



VIALE STAZIONE 5 - 36054 MONTEBELLO VIC. - VI - ITALY  
Phone (+39) 0444 440441 - Fax (+39) 04444 440418  
[www.AXORINDUSTRIES.COM](http://www.AXORINDUSTRIES.COM) - [INFO@AXORINDUSTRIES.COM](mailto:INFO@AXORINDUSTRIES.COM)

# ***Additional Features*** **Manual**

**ver.1 rev.12/'08**

## **Enclosures to Service Manuals of:**

- **McbNET Digital™**
- **Magnum400™**
- **MiniMagnum400™**
- **FastBack™**

# Summary

---

1 Programmable digital inputs	3
2 Programmable digital outputs	4
3 Limit Switch	5
4 Reset Fault Function	7
5 Emergency Function	8
6 Motor brake management	9
7 Stop Functions	14

Release	Notes
ver.1 rev.06/'07	Preliminary first edition.
ver.1 rev.12/'08	Corrections.

All rights reserved. Reproduction in whole or in part is prohibited without prior written consent of the copyright owner. All specifications are subject to change without prior notification.

This manual has been carefully checked. However, Axor does not assume liability for errors or inaccuracies.

Print in Italy 12/2008



**THIS MANUAL IS EXCLUSIVELY ADDRESSED TO TECHNICAL PERSONNEL WITH  
AN APPROPRIATE TECHNICAL KNOWLEDGE ON SERVODRIVE.  
BEFORE USING THIS MANUAL READ DRIVE'S SERVICE MANUAL.**

# 1 Programmable digital inputs

The following table illustrates all functions settable on **programmable digital inputs** and operative modes which manage them:

<b>FUNCTION</b>	<b>DESCRIPTION</b>	<b>OP MODE</b>
<b>Off</b>	With this settings there is not a particular function assigned to the input.	all
<b>Ref-On</b>	It enables the motor rotation.	Analog Speed Digital Speed Gearing Pulse/Dir Mode
<b>PStop</b>	See chapter "3 Limit Switch".	Analog Speed Digital Speed
<b>NStop</b>		
<b>P+N Stop</b>		
<b>Brake</b>	See chapter "6 Motor Brake Management".	all
<b>Homing Sensor</b>	Homing sensor.	Position Mode Gearing Pulse/Dir Mode (See "Positioner Manual")
<b>Start Jog</b>	It enables a movement having the following parameters: <ul style="list-style-type: none"> <li>• acceleration time that is equal to the homing acceleration time;</li> <li>• speed (in rpm) equal to the value set in the auxiliary variable;</li> <li>• target equal to the positive extreme (PSTOP software) of the axis if the speed is positive, or equal to the negative extreme (NSTOP software) of the axis if the speed is negative;</li> <li>• deceleration time that is equal to the homing acceleration time.</li> </ul>	Position Mode (See "Positioner Manual")
<b>Start_Task_n°</b>	It enables the task set by the auxiliary variable. There is not possibility of blending with this function.	
<b>Start Task I/O</b>	It enables the task set by the digital inputs DGT-IN5...DGT-IN9. There is not possibility of blending with this function.	
<b>Start Sequence</b>	It enables a sequence of tasks. The first task is set by the digital inputs DGT-IN5...DGT-IN9, while the next tasks are set by using the "Next Profile" parameter associated to each task. At the end of each task the following automatically starts.	
<b>Start Next</b>	It enables a sequence of tasks. The first task is set by the digital inputs DGT-IN5...DGT-IN9, while the next tasks are set by using the "Next Profile" parameter associated to each task. At the end of each task the motor stops, the user has to disable and enable the input set with the "Start Next" function in order to start the next task of the sequence.	
<b>Emergency</b>	See chapter "5 Emergency Function".	Analog Speed Digital Speed Position Mode
<b>Start Homing</b>	It is used to start/stop the homing procedure.	Position Mode Gearing Pulse/Dir Mode (See "Positioner Manual")
<b>Reset Fault</b>	See chapter "4 Reset Fault Function".	all

## 2 Programmable digital outputs

The following table illustrates all functions settable on **programmable digital outputs** and operative modes which manage them:

FUNCTION	DESCRIPTION	OP MODE
<b>Off</b>	Selecting this function the output will always be open.	all
<b> Speed &gt;x</b>	If the absolute value of the actual speed is greater than the value inserted in the auxiliary variable, the output will be closed. On the contrary, if the absolute value of the actual speed is less than the value inserted in the auxiliary variable the output will be opened.	all
<b> Speed &lt;x</b>	If the absolute value of the actual speed is less than the value inserted in the auxiliary variable, the output will be closed. On the contrary, if the absolute value of the actual speed is greater than the value inserted in the auxiliary variable the output will be opened.	all
<b>Homing OK</b>	The output will be closed after a complete and successful homing procedure.	Position mode Gearing Pulse/Dir Mode (see "Positioner Manual")
<b>I2t</b>	The output is closed if there is alarm 6 (I <sup>2</sup> t Drive Alarm). When this condition comes down the output opens.	all
<b> Irms% &gt;x</b>	If the absolute value of the actual current is greater than the value inserted in the auxiliary variable, the output will be closed. On the contrary, if the absolute value of the actual current is less than the value inserted in the auxiliary variable the output will be opened.	all
<b> Irms% &lt;x</b>	If the absolute value of the actual current is less than the value inserted in the auxiliary variable, the output will be closed. On the contrary, if the absolute value of the actual current is greater than the value inserted in the auxiliary variable the output will be opened.	all
<b>Target OK</b>	This function closes the output when a positioning task successfully terminates; at the start of a new profile the output is opened.	Position mode (see "Positioner Manual")
<b>Error</b>	With this function the output is closed if one or more alarms are present. When all alarm are cleared the output will be opened.	all
<b>Ready</b>	When the control circuitry is powered up (with a minimum delay), the output will be closed.	all
<b>P.A. Max</b>	When 80% of the maximum recovery is reached, the output is closed and it will be re-opened if the value becomes less than 80% of the maximum recovery value. ATTENTION: This function is not active for <b>McbNET Digital™</b> .	all
<b> Err Pos &gt;x</b>	If the absolute value of the actual Position Error is greater than the value inserted in the auxiliary variable, the output will be closed. On the contrary, if the absolute value of the actual current is less than the value inserted in the auxiliary variable the output will be opened. The actual position error can be monitored in main window of Speeder One interface by selecting Posit_Err option in Analog Out1 or Analog Out2 menu.	Position mode Gearing Pulse/Dir Mode (see "Positioner Manual")
<b> Err Pos &lt;x</b>	If the absolute value of the actual Position Error is less than the value inserted in the auxiliary variable, the output will be closed. On the contrary, if the absolute value of the actual current is greater than the value inserted in the auxiliary variable the output will be opened. The actual position error can be monitored in main window of Speeder One interface by selecting Posit_Err option in Analog Out1 or Analog Out2 menu.	
<b>Next Target</b>	At the start of the first profile the output is opened and it will change status (toggled) at the start of every new profile.	Position mode (see "Positioner Manual")

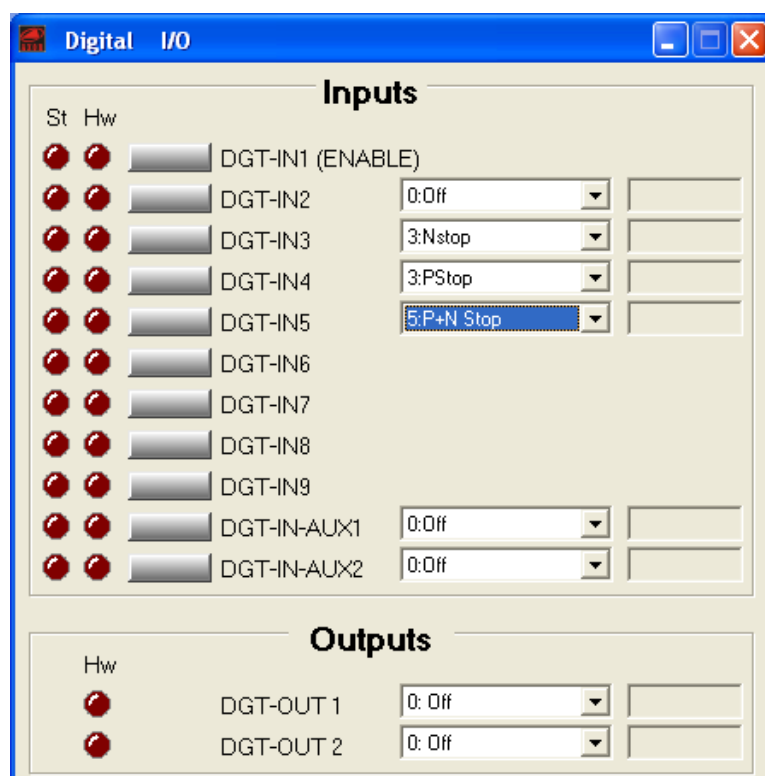
### 3 Limit Switch

In the "**Digital I/O**" window it is possible to manage **limit switches**, setting the "**NSTOP**", "**PSTOP**" and "**P+N STOP**" functions:

Function	Description
<b>PSTOP</b>	If in the input set with this function a <u>low logical signal</u> is reached the motor, in <u>clockwise</u> turning, decelerates by using the "Emer.Ramp" parameter set in the "Speed" window.
<b>NSTOP</b>	If in the input set with this function a <u>low logical signal</u> is reached the motor, in <u>counter-clockwise</u> turning, decelerates by using the "Emer.Ramp" parameter set in the "Speed" window.
<b>P+N STOP</b>	If in the input set with this function a <u>low logical signal</u> is reached the motor, in <u>clockwise</u> or <u>counter-clockwise</u> turning, decelerates by using the "Emer.Ramp" parameter set in the "Speed" window.

The procedure is the following:

- 1- connect the limit switches to the pins dedicated to the digital inputs, DGT-IN2...DGT-IN5 (see the service manual of the drive);
- 2- set the function/s NSTOP, PSTOP and P+NSTOP in the Digital I/O window, referring to the connections at point 1:



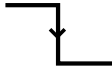
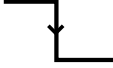
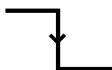
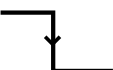

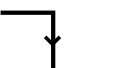
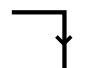
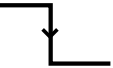
- 3- select the desired operative mode: "0: Analog Speed", "1: Digital Speed" (the others operative modes do not manage the limit switches).

### 3 Limit Switch

**Note:**

- The DGT-IN1 digital input is always the primary input verses the limit switches inputs (PSTOP, NSTOP and P+N STOP).
- If a low logical signal is reached on *both* inputs set with the PSTOP and NSTOP functions, the alarm 15 (Limit Switch) appears, which causes the opening of the Relè Ok contact and the disabling of the functioning. Disable the drive, check the end-run contact and external connections, then enable the drive.

The following table illustrates which limit switch operates reference to the "speed reference" (POSITIVE or NEGATIVE) and the "Rotary Direction" parameter (Positive or Negative) set on the "Speed" window:

ROTOR TURNING (driving shaft view)	SPEED REFERENCE	ROTARY DIRECTION Parameter	PSTOP	NSTOP	P + N STOP
CW (clockwise)	POSITIVE	Positive		- (*)	
	NEGATIVE	Negative		- (*)	
CCW (counter-clockwise)	POSITIVE	Negative	- (*)		
	NEGATIVE	Positive	- (*)		

(\*) a lowering signal on input set with this function does not change the rotor movement.



**NOTE FOR FastBack™: FastBack™ DOES NOT MANAGE LIMIT SWITCHES.**

## 4 Reset Fault Function

The "**Reset Fault**" function, that can be set on one of the programmable digital inputs in the **Digital I/O** window, allows you to reset all *resettable alarms*.

The *resettable alarms* are the following:

- AL3: Drive's temperature;
- AL4: Hall;
- AL5: Encoder;
- AL7: Motor's temperature;
- AL8: Regenerative Resistance;
- AL14: Following Error.

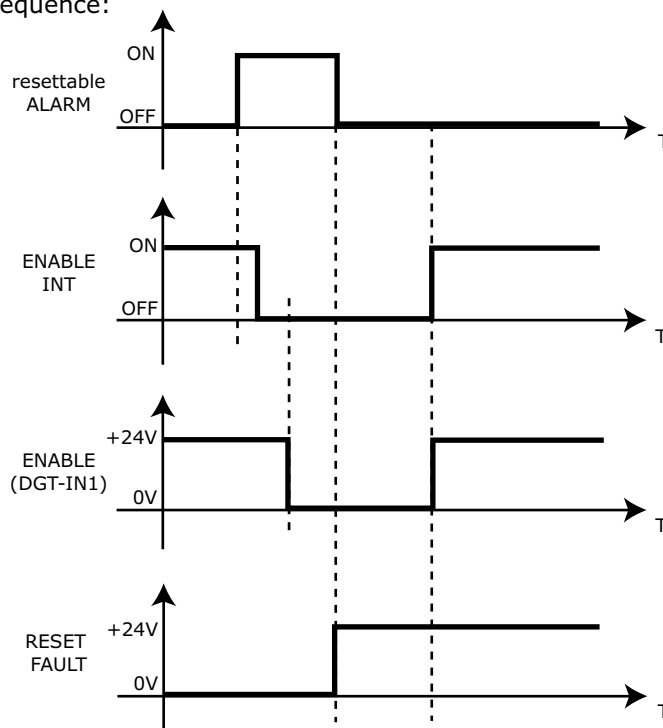
When a resettable alarm occurs the motor is blocked; to restore the correct functioning it is necessary to:

- 1) disable the drive (using the "**Disable**" icon and/or **DGT-IN1** input);
- 2) eliminate the cause that has determined intervention;
- 3) reset the alarm by setting the "**Reset Fault**" function in one of the available programmable digital inputs and applying a high logic signal to this input (see note below);
- 4) enable the drive (using the "**Enable**" icon and/or **DGT-IN1** input).

**Note:** It is possible to **apply a high logic signal** to the input in two modes:

- **utilising the Speeder One interface:** clicking on the button near the name of the digital input which will then show red on the "St" led.
- **hardware:** by applying the corresponding voltage on the connector pins. This will cause leds "St" and "Hw" (visualized on "Digital I/O" window) to show red.

Reset Fault function sequence:



## 5 Emergency Function

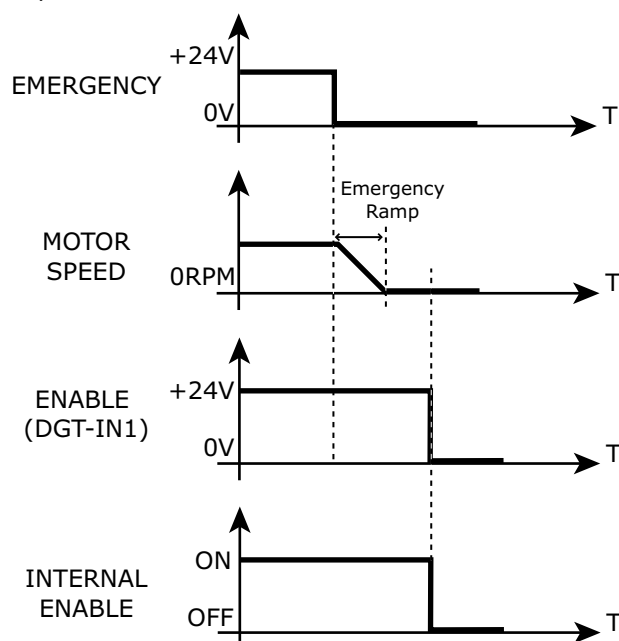
Axor drives have an **EMERGENCY function**, which can be set on one of the programmable digital inputs in the **Digital I/O** window  $\Rightarrow$  a falling edge on the input set with this function causes the motor to stop by using the "**Emer.Ramp**" parameter set in the "**Speed**" window.

The procedure is the following:

- 1- set the Emergency function on one digital input in the Digital I/O window;
- 2- select the desired operative mode between "0: Analog Speed", "1: Digital Speed" or "4:Position Mode" (the others operative modes do not manage the limit switches);
- 3- enable/disable the drive by using **Enable/Disable** buttons.

**Attention:** After stopping the motor remains in torque until a hardware disable .

*Emergency function sequence:*





## 6 Motor brake management

---

Some Axor digital servodrives (**MAGNUM400™**, **MiniMagnum™** and **FastBack™**) have a circuitry which allows the control of the **electromechanical brake integrated** in the motor. It is a **Stationary Brake**, so it can be used with motor not running, for blocking the motor's axis.

It cannot be used for dynamic braking.

The user has the following possibilities:

**a- Not manage the brake by drive.**

**b- MANUAL brake management:**

- **The current necessary to unblock the brake is given by the drive's electronics, but it is controlled by a logic external to the drive.**

- **The user has to manage:** the blocking time and the unblocking time of the brake, the enabling, the emergency ramp, the blocking time of the brake during alarms or when the motor is turning.

**c- AUTOMATIC brake management:**

- **The current necessary to unblock the brake is given by the drive's electronics and it is controlled by a logic internal to the drive.**

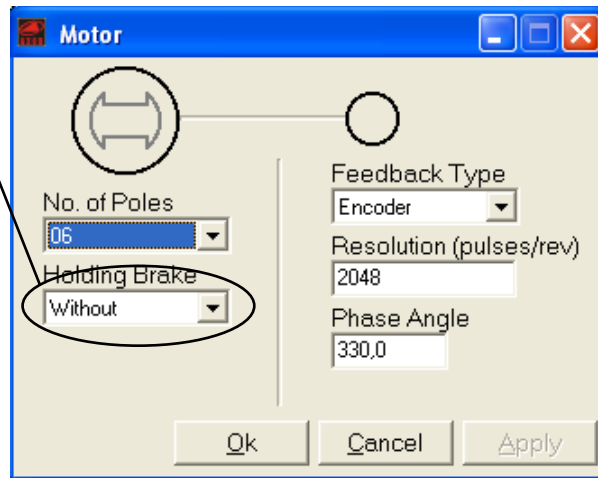
- **The drive has to manage:** the blocking time and the unblocking time of the brake, the enabling, the emergency ramp, the opening time of the brake during alarms or when the motor is turning.

## 6 Motor brake management

### a- NOT managing the brake by drive

1) Select **without** in the **Holding Brake** box of the "Motor" window.

2) Click on the "Save Data To Eeprom" icon in the main window of the interface, in order to save all settings and make them operative at the next start up.



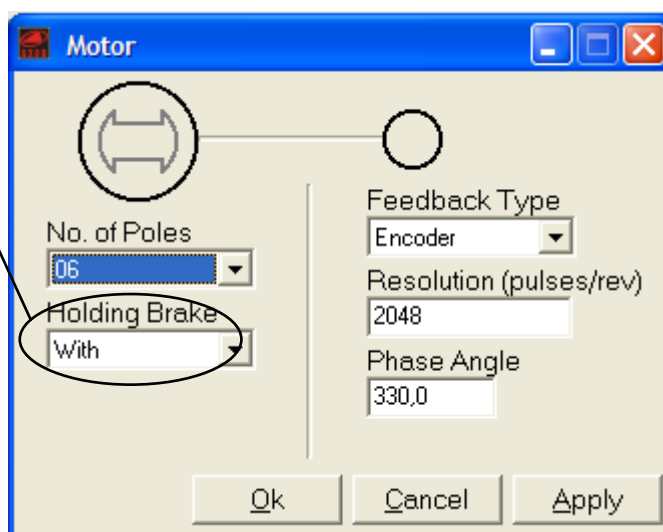
During alarms the functioning of the system is interrupted, the motor remains free and will eventually stop due to the friction and inertia of the axis; at this point there are two possibilities:

- if the motor has no brake, the axis remains free;
- if the motor has an electromechanical brake, the user can manage the axis block, for example using an external relè.

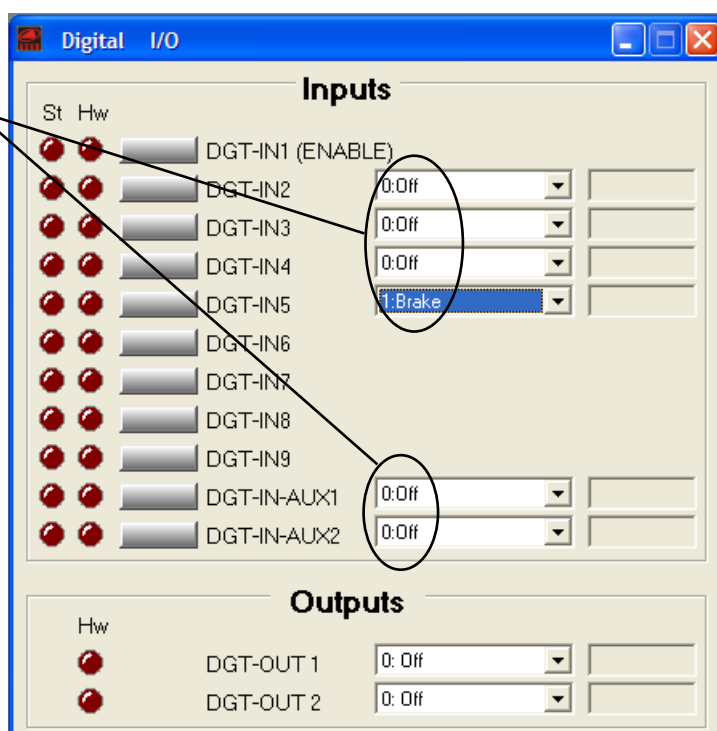
## 6 Motor brake management

**b- MANUAL brake management:** the brake can be **manually** controlled via **software**, or via **hardware**.

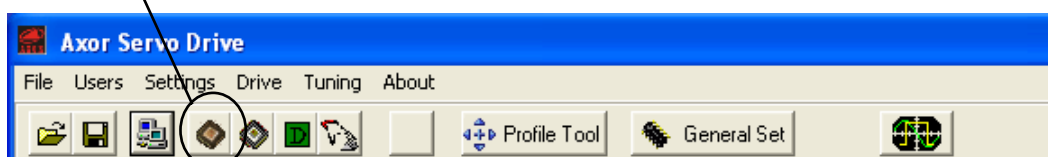
1) Select **With** in the **Holding Brake** box of the "**Motor**" window.



2) Select **Brake** in a digital programmable input (DGT-IN2...DGT-IN5 or DGT-IN-AUX1...DGT-IN-AUX1).



3) Click on the "**Save Data To Eep-rom**" icon in the main window of the interface, in order to save all settings and make them operative at the next startup.



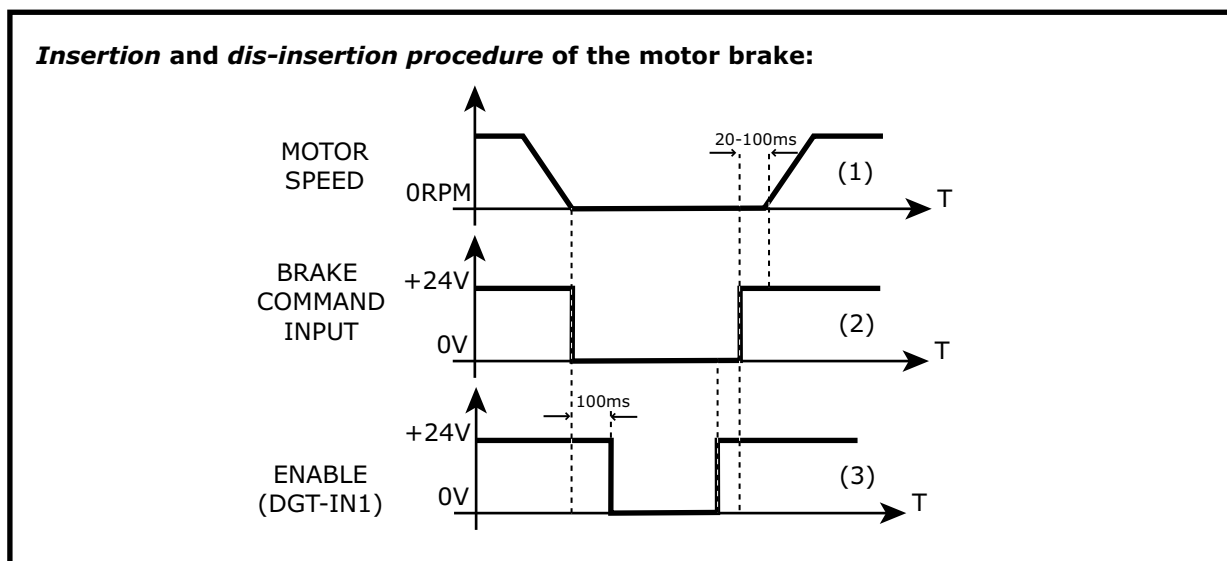
## 6 Motor brake management

Follow this **insertion procedure**:

- 1) Stop the motor by applying a zero speed reference.
- 2) Then block the motor brake by applying **0V** on the digital input set with the "**Brake**" function.
- 3) After **100ms** it is possible to disable the drive applying **0V** on the **DGT-IN1(ENABLE)** input. At this point the motor will remain mechanically blocked.

Follow this **dis-insertion procedure**:

- 1) Apply **+24V** to the **DGT-IN1 (ENABLE)** input.
- 2) Apply **+24V** to the digital input set with the "**Brake**" function.
- 3) After **20÷100ms** (reference to brake), it will be possible to setup the desired speed reference.



**Attention:** it is possible to drive the **DGT-IN1** and **Brake** digital inputs:

- ✓ **via software:** in the **Digital I/O** window, by using the dedicated buttons;
- ✓ **via hardware:** applying the appropriate voltage (0V/+24V) on pin corresponding to the digital input set with Brake function. It is necessary to connect the pin **DGT-IN RTN** to CN, too.

**Note:** You can find more information about the *behaviour of the system in presence of alarms* on paragraph "7 Stop Functions".

## 6 Motor brake management

### c- AUTOMATIC brake management:

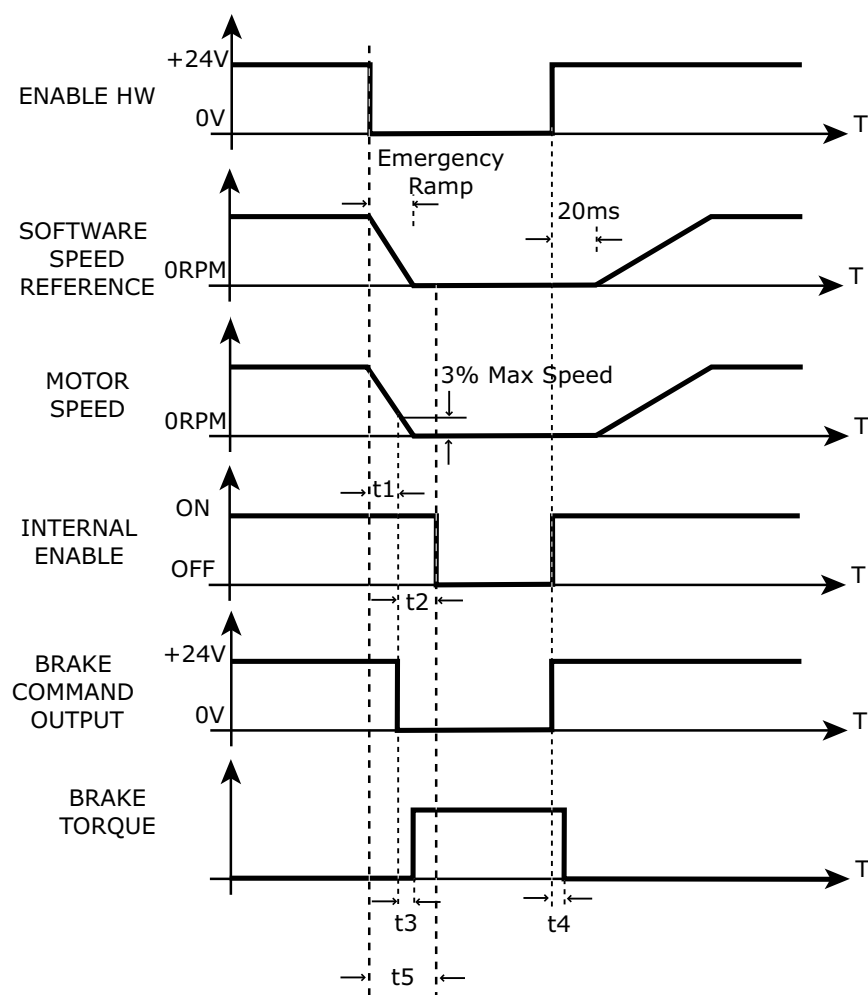
It works with these operative modes: "0: Analog Speed", "1: Digital Speed", "4: Position Mode", "7: Can Open", "10: Square Wave".

Execute these **settings**:

- 1) Select **With** on the **Holding Brake** box of the "**Motor**" window.
- 2) **Do not** select the "**Brake**" function in a programmable digital input.

The **behaviour of the system** is the following:

After the hardware disabling the speed reference becomes zero by using the emergency ramp set in the Speed window. When 3% of the max. speed is reached, or after a time equal to  $1,5 \times \text{Emer. Ramp}$ , the brake output is disabled (so the brake is blocked). During the dis-insertion phase of the brake, the internal speed reference can be supplied after about 20ms from the disabling of the brake output.



$t_1$  = max. deceleration time ( $1.5 \times \text{Emergency Ramp}$ ).

$t_2$  = internal software delay after the brake block (100ms)

$t_3, t_4$  = opening and closing times of the brake (they depend from the brake).

**$t_5$  = into this time the functioning of the system is controlled only by the drive, all external commands are ignored.**

**Note:** You can find more information about the behaviour of the system in presence of alarms on paragraph "7 Stop Functions".

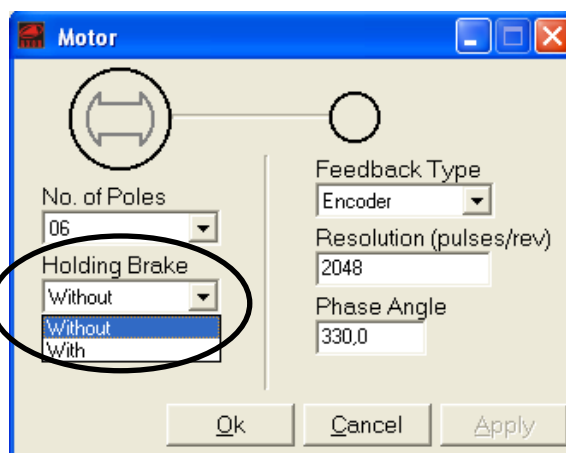
## 7 Stop Functions

In the following pages we illustrate the behaviour of the system in reference to these settings:

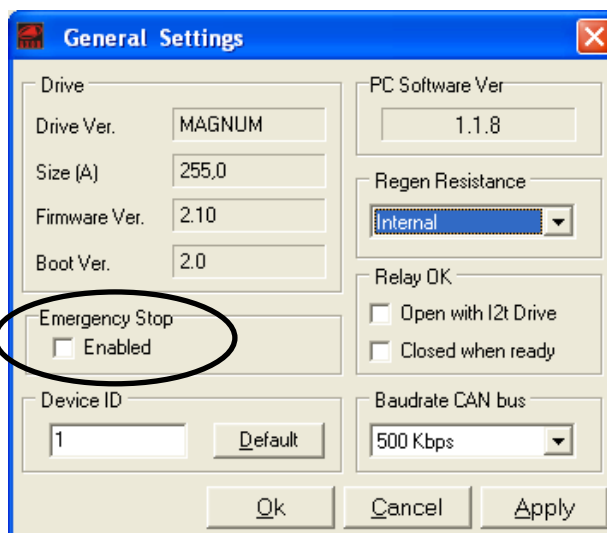
- ✓ automatic or manual management of the *stationary brake*;
- ✓ *emergency stop*.

We remember that:

- For the **manual management** of the brake it is necessary to set the "**With**" option in the "**Holding Brake**" box in the "**Motor**" window, then it is necessary to select the "**Brake**" function on one of the programmable digital inputs.
- For the **automatic management** of the brake it is only necessary to set the "**With**" option in the "**Holding Brake**" box in the "**Motor**" window (Attention: Do Not select the "**Brake**" function on one of the programmable digital inputs).
- For the **no management** of the brake it is necessary to set the "**Without**" option in the "**Holding Brake**" box in the "**Motor**" window.



- For the **emergency stop function** it is necessary to set the dedicated flag in the "**General Set**" window, and to set the "**Emer. Ramp**" parameter [in ms] in the "**Speed**" window.  
**ATTENTION: In the "7: CAN open" operative mode the "Emer. Ramp" parameter is set via CanBus.**



The **dangerous alarms**, which cause the immediately insertion of the brake, are the followings:

- AI2: Over Current;
- AI4: Hall;
- AI5: Encoder;
- AI9: Max/Min Voltage;
- AI12: Resolver;
- AI14: Following Error;
- AI17: Over Current Brake.

All others alarms stop the system by using the emergency ramp before the brake's insertion.

## 7 Stop Functions

This table illustrates all possible cases:

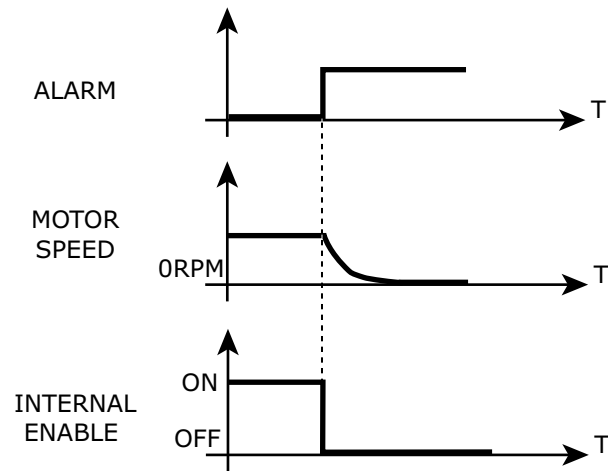
CASES	BRAKE MANAGEMENT	EMERGENCY STOP FUNCTION	BEHAVIOUR	
			DISABLING OR NOT DANGEROUS ALARM	DANGEROUS ALARM
1°	No brake management	Disable	The internal enable immediately disables, the motor remains free and will eventually stop due to the friction and inertia of the axis.	
2°	No brake management	Enable	The motor stops following an emergency ramp equal to the " <b>Emer. Ramp</b> " parameter set in the "Speed" window.	The internal enable immediately disables, the motor remains free and will eventually stop due to the friction and inertia of the axis.
3°	Automatic brake management	Enable or Disable	The motor stops following an emergency ramp equal to the " <b>Emer. Ramp</b> " parameter; when 3% of the max speed is reached the brake output is disabled, then after the motor stops, the internal enable disables.	The brake is immediately activated.
4°	Manual brake management	Disable	The internal enable disables, the motor remains free and will eventually stop due to the friction and inertia of the axis; after the motor stops it is possible to block the axis enabling the brake command. In particular conditions (for example: having a vertical axis), it is possible to immediately enable the brake without waiting the axis' stop ⇒ the motor will stop due to the friction. ATTENTION: THE TIME FOR BRAKE ENABLE IS DECIDED BY THE USER.	
5°	Manual brake management	Enable	The motor stops following the emergency ramp; after the motor stops it is possible to block the axis enabling the brake command.	The motor remains free and will eventually stop due to the friction and inertia of the axis; after the motor stops it is possible to block the axis enabling the brake command. In particular conditions (for example: having a vertical axis), it is possible to immediately enable the brake without waiting the axis' stop ⇒ the motor will stop due to the friction. ATTENTION: THE TIME FOR BRAKE ENABLE IS DECIDED BY THE USER.

**NOTA: McbNET Digital™ DOES NOT MANAGE BRAKE, SO IN PRESENCE OF A DISABLE OR AN ALARM IT FOLLOWS CASE 1° OR CASE 2° DEPENDENT ON EMERGENCY STOP FUNCTION SETTINGS.**

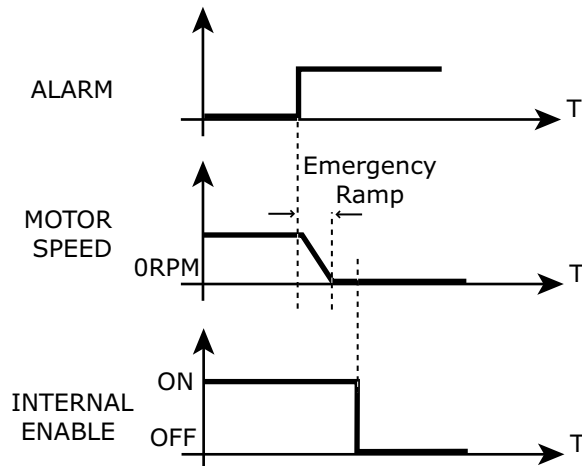


## 7 Stop Functions

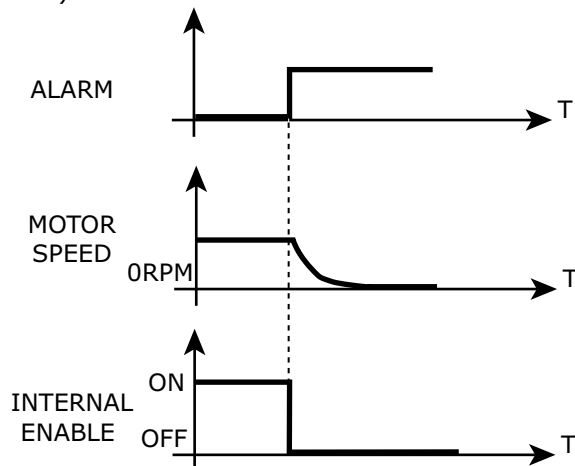
Case 1° (disable or alarm):



Case 2° (disable or not dangerous alarm):



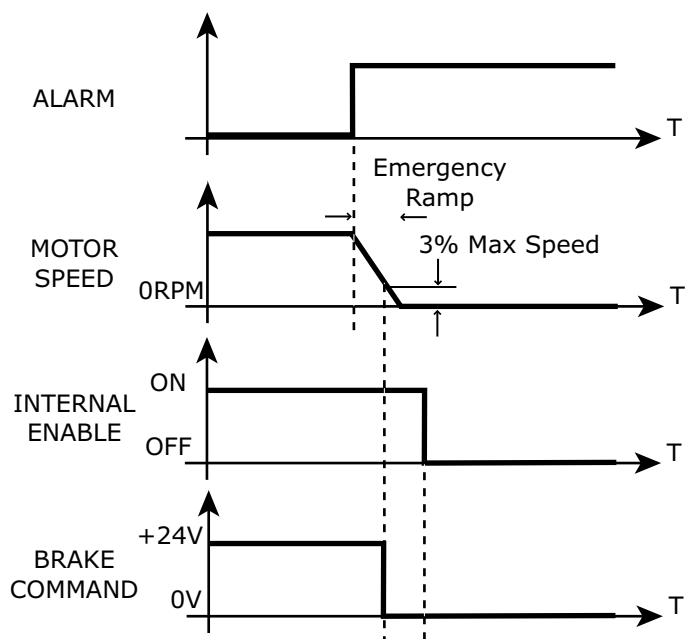
Case 2° (dangerous alarm):



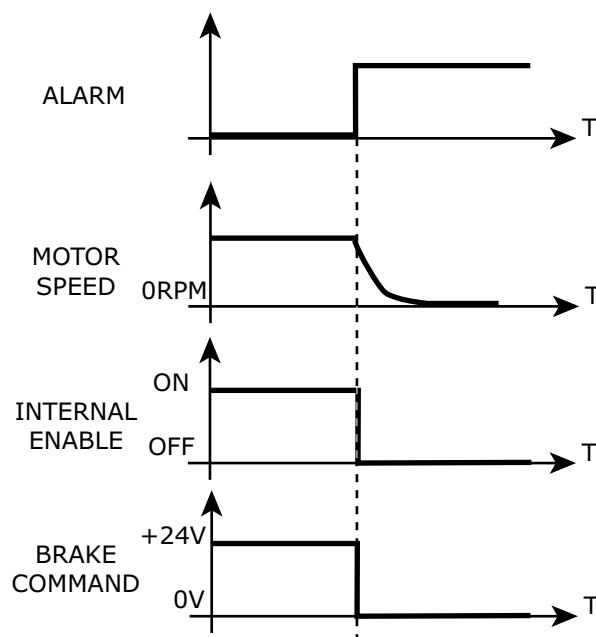


## 7 Stop Functions

Case 3° (disable or not dangerous alarm):

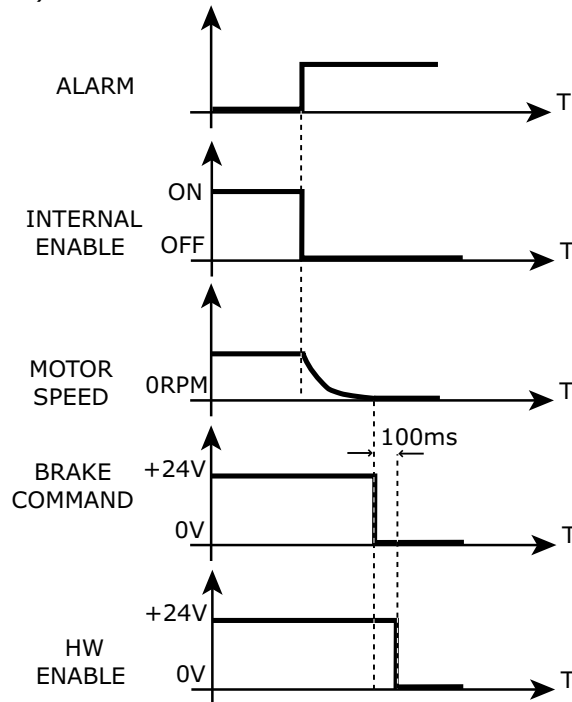


Case 3° (dangerous alarm):

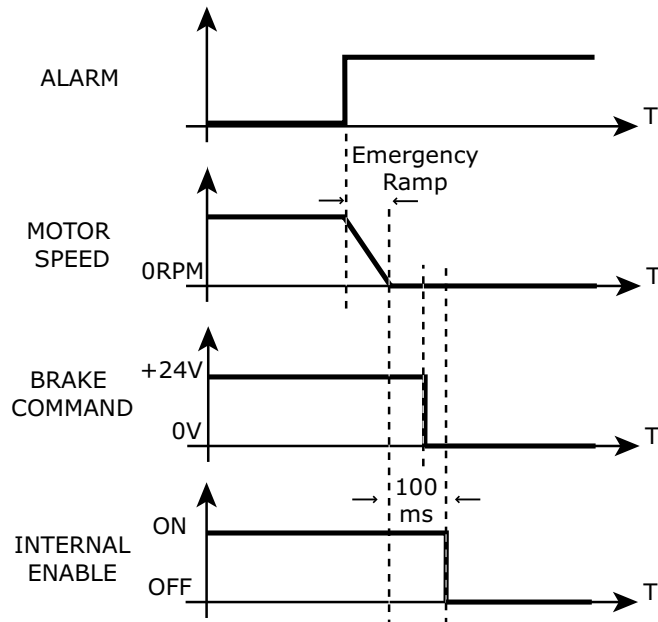


## 7 Stop Functions

Case 4° (disable or alarm):



Case 5° (disable or not dangerous alarm):







**AXOR INDUSTRIES®**

viale Stazione, 5  
36054 Montebello Vic.  
Vicenza - Italy

phone (+39) 0444 440441  
fax (+39) 0444 440418  
info@axorindustries.com

[www.axorindustries.com](http://www.axorindustries.com)

