User's
Manual

Ethernet Communication Functions

IM 05G01B52-01E

YOKOGAWA
Yokogawa Electric Corporation

IM 05G01B52-01E
4th Edition

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Introduction

This user's manual provides information necessary for using Ethernet communication functions and creating communication programs.

The UT351 and UT551 controllers with embedded Ethernet have the D registers storing parameter data and the like.

The UT351 and UT551 controllers with embedded Ethernet can communicate with a host device via the D registers.

You are required to have background knowledge on host devices to be connected to in order to understand the communication specifications, communication hardware, language used for creating communication programs of host devices, and so on.

■ Intended Readers

This manual is intended for people familiar with the functions of the UT351 and UT551 controllers with embedded Ethernet such as control engineers and personnel in charge of the maintenance of instrumentation and control equipment.

■ Related Documents

The following user's manuals all relate to the communication functions of the UT351 and UT551 controllers with embedded Ethernet. Read them as necessary. The codes enclosed in parentheses are the document numbers.

- ***UT351-xA User's Manual***
  (IM 05D01D13-01E to 04E)

  Explains the basic operation of the UT351-xA controller.

  Supplied with the product.

- ***UT551 User's Manual***
  (IM 05D01C03-01E to 06E)

  Explains the basic operation of the UT551 controller.

  Supplied with the product.

- ***Ethernet Communication Functions User's Manual (This manual)***
  (IM 05G01B52-01E)

  Provides detailed information about the Ethernet communication functions, communication protocol and D registers.

  Sold separately.

Documentation Conventions

■ Symbols

NOTE

Draws attention to information that is essential for understanding the operation and/or features of the product.

NOTE

Draws attention to information that is essential for understanding the features of the product.

TIP

Gives additional information to complement the present topic.

See Also

Gives reference locations for further information on the topic.

■ Description of Displays

(1) Some of the representations of product displays shown in this manual may be exaggerated, simplified, or partially omitted for reasons of convenience when explaining them.

(2) Figures and illustrations representing the controller's displays may differ from the real displays in regard to the position and/or indicated characters (upper-case or lower-case, for example), to the extent that they do not impair a correct understanding of the functions and the proper operation and monitoring of the system.

Notices

■ Regarding This User's Manual

(1) This manual should be passed on to the end user. Keep at least one extra copy of the manual in a safe place.

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Ethernet Communication Functions

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1. Communications Overview

The UT351 and UT551 can be connected to an IEEE802.3-compliant network (10BASE-T/100BASE-TX) and are capable of exchanging data with host devices, such as personal computers or PLCs (sequencers), using the MODBUS/TCP protocol.

The UT351 and UT551 also have an RS485 communication interface and the Ethernet-serial gateway function that relays the communication data received via network to the serial communication terminals. With this function, other serial communication devices not equipped with a network function can be connected to a network.

Table 1.1 Ethernet Communication Interface Specification

Item	10BASE-T/100BASE-TX
Access Control	CSMA/CD
Transfer Rate	10Mbps/100Mbps
Max. Segment Length	100m Note 1
Max. Connecting Configuration	Cascade max. 4 level (10BASE-T), max. 2 level (100BASE-TX) Note 2
Communication System	TCP/IP
Data Form	Binary
Max. Number of Connection	2
Port Number	01F6h (hexadecimal) / 502 (decimal) (can be changed by setup parameter PRT)

Note 1 : The length between Hub and Module.
Note 2 : The number of cascade connections per Hub.

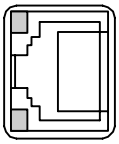
Table 1.2 RS485 Communication Interface Specification

Interface	Communication system	Communication rate	Other specifications	Protocol available
Standard RS485	4-wire, half-duplex	9600bps	Asynchronous (start-stop) Handshaking Maximum communication distance: 1200 m Maximum number of connectable devices: 31 Start bit: 1 bit Data length: 8 bits Parity: none, even, odd Stop bit: 1 bit	MODBUS/RTU communication

MAC address: The MAC address of the product is indicated on the nameplate attached to the upper side of the case body.

■ Ethernet Port

The UT351 and UT551 can detect 10BASE-T or 100BASE-TX automatically. The Ethernet port shows the status by LEDs.



Activity LED (upper side)	
Color	Meaning
Off	No Activity
Amber	Half-duplex
Green	Full-duplex
Link LED (lower side)	
Color	Meaning
Off	No Link
Amber	10 Mbps
Green	100 Mbps

Figure 1.1 Ethernet Port

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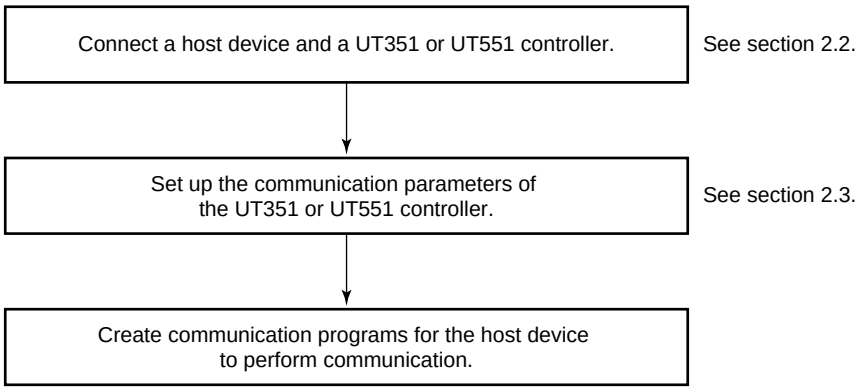
2. Setup

This chapter describes the procedure to set up the communication functions and also refers to some notes on wiring and communication parameters.

2.1 Setup Procedure

Set up the communication functions of the UT351 or UT551 as follows:



2.2 Wiring for Communication

2.2.1 Wiring for Ethernet Communication

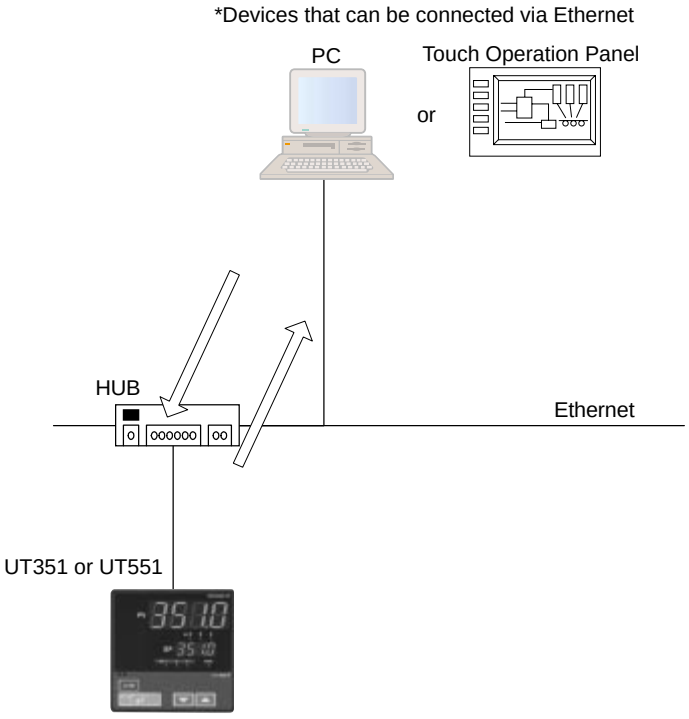
Connect the UT351 or UT551 and the host device using 10BASE-T/100BASE-TX for Ethernet communication. 10Base-T/100Base-TX are Ethernet connection methods using twisted-pair cables. The transmission rates are 10Mbps/100Mbps. In 10BASE-T/100BASE-TX networks, PCs and other host devices are connected in a star pattern through a hub.

NOTE

Be sure to turn all devices off before connecting the UT351 or UT551 and the host device to avoid possible electric shocks.

Use hubs and twisted-pair cables that conforms to the Ethernet specifications. Up to 4 segments for 10BASE-T or up to 2 segments for 100BASE-TX are allowed for cascade connections to the hub. The maximum allowable length of twisted-pair cables is 100 meters.

Read the user's manuals for the respective devices carefully before wiring.



2.2.2 Wiring for RS485 Communication

Connect the RS485 communication terminals and other RS485 serial communication device for using the Ethernet-serial gateway function.

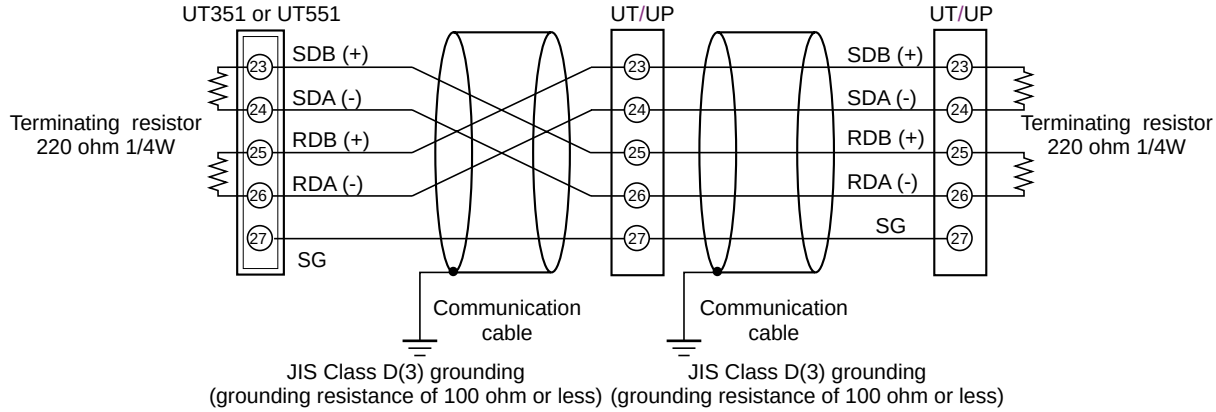
NOTE

Be sure to turn all devices off before connecting the UT351 or UT551 and the host device to avoid possible electric shocks.

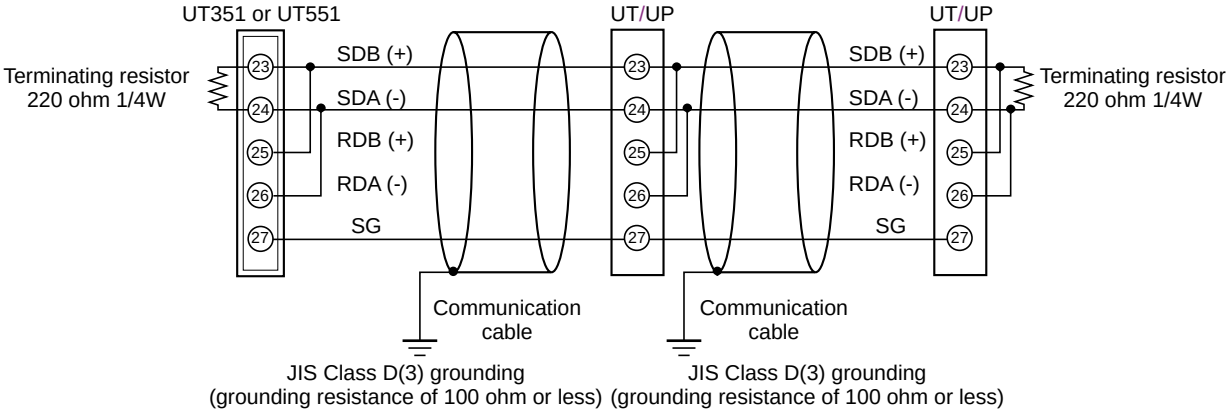
The figure below shows the example of wiring connection with the GREEN series controllers. If other devices are used for connection, the names of communication terminals and others may be different from those mentioned in the figure.

Read the user's manuals for the respective devices carefully before wiring.

Four-wire connection



Two-wire connection



2.3 Notes on Setting Communication Parameters

This section describes the parameters that set up the communication functions and their setting ranges.

Table 2.1 Communication Parameters

Parameter Name	Parameter Symbol	Setting Range	Default
High-speed Response Mode	HSR	0 to 8	1
Parity	PRI	0, 1, 2	1
IP Address	IP1	0 to 255	192
	IP2	0 to 255	168
	IP3	0 to 255	1
	IP4	0 to 255	1
Subnet Mask	SM1	0 to 255	255
	SM2	0 to 255	255
	SM3	0 to 255	255
	SM4	0 to 255	0
Default Gateway	DG1	0 to 255	0
	DG2	0 to 255	0
	DG3	0 to 255	0
	DG4	0 to 255	0
Port Number	PRT	01F6h(502), 0400h(1024) to FFFFh(65535)	01F6h(502)
Ethernet Setting Switch	ESW	0, 1	0

MAC address: The MAC address of the product is indicated on the nameplate attached to the upper side of the case body.

(1) High-speed Response Mode

Set the address of the device for which the Process data high-speed response function is used.

NOTE

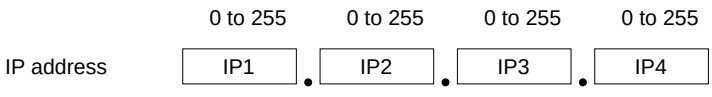
Refer to chapter 5, “Process Data High-speed Response Function” for the settings of high-speed response mode.

(2) Parity

Set the parity of RS485 communication to be connected to the Ethernet-serial gateway function.

(3) IP Address

Set the IP address for the UT351 or UT551 by the following format.



(4) Subnet Mask

Set the Subnet Mask for the UT351 or UT551 by the following format.

	0 to 255		0 to 255		0 to 255		0 to 255
Subnet Mask	SM1	.	SM2	.	SM3	.	SM4

(5) Default Gateway

Set the Default Gateway for the UT351 or UT551 by the following format.

	0 to 255		0 to 255		0 to 255		0 to 255
Default Gateway	DG1	.	DG2	.	DG3	.	DG4

NOTE

Before performing setup of IP address, subnet mask, and default gateway, consult the network administrator for the network to which the UT351 or UT551 is to be connected.

(6) Port Number

Generally, the MODBUS/TCP protcol communicates through port 01F6h in hexadecimal (502 in decimal). The port number can be changed within the range of 0400h (1024) to FFFFh (65535).

NOTE

To activate the settings of high-speed response mode, parity, IP address, subnet mask, default gateway, and port number set the Ethernet setting switch to ‘1’.

The settings are also activated by turning the UT351 or UT551 off and on.

(7) Ethernet Setting Swtich

This switch activates the communication parameters’ settings. Setting this parameter to ‘1’ activates the settings of high speed-response mode, parity, IP address, subnet mask, default gateway, and port number.

This parameter automatically reverts to ‘0’ after being set to ‘1’.

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3. MODBUS/TCP

3.1 Overview

MODBUS/TCP is one of the protocol used to communicate with devices such as general-purpose PCs, PLCs (sequencers), or touch operation panels using the TCP/IP protocol via Ethernet and other networks.

This communication protocol is used to perform read/write operations with the D registers in the UT351 or UT551 and exchange data with connected devices.

The UT351 or UT551 can be connected to IEEE802.3-compliant networks (10BASE-T/100BASE-TX). Generally, the MODBUS/TCP protocol communicates through port 502.

In addition, the UT351 and UT551 operate as Ethernet-serial gateway. A host device can exchange data with other serial communication devices using the MODBUS/TCP protocol via the UT351 or UT551.

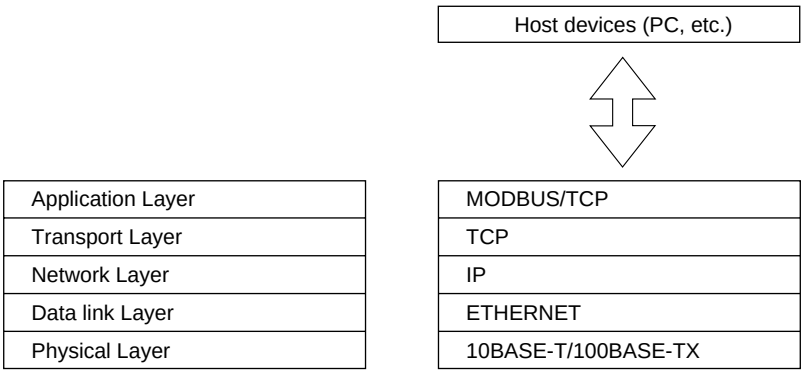


Figure 3.1 Network Layer

3.2 TCP/IP Communication

MODBUS/TCP communicates with other devices, following the procedure below, through the TCP/IP socket interface.

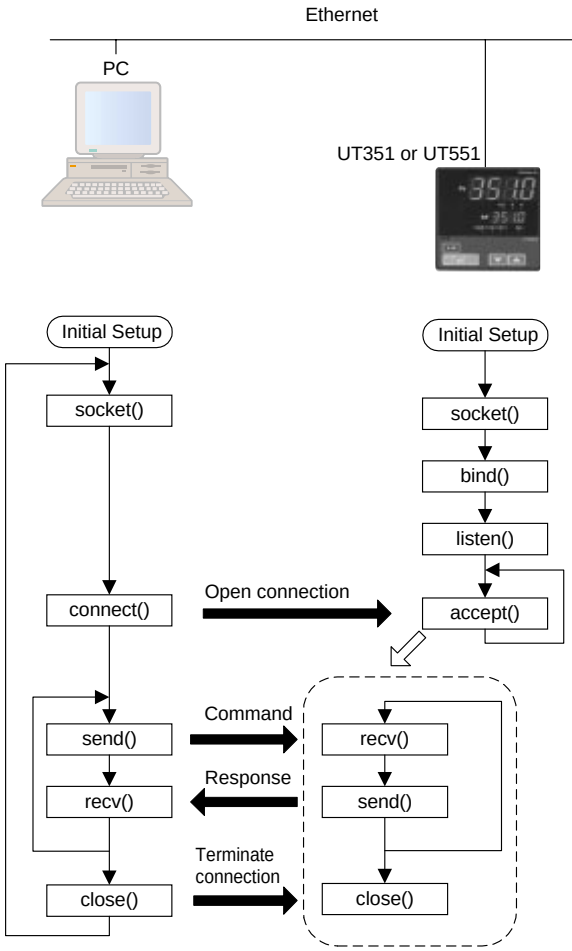


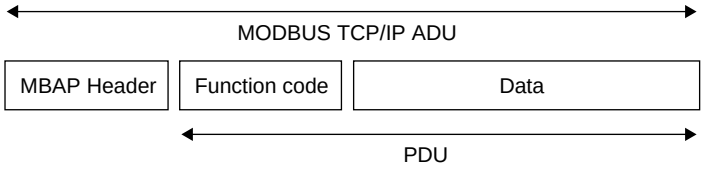
Figure 3.2 TCP/IP Communication

NOTE

If no request is received from the host device for more than 60 seconds after establishing a connection, the UT351 or UT551 will automatically terminate the connection.

3.3 Network Frame Structure

The MODBUS/TCP frame structure is as follows:



MBAP Header (MODBUS Application Protocol Header) : Header used to identify the MODBUS/TCP protocol
PDU (Simple Protocol Unit): Body of the data communication

3.3.1 MBAP Header Structure

The MBAP Header (MODBUS Application Protocol Header) consists of the following seven bytes.

Byte No	0	1	2	3	4	5	6
Description	Transaction ID		Protocol ID		Number of bytes		Unit ID

Transaction ID: The host device specifies an arbitrary value to identify a transaction. The UT351 or UT551 returns the value it received from the host device as its response.
Protocol ID: This parameter is set to '0' to indicate the MODBUS/TCP protocol.
Number of bytes: The number of bytes from the Unit ID (byte number 6) byte on.
Unit ID: For the communication with the UT351 or UT551 itself, specify "1" for the host device. The UT351 or UT551 returns '1' as its response. For the communication with the device connected to the RS485 communication terminals of the UT351 or UT551 using the Ethernet-serial gateway function, specify its communication address (2 to 99). The device returns the same value as its response.

3.3.2 PDU Structure

The PDU (Simple Protocol Unit) consists of the following *n* bytes.

Byte No	0	1 to (n-1)
Description	Function code	Data

Function code: The command specified from the host device
Data: Depending on the function code, D register addresses, the number of individual D registers, or parameter values are specified in this position.

3.4 Communication with Host Devices

Follow the procedures below to specify a D register from a host device:

(1) If using an off-the-shelf SCADA or the like, specify the Ref No. indicated in chapter 6, “Functions and Usage of D Registers.”

(2) For custom-made communication programs, specify the H No. indicated in chapter 6, “Functions and Usage of D Registers.”

Example: To specify ‘D0301’ as the target setpoint,

*Specify Ref. No. ‘40301’ for a request using an off-the-shelf SCADA or the like.

*Specify H No. ‘012C’ for a request using a custom-made communication program.

3.4.1 List of Function Codes

The codes in the following list are command words host devices use to acquire information from the internal registers (D registers) of the UT351 or UT551.

Code number	Function	Description
03	Reads data from multiple D registers	Capable of reading data from up to 64 successive registers
06	Writes data to D registers	Capable of writing data to only one register
08	Performs a loop back test	See subsection 3.4.2
16	Writes data to multiple D registers	Capable of writing data to up to 32 successive registers

Codes 06 and 16 cannot write to read-only or use-prohibited registers.

3.4.2 Function Codes

03 Reads data from multiple D registers.

● Function

This function code reads the contents of successive D registers by the specified number starting at a specified D registers number.

- The maximum number of D registers to be read at a time is 64.
- For the format of responses in the event of failure, see subsection 3.4.3.

● Request (normal): Reading data from n registers

Element	MBAP Header				PDU		
Number of bytes	2	2	2	1	1	2	2
Command element	Transaction ID	Protocol ID	Number of bytes	Unit ID	Function code	Register start number	Number of registers
Hex value	Arbitrary	0000	0006	01 to 99	03		n

● Response (normal)

Element	MBAP Header				PDU				
Number of bytes	2	2	2	1	1	1	2		2
Command element	Transaction ID	Protocol ID	Number of bytes	Unit ID	Function code	Byte count	Content of Register 1	••••	Number of registers
Hex value	Arbitrary	0000	2n+1	01 to 99	03	2n			

● Example: Reading alarm registers 1 to 4 from the UT351.

[Request] 123400000006010303920004

(1) (2) (3) (4) (5) (6) (7)

(1) [1234]: Arbitrary two-byte data (2) [0000]: Protocol ID=0000 (fixed)
(3) [0006]: Number of bytes (4) [01]: Unit ID=01 (UT351)
(5) [03]: Function code=03 (6) [0392]: D register address=0915
(7) [0004]: Number of D registers=4

The following response is returned for the request above.

[Response] 1234000000B01030800000001000100000

(1) (2) (3) (4) (5) (6) Alarm1 Alarm 2 Alarm 3 Alarm 4

(1) [1234]: The request's arbitrary two-byte data
(2) [0000]: Protocol ID=0000 (fixed)
(3) [000B]: Number of bytes
(4) [01]: Unit ID=01 (UT351)
(5) [03]: Function code=03
(6) [08]: Byte count

16 Writes data to multiple D registers.

● Function

This function code writes data to successive D registers by the number starting from a specified D registers number.

- The maximum number of Dregisters to be written to at the same time is 32.
- For the format of response in the event of failure, see subsection 3.4.3.

● Request (normal): Writing data to n registers

Element	MBAP Header				PDU		
Number of bytes	2	2	2	1	1	2	2
Command element	Transaction ID	Protocol ID	Number of bytes	Unit ID	Function code	Register start number	Number of registers
Hex value	Arbitrary	0000	2n+7	01 to 99	10		n

Continuation of request

PDU			
1	2		2
Byte count	Data 1	••••	Data n
2n			

● Response (normal)

Element	MBAP Header				PDU		
Number of bytes	2	2	2	1	1	2	2
Command element	Transaction ID	Protocol ID	Number of bytes	Unit ID	Function code	Register start number	Number of registers
Hex value	Arbitrary	0000	0006	01 to 99	10		n

● Example: Set the proportional band to 200, the integral time to 10, and the derivative time to 3 on the UT351.

[Request] 56780000000D0110014A00030600C8000A0003

(1) (2) (3) (4) (5) (6) (7) (8) Proportional band, Integral time, Derivative time

(1) [5678]: Arbitrary two-byte data
(2) [0000]: Protocol ID=0000 (fixed)
(3) [000D]: Number of bytes
(4) [01]: Unit ID=01 (UT351)
(5) [10]: Function code=16
(6) [014A]: First register address=0331
(7) [0003]: Number of registers=3
(8) [06]: Byte count; [00C8]: Value of the proportional band=200
*Numbers in the brackets are in hex.

The following response is returned for the request above.

[Response] 567800000006011 0014A0003

(1) (2) (3) (4) (5)

(1) [5678]: The request's arbitrary two-byte data
(2) [0000]: Protocol ID=0000 (fixed)
(3) [0006]: Number of bytes
(4) [01]: Unit ID=01 (UT351)
(5) [10]: Function code=16

06 Writes data to D registers.

● Function

This function code writes data to a specified D registers number.

- The maximum number of D registers to be written to at the same time is 1.
- For the format of response in the event of failure, see subsection 3.4.3.

● Request (normal)

Element	MBAP Header				PDU		
Number of bytes	2	2	2	1	1	2	2
Command element	Transaction ID	Protocol ID	Number of bytes	Unit ID	Function code	Register start number	Write data
Hex value	Arbitrary	0000	0006	01 to 99	06		

● Response (normal)

Element	MBAP Header				PDU		
Number of bytes	2	2	2	1	1	2	2
Command element	Transaction ID	Protocol ID	Number of bytes	Unit ID	Function code	Register start number	Write data
Hex value	Arbitrary	0000	0006	01 to 99	06		

● Example: Set 70.00 as the target setpoint of the UT351.

[Request] 9ABC00000006010601451B58

(1) (2) (3) (4) (5) (6) (7)

(1) [9ABC]: Arbitrary two-byte data
(2) [0000]: Protocol ID=0000 (fixed)
(3) [0006]: Number of bytes
(4) [01]: Unit ID=01 (UT351)
(5) [06]: Function code=06
(6) [0145]: D register address=0326
(7) [1B58]: Target setpoint=70.00

The following response is returned for the request above.

[Response] 9ABC00000006010601451B58

08 Performs a loop back test.

● Function

This function code is used to check connection for communication.

- For the format of response in the event of failure, see subsection 3.4.3.
- The “0000” shown below (marked with an asterisk *) are fixed.
- Any value can be selected for send data.

● Request (normal)

Element	MBAP Header				PDU		
Number of bytes	2	2	2	1	1	2	2
Command element	Transaction ID	Protocol ID	Number of bytes	Unit ID	Function code	0000*	Transmit data
Hex value	Arbitrary	0000	0006	01 to 99	08	0000	Arbitrary

● Response (normal)

Element	MBAP Header				PDU		
Number of bytes	2	2	2	1	1	2	2
Command element	Transaction ID	Protocol ID	Number of bytes	Unit ID	Function code	00000*	Transmit data
Hex value	Arbitrary	0000	0006	01 to 99	08	0000	Arbitrary

● Example: Send 1234h to the UT351 to check the communication connection.

[Request] DEF0000000060108000012 34

(1) (2) (3) (4) (5) (6)

(1) [DEF0]: Arbitrary two-byte data
(2) [0000]: Protocol ID=0000 (fixed)
(3) [0006]: Number of bytes
(4) [01]: Unit ID=01 (UT351)
(5) [08]: Function code=08
(6) [1234]: Transmit data
*Numbers in the brackets are in hex.

The following response is returned for the request above.

[Response] DEF0000000060108000012 34

3.4.3 Response Error Codes

● When a response is returned

If an inconsistency is found in a request's PDU, the UT351 or UT551 ignores the request and returns the following response.

Element	MBAP Header				PDU	
Number of bytes	2	2	2	1	1	1
Command element	Transaction ID	Protocol ID	Number of bytes	Unit ID	Function code	Error code
Hex value	Arbitrary	0000	03	01 to 99		

*The function code entered here is the request's function code (in hex) plus 80 (in hex).

● Response Error Codes

Error Code	Meaning	Cause
01	Function-code error	The specified function code does not exist.
02	Register-address error	The specified address is out of range.
03	Number-of-registers error	The number of registers specified is out of range.

● When a response is not returned

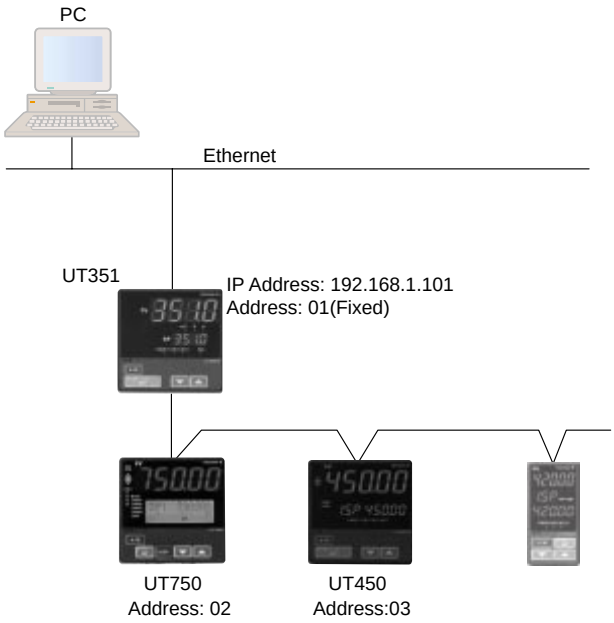
In the following cases, the UT351 or UT551 ignores the request and does not return a response.

- When no connection is established at the TCP/IP socket interface.
- When an inconsistency is found in a request's MBAP header.
- When the communication with the serial communication device specified in Unit ID is unusual.

*Set a timeout in the host device's communication function or communication program to avoid complications in these situations.

3.5 Example of Communication Program

This section describes an example of a program to upload the PV, Target setpoint and Control output of the UT750 connected to the RS485 serial communication line for which the UT351 or UT551 works as gateway, via LAN port of the personal computer by the following connection. In this example, connect the controller and send command by Connect/SendData method of Winsock control, and receive data by DataArrival event.



The following procedure is described using the real numbers and real character strings for explanation. Check error processing and retry processing in normal conditions are omitted. The program does not operate only this procedure. Please make it the reference at the time of actual application creation.

```
////////////////////////////////////////////////////////////////////////////////////////////
‘
‘_____________________________________________________________________________
‘Variable declaration
‘
Option Explicit
Dim strSendData As String      ‘Sending Data
Dim strReceive As String       ‘Received data
Dim binChrs(11) As Byte        ‘Store Binary data
Dim i As Integer               ‘Variable declaration
‘
‘_____________________________________________________________________________
Private Sub cmdSend1()
‘
‘Procedure to connect UT351 by TCP/IP and to create/send command for uploading data from UT351.
‘
‘
‘Variable declaration
‘
   Dim sChr2 As String
   Dim varChrs As String
‘
‘Set properties of Winsock control
‘
   Winsock1.Protocol = sckTCPProtoco1          ‘Set Protocol used for TCP connection
   Winsock1.RemoteHost = “192.168.1.101”       ‘Set IP Address of UT351
   Winsock1.RemotePort = 502                   ‘Set a port of UT351 (502 fixed for UT351)
‘
‘Request TCP connection of UT351
‘
   Winsock1.Connect                            ‘Request TCP connection
   Do Until Winsock1.State = sckConnected      ‘Wait for the completion of connection
      i = DoEvents()
   Loop
‘
‘Create sending data
‘
   ‘
   ‘Create command to upload data from UT351
   ‘ (D0003:PV, D0004:Target setpoint, D0005:Control output)
   ‘
   ‘
```

```
strSendData = "123400000006010300020003"    'Sending command character string

 '  Explanation of command character string
 '  1234  0000  0006  01  03  0002  0003
 '    |     |     |    |   |    |    +--------- Number of D register (3)
 '    |     |     |    |   |    +------------------ D register start number (D0003)
 '    |     |     |    |   +----------------------- Function code (03:Read data from multiple registers)
 '    |     |     |    +---------------------------- Device address of UT351 (Address:1)
 '    |     |     +---------------------------------- The number of sending data bytes after "RS485 side device address" (6 bytes)
 '    |     +------------------------------------------ Protocol ID (0000 fixed)
 '    +------------------------------------------------- Trasaction ID (1234:Arbitrary values of 2 bytes)
 '
 '
  varChrs = StrConv(strSendData, vbFromUnicode) 'To change sending command character string into binary data
  For i = 1 To 12                               'Change every two character strings into Unicode and arrange them to store in binChrs
    sChr2 = MidB(varChrs, 2 * i - 1, 2)
    binChrs(i - 1) = CByte("&H" & StrConv(sChr2, vbUnicode))
  Next i
'
'Send sending command binChrs to UT351
'
  Winsock1.SendData binChrs
'
End Sub
'______________________________________________________________________________
Private Sub cmdSend2()
'
'Procedure to connect UT351 by TCP/IP and to create send command for uploading data from UT750 connected
'to RS485 serial communication line for which UT351 works as serial gateway.
'
'
'Variable declaration
'
  Dim sChr2 As String
  Dim varChrs As String
'
'Set properties of Winsock control
'
  Winsock1.Protocol = sckTCPProtoco1          'Set Protocol used for TCP connection
  Winsock1.RemoteHost = "192.168.1.101"       'Set IP Address of UT351
  Winsock1.RemotePort = 502                   'Set a port of UT351 (502 fixed for UT351)
'
'Request TCP connection of UT351
'
  Winsock1.Connect                            'Request TCP connection
  Do Until Winsock1.State = sckConnected      'Wait for the completion of connection
    i = DoEvents()
  Loop
'
```

```
‘Create sending data
‘
  ‘
  ‘Create command to upload data from UT750
  ‘ (D0003:PV, D0004:Target setpoint, D0005:Control output)
  ‘
  ‘
  strSendData = “567800000006020300020003”    ‘Sending command character string
  ‘
  ‘  Explanation of command character string
  ‘  5678  0000  0006  02  03  0002  0003
  ‘     |      |      |     |    |     |       +------ Number of D registers (3)
  ‘     |      |      |     |    |     +-------------- D register start number (D0003)
  ‘     |      |      |     |    +-------------------- Function code (03:Read data from multiple registers)
  ‘     |      |      |     +------------------------- Device address of UT750 (Address:2)
  ‘     |      |      +------------------------------- The number of send data bytes after “RS485 side device address” (6 bytes)
  ‘     |      +---------------------------------------- Protocol ID (0000 fixed)
  ‘     +------------------------------------------------ Transaction ID (5678: Arbitrary values of 2 bytes)
  ‘
  ‘
  varChrs = StrConv(strSendData, vbFromUnicode) ‘To change sending command character string into binary data
  For i = 1 To 12                                          ‘Change every two character strings into Unicode and arrange them to store in binChrs
    sChr2 = MidB(varChrs, 2 * i - 1, 2)
    binChrs(i - 1) = CByte(“&H” & StrConv(sChr2, vbUnicode))
  Next i
‘
‘Send sending command binChrs to UT351
‘
  Winsock1.SendData binChrs
‘
End Sub
‘_____________________________________________________________________________________
Private Sub Winsock1_DataArrival(ByVal bytesTotal As Long)
‘
‘Receive data from UT351 by Data Arrival of Winsock and cut connection with UT351
‘
‘
‘Variable declaration
‘
  Dim strData() As Byte
  Dim strHex1 As String
  Dim strReceive As String
  Dim varReceive As String
‘
‘Receive data from UT351
‘
  Winsock1.GetData strData          ‘Get received data of Winsock1 control into strData
```

```
'
'Change received binary data strings to character strings
'
  '
  For i = 0 To bytesTotal - 1
    varReceive = varReceive & ChrB(strData(i))
  Next i
  '
  For i = 1 To LenB(varReceive)
    strHex1 = Right("0" & Hex(AscB(MidB(varReceive, i, 1))), 2)
    strReceive = strReceive & strHex1
  Next i
                    'Received data character strings are stored in strReceive
  '
  '  Explanation of character string strReceive received from UT351
  '  (By the device address in data (1 or 2), you can judge whether the received data is from UT351 (=1) or UT750 (=2).)
  '
  '  1234  0000  0009  01  03  06 0078 0096 0395
  '    |     |     |     |   |   |    |    |     |
  '    |     |     |     |   |   |    |    |     +------ D0005 register data (Control output value: 0395h=87.5%)
  '    |     |     |     |   |   |    |    +------------ D0004 register data (Target setpoint: 0096h=150 °C)
  '    |     |     |     |   |   |    +----------------- D0003 register data (PV: 0078h=120 °C)
  '    |     |     |     |   |   +---------------------- Data amount bytes (6 bytes)
  '    |     |     |     |   +-------------------------- Function code (03: Read data from multiple registers)
  '    |     |     |     +------------------------------ RS485 side device address (Address: 1 or 2)
  '    |     |     +-------------------------------------- The number of received data bytes after "RS485 side device address' (9 bytes)
  '    |     +------------------------------------------- Protocol ID (0000 fixed)
  '    +------------------------------------------------- Transaction ID (The same value of 2 bytes as the transaction ID
  '                                                        specified at the time of 1234 or 5678 command sending)
  '
'
'Cut TCP connection
'
  Winsock1.Close
'
End Sub
'
'_____
'
'////////////////////////////////////////////////////////////////////////////////////////////////////
```

4. Ethernet-Serial Gateway Function

4.1 Overview

The Ethernet-serial gateway function is a function that reads/writes data from/to other devices equipped with RS485 serial communication function using the MODBUS/TCP protocol via the UT351 or UT551.

With this function, the host device can access the devices connected to the RS485 serial communication line in the same way as to access the devices connected to Ethernet.

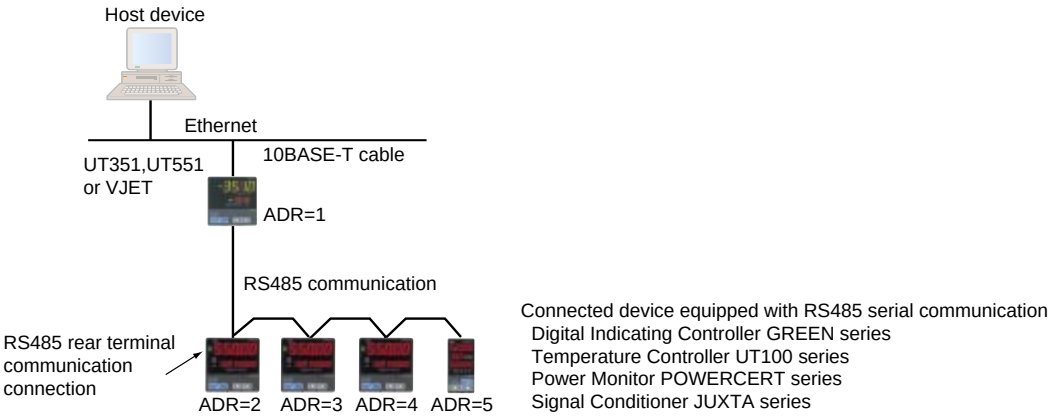


Figure 4.1 Connection for Ethernet-serial Gateway Function

UT351 and UT551 operate as a gateway that changes the MODBUS/TCP protocol received via network to the MODBUS/RTU protocol for the serial devices connected to the RS485 communication interface. Therefore, the devices supporting the MODBUS/RTU protocol are required for the devices to be connected.

NOTE

The RS485 communication interface of the UT351 and UT551 is exclusively for the Ethernet-serial gateway function.

PCs and other host devices cannot access the UT351 or UT551 through the RS485 communication interface.

4.2 Wiring for Communication with Serial Devices

For wiring, refer to subsection 2.2.2, “Wiring for RS485 Communication.” A maximum of 31 serial devices are connectable. Set a communication address (2 to 99) different from each other for each device.

NOTE

Do not set the communication address ‘1’ for other serial devices. The address ‘1’ is for the UT351 or UT551.

4.3 Setting for Serial Devices

Set the following communication conditions for the serial devices connected to the RS485 communication line.

Table 4.1 Communication Conditions

Communication Protocol	MODBUS/RTU
Baud Rate	9600bps
Parity	None, even, odd
Stop Bit	1
Data Length	8 bits
Communication Address	2 to 99

4.4 How to Access Serial Devices

Refer to section 3.3, “Network Frame Structure.”

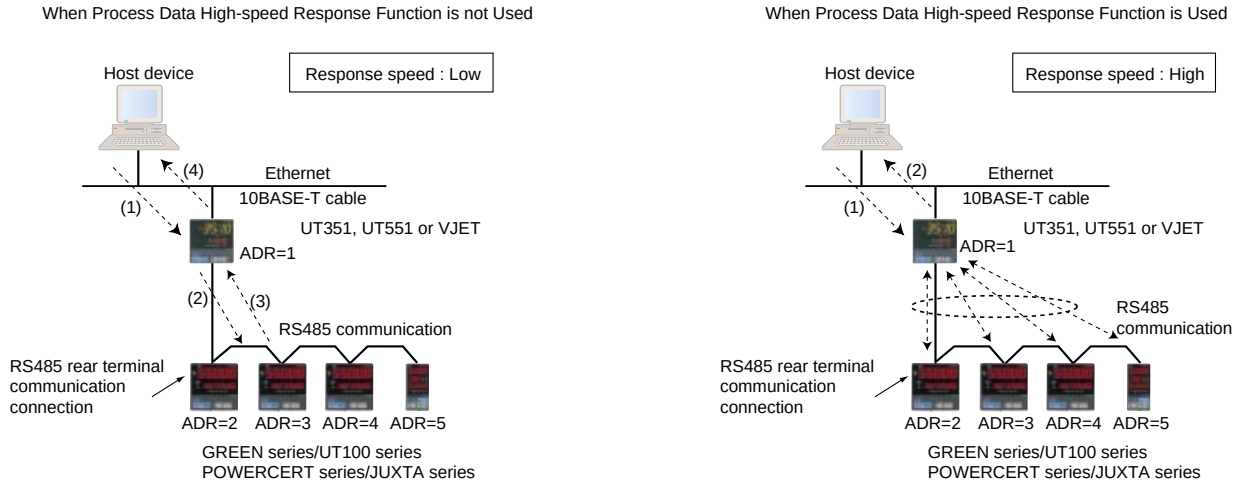
5. Process Data High-speed Response Function

5.1 Overview

The UT351 and UT551 have a function that reads periodically the process data from the UT351 and UT551 themselves and the process data from other serial devices connected to the RS485 serial communication line and stores them in the UT351 and UT551.

With this function, when process data read-out command is sent form the host device, the UT351 and UT551 can return the process data stored in themselves at high speed, without communicating with the serial devices one by one. This function is called the Process data high-speed response function.

The figure 5.1 shows the data flow when the host device reads process data in the case of not using / using the function.



(1) The host device sends the command to read the process data from the serial devices through the UT351 or UT551.
(2) The UT351 or UT551 sends the command to the serial devices using the Ethernet-serial gateway function.
(3) The serial devices return the process data.
(4) The UT351 or UT551 sends the received process data to the host device using the Ethernet-serial gateway function.

(1) The host device sends the command to read the process data from the serial devices through the UT351 or UT551.
(2) The UT351 or UT551 returns the process data of the serial devices stored in the UT351 or UT551 to the host device.

Figure 5.1 Flow at the Time of Process Data Read-out

The function can read periodically the process data from a maximum of 8 serial devices, store them in the UT351 and UT551 and return the response at high speed.

However, the function can be used for a maximum of 7 serial devices connected to the RS485 communication line because the serial communication address ‘1’ is for the UT351 or UT551.

NOTE

The period to read the process data from other serial devices cannot be specified. The UT351 and UT551 read the process data by the fastest automatically according to the number of serial devices for which the function is used.

NOTE

If the function is used for many serial devices, the process data from each serial device stored in the UT351 and UT551 may be delayed to the actual process. In this case, turn off the function.

5.2 How to Set the Function

Parameter HSR specifies the operation of the function.

Parameter Symbol	Name of Parameter	Setting Range and Description	Initial Value
HSr (HSR)	High-speed Response Mode	OFF: The process data high-speed response function is not used. 1: The process data of the device itself is returned as a response at high speed. 2 to 8: The process data of the device itself and the process data from the serial communication devices connected to the RS485 communication terminals are returned as a response at high speed. The maximum address of the serial devices is specified. Note: Set the continuous communication address which begins from "2" for other serial communication devices connected to the RS485 communication terminals. Note: After setting the parameter HSR, set the Ethernet setting switch ESW to "1" to activate the settings. If other parameters (Parity, IP address, subnet mask, default gateway or port number) are also changed, activate the settings at the end.	1

NOTE

A maximum of 31 serial devices are connectable to the RS485 communication line. Set the serial communication address (2 to 99) for each device so that the host device can access using the Ethernet-serial gateway function. However, the function can be used only for the serial devices with the continuous communication addresses from 2 to 8. Set the serial communication addresses from 2 to 8 for the serial devices for which the function is to be used.

5.3 Process Data for High-speed Response

The function treats from D0001 to D0025 map as process data in D register, regardless of the kind of the serial devices connected to the RS485 communication line.

The UT351 and UT551 read this data periodically from the serial devices for which the function is used and return a response at high speed to the command to read data from multiple registers in this category from the host device.

NOTE

For D register map, refer to user's manual of the connected instrument.

For D register map of UT351 and UT551, refer to chapter 6, "Functions and Usage of D Registers."

6. Functions and Usage of D Registers (for UT351)

6.1 Overview

This section explains the functions and usage of D registers.

D registers store parameter data, flag data and process data of the UT351 controller. You can readily use these internal data items by reading from or writing to the D registers.

You can use D registers to perform:

- **Centralized control using a host device**
- **Data exchange by reading/writing data from/to a host device**

6.2 Interpretation of D Register Tables

This section explains how to read the D Register Map tables in this chapter. The numbers listed in the leftmost column are D register numbers ((1) below). The five-digit numbers in the next column are reference numbers used for MODBUS/TCP communication ((2) below). The numbers in the column third from left are register numbers in hexadecimal notation used in MODBUS/TCP communication programs ((3) below). Each register code name in the D Register Map tables represents a specific process data item, operating parameter, setup parameter or other data items such as a flag. For details on the operating parameters and setup parameters, see the user's manual of UT351.

Name of D Register Map				
D-Reg No.	Ref No.	H No.	Register name	R/W
D0001	40001	0000	ADERROR	R

(1) D register number

(2) Reference number (for MODBUS/TCP communication)

(3) Hex number (for MODBUS/TCP communication program)

Permission of read/write by communication
An asterisk (*) in this column indicates that the number of writing actions is limited to 100,000.

■ Names of D Registers

The base names of some D registers are preceded by a combination of a number and then a period as shown in the format Y.xxxx. (Y: group number)

Examples:

- The name 3.SP means the SP of group 3.

6.3 Classification of D Registers

■ Classification of D Register Map Tables

The table below outlines how the D registers are classified by their numbers in the D Register Map tables.

Table 6.1 Classification of D Registers

Register No.	Area and data categories		Description	Reference
D0001 to D0049	Process data area (Note 1)	Data displayed for operation	PV, SP, OUT, and others	Section 6.4
D0050 to D0100	User area (Note 2), represented by shaded cells in the table	–	If a graphic panel is used, this area is used for communication with the touch operation panel.	Section 6.4
D0101 to D0200	Cannot be used.			
D0201 to D0230	Operating parameters (Note 1)	Operation mode parameters	A/M, MOUT, and others	Section 6.5
D0231 to D0300		Computation parameters	AT, SC, BS, FL, and others	Section 6.5
D0301 to D0500		PID parameters	P, I, D, and others	Section 6.6
D0501 to D0900	Cannot be used			
D0901 to D1000	Setup parameters (Note 1)	Control action parameters	TMU, ALM, C.MD and others	Section 6.7
D1001 to D1100		Common function, Ethernet communication parameters	RET, LOCK, IP1, IP2, and others	Section 6.7 Section 6.7
D1101 to D1200		SELECT display registration parameters	C.S and others	Section 6.7
D1201 to D1300		PV input and control output parameters	IN, OUT, BSL, and others	Section 6.8

Note 1: Data for process values, operating parameters and setup parameters are stored in the types (EU, EUS, %, or ABS without the decimal point) indicated in the Operating Parameter Lists and Setup Parameter Lists of the user's manual of UT351. The OFF and ON states are represented by 0 and 1, respectively. D registers D0001 to D0049 are read-only.

Note 2: When communicating with a touch operation panel, do not write to or read from this area (D0050 to D0100) because this area is reserved for 16-bit register data used by touch operation panels.

[See Also] Section 6.4, Process Data and User Area.

NOTE

It is prohibited to read/write data by communication from/to the registers of blank cells in the register map tables. If you attempt to do so, the UT351 may not operate properly.

6.4 Process Data and User Area

Area for process data									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0001	40001	0000	ADERROR	R	D0051	40051	0032		R/W
D0002	40002	0001	ERROR	R	D0052	40052	0033		R/W
D0003	40003	0002	PV	R	D0053	40053	0034		R/W
D0004	40004	0003	CSP	R	D0054	40054	0035		R/W
D0005	40005	0004	OUT	R	D0055	40055	0036		R/W
D0006	40006	0005	HOUT	R	D0056	40056	0037		R/W
D0007	40007	0006	COUT	R	D0057	40057	0038		R/W
D0008	40008	0007	MOD	R	D0058	40058	0039		R/W
D0009	40009	0008	PIDNO	R	D0059	40059	003A		R/W
D0010	40010	0009	CSPNO	R	D0060	40060	003B		R/W
D0011	40011	000A	ALM	R	D0061	40061	003C		R/W
D0012					D0062	40062	003D		R/W
D0013					D0063	40063	003E		R/W
D0014					D0064	40064	003F		R/W
D0015					D0065	40065	0040		R/W
D0016					D0066	40066	0041		R/W
D0017					D0067	40067	0042		R/W
D0018					D0068	40068	0043		R/W
D0019					D0069	40069	0044		R/W
D0020					D0070	40070	0045		R/W
D0021					D0071	40071	0046		R/W
D0022					D0072	40072	0047		R/W
D0023					D0073	40073	0048		R/W
D0024					D0074	40074	0049		R/W
D0025					D0075	40075	004A		R/W
D0026					D0076	40076	004B		R/W
D0027	40027	001A	OR	R	D0077	40077	004C		R/W
D0028					D0078	40078	004D		R/W
D0029					D0079	40079	004E		R/W
D0030					D0080	40080	004F		R/W
D0031					D0081	40081	0050		R/W
D0032					D0082	40082	0051		R/W
D0033					D0083	40083	0052		R/W
D0034					D0084	40084	0053		R/W
D0035	40035	0022	PARAERR	R	D0085	40085	0054		R/W
D0036					D0086	40086	0055		R/W
D0037					D0087	40087	0056		R/W
D0038					D0088	40088	0057		R/W
D0039					D0089	40089	0058		R/W
D0040					D0090	40090	0059		R/W
D0041					D0091	40091	005A		R/W
D0042					D0092	40092	005B		R/W
D0043					D0093	40093	005C		R/W
D0044					D0094	40094	005D		R/W
D0045					D0095	40095	005E		R/W
D0046					D0096	40096	005F		R/W
D0047					D0097	40097	0060		R/W
D0048					D0098	40098	0061		R/W
D0049					D0099	40099	0062		R/W
D0050	40050	0031		R/W	D0100	40100	0063		R/W

Shaded area : User area (You cannot use these registers when a touch operation panel is used.)

6.4.1 Process Data Area (Read-only)

Some of the registers in this area (D0001 to D0049, read-only) are designed to represent two or more events, such as errors and statuses, using combinations of bits within the register. If any of the events shown in the following tables occur, the corresponding bit is set to 1. The bit remains 0 if the event does not occur. Note that bits with blank fields in the tables are not in use.

● Bit Configuration of D0001: ADERROR (Input Error)

Bit	Code	Event
0	ADERR.st	Input A/D converter error
1 to 15		

● Bit Configuration of D0002: ERROR (PV Error)

Bit	Code	Event
0	PVADC.st	PV A/D converter error
1	PVBO.st	PV burnout error
2	RJCERR.st	PV RJC error
3		
4	PV+over.st	PV over-scale
5	PV-over.st	PV under-scale
6 to 13		
14	ATERR.st	Auto-tuning error
15		

● D0003: PV (Measured input value)

● D0004: CSP (Current target setpoint [SP])

● D0005: OUT (Control output value [OUT])

- During PID computation, you can read the computation result as is from this register. For example, when the computation result is 75.0%, the register contains a value of “750.”
- During on-off computation, the register contains “0” (0.0%) for the OFF state or “1000” (100.0%) for the ON state.
- During heating/cooling computation, this register contains the value of PID computation result.

● D0006: HOUT (Heating-side control output in Heating/Cooling Control)

- During heating/cooling computation, this register contains the heating-side control output value.

● D0007: COUT (Cooling-side control output in Heating/Cooling Control)

- During heating/cooling computation, this register contains the cooling-side control output value.

● Bit Configuration of D0008: MOD (Operation mode)

Bit	Code	Event
0	A/M.st	0: AUTO; 1: MAN
1		
2	S/R.st	0: RUN; 1: STOP
3 to 13		
14	AT.st	0: Auto-tuning is OFF; 1: Auto-tuning is ON
15		

● D0009: PIDNO (Current PID number)

Bit	Code	Event
0	PIDNO.0	Bit 0 of the current PID number
1	PIDNO.1	Bit 1 of the current PID number
2	PIDNO.2	Bit 2 of the current PID number
3	PIDNO.3	Bit 3 of the current PID number
4 to 15		

From this register, you can read the PID number currently in use in the form of a binary bit string. For example, the configuration of “bit 3 = off; bit 2 = on; bit 1 = off; bit 0 = off”, which is represented as “0100” in binary notation and as “4” in decimal notation, indicates that the PID number currently being used is 4.

● D0010: CSPNO (Current target-setpoint number)

Bit	Code	Event
0	CSPNO1.0	Bit 0 of CSP (current SP number)
1	CSPNO1.1	Bit 1 of CSP (current SP number)
2	CSPNO1.2	Bit 2 of CSP (current SP number)
3	CSPNO1.3	Bit 3 of CSP (current SP number)
4 to 15		

From this register, you can read the SP number of the currently used target setpoint in the form of a binary bit string. For example, the configuration of “bit 3 = off; bit 2 = on; bit 1 = off; bit 0 = off”, which is represented as “0100” in binary notation and as “4” in decimal notation, indicates that the target setpoint value of 4.SP is now being used.

● Bit Configuration of D0011: ALM (Alarm Status)

Bit	Code	Event
0	ALM1.st	‘1’ when alarm 1 is ON; ‘0’ when OFF
1	ALM2.st	‘1’ when alarm 2 is ON; ‘0’ when OFF
2	ALM3.st	‘1’ when alarm 3 is ON; ‘0’ when OFF
3 to 15		

[See Also] User’s Manual of UT351.

● Bit Configuration of D0027: OR (Moving average of sensor grounding alarm)

● Bit Configuration of D0035: PARAERR (Error in calibration values and parameters)

Bit	Code	Event
0	CALB.E.st	Calibration value error
1 to 5		
6	SETUP.st	Setup parameter error
7		
8	PARA.E.st	Operating parameter error
9	MODE.E.st	Error in power-failure backup data
10, 11		
12	EEP.E.st	EEPROM error
13		
14	SYSTEM.E.st	System data error
15		

6.4.2 User Area

Register No.	Category	Description
D0050 to D0100	User area	Users can read/write data from/to the registers in this area. However, if a touch operation panel is used in the system, users cannot use this area because it is reserved for communication with the touch operation panel.

6.5 Operation Mode and Computation Parameters

Area for Operation Mode and Computation Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0201	40201	00C8	A/M	*R/W	D0251	40251	00FA	ORH	*R/W
D0202					D0252	40252	00FB	ORL	*R/W
D0203					D0253				
D0204					D0254	40254	00FD	OH	*R/W
D0205	40205	00CC	S/R	*R/W	D0255	40255	00FE	OL	*R/W
D0206					D0256	40256	00FF	HYS	*R/W
D0207	40207	00CE	SPNO	*R/W	D0257	40257	0100	DR	*R/W
D0208					D0258	40258	0101	HB1	*R/W
D0209					D0259	40259	0102	HB2	*R/W
D0210					D0260				
D0211					D0261				
D0212					D0262				
D0213					D0263				
D0214					D0264				
D0215	40215	00D6	C.RSP	R/W	D0265				
D0216					D0266				
D0217	40217	00D8	MOUT	R/W	D0267				
D0218	40218	00D9	MOUTc	R/W	D0268				
D0219					D0269				
D0220					D0270				
D0221					D0271				
D0222					D0272				
D0223					D0273				
D0224					D0274				
D0225					D0275				
D0226					D0276				
D0227					D0277				
D0228					D0278				
D0229					D0279				
D0230					D0280				
D0231	40231	00E6	A1	*R/W	D0281				
D0232	40232	00E7	A2	*R/W	D0282				
D0233	40233	00E8	A3	*R/W	D0283				
D0234					D0284				
D0235					D0285				
D0236					D0286				
D0237	40237	00EC	PCCH	*R/W	D0287				
D0238	40238	00ED	PCCL	*R/W	D0288				
D0239					D0289				
D0240					D0290				
D0241	40241	00F0	AT	*R/W	D0291				
D0242	40242	00F1	SC	*R/W	D0292				
D0243	40243	00F2	BS	*R/W	D0293				
D0244	40244	00F3	FL	*R/W	D0294				
D0245	40245	00F4	UPR	*R/W	D0295				
D0246	40246	00F5	DNR	*R/W	D0296				
D0247					D0297				
D0248					D0298				
D0249					D0299				
D0250	40250	00F9	ORB	*R/W	D0300				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

6.5.1 Operation Mode Information

The mode registers listed below are designed to show, by the value contained, which mode is selected.

You can change the mode by writing a different mode to the register via communication.

● D0201: A/M (AUTO/MAN modes)

When D0201 = 0, the controller is in the AUTO (automatic) mode.

When D0201 = 1, the controller is in the MAN (manual) mode.

● D0205: S/R (STOP/RUN modes)

When D0205 = 0, the controller is in the RUN mode.

When D0205 = 1, the controller is in the STOP mode.

When the setup parameter DIS ≠ 4, writing via communication is possible.

The status of external contact input is held at power off.

When the setup parameter DIS = 4, writing via communication is impossible.

The status of external contact input is not held at power off. (Depending on external contact input at power on.)

6.5.2 Write-only Data Area

The registers listed below are write-only registers that are accessed by a host device.

For example, to set 150.0°C in the C.RSP register, write 1500 in the register.

D Register No.	Code	Description
D0215	C.RSP	Used to set SP.
D0217	MOUT	Used to set control output value or heating-side control output value in the MAN mode.
D0218	MOUTc	Used to set cooling-side control output value in the MAN mode.

■ Writing an SP Value

An SP value can be written via communication only when the operating parameter SP.NO (SP number selection) is set to “0.”

(1) Write the SP value into the C.RSP register.

(2) Set the SP number selection parameter SP.NO to “0.”

In this way, you can operate the controller to set SP values via communication.

■ Writing a Control Output Value in MAN Mode

You can write a control output value via communication only when the controller is in MAN mode.

(1) Set the controller to MAN mode.

(2) Write the control output value to MOUT or MOUTc register.

In this way, you can operate the controller in MAN mode to set control output values via communication.

6.5.3 Data Area for Computation Parameters

Register No.	Category	Description	Remarks
D0231 to D0233	Alarm setpoint parameters	A1 to A3: Alarm setpoints for alarm 1 to 3	For details on the parameters, see the User's Manual of UT351.
D0237, D0238	PV color change parameters	PCCH: High limit for PV color change PCCL: Low limit for PV color change	
D0241 to D0252	Computation parameters	AT: Auto-tuning selection SC: SUPER function selection BS: PV bias FL: PV filter UPR: Setpoint ramp-up rate DNR: Setpoint ramp-down rate ORB: ON/OFF rate detection band ORH: ON/OFF rate high-limit ORL: ON/OFF rate low-limit	

6.6 PID Parameters

Area for PID Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0301	40301	012C	1.SP	*R/W	D0351	40351	015E	3.SP	*R/W
D0302					D0352				
D0303					D0353				
D0304					D0354				
D0305					D0355				
D0306	40306	0131	1.P	*R/W	D0356	40356	0163	3.P	*R/W
D0307	40307	0132	1.I	*R/W	D0357	40357	0164	3.I	*R/W
D0308	40308	0133	1.D	*R/W	D0358	40358	0165	3.D	*R/W
D0309					D0359				
D0310					D0360				
D0311	40311	0136	1.MR	*R/W	D0361	40361	0168	3.MR	*R/W
D0312					D0362				
D0313					D0363				
D0314	40314	0139	1.Pc	*R/W	D0364	40364	016B	3.Pc	*R/W
D0315	40315	013A	1.Ic	*R/W	D0365	40365	016C	3.Ic	*R/W
D0316	40316	013B	1.Dc	*R/W	D0366	40366	016D	3.Dc	*R/W
D0317					D0367				
D0318	40318	013D	1.DB	*R/W	D0368	40368	016F	3.DB	*R/W
D0319	40319	013E	1.RP	*R/W	D0369				
D0320					D0370				
D0321					D0371				
D0322					D0372				
D0323					D0373				
D0324					D0374				
D0325					D0375				
D0326	40326	0145	2.SP	*R/W	D0376	40376	0177	4.SP	*R/W
D0327					D0377				
D0328					D0378				
D0329					D0379				
D0330					D0380				
D0331	40331	014A	2.P	*R/W	D0381	40381	017C	4.P	*R/W
D0332	40332	014B	2.I	*R/W	D0382	40382	017D	4.I	*R/W
D0333	40333	014C	2.D	*R/W	D0383	40383	017E	4.D	*R/W
D0334					D0384				
D0335					D0385				
D0336	40336	014F	2.MR	*R/W	D0386	40386	0181	4.MR	*R/W
D0337					D0387				
D0338					D0388				
D0339	40339	0152	2.Pc	*R/W	D0389	40389	0184	4.Pc	*R/W
D0340	40340	0153	2.Ic	*R/W	D0390	40390	0185	4.Ic	*R/W
D0341	40341	0154	2.Dc	*R/W	D0391	40391	0186	4.Dc	*R/W
D0342					D0392				
D0343	40343	0156	2.DB	*R/W	D0393	40393	0188	4.DB	*R/W
D0344	40344	0157	2.RP	*R/W					
D0345									
D0346									
D0347									
D0348									
D0349									
D0350					D0494	40494	01ED	RDV	*R/W

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

6.6.1 Data Area for PID Parameters

Register No.	Category	Description	Remarks
D0301 to D0319	Group-1 parameters	1.SP: Target setpoint 1.P: Proportional band 1.I: Integral time 1.D: Derivative time 1.MR: Manual reset 1.Pc: Cooling-side proportional band 1.Ic: Cooling-side integral time 1.Dc: Cooling-side derivative time 1.DB: Deadband 1.RP: Zone PID reference point	Selecting an SP number by means of communication enables a parameter group with the same number to be used. For example, if you set the SP number selection parameter (SPNO) to 2, the parameters from 2.SP through 2.RP are used. For details on the parameters, see the User's Manual of UT351.
D0326 to D0344	Group-2 parameters	The parameters from 2.SP to 2.RP are functionally the same as their corresponding group-1 parameters.	
D0351 to D0369	Group-3 parameters	The parameters from 3.SP to 3.DB are functionally the same as their corresponding group-1 parameters.	
D0376 to D0393	Group-4 parameters	The parameters from 4.SP to 4.DB are functionally the same as their corresponding group-1 parameters.	
D0494	PID switching parameter	RDV: zone PID reference deviation.	

6.7 Control Action, Common Function, Ethernet Communication, and SELECT Display Registration Parameters

Area for Control Action Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0901					D0951				
D0902					D0952				
D0903					D0953				
D0904	40904	0387	TMU	*R/W	D0954				
D0905					D0955				
D0906					D0956				
D0907					D0957				
D0908					D0958				
D0909					D0959				
D0910					D0960				
D0911					D0961				
D0912					D0962				
D0913					D0963				
D0914					D0964				
D0915	40915	0392	AL1	*R/W	D0965				
D0916	40916	0393	AL2	*R/W	D0966				
D0917	40917	0394	AL3	*R/W	D0967				
D0918					D0968				
D0919	40919	0396	HY1	*R/W	D0969				
D0920	40920	0397	HY2	*R/W	D0970				
D0921	40921	0398	HY3	*R/W	D0971				
D0922					D0972				
D0923					D0973				
D0924	40924	039B	PO	*R/W	D0974				
D0925	40925	039C	POc	*R/W	D0975				
D0926					D0976				
D0927	40927	039E	C.MD	*R/W	D0977				
D0928	40928	039F	AR	*R/W	D0978				
D0929	40929	03A0	ZON	*R/W	D0979				
D0930					D0980				
D0931					D0981				
D0932	40932	03A3	DIS	*R/W	D0982				
D0933	40933	03A4	SPH	*R/W	D0983				
D0934	40934	03A5	SPL	*R/W	D0984				
D0935	40935	03A6	DY1	*R/W	D0985				
D0936	40936	03A7	DY2	*R/W	D0986				
D0937	40937	03A8	DY3	*R/W	D0987				
D0938					D0988				
D0939					D0989				
D0940					D0990				
D0941					D0991				
D0942					D0992				
D0943					D0993				
D0944					D0994				
D0945					D0995				
D0946					D0996				
D0947					D0997				
D0948					D0998				
D0949					D0999				
D0950					D1000				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

Area for Common Function and Ethernet Communication Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D1001					D1051				
D1002					D1052				
D1003					D1053				
D1004					D1054				
D1005					D1055				
D1006					D1056				
D1007					D1057				
D1008					D1058				
D1009					D1059				
D1010					D1060				
D1011					D1061	41061	0424	IP1	*R/W
D1012					D1062	41062	0425	IP2	*R/W
D1013	41013	03F4	RET	*R/W	D1063	41063	0426	IP3	*R/W
D1014	41014	03F5	RTH	*R/W	D1064	41064	0427	IP4	*R/W
D1015	41015	03F6	RTL	*R/W	D1065	41065	0428	SM1	*R/W
D1016					D1066	41066	0429	SM2	*R/W
D1017					D1067	41067	042A	SM3	*R/W
D1018					D1068	41068	042B	SM4	*R/W
D1019					D1069	41069	042C	DG1	*R/W
D1020					D1070	41070	042D	DG2	*R/W
D1021					D1071	41071	042E	DG3	*R/W
D1022					D1072	41072	042F	DG4	*R/W
D1023					D1073	41073	0430	ESW	R/W
D1024					D1074				
D1025					D1075	41075	0432	PRT	*R/W
D1026					D1076				
D1027					D1077				
D1028					D1078				
D1029					D1079				
D1030					D1080				
D1031					D1081				
D1032					D1082				
D1033					D1083				
D1034					D1084				
D1035					D1085				
D1036	41036	040B	LOCK	R	D1086				
D1037	41037	040C	PCMD	*R/W	D1087				
D1038	41038	040D	ERJC	*R/W	D1088				
D1039					D1089				
D1040					D1090				
D1041	41041	040F	HSR	*R/W	D1091				
D1042					D1092				
D1043					D1093				
D1044					D1094				
D1045					D1095				
D1046					D1096				
D1047					D1097				
D1048					D1098				
D1049					D1099				
D1050					D1100				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

Area for SELECT Display Registration Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D1101	41101	044C	C.S1	*R/W	D1151				
D1102	41102	044D	C.S2	*R/W	D1152				
D1103	41103	044E	C.S3	*R/W	D1153				
D1104	41104	044F	C.S4	*R/W	D1154				
D1105					D1155				
D1106					D1156				
D1107					D1157				
D1108					D1158				
D1109					D1159				
D1110					D1160				
D1111					D1161				
D1112					D1162				
D1113					D1163				
D1114					D1164				
D1115					D1165				
D1116					D1166				
D1117					D1167				
D1118					D1168				
D1119					D1169				
D1120					D1170				
D1121					D1171				
D1122					D1172				
D1123					D1173				
D1124					D1174				
D1125					D1175				
D1126					D1176				
D1127					D1177				
D1128					D1178				
D1129					D1179				
D1130					D1180				
D1131					D1181				
D1132					D1182				
D1133					D1183				
D1134					D1184				
D1135					D1185				
D1136					D1186				
D1137					D1187				
D1138					D1188				
D1139					D1189				
D1140					D1190				
D1141					D1191				
D1142					D1192				
D1143					D1193				
D1144					D1194				
D1145					D1195				
D1146					D1196				
D1147					D1197				
D1148					D1198				
D1149					D1199				
D1150					D1200				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

6.7.1 Data Area for Control Action Parameters

Register No.	Category	Description	Remarks
D0904	Time unit for ramp-rate setting	TMU	
D0915 to D0917	Alarm setting parameters	AL1 to AL3	For alarm types, see the User's Manual of UT351.
D0919 to D0921	Alarm hysteresis	HY1 to HY3	0.0 to 100.0% of PV input range span
D0924 to D0932	Control function setting parameters	PO to DIS	For details on the parameters, see the User's Manual of UT351.
D0933, D0934	Upper and lower limits of target setpoint	SPH, SPL	
D0935 to D0937	Alarm-ON delay time	DY1 to DY3	

6.7.2 Data Area for Common Function Parameters

Register No.	Category	Description	Remarks
D1013 to D1015	Retransmission output setting parameters	RET to RTL	For details on the parameters, see the User's Manual of UT351.
D1036	Menu-lock setting parameters	LOCK	
D1037	PV color mode	PCMD	
D1038	External RJC setpoint	ERJC	
D1040	High-speed response mode	HSR	

6.7.3 Data Area for Ethernet Communication Parameters

Register No.	Category	Description	Remarks
D1061 to D1075	Ethernet communication parameters	IP1 to PRT	For details on the parameters, see the User's Manual of UT351.

6.7.4 Data Area for SELECT Display Registration Parameters

Register No.	Category	Description	Remarks
D1101 to D1104	SELECT display registration parameters	C.S1 to C.S4	For details on the parameters, see the User's Manual of UT351.

6.8 PV Input and Control Output Parameters

Area for PV Input and Control Output Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D1201	41201	04B0	IN	*R/W	D1251				
D1202	41202	04B1	UNI	*R/W	D1252				
D1203					D1253				
D1204	41204	04B3	RH	*R/W	D1254				
D1205	41205	04B4	RL	*R/W	D1255				
D1206	41206	04B5	SDP	*R/W	D1256				
D1207	41207	04B6	SH	*R/W	D1257				
D1208	41208	04B7	SL	*R/W	D1258				
D1209	41209	04B8	BSL	*R/W	D1259				
D1210	41210	04B9	RJC	*R/W	D1260				
D1211					D1261				
D1212					D1262				
D1213					D1263				
D1214					D1264				
D1215					D1265				
D1216					D1266				
D1217					D1267				
D1218					D1268				
D1219					D1269				
D1220					D1270				
D1221					D1271				
D1222					D1272				
D1223					D1273				
D1224					D1274				
D1225					D1275				
D1226					D1276				
D1227					D1277				
D1228					D1278				
D1229					D1279				
D1230					D1280				
D1231					D1281				
D1232					D1282				
D1233					D1283				
D1234					D1284				
D1235					D1285				
D1236					D1286				
D1237					D1287				
D1238	41238	04D5	OT	*R/W	D1288				
D1239					D1289				
D1240	41240	04D7	CT	*R/W	D1290				
D1241					D1291				
D1242	41242	04D9	CTc	*R/W	D1292				
D1243					D1293				
D1244					D1294				
D1245					D1295				
D1246					D1296				
D1247					D1297				
D1248					D1298				
D1249	41249	04E0	PRI	R	D1299				
D1250					D1300				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

6.8.1 Data Area for PV Input and Control Output Parameters

Register No.	Category	Description	Remarks
D1201 to D1210	PV input parameters	IN to RJC	For details on the parameters, see the User's Manual of UT351.
D1238 to 1242	Control output parameters	OT to CTc	
D1249	Communication parameter	PRI	

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7. Functions and Usage of D Registers (for UT551)

7.1 Overview

This section explains the functions and usage of D registers.

D registers store parameter data, flag data and process data of UT551 controller. You can readily use these internal data items by reading from or writing to the D registers.

You can use D registers to perform:

- **Centralized control using a host device**
- **Data exchange by reading/writing data from/to a host device**

7.2 Interpretation of D Register Tables

This section explains how to read the D Register Map tables in this chapter. The numbers listed in the leftmost column are D register numbers ((1) below). The five-digit numbers in the next column are reference numbers used for MODBUS communication ((2) below). The numbers in the column third from left are register numbers in hexadecimal notation used in MODBUS communication programs ((3) below). Each register code name in the D Register Map tables represents a specific process data item, operating parameter, setup parameter or other data items such as a flag. For details on the operating parameters and setup parameters, see the user's manual of UT551.

Name of D Register Map				
D-Reg No.	Ref No.	H No.	Register name	R/W
D0001	40001	0000	ADERROR	R

(1) D register number

(2) Reference number (for MODBUS communication)

(3) Hex number (for MODBUS communication program)

Permission of read/write by communication
An asterisk (*) in this column indicates that the number of writing actions is limited to 100,000.

■ Names of D Registers

The base names of some D registers are preceded by a combination of a number and then a period, and/or followed by a combination of a period and then a number, as shown in the format Y.xxx.X. (Y: group number; X: loop number)

Examples:

- The name 3.SP.1 means the SP of group 3 and for Loop-1.
- The name OUT.2 means the OUT of Loop-2.

7.3 Classification of D Registers

■ Classification of D Register Map Tables

The table below outlines how the D registers are classified by their numbers in the D Register Map tables.

Table 7.1 Classification of D Registers

Register No.	Area and data categories		Description	Reference
D0001 to D0049	Process data area (Note 1)	Data displayed for operation	PV, SP, OUT, and others	Section 7.4
D0050 to D0100	User area (Note 2), represented by shaded cells in the table	—	If a touch operation panel is used, this area is used for communication with the touch operation panel.	Section 7.4
D0101 to D0200	Cannot be used			
D0201 to D0230	Operating parameters (Note 1)	Operation mode parameters	A/M, C/A/M, MOUT, and others	Section 7.5
D0231 to D0300		Operation-related parameters for Loop-1 and -2	AT, SC, BS, FL, and others	Sections 7.6 and 7.7
D0301 to D0700		PID parameters for Loop-1 and -2	P, I, D, and others	Sections 7.6 and 7.7
D0701 to D0800		Ten-segment linearizer parameters and USER parameters	1.A1 to 1.PMD and others	Section 7.8
D0901 to D1000	Setup parameters (Note 1)	Control action parameters for Loop-1 and -2	SP, ALM, CTL	Section 7.9
D1001 to D1100		Loop-common function and Ethernet communication parameters	AIN, RET, IP1 and others	Section 7.9
D1101 to D1200		Display and I/O configuration parameters	CSEL, DO, DI, C.PYS and others	Section 7.9
D1201 to D1300		Controller mode, PV input, and control output parameters	UTMD, IN, OUT, INIT and others	Section 7.10

Note 1: Data for process values, operating parameters and setup parameters are stored in the types (EU, EUS, %, or ABS without the decimal point) indicated in the Operating Parameter Lists and Setup Parameter Lists of the user's manual of UT551. The OFF and ON states are represented by 0 and 1, respectively. D registers D0001 to D0049 are read-only.

Note 2: When communicating with a touch operation panel, do not write to or read from this area (D0050 to D0100) because this area is reserved for 16-bit register data used by touch operation panels.

[See Also] Section 7.4, Process Data and User Area.

NOTE

It is prohibited to read/write data by communication from/to the registers of blank cells in the register map tables. If you attempt to do so, the UT551 may not operate properly.

7.4 Process Data and User Area

Area for process data									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0001	40001	0000	ADERROR	R	D0051	40051	0032		R/W
D0002	40002	0001	ERROR.1	R	D0052	40052	0033		R/W
D0003	40003	0002	PV.1	R	D0053	40053	0034		R/W
D0004	40004	0003	CSP.1	R	D0054	40054	0035		R/W
D0005	40005	0004	OUT.1	R	D0055	40055	0036		R/W
D0006					D0056	40056	0037		R/W
D0007					D0057	40057	0038		R/W
D0008	40008	0007	MOD.1	R	D0058	40058	0039		R/W
D0009	40009	0008	PIDNO.1	R	D0059	40059	003A		R/W
D0010	40010	0009	CSPNO	R	D0060	40060	003B		R/W
D0011	40011	000A	ALM	R	D0061	40061	003C		R/W
D0012					D0062	40062	003D		R/W
D0013					D0063	40063	003E		R/W
D0014					D0064	40064	003F		R/W
D0015					D0065	40065	0040		R/W
D0016					D0066	40066	0041		R/W
D0017					D0067	40067	0042		R/W
D0018	40018	0011	ERROR.2	R	D0068	40068	0043		R/W
D0019	40019	0012	PV.2	R	D0069	40069	0044		R/W
D0020	40020	0013	CSP.2	R	D0070	40070	0045		R/W
D0021	40021	0014	OUT.2	R	D0071	40071	0046		R/W
D0022					D0072	40072	0047		R/W
D0023					D0073	40073	0048		R/W
D0024	40024	0017	MOD.2	R	D0074	40074	0049		R/W
D0025	40025	0018	PIDNO.2	R	D0075	40075	004A		R/W
D0026	40026	0019	DEV.1	R	D0076	40076	004B		R/W
D0027	40027	001A	OR.1	R	D0077	40077	004C		R/W
D0028					D0078	40078	004D		R/W
D0029					D0079	40079	004E		R/W
D0030	40030	001D	DEV.2	R	D0080	40080	004F		R/W
D0031	40031	001E	OR.2	R	D0081	40081	0050		R/W
D0032	40032	001F	SMEC	R	D0082	40082	0051		R/W
D0033	40033	0020	DISTS	R	D0083	40083	0052		R/W
D0034					D0084	40084	0053		R/W
D0035	40035	0022	PARAERR	R	D0085	40085	0054		R/W
D0036	40036	0023	ALOSTS	R	D0086	40086	0055		R/W
D0037	40037	0024	TIM1	R	D0087	40087	0056		R/W
D0038					D0088	40088	0057		R/W
D0039					D0089	40089	0058		R/W
D0040					D0090	40090	0059		R/W
D0041					D0091	40091	005A		R/W
D0042					D0092	40092	005B		R/W
D0043					D0093	40093	005C		R/W
D0044					D0094	40094	005D		R/W
D0045					D0095	40095	005E		R/W
D0046					D0096	40096	005F		R/W
D0047					D0097	40097	0060		R/W
D0048					D0098	40098	0061		R/W
D0049					D0099	40099	0062		R/W
D0050	40050	0031		R/W	D0100	40100	0063		R/W

Shaded area : User area (You cannot use these registers when a touch operation panel is used.)

7.4.1 Process Data Area (Read-only)

Some of the registers in this area (D0001 to D0049, read-only) are designed to represent two or more events, such as errors and statuses, using combinations of bits within the register. If any of the events shown in the following tables occur, the corresponding bit is set to 1. The bit remains 0 if the event does not occur. Note that bits with blank fields in the tables are not in use.

● Bit Configuration of D0001: ADERROR (Input Error)

Bit	Code	Event
0	AD1ERR.st	Input-1 A/D converter error
1		
2	AD3ERR.st	Input-3 A/D converter error
3		
4	AD1BO.st	Input-1 burnout error
5		
6	AD3BO.st	Input-3 burnout error
7		
8	RJC1ERR.st	Input-1 RJC error
9 to 15		

● Bit Configuration of D0002: ERROR.1 (PV1 Error)

Bit	Code	Event
0	PV1ADC.st	PV1 A/D converter error
1	PV1BO.st	PV1 burnout error
2	RJC1ERR.st	PV1 RJC error
3		
4	PV1+over.st	PV1 over-scale
5	PV1-over.st	PV1 under-scale
6, 7		
8	RSP1ADC.st	RSP1 A/D converter error
9	RSP1BO.st	RSP1 burnout error
10, 11		
12	C.RSP1ADC.st	RSP1 A/D converter error when RSP1 is used for control
13	C.RSP1BO.st	Burnout error when RSP1 is used for control
14	AT1ERR.st	Auto-tuning error
15		

● D0003: PV.1 (Measured input value [PV] for Loop-1)

● D0004: CSP.1 (Current target setpoint [SP] for Loop-1)

● D0005: OUT.1 (Control output value [OUT] for Loop-1)

- During PID computation, you can read the computation result as is from this register. For example, when the computation result is 75.0%, the register contains a value of “750.”
- During on-off computation, the register contains “0” (0.0%) for the OFF state or “1000” (100.0%) for the ON state.

● Bit Configuration of D0008: MOD.1 (Operation mode of Loop-1)

Bit	Code	Event
0	A/M1.st	0: AUTO; 1: MAN
1	R/L1.st	0: Local; 1: Remote
2	R/S1.st	0: Run; 1: Stop
3		
4	CAS.st	1: CAS
5	AUT.st	1: AUTO
6	MAN.st	1: MAN
7 to 13		
14	AT1.st	0: Auto-tuning is OFF; 1: Auto-tuning is ON
15		

● D0009: PIDNO.1 (Current PID number for Loop-1)

Bit	Code	Event
0	PIDNO.0	Bit 0 of the current PID number
1	PIDNO.1	Bit 1 of the current PID number
2	PIDNO.2	Bit 2 of the current PID number
3	PIDNO.3	Bit 3 of the current PID number
4 to 15		

From this register, you can read the PID number currently in use in the form of a binary bit string. For example, the configuration of “bit 3 = off; bit 2 = on; bit 1 = off; bit 0 = on”, which is represented as “0101” in binary notation and as “5” in decimal notation, indicates that the PID number currently being used is 5.

● D0010: CSPNO (Current target-setpoint number)

Bit	Code	Event
0	CSPNO1.0	Bit 0 of CSP (current SP number)
1	CSPNO1.1	Bit 1 of CSP (current SP number)
2	CSPNO1.2	Bit 2 of CSP (current SP number)
3	CSPNO1.3	Bit 3 of CSP (current SP number)
4 to 15		

From this register, you can read the SP number of the target setpoint currently being used in the form of a binary bit string. For example, the configuration of “bit 3 = off; bit 2 = on; bit 1 = off; bit 0 = on”, which is represented as “0101” in binary notation and as “5” in decimal notation, indicates that the target setpoint value of 5.SP is now being used.

● Bit Configuration of D0011: ALM (Alarm Status)

Bit	Code	Event
0	ALM11.st	'1' when alarm 1 for Loop-1 is ON; '0' when OFF
1	ALM12.st	'1' when alarm 2 for Loop-1 is ON; '0' when OFF
2	ALM13.st	'1' when alarm 3 for Loop-1 is ON; '0' when OFF
3		
4	ALM14.st	'1' when alarm 4 for Loop-1 is ON; '0' when OFF
5	OR1.st	'1' when sensor grounding alarm for Loop-1 is ON; '0' when OFF
6, 7		
8	ALM21.st	'1' when alarm 1 for Loop-2 is ON; '0' when OFF
9	ALM22.st	'1' when alarm 2 for Loop-2 is ON; '0' when OFF
10	ALM23.st	'1' when alarm 3 for Loop-2 is ON; '0' when OFF
11		
12	ALM24.st	'1' when alarm 4 for Loop-2 is ON; '0' when OFF
13	OR2.st	'1' when sensor grounding alarm for Loop-2 is ON; '0' when OFF
14, 15		

When the controller mode (UT mode) is other than "cascade control," ALM21 to ALM24 for Loop-2 are used as alarms 5 to 8 for Loop-1 if the 8-alarm mode is selected using setup parameter AMD.

[See Also] The section on the 8-alarm mode in the User's Manual of UT551.

● Bit Configuration of D0018: ERROR.2 (PV2 Error)

Bit	Code	Event
0	PV2ADC.st	PV2 A/D converter error
1	PV2BO.st	PV2 burnout error
2		
3		
4	PV2+over.st	PV2 over-scale
5	PV2-over.st	PV2 under-scale
6 to 13		
14	AT2ERR.st	Auto-tuning error
15		

● D0019: PV.2 (Measured input value [PV] for Loop-2)

● D0020: CSP.2 (Current target setpoint [SP] for Loop-2)

● D0021: OUT.2 (Control output value [OUT] for Loop-2)

- During PID computation, you can read the computation result as is from this register. For example, when the computation result is 75.0%, the register contains a value of "750."
- During on-off computation, the register contains "0" (0.0%) for the OFF state or "1000" (100.0%) for the ON state.

● Bit Configuration of D0024: MOD.2 (Operation mode of Loop-2)

Bit	Code	Event
0 to 13		
14	AT2.st	0: Auto-tuning is OFF; 1: Auto-tuning is ON
15		

● D0025: PIDNO.2 (Current PID number for Loop-2)

Bit	Code	Event
0	PIDNO2.0	Bit 0 of the current PID number
1	PIDNO2.1	Bit 1 of the current PID number
2	PIDNO2.2	Bit 2 of the current PID number
3	PIDNO2.3	Bit 3 of the current PID number
4 to 15		

From this register, you can read the PID number currently in use in the form of a binary bit string. For example, the configuration of “bit 3 = off; bit 2 = on; bit 1 = off; bit 0 = on”, which is represented as “0101” in binary notation and as “5” in decimal notation, indicates that the PID number currently being used is 5.

● D0026: DEV.1 (Deviation for Loop-1)

● D0027: OR.1 (Moving average of sensor grounding alarm for Loop-1)

● D0030: DEV.2 (Deviation for Loop-2)

● D0031: OR.2 (Moving average of sensor grounding alarm for Loop-2)

● D0032: SMEC (Sampling error counter)

● Bit Configuration of D0033: DISTS (Statuses of External Contact Inputs)

Bit	Code	Event
0	DI1.st	Status of external contact input terminal 1 (1: contact is ON; 0: contact is OFF)
1	DI2.st	Status of external contact input terminal 2 (1: contact is ON; 0: contact is OFF)
2	DI3.st	Status of external contact input terminal 3 (1: contact is ON; 0: contact is OFF)
3	DI4.st	Status of external contact input terminal 4 (1: contact is ON; 0: contact is OFF)
4	DI5.st	Status of external contact input terminal 5 (1: contact is ON; 0: contact is OFF)
5	DI6.st	Status of external contact input terminal 6 (1: contact is ON; 0: contact is OFF)
6	DI7.st	Status of external contact input terminal 7 (1: contact is ON; 0: contact is OFF)
7	DI8.st	Status of external contact input terminal 8 (1: contact is ON; 0: contact is OFF)
8 to 15		

Functions assigned to external contact inputs vary depending on the setting of the controller mode (UT mode) and whether or not functions have been assigned to the contact inputs.

[See Also] User's manual of UT551, for the function assignments of external contact inputs.

● Bit Configuration of D0035: PARAERR (Error in calibration values and parameters)

Bit	Code	Event
0	CALB.E.st	Calibration value error
1 to 3		
4	UTMD.st	UT mode error
5	RANGE.st	Input range data error
6	SETUP.st	Setup parameter error
7		
8	PARA.E.st	Operating parameter error
9	MODE.E.st	Error in power-failure backup data
10, 11		
12	EEP.E.st	EEPROM error
13		
14	SYSTEM.E.st	System data error
15		

● Bit Configuration of D0036: ALOSTS (Status of alarm output)

Bit	Code	Event
0	ALO11	Status of output assigned with alarm 1 for Loop-1 0: alarm is OFF for “energized” type alarm or ON for “de-energized” type alarm (the relay contact is open) 1: alarm is ON for “energized” type alarm or OFF for “de-energized” type alarm (the relay contact is closed)
1	ALO12	Status of output assigned with alarm 2 for Loop-1 Bit status information is the same as bit 0.
2	ALO13	Status of output assigned with alarm 3 for Loop-1 Bit status information is the same as bit 0.
3		
4	ALO14	Status of output assigned with alarm 4 for Loop-1 Bit status information is the same as bit 0.
5 to 7		
8	ALO21	Status of output assigned with alarm 1 for Loop-2 Bit status information is the same as bit 0.
9	ALO22	Status of output assigned with alarm 2 for Loop-2 Bit status information is the same as bit 0.
10	ALO23	Status of output assigned with alarm 3 for Loop-2 Bit status information is the same as bit 0.
11		
12	ALO24	Status of output assigned with alarm 4 for Loop-2 Bit status information is the same as bit 0.
13 to 15		

● D0037: TIM1 (Remaining timer count value for Loop-1 timer function)

7.4.2 User Area

Register No.	Category	Description
D0050 to D0100	User area	Users can read/write data from/to the registers in this area. However, if a touch operation panel is used in the system, users cannot use this area because it is reserved for communication with the touch operation panel.

7.5 Operation Mode and Computation Parameters

Area for Operation Mode and Computation Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0201	40201	00C8	A/M.1	R/W	D0251	40251	00FA	ORH.1	*R/W
D0202					D0252	40252	00FB	ORL.1	*R/W
D0203	40203	00CA	R/L.1	R/W	D0253				
D0204					D0254				
D0205	40205	00CC	S/R	R/W	D0255				
D0206	40206	00CD	C.A.M	R/W	D0256				
D0207	40207	00CE	SPN	R/W	D0257				
D0208					D0258				
D0209					D0259				
D0210					D0260				
D0211					D0261				
D0212					D0262	40262	0105	PCH.1	*R/W
D0213					D0263	40263	0106	PCL.1	*R/W
D0214					D0264				
D0215	40215	00D6	C.RSP.1	R/W	D0265				
D0216					D0266				
D0217	40217	00D8	MOUT.1	R/W	D0267				
D0218					D0268				
D0219					D0269				
D0220					D0270				
D0221					D0271	40271	010E	AT.2	*R/W
D0222					D0272	40272	010F	SC.2	*R/W
D0223					D0273	40273	0110	BS.2	*R/W
D0224					D0274	40274	0111	FL.2	*R/W
D0225	40225	00E0	PNO	R/W	D0275	40275	0112	UPR.2	*R/W
D0226					D0276	40276	0113	DNR.2	*R/W
D0227					D0277	40277	0114	RT.2	*R/W
D0228					D0278	40278	0115	RBS.2	*R/W
D0229					D0279	40279	0116	RFL.2	*R/W
D0230					D0280	40280	0117	ORB.2	*R/W
D0231					D0281	40281	0118	ORH.2	*R/W
D0232					D0282	40282	0119	ORL.2	*R/W
D0233					D0283				
D0234					D0284				
D0235					D0285				
D0236					D0286				
D0237					D0287				
D0238					D0288				
D0239					D0289				
D0240					D0290				
D0241	40241	00F0	AT.1	*R/W	D0291				
D0242	40242	00F1	SC.1	*R/W	D0292	40292	0123	PCH.2	*R/W
D0243	40243	00F2	BS.1	*R/W	D0293	40293	0124	PCL.2	*R/W
D0244	40244	00F3	FL.1	*R/W	D0294				
D0245	40245	00F4	UPR.1	*R/W	D0295				
D0246	40246	00F5	DNR.1	*R/W	D0296				
D0247	40247	00F6	RT.1	*R/W	D0297				
D0248	40248	00F7	RBS.1	*R/W	D0298				
D0249	40249	00F8	RFL.1	*R/W	D0299				
D0250	40250	00F9	ORB.1	*R/W	D0300				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

7.5.1 Operation Mode Information

The mode registers listed below are designed to show, by the value contained, which mode is selected.

You can change the mode by writing a different mode to the register via communication.

● D0201: A/M.1 (AUTO/MAN modes for Loop-1)

When D0201 = 0, Loop-1 is in the AUTO (automatic) mode.

When D0201 = 1, Loop-1 is in the MAN (manual) mode.

● D0203: R/L.1 (REMOTE/LOCAL modes for Loop-1)

When D0203 = 0, Loop-1 is in the LOCAL mode.

When D0203 = 1, Loop-1 is in the REMOTE mode.

● D0205: S/R (STOP/RUN modes)

When D0205 = 0, the controller is in the STOP mode.

When D0205 = 1, the controller is in the RUN mode.

When the contact input registration parameter S/R of setup parameters is set to “0”, you can write via communication. When it is set to “5162”, you can write via communication.

● D0206: C.A.M (CAS/AUTO/MAN modes)

When D0206 = 0, the controller is in the AUTO mode.

When D0206 = 1, the controller is in the MAN mode.

When D0206 = 2, the controller is in the CAS (cascade) mode.

7.5.2 Write-only Data Area

The registers listed below are write-only registers that are accessed by a host device.

For example, to set 150.0˚C in the C.RSP.1 register, write 1500 in the register.

Register No.	Code	Description
D0215	C.RSP.1	Used to set SP value for Loop-1.
D0217	MOUT.1	Used to set control output value when Loop-1 is in the MAN mode.

■ Writing an SP Value

An SP value can be written via communication only when the loop is in the REMOTE mode.

(1) Set the remote input selection parameter RMS to “COM(1).”

(2) Write the SP value to the C.RSP1 or C.RSP2 register.

(3) Set the loop to the REMOTE(1) mode.

In this way, you can operate the controller to set SP values via communication.

■ Writing a Control Output Value in MAN Mode

You can write a control output value via communication only when the loop is in MAN mode.

(1) Set the loop to the MAN mode.

(2) Write the control output value to MOUT.1 register.

In this way, you can operate the controller in MAN mode to set control output values via communication.

■ Manipulating Valves (for position-proportional type only)

In the MAN mode with position-proportional PID computation, write a valve position to the MOUT.1 register.

■ PID Number Selection

Can be used when Zone PID selection parameter ZON is set to 3.

D0225 = 1 to 8.

(Depends on the setting of the setup parameter GRP.)

It cannot be set via communication when the PID number is selected by external contact input.

7.5.3 Data Area for Computation Parameters

Register No.	Category	Description	Remarks
D0241 to D0252	Loop-1 computation parameters	AT.1: Loop-1 auto-tuning selection SC.1: Loop-1 SUPER function selection BS.1: Loop-1 PV bias FL.1: Loop-1 PV filter UPR.1: Loop-1 setpoint ramp-up rate DNR.1: Loop-1 setpoint ramp-down rate RT.1: Loop-1 ratio setting RBS.1: Loop-1 remote bias RFL.1: Loop-1 remote input filter ORB.1: Loop-1 ON/OFF rate detection range ORH.1: Loop-1 ON/OFF rate high-limit ORL.1: Loop-1 ON/OFF rate low-limit	For details on the parameters, see the User's Manual of UT551.
D0262, D0263	Loop-1 PV color change parameters	PCH.1: High limit for PV color change PCL.1: Low limit for PV color change	
D0271 to D0282	Loop-2 computation parameters	The Loop-2 computation parameters, i.e., AT.2 through ORL.2, are functionally the same as their corresponding Loop-1 computation parameters.	
D0292, D0293	Loop-2 PV color change parameters	PCH.2: High limit for PV color change PCL.2: Low limit for PV color change	

7.6 Loop-1 PID Parameters

Area for Loop-1 PID Parameters (1/2)									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0301	40301	012C	1.SP	R/W	D0351	40351	015E	3.SP	R/W
D0302	40302	012D	1.A1	*R/W	D0352	40352	015F	3.A1	*R/W
D0303	40303	012E	1.A2	*R/W	D0353	40353	0160	3.A2	*R/W
D0304	40304	012F	1.A3	*R/W	D0354	40354	0161	3.A3	*R/W
D0305	40305	0130	1.A4	*R/W	D0355	40355	0162	3.A4	*R/W
D0306	40306	0131	1.P	*R/W	D0356	40356	0163	3.P	*R/W
D0307	40307	0132	1.I	*R/W	D0357	40357	0164	3.I	*R/W
D0308	40308	0133	1.D	*R/W	D0358	40358	0165	3.D	*R/W
D0309	40309	0134	1.OH	*R/W	D0359	40359	0166	3.OH	*R/W
D0310	40310	0135	1.OL	*R/W	D0360	40360	0167	3.OL	*R/W
D0311	40311	0136	1.MR	*R/W	D0361	40361	0168	3.MR	*R/W
D0312	40312	0137	1.H	*R/W	D0362	40362	0169	3.H	*R/W
D0313	40313	0138	1.DR	*R/W	D0363	40363	016A	3.DR	*R/W
D0314					D0364				
D0315					D0365				
D0316					D0366				
D0317					D0367				
D0318	40318	013D	1.DB	*R/W	D0368	40368	016F	3.DB	*R/W
D0319	40319	013E	1.RP	*R/W	D0369	40369	0170	3.RP	*R/W
D0320	40320	013F	1.PO	*R/W	D0370	40370	0171	3.PO	*R/W
D0321					D0371				
D0322					D0372				
D0323					D0373				
D0324					D0374				
D0325					D0375				
D0326	40326	0145	2.SP	R/W	D0376	40376	0177	4.SP	R/W
D0327	40327	0146	2.A1	*R/W	D0377	40377	0178	4.A1	*R/W
D0328	40328	0147	2.A2	*R/W	D0378	40378	0179	4.A2	*R/W
D0329	40329	0148	2.A3	*R/W	D0379	40379	017A	4.A3	*R/W
D0330	40330	0149	2.A4	*R/W	D0380	40380	017B	4.A4	*R/W
D0331	40331	014A	2.P	*R/W	D0381	40381	017C	4.P	*R/W
D0332	40332	014B	2.I	*R/W	D0382	40382	017D	4.I	*R/W
D0333	40333	014C	2.D	*R/W	D0383	40383	017E	4.D	*R/W
D0334	40334	014D	2.OH	*R/W	D0384	40384	017F	4.OH	*R/W
D0335	40335	014E	2.OL	*R/W	D0385	40385	0180	4.OL	*R/W
D0336	40336	014F	2.MR	*R/W	D0386	40386	0181	4.MR	*R/W
D0337	40337	0150	2.H	*R/W	D0387	40387	0182	4.H	*R/W
D0338	40338	0151	2.DR	*R/W	D0388	40388	0183	4.DR	*R/W
D0339					D0389				
D0340					D0390				
D0341					D0391				
D0342					D0392				
D0343	40343	0156	2.DB	*R/W	D0393	40393	0188	4.DB	*R/W
D0344	40344	0157	2.RP	*R/W	D0394	40394	0189	4.RP	*R/W
D0345	40345	0158	2.PO	*R/W	D0395	40395	018A	4.PO	*R/W
D0346					D0396				
D0347					D0397				
D0348					D0398				
D0349					D0399				
D0350					D0400				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

Area for Loop-1 PID Parameters (2/2)									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0401	40401	0190	5.SP	R/W	D0451	40451	01C2	7.SP	R/W
D0402	40402	0191	5.A1	*R/W	D0452	40452	01C3	7.A1	*R/W
D0403	40403	0192	5.A2	*R/W	D0453	40453	01C4	7.A2	*R/W
D0404	40404	0193	5.A3	*R/W	D0454	40454	01C5	7.A3	*R/W
D0405	40405	0194	5.A4	*R/W	D0455	40455	01C6	7.A4	*R/W
D0406	40406	0195	5.P	*R/W	D0456	40456	01C7	7.P	*R/W
D0407	40407	0196	5.I	*R/W	D0457	40457	01C8	7.I	*R/W
D0408	40408	0197	5.D	*R/W	D0458	40458	01C9	7.D	*R/W
D0409	40409	0198	5.OH	*R/W	D0459	40459	01CA	7.OH	*R/W
D0410	40410	0199	5.OL	*R/W	D0460	40460	01CB	7.OL	*R/W
D0411	40411	019A	5.MR	*R/W	D0461	40461	01CC	7.MR	*R/W
D0412	40412	019B	5.H	*R/W	D0462	40462	01CD	7.H	*R/W
D0413	40413	019C	5.DR	*R/W	D0463	40463	01CE	7.DR	*R/W
D0414					D0464				
D0415					D0465				
D0416					D0466				
D0417					D0467				
D0418	40418	01A1	5.DB	*R/W	D0468	40468	01D3	7.DB	*R/W
D0419	40419	01A2	5.RP	*R/W	D0469	40469	01D4	RHY	*R/W
D0420	40420	01A3	5.PO	*R/W	D0470	40470	01D5	7.PO	*R/W
D0421					D0471				
D0422					D0472				
D0423					D0473				
D0424					D0474				
D0425					D0475				
D0426	40426	01A9	6.SP	R/W	D0476	40476	01DB	8.SP	R/W
D0427	40427	01AA	6.A1	*R/W	D0477	40477	01DC	8.A1	*R/W
D0428	40428	01AB	6.A2	*R/W	D0478	40478	01DD	8.A2	*R/W
D0429	40429	01AC	6.A3	*R/W	D0479	40479	01DE	8.A3	*R/W
D0430	40430	01AD	6.A4	*R/W	D0480	40480	01DF	8.A4	*R/W
D0431	40431	01AE	6.P	*R/W	D0481	40481	01E0	8.P	*R/W
D0432	40432	01AF	6.I	*R/W	D0482	40482	01E1	8.I	*R/W
D0433	40433	01B0	6.D	*R/W	D0483	40483	01E2	8.D	*R/W
D0434	40434	01B1	6.OH	*R/W	D0484	40484	01E3	8.OH	*R/W
D0435	40435	01B2	6.OL	*R/W	D0485	40485	01E4	8.OL	*R/W
D0436	40436	01B3	6.MR	*R/W	D0486	40486	01E5	8.MR	*R/W
D0437	40437	01B4	6.H	*R/W	D0487	40487	01E6	8.H	*R/W
D0438	40438	01B5	6.DR	*R/W	D0488	40488	01E7	8.DR	*R/W
D0439					D0489				
D0440					D0490				
D0441					D0491				
D0442					D0492				
D0443	40443	01BA	6.DB	*R/W	D0493	40493	01EC	8.DB	*R/W
D0444	40444	01BB	6.RP	*R/W	D0494	40494	01ED	RDV	*R/W
D0445	40445	01BC	6.PO	*R/W	D0495	40495	01EE	8.PO	*R/W
D0446					D0496				
D0447					D0497				
D0448					D0498				
D0449					D0499				
D0450					D0500				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

7.6.1 Data Area for Loop-1 PID Parameters

Register No.	Category	Description	Remarks
D0301 to D0320	Group-1 parameters for Loop-1	1.SP: Target setpoint 1.A1: Alarm 1 setpoint 1.A2: Alarm 2 setpoint 1.A3: Alarm 3 setpoint 1.A4: Alarm 4 setpoint 1.P: Proportional band 1.I: Integral time 1.D: Derivative time 1.OH: Upper limit of output 1.OL: Lower limit of output 1.MR: Manual reset 1.H: Hysteresis 1.DR: Direct/reverse action switchover 1.DB: Deadband 1.RP: Zone PID reference point 1.PO: Preset output value	Selecting an SP number by means of communication enables a parameter group with the same number to be used for both Loop-1 and Loop-2 simultaneously. For example, if you set the SP number selection parameter (SPN) to 5, the parameters from 5.SP through 5.PO are used. For details on the parameters, see the User's Manual of UT551.
D0326 to D0345	Group-2 parameters for Loop-1	The parameters from 2.SP to 2.PO are functionally the same as their corresponding group-1 parameters.	
D0351 to D0370	Group-3 parameters for Loop-1	The parameters from 3.SP to 3.PO are functionally the same as their corresponding group-1 parameters.	
D0376 to D0395	Group-4 parameters for Loop-1	The parameters from 4.SP to 4.PO are functionally the same as their corresponding group-1 parameters.	
D0401 to D0420	Group-5 parameters for Loop-1	The parameters from 5.SP to 5.PO are functionally the same as their corresponding group-1 parameters.	
D0426 to D0445	Group-6 parameters for Loop-1	The parameters from 6.SP to 6.PO are functionally the same as their corresponding group-1 parameters.	
D0451 to D0470	Group-7 parameters for Loop-1	The parameters from 7.SP to 7.PO are functionally the same as their corresponding group-1 parameters. However, parameter RHY, which corresponds to 1.RP, denotes the zone PID hysteresis.	
D0476 to D0495	Group-8 parameters for Loop-1	The parameters from 8.SP to 8.PO are functionally the same as their corresponding group-1 parameters. However, parameter RDV, which corresponds to 1.RP, denotes the zone PID reference deviation.	

7.7 Loop-2 PID Parameters

Area for Loop-2 PID Parameters (1/2)									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0501	40501	01F4	1.SP	R/W	D0551	40551	0226	3.SP	R/W
D0502	40502	01F5	1.A1	*R/W	D0552	40552	0227	3.A1	*R/W
D0503	40503	01F6	1.A2	*R/W	D0553	40553	0228	3.A2	*R/W
D0504	40504	01F7	1.A3	*R/W	D0554	40554	0229	3.A3	*R/W
D0505	40505	01F8	1.A4	*R/W	D0555	40555	022A	3.A4	*R/W
D0506	40506	01F9	1.P	*R/W	D0556	40556	022B	3.P	*R/W
D0507	40507	01FA	1.I	*R/W	D0557	40557	022C	3.I	*R/W
D0508	40508	01FB	1.D	*R/W	D0558	40558	022D	3.D	*R/W
D0509	40509	01FC	1.OH	*R/W	D0559	40559	022E	3.OH	*R/W
D0510	40510	01FD	1.OL	*R/W	D0560	40560	022F	3.OL	*R/W
D0511	40511	01FE	1.MR	*R/W	D0561	40561	0230	3.MR	*R/W
D0512	40512	01FF	1.H	*R/W	D0562	40562	0231	3.H	*R/W
D0513	40513	0200	1.DR	*R/W	D0563	40563	0232	3.DR	*R/W
D0514					D0564				
D0515					D0565				
D0516					D0566				
D0517					D0567				
D0518	40518	0205	1.DB	*R/W	D0568	40568	0237	3.DB	*R/W
D0519	40519	0206	1.RP	*R/W	D0569	40569	0238	3.RP	*R/W
D0520	40520	0207	1.PO	*R/W	D0570	40570	0239	3.PO	*R/W
D0521					D0571				
D0522					D0572				
D0523					D0573				
D0524					D0574				
D0525					D0575				
D0526	40526	020D	2.SP	R/W	D0576	40576	023F	4.SP	R/W
D0527	40527	020E	2.A1	*R/W	D0577	40577	0240	4.A1	*R/W
D0528	40528	020F	2.A2	*R/W	D0578	40578	0241	4.A2	*R/W
D0529	40529	0210	2.A3	*R/W	D0579	40579	0242	4.A3	*R/W
D0530	40530	0211	2.A4	*R/W	D0580	40580	0243	4.A4	*R/W
D0531	40531	0212	2.P	*R/W	D0581	40581	0244	4.P	*R/W
D0532	40532	0213	2.I	*R/W	D0582	40582	0245	4.I	*R/W
D0533	40533	0214	2.D	*R/W	D0583	40583	0246	4.D	*R/W
D0534	40534	0215	2.OH	*R/W	D0584	40584	0247	4.OH	*R/W
D0535	40535	0216	2.OL	*R/W	D0585	40585	0248	4.OL	*R/W
D0536	40536	0217	2.MR	*R/W	D0586	40586	0249	4.MR	*R/W
D0537	40537	0218	2.H	*R/W	D0587	40587	024A	4.H	*R/W
D0538	40538	0219	2.DR	*R/W	D0588	40588	024B	4.DR	*R/W
D0539					D0589				
D0540					D0590				
D0541					D0591				
D0542					D0592				
D0543	40543	021E	2.DB	*R/W	D0593	40593	0250	4.DB	*R/W
D0544	40544	021F	2.RP	*R/W	D0594	40594	0251	4.RP	*R/W
D0545	40545	0220	2.PO	*R/W	D0595	40595	0252	4.PO	*R/W
D0546					D0596				
D0547					D0597				
D0548					D0598				
D0549					D0599				
D0550					D0600				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

Area for Loop-2 PID Parameters (2/2)									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0601	40601	0258	5.SP	R/W	D0651	40651	028A	7.SP	R/W
D0602	40602	0259	5.A1	*R/W	D0652	40652	028B	7.A1	*R/W
D0603	40603	025A	5.A2	*R/W	D0653	40653	028C	7.A2	*R/W
D0604	40604	025B	5.A3	*R/W	D0654	40654	028D	7.A3	*R/W
D0605	40605	025C	5.A4	*R/W	D0655	40655	028E	7.A4	*R/W
D0606	40606	025D	5.P	*R/W	D0656	40656	028F	7.P	*R/W
D0607	40607	025E	5.I	*R/W	D0657	40657	0290	7.I	*R/W
D0608	40608	025F	5.D	*R/W	D0658	40658	0291	7.D	*R/W
D0609	40609	0260	5.OH	*R/W	D0659	40659	0292	7.OH	*R/W
D0610	40610	0261	5.OL	*R/W	D0660	40660	0293	7.OL	*R/W
D0611	40611	0262	5.MR	*R/W	D0661	40661	0294	7.MR	*R/W
D0612	40612	0263	5.H	*R/W	D0662	40662	0295	7.H	*R/W
D0613	40613	0264	5.DR	*R/W	D0663	40663	0296	7.DR	*R/W
D0614					D0664				
D0615					D0665				
D0616					D0666				
D0617					D0667				
D0618	40618	0269	5.DB	*R/W	D0668	40668	029B	7.DB	*R/W
D0619	40639	026A	5.RP	*R/W	D0669	40669	029C	RHY	*R/W
D0620	40620	026B	5.PO	*R/W	D0670	40670	029D	7.PO	*R/W
D0621					D0671				
D0622					D0672				
D0623					D0673				
D0624					D0674				
D0625					D0675				
D0626	40626	0271	6.SP	R/W	D0676	40676	02A3	8.SP	R/W
D0627	40627	0272	6.A1	*R/W	D0677	40677	02A4	8.A1	*R/W
D0628	40628	0273	6.A2	*R/W	D0678	40678	02A5	8.A2	*R/W
D0629	40629	0274	6.A3	*R/W	D0679	40679	02A6	8.A3	*R/W
D0630	40630	0275	6.A4	*R/W	D0680	40680	02A7	8.A4	*R/W
D0631	40631	0276	6.P	*R/W	D0681	40681	02A8	8.P	*R/W
D0632	40632	0277	6.I	*R/W	D0682	40682	02A9	8.I	*R/W
D0633	40633	0278	6.D	*R/W	D0683	40683	02AA	8.D	*R/W
D0634	40634	0279	6.OH	*R/W	D0684	40684	02AB	8.OH	*R/W
D0635	40635	027A	6.OL	*R/W	D0685	40685	02AC	8.OL	*R/W
D0636	40636	027B	6.MR	*R/W	D0686	40686	02AD	8.MR	*R/W
D0637	40637	027C	6.H	*R/W	D0687	40687	02AE	8.H	*R/W
D0638	40638	027D	6.DR	*R/W	D0688	40688	02AF	8.DR	*R/W
D0639					D0689				
D0640					D0690				
D0641					D0691				
D0642					D0692				
D0643	40643	0282	6.DB	*R/W	D0693	40693	02B4	8.DB	*R/W
D0644	40644	0283	6.RP	*R/W	D0694	40694	02B5	RDV	*R/W
D0645	40645	0284	6.PO	*R/W	D0695	40695	02B6	8.PO	*R/W
D0646					D0696				
D0647					D0697				
D0648					D0698				
D0649					D0699				
D0650					D0700				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

7.7.1 Data Area for Loop-2 PID Parameters

Register No.	Category	Description	Remarks
D0501 to D0520	Group-1 parameters for Loop-2	1.SP: Target setpoint 1.A1: Alarm 1 setpoint 1.A2: Alarm 2 setpoint 1.A3: Alarm 3 setpoint 1.A4: Alarm 4 setpoint 1.P: Proportional band 1.I: Integral time 1.D: Derivative time 1.OH: Upper limit of output 1.OL: Lower limit of output 1.MR: Manual reset 1.H: Hysteresis 1.DR: Direct/reverse action switchover 1.DB: Deadband 1.RP: Zone PID reference point 1.PO: Preset output value	Selecting an SP number by means of communication enables a parameter group with the same number to be used for both Loop-1 and Loop-2 simultaneously. For example, if you set the SP number selection parameter (SPN) to 5, the parameters from 5.SP through 5.PO are used. For details on the parameters, see the User's Manual of UT551.
D0526 to D0545	Group-2 parameters for Loop-2	The parameters from 2.SP to 2.PO are functionally the same as their corresponding group-1 parameters.	
D0551 to D0570	Group-3 parameters for Loop-2	The parameters from 3.SP to 3.PO are functionally the same as their corresponding group-1 parameters.	
D0576 to D0595	Group-4 parameters for Loop-2	The parameters from 4.SP to 4.PO are functionally the same as their corresponding group-1 parameters.	
D0601 to D0620	Group-5 parameters for Loop-2	The parameters from 5.SP to 5.PO are functionally the same as their corresponding group-1 parameters.	
D0626 to D0645	Group-6 parameters for Loop-2	The parameters from 6.SP to 6.PO are functionally the same as their corresponding group-1 parameters.	
D0651 to D0670	Group-7 parameters for Loop-2	The parameters from 7.SP to 7.PO are functionally the same as their corresponding group-1 parameters. However, parameter RHY, which corresponds to 1.RP, denotes the zone PID hysteresis.	
D0676 to D0695	Group-8 parameters for Loop-2	The parameters from 8.SP to 8.PO are functionally the same as their corresponding group-1 parameters. However, parameter RDV, which corresponds to 1.RP, denotes the zone PID reference deviation.	

7.8 USER Parameters and Ten-segment Linearizer Parameters

Area for USER Parameters and Ten-segment Linearizer Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0701	40701	02BC	U1	*R/W	D0751	40751	02EE	2.A1	*R/W
D0702	40702	02BD	U2	*R/W	D0752	40752	02EF	2.B1	*R/W
D0703	40703	02BE	U3	*R/W	D0753	40753	02F0	2.A2	*R/W
D0704					D0754	40754	02F1	2.B2	*R/W
D0705					D0755	40755	02F2	2.A3	*R/W
D0706					D0756	40756	02F3	2.B3	*R/W
D0707					D0757	40757	02F4	2.A4	*R/W
D0708					D0758	40758	02F5	2.B4	*R/W
D0709	40709	02C4			D0759	40759	02F6	2.A5	*R/W
D0710	40710	02C5			D0760	40760	02F7	2.B5	*R/W
D0711	40711	02C6			D0761	40761	02F8	2.A6	*R/W
D0712	40712	02C7			D0762	40762	02F9	2.B6	*R/W
D0713	40713	02C8			D0763	40763	02FA	2.A7	*R/W
D0714	40714	02C9			D0764	40764	02FB	2.B7	*R/W
D0715	40715	02CA			D0765	40765	02FC	2.A8	*R/W
D0716	40716	02CB			D0766	40766	02FD	2.B8	*R/W
D0717	40717	02CC			D0767	40767	02FE	2.A9	*R/W
D0718	40718	02CD			D0768	40768	02FF	2.B9	*R/W
D0719	40719	02CE			D0769	40769	0300	2.A10	*R/W
D0720	40720	02CF			D0770	40770	0301	2.B10	*R/W
D0721	40721	02D0			D0771	40771	0302	2.A11	*R/W
D0722	40722	02D1			D0772	40772	0303	2.B11	*R/W
D0723	40723	02D2			D0773	40773	0304	2.PMD	*R/W
D0724	40724	02D3			D0774				
D0725	40725	02D4			D0775				
D0726	40726	02D5	1.A1	*R/W	D0776				
D0727	40727	02D6	1.B1	*R/W	D0777				
D0728	40728	02D7	1.A2	*R/W	D0778				
D0729	40729	02D8	1.B2	*R/W	D0779				
D0730	40730	02D9	1.A3	*R/W	D0780				
D0731	40731	02DA	1.B3	*R/W	D0781				
D0732	40732	02DB	1.A4	*R/W	D0782				
D0733	40733	02DC	1.B4	*R/W	D0783				
D0734	40734	02DD	1.A5	*R/W	D0784				
D0735	40735	02DE	1.B5	*R/W	D0785				
D0736	40736	02DF	1.A6	*R/W	D0786				
D0737	40737	02E0	1.B6	*R/W	D0787				
D0738	40738	02E1	1.A7	*R/W	D0788				
D0739	40739	02E2	1.B7	*R/W	D0789				
D0740	40740	02E3	1.A8	*R/W	D0790				
D0741	40741	02E4	1.B8	*R/W	D0791				
D0742	40742	02E5	1.A9	*R/W	D0792				
D0743	40743	02E6	1.B9	*R/W	D0793				
D0744	40744	02E7	1.A10	*R/W	D0794				
D0745	40745	02E8	1.B10	*R/W	D0795				
D0746	40746	02E9	1.A11	*R/W	D0796				
D0747	40747	02EA	1.B11	*R/W	D0797				
D0748	40748	02EB	1.PMD	*R/W	D0798				
D0749					D0799				
D0750					D0800				

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7.8.1 Data Area for USER Parameters

Register No.	Category	Description	Remarks
D0701 to D0703	User parameter	U1 to U3	Parameters U1 to U3 are used when the controller mode (UT mode) is set for loop control with PV switching or loop control with PV auto-selector. **[See Also]** User's Manual of UT551.

7.8.2 Data Area for Parameters of Ten-segment Linearizers 1 and 2

Register No.	Category	Description	Remarks
D0726 to D0748	Ten-segment linearizer-1 parameters	1.A1: Ten-segment linearizer-1 input 1 1.B1: Ten-segment linearizer-1 output 1 1.A2: Ten-segment linearizer-1 input 2 1.B2: Ten-segment linearizer-1 output 2 1.A3: Ten-segment linearizer-1 input 3 1.B3: Ten-segment linearizer-1 output 3 1.A4: Ten-segment linearizer-1 input 4 1.B4: Ten-segment linearizer-1 output 4 1.A5: Ten-segment linearizer-1 input 5 1.B5: Ten-segment linearizer-1 output 5 1.A6: Ten-segment linearizer-1 input 6 1.B6: Ten-segment linearizer-1 output 6 1.A7: Ten-segment linearizer-1 input 7 1.B7: Ten-segment linearizer-1 output 7 1.A8: Ten-segment linearizer-1 input 8 1.B8: Ten-segment linearizer-1 output 8 1.A9: Ten-segment linearizer-1 input 9 1.B9: Ten-segment linearizer-1 output 9 1.A10: Ten-segment linearizer-1 input 10 1.B10: Ten-segment linearizer-1 output 10 1.A11: Ten-segment linearizer-1 input 11 1.B11: Ten-segment linearizer 1 output 11 1.PMD: Ten-segment linearizer 1 mode	For details on the parameters, see the User's Manual of UT551. 1. A1≤1.A2≤...≤1.A11 1. B1≤1.B2≤...≤1.B11 Unit and setting range EU data: -66.7 through 105.0% of PV input range; EUS data: -66.7 through 105.0% of PV input range span; % data: -5.0 through 105.0%
D0751 to D0773	Ten-segment linearizer-2 parameters	The parameters from 2.A1 to 2.PMD are functionally the same as their corresponding parameters for ten-segment linearizer-1.	

7.9 Control Action, Loop-common Function, Ethernet Communication, and I/O Configuration Parameters

Area for Control Action Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D0901	40901	0384	RMS.1	*R/W	D0951				
D0902	40902	0385	SPT.1	*R/W	D0952				
D0903	40903	0386	PVT.1	*R/W	D0953				
D0904	40904	0387	TMU.1	*R/W	D0954				
D0905					D0955	40955	03BA	AL1.2	*R/W
D0906					D0956	40956	03BB	AL2.2	*R/W
D0907					D0957	40957	03BC	AL3.2	*R/W
D0908					D0958	40958	03BD	AL4.2	*R/W
D0909					D0959	40959	03BE	HY1.2	*R/W
D0910					D0960	40960	03BF	HY2.2	*R/W
D0911					D0961	40961	03C0	HY3.2	*R/W
D0912					D0962	40962	03C1	HY4.2	*R/W
D0913					D0963	40963	03C2	AMD.2	*R/W
D0914					D0964				
D0915	40915	0392	AL1.1	*R/W	D0965				
D0916	40916	0393	AL2.1	*R/W	D0966	40966	03C5	OPR.2	*R/W
D0917	40917	0394	AL3.1	*R/W	D0967	40967	03C6	MOD.2	*R/W
D0918	40918	0395	AL4.1	*R/W	D0968	40968	03C7	AR.2	*R/W
D0919	40919	0396	HY1.1	*R/W	D0969				
D0920	40920	0397	HY2.1	*R/W	D0970				
D0921	40921	0398	HY3.1	*R/W	D0971				
D0922	40922	0399	HY4.1	*R/W	D0972				
D0923	40923	039A	AMD.1	*R/W	D0973	40973	03CC	SPH.2	*R/W
D0924					D0974	40974	03CD	SPL.2	*R/W
D0925					D0975	40975	03CE	DY1.2	*R/W
D0926	40926	039D	OPR.1	*R/W	D0976	40976	03CF	DY2.2	*R/W
D0927	40927	039E	MOD.1	*R/W	D0977	40977	03D0	DY3.2	*R/W
D0928	40928	039F	AR.1	*R/W	D0978	40978	03D1	DY4.2	*R/W
D0929	40929	03A0	ZON	*R/W	D0979				
D0930	40930	03A1	R.MD	*R/W	D0980				
D0931	40931	03A2	R.TM	*R/W	D0981				
D0932					D0982				
D0933	40933	03A4	SPH.1	*R/W	D0983				
D0934	40934	03A5	SPL.1	*R/W	D0984				
D0935	40935	03A6	DY1.1	*R/W	D0985				
D0936	40936	03A7	DY2.1	*R/W	D0986				
D0937	40937	03A8	DY3.1	*R/W	D0987				
D0938	40938	03A9	DY4.1	*R/W	D0988				
D0939					D0989				
D0940	40940	03AD	GRP	*R/W	D0990				
D0941					D0991				
D0942	40942	03AD	SPT.2	*R/W	D0992				
D0943	40943	03AE	PVT.2	*R/W	D0993				
D0944	40944	03AF	TMU.2	*R/W	D0994				
D0945					D0995				
D0946					D0996				
D0947					D0997				
D0948					D0998				
D0949					D0999				
D0950					D1000				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

Area for Loop-common Function and Ethernet Communication Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D1001	41001	03E8	A.BS1	*R/W	D1051				
D1002	41002	03E9	A.FL1	*R/W	D1052				
D1003	41003	03EA	A.SR1	*R/W	D1053				
D1004	41004	03EB	A.LC1	*R/W	D1054				
D1005					D1055				
D1006					D1056				
D1007					D1057				
D1008					D1058				
D1009	41009	03F0	A.BS3	*R/W	D1059				
D1010	41010	03F1	A.FL3	*R/W	D1060				
D1011	41011	03F2	A.SR3	*R/W	D1061	41061	0424	IP1	*R/W
D1012	41012	03F3	A.LC3	*R/W	D1062	41062	0425	IP2	*R/W
D1013	41013	03F4	RET1	*R/W	D1063	41063	0426	IP3	*R/W
D1014	41014	03F5	RTH1	*R/W	D1064	41064	0427	IP4	*R/W
D1015	41015	03F6	RTL1	*R/W	D1065	41065	0428	SM1	*R/W
D1016	41016	03F7	RET2	*R/W	D1066	41066	0429	SM2	*R/W
D1017	41017	03F8	RTH2	*R/W	D1067	41067	042A	SM3	*R/W
D1018	41018	03F9	RTL2	*R/W	D1068	41068	042B	SM4	*R/W
D1019	41019	03FA	DVB1	*R/W	D1069	41069	042C	DG1	*R/W
D1020	41020	03FB	DVB2	*R/W	D1070	41070	042D	DG2	*R/W
D1021					D1071	41071	042E	DG3	*R/W
D1022					D1072	41072	042F	DG4	*R/W
D1023					D1073	41073	0430	ESW	R/W
D1024	41024	03FF	▲▼	*R/W	D1074				
D1025	41025	0400	A/M	*R/W	D1075	41075	0432	PRT	*R/W
D1026					D1076				
D1027					D1077				
D1028	41028	0403	MODE	*R/W	D1078				
D1029					D1079				
D1030	41030	0405	LP1	*R/W	D1080				
D1031	41031	0406	LP2	*R/W	D1081				
D1032	41032	0407	PID	*R/W	D1082				
D1033	41033	0408	USR	*R/W	D1083				
D1034	41034	0409	PYS1	*R/W	D1084				
D1035	41035	040A	PYS2	*R/W	D1085				
D1036					D1086				
D1037	41037	040C	PCM.1	*R/W	D1087				
D1038	41038	040D	ERJ	*R/W	D1088				
D1039	41039	040E	PCM.2	*R/W	D1089				
D1040	41040	040F	HSR	*R/W	D1090				
D1041					D1091				
D1042					D1092				
D1043					D1093				
D1044					D1094				
D1045					D1095				
D1046					D1096				
D1047					D1097				
D1048					D1098				
D1049					D1099				
D1050					D1100				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

Area for I/O Configuration Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D1101	41101	044C	C.S1	*R/W	D1151				
D1102	41102	044D	C.S2	*R/W	D1152				
D1103	41103	044E	C.S3	*R/W	D1153				
D1104	41104	044F	C.S4	*R/W	D1154				
D1105	41105	0450	C.S5	*R/W	D1155				
D1106	41106	0451	DO1	*R/W	D1156				
D1107	41107	0452	DO2	*R/W	D1157				
D1108	41108	0453	DO3	*R/W	D1158				
D1109	41109	0454	DO4	*R/W	D1159				
D1110	41110	0455	DO5	*R/W	D1160				
D1111	41111	0456	DO6	*R/W	D1161				
D1112	41112	0457	DO7	*R/W	D1162				
D1113					D1163				
D1114					D1164				
D1115					D1165				
D1116					D1166				
D1117					D1167				
D1118					D1168				
D1119					D1169				
D1120					D1170	41170	0491	PYA1	*R/W
D1121					D1171	41171	0492	PYB1	*R/W
D1122					D1172	41172	0493	PYA2	*R/W
D1123					D1173	41173	0494	PYB2	*R/W
D1124					D1174	41174	0495	PIDNO.b0	*R/W
D1125					D1175	41175	0496	PIDNO.b1	*R/W
D1126					D1176	41176	0497	PIDNO.b2	*R/W
D1127					D1177	41177	0498	PIDNO.b3	*R/W
D1128					D1178	41178	0499	REM	*R/W
D1129	41129	0468	A/M.1	*R/W	D1179				
D1130					D1180	41180	049B	LCL	*R/W
D1131	41131	046A	R/L.1	*R/W	D1181				
D1132					D1182				
D1133	41133	046C	S/R	*R/W	D1183				
D1134	41134	046D	CAS	*R/W	D1184				
D1135	41135	046E	AUTO	*R/W	D1185				
D1136	41136	046F	MAN	*R/W	D1186				
D1137	41137	0470	SP.b0	*R/W	D1187				
D1138	41138	0471	SP.b1	*R/W	D1188				
D1139	41139	0472	SP.b2	*R/W	D1189				
D1140	41140	0473	SP.b3	*R/W	D1190				
D1141					D1191				
D1142					D1192				
D1143					D1193				
D1144					D1194				
D1145					D1195				
D1146					D1196				
D1147					D1197				
D1148					D1198				
D1149					D1199				
D1150					D1200				

An asterisk (*) indicates that the number of writing actions is limited to 100,000.

7.9.1 Data Area for Control Action Parameters

Register No.	Category	Description	Remarks
D0901 to D0904 D0933, D0934	SP-related parameters for Loop-1	RMS.1 to TMU.1 SPH.1, SPL.1	For details on the parameters, see the User's Manual of UT551.
D0915 to D0923 D0935, D0938	Alarm setting parameters for Loop-1	AL1.1 to AMD.1 DY1.1 to DY4.1	
D0926 to D0931 D0940	Control function setting parameters for Loop-1	OPR.1 to R.TM GRP (common to Loop-1 and -2)	
D0942 to D0944 D0973, D0974	SP-related parameters for Loop-2	SPT.2 to TMU.2 SPH.2, SPL.2	
D0955 to D0963 D0975, D0978	Alarm setting parameters for Loop-2	AL1.2 to AMD.2 DY1.2 to DY4.2	
D0966 to D0968 D0940	Control function setting parameters for Loop-2	OPR.2 to AR.2 GRP (common to Loop-1 and -2)	

7.9.2 Data Area for Loop-common Function Parameters

Register No.	Category	Description	Remarks
D1001 to D1004	Input computation setting parameters	A.BS1 to A.LC1	For details on the parameters, see the User's Manual of UT551.
D1009 to D1012		A.BS3 to A.LC3	
D1013 to D1018	Retransmission output setting parameters	RET1 to RTL2	
D1019, D1020	Deviation setting parameters	DVB1, DVB2	
D1024, D1025	Key-lock setting parameters	▲▼, A/M	
D1028 to D1035	Menu-lock setting parameters	MODE, LP1 to PYS2	
D1037	PV color mode	PCM	
D1038	External RJC setpoint	ERJ	

7.9.3 Data Area for Ethernet Communication Parameters

Register No.	Category	Description	Remarks
D1061 to D1075	Ethernet communication parameters	IP1 to PRT	For details on the parameters, see the User's Manual of UT551.

7.9.4 Data Area for I/O Configuration Parameters

Register No.	Category	Description	Remarks
D1101 to D1105	SELECT display registration parameters	C.S1 to C.S5	For details on the parameters, see the User's Manual of UT551.
D1106 to D1112	Contact output flag configuration parameters	DO1 to DO7	
D1129, D1131 D1133 to D1140	Contact input configuration parameters	A/M.1, RL.1, S/R to SP.b3.	
D1170 to D1173	Ten-segment linearizer unit setting parameters	PYA1 to PYB2	
D1174 to D1177	Contact input configuration parameters	PIDNO.b0 to PIDNO.b3	
D1178 D1180		REM, LCL	

7.10 Controller Mode (UT mode), PV Input, and Control Output Parameters

Area for Controller Mode, Analog Input, and Control Output Parameters									
D-Reg No.	Ref No.	H No.	Register name	R/W	D-Reg No.	Ref No.	H No.	Register name	R/W
D1201	41201	04B0	IN1	*R/W	D1251				
D1202	41202	04B1	UNI1	*R/W	D1252				
D1203					D1253				
D1204	41204	04B3	RH1	*R/W	D1254				
D1205	41205	04B4	RL1	*R/W	D1255				
D1206	41206	04B5	SDP1	*R/W	D1256				
D1207	41207	04B6	SH1	*R/W	D1257				
D1208	41208	04B7	SL1	*R/W	D1258				
D1209	41209	04B8	BSL1	*R/W	D1259				
D1210	41210	04B9	RJC1	*R/W	D1260				
D1211					D1261	41261	04EC	V.RS	*R/W
D1212					D1262	41262	04ED	V.L	*R/W
D1213					D1263	41263	04EE	V.H	*R/W
D1214					D1264	41264	04EF	TR.T	*R/W
D1215					D1265	41265	04F0	V.MOD	*R/W
D1216					D1266	41266	04F1	INIT	*R/W
D1217					D1267	41267	04F2	V.AT	*R/W
D1218					D1268	41268	04F3	A1H	*R/W
D1219					D1269	41269	04F4	A1L	*R/W
D1220					D1270				
D1221	41221	04C4	IN3	*R/W	D1271				
D1222	41222	04C5	UNI3	*R/W	D1272	41272	04F7	A3H	*R/W
D1223					D1273	41273	04F8	A3L	*R/W
D1224	41224	04C7	RH3	*R/W	D1274				
D1225	41225	04C8	RL3	*R/W	D1275				
D1226	41226	04C9	SDP3	*R/W	D1276				
D1227	41227	04CA	SH3	*R/W	D1277				
D1228	41228	04CB	SL3	*R/W	D1278				
D1229	41229	04CC	BSL3	*R/W	D1279				
D1230	41230	04CD	P.UNI1	*R/W	D1280	41280	04FF	UTM	*R/W
D1231	41231	04CE	P.DP1	*R/W	D1281	41281	0500	SMP	*R/W
D1232	41232	04CF	P.RH1	*R/W	D1282				
D1233	41233	04D0	P.RL1	*R/W	D1283				
D1234	41234	04D1	P.UNI2	*R/W	D1284				
D1235	41235	04D2	P.DP2	*R/W	D1285				
D1236	41236	04D3	P.RH2	*R/W	D1286				
D1237	41237	04D4	P.RL2	*R/W	D1287				
D1238	41238	04D5	OT1	*R/W	D1288				
D1239	41239	04D6	OT2	*R/W	D1289				
D1240	41240	04D7	CT1	*R/W	D1290				
D1241					D1291				
D1242					D1292				
D1243					D1293				
D1244	41244	04DB	AO1	*R/W	D1294				
D1245					D1295				
D1246	41246	04DD	AO3	*R/W	D1296				
D1247					D1297				
D1248					D1298				
D1249	41249	04E0	PRI	*R/W	D1299				
D1250					D1300				

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7.10.1 Data Area for Controller Mode (UT mode), PV Input, and Control Output Parameters

Register No.	Category	Description	Remarks
D1201 to D1210	Analog input 1 parameters	IN1 to RJC1	For details on the parameters, see the User's Manual of UT551.
D1221, D1222 D1224 to D1229	Analog input 3 parameters	IN3, UNI3, RH3 to BSL3	
D1230 to D1233	PV input 1 parameters	P.UNI1 to P.RL1	
D1234 to D1237	PV input 2 parameters	P.UNI2 to P.RL2	
D1238 to D1240	Control output parameters	OT1 to CT1	
D1244, D1246	Analog output 1 and 3 types	AO1, AO3	
D1249	Communication parameter	PRI	
D1261 to D1265	Valve calibration parameters	V.RS to V.MD	
D1266	Parameter initialization	INI	
D1267	Automatic valve adjustment	V.AT	
D1268, D1269, D1272, D1273	Analog output scales	A1H, A1L, A3H, A3L	
D1280	UT mode parameter	UTM	
D1281	Control period parameter	SMP	

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