T50 SERIES COMMUNICATION PROTOCOL



T50 SERIES



N50 SERIES

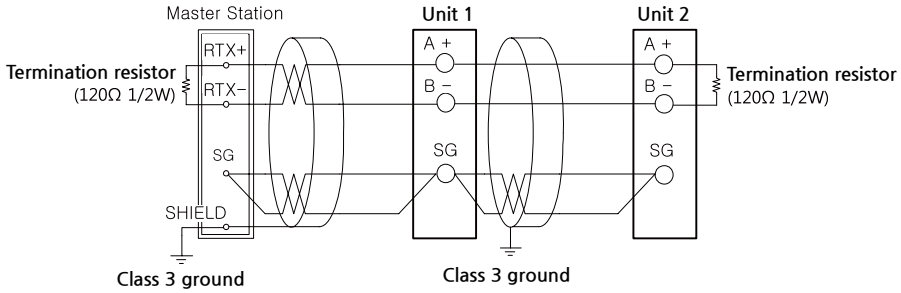
TemcoLine™

www.temcoline.com

◈ TemcoLine T50 Series Communication Overview

The communication is composed of a half-duplex two-wire system using RS-485, it is possible to connect up to 99 units (recommended 31 units) by using the prepared protocol for communication with the host computer such as PC.

※ Communication (RS-485) wiring
1) The slave (T50) can connect up to 31 units in multi drop connection.
2) Be sure to connect a terminating resistor (120Ω 1 / 2W) to the slave or master on both ends of the communication path.
3) In case by case, the signal ground can be omitted.



◈ Communication parameter

The communication parameters are for setting communication conditions, and the contents are as follows.

Parameters	Meaning	Setting value	Description	Default
COM.P	Protocol selection	HSTD	Basic protocol (Do not use it other than communication test!)	H-TL
		HSUM	**Recommended protocol**	
		H-TL	Recommended when using its multi remote monitoring software(TemcoLine)	
		MODA	Modbus-ASC II Protocol	
		MODB	Modbus-RTU Protocol	
		SYNM	Sync-Master	
		SYNS	Sync-Slave	
BPS	Baud Rates	1200 ~ 19K2	1,200 ~ 19,200 bps	9600
PRTY	Parity	NONE EVEN ODD	No parity Even parity Odd parity	NONE
STOP	Stop bit	1-bt 2-bt	1 bits 2 bits	1-bt
DTLN	Data Length	7-bt 8-bt	7 bits 8 bits	8-bt
ADDR	Address	1~99	Address setting	1
RSPN	Response time	0~10	Response time : Processing time + RSPN x 10ms	1

The above parameters show the default setting on the T50 Series. When using several T50 Series, each unit must have a different address number. For other protocols and detailed operating procedures except for HSUM, refer to the instruction manual in the product.

◈ Communication protocol

The communication of the T50 Series is done in ASCII code string, and the contents of the defined D-Register can be read and written. The protocol can be selected from two parameters.
The basic protocol is 'HSTD (not recommended)'
It starts with the start character STX (0x02) and ends with the end character CR (0x0D) LF (0x0A).
The 'HSUM (recommended)' protocol is a add Check SUM(error detection code) to 'HSTD'.

① HSTD (Basic Protocol) Frame structure (HSTD has no error detection code, so it can not be used in actual products.)

STX	Address	Command	Data	CR	LF
0x02	1~99	Refer to each Command		0x0D	0x0A

◀ not recommended

② HSUM or H-TL Frame structure

STX	**Address**	**Command**	**Data**	**Error Code**	**CR**	**LF**
0x02	**1~99**	**Refer to each Command**		**Check Sum**	**0x0D**	**0x0A**

◀ recommended protocol

Write a check Sum in a hexadecimal character string (2 characters, 2 bytes) of 1 byte which is made by adding 1 byte of ASCII code of character from the next character of STX till the error code appears in a frame

◈ Structure of Data (HSUM Protocol)

Data in frame is expressed in hexadecimal. At this time, if the data to be expressed contains a decimal point, 'x10 ^ n' is calculated and expressed as much as the number of digits of the decimal point. When reading data, '÷ 10 ^ n' is calculated to use according to the decimal point of the data to read.

ex) Expression of Data

① Without decimal point 10 → 10 x 10^0 → 000A

② Decimal point 1 10.0 → 10.0 x 10^1 = 100 → 0064

③ Decimal point 2 10.00 → 10.00x 10^2 = 1000 → 03E8

◈ Difference between "HSUM" Protocol and "H-TL" Protocol!

Basically, all frames are the same, In the case of H-TL Protocol, all temperature data processing is treated as having a decimal point. Example) **10** → 10 x 10^1 = 100 → 0064, **10.0** → 10.0 x 10^1 = 100 → 0064

◈ Communication command

The communication command of the T50 Series is a universal command that can read / write the contents of the D-Register and an information command that indicates the T50 Series model and version.

Read Command	
Command	**Description**
DRS	D-Register Sequence Read
DRR	D-Register Random Read

Write Command	
Command	**Description**
DWS	D-Register Sequence Write
DWR	D-Register Random Write

Information Command	
Command	**Description**
WHO	Self-information expression

Read Command

(1) DRS Command

DRS Command is a command to read consecutive D Register values, On the frame, set the number to read and the D register number.

Frame Format

Bytes	1	2	3	1	2	1	4	2	1	1
Frame	STX	Address	DRS	,	Number	,	D Register	CheckSUM	CR	LF

Start D Register

1~32

Response Frame Format

Bytes	1	2	3	1	2	1	4	1	...	1	4	2	1	1
Frame	STX	Address	DRS	,	OK	,	Data-1	,	...	,	Data-n	CheckSUM	CR	LF

HEX word data string

Ex) Read PV & SV value (decimal point = 1)

PV : D0001 (NPV) **SV : D0002 (NSV)**

transmission = STX + "01DRS,02,0001" + CheckSUM(C5) + CR + LF

Check SUM = (30H+31H+44H+52H+53H+2CH+30H+32H+2CH+30H+30H+30H+31H) = 2C5H

☞ Since 1 Byte Check SUM is used, "C5", converting to ASCII → "43H", "35H"

reception = STX + "01DRS,OK,04D2,0929" + CheckSUM(16) + CR + LF

Check SUM = (30H+31H+44H+52H+53H+2CH+4FH+4BH+2CH+30H+34H+44H+32H+2CH+30H+39H+32H+39H = 416H

☞ Since 1 Byte Check SUM is used, "C16", converting to ASCII → "31H", "36H"

 # PV=04D2H → 1234 → 123.4, SV = 0929H → 2345 → 234.5

Read Command

(2) DRR Command

The DRR Command is a command to read an arbitrary D Register, On the frame, set the number of read and the number of each D register.

Frame Format

Bytes	1	2	3	1	2	1	4	1	...	1	4	2	1	1
Frame	STX	Address	DRR	,	Number	,	D REG-1	,	...	,	D REG-n	CheckSUM	CR	LF

Start D Register

1~32

Response Frame Format

Bytes	1	2	3	1	2	1	4	1	...	1	4	2	1	1
Frame	STX	Address	DRR	,	OK	,	Data-1	,	...	,	Data-n	CheckSUM	CR	LF

HEX word data string

Ex) Read Range High & Low, Scale High & Low (Range decimal point = 0, Scale decimal point = 1)

Range High : D0612 (RH) Range Low : D0613 (RL)

Scale High : D0615 (SH) Scale Low : D0616 (SL)

STX : 0x02 CR : 0x0D LF : 0x0A

transmission = STX + "01DRR,04,0612,0613,0615,0616" + CheckSUM + CR + LF

reception = STX + "01DRR,OK,0005,0001,03E8,0000" + CheckSUM + CR + LF

 # Response Frame Format

Range High (RH) = 0005 → 5(VOLT) **Range Low (RL) = 0001 → 1(VOLT)**

Scale High (SH) = 03E8 → 1000 → 100.0 **Scale Low (SL) = 0000 → 0 → 0.0**

Write Command

(3) DWS Command

DWS Command is a command that can write a series of D Register values, On the frame, set the number to write, start D register number, and write data.

Frame Format

Bytes	1	2	3	1	2	1	4	1	4	1	...	1	4	2	1	1
Frame	STX	Address	DWS	,	Number	,	D REG.	,	$Data_1$	,	...	,	$Data_n$	CheckSUM	CR	LF

HEX word data string

Start D Register

1~25

Response Frame Format

Bytes	1	2	3	1	2	2	1	1
Frame	STX	Address	DWS	,	OK	CheckSUM	CR	LF

Ex) SV number & SV1, 2, 3 Write (SV number decimal point = 0,1,2,3 decimal point = 1)

SV number : D0300 (SVNO) = 1 → 0001

SV1 : D0301 (SV1) = 100.0 → 1000 → 03E8

SV2 : D0302 (SV2) = 200.0 → 2000 → 07D0

SV3 : D0303 (SV3) = 300.0 → 3000 → 0BB8

STX : 0x02

CR : 0x0D

LF : 0x0A

transmission = STX + "01DWS,04,0300,0001,03E8,07D0,0BB8" + CheckSUM + CR + LF

reception = STX + "01DWS,OK" + CheckSUM + CR + LF

Write Command

(4) DWR Command

DWR Command is a command to write an arbitrary D Register, On the frame, set the number of writes, the number of each D register, and write data.

Frame Format

Bytes	1	2	3	1	2	1	4	1	4	1	...	1	4	1	4	2	1	1
Frame	STX	Address	DWR	,	Number	,	D REG-1	,	$Data_1$	,	...	,	D REG-n	,	$Data_n$	CheckSUM	CR	LF

1~25 : Number

D Register : D REG-1

HEX word data string : $Data_1$ ~ $Data_n$

Response Frame Format

Bytes	1	2	3	1	2	2	1	1
Frame	STX	Address	DWR	,	OK	CheckSUM	CR	LF

Ex) Change alarm1 type, change alarm 1 set value, Fast function ON

Change alarm1 type : D0410 = 07 (A1TY = 07 (Upper and lower limit deviation))

Change alarm 1 set value : D0416 = 20 (AL-1 = 20 ℃)

Fast function ON : D0103 = 1 (: 0 = OFF, 1 = ON)

STX : 0x02

CR : 0x0D

LF : 0x0A

= STX + "01DWR,03,0410,0007,0416,0014,0103,0001" + CheckSUM + CR + LF

= STX + "01DWR,OK" + CheckSUM + CR + LF

Bytes	1	2	3	1	2	2	2	1	1
Frame	S T X	Address	Command	,	NG	Error Code	CheckSUM	C R	L F

Error Code	Description	Remarks
01	When assigning a nonexistent command	
02	When assigning a nonexistent register	
03	If the register specification range is exceeded	
04	Data setting error	Use characters other than valid data (Only hexadecimal number are used that data is 0 to 9 and A to F.)
08	Invalid format configuration	The assigned command differs from format The Assigned number differs from set number
14	Time out error	
16	Check sum error	
20	Busy (wait)	
00	When other error occurs	

Register	Description	
0001 - 0099	**Configure as read-only area**	
	0001(N.PV)	Present PV value
	0002(N.SV)	Present SV value
	0003(N.SVNO)	Present remote SV value
	0005(MV.OUT)	Present output value
	0008(PID.NO)	Present PID number
	0009(ALM.STS)	Present alam status (bit information)
	0014(HCM1)	Heater current value
	0016(ADE.STS)	Input processing error information (bit information)
	0017(ERR.STS)	Input and AT error information (bit information)
	0018(MOD.STS)	Present operating status information(bit information)
	0019 ~ 0099	Undefined (Disabled!)
0100-0199	Control Menu	
0200-0299	Program composition	
0300-0399	SV setting and PID setting	
0400-0499	Setting parameters concerning alam	
0500-0599	Set transmission & remote parameters and confirm (0510 - 0516 : Read Only)	
0600-0699	Set input and output parameter	

Register Map

READ ONLY | READ/WRITE | PROHIBIT (READ ONLY) | RESERVED

ADDRESS		PROCESS	CONTROL	PROGRAM	PID AUTO	ALM & HBA	RET/COM/RSP	OUT & IN
Modbus	Absolute	0	100	200	300	400	500	600
400 001	0				SV.NO	HBA1	RET	OUT
400 002	1	N.PV			SV1	H1DB	RET.H	O.ACT
400 003	2	N.SV	ZONE		SV2	HBS	RET.L	CT
400 004	3	N.SVNO	FAST		SV3	H.ADJ		CTC
400 005	4		ARW			H.HLD		HYS
400 006	5	MV.OUT			AT.M	H.EXT		PO
400 007	6	H.OUT	DIS		AT	HOC		POC
400 008	7	C.OUT						OL-H
400 009	8	PID.NO	UP.RT					OL-L
400 010	9	ALM.STS	DN.RT					
400 011	10		RTMU		1.P	A1TY	COM.P	INP
400 012	11				1.I	A2TY	BPS	UNIT
400 013	12				1.D	A3TY	PRTY	FR-H
400 014	13				1.MR	A1DB	STOP	FR-L
400 015	14	HCM1			1.Pc	A2DB	DTLN	DP-P
400 016	15				1.Ic	A3DB	ADDR	SL-H
400 017	16	ADE.STS			1.Dc	AL-1	RSPN	SL-L
400 018	17	ERR.STS			1.DB	AL-2		FILT
400 019	18	MOD.STS	Run/Stop		1.RP	AL-3		BIAS
400 020	19		Auto/Man.			A1Pn		B.OUT
400 021	20		M.MVn		2.P	A2Pn		
400 022	21				2.I	A3Pn		
400 023	22	Limit Controller			2.D			
400 024	23				2.MR			
400 025	24		Hi.Lo		2.Pc			
400 026	25		RS.Md		2.Ic			
400 027	26		HoLd		2.Dc			
400 028	27	Peak Hold			2.DB			
400 029	28	Keep Time			2.RP			
400 030	29							
400 031	30	HoPt(DAY)			3.P			
400 032	31	HoPt(MINUTE)			3.I			
400 033	32				3.D			
400 034	33				3.MR			
400 035	34				3.Pc			
400 036	35				3.Ic			
400 037	36				3.Dc			
400 038	37				3.DB			
..	..							
..	..							
400 099	99							

※ Note on Modbus communication!

1. For Modbus communication, T50-Series supports function codes 03, 06, and 16.
   That is, the Modbus supporting device uses 4x 00001 ~ 00999 (DEC) or 4x 0001 ~ 03E7 (HEX) address which is the 16bit Holding Register area

2. T50 Register Map is written in decimal number(DEC), so when using hexadecimal number(HEX) such as PLC, you must convert address to decimal number and use it.
   Ex) Address 301 (SV1) → 0x12D (hexadecimal)
   Accordingly, 400301 (SV1) → 4012D (HEXA)

3. Modbus communication is used from address 40001, depending on the vendor, it may be assigned+1 Please use it after confirming it.

Register Map

T50-SERIES DATA REGISTER MAPPING

Address	Mark	Meaning (PROCESS)	Description of Setting
1	N.PV	Present PV value	
2	N.SV	Present SV value	
3	N.SVNO	Present remote SV value	
4	DP.I		
5	MV.OUT	Present output value	
8	PID.NO	Present PID number	
9	ALM.STS	Present alam status (bit information)	**bit0:** ALM1, **bit1:** ALM2, **bit2:** ALM3
14	HCM1	Heater current value	
16	ADE.STS	Input processing error information (bit information)	
17	ERR.STS	Input and AT error information (bit information)	**bit0:** Burnout(B.out), **bit1:** RJC Error, **bit2:** +Over(+OVR), **bit3:** -Over(-OVR), **bit8:** AT Error
18	MOD.STS	Present mode status (bit information)	**bit0:** Auto(0)/Man(1), **bit1:** Run(0)/Stop(1), **bit6:** OUT1(Heating), **bit7:** OUT2(Cooling), **bit14:** A.T, **bit4:** Exceed, **bit5:** Limit Out
:	:		**Limit Controller**
27	Peak Hold	Peak value display when limit occurs	Limit Controller
28	Keep Time	Displays the over time when a limit occurs	0~60,000 sec
30	HoPt (DAY)	Heater total operating time (days)	
31	HoPt (MINUTE)	Total operating time of heater (min)	
:	:		
99	**Read only area : Address 0 ~ 99**		
102	ZONE	Activate the function of zone PID	OFF(0) / ON(1)
103	FAST	Activate the high speed PID control mode	OFF(0) / ON(1)
104	ARW	Set the Anti-reset windup	Auto(49.9) / 50.0 ~ 200.0%
105			
106	DIS	Select to type of external digital input	OFF(0), SVn(1), Run/Stop(2), Auto/Man(3), ALM/Reset(4)
107			
108	UP.RT	Set rising temperature at ramp control	OFF / EUS(0~100%)
109	DN.RT	Set falling temperature at ramp control	OFF / EUS(0~100%)
110	RT.RU	Select time unit (hour/minute)	Minute(0) / Hour(1)
:	:		
117	RST/(ALM)	Reset the alarm latch function	Reset(1)
118	RUN/STOP	Select the Run or stop for operation mode	RUN(0) / STOP(1)
119	AUTO/MAN.	Select Automatic or Manual operation mode	AUTO(0) / MANUAL(1)
120	M.MVn	Set the MV value in the manual operation mode	0.0(0) ~ 100.0 (1000) %
:	:		
124	Hi.Lo	Upper limit(1) / low limit(0) selection	LOW(0) / HIGH(1)
125	RS.Md	Restart Mode selection	OFF(0) / ON(1)
126	Hold	Hold operation selection	OFF(0) / ON(1)

Register Map

T50-SERIES DATA REGISTER MAPPING

Address	Mark	Meaning (PROCESS)	Description of Setting
300	SVNO	Select the target set value no(1~3)	1 ~ 3
301	SV1	Set the target set value for SV1	EU (0.0 ~ 100.0 %)
302	SV2	Set the target set value for SV2	EU (0.0 ~ 100.0 %)
303	SV3	Set the target set value for SV3	EU (0.0 ~ 100.0 %)
304			
305	AT M	Select the type of auto tuning	STD(0) / LOW(1)
306	AT	Start auto tuning	OFF(0) / 1 / 2 / 3 / Auto(4)
		:	
310	1.P	Proportional band	0.0(ON/OFF control) ~ 999.9 ℃
311	1.I	Integral time	OFF / 1 ~ 6000 s
312	1.D	Derivative time	OFF / 1 ~ 6000 s
313	1.MR	Manual reset	-5 ~ 105.0 %
314	1.Pc	Cooling proportional band	0.0(ON/OFF control) / ~ 999.9 ℃
315	1.Ic	Cooling Integral time	OFF / 1 ~ 6000 s
316	1.Dc	Cooling Differential time	OFF / 1 ~ 6000 s
317	1.DB	Dead band of heating and cooling	-100.0 ~ 50.0 %
318	1.RP	Set the zone point at the zone mode	EU(0) < 1RP < 2RP < EU(100 %)
		:	
320	2.P	Proportional band	0.0(ON/OFF control) ~ 999.9 ℃
321	2.I	Integral time	OFF / 1 ~ 6000 s
322	2.D	Derivative time	OFF / 1 ~ 6000 s
323	2.MR	Manual reset	-5 ~ 105.0 %
324	2.Pc	Cooling proportional band	0.0(ON/OFF control) / ~ 999.9 ℃
325	2.Ic	Cooling Integral time	OFF / 1 ~ 6000 s
326	2.Dc	Cooling Differential time	OFF / 1 ~ 6000 s
327	2.DB	Dead band of heating and cooling	-100.0 ~ 50.0 %
328	2.RP	Set the zone point at the zone mode	EU(0) < 1RP < 2RP < EU(100 %)
		:	
330	3.P	Proportional band	0.0(ON/OFF control) / ~ 999.9 ℃
331	3.I	Integral time	OFF / 1 ~ 6000 s
332	3.D	Derivative time	OFF / 1 ~ 6000 s
333	3.MR	Manual reset	-5 ~ 105.0 %
334	3.Pc	Cooling proportional band	0.0(ON/OFF control) / ~ 999.9 ℃
335	3.Ic	Cooling Integral time	OFF / 1 ~ 6000 s
336	3.Dc	Cooling Differential time	OFF / 1 ~ 6000 s
337	3.DB	Dead band of heating and cooling	-100.0 ~ 50.0 %

Register Map

T50-SERIES DATA REGISTER MAPPING

Address	Mark	Meaning (PROCESS)	Description of Setting
400	HBA1	Set the HBA's operating current	OFF(0) / 0.1 ~ 38.0 A
401	H1DB	Set the HBA's deadband(hysteresis	0.0 ~ 20.0 A
402	HBS	Set starting point of HBA detection at SCR output(4 ~ 20mA)	0 ~ 100 %
403	H.ADJ	Compensate value of heater current	-10.0 ~ 10.0 A
404	H.HLD	Hold the peak current of the heater	OFF(0) / ON(1)
405	H.EXT	Activate current monitoring at operation mode	OFF(0) / ON(1)
406	HOC	Set the HBA's over current	OFF(0) / 0.1 ~ 38.0 A
407			
408			
409			
410	A1TY	Set type of alarm 1	OFF(0) / 1 ~ 21
411	A2TY	Set type of alarm 2	OFF(0) / 1 ~ 20
412	A3TY	Set type of alarm 3	OFF(0) / 1 ~ 20
413	A1DB	Set dead band(Hysterisis) for alarm 1	EUS (0.0 ~ 100.0 %)
414	A2DB	Set dead band(Hysterisis) for alarm 2	EUS (0.0 ~ 100.0 %)
415	A3DB	Set dead band(Hysterisis) for alarm 3	EUS (0.0 ~ 100.0 %)
416	AL-1	Set alarm point for alarm 1	EUS (-100.0 ~ 100.0 %)
417	AL-2	Set alarm point for alarm 2	EUS (-100.0 ~ 100.0 %)
418	AL-3	Set alarm point for alarm 3	EUS (-100.0 ~ 100.0 %)
419	A1Pn	Set alarm port for alarm 1	OFF(0) / AL1(1) / AL2(2) / AL3(3)
420	A2Pn	Set alarm port for alarm 2	OFF(0) / AL1(1) / AL2(2) / AL3(3)
421	A3Pn	Set alarm port for alarm 3	OFF(0) / AL1(1) / AL2(2) / AL3(3)
422	A1DY	Set alarm delay time for alarm 1	OFF(0) / 1 ~ 240 s
423	A2DY	Set alarm delay time for alarm 2	OFF(0) / 1 ~ 240 s
423	A3DY	Set alarm delay time for alarm 3	OFF(0) / 1 ~ 240 s
:	:		
500	RET	Select type of transmission output or power for sensor	PV(0) / SV(1) / MV(2) / SPS(3)
501	RET.H	Set the upper limit for transmission output	EU (100.0 %)
502	RET.L	Set the lower limt of transmission output	EU (0.0 %)
:	:		
510	COM.P	Select the type of Protocol	HSTD(0) / HSUM(1) / H-TL(2) / MODA(3) / MODB(4) / SYNM(5) / SYNS(6)
511	BPS	Select the type of Baud rate	1200(1) / 2400(2) / 4800(3) / 9600(4) / 19200(5)
512	PRTY	Select the type of Parity bit	NONE(0) / EVEN(1) / ODD(2)
513	STOP	Select the Stop bit	1-BT(0) / 2-BT(1)
514	DTLN	Select the type of Data length	7-BT(0) / 8-BT(1)
515	ADDR	Set the Address number	1 ~ 99
516	RSPN	Select Response time (processing time)	1 ~ 10
517			

Register Map

T50-SERIES DATA REGISTER MAPPING

Address	Mark	Meaning (PROCESS)	Description of Setting
600	OUT	Select type of output device	Relay ON/OFF(0), / SSR(1), / SCR(2), / Relay PID(3)
601	O.ACT	Select type of output action	REV(0) / DIR(1) / DUAL(2)
602	CT	Set the cycle time	1 ~ 1000 s
603	CTC	Set the cycle time of cooling	1 ~ 1000 s
604	HYS	Set the Hysteresis	EUS (0 ~ 100 %)
605	PO	Output1 value when sensor is burn-out	-5.0 ~ 105.0 %
606	POC	Output2(cool) value at sensor is burn-out	0.0 ~ 105.0 %
607	OL-H	Set output volume of upper limit	-5.0 ~ 105.0 %
608	OL-L	Set output volume of lower limit	-5.0 ~ 105.0 %
609			
610	INP	Select type of input(sensor)	1 ~ 33
611	UNIT	Select the Temperature unit	℃ (0) ☜ Fixed!
612	FR-H	Set input range of upper limit	
613	FR-L	Set the input range of lower limit	
614	DP-P	Select the position of decimal point	0 / 1 / 2 / 3
615	SL-H	Set Scale of upper limit	-1999 ~9999 at the voltage and current input
616	SL-L	Set the Scale of lower limit	-1999 ~9999
617	FILT	Input digital filter	OFF(0) / 1 ~ 120 s
618	BIAS	Set the input compensation of low	EUS (-100 ~ 100 %)
619	B.OUT	Select the input action during burn-out	OFF(0) / UP(1) / DOWN(2)
620			
621	BS.P1	Set BIAS zone point 1	EU (0 ~ 100.0 %) FR-L(SL-L) ≤ BSP1 ≤ BSP2 ≤ BSP1 ≤ FR-H(SL-H)
622	BS.P2	Set BIAS zone point 2	EU (0 ~ 100.0 %) FR-L(SL-L) ≤ BSP1 ≤ BSP2 ≤ BSP1 ≤ FR-H(SL-H)
623	BS.P3	Set BIAS zone point 3	EU (0 ~ 100.0 %) FR-L(SL-L) ≤ BSP1 ≤ BSP2 ≤ BSP1 ≤ FR-H(SL-H)
624	BS0	Set BIAS value for point 0	EUS (-100 ~ 100 %)
625	BS1	Set BIAS value for point 1	EUS (-100 ~ 100 %)
626	BS2	Set BIAS value for point 2	EUS (-100 ~ 100 %)
627	BS3	Set BIAS value for point 3	EUS (-100 ~ 100 %)
628	BS4	Set BIAS value for point 4	EUS (-100 ~ 100 %)

Input selection code table

Input type	Input	Code	Temperature range	Accuracy	Remarks
Thermocouple (T.C)	K	1	-200 ~ 1370	±0.3% of FS + 1 Digit	* F.S is max. value to min. value of each range. * Digit is minimum of display.
		2	-199.9 ~ 999.9		
	J	15	-200 ~ 1000		
		3	-199.9 ~ 999.9		
	E	16	-200 ~ 1000		
		4	-199.9 ~ 999.9		
	T	5	-199.9 ~ 400.0		
	R	6	0 ~ 1700		
	B	7	400 ~ 1800		
	S	8	0 ~ 1700		
	L	17	-200 ~ 900		
		9	-199.9 ~ 900.0		
	N	10	-200 ~ 1300		
		14	-199.9 ~ 999.9		
	U	11	-199.9 ~ 400.0		
	C (W5)	12	0 ~ 2300		
	D (W3)	13	0 ~ 2400		
RTD	JPt100Ω (JIS, KS)	20	-199.9 ~ 500.0		
		22	-200 ~ 500		
	Pt100Ω (DIN, IEC)	21	-199.9 ~ 640.0		
		23	-200 ~ 640		
Voltage (V DC/mV DC)	0~100mV DC	33	0 ~ 100mV DC		
	-10~20mV DC	32	-10 ~ 20mV DC		
	1~5V DC	30	1~5V DC		
Current	4~20mA DC	30	When using current input, use the resistor 250Ω on input terminal.		

◈ Summary of T50-series communication protocol

T50-series supports the most protocols among domestic and overseas products
The protocol is set in COM.P of the parameter menu 7 group. You can select one of HSTD, HSUM, H-TL and MODA (Modbus-ASCII), MODB (Modbus-RTU), SYNM (Sync-Master) and SYNS (Sync-Slave).
Here, we describe three protocols, HSTD, HSUM, and H-TL
The protocol, HSTD, is not recommended for industrial use because there is no error detection code
The "HSUM" protocol is the addition of the error detection code "CHECK SUM" to HSTD
It is recommended to use "HSUM" or "H-TL" protocol.
In addition, use industry standard protocols such as MODA (Modbus-ASCII) and MODB (Modbus-RTU).
The H-TL protocol is the same as the HSUM protocol, but temperature value (PV) communicates by an unconditional decimal point mode value among the transmit / receive data formats.
In other words, in the case of HSUM, the transmission data value is wrong when the input setting is in decimal mode 0.1 ° C (2) and 1 ° C mode,

Ex) K (CA) -200 to 1370: Setting code 1
When 100 ° C is transmitted, 100 (0064H)
K (CA) -199.9 ~ 999.9: Setting code 2
If 100.0 ℃ is transmitted, 1000 (03E8H)

In the case of the H-TL protocol,
Ex) K (CA) -200 to 1370: Setting code 1
When 100 ° C is transmitted, 1000 (03E8H)
K (CA) -199.9 ~ 999.9: Setting code 2
If 100.0 ℃ is transmitted, 1000 (03E8H)

That is, in any case, the decimal point assumes that there is a single digit and processes the data.
Generally, communication of PLC and touch panel uses HSUM protocol,
The H-TL protocol is very useful for TemcoLine remote monitoring programs and PC programs.
The following commands are used in T50-Series and N50.

1) Available commands
① Read Command: DRS and DRR .
② Write Command: DWS and DWR .
③ Other information Command "WHO" can be used.

The following is an example of usage by command.

1) Read the PV (PROCESS VALUE) value.
In this case, the available commands are DRS and DRR.
You can read address 001 (N.PV) from D-REG Map.

[Request Data] STX (02H) 01 DRS, 01, 0001 C4 CR (0DH) LF (0AH)
Check SUM = 30H + 31H + 44H + 52H + 53H + 2CH + 30H + 31H + 2CH + 30H + 30H + 30H + 31H)
= 2C4H
= 1 Byte Check Since SUM is used, "C4"
[Data Response] STX (02H) 01 DRS, OK, 0097 0C CR (0DH) LF (0AH) = PV value is 0097H
= 151
= 15.1℃

2) Let's change the value of SV (SET VALUE).
In this case, the available commands are DWS and DWR.
You can write data to address 301 (SV1) in D-REG Map

[Data request] STX (02H) 01 DWR, 01, 0301, 028A D2 CR (0DH) LF (0AH)
[Data Response] STX (02H) 01 DWR, OK 14 CR (0DH) LF (0AH) = SV value is set to 028AH
= 650
= 65.0 ℃

TemcoLine™

www.temcoline.com

TEMCOLINE Co., Ltd.
Misung Bldg, 217-1, Gurojungang-ro, Seoul, 08216 Korea
Tel. +82-2-3667-5521 Fax. +82-2-2632-5549 E-Mail: sales@temcoline.com