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1. GENERAL

The manual describes the version APS x-B-Ex of the series STAR 2000 with storeable programmes.

This drive can store 8 or 16 programmes and one start-up program (program "0").

For more details please use also the manual **APS 1-5-0102-60fw2b-ivb** and the **Appendix**. For the starting apparatus we recommend all manuals.

1.1 REQUIREMENT

To start the driver via the PC (serial interface RS 232) you must use a serial cable (type: PCS 2) between PC and APS driver and you must install the terminal sofware **WinStarxx** (for systems under DOS you must use the DSTAR software).

1.1.1 RS 232 COMMUNICATION CABLE

Pin connections for connector J4 und RS 232 serieal interface on PC.



J4 – connector (item covered by the contract) SUB-D connector, 9-pin, female

1.1.2 DIP-SWITCH SETTINGS

Before starting the driver the following DIP switch setting must be done:

DIP-SWITCH A			
DIP			
6		OFF	
5		OFF	
4		OFF	
3		OFF	
2		OFF	
1	ON	OFF	
	9600	19200	

You can use a baud rate of 9600 or 19200 baud. We recommend to use 9600 baud.

DIP-SWITCH B				
DIP				
4		OFF		
3	ON			
2	ON → 16 program	OFF → 8 program		
1	ON			

Please note: The settings must be done before starting the driver.

1.2 BCD-INPUTS

The 16 programmes can be chosen with 4 inputs and execute with the "BCD valid" input.

INPUTS					
BCD valid	J2 pin 8	non optoisolated			
BCD 0	J2 pin 1	non optoisolated			
BCD 1	J2 pin 2	non optoisolated			
BCD 2 J2 pin 3		non optoisolated			
BCD 4 (IN 1)	J2 pin 14	optoisolated possible			
IN 2	J2 pin 15	optoisolated possible			
IN 3	J2 pin 16	optoisolated possible			
DISABLE	J2 pin 17	optoisolated possible			

1.2 BCD - INPUTS

1.2.1 CIRCUIT DIAGRAM

Circuit diagram of the non optoisolated inputs



Circuit diagrAm of the optoisolated inputs



1.2.2 INPUT VOLTAGE LEVEL

VOLTAGE LEVEL	IN1 (BCD 4) INPUT	IN2, IN3, DISABLE INPUT	BCD 0, 1, 2 INPUT	
LOW LEVEL	from 0 V to 8 V	from 0 V to 2.5 V	from 0 V to 1 V	
HIGH LEVEL	from 11 V to 30 V	from 4.6 V to 30 V	from 4 V bto 30 V	

1.2.3 INPUT SUPPLY VOLTAGE

The supply voltage for the BCD inputs with the internal 15 VDC

It is possible to use the existing output (J2 pin 21 \rightarrow 15 VDC, max. current 150 mA) to supply the inputs (see drawing 1).



drawing 1

The supply voltage for the BCD inputs with external 24 VDC

If an external supply voltage is used the inputs can not be optoisolated (see drawing 2).



drawing 2

ATTENTION: ALL INPUTS AND OUTPUTS ARE NOT OPTOISOLATED.

2. TO STORE PROGRAMMES

Depending on the settings of the switch DIP B 2 you can store 8 (DIP B 2 \rightarrow OFF) or 16 (DIP B 2 \rightarrow ON) programmes plus the start-up program (program "0").

Note: The DIP switch settings must be done before starting.

The start-up program will be execute after each starting. In this case it could be better to store all values which are all valid for all other programmes (program 1 to 16). For example the motor current, resolution, min. frequency, acceleration, current reduction a.s.o. It is also possible to store a reference drive in the start-up program. After each starting the reference drive will be executed automatically.

Note: If you change values in program "0", do not forget to switch OFF and ON the power supply.

2.1 REQUIREMENT

- 1. Connect the APS x-B-Ex driver as shown in the manual.
- 2. Set the DIP swichtes according the to capital 1.1.2
- 3. Set the baud rate in the PC to 9600 or 19200 (DIP B 2 "ON" or "OFF")
- 4. Be sure that the WinStar software is available on your PC
- 5. Connect the serial cable between the PC (RS 232) and the APS driver
- 6. Switch on the power supply for the APS; after an internal check the driver will show a "r" at the display
- 7. Start the WinStar software

After the above procedure you can start the programming.

Note: The communication is only via the RS 232 serial interface. The driver address must be set to "0". Check the baud rate on the PC and the driver.

2.2 PROGRAMMING

2.2.1 DIRECT MOVING

After loading the WinStar software the following window appears.

🖷 WinStar 2.6 S.	H.S. Srl			_ 🗆 X
<u>File S</u> ettings <u>H</u> elp				
Address	Current [mA]	Resolution]	Drive reset
Min freq. [Hz]	Max freq. [Hz]	Ramp [cs]	Send init	Infinite Mov>
<u> ·</u>	ŀ			Infinite Mov. <
Relative quote		Start relative positioning		Start last postioning
Absolute quote		Start absolute positioning		Stop
Command selection				Go to zero
Select command		•	Send command	Low noise ON
TX - Hex string			RX Description	Low noise OFF
- HX - Hex string				PRG.EEPROM
Serial Port: COM 1	Settings: 9600	D,N,8,1		

In the upper line you see the actual serial interface settings.

In the menue "settings" you can change the serial interface parameters and the language.

For controlling the function of the motor and the driver you can move the motor without storing a program. In this case put the right datas for the motor in the field "address" (by using the RS 232 serial interface the address is always "0", "current", "resolution", "min freq.", "max freq" and "ramp".

Send the datas to the driver by using the bottom "send int". In the control field "TX hex string" you see the datas which are sent.

When the data download is finished, the driver send back the code "06", which can you see in the control field "RX hex string".

If the driver send back "15" the data transfer was not successful.

Was the transfer successfuly you can move the motor directly with the bottom "infinite move \rightarrow " or "infinite move \leftarrow ".

2.2.2 TO STORE A PROGRAM IN EEPROM

To store programmes use the bottom "PRG EEPROM" and the following window appears.

🖏 EEPROM PRI	DGRAM		×
PROGRAM EDI	ron		PROGRAM SELECTION
HEX	COMMAND		0
			<- −>
			DISK OPERATIONS
			Load program
			Save program
			Print program
			DRIVE OPERATIONS
			Read programs from drive
			Send all program to drive
		-	Send current program to drive
Delete line	Select command Select command	nsert mmand	Delete program
Status			Delete all stored program
			Copy program
		 V	Exit

With the "disk operations" you can "load" or "store" programmes from disks or you can "print" programmes.

With the "drive operations" you can "read", "send", "send current", "delete" or "delete all" programmes.

With the bottom "copy program" you can copy a single program.

With the bottom "exit" you will reach the start window.

With the bottom "delete line" you can delete lines in a program.

In the field "status" you see actual informations.

With the bottom "insert command" you can insert lines in the program.

2.2.2.1 EXAMPLE TO STORE A PROGRAM

To store the programmes "0" and "1" see the next lines.

Store all values in program "0" they are all valid for all programmes. If you change values in program "0", do not forget to switch OFF and ON the power supply.

Program "1" contains a relative positioning.

2.2.2.2 PROCEEDING

After chosing the program number you can start with the single commands. Open the field "select command" and chose the correct command

ROGRAM EDITI)R	PROGRAM SELECTION
HEX	COMMAND	
		Load program
		Save program
		Print program
		DRIVE OPERATIONS
		Read programs from driv
		Send all program to driv
1-1		Send current program to drive
Delete line	- Select command	Insert Delete program
atus	Reset (Don't use in EEPROM prg.) Set low noise mode (Don't use in EEPROM prg.) Current	Delete all stored program
	Lived johan meda	
	Minimum frequency	Copy program

Use the bottom "insert command". If necessary a new window appears in which you can put values.

For example: 1500 \rightarrow is 1,5 A Now you can set all other necessary commands

In the following example we show the commands for programm "0"

	Command	value		function
Line 1: Line 2: Line 3: Line 4: kHz Line 5:	motor current reduction mode min freq ramp resolution	1500 1, 2 200 10 2	$ \begin{array}{c} \rightarrow \\ \rightarrow \\ \rightarrow \\ \rightarrow \\ \rightarrow \\ \rightarrow \end{array} $	means 1,5 A after 32 ms the current goes down to 50% min frequency (start-stop frequency) acceleration time in 10 x 10 ms = 100 ms to 10 $2 = \frac{1}{4}$ steps, this means 800 steps per round

EPROM PROGR	AM		
ROGRAM EDITOR		F	ROGRAM SELECTION -
HEX	COMMAND		0
A8 05 DC	Current 1500		1
27 81	Reduction mode 32 ms, Ired=I*25 %		<−
20 00 C8	Minimum frequency 200		
22 OA	Ramp 10		JOK OPERATIONS
26 02	Step resolution 1/4		Load program
•			Save program
			Print program
			RIVE OPERATIONS
			Read programs from driv
			Send all program to drive
1-1			Send current program to drive
I S	elect command		Delete program
Delete line	tep resolution	command -	Delete program
atus			Delete all stored program
			Copy program
			F 3

With the bottom "send current program to drive" you can store the program immediately or you can write further programmes. With the bottom "send all programmes to drive" you can store all written programmes to the drive and finish the program creating.

The values for programm "1" are as follows:

	Command	value		function
Line 1:	maximum freqency	5000	\rightarrow	frequency in Hz ($^{1\!\!/}_{4}$ steps with 5000 = 375 rpm
) Line 2:	relative positioning	25600	\rightarrow	25600 = 10 rounds (1 round = 25600)

💐 EEPROM PRI	DGRAM					×
- PROGRAM EDI	TOR				PROGRAM S	ELECTION
HEX	COMM	AND				1
21 13 88	Maximu	m frequency 5000			(-> [
31 00 00 64	UU Helativ	e positioning 25600				
					DISK OPER/	TIONS
					Load	program
					Save	program
					Print	program
					DRIVE OPER	RATIONS
					Read progr	ams from drive
					Send all pr	ogram to drive
				Þ	Send curre	nt program to Irive
Delete line	Select command Relative positioning		1	Insert	Delete	program
Status					Delete all s	tored program
					Сору	program
				V		Exit

3. EXECUTE PROGRAMMES

To select the programmes use the 3 or 4 BCD inputs. To execute the selected program use input "valid strobe".

The input "valid strobe" must be high during the complete positioning. If you switch "OFF" the input before the positioning is finished, the motor stops immediately. Now you can select a new programm or you can use the same program by switch "ON" the input "valid strobe ".

3.1 SELECTION OF 8 PROGRAMMES

DIP- B 2 \rightarrow OFF

BCD2	BCD1	BCD0	PROGRAM
0	0	0	PRG. 1
0	0	1	PRG. 2
0	1	0	PRG. 3
0	1	1	PRG. 4
1	0	0	PRG. 5
1	0	1	PRG. 6
1	1	0	PRG. 7
1	1	1	PRG. 8

1 = input selected

0 = input not selected

3.2 SELECTION OF 16 PROGRAMMES

DI	Ρ	В	2	\rightarrow	ON
----	---	---	---	---------------	----

IN1	BCD2	BCD1	BCD0	PROGRAM
0	0	0	0	PRG. 1
0	0	0	1	PRG. 2
0	0	1	0	PRG. 3
0	0	1	1	PRG. 4
0	1	0	0	PRG. 5
0	1	0	1	PRG. 6
0	1	1	0	PRG. 7
0	1	1	1	PRG. 8
1	0	0	0	PRG. 9
1	0	0	1	PRG. 10
1	0	1	0	PRG. 11
1	0	1	1	PRG. 12
1	1	0	0	PRG. 13
1	1	0	1	PRG. 14
1	1	1	0	PRG. 15
1	1	1	1	PRG. 16

1 = input selected

0 = input not selected

PLEASE NOTE: If you change values in program "0", <u>do not forget</u> to switch OFF and ON the power supply.

For programs 1 to 16 you do not need to switch OFF and ON the power supply.

4. APPENDIX PROGRAM EXAMPLES

4.1 REFERENCE DRIVE STORED IN PROGRAM "0"

ia, E	EPROM PROGRA	AM	×
- PE	OGBAM EDITOR		
	HEX	COMMAND	
	A8 05 DC	Current 1500	
ΙĽ	27 C2	Reduction mode 64 ms, Ired=I*50 %	<−
	20 00 0A	Minimum frequency 10	
	21 01 F4	Maximum frequency 500	DISK OPERATIONS
	22 QA	Ramp 10	Load program
	26 01	Step resolution 1/2	
	A6	Go to home position	1
	AF 22	AXIS ZEROING input setting - Inputs: 0010 Levels: 0010	Save program
			Print program
			Thirk program
			DRIVE OPERATIONS
			Dead and an address of the
			neau programs nom unve
			Send all program to drive
			Send current program to
	1-1		drive
	I C	elect command	Delete program
	Delete line Re	elative positioning	Delete program
_ St	atus		Delete all stored program
			Copy program
			-1
			Exit

4.2 RELATIVE POSITIONING

E	PROM PROGRAM			
RO	GRAM EDITOR			PROGRAM SELECTION -
	HEX	COMMAND		3
•	A8 03 E8	Current 1000		
1	20 00 64	Minimum frequency 100		<- _>
į,	21 OF A0	Maximum frequency 4000		
í	22 OF	Ramp 15		DISK OPERATIONS
í	26 02	Step resolution 1/4		Load program
	31 00 01 90 00	Relative positioning 102400		
				Save program
				Print program
				DRIVE OPERATIONS
				Read programs from driv
				Send all program to drive
				Send current program to drive
D	elete line Rela	st command tive positioning		Delete program
atu	us			Delete all stored program
				Copy program
			v	Exit

4.3 REPEATING DRIVE WITH 1 ROUND LEFT AND 1 ROUND RIGHT

📬, El	EPROM PRO	GRAM	×
- PF	OGRAM EDIT)R	PROGRAM SELECTION
	HEX	COMMAND	1
	A8 03 E8	Current 1000	
1 F	20 00 C8	Minimum frequency 200	— — — — — — — — — — — — — — — — — — —
	21 07 D0	Maximum frequency 2000	
	26 01	Step resolution 1/2	DISK OFERATIONS
	22 0A	Ramp 10	Load program
	31 00 00 64 0	0 Relative positioning 25600	
	F4 0A	Pause 10	
	31 FF FF 9C I	00 Relative positioning -25600	Save program
	F4 0A	Pause 10	
	F5	Repeat program	Print program
			- Thirk program
			DRIVE OPERATIONS
			Dead areas were drived
			Read programs from drive
			Send all program to drive
			Send current program to
	1-1		drive
	1	Select command	cert Delete program
	Delete line	Relative positioning	mand
_ Sta	atus		Delete all stored program
			A
			Copy program
			Exit

4.4 CONTINUE DRIVE AFTER EXECUTING 1 ROUND LEFT AND 1 ROUND RIGHT

OGRAM EDITOR		PROGRAM SELECTION
HEX	COMMAND	2
A8 03 E8	Current 1000	
20 00 C8	Minimum frequency 200	<- _>
21 03 E8	Maximum frequency 1000	
22 OA	Ramp 10	DISK OPENATIONS
26 04	Step resolution 1/16	Load program
31 FF FF 38 00	Relative positioning -51200	
F4 0A	Pause 10	
21 OB B8	Maximum frequency 3000	Save program
31 00 00 64 00	Relative positioning 25600	
F4 0A	Pause 10	Print program
21 27 10	Maximum frequency 10000	- Third program
32 00	Infinite motion - CW	
		DRIVE OPERATIONS -
		Send all program to dri
		Send current program drive
Delete line Rela	t command	Insert Delete program
atus		Delete all stored progra
		Copy program

4.5 CONTINUE DRIVE

is, 1	EPROM PROGRA	AM		×
FP	ROGRAM EDITOR-			PROGRAM SELECTION
	HEX	COMMAND		6
	A8 03 E8	Current 1000		
	20 00 C8	Minimum frequency 200		<- ->
	21 03 E8	Maximum frequency 1000		
	22 0A	Ramp 10		DISK OPERATIONS
	26 04	Step resolution 1/16		Load program
	21 27 10	Maximum frequency 10000		
	32 00	Infinite motion - CW		1
IF				Save program
				Print program
				Head programs from drive
				Send all program to drive
			Þ	Send current program to drive
Summer of	Delete line	elect command elative positioning	Insert command	Delete program
S	tatus			Delete all stored program
				Copy program
				Exit