

- Temperature controller

STATOP serie 60

MODEL ----- **24-60**
48-60
4896-60
96-60

ENGLISH

Application note: MODBUS



Modbus communication

This chapter specifies the Modbus Communications protocol as RS-232 or RS-485 interface module is installed. Only RTU mode is supported. Data is transmitted as eight-bit binary bytes with 1 start bit, 1 stop bit and optional parity checking (None, Even or Odd). Baud rate may be set to 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 28800 and 38400.

Functions supported

Only function 03, 06 and 16 are available for this series of controllers.
The message formats for each function are described as follows:

Function 03: Read Holding Registers

Query (from master)	Response (from slave)
Slave address (0-255)	←
Function code (3)	←
Starting address of register Hi (0)	Byte count
Starting address of register Lo (0-79, 128-131)	Data 1 Hi
No. of words Hi (0)	Data 1 Lo
No. of words Lo (1-79)	Data 2 Hi
CRC16 Hi	Data 2 Lo
CRC16 Lo	.
	.
	CRC16 Hi
	CRC16 Lo

Function 06: Preset single Register

Query (from master)	Response (from slave)
Slave address (0-255)	←
Function code (6)	←
Register address Hi (0)	←
Register address Lo (0-79, 128-131)	←
Data Hi	←
Data Lo	←
CRC16 Hi	←
CRC16 Lo	←

Function 16: Preset Multiple Registers

Query (from master)	Response (from slave)
Slave address (0-255)	←
Function code (16)	←
Starting address of register Hi (0)	←
Starting address of register Lo (0-79,128-131)	←
No. of words Hi (0)	←
No. of words Lo (1-79)	←
Byte count (2-158)	CRC16 Hi
Data 1 Hi	CRC16 Lo
Data 1 Lo	
Data 2 Hi	
.....	
Data 2 Lo	
CRC16 Hi	
CRC16 Lo	

Exception responses

If the controller receives a message which contains a corrupted character (parity check error, framing error etc.), or if the CRC16 check fails, the controller ignores the message. However, if the controller receives a syntactically correct message which contains an illegal value, it will send an exception response, consisting of five bytes as follows:

Slave address + offset function code + exception code + CRC16 Hi + CRC16 Lo

Where the offset function code is obtained by adding the function code with 128 (ie. function 3 becomes H'83), and the exception code is equal to the value contained in the following table:

Exeption code	Name	Cause
1	Bad function code	Function code is not supported by the controller
2	Illegal data address	Register address out of range
3	Illegal data value	Data value out of rang or attempt to write a read-only protected data

Parameter table

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	-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			100.0°C	-19999	45536	
A1DV	3	Alarm 1 deviation value	R/W	-200.0°C	200.0°C	10.0°C	-19999	45536	
A2SP	4	Alarm 2 set point	R/W			100.0°C	-19999	45536	
A2DV	5	Alarm 2 deviation value	R/W	-200.0°C	200.0°C	10.0°C	-19999	45536	
RAMP	6	Ramp Rate	R/W	0	500.0°C	0.0	0	65535	
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	200.0°C	0.0	-19999	45536	PV1
PB1	10	Proportional band 1 value	R/W	0	500.0°C	10.0°C	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			37.8°C	-19999	45536	PV
PB2	16	Proportional band 2 value	R/W	0	500.0°C	10.0°C	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
01HY	19	Output 1 ON-OFF control hysteresis	R/W	0.1	55.6°C	0.1	0	65535	PV
A1HY	20	Hysteresis control of alarm 1	R/W	0.1	10.0°C	0.1	0	65535	*E1
A2HY	21	Hysteresis control of alarm 2	R/W	0.1	10.0°C	0.1	0	65535	*E2
PL1	22	Output 1 power limit	R/W	0	100	100	0	655.35	%
PL2	23	Output 2 power limit	R/W	0	100	100	0	65535	%
FUNC	24	Function complexity level	R/W	0	1	1	0	65535	-
COMM	25	Communication interface type	R	0	8	1	0	65535	-
PROT	26	COMM protocol selection	R	0	0	0	0	65535	-
ADDR	27	Address assignment of digital COMM	R	1	255	-	0	65535	-
BAUD	28	Baud rate of digital COMM	R	0	9	5	0	65535	-
DATA	29	Data Bit count of digital COMM	R	0	1	1	0	65535	-
PARI	30	Parity bit of digital COMM	R	0	2	0	0	35535	-
STOP	31	Stop bit count of digital COMM	R	0	1	0	0	65535	-
AOFN	32	Analog output function	R/W	0	7	0	0	65535	-
AOLO	33	Analog output low scale value	R/W	-19999	45536	0°C	-19999	45536	*E4
AOHI	34	Analog output high scale value	R/W	-19999	45536	100.0°C	-19999	45536	*E4
IN1	35	IN1 sensor type selection	R/W	0	17	1	0	65535	-
IN1U	36	IN1 unit selection	R/W	*B13 0	*B13 2	0 (1)	0	65535	-
DP1	37	IN1 decimal point selection	R/W	*B14 0	*B14 3	1	0	65535	-
IN1L	38	IN1 low scale value	R/W	-19999	45536	0	-19999	45536	*ES
IN1H	39	IN 1 High scale value	R/W	-19999	45536	1000	-19999	45536	*ES
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	*B15 0	*B15 20	1	0	65535	-
IN2U	43	IN2 unit selection	R/W	*B13 0	*B13 2	2	0	65535	-
DP2	44	IN2 decimal point selection	R/W	*B14 0	*B14 3	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 BTC-2500	R/W	*B21 0	*B21 1	0	0	65535	-
EIFN	48	Event input function	R/W	*B16 0	*B16 9	1	0	65535	-
OUT1	49	Output 1 function	R/W	*B17 0	*B17 1	0	0	65535	-
01TY	50	Output 1 signal type	R/W	*B18 0	*B18 8	0	0	65535	-
CYC1	51	Output 1 cycle time	R/W	0.1	100.0	18.0	0	65535	Sec
01FT	52	Output 1 failure transfer mode	R/W	*B19 -1	*B19 100.0	-1	-19999	45536	%
OUT2	53	Output 2 function	R/W	*B20 0	*B20 3	2	0	65535	-
02TY	54	Output 2 signal type	R/W	*B18 0	*B18 8	0	0	65535	-
CYC2	55	Output 2 cycle time	R/W	0.1	100.0	18.0	0	65535	Sec
02FT	56	Output 2 failure transfer mode	R/W	*B19 -1	*B19 100.0	-1	-19999	45538	%
A1FN	57	Alarm 1 function	R/W	*B22 0	*B22 15	2	0	65535	-

Parameter Notation	Register Address	Parameter description	Data Type *A	Range *B		Default Value *C	Scale *D		Unit *E
				Low	High		Low	High	
A1MD	58	Alarm 1 operation mode	R/W	*B23 0	*B23 3	0	0	65535	-
A1FT	59	Alarm 1 failure transfer mode	R/W	*B24 0	*B24 1	1	0	65535	-
A2FN	60	Alarm 2 function	R/W	*B22 0	*B22 15	2	0	65535	-
A2MD	61	Alarm 2 operation mode	R/W	*B23 0	*B23 3	0	0	65535	-
A2FT	62	Alarm 2 failure transfer mode	R/W	*B24 0	*B24 1	1	0	65535	-
SELF	63	Self tune function selection	R/W	*B25 0	*B25 1	0	0	65535	-
SLEP	64	Sleep mode function selection	R/W	*B26 0	*B26 1	0	0	65535	-
PVMD	65	PV mode selection	R/W	*B27 0	*B27 3	0	0	65535	-
SP2F	66	Format of set point 2 value	R/W	*B28 0	*B28 1	0	0	65535	-
FILT	67	Filter damping time constant of PV	R/W	*B29 0	*B29 9	2	0	65535	-
SPMD	68	Set point mode selection	R/W	*B30 0	*B30 5	0	0	65535	-
SEL1	69	Select 1'st parameter	R/W	*B31 0	*B31 18	0	0	65535	-
SEL2	70	Select 2'nd parameter	R/W	*B31 0	*B31 18	0	0	65535	-
SEL3	71	Select 3'rd parameter	R/W	*B31 0	*B31 18	0	0	65535	-
SEL4	72	Select 4'th parameter	R/W	*B31 0	*B31 18	0	0	65535	-
SEL5	73	Select 5'th parameter	R/W	*B31 0	*B31 18	0	0	65535	-
	74								
	75								
DRIF	76	Warm-up drift calibration factor	R/W	-5.0°C	5.0°C	-	-19999	45536	°C
ADO	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	-
CJTL	80	Cold junction low temperature calibration coefficient	R/W	-5.00	40.00	-	-19999	45536	C°
CJG	81	Cold junction gain calibration coefficient	R/W	-199.9	199.9	-	-19999	45536	-
REF1	82	Reference voltage 1 calibration coefficient for RTD1	R/W	-199.9	199.9	-	-19999	45536	-
SR1	83	Serial resistance 1 calibration coefficient for RTD1	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 RTD2	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	-
S1G1	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

Parameter Notation	Register Address	Parameter description	Data Type *A	Range *B		Default Value *C	Scale *D		Unit *E
				Low	High		Low	High	
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	-
HOURL	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	100.0	-	0	65535	%
BPL2	118	OUT2 bumpless transfer value	R	0	100.0	-	0	65535	%
	119								
	120								
	121								
PVHI	122	Historical maximum value of PV	R/W	-19999	45536	-	-19999	45536	PV
PVLO	123	Historical maximum 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	-B32 0	*B32 1	-	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	*B33 0	*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	*B34 0	*B34 40	-	0	65535	-
PROG	140	Program identification code contains program number and version number	R	*B35 0	*B35 15.99	-	0	65535	-
MODE	141	Contains lockout status code and current system mode	R	*B36 0	*B36 3.5	-	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	-

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 or via programming port.

*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, D1.2.H, P1.2.L 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, D1.2.H, P1.2.L 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

*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

*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	SPP2	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

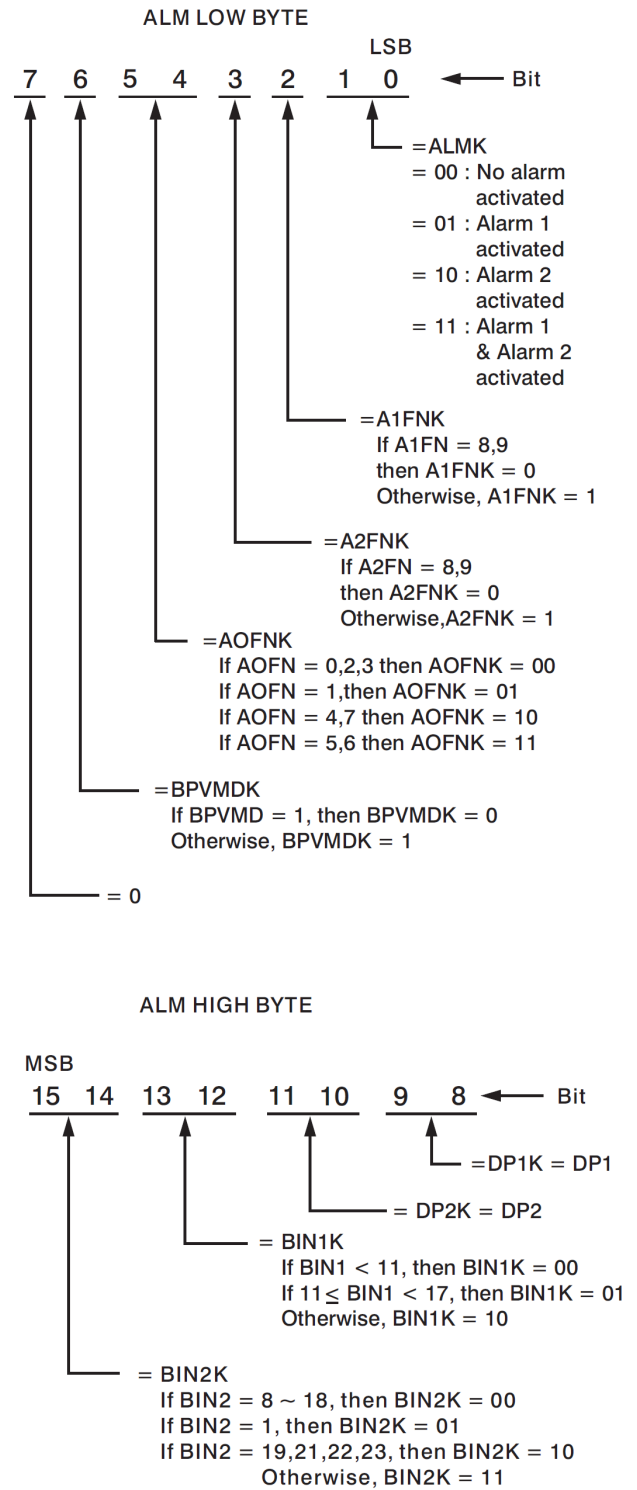
*B31, Display symbol and description for SEL1 ~ SEL5

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	DB	Parameter DB put ahead
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	<i>Er01</i>	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	<i>Er02</i>	Illegal setup values used: PV2 is used for both PVMD and SPMD that is meaningless for control	Same as error code 1
3	<i>Er03</i>	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	<i>Er04</i>	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	<i>Er05</i>	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	<i>Er06</i>	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	<i>Er07</i>	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.

Error Code	Display Symbol	Error Description	Corrective Action
9	<i>Er09</i>	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 resistor 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	<i>Er10</i>	Communication error: bad function code	Correct the communication software to meet the protocol requirements.
11	<i>Er11</i>	Communication error: register address out of range	Don't issue an over-range address of register to the slave.
12	<i>Er12</i>	Communication error: access a non-existent parameter	Don't issue a non-existent parameter to the slave.
14	<i>Er14</i>	Communication error: attempt to write a read only data	Don't write a read only data or a protected data to the slave.
15	<i>Er15</i>	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	<i>Er17</i>	Computing error: Illegal (unnormalized) floating point data	Software bug. Return to factory for repair.
18	<i>Er18</i>	Computing error: Arithmetic result overflow or underflow	Software bug. Return to factory for repair.
19	<i>Er19</i>	Computing error: divided by zero	Don't use an equal value for AOLO and AOHI.
20	<i>Er20</i>	Computing error: Illegal BCD data entry	Software bug. Return to factory for repair.
21	<i>Er21</i>	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	<i>Er22</i>	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	<i>Er23</i>	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	<i>AtEr</i>	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	<i>CEr</i>	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	<i>CEPE</i>	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	<i>EEPE</i>	EEPROM can't be written correctly	Return to factory for repair.
32	<i>CEr</i>	Cold junction compensation device(s) malfunction	Return to factory for repair.
33	<i>EYEr</i>	Key switch shorted or related PCB circuit shorted	Return to factory for repair.
34	<i>LLL2</i>	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	<i>HHH2</i>	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	<i>LLL1</i>	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	<i>HHH1</i>	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.

Error Code	Display Symbol	Error Description	Corrective Action
38	<i>Sb2E</i>	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	<i>Sb1E</i>	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	<i>AdEr</i>	A to D converter or related component(s) malfunction	Return to factory for repair.

*B35, PROG code description

Parameter Value	Specified product
0.XX	STATOP 2460 controller
1.XX	STATOP 4860 controller
2.XX	Reserved
3.XX	STATOP 489660 controller
4.XX	STATOP 9660 controller

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 specify 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

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

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 :

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

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

*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 = Unit same as unit of	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
	PV	PV1	PV2	PV1, PV2

*E2: Unit determination for A2SP, A2DV and A2HY

If A2FN = Unit same as unit of	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
	PV	PV1	PV2	PV1, PV2

*E3: Unit determination for RAMP

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

*E4: Unit determination for AOLO and AOHI

If AOFN = Same unit as unit of	PV1	PV2	P1-2 P2-1	SV	MV1 MV2
	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)

9–4 Communication Examples

Example 1: Preset 9 multiple registers

01	10	00	00	00	09	18	52	07	00	00	52	07
Addr.	Func.	Starting Addr.	No. of words	Bytes	SP1=100.0	TIME=0.0	A1SP=100.0					

4E	83	52	07	4E	83	00	00	00	FA	00	02	Hi	Lo
A1DV=10.0	A2SP=100.0	A2DV=10.0	RAMP=0.0	OFST=25.0	REFC=2	CRC16							

Example 2: Read PV, SV, MV1 and MV2.

Send the following message to the controller via the COMM port or programming port:

	03	00	H'80	00	04	Hi	Lo
Addr.	Func.	Starting Addr.	No. of words	CRC16			

Example 3: Perform Reset Function (same effect as pressing ▲ ▼ key)

Query

	06	00	H'8E	H'68	H'25	Hi	Lo
Addr.	Func.	Register Addr.	Data Hi/Lo	CRC16			

Example 4: Enter Auto-tuning Mode

Query

	06	00	H'8E	H'68	H'28	Hi	Lo
Addr.	Func.	Register Addr.	Data Hi/Lo	CRC16			

Example 5: Enter Manual Control Mode

Query

	06	00	H'8E	H'68	H'27	Hi	Lo
Addr.	Func.	Register Addr.	Data Hi/Lo	CRC16			

Example 6: Read All Parameters

Query

	03	00	00	00	H'50	Hi	Lo
Addr.	Func.	Starting Addr.	No. of words	CRC16			

Example 7: Modify the Calibration Coefficient

Preset the CMND register with 26665 before attempting to change the calibration coefficient.

	06	00	H'8E	H'68	H'29	Hi	Lo
Addr.	Func.	Starting Addr.	No. of words	CRC16			



07-2014
694530A02-ed2

6 bis Avenue Schweitzer 69881 MEYZIEU Cedex - France
tél : (33) 04 72 14 15 40 Fax : (33) 04 72 14 15 41 www.pyro-controle.com