Instruction Manual

UT37, UT38, UP27
Communication Interface
(RS-422A)

CONTENTS

1. INTRODUCTION 2
2. RS-422A COMMUNICATIONS SPECIFICATIONS 2
3. COMMUNICATIONS TERMINALS 3
   - 3.1 Communications Cable End Treatment 3
   - 3.2 Overview of Communications Terminal Connections 4
   - 3.3 Communications Terminal Connection Methods 4
4. COMMUNICATION PARAMETER SETTING 6
5. COMMUNICATIONS OVERVIEW 10
   - 5.1 Typical Data that can be set (Changed) in a UT/UP from the Host 10
   - 5.2 Typical Data that can be Read by the Host from a UT/UP 11
   - 5.3 Communication Data Format 12
6. STATE TRANSITIONS DURING COMMUNICATIONS 14
   - 6.1 What is Communication Close Status? 15
   - 6.2 What is Communication Open Status? 16
   - 6.3 What is Communication Error Status? 17
7. COMMANDS 18
   - 7.1 Summary of Commands for UT37/UT38 18
   - 7.2 Summary of Commands for UP27 20
   - 7.3 Data Set Command, Data Read Command 23
   - 7.4 Command Descriptions 24
8. Coordinated Operation 61
   - 8.1 Functions Executable by Coordinated Operation 61
   - 8.2 Communication Specification for Coordinated Operation 62
   - 8.3 Preparations for Starting Coordinated Operation 63
   - 8.4 Communication Terminals and Their Connections 64
   - 8.5 PI-D Parameters for coordinated operation 65
   - 8.6 Execution of Cooperative Runs 69
9. COMMUNICATION ERROR ORGANIZATION 71
   - 9.1 Response to Communication Errors 72
   - 9.2 Response to Instrument Errors 72
10. PROGRAMMING EXAMPLES 73

*Subject to change without notice

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1. INTRODUCTION

Thank you for purchasing the /RS-422 communications option. This Instruction Manual pertains to the /RS-422 communications option and the coordinated operation only.

For information concerning the basic functions of the UT37, UT38 and UP27, see the "UT37/UT38 Instruction Manual" and the "UP27 Instruction Manual", respectively.

Retain this instruction manual.

■Documentation Conventions

The symbolic conventions below are used in this manual.

⚠**WARNING:** This marking on the product indicates that the operator must exercise special care to avoid electric shock or other dangers that may result in injury or the loss of life.

⚠**CAUTION:** This marking on the product indicates that the operation must refer to an explanation in the instruction manual in order to avoid damage to the instrument.

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1995 June IM 5B4B7-51E 2nd Revision

2. RS-422A COMMUNICATIONS SPECIFICATIONS

Connection system	Multidrop	*1
Communication system	4-wire half duplex, EIA RS-422A conformance	
Synchronization system	Start-stop synchronization	
Communication protocol	Protocol-free	
Communication distance	Maximum 500 m	
Communication rate	150, 300, 600, 1200, 2400, 4800, 9600 (BPS)	*2
Start bit length	1 bit (fixed)	*3
Data length	7 bits or 8 bits	*2
Patity	Even, odd, no parity	*2
Stop bit length	1 bit or 2 bits	*2
Communication code	ASCII code	

*1: A maximum of 16 UT37, UT38 and UP27 units can communicate with a single host. Assign each unit a unique communication address (1 to 16).
*2: See Section 4, "Communication Parameter Setting" (P.6 to 9).
*3: Because the system uses start-stop synchronization, and because the start bit is set automatically to 1 bit, no special setting is required.

3. COMMUNICATIONS TERMINALS

Figure 3.1 shows the communications terminals for the UT37, UT38 and for the UP27.

⚠WARNING
To avoid electric shock, never touch the power supply terminals, control output terminals, and alarm output terminals when the power is on.
Carry out protective grounding to avoid electric shock.

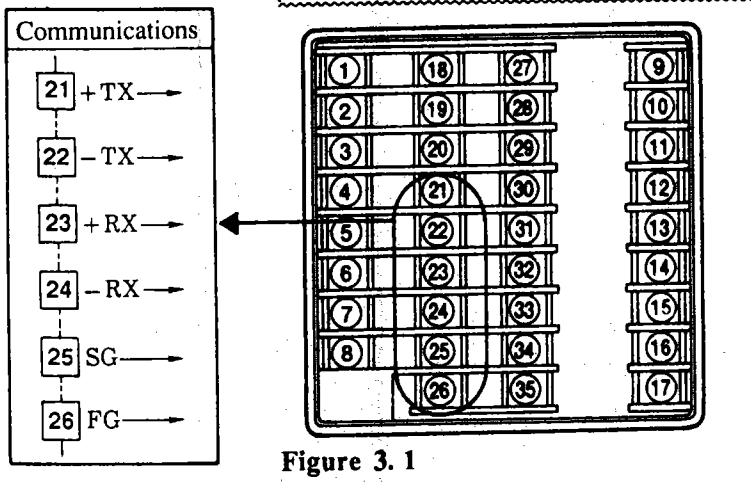
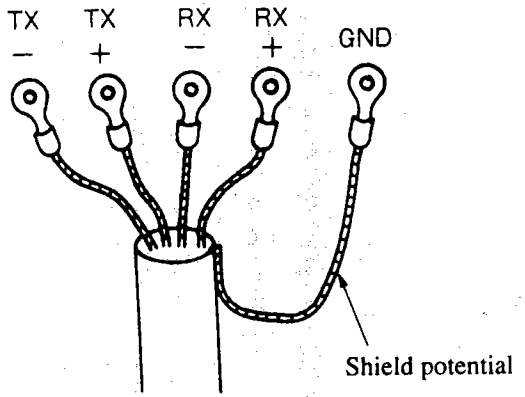


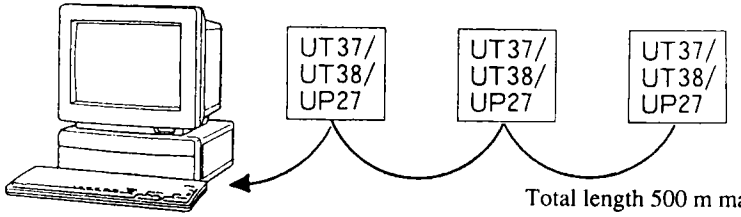
Figure 3. 1

3.1 Communications Cable End Treatment



3.2 Overview of Communications Terminal Connections

Using a cable with the recommended end treatment, connect the UT37, UT38 and UP27 in "daisy-chain" fashion.



(a) Number of units connected: Maximum 16 units, excluding the host.

(b) Except for the host, each unit has a communications address, and communications are done on a one-to-one basis with the UT37/UT38, UP27 specified by the host. (Only one unit at a time can be specified from the host.)

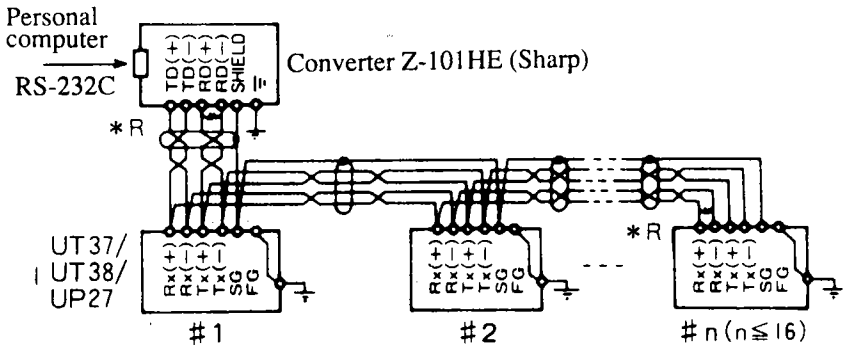
3.3 Communications Terminal Connection Methods

The methods for connecting between the terminal boards are illustrated here using the Z-101HE RS-422A/RS-232C converter for example.

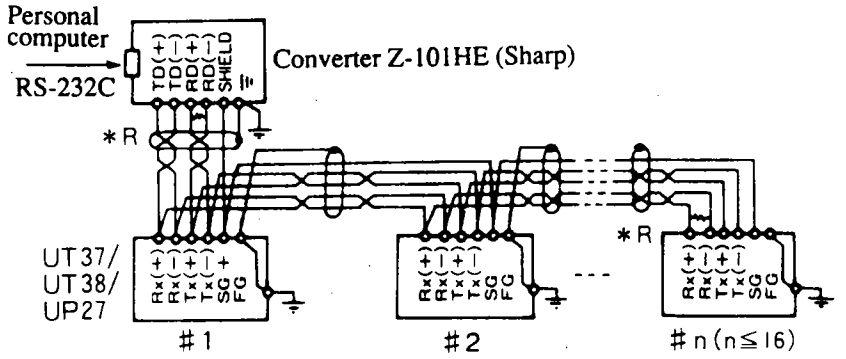
The electrical connections are the same for connection examples (A) and (B) at the right.

Either method can be used to make the connections. Method (B) should be used for connections between different panels.

(A)



(B)



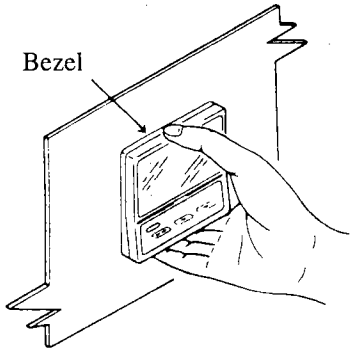
*R terminal resistance 100 1/2 W minimum

4. COMMUNICATION PARAMETER SETTING

This section describes the procedures for setting (or changing) the communications parameters. Follow the procedures below to set these parameters. (The procedures are illustrated using a UT37 as an example, but are just the same for a UT38 and a UP27.)

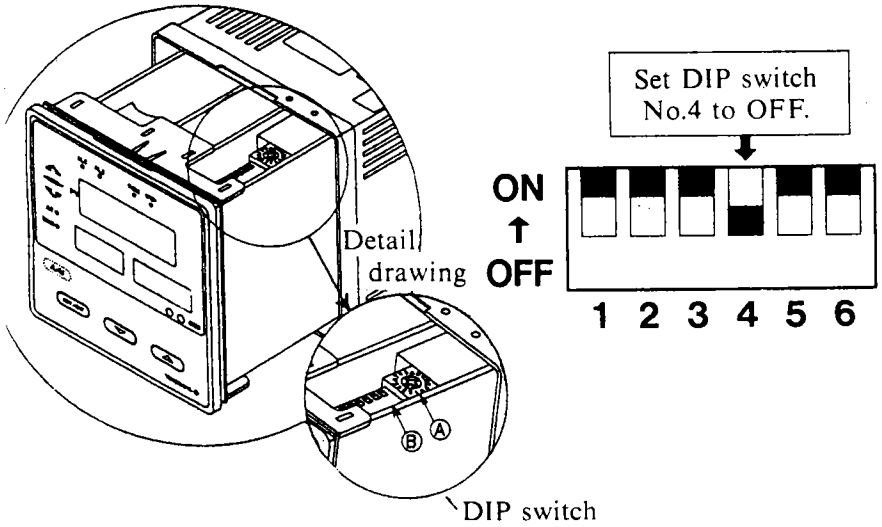
① Turn OFF the power supply to the UT37/UT38/UP27. (Power down.) ⚠CAUTION

② Pull out the internal unit.



While pressing up with your finger on the bezel stopper (latch), pull the entire bezel toward you to withdraw the internal unit from the housing.

③ Set DIP switch No. 4 to OFF.



④ Return the internal unit to the housing.

⑤ Reapply power to the UT37/UT38/UP27.

The panel shown at the left will appear on the display.

⑥ Press the ▲ key a sufficient number of times (the number of times will differ depending on whether certain option suffix codes are specified) to display the communication parameter display panel.

Verify that this display is on the panel.
(If you go past this display, press the ▼ key enough times to come around to it again.)

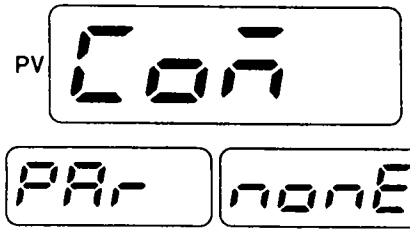
⑦ Press the SET/ENT key once.

The communication rate setting panel will appear on the lower display.

⑧ Use the ▲ and ▼ keys to change the communication rate. (If no change is required, proceed to 0 without pressing the ▲ or ▼ key.)

⑨ After verifying the communication address displayed, press the SET/ENT key to register (enter) it.

⑩ Press the SET/ENT key again.
The parity setting panel is now displayed.



← The left panel shows an example of "NONE" (no parity: initial value).

Now set (change) all of the parameters from the stop bit through the communication address (see the communication summary table below).

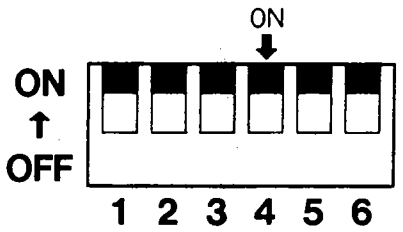
Set these parameters using the same procedure as in steps ⑦ through ⑩.

Communication Parameter Summary Table

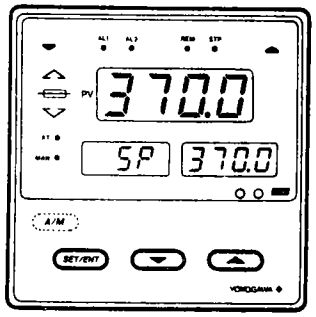
The UT37/UT38/UP27 communication parameters are listed below. All of these must be set (change) before beginning communications.

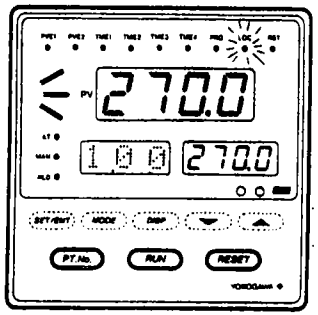
Display	Item	Setting range	Initial value	Remarks
bPS	Communication rate	150, 300, 600 1200, 2400, 4800 9600 BPS	9600	
PAr	Parity bit	NONE, EVEN or ODD	NONE	
StP	Stop bit	1, 2	1	1: 1 bit 2: 2 bit
dLn	Data length	7, 8	8	7: 7 bit 8: 8 bit
Adr	Communication address	01 ~ 16	1	A communication address is chosen from among 01 to 16. Don't use addresses ranging from 17 to 99.

⑪ When the communication parameter setting (change) is complete turn OFF the power to the UT37/UT38/UP27. (Power down.)
⑫ Pull out the internal unit. (See step 2 .)
⑬ Set DIP switch No. 4 to ON.



⑭ Return the internal unit to the housing.
⑮ Reapply power to the UT37/UT38/UP27, and verify that the normal display panel appears.

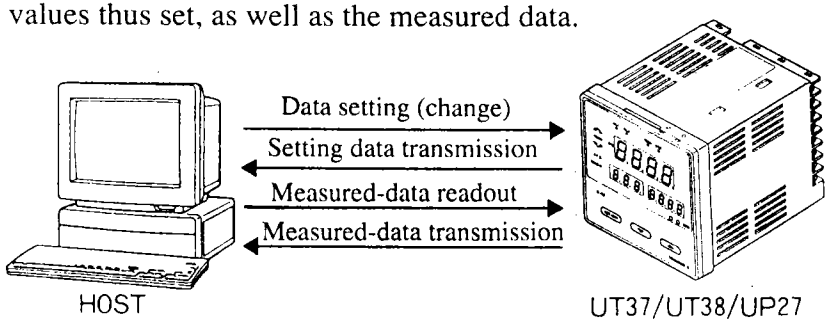




The above normal display panels show examples of a UT37 (or UT38) with measured value of 370.0°C and set point of 370.0°C, and a UP27 with measured value of 270.0°C and set point of 270.0°C (in the LOCAL run mode).

5. COMMUNICATIONS OVERVIEW

The host is able via communications to set (change) data values into a UT37, UT38, or UP27 (hereafter represented as a UT/UP in the case that is common to three models), and to read any of the data values thus set, as well as the measured data.



5.1 Typical Data that can be set (Changed) in a UT/UP from the Host

① Parameter settings (see note 1)
② Control output value when operating in the MAN (manual) run mode
③ Auto tuning start/stop
④ Selection of the set point to be used (SP, 2.SP, 3.SP or 4.SP) UT37, UT38 only
⑤ Execution of ADVANCE command UP27 only
⑥ Change of operation modes
- AUTO/MAN (manual)
- RUN/STOP UT37, UT38 only
- REM (remote)/LOCAL UT37, UT38 only
- RUN/HOLD UP27 only
- RESET/LOCAL UP27 only

5.2 Typical Data that can be Read by the Host from a UT/UP

① All parameter settings, excluding communication (setup) parameters and valve calibration (setup) parameters for a UT38.
② Measurement range maximum value (RH) and minimum value (RL).
③ Measured value (process variable)(PV), control output value, setpoint, and deviation
④ Alarm status (alarm or PV event)
⑤ No. of setpoint No. currently in use UT37, UT38 only
⑥ Operation mode

(Note 1.) The parameter items below can not be changed by means of communications:
- The following measurement input (setup) parameters:
  PD (Position of linear decimal point)
  RL (Minimum measurement range value)
  RH (Maximum measurement range value)
  UNI (Units)
- Communication (setup) parameters
- Valve calibration (setup) parameters UT38 only
- Programmed pattern setting (setup) parameters and programmed pattern operating (setup) parameters for a UP27, while they are being set by the key manipulation. (They cannot be read out either.)

(Note 2.) A UT/UP accepts commands from the host also in the following cases:
- When auto tuning is in progress
- When operating panels are not displayed

(Note 3.) Key operations at a UT37/UT38 can be performed freely, even while communications are in progress (no restrictions).

(Note 4.) At a UP27, the keys can be manipulated with complete freedom even during communications. However, programmed pattern setting parameters and programmed pattern operating parameters cannot be registered by appropriate parameter keys while communicating information about them.

5.3 Communication Data Format

command ␣data 1, data 2, ... data n CR LF

Indicates data delimiter. A comma "," is inserted between data. See Note ④.

A space ␣ is required between a command and data 1 (data for first parameter to be set). However, such space ␣ is not required in the case of data read command.

Communication delimiter.
When transmitting data from a host to a UT/UP, do not fail to provide a "CR LF" to terminate each single communication.
When data is transmitted from the UT/UP to the host, this delimiter is affixed automatically.
This delimiter is hereafter represented by the notation <terminator>.

Cautions :

1. Communication is started by a command transmission from the host to the UT/UP. When the UT/UP accepts the command, it returns a response to the host. The times for a UT/UP to respond to commands are as follows.
   Data read commend: 50ms or less, data set command: 125ms or less.

② When a data set command is used, the host absolutely must perform a comparison check against the data in the response from the UT/UP.

③ Received/sent data length (from a command to CR LF) is up to 200 bytes.

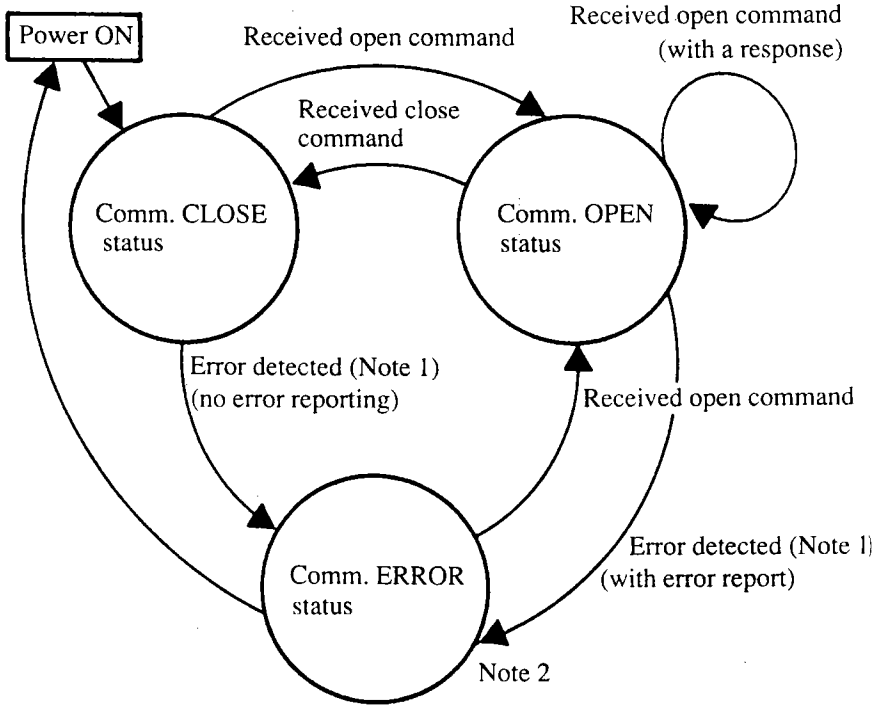
④ Communication data are represented differently in the following two cases. When data 2, for example, doesn't need to be set (changed), the communication data format is represented as "command␣data 1,,data 3,...data n CR LF". Data 2 can be omitted by using ",,". When each communication command is hereafter described, such a omissible data is enclosed in "( )". In contrast, the communication data format transmitted from a UT/UP to the host always includes all the parameter items, and thus none of the data are enclosed in "( )".

⑤ The codes of parameter items which must be set may be absent depending on internal switch settings or when certain communication options are not specified. (e.g. "remote bias" (setting value) in the case that /RSP was not specified, etc.)
In such case, a UT/UP responds to the host with "-" in place of the data of the appropriate parameter item.
As the data position of each parameter item is fixed in data setting, send data with the position of the parameter established by ",," if it is impossible to set the parameter.

⑥ When the UT37/UT38/UT27 receives a set command, data are stored in the EEPROM.
The EEPROM'S life expectancy (memory cell life) is about 100,000 writes.
So, use the set command only when stored data must be changed; do not write data unnecessarily.

(The data of the target setpoint (Note) are usually stored in the RAM. They are stored in the EEPROM only in case of power failure.
Note (1) The target setpoint data of UT37/UT38 : SP, 2.SP
(2) The target setpoint data of UP27 : LSP (Fixed setpoint))

6. STATE TRANSITIONS DURING COMMUNICATIONS



(Note 1.) Here, "error" refers to a framing error or to a parity error.
(Note 2.) When communication cannot be achieved, first check whether the UT/UP communication parameters and the host communication parameters are in agreement.
If there is an error in the settings, re-set correctly.

6.1 What is Communication Close Status?

- That status where the UT/UP has not been specified as the communication partner by the host.
- Data set commands and data read commands are not accepted.
- The keys can be manipulated with complete freedom.

6.1.1 Conditions that Result in Communication Close Status

① Turning ON power
② Acceptance of the command [ESC] C␣<own address>[CR][LF] from the host when in communication open status: The UT/UP responds to the host at this time with [ESC] C␣<own address>[CR][LF]
③ Acceptance of the command [ESC] O␣<other address>[CR][LF] from the host when in communication open status: The UT/UP enters to communication closed status without returning a response to the host.

6.1.2 Conditions for Transition from Communication Closed Status to Another Status

① Acceptance of the command [ESC] O␣<own address>[CR][LF] from the host when in communication closed status: The UT/UP responds to the host with [ESC] O␣<own address>[CR][LF], and simultaneously enters communication open status.
② Detection of an error (framing error, parity error): The instrument enters communication error status.

6.2 What is Communication Open Status?

- That status where the UT/UP has been specified as the partner for communication.
- Data set commands and data read commands can be accepted.
- The keys can be manipulated with complete freedom.

6.2.1 Conditions that Result in Communications Open Status

① Acceptance of the command [ESC] O ␣ <own address> [CR] [LF] from the host when in communication closed status:
The UT/UP responds to the host with [ESC] O ␣ <own address> [CR] [LF] and simultaneously enters communication open status.

② Acceptance of the command [ESC] O ␣ <own address> [CR] [LF] from the host when in communication error status:
The UT/UP responds to the host with [ESC] O ␣ <own address> [CR] [LF] and enters communication open status.

6.2.2 Conditions that Result in Transition from Communication Open Status to Another Status

① Acceptance of the command [ESC] C ␣ <own address> [CR] [LF] from the host when in communication open status:
The UT/UP responds to the host with [ESC] C ␣ <own address> [CR] [LF] and simultaneously enters communication closed status.

② Acceptance of the command [ESC] O ␣ <other address> [CR] [LF] from the host when in communication open status.
The UT/UP enters communication closed status without making a response to the host.

③ Detection of an error (framing error, parity error) in communication open status:
A response of ERR ␣ 200 [CR] [LF] is sent from the UT/UP to the host, and the instrument enters communication error status.

④ Turning power to the UT/UP OFF and then ON again while in communication open status: The UT/UP enters communication closed status without making a response to the host.

6.3 What is Communication Error Status?

Communication error status is a status in which the instrument awaits a recovery action (reopen) from the host.

The instrument recovers from the communication error status and change to the communication open status as a result of a reopen having been performed.

If the instrument fails to enter communication open status even when the above recovery operation has been performed, check the communication parameters (reenter if necessary) and the wiring, noise level, etc. of the communication line.

6.3.1 Conditions that Result in Communication Error Status

① Detection of an error (framing error, parity error) while in communication open status.
The instrument responds to the host with ERR ␣ 200 [CR] [LF], and enters communication error status.

② Detection of an error while in communication closed status:
The instrument enters communication error status without sending a response to the host.

6.3.2 Conditions for Transition from Communication Closed Status to Another Status

① Acceptance of the command [ESC] O ␣ <own address> [CR] [LF] while in communication error status:
The instrument enters communication open status, and responds to the host with [ESC] O ␣ <own address> [CR] [LF].

② Turning power to the UT/UP OFF and then ON again while it is in communication error status:
The UT/UP enters communication closed status without sending a response to the host.

7. COMMANDS

7.1 Summary of Commands for UT37/UT38

Command code	Functional overview	Command class Set	Command class Read	Reference page
[ESC] O *1	Open command Specifies (opens) from the host the UT37/UT38 that will be the communication partner using O accompanied by [ESC].	○ *2	— *3	P.24
[ESC] C *1	Close command Cancels (closes) communication from the host to the UT37/UT38 with which communication is being performed by using C accompanied by [ESC].	○	—	P.24
DP for UT37	"Reads" control output value (OUT), measured value (PV), set point (SP), deviation (DV) and set point No. (SP No) for a UT37.	—	○	P.25
DP for UT38	Reads the valve opening value, measured value (PV), set point (SP), deviation (DV), and set point No. (SP␣ No.) for a UT38.	○	○	P.25
DA	Reads whether Alarm 1 and Alarm 2 are currently ON or OFF.	—	○	P.25
DU	Reads whether the temperature unit currently in use is °C or °F. (The UT37/UT38 responds "-" to the host when DC voltage input.)	—	○	P.26
DS	Reads the timer indication (setting time) when a timer function is used.	—	○	P.26
OP for UT37	Reads the control output value (OUT) for a UT37, and changes its value only when operating in the MAN (manual) run mode.	○	○	P.27
OP for UT38	Reads the current valve opening value for a UT38, and changes its value only when operating in the MAN (manual) run mode(AUTO or MAN)	○	○	P.27
AM	Switches AUTO/MAN and reads the current run mode.	○	○	P.27
MD	Switches operation modes and reads the current operation mode.	○	○	P.28
AT	Specifies auto tuning start/stop, and identifies whether auto tuning is in progress.	○	○	P.28
SN	Enables the setpoint No. currently used to be switched and read.	△ *4	○	P.29
S1	Sets (changes) and reads the values of the main set point and a part of the operating parameter items used for the main set point.	○	○	P.29
S2	Sets (changes) and reads the values of the second set point and a part of the operation parameter items (2.P, 2.I, 2.D,...) used for the second SP (2.SP).	○ *2	○ *3	P.31
S3	Sets (changes) and reads the values for a part of the UT37/UT38's operating parameter items (3.P, 3.I, 4.P, 4.I,...) used in the Coordinated Operation (see P.58). (These commands are used in the case of RS-422A communications)	○	○	P.31
S4		○	○	P.31
PA	Sets (changes) and reads the values of the cycle time and a part of the operation parameter items (excluding the parameter items associated with S1 to S4 commands).	○	○	P.32
LC	Sets (changes) each key lock (five types) to ON/OFF and reads the current key lock status. (Note 1)	○	○	P.32
PR	Reads the values of measurement input parameters (PD, RH, RL and UNI).	—	○	P.33
PI	Sets (changes) and reads the values of measurement input parameters (BS, FL).	○	○	P.33
RR	Sets (changes) and reads the values of remote setting input parameters (RMH, RML).	○	○	P.34
RI	Sets (changes) and reads the values of remote setting input parameters (RFL, RSL).	○	○	P.34
P2	Sets (changes) and reads the values of set point (SP) parameters.	○	○	P.35
P3	Sets (changes) and reads the values of control output parameters.	○	○	P.35
P4	Sets (changes) and reads the values of transmission output parameters and alarm type parameters.	○	○	P.36
DV	Enables the host to identify the type of device with which communication is currently in progress. When a UT37 (or UT38) receives this command, it responds with "UT37" (or "UT38).	—	○	P.36
NA	Assigns (changes) up to 24 characters of a unique name (ASCII string) for a parameter setting data, and reads it.	○	○	P.37
OA	Sets (changes) and reads the values of Alarm 3 and 4.	○	○	P.37
AL	Sets (changes) and reads the type-related parameters for Alarm 3 and 4.	○	○	P.38
OT	Sets (changes) and reads the parameters for deviation value beath, anti-reset windup, etc.	○	○	P.38
DB	Reads whether Alarm 3 and Alarm 4 are currently ON or OFF.	—	○	P.39

*1: [ESC] is "1BH". *2: ○ indicates applicable commands.
*3: — indicates non-applicable commands.
*4: △ indicates the related command is applicable depending upon the setup conditions.

(Note 1.) At a UT37/UT38, data can be set (changed) by using commands (data set command only), independent of the key lock status.

7.2 Summary of Commands for UP27

Command code	Functional overview	Command class Set	Command class Read	Reference page
[ESC] O *1	Open command Specifies (opens) from the host the UP27 that will be the communication partner using O accompanied by [ESC].	○ *2	— *3	P.40
[ESC] C *1	Close command Cancels (closes) communication from the host to the UP27 with which communication is being performed by using C accompanied by [ESC].	○	—	P.40
DP	"Reads" control output value (OUT), measured value (PV), set point (SP), deviation (DV), and PID group No. for a UP27.	—	○	P.41
DA	Reads whether PV events (event 9 and event 10) are currently ON or OFF.	—	○	P.41
DU	Reads whether the temperature unit currently in use is °C or °F. (The UT37/UT38 responds "—" to the host when DC voltage input.)	—	○	P.42
DR	Reads repetition information when programmed runs are repeated at a UP27.	—	○	P.42
DS	Reads information about the current run situation (segment) when programmed runs are being performed at a UP27.	—	○	P.43
DT	Reads whether time events (event 1, 2, 3 and 4) are currently ON or OFF.	—	○	P.43
OP	Reads the control output value (OUT) for a UP27, and changes its value only when in the MAN (manual) run mode.	○	○	P.44
HS	Sets (changes) and reads the control target value and the remaining time of the segment when the UT27 is in the HOLD operation mode (in the soaked segment).	○	○	P.44
AM	Switches AUTO/MAN and reads the current run mode.	○	○	P.45
MD	Switches operation modes and reads the current operation mode.	○	○	P.45
AV	Advances a programmed segment of the UP27 to the next segment.	○	○	P.46
AT	Specifies auto tuning start/stop, and identifies whether auto tuning is in progress.	○	○	P.46

*1 : [ESC] is "1BH". *2: ○ indicates applicable commands.
*3: — indicates non-applicable commands.

Command code	Functional overview	Command class Set	Command class Read	Reference page
SP	Selects the programmed pattern No. to be run and reads currently running pattern No.	○ *2	○ *3	P.47
S1	Sets (changes) and reads the values of control parameter (operati on parameter) items for PID group 1.	○	○	P.47
S2	Sets (changes) and reads the values of control parameter (operati on parameter) items for PID group 2.	○	○	P.48
S3	Sets (changes) and reads the values of control parameter (operati on parameter) items for PID group 3.	○	○	P.48
S4	Sets (changes) and reads the values of control parameter (operati on parameter) items for PID group 4.	○	○	P.48
SL	Sets (changes) and reads the set point, PV event types, event values, PID group No. to be used, when a UP27 is in the fixed value control run (LOCAL mode).	○	○	P.49
PA	Sets (changes) and reads the cycle time and ON/OFF status of SUPER code.	○	○	P.49
LC	Sets (changes) each key lock (five types) to ON/OFF and reads the current key lock status. (Note 1)	○	○	P.50
PR	Reads the setting values of measurement input parameters (PD, RH, RL and UNI).	—	○	P.50
PI	Sets (changes) and reads the values of measurement input parameters (BS, FL).	○	○	P.51
P2	Sets (changes) and reads the values of target set point (TSP) parameters.	○	○	P.51
P3	Sets (changes) and reads the values of control output parameters.	○	○	P.52
P4	Sets (changes) and reads the values of transmission output parameters and event type parameters.	○	○	P.52
DV	Enables the host to identify the type of device with which communication is currently in progress. When a UP27 receives this command, it responds with "UP27".	—	○	P.53

(Note 1.) At a UP27, data can be set (changed) by using commands (data set command only), independent of the key lock status.

7.2 Summary of Commands for UP27 (Cont'd)

Command code	Functional overview	Command class		Reference page
		Set	Read	
PG	Sets (changes) and reads the values of pattern setting parameters.	○*2	○*3	P.53
PP	Sets (changes) and reads the pattern No. and segment No.	○	○	P.55
PE	Deletes a specific pattern.	○	—	P.55
PC	Makes a copy of a specific pattern using another pattern No.	○	—	P.56
PN	Assigns (changes) up to 24 characters of a unique name (ASCII string) for a specific pattern, and reads it.	○	○	P.56
ST	Sets (changes) and reads the parameter values associated with the same pattern of repeated runs.	○	○	P.57
SE	Deletes the segment of pattern No. or segment No. currently selected.	○	—	P.57
SI	Inserts (adds) the current segment behind pattern No. or segment No. currently selected.	○	—	P.58
TS	Reads the number of the remaining segments whose patterns are not currently defined [192 - (total segments whose patterns are currently defined)].	—	○	P.58
PS ␣ a	Reads the number of the segments which are set to a specific pattern. ("a" is pattern No.)	—	○	P.59
NA	Assigns (changes) up to 24 characters of a unique name (ASCII string) for a parameter setting data, and reads it.	○	○	P.59
OT	Sets (changes) and reads the values of the parameter for the RJC function.	○	○	P.60

*2 : O indicates applicable commands.
*3 :— indicates non-applicable commands.

7.3 Data Set Command, Data Read Command

As listed in Section 7.1, "Summary of Commands for UT37/UT38", and in Section 7.2, "Summary of Commands for UP27", the UT/UP commands can be broadly divided into data set commands [commands whose function is to set (or change) data], and data read commands, [commands whose function is to read the value of data previously set or entered into the UT/UP].

Note

Certain of the operating parameters may be absent depending on internal switch settings and on whether the UT/UP has certain option suffix codes. The UT/UP will respond to commands received with respect to those absent parameters as follows.

i) Response to data set command

- The UT/UP accepts the command exactly as it would if it had that function, and does not treat it as an error.
- The response to that particular command becomes a "-" (hyphen).

Example: When the UT37 has been set via the internal switch to ON/OFF control mode. (Parameters such as proportional band become absent.)
Response from UT37 to the host: S1 ␣ — <terminator>.

ii) Response to data read command

- The response to that particular command becomes a "—" (hyphen).

(Same as in the above example.)

7.4 Command Descriptions (for both UT37 & UT38)

7.4.1 Open Command (for both UT37 & UT38)

O Command having the function to specify (open) from the host the UT37/UT38 that will be the communication partner. The command needs to be used together with [Esc].

Used with	UT37. UT38
Data flow for data set (HOST) → (UT/UP)	[Esc] O ␣ aa <terminator>
Data flow for data read (HOST) → (UT/UP)	There is no data read function in this command.
Data flow in response to data set/ data read command (UT/UP) → (HOST)	[Esc] O ␣ aa <terminator> *1

Table of parameter items.

Code	Item	Units	Data range	Initial value
aa	UT37/UT38 communication address *2	–	01 to 16 and 99 *2, *3	

*1 If none of the UT37/UT38's physically connected to the host have been set to this address, there will be no response from any UT37/UT38.
*2 Always specify two digits. (For example, for address "3", specify "03".)
*3 An address 99 must be used in coordinated Operation and addresses 01 to 16 in communications with the host.

7.4.2 Close Command (for both UT37 & UT38)

C Command from the host having the function to cancel (close) the active-address status of a UT37/UT38. The command needs to be used together with [Esc].

Used with	UT37. UT38
Data flow for data set (HOST) → (UT/UP)	[Esc] O ␣ aa <terminator>
Data flow for data read (HOST) → (UT/UP)	There is no data read function in this command.
Data flow in response to data set/ data read command (UT/UP) → (HOST)	[Esc] O ␣ aa <terminator> *1

Table of parameter items.

Code	Item	Units	Data range	Initial value
aa	UT37/UT38 communication *2	–	01 to 16	

*1: If none of the UT37/UT38's physically connected to the host have been set to this address, there will be no response from any UT37/UT38.
*2: Always specify two digits. (For example, for address "3", specify "03".)

7.4.3 DP Command (for UT37/UT38)

DP Command having the function to read the control output value (OP), measured value (PV), set point (SP), deviation (DV), and set point No. (SP␣ No.) for a UT37/UT38. (For a UT38, valve opening data replaces control output value for a UT37.)

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	This command has no data setting function.
Data flow for data read (HOST) → (UT37/38)	DP <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	DP ␣ a, b, c, d, e <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Control output value	–	-5.0 ~ 105.0	–
b	Process variable (measured value)	–	RL ~ RH	–
c	Set point	–	RL ~ RH	–
d	Deviation	–	-105.0 ~ 105.0	–
e	Set point No.	–	1, 2, 3 or 4	1

*1. For a UT38, valve opening data replaces control output value.
*2. When operating with the second (sub) set point, this item becomes the second set point.

7.4.4 DA Command (for UT37/UT38)

DA Command having the function to read whether Alarm 1 and Alarm 2 are currently ON or OFF for a UT37/UT38.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	This command has no data setting function.
Data flow for data read (HOST) → (UT37/38)	DA <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	DA ␣ a, b, <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Alarm 1 status	–	0 or 1 *1	–
b	Alarm 2 status	–	0 or 1	–

*1 0: OFF (No Alarm)
1: ON (Alarm occurs)

7.4.5 DU Command (for UT37/UT38)

DU

Command having the function to read the temperature unit currently in use.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	This command has no data setting function.
Data flow for data read (HOST) → (UT37/38)	DU <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	DU ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Display unit	–	0 : °C 1 : °F – : DCV	– *1

*1 Not specified, as the input type is changeable by using the input range codes.

7.4.6 DS Command (for UT37/UT38)

DS

Command having the function to read the timer indication (setting time) when using a timer function at a UT37/UT38.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	This command has no data setting function.
Data flow for data read (HOST) → (UT37/38)	DS <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	DS ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Timer indication	min/ sec	0000 ≀ 5999 *1 (-1: timer set to OFF)	

*1 00:00 to 99:59 (min:sec) or 00:00 to 99:59 (hr:min) (Min:sec and hr:min are switched by the timer type codes.)

Note: In the case of communications, the timer indication values are set and read out in sec or min. For example, 99:59 (hr:min) is displayed as 5999 (min).

7.4.7 OP Command (for UT37/UT38)

OP

- For UT37: Command having the function to change (only in the MAN run mode) and read the control output value.
- For UT38: Command having the function to change (only in the MAN run mode) and read the valve opening value.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	OP ␣ a <terminator>
Data flow for data read (HOST) → (UT37/38)	OP <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	OP ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	• Control output value (for UT37) • Valve opening value (for UT38)	%	OL ~ OH	0

• Control output value/valve opening value cannot be changed (data setting is disabled), except when the UT37/UT38 is in both RUN and MAN mode.

7.4.8 AM Command (for UT37/UT38)

AM

Command having the function to switch AUTO/MAN and to read the current run mode.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	AM ␣ a <terminator>
Data flow for data read (HOST) → (UT37/38)	AM <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	AM ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	AUTO/MAN (manual) switching	–	0 : MAN 1 : AUTO	0

• When UT37/UT38 is in the MAN run mode because external contact terminals for AUTO/MAN switching are closed, AUTO/MAN switching (data setting) by means of communications is disabled.

7.4.9 MD Command (for UT37/UT38)

MD Changes the operation mode between LOCAL/REMOTE along with either the RUN/STOP mode and reads current mode.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	MD ␣ a <terminator>
Data flow for data read (HOST) → (UT37/38)	MD <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	MD ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	LOCAL/REM switching *1	–	0 : LOCAL 1 : REM	0
b	RUN/STOP switching *2	–	0 : RUN 1 : STOP	0

*1 When/RSP not specified, the response data to the host becomes MD␣0, b<terminator>.
*2 Selection between the RUN/STOP modes is available when dip switch No.3 is set to OFF. DI selection (DIS: Setup parameter) is set to "3", and Terminal EX1 is set to OFF (non-keylock mode).
- When the UT37/UT38 is in the REM run mode with external contact terminals closed, LOCAL/REM switching by means of communications is disabled.

7.4.10 AT Command (for UT37/UT38)

AT Command having the function to specify auto tuning start/stop and to identify whether auto tuning is currently in progress.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	AT ␣ a <terminator>
Data flow for data read (HOST) → (UT37/38)	AT <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	AT ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Autotuning executing/not executing	–	0: AT stop 1: AT start	

7.4.11 SN Command (for UT37/UT38)

SN Enables the setpoint No. currently used to be switched and read.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	This command has no data setting function.
Data flow for data read (HOST) → (UT37/38)	SN <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	SN ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	SP No. used *1		1: main SP (SP1) 2: SP2 3: SP3 4: SP4	Decided by external contact

*1 Selection of SP1, SP2, SP3, or SP4 is available when dip switch No.3 is set to OFF, DI selection (DIS: Setup parameter) is set to "3", and terminal EX1 is set to OFF (non-key lock mode)
- The selection of the second SP is disabled unless DIP switch is set to the position of 2.SP is existing.

7.4.12 S1 Command (for UT37/UT38)

S1 Command having the function to set (change) and read the values of the set point and a part of the operating parameter items, when the main set point is used.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	SI ␣ (a), , (b), (c), (d), (e), (f), , (g), (h), (i), (j), (k) <terminator>
Data flow for data read (HOST) → (UT37/38)	SI <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	SI ␣ a, –, b, c, d, e, f, –, g, h, i, j, k, <terminator> *1

Table of parameter items.

Code	Item	Units	Data range	Initial value
	Refer to Table 7.1 (P.30)			

*1
- Insert two commas ",," between (a) and (b) and between (f) and (g) in data setting.
- The UT37/UT38 responds to the host with "-" (dummy data) added to the positions above mentioned.

— Table 7.1 —

Code	Item	Unit	Data range	Initial value	Command				
					S1	S2	S3	S4	
a	Set point	EU	EU (0%) to EU (100%)	EU(0%)	a	a	a	a	*1 *2
–	Dummy data	–	–	–	–	–	–	–	
b	Alarm 1 setting value	EU	EU (0%) to EU (100%) or EU(-100%)S to EU (100%)S	EU(100%)	b	–	–	–	
c	Alarm 2 setting value	EU		EU(0%)	c	–	–	–	
d	Proportional band	%	0.1~999.9	5.0	d	d	d	d	*3
e	Integral time	sec	OFF or 1 to 6000 sec	240	e	e	e	e	
f	Derivative time	sec	OFF or 1 to 6000 sec	60	f	f	f	f	
–	Dummy data	–	–	–	–	–	–	–	
g	Manual reset value	%	-5.0~105.0	50.0	g	g	g	g	
h	ON/OFF control hysteresis	EU ( )S	EU (0.0%)S to EU(100.0%)S	EU(0.5%)S	h	h	h	h	
i	Upper output limit	%	-5.0 < j < i < 105.0	100.0	i	i	i	i	
j	Lower output limit			0.0	j	j	j	j	
k	Reference point	EU	EU (0%) to EU (100%)	EU(100%)	k	k			*4
	Reference DV	EU ( )S	EU (0%)S to EU(100%)S [EU (0%) S is OFF]	EU(0%)S				k	*5

*1 For S2, S3, S4 command, "a" becomes "the 2nd", "the 3rd", "the 4th" set point.

*2 Mark "-" indicates existence of dummy data at this position.

*3 Any parameter value from d (proportional band) to j (lower output limit) can be set individually for each command (S1, S2, S3 and S4).

*4 The "k" value for S2 command (reference point 2) should be more than for S1 command (reference point 1).

*5
- Commands S1 and S2 don't include the item "reference DV".
- Command S3 doesn't include either of the items "reference point" or "reference DV".
- Command S4 doesn't include the item "reference point".

7.4.13 S2 Command (for UT37/UT38)

Command having the function to set (change) and read the values of the second set point (2.SP) and a part of the operation parameter items used for the 2.SP.

S2

Used with	UT37, UT38
Data flow for data set (HOST) → (UT37/38)	S2 ␣ (a), , , , (d), (e), (f),, (g), (h), (i), (j), (k) <terminator> *1 *2
Data flow for data read (HOST) → (UT37/38)	S2 <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	S2 ␣ a, –, –, –, d, e, f, –, g, h, i, j, k <terminator> *1

Table of parameter items.

Code	Item	Units	Data range	Initial value
	Refer to Table 7.1(P.30)			

*1 ● Insert four commas " , , , " between (a) and (b) and two commas " , , " between (f) and (g) in data setting.
● The UT37/UT38 responds to the host with "–" (dummy data) added to the positions above mentioned.

*2 The setting (change) of "Alarm 1, 2 setting value" parameter is disabled for S2 command. (Enabled for S1 command)

7.4.14 S3 and S4 Commands (for UT37/UT38)

Command having the function to set (change) and read the values for a part of the UT37/UT38's operating parameter items (3.P, 3.I, 4.P, 4.I,...) used in the coordinated operation (see P.59). (In the case of RS-422A communications)

Notes: Coordinated operation and RS-422A communications are incompatible.

S3
S4

Used with	UT37, UT38
Data flow for data set (HOST) → (UT37/38)	S3 ␣ , , , , (d), (e), (f),, (g), (h), (i), (j), (k) <terminator> *1 — Note 2. or S4
Data flow for data read (HOST) → (UT37/38)	S3 <terminator> or S3 <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	S3 ␣ –, –, –, –, d, e, f, –, g, h, i, j, k, <terminator> Note 2. or S4

Table of parameter items.

Code	Item	Units	Data range	Initial value
	Refer to Table 7.1 (P.30)			

*1 ● Insert four commas " , , , " before (d) and two commas " , , " between (f) and (g) in data setting.
● The UT37/UT38 responds to the host with "–" (dummy data) added to the positions above mentioned.

(Note 1.) The same address "99" is assigned to all UT37/UT38 units in the coordinated operation and addresses from 01 to 16 to each UT37/UT38 unit in RS-422A communications. For this reason, two types of communications are incompatible. (S3 and S4 commands are provided for the purpose of allowing the host to perform, for example, maintenance of parameters for coordinated operation.)

(Note 2.) "K" is included in S4 command. (Not in S3 command)

7.4.15 PA Command (for UT37/UT38)

PA

Command having the function to set (change) and read the values of the cycle time and a part of the operation parameter items (excluding the parameter items associated with S1 to S4 commands).

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	PA ␣(a),(b),(c),,(d),(e),(f),<terminator> *1
Data flow for data read (HOST) → (UT37/38)	PA <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	PA ␣ a, b, c, –, d, e, –, f <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Ratio *2	times	0.000 ~ 999.9	1.000
b	Remote bias *2	EUS	EU(-100%)S~EU(100%)S	EU(0%)S
c	Cycle time *3	sec	1 ~240	30
d	Dead band *4	%	1.0 ~ 10.0	3.0
e	Relay hysteresis *4	%	0.1 ~ 0.5	0.5
f	Super ON/OFF	–	0 : OFF, 1 : ON	0

*1 • Insert two commas ",," between (c) and (d) and between (e) and (f) in data setting.
• The UT37/UT38 responds to the host with "-" (dummy data) added to the positions above mentioned.
*2 Valid only when /RSP specified.
*3 Valid only when time-proportioning PID (relay/pulse) output selected.
*4 Only for UT38.
See the "Note" in Section 7.3 (P.23).

7.4.16 LC Command (for UT37/UT38)

LC

Command having the function to set (change) each key lock (five types) to ON/OFF and to read the current key lock status.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	LC ␣(a), (b), (c), (d), (e) <terminator>
Data flow for data read (HOST) → (UT37/38)	LC <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	LC ␣ a, b, c, d, e <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	(▼), (▲) Key lock	–	0 : OFF or 1 : ON (lock)	0
b	(A/M) key lock	–		
c	R/L lock	–		
d	Operating parameter lock	–		
e	PID parameter lock	–		

For more information on each key lock, refer to Instruction Manual "IM 5B4B7-02E".
Note: Key locks are effective only against key operations. Even if a UT37/UT38 is in a key lock status, data setting (changing) by means of communications is enabled.

7.4.17 PR Command (for UT37/UT38)

PR

Command having the function to read the setting values of measurement input parameters (PD, RH, RL and UNI).

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	This command has no data setting function.
Data flow for data read (HOST) → (UT37/38)	PR<terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	PR ␣ a, b, c, d <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Decimal point position	–	0, 1, 2, 3	0 *1
b	Measurement range maximum value.(RH)	EU	EU(0.0%) ≤ RL < RH≤ EU(100.0%) *2	EU(100.0%)
c	Measurement range minimum value (RL)			EU(0.0%)
d	Display unit	–	0 or 1*3	0

*1 0 (thermocouple type K, -200 to 1200degC range)
*2 Data range with linear input is -1999<RL<RH<9999.
*3 0 : °C, 1 : °F

7.4.18 PI Command (for UT37/UT38)

PI

Command having the function to set (change) and read the values of measurement input parameters (BS, FL).

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	PI ␣ (a), (b) <terminator>
Data flow for data read (HOST) → (UT37/38)	PI <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	PI ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
aa	Measurement input device	EU ( )S	EU(–100%)S ~EU (100%)S	EU (0.0%)S
b	Measurement input filter	sec	0 (OFF), 1~120	0

7.4.19 RR Command (for UT37/UT38)

RR

Command having the function to set (change) and read the values of remote setting input parameters (RMH, RML).

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	RR ␣ (a), (b) <terminator>
Data flow for data read (HOST) → (UT37/38)	RR <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	RR ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Remote setting input range maximum value	EU	-1999 ≤ b < a ≤ 9999	*1
b	Remote setting input range minimum value	EU		*2

*1 The initial value of remote setting input range maximum value is the measurement range maximum value (RH).
*2 The initial value of remote setting input range minimum value is the measurement range minimum value (RL).

7.4.20 RI Command (for UT37/UT38)

RI

Command having the function to set (change) and read the values of remote setting input parameters (RFL, RSL).

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	RI ␣ (a), (b) <terminator>
Data flow for data read (HOST) → (UT37/38)	RI <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	RI ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Remote setting input filter	sec	0 (OFF), 1 ~ 120	0
b	Remote setting input, Ratio, Ratio bias ON/	–	0: OFF or 1: ON	0

• Valid only when /RSP specified.

See the "Note" in Section 7.3 (P.23).

7.4.21 P2 Command (for UT37/UT38)

P2

Command having the function to set (change) and read the values of set point (SP) parameters.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	P2 ␣ (a), (b), (c), (d), (e), (f), (g) <terminator>
Data flow for data read (HOST) → (UT37/38)	P2 <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	P2 ␣ a, b, c, d, e, f, g <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	SP high limit	EU	EU(0.0%) ~ EU(100.0%)	EU(100%)
b	SP low limit	EU		EU(0%)
c	SP up - ramp slope	EUS	*2	0
d	SP down - ramp slope	EUS		0
e	SP tracking selection	–	0 : OFF, 1 : ON	1
f	PV tracking selection	–	0 : OFF, 1 : ON	0
g	Slope setting unit	–	0 (hour) or 1 (minute)	0

*1 SP tracking selection is valid only when /RSP specified. See the "Note" in Section 7.3 (P.23).
*2 Data range is from "EU(0%)S/hr or min" to "EU(100%)S/hr or min.

7.4.22 P3 Command (for UT37/UT38)

P3

Command having the function to set (change) and read the values of control output parameters.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	P3 ␣ (a), (b), (c), (d), (e), (f), (g) <terminator> *1
Data flow for data read (HOST) → (UT37/38)	P3 <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	P3 ␣ –, a, b, c, d, e, f, g <terminator> *2

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Direct/reverse switching	–	0: reverse, 1 : Direct	0
b	Output rate - of - change limit	%/sec	0(OFF), 0.1% ~ 100.0%	0
c	Preset output value	%	-5.0 ~ 105.0	0.0
d	Restart code	–	0, 1 or 2 *3	0
e	Cycle time	sec	1 ~240	30
f	Direct/reverse switching for the 2.SP	–	0: reverse, 1: normal	0
g	DI selection	–	0, 1, 2 or 3 *4	0

*1 Insert a comma "," before (a).
*2 The P3 always followed by a hyphen "-" and a comma ",".
*3 0(The discontinued action is resumed after recovery of power failure.), 1(MAN run is performed after power recovery.), 2 (Similar to 0. but output value is the preset value.)
*4 See IM 5B4B7-02E for detail.

7.4.23 P4 Command (for UT37/UT38)

P4 Command having the function to set (change) and read the values of transmission output parameters and alarm type parameters.

Used with	UP 27
Data flow for data set (HOST) → (UT37/38)	P4 ␣ (a), (b), (c), (d), (e), (f), (g) <terminator>
Data flow for data read (HOST) → (UT37/38)	P4 <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	P4 ␣ a, b, c, d, e, f, g <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Retransmission output selection	–	0, 1, 2, 3, 4 *1	0
b	Retransmission range max. value	EU	EU(0.0%) ~ EU(100.0%)	EU (100.0%)
c	Retransmission range min. value			EU(0.0%)
d	Alarm 1 type	–	0(OFF), 1 ~ 24 *2	1
e	Alarm 2 type	–		2
f	Alarm 1 hysteresis	EUS	EU(0.0%)S ~ EU(100.0%)S	EU(0.5%)S
g	Alarm 2 hysteresis	EUS		EU(0.5%)S

*1 Valid only when /RET specified (for more information on option, see "IM 5B4B7-02E).
See the "Note" in Section 7.3 (P.23).
*2 Alarm 1: 0 (OFF), 1 to 24 (for more information on option, see "IM 5B4B7-02E).
Alarm 2: 0 (OFF), 1 to 20

7.4.24 DV Command (for UT37/UT38)

DV Command having the function to enable the host to identify the type code of the partner device (UT37/UT38) with which communication is currently in progress.

Used with	UP 27
Data flow for data set (HOST) → (UT37/38)	This command has no data setting function.
Data flow for data read (HOST) → (UT37/38)	DV <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	DV ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Type code		UT37 or UT38*1	Depending on the type

*1 When the UT37(or the UT38) receives this command, it responds to the host with "DV␣UT37<terminator>" (or "DV$ UT38<terminator>").

7.4.25 NA Command (for UT37/UT38)

NA Command having the function to set (charge) up to 24 characters of a unique name (ASCII String) for a parameter setting data and to readit.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	NA ␣ (a) <terminator>
Data flow for data read (HOST) → (UT37/38)	NA <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	NA ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	ASCII string of up to 24 characters	–	–	–

7.4.26 OA Command (for UT37/UT38)

OA Command having the function to set (change) and read the values of Alarm 3 and Alarm 4.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	OA␣ (a), (b) <terminator>
Data flow for data read (HOST) → (UT37/38)	OA<terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	OA␣ a, b< terminator> *1

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Alarm 3 setting value	EU	EU(0%)~ EU(100%) or EU(−100%)~ EU(100%)	EU(100%)
b	Alarm 4 setting value	EU		EU(0%)

*1 When Alarm 3 is in failure diagnostic output status and Alarm 4 is in fail output status. UT37/UT38 responds to the host with "−" (hyphen).

7.4.27 AL Command (for UT37/ UT38)

AL Command having the function to set (change) and read the values of type-related parameters for Alarm 3 and 4, and hysteresis parameters.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	AL␣(a), (b), (c), (d) <terminator>
Data flow for data read (HOST) → (UT37/38)	AL <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	AL␣a, b, c, d <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Type of Alarm 3	–	1 ~ 21*	1
b	Type of Alarm 4	–		2
c	Hysteresis of Alarm 3	EUS	EU(0.0%)S ~ EU(100.0%)S	EU(0.5%)S
d	Hysteresis of Alarm 4	EUS		EU(0.5%)S

* Refer to IM 5B4B7-02E for alarm types.

7.4.28 OT Command (for UT37/UT38)

OT Command having the function to set (change) and read the values of the parameters for deviation value breadth (D.V.B.), anti-reset windup function and RJC function, etc.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	OT␣(a), (b), (c), (d), (e) <terminator>
Data flow for data read (HOST) → (UT37/38)	OT <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	OT␣a, b, c, d, e <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	D.V.B.	EUS	EU(0%)S ~ EU(100%)S	EU(1%)S
b	RJC ON/OFF	–	ON or OFF	ON*1
c	Anti-reset windup	%	0.0 ~ 999.9%	0.0%
d	SP3 D/R selection*2	–	0 or 1*3	0
e	SP4 D/R selection	–	0 or 1	0

*1 0: OFF, 1: ON
*2 D: Direct, R: Reverse action
*3 0: Reverse, 1: Direct action

7.4.29 DB Command (for UT37/UT38)

DB Command having the function to read whether Alarm 3 and Alarm 4 are currently ON or OFF.

Used with	UT37. UT38
Data flow for data set (HOST) → (UT37/38)	This command has no data setting function.
Data flow for data read (HOST) → (UT37/38)	DB <terminator>
Data flow in response to data set/ data read command (UT37/38) → (HOST)	DB␣a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Alarm 3 status	–	0 or 1 *1	–
b	Alarm 4 status	–	0 or 1	–

*1 0: OFF (No Alarm)
1: ON (Alarm occurs)

Command Description (for UP27)

7.4.30 Open Command

O Command having the function to specify (open) from the host for the UP27 to be the communication partner. The command must be used together with [ESC].

Used with	UP27
Data flow for data set (HOST) → (UT/UP)	[ESC] O ␣ aa <terminator>
Data flow for data read (HOST) → (UT/UP)	There is no data read function in this command.
Data flow in response to data set/ data read command (UT/UP) → (HOST)	[ESC] O ␣ aa <terminator> *1

Table of parameter items.

Code	Item	Units	Data range	Initial value
aa	UP27 communication address *2	–	01 to 16 and 99 *2, *3	

*1: If none of the UP27's physically connected to the host have been set to this address, no UP27 will respond.
*2: Always specify two digits. (For example, for address "3", specify "03".)
*3: An address 99 must be used in coordinated operation and addresses 01 to 16 in communications with the host.

7.4.31 Close Command

C Command from the host having the function to cancel (close) the active-address status of a UP27. The command needs to be used together with [ESC]. *1

Used with	UP27
Data flow for data set (HOST) → (UT/UP)	[ESC] O ␣ aa <terminator>
Data flow for data read (HOST) → (UT/UP)	There is no data read function in this command.
Data flow in response to data set/ data read command (UT/UP) → (HOST)	[ESC] O ␣ aa <terminator> *1

Table of parameter items.

Code	Item	Units	Data range	Initial value
aa	UP27 communication address *2	–	01 to 16	

*1 If none of the UP27's physically connected to the host have been set to this address, no UP27 will respond.
*2 Always specify two digits. (For example, for address "3", specify "03".)

7.4.32 DP Command

DP Command having the function to read the control output value (OUT), measured value (process variable) (PV), set point (SP), deviation (DV), and PID group No. for a UP27.

Used with	UP27
Data flow for data set (HOST) → (UP27)	This command has no data setting function.
Data flow for data read (HOST) → (UP27)	DP <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	DP ␣ a, b, c, d, e <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Control output value	%	–5.0 ~ 105.0	—
b	Measured value (PV)	EU	RL ~ RH	—
c	Set point (SP)	EU	RL ~ RH	—
d	Deviation	%	–105.0 ~ 105.0	—
e	PID No.	—	1, 2, 3, 4	1

*1 The response data of each parameter item is represented as an ASCII string.
*2 When the measured input value is out of data range, the response data is "+OVER"(for 105.0% or more) or "-OVER"(for -5.0% or less).
When there is no measured input because of a broken wire, the response data is "BURN␣OUT".
*3 When A/D converter, reference junction compensation or auto tuning is in bad or unadjusted condition, the measured data is followed by the data below:
*E300, *RJC_ERR, *E200 (Data are listed in the order of descending priorities)

7.4.33 DA Command

DA Command having the function to read whether PV events (event 9 and event 10) are currently ON or OFF.

Used with	UP27
Data flow for data set (HOST) → (UP27)	This command has no data setting function.
Data flow for data read (HOST) → (UP27)	DA <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	DA ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	PV event 9 ON/OFF	–	0: OFF 1: ON	—
b	PV event 10 ON/OFF	–		

7.4.34 DU Command

DU Command having the function to read the temperature unit currently in use.

Used with	UP27
Data flow for data set (HOST) → (UP27)	This command has no data setting function.
Data flow for data read (HOST) → (UP27)	DU <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	DU ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Display unit	—	0 : °C 1 : °F —: DCV input	—*1

*1 Not specified, as the input type is changeable by using the input range codes.

7.4.35 DR Command

DR Command having the function to read repetition information when program runs are repeated at a UP27.

Used with	UP27
Data flow for data set (HOST) → (UP27)	This command has no data setting function.
Data flow for data read (HOST) → (UP27)	DR <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	DR ␣ a, b, c, d <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Remaining repeat runs	Count	0 ~ 1000	0
b	Total repeat runs	Count	0 ~ 999, 1000 *1	0
c	Repeat starting segment No.		*2	1
d	Repeat ending segment No.		*2	*3

Unit: Count
*1 When repeats "endless", UP27 responds to the host with "1000".
*2 The data range is the range of segment Nos. assigned to a specific program pattern.
*3 This value is the last segment No. of the segments assigned to a specific pattern.

7.4.36 DS Command

DS Command having the function to read information about the currently run situation (segment) while program runs are being performed at a UP27.

Used with	UP27
Data flow for data set (HOST) → (UP27)	This command has no data setting function.
Data flow for data read (HOST) → (UP27)	DS <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	DS ␣ a, b, c, d, e <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Remaining time for the segment (at usual time) Elapsed waiting time (at waiting time)	sec	(Note 1)	—
b	Current running pattern No.	—	1 ~ 15	—
c	Current running segment No.	—	1 ~ 60	—
d	Number of segments with the current running pattern	—	1 ~ 60	—

(Note 1.) Data range and time units are the following:
0 to 5999
Time unit set or read out by means of communications is sec or min. For example, 99:59 (min:sec) is shown as 5999 (sec).

7.4.37 DT Command

DT Command having the function to read whether timed events (TME 1, 2, 3 and 4) are currently ON or OFF.

Used with	UP27
Data flow for data set (HOST) → (UP27)	This command has no data setting function.
Data flow for data read (HOST) → (UP27)	DT <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	DT ␣ a, b, c, d, e <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	TME 1 ON/OFF	—	0: OFF 1: ON	—
b	TME 2 ON/OFF	—		
c	TME 3 ON/OFF	—		
d	TME 4 ON/OFF	—		

*1 TME: time event

7.4.38 OP Command

OP Command having the function to read the output value (OUT) for a UP27 and to change control output value only when in the MAN (manual) run mode.

Used with	UP27
Data flow for data set (HOST) → (UP27)	OP ␣ a <terminator>
Data flow for data read (HOST) → (UP27)	OP <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	OP ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Control output value	%	OL ~ OH *2	

*1 Control output value can be changed only when the UP27 is in both RUN and MAN mode.
*2 OL (Output high limit value), OH (Output law limit value)

7.4.39 HS command

HS Command having the function to set (change) and read the control set point and the remaining time of the segment when the UP27 is in the HOLD mode (in the soaked segment).

Used with	UP27
Data flow for data set (HOST) → (UP27)	HS ␣ (a), (b) <terminator>
Data flow for data read (HOST) → (UP27)	HS <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	HS ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Control set point at HOLD time RL (Measurement range max. value) to RH (Measurement range min. value)	EU	RL (Measurement range max. value) ~ RH (Measurement range min. value)	–
b	Remaining time of the current segment at HOLD time	Min.	0 ~ 5999 (Note)	–

This command is effective only when UP27 is in the HOLD mode (in the soaked segment). Otherwise, the response to the host is "HS␣-,-- <terminator>".
Note: Time unit set or read out by means of communications is sec or min. For example, 99:59 (hr:min) is shown as 5999 (min).

7.4.40 AM Command

AM Command having the function to switch AUTO/MAN and to read the current run mode.

Used with	UP27
Data flow for data set (HOST) → (UP27)	AM ␣ a <terminator>
Data flow for data read (HOST) → (UP27)	AM <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	AM ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	AUTO/MAN (manual) switching	–	0: MAN 1: AUTO	0

7.4.41 MD Command

MD Command having the function to switch operation modes and to read the current operation mode.

Used with	UP27
Data flow for data set (HOST) → (UP27)	MD ␣ (a), (b) <terminator>
Data flow for data read (HOST) → (UP27)	MD <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	MD ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	RESET/LOCAL/ PRGM run mode switching	–	0 : reset 1 : local 2 : program	0
b	HOLD executing	–	0 : run 1 : hold	0

7.4.42 AV Command

AV

Command having the function which allows UP27 to execute ADVANCE. (ADVANCE is the function to move the one of segments to the next when operating in the PROGRAM mode.)

Used with	UP27
Data flow for data set (HOST) → (UP27)	AV <terminator>
Data flow for data read (HOST) → (UP27)	This command has no data read function.
Data flow in response to data set/ data read command (UP27) → (HOST)	AV ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Pattern No. for which ADVANCE has been executed	–	0 ~ 15	–
b	Incremented segment No. after executing ADVANCE	–	1 ~ 60	–

(Note 1.) Note that AV command for data set is followed by <terminator> only, differing from other commands.

(Note 2.) After ADVANCE has been executed for the end segment of a specific pattern, the UP27 responds to the host with "AV␣0,0 <terminator>. At the same time, the UP27 is reset to 0 pattern and 0 segment (initial value). The response is also "AV␣0,0 <terminator>" when UP27 is already in the RESET mode.

7.4.43 AT Command

AT

Command having the functions to specify auto tuning start/ stop and to identify whether auto tuning is currently in progress.

Used with	UP27
Data flow for data set (HOST) → (UP27)	AT ␣ a <terminator>
Data flow for data read (HOST) → (UP27)	AT <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	AT ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Auto tuning start/stop	–	0: AT stop 1: AT start	0

7.4.44 SP Command

SP

Command having the functions to select the program pattern No. to be run and to read the current running pattern No.

Used with	UP27
Data flow for data set (HOST) → (UP27)	SP ␣ a <terminator>
Data flow for data read (HOST) → (UP27)	SP <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	SP ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Pattern No. to be run or running	–	1 ~ 15 [or 0: run lock status]	–

Note: This command can not be used as a data set command to select the program pattern No. except when the UP27 is in both RESET and LOCAL mode.

7.4.4.5 S1 Command

S1

Command having the function to set (change) and read the values of control parameter (operation parameter) items for PID group 1.

Used with	UP27
Data flow for data set (HOST) → (UP27)	S1 ␣ (a), (b), (c), –, (d), (e), (f), (g), (h) <terminator>
Data flow for data read (HOST) → (UP27)	S1 <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	S1 ␣ a, b, c, –, d, e, f, g, h <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Proportional band	%	0.1 ~ 999.9	5.0
b	Integral time	sec	0 (OFF) or	240
c	Derivative time	sec	1 ~ 6000	60
-	Dummy	–	–	–
d	Manual reset value	%	–5.0 ~ 105.0	50.0
e	ON/OFF hysteresis	EUS	EU(0%)S–EU(100%)S	EU(0.5%)S
f	Output high limit value	%	–5.0 g f 105.0	100.0
g	Output low limit value	%		0.0
h	Reference point 1	EU	EU(0%) h 2.RP*	EU(100%)S

* 2.RP: Reference point 2

7.4.46 S2 Command

S2

Command having the function to set (change) and read the values of control parameter (operation parameter) items for PID group 2.

Used with	UP27
Data flow for data set (HOST) → (UP27)	S2 ␣ (a), (b), (c), (d), (e), (f), (g), (h) <terminator> Note: Two commas " , , " should be inserted between c. and d.
Data flow for data read (HOST) → (UP27)	S2 <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	S2 ␣ a, b, c, –, d, e, f, g, h <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Proportional band(2.P)	%	0.1 ~ 999.9	5.0
b	Integral time(2.I)	sec	0 (OFF) or	240
c	Derivative time(2.D)	sec	1 ~ 6000	60
–	Dummy	–	–	–
d	Manual reset value	%	–5.0 ~ 105.0	50.0
e	ON/OFF hysteresis	EUS	EU(0%)S~EU(100%)S	EU(0.5%)S
f	Output high limit value	%	–5.0 g<f 105.0	100.0
g	Output low limit value	%		0.0
h	Reference point 1	EU	1.RP h EU(100%)*	EU(100%)

*1. RP: Reference point

7.4.47 S3 and S4 Commands

S3 S4

S3 and S4 commands having the function to set (change) and read the values of control parameter (operation parameter) items for PID group 3 and 4, respectively.

Used with	UP27
Data flow for data set (HOST) → (UP27)	S3 or S4 ␣ (a), (b), (c), (d), (e), (f), (g), (h) <terminator> (Note) Two commas " , , " should be inserted between c. and d.
Data flow for data read (HOST) → (UP27)	S3 or S4 <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	S3 or S4 ␣ a , b, c, –, d, e, f, g, h <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Proportional band*1	%	0.1 ~ 999.9	5.0
b	Integral time	sec	0 (OFF) or	240
c	Derivative time	sec	1 ~ 6000	60
–	Dummy	–	–	–
d	Manual reset value	%	–5.0 ~ 105.0	50.0
e	ON/OFF hysteresis	EUS	EU(0%)S~EU(100%)S	EU(0.5%)S
f	Output high limit value	%	–5.0 g<f 105.0	100.0
g	Output low limit value	%		0.0
h	Reference point DV*2	EU	1.RP h EU(100%)*	EU(100%)

*1 Any value of the parameter items "a" (proportional band) to "g" (output low limit value) should be set and read out individually for each command (S3 or S4).
*2 The item "h" (Reference DV) is included in S4 command, but not in S3 command.

7.4.48 SL Command (for the fixed setpoint control run)

SL

Command having the function to set (change) and read the set point, PV event types, event values, and PID group No. to be used, when a UP27 is in the fixed setpoint control run (LOCAL mode).

Used with	UP27
Data flow for data set (HOST) → (UP27)	SL ␣ (a), (b), (c), (d), (e), (f) <terminator>
Data flow for data read (HOST) → (UP27)	SL <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	SL ␣ a, b, c, d, e, f <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Set point	EU	EU(0%)~EU(100%)	EU(0%)
b	Type of PV event 9	–	OFF, 1 ~ 10	1
c	Set value of PV event 9	–	*1	
d	Type of PV event 10	–	OFF, 1 ~ 10	2
e	Set value of PV event 10	–	*1	
f	PID group No.	–	1 ~ 4	1

*1 EU(-100.0%)~EU(100.0%) or EU(-100.0%)S~EU(100.0%)S

7.4.49 PA Command

PA

Command having the function to set (change) and read the cycle time and ON/OFF status of SUPER code.

Used with	UP27
Data flow for data set (HOST) → (UP27)	PA ␣ , , (a), , , , , (b) <terminator>*1
Data flow for data read (HOST) → (UP27)	PA <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	PA ␣ –, –, a, –, –, –, –, b <terminator>*2

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Cycle time	sec	1 ~ 240	30
b	SUPER code	–	0 : OFF 1 : ON	0

*1 Insert two commas "," before (a) and five commas "," between (a) and (b) in data setting.
*2 The UP27 responds to the host with "-" (dummy data) added to the positions above mentioned.
See the **"Note" in Section 7.3 "Data Set Command, Data Read Command"**

7.4.50 LC Command

LC

Command having the function to set (change) each key lock (five types) to ON/OFF and to read the current key lock status.

Used with	UP27
Data flow for data set (HOST) → (UP27)	LC ␣ (a), (b), (c), (d), (e) <terminator>
Data flow for data read (HOST) → (UP27)	LC <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	LC ␣ a, b, c, d, e, <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Data register key lock	–	0 : OFF 1 : ON	0
b	Program operation key lock	–		0
c	MODE key lock	–		0
d	Operation parameter lock	–		0
e	PID parameter lock	–		0

Note: Data for a UP27 can be set (changed) by using commands (data set command only), independent of key lock status.

7.4.51 PR Command

PR

Command having the function to read the measurement input parameters (PD, RH, RL and UNI).

Used with	UP27
Data flow for data set (HOST) → (UP27)	This command has no data setting function.
Data flow for data read (HOST) → (UP27)	PR <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	PR ␣ a, b, c, d <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Decimal point position (PD)	–	0, 1, 2, 3	Depending on the input range
b	Measurement range max. volue (RH)	–	*1	
c	Measurement range mix. value (RL)	–		
d	Display unit (UNI)	–	0: °C, 1: °F	–

*1 • Thermocouple/RTD: within the measuring range of the instrument.
• DC voltage input: -1999 to 9999.

7.4.52 PI Command

PI

Command having the function to set (change) and read the values of measurement input parameters (BS, FL).

Used with	UP27
Data flow for data set (HOST) → (UP27)	PI ␣ (a), (b) <terminator>
Data flow for data read (HOST) → (UP27)	PI <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	PI ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Measured input bias (BS)	EUS	EU(–100%)S ~ EU(100%)S	EU(0%)
b	Measured input filter (FL)	sec	0:OFF and 1 to 120	0

7.4.53 P2 Command

P2

Command having the function to set (change) and read the values of target set point (TSP) parameters.

Used with	UP27
Data flow for data set (HOST) → (UP27)	P2 ␣ (a), (b), (c), (d) <terminator>
Data flow for data read (HOST) → (UP27)	P2 <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	P2 ␣ a, b, c, d <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Maximum setting value	–	EU(0%)≤b<a≤ EU(100%)	EU(100%)
b	Minimum setting value	–		EU(0%)
c	SP tracking	–	*1	0
d	Time units of gradient	–	*2	0

*1 0: OFF
1: ON
*2 0: hr:min
1: min:sec

7.4.54 P3 Command

P3

Command having the function to set (change) and read the values of control output parameters.

Used with	UP27
Data flow for data set (HOST) → (UP27)	P3 ␣ (a), (b), (c), (d), (e), (f) <terminator> Note: A comma "," should be inserted before (a).
Data flow for data read (HOST) → (UP27)	P3 <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	P3 ␣ –*1, a, b, c, d, e, f, <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Direct/reverse action	–	0: reverse 1 : Direct	0
b	Output rate -of - change limit	%/ sec	*2	0(OFF)
c	Preset output value	%	–5.0 ~ 105.0	0.0
d	Restart code	–	*3	0
e	Cycle time	sec	1 ~ 240	30
f	DI selection*4	–	0, 1, 2, 3, 4	0

*1 In the response data, P3␣ is always followed by a dummy data "–".
*2 0 (OFF), 0.1 to 100.0%
*3 0: continued, 1: MAN (Preset out put), 2: Continued (Preset output)
*4 Refer to the instruction manual "IM 4P2F5 -02E".
See the **"Note" in Section 7.3 "Data Set Command, Data Read Command".**

7.4.55 P4 Command

P4

Command having the function to set (change) and read the values of retransmission output parameters and event type parameters.

Used with	UP27
Data flow for data set (HOST) → (UP27)	P4 ␣ (a), (b), (c), (d), (e) <terminator>
Data flow for data read (HOST) → (UP27)	P4 <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	P4 ␣ a, b, c, d, e <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	retransmission output selection	–	0, 1, 2, 3, 4*1	0
b	Retransmission range max. value	EU	EU(0%) c<b	EU(100%)
c	Retransmission range min. value	EU	EU(100%)	EU(0%)
d	PVE 9 hysteresis*2	EUS	EU (0%)S ~ EU (100%)S	EU(0.5%)S
e	PVE 10 hysteresis*2	EUS		

*1 Valid only when /RET specified (for description of options, see "IM 4P2F5 -02E").
*2 PVE 9: PV Event 1 PVE 10: PV Event 2

7.4.56 DV Command

DV

Command having the function to enable the host to identify the type of the partner device with which communication is currently in progress. When a UP27 receives this command, it responds to the host with "UP27".

Used with	UP27
Data flow for data set (HOST) → (UP27)	This command has no data setting function.
Data flow for data read (HOST) → (UP27)	DV <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	DV ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Device code	–	UP27	UP27

7.4.57 PG Command

PG

Command having the function to set (change) and read the values of pattern setting parameters.

Note: PG command is not accepted while defining program patterns by key operations. At this time, the UP27 responds to the host with "PG␣NOP <terminator>".

Used with	UP27
Data flow for data set (HOST) → (UP27)	PG ␣ (a), (b), (c), (d), (e), (f), (g), (h), (i), (j), (k), (l), (m), (n), (o), (p) <terminator>
Data flow for data read (HOST) → (UP27)	PG <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	PG ␣ a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
	See the table on page 54.			

Note: These parameter items can not be set unless a pattern No. and segment No. are previously selected by using PP command.

Table of parameter items

Code	Item	Unit	Data range	Initial value
a	Target set point	EU	EU (0%) ~ EU (100%)	–
b	Segment time	sec	0 ~ 5999 (Note)	–
c	Event type 1	–	0: OFF, 1 ~ 4 (TME), 9, 10 (PVE)*1	0
d	EVA 1	–	ON time or PV event type*2	0
e	EVB 1	–	OFF time or PV event set point*3	EU (0%)
f	Event type 2	–	*1	0
g	EVA 2	–	*2	0
h	EVB 2	–	*3	EU (0%)
i	Event type 3	–	*1	0
j	EVA 3	–	*2	0
k	EVB 3	–	*3	EU (0%)
l	Event type 4	–	*1	0
m	EVA 4	–	*2	0
n	EVB 4	–	*3	EU (0%)
o	Junction code	–	0 ~ 3	0
p	PID No.	–	1 ~ 4	1

(Note) 0 to 5999 sec (0:00 to 99:59 (min:sec))
Each of *1, *2 and *3 means the same content.

7.4.58 PP Command

PP Command having the function to set (change) and read the program pattern No. and segment No.

Note: PP command is not accepted while defining program patterns using key operation. At this time, the UP27 responds to the host with "PP␣NOP <terminator>".

Used with	UP27
Data flow for data set (HOST) → (UP27)	PP ␣ (a), (b) <terminator>
Data flow for data read (HOST) → (UP27)	PP <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	PP ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Program pattern No.	–	0 (lock), 1 to 15*1	0
b	Segment No.	–	1 ~ 60	1

*1 When specifying a value within 1 to 15, program patterns can not be defined using key operation.

Note: When the program pattern setting is complete, send "PP_0 <terminator>" to the UP27 and put the UP27 in program pattern setting lock status. (Otherwise, program pattern setting with keys is disabled.)

7.4.59 PE Command

PE Command having the function to delete a specific pattern.

Note: PE command is not accepted while defining program patterns by key operation. At this time, the UP27 responds to the host with "PE␣NOP <terminator>".

Used with	UP27
Data flow for data set (HOST) → (UP27)	PE ␣ a <terminator> (↑ This data can not be omitted.)
Data flow for data read (HOST) → (UP27)	This command has no data read function.
Data flow in response to data set/ data read command (UP27) → (HOST)	PE ␣ a <terminator> PE ␣ NOP <terminator>*1

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Pattern No. to be deleted	–	Range of pattern Nos. already defined	–

*1 While the UP27 is performing program run or when there is no specified pattern No. to be deleted, the UP27 responds to the host with "PE␣NOP <terminator>" and deletion is not executed.

7.4.60 PC Command

PC Command having the function to make a copy of a specific pattern using another pattern No.

Note: PC command is not accepted while defining program patterns using key operation. At this time, the UP27 responds to the host with "PC␣NOP <terminator>".

Used with	UP27
Data flow for data set (HOST) → (UP27)	PC ␣ a, b <terminator> (└ This data can not be omitted.)
Data flow for data read (HOST) → (UP27)	This command has no data read function.
Data flow in response to data set/ data read command (UP27) → (HOST)	PC ␣ a, b <terminator> PC ␣ NOP <terminator> *1

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Source pattern No.	–	Range of pattern Nos. already	–
b	Destination pattern No.	–	1 ~ 15	1

*1 While the UP27 is performing program run or when there is no specified pattern No., the UP27 responds to the host with "PC␣NOP" and copy is not executed.

7.4.61 PN Command

PN Command having the function to set (change) up to 24 characters of a unique name (ASCII string) for a specific pattern and to read it.

Note: PN command is not accepted while defining program patterns using key operation. At this time, the UP27 responds to the host with "PN␣NOP <terminator>".

Used with	UP27
Data flow for data set (HOST) → (UP27)	PN ␣ a, b <terminator> (└ This data can not be omitted.)
Data flow for data read (HOST) → (UP27)	PN ␣ a <terminator> (└ This data can not be omitted.)
Data flow in response to data set/ data read command (UP27) → (HOST)	PN ␣ a, b <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Pattern No.	–	1 ~ 15	–
b	ASCII string of up to 24 characters	–	–	–

7.4.62 ST Command

ST Command having the function to set (change) and read the parameter values associated with the same pattern of repeated runs.

Note: ST command can be executed only when a pattern No. and segment No. are previously specified by using PP command. (This command must be used together with PP command.)

Used with	UP27
Data flow for data set (HOST) → (UP27)	ST ␣ (a), (b), (c), (d), (e), (f), (g) <terminator>
Data flow for data read (HOST) → (UP27)	ST <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	ST ␣ a, b, c, d, e, f, g <terminator> ST ␣ NOP <terminator> *1

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Start SP	EU	EU(0%)~EU(100%)	EU(0%)
b	Start code	–	0, 1, 2	0
c	Waiting time	sec	*2	0 (OFF)
d	Waiting zone	EUS	EU(0%)~EU(10%)	EU(0%)
e	Repeat cycle	time	*3	0
f	Repeat starting segment	–	1 ~ 60	1
g	Repeat ending segment	–	1 ~ 60	1

*1 When ST command is executed with pattern No. set to 0 (zero), the UP27 responds with "ST␣NOP <terminator>". (Data setting (change) is disabled.)
*2 0 (OFF), 0 to 5999 (sec) (00:00 to 99:59 (min:sec))
(When data is set or read out by means of communications, sec or min is used as time unit.)
*3 0 to 999 times, 1000: endless

7.4.63 SE Command

SE Command having the function to delete the segment of pattern No. and segment No. currently selected.

Note: SE command can be executed only when a pattern No. and segment No. are previously specified using PP command. (This command must be used together with PP command.)

Used with	UP27
Data flow for data set (HOST) → (UP27)	SE <terminator> (Note 1)
Data flow for data read (HOST) → (UP27)	This command has no data read function.
Data flow in response to data set/ data read command (UP27) → (HOST)	SE <terminator> SE ␣ NOP <terminator>*1

Table of parameter items.

Code	Item	Units	Data range	Initial value
	None			

(Note 1.) The specified segment is deleted by executing command string "SE <terminator>". (Note that there is no data read function in this command string.)

*1 When SE command is executed with pattern No. set to 0, the UP27 responds with "SE␣NOP <terminator>". (The segment can not be deleted.)

7.4.64 SI Command

SI Command having the function to insert (add) the current segment after the segment of pattern No. and segment No. currently selected.

Note: SI command can be executed only when a pattern No. and segment No. are previously specified using PP command. (This command must be used together with PP command.)

Used with	UP27
Data flow for data set (HOST) → (UP27)	SI <terminator> (Note 1)
Data flow for data read (HOST) → (UP27)	This command has no data read function.
Data flow in response to data set/ data read command (UP27) → (HOST)	SI <terminator> SI ␣ NOP <terminator> *1

Table of parameter items.

Code	Item	Units	Data range	Initial value
	None			

(Note 1.) The current segment is inserted by executing command string "SI <terminator>". (Note that there is no data read function in this command string.)

*1 When SI command is executed with pattern No. set to 0, the UP27 responds with "SI␣NOP <terminator>". (The segment can not be inserted.)

7.4.65 TS Command

TS Command having the function to read the number of the remaining segments whose patterns are not currently defined [192 - (total segments whose patterns are currently defined)].

Used with	UP27
Data flow for data set (HOST) → (UP27)	This command has no data setting function.
Data flow for data read (HOST) → (UP27)	TS <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	TS ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Number of remaining segments	–	0 ~ 192	192

7.4.66 PS Command

PS ␣ a Command having the function to read the number of the segments which belong to the specified pattern.

"a" is pattern No.

Used with	UP27
Data flow for data set (HOST) → (UP27)	This command has no data setting function.
Data flow for data read (HOST) → (UP27)	PS ␣ a <terminator> *1 Pattern No. can not be omitted
Data flow in response to data set/ data read command (UP27) → (HOST)	PS ␣ a, b <terminator> PS ␣ NOP <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	Pattern No.	–	1 ~ 16	–
b	Number of segments	pc.	1 ~ 60	–

*1 PS command must be used together with a parameter "a" specifing program pattern No.

7.4.67 NA Command

NA Command having the function to set (change) up to 24 characters of a unique name (ASCII Sting) for a parameter setting data and to read it.

Used with	UP27
Data flow for data set (HOST) → (UP27)	NA ␣ (a)<terminator>
Data flow for data read (HOST) → (UP27)	NA <terminator>
Data flow in response to data set/ data read command (UP27) → (HOST)	NA ␣ a <terminator>

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	ASCII string of UP to 24 characters	–	–	–

Note: Use PN command when program pattern requires name.

7.4.68 OT Command

OT

Command having the function to set (change) and read the values of the parameter for the RJC function.

Used with	UT37, UT38
Data flow for data set (HOST) → (UT37/38)	OT␣a〈terminator〉
Data flow for data read (HOST) → (UT37/38)	OT〈terminator〉
Data flow in response to data set/ data read command (UT37/38) → (HOST)	OT␣−,a,−,−,−〈terminator〉

Table of parameter items.

Code	Item	Units	Data range	Initial value
a	RJC ON/OFF		ON or OFF *1	ON

*1 0: OFF
1: ON

8. COORDINATED OPERATION

"Coordinated operation" mean the function of a maximum of 16 UT37 units connected to a UP27 unit, which is a key station, via communications (/RS-422 needs to be specified) being run using program patterns. (No special software is required for coordinated operatwo.)

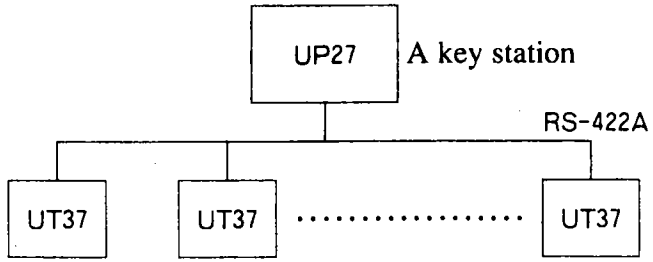
8.1 Functions Executable by coordinated operation

When performing coordinated operation the UP27 sends data required for program pattern runs (see Table 8-1) to the UT37 specified as a communication partner at control interval of 200 ms.

In this way, the UP27 performs the following for UT37s:

① Transmits set point (SP) to UT37s without an error
② Permits UT37s to execute program pattern runs provided with a SUPER function (when SC is ON)
③ Switches run mode of UT37s (STOP/RUN) according to UP27 status (RESET/PROGRAM/LOCAL).
④ Switches PID parameters on zone basis.

Block Diagram of Coordinated Operation



A maximum of 16 UT37 units can be connected to one UP27 unit.

— Table 8-1 —

Communication data sent from UP27 to UT37 units	
Set point (SP)	Current SP value
SUPER function ON/OFF flag	Data activating (turning ON/OFF) a SUPER function
TSP (target set point)	
STOP/RUN (operation mode)	0 (STOP) : RESET 1 (SUN) : PROGRAM/LOCAL
PID No.	O (Fixed)
Error check data	Sum check (two digits of ASCII code)

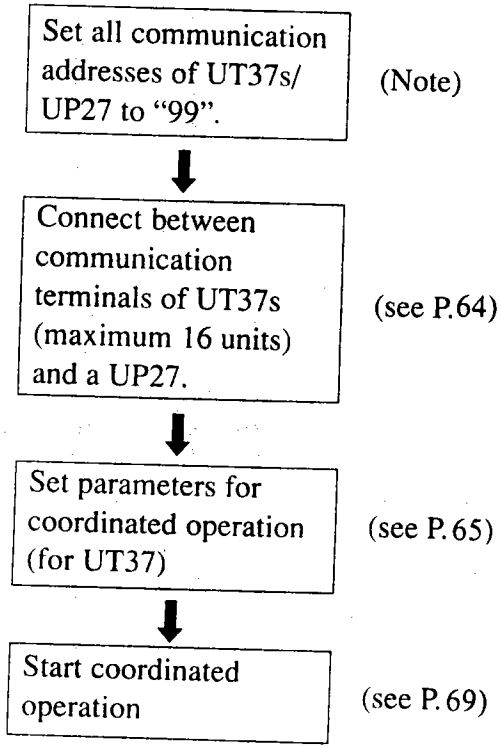
8.2 Communication Specification for Coordinated Operation

Communication rate	9600 BPS	*1
Start bit length	1bit	*1
Data length	7bit	*1
Parity	Odd number	*1
Stop bit length	1bit	*1
Communication address	99 (must be specified)	*2

*1 The above parameter values are used for coordinated operation (They are independent of communication parameter values set for UT37s and UP27.)

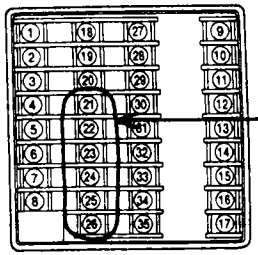
*2 The identical communication address "99" should be assigned to all UT37s and a UP27 for coordinated operation

8.3 Preparations for Starting coordinated operation



(Note)
- Assign the identical communication address "99" to all UT37s (maximum 16 units) as well as a UP27.
- Concurrent data communication with a personal computer through RS-422A interface is disabled during coordinated operation

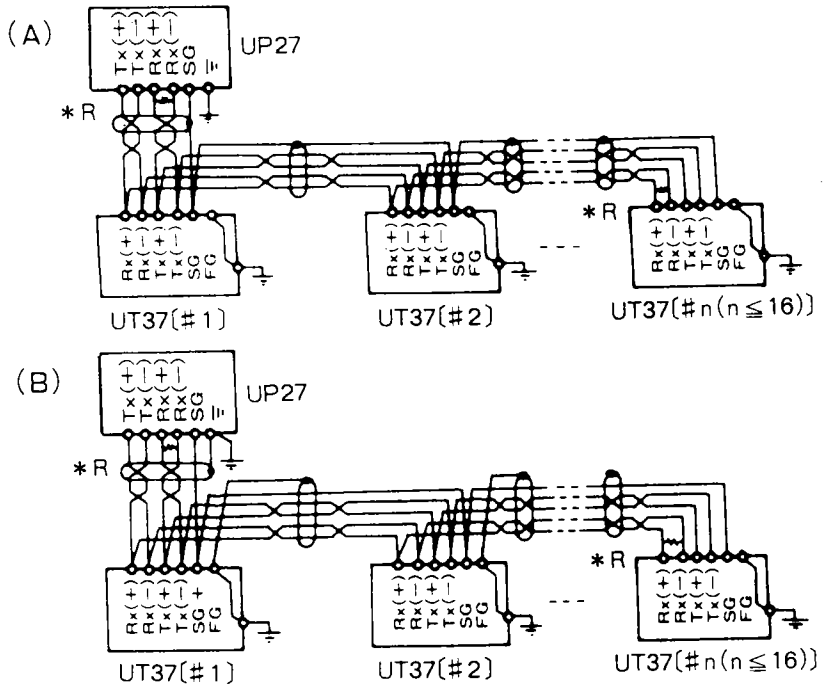
8.4 Communication Terminals and Their Connections



For both UT37 and UP27, terminals <21> to <26> are used for connections (for /RS-422).

⚠WARNING
To avoid electric shock, never touch the power supply terminals, control output terminals, and alarm output terminals when the power is on.
Carry out protective grounding to avoid electric shock.

The following (A) and (B) are examples of the connection methods. They are electrically equivalent and either method may be used. (However, method (B) should be used for connections between different panels.)



*R Terminal resistance 100Ω1/2W minimum

8.5 PID Parameters for coordinated operation

When assigned "99" as a communication address in the cooperative runs, the UT37s have four sets of PID parameters as operation parameters.

(Note 1.) Operating parameters A1 to 2.SP, (1.)P to (1.)OL, and 2.P to 2. OL in the Table 8-2 are set and used usually (except when in coordinated operation). For description of these parameters, refer to the UT37 instruction manual "IM 5B4B7-02E"(and "IM 5B4B7-21E).

(Note 2) Parameters 1.RP, 2.RP and 3.P to RDV in Table 8-2 are set and used when in coordinated operation

(Note 3) For description of 1.RP, 2.RP and RDV, refer to the UP27 instruction manual "IM 4P2F5-02E"(and "IM 4P2F5-21E).

Table 8-2 (1/3)

Code	Item	Setting range	Value set at factory	User set value
A1	Alarm 1 setting value *1	• EU(−100%)~EU(100%) For measured value alarm • EU(−100%)S~EU(100%)S For deviation alarm • Failure diagnostic output (only A3) • Fail output (only A4)	EU(100%)	
A2	Alarm 2 setting value		EU(0%)	
A3	Alarm 3 setting value		EU(100%)	
A4	Alarm 4 setting value		EU(0%)	
RT	Ratio	0.000~9.999	1,000	
RBS	Remote bias	EU(−100%)S~EU(100%)S	EU(0%)S	
R/L	Remote/local mode switching	LOCAL or REM	LOCAL	
SC	Super ON/OFF	ON or OFF	OFF	
AT	Auto tuning ON/OFF	ON or OFF	OFF	
BS	Measured input bias	EU(−100.0%)S~EU(100.0%)	EU(0.0%)S	
UPR	SP up-ramp slope	OFF or EU(0%)S/T or M ~ EU(100%)S/T or M *2	OFF (No slope)	
DNR	SP down-ramp slope		OFF (No slope)	
DB	Dead Band (for UT38 only)	1.0~10.0%	3.0%	
RHY	Relay hysteresis (for UT38 only)	0.1~0.5%	0.5%	
1. SP	Set point	EU(0%)~EU(100%)	EU(0%)	
2. SP	The 2nd set point	EU(0%)~EU(100%)	EU(0%)	
3. SP	The 3rd set point	EU(0%)~EU(100%)	EU(0%)	
4. SP	The 4th set point	EU(0%)~EU(100%)	EU(0%)	

*1 When a timer function is used (for A1 only), data setting range is 00:00 to 99:59 (min:sec or hr:min).
*2 T:time, M:Minute (Specify T or M with parameter "TMU".)

Table 8-2 (2/3)

Code	Item	Setting range	Value set at factory	User set value
1.P	Proportional band	0.1~999.9%	5.0%	
1.I	Integral time	OFF or 1 to 6000 sec	240 sec	
1.D	Derivative time	OFF or 1 to 6000 sec	60 sec	
1.MR	Manual reset value	-5.0~105.0%	50.0%	
1.HY	ON/OFF control hysteresis	EU(0.0%)S ~ EU(100.0%)S	EU(0.5%)S	
1.OH	Output high limit value	-5.0 ≤ 1.0L < 1.0H ≤ 105.0%	100.0%	
1.OL	Output high limit value		0.0%	
1.RP	Reference point 1	EU(0%) ≤ 1.RP < 2.RP	EU(100%)	
2.P	Proportional band for the 2.SP	0.1~999.9%	5.0%	
2.I	Integral time for the 2.SP	OFF or 1 to 6000 sec	240 sec	
2.D	Derivative time for the 2.SP	OFF or 1 to 6000 sec	60 sec	
2.MR	Manual reset value for the 2.SP	-5.0~105.0	50.0%	
2.HY	ON/OFF hysteresis for the 2.SP	EU (0.0%)S ~EU(100.0%)S	EU(0.5%)S	
2.OH	Output high limit value for the 2.SP	-5.0 ≤ 2.0L < 2.0H ≤ 105.0%	100.0%	
2.OL	Output high limit value for the 2.SP		0.0%	
2.RP	Reference point 2	1.PR < 2.RP ≤ EU(100%)	EU(100%)	

Table 8-2 (3/3)

Code	Item	Setting range	Value set at factory	User set value
3.P	Proportional band for the 3.SP	0.1~999.9%	5.0%	
3.I	Integral time for the 3.SP	OFF or 1 to 6000 sec	240 sec	
3.D	Derivative time for the 3.SP	OFF or 1 to 6000 sec	60 sec	
3.MR	Manual reset value for the 3.SP	-5.0 ~ 105.0%	50.0%	
3.HY	ON/OFF control hysteresis for the 3.SP	EU(0.0%)S ~ EU(100.0%)S	EU(0.5%)S	
3.OH	Output high limit value value for the 3.SP	-5.0 ≤ 3.0L < 3.0H ≤ 105.0%	100.0%	
3.OL	Output high limit value for the 3.SP		0.0%	
4.P	Proportional band for the 4.SP	0.1~999.9%	5.0%	
4.I	Integral time for the 4.SP	OFF or 1 to 6000 sec	240 sec	
4.D	Derivative time for the 4.SP	OFF or 1 to 6000 sec	60 sec	
4.MR	Manual reset value for the 4.SP	-5.0~105.0	50.0%	
4.HY	ON/OFF hysteresis for the 4.SP	EU (0.0%)S ~ EU(100.0%)S	EU(0.5%)S	
4.OH	Output high limit value for the 4.SP	-5.0 ≤ 4.0L < 4.0H ≤ 105.0%	100.0%	
4.OL	Output high limit value for the 4.SP		0.0%	
RDV	Reference point 2	EU (0.0%)S ~ EU(100.0%)S	EU(0%)S	

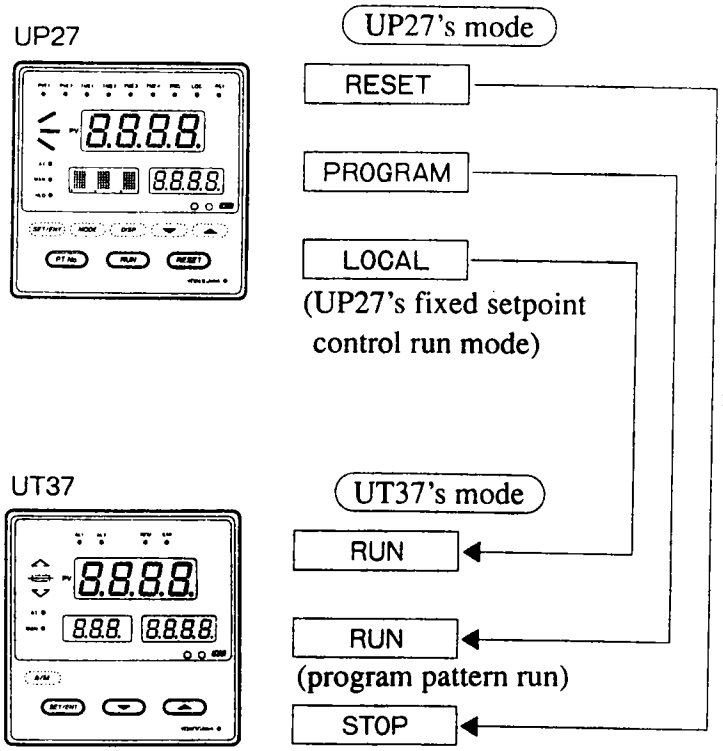
*2 EU(0%) means "no reference DV" (OFF).

8.6 Execution of Coordinated Operation

A UP27 and UT37s start coordinated operation by turning ON power supply, when preparations for starting coordinated operation (see Section 8.3) are complete. (Switch UT37s to REM mode.)

8.6.1 Operation (Run Mode Switching)

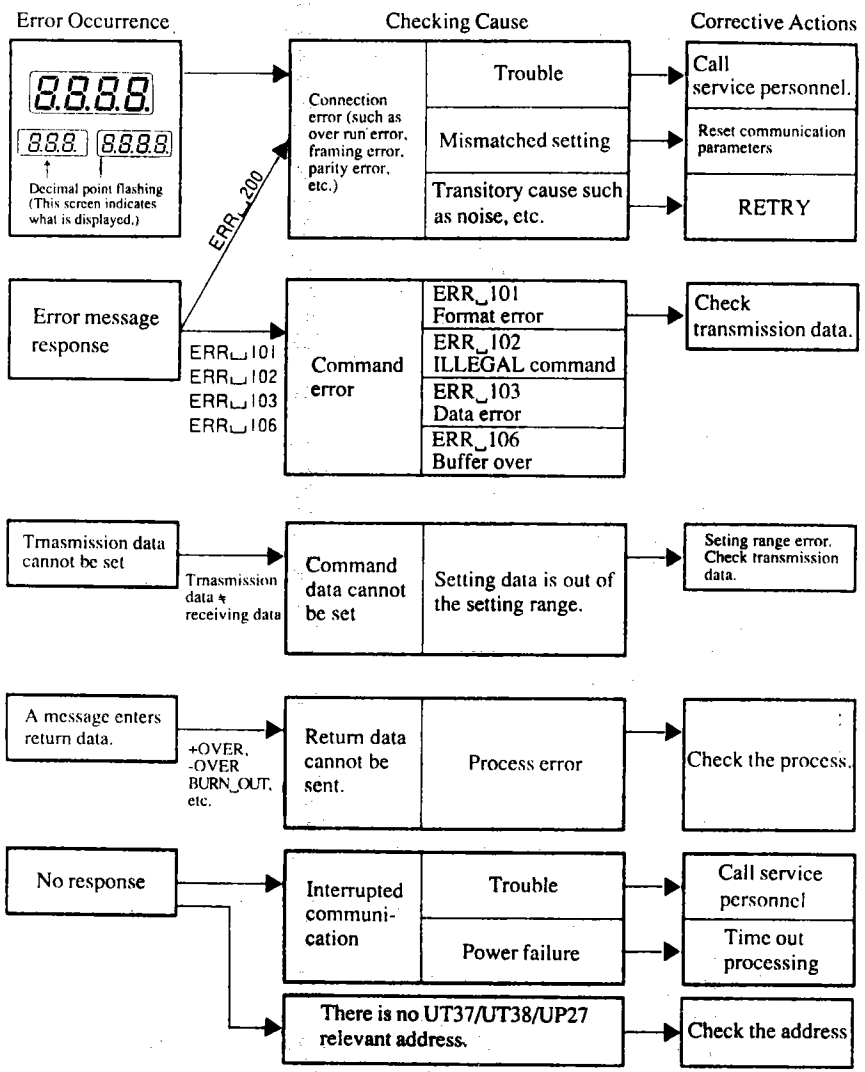
- When in the REM (remote) mode, a UT37's run mode is automatically switched according to the UP27's run mode switching.



(Note) ·Concerning a UT37's RUN/STOP status, when a UT37 is in STOP status because of closed external contact. It is impossible to permit the UP27 to release the UT37 from the STOP status and put it in the RUN status.

- When in the LOCAL mode, a UT37 performs its own original fix setpoint control run, independently of the UP27.

9. COMMUNICATION ERROR ORGANIZATION



9.1 Response to Communication Errors

Error display	Error item	Description
ERR ␣ 101	Format error	Received text is not correct
ERR ␣ 102	Illegal command	Command (2 characters) is undefined
ERR ␣ 103	Data error	Data format is not correct
ERR ␣ 106	Buffer over	Received text consists of 198 characters or more.
ERR ␣ 200	Communication error	Error such as parity error, framing error, etc. (when in communication open status only)

9.2 Response to Instrument Errors

Response data for DP command. (One of the following is sent in lieu of the PV data in the response.)

Error item	Response data
For + OVER	+ OVER
For - OVER	- OVER
For burnout	BURN_OUT
For RJC error	RJC_ERR appended immediately behind PV value
For A/D converter error	"E300" appended immediately behind PV value
For auto tuning error	"E200" appended immediately behind PV value

10. PROGRAMMING EXAMPLES

(1) Using HP9000 Series

```
1    |-----------------------------------------
2    |   UT/UP RS232C  TEST PROGRAM
4    |-----------------------------------------
5    DIM B$[255],D$[255]
90   CONTROL 9,3;9600
100  CONTROL 9,4;DVAL("000011",2)
120  D$=CHR$(27)&"O 01"
130  OUTPUT 9;D$
150  ENTER 9;B$
160  IF D$<>B$ THEN
161                 PRINT "ADDRESS ERROR"
170                 GOTO 290
180               ELSE
190                 PRINT B$
200  END IF
220  LINPUT "CMD=",D$
230  IF D$="END" THEN GOTO 280
240  OUTPUT 9;D$
250  ENTER 9;B$
260  PRINT B$
270  GOTO 220
280  D$=CHR$(27)&"C 01"
290  OUTPUT 9;D$
300  ENTER 9;B$
310  IF D$<>B$ THEN
311                 PRINT "ADDRESS ERROR"
320               ELSE
330                 PRINT "TEST END"
340  END IF
350  END
```

(2) Using YEWMAC500 (Built-in RS-232C)

```
100 DIM A$512,D$512
110 A$=CHR$(27)+"O 01"
120 OUTPUT 99,1;A$
130 ENTER 99,1;D$
140 PRINT D$
150  IF LEFT$(A$,4)<>LEFT$(D$,4) THEN PRINT "ADDRESS ERROR":GOTO 270
160 PRINT "CMD=";
170 LINPUT  A$
180 IF A$="END" THEN GOTO 230
190 OUTPUT 99,1 ;A$
200 ENTER 99,1;D$
210 PRINT D$
220 GOTO 160
230 A$=CHR$(27)+"C 01"
240 OUTPUT 99,1;A$
250 ENTER 99,1;D$
260 IF LEFT$(A$,4)<>LEFT$(D$,4) THEN PRINT "ADDRESS ERROR" ELSE PRINT "TEST E
    ND"
270 END
```

(3) Using IBM PC

```
10 '-----------------------------------------------------
20 ' IBM PC <--> UT/UP RS422(RS232C) TEST PROGRAM
30 '-----------------------------------------------------
40 DIM L$(80)
50 OPEN "COM1:9600,N,8,1,CS0,DS0" AS #1
60 A$=CHR$(27)+"O 01"
70 PRINT #1,A$
80 LINE INPUT #1,L$
90 IF MID$(L$,1,1)=CHR$(&HA) THEN L$=MID$(L$,2,80)
100 IF A$<>L$ THEN PRINT "ADDRESS ERROR":GOTO 240
110 PRINT L$
120 LINE INPUT "CMD=",C$
130 IF C$="END" THEN GOTO 190
140 PRINT #1,C$
150 LINE INPUT #1,L$
160 IF MID$(L$,1,1)=CHR$(&HA) THEN L$=MID$(L$,2,80)
170 PRINT L$
180 GOTO 120
190 A$=CHR$(27)+"C 01"
200 PRINT #1,A$
210 LINE INPUT #1,L$
220 IF MID$(L$,1,1)=CHR$(&HA) THEN L$=MID$(L$,2,80)
230 IF A$=L$ THEN PRINT "TEST END" ELSE PRINT "ADRESS ERROR"
240 CLOSE
250 END
```

(4) Using PC9801 (NEC)

```
1  '=====================================================
2  '
3  '
4  '     RS 422  TEST PROGRAM
5  '
6  '=====================================================
10 'SAVE "1:UTRSTST"
20  OPEN "COM:N81NN" AS #2
30  A$=CHR$(&H1B)+"O 01"
40  PRINT #2,A$
50  LINE INPUT #2,D$
60  IF A$<>D$ THEN PRINT "ADDRESS ERROR":GOTO 180
70  LINE INPUT "CMD=",C$
80  IF C$="END" THEN GOTO 130
90  PRINT #2,C$
100  LINE INPUT #2,D$
110 PRINT D$
120 GOTO 70
130 A$=CHR$(&H1B)+"C 01"
140 PRINT #2,A$
150 LINE INPUT #2,D$
160 IF A$<>D$ THEN PRINT "ADDRESS ERROR":GOTO 180
170 PRINT "TEST END"
180 CLOSE
190 END
```