

PRELIMINARY ONLY

Serial_instM

SMT-BD1/m instructions list

Version 1.3

1 - OVERVIEW

The specifications of the SMT-BD1/m amplifier serial link are:

- 8 data bits, 1 stop bit, no parity,
- 19200 baud.

The parameters can be sent to the amplifier by an ASCII terminal using the instructions list given in this manual. Each instruction is coded as 2 ASCII characters with or without parameter.

Each instruction, which can be followed by one or two parameters sent to the amplifier must end with a "carriage return" character (ASCII code 13). Les parameters must be separated by a ',' (ASCII code 44).

All these characters, except for the "carriage return", will be sent back by the amplifier (echo).

The amplifier answer starts with a separation character ":" (ASCII code 58) possibly followed by an value. The amplifier will then send a "carriage return", a "line feed" (ASCII code 10) and ">" (ASCII code 62).

These instructions allows to modify or to read the value of a variable. If there is a parameter, the variable corresponding to the instruction will take this value. Otherwise, the amplifier will send back the actual variable value.

Notes:

- If the amplifier does not know the instruction, it will send back "?" instead of ":".
- Some instructions are only valid when the amplifier is disabled.
- If the entered parameter is out of the appropriate variable range or if the restrictive condition (amplifier disabled) is not answered, the parameter will not be taken in account (the amplifier will keep the former variable value).
- The amplifier works normally in hexadecimal. The switch SW2.1 (the switch SW2 is near to X4 connector) gives the possibility to set to decimal mode at power up.
 - SW2.1 = OFF hexadecimal mode,
 - SW2.1 = ON decimal mode.

The BD1m software always changes the amplifier in hexadecimal mode independently to the status of SW2.1. It's necessary to exit BD1m correctly to set the amplifier in default mode (hexadecimal ou decimal mode).

Dialogue examples:

The user sends the NP instruction (number of motor pole pairs):

NP4

and a "carriage return" character for ending the instruction.

The amplifier will answer with:

NP4:

>

"NP4" are echo from characters sent. ":" indicates that the instruction has been decoded. The value 4 is stored in the variable corresponding to the number motor pole pairs. After the character "carriage return", the amplifier will also send the ">" character in order to indicate that it is ready for a new instruction.

If the user sends the instruction:

NP

The amplifier will answer with:

NP:4

>

As there is no parameter in the instruction, the amplifier sends back the actual number of pole pairs.

2 - INSTRUCTIONS LIST

All instructions described below are specific to the positioner SMT-BD1/m. Other standard instructions can be found in the standard "instruction list manual" of the standard drive SMT-BD1.

Modify position of a sequence

Instruction	UP
Parameters	1st parameter: sequence number. 2nd parameter: position value. If there is no 2nd parameter, the amplifier will return the actual position value of the sequence (1st parameter).
Conditions	This instruction can be sent only if there is no sequence executed. The sequence must exist.
Unit	The unit of the position value is defined by "position resolution" and "decimal number" defined in BD1m software. The value must be sent without the decimal point. Example: position resolution: 5000 decimal number: 3 unit: mm if the user wants to set a value 100mm to sequence 3, the instruction will be: UP3,100000 (in decimal mode)

Modify speed of a sequence

Instruction	US
Parameters	1st parameter: sequence number. 2nd parameter: speed. If there is no 2nd parameter, the amplifier will return the actual speed of the sequence (1st parameter).
Conditions	This instruction can be sent only if there is no sequence executed. The sequence must exist.
Unit	The minimum speed is 20rpm. rpm.

Modify acceleration of a sequence

Instruction	UA
Parameters	1st parameter: sequence number. 2nd parameter: acceleration time. If there is no 2nd parameter, the amplifier will return the actual acceleration time of the sequence (1st parameter).
Conditions	This instruction can be sent only if there is no sequence executed. The sequence must exist.
Unit	second.
Range	16ms - 16000ms.
Remark	See SMT-BD1/m manual for "acceleration time" signification.

Modify deceleration of a sequence

Instruction	UD
Parameters	1st parameter: sequence number. 2nd parameter: acceleration time. If there is no 2nd parameter, the amplifier will return the actual deceleration time of the sequence (1st parameter).
Conditions	This instruction can be sent only if there is no sequence executed. The sequence must exist.
Unit	second.
Range	16ms - 16000ms.
Remark	See SMT-BD1/m manual for "deceleration time" signification.

Execution of a sequence

Instruction	GO
Parameters	1st parameter: sequence number.
Conditions	This instruction can be sent only if there is no sequence executed. "Enable" and "Run" signals are activated. "Wait" and "Stop" inputs are not activated. The sequence must exist.
Remark	This instruction execute a sequence (with paramter as sequence number) regardless logic inputs status.

Position feed back

Instruction	PF
Parameters	no.
Conditions	Read only.
Remark	This instruction reads the position of the motor.
Unit	see <i>modify position of a sequence</i> .

Inputs/Outputs status

Instruction IO
 Parameters no.
 Conditions Read only.
 Remarks This instruction reads status of the inputs and outputs logics.

<u>bit</u>	<u>signification</u>
0	START
1	STOP
2	WAIT
3	TEACH
4	JOG+
5	JOG-
8	SEQ
9	POS
10	SPEED
11	OK
16	IN1
17	IN2
18	IN3
19	IN4
20	IN5
21	IN6
22	IN7
23	IN8
24	OUT1
25	OUT2
26	OUT3
27	OUT4
28	OUT5
29	OUT6
30	OUT7
31	OUT8

- Bit SEQ indicates the positioner running a sequence.
- A sequence can be execute when bit OK is set and and bit STOP is reset, and also if the security of the first sequence disable.

Absolute move

Instruction MP
 Parameters absolute position.
 Conditions "Enable" and "Run" signals are activated.
 Remark
 Unit see *modify position of a sequence*.

Speed (absolute movement)

Instruction DS
 Parameters define the speed for absolute movement (MP).
 Parameters speed
 Conditions
 Remark This parameter is saved in positioner's memory.
 Unit rpm.

Acceleration (absolute movement)

Instruction	DA
	define the acceleration for absolute movement (MP).
Parameters	acceleration time.
Conditions	
Remark	See SMT-BD1/m manual for "acceleration time" signification. This parameter is saved in positioner's memory.
Unit	ms.

Deceleration (absolute movement)

Instruction	DD
	define the deceleration for absolute movement (MP).
Parameters	deceleration time.
Conditions	
Remark	See SMT-BD1/m manual for "deceleration time" signification. This parameter is saved in positioner's memory.
Unit	ms.

Stop

Instruction	SO
Parameters	FF
Conditions	
Remark	Stop all movement except jog.
Unit	

Read/Write sequence into memory

A sequence is defined by a list of parameters:

- Control
- Position
- Speed
- Acceleration
- Deceleration
- Temporization
- Link
- Counter
- Counter link
- Start condition
- Output
- Output position

Each parameter can be read or written individually by single instruction (XC, XP, XS, XA, XD, XT, XN, XI, XL, XF, XO, XQ, XZ).

We can read a sequence from drive's memory by the the instruction RD.

For example RD2

Then we can read all the parameter of this sequence (sequence 2 in example) by single instruction (XC, XP, XS, XA, XD, XT, XN, XI, XL, XF, XO, XQ, XZ).

To write a sequence into drive's memory, we must first send all parameters of the sequence by single instruction (XC, XP, XS, XA, XD, XT, XN, XI, XL, XF, XO, XQ, XZ) to the drive and then send the instruction WR.

For example (in decimal mode)

```
XC1
XP10000
XS1000
XA200
XD200
XT0
XN-1
XI-1
XL-1
XF0
XO65280
XQ0
XZ0
WR0
```

The last instruction write sequence 0 into memory.

When all sequences were written into memory we must send a WR128 to update the memory checksum.

Note: The drive is enabled when "ENABLE" signal and "RUN" signal are activated. It is disabled when at least one of these 2 signals is deactivated.

It is impossible with the SMT-BD1/m to enable or disable the drive by the serial link.

Standard inputs

Instruction	SX
	This instruction reads the status of standard inputs.
Parameters	word.
	bit Description
	0 This bit gives the configuration of input logic (positive or negative): 0 = logic positive. 1 = logic negative.
	1 FC+ positive limit switch input.
	2 FC- Negative limit switch input.
	3 RUN input.
	4 INDEX/CLR input.
	5 ENABLE input.
	6 This bit gives the state of the drive: 0 = drive disabled. 1 = drive enabled.
	7 Break.
Conditions	read only.

Hexa/Decimal mode

Instruction	DC
	This instruction changes the drive into hexa or decimal mode.
Parameters	0 hexa mode. 2 decimal mode.
Remark	The drive boots up with hexa mode.

Read a sequence

Instruction	RD
	This instruction reads a sequence from memory. Each parameter of the sequence can be read by others instructions.
Parameters	word: sequence number.
Return	1 Read successful. 0 Read fail (drive is enabled).
Conditions	drive disabled.
Range	0 - 127

Write a sequence

Instruction	WR
	This instruction writes a sequence from memory. Every parameter of the sequence must be defined by others instructions (see below) before this instruction.
Parameters	word: sequence number.
Return	1 Read successful. 0 Read fail (drive is enabled).
Conditions	drive disabled.
Range	0 - 127 for sequence. 128 for checksum update.
Remark	When all sequences were written in memory, a WR80 (in hexa mode) must be executed to update the checksum in memory. If this is not done, the drive will display NovRAM error at the next power up.

Sequence: Control

Instruction	XC
Parameters	word
	bit description
	0 1 = sequence validated 0 = sequence not validated
	1 0 = Movement 1 = Home
	2 0 = Absolute movement 1 = Relative movement
	3 Speed sequence
	5 Torque sequence
	If the sequence is a home procedure then bit 3 to 7 are:
	3 0 = Direction positive 1 = Direction negative
	4 0 = without Switch 1 = with Switch
	5 0 = without Zero mark 1 = with zero mark
	6 0 = Stop motor after switch detection 1 = Move back to origin position.
	7 0 = without Reset position value 1 = Reset position value

8 -11 define the output trigger:

- 0 End
- 1 Begin
- 2 Stop
- 3 Speed
- 4 Pos

See SMT-BD1/m manual for more information.

12-15 reserved. Always 0.

Conditions

drive disabled.

Remark

When a sequence is not used, it is necessary to send only XC0, all others parameters can be ignored.

Examples

Absolute Sequence = 0x0001

Relative Sequence = 0x0005

Home Sequence with "Positive Direction", "No Switch", "With Zero Mark", "Move To Origin" and "Reset Position" = 0x00E3

Speed Sequence = 0x0009

Torque Sequence = 0x0021

Sequence: Pos

Instruction

XP

This parameter defines the position for a movement (or the reset position value for a home procedure).

Parameters

long word.

Conditions

drive disabled.

Unit

The unit of the position value is defined by "position resolution" and "decimal number" defined in BD1m software. The value must be sent without the decimal point.

Example: position resolution: 5000
 decimal number: 3
 unit: mm

if the user wants to set a value 100mm, the instruction will be:

XP100000 (in decimal mode)

Range

-32768 x resolution to +32637 x revolution.

Sequence: Speed

Instruction

XS

This instruction defines the speed of the movement.

Parameters

word.

Conditions

drive disabled.

Unit

rpm.

Range

1 to max speed defined in the drive.

Sequence: Acceleration ramp

Instruction

XA

Parameters

word.

Conditions

drive disabled.

Unit

ms

Range

1 to 16000 ms.

Remark

See SMT-BD1/m manual for "acceleration ramp" signification.

The minimum value depend on motor and inertia.

Sequence: Deceleration ramp

Instruction XD
 Parameters word.
 Conditions drive disabled.
 Unit ms.
 Range 0 to 16000ms.
 Remark See SMT-BD1/m manual for "acceleration time" signification.

Sequence: Temporization/Timeout

Instruction XT
 Parameters word.
 Conditions drive disabled.
 Unit ms for a movement.
 s for home procedure (Timeout).
 Range 0-16000ms for temporization.
 0-16000s for timeout.

Sequence: Link

Instruction XN
 Parameters integer.
 Conditions drive disabled.
 Range 0-127 sequence number.
 -1 no link.

Sequence: Counter

Instruction XI
 Parameters integer.
 Conditions drive disabled.
 Range 0-32767 counter number.
 -1 no counter.

Sequence: Counter link / Conditional jump

Instruction XL
 Parameters integer.
 Conditions drive disabled.
 Range 0-127 sequence number.
 -1 no jump.
 Remark For a conditional jump, the counter value must be -1.

Sequence: Start condition

Instruction XF
 This instruction defines the inputs which will be a start condition for this sequence. The corresponding inputs must not be defined as sequence control inputs (inputs used to define the sequence number).
 Parameters word.

bit	description
0-7	define if the inputs 1 to 8 must be deactivated.
8-15	define if the inputs 1 to 8 must be activated.

 Conditions drive disabled.

Sequence: Output

Instruction	XO
	This instruction define the action to the outputs in this sequence.
Parameters	word.
	bit description
	0-7 s mask set of output 1 to 8.
	8-15 r mask reset of output 1 to 8.
	the combinaison of mask s and r gives:
	rs
	01 -> set the output.
	00 -> reset the output.
	10 -> do not change the output.
	11 -> toggle the output.
Conditions	drive disabled.

Sequence: Output pos

Instruction	XQ
Parameters	long word.
Conditions	drive disabled.
Unit	see "XP position"
Range	see "XP position"
Remark	this parameter takes effect only if the ouput trigger is set to "position".

Sequence:

Instruction	XZ
Parameters	word = 0.
Conditions	drive disabled.
Unit	% of max current
Range	0 – 0x7FFF
	0x7FFF correspond to max current defined by "max current" parameter of the drive

REMARKS**1 - Read/Write Sequence**

All sequences are saved in an EEPROM, and a sequence cannot be accessed directly. So there is a buffer for this purpose:

Read (RD)	transfers sequence data from EEPROM to buffer
Write (WR)	transfers sequence from buffer to EEPROM.

All others instructions (XC, XP...) access only to the buffer.

When writing a new sequence we need to write ALL 13 parameters (XC, XP, XS, XA, XD, XT, XN, XI, XL, XO, XQ, XF, XZ) because we don't know what are values in the buffer. next you can use WRn to write into EEPROM.

The write to EEPROM takes time so the best way for serial communication is waiting the reply from the drive before continue (1 write Ok, 0 write failed).

With WR80, the drive calculates the checksum of all sequences and writes it to EEPROM. We need only one WR80 after all others WRn. Again, it writes to EEPROM so it takes also time to do it.

If we want to modify only one parameter we can do like that:

Example

RD1	Reads sequence 1 and writes to buffer
XP10000	Changes position to 10000
WR1	Rewrites sequence 1 into EEPROM
...	changes other parameters of other sequences
WR80	Don't forget the checksum after the last modified sequence

2 - Sequence validated

The bit 0 of XC indicate if a sequence is validated. When we define a sequence, this bit must be set, otherwise this sequence cannot be executed by the positioner.

We can delete a sequence quickly by sending only

XC0
WR1