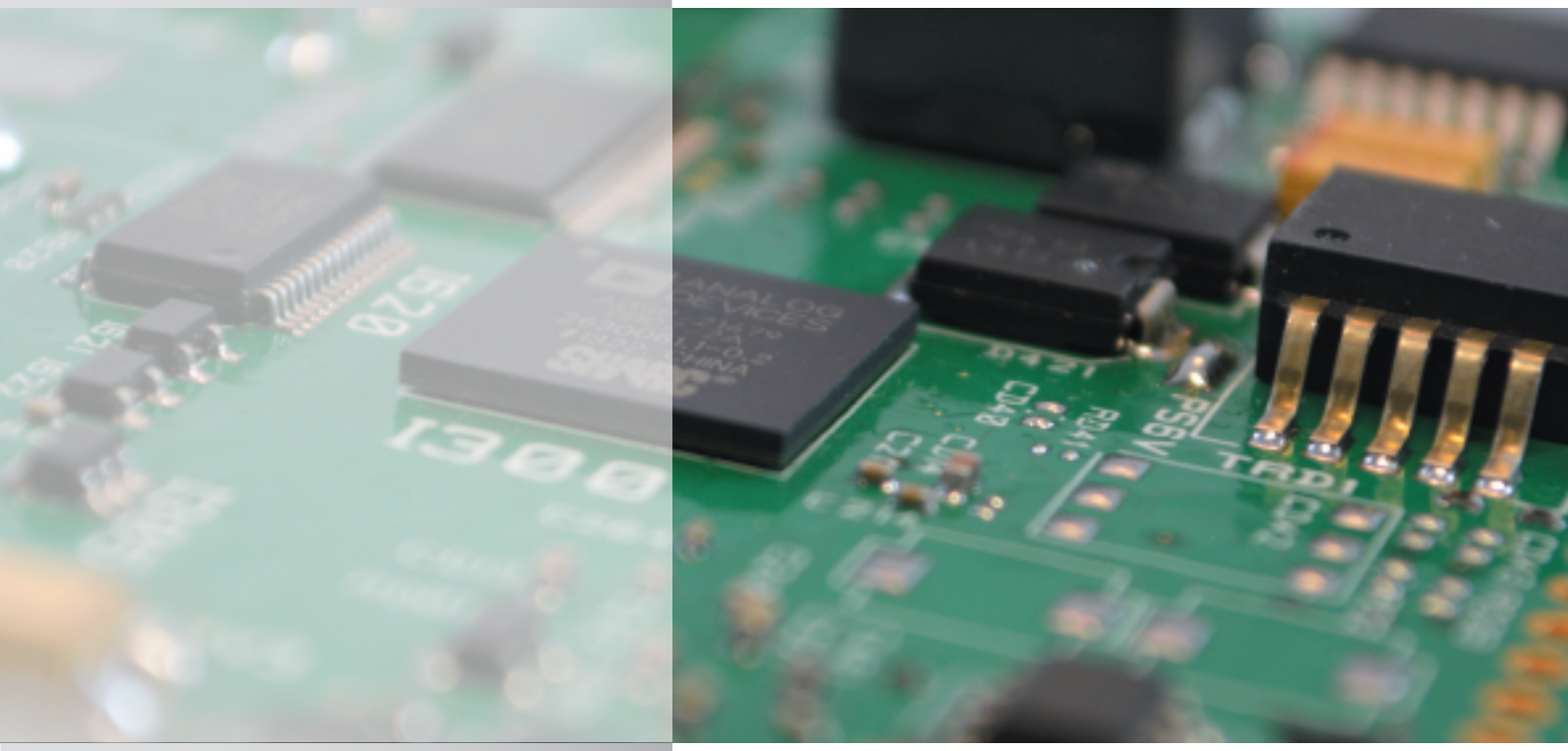
QUALITY IN MOTION

www.IRTSA.com

Instruction Manual



2000 & 4000 - Profile Add-on

QUALITY IN MOTION

Contents

1. OVERVIEW 4

1.1 EXAMPLE OF MOVEMENT 5

2. MECHANICAL DESCRIPTION 6

3. ELECTRICAL CHARACTERISTICS 7

3.1 CONNECTOR PINOUT 8

3.2 FIXED INPUTS/OUTPUTS FUNCTIONS 9

3.3 PROFILE SELECTION 10

4. SOFTWARE 12

4.1 COMMAND LIST DESCRIPTION 12

4.2 WINDOWS SOFTWARE DESCRIPTION 15

4.2.1 MAIN WINDOW DESCRIPTION 15

4.2.2 PROGRAM WINDOW DESCRIPTION 16

4.2.3 PROGRAM CONFIGURATION 18

4.3 PROGRAM EXAMPLE 19

4.4 STATUS WINDOW 21

5. DRIVE PARAMETERS (PARTICULAR TO PROFILE) 23

5.1 PROFILE STATUS 25

6. FIRMWARE VERSION 2305 OR HIGHER, NEWS 26

APPENDIX A - VARIABLES (PRELIMINARY) 27

1. INTRODUCTION 27

1.1 PROGRAM WITH VARIABLES 28

1.2 PROGRAM EXAMPLE WITH VARIABLES 30

2. VARIABLES, VIEWING AND EDITING VALUES 32

2.1 PROFILE BLOCS 33

2.2 VALUES DESCRIPTIONS 34

2.3 DIALOGUE PROTOCOL FOR ACCESS TO BLOCS 36

1. Overview

The profile package, board and software, allows you to realise elementary movement in combination with inputs and outputs.

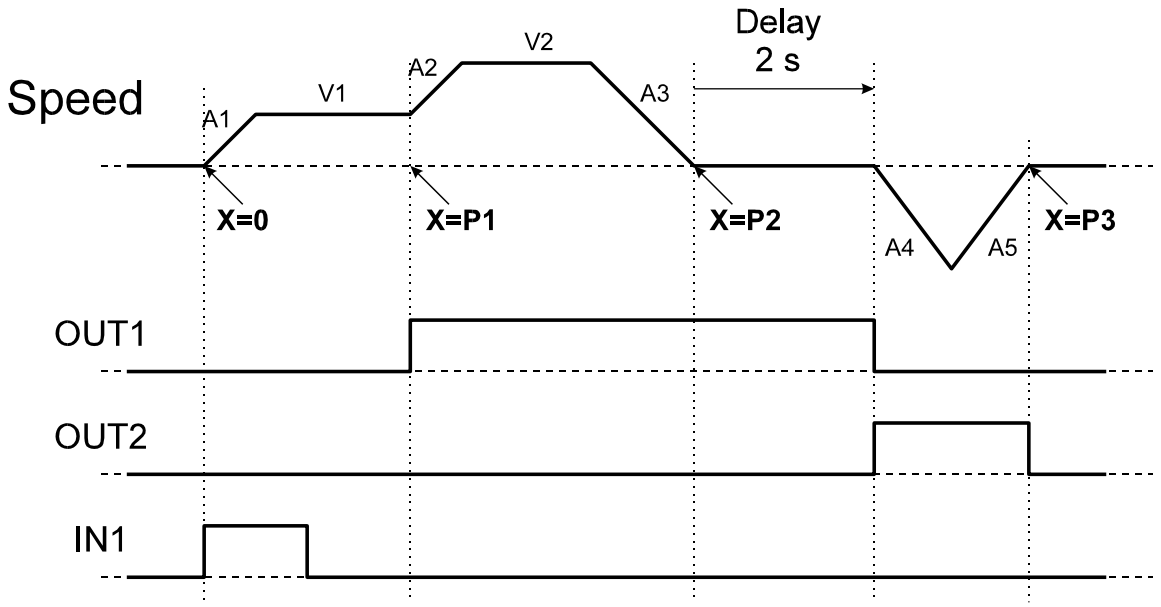
Hardware features :

- Easy plug in a IRT drive of series 2000 and 4000.
- 24 VDC inputs.
- 24 VDC outputs with short circuit protection.
- DC-DC 24V to 6V conversion for drive power backup .

Software features :

- Off-line programation with Windows software (for Windows 3.1 or later).
- Transfer of program direct in the non-volatile memory of the drive by RS232 serial link.
- Input/output functions.
- Time functions.
- Relative and absolute positions commands.
- Jump functions.

1.1 Example of movement



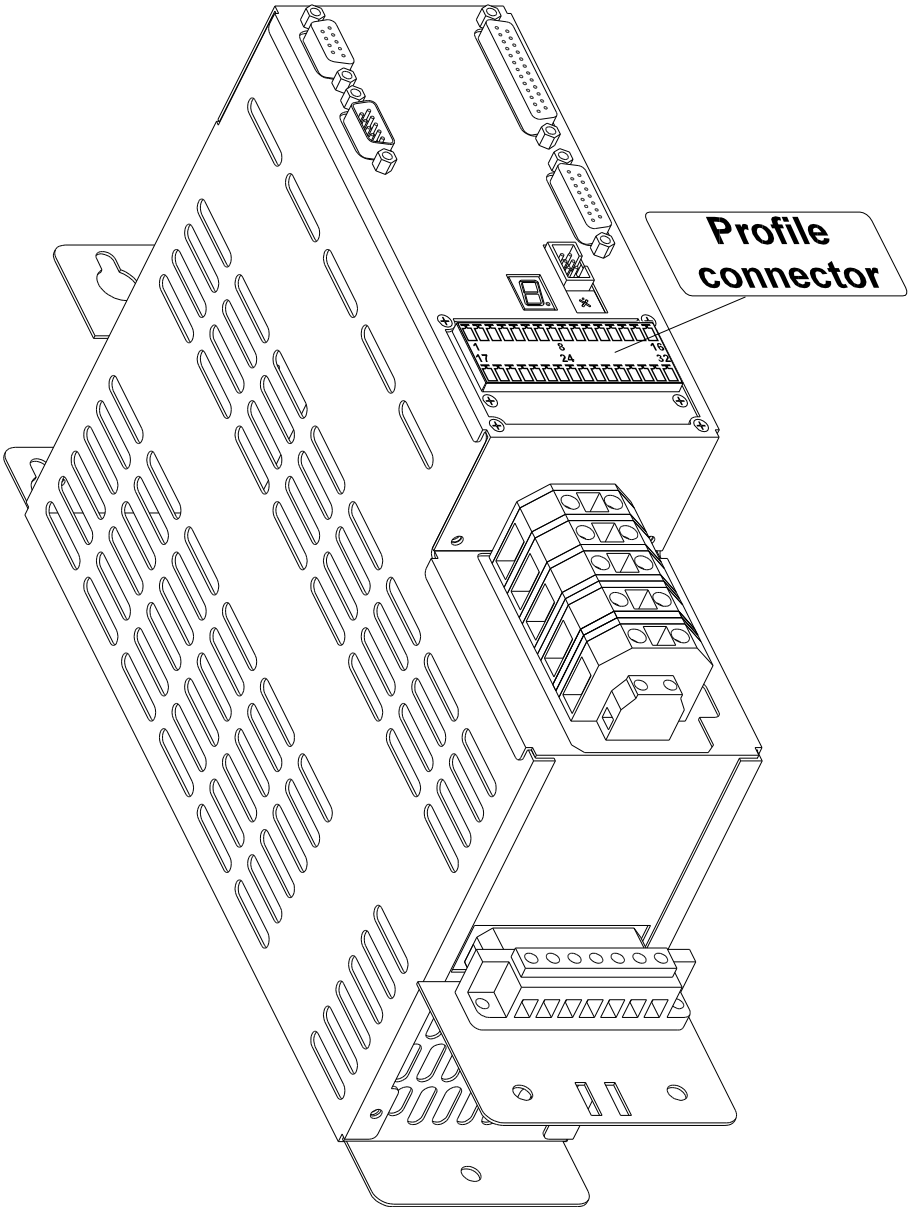
This example is composed of two movements and one delay. The first movement, from x=0 to x = P2 contains a speed change at x=P1. For the second movement, from x=P2 to x=P3, the maximum speed is not reached.

The input IN1 starts the programmed sequential operations.

The output OUT1 is set when x=P1 and cleared 2 seconds after the position x=P2 is reached.

The output OUT2 is set when OUT1 is cleared. OUT2 is cleared when position P3 is reached.

2. Mechanical description



Profile connector type:

Drive part :

MINICONNEC MCDV 1.5/16-G1-3.81 (32 PIN Male)

Opposing part :

2 x MINICONNEC MC 1.5/16-ST-3.81 (2 x 16 PIN Female for wires 0.14 - 1.5 mm^2)

3. Electrical characteristics

SUPPLY :

Supply voltage : U_{supply} = 24 VDC ±25%
(=18..30 VDC)

INPUTS (IN1..IN16):

Input impedance : Z_{IN} = 7,1 kΩ

High level detection : U_{IH} = 16..30 V

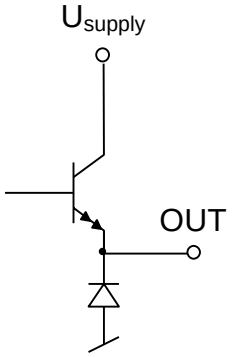
Low level detection : U_{IL} = 0..5 V

OUTPUTS (OUT1..OUT14):

Max. output current : I_{OH} = 100 mA

Output voltage : $U_{OH} = U_{supply} - 1.6$
(@ I_{OH} = 100 mA)

All outputs are short-circuit protected.



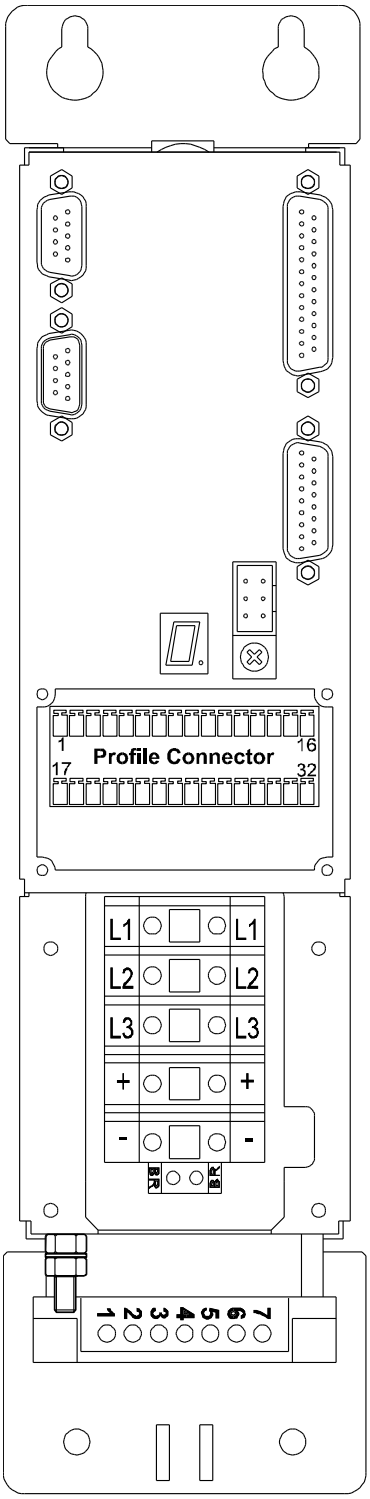
NOTES :

- Inputs and outputs voltage with respect to GND
- The inputs and outputs are fully potential free with the internal voltage (opto-coupler separation).
- The input IN16 is directly hardware wired to the drive **TORQUE ENABLE**.
- When a short-circuit is detected, the output is desactivated and an indication is shown by display (Profile Status P-F). The short-circuit can be reset by the « INIT DRIVE » input or by a serial link « RESET » command.

3.1 Connector pinout

PIN Number	Name	Description
1	OUT1	
2	OUT2	
3	OUT3	
4	OUT4	
5	OUT5	
6	OUT6	
7	OUT7	
8	OUT8	
9	OUT9	
10	OUT10	
11	OUT11	
12	OUT12	Position OK
13	OUT13	Homing ended
14	OUT14	Drive OK
15	**24V**	**Power supply 24 V**
16	**GND**	**Power supply GND**
17	IN1	Profile selection
18	IN2	
19	IN3	
20	IN4	
21	IN5	
22	IN6	Profile validation
23	IN7	
24	IN8	
25	IN9	
26	IN10	
27	IN11	
28	IN12	End-limit +
29	IN13	End-limit -
30	IN14	Stop \
31	IN15	Init drive
32	**IN16**	**Torque enable**

Front view :



3.2 Fixed inputs/outputs functions

Some inputs and outputs are already fixed for specified functions :

FIXED OUTPUTS

OUT12, POSITION OK

Activated when the motor position equals to the pointed position (the positioning window value defines the tolerance for the pointed position).

OUT13, HOMING ENDED

Activated when a homing function is ended. This output is cleared when the drive is initialised or when a new homing is started.

OUT14, DRIVE OK

Indicate when the drive is ready (no drive alarm and torque enable). This following events will disable the **DRIVE OK** output :

- Any drive alarm.
- Torque disable.
- Following error (profile status P-A).
- No profile loaded or CRC check error (profile status P-E).
- Unknow command (profile status P-9).
- No 24V supply or output short-citcuit (profile status P-F).

FIXED INPUTS

IN1-6, PROFILE SELECTION AND VALIDATION

See section 3.3, profile selection.

IN12, END-LIMIT+

Stop the positive speed (active when 24V is applied).
Firmware version 2305 or higher :
If the bit 0 of drive parameter 24 is set, the **END-LIMIT+** input is inverted (active when 0V is applied, see section 5, page 23, description of parameter 24).

IN13, END-LIMIT-

Stop the negative speed (active when 24V is applied).
Firmware version 2305 or higher :
If the bit 1 of drive parameter 24 is set, the **END-LIMIT-** input is inverted (active when 0V is applied, see section 5, page 23, description of parameter 24).

IN14, STOP

When this input is enabled (24V removed), the motor stops with the « Stop » deceleration (value set by the command « STOPDECEL »). When input is disabled again, the profile execution is recovered (the motor resumes the movement with the defined acceleration).

IN15, INIT DRIVE

Drive initialization, all values are initialized (position, acceleration, speed,..), a profile selection is waited. In addition, this input resets a short-circuit detection

IN16, TORQUE ENABLE

While this input is disabled, the motor is not supplied.

3.3 Profile selection

A program can be composed of 1 to 32 profiles. At power on or after an initialization, a profile selection must be performed to start into the desired profile.

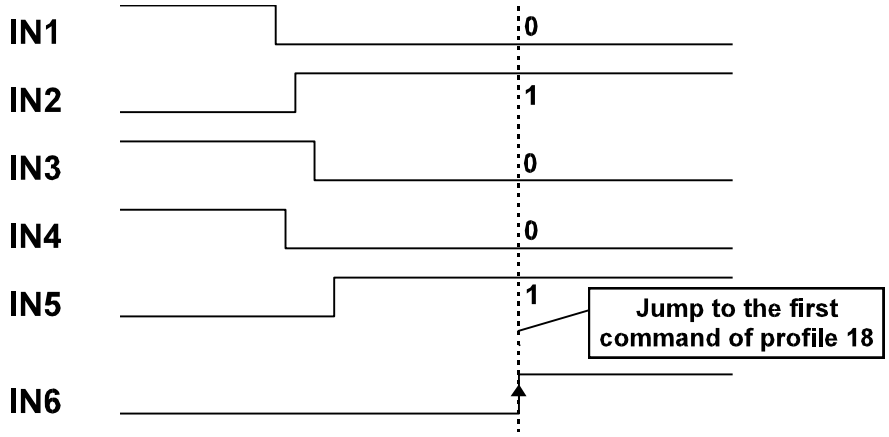
INPUT1 to INTPUT5 are used to select one of the 32 profiles. The table below gives the relation for profile selection :

Profile Nr.	IN5	IN4	IN3	IN2	IN1
0	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1

Profile Nr.	IN5	IN4	IN3	IN2	IN1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	1	0	1
22	1	0	1	1	0
23	1	0	1	1	1
24	1	1	0	0	0
25	1	1	0	0	1
26	1	1	0	1	0
27	1	1	0	1	1
28	1	1	1	0	0
29	1	1	1	0	1
30	1	1	1	1	0
31	1	1	1	1	1

Profile validation (INPUT6) :
INPUT6 enables the start in a profile after power on or after the END of a profile.

The profile is selected at the positive edge on INPUT6.
Example for selection of profile number 18 :



If the selected profile is empty or not defined in software, no jump is performed and a new valid profile selection is waited.
When a profile is running, a new profile selection is possible only after an END command or after an initialization (only one profile can run).

4. Software

4.1 Command list description

New functions available only with firmware version 2305 or higher :
***(indication* V2305➔ in the table)**

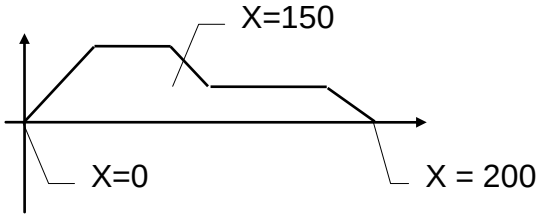
CHKPOS CHKPOSREL IFPOSGEJMP IFPOSLTJMP
IFFALSJUMP STOPMOVE AUTOSTART

COMMAND NAME	DESCRIPTION	EXAMPLE	
SETACCEL	Set the acceleration value in RPM/s	SETACCEL	10000
SETDECEL	Set the deceleration value in RPM/s	SETDECEL	12000
STOPDECEL	Set the stopping deceleration, value for deceleration when stop input is activated	STOPDECEL	20000
SETWINPOS	Set the size of the positioning window in increment.	SETWINPOS	2
SETMAXSPD	Set the maximum speed value in RPM	SETMAXSPD	1500
SETPOS	Set the position counter to a value.	SETPOS	0 REV
SETPOSREL	Shift the position counter with a value.	SETPOSREL	-10 REV
MOVETOPOS	Set an absolute movement, the position set is not waited.	MOVEPOS	23.5 REV
MOVPOSREL	Set a relative movement, the position set is not waited (be careful, the position is relative to the position to reach).	MOVEPOSREL	30.325 REV
WAITPOS	Wait an absolute position.	WAITPOS	0.025 REV
WAITPOSREL	Wait a relative position (be careful, the position is relative to the position to reach).	WAITPOSREL	-5.5 REV
CHKPOS **(V2305➔)**	Check the position. The real position is compared to the given position value.	CHKPOS	20.00 REV
CHKPOSREL **(V2305➔)**	Check the relative position. The real position is compared to the given relative position value(be careful, the position is relative to the position to reach).	CHKPOSREL	-100.0 REV
IFPOSGEJMP **(V2305➔)**	At the last check position command (CHKPOS or CHKPOSREL), if the real position was greater than or equal to the check position then jump to label name.	IFPOSGEJMP	LABEL0

COMMAND NAME	DESCRIPTION	EXAMPLE	
IFPOSLTJMP **(V2305➔)**	At the last check position command (CHKPOS or CHKPOSREL), if the real position was less than the check position then jump to label name.	IFPOSLTJMP	LABEL1
SETOUT	Set one or several outputs (to ease the entry, « 2;5;6 » can be written « 2 5 6 »).	SETOUT	2;5;6
CLROUT	Clear one or several outputs (to ease the entry, « 3;11;13 » can be written « 3 11 13 »).	CLROUT	3;11;13
WAITINP	Wait a defined state of the inputs (to ease the entry, « IN3=0; IN5=1; IN12=0 » can be written « 3 0 5 1 12 0 »),	WAITINP	IN3=0; IN5=1; IN12=0
TESTINP	Test a defined state of the inputs for conditional jump (to ease the entry, « IN3=0; IN5=1; IN12=0 » can be written « 3 0 5 1 12 0 »)	TESTINP	IN3=0; IN5=1; IN12=0
IFTRUEJUMP	If the last input test (TESTINP command) was true, jump to label name.	IFTRUEJUMP	LABEL0
IFFALSJUMP **(V2305➔)**	If the last input test (TESTINP command) was false, jump to label name	IFFALSJUMP	LABEL2
JUMP	Jump to a label name	JUMP	LABEL1
JUMPPROF	Jump to the beginning of a profile	JUMP	1
WAITDELAY	Wait a delay time, in ms	WAITDELAY	1000
HOME	Search of origin. An input number must defined the home switch, in addition, the rotation direction (+ or -) and for synchronisation with zero pulse, a « Z » can be added	HOME	+5 or -5 +5Z or -5Z
STOPMOVE **(V2305➔)**	Stop the motor with normal deceleration. This command is passed only when motor speed = 0.	STOPMOVE	
AUTOSTART **(V2305➔)**	This command can be only used at the first line of Profile 0. It set the drive in AUTOSTART mode.	AUTOSTART	
END	end of a profile (must be the last command of each profile).	END	

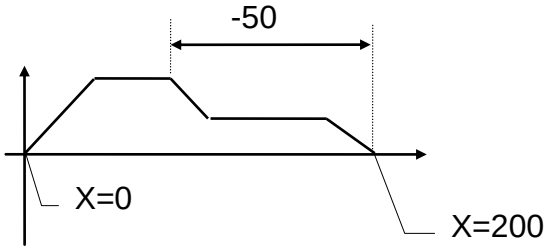
EXAMPLE FOR AN ELEMENTARY MOVEMENT :

SETPOS	0 REV
SETMAXSPD	1500
MOVETOPOS	200 REV
WAITPOS	150 REV
SETMAXSPD	500
WAITPOS	200 REV



SAME IN RELATIVE :

SETPOS	0 REV
SETMAXSPD	1500
MOVPOSREL	200 REV
WAITPOSREL	-50 REV
SETMAXSPD	500
WAITPOSREL	0 REV



AUTOSTART MODE (FIRMWARE VERSION 2305 OR HIGHER)

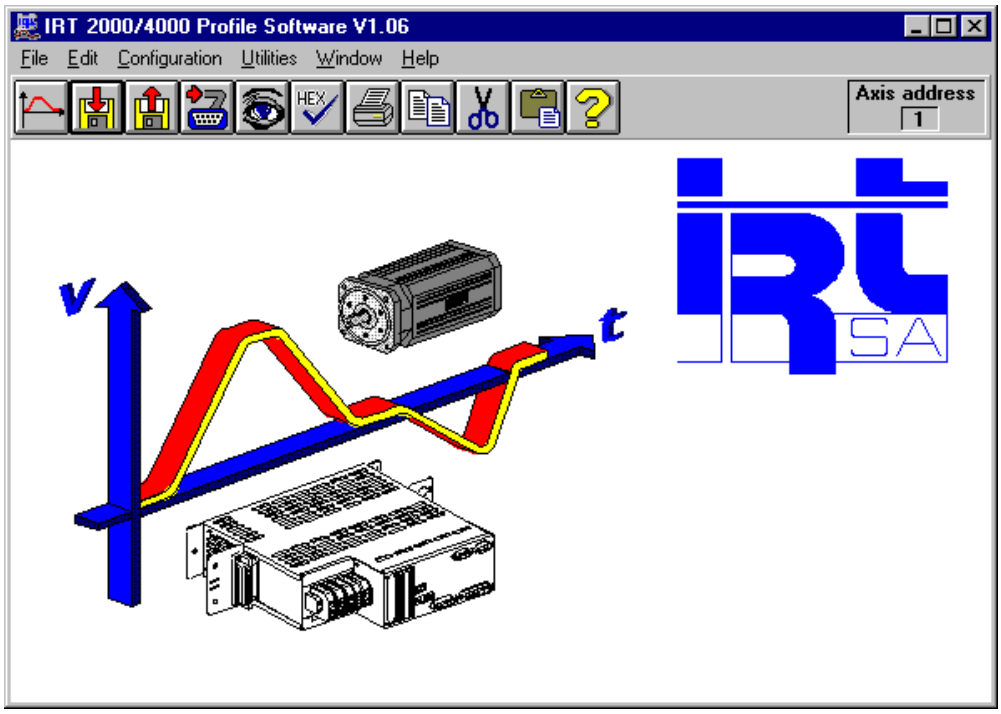
When the first command of Profile 0 is AUTOSTART, the drive is configured in autostart mode :

- At power on, the drive automatically starts the profile 0, the state of profile selection and validation inputs is not considered.
- When an END command is encountered during execution, status P-8 (Autostart end) is indicated (see page 25, section 5.1). In this case, only an INIT can restart the program (profile validation input is not considered).

The Autostart mode is useful to free inputs number 1 to 6. In this mode, this inputs can be used in program as any other input.

4.2 Windows software description

4.2.1 Main window description



Toolbar buttons :

Open a new empty program with default configuration :
1 profile
Position Unit : REV (4096 inc. ⇒ 1 REV)

Save the selected program in the current filename (command « Save as » in the file menu allows you to save the program in a different filename).

Open a program file.

Transfer utility :
a) Transfer program into Drive.
b) Compare program with drive contents
c) Import program from drive (open a new program window)

Drive Status :
a) View inputs/outputs and parameters state.
b) Scope function.

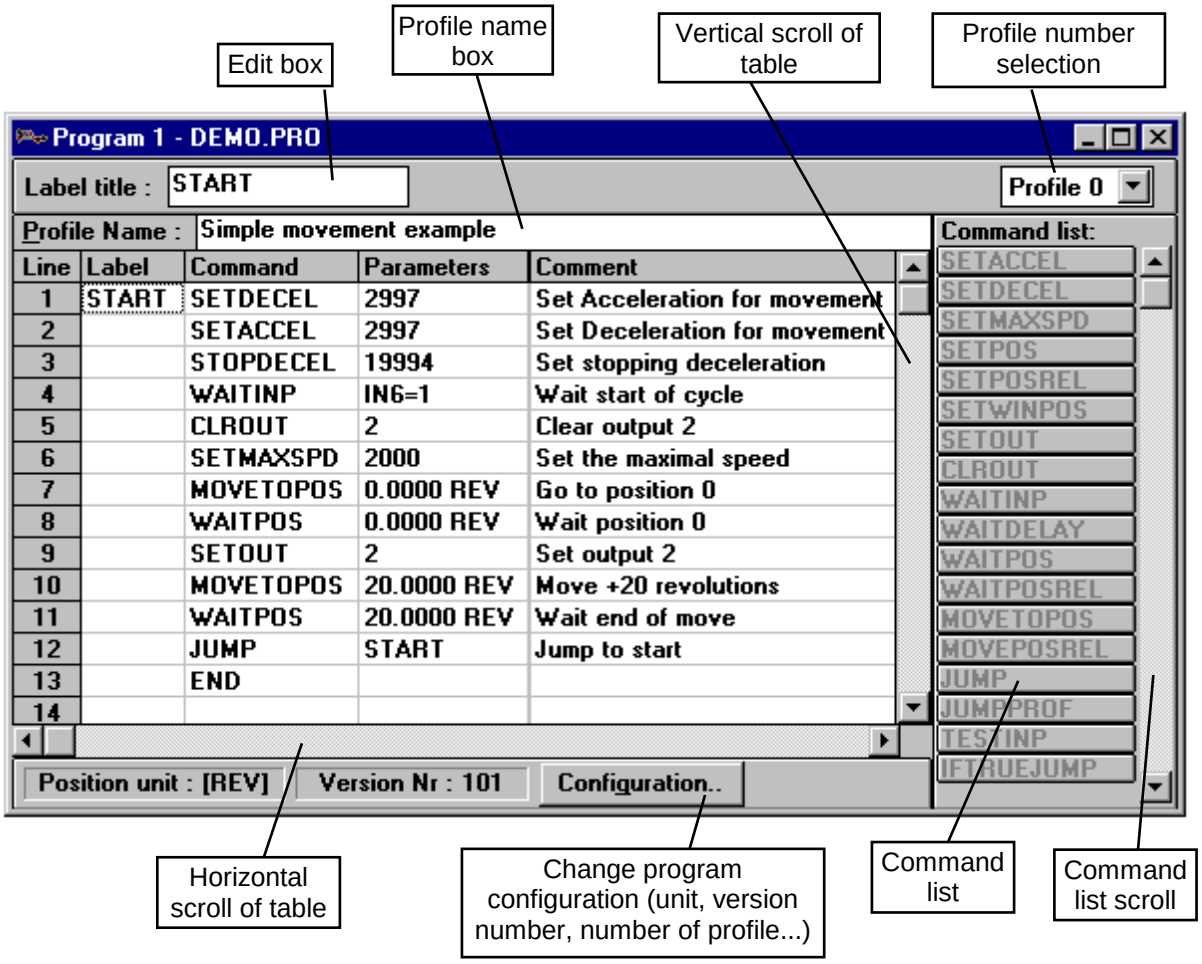
Program verification (the program is fully compiled)

Print function

Program editing functions : Copy, Cut and Paste

Current axis address, a double-click in this box opens a window for the change of the address number.

4.2.2 Program window description



a) Column label :

Line address to define a destination for a jump as example. A label name cannot be a command name and size is limited to 12 characters .

b) Column command :

Instruction name, can be selected in the command list at the right of the window or entered manually.

c) Column parameter ::

Parameter value for the specified instruction. An help box can be enabled by a click on the right button of the mouse.

d) Column comment :

This column allows the programmer to enrich the profile with annotations. It is useful when complex profiles are developed. The size of each comment line is limited to 100 characters, the view of comment column can be expanded with the horizontal scroll bar situated bellow the main table.

e) Profile name box :

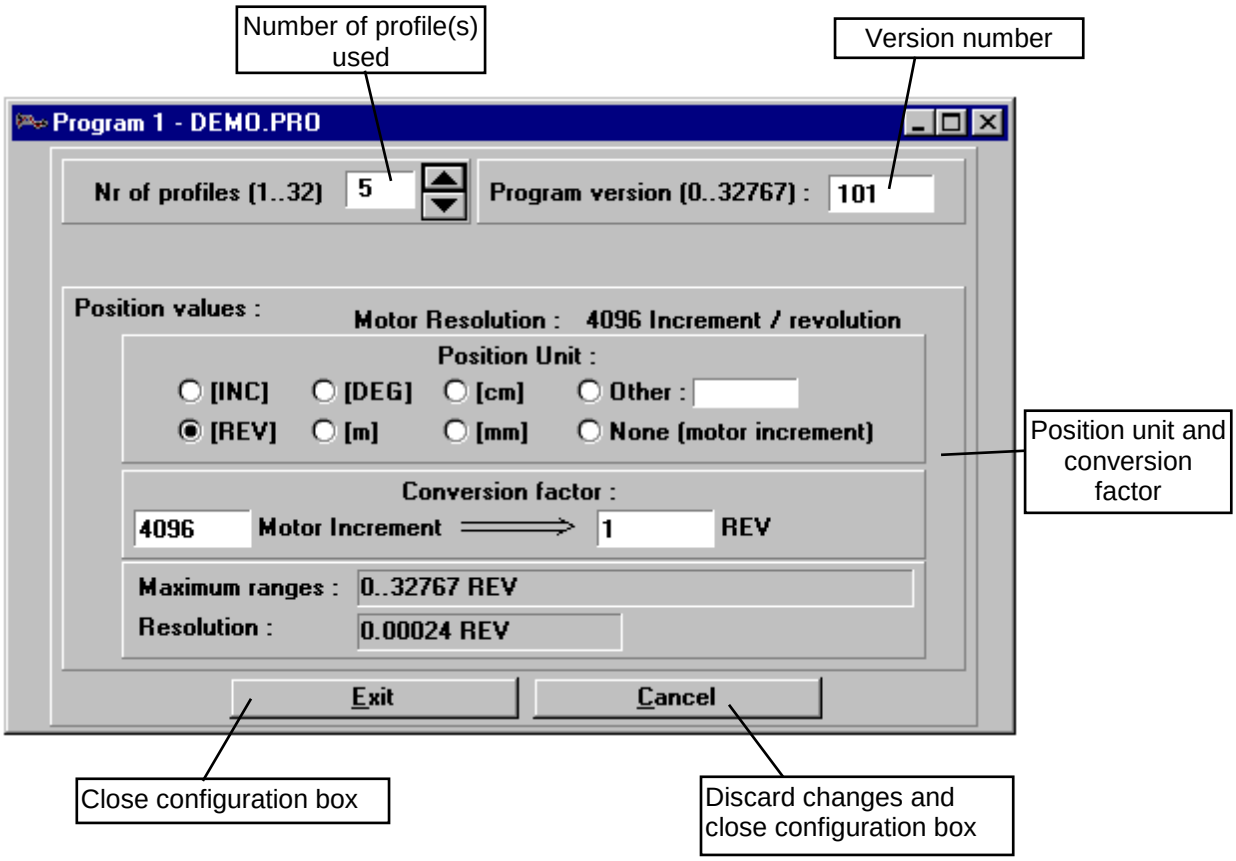
This box can be edited for each profile to give a little description of selected profile.

Important note :

Profile names and comments are ignored by the compilation. Profile name, comments, labels, conversion factors and special unit are only stored in the profile file. When a program is imported from drive, the profile names and comments will be left blank, the labels will have default names (LABEL0, LABEL1, ..), conversion factor and unit will be defined as default (4096 ➔1 and REV unit).

4.2.3 Program configuration

The configuration of a program can be edited by a click on the Configuration button of the program window. When the configuration button is pushed, the following display appears :



a) Number of profile(s) :

Defines the number of profiles used in the program. If this value is reduced the contents of unused profiles is lost

b) Version number :

This number can be used by the programmer to differentiate several program, this number is saved in drive and can be read by an import function.

c) Position unit and conversion factor

The position unit will be the string added at the end of all positions values. It can be one of the list or another that you can define.
The conversion factor is used for all position, to convert the motor increments to the correct value depending of wanted unit.
The maximum range correspond to the maximal position unit with the chosen conversion factor. And the resolution is the position value for one motor increment.

4.3 Program example

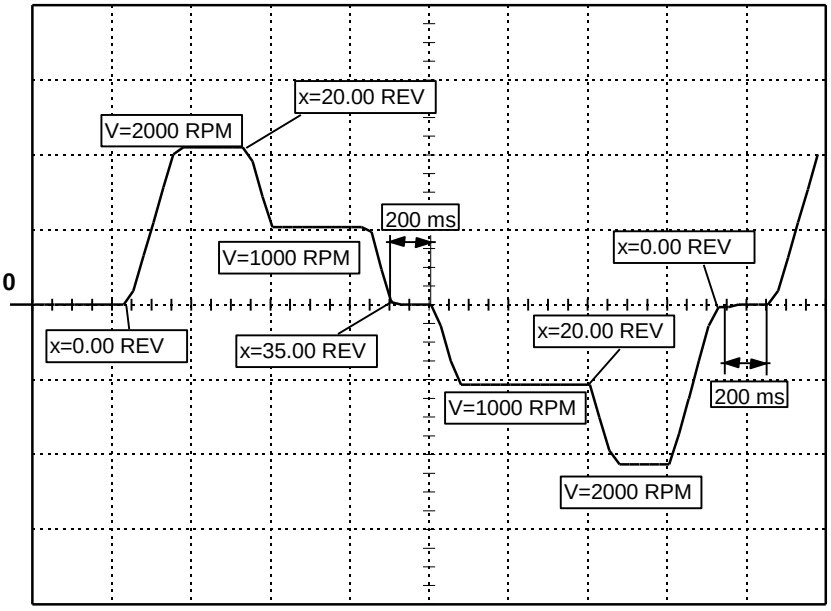
Example program :

Line	Label	Command	Parameter
1		SETDECEL	7007
2		SETACCEL	7007
3		STOPDECEL	29998
4	START	WAITINP	IN6=1
5		CLROUT	1 ;2 ;3 ;4 ;5 ;6
6		SETMAXSPD	2000
7		MOVETOPOS	0.0000 REV
8		WAITPOS	0.0000 REV
9		SETOUT	1
10		MOVETOPOS	35.0000 REV
11		WAITPOS	20.0000 REV
12		SETOUT	2
13		SETMAXSPD	1000
14		WAITPOS	0.0000 REV
15		SETOUT	3
16		WAITDELAY	200
17		SETOUT	4
18		SETMAXSPD	2000
19		MOVETOPOS	0.0000 REV
20		WAITPOS	20.0000 REV
21		SETMAXSPD	2000
22		SETOUT	5
23		WAITPOS	0.0000 REV
24		SETOUT	6
25		WAITDELAY	200
26		JUMP	START
27		END	

This example is realised with the default configuration (configuration when a new program is opened)

The input IN6 gives the start.

Speed profile V=f(t) :

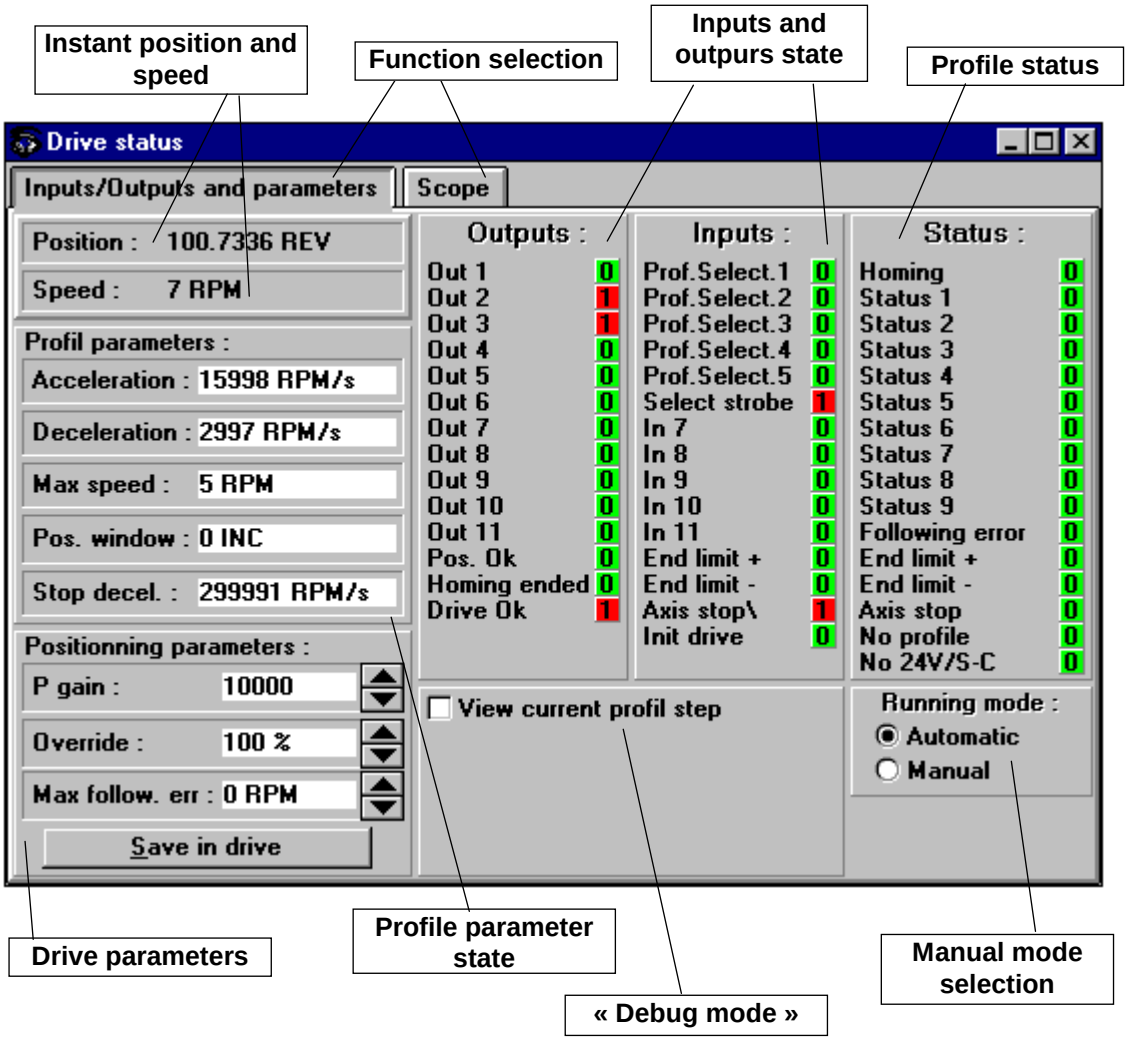


Horizontal scale : 500ms/div
Vertical scale : 948 RPM/div

4.4 Status window

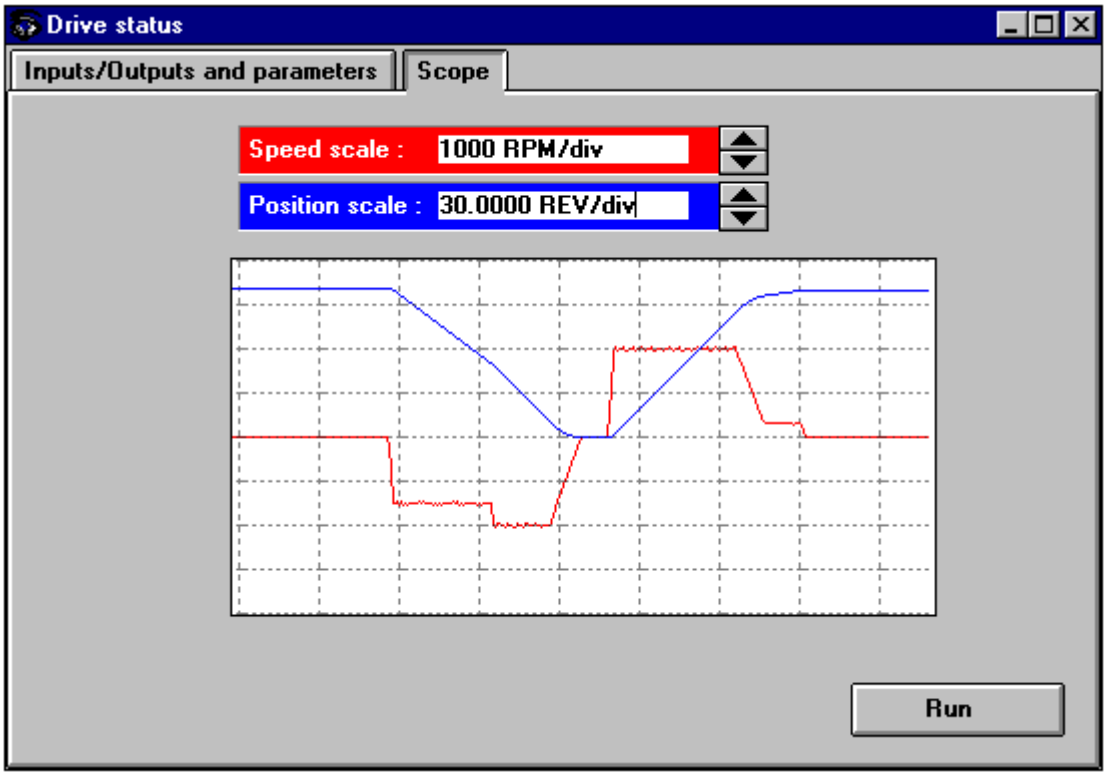
A click on the icon of the toolbar open a status window. If the drive is connected to the PC, this window shows the profile status. Two functions are available:

- Input/output state, instantaneous position, speed, max speed...
- Scope



- The unit of the instantaneous position corresponds to the unit of the last selected program (if no program is opened, unit is defined as default in REV)
- The debug mode (« View current profile step » option) is usable only when the running program is opened (the « Import program from drive » function allows you to read the running program).

***Scope function*) :**



This function is still in development, the horizontal scale is not constant, it depend for the moment, of the used computer speed. This scope is momentarily usable to see a lowbred image of the running profile.

5. Drive parameters (particular to profile)

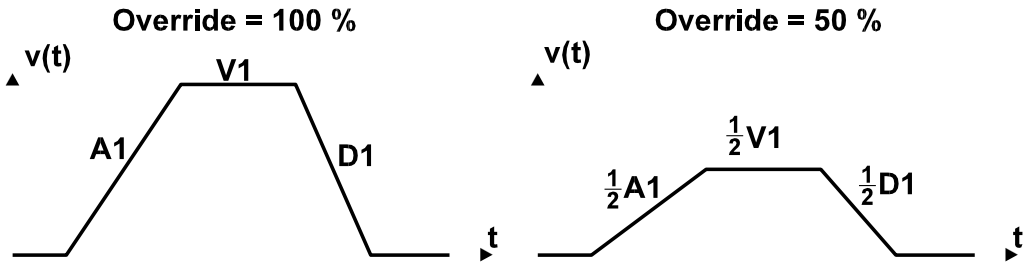
This parameters belongs to the drive parameters list, they can be modified by the standard User software or by the Profile software.

When you modifies a drive parameter value, you have to select the « Save in drive » function else the changes will be lost at power down or at initilization.

OVERRIDE, ADDRESS 57

This value affects all speed and acceleration/deceleration values. When a command set a speed or an acceleration/deceleration, the value is multiplied by the override value. This function is useful for testing slowly a profile.

Example (same profile executed with Override=100% and 50%) :



Important :

The override value is considered only at the execution of a set speed or set acceleration/deceleration command. If a profile is running in a loop which not includes a set speed or a set acceleration command, a change of the override value will never affect the profile.

POSITIONING PROPORTIONAL GAIN, ADDRESS 58

Define the positioning proportional gain, usually 10000 is a good value.

Important :

The speed loop integral gain must be different of 0 for a good position regulation.

FOLLOWING SPEED ERROR, ADDRESS 59

If this value is different of zero, the following error detection is enabled. When the difference between the speed and the command speed reach this value, the motor stops and following error (« P » - « A ») is shown on the display. The following error can be reset only by an initialization (« Init » input of power off/on).

END LIMIT SWITCHES N/O OR N/C, ADDRESS 24

Firmware version 2305 or higher :
Defines the configuration of **END-LIMIT+** and **END-LIMIT-** inputs :

	0	1
Bit 0	Speed+ stopped when 24V applied to **END-LIMIT+** input.	Speed+ stopped when 0V applied to **END-LIMIT+** input.
Bit 1	Speed- stopped when 24V applied to **END-LIMIT-** input.	Speed- stopped when 0V applied to **END-LIMIT-** input.

Important Notes :

- The Drive inputs END-SW1\ and END-SW2\ of DSUB25 connector (XCOMMAND) are no more usable with a profile firmware.
- The RDY1 and RDY2 pins (Ready relay) of DSUB25 connector (XCOMMAND) are internally used by profile card. This relay outputs are no more usable with a profile firmware (value of drive parameter 30, relay configuration, is also ignored).

5.1 Profile status

The drive shows profile status on the 7-segment display. To indicate a profile status, the display shows « P » alternate with status number :

Display	Status description	Effect
P 0	Homing function in progress	
P 8	Autostart end (firmware version 2305 or higher). When a END command is encountered in Autostart mode.	• The current move is ended (move to last pointed position). • No possibility to start an other profile.
P 9	Unknown command encountered (the current profile command is unknown from current firmware).	• Stop with defined stop deceleration. • **DRIVE OK** output disabled.
P A	Following error.	• Stop with defined stop deceleration. • **DRIVE OK** output disabled.
P b	« End-limit + » activated.	If speed > 0 : • Stop with motor maximal current.
P C	« End-limit - » activated	If speed < 0 : • Stop with motor maximal current.
P d	Axis stop (input STOP\ activated).	• Stop with defined stop deceleration.
P E	No profile loaded or CRC check error.	• **DRIVE OK** output disabled.
P F	No 24V supply or output short-circuit detected.	• **DRIVE OK** output disabled. • Stop with defined stop deceleration.

Important note :
Drive errors have higher priority than profile status, when a drive error occurs, the profile status is not more indicated by the drive display.

6. Firmware version 2305 or higher, news

From firmware version 2305, a CRC check of program is performed at drive power on. If the loaded program does not include a CRC, the profile status P-E is indicated and the program cannot be executed.

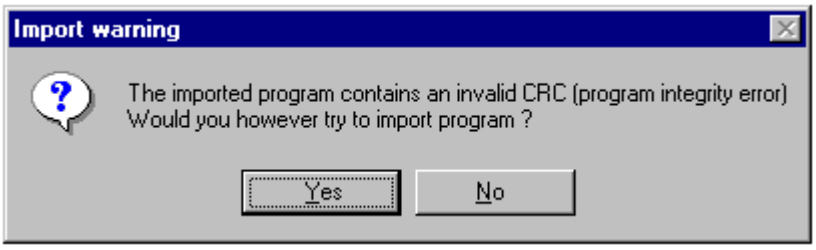
Only « Windows Profile software » version 1.07 or higher are compatible with CRC check function (compilation with CRC check).

UPDATE OF OLDER FIRMWARE VERSION :

If the drive firmware is older than version 2305 and it is updated by a firmware version 2305 or higher, the profile will generate the profile status P-E. Two possibilities to recover the profile :

- If the source file exists on the computer :
  Open the program file with a « Windows Profile software » version 1.07 or higher and transfer it into the drive.

- If the program exists only in the drive :
  Start the « Transfer utility » function in a « Windows Profile software » version 1.07 or higher and select « Import program from drive ». The following message will appear :



  Select « Yes » and when the program window is opened, transfer the imported profile back into drive.

Important note :

After the update, check the drive parameter 24 value, for firmware version 2305 or higher, this value configure the type of **END-LIMIT+** and **END-LIMIT-** inputs. It this value is setted to zero, configuration will be the same as with older firmware.

APPENDIX A - VARIABLES (PRELIMINARY)

1. Introduction

Variables are used to perform an interaction with a system. The variable values can be changed by the system through a serial link (RS232 or RS485).

The variable are grouped by blocs of eight. The variables are named with following syntax :

V<bloc number (0..3)><variable number (0..7)>

Example : V13 = Variable 3 of bloc 1

Four blocs of eight variables are usable :

Bloc0	Bloc1	Bloc2	Bloc3
V00	V10	V20	V30
V01	V11	V21	V31
V02	V12	V22	V32
V03	V13	V23	V33
V04	V14	V24	V34
V05	V15	V25	V35
V06	V16	V26	V36
V07	V17	V27	V37

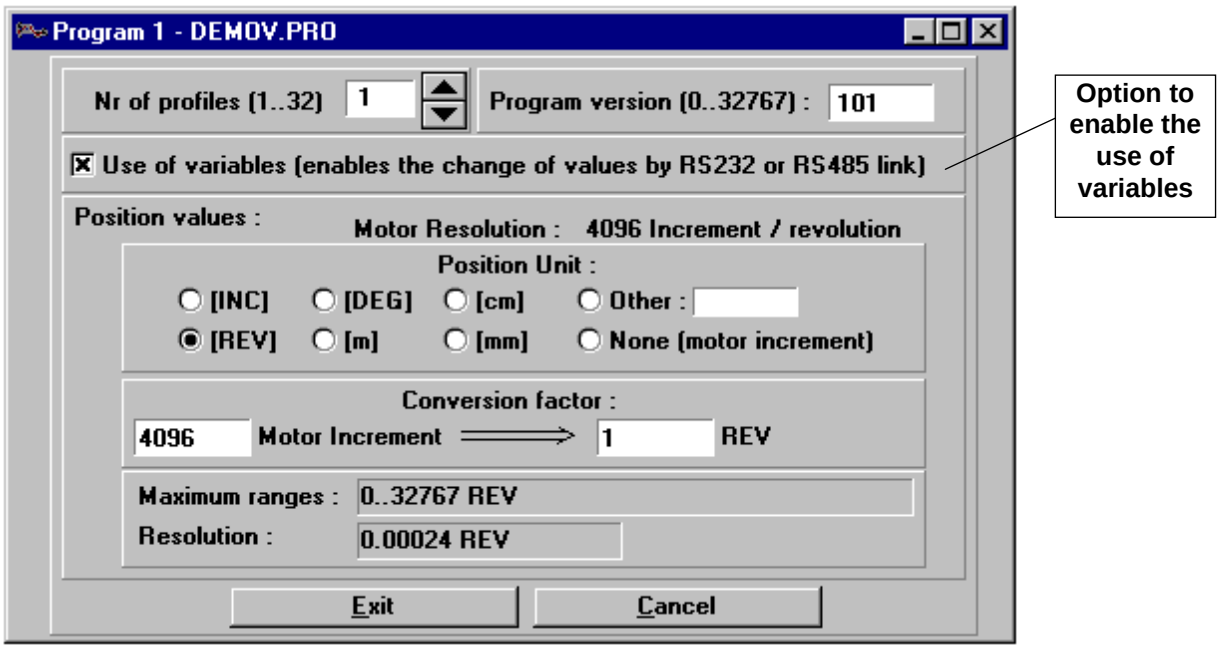
Every case correspond to one 16 bits variable, for acceleration, deceleration, speed and time values, 16 bits are needed but for position, 32 bits are needed. That's why a position variable used two variables (Example : V10 is used to define a position, V11 is also not usable because the case is used by the position V10).

Important note :

The variables use is possible only with the following version of softwares :
Firmware version : 2400 and greater.
Windows Profile version : 2.00 and greater.

1.1 Program with variables

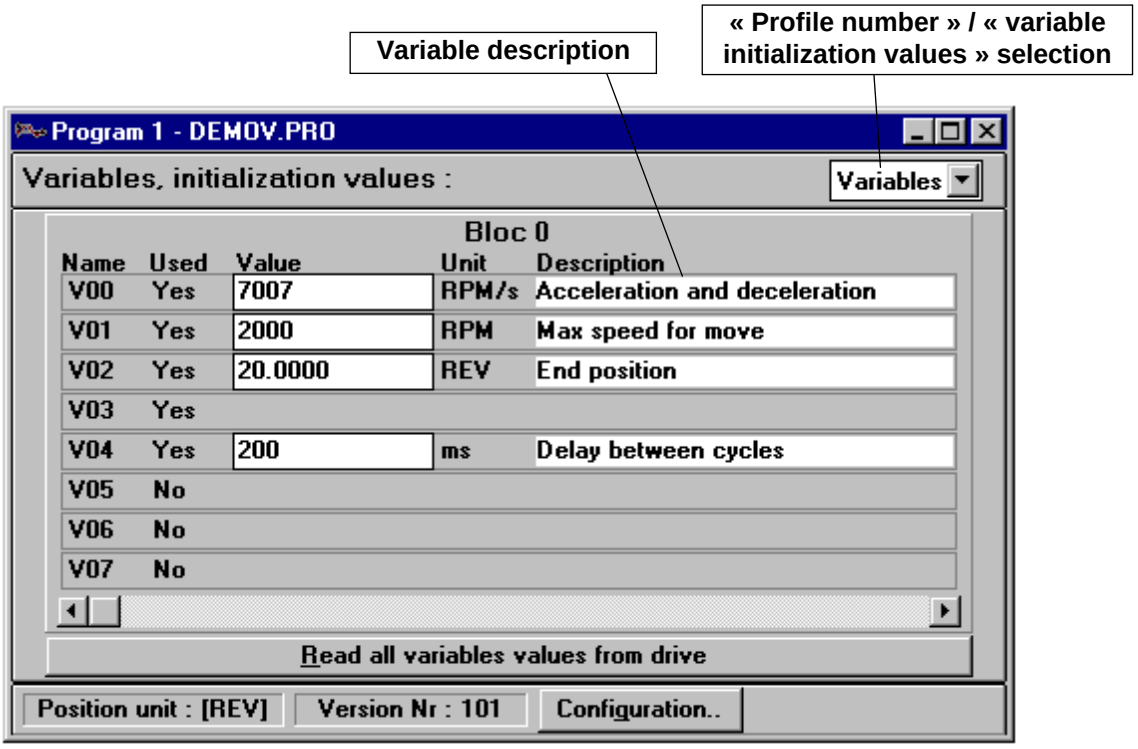
To enable the use of variable, change program configuration (only Profile software version 2.00 and greater includes variables functions):



All other configuration options are same as describe in the main Profile manual.

When the use of variable is enabled, you can simply specify a variable name in place of acceleration, deceleration, speed, time or position value. The difference with a normal value, it's the initialization, every variable must be initialized. When the program is written with the desired variables, select variables in the profile selection box at the right top of the program to show the variable initialization values.

Variables, initialization values :



Only used variables can be edited. The initialization values must be edited only after the write of program (the type of the variable must be know to display the right unit and the variable size).

The Description box can be edited to describe the variable function (optional). Like the profile names and the comments, the variable description is not saved in the drive.

Important :

When you edit a program zone that contains variables (cut or copy a program zone with variable), the used variable list can be wrong, to refresh the list, start a verification (icon)

1.2 Program example with variables

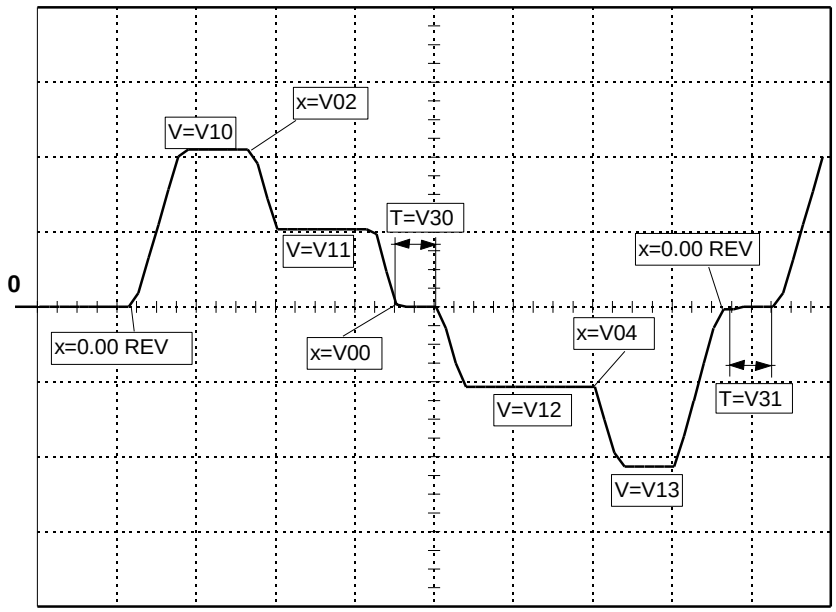
The example is the same that the example describes in the main manual but it is programmed with variables :

Line	Label	Command	Parameter
1		SETDECEL	V20
2		SETACCEL	V21
3		STOPDECEL	V22
4	START	WAITINP	IN6=1
5		CLROUT	1 ;2 ;3 ;4 ;5 ;6
6		SETMAXSPD	V10
7		MOVETOPOS	0.0000 REV
8		WAITPOS	0.0000 REV
9		SETOUT	1
10		MOVETOPOS	V00
11		WAITPOS	V02
12		SETOUT	2
13		SETMAXSPD	V11
14		WAITPOS	V02
15		SETOUT	3
16		WAITDELAY	V30
17		SETOUT	4
18		SETMAXSPD	V12
19		MOVETOPOS	0.0000 REV
20		WAITPOS	V04
21		SETMAXSPD	V13
22		SETOUT	5
23		WAITPOS	0.0000 REV
24		SETOUT	6
25		WAITDELAY	V31
26		JUMP	START
27		END	

Variable initialization values :

Bloc0		Bloc1		Bloc2		Bloc3	
V00	35.0000 REV	**V10**	2000 RPM	**V20**	8000 RPM/s	**V30**	200 ms
V01		**V11**	1000 RPM	**V21**	8000 RPM/s	**V31**	200 ms
V02	20.0000 REV	**V12**	1000 RPM	**V22**	50000 RPM/s	**V32**	
V03		**V13**	2000 RPM	**V23**		**V33**	
V04	20.0000REV	**V14**		**V24**		**V34**	
V05		**V15**		**V25**		**V35**	
V06		**V16**		**V26**		**V36**	
V07		**V17**		**V27**		**V37**	

Speed profile V=f(t) :



Horizontal scale : 500ms/div
Vertical scale : 948 RPM/div

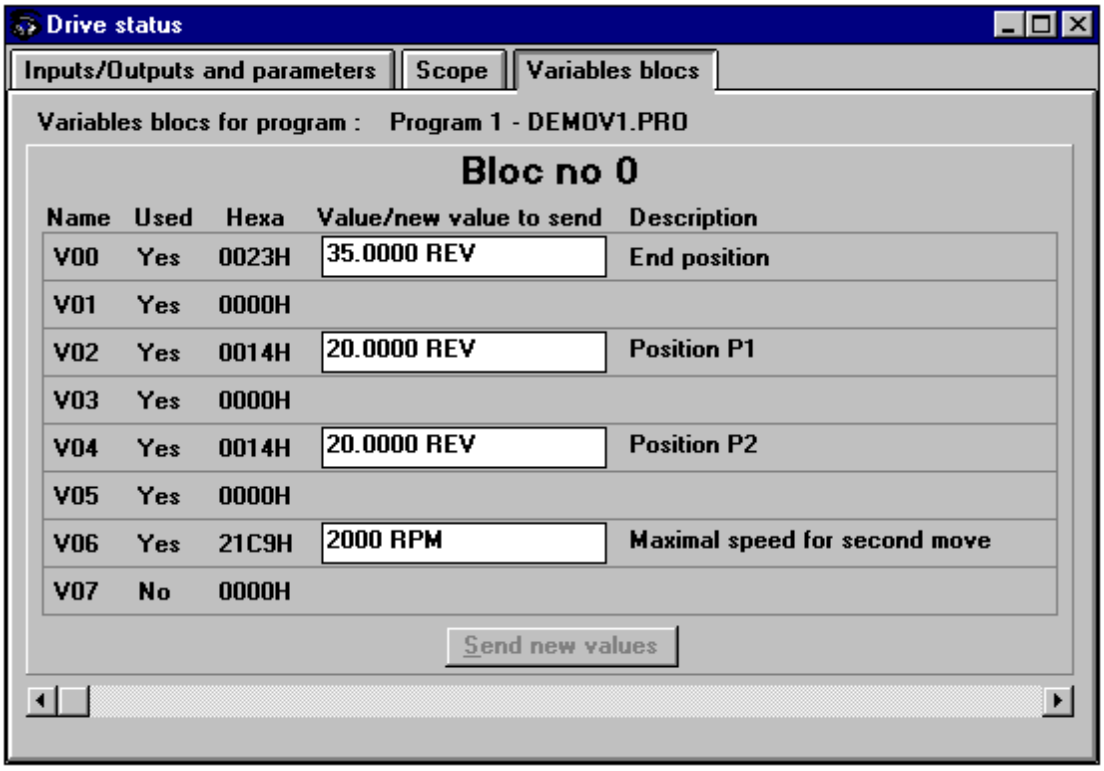
2. Variables, viewing and editing values

The variable blocs can be displayed and edited during program execution with the drive status function (icon) of the windows software.

The variables values can be changed and sent to the drive during execution.

Important :

To display the correct unit of the variables, the executed program must be selected before the start of « Drive status » (« Import program from drive » button in transfer utility function get the program from the drive).



If the drive is connected to the computer by a RS485 link, you can easily view the variables values of each axis. You just have to change the axis address (a double click on the « Axis address » box open a window for selecting the axis address).

Every system can access to the variable blocs with the protocol defined in section 2.2.

2.1 Profile Blocs

Eight blocs (only four if variables are not used) are used for the dialogue between the drive and the command system :

Bloc Addr.	Access	Nr.	Description
32	Read/ write	0	0:Automatic/1:Manual mode
		1	Positionning window
		2	Acceleration
		3	Deceleration
		4	Stop Deceleration
		5	Max Speed
		6	
		7	
33	Read/ write	0	Manual : Move relative HW
		1	Manual : Move relative LW
		2	
		3	
		4	
		5	
		6	
		7	
34	Read only	0	Status
		1	Input
		2	Output
		3	Speed command
		4	Instantaneous speed
		5	Profile, address pointer
		6	Instantaneous position HW
		7	Instantaneous position LW
35	Read only	0	
		1	
		2	
		3	
		4	
		5	
		6	End position HW
		7	End position LW
36	R/W	0..7	Variable bloc 0, values V00..V07
37	R/W	0..7	Variable bloc 1, values V10..V17
38	R/W	0..7	Variable bloc 2, values V20..V27
39	R/W	0..7	Variable bloc 3, values V30..V37

Note :

When manual mode is set ({ bloc 32, 0 } = 1) the motor stop to the last pointed position, the profile execution is suspended. In manual mode, a manual move can be set by writing a relative position in cases 0 and 1 of bloc 33. The manual mode is used by the Profile software, in status window to ease the search of motor position. When automatic mode is set again ({ bloc 32, 0 } = 0), profile execution is resumed.

2.2 Values descriptions

The drive values are not directly usable, to obtain values with same units as used in « Windows Profile Software », following factors are given :

Value with unit	➔	Drive Value

Speed values :

X RPM	➔	$X \cdot \frac{4}{0.925} = X \cdot \frac{1}{0.23125}$
3'000 RPM	➔	12973

Acceleration and deceleration values

X RPM/s	➔	$X \cdot \frac{1}{0.925 * 15} = X \cdot \frac{1}{13.875}$
10'000 RPM/s	➔	721

Time values (for delays)

X ms	➔	$X \cdot \frac{1}{2} = X \cdot 0.5$
500 ms	➔	250

Position values

Each positions are composed of two 16 bits words, number of revolution and position within a revolution. To compute this numbers, the position is firstly converted in increments with the factor defined by the user :

$$\text{Number of increments} = \text{Position} \cdot \frac{\text{Factor1}}{\text{Factor2}}$$

Then, the two words values are defined as follows :

$$1^{st}\text{ word} = \langle \text{Number of revolution} \rangle = \text{INT}\left(\frac{\langle \text{Number of increments} \rangle}{4096}\right)$$

Limits : -16384..16384

$$2^{nd}\text{ word} = \langle \text{Position within a revolution} \rangle = (\langle \text{Nr. of inc.} \rangle \text{ MOD } 4096) \cdot 16$$

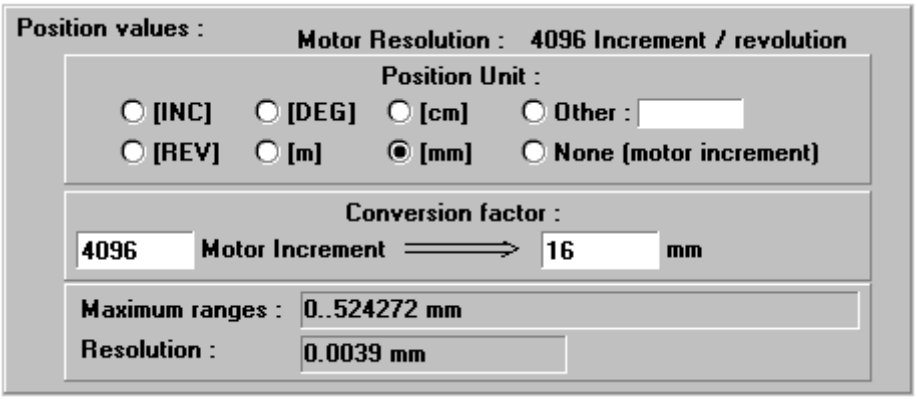
Limits : 0..65535

Notes:

- « INT(*number*) » function return the first integer less than or equal to *number*.
  Examples : « INT(4.2) = 4 », « INT(5.8) = 5 », « INT(-7.2) = -8) ».
- « *number1* MOD *number2* » operation return the remainder of the integer division *number1*/*number2.*
  Examples : « 5000 MOD 4096 = 904 », « 9096 MOD 4096 = 904 ».

Position values conversion, examples

a) V00 = 110 mm, with following configuration :

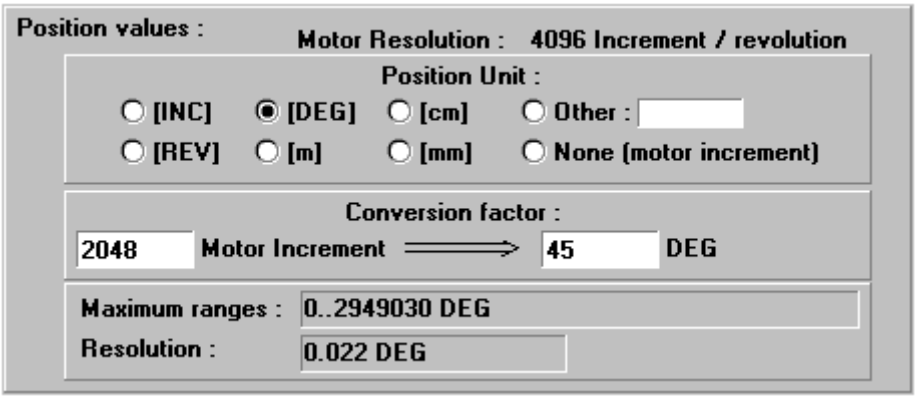


Number of increments : 110 mm ➔ $110 \cdot \frac{4096}{16} = 28160$ INC

Number of revolutions : $V00 = \text{INT}\left(\frac{28160}{4096}\right) = \text{INT}(6.875) = 6 = 0006_H$

Position within a rev. : V01 = (28160 MOD 4096) · 16 = 57344 = $E000_H$

b) V12 = -290 DEG, with following configuration :



Number of increments : -290 DEG ➔ $-290 \cdot \frac{2048}{45} = -13198 \text{ INC}$

Number of revolutions : $V12 = \text{INT}\left(\frac{-13198}{4096}\right) = \text{INT}(-3.22) = -4 = \text{FFFC}_H$

Position within a rev. : V01 = (-13198 MOD 4096) · 16 = 50976 = $C720_H$

Note :

The round of increment causes an error on the position due to the resolution (4096 increments per revolution).
In the example b), 13198.22 INC is rounded at 13198 INC, in this case, the correct position is :

$$13198 \cdot \frac{45}{2048} = 289.995 \text{ DEG} \neq 290 \text{ DEG}$$

2.3 Dialogue protocol for access to blocs

Except for values codification, the protocol principle is the same as describes in « Instruction manual 2000/4000 ».

Serial protocol for write bloc :

<STX><AXIS_ADDRESS+48><W><BLOC_ADDR><VALUES CODE><ETX><BCC>

Example : Write in Variable Bloc 0, Axis address 2
V00 = 1234 = $04D2 $ = Hexadecimal
V01 = -100 = $FF9C
V03..V08 = 0 = $0000
Bloc address : 36 (= $24),
Axis address : 2 (+48 = 50 = $32)

Parameter coding 16 bits -> 3 bytes:

```
1234 = 000001 001101 0010

$1+$30=$31  $D+$30=$3D  001000 -> $8+$30=$38
```

```
-100 = 111111 111001 1100

$3F+$30=$6F  $39+$30=$69  110000 -> $30+$30=$60
```

Hexadecimal codes for the write :

$02, $32, $57, $24, $31, $3D, $38, $6F, $69, $60, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $03, $12

The drive replies ACK ($06) when the message is correctly received. When checksum is not correct the drive replies nothing.

Serial protocol for read bloc :

<STX><AXIS_ADDRESS+48><R><BLOC_ADDR><ETX><BCC>

Hexadecimal codes for the read of variable bloc 0, axis 2 :

$02, $32, $52, $24, $03, $45

Hexadecimal reply of the drive :
$02, $32, $52, $24, $31, $3D, $38, $6F, $69, $60, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $30, $03, $17

Index

B

Blocs
- Dialogue protocol....36

C

Command list....12

D

Drive OK output....9
Drive parameters....23

E

Electrical characteristics....7
End-limit inputs....9

F

Fixed inputs/outputs functions....9
Following error....23

H

Hardware features....4

I

Init drive input....10
Input
- Impedance....7
- IN12, IN13, End-limit....9
- IN14, Stop\....10
- IN15, Init drive....10
- IN1-6, Profile selection and validation....9; 10
- IN16, Torque enable....10
- Voltage levels....7

M

Mechanical description....6
Movement example....5

N

Number of profile(s)....18

O

Output
- Current....7
- OUT14, Drive OK....9
- Voltage....7

Override....23
Overview....4

P

Position unit and conversion factor....19
Positioning proportional gain....23
Profile blocs....33
Profile connector type....6
Profile selection....10
Profile validation....10
Program configuration....18
- Number of profile(s)....18
- Position unit and conversion factor....19
- Version number....18

Program example
- Complete profile....19
- Complete profile with variables....30
- Elementary movement....14

Program window
- Column command....17
- Column comment....17
- Column label....17
- Column parameter....17
- Description....16
- Profile name....17

S

Scope function....22
Short-circuit detection....7; 25
Software features....4
Status....25
Status window....21
Stop\ input....10
Supply voltage....7

T

Torque enable input....10

V

Variables....27
- Program example....30
- Viewing and editing....32

Version number....18

W

Windows software
- Compare program with drive contents.....15
- Drive status.....16
- Editing functions 16
- Import program from drive 15
- Main window description.....15
- Open a new empty program 15
- Open a program file.....15
- Print function.....16
- Program verification.....16
- Save selected program.....15
- Transfer program into drive 15

These instructions have been written and checked to the best of our knowledge and belief.
However, IRT will not be liable for errors and reserves the right for changes at any time without notice.

PROFILE, INSTRUCTION MANUAL EVOLUTION

Version Erreur ! Source du renvoi introuvable. **modifications and news compared with September 1998 manual :**

SECTION	PAGE	NEW	MODIF	DESCRIPTION
-	27	X		Appendix A : variable (preliminary) added
3	7	X		Output schema added
3.2	9		X	OUT14, Drive OK : Profile status number corrected.
5.1	25		X	Profile status P-b and P-C effect (end-limit reached) : stop with motor maximal current.

LAST MODIFICATION : 27 JANUARY 2016