Modbus Protocol Parameters

FDC-2500/9300
Self-Tune Fuzzy / PID
Process / Temperature Controller

FUTUREDESIGN CONTROLS

Modbus Parameter Property Table (for FDC-2500/9300)

Parameter Notation	Register Address	Parameter Description	Data Type *A	Range *B		Default Value *C	Scale *D		Unit *E
				Low	High		Low	High	
SP1	0	Set point 1	R/W	SP1L	SP1H	100.0°C (212.0°F)	-19999	45536	PV
TIME	1	Dwell Time	R/W	0	6553.5	0.0	0	65535	minute
A1SP	2	Alarm 1 Set point	R/W	*B1	*B1	100.0°C (212.0°F)	-19999	45536	*E1
A1DV	3	Alarm 1 Deviation Value	R/W	-200.0°C (-360.0°F)	200.0°C (360.0°F)	10.0°C (18.0°F)	-19999	45536	*E1
A2SP	4	Alarm 2 Set point	R/W	*B1	*B1	100.0°C (212.0°F)	-19999	45536	*E2
A2DV	5	Alarm 2 Deviation Value	R/W	-200.0°C (-360.0°F)	200.0°C (360.0°F)	10.0°C (18.0°F)	-19999	45536	*E2
RAMP	6	Ramp Rate	R/W	0	500.0°C (900.0°F)	0.0	0	65535	*E3
OFST	7	Offset Value for P control	R/W	0	100.0	25.0	0	65535	%
REFC	8	Reference Constant for Specific Function	R/W	0	60	2	0	65535	—
SHIF	9	PV1 Shift (offset) Value	R/W	-200.0°C (-360.0°F)	200.0°C (360.0°F)	0.0	-19999	45536	PV1
PB1	10	Proportional Band 1 Value	R/W	0	500.0°C (900.0°F)	10.0°C (18.0°F)	0	65535	PV
TI1	11	Integral Time 1 Value	R/W	0	1000	100	0	65535	Sec
TD1	12	Derivative Time 1 Value	R/W	0	360.0	25.0	0	65535	Sec
CPB	13	Cooling Proportional Band Value	R/W	1	255	100	0	65535	% of PB
	14								
SP2	15	Set point 2	R/W	*B2	*B2	37.8°C (100.0°F)	-19999	45536	PV
PB2	16	Proportional Band 2 Value	R/W	0	500.0°C (900.0°F)	10.0°C (18.0°F)	0	65535	PV
TI2	17	Integral Time 2 Value	R/W	0	1000	100	0	65535	Sec
TD2	18	Derivative Time 2 Value	R/W	0	360.0	25.0	0	65535	Sec
O1HY	19	Output 1 ON-OFF Control Hysteresis	R/W	0.1	55.6°C (100.0°F)	0.1	0	65535	PV
A1HY	20	Hysteresis Control of Alarm 1	R/W	0.1	10.0°C (18.0°F)	0.1	0	65535	*E1
A2HY	21	Hysteresis Control of Alarm 2	R/W	0.1	10.0°C (18.0°F)	0.1	0	65535	*E2
PL1	22	Output 1 Power Limit	R/W	0	100	100	0	65535	%
PL2	23	Output 2 Power Limit	R/W	0	100	100	0	65535	%
FUNC	24	Function Complexity Level	R/W	0 *B3	1 *B3	1	0	65535	—
COMM	25	Communication Interface Type	R *A1	0 *B4	8 *B4	1	0	65535	—
PROT	26	COMM Protocol Selection	R *A1	0 *B5	0 *B5	0	0	65535	—
ADDR	27	Address Assignment of Digital COMM	R *A1	1	255	—	0	65535	—
BAUD	28	Baud Rate of Digital COMM	R *A1	0 *B7	9 *B7	5	0	65535	—
DATA	29	Data Bit count of Digital COMM	R *A1	0 *B8	1 *B8	1	0	65535	—
PARI	30	Parity Bit of Digital COMM	R *A1	0 *B9	2 *B9	0	0	65535	—
STOP	31	Stop Bit Count of Digital COMM	R *A1	0 *B10	1 *B10	0	0	65535	—
AOFN	32	Analog Output Function	R/W	0 *B11	7 *B11	0	0	65535	—
AOLO	33	Analog Output Low Scale Value	R/W	-19999	45536	0°C (32.0°F)	-19999	45536	*E4
AOHI	34	Analog Output High Scale Value	R/W	-19999	45536	100.0°C (212.0°F)	-19999	45536	*E4
IN1	35	IN1 Sensor Type Selection	R/W	0 *B12	17 *B12	1 (0)	0	65535	—
IN1U	36	IN1 Unit Selection	R/W	0 *B13	2 *B13	0 (1)	0	65535	—
DP1	37	IN1 Decimal Point Selection	R/W	0 *B14	3 *B14	1	0	65535	—
IN1L	38	IN1 Low Scale Value	R/W	-19999	45536	0	-19999	45536	*E5
IN1H	39	IN1 High Scale Value	R/W	-19999	45536	1000	-19999	45536	*E5

Modbus Parameter Property Table (for FDC-2500/9300)

Parameter Notation	Register Address	Parameter Description	Data Type *A	Range *B		Default Value *C	Scale *D		Unit *E
				Low	High		Low	High	
SP1L	40	SP1 Low Scale Value	R/W	-19999	45536	0°C (32.0°F)	-19999	45536	PV
SP1H	41	SP1 High Scale Value	R/W	-19999	45536	1000.0°C (1832.0°F)	-19999	45536	PV
IN2	42	IN2 Signal Type Selection	R/W	*B150	*B1520	1	0	65535	—
IN2U	43	IN2 Unit Selection	R/W	*B130	*B132	2	0	65535	—
DP2	44	IN2 Decimal Point Selection	R/W	*B140	*B143	1	0	65535	—
IN2L	45	IN2 Low Scale Value	R/W	-19999	45536	0	-19999	45536	*E6
IN2H	46	IN2 High Scale Value	R/W	-19999	45536	1000	-19999	45536	*E6
DISF	47	Display Format Selection for FDC-2500	R/W	*B210	*B211	0	0	65535	—
EIFN	48	Event Input Function	R/W	*B160	*B169	1	0	65535	—
OUT1	49	Output 1 Function	R/W	*B170	*B171	0	0	65535	—
O1TY	50	Output 1 Signal Type	R/W	*B180	*B188	0	0	65535	—
CYC1	51	Output 1 Cycle Time	R/W	0.1	100.0	18.0	0	65535	Sec
O1FT	52	Output 1 Failure Transfer Mode	R/W	*B19-1	*B19100.0	-1	-19999	45536	%
OUT2	53	Output 2 Function	R/W	*B200	*B203	2	0	65535	—
O2TY	54	Output 2 Signal Type	R/W	*B180	*B188	0	0	65535	—
CYC2	55	Output 2 Cycle Time	R/W	0.1	100.0	18.0	0	65535	Sec
O2FT	56	Output 2 Failure Transfer Mode	R/W	*B19-1	*B19100.0	-1	-19999	45536	%
A1FN	57	Alarm 1 Function	R/W	*B220	*B2215	2	0	65535	—
A1MD	58	Alarm 1 Operation Mode	R/W	*B230	*B233	0	0	65535	—
A1FT	59	Alarm 1 Failure Transfer Mode	R/W	*B240	*B241	1	0	65535	—
A2FN	60	Alarm 2 Function	R/W	*B220	*B2215	2	0	65535	—
A2MD	61	Alarm 2 Operation Mode	R/W	*B230	*B233	0	0	65535	—
A2FT	62	Alarm 2 Failure Transfer Mode	R/W	*B240	*B241	1	0	65535	—
SELF	63	Self Tune Function Selection	R/W	*B250	*B251	0	0	65535	—
SLEP	64	Sleep mode Function Selection	R/W	*B260	*B261	0	0	65535	—
PVMD	65	PV Mode Selection	R/W	*B270	*B273	0	0	65535	—
SP2F	66	Format of Set point 2 Value	R/W	*B280	*B281	0	0	65535	—
FILT	67	Filter Damping Time Constant of PV	R/W	*B290	*B299	2	0	65535	—
SPMD	68	Set point Mode Selection	R/W	*B300	*B305	0	0	65535	—
SEL1	69	Select 1'st Parameter	R/W	*B310	*B3118	0	0	65535	—
SEL2	70	Select 2'nd Parameter	R/W	*B310	*B3118	0	0	65535	—
SEL3	71	Select 3'rd Parameter	R/W	*B310	*B3118	0	0	65535	—
SEL4	72	Select 4'th Parameter	R/W	*B310	*B3118	0	0	65535	—
SEL5	73	Select 5'th Parameter	R/W	*B310	*B3118	0	0	65535	—
	74								
	75								
DRIF	76	Warm-up Drift Calibration Factor	R/W	-5.0°C	5.0°C	—	-19999	45536	°C
AD0	77	A to D Zero Calibration Coefficient	R/W	-360	360	—	-19999	45536	—
ADG	78	A to D Gain Calibration Coefficient	R/W	-199.9	199.9	—	-19999	45536	—
V1G	79	Voltage Input 1 Gain Calibration Coefficient	R/W	-199.9	199.9	—	-19999	45536	—

Modbus Parameter Property Table (for FDC-2500/9300)

Parameter Notation	Register Address	Parameter Description	Data Type *A	Range *B		Default Value *C	Scale *D		Unit *E
				Low	High		Low	High	
CJTL	80	Cold Junction Low Temperature Calibration Coefficient	R/W	-5.00	40.00	—	-19999	45536	℃
CJG	81	Cold Junction Gain Calibration Coefficient	R/W	-199.9	199.9	—	-19999	45536	—
REF1	82	Reference Voltage 1 Calibration Coefficient for RTD 1	R/W	-199.9	199.9	—	-19999	45536	—
SR1	83	Serial Resistance 1 Calibration Coefficient for RTD 1	R/W	-199.9	199.9	—	-19999	45536	—
MA1G	84	mA Input 1 Gain Calibration Coefficient	R/W	-199.9	199.9	—	-19999	45536	—
REF2	85	Reference Voltage 2 Calibration Coefficient for RTD 2	R/W	-199.9	199.9	—	-19999	45536	—
SR2	86	Serial Resistance 2 Calibration Coefficient for RTD 2	R/W	-199.9	199.9	—	-19999	45536	—
V2G	87	Voltage Input 2 Gain Calibration Coefficient	R/W	-199.9	199.9	—	-19999	45536	—
MA2G	88	mA Input 2 Gain Calibration Coefficient	R/W	-199.9	199.9	—	-19999	45536	—
O2L	89	Output 2 Low Calibration Coefficient	R/W	0	360.0	—	0	65535	—
O2H	90	Output 2 High Calibration Coefficient	R/W	0	900.0	—	0	65535	—
SIG1	91	Point 1 Signal Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	*E8
IND1	92	Point 1 Indication Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	PV
SIG2	93	Point 2 Signal Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	*E8
IND2	94	Point 2 Indication Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	PV
SIG3	95	Point 3 Signal Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	*E8
IND3	96	Point 3 Indication Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	PV
SIG4	97	Point 4 Signal Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	*E8
IND4	98	Point 4 Indication Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	PV
SIG5	99	Point 5 Signal Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	*E8
IND5	100	Point 5 Indication Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	PV
SIG6	101	Point 6 Signal Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	*E8
IND6	102	Point 6 Indication Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	PV
SIG7	103	Point 7 Signal Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	*E8
IND7	104	Point 7 Indication Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	PV
SIG8	105	Point 8 Signal Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	*E8
IND8	106	Point 8 Indication Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	PV
SIG9	107	Point 9 Signal Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	*E8
IND9	108	Point 9 Indication Value of Special Sensor	R/W	-19999	45536	—	-19999	45536	PV
TYPE	109	Signal Type of Special Sensor	R/W	0	3	—	0	65535	—
DATE	110	Manufacturing Date of Product	R	0	3719	—	0	65535	—
NO	111	Serial Number of Product	R	1	999	—	0	65535	—
HOUR	112	Working Hour Value	R	0	65535	—	0	65535	Hour
HRLO	113	Fractional Hour Value	R	0	0.9	—	0	65535	0.1Hour
ERR1	114	Historical Error Record 1	R/W	0	FFFF	0	0	65535	—
ERR2	115	Historical Error Record 2	R/W	0	FFFF	0	0	65535	—
DELI	116	ASCII Input Delimiter	R/W	0000	007F	000A	0	65535	—
BPL1	117	OUT1 Bumpless Transfer Value	R	0	100.00	—	0	65535	%
BPL2	118	OUT2 Bumpless Transfer Value	R	0	100.00	—	0	65535	%
	119								

Parameter Notation	Register Address	Parameter Description	Data Type *A	Range *B		Default Value *C	Scale *D		Unit *E
				Low	High		Low	High	
	120								
	121								
PVHI	122	Historical Maximum Value of PV	R/W	-19999	45536	—	-19999	45536	PV
PVLO	123	Historical Minimum Value of PV	R/W	-19999	45536	—	-19999	45536	PV
	124								
CJCL	125	Sense Voltage of Cold Junction Calibration Low	R	31.680	40.320	—	0	65535	mV
	126								
FILE	127	Default File Selection	R/W	0 *B32	1 *B32	—	0	65535	—
PV	128	Current Process Value	R	-19999	45536	—	-19999	45536	PV
SV	129	Current set point Value	R	-19999	45536	—	-19999	45536	PV
MV1	130	Current Output 1 Value	R	0	100.00	—	0	65535	%
MV2	131	Current Output 2 Value	R	0	100.00	—	0	65535	%
ALM	132	Contains Conditional Code of Parameters' Resolution and Current Alarm Status	R	0 *B33	*B33 EF7F	—	0	65535	—
DV	133	Current Deviation (PV-SV)Value	R	-12600	12600	—	-19999	45536	PV
PV1	134	IN1 Process Value	R	-19999	45536	—	-19999	45536	*E5
PV2	135	IN2 Process Value	R	-19999	45536	—	-19999	45536	*E6
PB	136	Current Proportional Band Value	R	0	500.0°C (900.0°F)	—	0	65535	PV
TI	137	Current Integral Time Value	R	0	4000	—	0	65535	Sec
TD	138	Current Derivative Time Value	R	0	1440	—	0	65535	Sec
EROR	139	Current Error Code	R	0 *B34	40 *B34	—	0	65535	—
PROG	140	Program Identification Code Contains Program Number and Version Number	R	0 *B35	15.99 *B35	—	0	65535	—
MODE	141	Contains Lockout Status Code and Current System Mode	R	0 *B36	3.5 *B36	—	0	65535	—
CMND	142	Command Password	R/W	0	65535	—	0	65535	—
JOB	143	Job Password	R/W	0	65535	—	0	65535	—
CJCT	144	Cold Junction Compensation Temperature	R	-40.00°C	90.00°C	—	-19999	45536	°C
PVR	145	Current Process Rate Value	R	-16383	16383	—	-19999	45536	PV/min
PVRH	146	Maximum Process Rate Value	R	-16383	16383	—	-19999	45536	PV/min
PVRL	147	Minimum Process Rate Value	R	-16383	16383	—	-19999	45536	PV/min
SPC	148	Current Target Value of set point	R	-19999	45536	—	-19999	45536	PV
WDATA	149	Write Data for communication during calibration procedure	R/W	-19999	45536	—	-19999	45536	—
	150								
	151								
	152								
	153								
	154								
	155								
	156								
	157								

Notes:

*A: R/W Specifies a readable / writable data, R specifies a read only data.

*A1: The communication setup data which can't be modified via communication. However these data can be set by using key pad on front panel.

*B: The range of some parameters are dependent on the input types. The range of IN1 and IN2 for various input type is shown in the following table:

Input (IN1 or IN2) Range Table

Input Type	J_TC	K_TC	T_TC	E_TC	B_TC	R_TC	S_TC
Range Low	-120°C (-184°F)	-200°C (-328°F)	-250°C (-418°F)	-100°C (-148°F)	0°C (32°F)	0°C (32°F)	0°C (32°F)
Range High	1000°C (1832°F)	1370°C (2498°F)	400°C (752°F)	900°C (1652°F)	1820°C (3308°F)	1767.8°C (3214°F)	1767.8°C (3214°F)

Input Type	N_TC	L_TC	PT.DN	PT.JS	CT	Linear (V, mA) or SPEC
Range Low	-250°C (-418°F)	-200°C (-328°F)	-210°C (-346°F)	-200°C (-328°F)	0 Amp	-19999
Range High	1300°C (2372°F)	900°C (1652°F)	700°C (1292°F)	600°C (1112°F)	90 Amp	45536

*B1: Range of A1SP

If A1FN =	PV1.H, PV1.L	PV2.H,PV2.L	P1.2.H, P1.2.L D1.2.H, D1.2.L
Range of A1SP same as range of	IN1	IN2	IN1, IN2

Range of A2SP

If A2FN =	PV1.H, PV1.L	PV2.H,PV2.L	P1.2.H, P1.2.L D1.2.H, D1.2.L
Range of A2SP same as range of	IN1	IN2	IN1, IN2

Exception: If A1SP or A2SP is configured with respect to CT input, its adjustment range is unlimited.

*B2: Range of SP2

If PVMD =	PV1	PV2	P1−2, P2−1
Range of SP2 same as range of	IN1	IN2	IN1, IN2

Exception: If SP2 is configured with respect to CT input, its adjustment range is unlimited.

*B3, Display symbol and description for FUNC

Parameter Value	Display Symbol	Description
0	BASC	Basic Function Mode
1	FULL	Full Function Mode

*B4, Display symbol and description for COMM

Parameter Value	Display Symbol	Description
0	NONE	No communication function
1	485	RS-485 interface
2	232	RS-232 interface
3	4 - 20	4 - 20 mA analog retransmission output
4	0 - 20	0 - 20 mA analog retransmission output
5	0 - 1V	0 - 1V analog retransmission output
6	0 - 5V	0 - 5V analog retransmission output
7	1 - 5V	1 - 5V analog retransmission output
8	0 - 10V	0 - 10V analog retransmission output

*B5, Display symbol and description for PROT

Parameter Value	Display Symbol	Description
0	RTU	Modbus protocol RTU mode
1	ASCI	Modbus protocol ASCII mode
2	DNET	Device net protocol
3	PBUS	Profibus protocol
4	FBUS	Field bus protocol
5	ABUS	Reserved protocol
6	BNET	Reseved protocol

*B7, Display symbol and description for BAUD

Parameter Value	Display Symbol	Description
0	0.3	0.3 Kbits/s baud rate
1	0.6	0.6 Kbits/s baud rate
2	1.2	1.2 Kbits/s baud rate
3	2.4	2.4 Kbits/s baud rate
4	4.8	4.8 Kbits/s baud rate
5	9.6	9.6 Kbits/s baud rate
6	14.4	14.4 Kbits/s baud rate
7	19.2	19.2 Kbits/s baud rate
8	28.8	28.8 Kbits/s baud rate
9	38.4	38.4 Kbits/s baud rate

*B8, Display symbol and description for DATA

Parameter Value	Display Symbol	Description
0	7BIT	7 data bits
1	8BIT	8 data bits

*B9, Display symbol and description for PARI

Parameter Value	Display Symbol	Description
0	EVEN	Even parity
1	ODD	Odd parity
2	NONE	No parity bit

*B10, Display symbol and description for STOP

Parameter Value	Display Symbol	Description
0	1BIT	One stop bit
1	2BIT	Two stop bits

*B11, Display symbol and description for AOFN

Parameter Value	Display Symbol	Description
0	PV1	Retransmit IN1 process value
1	PV2	Retransmit IN2 process value
2	P1−2	Retransmit IN1−IN2 difference process value
3	P2−1	Retransmit IN2−IN1 difference process value
4	SV	Retransmit set point value
5	MV1	Retransmit output 1 manipulation value
6	MV2	Retransmit output 2 manipulation value
7	DV	Retransmit deviation(PV-SV) Value

*B12, Display symbol and description for IN1

Parameter Value	Display Symbol	Description
0	J_TC	J type thermocouple
1	K_TC	K type thermocouple
2	T_TC	T type thermocouple
3	E_TC	E type thermocouple
4	B_TC	B type thermocouple
5	R_TC	R type thermocouple
6	S_TC	S type thermocouple
7	N_TC	N type thermocouple
8	L_TC	L type thermocouple
9	PT.DN	PT 100 ohms DIN curve
10	PT.JS	PT 100 ohms JIS curve
11	4 - 20	4 - 20 mA linear current input
12	0 -20	0 - 20 mA linear current input
13	0 -1V	0 - 1V linear Voltage input
14	0 - 5V	0 - 5V linear Voltage input
15	1 - 5V	1 - 5V linear Voltage input
16	0 - 10	0 - 10V linear Voltage input
17	SPEC	Special defined sensor curve

*B13, Display symbol and description for IN1U & IN2U

Parameter Value	Display Symbol	Description
0	°C	Degree C unit
1	°F	Degree F unit
2	PU	Process unit

*B14, Display symbol and description for DP1 & DP2

Parameter Value	Display Symbol	Description
0	NO.DP	No decimal point
1	1-DP	1 decimal digit
2	2-DP	2 decimal digits
3	3-DP	3 decimal digits

*B15, Display symbol and description for IN2

Parameter Value	Display Symbol	Description
0	NONE	IN2 no function
1	CT	Current transformer input
2	4 - 20	4 - 20 mA linear current input
3	0 - 20	0 - 20 mA linear current input
4	0 - 1V	0 - 1V linear voltage input
5	0 - 5V	0 - 5V linear voltage input
6	1 - 5V	1 - 5V linear voltage input
7	0 - 10	0 - 10V linear voltage input
8	J_TC	J type thermocouple
9	K_TC	K type thermocouple
10	T_TC	T type thermocouple
11	E_TC	E type thermocouple
12	B_TC	B type thermocouple
13	R_TC	R type thermocouple
14	S_TC	S type thermocouple
15	N_TC	N type thermocouple
16	L_TC	L type thermocouple
17	PT.DN	PT 100 ohms DIN curve
18	PT.JS	PT 100 ohms JIS curve
19	SPEC	Special defined sensor curve
20	EIFN	Perform event input function

*B16, Display symbol and description for EIFN

Parameter Value	Display Symbol	Description
0	NONE	Event input no function
1	SP2	SP2 activated to replace SP1
2	PID2	PB2, TI2, TD2 activated to replace PB1, TI1, TD1
3	SP.P2	SP2, PB2, TI2, TD2 activated to replace SP1, PB1, TI1, TD1
4	RS.A1	Reset alarm 1 output
5	RS.A2	Reset alarm 2 output
6	R.A1.2	Reset alarm 1 & alarm 2
7	D.O1	Disable Output 1
8	D.O2	Disable Output 2
9	D.O1.2	Disable Output 1 & Output 2
10	LOCK	Lock all parameters

*B17, Display symbol and description for OUT1

Parameter Value	Display Symbol	Description
0	REVR	Reverse (heating) control action
1	DIRT	Direct (cooling) control action

*B18, Display symbol and description for O1TY & O2TY

Parameter Value	Display Symbol	Description
0	RELY	Relay output
1	SSRD	Solid state relay drive output
2	SSR	Solid state relay output
3	4 - 20	4 - 20 mA current module
4	0 - 20	0 - 20 mA current module
5	0 - 1V	0 - 1V voltage module
6	0 - 5V	0 - 5V voltage module
7	1 - 5V	1 - 5V voltage module
8	0 - 10	0 - 10V voltage module

*B19: Failure transfer mode for output 1 and output 2, select BPLS (bumpless transfer) or 0.0 ~ 100.0 % to continue output 1 and output 2 control function as the unit fails , power starts or manual mode starts.

*B20, Display symbol and description for OUT2

Parameter Value	Display Symbol	Description
0	NONE	Output 2 no function
1	COOL	PID cooling control
2	=AL2	Perform alarm 2 function
3	DCPS	DC power supply module installed

*B21, Display symbol and description for DISF

Parameter Value	Display Symbol	Description
0	PV	Display PV Value
1	SV	Display SV Value

*B22, Display symbol and description for A1FN & A2FN

Parameter Value	Display Symbol	Description
0	NONE	No alarm function
1	TIMR	Dwell timer action
2	DE.HI	Deviation high alarm
3	DE.LO	Deviation low alarm
4	DB.HI	Deviation band out of band alarm
5	DB.LO	Deviation band in band alarm
6	PV1.H	IN1 process value high alarm
7	PV1.L	IN1 process value low alarm
8	PV2.H	IN2 process value high alarm
9	PV2.L	IN2 process value low alarm
10	P1.2.H	IN1 or IN2 process value high alarm
11	P1.2.L	IN1 or IN2 process value low alarm
12	D1.2.H	IN1 – IN2 difference process value high alarm
13	D1.2.L	IN1 – IN2 difference process value low alarm
14	LB	Loop break alarm
15	SEN.B	Sensor break or A-D fails

*B23, Display symbol and description for A1MD & A2MD

Parameter Value	Display Symbol	Description
0	NORM	Normal alarm action
1	LTCH	Latching alarm action
2	HOLD	Hold alarm action
3	LT.HO	Latching & Hold action

*B24, Display symbol and description for A1FT & A2FT

Parameter Value	Display Symbol	Description
0	OFF	Alarm output OFF as unit fails
1	ON	Alarm output ON as unit fails

*B25, Display symbol and description for SELF

Parameter Value	Display Symbol	Description
0	NONE	Self tune function disabled
1	YES	Self tune function enabled

*B26, Display symbol and description for SLEP

Parameter Value	Display Symbol	Description
0	NONE	Sleep mode function disabled
1	YES	Sleep mode function enabled

*B27, Display symbol and description for PVMD

Parameter Value	Display Symbol	Description
0	PV1	Use PV1 as process value
1	PV2	Use PV2 as process value
2	P1 – 2	Use PV1 – PV2 (difference) as process value
3	P2 – 1	Use PV2 – PV1 (difference) as process value

*B28, Display symbol and description for SP2F

Parameter Value	Display Symbol	Description
0	ACTU	set point 2 (SP2) is an actual value
1	DEVI	set point 2 (SP2) is a deviation value

*B29, Display symbol and description for FILT

Parameter Value	Display Symbol	Description
0	0	0 second time constant
1	0.2	0.2 second time constant
2	0.5	0.5 second time constant
3	1	1 second time constant
4	2	2 seconds time constant
5	5	5 seconds time constant
6	10	10 seconds time constant
7	20	20 seconds time constant
8	30	30 seconds time constant
9	60	60 seconds time constant

*B30, Display symbol and description for SPMD

Parameter Value	Display Symbol	Description
0	SP1.2	Use SP1 or SP2 (depends on EIFN) as set point
1	MIN.R	Use minute ramp rate as set point
2	HR.R	Use hour ramp rate as set point
3	PV1	Use IN1 process value as set point
4	PV2	Use IN2 process value as set point
5	PUMP	Selected for pump control

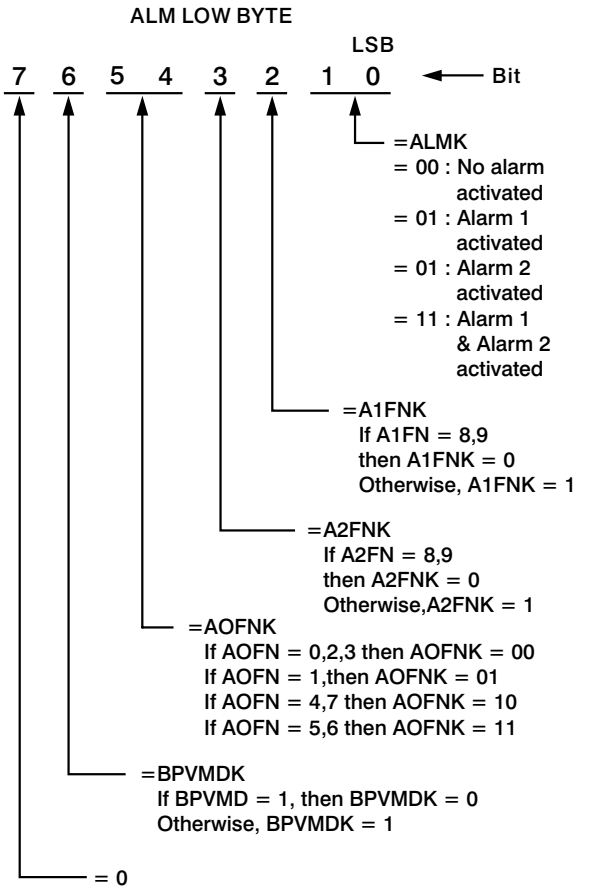
*B31, Display symbol and description for SEL1 ~ SEL5

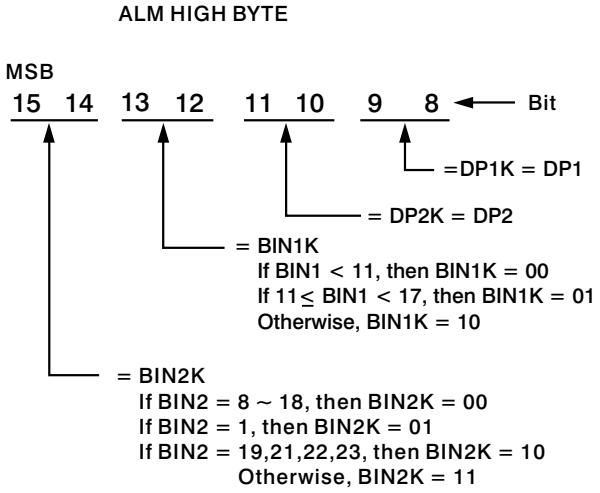
Parameter Value	Display Symbol	Description
0	NONE	No parameter put ahead
1	TIME	Parameter TIME put ahead
2	A1.SP	Parameter A1SP put ahead
3	A1.DV	Parameter A1DV put ahead
4	A2.SP	Parameter A2SP put ahead
5	A2.DV	Parameter A2DV put ahead
6	RAMP	Parameter RAMP put ahead
7	OFST	Parameter OFST put ahead
8	REFC	Parameter REFC put ahead
9	SHIF	Parameter SHIF put ahead
10	PB1	Parameter PB1 put ahead
11	TI1	Parameter TI1 put ahead
12	TD1	Parameter TD1 put ahead
13	C.PB	Parameter CPB put ahead
14		Reserved, not used
15	SP2	Parameter SP2 put ahead
16	PB2	Parameter PB2 put ahead
17	TI2	Parameter TI2 put ahead
18	TD2	Parameter TD2 put ahead

*B32, Display symbol and description for FILE

Parameter Value	Display Symbol	Description
0	0	Perform default setting by using °C FILE
1	1	Perform default setting by using °F FILE

*B33, Description of ALM Value





*B34, Error messages

Error Code	Display Symbol	Error Description	Corrective Action
1	Er01	Illegal setup values used: PV1 is used for both PVMD and SPMD that is meaningless for control.	Check and correct setup values of PVMD and SPMD, PV and SV can't use the same value for normal control
2	Er02	Illegal setup values used: PV2 is used for both PVMD and SPMD that is meaningless for control	Same as error code 1
3	Er03	Illegal setup values used: P1-2 or P2-1 is used for PVMD while PV1 or PV2 is used for SPMD. Dependent values are used for PV and SV will produce incorrect result of control	Check and correct setup values of PVMD and SPMD. Difference of PV1 and PV2 can't be used for PV while PV1 or PV2 is used for SV
4	Er04	Illegal setup values used: COOL is used for OUT2, but DIRT (cooling action) is already used for OUT1 or PID mode is not used for OUT1 (that is PB1 or PB2 =0, and TI1 or TI2 =0)	Check and correct setup values of OUT2, PB1, PB2, TI1, TI2 and OUT1. IF OUT2 is required for cooling control, the control should use PID mode (PB ≠ 0, TI ≠ 0) and OUT1 should use reverse mode (heating action), otherwise, don't use OUT2 for cooling control
5	Er05	Illegal setup values used: unequal IN1U and IN2U or unequal DP1 and DP2 while P1-2 or P2-1 is used for PVMD or, PV1 or PV2 is used for SPMD or, P1.2.H, P1.2.L, D1.2.H or D1.2.L are used for A1FN or A2FN.	Check and correct setup values of IN1U , IN2U, DP1, DP2, PVMD, SPMD, A1FN or A2FN. Same unit and decimal point should be used if both PV1 and PV2 are used for PV, SV, alarm1 or alarm 2.
6	Er06	Illegal setup values used: OUT2 select =AL2 but A2FN select NONE	Check and correct setup values of OUT2 and A2FN. OUT2 will not perform alarm function if A2FN select NONE.
7	Er07	Illegal setup values used: Dwell timer (TIMR) is selected for both A1FN and A2FN.	Check and correct setup values of A1FN and A2FN. Dwell timer can only be properly used for single alarm output.
9	Er09	Communication error: receive error due to parity error, framing error, overrun error, receive buffer full error, frame check-sum error or receive disturbed	1.Correct the communication software to meet the protocol requirements 2. Add a terminating resister to the multi-drop link (RS-485) to minimize the noise. 3. Use twisted pair wire for RS-485 interface connection to minimize the noise. 4. Check the polarity of RS-485 interface connection.
10	Er 10	Communication error: bad function code	Correct the communication software to meet the protocol requirements.
11	Er 11	Communication error: register address out of range	Don't issue an over-range address of register to the slave.
12	Er 12	Communication error: access a non-existent parameter	Don't issue a non-existent parameter to the slave.
14	Er 14	Communication error: attempt to write a read only data	Don't write a read only data or a protected data to the slave.
15	Er 15	Communication error: write a value which is out of range to a register	Don't write an over-range data to the slave register.
17	Er 17	Computing error: Illegal (unnormalized) floating point data	Software bug. Return to factory for repair.
18	Er 18	Computing error: Arithmetic result overflow or underflow	Software bug. Return to factory for repair.
19	Er 19	Computing error: divided by zero	Don't use an equal value for AOLO and AOHI.
20	Er20	Computing error: Illegal BCD data entry	Software bug. Return to factory for repair.
21	Er21	Timing error: A to D conversion data error due to overrun	A to D converter doesn't work properly. Return to factory for repair.
22	Er22	Timing error: check-sum error received during multi-chip communication procedure	1.Correct the multi-chip communication software to meet the protocol requirement. 2.Return to factory for repair.
23	Er23	Timing error: wrong function code received during multi-chip communication procedure	1.Correct the multi-chip communication software to meet the protocol requirement. 2.Return to factory for repair.

26	AtEr	Fail to perform auto-tuning function	1.The PID values obtained after auto-tuning procedure are out of range. Retry auto-tuning. 2.Don't change set point value during auto-tuning procedure. 3.Don't change Event input state during auto-tuning procedure. 4.Use manual tuning instead of auto-tuning.
27	CAEr	Incorrect calibration procedure or tolerance of analog component too big to meet specified accuracy	1.Pay more attention to the calibration procedures. 2.Return to factory for repair.
28	CrPE	Memory comparison error, different value detected in the EEPROM and mapped RAM	1.Check and correct the wiring and grounding problems to minimize the system noise. 2.Return to factory for repair.
29	EEPE	EEPROM can't be written correctly	Return to factory for repair.
32	CJEr	Cold junction compensation device(s) malfunction	Return to factory for repair.
33	KYEr	Key switch shorted or related PCB circuit shorted	Return to factory for repair.
34	LLL2	Input 2 (IN2) signal too low	1.Check if the input 2 sensor used is accordant with IN2 type selection. 2.Check the connection polarity of input 2 sensor. 3.Replace input 2 sensor.
35	HHH2	Input 2 (IN2) signal too high	1.Check if the input 2 sensor used is accordant with IN2 type selection. 2.Replace input 2 sensor.
36	LLL 1	Input 1 (IN1) signal too low	1.Check if the input 1 sensor used is accordant with IN1 type selection. 2.Check the connection polarity of input 1 sensor. 3.Replace input 1 sensor.
37	HHH 1	Input 1 (IN1) signal too high	1.Check if the input 1 sensor used is accordant with IN1 type selection. 2.Replace input 1 sensor.
38	Sb2E	Input 2 (IN2) sensor break, or input 2 current below 1 mA if 4-20 mA is selected, or input 2 voltage below 0.25V if 1 - 5V is selected	Replace input 2 sensor.
39	Sb 1E	Input 1 (IN1) sensor break, or input 1 current below 1 mA if 4-20 mA is selected, or input 1 voltage below 0.25V if 1 - 5V is selected	Replace input 1 sensor.
40	AdEr	A to D converter or related component(s) malfunction	Return to factory for repair.

*B35, PROG code description

Parameter Value	Specified product
0.XX	FDC-2500 controller
1.XX	FDC-9300 controller
2.XX	FDC-9500 controller
3.XX	FDC-8300 controller
4.XX	FDC-4300 controller
5.XX	FDC-7300 controller
6.XX	FDC-9100 controller
7.XX	SM-40A smart panel meter
8.XX	Reserved
9.XX	ST-30A smart transmitter
10.XX	Reserved
11.XX	FDC-8100 controller
12.XX	Reserved
13.XX	Reserved
14.XX	ST-20A smart transmitter (software setup)
15.XX	ST-20A smart transmitter (DIP switches setup)

XX indicates the program version

*B36, Display symbol and description for MODE

Parameter Value	Description
X.0	Perform normal mode
X.1	Enter calibration mode
X.2	Enter auto-tuning mode
X.3	Enter failure mode
X.4	Enter manual mode
X.5	Enter sleep mode
0.X	Unlock condition
1.X	SP1, SEL1 – SEL5 are unlocked
2.X	Lock all parameters except SP1
3.X	All parameters are locked

*C: The parameters are preset with the default values specified in the table during production.

*D: The scale values specifiy the transformation relation between the value of parameter and the value of register. The parameter with a scale low value is stored in the register with a number zero. The parameter with a scale high value is stored in the register with a number 65535.
For example , if a value R is read from the addressed register, and LS = scale low value, HS = scale high value,then

$$\text{the value of the parameter} = LS + R \times \frac{(HS - LS)}{65535}$$

Similarly, before writing the value of parameter to the addressed register, the value W of the parameter must be transformed according to the following formula :

$$(W - LS) \times \frac{65535}{(HS - LS)}$$

Note that the value stored in the register is always positive value.

PC Software/Discrete display devices allow for linear scaling of register values. The following examples will cover all registers in the 2500/9300 controller.

For registers with “Scale” Ranges of -19999 (low) to 45536 (high):
Min Raw = 0 Max Raw = 65535
Min EU = -19999 Max EU = 45536

For registers with “Scale” Ranges of 0 (low) to 65535 (high):
Min Raw = 0 Max Raw = 65535
Min EU = 0 Max EU = 65535

Hi/Low adjustable range for each register is found in the parameter tables starting on page 1. Limits for each register should be set in the HMI/Display device (from this table) to reduce the possibility of writing an “out of range” value to the controller. Writing an “out of range” value to the controller will result in the indication of an error on the front panel of the controller.

*E: The unit PV means that the unit of parameter is the same as the unit of PV (process value).The unit of PV is determined by PVMD , IN1, IN2, IN1U, and IN2U.

*E1: Unit determination for A1SP, A1DV and A1HY

If A1FN =	DE.HI, DE.LO DB.HI, DB.LO	PV1.H PV1.L	PV2.H PV2.L	P1.2.H, P1.2.L D1.2.H, D1.2.L
Unit same as unit of	PV	PV1	PV2	PV1, PV2

*E2: Unit determination for A2SP, A2DV and A2HY

If A2FN =	DE.HI, DE.LO DB.HI, DB.LO	PV1.H PV1.L	PV2.H PV2.L	P1.2.H, P1.2.L D1.2.H, D1.2.L
Unit same as unit of	PV	PV1	PV2	PV1, PV2

*E3: Unit determination for RAMP

	SPMD = MIN.R	SPMD = HR.R
Unit =	PV / Minute	PV / Hour

*E4: Unit determination for AOLO and AOHI

If AOFN =	PV1	PV2	P1–2 P2–1	SV	MV1 MV2
Same unit as unit of	PV1	PV2	PV1, PV2	PV	%

*E5: Unit is the same as unit of PV1 (IN1)

*E6: Unit is the same as unit of PV2 (IN2)

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