

## AS24150

### INTRODUCTION

Version of the manual including: adjustment table, diagnostics messages, electric wiring scheme, adjustment procedure.

### Adjustable parameters

The name of the software must be:

N°	Name	Units	Min	Max	Notes
1	Time of acceleration	sec	7	0	This is the time used to proceed from the minimum to the maximum tension on the motor.
2	Time of deceleration	sec	7	0	This is the time used to proceed from the maximum to the minimum tension on the motor.
3	Forward direction speed limit	%	0	100	This is the maximum tension applied to the motor (it becomes speed) when the forward direction is active.
4	Reverse direction speed limit	%	0	100	This is the maximum tension applied to the motor (it becomes speed) when the reverse direction is active.
5	Not used				
6	Not used				
7	Not used				
8	Electric brakerelease delay time	sec	0	6	The output (pin n°5) is switched off when the braking condition ends with a delay
9	Max Current I-Max		20	150	Max Current adjustment

## Diagnostic flashing code

The controller is provided with a diagnostic system able to identify the following cases of bad working:

n.° flash	Description	Solution
1	Forward and reverse input already active in the moment of ignition: the key of the vehicle is on with the forward and reverse input already connected;	It's necessary to leave the forward and reverse input to end the alarm. If that doesn't happen, it can be necessary to adjust again the acceleration system.
2	Discharged or under tension battery caused by a short-circuit on the power. It means that the tension read by the controller is inferior to the minimum provided for the correct working. It means also that the version of the controller is compatible with the installed battery . Otherwise it is necessary to replace the controller.	It is necessary to check the situation of the battery, if it is discharged, it's necessary to charge it. Otherwise verify the electrical connections, they can be not well fastened. If it's impossible to solve the problem it can be necessary to replace the controller.
3	Not used	
4	Not connected motor or false contact on the circuit. It happens for example when the motor brushes don't touch correctly on the armature or when the wires are not well fastened.	It is necessary to verify the connections, the functionality and the integrity of the motor.
5	Internal fault on the controller or ground on the motor.	It could be a dispersion at negative pole on the motor circuit; if not, it's necessary to verify the controller.
6	Fault of the potentiometer; it's displayed when the negative potentiometer is not present. This alarm means that the tension read by the controller is superior to that provided for the speed command. It happens for example if the connection at negative pole of the speed command is not present.	It is necessary to verify the connection and the integrity of the potentiometer.

n.° flash	Description	Solution
7	Too high temperature of the circuit ; it happens when the temperature of the mosfet is superior to 75°C+/-5°C, which means that the machine has worked in conditions of overloading for example on high slope for too long or at temperature superior to 40°C. It can also happen in case of damage at the motor winding that cause an abnormal current sinking.	It is necessary to wait until the temperature falls.
8	Motor already working at the start. The operator is trying to turn on the vehicle when it is already working.	First it is necessary to stop the vehicle and then the operator has to repeat the operation.
9	Software fault of the microprocessor or problem on the hardware. It happens in case of damage at the circuits of current and load measure.	The operator has to turn off and on the vehicle; if the fault remains, it is necessary to verify the controller.

**The damages and fault identified by the controller don't allow the closure and cause the opening of the line relay .The system goes in condition of security.**

## Table connections

J1: connector molex 12 poles for auxiliary connection

Number Pin	Function	Notes
1	Negative for logical signal	To use to supply the potentiometer.
2	Positive battery	Do not use, only for diagnostics.
3	Return key	Enable to turn on to the controller logic.
4	Copy of the key return	To use only for logical absorbment max 200mA
5	Command at negative electro brake	The diode is assembled inside.
6	Not used	
7	Forward direction input	N.O. active if closed at negative.
8	Reverse direction input	N.O. active if closed at negative.
9	Speed inversion input	N.C. at negative, active if left opened.
10	Speed command signal	On potentiometer or electrical accelerator signal. It has to be included in 0-2,4V
11	Positive potentiometer	Supplying for potentiometer. Do not use to supply electrical potentiometer. The output is internally provided by a resistor of 1K for protection. With a potentiometer of 5K the maximum tension is about 4V.

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## Technical data

Description	Data
<b>Electrical characteristics</b>	
Tensions of battery	24V (nominal)
Absolute tension limit	16 -32V
Maximum current for one hour (controller mounted on heat sink support and ambient temperature 20°C, natural convection)	60A
Maximum current limit (1 minute)	150A
Switching frequency	15KHz
Operative ambient temperature	-20/+40°C
Under tension limit	16V                      25V
Signal voltage on the motor with maximum duty 100%(@Imot= 40A)	23.4V@(24Vbatt,25°C)
<b>Mechanical characteristics</b>	
Weight	850 g
Power connections	4 bushes in aluminium with female insert M5

## **Description of function**

The direction is chosen with the AV and IND inputs. When they are connected, the controller makes a check to assure the existence of the operating conditions (integrity of the system, battery tension, temperature). After this check, the internal line relay is closed and the controller is ready to answer to the acceleration request defined with the potentiometer. The tension is applied to the motor with a speed ramp corresponding to the set acceleration time. The shorter the acceleration time, the quicker the tension applied to the motor will increase and so the torque applied to the load will be greater.

## **Braking**

The controller makes a regenerative braking when one of the following conditions happens:

1. Release of the forward and reverse command
2. Reduction of the acceleration request
3. Inversion of the forward and reverse command
4. Realisation of the speed limit

In these cases the motor tension is reduced gradually in relation to the ramp determined by the deceleration time. When the operator brakes with release of the forward and reverse command, it is possible to have a more intense braking using the shift function; with this parameter it is possible to set the starting torque of braking, the controller reduces the motor tension so that it goes in a working dominated by the current till the braking effect is soft and the time of deceleration returns to dominate. Setting low shift values, the effect of the changes of deceleration time can be hidden, so that in practical effect it can be difficult to identify the difference between a deceleration time and another one.

## **Current limit**

In traction, if the current required by the motor remains under the limit value, no limitation will be imposed to the motor tension; on the contrary the motor tension will be reduced until the current returns in its limits. The current limit is usually put at the nominal value dependent on the model, except for the case the controller temperature doesn't exceed 75°C: in this case the current is progressively reduced. The same thing happens in case of temperatures inferior to 0°C.

The same happens for the braking.

## **Security inversion limit**

This input, if active with the reverse command inserted, causes a quick stop of the vehicle and the re-starting in the opposite direction with the set speed with the corresponding setting.