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Alarms Manual

ver.1 rev.06/'07

Enclosures to Service Manuals of:

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

Summary

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

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THIS MANUAL IS EXCLUSIVELY ADDRESSED TO TECHNICAL PERSONNEL WITH AN APPROPRIATE TECHNICAL KNOWLEDGE ON SERVODRIVES.
BEFORE USING THIS MANUAL READ DRIVE'S SERVICE MANUAL AND ENCLOSURE "SPEEDER ONE INTERFACE".

1 Protections

Axor digital drives are equipped with a series of **protections** which safeguard both the drive and the motor in case of malfunctions.

There are three kinds of protection: **reversible**, **resettable** and **irreversible**.

Reversible protection intervention
It compares in presence of alarms which "reset itself" when the cause that has determined intervention is no longer present.
This causes the block of the drive. To restore the correct functioning it is necessary to:
1) disable the drive (using the "Disable" icon or the DGT-IN1 input);
2) eliminate the cause that has determined intervention;
3) enable the drive (using the "Enable" icon or the DGT-IN1 input).

Resettable protection intervention
It compares in presence of alarms which "can be reset" using the "Reset Fault" function.
This causes the block of the drive. To restore the correct functioning it is necessary to:
1) disable the drive (using the "Disable" icon or the DGT-IN1 input);
2) reset the alarm using the "Reset Fault" function;
3) enable the drive (using the "Enable" icon or the DGT-IN1 input).

Irreversible protection intervention
It compares in presence of alarms which "cannot be reset".
This causes the disabling of the drive. To restore the correct functioning it is necessary to:
1) Disconnect the power (main power supply and auxiliary power supply);
2) eliminate the cause of the block;
3) power again.
N.B. Before powering again wait a short while until the drive is securely switched off.

Note: In some cases (Alarm 6, Alarm 10, 24 UP) the drive is not disable and the control visualises ***only a message*** without change the system's functioning.

Eventual functioning errors are visualized on the drive's ***display***, besides they can be controlled by using ***Speeder One*** *interface*.

2 Error messages and protections

The table below illustrates all the message errors:

ALARM		SOLUTION	RESET
AL1	**EEPROM alarm** Error while memorising parameters to the drive's EEPROM or while reading parameters from Eeprom. This causes the opening of the Relè OK contact and the disabling of the functioning.	Disable the drive, try to memorise the parameter, then re-enable.	Reset itself
AL2	**Overcurrent alarm** Short circuit between U, V, W or toward earth. This causes the opening of the Relè OK contact and the disabling of the functioning.	Disconnect the power, verify the wiring, then power again.	Not resettable
AL3	**Drive Temperature alarm** Heat sink temperature too high, >75°C. This causes the opening of the Relè OK contact and the disabling of the functioning.	Disable the drive, verify: • the forced ventilation functioning, • the ambient temperature, wait until the radiator has cool off, reset the alarm then enable the drive.	Resettable
AL4	**Hall alarm** This alarm comes on if one or more of the hall cell's wires are disconnected. This causes the opening of the Relè OK contact and the disabling of the functioning.	Disable the drive, verify the cell's wire connection, reset the alarm, then enable the drive.	Resettable
AL5	**Encoder alarm** This alarm comes on if one or more of the encoder channels are interrupted. This causes the opening of the Relè OK contact and the disabling of the functioning.	Disable the drive, control the connections, reset the alarm, then enable the drive. If the alarm persists contact Axor.	Resettable
AL6	**I^2t Drive alarm** The internal I^2t function has reached the maximum permitted. The cause could be one of the following: • the working cycle could be too heavy; • a possible mechanical block; • a motor phases inversion; • the electronic brake is not unblocked; • the amplifier dynamic costants: "KP", "KI" and "KD", could create useless current oscillation. This does not cause the disabling of the functioning, but it is possible to open or not open the Relè OK contact.	*It is only a message.* The current is limited to the rated one, set in "Current" window.	Reset itself
AL7	**Motor Temperature alarm** Heat sink temperature too high. This causes the opening of the Relè Ok contact and the disabling of the functioning.	Disable the drive: • control the heat sink temperature; • decrease the dynamic constant if the motor is vibrating. This situation causes the current oscillation and consequently the overheating of the motor. Wait the motor has cool off, reset the alarm, then enable the drive.	Resettable

AL8	**Regenerative Resistance alarm** The value I^2t energy recovery has reached the maximum permitted. This causes the opening of the Relè Ok contact and the disabling of the functioning.	Disable the drive: • check the AC power supply input; • check that the working cycles are not excessive; • verify if the motor, going at half speed, shows the same problem. Reset the alarm, then enable the drive.	Resettable
AL9	**Min/Max Voltage alarm** Minimum or maximum converter voltage. This causes the opening of the Relè Ok contact and the disabling of the functioning.	Disable the drive, wait the DC power supply voltage reaches the correct threshold, check the AC power supply input, then enable the drive.	Reset itself
AL10	**Pre-Alarm Recovery alarm** 80% of the I^2t energy recovery has been reached. This does not cause the disabling of the functioning.	*It is only a message.* Check the AC power supply input and the working cycles. This is a visual alarm, it anticipates the intervention of the "Maximum recovery" alarm.	Reset itself
AL12	**Resolver alarm** Missing one or more resolver signals. This causes the opening of the Relè Ok contact and the disabling of the functioning.	Disable the drive, control the resolver's contact, reset the alarm, then enable the drive.	Not resettable
AL14	**Following Error** The error between the position reference and the position feedback exceeds the "Max Position Error" parameter, because of the "Max Position Error" parameter is too small, or the dynamic gains of the velocity-positioning loop are wrong. This causes the opening of the Relè Ok contact and the disabling of the functioning.	Disable the drive, check the Max Position Error parameter, check the dynamic gains, reset the alarm, then enable the drive.	Resettable
AL15	**Limit Switch** The two fixed limit switches have both been disabled or interrupted. This causes the opening of the Relè Ok contact and the disabling of the functioning.	Disable the drive, check the limit switches and external connections, then enable the drive.	Reset itself
AL17	**Overcurrent regen resistance circuit** Possible short-circuit in the regen resistance circuit. This causes the opening of the Relè OK contact and the disabling of the functioning.	Power off the drive, control the short-circuit, then power on the drive.	Not resettable
AL18	**Mechanical Brake** Overcurrent at the internal brake command or wrong connections. This causes the opening of the Relè Ok contact and the disabling of the functioning.	Disconnect the power: • control the external connections; • control the current absorption of the motor brake; • verify the settings of the "Holding Brake" parameter on the "Motor" window; then power again.	Not resettable

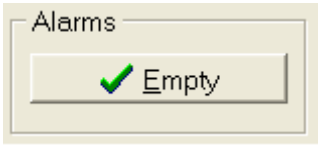
24 UP	**In-rush Bus** *This is not an alarm.* Indication of the drive's in-rush phase or the lack of the main supply.	*It is only a message.*	Reset itself
AL20	**Auxiliary Voltage** Presence of the main supply (L1, L2, L3), but the auxiliary +24Vdc voltage is missing. This causes the opening of the Relè Ok contact and the disabling of the functioning.	Disable the drive, then connect the Auxiliary Voltage and then re-enable.	Resettable
AL23	**Flash Alarm** Errors in reading/writing parameters on Flash, or Flash is empty. This causes the opening of the Relè Ok contact and the disabling of the functioning.	Disable the drive, save new values, then re-enable. If the problem persists contact Axor.	Reset itself
AL24	**Can Bus Alarm** Error during communication with CanOpen protocol. This causes the opening of the Relè Ok contact and the disabling of the functioning.	Disable the drive, check the cabling and re-enable. If the problem persists contact Axor.	Resettable via Can Master
AL26	**Homing Error** Position error too high during the homing procedure. The motor stops, but it is not disabled.	Check the homing setup, then reset the alarm using the "Start Homing" function.	Resettable with Start Homing function

If the provided solutions do not solve the alarm, contact Axor.

ATTENTION: McbNET Digital™ does not manage alarms AL17, AL18 and AL20.

3 Alarms window

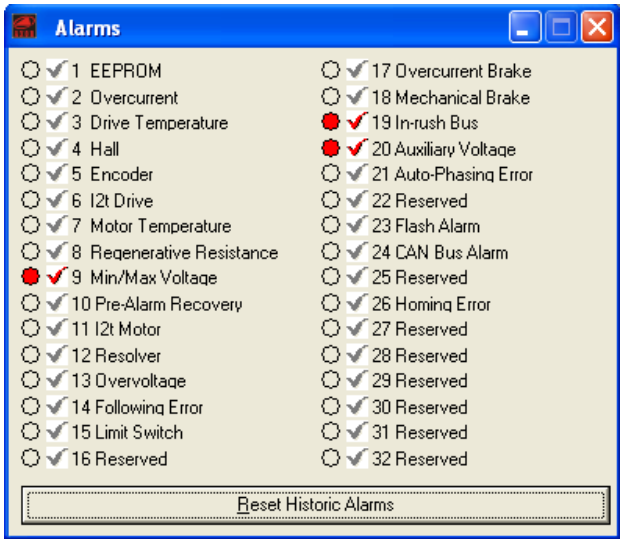
Speeder One *interface* allows you to control the history of the drive's alarms and the status of them, by openig "**Alarm**" window:



There are not active alarms

There are active alarms

Clicking on **Empty**/**Present** button "**Alarms**" window opens:



A red dot ● and the red symbol ✓ near the alarm name indicate that the alarm is currently on, while a red checkmark signifies that the alarm has been resolved.
It is possible to reset the **history** of the alarms by disabling and enabling the drive or clicking on "**Reset Historic Alarms**".

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);

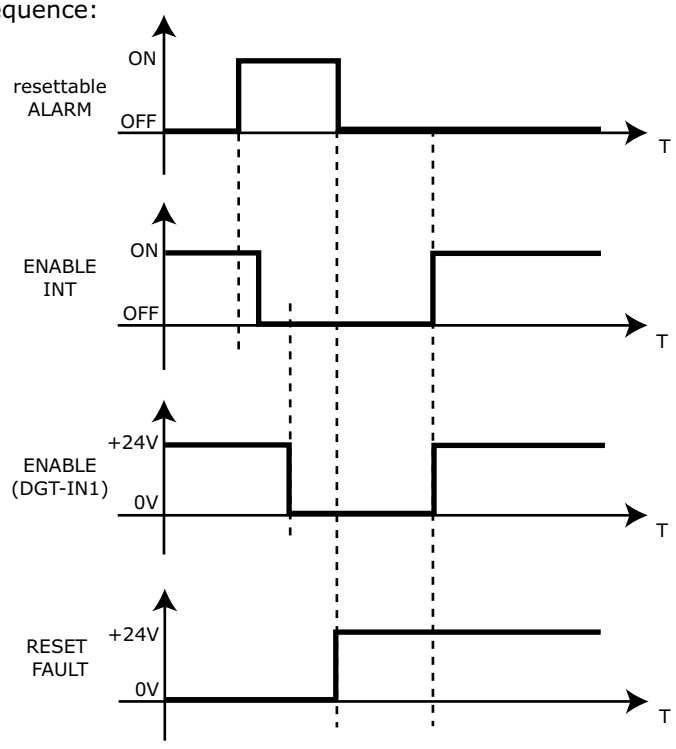
4) enable the drive (using the "**Enable**" icon and/or **DGT-IN1** input).

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" to show red.

Reset Fault function sequence:



5 Management via Modbus

Parameters: **Alarms HI** (address 51), **Alarms LO** (address 52), **Historic Alarms HI** (address 83), **Historic Alarms LO** (address 84), allows you to control *alarms currently on* and the *history of alarms* via ModBus.

The following table illustrate the meaning of each bit:

Alarms HI and Historic Alarms HI	
Bit	**Description**
0	Eeprom alarm
1	Overcurrent alarm
2	Drive temperature alarm
3	Hall alarm
4	Encoder alarm
5	I2t drive alarm
6	Motor temperature alarm
7	Regen resistance alarm
8	Min/Max voltage alarm
9	NA
10	NA
11	Resolver alarm
12	NA
13	Following error alarm
14	Limit switch alarm
15	NA
Alarms LO and Historic Alarms LO	
0	Overcurrent regen resistance alarm (only Magnum400 and MiniMagnum)
1	Holding brake alarm (only Magnum400 and MiniMagnum)
2	In-rush bus alarm (only Magnum400 and MiniMagnum)
3	Auxiliry voltage alarm (only Magnum400 and MiniMagnum)
4	NA
5	NA
6	Flash alarm
7	CanBus alarm
8	NA
9	Homing alarm
10	NA
11	NA
12	NA
13	NA
14	NA
15	NA

You can find more information about ModBus management on enclosure "**ModBus Manual**" available on the CD provided with the drive.

6 Stop due an alarm

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

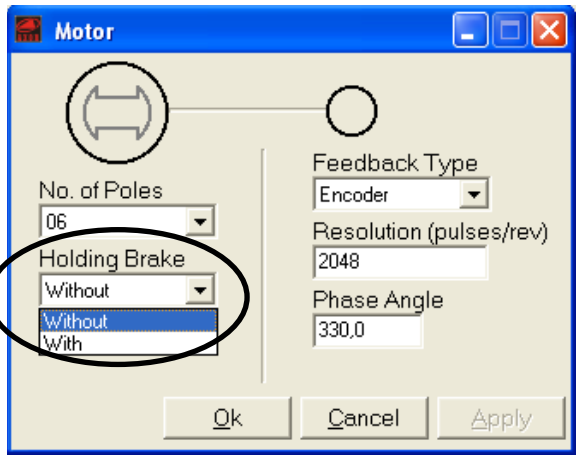
- automatic or manual management of the *stationary brake*;
- *emergency stop*.

We remember that:

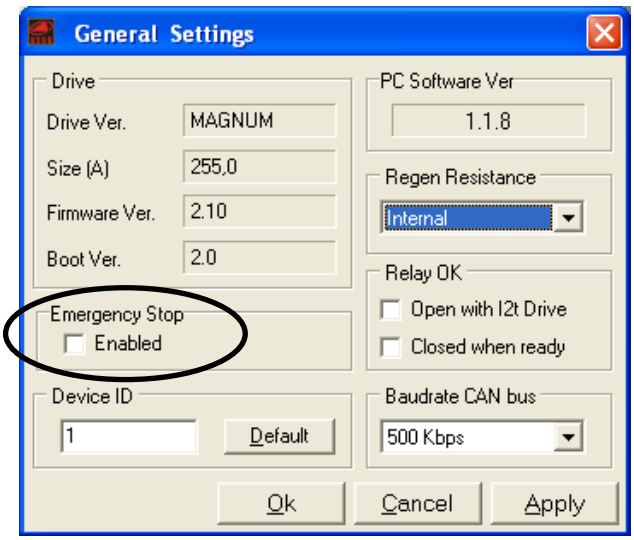
• For the ***manual management*** of the brake it is necessary to set the "**With**" option in the "**Holding Brake**" box in the "**Motor**" window, then it is necessary to select the "**Brake**" function on one of the programmable digital inputs.

• 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 by drive 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. **Note: In the operative mode "7:CAN open" 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.

This table illustrates all possible cases:

CASES	BRAKE MANAGEMENT	EMERGENCY STOP FUNCTION	BEHAVIOUR	
			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 "**Emer. Ramp**" 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 "**Emer. Ramp**" parameter set in the "**Speed**" window; 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.

NOTE: 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 SET IN THE "GENERAL SETTING" WINDOW.

Since **AXOR™ INDUSTRIES** MOTORS SERVO DRIVES *1988*

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