 100.0		
SUM	Totalizer value	○	○	Engineering unit	0.0 to 99999999		
PH (Note 4)	High limit alarm set point	○	○	Engineering unit	SL to SH		
PL (Note 4)	Low limit alarm set point	○	○	Engineering unit	SL to SH		
AS	Alarm status	○	×	–			
LS	Loop status	○	×	–			
SH	Scale high limit value	×	○	Engineering unit	-32768 to 32767		
SL	Scale low limit value	×	○	Engineering unit	-32768 to 32767		
SU	Totalizer high-order digits	○	×	–	0 to 9999		
SM	Totalizer low-order digits	○	×	Engineering unit	0 to 9999		

Note 1 : Exist/not of display on CENTUM-XL, μXL Operation Panel (tuningu panel).
Note 2 : Displays operation mode of Model YS135.
Note 3 : Engineering units set in Model YS135 scale SCH1, SCL1, SCDP 1.
Note 4 : Parameters with the same name exist in Model YS135, but set them independently (set the same value).

Table 7.1.3 List of DCS Instrument Data Types and its Corresponding YS136 Auto/Manual Station (for MV Setting) Parameters

Data types with no corresponding parameters in the table below are information owned only by CENTUM-XL, μXL.

CENTUM-XL, μXL Instrument Data Types (Model SMST-121)						YS135 Parameters	
Data Type	Name	Setting Enable/Disable	Display (Note 1) Enable/Disable	Unit	Range	Parameters	Setting Enable/Disable
ALRM	Alarm status (with substatus)	O	O	–			
LOOP	Mode (Loop status)	O	O	–		LS1 (Note 2)	O
PV	Process variable	×	O	Engineering unit	SL to SH	PV1 (Note 3)	×
MV	Manipulated variable	O	O	%	0.0 to 100.0	MV1	O
RAW	Raw data	×	O	%	0.0 to 100.0		
SUM	Totalizer value	O	O	Engineering unit	0 to 99999999		
OPHI	Output high limit index	O	O	%	0.0 to 100.0		
OPLO	Output low limit index	O	O	%	0.0 to 100.0		
PH	High limit alarm set point	O	O	Engineering unit	SL to SH		
PL	Low limit alarm set point	O	O	Engineering unit	SL to SH		
MH	Manipulated variable high limit set point	O	O	%	0.0 to 100.0	MH1	O
ML	Manipulated variable low limit set point	O	O	%	0.0 to 100.0	ML1	O
AS	Alarm status	O	×	–			
LS	Loop status	O	×	–			
SH	Scale high limit value	×	O	Engineering unit	–32768 to 32767		
SL	Scale low limit value	×	O	Engineering unit	–32768 to 32767		
SU	Totalizer high-order digits	O	×	–	0 to 9999		
SM	Totalizer low-order digits	O	×	Engineering unit	0 to 9999		

Note 1 : Exist/not of display on CENTUM-XL, Operation Panel (tuning panel).
Note 2 : Displays operation mode of Model YS136.
Note 3 : Engineering units set in Model YS136 scale SCH1, SCL1, SCDP1.
Note 4 : Parameters with the same name exist in Model YS136, but set them independently (set the same value).

7.2 Operation Mode and Loop Status of Model YS100

Three operation modes, C, A, M, existin Model YS100.

Operation mode C can be separated further into the cascade Mode and the Computer Mode. The cascade or computer modes are specified by both the YS100 and DCS. Refer to Section 3.3 for changing the YS100 operation modes.

7.2.1 Operation Mode and Loop Status of Models YS150, YS170.

The operation modes of Models YS150, YS170 and the loop status display of the operator station are related as follows

(1) Cascade Mode

Operation Mode Display with YS150, YS170	YS150, YS170 Control Operation	Loop Status Display in Operator station	SV, MV Setting from Operator Station
C(CAS)	YS150, YS170 follow CSV1 input set point and carries out automatic operation	CAS	Impossible
A	Automatic operation	AUT	SV possible
M	Manual operation	MAN	SV, MV, possible

(2) Computer Mode

Operation Mode Display with YS150, YS170		YS150, YS170 Control Operation	Loop Status Display in Operator station	SV, MV Setting from Operator Station
C	(DDC)	Supervisory computer transmits output value to DCS instruments. YS150, S170 outputs above output value as manipulated output signal	CAS	Impossible
	(SPC)	Supervisory computer transmits setpoint to DCS instruments. YS150, YS170 follows above set point and carries out automatic operation.	SPC	Impossible
	(SPC)	YS150, YS170 follows the setpoint from DCS instruments and carrries out automatic operation	CAS	Impossible
A		Automatic operation	AUT	SV possible
M		Manual operation	MAN	SV, MV, possible

7.2.2 Operation Mode and Loop Status of Model YS135

The operation modes of Model YS135 and the loop status display of the operator station are related as follows.

(1) Cascade Mode

Operation Mode Display with YS135	YS135 Operation	Loop Status Display in Operator station	SV Setting from Operator Station
C(CAS)	YS135 outputs the CIN1 input value as the setpoint	CAS	Impossible
M	Outputs manual setpoint	MAN	Possible

(2) Computer Mode

Operation Mode Display with YS135	YS135 Operation	Loop Status Display in Operator station	SV Setting from Operator Station
C(DDC)	Supervisory computer transmits setpoint to DCS instruments. YS135 outputs above setpoint as *setpoint output signal.*	DDC	Impossible
M	Output manual setpoint	MAN	Possible

Note : Model YS135 cannot be changed into the Computer Mode from the DCS Operator Station.

7.2.3 Operation Mode Loop and Status of Model YS136

The operation modes of Model YS136 and the loop status display of the operator station are related as follows.

(1) Cascade Mode

Operation Mode Display with YS136	YS136 Operation	Loop Status Display in Operator station	MV Setting from Operator Station
C(CAS)	YS136 outputs CIN1 input value as manipulated output signal	CAS	Impossible
M	Outputs manual Manipulated output value as manipulated output signal.	MAN	Possible

(2) Computer Mode

Operation Mode Display with YS136	YS136 Operation	Loop Status Display in Operator station	MV Setting from Operator Station
C(DDC)	Supervisory computer transmits output value to DCS instruments. YS136 outputs above output value as manipulated output signal.	DDC	Impossible
M	Output manual manipulated output value as manipulated output signal.	MAN	Possible

8. YS170 USER PROGRAM EXAMPLE (DCS-LCS COMMUNICATION)

To communicate with DCS, YS170 can use not only control parameters but also the following parameters.

These parameters can be used effectively with the YS170 user program.

- **BS, CS (P1, P2)**

  Data types BS and CS correspond to each YS170 variable parameter P1 and P2, and can be displayed and changed from both the DCS operator station and YS170. For example, when using YS170 as ratio controller, if the ratio setpoint is assigned to P1, the ratio can be set by setting BS (P1) from the operator station panel.

- **AUX1 to AUX3 (Y4, Y5, Y6)**

  Data type AUX1, AUX2, and AUX3 correspond to YS170 output registers (Y4, Y5 and Y6).

  While Y4 to Y6 have no analog output, if data is stored by program, Y4 to Y6 can be displayed on an operator station panel as a communication data item.

  Further, while less than ±8 data can be stored in YS170, 0 to 1.0 data can be communicated.

- **Ratio Controller Application (Program Example)**

<Function block>

Function block is shown in Figure 8.1. Ratio is displayed as P1 (BS for communication), input value (X2), prior to ratio computation, as Y4 (AUX1 for communication), and the ratio computation setpoint as Y5 (AUX2). In this example, X1 is displayed as PV value, and Y1 as MV1 value.

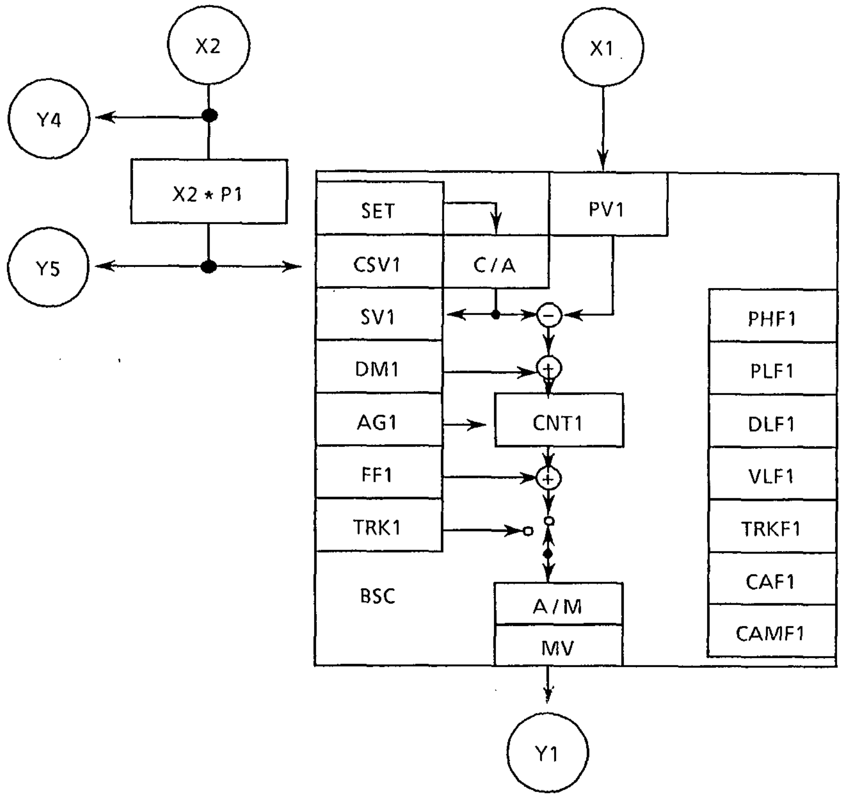


Figure 8.1 Function Block

<Program>

Program	S1	S2	Explanation
LD X2	X2		Input a cascade setpoint
ST Y4	X2		Output to communication register AUX1
LD P01	P1	X2	Input a ratio setpoint
*	P1·X2		Ratio computation
ST Y5	P1·X2		Output to communication register AUX2
ST CSV1	P1·X2		Storing to cascade setpoint register
LD X1	X1	P1·X2	
BSC1	MV1	P1·X2	Execution of control
ST Y1	MV1	P1·X2	
END			

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2-9-32 Nakacho, Musashino-shi, Tokyo 180-8750, JAPAN

YOKOGAWA ◆
Yokogawa Electric Corporation

YOKOGAWA ELECTRIC CORPORATION

Network Solutions Business Division
2-9-32, Nakacho, Musashino-shi, Tokyo, 180-8750 JAPAN
Phone: +81-422-52-7179 Facsimile: +81-422-52-6793
Sales Branch Offices
Tokyo, Nagoya, Osaka, Hiroshima, Fukuoka

YOKOGAWA CORPORATION OF AMERICA

Headquaters
2 Dart Road, Newnan, GA. 30265-1094 U.S.A.
Phone: +1-770-253-7000 Facsimile: +1-770-251-0928
Sales Branch Offices / Texas, Chicago, Detroit, San Jose

YOKOGAWA EUROPE B. V.

Headquaters
Databankweg 20, 3821 AL Amersfoort THE NETHERLANDS
Phone: +31-334-64-1611 Facsimile: +31-334-64-1610
Sales Branch Offices / Houten (The Netherlands), Wien (Austria), Zaventem (Belgium), Ratingen (Germany), Madrid (Spain), Bratislava (Slovakia), Runcorn (United Kingdom), Milano (Italy), Velizy villacoublay(France), Johannesburg(Republic of South Africa)

YOKOGAWA AMERICA DO SUL S.A.

Headquarters & Plant
Praca Acapulco, 31-Santo Amaro, Sao Paulo/SP, BRAZIL CEP-04675-190
Phone: +55-11-5681-2400 Facsimile: +55-11-5681-4434

YOKOGAWA ENGINEERING ASIA PTE. LTD.

Head office
5 Bedok South Road, Singapore 469270 SINGAPORE
Phone: +65-6241-9933 Facsimile: +65-6241-2606

YOKOGAWA ELECTRIC KOREA CO., LTD.

Seoul Sales office
395-70, Shindaebang-dong, Dongjak-gu, Seoul,156-010, KOREA
Phone: +82-2-3284-3000 Facsimile: +82-2-3284-3019

YOKOGAWA TAIWAN CORPORATION

Head office
17F, No.39, Sec. 1, Chung Hwa Road Taipei, 100 TAIWAN
Phone: +886-2-2314-9166 Facsimile: +886-2-2314-9918

YOKOGAWA AUSTRALIA PTY. LTD.

Head office
Centrecourt D1, 25-27 Paul Street North, North Ryde, N. S. W. 2113, AUSTRALIA
Phone: +61-2-9805-0699 Facsimile: +61-2-9888-1844

YOKOGAWA INDIA LTD.

Head office
40/4 Lavelle Road, Bangalore, 560 001, INDIA
Phone: +91-80-227-1513 Facsimile: +91-80-227-4270

LTD. YOKOGAWA ELECTRIC

Grokholskiy per. 13, Build. 2, 4th Floor, 129010, Moscow, RUSSIA FEDERATION
Phone: +7-095-737-7868 Facsimile: +7-095-737-7869